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Preface

About NGINX

NGINX® ("engine x") is a high performance, high concurrency web server excelling at large scale content delivery, web acceleration and protecting application containers. Its precise integration with modern operating systems allows unprecedented levels of efficiency even when running on commodity hardware.

Nginx, Inc. develops and maintains NGINX open source distribution, and offers commercial support and professional services for NGINX.

About NGINX Plus

- Offers additional features on top of the free open source NGINX version.
- Prepared, tested and supported by NGINX core engineering team.

For more information

- Find more details about NGINX products and support at https://www.nginx.com/.
- For online NGINX documentation visit https://nginx.org/en/docs.
- NGINX and NGINX Plus Tutorial and Admin Guide is available here: https://www.nginx.com/resources/admin-guide/.
- For general inquiries, please use: nginx-inquiries@nginx.com
# Contents

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>2</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>3</td>
</tr>
</tbody>
</table>

## 1 Core modules
- 1.1 Core functionality ........................................ 6
- 1.2 Setting up hashes ............................................ 16
- 1.3 Connection processing methods ............................ 17
- 1.4 Logging to syslog ............................................ 18

## 2 HTTP server modules
- 2.1 Module ngx_http_core_module .................................. 19
- 2.2 Module ngx_http_access_module ................................ 59
- 2.3 Module ngx_http_addition_module ................................ 61
- 2.4 Module ngx_http_api_module .................................... 63
- 2.5 Module ngx_http_auth_basic_module ............................ 116
- 2.6 Module ngx_http_auth_jwt_module ................................ 118
- 2.7 Module ngx_http_auth_request_module .......................... 123
- 2.8 Module ngx_http_autoindex_module ............................. 125
- 2.9 Module ngx_http_browser_module ................................ 127
- 2.10 Module ngx_http_charset_module ................................ 129
- 2.11 Module ngx_http_dav_module ................................... 132
- 2.12 Module ngx_http_empty_gif_module ............................. 135
- 2.13 Module ngx_http_f4f_module ................................... 136
- 2.14 Module ngx_http_fastcgi_module ............................... 137
- 2.15 Module ngx_http_flv_module .................................... 158
- 2.16 Module ngx_http_geo_module .................................... 159
- 2.17 Module ngx_http_geoip_module .................................. 162
- 2.18 Module ngx_http_grpc_module ................................... 165
- 2.19 Module ngx_http_gunzip_module .................................. 174
- 2.20 Module ngx_http_gzip_module .................................... 175
- 2.21 Module ngx_http_gzip_static_module ............................ 179
- 2.22 Module ngx_http_headers_module ................................ 180
- 2.23 Module ngx_http_hls_module .................................... 183
- 2.24 Module ngx_http_image_filter_module .......................... 187
## 2.25 Module ngx_http_index_module

2.26 Module ngx_http_int ... _module

2.27 Module ngx_http_is_module

2.28 Module ngx_http_keyval_module

2.29 Module ngx_http_limit_conn_module

2.30 Module ngx_http_limit_req_module

2.31 Module ngx_http_log_module

2.32 Module ngx_http_map_module

2.33 Module ngx_http_memcached_module

2.34 Module ngx_http_mirror_module

2.35 Module ngx_http_mp4_module

2.36 Module ngx_http_perl_module

2.37 Module ngx_http_proxy_module

2.38 Module ngx_http_pro ... _module

2.39 Module ngx_http_random_index_module

2.40 Module ngx_http_realip_module

2.41 Module ngx_http_referer_module

2.42 Module ngx_http_rewrite_module

2.43 Module ngx_http_scgi_module

2.44 Module ngx_http_secure_link_module

2.45 Module ngx_http_session_log_module

2.46 Module ngx_http_slice_module

2.47 Module ngx_http_split_clients_module

2.48 Module ngx_http_ssl_module

2.49 Module ngx_http_ssi_module

2.50 Module ngx_http_status_module

2.51 Module ngx_http_stub_status_module

2.52 Module ngx_http_sub_module

2.53 Module ngx_http_upstream_module

2.54 Module ngx_http_upstream_conf_module

2.55 Module ngx_http_upstream_hc_module

2.56 Module ngx_http_userid_module

2.57 Module ngx_http_uwsgi_module

2.58 Module ngx_http_v2_module

2.59 Module ngx_http_v3_module

2.60 Module ngx_http_xslt_module

## 3 Stream server modules

3.1 Module ngx_stream_core_module

3.2 Module ngx_stream_access_module

3.3 Module ngx_stream_geo_module

3.4 Module ngx_stream_geoip_module

3.5 Module ngx_stream_js_module

3.6 Module ngx_stream_keyval_module

3.7 Module ngx_stream_limit_conn_module

3.8 Module ngx_stream_log_module
3.9 Module ngx_stream_map_module .......................... 433
3.10 Module ngx_stream_mqtt_filter_module ............... 436
3.11 Module ngx_stream_mqtt_preread_module .............. 438
3.12 Module ngx_stream_proxy_module ...................... 439
3.13 Module ngx_stream_p ... _module .................... 448
3.14 Module ngx_stream_realip_module .................... 449
3.15 Module ngx_stream_return_module ..................... 450
3.16 Module ngx_stream_set_module ........................ 451
3.17 Module ngx_stream_split_clients_module .............. 452
3.18 Module ngx_stream_ssl_module ........................ 453
3.19 Module ngx_stream_ssl_preread_module ............... 463
3.20 Module ngx_stream_upstream_module .................. 465
3.21 Module ngx_stream_upstream_hc_module ............... 473
3.22 Module ngx_stream_zone_sync_module ................ 477

4 Mail server modules 485
  4.1 Module ngx_mail_core_module .......................... 485
  4.2 Module ngx_mail_auth_http_module .................... 491
  4.3 Module ngx_mail_proxy_module ........................ 495
  4.4 Module ngx_mail_realip_module ........................ 497
  4.5 Module ngx_mail_ssl_module ........................... 498
  4.6 Module ngx_mail_imap_module ........................ 507
  4.7 Module ngx_mail_pop3_module .......................... 509
  4.8 Module ngx_mail_smtp_module .......................... 510

5 Miscellaneous 512
  5.1 Command-line parameters ............................. 512
  5.2 Module ngx_otel_module ............................... 514

A Changelog for NGINX Plus 518

B Legal Notices 530

Index 535
Chapter 1

Core modules

1.1 Core functionality

1.1.1 Example Configuration ........................................... 7
1.1.2 Directives .......................................................... 7
  accept_mutex ......................................................... 7
  accept_mutex_delay ................................................. 7
  daemon ............................................................... 7
  debug_connection ................................................... 8
  debug_points ......................................................... 8
  env ................................................................. 8
  error_log ............................................................. 9
  events ............................................................... 10
  include .............................................................. 10
  load_module ......................................................... 10
  lock_file ............................................................ 10
  master_process ..................................................... 11
  multi_accept ......................................................... 11
  pcre_jit ............................................................. 11
  pid ................................................................. 11
  ssl_engine .......................................................... 11
  thread_pool ........................................................ 12
  timer_resolution ................................................... 12
  use ................................................................. 12
  user ............................................................... 13
  worker_aio_requests ............................................... 13
  worker_connections ............................................... 13
  worker_cpu_affinity .............................................. 13
  worker_priority .................................................. 14
  worker_processes ............................................... 14
  worker_rlimit_core ............................................... 15
  worker_rlimit_nofile .............................................. 15
  worker_shutdown_timeout ........................................ 15
  working_directory ............................................... 15
1.1.1 Example Configuration

```
user www www;
worker_processes 2;
error_log /var/log/nginx-error.log info;

events {
    use kqueue;
    worker_connections 2048;
}
... 
```

1.1.2 Directives

**accept_mutex**

**Syntax:** `accept_mutex on | off;`

**Default** off

**Context:** events

If `accept_mutex` is enabled, worker processes will accept new connections by turn. Otherwise, all worker processes will be notified about new connections, and if volume of new connections is low, some of the worker processes may just waste system resources.

There is no need to enable `accept_mutex` on systems that support the `EPOLLEXCLUSIVE` flag (1.11.3) or when using `reuseport`.

Prior to version 1.11.3, the default value was on.

**accept_mutex_delay**

**Syntax:** `accept_mutex_delay time;`

**Default** 500ms

**Context:** events

If `accept_mutex` is enabled, specifies the maximum time during which a worker process will try to restart accepting new connections if another worker process is currently accepting new connections.

**daemon**

**Syntax:** `daemon on | off;`

**Default** on

**Context:** main

Determines whether nginx should become a daemon. Mainly used during development.
debug_connection

**Syntax:**  
\[\text{debug_connection} \text{ address} | \text{CIDR} | \text{unix;};\]

**Default** —

**Context:** events

Enables debugging log for selected client connections. Other connections will use logging level set by the `error_log` directive. Debugged connections are specified by IPv4 or IPv6 (1.3.0, 1.2.1) address or network. A connection may also be specified using a hostname. For connections using UNIX-domain sockets (1.3.0, 1.2.1), debugging log is enabled by the “unix:” parameter.

```bash
events {
    debug_connection 127.0.0.1;
    debug_connection localhost;
    debug_connection 192.0.2.0/24;
    debug_connection ::1;
    debug_connection 2001:0db8::/32;
    debug_connection unix:;
    ...
}
```

For this directive to work, nginx needs to be built with `--with-debug`, see “A debugging log”.

debug_points

**Syntax:**  
\[\text{debug_points} \text{ abort} | \text{stop};\]

**Default** —

**Context:** main

This directive is used for debugging. When internal error is detected, e.g. the leak of sockets on restart of working processes, enabling `debug_points` leads to a core file creation (abort) or to stopping of a process (stop) for further analysis using a system debugger.

eval

**Syntax:**  
\[\text{env} \text{ variable} [=\text{value}];\]

**Default** TZ

**Context:** main

By default, nginx removes all environment variables inherited from its parent process except the TZ variable. This directive allows preserving some of the inherited variables, changing their values, or creating new environment variables. These variables are then:

- inherited during a live upgrade of an executable file;
- used by the `ngx_http_perl_module` module;
core functionality. One should bear in mind that controlling system libraries in this way is not always possible as it is common for libraries to check variables only during initialization, well before they can be set using this directive. An exception from this is an above mentioned live upgrade of an executable file.

The TZ variable is always inherited and available to the ngx_http_perl-module module, unless it is configured explicitly.

Usage example:

```bash
env MALLOC_OPTIONS;
env PERL5LIB=/data/site/modules;
env OPENSSL_ALLOW_PROXY_CERTS=1;
```

The NGINX environment variable is used internally by nginx and should not be set directly by the user.

**error_log**

**Syntax:** `error_log` `file` `[level];`

**Default:** `logs/error.log` `error`

**Context:** main, http, mail, stream, server, location

Configures logging. Several logs can be specified on the same configuration level (1.5.2). If on the main configuration level writing a log to a file is not explicitly defined, the default file will be used.

The first parameter defines a `file` that will store the log.

The special value `stderr` selects the standard error file. Logging to syslog can be configured by specifying the “syslog:” prefix. Logging to a cyclic memory buffer can be configured by specifying the “memory:” prefix and buffer size, and is generally used for debugging (1.7.11).

The second parameter determines the `level` of logging, and can be one of the following: debug, info, notice, warn, error, crit, alert, or emerg. Log levels above are listed in the order of increasing severity. Setting a certain log level will cause all messages of the specified and more severe log levels to be logged. For example, the default level error will cause error, crit, alert, and emerg messages to be logged. If this parameter is omitted then error is used.

For debug logging to work, nginx needs to be built with `--with-debug`, see “A debugging log”.

The directive can be specified on the stream level starting from version 1.7.11, and on the mail level starting from version 1.9.0.
**events**

**Syntax:** \texttt{events \{ ... \}}

**Default** —

**Context:** main

Provides the configuration file context in which the directives that affect connection processing are specified.

**include**

**Syntax:** \texttt{include file | mask;}

**Default** —

**Context:** any

Includes another file, or files matching the specified mask, into configuration. Included files should consist of syntactically correct directives and blocks.

**Usage example:**

```plaintext
include mime.types;
include vhosts/*.conf;
```

**load_module**

**Syntax:** \texttt{load_module file;}

**Default** —

**Context:** main

This directive appeared in version 1.9.11.

Loads a dynamic module.

**Example:**

```plaintext
load_module modules/ngx_mail_module.so;
```

**lock_file**

**Syntax:** \texttt{lock_file file;}

**Default** \texttt{logs/nginx.lock}

**Context:** main

nginx uses the locking mechanism to implement \texttt{accept_mutex} and serialize access to shared memory. On most systems the locks are implemented using atomic operations, and this directive is ignored. On other systems the “lock file” mechanism is used. This directive specifies a prefix for the names of lock files.
master_process

Syntax: \texttt{master\_process on | off;}
Default: on
Context: main

Determines whether worker processes are started. This directive is intended for nginx developers.

multi_accept

Syntax: \texttt{multi\_accept on | off;}
Default: off
Context: events

If \texttt{multi\_accept} is disabled, a worker process will accept one new connection at a time. Otherwise, a worker process will accept all new connections at a time.

The directive is ignored if \texttt{kqueue} connection processing method is used, because it reports the number of new connections waiting to be accepted.

pcre_jit

Syntax: \texttt{pcre\_jit on | off;}
Default: off
Context: main

This directive appeared in version 1.1.12.

Enables or disables the use of “just-in-time compilation” (PCRE JIT) for the regular expressions known by the time of configuration parsing.

PCRE JIT can speed up processing of regular expressions significantly.

The JIT is available in PCRE libraries starting from version 8.20 built with the \texttt{--enable-jit} configuration parameter. When the PCRE library is built with nginx (\texttt{--with-pcre=}), the JIT support is enabled via the \texttt{--with-pcre-jit} configuration parameter.

pid

Syntax: \texttt{pid file;}
Default: logs/nginx.pid
Context: main

Defines a \texttt{file} that will store the process ID of the main process.

ssl_engine

Syntax: \texttt{ssl\_engine device;}
Default: --
Context: main
Defines the name of the hardware SSL accelerator.

**thread_pool**

**Syntax:** `thread_pool name threads=number [max_queue=number];`

**Default**: default threads=32 max_queue=65536

**Context**: main

This directive appeared in version 1.7.11.

Defines the *name* and parameters of a thread pool used for multi-threaded reading and sending of files *without blocking* worker processes.

The *threads* parameter defines the number of threads in the pool.

In the event that all threads in the pool are busy, a new task will wait in the queue. The *max_queue* parameter limits the number of tasks allowed to be waiting in the queue. By default, up to 65536 tasks can wait in the queue. When the queue overflows, the task is completed with an error.

**timer_resolution**

**Syntax:** `timer_resolution interval;`

**Default** —

**Context**: main

Reduces timer resolution in worker processes, thus reducing the number of `gettimeofday` system calls made. By default, `gettimeofday` is called each time a kernel event is received. With reduced resolution, `gettimeofday` is only called once per specified *interval*.

Example:

```
timer_resolution 100ms;
```

Internal implementation of the interval depends on the method used:

- the `EVFILT_TIMER` filter if `kqueue` is used;
- `timer_create` if `eventport` is used;
- `setitimer` otherwise.

**use**

**Syntax**: `use method;`

**Default** —

**Context**: events

Specifies the connection processing *method* to use. There is normally no need to specify it explicitly, because nginx will by default use the most efficient method.
user

Syntax:  \texttt{user user [group];}

Default:  nobody nobody

Context:  main

Defines \textit{user} and \textit{group} credentials used by worker processes. If \textit{group} is omitted, a group whose name equals that of \textit{user} is used.

worker\_aio\_requests

Syntax:  \texttt{worker\_aio\_requests number;}

Default:  32

Context:  events

This directive appeared in versions 1.1.4 and 1.0.7.

When using \texttt{aio} with the \texttt{epoll} connection processing method, sets the maximum \textit{number} of outstanding asynchronous I/O operations for a single worker process.

worker\_connections

Syntax:  \texttt{worker\_connections number;}

Default:  512

Context:  events

Sets the maximum number of simultaneous connections that can be opened by a worker process.

It should be kept in mind that this number includes all connections (e.g. connections with proxied servers, among others), not only connections with clients. Another consideration is that the actual number of simultaneous connections cannot exceed the current limit on the maximum number of open files, which can be changed by \texttt{worker\_rlimit\_nofile}.

worker\_cpu\_affinity

Syntax:  \texttt{worker\_cpu\_affinity cpumask \ldots ;}

Syntax:  \texttt{worker\_cpu\_affinity auto [cpumask];}

Default:  —

Context:  main

Binds worker processes to the sets of CPUs. Each CPU set is represented by a bitmask of allowed CPUs. There should be a separate set defined for each of the worker processes. By default, worker processes are not bound to any specific CPUs.

For example,

\begin{verbatim}
worker_processes 4;
worker_cpu_affinity 0001 0010 0100 1000;
\end{verbatim}

binds each worker process to a separate CPU, while
worker_processes 2;
worker_cpu_affinity 0101 1010;

binds the first worker process to CPU0/CPU2, and the second worker process to CPU1/CPU3. The second example is suitable for hyper-threading.

The special value auto (1.9.10) allows binding worker processes automatically to available CPUs:

worker_processes auto;
worker_cpu_affinity auto;

The optional mask parameter can be used to limit the CPUs available for automatic binding:

worker_cpu_affinity auto 01010101;

The directive is only available on FreeBSD and Linux.

**worker_priority**

**Syntax:** `worker_priority number;`

**Default:** 0

**Context:** main

Defines the scheduling priority for worker processes like it is done by the `nice` command: a negative `number` means higher priority. Allowed range normally varies from -20 to 20.

Example:

worker_priority -10;

**worker_processes**

**Syntax:** `worker_processes number | auto;`

**Default:** 1

**Context:** main

Defines the number of worker processes.

The optimal value depends on many factors including (but not limited to) the number of CPU cores, the number of hard disk drives that store data, and load pattern. When one is in doubt, setting it to the number of available CPU cores would be a good start (the value “auto” will try to autodetect it).

The auto parameter is supported starting from versions 1.3.8 and 1.2.5.
**worker_rlimit_core**

**Syntax:** `worker_rlimit_core size;`

**Default** —

**Context:** main

Changes the limit on the largest size of a core file (RLIMIT_CORE) for worker processes. Used to increase the limit without restarting the main process.

**worker_rlimit_nofile**

**Syntax:** `worker_rlimit_nofile number;`

**Default** —

**Context:** main

Changes the limit on the maximum number of open files (RLIMIT_NOFILE) for worker processes. Used to increase the limit without restarting the main process.

**worker_shutdown_timeout**

**Syntax:** `worker_shutdown_timeout time;`

**Default** —

**Context:** main

This directive appeared in version 1.11.11.

Configures a timeout for a graceful shutdown of worker processes. When the `time` expires, nginx will try to close all the connections currently open to facilitate shutdown.

**working_directory**

**Syntax:** `working_directory directory;`

**Default** —

**Context:** main

Defines the current working directory for a worker process. It is primarily used when writing a core-file, in which case a worker process should have write permission for the specified directory.
1.2 Setting up hashes

1.2.1 Overview

To quickly process static sets of data such as server names, map directive’s values, MIME types, names of request header strings, nginx uses hash tables. During the start and each re-configuration nginx selects the minimum possible sizes of hash tables such that the bucket size that stores keys with identical hash values does not exceed the configured parameter (hash bucket size). The size of a table is expressed in buckets. The adjustment is continued until the table size exceeds the hash max size parameter. Most hashes have the corresponding directives that allow changing these parameters, for example, for the server names hash they are server_names_hash_max_size and server_names_hash_bucket_size.

The hash bucket size parameter is aligned to the size that is a multiple of the processor’s cache line size. This speeds up key search in a hash on modern processors by reducing the number of memory accesses. If hash bucket size is equal to one processor’s cache line size then the number of memory accesses during the key search will be two in the worst case — first to compute the bucket address, and second during the key search inside the bucket. Therefore, if nginx emits the message requesting to increase either hash max size or hash bucket size then the first parameter should first be increased.
1.3 Connection processing methods

1.3.1 Overview

nginx supports a variety of connection processing methods. The availability of a particular method depends on the platform used. On platforms that support several methods nginx will normally select the most efficient method automatically. However, if needed, a connection processing method can be selected explicitly with the use directive.

The following connection processing methods are supported:

- **select** — standard method. The supporting module is built automatically on platforms that lack more efficient methods. The --with-select_module and --without-select_module configuration parameters can be used to forcibly enable or disable the build of this module.

- **poll** — standard method. The supporting module is built automatically on platforms that lack more efficient methods. The --with-poll_module and --without-poll_module configuration parameters can be used to forcibly enable or disable the build of this module.

- **kqueue** — efficient method used on FreeBSD 4.1+, OpenBSD 2.9+, NetBSD 2.0, and macOS.

- **epoll** — efficient method used on Linux 2.6+.

The EPOLLRDHUP (Linux 2.6.17, glibc 2.8) and EPOLLEXCLUSIVE (Linux 4.5, glibc 2.24) flags are supported since 1.11.3.

Some older distributions like SuSE 8.2 provide patches that add epoll support to 2.4 kernels.

- **/dev/poll** — efficient method used on Solaris 7 11/99+, HP/UX 11.22+ (eventport), IRIX 6.5.15+, and Tru64 UNIX 5.1A+.

- **eventport** — event ports, method used on Solaris 10+ (due to known issues, it is recommended using the /dev/poll method instead).
CHAPTER 1. CORE MODULES

1.4 Logging to syslog

1.4.1 Overview

The error_log and access_log directives support logging to syslog. The following parameters configure logging to syslog:

**server=address**
Defines the address of a syslog server. The address can be specified as a domain name or IP address, with an optional port, or as a UNIX-domain socket path specified after the “unix:” prefix. If port is not specified, the UDP port 514 is used. If a domain name resolves to several IP addresses, the first resolved address is used.

**facility=string**
Sets facility of syslog messages, as defined in RFC 3164. Facility can be one of “kern”, “user”, “mail”, “daemon”, “auth”, “intern”, “lpr”, “news”, “uucp”, “clock”, “authpriv”, “ftp”, “ntp”, “audit”, “alert”, “cron”, “local0”..“local7”. Default is “local7”.

**severity=string**
Sets severity of syslog messages for access_log, as defined in RFC 3164. Possible values are the same as for the second parameter (level) of the error_log directive. Default is “info”.

Severity of error messages is determined by nginx, thus the parameter is ignored in the error_log directive.

**tag=string**
Sets the tag of syslog messages. Default is “nginx”.

**nohostname**
Disables adding the “hostname” field into the syslog message header (1.9.7).

Example syslog configuration:

```plaintext
error_log syslog:server=192.168.1.1 debug;
access_log syslog:server=unix:/var/log/nginx.sock,nohostname;
access_log syslog:server=[2001:db8::1]:12345,facility=local7,tag=nginx,severity=info combined;
```

Logging to syslog is available since version 1.7.1. As part of our commercial subscription logging to syslog is available since version 1.5.3.
Chapter 2

HTTP server modules

2.1 Module ngx_http_core_module

2.1.1 Directives . . . . . . . . . . . . . . . . . . . . . . . . . . 21
absolute_redirect . . . . . . . . . . . . . . . . . . . . . . . 21
aio . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 21
aio_write . . . . . . . . . . . . . . . . . . . . . . . . . . 22
alias . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 22
auth_delay . . . . . . . . . . . . . . . . . . . . . . . . . 23
chunked_transfer_encoding . . . . . . . . . . . . . . . . . 23
client_body_buffer_size . . . . . . . . . . . . . . . . . . 24
client_body_in_file_only . . . . . . . . . . . . . . . . . . 24
client_body_in_single_buffer . . . . . . . . . . . . . . . . 24
client_body_temp_path . . . . . . . . . . . . . . . . . . . 24
client_body_timeout . . . . . . . . . . . . . . . . . . . . 25
client_header_buffer_size . . . . . . . . . . . . . . . . . . 25
client_header_timeout . . . . . . . . . . . . . . . . . . . 25
client_max_body_size . . . . . . . . . . . . . . . . . . . . 25
connection_pool_size . . . . . . . . . . . . . . . . . . . . 26
default_type . . . . . . . . . . . . . . . . . . . . . . . . . 26
directio . . . . . . . . . . . . . . . . . . . . . . . . . . . 26
directio_alignment . . . . . . . . . . . . . . . . . . . . . . 26
disable_symlinks . . . . . . . . . . . . . . . . . . . . . . . 27$error_page . . . . . . . . . . . . . . . . . . . . . . . . . . 28
etag . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 29
http . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 29
if_modified_since . . . . . . . . . . . . . . . . . . . . . . . 29
ignore_invalid_headers . . . . . . . . . . . . . . . . . . . 29
internal . . . . . . . . . . . . . . . . . . . . . . . . . . . 30
keepalive_disable . . . . . . . . . . . . . . . . . . . . . . 30
keepalive_requests . . . . . . . . . . . . . . . . . . . . . . 31
keepalive_time . . . . . . . . . . . . . . . . . . . . . . . . 31
keepalive_timeout . . . . . . . . . . . . . . . . . . . . . . 31
large_client_header_buffers . . . . . . . . . . . . . . . . 32
<table>
<thead>
<tr>
<th>Module</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>limit_except</td>
<td>32</td>
</tr>
<tr>
<td>limit_rate</td>
<td>32</td>
</tr>
<tr>
<td>limit_rate_after</td>
<td>33</td>
</tr>
<tr>
<td>lingering_close</td>
<td>33</td>
</tr>
<tr>
<td>lingering_time</td>
<td>34</td>
</tr>
<tr>
<td>lingering_timeout</td>
<td>34</td>
</tr>
<tr>
<td>listen</td>
<td>35</td>
</tr>
<tr>
<td>location</td>
<td>38</td>
</tr>
<tr>
<td>log_not_found</td>
<td>39</td>
</tr>
<tr>
<td>log_subrequest</td>
<td>40</td>
</tr>
<tr>
<td>max_ranges</td>
<td>40</td>
</tr>
<tr>
<td>merge_slashes</td>
<td>40</td>
</tr>
<tr>
<td>msie_padding</td>
<td>41</td>
</tr>
<tr>
<td>msie_refresh</td>
<td>41</td>
</tr>
<tr>
<td>open_file_cache</td>
<td>41</td>
</tr>
<tr>
<td>open_file_cache_errors</td>
<td>42</td>
</tr>
<tr>
<td>open_file_cache_min_uses</td>
<td>42</td>
</tr>
<tr>
<td>open_file_cache_valid</td>
<td>42</td>
</tr>
<tr>
<td>output_buffers</td>
<td>42</td>
</tr>
<tr>
<td>port_in_redirect</td>
<td>42</td>
</tr>
<tr>
<td>postpone_output</td>
<td>43</td>
</tr>
<tr>
<td>readAhead</td>
<td>43</td>
</tr>
<tr>
<td>recursive_error_pages</td>
<td>43</td>
</tr>
<tr>
<td>request_pool_size</td>
<td>43</td>
</tr>
<tr>
<td>reset_timedout_connection</td>
<td>43</td>
</tr>
<tr>
<td>resolver</td>
<td>44</td>
</tr>
<tr>
<td>resolver_timeout</td>
<td>45</td>
</tr>
<tr>
<td>root</td>
<td>45</td>
</tr>
<tr>
<td>satisfy</td>
<td>45</td>
</tr>
<tr>
<td>send_lowat</td>
<td>46</td>
</tr>
<tr>
<td>send_timeout</td>
<td>46</td>
</tr>
<tr>
<td>sendfile</td>
<td>46</td>
</tr>
<tr>
<td>sendfile_max_chunk</td>
<td>47</td>
</tr>
<tr>
<td>server</td>
<td>47</td>
</tr>
<tr>
<td>server_name</td>
<td>47</td>
</tr>
<tr>
<td>server_name_in_redirect</td>
<td>49</td>
</tr>
<tr>
<td>server_names_hash_bucket_size</td>
<td>49</td>
</tr>
<tr>
<td>server_names_hash_max_size</td>
<td>49</td>
</tr>
<tr>
<td>server_tokens</td>
<td>50</td>
</tr>
<tr>
<td>subrequest_output_buffer_size</td>
<td>50</td>
</tr>
<tr>
<td>tcp_nodelay</td>
<td>50</td>
</tr>
<tr>
<td>tcp_nopush</td>
<td>50</td>
</tr>
<tr>
<td>try_files</td>
<td>51</td>
</tr>
<tr>
<td>types</td>
<td>53</td>
</tr>
<tr>
<td>types_hash_bucket_size</td>
<td>53</td>
</tr>
<tr>
<td>types_hash_max_size</td>
<td>53</td>
</tr>
</tbody>
</table>
2.1.1 Directives

**absolute_redirect**

**Syntax:** `absolute_redirect on | off;`

**Default:** `on`

**Context:** `http, server, location`

This directive appeared in version 1.11.8.

If disabled, redirects issued by nginx will be relative.
See also `server_name_in_redirect` and `port_in_redirect` directives.

**aio**

**Syntax:** `aio on | off | threads[=pool];`

**Default:** `off`

**Context:** `http, server, location`

This directive appeared in version 0.8.11.

Enables or disables the use of asynchronous file I/O (AIO) on FreeBSD and Linux:

```
location /video/ {
  aio on;
  output_buffers 1 64k;
}
```

On FreeBSD, AIO can be used starting from FreeBSD 4.3. Prior to FreeBSD 11.0, AIO can either be linked statically into a kernel:

```
options VFS_AIO
```

or loaded dynamically as a kernel loadable module:

```
kldload aio
```

On Linux, AIO can be used starting from kernel version 2.6.22. Also, it is necessary to enable `directio`, or otherwise reading will be blocking:

```
location /video/ {
  aio on;
  directio 512;
  output_buffers 1 128k;
}
```

On Linux, `directio` can only be used for reading blocks that are aligned on 512-byte boundaries (or 4K for XFS). File’s unaligned end is read in blocking
mode. The same holds true for byte range requests and for FLV requests not from the beginning of a file: reading of unaligned data at the beginning and end of a file will be blocking.

When both AIO and sendfile are enabled on Linux, AIO is used for files that are larger than or equal to the size specified in the directio directive, while sendfile is used for files of smaller sizes or when directio is disabled.

```
location /video/ {
    sendfile on;
    aio on;
    directio 8m;
}
```

Finally, files can be read and sent using multi-threading (1.7.11), without blocking a worker process:

```
location /video/ {
    sendfile on;
    aio threads;
}
```

Read and send file operations are offloaded to threads of the specified pool. If the pool name is omitted, the pool with the name “default” is used. The pool name can also be set with variables:

```
aio threads=pool$disk;
```

By default, multi-threading is disabled, it should be enabled with the --with-threads configuration parameter. Currently, multi-threading is compatible only with the epoll, kqueue, and eventport methods. Multi-threaded sending of files is only supported on Linux.

See also the sendfile directive.

**aio_write**

**Syntax:**
```
aio_write on | off;
```

**Default:** off

**Context:** http, server, location

This directive appeared in version 1.9.13.

If aio is enabled, specifies whether it is used for writing files. Currently, this only works when using aio threads and is limited to writing temporary files with data received from proxied servers.

**alias**

**Syntax:**
```
alias path;
```

**Default:** —

**Context:** location

Defines a replacement for the specified location. For example, with the following configuration
location /i/ {
    alias /data/w3/images/;
}

on request of “/i/top.gif”, the file /data/w3/images/top.gif will be sent.

The path value can contain variables, except $document_root and $realpath_root.

If alias is used inside a location defined with a regular expression then such regular expression should contain captures and alias should refer to these captures (0.7.40), for example:

```nginx
location ~ ^/users/(.\+(?:gif|jpe?g|png))$ {
    alias /data/w3/images/$1;
}
```

When location matches the last part of the directive’s value:

```nginx
location /images/ {
    alias /data/w3/images/;
}
```

it is better to use the root directive instead:

```nginx
location /images/ {
    root /data/w3;
}
```

auth_delay

**Syntax:** auth_delay time;

**Default:** 0s

**Context:** http, server, location

This directive appeared in version 1.17.10.

Delays processing of unauthorized requests with 401 response code to prevent timing attacks when access is limited by password, by the result of subrequest, or by JWT.

chunked_transfer_encoding

**Syntax:** chunked_transfer_encoding on | off;

**Default:** on

**Context:** http, server, location

Allows disabling chunked transfer encoding in HTTP/1.1. It may come in handy when using a software failing to support chunked encoding despite the standard’s requirement.
client_body_buffer_size

Syntax:  \texttt{client\_body\_buffer\_size \texttt{size};}
Default:  8k|16k
Context:  http, server, location

Sets buffer size for reading client request body. In case the request body is larger than the buffer, the whole body or only its part is written to a temporary file. By default, buffer size is equal to two memory pages. This is 8K on x86, other 32-bit platforms, and x86-64. It is usually 16K on other 64-bit platforms.

client_body_in_file_only

Syntax:  \texttt{client\_body\_in\_file\_only \texttt{on | clean | off;}}
Default:  off
Context:  http, server, location

Determines whether nginx should save the entire client request body into a file. This directive can be used during debugging, or when using the $\texttt{request\_body\_file}$ variable, or the \texttt{\$r->request\_body\_file} method of the module \texttt{ngx\_http\_perl\_module}.

When set to the value \texttt{on}, temporary files are not removed after request processing.

The value \texttt{clean} will cause the temporary files left after request processing to be removed.

client_body_in_single_buffer

Syntax:  \texttt{client\_body\_in\_single\_buffer \texttt{on | off;}}
Default:  off
Context:  http, server, location

Determines whether nginx should save the entire client request body in a single buffer. The directive is recommended when using the $\texttt{request\_body}$ variable, to save the number of copy operations involved.

client_body_temp_path

Syntax:  \texttt{client\_body\_temp\_path \texttt{path [level1 [level2 [level3]]];}}
Default:  client_body_temp
Context:  http, server, location

Defines a directory for storing temporary files holding client request bodies. Up to three-level subdirectory hierarchy can be used under the specified directory. For example, in the following configuration

\begin{verbatim}
client_body_temp_path /spool/nginx/client_temp 1 2;
\end{verbatim}

a path to a temporary file might look like this:
client_body_timeout

Syntax: \texttt{client_body_timeout \textit{time};}

Default: 60s

Context: http, server, location

Defines a timeout for reading client request body. The timeout is set only for a period between two successive read operations, not for the transmission of the whole request body. If a client does not transmit anything within this time, the request is terminated with the 408 Request Time-out error.

client_header_buffer_size

Syntax: \texttt{client_header_buffer_size \textit{size};}

Default: 1k

Context: http, server

Sets buffer size for reading client request header. For most requests, a buffer of 1K bytes is enough. However, if a request includes long cookies, or comes from a WAP client, it may not fit into 1K. If a request line or a request header field does not fit into this buffer then larger buffers, configured by the \texttt{large_client_header_buffers} directive, are allocated.

If the directive is specified on the server level, the value from the default server can be used. Details are provided in the “Virtual server selection” section.

client_header_timeout

Syntax: \texttt{client_header_timeout \textit{time};}

Default: 60s

Context: http, server

Defines a timeout for reading client request header. If a client does not transmit the entire header within this time, the request is terminated with the 408 Request Time-out error.

client_max_body_size

Syntax: \texttt{client_max_body_size \textit{size};}

Default: 1m

Context: http, server, location

Sets the maximum allowed size of the client request body. If the size in a request exceeds the configured value, the 413 Request Entity Too Large error is returned to the client. Please be aware that browsers cannot
correctly display this error. Setting \texttt{size} to 0 disables checking of client request body size.

\textbf{connection\_pool\_size}

\begin{verbatim}
SYNTAX: connection_pool_size size;
DEFAULT 256|512
CONTEXT: http, server
\end{verbatim}

Allows accurate tuning of per-connection memory allocations. This directive has minimal impact on performance and should not generally be used. By default, the size is equal to 256 bytes on 32-bit platforms and 512 bytes on 64-bit platforms.

Prior to version 1.9.8, the default value was 256 on all platforms.

\textbf{default\_type}

\begin{verbatim}
SYNTAX: default_type mime-type;
DEFAULT text/plain
CONTEXT: http, server, location
\end{verbatim}

Defines the default MIME type of a response. Mapping of file name extensions to MIME types can be set with the \texttt{types} directive.

\textbf{directio}

\begin{verbatim}
SYNTAX: directio size | off;
DEFAULT off
CONTEXT: http, server, location
THIS DIRECTIVE APPEARED IN VERSION 0.7.7.
\end{verbatim}

Enables the use of the \texttt{O\_DIRECT} flag (FreeBSD, Linux), the \texttt{F\_NOCACHE} flag (macOS), or the \texttt{directio} function (Solaris), when reading files that are larger than or equal to the specified \texttt{size}. The directive automatically disables (0.7.15) the use of \texttt{sendfile} for a given request. It can be useful for serving large files:

\begin{verbatim}
directio 4m;
\end{verbatim}

or when using \texttt{aio} on Linux.

\textbf{directio\_alignment}

\begin{verbatim}
SYNTAX: directio_alignment size;
DEFAULT 512
CONTEXT: http, server, location
THIS DIRECTIVE APPEARED IN VERSION 0.8.11.
\end{verbatim}
Sets the alignment for `directio`. In most cases, a 512-byte alignment is enough. However, when using XFS under Linux, it needs to be increased to 4K.

**disable_symlinks**

**Syntax:** `disable_symlinks off;`

**Context:** http, server, location

Determines how symbolic links should be treated when opening files:

- **off**
  - Symbolic links in the pathname are allowed and not checked. This is the default behavior.

- **on**
  - If any component of the pathname is a symbolic link, access to a file is denied.

- **if_not_owner**
  - Access to a file is denied if any component of the pathname is a symbolic link, and the link and object that the link points to have different owners.

- **from=part**
  - When checking symbolic links (parameters `on` and `if_not_owner`), all components of the pathname are normally checked. Checking of symbolic links in the initial part of the pathname may be avoided by specifying additionally the `from=part` parameter. In this case, symbolic links are checked only from the pathname component that follows the specified initial part. If the value is not an initial part of the pathname checked, the whole pathname is checked as if this parameter was not specified at all. If the value matches the whole file name, symbolic links are not checked. The parameter value can contain variables.

**Example:**

```
disable_symlinks on from=$document_root;
```

This directive is only available on systems that have the `openat` and `fstatat` interfaces. Such systems include modern versions of FreeBSD, Linux, and Solaris.

Parameters `on` and `if_not_owner` add a processing overhead.

On systems that do not support opening of directories only for search, to use these parameters it is required that worker processes have read permissions for all directories being checked.
The `ngx_http_autoindex_module`, `ngx_http_random_index_module`, and `ngx_http_dav_module` modules currently ignore this directive.

**error_page**

**Syntax:**  
```
error_page code ...[=][response] uri;
```

**Default** —

**Context:** `http`, `server`, `location`, `if in location`

Defines the URI that will be shown for the specified errors. A `uri` value can contain variables.

**Example:**

```
error_page 404 /404.html;
error_page 500 502 503 504 /50x.html;
```

This causes an internal redirect to the specified `uri` with the client request method changed to “GET” (for all methods other than “GET” and “HEAD”).

Furthermore, it is possible to change the response code to another using the “`=`response” syntax, for example:

```
error_page 404 =200 /empty.gif;
```

If an error response is processed by a proxied server or a FastCGI/uwsgi/SCGI/gRPC server, and the server may return different response codes (e.g., 200, 302, 401 or 404), it is possible to respond with the code it returns:

```
error_page 404 = /404.php;
```

If there is no need to change URI and method during internal redirection it is possible to pass error processing into a named location:

```
location / {
    error_page 404 = @fallback;
}

location @fallback {
    proxy_pass http://backend;
}
```

If `uri` processing leads to an error, the status code of the last occurred error is returned to the client.

It is also possible to use URL redirects for error processing:

```
error_page 403 http://example.com/forbidden.html;
error_page 404 =301 http://example.com/notfound.html;
```

In this case, by default, the response code 302 is returned to the client. It can only be changed to one of the redirect status codes (301, 302, 303, 307, and 308).
The code 307 was not treated as a redirect until versions 1.1.16 and 1.0.13.

The code 308 was not treated as a redirect until version 1.13.0.

These directives are inherited from the previous configuration level if and only if there are no `error_page` directives defined on the current level.

**etag**

*SXNTAX:* `etag on | off;`

*Default:* `on`

*Context:* `http, server, location`

This directive appeared in version 1.3.3.

Enables or disables automatic generation of the ETag response header field for static resources.

**http**

*SXNTAX:* `http {...}

*Default* —

*Context:* `main`

Provides the configuration file context in which the HTTP server directives are specified.

**if_modified_since**

*SXNTAX:* `if_modified_since off | exact | before;`

*Default* `exact`

*Context:* `http, server, location`

This directive appeared in version 0.7.24.

Specifies how to compare modification time of a response with the time in the If-Modified-Since request header field:

- `off` — the response is always considered modified (0.7.34);
- `exact` — exact match;
- `before` — modification time of the response is less than or equal to the time in the If-Modified-Since request header field.

**ignore_invalid_headers**

*SXNTAX:* `ignore_invalid_headers on | off;`

*Default* `on`

*Context:* `http, server`
Controls whether header fields with invalid names should be ignored. Valid names are composed of English letters, digits, hyphens, and possibly underscores (as controlled by the underscores_in_headers directive).

If the directive is specified on the server level, the value from the default server can be used. Details are provided in the “Virtual server selection” section.

**internal**

**Syntax:** internal;
**Default:** —
**Context:** location

Specifies that a given location can only be used for internal requests. For external requests, the client error 404 Not Found is returned. Internal requests are the following:

- requests redirected by the error_page, index, internal_redirect, random_index, and try_files directives;
- requests redirected by the X-Accel-Redirect response header field from an upstream server;
- subrequests formed by the “include virtual” command of the ngx_http_ssi_module module, by the ngx_http_addition_module module directives, and by auth_request and mirror directives;
- requests changed by the rewrite directive.

Example:

```bash
error_page 404 /404.html;
location = /404.html {
    internal;
}
```

There is a limit of 10 internal redirects per request to prevent request processing cycles that can occur in incorrect configurations. If this limit is reached, the error 500 Internal Server Error is returned. In such cases, the “rewrite or internal redirection cycle” message can be seen in the error log.

**keepalive_disable**

**Syntax:** keepalive_disable none | browser ...;
**Default:** msie6
**Context:** http, server, location
Disables keep-alive connections with misbehaving browsers. The browser parameters specify which browsers will be affected. The value msie6 disables keep-alive connections with old versions of MSIE, once a POST request is received. The value safari disables keep-alive connections with Safari and Safari-like browsers on macOS and macOS-like operating systems. The value none enables keep-alive connections with all browsers.

Prior to version 1.1.18, the value safari matched all Safari and Safari-like browsers on all operating systems, and keep-alive connections with them were disabled by default.

**keepalive_requests**

**Syntax:** keepalive_requests number;

**Default:** 1000

**Context:** http, server, location

This directive appeared in version 0.8.0.

Sets the maximum number of requests that can be served through one keep-alive connection. After the maximum number of requests are made, the connection is closed.

Closing connections periodically is necessary to free per-connection memory allocations. Therefore, using too high maximum number of requests could result in excessive memory usage and not recommended.

Prior to version 1.19.10, the default value was 100.

**keepalive_time**

**Syntax:** keepalive_time time;

**Default:** 1h

**Context:** http, server, location

This directive appeared in version 1.19.10.

Limits the maximum time during which requests can be processed through one keep-alive connection. After this time is reached, the connection is closed following the subsequent request processing.

**keepalive_timeout**

**Syntax:** keepalive_timeout timeout [header_timeout];

**Default:** 75s

**Context:** http, server, location

The first parameter sets a timeout during which a keep-alive client connection will stay open on the server side. The zero value disables keep-alive client connections. The optional second parameter sets a value in the Keep-Alive: timeout=time response header field. Two parameters may differ.
The Keep-Alive: timeout=\textit{time} header field is recognized by Mozilla and Konqueror. MSIE closes keep-alive connections by itself in about 60 seconds.

\textbf{large\_client\_header\_buffers}

\begin{itemize}
  \item Syntax: \texttt{large\_client\_header\_buffers number size;}
  \item Default: 4 8k
  \item Context: http, server
\end{itemize}

Sets the maximum \textit{number} and \textit{size} of buffers used for reading large client request header. A request line cannot exceed the size of one buffer, or the 414 Request-URI Too Large error is returned to the client. A request header field cannot exceed the size of one buffer as well, or the 400 Bad Request error is returned to the client. Buffers are allocated only on demand. By default, the buffer size is equal to 8K bytes. If after the end of request processing a connection is transitioned into the keep-alive state, these buffers are released.

If the directive is specified on the server level, the value from the default server can be used. Details are provided in the “Virtual server selection” section.

\textbf{limit\_except}

\begin{itemize}
  \item Syntax: \texttt{limit\_except method \ldots\{\ldots\}}
  \item Default: —
  \item Context: location
\end{itemize}

Limits allowed HTTP methods inside a location. The \textit{method} parameter can be one of the following: GET, HEAD, POST, PUT, DELETE, MKCOL, COPY, MOVE, OPTIONS, PROPFIND, PROPPATCH, LOCK, UNLOCK, or PATCH. Allowing the GET method makes the HEAD method also allowed. Access to other methods can be limited using the \texttt{ngx\_http\_access\_module}, \texttt{ngx\_http\_auth\_basic\_module}, and \texttt{ngx\_http\_auth\_jwt\_module} (1.13.10) modules directives:

\begin{verbatim}
limit_except GET {
  allow 192.168.1.0/32;
  deny all;
}
\end{verbatim}

Please note that this will limit access to all methods except GET and HEAD.

\textbf{limit\_rate}

\begin{itemize}
  \item Syntax: \texttt{limit\_rate rate;}
  \item Default: 0
  \item Context: http, server, location, if in location
\end{itemize}
Limits the rate of response transmission to a client. The rate is specified
in bytes per second. The zero value disables rate limiting.

The limit is set per a request, and so if a client simultaneously opens two
connections, the overall rate will be twice as much as the specified limit.

Parameter value can contain variables (1.17.0). It may be useful in cases
where rate should be limited depending on a certain condition:

```
map $slow $rate {
    1  4k;
    2  8k;
}
limit_rate $rate;
```

Rate limit can also be set in the $limit_rate variable, however, since version
1.17.0, this method is not recommended:

```
server {
    if ($slow) {
        set $limit_rate 4k;
    }
    ...
}
```

Rate limit can also be set in the X-Accel-Limit-Rate header field
of a proxied server response. This capability can be disabled using the
proxy_ignore_headers, fastcgi_ignore_headers, uwsgi_ignore_headers, and scgi_ignore_headers directives.

**limit_rate_after**

**Syntax:** `limit_rate_after size;`

**Default:** 0

**Context:** http, server, location, if in location

This directive appeared in version 0.8.0.

Sets the initial amount after which the further transmission of a response
to a client will be rate limited. Parameter value can contain variables (1.17.0).

Example:

```
location /flv/ {
    flv;
    limit_rate_after 500k;
    limit_rate 50k;
}
```

**lingering_close**

**Syntax:** `lingering_close off | on | always;`

**Default:** on

**Context:** http, server, location
This directive appeared in versions 1.1.0 and 1.0.6.

Controls how nginx closes client connections.

The default value “on” instructs nginx to wait for and process additional data from a client before fully closing a connection, but only if heuristics suggests that a client may be sending more data.

The value “always” will cause nginx to unconditionally wait for and process additional client data.

The value “off” tells nginx to never wait for more data and close the connection immediately. This behavior breaks the protocol and should not be used under normal circumstances.

To control closing HTTP/2 connections, the directive must be specified on the server level (1.19.1).

**lingering_time**

Syntax:  

```
lingering_time time;
```

Default: 30s

Context: http, server, location

When `lingering_close` is in effect, this directive specifies the maximum time during which nginx will process (read and ignore) additional data coming from a client. After that, the connection will be closed, even if there will be more data.

**lingering_timeout**

Syntax:  

```
lingering_timeout time;
```

Default: 5s

Context: http, server, location

When `lingering_close` is in effect, this directive specifies the maximum waiting time for more client data to arrive. If data are not received during this time, the connection is closed. Otherwise, the data are read and ignored, and nginx starts waiting for more data again. The “wait-read-ignore” cycle is repeated, but no longer than specified by the `lingering_time` directive.
listen

**Syntax:**
```
listen address[:port] [default_server] [ssl] [http2 | quic]
[proxy_protocol] [setfib=number] [fastopen=number]
[backlog=number] [rcvbuf=size] [sndbuf=size]
[accept_filter=filter] [deferred] [bind] [ipv6only=on|off]
[reuseport] [so_keepalive=on|off] [keepidle]:[keepintvl]:[keepcnt];
```

**Syntax:**
```
listen port [default_server] [ssl] [http2 | quic]
[proxy_protocol] [setfib=number] [fastopen=number]
[backlog=number] [rcvbuf=size] [sndbuf=size]
[accept_filter=filter] [deferred] [bind] [ipv6only=on|off]
[reuseport] [so_keepalive=on|off] [keepidle]:[keepintvl]:[keepcnt];
```

**Syntax:**
```
listen unix:path [default_server] [ssl] [http2 | quic]
[proxy_protocol] [backlog=number] [rcvbuf=size] [sndbuf=size]
[accept_filter=filter] [deferred] [bind]
[so_keepalive=on|off] [keepidle]:[keepintvl]:[keepcnt];
```

**Default:** *:80 | *:8000

**Context:** server

Sets the address and port for IP, or the path for a UNIX-domain socket on which the server will accept requests. Both address and port, or only address or port can be specified. An address may also be a hostname, for example:

```
listen 127.0.0.1:8000;
listen 127.0.0.1;
listen 8000;
listen *:8000;
listen localhost:8000;
```

IPv6 addresses (0.7.36) are specified in square brackets:

```
listen [::]:8000;
listen [::];
```

UNIX-domain sockets (0.8.21) are specified with the “unix:” prefix:

```
listen unix:/var/run/nginx.sock;
```

If only address is given, the port 80 is used.

If the directive is not present then either *:80 is used if nginx runs with the superuser privileges, or *:8000 otherwise.

The default_server parameter, if present, will cause the server to become the default server for the specified address:port pair. If none of the directives have the default_server parameter then the first server with the address:port pair will be the default server for this pair.

In versions prior to 0.8.21 this parameter is named simply default.

The ssl parameter (0.7.14) allows specifying that all connections accepted on this port should work in SSL mode. This allows for a more compact configuration for the server that handles both HTTP and HTTPS requests.
The `http2` parameter (1.9.5) configures the port to accept HTTP/2 connections. Normally, for this to work the `ssl` parameter should be specified as well, but nginx can also be configured to accept HTTP/2 connections without SSL.

The parameter is deprecated, the `http2` directive should be used instead.

The `quic` parameter (1.25.0) configures the port to accept QUIC connections.

The `proxy_protocol` parameter (1.5.12) allows specifying that all connections accepted on this port should use the PROXY protocol.

The PROXY protocol version 2 is supported since version 1.13.11.

The `listen` directive can have several additional parameters specific to socket-related system calls. These parameters can be specified in any `listen` directive, but only once for a given `address:port` pair.

In versions prior to 0.8.21, they could only be specified in the `listen` directive together with the `default` parameter.

\[ \text{setfib}=\text{number} \]
this parameter (0.8.44) sets the associated routing table, FIB (the SO_SETFIB option) for the listening socket. This currently works only on FreeBSD.

\[ \text{fastopen}=\text{number} \]
enables "TCP Fast Open" for the listening socket (1.5.8) and limits the maximum length for the queue of connections that have not yet completed the three-way handshake.

Do not enable this feature unless the server can handle receiving the same SYN packet with data more than once.

\[ \text{backlog}=\text{number} \]
sets the `backlog` parameter in the `listen` call that limits the maximum length for the queue of pending connections. By default, `backlog` is set to -1 on FreeBSD, DragonFly BSD, and macOS, and to 511 on other platforms.

\[ \text{rcvbuf}=\text{size} \]
sets the receive buffer size (the SO_RCVBUF option) for the listening socket.

\[ \text{sndbuf}=\text{size} \]
sets the send buffer size (the SO_SNDBUF option) for the listening socket.

\[ \text{accept_filter}=\text{filter} \]
sets the name of accept filter (the SO_ACCEPTFILTER option) for the listening socket that filters incoming connections before passing them to accept. This works only on FreeBSD and NetBSD 5.0+. Possible values are `dataready` and `httpready`. 

Nginx, Inc. 

p.36 of 542
deferred
instructs to use a deferred accept (the TCP_DEFER_ACCEPT socket option) on Linux.

bind
instructs to make a separate bind call for a given address:port pair. This is useful because if there are several listen directives with the same port but different addresses, and one of the listen directives listens on all addresses for the given port (*:port), nginx will bind only to *:port. It should be noted that the getsockname system call will be made in this case to determine the address that accepted the connection. If the setfib, fastopen, backlog, rcvbuf, sndbuf, accept_filter, deferred, ipv6only, reuseport, or so_keepalive parameters are used then for a given address:port pair a separate bind call will always be made.

ipv6only=on|off
this parameter (0.7.42) determines (via the IPV6_V6ONLY socket option) whether an IPv6 socket listening on a wildcard address [:] will accept only IPv6 connections or both IPv6 and IPv4 connections. This parameter is turned on by default. It can only be set once on start.

Prior to version 1.3.4, if this parameter was omitted then the operating system’s settings were in effect for the socket.

reuseport
this parameter (1.9.1) instructs to create an individual listening socket for each worker process (using the SO_REUSEPORT socket option on Linux 3.9+ and DragonFly BSD, or SO_REUSEPORT_LB on FreeBSD 12+), allowing a kernel to distribute incoming connections between worker processes. This currently works only on Linux 3.9+, DragonFly BSD, and FreeBSD 12+ (1.15.1).

Inappropriate use of this option may have its security implications.

so_keepalive=on|off|[keepidle]:[keepintvl]:[keepcnt]
this parameter (1.1.11) configures the “TCP keepalive” behavior for the listening socket. If this parameter is omitted then the operating system’s settings will be in effect for the socket. If it is set to the value “on”, the SO_KEEPALIVE option is turned on for the socket. If it is set to the value “off”, the SO_KEEPALIVE option is turned off for the socket. Some operating systems support setting of TCP keepalive parameters on a per-socket basis using the TCP_KEEPIDLE, TCP_KEEPINTVL, and TCP_KEEPCNT socket options. On such systems (currently, Linux 2.4+, NetBSD 5+, and FreeBSD 9.0-STABLE), they can be configured using the keepidle, keepintvl, and keepcnt parameters. One or two parameters may be omitted, in which case the system default setting for the corresponding socket option will be in effect. For example,
so_keepalive=30m:10

will set the idle timeout (TCP_KEEPIDLE) to 30 minutes, leave the probe interval (TCP_KEEPINTVL) at its system default, and set the probes count (TCP_KEEPCNT) to 10 probes.

Example:

```
listen 127.0.0.1 default_server accept_filter=dataready backlog=1024;
```

### location

**Syntax:**

```
location [ = | ~ | ~* | ~* ] uri { ... }
```

**Syntax:**

```
location @name { ... }
```

**Default** —

**Context:** server, location

Sets configuration depending on a request URI.

The matching is performed against a normalized URI, after decoding the text encoded in the “%XX” form, resolving references to relative path components “.” and “..”, and possible compression of two or more adjacent slashes into a single slash.

A location can either be defined by a prefix string, or by a regular expression. Regular expressions are specified with the preceding “~*” modifier (for case-insensitive matching), or the “~” modifier (for case-sensitive matching). To find location matching a given request, nginx first checks locations defined using the prefix strings (prefix locations). Among them, the location with the longest matching prefix is selected and remembered. Then regular expressions are checked, in the order of their appearance in the configuration file. The search of regular expressions terminates on the first match, and the corresponding configuration is used. If no match with a regular expression is found then the configuration of the prefix location remembered earlier is used.

Location blocks can be nested, with some exceptions mentioned below.

For case-insensitive operating systems such as macOS and Cygwin, matching with prefix strings ignores a case (0.7.7). However, comparison is limited to one-byte locales.

Regular expressions can contain captures (0.7.40) that can later be used in other directives.

If the longest matching prefix location has the “~*” modifier then regular expressions are not checked.

Also, using the “=” modifier it is possible to define an exact match of URI and location. If an exact match is found, the search terminates. For example, if a “/” request happens frequently, defining “location = /” will speed up the processing of these requests, as search terminates right after the first comparison. Such a location cannot obviously contain nested locations.
In versions from 0.7.1 to 0.8.41, if a request matched the prefix location without the "=" and "^~" modifiers, the search also terminated and regular expressions were not checked.

Let’s illustrate the above by an example:

```nginx
location = / {  
  [ configuration A ]  
}
location / {  
  [ configuration B ]  
}
location /documents/ {  
  [ configuration C ]  
}
location ^~ /images/ {  
  [ configuration D ]  
}
location ~* \.\.(gif|jpg|jpeg)$ {  
  [ configuration E ]  
}
```

The "/" request will match configuration A, the "/index.html" request will match configuration B, the "/documents/document.html" request will match configuration C, the "/images/1.gif" request will match configuration D, and the "/documents/1.jpg" request will match configuration E.

The "@" prefix defines a named location. Such a location is not used for a regular request processing, but instead used for request redirection. They cannot be nested, and cannot contain nested locations.

If a location is defined by a prefix string that ends with the slash character, and requests are processed by one of `proxy_pass`, `fastcgi_pass`, `uwsgi_pass`, `scgi_pass`, `memcached_pass`, or `grpc_pass`, then the special processing is performed. In response to a request with URI equal to this string, but without the trailing slash, a permanent redirect with the code 301 will be returned to the requested URI with the slash appended. If this is not desired, an exact match of the URI and location could be defined like this:

```nginx
location /user/ {  
  proxy_pass http://user.example.com;  
}
location = /user {  
  proxy_pass http://login.example.com;  
}
```

### log_not_found

**Syntax:** `log_not_found` on | off;

**Default:** on

**Context:** http, server, location
Enables or disables logging of errors about not found files into `error_log`.

**log_subrequest**

**Syntax:** `log_subrequest on | off;`

**Default:** off

**Context:** http, server, location

Enables or disables logging of subrequests into `access_log`.

**max_ranges**

**Syntax:** `max_ranges number;`

**Default:** —

**Context:** http, server, location

This directive appeared in version 1.1.2.

Limits the maximum allowed number of ranges in byte-range requests. Requests that exceed the limit are processed as if there were no byte ranges specified. By default, the number of ranges is not limited. The zero value disables the byte-range support completely.

**merge_slashes**

**Syntax:** `merge_slashes on | off;`

**Default:** on

**Context:** http, server

Enables or disables compression of two or more adjacent slashes in a URI into a single slash.

Note that compression is essential for the correct matching of prefix string and regular expression locations. Without it, the “/scripts/one.php” request would not match

```
location /scripts/ {
  ...
}
```

and might be processed as a static file. So it gets converted to “/scripts/one.php”.

Turning the compression off can become necessary if a URI contains base64-encoded names, since base64 uses the “/” character internally. However, for security considerations, it is better to avoid turning the compression off.

If the directive is specified on the server level, the value from the default server can be used. Details are provided in the “Virtual server selection” section.
msie_padding

Syntax: `msie_padding on | off;`
Default: on
Context: http, server, location

Enables or disables adding comments to responses for MSIE clients with status greater than 400 to increase the response size to 512 bytes.

msie_refresh

Syntax: `msie_refresh on | off;`
Default: off
Context: http, server, location

Enables or disables issuing refreshes instead of redirects for MSIE clients.

open_file_cache

Syntax: `open_file_cache off;`
Syntax: `open_file_cache max=\(N\)[inactive=time];`
Default: off
Context: http, server, location

Configures a cache that can store:
- open file descriptors, their sizes and modification times;
- information on existence of directories;
- file lookup errors, such as "file not found", "no read permission", and so on.

Caching of errors should be enabled separately by the `open_file_cache-errors` directive.

The directive has the following parameters:

- `max` sets the maximum number of elements in the cache; on cache overflow the least recently used (LRU) elements are removed;
- `inactive` defines a time after which an element is removed from the cache if it has not been accessed during this time; by default, it is 60 seconds;
- `off` disables the cache.

Example:

```
open_file_cache max=1000 inactive=20s;
open_file_cache_valid 30s;
open_file_cache_min_uses 2;
open_file_cache_errors on;
```
open_file_cache_errors

Syntax:  open_file_cache_errors on | off;
Default  off
Context: http, server, location

Enables or disables caching of file lookup errors by open_file_cache.

open_file_cache_min_uses

Syntax:  open_file_cache_min_uses number;
Default  1
Context: http, server, location

Sets the minimum number of file accesses during the period configured by the inactive parameter of the open_file_cache directive, required for a file descriptor to remain open in the cache.

open_file_cache_valid

Syntax:  open_file_cache_valid time;
Default  60s
Context: http, server, location

Sets a time after which open_file_cache elements should be validated.

output_buffers

Syntax:  output_buffers number size;
Default  2 32k
Context: http, server, location

Sets the number and size of the buffers used for reading a response from a disk.

Prior to version 1.9.5, the default value was 1 32k.

port_in_redirect

Syntax:  port_in_redirect on | off;
Default  on
Context: http, server, location

Enables or disables specifying the port in absolute redirects issued by nginx. The use of the primary server name in redirects is controlled by the server_name_in_redirect directive.
postpone_output

Syntax:  \texttt{postpone_output \textit{size};}

Default  1460

Context: http, server, location

If possible, the transmission of client data will be postponed until nginx has at least \textit{size} bytes of data to send. The zero value disables postponing data transmission.

readAhead

Syntax:  \texttt{readAhead \textit{size};}

Default  0

Context: http, server, location

Sets the amount of pre-reading for the kernel when working with file.

On Linux, the \texttt{posix_fadvise(0, 0, 0, POSIX_FADV_SEQUENTIAL)} system call is used, and so the \textit{size} parameter is ignored.

On FreeBSD, the \texttt{fcntl(O_READAHEAD, size)} system call, supported since FreeBSD 9.0-CURRENT, is used. FreeBSD 7 has to be patched.

recursive_error_pages

Syntax:  \texttt{recursive_error_pages \texttt{on} | \texttt{off};}

Default  \texttt{off}

Context: http, server, location

Enables or disables doing several redirects using the \texttt{error_page} directive. The number of such redirects is limited.

request_pool_size

Syntax:  \texttt{request_pool_size \textit{size};}

Default  4k

Context: http, server

Allows accurate tuning of per-request memory allocations. This directive has minimal impact on performance and should not generally be used.

reset_timedout_connection

Syntax:  \texttt{reset_timedout_connection \texttt{on} | \texttt{off};}

Default  \texttt{off}

Context: http, server, location

Enables or disables resetting timed out connections and connections closed with the non-standard code 444 (1.15.2). The reset is performed as follows. Before closing a socket, the \texttt{SO_LINGER} option is set on it with a timeout value of 0. When the socket is closed, TCP RST is sent to the client, and
all memory occupied by this socket is released. This helps avoid keeping an
already closed socket with filled buffers in a FIN_WAIT1 state for a long time.

It should be noted that timed out keep-alive connections are closed
normally.

**resolver**

**Syntax:** resolver address ... [valid=time] [ipv4=on|off] [ipv6=on|off]
[status_zone=zone];

**Default** —

**Context:** http, server, location

Configures name servers used to resolve names of upstream servers into
addresses, for example:

```
resolver 127.0.0.1 [::1]:5353;
```

The address can be specified as a domain name or IP address, with an
optional port (1.3.1, 1.2.2). If port is not specified, the port 53 is used. Name
servers are queried in a round-robin fashion.

Before version 1.1.7, only a single name server could be configured.
Specifying name servers using IPv6 addresses is supported starting from
versions 1.3.1 and 1.2.2.

By default, nginx will look up both IPv4 and IPv6 addresses while resolving.
If looking up of IPv4 or IPv6 addresses is not desired, the ipv4=off (1.23.1)
or the ipv6=off parameter can be specified.

Resolving of names into IPv6 addresses is supported starting from version
1.5.8.

By default, nginx caches answers using the TTL value of a response. An
optional valid parameter allows overriding it:

```
resolver 127.0.0.1 [::1]:5353 valid=30s;
```

Before version 1.1.9, tuning of caching time was not possible, and nginx
always cached answers for the duration of 5 minutes.

To prevent DNS spoofing, it is recommended configuring DNS servers in
a properly secured trusted local network.

The optional status_zone parameter (1.17.1) enables collection of DNS
server statistics of requests and responses in the specified zone. The parameter
is available as part of our commercial subscription.
resolver_timeout

Syntax:  resolver_timeout time;
Default:  30s
Context:  http, server, location

Sets a timeout for name resolution, for example:

```
resolver_timeout 5s;
```

root

Syntax:  root path;
Default:  html
Context:  http, server, location, if in location

Sets the root directory for requests. For example, with the following configuration

```
location /i/ {
    root /data/w3;
}
```

The /data/w3/i/top.gif file will be sent in response to the “/i/top.gif” request.

The path value can contain variables, except $document_root and $realpath_root.

A path to the file is constructed by merely adding a URI to the value of the root directive. If a URI has to be modified, the alias directive should be used.

satisfy

Syntax:  satisfy all | any;
Default:  all
Context:  http, server, location

Allows access if all (all) or at least one (any) of the ngx_http_access_module, ngx_http_auth_basic_module, ngx_http_auth_request_module, or ngx_http_auth_jwt_module modules allow access.

Example:

```
location / {
    satisfy any;
    allow 192.168.1.0/32;
    deny all;
    auth_basic "closed site";
    auth_basic_user_file conf/htpasswd;
}
```
send_lowat

Syntax:  send_lowat size;
Default  0
Context: http, server, location

If the directive is set to a non-zero value, nginx will try to minimize the
number of send operations on client sockets by using either NOTE_LOWAT flag
of the kqueue method or the SO_SNDLOWAT socket option. In both cases the
specified size is used.

This directive is ignored on Linux, Solaris, and Windows.

send_timeout

Syntax:  send_timeout time;
Default  60s
Context: http, server, location

Sets a timeout for transmitting a response to the client. The timeout is set
only between two successive write operations, not for the transmission of the
whole response. If the client does not receive anything within this time, the
connection is closed.

sendfile

Syntax:  sendfile on | off;
Default  off
Context: http, server, location, if in location

Enables or disables the use of sendfile.
Starting from nginx 0.8.12 and FreeBSD 5.2.1, aio can be used to pre-load
data for sendfile:

```
location /video/ {
    sendfile  on;
    tcp_nopush on;
    aio      on;
}
```

In this configuration, sendfile is called with the SF_NODISKIO flag
which causes it not to block on disk I/O, but, instead, report back that the
data are not in memory. nginx then initiates an asynchronous data load by
reading one byte. On the first read, the FreeBSD kernel loads the first 128K
bytes of a file into memory, although next reads will only load data in 16K
chunks. This can be changed using the read_ahead directive.

Before version 1.7.11, pre-loading could be enabled with aio send-
file;.

Nginx, Inc.
sendfile_max_chunk

**Syntax:** `sendfile_max_chunk size;`

**Default:** 2m

**Context:** http, server, location

Limits the amount of data that can be transferred in a single sendfile call. Without the limit, one fast connection may seize the worker process entirely.

Prior to version 1.21.4, by default there was no limit.

server

**Syntax:** `server {...}

**Default:** —

**Context:** http

Sets configuration for a virtual server. There is no clear separation between IP-based (based on the IP address) and name-based (based on the Host request header field) virtual servers. Instead, the listen directives describe all addresses and ports that should accept connections for the server, and the server_name directive lists all server names. Example configurations are provided in the “How nginx processes a request” document.

server_name

**Syntax:** `server_name name ...;`

**Default:** ""

**Context:** server

Sets names of a virtual server, for example:

```nginx
server {
    server_name example.com www.example.com;
}
```

The first name becomes the primary server name.

Server names can include an asterisk (“*”) replacing the first or last part of a name:

```nginx
server {
    server_name example.com *.example.com www.example.*;
}
```

Such names are called wildcard names.

The first two of the names mentioned above can be combined in one:

```nginx
server {
    server_name .example.com;
}
```
It is also possible to use regular expressions in server names, preceding the name with a tilde ("~"): 

```plaintext
server {
    server_name www.example.com ~^www\d+.example\.com$;
}
```

Regular expressions can contain captures (0.7.40) that can later be used in other directives:

```plaintext
server {
    server_name ^\(www\.)?([^$]+)$;

    location / {
        root /sites/$2;
    }
}
server {
    server_name _;
    location / {
        root /sites/default;
    }
}
```

Named captures in regular expressions create variables (0.8.25) that can later be used in other directives:

```plaintext
server {
    server_name ^\(www\.)?\<domain\>[.]+$;

    location / {
        root /sites/$domain;
    }
}
server {
    server_name _;
    location / {
        root /sites/default;
    }
}
```

If the directive’s parameter is set to “$hostname” (0.9.4), the machine’s hostname is inserted.

It is also possible to specify an empty server name (0.7.11):

```plaintext
server {
    server_name www.example.com "";
}
```

It allows this server to process requests without the Host header field — instead of the default server — for the given address:port pair. This is the default setting.
Before 0.8.48, the machine’s hostname was used by default.

During searching for a virtual server by name, if the name matches more than one of the specified variants, (e.g. both a wildcard name and regular expression match), the first matching variant will be chosen, in the following order of priority:

1. the exact name
2. the longest wildcard name starting with an asterisk, e.g. “*.example.com”
3. the longest wildcard name ending with an asterisk, e.g. “mail.*”
4. the first matching regular expression (in order of appearance in the configuration file)

Detailed description of server names is provided in a separate Server names document.

server_name_in_redirect

**Syntax:** `server_name_in_redirect on | off;`

**Default:** off

**Context:** http, server, location

Enables or disables the use of the primary server name, specified by the `server_name` directive, in absolute redirects issued by nginx. When the use of the primary server name is disabled, the name from the Host request header field is used. If this field is not present, the IP address of the server is used.

The use of a port in redirects is controlled by the `port_in_redirect` directive.

server_names_hash_bucket_size

**Syntax:** `server_names_hash_bucket_size size;`

**Default:** 32|64|128

**Context:** http

Sets the bucket size for the server names hash tables. The default value depends on the size of the processor’s cache line. The details of setting up hash tables are provided in a separate document.

server_names_hash_max_size

**Syntax:** `server_names_hash_max_size size;`

**Default:** 512

**Context:** http

Sets the maximum size of the server names hash tables. The details of setting up hash tables are provided in a separate document.
server_tokens

**Syntax:**  `server_tokens on | off | build | string;`
**Default:** on
**Context:** http, server, location

Enables or disables emitting nginx version on error pages and in the Server response header field.

The `build` parameter (1.11.10) enables emitting a build name along with nginx version.

Additionally, as part of our commercial subscription, starting from version 1.9.13 the signature on error pages and the Server response header field value can be set explicitly using the `string` with variables. An empty string disables the emission of the Server field.

subrequest_output_buffer_size

**Syntax:**  `subrequest_buffer_size size;`
**Default:** 4k | 8k
**Context:** http, server, location

This directive appeared in version 1.13.10.

Sets the size of the buffer used for storing the response body of a subrequest. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform. It can be made smaller, however.

The directive is applicable only for subrequests with response bodies saved into memory. For example, such subrequests are created by SSI.

tcp_nodelay

**Syntax:**  `tcp_nodelay on | off;`
**Default:** on
**Context:** http, server, location

Enables or disables the use of the TCP_NODELAY option. The option is enabled when a connection is transitioned into the keep-alive state. Additionally, it is enabled on SSL connections, for unbuffered proxying, and for WebSocket proxying.

tcp_nopush

**Syntax:**  `tcp_nopush on | off;`
**Default:** off
**Context:** http, server, location

Enables or disables the use of the TCP_NOPUSH socket option on FreeBSD or the TCP_CORK socket option on Linux. The options are enabled only when `sendfile` is used. Enabling the option allows

• sending the response header and the beginning of a file in one packet, on Linux and FreeBSD 4.*;
• sending a file in full packets.

try_files

Syntax:  
try_files file ... uri;

Syntax:  
try_files file ... = code;

Default —

Context: server, location

Checks the existence of files in the specified order and uses the first found file for request processing; the processing is performed in the current context. The path to a file is constructed from the file parameter according to the root and alias directives. It is possible to check directory’s existence by specifying a slash at the end of a name, e.g. “$uri/”. If none of the files were found, an internal redirect to the uri specified in the last parameter is made. For example:

```plaintext
location /images/ {
    try_files $uri /images/default.gif;
}

location = /images/default.gif {
    expires 30s;
}
```

The last parameter can also point to a named location, as shown in examples below. Starting from version 0.7.51, the last parameter can also be a code:

```plaintext
location / {
    try_files $uri $uri/index.html $uri.html =404;
}
```

Example in proxying Mongrel:

```plaintext
location / {
    try_files /system/maintenance.html $uri $uri/index.html $uri.html @mongrel;
}

location @mongrel {
    proxy_pass http://mongrel;
}
```

Example for Drupal/FastCGI:

```plaintext
location / {
    try_files $uri @drupal;
}

location ~ \.php$ {
    try_files $uri @drupal;
    fastcgi_pass ...;
    fastcgi_param SCRIPT_FILENAME /path/to/fastcgi_script_name;
}
```
fastcgi_param SCRIPT_NAME $fastcgi_script_name;
fastcgi_param QUERY_STRING $args;

... other fastcgi_param’s
}
location @drupal {
  fastcgi_pass ...

  fastcgi_param SCRIPT_FILENAME /path/to/index.php;
fastcgi_param SCRIPT_NAME /index.php;
fastcgi_param QUERY_STRING q=$uri&$args;

  ... other fastcgi_param’s
}

In the following example,

location / {
  try_files $uri $uri/ @drupal;
}

the try_files directive is equivalent to

location / {
  error_page 404 = @drupal;
  log_not_found off;
}

And here,

location ~ \.php$ {
  try_files $uri @wordpress;

  fastcgi_pass ...

  fastcgi_param SCRIPT_FILENAME /path/to$fastcgi_script_name;

  ...
}

try_files checks the existence of the PHP file before passing the request to the FastCGI server.

Example for Wordpress and Joomla:

location / {
  try_files $uri $uri/ @wordpress;
}

location ~ \.php$ {
  try_files $uri @wordpress;

  fastcgi_pass ...

  fastcgi_param SCRIPT_FILENAME /path/to$fastcgi_script_name;

  ... other fastcgi_param’s
}

location @wordpress {
  fastcgi_pass ...

  fastcgi_param SCRIPT_FILENAME /path/to/index.php;

  ... other fastcgi_param’s
}
**types**

**Syntax:** `types { ... }`

**Default:** `text/html html; image/gif gif; image/jpeg jpg;`

**Context:** `http, server, location`

Maps file name extensions to MIME types of responses. Extensions are case-insensitive. Several extensions can be mapped to one type, for example:

```
types {
  application/octet-stream bin exe dll;
  application/octet-stream deb;
  application/octet-stream dmg;
}
```

A sufficiently full mapping table is distributed with nginx in the `conf/mime.types` file.

To make a particular location emit the “application/octet-stream” MIME type for all requests, the following configuration can be used:

```
location /download/ {
  types {
  }
  default_type application/octet-stream;
}
```

**types_hash_bucket_size**

**Syntax:** `types_hash_bucket_size size;`

**Default:** `64`

**Context:** `http, server, location`

Sets the bucket size for the types hash tables. The details of setting up hash tables are provided in a separate document.

Prior to version 1.5.13, the default value depended on the size of the processor’s cache line.

**types_hash_max_size**

**Syntax:** `types_hash_max_size size;`

**Default:** `1024`

**Context:** `http, server, location`

Sets the maximum size of the types hash tables. The details of setting up hash tables are provided in a separate document.
underscores_in_headers

Syntax: underscores_in_headers on | off;
Default off
Context: http, server

Enables or disables the use of underscores in client request header fields. When the use of underscores is disabled, request header fields whose names contain underscores are marked as invalid and become subject to the ignore_invalid_headers directive.

If the directive is specified on the server level, the value from the default server can be used. Details are provided in the “Virtual server selection” section.

variables_hash_bucket_size

Syntax: variables_hash_bucket_size size;
Default 64
Context: http

Sets the bucket size for the variables hash table. The details of setting up hash tables are provided in a separate document.

variables_hash_max_size

Syntax: variables_hash_max_size size;
Default 1024
Context: http

Sets the maximum size of the variables hash table. The details of setting up hash tables are provided in a separate document.

Prior to version 1.5.13, the default value was 512.

2.1.2 Embedded Variables

The ngx_http_core_module module supports embedded variables with names matching the Apache Server variables. First of all, these are variables representing client request header fields, such as $http_user_agent, $http_cookie, and so on. Also there are other variables:

$arg_name
argumet name in the request line
$args
arguments in the request line
$binary_remote_addr
client address in a binary form, value’s length is always 4 bytes for IPv4 addresses or 16 bytes for IPv6 addresses
$\text{body.bytes.sent}$
number of bytes sent to a client, not counting the response header; this variable is compatible with the "%B" parameter of the mod_log_config Apache module

$\text{bytes.sent}$
number of bytes sent to a client (1.3.8, 1.2.5)

$\text{connection}$
connection serial number (1.3.8, 1.2.5)

$\text{connection_requests}$
current number of requests made through a connection (1.3.8, 1.2.5)

$\text{connection_time}$
connection time in seconds with a milliseconds resolution (1.19.10)

$\text{content_length}$
Content-Length request header field

$\text{content_type}$
Content-Type request header field

$\text{cookie_name}$
the name cookie

$\text{document_root}$
root or alias directive’s value for the current request

$\text{document_uri}$
same as $\text{uri}$

$\text{host}$
in this order of precedence: host name from the request line, or host name from the Host request header field, or the server name matching a request

$\text{hostname}$
host name

$\text{http_name}$
arbitrary request header field; the last part of a variable name is the field name converted to lower case with dashes replaced by underscores

$\text{https}$
“on” if connection operates in SSL mode, or an empty string otherwise

$\text{is_args}$
“?” if a request line has arguments, or an empty string otherwise

$\text{limit_rate}$
setting this variable enables response rate limiting; see limit_rate

$\text{msec}$
current time in seconds with the milliseconds resolution (1.3.9, 1.2.6)

$\text{nginx_version}$
nginx version

$\text{pid}$
PID of the worker process

$\text{pipe}$
“p” if request was pipelined, “.” otherwise (1.3.12, 1.2.7)
$proxy_protocol_addr
client address from the PROXY protocol header (1.5.12)
The PROXY protocol must be previously enabled by setting the
proxy_protocol parameter in the listen directive.

$proxy_protocol_port
client port from the PROXY protocol header (1.11.0)
The PROXY protocol must be previously enabled by setting the
proxy_protocol parameter in the listen directive.

$proxy_protocol_server_addr
server address from the PROXY protocol header (1.17.6)
The PROXY protocol must be previously enabled by setting the
proxy_protocol parameter in the listen directive.

$proxy_protocol_server_port
server port from the PROXY protocol header (1.17.6)
The PROXY protocol must be previously enabled by setting the
proxy_protocol parameter in the listen directive.

$proxy_protocol_tlv_name
TLV from the PROXY Protocol header (1.23.2). The name can be a
TLV type name or its numeric value. In the latter case, the value is
hexadecimal and should be prefixed with 0x:

```
$proxy_protocol_tlv_alpn
$proxy_protocol_tlv_0x01
```

SSL TLVs can also be accessed by TLV type name or its numeric value,
both prefixed by ssl_:

```
$proxy_protocol_tlv_ssl_version
$proxy_protocol_tlv_ssl_0x21
```

The following TLV type names are supported:
- `alpn (0x01)` - upper layer protocol used over the connection
- `authority (0x02)` - host name value passed by the client
- `unique_id (0x05)` - unique connection id
- `netns (0x30)` - name of the namespace
- `ssl (0x20)` - binary SSL TLV structure

The following SSL TLV type names are supported:
- `ssl_version (0x21)` - SSL version used in client connection
- `ssl_cn (0x22)` - SSL certificate Common Name
- `ssl_cipher (0x23)` - name of the used cipher
- `ssl_sig_alg (0x24)` - algorithm used to sign the certificate
- `ssl_key_alg (0x25)` - public-key algorithm

Also, the following special SSL TLV type name is supported:
• `ssl_verify` - client SSL certificate verification result, 0 if the client presented a certificate and it was successfully verified, non-zero otherwise.

The PROXY protocol must be previously enabled by setting the `proxy_protocol` parameter in the `listen` directive.

```
$proxy_string
    same as $args
$realpath_root
    an absolute pathname corresponding to the root or alias directive’s value for the current request, with all symbolic links resolved to real paths
$remote_addr
    client address
$remote_port
    client port
$remote_user
    user name supplied with the Basic authentication
$request
    full original request line
$request_body
    request body
    The variable’s value is made available in locations processed by the `proxy_pass`, `fastcgi_pass`, `uwsgi_pass`, and `scgi_pass` directives when the request body was read to a memory buffer.
$request_body_file
    name of a temporary file with the request body
    At the end of processing, the file needs to be removed. To always write the request body to a file, `client_body_in_file_only` needs to be enabled. When the name of a temporary file is passed in a proxied request or in a request to a FastCGI/uwsgi/SCGI server, passing the request body should be disabled by the `proxy_pass_request_body off`, `fastcgi_pass_request_body off`, `uwsgi_pass_request_body off`, or `scgi_pass_request_body off` directives, respectively.
$request_completion
    “OK” if a request has completed, or an empty string otherwise
$request_filename
    file path for the current request, based on the root or alias directives, and the request URI
$request_id
    unique request identifier generated from 16 random bytes, in hexadecimal (1.11.0)
$request_length
    request length (including request line, header, and request body) (1.3.12, 1.2.7)
$request_method
    request method, usually “GET” or “POST”
\$\text{request\_time} \\
\text{request processing time in seconds with a milliseconds resolution (1.3.9, 1.2.6); time elapsed since the first bytes were read from the client}

\$\text{request\_uri} \\
\text{full original request URI (with arguments)}

\$\text{scheme} \\
\text{request scheme, “http” or “https”}

\$\text{sent\_http\_name} \\
\text{arbitrary response header field; the last part of a variable name is the field name converted to lower case with dashes replaced by underscores}

\$\text{sent\_trailer\_name} \\
\text{arbitrary field sent at the end of the response (1.13.2); the last part of a variable name is the field name converted to lower case with dashes replaced by underscores}

\$\text{server\_addr} \\
\text{an address of the server which accepted a request}
\text{Computing a value of this variable usually requires one system call. To avoid a system call, the listen directives must specify addresses and use the bind parameter.}

\$\text{server\_name} \\
\text{name of the server which accepted a request}

\$\text{server\_port} \\
\text{port of the server which accepted a request}

\$\text{server\_protocol} \\
\text{request protocol, usually “HTTP/1.0”, “HTTP/1.1”, “HTTP/2.0”, or “HTTP/3.0”}

\$\text{status} \\
\text{response status (1.3.2, 1.2.2)}

\$\text{tcpinfo\_rtt}, \$\text{tcpinfo\_rttvar}, \$\text{tcpinfo\_snd\_cwnd}, \$\text{tcpinfo\_rcv\_space} \\
\text{information about the client TCP connection; available on systems that support the TCP_INFO socket option}

\$\text{time\_iso8601} \\
\text{local time in the ISO 8601 standard format (1.3.12, 1.2.7)}

\$\text{time\_local} \\
\text{local time in the Common Log Format (1.3.12, 1.2.7)}

\$\text{uri} \\
\text{current URI in request, normalized}
\text{The value of $uri$ may change during request processing, e.g. when doing internal redirects, or when using index files.}
2.2 Module ngx_http_access_module

2.2.1 Summary

The ngx_http_access_module module allows limiting access to certain client addresses.

Access can also be limited by password, by the result of subrequest, or by JWT. Simultaneous limitation of access by address and by password is controlled by the satisfy directive.

2.2.2 Example Configuration

```
location / {
    deny 192.168.1.1;
    allow 192.168.1.0/24;
    allow 10.1.1.0/16;
    allow 2001:0db8::/32;
    deny all;
}
```

The rules are checked in sequence until the first match is found. In this example, access is allowed only for IPv4 networks 10.1.1.0/16 and 192.168.1.0/24 excluding the address 192.168.1.1, and for IPv6 network 2001:0db8::/32. In case of a lot of rules, the use of the ngx_http_geo_module module variables is preferable.

2.2.3 Directives

allow

**Syntax:** `allow address | CIDR | unix: | all;`

**Default** —

**Context:** http, server, location, limit_except

Allows access for the specified network or address. If the special value `unix:` is specified (1.5.1), allows access for all UNIX-domain sockets.

deny

**Syntax:** `deny address | CIDR | unix: | all;`

**Default** —

**Context:** http, server, location, limit_except
Denies access for the specified network or address. If the special value `unix:` is specified (1.5.1), denies access for all UNIX-domain sockets.
2.3 Module ngx_http_addition_module

2.3.1 Summary

The ngx_http_addition_module module is a filter that adds text before and after a response. This module is not built by default, it should be enabled with the --with-http_addition_module configuration parameter.

2.3.2 Example Configuration

```
location / {
    add_before_body /before_action;
    add_after_body  /after_action;
}
```

2.3.3 Directives

add_before_body

**Syntax:** `add_before_body uri;`

**Default:** —

**Context:** http, server, location

 Adds the text returned as a result of processing a given subrequest before the response body. An empty string (""") as a parameter cancels addition inherited from the previous configuration level.

add_after_body

**Syntax:** `add_after_body uri;`

**Default:** —

**Context:** http, server, location

 Adds the text returned as a result of processing a given subrequest after the response body. An empty string (""") as a parameter cancels addition inherited from the previous configuration level.
addition_types

**Syntax:**  
addition_types mime-type...;

**Default:**  
text/html

**Context:**  
http, server, location

This directive appeared in version 0.7.9.

Allows adding text in responses with the specified MIME types, in addition to “text/html”. The special value “*” matches any MIME type (0.8.29).
2.4 Module ngx_http_api_module

2.4.1 Summary
The ngx_http_api_module module (1.13.3) provides REST API for accessing various status information, configuring upstream server groups on-the-fly, and managing key-value pairs without the need of reconfiguring nginx.

The module supersedes the ngx_http_status_module and ngx_http-upstream_conf_module modules.

When using the PATCH or POST methods, make sure that the payload does not exceed the buffer size for reading the client request body, otherwise, the 413 Request Entity Too Large error may be returned.

This module is available as part of our commercial subscription.

2.4.2 Example Configuration

```nginx
http {
    upstream backend {
        zone http_backend 64k;
        server backend1.example.com weight=5;
        server backend2.example.com;
    }
    proxy_cache_path /data/nginx/cache_backend keys_zone=cache_backend:10m;
    server {
        server_name backend.example.com;
        location / {
            proxy_pass http://backend;
            proxy_cache cache_backend;
            health_check;
        }
        status_zone server_backend;
    }
    keyval_zone zone=one:32k state=one.keyval;
    keyval $arg_text $text zone=one;
}
```
server {
    listen 127.0.0.1;

    location /api {
        api write=on;
        allow 127.0.0.1;
        deny all;
    }
}

stream {

    upstream backend {
        zone stream_backend 64k;

        server backend1.example.com:12345 weight=5;
        server backend2.example.com:12345;
    }

    server {
        listen 127.0.0.1:12345;
        proxy_pass backend;
        status_zone server_backend;
        health_check;
    }
}

All API requests include a supported API version in the URI. Examples of API requests with this configuration:

http://127.0.0.1/api/9/
http://127.0.0.1/api/9/nginx
http://127.0.0.1/api/9/connections
http://127.0.0.1/api/9/workers
http://127.0.0.1/api/9/http/requests
http://127.0.0.1/api/9/http/server_zones/server_backend
http://127.0.0.1/api/9/http/caches/cache_backend
http://127.0.0.1/api/9/http/upstreams/backend
http://127.0.0.1/api/9/http/keyvals/one?key=arg1
http://127.0.0.1/api/9/stream/
http://127.0.0.1/api/9/stream/server_zones/server_backend
http://127.0.0.1/api/9/stream/upstreams/
http://127.0.0.1/api/9/stream/upstreams/backend

2.4.3 Directives

api

Syntax:   api [write=on|off];

Default —

Context: location

Turns on the REST API interface in the surrounding location. Access to this location should be limited.

The write parameter determines whether the API is read-only or read-write. By default, the API is read-only.
All API requests should contain a supported API version in the URI. If the request URI equals the location prefix, the list of supported API versions is returned. The current API version is “9”.

The optional “fields” argument in the request line specifies which fields of the requested objects will be output:

```
http://127.0.0.1/api/9/nginx?fields=version,build
```

**status_zone**

**Syntax:**

```
status_zone zone;
```

**Default** —

**Context:** server, location, if in location

This directive appeared in version 1.13.12.

Enables collection of virtual http or stream server status information in the specified zone. Several servers may share the same zone.

Starting from 1.17.0, status information can be collected per location. The special value off disables statistics collection in nested location blocks. Note that the statistics is collected in the context of a location where processing ends. It may be different from the original location, if an internal redirect happens during request processing.

### 2.4.4 Compatibility

- The /workers/ data were added in version 9.
- Detailed failure counters were added to SSL statistics in version 8 (1.23.2).
- The ssl data for each HTTP upstream, server zone, and stream upstream, server zone, were added in version 8 (1.21.6).
- The codes data in responses for each HTTP upstream, server zone, and location zone were added in version 7.
- The /stream/limit_conns/ data were added in version 6.
- The /http/limit_conns/ data were added in version 6.
- The /http/limit_reqs/ data were added in version 6.
- The “expire” parameter of a key-value pair can be set or changed since version 5.
- The /resolvers/ data were added in version 5.
- The /http/location_zones/ data were added in version 5.
• The path and method fields of nginx error object were removed in version 4. These fields continue to exist in earlier api versions, but show an empty value.
• The /stream/zone_sync/ data were added in version 3.
• The drain parameter was added in version 2.
• The /stream/keyvals/ data were added in version 2.

2.4.5 Endpoints

/ Supported methods:
  • GET - Return list of root endpoints
    Returns a list of root endpoints.
    Possible responses:
    - 200 - Success, returns an array of strings
    - 404 - Unknown version (UnknownVersion), returns Error

/nginx Supported methods:
  • GET - Return status of nginx running instance
    Returns nginx version, build name, address, number of configuration reloads, IDs of master and worker processes.
    Request parameters:
    fields (string, optional)
      Limits which fields of nginx running instance will be output.
    Possible responses:
    - 200 - Success, returns nginx
    - 404 - Unknown version (UnknownVersion), returns Error

/processes Supported methods:
  • GET - Return nginx processes status
    Returns the number of abnormally terminated and respawned child processes.
    Possible responses:
    - 200 - Success, returns Processes
    - 404 - Unknown version (UnknownVersion), returns Error
DELETE - Reset nginx processes statistics 
 Resets counters of abnormally terminated and respawned child processes. 
 Possible responses: 
  - 204 - Success 
  - 404 - Unknown version (UnknownVersion), returns Error 
  - 405 - Method disabled (MethodDisabled), returns Error 

/connections 
Supported methods: 
  - GET - Return client connections statistics 
    Returns statistics of client connections. 
    Request parameters: 
      fields (string, optional) 
      Limits which fields of the connections statistics will be output. 
    Possible responses: 
      - 200 - Success, returns Connections 
      - 404 - Unknown version (UnknownVersion), returns Error 

DELETE - Reset client connections statistics 
 Resets statistics of accepted and dropped client connections. 
 Possible responses: 
  - 204 - Success 
  - 404 - Unknown version (UnknownVersion), returns Error 
  - 405 - Method disabled (MethodDisabled), returns Error 

/slabs/ 
Supported methods: 
  - GET - Return status of all slabs 
    Returns status of slabs for each shared memory zone with slab allocator. 
    Request parameters: 
      fields (string, optional) 
      Limits which fields of slab zones will be output. If the “fields” value is empty, then only zone names will be output. 
    Possible responses: 
      - 200 - Success, returns a collection of “Shared memory zone with slab allocator” objects for all slabs 
      - 404 - Unknown version (UnknownVersion), returns Error 

/slabs/{slabZoneName} 
Parameters common for all methods:
slabZoneName (string, required)
The name of the shared memory zone with slab allocator.

Supported methods:

- **GET** - Return status of a slab
  Returns status of slabs for a particular shared memory zone with slab allocator.
  Request parameters:

  fields (string, optional)
  Limits which fields of the slab zone will be output.

  Possible responses:
  - 200 - Success, returns Shared memory zone with slab allocator
  - 404 - Slab not found (SlabNotFound), unknown version (UnknownVersion), returns Error

**DELETE** - Reset slab statistics
Resets the “reqs” and “fails” metrics for each memory slot.
Possible responses:

- 204 - Success
- 404 - Slab not found (SlabNotFound), unknown version (UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

/http/

Supported methods:

- **GET** - Return list of HTTP-related endpoints
  Returns a list of first level HTTP endpoints.
  Possible responses:
  - 200 - Success, returns an array of strings
  - 404 - Unknown version (UnknownVersion), returns Error

/http/requests

Supported methods:

- **GET** - Return HTTP requests statistics
  Returns status of client HTTP requests.
  Request parameters:

  fields (string, optional)
  Limits which fields of client HTTP requests statistics will be output.

  Possible responses:
  - 200 - Success, returns HTTP Requests
  - 404 - Unknown version (UnknownVersion), returns Error
DELETE - Reset HTTP requests statistics
Resets the number of total client HTTP requests.
Possible responses:
- 204 - Success
- 404 - Unknown version (UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

GET - Return status of all HTTP server zones
Returns status information for each HTTP server zone.
Request parameters:
fields (string, optional)
Limits which fields of server zones will be output. If the “fields” value is empty, then only server zone names will be output.
Possible responses:
- 200 - Success, returns a collection of "HTTP Server Zone" objects for all HTTP server zones
- 404 - Unknown version (UnknownVersion), returns Error

GET - Return status of an HTTP server zone
Returns status of a particular HTTP server zone.
Request parameters:
fields (string, optional)
Limits which fields of the server zone will be output.
Possible responses:
- 200 - Success, returns HTTP Server Zone
- 404 - Server zone not found (ServerZoneNotFound), unknown version (UnknownVersion), returns Error

DELETE - Reset statistics for an HTTP server zone
Resets statistics of accepted and discarded requests, responses, received and sent bytes, counters of SSL handshakes and session reuses in a particular HTTP server zone.
Possible responses:
- 204 - Success
- 404 - Server zone not found (ServerZoneNotFound),
  unknown version (UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

/http/location_zones/
  Supported methods:
  
  * GET - Return status of all HTTP location zones
    Returns status information for each HTTP location zone.
    Request parameters:
      fields (string, optional)
      Limits which fields of location zones will be output. If the
      "fields" value is empty, then only zone names will be output.
    Possible responses:
    - 200 - Success, returns a collection of "HTTP Location Zone"
      objects for all HTTP location zones
    - 404 - Unknown version (UnknownVersion), returns Error

/http/location_zones/{httpLocationZoneName}
  Parameters common for all methods:
    httpLocationZoneName (string, required)
    The name of an HTTP location zone.
  Supported methods:
  
  * GET - Return status of an HTTP location zone
    Returns status of a particular HTTP location zone.
    Request parameters:
      fields (string, optional)
      Limits which fields of the location zone will be output.
    Possible responses:
    - 200 - Success, returns HTTP Location Zone
    - 404 - Location zone not found (LocationZoneNotFound),
      unknown version (UnknownVersion), returns Error

DELETE - Reset statistics for a location zone.
Resets statistics of accepted and discarded requests, responses,
received and sent bytes in a particular location zone.
Possible responses:
  * 204 - Success
  - 404 - Location zone not found (LocationZoneNotFound),
    unknown version (UnknownVersion), returns Error
  - 405 - Method disabled (MethodDisabled), returns Error

/http/caches/
  Supported methods:
• GET - Return status of all caches
  Returns status of each cache configured by proxy_cache_path and other “*_cache_path” directives.
  Request parameters:
  fields (string, optional)
    Limits which fields of cache zones will be output. If the “fields” value is empty, then only names of cache zones will be output.

Possible responses:
  – 200 - Success, returns a collection of “HTTP Cache” objects for all HTTP caches
  – 404 - Unknown version (UnknownVersion), returns Error

/https/caches/{httpCacheZoneName}
Parameters common for all methods:
  httpCacheZoneName (string, required)
    The name of the cache zone.

Supported methods:

• GET - Return status of a cache
  Returns status of a particular cache.
  Request parameters:
  fields (string, optional)
    Limits which fields of the cache zone will be output.

Possible responses:
  – 200 - Success, returns HTTP Cache
  – 404 - Cache not found (CacheNotFound), unknown version (UnknownVersion), returns Error

DELETE - Reset cache statistics
Resets statistics of cache hits/misses in a particular cache zone.
Possible responses:
  – 204 - Success
  – 404 - Cache not found (CacheNotFound), unknown version (UnknownVersion), returns Error
  – 405 - Method disabled (MethodDisabled), returns Error

/https/limit_conns/
Supported methods:

• GET - Return status of all HTTP limit_conn zones
  Returns status information for each HTTP limit_conn zone.
  Request parameters:
fields (string, optional)
Limits which fields of limit_conn zones will be output. If the “fields” value is empty, then only zone names will be output.

Possible responses:
- 200 - Success, returns a collection of "HTTP Connections Limiting" objects for all HTTP limit conns
- 404 - Unknown version (UnknownVersion), returns Error

/http/limit_conns/{httpLimitConnZoneName}
Parameters common for all methods:
httpLimitConnZoneName (string, required)
The name of a limit_conn zone.

Supported methods:
- GET - Return status of an HTTP limit_conn zone
  Returns status of a particular HTTP limit_conn zone.
  Request parameters:
    fields (string, optional)
    Limits which fields of the limit_conn zone will be output.
  Possible responses:
    - 200 - Success, returns HTTP Connections Limiting
    - 404 - limit_conn not found (LimitConnNotFound), unknown version (UnknownVersion), returns Error

DELETE - Reset statistics for an HTTP limit_conn zone
Resets the connection limiting statistics.
Possible responses:
- 204 - Success
- 404 - limit_conn not found (LimitConnNotFound), unknown version (UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

/http/limit_reqs/
Supported methods:
- GET - Return status of all HTTP limit_req zones
  Returns status information for each HTTP limit_req zone.
  Request parameters:
    fields (string, optional)
    Limits which fields of limit_req zones will be output. If the “fields” value is empty, then only zone names will be output.
  Possible responses:
    - 200 - Success, returns a collection of "HTTP Requests Rate Limiting" objects for all HTTP limit reqs
CHAPTER 2. HTTP SERVER MODULES

2.4. MODULE NGX_HTTP_API_MODULE

- 404 - Unknown version (UnknownVersion), returns Error

/http/limit_reqs/{httpLimitReqZoneName}
Parameters common for all methods:

httpLimitReqZoneName (string, required)
The name of a limit_req zone.

Supported methods:

• GET - Return status of an HTTP limit_req zone
  Returns status of a particular HTTP limit_req zone.
  Request parameters:
  fields (string, optional)
  Limits which fields of the limit_req zone will be output.
  Possible responses:
  - 200 - Success, returns HTTP Requests Rate Limiting
  - 404 - limit_req not found (LimitReqNotFound), unknown version (UnknownVersion), returns Error

DELETE - Reset statistics for an HTTP limit_req zone
Resets the requests limiting statistics.
Possible responses:
- 204 - Success
- 404 - limit_req not found (LimitReqNotFound), unknown version (UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

:http/upstreams/
Supported methods:

• GET - Return status of all HTTP upstream server groups
  Returns status of each HTTP upstream server group and its servers.
  Request parameters:
  fields (string, optional)
  Limits which fields of upstream server groups will be output. If the “fields” value is empty, only names of upstreams will be output.
  Possible responses:
  - 200 - Success, returns a collection of "HTTP Upstream" objects for all HTTP upstreams
  - 404 - Unknown version (UnknownVersion), returns Error

/:http/upstreams/{httpUpstreamName}/
Parameters common common for all methods:

httpUpstreamName (string, required)
The name of an HTTP upstream server group.
Supported methods:

- **GET** - Return status of an HTTP upstream server group
  Returns status of a particular HTTP upstream server group and its servers.
  Request parameters:
  
  fields (string, optional)
  Limits which fields of the upstream server group will be output.
  Possible responses:
  
  - 200 - Success, returns **HTTP Upstream**
  - 400 - Upstream is static (UpstreamStatic), returns **Error**
  - 404 - Unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns **Error**

**DELETE** - Reset statistics of an HTTP upstream server group
Resets the statistics for each upstream server in an upstream server group and queue statistics.
Possible responses:

- 204 - Success
- 400 - Upstream is static (UpstreamStatic), returns **Error**
- 404 - Unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns **Error**
- 405 - Method disabled (MethodDisabled), returns **Error**

/http/upstreams/{httpUpstreamName}/servers/

Parameters common for all methods:

httpUpstreamName (string, required)
The name of an upstream server group.

Supported methods:

- **GET** - Return configuration of all servers in an HTTP upstream server group
  Returns configuration of each server in a particular HTTP upstream server group.
  Possible responses:
  
  - 200 - Success, returns an array of **HTTP Upstream Servers**
  - 400 - Upstream is static (UpstreamStatic), returns **Error**
  - 404 - Unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns **Error**

**POST** - Add a server to an HTTP upstream server group
Adds a new server to an HTTP upstream server group. Server parameters are specified in the JSON format.
Request parameters:
- postHttpUpstreamServer (HTTP Upstream Server, required)
  Address of a new server and other optional parameters in the JSON format. The “ID”, “backup”, and “service” parameters cannot be changed.

Possible responses:
- 201 - Created, returns HTTP Upstream Server
- 400 - Upstream is static (UpstreamStatic), invalid “parameter” value (UpstreamConfFormatError), missing “server” argument (UpstreamConfFormatError), unknown parameter “name” (UpstreamConfFormatError), nested object or list (UpstreamConfFormatError), “error” while parsing (UpstreamBadAddress), service upstream “host” may not have port (UpstreamBadAddress), service upstream “host” requires domain name (UpstreamBadAddress), invalid “weight” (UpstreamBadWeight), invalid “max_conns” (UpstreamBadMaxConns), invalid “max_fails” (UpstreamBadMaxFails), invalid “fail_timeout” (UpstreamBadFailTimeout), invalid “slow_start” (UpstreamBadSlowStart), reading request body failed (BodyReadError), route is too long (UpstreamBadRoute), “service” is empty (UpstreamBadService), no resolver defined to resolve (UpstreamConfNoResolver), upstream “name” has no backup (UpstreamNoBackup), upstream “name” memory exhausted (UpstreamOutOfMemory), returns Error
- 404 - Unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns Error
- 405 - Method disabled (MethodDisabled), returns Error
- 409 - Entry exists (EntryExists), returns Error
- 415 - JSON error (JsonError), returns Error

/http/upstreams/{httpUpstreamName}/servers/
{httpUpstreamServerId}

Parameters common for all methods:
- httpUpstreamName (string, required)
  The name of the upstream server group.
- httpUpstreamServerId (string, required)
  The ID of the server.

Supported methods:
- GET - Return configuration of a server in an HTTP upstream server group
  Returns configuration of a particular server in the HTTP upstream server group.
Possible responses:

- 200 - Success, returns HTTP Upstream Server
- 400 - Upstream is static (UpstreamStatic), invalid server ID (UpstreamBadServerId), returns Error
- 404 - Server with ID “id” does not exist (UpstreamServerNotFound), unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns Error

PATCH - Modify a server in an HTTP upstream server group
Modify settings of a particular server in an HTTP upstream server group. Server parameters are specified in the JSON format.
Request parameters:

- `patchHttpUpstreamServer` (HTTP Upstream Server, required)

Server parameters, specified in the JSON format. The “ID”, “backup”, and “service” parameters cannot be changed.

Possible responses:

- 200 - Success, returns HTTP Upstream Server
- 400 - Upstream is static (UpstreamStatic), invalid “parameter” value (UpstreamConfFormatError), unknown parameter “name” (UpstreamConfFormatError), nested object or list (UpstreamConfFormatError), “error” while parsing (UpstreamBadAddress), invalid “server” argument (UpstreamBadAddress), invalid server ID (UpstreamBadServerId), invalid “weight” (UpstreamBadWeight), invalid “max_conns” (UpstreamBadMaxConns), invalid “max_fails” (UpstreamBadMaxFails), invalid “fail_timeout” (UpstreamBadFailTimeout), invalid “slow_start” (UpstreamBadSlowStart), reading request body failed (BodyReadError), route is too long (UpstreamBadRoute), “service” is empty (UpstreamBadService), server “ID” address is immutable (UpstreamServerImmutable), server “ID” weight is immutable (UpstreamServerWeightImmutable), upstream “name” memory exhausted (UpstreamOutOfMemory), returns Error
- 404 - Server with ID “id” does not exist (UpstreamServerNotFound), unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns Error
- 405 - Method disabled (MethodDisabled), returns Error
- 415 - JSON error (JsonError), returns Error
DELETE - Remove a server from an HTTP upstream server group
Removes a server from an HTTP upstream server group.
Possible responses:

- 200 - Success, returns an array of HTTP Upstream Servers
- 400 - Upstream is static (UpstreamStatic), invalid server ID (UpstreamBadServerId), server “id” not removable (UpstreamServerImmutable), returns Error
- 404 - Server with ID “id” does not exist (UpstreamServerNotFound), unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

/http/keyvals/
Supported methods:

- GET - Return key-value pairs from all HTTP keyval zones
Returns key-value pairs for each HTTP keyval shared memory zone.
Request parameters:

  fields (string, optional)
  If the “fields” value is empty, then only HTTP keyval zone names will be output.

Possible responses:

- 200 - Success, returns a collection of "HTTP Keyval Shared Memory Zone" objects for all HTTP keyvals
- 404 - Unknown version (UnknownVersion), returns Error

/http/keyvals/{httpKeyvalZoneName}
Parameters common for all methods:

httpKeyvalZoneName (string, required)
The name of an HTTP keyval shared memory zone.
Supported methods:

- GET - Return key-value pairs from an HTTP keyval zone
Returns key-value pairs stored in a particular HTTP keyval shared memory zone.
Request parameters:

  key (string, optional)
  Get a particular key-value pair from the HTTP keyval zone.

Possible responses:

- 200 - Success, returns HTTP Keyval Shared Memory Zone
- 404 - Keyval not found (KeyvalNotFound), keyval key not found (KeyvalKeyNotFound), unknown version (UnknownVersion), returns Error
POST - Add a key-value pair to the HTTP keyval zone

Adds a new key-value pair to the HTTP keyval shared memory zone. Several key-value pairs can be entered if the HTTP keyval shared memory zone is empty.

Request parameters:
- **Key-value** *(HTTP Keyval Shared Memory Zone, required)*
  A key-value pair is specified in the JSON format. Several key-value pairs can be entered if the HTTP keyval shared memory zone is empty. Expiration time in milliseconds can be specified for a key-value pair with the `expire` parameter which overrides the `timeout` parameter of the `keyval_zone` directive.

Possible responses:
- 201 - Created
- 400 - Invalid JSON *(KeyvalFormatError)*, invalid key format *(KeyvalFormatError)*, key required *(KeyvalFormatError)*, keyval timeout is not enabled *(KeyvalFormatError)*, only one key can be added *(KeyvalFormatError)*, reading request body failed BodyReadError, returns Error
- 404 - Keyval not found *(KeyvalNotFound)*, unknown version *(UnknownVersion)*, returns Error
- 405 - Method disabled *(MethodDisabled)*, returns Error
- 409 - Entry exists *(EntryExists)*, key already exists *(KeyvalKeyExists)*, returns Error
- 413 - Request Entity Too Large, returns Error
- 415 - JSON error *(JsonError)*, returns Error

PATCH - Modify a key-value or delete a key

Changes the value of the selected key in the key-value pair, deletes a key by setting the key value to null, changes expiration time of a key-value pair. If synchronization of keyval zones in a cluster is enabled, deletes a key only on a target cluster node. Expiration time in milliseconds can be specified for a key-value pair with the `expire` parameter which overrides the `timeout` parameter of the `keyval_zone` directive.

Request parameters:
- **httpKeyvalZoneKeyValue** *(HTTP Keyval Shared Memory Zone, required)*
  A new value for the key is specified in the JSON format.

Possible responses:
- 204 - Success
- 400 - Invalid JSON *(KeyvalFormatError)*, key required *(KeyvalFormatError)*, keyval timeout is not enabled *(KeyvalFormatError)*, only one key can be up-
dated (KeyvalFormatError), reading request body failed
BodyReadError), returns Error
- 404 - Keyval not found (KeyvalNotFound), keyval
key not found (KeyvalKeyNotFound), unknown version
(UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error
- 413 - Request Entity Too Large, returns Error
- 415 - JSON error (JsonError), returns Error

DELETE - Empty the HTTP keyval zone
Deletes all key-value pairs from the HTTP keyval shared memory
zone. If synchronization of keyval zones in a cluster is enabled,
empties the keyval zone only on a target cluster node.
Possible responses:
- 204 - Success
- 404 - Keyval not found (KeyvalNotFound), unknown version
(UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

/stream/
Supported methods:
- GET - Return list of stream-related endpoints
  Returns a list of first level stream endpoints.
  Possible responses:
  - 200 - Success, returns an array of strings
  - 404 - Unknown version (UnknownVersion), returns Error

/stream/server_zones/
Supported methods:
- GET - Return status of all stream server zones
  Returns status information for each stream server zone.
  Request parameters:
    fields (string, optional)
    Limits which fields of server zones will be output. If the
    "fields" value is empty, then only server zone names will be
    output.
  Possible responses:
  - 200 - Success, returns a collection of "Stream Server Zone"
    objects for all stream server zones
  - 404 - Unknown version (UnknownVersion), returns Error

/stream/server_zones/{streamServerZoneName}
Parameters common for all methods:
streamServerZoneName (string, required)
The name of a stream server zone.

Supported methods:

- GET - Return status of a stream server zone
  Returns status of a particular stream server zone.
  Request parameters:
    fields (string, optional)
    Limits which fields of the server zone will be output.
  Possible responses:
    - 200 - Success, returns Stream Server Zone
    - 404 - Server zone not found (ServerZoneNotFound),
      unknown version (UnknownVersion), returns Error

DELETE - Reset statistics for a stream server zone
Rests statistics of accepted and discarded connections, sessions,
received and sent bytes, counters of SSL handshakes and session
reuses in a particular stream server zone.
Possible responses:
  - 204 - Success
  - 404 - Server zone not found (ServerZoneNotFound),
    unknown version (UnknownVersion), returns Error
  - 405 - Method disabled (MethodDisabled), returns Error

/stream/limit_conns/
Supported methods:

- GET - Return status of all stream limit_conn zones
  Returns status information for each stream limit_conn zone.
  Request parameters:
    fields (string, optional)
    Limits which fields of limit_conn zones will be output. If the
    "fields" value is empty, then only zone names will be output.
  Possible responses:
    - 200 - Success, returns a collection of "Stream Connections
      Limiting" objects for all stream limit conns
    - 404 - Unknown version (UnknownVersion), returns Error

/stream/limit_conns/{streamLimitConnZoneName}
Parameters common for all methods:
    streamLimitConnZoneName (string, required)
    The name of a limit_conn zone.

Supported methods:
• GET - Return status of an stream_limit_conn zone
Returns status of a particular stream limit_conn zone.
Request parameters:
  fields (string, optional)
  Limits which fields of the limit_conn zone will be output.
Possible responses:
  - 200 - Success, returns Stream Connections Limiting
  - 404 - limit_conn not found (LimitConnNotFound), unknown version (UnknownVersion), returns Error

DELETE - Reset statistics for a stream limit_conn zone
Resets the connection limiting statistics.
Possible responses:
  - 204 - Success
  - 404 - limit_conn not found (LimitConnNotFound), unknown version (UnknownVersion), returns Error
  - 405 - Method disabled (MethodDisabled), returns Error

/stream/upstreams/
Supported methods:
• GET - Return status of all stream upstream server groups
Returns status of each stream upstream server group and its servers.
Request parameters:
  fields (string, optional)
  Limits which fields of upstream server groups will be output. If the “fields” value is empty, only names of upstreams will be output.
Possible responses:
  - 200 - Success, returns a collection of ”Stream Upstream” objects for all stream upstreams
  - 404 - Unknown version (UnknownVersion), returns Error

/stream/upstreams/{streamUpstreamName}/
Parameters common for all methods:
  streamUpstreamName (string, required)
The name of a stream upstream server group.
Supported methods:
• GET - Return status of a stream upstream server group
Returns status of a particular stream upstream server group and its servers.
Request parameters:
fields (string, optional)
Limits which fields of the upstream server group will be output.

Possible responses:
- 200 - Success, returns Stream Upstream
- 400 - Upstream is static (UpstreamStatic), returns Error
- 404 - Unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns Error

DELETE - Reset statistics of a stream upstream server group
Resets the statistics for each upstream server in an upstream server group.
Possible responses:
- 204 - Success
- 400 - Upstream is static (UpstreamStatic), returns Error
- 404 - Unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

/stream/upstreams/{streamUpstreamName}/servers/
Parameters common for all methods:
streamUpstreamName (string, required)
The name of an upstream server group.

Supported methods:
- GET - Return configuration of all servers in a stream upstream server group
  Returns configuration of each server in a particular stream upstream server group.
  Possible responses:
  - 200 - Success, returns an array of Stream Upstream Servers
  - 400 - Upstream is static (UpstreamStatic), returns Error
  - 404 - Unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns Error

POST - Add a server to a stream upstream server group
Adds a new server to a stream upstream server group. Server parameters are specified in the JSON format.
Request parameters:
- postStreamUpstreamServer (Stream Upstream Server, required)
  Address of a new server and other optional parameters in the JSON format. The “ID”, “backup”, and “service” parameters cannot be changed.
  Possible responses:
- 201 - Created, returns Stream Upstream Server
- 400 - Upstream is static (UpstreamStatic), invalid “parameter” value (UpstreamConfFormatError), missing “server” argument (UpstreamConfFormatError), unknown parameter “name” (UpstreamConfFormatError), nested object or list (UpstreamConfFormatError), “error” while parsing (UpstreamBadAddress), no port in server “host” (UpstreamBadAddress), service upstream “host” may not have port (UpstreamBadAddress), service upstream “host” requires domain name (UpstreamBadAddress), invalid “weight” (UpstreamBadWeight), invalid “max_conns” (UpstreamBadMaxConns), invalid “max_fails” (UpstreamBadMaxFails), invalid “fail_timeout” (UpstreamBadFailTimeout), invalid “slow_start” (UpstreamBadSlowStart), “service” is empty (UpstreamBadService), no resolver defined to resolve (UpstreamConfNoResolver), upstream “name” has no backup (UpstreamNoBackup), upstream “name” memory exhausted (UpstreamOutOfMemory), reading request body failed BodyReadError), returns Error
- 404 - Unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns Error
- 405 - Method disabled (MethodDisabled), returns Error
- 409 - Entry exists (EntryExists), returns Error
- 415 - JSON error (JsonError), returns Error

/stream/upstreams/{streamUpstreamName}/servers/{streamUpstreamServerId}

Parameters common for all methods:

- streamUpstreamName (string, required)
  The name of the upstream server group.
- streamUpstreamServerId (string, required)
  The ID of the server.

Supported methods:

- GET - Return configuration of a server in a stream upstream server group
  Returns configuration of a particular server in the stream upstream server group.
  Possible responses:
  - 200 - Success, returns Stream Upstream Server
  - 400 - Upstream is static (UpstreamStatic), invalid server ID (UpstreamBadServerId), returns Error
- 404 - Unknown version (UnknownVersion), upstream not found (UpstreamNotFound), server with ID “id” does not exist (UpstreamServerNotFound), returns Error

PATCH - Modify a server in a stream upstream server group
Modifies settings of a particular server in a stream upstream server group. Server parameters are specified in the JSON format.
Request parameters:
- patchStreamUpstreamServer (Stream Upstream Server, required)
  Server parameters, specified in the JSON format. The “ID”, “backup”, and “service” parameters cannot be changed.
Possible responses:
- 200 - Success, returns Stream Upstream Server
- 400 - Upstream is static (UpstreamStatic), invalid “parameter” value (UpstreamConfFormatError), unknown parameter “name” (UpstreamConfFormatError), nested object or list (UpstreamConfFormatError), “error” while parsing (UpstreamBadAddress), invalid “server” argument (UpstreamBadAddress), no port in server “host” (UpstreamBadAddress), invalid server ID (UpstreamBadServerId), invalid “weight” (UpstreamBadWeight), invalid “max_conns” (UpstreamBadMaxConns), invalid “max_fails” (UpstreamBadMaxFails), invalid “fail_timeout” (UpstreamBadFailTimeout), invalid “slow_start” (UpstreamBadSlowStart), reading request body failed (BodyReadError), “service” is empty (UpstreamBadService), server “ID” address is immutable (UpstreamServerImmutable), server “ID” weight is immutable (UpstreamServerWeightImmutable), upstream “name” memory exhausted (UpstreamOutOfMemory), returns Error
- 404 - Server with ID “id” does not exist (UpstreamServerNotFound), unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns Error
- 405 - Method disabled (MethodDisabled), returns Error
- 415 - JSON error (JsonError), returns Error

DELETE - Remove a server from a stream upstream server group
Removes a server from a stream server group.
Possible responses:
- 200 - Success, returns an array of Stream Upstream Servers
- 400 - Upstream is static (UpstreamStatic), invalid server ID (UpstreamBadServerId), server “id” not removable (UpstreamServerImmutable), returns Error
- 404 - Server with ID “id” does not exist (UpstreamServerNotFound), unknown version (UnknownVersion), upstream not found (UpstreamNotFound), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

/stream/keyvals/
Supported methods:

- GET - Return key-value pairs from all stream keyval zones
  Returns key-value pairs for each stream keyval shared memory zone.
  Request parameters:
  fields (string, optional)
  If the “fields” value is empty, then only stream keyval zone names will be output.

Possible responses:
- 200 - Success, returns a collection of "Stream Keyval Shared Memory Zone" objects for all stream keyvals
- 404 - Unknown version (UnknownVersion), returns Error

/stream/keyvals/{streamKeyvalZoneName}
Parameters common for all methods:

streamKeyvalZoneName (string, required)
The name of a stream keyval shared memory zone.

Supported methods:

- GET - Return key-value pairs from a stream keyval zone
  Returns key-value pairs stored in a particular stream keyval shared memory zone.
  Request parameters:
  key (string, optional)
  Get a particular key-value pair from the stream keyval zone.

Possible responses:
- 200 - Success, returns Stream Keyval Shared Memory Zone
- 404 - Keyval not found (KeyvalNotFound), keyval key not found (KeyvalKeyNotFound), unknown version (UnknownVersion), returns Error

POST - Add a key-value pair to the stream keyval zone
Adds a new key-value pair to the stream keyval shared memory zone. Several key-value pairs can be entered if the stream keyval shared memory zone is empty.
Request parameters:

- **Key-value** *(Stream Keyval Shared Memory Zone, required)*
  
  A key-value pair is specified in the JSON format. Several key-value pairs can be entered if the stream keyval shared memory zone is empty. Expiration time in milliseconds can be specified for a key-value pair with the `expire` parameter which overrides the `timeout` parameter of the `keyval_zone` directive.

Possible responses:

- 201 - Created
- 400 - Invalid JSON (KeyvalFormatError), invalid key format (KeyvalFormatError), key required (KeyvalFormatError), keyval timeout is not enabled (KeyvalFormatError), only one key can be added (KeyvalFormatError), reading request body failed (BodyReadError), returns Error
- 404 - Keyval not found (KeyvalNotFound), unknown version (UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error
- 409 - Entry exists (EntryExists), key already exists (KeyvalKeyExists), returns Error
- 413 - Request Entity Too Large, returns Error
- 415 - JSON error (JsonError), returns Error

**PATCH** - Modify a key-value or delete a key

Changes the value of the selected key in the key-value pair, deletes a key by setting the key value to `null`, changes expiration time of a key-value pair. If synchronization of keyval zones in a cluster is enabled, deletes a key only on a target cluster node. Expiration time is specified in milliseconds with the `expire` parameter which overrides the `timeout` parameter of the `keyval_zone` directive.

Request parameters:

- **streamKeyvalZoneKeyValue** *(Stream Keyval Shared Memory Zone, required)*
  
  A new value for the key is specified in the JSON format.

Possible responses:

- 204 - Success
- 400 - Invalid JSON (KeyvalFormatError), key required (KeyvalFormatError), keyval timeout is not enabled (KeyvalFormatError), only one key can be updated (KeyvalFormatError), reading request body failed (BodyReadError), returns Error
- 404 - Keyval not found (KeyvalNotFound), keyval key not found (KeyvalKeyNotFound), unknown version (UnknownVersion), returns Error
DELETES - Empty the stream keyval zone
Deletes all key-value pairs from the stream keyval shared memory zone. If synchronization of keyval zones in a cluster is enabled, empties the keyval zone only on a target cluster node.
Possible responses:
• 204 - Success
• 404 - Keyval not found (KeyvalNotFound), unknown version (UnknownVersion), returns Error
• 405 - Method disabled (MethodDisabled), returns Error

/stream/zone_sync/
Supported methods:
• GET - Return sync status of a node
  Returns synchronization status of a cluster node.
  Possible responses:
  • 200 - Success, returns Stream Zone Sync Node
  • 404 - Unknown version (UnknownVersion), returns Error

/resolvers/
Supported methods:
• GET - Return status for all resolver zones
  Returns status information for each resolver zone.
  Request parameters:
    fields (string, optional)
    Limits which fields of resolvers statistics will be output.
  Possible responses:
  • 200 - Success, returns a collection of “Resolver Zone” objects for all resolvers
  • 404 - Unknown version (UnknownVersion), returns Error

/resolvers/{resolverZoneName}
Parameters common for all methods:
  resolverZoneName (string, required)
  The name of a resolver zone.
Supported methods:
• GET - Return statistics of a resolver zone
  Returns statistics stored in a particular resolver zone.
  Request parameters:
fields (string, optional)
   Limits which fields of the resolver zone will be output (requests, responses, or both).

Possible responses:
- 200 - Success, returns Resolver Zone
- 404 - Resolver zone not found (ResolverZoneNotFound), unknown version (UnknownVersion), returns Error

DELETE - Reset statistics for a resolver zone.
Resets statistics in a particular resolver zone.
Possible responses:
- 204 - Success
- 404 - Resolver zone not found (ResolverZoneNotFound), unknown version (UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

/ssl
Supported methods:
- GET - Return SSL statistics
   Returns SSL statistics.
   Request parameters:
   fields (string, optional)
      Limits which fields of SSL statistics will be output.
   Possible responses:
   - 200 - Success, returns SSL
   - 404 - Unknown version (UnknownVersion), returns Error

DELETE - Reset SSL statistics
Resets counters of SSL handshakes and session reuses.
Possible responses:
- 204 - Success
- 404 - Unknown version (UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

/workers/
Supported methods:
- GET - Return statistics for all worker processes
  Returns statistics for all worker processes such as accepted, dropped, active, idle connections, total and current requests.
  Request parameters:
  fields (string, optional)
    Limits which fields of worker process statistics will be output.

Possible responses:
- 200 - Success, returns a collection of "Worker process" objects for all workers
- 404 - Worker not found (WorkerNotFound), unknown version (UnknownVersion), returns Error

/workers/{workerId}
Parameters common for all methods:

workerId (string, required)
The ID of the worker process.

Supported methods:

- GET - Return status of a worker process
  Returns status of a particular worker process.
  Possible responses:
  - 200 - Success, returns Worker process
  - 404 - Worker not found (WorkerNotFound), unknown version (UnknownVersion), returns Error

DELETE - Reset statistics for a worker process.
Resets statistics of accepted, dropped, active, idle connections, as well as total and current requests.
Possible responses:
- 204 - Success
- 404 - Worker not found (WorkerNotFound), unknown version (UnknownVersion), returns Error
- 405 - Method disabled (MethodDisabled), returns Error

2.4.6 Response Objects

- nginx:
  General information about nginx:

  version (string)
  Version of nginx.

  build (string)
  Name of nginx build.

  address (string)
  The address of the server that accepted status request.

  generation (integer)
  The total number of configuration reloads.

  load_timestamp (string)
  Time of the last reload of configuration, in the ISO 8601 format with millisecond resolution.
timestamp (string)
  Current time in the ISO 8601 format with millisecond resolution.

pid (integer)
  The ID of the worker process that handled status request.

ppid (integer)
  The ID of the master process that started the worker process.

Example:

```json
{
  "nginx": {
    "version": "1.21.6",
    "build": "nginx-plus-r27",
    "address": "206.251.255.64",
    "generation": 6,
    "load_timestamp": "2022-06-28T11:15:44.467Z",
    "timestamp": "2022-06-28T09:26:07.305Z",
    "pid": 32212,
    "ppid": 32210
  }
}
```

- Processes:

  respawned (integer)
  The total number of abnormally terminated and respawned child processes.

  Example:

  ```json
  {
    "respawned": 0
  }
  ```

- Connections:

  The number of accepted, dropped, active, and idle connections.

  accepted (integer)
  The total number of accepted client connections.

  dropped (integer)
  The total number of dropped client connections.

  active (integer)
  The current number of active client connections.

  idle (integer)
  The current number of idle client connections.

  Example:

  ```json
  {
    "accepted": 4968119,
    "dropped": 0,
    "active": 5,
  }
  ```
SSL:

- handshakes (integer)
  The total number of successful SSL handshakes.

- handshakes_failed (integer)
  The total number of failed SSL handshakes.

- session_reuses (integer)
  The total number of session reuses during SSL handshake.

- no_common_protocol (integer)
  The number of SSL handshakes failed because of no common protocol.

- no_common_cipher (integer)
  The number of SSL handshakes failed because of no shared cipher.

- handshake_timeout (integer)
  The number of SSL handshakes failed because of a timeout.

- peer_rejected_cert (integer)
  The number of failed SSL handshakes when nginx presented the certificate to the client but it was rejected with a corresponding alert message.

- verify_failures
  SSL certificate verification errors

  - no_cert (integer)
    A client did not provide the required certificate.

  - expired_cert (integer)
    An expired or not yet valid certificate was presented by a client.

  - revoked_cert (integer)
    A revoked certificate was presented by a client.

  - hostname_mismatch (integer)
    Server’s certificate doesn’t match the hostname.

  - other (integer)
    Other SSL certificate verification errors.

Example:

```
{
    "handshakes" : 79572,
    "handshakes_failed" : 21025,
    "session_reuses" : 15762,
    "no_common_protocol" : 4,
    "no_common_cipher" : 2,
    "handshake_timeout" : 0,
    "peer_rejected_cert" : 0,
    "verify_failures" : {
      "no_cert" : 0,
      "expired_cert" : 2,
      "revoked_cert" : 1,
      "hostname_mismatch" : 2,
    }
}
```
Shared memory zone with slab allocator:

- **pages**
  - The number of free and used memory pages.
    - **used** (integer)
      - The current number of used memory pages.
    - **free** (integer)
      - The current number of free memory pages.

- **slots**
  - Status data for memory slots (8, 16, 32, 64, 128, etc.)
  - A collection of "Memory Slot" objects

Example:

```json
{
  "pages": {
    "used": 1143,
    "free": 2928
  },
  "slots": {
    "8": {
      "used": 0,
      "free": 0,
      "reqs": 0,
      "fails": 0
    },
    "16": {
      "used": 0,
      "free": 0,
      "reqs": 0,
      "fails": 0
    },
    "32": {
      "used": 0,
      "free": 0,
      "reqs": 0,
      "fails": 0
    },
    "64": {
      "used": 1,
      "free": 63,
      "reqs": 1,
      "fails": 0
    },
    "128": {
      "used": 0,
      "free": 0,
      "reqs": 0,
      "fails": 0
    },
    "256": {
      "used": 18078,
      "free": 178,
      "reqs": 3635736,
      "fails": 0
    }
  }
}
```
• Memory Slot:

  used (integer)
  The current number of used memory slots.

  free (integer)
  The current number of free memory slots.

  reqs (integer)
  The total number of attempts to allocate memory of specified size.

  fails (integer)
  The number of unsuccessful attempts to allocate memory of specified size.

HTTP Requests:

• total (integer)
  The total number of client requests.

  current (integer)
  The current number of client requests.

Example:

```json
{
  "total" : 10624511,
  "current" : 4
}
```

• HTTP Server Zone:

  processing (integer)
  The number of client requests that are currently being processed.

  requests (integer)
  The total number of client requests received from clients.

  responses
  The total number of responses sent to clients, the number of responses with status codes “1xx”, “2xx”, “3xx”, “4xx”, and “5xx”, and the number of responses per each status code.

  1xx (integer)
  The number of responses with “1xx” status codes.

  2xx (integer)
  The number of responses with “2xx” status codes.

  3xx (integer)
  The number of responses with “3xx” status codes.

  4xx (integer)
  The number of responses with “4xx” status codes.
5xx (integer)
The number of responses with “5xx” status codes.
codes
The number of responses per each status code.
    codeNumber (integer)
The number of responses with this particular status code.
total (integer)
The total number of responses sent to clients.
discarded (integer)
The total number of requests completed without sending a response.
received (integer)
The total number of bytes received from clients.
sent (integer)
The total number of bytes sent to clients.
ssl
    handshakes (integer)
The total number of successful SSL handshakes.
    handshakes_failed (integer)
The total number of failed SSL handshakes.
    session_reuses (integer)
The total number of session reuses during SSL handshake.
    no_common_protocol (integer)
The number of SSL handshakes failed because of no common protocol.
    no_common_cipher (integer)
The number of SSL handshakes failed because of no shared cipher.
    handshake_timeout (integer)
The number of SSL handshakes failed because of a timeout.
    peer_rejected_cert (integer)
The number of failed SSL handshakes when nginx presented the certificate to the client but it was rejected with a corresponding alert message.
verify_failures
SSL certificate verification errors
    no_cert (integer)
A client did not provide the required certificate.
    expired_cert (integer)
An expired or not yet valid certificate was presented by a client.
    revoked_cert (integer)
A revoked certificate was presented by a client.
    other (integer)
Other SSL certificate verification errors.
Example:

```json
{
    "processing" : 1,
    "requests" : 706690,
    "responses" : {
        "1xx" : 0,
        "2xx" : 699482,
        "3xx" : 4522,
        "4xx" : 907,
        "5xx" : 266,
        "codes" : {
            "200" : 699482,
            "301" : 4522,
            "404" : 907,
            "503" : 266
        },
        "total" : 705177
    },
    "discarded" : 1513,
    "received" : 172711587,
    "sent" : 19415530115,
    "ssl" : {
        "handshakes" : 104303,
        "handshakes_failed" : 1421,
        "session_reuses" : 54645,
        "no_common_protocol" : 4,
        "no_common_cipher" : 2,
        "handshake_timeout" : 0,
        "peer_rejected_cert" : 0,
        "verify_failures" : {
            "no_cert" : 0,
            "expired_cert" : 2,
            "revoked_cert" : 1,
            "other" : 1
        }
    }
}
```

- **HTTP Location Zone:***

  **requests (integer)**
  
  The total number of client requests received from clients.

  **responses**
  
  The total number of responses sent to clients, the number of responses with status codes “1xx”, “2xx”, “3xx”, “4xx”, and “5xx”, and the number of responses per each status code.

  **1xx (integer)**
  
  The number of responses with “1xx” status codes.

  **2xx (integer)**
  
  The number of responses with “2xx” status codes.

  **3xx (integer)**
  
  The number of responses with “3xx” status codes.

  **4xx (integer)**
  
  The number of responses with “4xx” status codes.

  **5xx (integer)**
  
  The number of responses with “5xx” status codes.
codes
The number of responses per each status code.

codeNumber (integer)
The number of responses with this particular status code.

total (integer)
The total number of responses sent to clients.

discarded (integer)
The total number of requests completed without sending a response.

received (integer)
The total number of bytes received from clients.

sent (integer)
The total number of bytes sent to clients.

Example:

```json
{
  "requests" : 706690,
  "responses" : {
    "1xx" : 0,
    "2xx" : 699482,
    "3xx" : 4522,
    "4xx" : 907,
    "5xx" : 266,
    "codes" : {
      "200" : 112674,
      "301" : 4522,
      "404" : 2504,
      "503" : 266
    },
    "total" : 705177
  },
  "discarded" : 1513,
  "received" : 172711587,
  "sent" : 19415530115
}
```

- HTTP Cache:

  size (integer)
The current size of the cache.

  max_size (integer)
The limit on the maximum size of the cache specified in the configuration.

  cold (boolean)
A boolean value indicating whether the “cache loader” process is still loading data from disk into the cache.

  hit

  responses (integer)
The total number of valid responses read from the cache.

  bytes (integer)
The total number of bytes read from the cache.

  stale
responses (integer)
The total number of expired responses read from the cache (see proxy_cache_use_stale and other "*_cache_use_stale" directives).

bytes (integer)
The total number of bytes read from the cache.

updating
responses (integer)
The total number of expired responses read from the cache while responses were being updated (see proxy_cache_use_stale and other "*_cache_use_stale" directives).

bytes (integer)
The total number of bytes read from the cache.

revalidated
responses (integer)
The total number of expired and revalidated responses read from the cache (see proxy_cache_revalidate and other "*_cache_revalidate" directives).

bytes (integer)
The total number of bytes read from the cache.

miss
responses (integer)
The total number of responses not found in the cache.

bytes (integer)
The total number of bytes read from the proxied server.

responses_written (integer)
The total number of responses written to the cache.

bytes_written (integer)
The total number of bytes written to the cache.

expired
responses (integer)
The total number of expired responses not taken from the cache.

bytes (integer)
The total number of bytes read from the proxied server.

responses_written (integer)
The total number of responses written to the cache.

bytes_written (integer)
The total number of bytes written to the cache.

bypass
responses (integer)
The total number of responses not looked up in the cache due to the proxy_cache_bypass and other "*_cache_bypass" directives.

bytes (integer)
The total number of bytes read from the proxied server.

responses_written (integer)

The total number of responses written to the cache.

bytes_written (integer)

The total number of bytes written to the cache.

Example:

```json
{
  "size" : 530915328,
  "max_size" : 536870912,
  "hit" : {
    "responses" : 254032,
    "bytes" : 6685627875
  },
  "stale" : {
    "responses" : 0,
    "bytes" : 0
  },
  "updating" : {
    "responses" : 0,
    "bytes" : 0
  },
  "revalidated" : {
    "responses" : 0,
    "bytes" : 0
  },
  "miss" : {
    "responses" : 1619201,
    "bytes" : 53841943822
  },
  "expired" : {
    "responses" : 45839,
    "bytes" : 1656847080,
    "responses_written" : 44992,
    "bytes_written" : 1641825173
  },
  "bypass" : {
    "responses" : 200187,
    "bytes" : 5510647548,
    "responses_written" : 200173,
    "bytes_written" : 44992
  }
}
```

- HTTP Connections Limiting:

  passed (integer)

  The total number of connections that were neither limited nor accounted as limited.

  rejected (integer)

  The total number of connections that were rejected.

  rejected_dry_run (integer)

  The total number of connections accounted as rejected in the dry run mode.

Example:
• HTTP Requests Rate Limiting:

\[
\begin{array}{l}
\text{passed} (\text{integer}) \\
\quad \text{The total number of requests that were neither limited nor}
\quad \text{accounted as limited.}
\end{array}
\]

\[
\begin{array}{l}
\text{delayed} (\text{integer}) \\
\quad \text{The total number of requests that were delayed.}
\end{array}
\]

\[
\begin{array}{l}
\text{rejected} (\text{integer}) \\
\quad \text{The total number of requests that were rejected.}
\end{array}
\]

\[
\begin{array}{l}
\text{delayed\_dry\_run} (\text{integer}) \\
\quad \text{The total number of requests accounted as delayed in the dry run}
\quad \text{mode.}
\end{array}
\]

\[
\begin{array}{l}
\text{rejected\_dry\_run} (\text{integer}) \\
\quad \text{The total number of requests accounted as rejected in the dry run}
\quad \text{mode.}
\end{array}
\]

Example:

\[
\begin{array}{l}
\{ \\
\quad \text{"passed" : 15,} \\
\quad \text{"delayed" : 4,} \\
\quad \text{"rejected" : 0,} \\
\quad \text{"delayed\_dry\_run" : 1,} \\
\quad \text{"rejected\_dry\_run" : 2} \\
\}
\end{array}
\]

• HTTP Upstream:

\[
\begin{array}{l}
\text{peers} \\
\quad \text{An array of:}
\end{array}
\]

\[
\begin{array}{l}
\text{id} (\text{integer}) \\
\quad \text{The ID of the server.}
\end{array}
\]

\[
\begin{array}{l}
\text{server} (\text{string}) \\
\quad \text{An address of the server.}
\end{array}
\]

\[
\begin{array}{l}
\text{service} (\text{string}) \\
\quad \text{The service parameter value of the server directive.}
\end{array}
\]

\[
\begin{array}{l}
\text{name} (\text{string}) \\
\quad \text{The name of the server specified in the server directive.}
\end{array}
\]

\[
\begin{array}{l}
\text{backup} (\text{boolean}) \\
\quad \text{A boolean value indicating whether the server is a backup}
\quad \text{server.}
\end{array}
\]
weight (integer)
   Weight of the server.
state (string)
   Current state, which may be one of “up”, “draining”, “down”,
   “unavai”, “checking”, and “unhealthy”.
active (integer)
   The current number of active connections.
ssl
   handshakes (integer)
      The total number of successful SSL handshakes.
handshakes_failed (integer)
      The total number of failed SSL handshakes.
session_reuses (integer)
      The total number of session reuses during SSL handshake.
no_common_protocol (integer)
      The number of SSL handshakes failed because of no
      common protocol.
handshake_timeout (integer)
      The number of SSL handshakes failed because of a timeout.
peer_rejected_cert (integer)
      The number of failed SSL handshakes when nginx presented
      the certificate to the upstream server but it was rejected
      with a corresponding alert message.
verify_failures
   SSL certificate verification errors
   expired_cert (integer)
      An expired or not yet valid certificate was presented by
      an upstream server.
   revoked_cert (integer)
      A revoked certificate was presented by an upstream
      server.
   hostname_mismatch (integer)
      Server’s certificate doesn’t match the hostname.
   other (integer)
      Other SSL certificate verification errors.
max_conns (integer)
   The max_conns limit for the server.
requests (integer)
   The total number of client requests forwarded to this server.
responses
   1xx (integer)
      The number of responses with “1xx” status codes.
   2xx (integer)
      The number of responses with “2xx” status codes.
   3xx (integer)
The number of responses with “3xx” status codes.
4xx (integer)
The number of responses with “4xx” status codes.
5xx (integer)
The number of responses with “5xx” status codes.
codes
The number of responses per each status code.
  codeNumber (integer)
    The number of responses with this particular status code.
total (integer)
The total number of responses obtained from this server.
sent (integer)
The total number of bytes sent to this server.
received (integer)
The total number of bytes received from this server.
fails (integer)
The total number of unsuccessful attempts to communicate with the server.
unavail (integer)
How many times the server became unavailable for client requests (state “unavail”) due to the number of unsuccessful attempts reaching the max_fails threshold.
health_checks
checks (integer)
The total number of health check requests made.
fails (integer)
The number of failed health checks.
unhealthy (integer)
How many times the server became unhealthy (state “unhealthy”).
last_passed (boolean)
Boolean indicating if the last health check request was successful and passed tests.
downtime (integer)
Total time the server was in the “unavail”, “checking”, and “unhealthy” states.
downstart (string)
The time when the server became “unavail”, “checking”, or “unhealthy”, in the ISO 8601 format with millisecond resolution.
selected (string)
The time when the server was last selected to process a request, in the ISO 8601 format with millisecond resolution.
header_time (integer)
The average time to get the response header from the server.
response_time (integer)
The average time to get the full response from the server.

keepalive (integer)
The current number of idle keepalive connections.

zombies (integer)
The current number of servers removed from the group but still processing active client requests.

zone (string)
The name of the shared memory zone that keeps the group’s configuration and run-time state.

queue
For the requests queue, the following data are provided:

size (integer)
The current number of requests in the queue.

max_size (integer)
The maximum number of requests that can be in the queue at the same time.

overflows (integer)
The total number of requests rejected due to the queue overflow.

Example:

```json
{
    "upstream_backend" : {
        "peers" : [{
            "id" : 0,
            "server" : "10.0.0.1:8088",
            "name" : "10.0.0.1:8088",
            "backup" : false,
            "weight" : 5,
            "state" : "up",
            "active" : 0,
            "ssl" : {
                "handshakes" : 620311,
                "handshakes_failed" : 3432,
                "session_reuses" : 36442,
                "no_common_protocol" : 4,
                "handshake_timeout" : 0,
                "peer_rejected_cert" : 0,
                "verify_failures" : {
                    "expired_cert" : 2,
                    "revoked_cert" : 1,
                    "hostname_mismatch" : 2,
                    "other" : 1
                }
            },
            "max_conns" : 20,
            "requests" : 667231,
            "header_time" : 20,
            "response_time" : 36,
            "responses" : {
                "1xx" : 0,
                "2xx" : 666310,
                "3xx" : 0,
                "4xx" : 915,
                "5xx" : 6,
                "codes" : {}
            }
        }
    }
}
```
HTTP Upstream Server:

Dynamically configurable parameters of an HTTP upstream server:

id (integer)
The ID of the HTTP upstream server. The ID is assigned automatically and cannot be changed.

**server (string)**
Same as the *address* parameter of the HTTP upstream server. When adding a server, it is possible to specify it as a domain name. In this case, changes of the IP addresses that correspond to a domain name will be monitored and automatically applied to the upstream configuration without the need of restarting nginx. This requires the `resolver` directive in the "http" block. See also the `resolve` parameter of the HTTP upstream server.

**service (string)**
Same as the *service* parameter of the HTTP upstream server. This parameter cannot be changed.

**weight (integer)**
Same as the *weight* parameter of the HTTP upstream server.

**max_conns (integer)**
Same as the *max_conns* parameter of the HTTP upstream server.

**max_fails (integer)**
Same as the *max_fails* parameter of the HTTP upstream server.

**fail_timeout (string)**
Same as the *fail_timeout* parameter of the HTTP upstream server.

**slow_start (string)**
Same as the *slow_start* parameter of the HTTP upstream server.

**route (string)**
Same as the *route* parameter of the HTTP upstream server.

**backup (boolean)**
When true, adds a *backup* server. This parameter cannot be changed.

**down (boolean)**
Same as the *down* parameter of the HTTP upstream server.

**drain (boolean)**
Same as the *drain* parameter of the HTTP upstream server.

**parent (string)**
Parent server ID of the resolved server. The ID is assigned automatically and cannot be changed.

**host (string)**
Hostname of the resolved server. The hostname is assigned automatically and cannot be changed.

Example:

```json
{
  "id" : 1,
  "server" : "10.0.0.1:8089",
  "weight" : 4,
  "max_conns" : 0,
  "max_fails" : 0,
  "fail_timeout" : "10s",
}
2.4. MODULE NGX_HTTP_API_MODULE

- **HTTP Keyval Shared Memory Zone:**
  Contents of an HTTP keyval shared memory zone when using the GET method.
  Example:

  ```json
  {
    "key1": "value1",
    "key2": "value2",
    "key3": "value3"
  }
  ```

- **HTTP Keyval Shared Memory Zone:**
  Contents of an HTTP keyval shared memory zone when using the POST or PATCH methods.
  Example:

  ```json
  {
    "key1": "value1",
    "key2": "value2",
    "key3": {
      "value": "value3",
      "expire": 30000
    }
  }
  ```

- **Stream Server Zone:**

  - `processing (integer)`
    The number of client connections that are currently being processed.
  - `connections (integer)`
    The total number of connections accepted from clients.
  - `sessions`
    The total number of completed sessions, and the number of sessions completed with status codes “2xx”, “4xx”, or “5xx”.
    - `2xx (integer)`
      The total number of sessions completed with status codes “2xx”.
    - `4xx (integer)`
      The total number of sessions completed with status codes “4xx”.
    - `5xx (integer)`
      The total number of sessions completed with status codes “5xx”.

Nginx, Inc. p.105 of 542
total (integer)
The total number of completed client sessions.
discarded (integer)
The total number of connections completed without creating a session.
received (integer)
The total number of bytes received from clients.
sent (integer)
The total number of bytes sent to clients.
ssl
handshakes (integer)
The total number of successful SSL handshakes.
handshakes_failed (integer)
The total number of failed SSL handshakes.
session_reuses (integer)
The total number of session reuses during SSL handshake.
no_common_protocol (integer)
The number of SSL handshakes failed because of no common protocol.
no_common_cipher (integer)
The number of SSL handshakes failed because of no shared cipher.
handshake_timeout (integer)
The number of SSL handshakes failed because of a timeout.
peer_rejected_cert (integer)
The number of failed SSL handshakes when nginx presented the certificate to the client but it was rejected with a corresponding alert message.
verify_failures
SSL certificate verification errors
no_cert (integer)
A client did not provide the required certificate.
expired_cert (integer)
An expired or not yet valid certificate was presented by a client.
revoked_cert (integer)
A revoked certificate was presented by a client.
other (integer)
Other SSL certificate verification errors.

Example:

```json
{
    "dns" : {
        "processing" : 1,
        "connections" : 155569,
        "sessions" : {
```
• Stream Connections Limiting:

passed (integer)
   The total number of connections that were neither limited nor
   accounted as limited.
rejected (integer)
   The total number of connections that were rejected.
rejected_dry_run (integer)
   The total number of connections accounted as rejected in the dry
   run mode.

Example:

```
{
   "passed" : 15,
   "rejected" : 0,
   "rejected_dry_run" : 2
}
```

• Stream Upstream:

peers
   An array of:
   id (integer)
      The ID of the server.
   server (string)
      An address of the server.
   service (string)
      The service parameter value of the server directive.
name (string)
  The name of the server specified in the server directive.
backup (boolean)
  A boolean value indicating whether the server is a backup server.
weight (integer)
  Weight of the server.
state (string)
  Current state, which may be one of “up”, “down”, “unavail”,
  “checking”, or “unhealthy”.
active (integer)
  The current number of connections.
ssl
 handshakes (integer)
  The total number of successful SSL handshakes.
handshakes_failed (integer)
  The total number of failed SSL handshakes.
session_reuses (integer)
  The total number of session reuses during SSL handshake.
no_common_protocol (integer)
  The number of SSL handshakes failed because of no
  common protocol.
handshake_timeout (integer)
  The number of SSL handshakes failed because of a timeout.
peer_rejected_cert (integer)
  The number of failed SSL handshakes when nginx presented
  the certificate to the upstream server but it was rejected
  with a corresponding alert message.
verify_failures
  SSL certificate verification errors
  expired_cert (integer)
  An expired or not yet valid certificate was presented by
  an upstream server.
revoked_cert (integer)
  A revoked certificate was presented by an upstream
  server.
hostname_mismatch (integer)
  Server’s certificate doesn’t match the hostname.
other (integer)
  Other SSL certificate verification errors.
max_conns (integer)
  The max_conns limit for the server.
connections (integer)
  The total number of client connections forwarded to this server.
connect_time (integer)
The average time to connect to the upstream server.

first_byte_time (integer)

The average time to receive the first byte of data.

response_time (integer)

The average time to receive the last byte of data.

sent (integer)

The total number of bytes sent to this server.

received (integer)

The total number of bytes received from this server.

fails (integer)

The total number of unsuccessful attempts to communicate with the server.

unavail (integer)

How many times the server became unavailable for client connections (state “unavail”) due to the number of unsuccessful attempts reaching the max_fails threshold.

health_checks

checks (integer)

The total number of health check requests made.

fails (integer)

The number of failed health checks.

unhealthy (integer)

How many times the server became unhealthy (state “unhealthy”).

last_passed (boolean)

Boolean indicating whether the last health check request was successful and passed tests.

downtime (integer)

Total time the server was in the “unavail”, “checking”, and “unhealthy” states.

downstart (string)

The time when the server became “unavail”, “checking”, or “unhealthy”, in the ISO 8601 format with millisecond resolution.

selected (string)

The time when the server was last selected to process a connection, in the ISO 8601 format with millisecond resolution.

zombies (integer)

The current number of servers removed from the group but still processing active client connections.

zone (string)

The name of the shared memory zone that keeps the group’s configuration and run-time state.

Example:
```json
{
    "dns" : {
        "peers" : [
            {
                "id" : 0,
                "server" : "10.0.0.1:12347",
                "name" : "10.0.0.1:12347",
                "backup" : false,
                "weight" : 5,
                "state" : "up",
                "active" : 0,
                "ssl" : {
                    "handshakes" : 200,
                    "handshakes_failed" : 4,
                    "session_reuses" : 189,
                    "no_common_protocol" : 4,
                    "handshake_timeout" : 0,
                    "peer_rejected_cert" : 0,
                    "verify_failures" : {
                        "expired_cert" : 2,
                        "revoked_cert" : 1,
                        "hostname_mismatch" : 2,
                        "other" : 1
                    }
                },
                "max_conns" : 50,
                "connections" : 667231,
                "sent" : 251946292,
                "received" : 19222475454,
                "fails" : 0,
                "unavail" : 0,
                "health_checks" : {
                    "checks" : 26214,
                    "fails" : 0,
                    "unhealthy" : 0,
                    "last_passed" : true
                },
                "downtime" : 0,
                "selected" : "2022-06-28T15:01:25.000Z"
            },
            {
                "id" : 1,
                "server" : "10.0.0.1:12348",
                "name" : "10.0.0.1:12348",
                "backup" : true,
                "weight" : 1,
                "state" : "unhealthy",
                "active" : 0,
                "max_conns" : 50,
                "connections" : 0,
                "sent" : 0,
                "received" : 0,
                "fails" : 0,
                "unavail" : 0,
                "health_checks" : {
                    "checks" : 26284,
                    "fails" : 26284,
                    "unhealthy" : 1,
                    "last_passed" : false
                },
                "downtime" : 262925617,
                "selected" : "2022-06-28T15:01:25.000Z"
            },
            {
                "id" : 2,
                "server" : "10.0.0.1:12349",
                "name" : "10.0.0.1:12349",
                "backup" : false,
                "weight" : 1,
                "state" : "up",
                "active" : 0,
                "max_conns" : 50,
                "connections" : 0,
                "sent" : 0,
                "received" : 0,
                "fails" : 0,
                "unavail" : 0,
                "health_checks" : {
                    "checks" : 26214,
                    "fails" : 0,
                    "unhealthy" : 0,
                    "last_passed" : true
                },
                "downtime" : 0,
                "selected" : "2022-06-28T15:01:25.000Z"
            }
        ],
        "zombies" : 0,
        "zone" : "dns"
    }
}
```
• Stream Upstream Server:
  Dynamically configurable parameters of a stream upstream server:

  id (integer)
  The ID of the stream upstream server. The ID is assigned automatically and cannot be changed.

  server (string)
  Same as the address parameter of the stream upstream server. When adding a server, it is possible to specify it as a domain name. In this case, changes of the IP addresses that correspond to a domain name will be monitored and automatically applied to the upstream configuration without the need of restarting nginx. This requires the resolver directive in the "stream" block. See also the resolve parameter of the stream upstream server.

  service (string)
  Same as the service parameter of the stream upstream server. This parameter cannot be changed.

  weight (integer)
  Same as the weight parameter of the stream upstream server.

  max_conns (integer)
  Same as the max_conns parameter of the stream upstream server.

  max_fails (integer)
  Same as the max_fails parameter of the stream upstream server.

  fail_timeout (string)
  Same as the fail_timeout parameter of the stream upstream server.

  slow_start (string)
  Same as the slow_start parameter of the stream upstream server.

  backup (boolean)
  When true, adds a backup server. This parameter cannot be changed.

  down (boolean)
  Same as the down parameter of the stream upstream server.

  parent (string)
  Parent server ID of the resolved server. The ID is assigned automatically and cannot be changed.

  host (string)
  Hostname of the resolved server. The hostname is assigned automatically and cannot be changed.

Example:

```json
{
  "id" : 0,
  "server" : "10.0.0.1:12348",
  "weight" : 1,
}
```
Stream Keyval Shared Memory Zone:
Contents of a stream keyval shared memory zone when using the GET method.
Example:

```json
{
  "key1" : "value1",
  "key2" : "value2",
  "key3" : "value3"
}
```

Stream Keyval Shared Memory Zone:
Contents of a stream keyval shared memory zone when using the POST or PATCH methods.
Example:

```json
{
  "key1" : "value1",
  "key2" : "value2",
  "key3" : {
    "value" : "value3",
    "expire" : 30000
  }
}
```

Stream Zone Sync Node:

- **zones**
  Synchronization information per each shared memory zone. A collection of "Sync Zone" objects
- **status**
  Synchronization information per node in a cluster.
  - **bytes_in** (integer)
    The number of bytes received by this node.
  - **msgs_in** (integer)
    The number of messages received by this node.
  - **msgs_out** (integer)
    The number of messages sent by this node.
  - **bytes_out** (integer)
    The number of bytes sent by this node.
  - **nodes_online** (integer)
    The number of peers this node is connected to.
Example:

```plaintext
{
  "zones" : {
    "zone1" : {
      "records_pending" : 2061,
      "records_total" : 260575
    },
    "zone2" : {
      "records_pending" : 0,
      "records_total" : 14749
    }
  },
  "status" : {
    "bytes_in" : 1364923761,
    "msgs_in" : 337236,
    "msgs_out" : 346717,
    "bytes_out" : 1402765472,
    "nodes_online" : 15
  }
}
```

- **Sync Zone:**
  
  Synchronization status of a shared memory zone.

  - `records_pending (integer)`
    The number of records that need to be sent to the cluster.

  - `records_total (integer)`
    The total number of records stored in the shared memory zone.

- **Resolver Zone:**
  
  Statistics of DNS requests and responses per particular resolver zone.

  - `requests`
    
    - `name (integer)`
      The total number of requests to resolve names to addresses.

    - `srv (integer)`
      The total number of requests to resolve SRV records.

    - `addr (integer)`
      The total number of requests to resolve addresses to names.

  - `responses`
    
    - `noerror (integer)`
      The total number of successful responses.

    - `formerr (integer)`
      The total number of FORMERR (Format error) responses.

    - `servfail (integer)`
      The total number of SERVFAIL (Server failure) responses.

    - `nxdomain (integer)`
      The total number of NXDOMAIN (Host not found) responses.
notimp (integer)
The total number of NOTIMP (Unimplemented) responses.

refused (integer)
The total number of REFUSED (Operation refused) responses.

timedout (integer)
The total number of timed out requests.

unknown (integer)
The total number of requests completed with an unknown error.

Example:

```json
{
  "resolver_zone1": {
    "requests": {
      "name": 25460,
      "srv": 130,
      "addr": 2580
    },
    "responses": {
      "noerror": 26499,
      "formerr": 0,
      "servfail": 3,
      "nxdomain": 0,
      "notimp": 0,
      "refused": 0,
      "timedout": 243,
      "unknown": 478
    }
  }
}
```

• Worker process:
The number of requests and connections handled by the worker processes.

id (integer)
The ID of the worker process.

pid (integer)
The PID identifier of the worker process used by the operating system.

connections
The number of accepted, dropped, active, and idle connections per worker process.

accepted (integer)
The total number of client connections accepted by the worker process.

dropped (integer)
The total number of client connections dropped by the worker process.

active (integer)
The current number of active client connections that are currently being handled by the worker process.
idle (integer)
The number of idle client connections that are currently being handled by the worker process.

http requests
The total number of client requests handled by the worker process.

total (integer)
The total number of responses sent to clients by the worker process.

current (integer)
The number of responses that are currently being sent to clients by the worker process.

Example:

```json
{
  "id" : 0,
  "pid" : 32212,
  "connections" : {
    "accepted" : 1,
    "dropped" : 0,
    "active" : 1,
    "idle" : 0
  },
  "http" : {
    "requests" : {
      "total" : 15,
      "current" : 1
    }
  }
}
```

• Error:
nginx error object.

derror
status (integer)
HTTP error code.
text (string)
Error description.
code (string)
Internal nginx error code.
request_id (string)
The ID of the request, equals the value of the $request_id variable.
href (string)
Link to reference documentation.
2.5 Module ngx_http_auth_basic_module

2.5.1 Summary

The ngx_http_auth_basic_module module allows limiting access to resources by validating the user name and password using the “HTTP Basic Authentication” protocol.

Access can also be limited by address, by the result of subrequest, or by JWT. Simultaneous limitation of access by address and by password is controlled by the satisfy directive.

2.5.2 Example Configuration

```nginx
location / {
    auth_basic "closed site";
    auth_basic_user_file conf/htpasswd;
}
```

2.5.3 Directives

auth_basic

**Syntax:** `auth_basic string | off;`

**Default:** `off`

**Context:** http, server, location, limit_except

Enables validation of user name and password using the “HTTP Basic Authentication” protocol. The specified parameter is used as a *realm*. Parameter value can contain variables (1.3.10, 1.2.7). The special value *off* cancels the effect of the auth_basic directive inherited from the previous configuration level.

auth_basic_user_file

**Syntax:** `auth_basic_user_file file;`

**Default:** `—`

**Context:** http, server, location, limit_except

Specifies a file that keeps user names and passwords, in the following format:

```
# comment
name1:password1
name2:password2:comment
```
The file name can contain variables.

The following password types are supported:

- encrypted with the crypt function; can be generated using the "htpasswd" utility from the Apache HTTP Server distribution or the "openssl passwd" command;

- hashed with the Apache variant of the MD5-based password algorithm (apr1); can be generated with the same tools;

- specified by the "\{ scheme\} data" syntax (1.0.3+) as described in RFC 2307; currently implemented schemes include PLAIN (an example one, should not be used), SHA (1.3.13) (plain SHA-1 hashing, should not be used) and SSHA (salted SHA-1 hashing, used by some software packages, notably OpenLDAP and Dovecot).

Support for SHA scheme was added only to aid in migration from other web servers. It should not be used for new passwords, since unsalted SHA-1 hashing that it employs is vulnerable to rainbow table attacks.
2.6 Module ngx_http_auth_jwt_module

2.6.1 Summary

The ngx_http_auth_jwt_module module (1.11.3) implements client authorization by validating the provided JSON Web Token (JWT) using the specified keys. The module supports JSON Web Signature (JWS), JSON Web Encryption (JWE) (1.19.7), and Nested JWT (1.21.0). The module can be used for OpenID Connect authentication.

The module may be combined with other access modules, such as ngx_http_access_module, ngx_http_auth_basic_module, and ngx_http_auth_request_module, via the satisfy directive.

This module is available as part of our commercial subscription.

2.6.2 Supported Algorithms

The module supports the following JSON Web Algorithms.

JWS algorithms:

- HS256, HS384, HS512
- RS256, RS384, RS512
- ES256, ES384, ES512
- EdDSA (Ed25519 and Ed448 signatures) (1.15.7)

Prior to version 1.13.7, only HS256, RS256, ES256 algorithms were supported.

JWE content encryption algorithms (1.19.7):
• A128CBC-HS256, A192CBC-HS384, A256CBC-HS512
• A128GCM, A192GCM, A256GCM
JWE key management algorithms (1.19.9):
• A128KW, A192KW, A256KW
• A128GCMKW, A192GCMKW, A256GCMKW
• dir - direct use of a shared symmetric key as the content encryption key
• RSA-OAEP, RSA-OAEP-256, RSA-OAEP-384, RSA-OAEP-512 (1.21.0)

2.6.3 Example Configuration

```
location / {
    auth_jwt "closed site";
    auth_jwt_key_file conf/keys.json;
}
```

2.6.4 Directives

**auth_jwt**

SYNTAX: `auth_jwt string [token=$variable] | off;`

DEFAULT: `off`

CONTEXT: http, server, location, limit

Enables validation of JSON Web Token. The specified `string` is used as a `realm`. Parameter value can contain variables.

The optional `token` parameter specifies a variable that contains JSON Web Token. By default, JWT is passed in the Authorization header as a Bearer Token. JWT may be also passed as a cookie or a part of a query string:

```
auth_jwt "closed site" token=$cookie_auth_token;
```

The special value `off` cancels the effect of the `auth_jwt` directive inherited from the previous configuration level.

**auth_jwt_claim_set**

SYNTAX: `auth_jwt_claim_set $variable name ...;`

DEFAULT: `-`

CONTEXT: `http`

This directive appeared in version 1.11.10.

Sets the `variable` to a JWT claim parameter identified by key names. Name matching starts from the top level of the JSON tree. For arrays, the variable keeps a list of array elements separated by commas.
Prior to version 1.13.7, only one key name could be specified, and the result was undefined for arrays.

Variable values for tokens encrypted with JWE are available only after decryption which occurs during the Access phase.

**auth_jwt_claim_set**

**Syntax:**

```
auth_jwt_claim_set $email info e-mail;
auth_jwt_claim_set $job info "job title";
```

**Default**

*Context:* http

This directive appeared in version 1.11.10.

Sets the variable to a JOSE header parameter identified by key names. Name matching starts from the top level of the JSON tree. For arrays, the variable keeps a list of array elements separated by commas.

Prior to version 1.13.7, only one key name could be specified, and the result was undefined for arrays.

**auth_jwt_header_set**

**Syntax:**

```
auth_jwt_header_set $variable name . . . ;
```

**Default**

*Context:* http

This directive appeared in version 1.11.10.

Sets the variable to a JOSE header parameter identified by key names. Name matching starts from the top level of the JSON tree. For arrays, the variable keeps a list of array elements separated by commas.

Prior to version 1.13.7, only one key name could be specified, and the result was undefined for arrays.

**auth_jwt_key_cache**

**Syntax:**

```
auth_jwt_key_cache time;
```

**Default**

0

*Context:* http, server, location

This directive appeared in version 1.21.4.

Enables or disables caching of keys obtained from a file or from a subrequest, and sets caching time for them. Caching of keys obtained from variables is not supported. By default, caching of keys is disabled.

**auth_jwt_key_file**

**Syntax:**

```
auth_jwt_key_file file;
```

**Default**

*Context:* http, server, location, limit_except

Specifies a file in JSON Web Key Set format for validating JWT signature. Parameter value can contain variables.

Several auth_jwt_key_file directives can be specified on the same level (1.21.1):

```
auth_jwt_key_file conf/keys.json;
auth_jwt_key_file conf/key.jwk;
```
If at least one of the specified keys cannot be loaded or processed, nginx will return the 500 Internal Server Error error.

**auth_jwt_key_request**

**Syntax:** `auth_jwt_key_request uri;`

**Default:** —

**Context:** http, server, location, limit_except

This directive appeared in version 1.15.6.

Allows retrieving a JSON Web Key Set file from a subrequest for validating JWT signature and sets the URI where the subrequest will be sent to. Parameter value can contain variables. To avoid validation overhead, it is recommended to cache the key file:

```bash
proxy_cache_path /data/nginx/cache levels=1 keys_zone=foo:10m;
server {
  ...
  location / {
    auth_jwt "closed site";
    auth_jwt_key_request /jwks_uri;
  }
  location = /jwks_uri {
    internal;
    proxy_cache foo;
    proxy_pass http://idp.example.com/keys;
  }
}
```

Several `auth_jwt_key_request` directives can be specified on the same level (1.21.1):

```bash
auth_jwt_key_request /jwks_uri;
auth_jwt_key_request /jwks2_uri;
```

If at least one of the specified keys cannot be loaded or processed, nginx will return the 500 Internal Server Error error.

**auth_jwt_leeway**

**Syntax:** `auth_jwt_leeway time;`

**Default:** 0s

**Context:** http, server, location

This directive appeared in version 1.13.10.

Sets the maximum allowable leeway to compensate clock skew when verifying the `exp` and `nbf` JWT claims.
auth_jwt_type

**Syntax:** `auth_jwt_type signed | encrypted | nested;`

**Default:** `signed`

**Context:** `http`, `server`, `location`, `limit_except`

This directive appeared in version 1.19.7.

Specifies which type of JSON Web Token to expect: JWS (signed), JWE (encrypted), or signed and then encrypted Nested JWT (nested) (1.21.0).

auth_jwt_require

**Syntax:** `auth_jwt_require $value ...[error=401 | 403];`

**Default:** `—`

**Context:** `http`, `server`, `location`, `limit_except`

This directive appeared in version 1.21.2.

Specifies additional checks for JWT validation. The value can contain text, variables, and their combination, and must start with a variable (1.21.7). The authentication will succeed only if all the values are not empty and are not equal to “0”.

```plaintext
map $jwt_claim_iss $valid_jwt_iss {
    "good" 1;
}
...
auth_jwt_require $valid_jwt_iss;
```

If any of the checks fails, the 401 error code is returned. The optional error parameter (1.21.7) allows redefining the error code to 403.

### 2.6.5 Embedded Variables

The `ngx_http_auth_jwt_module` module supports embedded variables:

- `$$jwt_header_name`
  - returns the value of a specified JOSE header
- `$$jwt_claim_name`
  - returns the value of a specified JWT claim
  - For nested claims and claims including a dot ("."), the value of the variable cannot be evaluated; the `auth_jwt_claim_set` directive should be used instead.
  - Variable values for tokens encrypted with JWE are available only after decryption which occurs during the Access phase.
- `$$jwt_payload`
  - returns the decrypted top-level payload of nested or encrypted tokens (1.21.2). For nested tokens returns the enclosed JWS token. For encrypted tokens returns JSON with claims.
2.7 Module ngx_http_auth_request_module

2.7.1 Summary

The ngx_http_auth_request_module module (1.5.4+) implements client authorization based on the result of a subrequest. If the subrequest returns a 2xx response code, the access is allowed. If it returns 401 or 403, the access is denied with the corresponding error code. Any other response code returned by the subrequest is considered an error.

For the 401 error, the client also receives the WWW-Authenticate header from the subrequest response.

This module is not built by default, it should be enabled with the --with-http_auth_request_module configuration parameter.

The module may be combined with other access modules, such as ngx_http_access_module, ngx_http_auth_basic_module, and ngx_http_auth_jwt_module, via the satisfy directive.

Before version 1.7.3, responses to authorization subrequests could not be cached (using proxy_cache, proxy_store, etc.).

2.7.2 Example Configuration

```nginx
location /private/ {
    auth_request /auth;
    ...
}
location = /auth {
    proxy_pass ...
    proxy_pass_request_body off;
    proxy_set_header Content-Length "";
    proxy_set_header X-Original-URI $request_uri;
}
```

2.7.3 Directives

auth_request

Syntax: auth_request uri|off;

Default: off

Context: http, server, location
Enables authorization based on the result of a subrequest and sets the URI to which the subrequest will be sent.

**auth_request_set**

Syntax:  

```plaintext
auth_request_set $variable value;
```

Default —

Context: http, server, location

Sets the request variable to the given value after the authorization request completes. The value may contain variables from the authorization request, such as `$upstream_http_*`. 
2.8 Module ngx_http_autoindex_module

2.8.1 Summary

The ngx_http_autoindex_module module processes requests ending with the slash character ('/') and produces a directory listing. Usually a request is passed to the ngx_http_autoindex_module module when the ngx_http_index_module module cannot find an index file.

2.8.2 Example Configuration

```nginx
location / {
    autoindex on;
}
```

2.8.3 Directives

**autoindex**

**Syntax:** `autoindex` on | off;
**Default:** off
**Context:** http, server, location

Enables or disables the directory listing output.

**autoindex_exact_size**

**Syntax:** `autoindex_exact_size` on | off;
**Default:** on
**Context:** http, server, location

For the HTML format, specifies whether exact file sizes should be output in the directory listing, or rather rounded to kilobytes, megabytes, and gigabytes.

**autoindex_format**

**Syntax:** `autoindex_format` html | xml | json | jsonp;
**Default:** html
**Context:** http, server, location

This directive appeared in version 1.7.9.
Sets the format of a directory listing.

When the JSONP format is used, the name of a callback function is set with the `callback` request argument. If the argument is missing or has an empty value, then the JSON format is used.

The XML output can be transformed using the `ngx_http_xslt_module` module.

**autoindex_localtime**

Syntax: `autoindex_localtime on | off;`

Default: `off`

Context: `http`, `server`, `location`

For the HTML format, specifies whether times in the directory listing should be output in the local time zone or UTC.
2.9 Module ngx_http_browser_module

2.9.1 Summary

The ngx_http_browser_module module creates variables whose values depend on the value of the User-Agent request header field:

* $modern_browser
  
equals the value set by the modern_browser_value directive, if a browser was identified as modern;

* $ancient_browser
  
equals the value set by the ancient_browser_value directive, if a browser was identified as ancient;

* $msie
  
equals “1” if a browser was identified as MSIE of any version.

2.9.2 Example Configuration

Choosing an index file:

```nginx
modern_browser_value "modern.";
modern_browser msie 5.5;
modern_browser gecko 1.0.0;
modern_browser opera 9.0;
modern_browser safari 413;
modern_browser konqueror 3.0;
index index.${modern_browser}html index.html;
```

Redirection for old browsers:

```nginx
modern_browser msie 5.0;
modern_browser gecko 0.9.1;
modern_browser opera 8.0;
modern_browser safari 413;
modern_browser konqueror 3.0;
modern_browser unlisted;
ancient_browser Links Lynx netscape4;
if ($ancient_browser) {
    rewrite ^ /ancient.html;
}
```
2.9.3 Directives

ancient_browser

**Syntax:**  
ancient_browser string ...;

**Default:** —

**Context:** http, server, location

If any of the specified substrings is found in the User-Agent request header field, the browser will be considered ancient. The special string “netscape4” corresponds to the regular expression “^Mozilla/[1-4]”.

ancient_browser_value

**Syntax:**  
ancient_browser_value string;

**Default:** 1

**Context:** http, server, location

Sets a value for the $ancient_browser variables.

modern_browser

**Syntax:**  
modern_browser browser version;

**Syntax:**  
modern_browser unlisted;

**Default:** —

**Context:** http, server, location

Specifies a version starting from which a browser is considered modern. A browser can be any one of the following: msie, gecko (browsers based on Mozilla), opera, safari, or konqueror.

Versions can be specified in the following formats: X, X.X, X.X.X, or X.X.X.X. The maximum values for each of the format are 4000, 4000.99, 4000.99.99, and 4000.99.99.99, respectively.

The special value unlisted specifies to consider a browser as modern if it was not listed by the modern_browser and ancient_browser directives. Otherwise such a browser is considered ancient. If a request does not provide the User-Agent field in the header, the browser is treated as not being listed.

modern_browser_value

**Syntax:**  
modern_browser_value string;

**Default:** 1

**Context:** http, server, location

Sets a value for the $modern_browser variables.
2.10 Module ngx_http_charset_module

2.10.1 Summary

The ngx_http_charset_module module adds the specified charset to the Content-Type response header field. In addition, the module can convert data from one charset to another, with some limitations:

- conversion is performed one way — from server to client,
- only single-byte charsets can be converted
- or single-byte charsets to/from UTF-8.

2.10.2 Example Configuration

```plaintext
include conf/koi-win;
charset windows-1251;
source_charset koi8-r;
```

2.10.3 Directives

**charset**

**Syntax:** `charset charset | off;`

**Default:** `off`

**Context:** `http`, `server`, `location`, if in `location`

Adds the specified charset to the Content-Type response header field. If this charset is different from the charset specified in the `source_charset` directive, a conversion is performed.

The parameter `off` cancels the addition of charset to the Content-Type response header field.

A charset can be defined with a variable:

```plaintext
charset $charset;
```
In such a case, all possible values of a variable need to be present in the configuration at least once in the form of the `charset_map`, `charset`, or `source_charset` directives. For utf-8, windows-1251, and koi8-r charsets, it is sufficient to include the files conf/koi-win, conf/koi-utf, and conf/win-utf into configuration. For other charsets, simply making a fictitious conversion table works, for example:

```
charset_map iso-8859-5 _ {} 
```

In addition, a charset can be set in the X-Accel-Charset response header field. This capability can be disabled using the proxy_ignore_headers, fastcgi_ignore_headers, uwsgi_ignore_headers, scgi_ignore_headers, and grpc_ignore_headers directives.

### charset_map

**Syntax:** `charset_map charset1 charset2 {...}

**Default**

**Context:** http

Describes the conversion table from one charset to another. A reverse conversion table is built using the same data. Character codes are given in hexadecimal. Missing characters in the range 80-FF are replaced with “?”.

When converting from UTF-8, characters missing in a one-byte charset are replaced with “\&#XXXX;”.

**Example:**

```
charset_map koi8-r windows-1251 {
  C0 FE ; # small yu
  C1 E0 ; # small a
  C2 E1 ; # small b
  C3 F6 ; # small ts
  ...
}
```

When describing a conversion table to UTF-8, codes for the UTF-8 charset should be given in the second column, for example:

```
charset_map koi8-r utf-8 {
  C0 D18E ; # small yu
  C1 D0B0 ; # small a
  C2 D0B1 ; # small b
  C3 D186 ; # small ts
  ...
}
```

Full conversion tables from koi8-r to windows-1251, and from koi8-r and windows-1251 to utf-8 are provided in the distribution files conf/

Nginx, Inc.  p.130 of 542
**charset_types**

**Syntax:** \texttt{charset_types mime-type...;}

**Default:** text/html text/xml text/plain text/vnd.wap.wml
               application/javascript application/rss+xml

**Context:** http, server, location

This directive appeared in version 0.7.9.

Enables module processing in responses with the specified MIME types in addition to \texttt{"text/html"}. The special value \texttt{"*"} matches any MIME type (0.8.29).

Until version 1.5.4, \texttt{“application/x-javascript”} was used as the default MIME type instead of \texttt{“application/javascript”}.

**override_charset**

**Syntax:** \texttt{override_charset on | off;}

**Default:** off

**Context:** http, server, location, if in location

Determines whether a conversion should be performed for answers received from a proxied or a FastCGI/uwsgi/SCGI/gRPC server when the answers already carry a charset in the Content-Type response header field. If conversion is enabled, a charset specified in the received response is used as a source charset.

It should be noted that if a response is received in a subrequest then the conversion from the response charset to the main request charset is always performed, regardless of the \texttt{override_charset} directive setting.

**source_charset**

**Syntax:** \texttt{source_charset charset;}

**Default:** —

**Context:** http, server, location, if in location

Defines the source charset of a response. If this charset is different from the charset specified in the \texttt{charset} directive, a conversion is performed.
2.11 Module ngx_http_dav_module

2.11.1 Summary

The ngx_http_dav_module module is intended for file management automation via the WebDAV protocol. The module processes HTTP and WebDAV methods PUT, DELETE, MKCOL, COPY, and MOVE.

This module is not built by default, it should be enabled with the --with-http_dav_module configuration parameter.

WebDAV clients that require additional WebDAV methods to operate will not work with this module.

2.11.2 Example Configuration

```nginx
location / {
    root /data/www;
    client_body_temp_path /data/client_temp;
    dav_methods PUT DELETE MKCOL COPY MOVE;
    create_full_put_path on;
    dav_access group:rw all:r;

    limit_except GET {
        allow 192.168.1.0/32;
        deny all;
    }
}
```

2.11.3 Directives

create_full_put_path

Syntax: `create_full_put_path on | off;`
Default: `off`
Context: `http, server, location`

The WebDAV specification only allows creating files in already existing directories. This directive allows creating all needed intermediate directories.
dav_access

Syntax: `dav_access users:permissions ...;`
Default: `user:rw`
Context: `http, server, location`

Sets access permissions for newly created files and directories, e.g.:

```
dav_access user:rw group:rw all:r;
```

If any `group` or `all` access permissions are specified then `user` permissions may be omitted:

```
dav_access group:rw all:r;
```

dav_methods

Syntax: `dav_methods off | method ...;`
Default: `off`
Context: `http, server, location`

Allows the specified HTTP and WebDAV methods. The parameter `off` denies all methods processed by this module. The following methods are supported: `PUT`, `DELETE`, `MKCOL`, `COPY`, and `MOVE`.

A file uploaded with the PUT method is first written to a temporary file, and then the file is renamed. Starting from version 0.8.9, temporary files and the persistent store can be put on different file systems. However, be aware that in this case a file is copied across two file systems instead of the cheap renaming operation. It is thus recommended that for any given location both saved files and a directory holding temporary files, set by the `client_body_temp_path` directive, are put on the same file system.

When creating a file with the PUT method, it is possible to specify the modification date by passing it in the `Date` header field.

min_delete_depth

Syntax: `min_delete_depth number;`
Default: `0`
Context: `http, server, location`

Allows the DELETE method to remove files provided that the number of elements in a request path is not less than the specified number. For example, the directive

```
min_delete_depth 4;
```

allows removing files on requests

```
/users/00/00/name
/users/00/00/name/pic.jpg
```
and denies the removal of

/users/00/00
2.12 Module ngx_http_empty_gif_module

2.12.1 Summary
The ngx_http_empty_gif_module module emits single-pixel transparent GIF.

2.12.2 Example Configuration

```
location = /_.gif {
    empty_gif;
}
```

2.12.3 Directives
empty_gif

**Syntax:** `empty_gif;`

**Default:**

**Context:** location

Turns on module processing in a surrounding location.
2.13 Module ngx_http_f4f_module

2.13.1 Summary

The ngx_http_f4f_module module provides server-side support for Adobe HTTP Dynamic Streaming (HDS).

This module implements handling of HTTP Dynamic Streaming requests in the “/videoSeg1-Frag1” form — extracting the needed fragment from the videoSeg1.f4f file using the videoSeg1.f4x index file. This module is an alternative to the Adobe’s f4f module (HTTP Origin Module) for Apache.

Usual pre-processing with Adobe’s f4fpackager is required, see relevant documentation for details.

This module is available as part of our commercial subscription.

2.13.2 Example Configuration

```nginx
location /video/ {
    f4f;
    ...
}
```

2.13.3 Directives

f4f

**Syntax:** `f4f;`

**Default** —

**Context:** location

Turns on module processing in the surrounding location.

f4f_buffer_size

**Syntax:** `f4f_buffer_size size;`

**Default** 512k

**Context:** http, server, location

Sets the size of the buffer used for reading the .f4x index file.
Chapter 2. HTTP Server Modules

2.14 Module ngx_http_fastcgi_module

2.14.1 Summary .................................................. 138
2.14.2 Example Configuration .................................. 138
2.14.3 Directives .................................................. 138
  fastcgi_bind .................................................. 138
  fastcgi_buffer_size .......................................... 139
  fastcgi_buffering ............................................ 139
  fastcgi_buffers .............................................. 139
  fastcgi_busy_buffers_size .................................. 140
  fastcgi_cache ............................................... 140
  fastcgi_cache_background_update .......................... 140
  fastcgi_cache_bypass ....................................... 140
  fastcgi_cache_key ........................................... 141
  fastcgi_cache_lock ......................................... 141
  fastcgi_cache_lock_age ..................................... 141
  fastcgi_cache_lock_timeout ............................... 141
  fastcgi_cache_max_range_offset .......................... 142
  fastcgi_cache_methods ..................................... 142
  fastcgi_cache_min_uses .................................... 142
  fastcgi_cache_path ........................................ 142
  fastcgi_cache_purge ....................................... 144
  fastcgi_cache_revalidate .................................. 145
  fastcgi_cache_use_stale .................................... 145
  fastcgi_cache_valid ....................................... 146
  fastcgi_catch_stderr ...................................... 146
  fastcgi_connect_timeout .................................. 147
  fastcgi_force_ranges ...................................... 147
  fastcgi_hide_header ...................................... 147
  fastcgi_ignore_client_abort ............................... 147
  fastcgi_ignore_headers ................................... 148
  fastcgi_index .............................................. 148
  fastcgi_intercept_errors .................................. 148
  fastcgi_keep_conn ........................................ 149
  fastcgi_limit_rate ........................................ 149
  fastcgi_max_temp_file_size ............................... 149
  fastcgi_next_upstream ..................................... 149
  fastcgi_next_upstream_timeout ........................... 150
  fastcgi_next_upstream_tries ............................. 151
  fastcgi_no_cache .......................................... 151
  fastcgi_param .............................................. 151
  fastcgi_pass ............................................... 152
  fastcgi_pass_header ...................................... 152
  fastcgi_pass_request_body ................................ 152
  fastcgi_pass_request_headers ............................ 153
  fastcgi_read_timeout ...................................... 153
2.14.1 Summary

The ngx_http_fastcgi_module module allows passing requests to a FastCGI server.

2.14.2 Example Configuration

```nginx
location / {
    fastcgi_pass localhost:9000;
    fastcgi_index index.php;
    fastcgi_param SCRIPT_FILENAME /home/www/scripts/php$fastcgi_script_name;
    fastcgi_param QUERY_STRING $query_string;
    fastcgi_param REQUEST_METHOD $request_method;
    fastcgi_param CONTENT_TYPE $content_type;
    fastcgi_param CONTENT_LENGTH $content_length;
}
```

2.14.3 Directives

**fastcgi_bind**

**Syntax:** `fastcgi_bind address [transparent] | off;`

**Default** —

**Context:** http, server, location

This directive appeared in version 0.8.22.

Makes outgoing connections to a FastCGI server originate from the specified local IP address with an optional port (1.11.2). Parameter value can contain variables (1.3.12). The special value `off` (1.3.12) cancels the effect of the `fastcgi_bind` directive inherited from the previous configuration level, which allows the system to auto-assign the local IP address and port.

The `transparent` parameter (1.11.0) allows outgoing connections to a FastCGI server originate from a non-local IP address, for example, from a real IP address of a client:

```nginx
fastcgi_bind $remote_addr transparent;
```
In order for this parameter to work, it is usually necessary to run nginx worker processes with the superuser privileges. On Linux it is not required (1.13.8) as if the transparent parameter is specified, worker processes inherit the CAP_NET_RAW capability from the master process. It is also necessary to configure kernel routing table to intercept network traffic from the FastCGI server.

**fastcgi_buffer_size**

*Syntax:*  
```
fastcgi_buffer_size size;
```

*Default:* 4k|8k

*Context:* http, server, location

Sets the size of the buffer used for reading the first part of the response received from the FastCGI server. This part usually contains a small response header. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform. It can be made smaller, however.

**fastcgi_buffering**

*Syntax:*  
```
fastcgi_buffering on | off;
```

*Default:* on

*Context:* http, server, location

This directive appeared in version 1.5.6.

Enables or disables buffering of responses from the FastCGI server. When buffering is enabled, nginx receives a response from the FastCGI server as soon as possible, saving it into the buffers set by the fastcgi_buffer_size and fastcgi_buffers directives. If the whole response does not fit into memory, a part of it can be saved to a temporary file on the disk. Writing to temporary files is controlled by the fastcgi_max_temp_file_size and fastcgi_temp_file_write_size directives.

When buffering is disabled, the response is passed to a client synchronously, immediately as it is received. nginx will not try to read the whole response from the FastCGI server. The maximum size of the data that nginx can receive from the server at a time is set by the fastcgi_buffer_size directive.

Buffering can also be enabled or disabled by passing “yes” or “no” in the X-Accel-Buffering response header field. This capability can be disabled using the fastcgi_ignore_headers directive.

**fastcgi_buffers**

*Syntax:*  
```
fastcgi_buffers number size;
```

*Default:* 8 4k|8k

*Context:* http, server, location

Sets the number and size of the buffers used for reading a response from the FastCGI server, for a single connection. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform.
fastcgi_busyBuffers_size

**Syntax:**  
`fastcgi_busyBuffers_size size;`

**Default:** 8k | 16k

**Context:** http, server, location

When buffering of responses from the FastCGI server is enabled, limits the total size of buffers that can be busy sending a response to the client while the response is not yet fully read. In the meantime, the rest of the buffers can be used for reading the response and, if needed, buffering part of the response to a temporary file. By default, size is limited by the size of two buffers set by the `fastcgi_buffer_size` and `fastcgi_buffers` directives.

fastcgi_cache

**Syntax:**  
`fastcgi_cache zone | off;`

**Default:** off

**Context:** http, server, location

Defines a shared memory zone used for caching. The same zone can be used in several places. Parameter value can contain variables (1.7.9). The off parameter disables caching inherited from the previous configuration level.

fastcgi_cache_background_update

**Syntax:**  
`fastcgi_cache_background_update on | off;`

**Default:** off

**Context:** http, server, location

This directive appeared in version 1.11.10.

Allows starting a background subrequest to update an expired cache item, while a stale cached response is returned to the client. Note that it is necessary to allow the usage of a stale cached response when it is being updated.

fastcgi_cache_bypass

**Syntax:**  
`fastcgi_cache_bypass string ...;`

**Default:** —

**Context:** http, server, location

Defines conditions under which the response will not be taken from a cache. If at least one value of the string parameters is not empty and is not equal to “0” then the response will not be taken from the cache:

```
fastcgi_cache_bypass $cookie_nocache $arg_nocache $arg_comment;
fastcgi_cache_bypass $http_pragma $http_authorization;
```

Can be used along with the `fastcgi_no_cache` directive.
fastcgi_cache_key

Syntax: `fastcgi_cache_key string;`  
Default —  
Context: http, server, location  

Defines a key for caching, for example:

```
fastcgi_cache_key localhost:9000$request_uri;
```

fastcgi_cache_lock

Syntax: `fastcgi_cache_lock on | off;`  
Default off  
Context: http, server, location  

This directive appeared in version 1.1.12.

When enabled, only one request at a time will be allowed to populate a new cache element identified according to the `fastcgi_cache_key` directive by passing a request to a FastCGI server. Other requests of the same cache element will either wait for a response to appear in the cache or the cache lock for this element to be released, up to the time set by the `fastcgi_cache_lock_timeout` directive.

fastcgi_cache_lock_age

Syntax: `fastcgi_cache_lock_age time;`  
Default 5s  
Context: http, server, location  

This directive appeared in version 1.7.8.

If the last request passed to the FastCGI server for populating a new cache element has not completed for the specified `time`, one more request may be passed to the FastCGI server.

fastcgi_cache_lock_timeout

Syntax: `fastcgi_cache_lock_timeout time;`  
Default 5s  
Context: http, server, location  

This directive appeared in version 1.1.12.

Sets a timeout for `fastcgi_cache_lock`. When the `time` expires, the request will be passed to the FastCGI server, however, the response will not be cached.

Before 1.7.8, the response could be cached.
fastcgi_cache_max_range_offset

**Syntax:**  
```
fastcgi_cache_max_range_offset number;
```

**Default:** —

**Context:** http, server, location

This directive appeared in version 1.11.6.

Sets an offset in bytes for byte-range requests. If the range is beyond the offset, the range request will be passed to the FastCGI server and the response will not be cached.

fastcgi_cache_methods

**Syntax:**  
```
fastcgi_cache_methods GET | HEAD | POST ...;
```

**Default:** GET HEAD

**Context:** http, server, location

This directive appeared in version 0.7.59.

If the client request method is listed in this directive then the response will be cached. “GET” and “HEAD” methods are always added to the list, though it is recommended to specify them explicitly. See also the fastcgi_no_cache directive.

fastcgi_cache_min_uses

**Syntax:**  
```
fastcgi_cache_min_uses number;
```

**Default:** 1

**Context:** http, server, location

Sets the number of requests after which the response will be cached.

fastcgi_cache_path

**Syntax:**  
```
fastcgi_cache_path path [levels=levels]
[use_temp_path=on|off] keys_zone=name:size [inactive=time]
[max_size=size] [min_free=size] [manager_files=number]
[manager_sleep=time] [manager_threshold=time]
[loader_files=number] [loader_sleep=time]
[loader_threshold=time] [purger=on|off]
[purger_files=number] [purger_sleep=time]
[purger_threshold=time];
```

**Default:** —

**Context:** http

Sets the path and other parameters of a cache. Cache data are stored in files. Both the key and file name in a cache are a result of applying the MD5 function to the proxied URL.

The levels parameter defines hierarchy levels of a cache: from 1 to 3, each level accepts values 1 or 2. For example, in the following configuration
file names in a cache will look like this:

```
/data/nginx/cache/c29/b7f54b2df7773722d382f4809d65029c
```

A cached response is first written to a temporary file, and then the file is renamed. Starting from version 0.8.9, temporary files and the cache can be put on different file systems. However, be aware that in this case a file is copied across two file systems instead of the cheap renaming operation. It is thus recommended that for any given location both cache and a directory holding temporary files are put on the same file system. A directory for temporary files is set based on the `use_temp_path` parameter (1.7.10). If this parameter is omitted or set to the value `on`, the directory set by the `fastcgi_temp_path` directive for the given location will be used. If the value is set to `off`, temporary files will be put directly in the cache directory.

In addition, all active keys and information about data are stored in a shared memory zone, whose `name` and `size` are configured by the `keys_zone` parameter. One megabyte zone can store about 8 thousand keys.

As part of commercial subscription, the shared memory zone also stores extended cache information, thus, it is required to specify a larger zone size for the same number of keys. For example, one megabyte zone can store about 4 thousand keys.

Cached data that are not accessed during the time specified by the `inactive` parameter get removed from the cache regardless of their freshness. By default, `inactive` is set to 10 minutes.

The special “cache manager” process monitors the maximum cache size set by the `max_size` parameter, and the minimum amount of free space set by the `min_free` (1.19.1) parameter on the file system with cache. When the size is exceeded or there is not enough free space, it removes the least recently used data. The data is removed in iterations configured by `manager_files`, `manager_threshold`, and `manager_sleep` parameters (1.11.5). During one iteration no more than `manager_files` items are deleted (by default, 100). The duration of one iteration is limited by the `manager_threshold` parameter (by default, 200 milliseconds). Between iterations, a pause configured by the `manager_sleep` parameter (by default, 50 milliseconds) is made.

A minute after the start the special “cache loader” process is activated. It loads information about previously cached data stored on file system into a cache zone. The loading is also done in iterations. During one iteration no more than `loader_files` items are loaded (by default, 100). Besides, the duration of one iteration is limited by the `loader_threshold` parameter (by default, 200 milliseconds). Between iterations, a pause configured by the `loader_sleep` parameter (by default, 50 milliseconds) is made.
Additionally, the following parameters are available as part of our commercial subscription:

- **purger=on|off**
  Instructs whether cache entries that match a wildcard key will be removed from the disk by the cache purger (1.7.12). Setting the parameter to on (default is off) will activate the “cache purger” process that permanently iterates through all cache entries and deletes the entries that match the wildcard key.

- **purger_files=number**
  Sets the number of items that will be scanned during one iteration (1.7.12). By default, purger_files is set to 10.

- **purger_threshold=number**
  Sets the duration of one iteration (1.7.12). By default, purger_threshold is set to 50 milliseconds.

- **purger_sleep=number**
  Sets a pause between iterations (1.7.12). By default, purger_sleep is set to 50 milliseconds.

In versions 1.7.3, 1.7.7, and 1.11.10 cache header format has been changed. Previously cached responses will be considered invalid after upgrading to a newer nginx version.

---

**fastcgi_cache_purge**

**Syntax:** `fastcgi_cache_purge string ...;

**Default** —

**Context:** http, server, location

This directive appeared in version 1.5.7.

Defines conditions under which the request will be considered a cache purge request. If at least one value of the string parameters is not empty and is not equal to “0” then the cache entry with a corresponding cache key is removed. The result of successful operation is indicated by returning the 204 No Content response.

If the cache key of a purge request ends with an asterisk (“*”), all cache entries matching the wildcard key will be removed from the cache. However, these entries will remain on the disk until they are deleted for either inactivity, or processed by the cache purger (1.7.12), or a client attempts to access them.

Example configuration:

```sh
fastcgi_cache_path /data/nginx/cache keys_zone=cache_zone:10m;
map $request_method $purge_method {
    PURGE 1;
    default 0;
}
server {
    ...
```
location / {
    fastcgi_pass backend;
    fastcgi_cache cache_zone;
    fastcgi_cache_key $uri;
    fastcgi_cache_purge $purge_method;
}

This functionality is available as part of our commercial subscription.

**fastcgi_cache_revalidate**

**Syntax:** `fastcgi_cache_revalidate` on | off;

**Default** off

**Context:** http, server, location

This directive appeared in version 1.5.7.

Enables revalidation of expired cache items using conditional requests with the If-Modified-Since and If-None-Match header fields.

**fastcgi_cache_use_stale**

**Syntax:** `fastcgi_cache_use_stale` error | timeout | invalid_header | updating | http_500 | http_503 | http_403 | http_404 | http_429 | off...;

**Default** off

**Context:** http, server, location

Determines in which cases a stale cached response can be used when an error occurs during communication with the FastCGI server. The directive’s parameters match the parameters of the `fastcgi_next_upstream` directive.

The `error` parameter also permits using a stale cached response if a FastCGI server to process a request cannot be selected.

Additionally, the `updating` parameter permits using a stale cached response if it is currently being updated. This allows minimizing the number of accesses to FastCGI servers when updating cached data.

Using a stale cached response can also be enabled directly in the response header for a specified number of seconds after the response became stale (1.11.10). This has lower priority than using the directive parameters.

- The “stale-while-revalidate” extension of the Cache-Control header field permits using a stale cached response if it is currently being updated.

- The “stale-if-error” extension of the Cache-Control header field permits using a stale cached response in case of an error.

To minimize the number of accesses to FastCGI servers when populating a new cache element, the `fastcgi_cache_lock` directive can be used.
fastcgi_cache_valid

**Syntax:** `fastcgi_cache_valid [code ...] time;`

**Default** —
**Context:** http, server, location

Sets caching time for different response codes. For example, the following directives

```
fastcgi_cache_valid 200 302 10m;
fastcgi_cache_valid 404 1m;
```

set 10 minutes of caching for responses with codes 200 and 302 and 1 minute for responses with code 404.

If only caching time is specified

```
fastcgi_cache_valid 5m;
```

then only 200, 301, and 302 responses are cached.

In addition, the any parameter can be specified to cache any responses:

```
fastcgi_cache_valid 200 302 10m;
fastcgi_cache_valid 301 1h;
fastcgi_cache_valid any 1m;
```

Parameters of caching can also be set directly in the response header. This has higher priority than setting of caching time using the directive.

- The X-Accel-Expires header field sets caching time of a response in seconds. The zero value disables caching for a response. If the value starts with the @ prefix, it sets an absolute time in seconds since Epoch, up to which the response may be cached.

- If the header does not include the X-Accel-Expires field, parameters of caching may be set in the header fields Expires or Cache-Control.

- If the header includes the Set-Cookie field, such a response will not be cached.

- If the header includes the Vary field with the special value “*”, such a response will not be cached (1.7.7). If the header includes the Vary field with another value, such a response will be cached taking into account the corresponding request header fields (1.7.7).

Processing of one or more of these response header fields can be disabled using the `fastcgi_ignore_headers` directive.

**fastcgi_catch_stderr**

**Syntax:** `fastcgi_catch_stderr string;`

**Default** —
**Context:** http, server, location
Sets a string to search for in the error stream of a response received from a FastCGI server. If the string is found then it is considered that the FastCGI server has returned an invalid response. This allows handling application errors in nginx, for example:

```
location /php/ {
    fastcgi_pass backend:9000;
    ...
    fastcgi_catch_stderr "PHP Fatal error";
    fastcgi_next_upstream error timeout invalid_header;
}
```

**fastcgi_connect_timeout**

**Syntax:** `fastcgi_connect_timeout time;`

**Default:** 60s

**Context:** http, server, location

Defines a timeout for establishing a connection with a FastCGI server. It should be noted that this timeout cannot usually exceed 75 seconds.

**fastcgi_force_ranges**

**Syntax:** `fastcgi_force_ranges on | off;`

**Default:** off

**Context:** http, server, location

This directive appeared in version 1.7.7.

Enables byte-range support for both cached and uncached responses from the FastCGI server regardless of the `Accept-Ranges` field in these responses.

**fastcgi_hide_header**

**Syntax:** `fastcgi_hide_header field;`

**Default:**

**Context:** http, server, location

By default, nginx does not pass the header fields `Status` and `X-Accel-...` from the response of a FastCGI server to a client. The `fastcgi_hide_header` directive sets additional fields that will not be passed. If, on the contrary, the passing of fields needs to be permitted, the `fastcgi_pass_header` directive can be used.

**fastcgi_ignore_client_abort**

**Syntax:** `fastcgi_ignore_client_abort on | off;`

**Default:** off

**Context:** http, server, location

Determines whether the connection with a FastCGI server should be closed when a client closes the connection without waiting for a response.
fastcgi_ignore_headers

Syntax:  fastcgi_ignore_headers field ...;

Default —

Context: http, server, location

Disables processing of certain response header fields from the FastCGI server. The following fields can be ignored: X-Accel-Redirect, X-Accel-Expires, X-Accel-Limit-Rate (1.1.6), X-Accel-Buffering (1.1.6), X-Accel-Charset (1.1.6), Expires, Cache-Control, Set-Cookie (0.8.44), and Vary (1.7.7).

If not disabled, processing of these header fields has the following effect:

- X-Accel-Expires, Expires, Cache-Control, Set-Cookie, and Vary set the parameters of response caching;
- X-Accel-Redirect performs an internal redirect to the specified URI;
- X-Accel-Limit-Rate sets the rate limit for transmission of a response to a client;
- X-Accel-Buffering enables or disables buffering of a response;
- X-Accel-Charset sets the desired charset of a response.

fastcgi_index

Syntax:  fastcgi_index name;

Default —

Context: http, server, location

Sets a file name that will be appended after a URI that ends with a slash, in the value of the $fastcgi_script_name variable. For example, with these settings

```bash
fastcgi_index index.php;
fastcgi_param SCRIPT_FILENAME /home/www/scripts/php$fastcgi_script_name;
```

and the “/page.php” request, the SCRIPT_FILENAME parameter will be equal to “/home/www/scripts/php/page.php”, and with the “/” request it will be equal to “/home/www/scripts/php/index.php”.

fastcgi_intercept_errors

Syntax:  fastcgi_intercept_errors on | off;

Default off

Context: http, server, location

Determines whether FastCGI server responses with codes greater than or equal to 300 should be passed to a client or be intercepted and redirected to nginx for processing with the error_page directive.
fastcgi_keep_conn

Syntax:  fastcgi_keep_conn on | off;
Default  off
Context: http, server, location
This directive appeared in version 1.1.4.

By default, a FastCGI server will close a connection right after sending the response. However, when this directive is set to the value on, nginx will instruct a FastCGI server to keep connections open. This is necessary, in particular, for keepalive connections to FastCGI servers to function.

fastcgi_limit_rate

Syntax:  fastcgi_limit_rate rate;
Default  0
Context: http, server, location
This directive appeared in version 1.7.7.

Limits the speed of reading the response from the FastCGI server. The rate is specified in bytes per second. The zero value disables rate limiting. The limit is set per request, and so if nginx simultaneously opens two connections to the FastCFI server, the overall rate will be twice as much as the specified limit. The limitation works only if buffering of responses from the FastCGI server is enabled.

fastcgi_max_temp_file_size

Syntax:  fastcgi_max_temp_file_size size;
Default  1024m
Context: http, server, location

When buffering of responses from the FastCGI server is enabled, and the whole response does not fit into the buffers set by the fastcgi_buffer_size and fastcgi_buffers directives, a part of the response can be saved to a temporary file. This directive sets the maximum size of the temporary file. The size of data written to the temporary file at a time is set by the fastcgi_temp_file_write_size directive.

The zero value disables buffering of responses to temporary files.

This restriction does not apply to responses that will be cached or stored on disk.

fastcgi_next_upstream

Syntax:  fastcgi_next_upstream error | timeout | invalid_header | http_500 | http_503 | http_403 | http_404 | http_429 | non_idempotent | off ...;
Default  error timeout
Context: http, server, location
Specifications in which cases a request should be passed to the next server:

- **error**
  - an error occurred while establishing a connection with the server, passing a request to it, or reading the response header;

- **timeout**
  - a timeout has occurred while establishing a connection with the server, passing a request to it, or reading the response header;

- **invalid_header**
  - a server returned an empty or invalid response;

- **http_500**
  - a server returned a response with the code 500;

- **http_503**
  - a server returned a response with the code 503;

- **http_403**
  - a server returned a response with the code 403;

- **http_404**
  - a server returned a response with the code 404;

- **http_429**
  - a server returned a response with the code 429 (1.11.13);

- **non_idempotent**
  - normally, requests with a non-idempotent method (POST, LOCK, PATCH) are not passed to the next server if a request has been sent to an upstream server (1.9.13); enabling this option explicitly allows retrying such requests;

- **off**
  - disables passing a request to the next server.

One should bear in mind that passing a request to the next server is only possible if nothing has been sent to a client yet. That is, if an error or timeout occurs in the middle of the transferring of a response, fixing this is impossible.

The directive also defines what is considered an unsuccessful attempt of communication with a server. The cases of **error**, **timeout** and **invalid_header** are always considered unsuccessful attempts, even if they are not specified in the directive. The cases of **http_500**, **http_503**, and **http_429** are considered unsuccessful attempts only if they are specified in the directive. The cases of **http_403** and **http_404** are never considered unsuccessful attempts.

Passing a request to the next server can be limited by the number of tries and by **time**.

**fastcgi_next_upstream_timeout**

**Syntax:**

`fastcgi_next_upstream_timeout time;`

**Default:** 0

**Context:** http, server, location

This directive appeared in version 1.7.5.
Limits the time during which a request can be passed to the next server. The 0 value turns off this limitation.

**fastcgi_next_upstream_tries**

**Syntax:** `fastcgi_next_upstream_tries number;`

**Default:** 0

**Context:** http, server, location

This directive appeared in version 1.7.5.

Limits the number of possible tries for passing a request to the next server. The 0 value turns off this limitation.

**fastcgi_no_cache**

**Syntax:** `fastcgi_no_cache string...;`

**Default:** —

**Context:** http, server, location

Defines conditions under which the response will not be saved to a cache. If at least one value of the string parameters is not empty and is not equal to “0” then the response will not be saved:

```
fastcgi_no_cache $cookie_nocache $arg_nocache $arg_comment;
fastcgi_no_cache $http_pragma $http_authorization;
```

Can be used along with the `fastcgi_cache_bypass` directive.

**fastcgi_param**

**Syntax:** `fastcgi_param parameter value [if_not_empty];`

**Default:** —

**Context:** http, server, location

Sets a parameter that should be passed to the FastCGI server. The value can contain text, variables, and their combination. These directives are inherited from the previous configuration level if and only if there are no `fastcgi_param` directives defined on the current level.

The following example shows the minimum required settings for PHP:

```
fastcgi_param SCRIPT_FILENAME /home/www/scripts/php$fastcgi_script_name;
fastcgi_param QUERY_STRING $query_string;
```

The `SCRIPT_FILENAME` parameter is used in PHP for determining the script name, and the `QUERY_STRING` parameter is used to pass request parameters.

For scripts that process POST requests, the following three parameters are also required:

```
fastcgi_param REQUEST_METHOD $request_method;
fastcgi_param CONTENT_TYPE $content_type;
```
fastcgi_param CONTENT_LENGTH $content_length;

If PHP was built with the --enable-force-cgi-redirect configuration parameter, the REDIRECT_STATUS parameter should also be passed with the value “200”:

fastcgi_param REDIRECT_STATUS 200;

If the directive is specified with if_not_empty (1.1.11) then such a parameter will be passed to the server only if its value is not empty:

fastcgi_param HTTPS $https if_not_empty;

fastcgi_pass

**Syntax:** fastcgi_pass address;

**Default:** —

**Context:** location, if in location

Sets the address of a FastCGI server. The address can be specified as a domain name or IP address, and a port:

fastcgi_pass localhost:9000;

or as a UNIX-domain socket path:

fastcgi_pass unix:/tmp/fastcgi.socket;

If a domain name resolves to several addresses, all of them will be used in a round-robin fashion. In addition, an address can be specified as a server group.

Parameter value can contain variables. In this case, if an address is specified as a domain name, the name is searched among the described server groups, and, if not found, is determined using a resolver.

fastcgi_pass_header

**Syntax:** fastcgi_pass_header field;

**Default:** —

**Context:** http, server, location

Permits passing otherwise disabled header fields from a FastCGI server to a client.

fastcgi_pass_request_body

**Syntax:** fastcgi_pass_request_body on | off;

**Default:** on

**Context:** http, server, location
Indicates whether the original request body is passed to the FastCGI server. See also the `fastcgi_pass_request_headers` directive.

**fastcgi_pass_request_headers**

Syntax: `fastcgi_pass_request_headers on | off;`

Default: on

Context: http, server, location

Indicates whether the header fields of the original request are passed to the FastCGI server. See also the `fastcgi_pass_request_body` directive.

**fastcgi_read_timeout**

Syntax: `fastcgi_read_timeout time;`

Default: 60s

Context: http, server, location

Defines a timeout for reading a response from the FastCGI server. The timeout is set only between two successive read operations, not for the transmission of the whole response. If the FastCGI server does not transmit anything within this time, the connection is closed.

**fastcgi_request_buffering**

Syntax: `fastcgi_request_buffering on | off;`

Default: on

Context: http, server, location

This directive appeared in version 1.7.11.

Enables or disables buffering of a client request body.

When buffering is enabled, the entire request body is read from the client before sending the request to a FastCGI server.

When buffering is disabled, the request body is sent to the FastCGI server immediately as it is received. In this case, the request cannot be passed to the next server if nginx already started sending the request body.

**fastcgi_send_lowat**

Syntax: `fastcgi_send_lowat size;`

Default: 0

Context: http, server, location

If the directive is set to a non-zero value, nginx will try to minimize the number of send operations on outgoing connections to a FastCGI server by using either `NOTE_LOWAT` flag of the `kqueue` method, or the `SO_SNDBUF` socket option, with the specified `size`.

This directive is ignored on Linux, Solaris, and Windows.
fastcgi_send_timeout

**Syntax:** `fastcgi_send_timeout time;`
**Default:** 60s
**Context:** http, server, location

Sets a timeout for transmitting a request to the FastCGI server. The timeout is set only between two successive write operations, not for the transmission of the whole request. If the FastCGI server does not receive anything within this time, the connection is closed.

`fastcgi_socket_keepalive`

**Syntax:** `fastcgi_socket_keepalive on | off;`
**Default:** off
**Context:** http, server, location

This directive appeared in version 1.15.6.

Configures the “TCP keepalive” behavior for outgoing connections to a FastCGI server. By default, the operating system’s settings are in effect for the socket. If the directive is set to the value “on”, the SO_KEEPALIVE socket option is turned on for the socket.

`fastcgi_split_path_info`

**Syntax:** `fastcgi_split_path_info regex;`
**Default:** —
**Context:** location

Defines a regular expression that captures a value for the `$fastcgi_path_info` variable. The regular expression should have two captures: the first becomes a value of the `$fastcgi_script_name` variable, the second becomes a value of the `$fastcgi_path_info` variable. For example, with these settings

```
location ~ ^(.+\./php)(.*$) {
    fastcgi_split_path_info ^(.+\./php)(.*)$;
    fastcgi_param SCRIPT_FILENAME /path/to/php$fastcgi_script_name;
    fastcgi_param PATH_INFO $fastcgi_path_info;
}
```

and the “/show.php/article/0001” request, the SCRIPT_FILENAME parameter will be equal to “/path/to/php/show.php”, and the PATH_INFO parameter will be equal to “/article/0001”.

`fastcgi_store`

**Syntax:** `fastcgi_store on | off | string;`
**Default:** off
**Context:** http, server, location

Enables saving of files to a disk. The on parameter saves files with paths corresponding to the directives alias or root. The off parameter disables
saving of files. In addition, the file name can be set explicitly using the \textit{string} with variables:

\begin{verbatim}
fastcgi_store /data/www$original_uri;
\end{verbatim}

The modification time of files is set according to the received \texttt{Last-Modified} response header field. The response is first written to a temporary file, and then the file is renamed. Starting from version 0.8.9, temporary files and the persistent store can be put on different file systems. However, be aware that in this case a file is copied across two file systems instead of the cheap renaming operation. It is thus recommended that for any given location both saved files and a directory holding temporary files, set by the \texttt{fastcgi_temp_path} directive, are put on the same file system.

This directive can be used to create local copies of static unchangeable files, e.g.:

\begin{verbatim}
location /images/ { 
    root /data/www;
    error_page 404 = /fetch$uri;
}
location /fetch/ { 
    internal;
    fastcgi_pass backend:9000;
    ...
    fastcgi_store on;
    fastcgi_store_access user:rw group:rw all:r;
    fastcgi_temp_path /data/temp;
    alias /data/www/;
}
\end{verbatim}

\textbf{fastcgi_store_access}

\textbf{Syntax}: \texttt{fastcgi_store_access users:permissions ...;}

\textbf{Default}: user:rw

\textbf{Context}: http, server, location

Sets access permissions for newly created files and directories, e.g.:

\begin{verbatim}
fastcgi_store_access user:rw group:rw all:r;
\end{verbatim}

If any group or all access permissions are specified then \texttt{user} permissions may be omitted:

\begin{verbatim}
fastcgi_store_access group:rw all:r;
\end{verbatim}
fastcgi_temp_file_write_size

**Syntax:** `fastcgi_temp_file_write_size size;`

**Default:** 8k | 16k

**Context:** http, server, location

Limits the `size` of data written to a temporary file at a time, when buffering of responses from the FastCGI server to temporary files is enabled. By default, `size` is limited by two buffers set by the `fastcgi_buffer_size` and `fastcgi_buffers` directives. The maximum size of a temporary file is set by the `fastcgi_max_temp_file_size` directive.

fastcgi_temp_path

**Syntax:** `fastcgi_temp_path path [level1 [level2 [level3]]];`

**Default:** `fastcgi_temp`

**Context:** http, server, location

Defines a directory for storing temporary files with data received from FastCGI servers. Up to three-level subdirectory hierarchy can be used underneath the specified directory. For example, in the following configuration:

```plaintext
fastcgi_temp_path /spool/nginx/fastcgi_temp 1 2;
```

a temporary file might look like this:

```
/spool/nginx/fastcgi_temp/7/45/00000123457
```

See also the `use_temp_path` parameter of the `fastcgi_cache_path` directive.

### 2.14.4 Parameters Passed to a FastCGI Server

HTTP request header fields are passed to a FastCGI server as parameters. In applications and scripts running as FastCGI servers, these parameters are usually made available as environment variables. For example, the User-Agent header field is passed as the `HTTP_USER_AGENT` parameter. In addition to HTTP request header fields, it is possible to pass arbitrary parameters using the `fastcgi_param` directive.

### 2.14.5 Embedded Variables

The `ngx_http_fastcgi_module` module supports embedded variables that can be used to set parameters using the `fastcgi_param` directive:

- `$fastcgi_script_name`
  
  request URI or, if a URI ends with a slash, request URI with an index file name configured by the `fastcgi_index` directive appended to it.
This variable can be used to set the SCRIPT_FILENAME and PATH_TRANSLATED parameters that determine the script name in PHP. For example, for the “/info/” request with the following directives:

```
fastcgi_index index.php;
fastcgi_param SCRIPT_FILENAME /home/www/scripts/php$fastcgi_script_name;
```

the SCRIPT_FILENAME parameter will be equal to “/home/www/scripts/php/info/index.php”.
When using the fastcgi_split_path_info directive, the $fastcgi_script_name variable equals the value of the first capture set by the directive.

$fastcgi_path_info
the value of the second capture set by the fastcgi_split_path_info directive. This variable can be used to set the PATH_INFO parameter.
2.15 Module ngx_http_flv_module

2.15.1 Summary

The `ngx_http_flv_module` provides pseudo-streaming server-side support for Flash Video (FLV) files.

It handles requests with the `start` argument in the request URI's query string specially, by sending back the contents of a file starting from the requested byte offset and with the prepended FLV header.

This module is not built by default, it should be enabled with the `--with-http_flv_module` configuration parameter.

2.15.2 Example Configuration

```nginx
location ~ \.flv$ {
    flv;
}
```

2.15.3 Directives

`flv`

**Syntax:** `flv;`

**Default:** —

**Context:** location

Turns on module processing in a surrounding location.
2.16 Module ngx_http_geo_module

2.16.1 Summary

The ngx_http_geo_module module creates variables with values depending on the client IP address.

2.16.2 Example Configuration

```nginx
geo $geo {
    default 0;
    127.0.0.1 2;
    192.168.1.0/24 1;
    10.1.0.0/16 1;
    ::1 2;
    2001:0db8::/32 1;
}
```

2.16.3 Directives

geo

**Syntax:** `geo [address] $variable { ... }

**Default:**
- Context: `http`

Describes the dependency of values of the specified variable on the client IP address. By default, the address is taken from the `$remote_addr` variable, but it can also be taken from another variable (0.7.27), for example:

```nginx
geo $arg_remote_addr $geo {
    ...
}
```

Since variables are evaluated only when used, the mere existence of even a large number of declared “geo” variables does not cause any extra costs for request processing.

If the value of a variable does not represent a valid IP address then the “255.255.255.255” address is used.

Addresses are specified either as prefixes in CIDR notation (including individual addresses) or as ranges (0.7.23).
IPv6 prefixes are supported starting from versions 1.3.10 and 1.2.7.

The following special parameters are also supported:

**delete**
deletes the specified network (0.7.23).

**default**
a value set to the variable if the client address does not match any of the specified addresses. When addresses are specified in CIDR notation, “0.0.0.0/0” and “::/0” can be used instead of default. When default is not specified, the default value will be an empty string.

**include**
includes a file with addresses and values. There can be several inclusions.

**proxy**
defines trusted addresses (0.8.7, 0.7.63). When a request comes from a trusted address, an address from the X-Forwarded-For request header field will be used instead. In contrast to the regular addresses, trusted addresses are checked sequentially.

Trusted IPv6 addresses are supported starting from versions 1.3.0 and 1.2.1.

**proxy_recursive**
enables recursive address search (1.3.0, 1.2.1). If recursive search is disabled then instead of the original client address that matches one of the trusted addresses, the last address sent in X-Forwarded-For will be used. If recursive search is enabled then instead of the original client address that matches one of the trusted addresses, the last non-trusted address sent in X-Forwarded-For will be used.

**ranges**
indicates that addresses are specified as ranges (0.7.23). This parameter should be the first. To speed up loading of a geo base, addresses should be put in ascending order.

Example:

```plaintext
geo $country {
    default ZZ;
    include conf/geo.conf;
    delete 127.0.0.0/16;
    proxy 192.168.100.0/24;
    proxy 2001:0db8::/32;
    127.0.0.0/24 US;
    127.0.0.1/32 RU;
    10.1.0.0/16 RU;
    192.168.1.0/24 UK;
}
```

The `conf/geo.conf` file could contain the following lines:
A value of the most specific match is used. For example, for the 127.0.0.1 address the value “RU” will be chosen, not “US”.

Example with ranges:

```
geo $country {
    ranges;
    default ZZ;
    127.0.0.0-127.0.0.0 US;
    127.0.0.1-127.0.0.1 RU;
    127.0.0.1-127.0.0.255 US;
    10.1.0.0-10.1.255.255 RU;
    192.168.1.0-192.168.1.255 UK;
}
```
2.17 Module ngx_http_geoip_module

2.17.1 Summary

The ngx_http_geoip_module module (0.8.6+) creates variables with values depending on the client IP address, using the precompiled MaxMind databases.

When using the databases with IPv6 support (1.3.12, 1.2.7), IPv4 addresses are looked up as IPv4-mapped IPv6 addresses.

This module is not built by default, it should be enabled with the `--with-http_geoip_module` configuration parameter.

This module requires the MaxMind GeoIP library.

2.17.2 Example Configuration

```
http {
    geoip_country GeoIP.dat;
    geoip_city GeoLiteCity.dat;
    geoip_proxy 192.168.100.0/24;
    geoip_proxy 2001:0db8::/32;
    geoip_proxy_recursive on;
    ...
}
```

2.17.3 Directives

**geoip_country**

**Syntax:** `geoip_country file;`

**Default** —

**Context:** http

Specifies a database used to determine the country depending on the client IP address. The following variables are available when using this database:

`$geoip_country_code`

two-letter country code, for example, "RU", "US".

`$geoip_country_code3`

three-letter country code, for example, "RUS", "USA".
$geoip_country_name
  country name, for example, “Russian Federation”, “United States”.

geoip_city

Syntax:   geoip_city file;
 Default —
 Context: http

Specifies a database used to determine the country, region, and city depending on the client IP address. The following variables are available when using this database:

$geoip_area_code
  telephone area code (US only).

This variable may contain outdated information since the corresponding database field is deprecated.

$geoip_city_continent_code
  two-letter continent code, for example, “EU”, “NA”.
$geoip_city_country_code
  two-letter country code, for example, “RU”, “US”.
$geoip_city_country_code3
  three-letter country code, for example, “RUS”, “USA”.
$geoip_city_country_name
  country name, for example, “Russian Federation”, “United States”.
$geoip_dma_code
  DMA region code in US (also known as “metro code”), according to the geotargeting in Google AdWords API.
$geoip_latitude
  latitude.
$geoip_longitude
  longitude.
$geoip_region
  two-symbol country region code (region, territory, state, province, federal land and the like), for example, “48”, “DC”.
$geoip_region_name
  country region name (region, territory, state, province, federal land and the like), for example, “Moscow City”, “District of Columbia”.
$geoip_city
  city name, for example, “Moscow”, “Washington”.
$geoip_postal_code
  postal code.
### geoip_org

**Syntax:**  
```
geoip_org file;
```

**Default** —

**Context:** http

This directive appeared in version 1.0.3.

Specifies a database used to determine the organization depending on the client IP address. The following variable is available when using this database:

\$geoip_org

organization name, for example, “The University of Melbourne”.

### geoip_proxy

**Syntax:**  
```
geoip_proxy address | CIDR;
```

**Default** —

**Context:** http

This directive appeared in versions 1.3.0 and 1.2.1.

Defines trusted addresses. When a request comes from a trusted address, an address from the X-Forwarded-For request header field will be used instead.

### geoip_proxy_recursive

**Syntax:**  
```
geoip_proxy_recursive on | off;
```

**Default**  
off

**Context:** http

This directive appeared in versions 1.3.0 and 1.2.1.

If recursive search is disabled then instead of the original client address that matches one of the trusted addresses, the last address sent in X-Forwarded-For will be used. If recursive search is enabled then instead of the original client address that matches one of the trusted addresses, the last non-trusted address sent in X-Forwarded-For will be used.
2.18 Module ngx_http_grpc_module

2.18.1 Summary

The ngx_http_grpc_module module allows passing requests to a gRPC server (1.13.10). The module requires the ngx_http_v2_module module.

2.18.2 Example Configuration

```plaintext
server {
    listen 9000;

    http2 on;

    location /
    {
        grpc_pass 127.0.0.1:9000;
    }
```

Nginx, Inc.  p.165 of 542
2.18.3 Directives

**grpc_bind**

Syntax: \texttt{grpc\_bind} \texttt{address [transparent ] | off;}

Default —

Context: http, server, location

Makes outgoing connections to a gRPC server originate from the specified local IP address with an optional port. Parameter value can contain variables. The special value off cancels the effect of the grpc_bind directive inherited from the previous configuration level, which allows the system to auto-assign the local IP address and port.

The transparent parameter allows outgoing connections to a gRPC server originate from a non-local IP address, for example, from a real IP address of a client:

\begin{verbatim}
grpc_bind $remote_addr transparent;
\end{verbatim}

In order for this parameter to work, it is usually necessary to run nginx worker processes with the superuser privileges. On Linux it is not required as if the transparent parameter is specified, worker processes inherit the CAP_-NET_RAW capability from the master process. It is also necessary to configure kernel routing table to intercept network traffic from the gRPC server.

**grpc_buffer_size**

Syntax: \texttt{grpc\_buffer\_size} \texttt{size;}

Default 4k | 8k

Context: http, server, location

Sets the size of the buffer used for reading the response received from the gRPC server. The response is passed to the client synchronously, as soon as it is received.

**grpc_connect_timeout**

Syntax: \texttt{grpc\_connect\_timeout} \texttt{time;}

Default 60s

Context: http, server, location

Defines a timeout for establishing a connection with a gRPC server. It should be noted that this timeout cannot usually exceed 75 seconds.
CHAPTER 2. HTTP SERVER MODULES

2.18. MODULE NGX_HTTP_GRPC_MODULE

grpc_hide_header

Syntax:  grpc_hide_header field;
Default —
Context: http, server, location

By default, nginx does not pass the header fields Date, Server, and X-Accel-... from the response of a gRPC server to a client. The grpc_hide_header directive sets additional fields that will not be passed. If, on the contrary, the passing of fields needs to be permitted, the grpc_pass_header directive can be used.

grpc_ignore_headers

Syntax:  grpc_ignore_headers field ...;
Default —
Context: http, server, location

Disables processing of certain response header fields from the gRPC server. The following fields can be ignored: X-Accel-Redirect and X-Accel-Charset.
If not disabled, processing of these header fields has the following effect:

- X-Accel-Redirect performs an internal redirect to the specified URI;
- X-Accel-Charset sets the desired charset of a response.

grpc_intercept_errors

Syntax:  grpc_intercept_errors on | off;
Default off
Context: http, server, location

Determines whether gRPC server responses with codes greater than or equal to 300 should be passed to a client or be intercepted and redirected to nginx for processing with the error_page directive.

grpc_next_upstream

Syntax:  grpc_next_upstream error | timeout | invalid_header |
http_500 | http_502 | http_503 | http_504 | http_403 |
http_404 | http_429 | non_idempotent | off ...;
Default error timeout
Context: http, server, location

Specifies in which cases a request should be passed to the next server:

error
an error occurred while establishing a connection with the server, passing a request to it, or reading the response header;
timeout
   a timeout has occurred while establishing a connection with the server,
   passing a request to it, or reading the response header;
invalid_header
   a server returned an empty or invalid response;
http_500
   a server returned a response with the code 500;
http_502
   a server returned a response with the code 502;
http_503
   a server returned a response with the code 503;
http_504
   a server returned a response with the code 504;
http_403
   a server returned a response with the code 403;
http_404
   a server returned a response with the code 404;
http_429
   a server returned a response with the code 429;
non_idempotent
   normally, requests with a non-idempotent method (POST, LOCK, PATCH)
   are not passed to the next server if a request has been sent to an upstream
   server; enabling this option explicitly allows retrying such requests;
off
   disabling passing a request to the next server.

One should bear in mind that passing a request to the next server is only
possible if nothing has been sent to a client yet. That is, if an error or timeout
occurs in the middle of the transferring of a response, fixing this is impossible.

The directive also defines what is considered an unsuccessful attempt of
communication with a server. The cases of error, timeout and invalid_header
are always considered unsuccessful attempts, even if they are not
specified in the directive. The cases of http_500, http_502, http_503,
http_504, and http_429 are considered unsuccessful attempts only if they
are specified in the directive. The cases of http_403 and http_404 are
never considered unsuccessful attempts.

Passing a request to the next server can be limited by the number of tries
and by time.

grpc_next_upstream_timeout

Syntax:  grpc_next_upstream_timeout time;
Default  0
Context:  http, server, location

Limits the time during which a request can be passed to the next server. The 0 value turns off this limitation.
**grpc_next_upstream_tries**

Syntax: `grpc_next_upstream_tries number;`

Default: 0

Context: http, server, location

Limits the number of possible tries for passing a request to the next server. The 0 value turns off this limitation.

**grpc_pass**

Syntax: `grpc_pass address;`

Default: —

Context: location, if in location

Sets the gRPC server address. The address can be specified as a domain name or IP address, and a port:

```
grpc_pass localhost:9000;
```

or as a UNIX-domain socket path:

```
grpc_pass unix:/tmp/grpc.socket;
```

Alternatively, the “grpc://” scheme can be used:

```
grpc_pass grpc://127.0.0.1:9000;
```

To use gRPC over SSL, the “grpcs://” scheme should be used:

```
grpc_pass grpcs://127.0.0.1:443;
```

If a domain name resolves to several addresses, all of them will be used in a round-robin fashion. In addition, an address can be specified as a server group.

Parameter value can contain variables (1.17.8). In this case, if an address is specified as a domain name, the name is searched among the described server groups, and, if not found, is determined using a resolver.

**grpc_pass_header**

Syntax: `grpc_pass_header field;`

Default: —

Context: http, server, location

Permits passing otherwise disabled header fields from a gRPC server to a client.
**grpc_read_timeout**

Syntax: `grpc_read_timeout time;`
Default: 60s
Context: http, server, location

Defines a timeout for reading a response from the gRPC server. The timeout is set only between two successive read operations, not for the transmission of the whole response. If the gRPC server does not transmit anything within this time, the connection is closed.

**grpc_send_timeout**

Syntax: `grpc_send_timeout time;`
Default: 60s
Context: http, server, location

Sets a timeout for transmitting a request to the gRPC server. The timeout is set only between two successive write operations, not for the transmission of the whole request. If the gRPC server does not receive anything within this time, the connection is closed.

**grpc_set_header**

Syntax: `grpc_set_header field value;`
Default: Content-Length $content_length
Context: http, server, location

Allows redefining or appending fields to the request header passed to the gRPC server. The value can contain text, variables, and their combinations. These directives are inherited from the previous configuration level if and only if there are no `grpc_set_header` directives defined on the current level.

If the value of a header field is an empty string then this field will not be passed to a gRPC server:

```
grpc_set_header Accept-Encoding "";
```

**grpc_socket_keepalive**

Syntax: `grpc_socket_keepalive on | off;`
Default: off
Context: http, server, location

This directive appeared in version 1.15.6.

Configures the “TCP keepalive” behavior for outgoing connections to a gRPC server. By default, the operating system’s settings are in effect for the socket. If the directive is set to the value “on”, the SO_KEEPALIVE socket option is turned on for the socket.
grpc_ssl_certificate

Syntax:  grpc_ssl_certificate file;
Default —
Context: http, server, location

Specifies a file with the certificate in the PEM format used for authentication to a gRPC SSL server.
Since version 1.21.0, variables can be used in the file name.

grpc_ssl_certificate_key

Syntax:  grpc_ssl_certificate_key file;
Default —
Context: http, server, location

Specifies a file with the secret key in the PEM format used for authentication to a gRPC SSL server.
The value engine:name:id can be specified instead of the file, which loads a secret key with a specified id from the OpenSSL engine name.
Since version 1.21.0, variables can be used in the file name.

grpc_ssl_ciphers

Syntax:  grpc_ssl_ciphers ciphers;
Default DEFAULT
Context: http, server, location

Specifies the enabled ciphers for requests to a gRPC SSL server. The ciphers are specified in the format understood by the OpenSSL library.
The full list can be viewed using the “openssl ciphers” command.

grpc_ssl_conf_command

Syntax:  grpc_ssl_conf_command name value;
Default —
Context: http, server, location
This directive appeared in version 1.19.4.

Sets arbitrary OpenSSL configuration commands when establishing a connection with the gRPC SSL server.
The directive is supported when using OpenSSL 1.0.2 or higher.

Several grpc_ssl_conf_command directives can be specified on the same level. These directives are inherited from the previous configuration level if and only if there are no grpc_ssl_conf_command directives defined on the current level.
Note that configuring OpenSSL directly might result in unexpected behavior.

**grpc_ssl_crl**

**Syntax:** `grpc_ssl_crl file;

**Default:** —

**Context:** http, server, location

Specifies a file with revoked certificates (CRL) in the PEM format used to verify the certificate of the gRPC SSL server.

**grpc_ssl_name**

**Syntax:** `grpc_ssl_name name;

**Default:** host from grpc_pass

**Context:** http, server, location

Allows overriding the server name used to verify the certificate of the gRPC SSL server and to be passed through SNI when establishing a connection with the gRPC SSL server.

By default, the host part from grpc_pass is used.

**grpc_ssl_password_file**

**Syntax:** `grpc_ssl_password_file file;

**Default:** —

**Context:** http, server, location

Specifies a file with passphrases for secret keys where each passphrase is specified on a separate line. Passphrases are tried in turn when loading the key.

**grpc_ssl_protocols**

**Syntax:** `grpc_ssl_protocols [SSLv2] [SSLv3] [TLSv1] [TLSv1.1] [TLSv1.2] [TLSv1.3];

**Default:** TLSv1 TLSv1.1 TLSv1.2 TLSv1.3

**Context:** http, server, location

Enables the specified protocols for requests to a gRPC SSL server.

The TLSv1.3 parameter is used by default since 1.23.4.

**grpc_ssl_server_name**

**Syntax:** `grpc_ssl_server_name on | off;

**Default:** off

**Context:** http, server, location
Enables or disables passing of the server name through TLS Server Name Indication extension (SNI, RFC 6066) when establishing a connection with the gRPC SSL server.

**grpc_ssl_session_reuse**

**Syntax:**  
```
grpc_ssl_session_reuse on | off;
```

**Default:** `on`

**Context:** `http`, `server`, `location`

Determines whether SSL sessions can be reused when working with the gRPC server. If the errors “SSL3_GET_FINISHED:digest check failed” appear in the logs, try disabling session reuse.

**grpc_ssl_trusted_certificate**

**Syntax:**  
```
grpc_ssl_trusted_certificate file;
```

**Default:** `—`

**Context:** `http`, `server`, `location`

Specifies a file with trusted CA certificates in the PEM format used to verify the certificate of the gRPC SSL server.

**grpc_ssl_verify**

**Syntax:**  
```
grpc_ssl_verify on | off;
```

**Default:** `off`

**Context:** `http`, `server`, `location`

Enables or disables verification of the gRPC SSL server certificate.

**grpc_ssl_verify_depth**

**Syntax:**  
```
grpc_ssl_verify_depth number;
```

**Default:** `1`

**Context:** `http`, `server`, `location`

Sets the verification depth in the gRPC SSL server certificates chain.
2.19 Module ngx_http_gunzip_module

2.19.1 Summary

The ngx_http_gunzip_module module is a filter that decompresses responses with “Content-Encoding: gzip” for clients that do not support “gzip” encoding method. The module will be useful when it is desirable to store data compressed to save space and reduce I/O costs.

This module is not built by default, it should be enabled with the --with-http_gunzip_module configuration parameter.

2.19.2 Example Configuration

```
location /storage/ {
    gunzip on;
    ...
}
```

2.19.3 Directives
gunzip

**Syntax:** gunzip on | off;
**Default:** off
**Context:** http, server, location

Enables or disables decompression of gzipped responses for clients that lack gzip support. If enabled, the following directives are also taken into account when determining if clients support gzip: gzip_http_version, gzip_proxied, and gzip_disable. See also the gzip_vary directive.

gunzip_buffers

**Syntax:** gunzip_buffers number size;
**Default:** 32 4k|16 8k
**Context:** http, server, location

Sets the number and size of buffers used to decompress a response. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform.
2.20 Module ngx_http_gzip_module

2.20.1 Summary

The ngx_http_gzip_module module is a filter that compresses responses using the “gzip” method. This often helps to reduce the size of transmitted data by half or even more.

When using the SSL/TLS protocol, compressed responses may be subject to BREACH attacks.

2.20.2 Example Configuration

```
gzip on;
gzip_min_length 1000;
gzip_proxied expired no-cache no-store private auth;
gzip_types text/plain application/xml;
```

The `$gzip_ratio` variable can be used to log the achieved compression ratio.

2.20.3 Directives

gzip

Syntax: `gzip on | off;
Default: off
Context: http, server, location, if in location

Enables or disables gzipping of responses.
gzip_buffers

Syntax:  
\texttt{gzip\_buffers number size;}

Default  
32 4k|16 8k

Context: http, server, location

Sets the number and size of buffers used to compress a response. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform.

Until version 0.7.28, four 4K or 8K buffers were used by default.

gzip_comp_level

Syntax:  
\texttt{gzip\_comp\_level level;}

Default  
1

Context: http, server, location

Sets a gzip compression level of a response. Acceptable values are in the range from 1 to 9.

gzip_disable

Syntax:  
\texttt{gzip\_disable regex ...;}

Default  
—

Context: http, server, location

This directive appeared in version 0.6.23.

Disables gzipping of responses for requests with User-Agent header fields matching any of the specified regular expressions.

The special mask “msie6” (0.7.12) corresponds to the regular expression “MSIE [4-6] \.
”, but works faster. Starting from version 0.8.11, “MSIE 6.0; ...SV1” is excluded from this mask.

gzip_http_version

Syntax:  
\texttt{gzip\_http\_version 1.0 | 1.1;}

Default  
1.1

Context: http, server, location

Sets the minimum HTTP version of a request required to compress a response.

gzip_min_length

Syntax:  
\texttt{gzip\_min\_length length;}

Default  
20

Context: http, server, location

Sets the minimum length of a response that will be gzipped. The length is determined only from the Content-Length response header field.
gzip_proxied

Syntax:  

    gzip_proxied off | expired | no-cache | no-store | private | no_last_modified | no_etag | auth | any ...;

Default:  off

Context:  http, server, location

Enables or disables gzipping of responses for proxied requests depending on the request and response. The fact that the request is proxied is determined by the presence of the Via request header field. The directive accepts multiple parameters:

- **off**
  - disables compression for all proxied requests, ignoring other parameters;
- **expired**
  - enables compression if a response header includes the Expires field with a value that disables caching;
- **no-cache**
  - enables compression if a response header includes the Cache-Control field with the “no-cache” parameter;
- **no-store**
  - enables compression if a response header includes the Cache-Control field with the “no-store” parameter;
- **private**
  - enables compression if a response header includes the Cache-Control field with the “private” parameter;
- **no_last_modified**
  - enables compression if a response header does not include the Last-Modified field;
- **no_etag**
  - enables compression if a response header does not include the ETag field;
- **auth**
  - enables compression if a request header includes the Authorization field;
- **any**
  - enables compression for all proxied requests.

gzip_types

Syntax:  

    gzip_types mime-type ...;

Default:  text/html

Context:  http, server, location

Enables gzipping of responses for the specified MIME types in addition to “text/html”. The special value “*” matches any MIME type (0.8.29). Responses with the “text/html” type are always compressed.
gzip_vary

**Syntax:** `gzip_vary on | off`;
**Default:** off
**Context:** http, server, location

Enables or disables inserting the Vary: Accept-Encoding response header field if the directives `gzip`, `gzip_static`, or `gunzip` are active.

### 2.20.4 Embedded Variables

$_{gzip\_ratio}$

achieved compression ratio, computed as the ratio between the original and compressed response sizes.
2.21 Module ngx_http_gzip_static_module

2.21.1 Summary

The ngx_http_gzip_static_module module allows sending precompressed files with the “.gz” filename extension instead of regular files.

This module is not built by default, it should be enabled with the --with-http_gzip_static_module configuration parameter.

2.21.2 Example Configuration

```
gzip_static on;
gzip_proxied expired no-cache no-store private auth;
```

2.21.3 Directives

gzip_static

Syntax: gzip_static on | off | always;
Default off
Context: http, server, location

Enables (“on”) or disables (“off”) checking the existence of precompressed files. The following directives are also taken into account: gzip_http_version, gzip_proxied, gzip_disable, and gzip_vary.

With the “always” value (1.3.6), gzipped file is used in all cases, without checking if the client supports it. It is useful if there are no uncompressed files on the disk anyway or the ngx_http_gunzip_module is used.

The files can be compressed using the gzip command, or any other compatible one. It is recommended that the modification date and time of original and compressed files be the same.
2.22 Module ngx_http_headers_module

2.22.1 Summary

The ngx_http_headers_module module allows adding the Expires and Cache-Control header fields, and arbitrary fields, to a response header.

2.22.2 Example Configuration

```plaintext
expires 24h;
expires modified +24h;
expires @24h;
expires 0;
expires -1;
expires epoch;
expires $expires;
add_header Cache-Control private;
```

2.22.3 Directives

add_header

**Syntax:**  
`add_header` name value [always];

**Default:** —

**Context:** http, server, location, if in location

Adds the specified field to a response header provided that the response code equals 200, 201 (1.3.10), 204, 206, 301, 302, 303, 304, 307 (1.1.16, 1.0.13), or 308 (1.13.0). Parameter value can contain variables.

There could be several add_header directives. These directives are inherited from the previous configuration level if and only if there are no add_header directives defined on the current level.

If the always parameter is specified (1.7.5), the header field will be added regardless of the response code.

add_trailer

**Syntax:**  
`add_trailer` name value [always];

**Default:** —

**Context:** http, server, location, if in location

This directive appeared in version 1.13.2.
Adds the specified field to the end of a response provided that the response code equals 200, 201, 206, 301, 302, 303, 307, or 308. Parameter value can contain variables.

There could be several add_trailer directives. These directives are inherited from the previous configuration level if and only if there are no add_trailer directives defined on the current level.

If the always parameter is specified the specified field will be added regardless of the response code.

**expires**

**Syntax:**

```plaintext
expires [modified] time;
```

**Syntax:**

```plaintext
expires epoch | max | off;
```

**Default:** off

**Context:** http, server, location, if in location

Enables or disables adding or modifying the Expires and Cache-Control response header fields provided that the response code equals 200, 201 (1.3.10), 204, 206, 301, 302, 303, 304, 307 (1.1.16, 1.0.13), or 308 (1.13.0). The parameter can be a positive or negative `time`.

The time in the Expires field is computed as a sum of the current time and `time` specified in the directive. If the `modified` parameter is used (0.7.0, 0.6.32) then the time is computed as a sum of the file’s modification time and the `time` specified in the directive.

In addition, it is possible to specify a time of day using the “@” prefix (0.7.9, 0.6.34):

```plaintext
expires @15h30m;
```

The contents of the Cache-Control field depends on the sign of the specified time:

- time is negative — Cache-Control: no-cache.
- time is positive or zero — Cache-Control: max-age=t, where t is a time specified in the directive, in seconds.

The `epoch` parameter sets Expires to the value “Thu, 01 Jan 1970 00:00:01 GMT”, and Cache-Control to “no-cache”.

The `max` parameter sets Expires to the value “Thu, 31 Dec 2037 23:55:55 GMT”, and Cache-Control to 10 years.

The `off` parameter disables adding or modifying the Expires and Cache-Control response header fields.

The last parameter value can contain variables (1.7.9):

```plaintext
map $sent_http_content_type $expires {
  default off;
  application/pdf 42d;
  ~image/ max;
}
```
expires $expires;
2.23 Module ngx_http_hls_module

2.23.1 Summary

The ngx_http_hls_module module provides HTTP Live Streaming (HLS) server-side support for MP4 and MOV media files. Such files typically have the .mp4, .m4v, .m4a, .mov, or .qt filename extensions. The module supports H.264 video codec, AAC and MP3 audio codecs.

For each media file, two URIs are supported:

- A playlist URI with the “.m3u8” filename extension. The URI can accept optional arguments:
  
  - “start” and “end” define playlist boundaries in seconds (1.9.0).
  
  - “offset” shifts an initial playback position to the time offset in seconds (1.9.0). A positive value sets a time offset from the beginning of the playlist. A negative value sets a time offset from the end of the last fragment in the playlist.
  
  - “len” defines the fragment length in seconds.

- A fragment URI with the “.ts” filename extension. The URI can accept optional arguments:
  
  - “start” and “end” define fragment boundaries in seconds.

This module is available as part of our commercial subscription.

2.23.2 Example Configuration

```
location / {
    hls;
    hls_fragment 5s;
    hls_buffers 10 10m;
    hls_mp4_buffer_size 1m;
    hls_mp4_max_buffer_size 5m;
    root /var/video/;
}
```
With this configuration, the following URIs are supported for the “/var¬
/video/test.mp4” file:

- http://hls.example.com/test.mp4.m3u8?offset=1.000&start=1.000&end=2.200
- http://hls.example.com/test.mp4.m3u8?len=8.000

### 2.23.3 Directives

**hls**

**Syntax:** `hls;`

**Default** —

**Context:** location

Turns on HLS streaming in the surrounding location.

**hls_buffers**

**Syntax:** `hls_buffers number size;`

**Default** 8 2m

**Context:** http, server, location

Sets the maximum `number` and `size` of buffers that are used for reading and writing data frames.

**hls_forward_args**

**Syntax:** `hls_forward_args on | off;`

**Default** off

**Context:** http, server, location

This directive appeared in version 1.5.12.

Adds arguments from a playlist request to URIs of fragments. This may be useful for performing client authorization at the moment of requesting a fragment, or when protecting an HLS stream with the `ngx_http_secure_link-module` module.

For example, if a client requests a playlist `http://example.com/hls/test.mp4.m3u8?a=1&b=2`, the arguments `a=1` and `b=2` will be added to URIs of fragments after the arguments `start` and `end`:

```http
#EXTM3U
#EXT-X-VERSION:3
#EXT-X-TARGETDURATION:15
#EXT-X-PLAYLIST-TYPE:VOD
#EXTINF:9.333,
test.mp4.ts?start=0.000&end=9.333&a=1&b=2
#EXTINF:7.167,
#EXTINF:5.416,
#EXTINF:5.500,
test.mp4.ts?start=21.916&end=27.416&a=1&b=2
```

Nginx, Inc. p.184 of 542
If an HLS stream is protected with the ngx_http_secure_link_module module, $uri should not be used in the secure_link_md5 expression because this will cause errors when requesting the fragments. Base URI should be used instead of $uri ($hls_uri in the example):

```nginx
http {
    map $uri $hls_uri {
        ~^(?<base_uri>.*).m3u8$ $base_uri;
        ~^(?<base_uri>.*).ts$ $base_uri;
        default $uri;
    }

    server {
        location /hls/ {
            hls;
            hls_forward_args on;
            alias /var/videos/;

            secure_link $arg_md5,$arg_expires;
            secure_link_md5 "$secure_link_expires$hls_uri$remote_addr secret";

            if ($secure_link = "") {
                return 403;
            }

            if ($secure_link = "0") {
                return 410;
            }
        }
    }
}
```

**hls_fragment**

**Syntax:**  
`hls_fragment time;`

**Default:** 5s

**Context:** http, server, location

Defines the default fragment length for playlist URIs requested without the “len” argument.

**hls_mp4_buffer_size**

**Syntax:**  
`hls_mp4_buffer_size size;`

**Default:** 512k

**Context:** http, server, location

Sets the initial size of the buffer used for processing MP4 and MOV files.
**hls_mp4_max_buffer_size**

**Syntax:** `hls_mp4_max_buffer_size size;`
**Default:** 10m
**Context:** http, server, location

During metadata processing, a larger buffer may become necessary. Its size cannot exceed the specified `size`, or else nginx will return the server error 500 Internal Server Error, and log the following message:

```
"/some/movie/file.mp4" mp4 moov atom is too large:
12583268, you may want to increase hls_mp4_max_buffer_size
```
2.24 Module ngx_http_image_filter_module

2.24.1 Summary

The `ngx_http_image_filter_module` module (0.7.54+) is a filter that transforms images in JPEG, GIF, PNG, and WebP formats.

This module is not built by default, it should be enabled with the `--with-http_image_filter_module` configuration parameter.

This module utilizes the libgd library. It is recommended to use the latest available version of the library.

The WebP format support appeared in version 1.11.6. To transform images in this format, the libgd library must be compiled with the WebP support.

2.24.2 Example Configuration

```
location /img/ {
    proxy_pass http://backend;
    image_filter resize 150 100;
    image_filter rotate 90;
    error_page 415 = /empty;
}

location = /empty {
    empty_gif;
}
```
2.24.3 Directives

image_filter

Syntax:  
image_filter off;
Syntax:  
image_filter test;
Syntax:  
image_filter size;
Syntax:  
image_filter rotate 90 | 180 | 270;
Syntax:  
image_filter resize width height;
Syntax:  
image_filter crop width height;
Default:  off
Context:  location

Sets the type of transformation to perform on images:

off
  turns off module processing in a surrounding location.
test
  ensures that responses are images in either JPEG, GIF, PNG, or WebP format. Otherwise, the 415 Unsupported Media Type error is returned.
size
  outputs information about images in a JSON format, e.g.:

{ "img" : { "width": 100, "height": 100, "type": "gif" } }

In case of an error, the output is as follows:

{}

rotate 90|180|270
  rotates images counter-clockwise by the specified number of degrees. Parameter value can contain variables. This mode can be used either alone or along with the resize and crop transformations.

resize width height
  proportionally reduces an image to the specified sizes. To reduce by only one dimension, another dimension can be specified as “-”. In case of an error, the server will return code 415 Unsupported Media Type. Parameter values can contain variables. When used along with the rotate parameter, the rotation happens after reduction.

crop width height
  proportionally reduces an image to the larger side size and crops extraneous edges by another side. To reduce by only one dimension, another dimension can be specified as “-”. In case of an error, the server will return code 415 Unsupported Media Type. Parameter values can contain variables. When used along with the rotate parameter, the rotation happens before reduction.
image_filter_buffer

Syntax:  image_filter_buffer size;
Default:  1M
Context:  http, server, location

Sets the maximum size of the buffer used for reading images. When the size is exceeded the server returns error 415 Unsupported Media Type.

image_filter_interlace

Syntax:  image_filter_interlace on | off;
Default:  off
Context:  http, server, location
This directive appeared in version 1.3.15.

If enabled, final images will be interlaced. For JPEG, final images will be in “progressive JPEG” format.

image_filter_jpeg_quality

Syntax:  image_filter_jpeg_quality quality;
Default:  75
Context:  http, server, location

Sets the desired quality of the transformed JPEG images. Acceptable values are in the range from 1 to 100. Lesser values usually imply both lower image quality and less data to transfer. The maximum recommended value is 95. Parameter value can contain variables.

image_filter_sharpen

Syntax:  image_filter_sharpen percent;
Default:  0
Context:  http, server, location

Increases sharpness of the final image. The sharpness percentage can exceed 100. The zero value disables sharpening. Parameter value can contain variables.

image_filter_transparency

Syntax:  image_filter_transparency on | off;
Default:  on
Context:  http, server, location

Defines whether transparency should be preserved when transforming GIF images or PNG images with colors specified by a palette. The loss of transparency results in images of a better quality. The alpha channel transparency in PNG is always preserved.
image_filter_webp_quality

Syntax:  `image_filter_webp_quality quality;`

Default:  80

Context:  http, server, location

This directive appeared in version 1.11.6.

Sets the desired quality of the transformed WebP images. Acceptable values are in the range from 1 to 100. Lesser values usually imply both lower image quality and less data to transfer. Parameter value can contain variables.
2.25 Module ngx_http_index_module

2.25.1 Summary

The ngx_http_index_module module processes requests ending with the slash character (`/`). Such requests can also be processed by the ngx_http_autoindex_module and ngx_http_random_index_module modules.

2.25.2 Example Configuration

```
location / {
  index index.$geo.html index.html;
}
```

2.25.3 Directives

**index**

**Syntax:** `index file ...;

**Default:** index.html

**Context:** http, server, location

Defines files that will be used as an index. The file name can contain variables. Files are checked in the specified order. The last element of the list can be a file with an absolute path. Example:

```
index index.$geo.html index.0.html /index.html;
```

It should be noted that using an index file causes an internal redirect, and the request can be processed in a different location. For example, with the following configuration:

```
location = / {
  index index.html;
}
location / {
  ...
}
```

a “/” request will actually be processed in the second location as “/index.html”.

Nginx, Inc. p.191 of 542
Module ngx_http_internal_redirect_module

2.26.1 Summary

The ngx_http_internal_redirect_module module (1.23.4) allows making an internal redirect. In contrast to rewriting URIs, the redirection is made after checking request and connection processing limits, and access limits.

This module is available as part of our commercial subscription.

2.26.2 Example Configuration

```nginx
limit_req_zone $jwt_claim_sub zone=jwt_sub:10m rate=1r/s;
server {
    location / {
        auth_jwt                 "realm";
        auth_jwt_key_file    key.jwk;
        internal_redirect @rate_limited;
    }
    location @rate_limited {
        internal;
        limit_req zone=jwt_sub burst=10;
        proxy_pass http://backend;
    }
}
```

The example implements per-user rate limiting. Implementation without internal_redirect is vulnerable to DoS attacks by unsigned JWTs, as normally the limit_req check is performed before auth_jwt check. Using internal_redirect allows reordering these checks.

2.26.3 Directives

internal_redirect

Syntax:  internal_redirect uri;

Default —

Context: server, location
Sets the URI for internal redirection of the request. It is also possible to use a named location instead of the URI. The \textit{uri} value can contain variables. If the \textit{uri} value is empty, then the redirect will not be made.
2.27 Module ngx_http_js_module

2.27.1 Summary

The ngx_http_js_module module is used to implement location and variable handlers in njs — a subset of the JavaScript language. Download and install instructions are available here.

2.27.2 Example Configuration

The example works since 0.4.0.

```
http {
  js_import http.js;
  js_set $foo http.foo;
  js_set $summary http.summary;
  js_set $hash http.hash;
  resolver 10.0.0.1;

  server {
    listen 8000;

    location / {
      add_header X-Foo $foo;
      js_content http.baz;
    }

    location = /summary {
```

Nginx, Inc.  p.194 of 542
return 200 $summary;
}

location = /hello {
  js_content http.hello;
}

# since 0.7.0
location = /fetch {
  js_content http.fetch;
  js_fetch_trusted_certificate /path/to/ISRG_Root_X1.pem;
}

# since 0.7.0
location = /crypto {
  add_header Hash $hash;
  return 200;
}
}
}

The http.js file:

```
function foo(r) {
  r.log("hello from foo() handler");
  return "foo";
}

function summary(r) {
  var a, s, h;
  s = "JS summary\n\n";
  s += "Method: " + r.method + "\n";
  s += "HTTP version: " + r.httpVersion + "\n";
  s += "Host: " + r.headersIn.host + "\n";
  s += "Remote Address: " + r.remoteAddress + "\n";
  s += "URI: " + r.uri + "\n";
  s += "Headers:"
  for (h in r.headersIn) {
    s += " header '" + h + "' is '" + r.headersIn[h] + "'\n";
  }
  s += "Args:"
  for (a in r.args) {
    s += " arg '" + a + "' is '" + r.args[a] + "'\n";
  }
  return s;
}

function baz(r) {
  r.status = 200;
  r.headersOut.foo = 1234;
  r.headersOut['Content-Type'] = "text/plain; charset=utf-8";
  r.headersOut['Content-Length'] = 15;
  r.sendHeader();
  r.send("nginx");
  r.send("java");
  r.send("script");
  r.finish();
}

function hello(r) {
  r.return(200, "Hello world!");
}
```
async function fetch(r) {
    let results = await Promise.all([ngx.fetch('https://nginx.org/'),
        ngx.fetch('https://nginx.org/en/')]);
    r.return(200, JSON.stringify(results, undefined, 4));
}

async function hash(r) {
    let hash = await crypto.subtle.digest('SHA-512', r.headersIn.host);
    r.setReturnValue(Buffer.from(hash).toString('hex'));
}
export default {foo, summary, baz, hello, fetch, hash};

2.27.3 Directives

js_body_filter

**Syntax:** js_body_filter function | module.function [buffer_type=string | buffer];

**Default** —

**Context:** location, if in location, limit_except

This directive appeared in version 0.5.2.

Sets an njs function as a response body filter. The filter function is called for each data chunk of a response body with the following arguments:

- **r**
  - the HTTP request object
- **data**
  - the incoming data chunk, may be a string or Buffer depending on the buffer_type value, by default is a string.
- **flags**
  - an object with the following properties:
    - **last**
      - a boolean value, true if data is a last buffer.

The filter function can pass its own modified version of the input data chunk to the next body filter by calling `r.sendBuffer()`. For example, to transform all the lowercase letters in the response body:

```javascript
function filter(r, data, flags) {
    r.sendBuffer(data.toLowerCase(), flags);
}
```

To stop filtering (following data chunks will be passed to client without calling `js_body_filter`), `r.done()` can be used.

If the filter function changes the length of the response body, then it is required to clear out the Content-Length response header (if any) in `js_header_filter` to enforce chunked transfer encoding.
As the `js_body_filter` handler returns its result immediately, it supports only synchronous operations. Thus, asynchronous operations such as `r.subrequest()` or `setTimeout()` are not supported.

The directive can be specified inside the `if` block since 0.7.7.

**js_content**

**Syntax:**  
```
js_content function | module.function;
```

**Default** —

**Context:** location, if in location, limit_except

Sets an njs function as a location content handler. Since 0.4.0, a module function can be referenced.

The directive can be specified inside the `if` block since 0.7.7.

**js_fetch_buffer_size**

**Syntax:**  
```
js_fetch_buffer_size size;
```

**Default** 16k

**Context:** http, server, location

This directive appeared in version 0.7.4.

Sets the size of the buffer used for reading and writing with Fetch API.

**js_fetch_ciphers**

**Syntax:**  
```
js_fetch_ciphers ciphers;
```

**Default** `HIGH:!aNULL:!MD5`

**Context:** http, server, location

This directive appeared in version 0.7.0.

Specifies the enabled ciphers for HTTPS requests with Fetch API. The ciphers are specified in the format understood by the OpenSSL library. The full list can be viewed using the “openssl ciphers” command.

**js_fetch_max_response_buffer_size**

**Syntax:**  
```
js_fetch_max_response_buffer_size size;
```

**Default** 1m

**Context:** http, server, location

This directive appeared in version 0.7.4.

Sets the maximum size of the response received with Fetch API.
js_fetch_protocols

**Syntax:** `js_fetch_protocols [TLSv1] [TLSv1.1] [TLSv1.2] [TLSv1.3];`
**Default:** TLSv1 TLSv1.1 TLSv1.2
**Context:** http, server, location

This directive appeared in version 0.7.0.

Enables the specified protocols for HTTPS requests with Fetch API.

js_fetch_timeout

**Syntax:** `js_fetch_timeout time;`
**Default:** 60s
**Context:** http, server, location

This directive appeared in version 0.7.4.

Defines a timeout for reading and writing for Fetch API. The timeout is set only between two successive read/write operations, not for the whole response. If no data is transmitted within this time, the connection is closed.

js_fetch_trusted_certificate

**Syntax:** `js_fetch_trusted_certificate file;`
**Default:** —
**Context:** http, server, location

This directive appeared in version 0.7.0.

Specifies a file with trusted CA certificates in the PEM format used to verify the HTTPS certificate with Fetch API.

js_fetch_verify

**Syntax:** `js_fetch_verify on | off;`
**Default:** on
**Context:** http, server, location

This directive appeared in version 0.7.4.

Enables or disables verification of the HTTPS server certificate with Fetch API.

js_fetch_verify_depth

**Syntax:** `js_fetch_verify_depth number;`
**Default:** 100
**Context:** http, server, location

This directive appeared in version 0.7.0.

Sets the verification depth in the HTTPS server certificates chain with Fetch API.
js_header_filter

**Syntax:**  
`js_header_filter function | module.function;`

**Default:** —

**Context:** location, if in location, limit_except

This directive appeared in version 0.5.1.

Sets an njs function as a response header filter. The directive allows changing arbitrary header fields of a response header.

As the `js_header_filter` handler returns its result immediately, it supports only synchronous operations. Thus, asynchronous operations such as `r.subrequest()` or `setTimeout()` are not supported.

The directive can be specified inside the if block since 0.7.7.

js_import

**Syntax:**  
`js_import module.js | export_name from module.js;`

**Default:** —

**Context:** http, server, location

This directive appeared in version 0.4.0.

Imports a module that implements location and variable handlers in njs. The `export_name` is used as a namespace to access module functions. If the `export_name` is not specified, the module name will be used as a namespace.

```
js_import http.js;
```

Here, the module name `http` is used as a namespace while accessing exports. If the imported module exports `foo()`, `http.foo` is used to refer to it.

Several `js_import` directives can be specified.

The directive can be specified on the server and location level since 0.7.7.

js_include

**Syntax:**  
`js_include file;`

**Default:** —

**Context:** http

Specifies a file that implements location and variable handlers in njs:

```
nginx.conf:
js_include http.js;
location /version {
  js_content version;
}
```
The directive was made obsolete in version 0.4.0 and was removed in version 0.7.1. The `js_import` directive should be used instead.

### js_path

**Syntax:** `js_path path;`

**Default:** —

**Context:** `http`, `server`, `location`

This directive appeared in version 0.3.0.

Sets an additional path for njs modules.

The directive can be specified on the `server` and `location` level since 0.7.7.

### js_preload_object

**Syntax:** `js_preload_object name.json | name from file.json;`

**Default:** —

**Context:** `http`, `server`, `location`

This directive appeared in version 0.7.8.

Preloads an immutable object at configure time. The `name` is used a name of the global variable though which the object is available in njs code. If the `name` is not specified, the file name will be used instead.

```
js_preload_object map.json;
```

Here, the `map` is used as a name while accessing the preloaded object. Several `js_preload_object` directives can be specified.

### js_set

**Syntax:** `js_set $variable function | module.function;`

**Default:** —

**Context:** `http`, `server`, `location`

Sets an njs function for the specified variable. Since 0.4.0, a module function can be referenced.

The function is called when the variable is referenced for the first time for a given request. The exact moment depends on a phase at which the variable is referenced. This can be used to perform some logic not related to variable evaluation. For example, if the variable is referenced only in the `log_format` directive, its handler will not be executed until the log phase. This handler can be used to do some cleanup right before the request is freed.
As the `js_set` handler returns its result immediately, it supports only synchronous operations. Thus, asynchronous operations such as `r.subrequest()` or `setTimeout()` are not supported.

The directive can be specified on the server and `location` level since 0.7.7.

### js_shared_dict_zone

**Syntax:**

```plaintext
js_shared_dict_zone zone=\text{name}:size [timeout=time]  
[type=string|number] [evict];
```

**Default** —

**Context:** `http`

This directive appeared in version 0.8.0.

Sets the `name` and `size` of the shared memory zone that keeps the key-value dictionary shared between worker processes.

By default the shared dictionary uses a string as a key and a value. The optional `type` parameter allows redefining the value type to number.

The optional `timeout` parameter sets the time after which all shared dictionary entries are removed from the zone.

The optional `evict` parameter removes the oldest key-value pair when the zone storage is exhausted.

**Examples:**

```plaintext
example.conf:
# Creates a 1Mb dictionary with string values,  
# removes key-value pairs after 60 seconds of inactivity:  
js_shared_dict_zone zone=foo:1M timeout=60s;

# Creates a 512Kb dictionary with string values,  
# forcibly removes oldest key-value pairs when the zone is exhausted:  
js_shared_dict_zone zone=bar:512K timeout=30s evict;

# Creates a 32Kb permanent dictionary with number values:  
js_shared_dict_zone zone=num:32k type=number;
```

```plaintext
example.js:
function get(r) {  
    r.return(200, ngx.shared.foo.get(r.args.key));
}

function set(r) {  
    r.return(200, ngx.shared.foo.set(r.args.key, r.args.value));
}

function delete(r) {  
    r.return(200, ngx.shared.bar.delete(r.args.key));
}

function increment(r) {  
    r.return(200, ngx.shared.num.incr(r.args.key, 2));
}
```
js_var

**Syntax:**  `js_var $variable [value];`
**Default:** —
**Context:** http, server, location
This directive appeared in version 0.5.3.

Declares a writable variable. The value can contain text, variables, and their combination. The variable is not overwritten after a redirect unlike variables created with the `set` directive.

The directive can be specified on the server and location level since 0.7.7.

### 2.27.4 Request Argument

Each HTTP njs handler receives one argument, a request object.
2.28 Module ngx_http_keyval_module

2.28.1 Summary

The ngx_http_keyval_module module (1.13.3) creates variables with values taken from key-value pairs managed by the API or a variable (1.15.10) that can also be set with njs.

This module is available as part of our commercial subscription.

2.28.2 Example Configuration

```nginx
http {
    keyval_zone zone=one:32k state=/var/lib/nginx/state/one.keyval;
    keyval $arg_text $text zone=one;
    ...
    server {
        ...
        location / {
            return 200 $text;
        }
        location /api {
            api write=on;
        }
    }
}
```

2.28.3 Directives

keyval

**Syntax:** `keyval key $variable zone=name;`

**Default** —

**Context:** http

Creates a new `$variable` whose value is looked up by the `key` in the key-value database. Matching rules are defined by the `type` parameter of the `keyval_zone` directive. The database is stored in a shared memory zone specified by the `zone` parameter.
**keyval_zone**

**SYNTAX:**  
keyval_zone zone=name:size [state=file] [timeout=time]  
[type=string|ip|prefix] [sync];

**DEFAULT —**

**CONTEXT:** http

Sets the *name* and *size* of the shared memory zone that keeps the key-value database. Key-value pairs are managed by the API.

The optional *state* parameter specifies a *file* that keeps the current state of the key-value database in the JSON format and makes it persistent across nginx restarts. Changing the file content directly should be avoided.

**Examples:**

```
keyval_zone zone=one:32k state=/var/lib/nginx/state/one.keyval; # path for Linux
keyval_zone zone=one:32k state=/var/db/nginx/state/one.keyval; # path for FreeBSD
```

The optional *timeout* parameter (1.15.0) sets the time after which key-value pairs are removed from the zone.

The optional *type* parameter (1.17.1) activates an extra index optimized for matching the key of a certain type and defines matching rules when evaluating a keyval $variable.

The index is stored in the same shared memory zone and thus requires additional storage.

- **type=string**
  - default, no index is enabled; variable lookup is performed using exact match of the record key and a search key
- **type=ip**
  - the search key is the textual representation of IPv4 or IPv6 address or CIDR range; to match a record key, the search key must belong to a subnet specified by a record key or exactly match an IP address
- **type=prefix**
  - variable lookup is performed using prefix match of a record key and a search key (1.17.5); to match a record key, the record key must be a prefix of the search key

The optional *sync* parameter (1.15.0) enables synchronization of the shared memory zone. The synchronization requires the *timeout* parameter to be set.

If the synchronization is enabled, removal of key-value pairs (no matter one or all) will be performed only on a target cluster node. The same key-value pairs on other cluster nodes will be removed upon *timeout*.
2.29 Module ngx_http_limit_conn_module

2.29.1 Summary

The ngx_http_limit_conn_module module is used to limit the number of connections per the defined key, in particular, the number of connections from a single IP address.

Not all connections are counted. A connection is counted only if it has a request being processed by the server and the whole request header has already been read.

2.29.2 Example Configuration

```plaintext
http {
  limit_conn_zone $binary_remote_addr zone=addr:10m;
  ...
  server {
    ...
    location /download/ {
      limit_conn addr 1;
    }
  }
}
```

2.29.3 Directives

**limit_conn**

**Syntax:**  `limit_conn zone number;`

**Default** —

**Context:** http, server, location

Sets the shared memory zone and the maximum allowed number of connections for a given key value. When this limit is exceeded, the server will return the *error* in reply to a request. For example, the directives
allow only one connection per an IP address at a time.

In HTTP/2 and HTTP/3, each concurrent request is considered a separate connection.

There could be several `limit_conn` directives. For example, the following configuration will limit the number of connections to the server per a client IP and, at the same time, the total number of connections to the virtual server:

```
limit_conn_zone $binary_remote_addr zone=addr:10m;
server {
    location /download/ {
        limit_conn addr 1;
    }
}
```

```
limit_conn_zone $binary_remote_addr zone=perip:10m;
limit_conn_zone $server_name zone=perserver:10m;
server {
    ...
    limit_conn perip 10;
    limit_conn perserver 100;
}
```

These directives are inherited from the previous configuration level if and only if there are no `limit_conn` directives defined on the current level.

### limit_conn_dry_run

**Syntax:** `limit_conn_dry_run on | off;`

**Default:** off

**Context:** http, server, location

This directive appeared in version 1.17.6.

Enables the dry run mode. In this mode, the number of connections is not limited, however, in the shared memory zone, the number of excessive connections is accounted as usual.

### limit_conn_log_level

**Syntax:** `limit_conn_log_level info | notice | warn | error;`

**Default:** error

**Context:** http, server, location

This directive appeared in version 0.8.18.

Sets the desired logging level for cases when the server limits the number of connections.
limit_conn_status

Syntax:  limit_conn_status code;
Default  503
Context: http, server, location
This directive appeared in version 1.3.15.

Sets the status code to return in response to rejected requests.

limit_conn_zone

Syntax:  limit_conn_zone key zone=name:size;
Default —
Context: http

Sets parameters for a shared memory zone that will keep states for various keys. In particular, the state includes the current number of connections. The key can contain text, variables, and their combination. Requests with an empty key value are not accounted.

Prior to version 1.7.6, a key could contain exactly one variable.

Usage example:

limit_conn_zone $binary_remote_addr zone=addr:10m;

Here, a client IP address serves as a key. Note that instead of $remote_addr, the $binary_remote_addr variable is used here. The $remote_addr variable’s size can vary from 7 to 15 bytes. The stored state occupies either 32 or 64 bytes of memory on 32-bit platforms and always 64 bytes on 64-bit platforms. The $binary_remote_addr variable’s size is always 4 bytes for IPv4 addresses or 16 bytes for IPv6 addresses. The stored state always occupies 32 or 64 bytes on 32-bit platforms and 64 bytes on 64-bit platforms. One megabyte zone can keep about 32 thousand 32-byte states or about 16 thousand 64-byte states. If the zone storage is exhausted, the server will return the error to all further requests.

Additionally, as part of our commercial subscription, the status information for each such shared memory zone can be obtained or reset with the API since 1.17.7.

limit_zone

Syntax:  limit_zone name $variable size;
Default —
Context: http

This directive was made obsolete in version 1.1.8 and was removed in version 1.7.6. An equivalent limit_conn_zone directive with a changed syntax should be used instead:
limit_conn_zone $variable zone=name:size;

2.29.4 Embedded Variables

$limit_conn_status keeps the result of limiting the number of connections (1.17.6): PASSED, REJECTED, or REJECTED_DRY_RUN.
2.30 Module ngx_http_limit_req_module

2.30.1 Summary

The ngx_http_limit_req_module module (0.7.21) is used to limit the request processing rate per a defined key, in particular, the processing rate of requests coming from a single IP address. The limitation is done using the “leaky bucket” method.

2.30.2 Example Configuration

```
http {
   limit_req_zone $binary_remote_addr zone=one:10m rate=1r/s;
...
   server {
      ...
      location /search/ {
         limit_req zone=one burst=5;
      }
   ...
}
```

2.30.3 Directives

limit_req

**Syntax:**  
`limit_req zone=name [burst=number] [nodelay | delay=number];`

**Default** —

**Context:** http, server, location

Sets the shared memory zone and the maximum burst size of requests. If the requests rate exceeds the rate configured for a zone, their processing is delayed such that requests are processed at a defined rate. Excessive requests are delayed until their number exceeds the maximum burst size in which case the request is terminated with an error. By default, the maximum burst size is equal to zero. For example, the directives
allow not more than 1 request per second at an average, with bursts not exceeding 5 requests.

If delaying of excessive requests while requests are being limited is not desired, the parameter nodelay should be used:

```
limit_req zone=one burst=5 nodelay;
```

The delay parameter (1.15.7) specifies a limit at which excessive requests become delayed. Default value is zero, i.e. all excessive requests are delayed.

There could be several limit_req directives. For example, the following configuration will limit the processing rate of requests coming from a single IP address and, at the same time, the request processing rate by the virtual server:

```
limit_req_zone $binary_remote_addr zone=perip:10m rate=1r/s;
limit_req_zone $server_name zone=perserver:10m rate=10r/s;
server {
  ... limit_req zone=perip burst=5 nodelay;
  limit_req zone=perserver burst=10;
}
```

These directives are inherited from the previous configuration level if and only if there are no limit_req directives defined on the current level.

**limit_req_dry_run**

**Syntax:** `limit_req_dry_run on | off;`

**Default:** off

**Context:** http, server, location

This directive appeared in version 1.17.1.

Enables the dry run mode. In this mode, requests processing rate is not limited, however, in the shared memory zone, the number of excessive requests is accounted as usual.

**limit_req_log_level**

**Syntax:** `limit_req_log_level info | notice | warn | error;`

**Default:** error

**Context:** http, server, location

This directive appeared in version 0.8.18.
Sets the desired logging level for cases when the server refuses to process requests due to rate exceeding, or delays request processing. Logging level for delays is one point less than for refusals; for example, if "limit_req_log_level notice" is specified, delays are logged with the info level.

**limit_req_status**

**Syntax:** \texttt{limit\_req\_status code;}
**Default:** 503
**Context:** http, server, location

This directive appeared in version 1.3.15.

Sets the status code to return in response to rejected requests.

**limit_req_zone**

**Syntax:** \texttt{limit\_req\_zone key zone=name: size rate=rate [sync];}
**Default:** —
**Context:** http

Prior to version 1.7.6, a \texttt{key} could contain exactly one variable.

Usage example:

```
limit_req_zone \$binary_remote_addr zone=one:10m rate=1r/s;
```

Here, the states are kept in a 10 megabyte zone “one”, and an average request processing rate for this zone cannot exceed 1 request per second.

A client IP address serves as a key. Note that instead of \$\texttt{remote\_addr}$, the \$\texttt{binary\_remote\_addr}$ variable is used here. The \$\texttt{binary\_remote\_addr}$ variable’s size is always 4 bytes for IPv4 addresses or 16 bytes for IPv6 addresses. The stored state always occupies 64 bytes on 32-bit platforms and 128 bytes on 64-bit platforms. One megabyte zone can keep about 16 thousand 64-byte states or about 8 thousand 128-byte states.

If the zone storage is exhausted, the least recently used state is removed. If even after that a new state cannot be created, the request is terminated with an \texttt{error}.

The rate is specified in requests per second (r/s). If a rate of less than one request per second is desired, it is specified in request per minute (r/m). For example, half-request per second is 30r/m.

The \texttt{sync} parameter (1.15.3) enables synchronization of the shared memory zone.
The `sync` parameter is available as part of our commercial subscription.

Additionally, as part of our commercial subscription, the status information for each such shared memory zone can be obtained or reset with the API since 1.17.7.

### 2.30.4 Embedded Variables

$limit_req_status keeps the result of limiting the request processing rate (1.17.6): PASSED, DELAYED, REJECTED, DELAYED_DRY_RUN, or REJECTED_DRY_RUN
2.31 Module ngx_http_log_module

2.31.1 Summary

The ngx_http_log_module module writes request logs in the specified format.

Requests are logged in the context of a location where processing ends. It may be different from the original location, if an internal redirect happens during request processing.

2.31.2 Example Configuration

```plaintext
log_format compression '
'$remote_addr - $remote_user [$time_local] '
""$request" $status $bytes_sent '
""$http_referer ""$http_user_agent" "$gzip_ratio"
"';
access_log /spool/logs/nginx-access.log compression buffer=32k;
```

2.31.3 Directives

**access_log**

**Syntax:**

```
access_log path [format [buffer=size] [gzip=[level]] [flush=time] [if=condition]];
```

**Syntax:**

```
access_log off;
```

**Default** logs/access.log combined

**Context:** http, server, location, if in location, limit_except

Sets the path, format, and configuration for a buffered log write. Several logs can be specified on the same configuration level. Logging to syslog can be configured by specifying the “syslog:” prefix in the first parameter. The special value off cancels all access_log directives on the current level. If the format is not specified then the predefined “combined” format is used.

If either the buffer or gzip (1.3.10, 1.2.7) parameter is used, writes to log will be buffered.

The buffer size must not exceed the size of an atomic write to a disk file. For FreeBSD this size is unlimited.

When buffering is enabled, the data will be written to the file:
• if the next log line does not fit into the buffer;
• if the buffered data is older than specified by the \texttt{flush} parameter (1.3.10, 1.2.7);
• when a worker process is re-opening log files or is shutting down.

If the \texttt{gzip} parameter is used, then the buffered data will be compressed before writing to the file. The compression level can be set between 1 (fastest, less compression) and 9 (slowest, best compression). By default, the buffer size is equal to 64K bytes, and the compression level is set to 1. Since the data is compressed in atomic blocks, the log file can be decompressed or read by “\texttt{zcat}” at any time.

Example:

\begin{verbatim}
access_log /path/to/log.gz combined gzip flush=5m;
\end{verbatim}

For gzip compression to work, nginx must be built with the zlib library.

The file path can contain variables (0.7.6+), but such logs have some constraints:

• the \texttt{user} whose credentials are used by worker processes should have permissions to create files in a directory with such logs;
• buffered writes do not work;
• the file is opened and closed for each log write. However, since the descriptors of frequently used files can be stored in a \texttt{cache}, writing to the old file can continue during the time specified by the \texttt{open_log_file_cache} directive’s \texttt{valid} parameter
• during each log write the existence of the request’s \texttt{root} directory is checked, and if it does not exist the log is not created. It is thus a good idea to specify both \texttt{root} and \texttt{access_log} on the same configuration level:

\begin{verbatim}
server {
  root /spool/vhost/data/$host;
  access_log /spool/vhost/logs/$host;
  ...
}
\end{verbatim}

The \texttt{if} parameter (1.7.0) enables conditional logging. A request will not be logged if the \texttt{condition} evaluates to “0” or an empty string. In the following example, the requests with response codes 2xx and 3xx will not be logged:

\begin{verbatim}
map $status $loggable {
  ~^[23] 0;
  default 1;
}
access_log /path/to/access.log combined if=$loggable;
\end{verbatim}
log_format

**Syntax:**  
\[\text{log\_format} \ name [\text{escape=}\text{default}|\text{json}|\text{none}] \ string...;\]

**Default:**  
combined "..."

**Context:**  
http

Specifies log format.

The `escape` parameter (1.11.8) allows setting `json` or `default` characters escaping in variables, by default, `default` escaping is used. The `none` value (1.13.10) disables escaping.

For `default` escaping, characters "\r", "\n", and other characters with values less than 32 (0.7.0) or above 126 (1.1.6) are escaped as "\xXX". If the variable value is not found, a hyphen ("-"), will be logged.

For `json` escaping, all characters not allowed in JSON strings will be escaped: characters "\"" and "\"" are escaped as "\"" and "\"", characters with values less than 32 are escaped as "\n", "\r", "\t", "\b", "\f", or "\u00XX".

The log format can contain common variables, and variables that exist only at the time of a log write:

- `bytes_sent`  
  the number of bytes sent to a client

- `connection`  
  connection serial number

- `connection_requests`  
  the current number of requests made through a connection (1.1.18)

- `msec`  
  time in seconds with a milliseconds resolution at the time of the log write

- `pipe`  
  "p" if request was pipelined, "-" otherwise

- `request_length`  
  request length (including request line, header, and request body)

- `request_time`  
  request processing time in seconds with a milliseconds resolution; time elapsed between the first bytes were read from the client and the log write after the last bytes were sent to the client

- `status`  
  response status

- `time_iso8601`  
  local time in the ISO 8601 standard format

- `time_local`  
  local time in the Common Log Format

In the modern nginx versions variables `status` (1.3.2, 1.2.2), `bytes_sent` (1.3.8, 1.2.5), `connection` (1.3.8, 1.2.5), `connection_requests` (1.3.8, 1.2.5), `msec` (1.3.9, 1.2.6), `request_time` (1.3.9, 1.2.6), `pipe` (1.3.12, 1.2.7), `request_length` (1.3.12, 1.2.7), `time_iso8601` (1.3.12, 1.2.7), and `time_local` (1.3.12, 1.2.7) are also available as common variables.
Header lines sent to a client have the prefix “sent_http_”, for example, $sent_http_content_range$.

The configuration always includes the predefined “combined” format:

```
log_format combined '$remote_addr - $remote_user [$time_local] '
   '"$request" $status $body_bytes_sent '
   '"$http_referer" "$http_user_agent"';
```

**open_log_file_cache**

**Syntax:**

- `open_log_file_cache max=N [inactive=time] [min_uses=N] [valid=time];`
- `open_log_file_cache off;`

**Default:** `off`

**Context:** `http`, `server`, `location`

Defines a cache that stores the file descriptors of frequently used logs whose names contain variables. The directive has the following parameters:

- **max**
  - sets the maximum number of descriptors in a cache; if the cache becomes full the least recently used (LRU) descriptors are closed
- **inactive**
  - sets the time after which the cached descriptor is closed if there were no access during this time; by default, 10 seconds
- **min_uses**
  - sets the minimum number of file uses during the time defined by the `inactive` parameter to let the descriptor stay open in a cache; by default, 1
- **valid**
  - sets the time after which it should be checked that the file still exists with the same name; by default, 60 seconds
- **off**
  - disables caching

**Usage example:**

```
open_log_file_cache max=1000 inactive=20s valid=1m min_uses=2;
```
2.32 Module ngx_http_map_module

2.32.1 Summary

The ngx_http_map_module module creates variables whose values depend on values of other variables.

2.32.2 Example Configuration

```nginx
map $http_host $name {
    hostnames;
    default 0;
    example.com 1;
    *.example.com 1;
    example.org 2;
    *.example.org 2;
    .example.net 3;
    wap.* 4;
}
map $http_user_agent $mobile {
    default 0;
    "~Opera Mini" 1;
}
```

2.32.3 Directives

map

**Syntax:** `map string $variable { ... }

**Default** —

**Context:** http

Creates a new variable whose value depends on values of one or more of the source variables specified in the first parameter.

Before version 0.9.0 only a single variable could be specified in the first parameter.

Since variables are evaluated only when they are used, the mere declaration even of a large number of “map” variables does not add any extra costs to request processing.
Parameters inside the `map` block specify a mapping between source and resulting values.

Source values are specified as strings or regular expressions (0.9.6). Strings are matched ignoring the case.

A regular expression should either start from the “~” symbol for a case-sensitive matching, or from the “~*” symbols (1.0.4) for case-insensitive matching. A regular expression can contain named and positional captures that can later be used in other directives along with the resulting variable.

If a source value matches one of the names of special parameters described below, it should be prefixed with the “\" symbol.

The resulting value can contain text, variable (0.9.0), and their combination (1.11.0).

The following special parameters are also supported:

`default value`
sets the resulting value if the source value matches none of the specified variants. When `default` is not specified, the default resulting value will be an empty string.

`hostnames`
indicates that source values can be hostnames with a prefix or suffix mask:

```
*.example.com 1;
example.*  1;
```

The following two records

```
example.com  1;
*.example.com 1;
```

can be combined:

```
.example.com  1;
```

This parameter should be specified before the list of values.

`include file`
includes a file with values. There can be several inclusions.

`volatile`
indicates that the variable is not cacheable (1.11.7).

If the source value matches more than one of the specified variants, e.g. both a mask and a regular expression match, the first matching variant will be chosen, in the following order of priority:

1. string value without a mask
2. longest string value with a prefix mask, e.g. “*.example.com”
3. longest string value with a suffix mask, e.g. “mail.*”
4. first matching regular expression (in order of appearance in a configuration file)

5. default value

**map_hash_bucket_size**

Syntax: `map_hash_bucket_size size;`

Default: 32|64|128

Context: http

Sets the bucket size for the map variables hash tables. Default value depends on the processor’s cache line size. The details of setting up hash tables are provided in a separate document.

**map_hash_max_size**

Syntax: `map_hash_max_size size;`

Default: 2048

Context: http

Sets the maximum size of the map variables hash tables. The details of setting up hash tables are provided in a separate document.
2.33 Module ngx_http_memcached_module

2.33.1 Summary

The ngx_http_memcached_module module is used to obtain responses from a memcached server. The key is set in the $memcached_key variable. A response should be put in memcached in advance by means external to nginx.

2.33.2 Example Configuration

```nginx
server {
    location / {
        set $memcached_key "$uri?$args";
        memcached_pass host:11211;
        error_page 404 502 504 = @fallback;
    }

    location @fallback {
        proxy_pass http://backend;
    }
}
```

2.33.3 Directives

**memcached_bind**

**Syntax:** `memcached_bind address [transparent] | off;`

**Default:** —

**Context:** http, server, location

*This directive appeared in version 0.8.22.*

Makes outgoing connections to a memcached server originate from the specified local IP address with an optional port (1.11.2). Parameter value can contain variables (1.3.12). The special value `off` (1.3.12) cancels the effect
of the `memcached_bind` directive inherited from the previous configuration level, which allows the system to auto-assign the local IP address and port.

The `transparent` parameter (1.11.0) allows outgoing connections to a memcached server originate from a non-local IP address, for example, from a real IP address of a client:

```plaintext
memcached_bind $remote_addr transparent;
```

In order for this parameter to work, it is usually necessary to run nginx worker processes with the `superuser` privileges. On Linux it is not required (1.13.8) as if the `transparent` parameter is specified, worker processes inherit the `CAP_NET_RAW` capability from the master process. It is also necessary to configure kernel routing table to intercept network traffic from the memcached server.

### memcached_buffer_size

**Syntax:** `memcached_buffer_size size;`

**Default:** 4k | 8k

**Context:** http, server, location

Sets the `size` of the buffer used for reading the response received from the memcached server. The response is passed to the client synchronously, as soon as it is received.

### memcached_connect_timeout

**Syntax:** `memcached_connect_timeout time;`

**Default:** 60s

**Context:** http, server, location

Defines a timeout for establishing a connection with a memcached server. It should be noted that this timeout cannot usually exceed 75 seconds.

### memcached_gzip_flag

**Syntax:** `memcached_gzip_flag flag;`

**Default:** —

**Context:** http, server, location

This directive appeared in version 1.3.6.

Enables the test for the `flag` presence in the memcached server response and sets the “Content-Encoding” response header field to “gzip” if the flag is set.
memcached_next_upstream

**Syntax:**

```
memcached_next_upstream error | timeout |
    invalid_response | not_found | off ...;
```

**Default:** error timeout

**Context:** http, server, location

Specifies in which cases a request should be passed to the next server:

- **error**
  - an error occurred while establishing a connection with the server, passing a request to it, or reading the response header;
- **timeout**
  - a timeout has occurred while establishing a connection with the server, passing a request to it, or reading the response header;
- **invalid_response**
  - a server returned an empty or invalid response;
- **not_found**
  - a response was not found on the server;
- **off**
  - disables passing a request to the next server.

One should bear in mind that passing a request to the next server is only possible if nothing has been sent to a client yet. That is, if an error or timeout occurs in the middle of the transferring of a response, fixing this is impossible.

The directive also defines what is considered an unsuccessful attempt of communication with a server. The cases of error, timeout and invalid_response are always considered unsuccessful attempts, even if they are not specified in the directive. The case of not_found is never considered an unsuccessful attempt.

Passing a request to the next server can be limited by the number of tries and by time.

memcached_next_upstream_timeout

**Syntax:**

```
memcached_next_upstream_timeout time;
```

**Default:** 0

**Context:** http, server, location

This directive appeared in version 1.7.5.

Limits the time during which a request can be passed to the next server. The 0 value turns off this limitation.

memcached_next_upstream_tries

**Syntax:**

```
memcached_next_upstream_tries number;
```

**Default:** 0

**Context:** http, server, location

This directive appeared in version 1.7.5.
Limits the number of possible tries for passing a request to the next server. The 0 value turns off this limitation.

**memcached_pass**

**Syntax:** `memcached_pass address;`
**Default:** —
**Context:** location, if in location

Sets the memcached server address. The address can be specified as a domain name or IP address, and a port:

```
memcached_pass localhost:11211;
```

or as a UNIX-domain socket path:

```
memcached_pass unix:/tmp/memcached.socket;
```

If a domain name resolves to several addresses, all of them will be used in a round-robin fashion. In addition, an address can be specified as a server group.

**memcached_read_timeout**

**Syntax:** `memcached_read_timeout time;`
**Default:** 60s
**Context:** http, server, location

Defines a timeout for reading a response from the memcached server. The timeout is set only between two successive read operations, not for the transmission of the whole response. If the memcached server does not transmit anything within this time, the connection is closed.

**memcached_send_timeout**

**Syntax:** `memcached_send_timeout time;`
**Default:** 60s
**Context:** http, server, location

Sets a timeout for transmitting a request to the memcached server. The timeout is set only between two successive write operations, not for the transmission of the whole request. If the memcached server does not receive anything within this time, the connection is closed.

**memcached_socket_keepalive**

**Syntax:** `memcached_socket_keepalive on | off;`
**Default:** off
**Context:** http, server, location

This directive appeared in version 1.15.6.
Configures the “TCP keepalive” behavior for outgoing connections to a memcached server. By default, the operating system’s settings are in effect for the socket. If the directive is set to the value “on”, the SO_KEEPALIVE socket option is turned on for the socket.

2.33.4 Embedded Variables

$memcached_key

Defines a key for obtaining response from a memcached server.
2.34 Module ngx_http_mirror_module

2.34.1 Summary

The ngx_http_mirror_module module (1.13.4) implements mirroring of an original request by creating background mirror subrequests. Responses to mirror subrequests are ignored.

2.34.2 Example Configuration

```nginx
location / {
    mirror /mirror;
    proxy_pass http://backend;
}

location = /mirror {
    internal;
    proxy_pass http://test_backend$request_uri;
}
```

2.34.3 Directives

**mirror**

*Syntax:* `mirror uri | off;`

*Default:* `off`

*Context:* http, server, location

Sets the URI to which an original request will be mirrored. Several mirrors can be specified on the same configuration level.

**mirror_request_body**

*Syntax:* `mirror_request_body on | off;`

*Default:* `on`

*Context:* http, server, location

Indicates whether the client request body is mirrored. When enabled, the client request body will be read prior to creating mirror subrequests. In this case, unbuffered client request body proxying set by the `proxy_request_buffering`, `fastcgi_request_buffering`, `scgi_request_buffering`, and `uwsgi_request_buffering` directives will be disabled.
location / {
    mirror /mirror;
    mirror_request_body off;
    proxy_pass http://backend;
}

location = /mirror {
    internal;
    proxy_pass http://log_backend;
    proxy_pass_request_body off;
    proxy_set_header Content-Length "";
    proxy_set_header X-Original-URI $request_uri;
}
CHAPTER 2. HTTP SERVER MODULES

2.35 Module ngx_http_mp4_module

2.35.1 Summary

The ngx_http_mp4_module module provides pseudo-streaming server-side support for MP4 files. Such files typically have the .mp4, .m4v, or .m4a filename extensions.

Pseudo-streaming works in alliance with a compatible media player. The player sends an HTTP request to the server with the start time specified in the query string argument (named simply start and specified in seconds), and the server responds with the stream such that its start position corresponds to the requested time, for example:

http://example.com/elephants_dream.mp4?start=238.88

This allows performing a random seeking at any time, or starting playback in the middle of the timeline.

To support seeking, H.264-based formats store metadata in a so-called “moov atom”. It is a part of the file that holds the index information for the whole file.

To start playback, the player first needs to read metadata. This is done by sending a special request with the start=0 argument. A lot of encoding software insert the metadata at the end of the file. This is suboptimal for pseudo-streaming, because the player has to download the entire file before starting playback. If the metadata are located at the beginning of the file, it is enough for nginx to simply start sending back the file contents. If the metadata are located at the end of the file, nginx must read the entire file and prepare a new stream so that the metadata come before the media data. This involves some CPU, memory, and disk I/O overhead, so it is a good idea to prepare an original file for pseudo-streaming in advance, rather than having nginx do this on every such request.

The module also supports the end argument of an HTTP request (1.5.13) which sets the end point of playback. The end argument can be specified with the start argument or separately:

http://example.com/elephants_dream.mp4?start=238.88&end=555.55
For a matching request with a non-zero start or end argument, nginx will read the metadata from the file, prepare the stream with the requested time range, and send it to the client. This has the same overhead as described above.

If the start argument points to a non-key video frame, the beginning of such video will be broken. To fix this issue, the video can be prepended with the key frame before start point and with all intermediate frames between them. These frames will be hidden from playback using an edit list (1.21.4).

If a matching request does not include the start and end arguments, there is no overhead, and the file is sent simply as a static resource. Some players also support byte-range requests, and thus do not require this module.

This module is not built by default, it should be enabled with the --with-http_mp4_module configuration parameter.

If a third-party mp4 module was previously used, it should be disabled.

A similar pseudo-streaming support for FLV files is provided by the ngx_http_flv_module module.

### 2.35.2 Example Configuration

```nginx
location /video/ {
    mp4;
    mp4_buffer_size 1m;
    mp4_max_buffer_size 5m;
    mp4_limit_rate on;
    mp4_limit_rate_after 30s;
}
```

### 2.35.3 Directives

**mp4**

**Syntax:** `mp4;`

**Default:** —

**Context:** location

Turns on module processing in a surrounding location.

**mp4_buffer_size**

**Syntax:** `mp4_buffer_size size;`

**Default:** 512K

**Context:** http, server, location

Sets the initial size of the buffer used for processing MP4 files.
mp4_max_buffer_size

Syntax:  `mp4_max_buffer_size size;`
Default: 10M
Context: http, server, location

During metadata processing, a larger buffer may become necessary. Its size cannot exceed the specified `size`, or else nginx will return the 500 Internal Server Error server error, and log the following message:

```
"/some/movie/file.mp4" mp4 moov atom is too large: 12583268, you may want to increase mp4_max_buffer_size
```

mp4_limit_rate

Syntax:  `mp4_limit_rate on | off | factor;`
Default: off
Context: http, server, location

Limits the rate of response transmission to a client. The rate is limited based on the average bitrate of the MP4 file served. To calculate the rate, the bitrate is multiplied by the specified `factor`. The special value "on" corresponds to the factor of 1.1. The special value "off" disables rate limiting. The limit is set per a request, and so if a client simultaneously opens two connections, the overall rate will be twice as much as the specified limit.

This directive is available as part of our commercial subscription.

mp4_limit_rate_after

Syntax:  `mp4_limit_rate_after time;`
Default: 60s
Context: http, server, location

Sets the initial amount of media data (measured in playback time) after which the further transmission of the response to a client will be rate limited.

This directive is available as part of our commercial subscription.

mp4_start_key_frame

Syntax:  `mp4_start_key_frame on | off;`
Default: off
Context: http, server, location

This directive appeared in version 1.21.4.

Forces output video to always start with a key video frame. If the `start` argument does not point to a key frame, initial frames are hidden using an mp4 edit list. Edit lists are supported by major players and browsers such as Chrome, Safari, QuickTime and ffmpeg, partially supported by Firefox.

Nginx, Inc.  p.229 of 542
CHAPTER 2. HTTP SERVER MODULES

2.36 Module ngx_http_perl_module

2.36.1 Summary

The ngx_http_perl_module module is used to implement location and variable handlers in Perl and insert Perl calls into SSI.

This module is not built by default, it should be enabled with the --with-http_perl_module configuration parameter.

This module requires Perl version 5.6.1 or higher. The C compiler should be compatible with the one used to build Perl.

2.36.2 Known Issues

The module is experimental, caveat emptor applies.

In order for Perl to recompile the modified modules during reconfiguration, it should be built with the -Dusemultiplicity=yes or -Dusethreads=yes parameters. Also, to make Perl leak less memory at run time, it should be built with the -Dusemymalloc=no parameter. To check the values of these parameters in an already built Perl (preferred values are specified in the example), run:

```
$ perl -V:usemultiplicity -V:usemymalloc
usemultiplicity='define';
usemymalloc='n';
```

Note that after rebuilding Perl with the new -Dusemultiplicity=yes or -Dusethreads=yes parameters, all binary Perl modules will have to be rebuilt as well — they will just stop working with the new Perl.

There is a possibility that the main process and then worker processes will grow in size after every reconfiguration. If the main process grows to an unacceptable size, the live upgrade procedure can be applied without changing the executable file.

While the Perl module is performing a long-running operation, such as resolving a domain name, connecting to another server, or querying a database, other requests assigned to the current worker process will not be processed.
is thus recommended to perform only such operations that have predictable and short execution time, such as accessing the local file system.

### 2.36.3 Example Configuration

```
http {
    perl_modules perl/lib;
    perl_require hello.pm;
    perl_set $msie6 'sub {
        my $r = shift;
        my $ua = $r->header_in("User-Agent");
        return "" if $ua =~ /Opera/;
        return "1" if $ua =~ / MSIE \[6-9]\d+/;
        return "";
    }
    ';
    server {
        location / {
            perl hello::handler;
        }
    }
}
```

The `perl/lib/hello.pm` module:

```
package hello;
use nginx;
sub handler {
    my $r = shift;
    $r->send_http_header("text/html");
    return OK if $r->header_only;
    $r->print("hello!
<br/>");
    if (-f $r->filename or -d _) {
        $r->print($r->uri, " exists!\n");
    }
    return OK;
} 1;
__END__
```

### 2.36.4 Directives

`perl`

**Syntax:** `perl module::function|sub { ... }`;

**Default** —

**Context:** location, limit_except
Sets a Perl handler for the given location.

**perl_modules**

**Syntax:** `perl_modules path;`

**Default:** —

**Context:** http

Sets an additional path for Perl modules.

**perl_require**

**Syntax:** `perl_require module;`

**Default:** —

**Context:** http

Defines the name of a module that will be loaded during each reconfiguration. Several `perl_require` directives can be present.

**perl_set**

**Syntax:** `perl_set $variable module::function|sub {...};`

**Default:** —

**Context:** http

Installs a Perl handler for the specified variable.

### 2.36.5 Calling Perl from SSI

An SSI command calling Perl has the following format:

```
<!--# perl sub="module::function" arg="parameter1" arg="parameter2" ... -->
```

### 2.36.6 The $r Request Object Methods

$r->args
returns request arguments.

$r->filename
returns a filename corresponding to the request URI.

$r->has_request_body(handler)
returns 0 if there is no body in a request. If there is a body, the specified handler is set for the request and 1 is returned. After reading the request body, nginx will call the specified handler. Note that the handler function should be passed by reference. Example:

```perl
define hello
use nginx;
```
sub handler {
    my $r = shift;

    if ($r->request_method ne "POST") {
        return DECLINED;
    }

    if ($r->has_request_body("\spost")) {
        return OK;
    }

    return HTTP_BAD_REQUEST;
}

sub post {
    my $r = shift;

    $r->send_http_header;

    $r->print("request_body: \\
", $r->request_body, \\
"<br/>");
    $r->print("request_body_file: \\
", $r->request_body_file, \\
"<br/>
");

    return OK;
}

__END__

$r->allow_ranges
    enables the use of byte ranges when sending responses.
$r->discard_request_body
    instructs nginx to discard the request body.
$r->header_in(field)
    returns the value of the specified client request header field.
$r->header_only
    determines whether the whole response or only its header should be sent to the client.
$r->header_out(field, value)
    sets a value for the specified response header field.
$r->internal_redirect(uri)
    does an internal redirect to the specified uri. An actual redirect happens after the Perl handler execution is completed.

Since version 1.17.2, the method accepts escaped URIs and supports redirections to named locations.

$r->log_error(errno, message)
    writes the specified message into the error log. If errno is non-zero, an error code and its description will be appended to the message.
$r->print(text, ...)
    passes data to a client.
$r->request_body
    returns the client request body if it has not been written to a temporary file. To ensure that the client request body is in memory, its size should
be limited by `client_max_body_size`, and a sufficient buffer size should be set using `client_body_buffer_size`.

$r->request_body_file
returns the name of the file with the client request body. After the processing, the file should be removed. To always write a request body to a file, `client_body_in_file_only` should be enabled.

$r->request_method
returns the client request HTTP method.

$r->remote_addr
returns the client IP address.

$r->flush
immediately sends data to the client.

$r->sendfile(name[, offset[, length]])
sends the specified file content to the client. Optional parameters specify the initial offset and length of the data to be transmitted. The actual data transmission happens after the Perl handler has completed.

$r->send_http_header([type])
sends the response header to the client. The optional `type` parameter sets the value of the `Content-Type` response header field. If the value is an empty string, the `Content-Type` header field will not be sent.

$r->status(code)
sets a response code.

$r->sleep(milliseconds, handler)
sets the specified handler and stops request processing for the specified time. In the meantime, nginx continues to process other requests. After the specified time has elapsed, nginx will call the installed handler. Note that the handler function should be passed by reference. In order to pass data between handlers, $r->variable() should be used. Example:

```perl
package hello;
use nginx;

sub handler {
    my $r = shift;
    $r->discard_request_body;
    $r->variable("var", "OK");
    $r->sleep(1000, \&next);
    return OK;
}

sub next {
    my $r = shift;
    $r->send_http_header;
    $r->print($r->variable("var"));
    return OK;
}

1;
__END__
```
$r->unescape(text)
   decodes a text encoded in the "%XX" form.
$r->uri
   returns a request URI.
$r->variable(name [, value])
   returns or sets the value of the specified variable. Variables are local to each request.
2.37 Module ngx_http_proxy_module

2.37.1 Summary ........................................... 237
2.37.2 Example Configuration ............................. 237
2.37.3 Directives ......................................... 238
  proxy_bind ........................................... 238
  proxy_buffer_size ................................. 238
  proxy_buffering .................................... 238
  proxy_buffers ...................................... 239
  proxy_busy_buffers_size ....................... 239
  proxy_cache ......................................... 239
  proxy_cache_background_update .......... 239
  proxy_cache_bypass ............................... 240
  proxy_cache_convert_head .................. 240
  proxy_cache_key .................................. 240
  proxy_cache_lock .................................. 240
  proxy_cache_lock_age ......................... 241
  proxy_cache_lock_timeout .................... 241
  proxy_cache_max_range_offset .......... 241
  proxy_cache_methods ........................... 241
  proxy_cache_min_uses ........................... 242
  proxy_cache_path ................................ 242
  proxy_cache_purge ............................... 244
  proxy_cache_revalidate ....................... 244
  proxy_cache_use_stale ....................... 245
  proxy_cache_valid .............................. 245
  proxy_connect_timeout ....................... 246
  proxy_cookie_domain ......................... 246
  proxy_cookie_flags .............................. 247
  proxy_cookie_path ............................... 248
  proxy_force_ranges .............................. 248
  proxy_headers_hash_bucket_size .......... 249
  proxy_headers_hash_max_size .............. 249
  proxy_hide_header ............................... 249
  proxy_http_version ......................... 249
  proxy_ignore_client_abort .................. 249
  proxy_ignore_headers ....................... 250
  proxy_intercept_errors ..................... 250
  proxy_limit_rate ............................... 250
  proxy_max_temp_file_size ................. 251
  proxy_method ...................................... 251
  proxy_next_upstream ......................... 251
  proxy_next_upstream_timeout .................. 252
  proxy_next_upstream_tries .................. 252
  proxy_no_cache .................................. 253
  proxy_pass ......................................... 253
2.37.1 Summary

The ngx_http_proxy_module module allows passing requests to another server.

2.37.2 Example Configuration

```plaintext
location / {
    proxy_pass http://localhost:8000;
    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
}
```

2.37.4 Embedded Variables
2.37.3 Directives

**proxy_bind**

**Syntax:** `proxy_bind address [transparent] | off;`

**Default:** –

**Context:** http, server, location

This directive appeared in version 0.8.22.

Makes outgoing connections to a proxied server originate from the specified local IP address with an optional port (1.11.2). Parameter value can contain variables (1.3.12). The special value `off` (1.3.12) cancels the effect of the `proxy_bind` directive inherited from the previous configuration level, which allows the system to auto-assign the local IP address and port.

The `transparent` parameter (1.11.0) allows outgoing connections to a proxied server originate from a non-local IP address, for example, from a real IP address of a client:

```
proxy_bind $remote_addr transparent;
```

In order for this parameter to work, it is usually necessary to run nginx worker processes with the superuser privileges. On Linux it is not required (1.13.8) as if the `transparent` parameter is specified, worker processes inherit the CAP_NET_RAW capability from the master process. It is also necessary to configure kernel routing table to intercept network traffic from the proxied server.

**proxy_buffer_size**

**Syntax:** `proxy_buffer_size size;`

**Default:** 4k|8k

**Context:** http, server, location

Sets the `size` of the buffer used for reading the first part of the response received from the proxied server. This part usually contains a small response header. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform. It can be made smaller, however.

**proxy_buffering**

**Syntax:** `proxy_buffering on | off;`

**Default:** on

**Context:** http, server, location

Enables or disables buffering of responses from the proxied server.

When buffering is enabled, nginx receives a response from the proxied server as soon as possible, saving it into the buffers set by the `proxy_buffer_size` and `proxy_buffers` directives. If the whole response does not fit into memory, a part of it can be saved to a temporary file on the disk. Writing to temporary files
is controlled by the `proxy_max_temp_file_size` and `proxy_temp_file_write_size` directives.

When buffering is disabled, the response is passed to a client synchronously, immediately as it is received. nginx will not try to read the whole response from the proxied server. The maximum size of the data that nginx can receive from the server at a time is set by the `proxy_buffer_size` directive.

Buffering can also be enabled or disabled by passing “yes” or “no” in the `X-Accel-Buffering` response header field. This capability can be disabled using the `proxy_ignore_headers` directive.

**proxy_buffers**

Syntax: `proxy_buffers number size;`
Default: 8 4k|8k
Context: http, server, location

Sets the `number` and `size` of the buffers used for reading a response from the proxied server, for a single connection. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform.

**proxy_busy_buffers_size**

Syntax: `proxy_busy_buffers_size size;`
Default: 8k|16k
Context: http, server, location

When buffering of responses from the proxied server is enabled, limits the total `size` of buffers that can be busy sending a response to the client while the response is not yet fully read. In the meantime, the rest of the buffers can be used for reading the response and, if needed, buffering part of the response to a temporary file. By default, `size` is limited by the size of two buffers set by the `proxy_buffer_size` and `proxy_buffers` directives.

**proxy_cache**

Syntax: `proxy_cache zone | off;`
Default: off
Context: http, server, location

Defines a shared memory zone used for caching. The same zone can be used in several places. Parameter value can contain variables (1.7.9). The `off` parameter disables caching inherited from the previous configuration level.

**proxy_cache_background_update**

Syntax: `proxy_cache_background_update on | off;`
Default: off
Context: http, server, location

This directive appeared in version 1.11.10.
Allows starting a background subrequest to update an expired cache item, while a stale cached response is returned to the client. Note that it is necessary to allow the usage of a stale cached response when it is being updated.

**proxy_cache_bypass**

Syntax: `proxy_cache_bypass string ...;
Default: 
Context: http, server, location

Defines conditions under which the response will not be taken from a cache. If at least one value of the string parameters is not empty and is not equal to “0” then the response will not be taken from the cache:

```
proxy_cache_bypass $cookie_nocache $arg_nocache $arg_comment;
proxy_cache_bypass $http_pragma $http_authorization;
```

Can be used along with the `proxy_no_cache` directive.

**proxy_cache_convert_head**

Syntax: `proxy_cache_convert_head on | off;
Default: on
Context: http, server, location

This directive appeared in version 1.9.7.

Enables or disables the conversion of the “HEAD” method to “GET” for caching. When the conversion is disabled, the cache key should be configured to include the `$request_method`.

**proxy_cache_key**

Syntax: `proxy_cache_key string;
Default: $scheme$proxy_host$request_uri
Context: http, server, location

Defines a key for caching, for example

```
proxy_cache_key "$host$request_uri $cookie_user";
```

By default, the directive’s value is close to the string

```
proxy_cache_key $scheme$proxy_host$uri$is_args$args;
```

**proxy_cache_lock**

Syntax: `proxy_cache_lock on | off;
Default: off
Context: http, server, location

This directive appeared in version 1.1.12.
When enabled, only one request at a time will be allowed to populate a new cache element identified according to the `proxy_cache_key` directive by passing a request to a proxied server. Other requests of the same cache element will either wait for a response to appear in the cache or the cache lock for this element to be released, up to the time set by the `proxy_cache_lock_timeout` directive.

**proxy_cache_lock_age**

**Syntax:** `proxy_cache_lock_age time;`

**Default:** 5s

**Context:** http, server, location

This directive appeared in version 1.7.8.

If the last request passed to the proxied server for populating a new cache element has not completed for the specified `time`, one more request may be passed to the proxied server.

**proxy_cache_lock_timeout**

**Syntax:** `proxy_cache_lock_timeout time;`

**Default:** 5s

**Context:** http, server, location

This directive appeared in version 1.1.12.

Sets a timeout for `proxy_cache_lock`. When the `time` expires, the request will be passed to the proxied server, however, the response will not be cached.

Before 1.7.8, the response could be cached.

**proxy_cache_max_range_offset**

**Syntax:** `proxy_cache_max_range_offset number;`

**Default:** —

**Context:** http, server, location

This directive appeared in version 1.11.6.

Sets an offset in bytes for byte-range requests. If the range is beyond the offset, the range request will be passed to the proxied server and the response will not be cached.

**proxy_cache_methods**

**Syntax:** `proxy_cache_methods GET | HEAD | POST ...;`

**Default:** GET HEAD

**Context:** http, server, location

This directive appeared in version 0.7.59.

If the client request method is listed in this directive then the response will be cached. “GET” and “HEAD” methods are always added to the list, though
it is recommended to specify them explicitly. See also the `proxy_no_cache` directive.

**proxy_cache_min_uses**

Syntax: `proxy_cache_min_uses number;`
Default 1
Context: http, server, location

Sets the *number* of requests after which the response will be cached.

**proxy_cache_path**

Syntax: `proxy_cache_path path [levels=levels]`

- `use_temp_path=on|off`
- `keys_zone=name:size [inactive=time]`
- `max_size=size` [`min_free=size`] [`manager_files=number`]
- `manager_sleep=time` [`manager_threshold=time`]
- `loader_files=number` [`loader_sleep=time`]
- `loader_threshold=time` [`purger=on|off`]
- `purger_files=number` [`purger_sleep=time`]
- `purger_threshold=time`;

Default —
Context: http

Sets the path and other parameters of a cache. Cache data are stored in files. The file name in a cache is a result of applying the MD5 function to the cache key. The `levels` parameter defines hierarchy levels of a cache: from 1 to 3, each level accepts values 1 or 2. For example, in the following configuration

```
proxy_cache_path /data/nginx/cache levels=1:2 keys_zone=one:10m;
```

file names in a cache will look like this:

```
/data/nginx/cache/c/29/b7f54b2df7773722d382f4809d65029c
```

A cached response is first written to a temporary file, and then the file is renamed. Starting from version 0.8.9, temporary files and the cache can be put on different file systems. However, be aware that in this case a file is copied across two file systems instead of the cheap renaming operation. It is thus recommended that for any given location both cache and a directory holding temporary files are put on the same file system. The directory for temporary files is set based on the `use_temp_path` parameter (1.7.10). If this parameter is omitted or set to the value `on`, the directory set by the `proxy_temp_path` directive for the given location will be used. If the value is set to `off`, temporary files will be put directly in the cache directory.

In addition, all active keys and information about data are stored in a shared memory zone, whose `name` and `size` are configured by the `keys_zone` parameter. One megabyte zone can store about 8 thousand keys.
As part of commercial subscription, the shared memory zone also stores extended cache information, thus, it is required to specify a larger zone size for the same number of keys. For example, one megabyte zone can store about 4 thousand keys.

Cached data that are not accessed during the time specified by the inactive parameter get removed from the cache regardless of their freshness. By default, inactive is set to 10 minutes.

The special “cache manager” process monitors the maximum cache size set by the max_size parameter, and the minimum amount of free space set by the min_free (1.19.1) parameter on the file system with cache. When the size is exceeded or there is not enough free space, it removes the least recently used data. The data is removed in iterations configured by manager_files, manager_threshold, and manager_sleep parameters (1.11.5). During one iteration no more than manager_files items are deleted (by default, 100). The duration of one iteration is limited by the manager_threshold parameter (by default, 200 milliseconds). Between iterations, a pause configured by the manager_sleep parameter (by default, 50 milliseconds) is made.

A minute after the start the special “cache loader” process is activated. It loads information about previously cached data stored on file system into a cache zone. The loading is also done in iterations. During one iteration no more than loader_files items are loaded (by default, 100). Besides, the duration of one iteration is limited by the loader_threshold parameter (by default, 200 milliseconds). Between iterations, a pause configured by the loader_sleep parameter (by default, 50 milliseconds) is made.

Additionally, the following parameters are available as part of our commercial subscription:

- **purger=on|off**
  Instructs whether cache entries that match a wildcard key will be removed from the disk by the cache purger (1.7.12). Setting the parameter to on (default is off) will activate the “cache purger” process that permanently iterates through all cache entries and deletes the entries that match the wildcard key.

- **purger_files=number**
  Sets the number of items that will be scanned during one iteration (1.7.12). By default, purger_files is set to 10.

- **purger_threshold=number**
  Sets the duration of one iteration (1.7.12). By default, purger_threshold is set to 50 milliseconds.

- **purger_sleep=number**
  Sets a pause between iterations (1.7.12). By default, purger_sleep is set to 50 milliseconds.
In versions 1.7.3, 1.7.7, and 1.11.10 cache header format has been changed. Previously cached responses will be considered invalid after upgrading to a newer nginx version.

**proxy_cache_purge**

**Syntax**: `proxy_cache_purge string ...;`

**Default** —

**Context**: http, server, location

This directive appeared in version 1.5.7.

Defines conditions under which the request will be considered a cache purge request. If at least one value of the string parameters is not empty and is not equal to “0” then the cache entry with a corresponding **cache key** is removed. The result of successful operation is indicated by returning the 204 **No Content** response.

If the **cache key** of a purge request ends with an asterisk ("*"), all cache entries matching the wildcard key will be removed from the cache. However, these entries will remain on the disk until they are deleted for either inactivity, or processed by the **cache purger** (1.7.12), or a client attempts to access them.

Example configuration:

```
proxy_cache_path /data/nginx/cache keys_zone=cache_zone:10m;

map $request_method $purge_method {
  PURGE 1;
  default 0;
}

server {
...
  location / {
    proxy_pass http://backend;
    proxy_cache cache_zone;
    proxy_cache_key $uri;
    proxy_cache_purge $purge_method;
  }
}
```

This functionality is available as part of our commercial subscription.

**proxy_cache_revalidate**

**Syntax**: `proxy_cache_revalidate on | off;`

**Default** off

**Context**: http, server, location

This directive appeared in version 1.5.7.

Enables revalidation of expired cache items using conditional requests with the **If-Modified-Since** and **If-None-Match** header fields.
proxy_cache_use_stale

Syntax:  proxy_cache_use_stale error | timeout | invalid_header | updating | http_500 | http_502 | http_503 | http_504 | http_403 | http_404 | http_429 | off ... ;

Default:  off

Context:  http, server, location

Determines in which cases a stale cached response can be used during communication with the proxied server. The directive’s parameters match the parameters of the proxy_next_upstream directive.

The error parameter also permits using a stale cached response if a proxied server to process a request cannot be selected.

Additionally, the updating parameter permits using a stale cached response if it is currently being updated. This allows minimizing the number of accesses to proxied servers when updating cached data.

Using a stale cached response can also be enabled directly in the response header for a specified number of seconds after the response became stale (1.11.10). This has lower priority than using the directive parameters.

- The “stale-while-revalidate” extension of the Cache-Control header field permits using a stale cached response if it is currently being updated.

- The “stale-if-error” extension of the Cache-Control header field permits using a stale cached response in case of an error.

To minimize the number of accesses to proxied servers when populating a new cache element, the proxy_cache_lock directive can be used.

proxy_cache_valid

Syntax:  proxy_cache_valid [code ...] time ;

Default:  —

Context:  http, server, location

Sets caching time for different response codes. For example, the following directives

| proxy_cache_valid 200 302 10m; |
| proxy_cache_valid 404 1m; |

set 10 minutes of caching for responses with codes 200 and 302 and 1 minute for responses with code 404.

If only caching time is specified

| proxy_cache_valid 5m; |

then only 200, 301, and 302 responses are cached.

In addition, the any parameter can be specified to cache any responses:
Parameters of caching can also be set directly in the response header. This has higher priority than setting of caching time using the directive.

- The `X-Accel-Expires` header field sets caching time of a response in seconds. The zero value disables caching for a response. If the value starts with the @ prefix, it sets an absolute time in seconds since Epoch, up to which the response may be cached.

- If the header does not include the `X-Accel-Expires` field, parameters of caching may be set in the header fields `Expires` or `Cache-Control`.

- If the header includes the `Set-Cookie` field, such a response will not be cached.

- If the header includes the `Vary` field with the special value “*”, such a response will not be cached (1.7.7). If the header includes the `Vary` field with another value, such a response will be cached taking into account the corresponding request header fields (1.7.7).

Processing of one or more of these response header fields can be disabled using the `proxy_ignore_headers` directive.

### proxy_connect_timeout

**Syntax:**

```
proxy_connect_timeout time;
```

**Default:** 60s

**Context:** http, server, location

Defines a timeout for establishing a connection with a proxied server. It should be noted that this timeout cannot usually exceed 75 seconds.

### proxy_cookie_domain

**Syntax:**

```
proxy_cookie_domain off;
```

**Syntax:**

```
proxy_cookie_domain domain replacement;
```

**Default:** off

**Context:** http, server, location

This directive appeared in version 1.1.15.

Sets a text that should be changed in the domain attribute of the `Set-Cookie` header fields of a proxied server response. Suppose a proxied server returned the `Set-Cookie` header field with the attribute “domain=localhost”. The directive

```
proxy_cookie_domain localhost example.org;
```
will rewrite this attribute to “domain=example.org”.
A dot at the beginning of the domain and replacement strings and the domain attribute is ignored. Matching is case-insensitive.

The domain and replacement strings can contain variables:

```
proxy_cookie_domain www.$host $host;
```

The directive can also be specified using regular expressions. In this case, domain should start from the “~” symbol. A regular expression can contain named and positional captures, and replacement can reference them:

```
proxy_cookie_domain ~\.(?P<sl_domain>[\-0-9a-z]+\.[a-z]+)$ $sl_domain;
```

Several proxy_cookie_domain directives can be specified on the same level:

```
proxy_cookie_domain localhost example.org;
proxy_cookie_domain ~\.(\[a-z]+\.[a-z]+)$ $1;
```

If several directives can be applied to the cookie, the first matching directive will be chosen.

The off parameter cancels the effect of the proxy_cookie_domain directives inherited from the previous configuration level.

### proxy_cookie_flags

**Syntax:**

```
proxy_cookie_flags off | cookie [flag ...];
```

**Default:** off

**Context:** http, server, location

This directive appeared in version 1.19.3.

Sets one or more flags for the cookie. The cookie can contain text, variables, and their combinations. The flag can contain text, variables, and their combinations (1.19.8). The secure, httponly, samesite=strict, samesite=lax, samesite=none parameters add the corresponding flags. The nosecure, nohttponly, nosamesite parameters remove the corresponding flags.

The cookie can also be specified using regular expressions. In this case, cookie should start from the “~” symbol.

Several proxy_cookie_flags directives can be specified on the same configuration level:

```
proxy_cookie_flags one httponly;
proxy_cookie_flags ~ nousecure samesite=strict;
```

If several directives can be applied to the cookie, the first matching directive will be chosen. In the example, the httponly flag is added to the cookie one, for all other cookies the samesite=strict flag is added and the secure flag is deleted.
The *off* parameter cancels the effect of the `proxy_cookie_flags` directives inherited from the previous configuration level.

**proxy_cookie_path**

**Syntax:**  
```
proxy_cookie_path off;
```

**Syntax:**  
```
proxy_cookie_path path replacement;
```

**Default:**  
off

**Context:**  
http, server, location

This directive appeared in version 1.1.15.

Sets a text that should be changed in the *path* attribute of the *Set-Cookie* header fields of a proxied server response. Suppose a proxied server returned the *Set-Cookie* header field with the attribute “path=/two/some/uri/”. The directive

```
proxy_cookie_path /two/ /;
```

will rewrite this attribute to “path=/some/uri/”.

The *path* and *replacement* strings can contain variables:

```
proxy_cookie_path $uri /some$uri;
```

The directive can also be specified using regular expressions. In this case, *path* should either start from the “~” symbol for a case-sensitive matching, or from the “~*” symbols for case-insensitive matching. The regular expression can contain named and positional captures, and *replacement* can reference them:

```
proxy_cookie_path ~*/user/([^/]+) /u/\1;
```

Several `proxy_cookie_path` directives can be specified on the same level:

```
proxy_cookie_path /one/ /;
proxy_cookie_path / /two/;
```

If several directives can be applied to the cookie, the first matching directive will be chosen.

The *off* parameter cancels the effect of the `proxy_cookie_path` directives inherited from the previous configuration level.

**proxy_force_ranges**

**Syntax:**  
```
proxy_force_ranges on | off;
```

**Default:**  
off

**Context:**  
http, server, location

This directive appeared in version 1.7.7.

Enables byte-range support for both cached and uncached responses from the proxied server regardless of the *Accept-Ranges* field in these responses.
proxy_headers_hash_bucket_size

Syntax:  \texttt{proxy\_headers\_hash\_bucket\_size size;}
Default  64
Context: http, server, location

Sets the bucket size for hash tables used by the \texttt{proxy\_hide\_header} and \texttt{proxy\_set\_header} directives. The details of setting up hash tables are provided in a separate document.

proxy_headers_hash_max_size

Syntax:  \texttt{proxy\_headers\_hash\_max\_size size;}
Default  512
Context: http, server, location

Sets the maximum size of hash tables used by the \texttt{proxy\_hide\_header} and \texttt{proxy\_set\_header} directives. The details of setting up hash tables are provided in a separate document.

proxy_hide_header

Syntax:  \texttt{proxy\_hide\_header field;}
Default  —
Context: http, server, location

By default, nginx does not pass the header fields \texttt{Date}, \texttt{Server}, \texttt{X-Pad}, and \texttt{X-Accel-...} from the response of a proxied server to a client. The \texttt{proxy\_hide\_header} directive sets additional fields that will not be passed. If, on the contrary, the passing of fields needs to be permitted, the \texttt{proxy\_pass\_header} directive can be used.

proxy_http_version

Syntax:  \texttt{proxy\_http\_version 1.0 | 1.1;}
Default  1.0
Context: http, server, location

This directive appeared in version 1.1.4.

Sets the HTTP protocol version for proxying. By default, version 1.0 is used. Version 1.1 is recommended for use with keepalive connections and NTLM authentication.

proxy_ignore_client_abort

Syntax:  \texttt{proxy\_ignore\_client\_abort on | off;}
Default  off
Context: http, server, location

Determines whether the connection with a proxied server should be closed when a client closes the connection without waiting for a response.
proxy_ignore_headers

Syntax:  `proxy_ignore_headers field ...;

Default —

Context: http, server, location

Disables processing of certain response header fields from the proxied server. The following fields can be ignored: X-Accel-Redirect, X-Accel-Expires, X-Accel-Limit-Rate (1.1.6), X-Accel-Buffering (1.1.6), X-Accel-Charset (1.1.6), Expires, Cache-Control, Set-Cookie (0.8.44), and Vary (1.7.7).

If not disabled, processing of these header fields has the following effect:

- X-Accel-Expires, Expires, Cache-Control, Set-Cookie, and Vary set the parameters of response caching;
- X-Accel-Redirect performs an internal redirect to the specified URI;
- X-Accel-Limit-Rate sets the rate limit for transmission of a response to a client;
- X-Accel-Buffering enables or disables buffering of a response;
- X-Accel-Charset sets the desired charset of a response.

proxy_intercept_errors

Syntax:  `proxy_intercept_errors on | off;

Default  off

Context: http, server, location

Determines whether proxied responses with codes greater than or equal to 300 should be passed to a client or be intercepted and redirected to nginx for processing with the error_page directive.

proxy_limit_rate

Syntax:  `proxy_limit_rate rate;

Default  0

Context: http, server, location

This directive appeared in version 1.7.7.

Limits the speed of reading the response from the proxied server. The rate is specified in bytes per second. The zero value disables rate limiting. The limit is set per a request, and so if nginx simultaneously opens two connections to the proxied server, the overall rate will be twice as much as the specified limit. The limitation works only if buffering of responses from the proxied server is enabled.
**proxy_max_temp_file_size**

Syntax:  
`proxy_max_temp_file_size size;`

Default: 1024m

Context: http, server, location

When buffering of responses from the proxied server is enabled, and the whole response does not fit into the buffers set by the `proxy_buffer_size` and `proxy_buffers` directives, a part of the response can be saved to a temporary file. This directive sets the maximum `size` of the temporary file. The size of data written to the temporary file at a time is set by the `proxy_temp_file_write_size` directive.

The zero value disables buffering of responses to temporary files.

This restriction does not apply to responses that will be cached or stored on disk.

**proxy_method**

Syntax:  
`proxy_method method;`

Default: —

Context: http, server, location

Specifies the HTTP `method` to use in requests forwarded to the proxied server instead of the method from the client request. Parameter value can contain variables (1.11.6).

**proxy_next_upstream**

Syntax:  
`proxy_next_upstream error | timeout | invalid_header | http_500 | http_502 | http_503 | http_504 | http_403 | http_404 | http_429 | non_idempotent | off ...;`

Default: error timeout

Context: http, server, location

Specifies in which cases a request should be passed to the next server:

- **error**
  an error occurred while establishing a connection with the server, passing a request to it, or reading the response header;

- **timeout**
  a timeout has occurred while establishing a connection with the server, passing a request to it, or reading the response header;

- **invalid_header**
  a server returned an empty or invalid response;

- **http_500**
  a server returned a response with the code 500;

- **http_502**
  a server returned a response with the code 502;
http_503
   a server returned a response with the code 503;
http_504
   a server returned a response with the code 504;
http_403
   a server returned a response with the code 403;
http_404
   a server returned a response with the code 404;
http_429
   a server returned a response with the code 429 (1.11.13);
non_idempotent
   normally, requests with a non-idempotent method (POST, LOCK, PATCH)
   are not passed to the next server if a request has been sent to an
   upstream server (1.9.13); enabling this option explicitly allows retrying
   such requests;
off
   disables passing a request to the next server.

One should bear in mind that passing a request to the next server is only
possible if nothing has been sent to a client yet. That is, if an error or timeout
occurs in the middle of the transferring of a response, fixing this is impossible.

The directive also defines what is considered an unsuccessful attempt of
communication with a server. The cases of error, timeout and invalid_header
are always considered unsuccessful attempts, even if they are not
specified in the directive. The cases of http_500, http_502, http_503,
http_504, and http_429 are considered unsuccessful attempts only if they
are specified in the directive. The cases of http_403 and http_404 are
never considered unsuccessful attempts.

Passing a request to the next server can be limited by the number of tries
and by time.

**proxy_next_upstream_timeout**

**Syntax:**

```
proxy_next_upstream_timeout time;
```

**Default:** 0

**Context:** http, server, location

This directive appeared in version 1.7.5.

Limits the time during which a request can be passed to the next server.
The 0 value turns off this limitation.

**proxy_next_upstream_tries**

**Syntax:**

```
proxy_next_upstream_tries number;
```

**Default:** 0

**Context:** http, server, location

This directive appeared in version 1.7.5.
CHAPTER 2. HTTP SERVER MODULES

2.37. MODULE NGX_HTTP_PROXY_MODULE

Limits the number of possible tries for passing a request to the next server. The 0 value turns off this limitation.

**proxy_no_cache**

**Syntax**: `proxy_no_cache string ...;`

**Default**: —

**Context**: http, server, location

Defines conditions under which the response will not be saved to a cache. If at least one value of the string parameters is not empty and is not equal to “0” then the response will not be saved:

```plaintext
proxy_no_cache $cookie_nocache $arg_nocache $arg_comment;
proxy_no_cache $http_pragma $http_authorization;
```

Can be used along with the `proxy_cache_bypass` directive.

**proxy_pass**

**Syntax**: `proxy_pass URL;`

**Default**: —

**Context**: location, if in location, limit_except

Sets the protocol and address of a proxied server and an optional URI to which a location should be mapped. As a protocol, “http” or “https” can be specified. The address can be specified as a domain name or IP address, and an optional port:

```plaintext
proxy_pass http://localhost:8000/uri;/
```

or as a UNIX-domain socket path specified after the word “unix” and enclosed in colons:

```plaintext
proxy_pass http://unix:/tmp/backend.socket:/uri;/
```

If a domain name resolves to several addresses, all of them will be used in a round-robin fashion. In addition, an address can be specified as a server group.

Parameter value can contain variables. In this case, if an address is specified as a domain name, the name is searched among the described server groups, and, if not found, is determined using a resolver.

A request URI is passed to the server as follows:

- If the `proxy_pass` directive is specified with a URI, then when a request is passed to the server, the part of a normalized request URI matching the location is replaced by a URI specified in the directive:

```plaintext
location /name/ {
  proxy_pass http://127.0.0.1/remote;/
}
```
• If `proxy_pass` is specified without a URI, the request URI is passed to the server in the same form as sent by a client when the original request is processed, or the full normalized request URI is passed when processing the changed URI:

```nginx
location /some/path/ {
    proxy_pass http://127.0.0.1;
}
```

Before version 1.1.12, if `proxy_pass` is specified without a URI, the original request URI might be passed instead of the changed URI in some cases.

In some cases, the part of a request URI to be replaced cannot be determined:

• When location is specified using a regular expression, and also inside named locations.

In these cases, `proxy_pass` should be specified without a URI.

• When the URI is changed inside a proxied location using the `rewrite` directive, and this same configuration will be used to process a request (break):

```nginx
location /name/ {
    rewrite /name/(.*) /users?name=$1 break;
    proxy_pass http://127.0.0.1;
}
```

In this case, the URI specified in the directive is ignored and the full changed request URI is passed to the server.

• When variables are used in `proxy_pass`:

```nginx
location /name/ {
    proxy_pass http://127.0.0.1$request_uri;
}
```

In this case, if URI is specified in the directive, it is passed to the server as is, replacing the original request URI.

**WebSocket** proxying requires special configuration and is supported since version 1.3.13.

**proxy_pass_header**

**Syntax:** `proxy_pass_header field;`

**Default** —

**Context:** `http, server, location`

Permits passing otherwise disabled header fields from a proxied server to a client.
proxy_pass_request_body

**Syntax:**  
`proxy_pass_request_body` on | off;

**Default:**  
on

**Context:**  
http, server, location

Indicates whether the original request body is passed to the proxied server.

```plaintext
location /x-accel-redirect-here/ {
  proxy_method GET;
  proxy_pass_request_body off;
  proxy_set_header Content-Length "";
  proxy_pass ...
}
```

See also the `proxy_set_header` and `proxy_pass_request_headers` directives.

proxy_pass_request_headers

**Syntax:**  
`proxy_pass_request_headers` on | off;

**Default:**  
on

**Context:**  
http, server, location

Indicates whether the header fields of the original request are passed to the proxied server.

```plaintext
location /x-accel-redirect-here/ {
  proxy_method GET;
  proxy_pass_request_headers off;
  proxy_pass_request_body off;
  proxy_pass ...
}
```

See also the `proxy_set_header` and `proxy_pass_request_body` directives.

proxy_read_timeout

**Syntax:**  
`proxy_read_timeout` time;

**Default:**  
60s

**Context:**  
http, server, location

Defines a timeout for reading a response from the proxied server. The timeout is set only between two successive read operations, not for the transmission of the whole response. If the proxied server does not transmit anything within this time, the connection is closed.

proxy_redirect

**Syntax:**  
`proxy_redirect` default;

**Syntax:**  
`proxy_redirect` off;

**Syntax:**  
`proxy_redirect` redirect replacement;

**Default:**  
default

**Context:**  
http, server, location
Sets the text that should be changed in the Location and Refresh header fields of a proxied server response. Suppose a proxied server returned the header field “Location: http://localhost:8000/two/some/uri/”. The directive

```
```

will rewrite this string to “Location: http://frontend/one/some/uri/”.

A server name may be omitted in the replacement string:

```
proxy_redirect http://localhost:8000/two/ /;
```

then the primary server’s name and port, if different from 80, will be inserted.

The default replacement specified by the default parameter uses the parameters of the location and proxy_pass directives. Hence, the two configurations below are equivalent:

```
location /one/ {
  proxy_pass http://upstream:port/two/;
  proxy_redirect default;
}

location /one/ {
  proxy_pass http://upstream:port/two/;
  proxy_redirect http://upstream:port/two/ /one/;
```

The default parameter is not permitted if proxy_pass is specified using variables.

A replacement string can contain variables:

```
```

A redirect can also contain (1.1.11) variables:

```
proxy_redirect http://$proxy_host:8000/ /;
```

The directive can be specified (1.1.11) using regular expressions. In this case, redirect should either start with the “~” symbol for a case-sensitive matching, or with the “~*” symbols for case-insensitive matching. The regular expression can contain named and positional captures, and replacement can reference them:

```
proxy_redirect ~^(http://[^:]+):\d+/([^/]+) http://$1.example.com/$2;
proxy_redirect ~*/user/([^/]+)/(.*) http://$1.example.com/$2;
```

Several proxy_redirect directives can be specified on the same level:

```
proxy_redirect default;
proxy_redirect http://localhost:8000/ /;
proxy_redirect http://www.example.com/ /;
```
If several directives can be applied to the header fields of a proxied server response, the first matching directive will be chosen.

The `off` parameter cancels the effect of the `proxy_redirect` directives inherited from the previous configuration level.

Using this directive, it is also possible to add host names to relative redirects issued by a proxied server:

```
proxy_redirect / /;
```

**proxy_request_buffering**

**Syntax:** `proxy_request_buffering on | off;`

**Default:** `on`

**Context:** `http, server, location`

This directive appeared in version 1.7.11.

Enables or disables buffering of a client request body.

When buffering is enabled, the entire request body is read from the client before sending the request to a proxied server.

When buffering is disabled, the request body is sent to the proxied server immediately as it is received. In this case, the request cannot be passed to the next server if nginx already started sending the request body.

When HTTP/1.1 chunked transfer encoding is used to send the original request body, the request body will be buffered regardless of the directive value unless HTTP/1.1 is enabled for proxying.

**proxy_send_lowat**

**Syntax:** `proxy_send_lowat size;`

**Default:** `0`

**Context:** `http, server, location`

If the directive is set to a non-zero value, nginx will try to minimize the number of send operations on outgoing connections to a proxied server by using either `NOTE_LOWAT` flag of the `kqueue` method, or the `SO_SNDLOWAT` socket option, with the specified `size`.

This directive is ignored on Linux, Solaris, and Windows.

**proxy_send_timeout**

**Syntax:** `proxy_send_timeout time;`

**Default:** `60s`

**Context:** `http, server, location`

Sets a timeout for transmitting a request to the proxied server. The timeout is set only between two successive write operations, not for the transmission of the whole request. If the proxied server does not receive anything within this time, the connection is closed.
### proxy_set_body

**Syntax:**  
```
proxy_set_body value;
```

**Default:** —

**Context:** `http, server, location`

Allows redefining the request body passed to the proxied server. The `value` can contain text, variables, and their combination.

### proxy_set_header

**Syntax:**  
```
proxy_set_header field value;
```

**Default:**
- `Host $proxy_host`
- `Connection close`

**Context:** `http, server, location`

Allows redefining or appending fields to the request header passed to the proxied server. The `value` can contain text, variables, and their combinations. These directives are inherited from the previous configuration level if and only if there are no `proxy_set_header` directives defined on the current level. By default, only two fields are redefined:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>proxy_set_header Host $proxy_host;</code></td>
<td></td>
</tr>
<tr>
<td><code>proxy_set_header Connection close;</code></td>
<td></td>
</tr>
</tbody>
</table>

If caching is enabled, the header fields `If-Modified-Since`, `If-Unmodified-Since`, `If-None-Match`, `If-Match`, `Range`, and `If-Range` from the original request are not passed to the proxied server.

An unchanged `Host` request header field can be passed like this:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>proxy_set_header Host $http_host;</code></td>
<td></td>
</tr>
</tbody>
</table>

However, if this field is not present in a client request header then nothing will be passed. In such a case it is better to use the `$host` variable - its value equals the server name in the `Host` request header field or the primary server name if this field is not present:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>proxy_set_header Host $host;</code></td>
<td></td>
</tr>
</tbody>
</table>

In addition, the server name can be passed together with the port of the proxied server:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>proxy_set_header Host $host:$proxy_port;</code></td>
<td></td>
</tr>
</tbody>
</table>

If the value of a header field is an empty string then this field will not be passed to a proxied server:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>proxy_set_header Accept-Encoding &quot;&quot;;</code></td>
<td></td>
</tr>
</tbody>
</table>
proxy_socket_keepalive

**Syntax:**
```
proxy_socket_keepalive on | off;
```

**Default:** off

**Context:** http, server, location

This directive appeared in version 1.15.6.

Configures the “TCP keepalive” behavior for outgoing connections to a proxied server. By default, the operating system’s settings are in effect for the socket. If the directive is set to the value “on”, the `SO_KEEPALIVE` socket option is turned on for the socket.

proxy_ssl_certificate

**Syntax:**
```
proxy_ssl_certificate file;
```

**Default:**

**Context:** http, server, location

This directive appeared in version 1.7.8.

Specifies a file with the certificate in the PEM format used for authentication to a proxied HTTPS server.

Since version 1.21.0, variables can be used in the `file` name.

proxy_ssl_certificate_key

**Syntax:**
```
proxy_ssl_certificate_key file;
```

**Default:**

**Context:** http, server, location

This directive appeared in version 1.7.8.

Specifies a file with the secret key in the PEM format used for authentication to a proxied HTTPS server.

The value `engine:name:id` can be specified instead of the `file` (1.7.9), which loads a secret key with a specified `id` from the OpenSSL engine `name`.

Since version 1.21.0, variables can be used in the `file` name.

proxy_ssl_ciphers

**Syntax:**
```
proxy_ssl_ciphers ciphers;
```

**Default:** default

**Context:** http, server, location

This directive appeared in version 1.5.6.

Specifies the enabled ciphers for requests to a proxied HTTPS server. The ciphers are specified in the format understood by the OpenSSL library.

The full list can be viewed using the “openssl ciphers” command.
proxy_ssl_conf_command

**Syntax:**  
`proxy_ssl_conf_command name value;`

**Default** —

**Context:** http, server, location

This directive appeared in version 1.19.4.

Sets arbitrary OpenSSL configuration commands when establishing a connection with the proxied HTTPS server.

The directive is supported when using OpenSSL 1.0.2 or higher.

Several `proxy_ssl_conf_command` directives can be specified on the same level. These directives are inherited from the previous configuration level if and only if there are no `proxy_ssl_conf_command` directives defined on the current level.

Note that configuring OpenSSL directly might result in unexpected behavior.

proxy_ssl_crl

**Syntax:**  
`proxy_ssl_crl file;`

**Default** —

**Context:** http, server, location

This directive appeared in version 1.7.0.

Specifies a file with revoked certificates (CRL) in the PEM format used to verify the certificate of the proxied HTTPS server.

proxy_ssl_name

**Syntax:**  
`proxy_ssl_name name;`

**Default**: `$proxy_host`

**Context:** http, server, location

This directive appeared in version 1.7.0.

Allows overriding the server name used to verify the certificate of the proxied HTTPS server and to be passed through SNI when establishing a connection with the proxied HTTPS server.

By default, the host part of the `proxy_pass` URL is used.

proxy_ssl_password_file

**Syntax:**  
`proxy_ssl_password_file file;`

**Default** —

**Context:** http, server, location

This directive appeared in version 1.7.8.
Specifies a file with passphrases for secret keys where each passphrase is specified on a separate line. Passphrases are tried in turn when loading the key.

**proxy_ssl_protocols**

**Syntax:** `proxy_ssl_protocols [SSLv2] [SSLv3] [TLSv1] [TLSv1.1] [TLSv1.2] [TLSv1.3];`

**Default:** TLSv1 TLSv1.1 TLSv1.2 TLSv1.3

**Context:** http, server, location

This directive appeared in version 1.5.6.

Enables the specified protocols for requests to a proxied HTTPS server.

The TLSv1.3 parameter is used by default since 1.23.4.

**proxy_ssl_server_name**

**Syntax:** `proxy_ssl_server_name on | off;`

**Default:** off

**Context:** http, server, location

This directive appeared in version 1.7.0.

Enables or disables passing of the server name through TLS Server Name Indication extension (SNI, RFC 6066) when establishing a connection with the proxied HTTPS server.

**proxy_ssl_session_reuse**

**Syntax:** `proxy_ssl_session_reuse on | off;`

**Default:** on

**Context:** http, server, location

Determines whether SSL sessions can be reused when working with the proxied server. If the errors “SSL3_GET_FINISHED:digest check failed” appear in the logs, try disabling session reuse.

**proxy_ssl_trusted_certificate**

**Syntax:** `proxy_ssl_trusted_certificate file;`

**Default:** —

**Context:** http, server, location

This directive appeared in version 1.7.0.

Specifies a file with trusted CA certificates in the PEM format used to verify the certificate of the proxied HTTPS server.
proxy_ssl_verify

**Syntax:**
```
proxy_ssl_verify on | off;
```

**Default:** `off`
**Context:** `http, server, location`

This directive appeared in version 1.7.0.

Enables or disables verification of the proxied HTTPS server certificate.

**proxy_ssl_verify_depth**

**Syntax:**
```
proxy_ssl_verify_depth number;
```

**Default:** `1`
**Context:** `http, server, location`

This directive appeared in version 1.7.0.

Sets the verification depth in the proxied HTTPS server certificates chain.

**proxy_store**

**Syntax:**
```
proxy_store on | off | string;
```

**Default:** `off`
**Context:** `http, server, location`

Enables saving of files to a disk. The `on` parameter saves files with paths corresponding to the directives `alias` or `root`. The `off` parameter disables saving of files. In addition, the file name can be set explicitly using the `string` with variables:

```
proxy_store /data/www$original_uri;
```

The modification time of files is set according to the received `Last-Modified` response header field. The response is first written to a temporary file, and then the file is renamed. Starting from version 0.8.9, temporary files and the persistent store can be put on different file systems. However, be aware that in this case a file is copied across two file systems instead of the cheap renaming operation. It is thus recommended that for any given location both saved files and a directory holding temporary files, set by the `proxy_temp_path` directive, are put on the same file system.

This directive can be used to create local copies of static unchangeable files, e.g.:

```
location /images/ {
    root /data/www;
    error_page 404 = /fetch$uri;
}
location /fetch/ {
    internal;
    proxy_pass http://backend/;
    proxy_store on;
    proxy_store_access user:rw group:rw all:r;
```
or like this:

```
location /images/ {
    root /data/www;
    error_page 404 = @fetch;
}
location @fetch {
    internal;
    proxy_pass http://backend;
    proxy_store on;
    proxy_store_access user:rw group:rw all:r;
    proxy_temp_path /data/temp;
    root /data/www;
}
```

### proxy_store_access

**Syntax:**

`proxy_store_access users:permissions ...;`

**Default:** user:rw

**Context:** http, server, location

Sets access permissions for newly created files and directories, e.g.:

```
proxy_store_access user:rw group:rw all:r;
```

If any group or all access permissions are specified then user permissions may be omitted:

```
proxy_store_access group:rw all:r;
```

### proxy_temp_file_write_size

**Syntax:**

`proxy_temp_file_write_size size;`

**Default:** 8k|16k

**Context:** http, server, location

Limits the size of data written to a temporary file at a time, when buffering of responses from the proxied server to temporary files is enabled. By default, size is limited by two buffers set by the `proxy_buffer_size` and `proxy_buffers` directives. The maximum size of a temporary file is set by the `proxy_max_temp_file_size` directive.
proxy_temp_path

**Syntax:**  
\texttt{proxy_temp_path path [level1 [level2 [level3]]];}

**Default:**  
proxy_temp

**Context:** http, server, location

Defines a directory for storing temporary files with data received from proxied servers. Up to three-level subdirectory hierarchy can be used underneath the specified directory. For example, in the following configuration

```
proxy_temp_path /spool/nginx/proxy_temp 1 2;
```

a temporary file might look like this:

```
/spool/nginx/proxy_temp/7/45/0000123457
```

See also the use_temp_path parameter of the \texttt{proxy_cache_path} directive.

### 2.37.4 Embedded Variables

The \texttt{ngx_http_proxy_module} module supports embedded variables that can be used to compose headers using the \texttt{proxy_set_header} directive:

- **$\text{proxy_host}**
  name and port of a proxied server as specified in the \texttt{proxy_pass} directive;

- **$\text{proxy_port}**
  port of a proxied server as specified in the \texttt{proxy_pass} directive, or the protocol’s default port;

- **$\text{proxy_add_x_forwarded_for}**
  the X-Forwarded-For client request header field with the $\text{remote_addr} variable appended to it, separated by a comma. If the X-Forwarded-For field is not present in the client request header, the $\text{proxy_add_x_forwarded_for} variable is equal to the $\text{remote_addr} variable.
2.38 Module ngx_http_proxy_protocol_vendor_module

2.38.1 Summary

The ngx_http_proxy_protocol_vendor_module module (1.23.3) allows obtaining additional information about a connection in cloud platforms from application-specific TLVs of the PROXY protocol header.

Supported cloud platforms:

- Amazon Web Services
- Google Cloud Platform
- Microsoft Azure

The PROXY protocol must be previously enabled by setting the proxy_protocol parameter in the listen directive.

This module is available as part of our commercial subscription.

2.38.2 Example Configuration

```plaintext
proxy_set_header X-Conn-ID $proxy_protocol_tlv_gcp_conn_id;
server {
    listen 80 proxy_protocol;
    listen 443 ssl proxy_protocol;
    ...
}
```

2.38.3 Embedded Variables

$proxy_protocol_tlv_aws_vpce_id
TLV value from the PROXY Protocol header representing the ID of AWS VPC endpoint

$proxy_protocol_tlv_azure_pel_id
TLV value from the PROXY Protocol header representing the LinkID of Azure private endpoint

$proxy_protocol_tlv_gcp_conn_id
TLV value from the PROXY Protocol header representing Google Cloud PSC connection ID
CHAPTER 2. HTTP SERVER MODULES

2.39 Module ngx_http_random_index_module

2.39.1 Summary

The ngx_http_random_index_module module processes requests ending with the slash character (‘/’) and picks a random file in a directory to serve as an index file. The module is processed before the ngx_http_index-module module.

This module is not built by default, it should be enabled with the --with-http_random_index_module configuration parameter.

2.39.2 Example Configuration

```bash
location / {
    random_index on;
}
```

2.39.3 Directives

random_index

**Syntax:** random_index on | off;

**Default:** off

**Context:** location

Enables or disables module processing in a surrounding location.
2.40 Module ngx_http_realip_module

2.40.1 Summary

The ngx_http_realip_module module is used to change the client address and optional port to those sent in the specified header field.

This module is not built by default, it should be enabled with the --with-http_realip_module configuration parameter.

2.40.2 Example Configuration

```conf
set_real_ip_from 192.168.1.0/24;
set_real_ip_from 192.168.2.1;
set_real_ip_from 2001:0db8::/32;
real_ip_header X-Forwarded-For;
real_ip_recursive on;
```

2.40.3 Directives

**set_real_ip_from**

**Syntax:** `set_real_ip_from address | CIDR | unix:;`

**Default:** —

**Context:** http, server, location

Defines trusted addresses that are known to send correct replacement addresses. If the special value unix: is specified, all UNIX-domain sockets will be trusted. Trusted addresses may also be specified using a hostname (1.13.1).

IPv6 addresses are supported starting from versions 1.3.0 and 1.2.1.

**real_ip_header**

**Syntax:** `real_ip_header field | X-Real-IP | X-Forwarded-For | proxy_protocol;`

**Default** X-Real-IP

**Context:** http, server, location
Defines the request header field whose value will be used to replace the client address.

The request header field value that contains an optional port is also used to replace the client port (1.11.0). The address and port should be specified according to RFC 3986.

The `proxy_protocol` parameter (1.5.12) changes the client address to the one from the PROXY protocol header. The PROXY protocol must be previously enabled by setting the `proxy_protocol` parameter in the `listen` directive.

**real_ip_recursive**

**Syntax:** `real_ip_recursive on | off;`

**Default** `off`

**Context:** `http`, `server`, `location`

This directive appeared in versions 1.3.0 and 1.2.1.

If recursive search is disabled, the original client address that matches one of the trusted addresses is replaced by the last address sent in the request header field defined by the `realip_header` directive. If recursive search is enabled, the original client address that matches one of the trusted addresses is replaced by the last non-trusted address sent in the request header field.

### 2.40.4 Embedded Variables

- `$realip_remote_addr`
  - keeps the original client address (1.9.7)

- `$realip_remote_port`
  - keeps the original client port (1.11.0)
2.41 Module ngx_http_referer_module

2.41.1 Summary

The ngx_http_referer_module module is used to block access to a site for requests with invalid values in the Referer header field. It should be kept in mind that fabricating a request with an appropriate Referer field value is quite easy, and so the intended purpose of this module is not to block such requests thoroughly but to block the mass flow of requests sent by regular browsers. It should also be taken into consideration that regular browsers may not send the Referer field even for valid requests.

2.41.2 Example Configuration

```
valid_referers none blocked server_names
  *.example.com example.* www.example.org/galleries/
-\.google\..;

if ($invalid_referer) {
  return 403;
}
```

2.41.3 Directives

referer_hash_bucket_size

Syntax: `referer_hash_bucket_size` size;

Default 64

Context: server, location

This directive appeared in version 1.0.5.

Sets the bucket size for the valid referers hash tables. The details of setting up hash tables are provided in a separate document.

referer_hash_max_size

Syntax: `referer_hash_max_size` size;

Default 2048

Context: server, location

This directive appeared in version 1.0.5.
Sets the maximum size of the valid referers hash tables. The details of setting up hash tables are provided in a separate document.

valid_referers

**Syntax:** `valid_referers none | blocked | server_names | string ...`

**Default:** —

**Context:** server, location

Specifies the Referer request header field values that will cause the embedded `$invalid_referer` variable to be set to an empty string. Otherwise, the variable will be set to “1”. Search for a match is case-insensitive.

Parameters can be as follows:

- **none**
  - the Referer field is missing in the request header;

- **blocked**
  - the Referer field is present in the request header, but its value has been deleted by a firewall or proxy server; such values are strings that do not start with “http://” or “https://”;

- **server_names**
  - the Referer request header field contains one of the server names;

- **arbitrary string**
  - defines a server name and an optional URI prefix. A server name can have an “*” at the beginning or end. During the checking, the server’s port in the Referer field is ignored;

- **regular expression**
  - the first symbol should be a “~”. It should be noted that an expression will be matched against the text starting after the “http://” or “https://”.

**Example:**

```
valid_referers none blocked server_names
    *.*example.com example.* www.example.org/galleries/
    ~\.*\google\.\.*
```

### 2.41.4 Embedded Variables

**$invalid_referer**

Empty string, if the Referer request header field value is considered valid, otherwise “1”.

Nginx, Inc. p.270 of 542
2.42 Module ngx_http_rewrite_module

2.42.1 Summary

The ngx_http_rewrite_module module is used to change request URI using PCRE regular expressions, return redirects, and conditionally select configurations.

The break, if, return, rewrite, and set directives are processed in the following order:

- the directives of this module specified on the server level are executed sequentially;
- repeatedly:
  - a location is searched based on a request URI;
  - the directives of this module specified inside the found location are executed sequentially;
  - the loop is repeated if a request URI was rewritten, but not more than 10 times.

2.42.2 Directives

break

**Syntax:** break;

**Default** —

**Context:** server, location, if

Stops processing the current set of ngx_http_rewrite_module directives.

If a directive is specified inside the location, further processing of the request continues in this location.

Example:
if ($slow) {
  limit_rate 10k;
  break;
}

**if**

**Syntax:** `if (condition) { ... }`

**Default** —

**Context:** server, location

The specified *condition* is evaluated. If true, this module directives specified inside the braces are executed, and the request is assigned the configuration inside the *if* directive. Configurations inside the *if* directives are inherited from the previous configuration level.

A condition may be any of the following:

- a variable name; false if the value of a variable is an empty string or “0”;

Before version 1.0.1, any string starting with “0” was considered a false value.

- comparison of a variable with a string using the “=” and “!=” operators;

- matching of a variable against a regular expression using the “~” (for case-sensitive matching) and “~*” (for case-insensitive matching) operators. Regular expressions can contain captures that are made available for later reuse in the $1..$9 variables. Negative operators “!~” and “!~*” are also available. If a regular expression includes the “{” or “;” characters, the whole expressions should be enclosed in single or double quotes.

- checking of a file existence with the “-f” and “!-f” operators;

- checking of a directory existence with the “-d” and “!-d” operators;

- checking of a file, directory, or symbolic link existence with the “-e” and “!-e” operators;

- checking for an executable file with the “-x” and “!-x” operators.

**Examples:**

```
if (${http_user_agent} ~ MSIE) {
  rewrite ^(.*)$ /msie/$1 break;
}

if (${http_cookie} ~* "id=(\[^;]+)(?:;|$)"") {
  set $id $1;
}

if (${request_method} = POST) {
  return 405;
}
```
if ($slow) {
    limit_rate 10k;
}

if ($invalid_referer) {
    return 403;
}

A value of the $invalid_referer embedded variable is set by the valid_referers directive.

return

Syntax:  return code [text];
Syntax:  return code URL;
Syntax:  return URL;
Default —
Context: server, location, if

Stops processing and returns the specified code to a client. The non-standard code 444 closes a connection without sending a response header.

Starting from version 0.8.42, it is possible to specify either a redirect URL (for codes 301, 302, 303, 307, and 308) or the response body text (for other codes). A response body text and redirect URL can contain variables. As a special case, a redirect URL can be specified as a URI local to this server, in which case the full redirect URL is formed according to the request scheme ($scheme) and the server_name_in_redirect and port_in_redirect directives.

In addition, a URL for temporary redirect with the code 302 can be specified as the sole parameter. Such a parameter should start with the “http://”, “https://”, or “$scheme” string. A URL can contain variables.

Only the following codes could be returned before version 0.7.51: 204, 400, 402 — 406, 408, 410, 411, 413, 416, and 500 — 504.

The code 307 was not treated as a redirect until versions 1.1.16 and 1.0.13.

The code 308 was not treated as a redirect until version 1.13.0.

See also the error_page directive.

rewrite

Syntax:  rewrite regex replacement [flag];
Default —
Context: server, location, if

If the specified regular expression matches a request URI, URI is changed as specified in the replacement string. The rewrite directives are executed...
sequentially in order of their appearance in the configuration file. It is possible to terminate further processing of the directives using flags. If a replacement string starts with “http://”, “https://”, or “$scheme”, the processing stops and the redirect is returned to a client.

An optional flag parameter can be one of:

- **last**
  stops processing the current set of ngx_http_rewrite_module directives and starts a search for a new location matching the changed URI;

- **break**
  stops processing the current set of ngx_http_rewrite_module directives as with the break directive;

- **redirect**
  returns a temporary redirect with the 302 code; used if a replacement string does not start with “http://”, “https://”, or “$scheme”;

- **permanent**
  returns a permanent redirect with the 301 code.

The full redirect URL is formed according to the request scheme ($scheme) and the server_name_in_redirect and port_in_redirect directives.

Example:

```
server {
  ...
  rewrite ^(/download/.*)/media/(.*)\.\*$ $1/mp3/$2.mp3 last;
  rewrite ^(/download/.*)/audio/(.*)\.\*$ $1/mp3/$2.ra last;
  return 403;
  ...
}
```

But if these directives are put inside the “/download/” location, the last flag should be replaced by break, or otherwise nginx will make 10 cycles and return the 500 error:

```
location /download/ {
  rewrite ^(/download/.*)/media/(.*)\.\*$ $1/mp3/$2.mp3 break;
  rewrite ^(/download/.*)/audio/(.*)\.\*$ $1/mp3/$2.ra break;
  return 403;
}
```

If a replacement string includes the new request arguments, the previous request arguments are appended after them. If this is undesired, putting a question mark at the end of a replacement string avoids having them appended, for example:

```
rewrite ^/users/(.*)$ /show?user=$1? last;
```

If a regular expression includes the “)” or “;” characters, the whole expressions should be enclosed in single or double quotes.
rewrite_log

**Syntax:**  
`rewrite_log on | off;`

**Default:**  
off

**Context:**  
http, server, location, if

Enables or disables logging of `ngx_http_rewrite_module` module directives processing results into the `error_log` at the `notice` level.

set

**Syntax:**  
`set $variable value;`

**Default:**  
—

**Context:**  
server, location, if

Sets a value for the specified variable. The value can contain text, variables, and their combination.

uninitialized_variable_warn

**Syntax:**  
`uninitialized_variable_warn on | off;`

**Default:**  
on

**Context:**  
http, server, location, if

Controls whether warnings about uninitialized variables are logged.

### 2.42.3 Internal Implementation

The `ngx_http_rewrite_module` module directives are compiled at the configuration stage into internal instructions that are interpreted during request processing. An interpreter is a simple virtual stack machine.

For example, the directives

```plaintext
location /download/ {
    if ($forbidden) {
        return 403;
    }

    if ($slow) {
        limit_rate 10k;
    }

    rewrite ^/(download/.*)/media/(.*)\.*$ /$1/mp3/$2.mp3 break;
}
```

will be translated into these instructions:

```plaintext
variable $forbidden
check against zero
return 403
end of code

variable $slow
check against zero
match of regular expression

copy "/\.*$/

copy $1
```

Nginx, Inc.  

p.275 of 542
Note that there are no instructions for the `limit_rate` directive above as it is unrelated to the `ngx_http_rewrite_module` module. A separate configuration is created for the `if` block. If the condition holds true, a request is assigned this configuration where `limit_rate` equals to 10k.

The directive

```plaintext
rewrite ^/(download/.*)/media/(.*)\..*$/ $1/mp3/$2.mp3 break;
```

can be made smaller by one instruction if the first slash in the regular expression is put inside the parentheses:

```plaintext
rewrite ^/(download/.*)/media/(.*)\..*$/ $1/mp3/$2.mp3 break;
```

The corresponding instructions will then look like this:

<table>
<thead>
<tr>
<th>match of regular expression</th>
<th>copy $1</th>
<th>copy &quot;/mp3/&quot;</th>
<th>copy $2</th>
<th>copy &quot;.mp3&quot;</th>
<th>end of regular expression</th>
<th>end of code</th>
</tr>
</thead>
</table>

| rewrite ^/(download/.*)/media/(.*)\..*$/ $1/mp3/$2.mp3 break; |
### 2.43 Module ngx_http_scgi_module

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.43.1 Summary</td>
<td>278</td>
</tr>
<tr>
<td>2.43.2 Example Configuration</td>
<td>278</td>
</tr>
<tr>
<td>2.43.3 Directives</td>
<td>278</td>
</tr>
<tr>
<td>scgi_bind</td>
<td>278</td>
</tr>
<tr>
<td>scgi_buffer_size</td>
<td>278</td>
</tr>
<tr>
<td>scgi_buffering</td>
<td>279</td>
</tr>
<tr>
<td>scgi_buffers</td>
<td>279</td>
</tr>
<tr>
<td>scgi_busy_buffers_size</td>
<td>279</td>
</tr>
<tr>
<td>scgi_cache</td>
<td>280</td>
</tr>
<tr>
<td>scgi_cache_background_update</td>
<td>280</td>
</tr>
<tr>
<td>scgi_cache_bypass</td>
<td>280</td>
</tr>
<tr>
<td>scgi_cache_key</td>
<td>280</td>
</tr>
<tr>
<td>scgi_cache_lock</td>
<td>280</td>
</tr>
<tr>
<td>scgi_cache_lock_age</td>
<td>281</td>
</tr>
<tr>
<td>scgi_cache_lock_timeout</td>
<td>281</td>
</tr>
<tr>
<td>scgi_cache_max_range_offset</td>
<td>281</td>
</tr>
<tr>
<td>scgi_cache_methods</td>
<td>281</td>
</tr>
<tr>
<td>scgi_cache_min_uses</td>
<td>282</td>
</tr>
<tr>
<td>scgi_cache_path</td>
<td>282</td>
</tr>
<tr>
<td>scgi_cache_purge</td>
<td>284</td>
</tr>
<tr>
<td>scgi_cache_revalidate</td>
<td>284</td>
</tr>
<tr>
<td>scgi_cache_use_revalidate</td>
<td>284</td>
</tr>
<tr>
<td>scgi_cache_valid</td>
<td>285</td>
</tr>
<tr>
<td>scgi_connect_timeout</td>
<td>286</td>
</tr>
<tr>
<td>scgi_force_ranges</td>
<td>286</td>
</tr>
<tr>
<td>scgi_hide_header</td>
<td>286</td>
</tr>
<tr>
<td>scgi_ignore_client_abort</td>
<td>287</td>
</tr>
<tr>
<td>scgi_ignore_headers</td>
<td>287</td>
</tr>
<tr>
<td>scgi_intercept_errors</td>
<td>287</td>
</tr>
<tr>
<td>scgi_limit_rate</td>
<td>287</td>
</tr>
<tr>
<td>scgi_max_temp_file_size</td>
<td>288</td>
</tr>
<tr>
<td>scgi_next_upstream</td>
<td>288</td>
</tr>
<tr>
<td>scgi_next_upstream_timeout</td>
<td>289</td>
</tr>
<tr>
<td>scgi_next_upstream_tries</td>
<td>289</td>
</tr>
<tr>
<td>scgi_no_cache</td>
<td>290</td>
</tr>
<tr>
<td>scgi_param</td>
<td>290</td>
</tr>
<tr>
<td>scgi_pass</td>
<td>290</td>
</tr>
<tr>
<td>scgi_pass_header</td>
<td>291</td>
</tr>
<tr>
<td>scgi_pass_request_body</td>
<td>291</td>
</tr>
<tr>
<td>scgi_pass_request_headers</td>
<td>291</td>
</tr>
<tr>
<td>scgi_read_timeout</td>
<td>291</td>
</tr>
<tr>
<td>scgi_request_buffering</td>
<td>292</td>
</tr>
<tr>
<td>scgi_send_timeout</td>
<td>292</td>
</tr>
<tr>
<td>scgi_socket_keepalive</td>
<td>292</td>
</tr>
</tbody>
</table>
2.43.1 Summary

The `ngx_http_scgi_module` module allows passing requests to an SCGI server.

2.43.2 Example Configuration

```plaintext
location / {
    include scgi_params;
    scgi_pass localhost:9000;
}
```

2.43.3 Directives

**scgi_bind**

*Syntax:* `scgi_bind address [transparent] | off;`

*Default:* —

*Context:* http, server, location

Makes outgoing connections to an SCGI server originate from the specified local IP address with an optional port (1.11.2). Parameter value can contain variables (1.3.12). The special value `off` (1.3.12) cancels the effect of the `scgi_bind` directive inherited from the previous configuration level, which allows the system to auto-assign the local IP address and port.

The `transparent` parameter (1.11.0) allows outgoing connections to an SCGI server originate from a non-local IP address, for example, from a real IP address of a client:

```plaintext
scgi_bind $remote_addr transparent;
```

In order for this parameter to work, it is usually necessary to run nginx worker processes with the superuser privileges. On Linux it is not required (1.13.8) as if the `transparent` parameter is specified, worker processes inherit the CAP_NET_RAW capability from the master process. It is also necessary to configure kernel routing table to intercept network traffic from the SCGI server.

**scgi_buffer_size**

*Syntax:* `scgi_buffer_size size;`

*Default:* `4k | 8k`

*Context:* http, server, location
Sets the size of the buffer used for reading the first part of the response received from the SCGI server. This part usually contains a small response header. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform. It can be made smaller, however.

**scgi_buffering**

Syntax: `scgi_buffering on | off;`

Default: on

Context: http, server, location

Enables or disables buffering of responses from the SCGI server.

When buffering is enabled, nginx receives a response from the SCGI server as soon as possible, saving it into the buffers set by the `scgi_buffer_size` and `scgi_buffers` directives. If the whole response does not fit into memory, a part of it can be saved to a temporary file on the disk. Writing to temporary files is controlled by the `scgi_max_temp_file_size` and `scgi_temp_file_write_size` directives.

When buffering is disabled, the response is passed to a client synchronously, immediately as it is received. nginx will not try to read the whole response from the SCGI server. The maximum size of the data that nginx can receive from the server at a time is set by the `scgi_buffer_size` directive.

Buffering can also be enabled or disabled by passing “yes” or “no” in the X-Accel-Buffering response header field. This capability can be disabled using the `scgi_ignore_headers` directive.

**scgi_buffers**

Syntax: `scgi_buffers number size;`

Default: 8 4k|8k

Context: http, server, location

Sets the number and size of the buffers used for reading a response from the SCGI server, for a single connection. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform.

**scgi_busy_buffers_size**

Syntax: `scgi_busy_buffers_size size;`

Default: 8k|16k

Context: http, server, location

When buffering of responses from the SCGI server is enabled, limits the total size of buffers that can be busy sending a response to the client while the response is not yet fully read. In the meantime, the rest of the buffers can be used for reading the response and, if needed, buffering part of the response to a temporary file. By default, size is limited by the size of two buffers set by the `scgi_buffer_size` and `scgi_buffers` directives.
CHAPTER 2. HTTP SERVER MODULES

2.43. MODULE NGX_HTTP_SCGI_MODULE

scgi_cache

**Syntax:** `scgi_cache zone | off;`
**Default:** `off`
**Context:** `http, server, location`

Defines a shared memory zone used for caching. The same zone can be used in several places. Parameter value can contain variables (1.7.9). The `off` parameter disables caching inherited from the previous configuration level.

scgi_cache_background_update

**Syntax:** `scgi_cache_background_update on | off;`
**Default:** `off`
**Context:** `http, server, location`

This directive appeared in version 1.11.10.

Allows starting a background subrequest to update an expired cache item, while a stale cached response is returned to the client. Note that it is necessary to allow the usage of a stale cached response when it is being updated.

scgi_cache_bypass

**Syntax:** `scgi_cache_bypass string ...;`
**Default:** `—`
**Context:** `http, server, location`

Defines conditions under which the response will not be taken from a cache. If at least one value of the string parameters is not empty and is not equal to “0” then the response will not be taken from the cache:

```
scgi_cache_bypass $cookie_nocache $arg_nocache$arg_comment;
scgi_cache_bypass $http_pragma $http_authorization;
```

Can be used along with the `scgi_no_cache` directive.

scgi_cache_key

**Syntax:** `scgi_cache_key string;`
**Default:** `—`
**Context:** `http, server, location`

Defines a key for caching, for example

```
scgi_cache_key localhost:9000$request_uri;
```

scgi_cache_lock

**Syntax:** `scgi_cache_lock on | off;`
**Default:** `off`
**Context:** `http, server, location`
This directive appeared in version 1.1.12.

When enabled, only one request at a time will be allowed to populate a new cache element identified according to the `scgi_cache_key` directive by passing a request to an SCGI server. Other requests of the same cache element will either wait for a response to appear in the cache or the cache lock for this element to be released, up to the time set by the `scgi_cache_lock_timeout` directive.

**scgi_cache_lock_age**

**Syntax:**

```
scgi_cache_lock_age time;
```

**Default:** 5s

**Context:** http, server, location

This directive appeared in version 1.7.8.

If the last request passed to the SCGI server for populating a new cache element has not completed for the specified `time`, one more request may be passed to the SCGI server.

**scgi_cache_lock_timeout**

**Syntax:**

```
scgi_cache_lock_timeout time;
```

**Default:** 5s

**Context:** http, server, location

This directive appeared in version 1.1.12.

Sets a timeout for `scgi_cache_lock`. When the `time` expires, the request will be passed to the SCGI server, however, the response will not be cached.

Before 1.7.8, the response could be cached.

**scgi_cache_max_range_offset**

**Syntax:**

```
scgi_cache_max_range_offset number;
```

**Default:** —

**Context:** http, server, location

This directive appeared in version 1.11.6.

Sets an offset in bytes for byte-range requests. If the range is beyond the offset, the range request will be passed to the SCGI server and the response will not be cached.

**scgi_cache_methods**

**Syntax:**

```
scgi_cache_methods GET | HEAD | POST . . . ;
```

**Default:** GET HEAD

**Context:** http, server, location

If the client request method is listed in this directive then the response will be cached. “GET” and “HEAD” methods are always added to the list, though it is recommended to specify them explicitly. See also the `scgi_no_cache` directive.
scgi_cache_min_uses

Syntax: `scgi_cache_min_uses number;`

Default: 1

Context: http, server, location

Sets the number of requests after which the response will be cached.

scgi_cache_path

Syntax: `scgi_cache_path path [levels=levels] [use_temp_path=on|off] keys_zone=name:size [inactive=time] [max_size=size] [min_free=size] [manager_files=number] [manager_sleep=time] [manager_threshold=time] [manager_sleep=time] [manager_threshold=time] [purger=on|off] [purger_files=number] [purger_sleep=time] [purger_threshold=time];`

Default —

Context: http

Sets the path and other parameters of a cache. Cache data are stored in files. The file name in a cache is a result of applying the MD5 function to the cache key. The levels parameter defines hierarchy levels of a cache: from 1 to 3, each level accepts values 1 or 2. For example, in the following configuration

```
scgi_cache_path /data/nginx/cache levels=1:2 keys_zone=one:10m;
```

file names in a cache will look like this:

```
/data/nginx/cache/c/29/b7f54b2df773722d382f4809d65029c
```

A cached response is first written to a temporary file, and then the file is renamed. Starting from version 0.8.9, temporary files and the cache can be put on different file systems. However, be aware that in this case a file is copied across two file systems instead of the cheap renaming operation. It is thus recommended that for any given location both cache and a directory holding temporary files are put on the same file system. A directory for temporary files is set based on the use_temp_path parameter (1.7.10). If this parameter is omitted or set to the value on, the directory set by the scgi_temp_path directive for the given location will be used. If the value is set to off, temporary files will be put directly in the cache directory.

In addition, all active keys and information about data are stored in a shared memory zone, whose name and size are configured by the keys_zone parameter. One megabyte zone can store about 8 thousand keys.

As part of commercial subscription, the shared memory zone also stores extended cache information, thus, it is required to specify a larger zone size.
for the same number of keys. For example, one megabyte zone can store about 4 thousand keys.

Cached data that are not accessed during the time specified by the inactive parameter get removed from the cache regardless of their freshness. By default, inactive is set to 10 minutes.

The special “cache manager” process monitors the maximum cache size set by the max_size parameter, and the minimum amount of free space set by the min_free (1.19.1) parameter on the file system with cache. When the size is exceeded or there is not enough free space, it removes the least recently used data. The data is removed in iterations configured by manager_files, manager_threshold, and manager_sleep parameters (1.11.5). During one iteration no more than manager_files items are deleted (by default, 100). The duration of one iteration is limited by the manager_threshold parameter (by default, 200 milliseconds). Between iterations, a pause configured by the manager_sleep parameter (by default, 50 milliseconds) is made.

A minute after the start the special “cache loader” process is activated. It loads information about previously cached data stored on file system into a cache zone. The loading is also done in iterations. During one iteration no more than loader_files items are loaded (by default, 100). Besides, the duration of one iteration is limited by the loader_threshold parameter (by default, 200 milliseconds). Between iterations, a pause configured by the loader_sleep parameter (by default, 50 milliseconds) is made.

Additionally, the following parameters are available as part of our commercial subscription:

\[ \text{purger} = \text{on} | \text{off} \]

Instructs whether cache entries that match a wildcard key will be removed from the disk by the cache purger (1.7.12). Setting the parameter to on (default is off) will activate the “cache purger” process that permanently iterates through all cache entries and deletes the entries that match the wildcard key.

\[ \text{purger\_files} = \text{number} \]

Sets the number of items that will be scanned during one iteration (1.7.12). By default, purger_files is set to 10.

\[ \text{purger\_threshold} = \text{number} \]

Sets the duration of one iteration (1.7.12). By default, purger_threshold is set to 50 milliseconds.

\[ \text{purger\_sleep} = \text{number} \]

Sets a pause between iterations (1.7.12). By default, purger_sleep is set to 50 milliseconds.

In versions 1.7.3, 1.7.7, and 1.11.10 cache header format has been changed. Previously cached responses will be considered invalid after upgrading to a newer nginx version.
scgi_cache_purge

Syntax: `scgi_cache_purge`string ...;
Default —
Context: http, server, location
This directive appeared in version 1.5.7.

Defines conditions under which the request will be considered a cache purge request. If at least one value of the string parameters is not empty and is not equal to “0” then the cache entry with a corresponding cache key is removed. The result of successful operation is indicated by returning the 204 No Content response.

If the cache key of a purge request ends with an asterisk (“*”), all cache entries matching the wildcard key will be removed from the cache. However, these entries will remain on the disk until they are deleted for either inactivity, or processed by the cache purger (1.7.12), or a client attempts to access them.

Example configuration:

```nginx
scgi_cache_path /data/nginx/cache keys_zone=cache_zone:10m;
map $request_method $purge_method {
    PURGE 1;
    default 0;
}
server {
    ...
    location / {
        scgi_pass backend;
        scgi_cache cache_zone;
        scgi_cache_key $uri;
        scgi_cache_purge $purge_method;
    }
}
```

This functionality is available as part of our commercial subscription.

scgi_cache_revalidate

Syntax: `scgi_cache_revalidate`on | off;
Default off
Context: http, server, location
This directive appeared in version 1.5.7.

Enables revalidation of expired cache items using conditional requests with the If-Modified-Since and If-None-Match header fields.

scgi_cache_use_stale

Syntax: `scgi_cache_use_stale`error | timeout | invalid_header | updating | http_500 | http_503 | http_403 | http_404 | http_429 | off ...
Default off
Context: http, server, location
Determines in which cases a stale cached response can be used when an error occurs during communication with the SCGI server. The directive’s parameters match the parameters of the `scgi_next_upstream` directive.

The `error` parameter also permits using a stale cached response if an SCGI server to process a request cannot be selected.

Additionally, the `updating` parameter permits using a stale cached response if it is currently being updated. This allows minimizing the number of accesses to SCGI servers when updating cached data.

Using a stale cached response can also be enabled directly in the response header for a specified number of seconds after the response became stale (1.11.10). This has lower priority than using the directive parameters.

- The “stale-while-revalidate” extension of the `Cache-Control` header field permits using a stale cached response if it is currently being updated.

- The “stale-if-error” extension of the `Cache-Control` header field permits using a stale cached response in case of an error.

To minimize the number of accesses to SCGI servers when populating a new cache element, the `scgi_cache_lock` directive can be used.

**scgi_cache_valid**

**Syntax:** `scgi_cache_valid [code ...] time;`

**Default** —

**Context:** http, server, location

Sets caching time for different response codes. For example, the following directives

```
scgi_cache_valid 200 302 10m;
scgi_cache_valid 404 1m;
```

set 10 minutes of caching for responses with codes 200 and 302 and 1 minute for responses with code 404.

If only caching `time` is specified

```
scgi_cache_valid 5m;
```

then only 200, 301, and 302 responses are cached.

In addition, the `any` parameter can be specified to cache any responses:

```
scgi_cache_valid 200 302 10m;
scgi_cache_valid 301 1h;
scgi_cache_valid any 1m;
```

Parameters of caching can also be set directly in the response header. This has higher priority than setting of caching time using the directive.
• The X-Accel-Expires header field sets caching time of a response in seconds. The zero value disables caching for a response. If the value starts with the @ prefix, it sets an absolute time in seconds since Epoch, up to which the response may be cached.

• If the header does not include the X-Accel-Expires field, parameters of caching may be set in the header fields Expires or Cache-Control.

• If the header includes the Set-Cookie field, such a response will not be cached.

• If the header includes the Vary field with the special value "*", such a response will not be cached (1.7.7). If the header includes the Vary field with another value, such a response will be cached taking into account the corresponding request header fields (1.7.7).

Processing of one or more of these response header fields can be disabled using the scgi_ignore_headers directive.

**scgi_connect_timeout**

**Syntax:** `scgi_connect_timeout time;`
**Default:** 60s
**Context:** http, server, location

Defines a timeout for establishing a connection with an SCGI server. It should be noted that this timeout cannot usually exceed 75 seconds.

**scgi_force_ranges**

**Syntax:** `scgi_force_ranges on | off;`
**Default:** off
**Context:** http, server, location

This directive appeared in version 1.7.7.

Enables byte-range support for both cached and uncached responses from the SCGI server regardless of the Accept-Ranges field in these responses.

**scgi_hide_header**

**Syntax:** `scgi_hide_header field;`
**Default:** —
**Context:** http, server, location

By default, nginx does not pass the header fields Status and X-Accel-... from the response of an SCGI server to a client. The scgi_hide_header directive sets additional fields that will not be passed. If, on the contrary, the passing of fields needs to be permitted, the scgi_pass_header directive can be used.
scgi_ignore_client_abort

Syntax:  `scgi_ignore_client_abort on | off;`
Default  `off`
Context: `http, server, location`

Determines whether the connection with an SCGI server should be closed when a client closes the connection without waiting for a response.

scgi_ignore_headers

Syntax:  `scgi_ignore_headers field ...;`
Default  —
Context: `http, server, location`

Disables processing of certain response header fields from the SCGI server. The following fields can be ignored:
`X-Accel-Redirect`, `X-Accel-Expires`, `X-Accel-Limit-Rate` (1.1.6), `X-Accel-Buffering` (1.1.6), `X-Accel-Charset` (1.1.6), `Expires`, `Cache-Control`, `Set-Cookie` (0.8.44), and `Vary` (1.7.7).

If not disabled, processing of these header fields has the following effect:

- `X-Accel-Expires`, `Expires`, `Cache-Control`, `Set-Cookie`, and `Vary` set the parameters of response caching;
- `X-Accel-Redirect` performs an internal redirect to the specified URI;
- `X-Accel-Limit-Rate` sets the rate limit for transmission of a response to a client;
- `X-Accel-Buffering` enables or disables buffering of a response;
- `X-Accel-Charset` sets the desired charset of a response.

scgi_intercept_errors

Syntax:  `scgi_intercept_errors on | off;`
Default  `off`
Context: `http, server, location`

Determines whether an SCGI server responses with codes greater than or equal to 300 should be passed to a client or be intercepted and redirected to nginx for processing with the `error_page` directive.

scgi_limit_rate

Syntax:  `scgi_limit_rate rate;`
Default  `0`
Context: `http, server, location`

This directive appeared in version 1.7.7.
Limits the speed of reading the response from the SCGI server. The rate is specified in bytes per second. The zero value disables rate limiting. The limit is set per a request, and so if nginx simultaneously opens two connections to the SCGI server, the overall rate will be twice as much as the specified limit. The limitation works only if buffering of responses from the SCGI server is enabled.

**scgi_max_temp_file_size**

**Syntax:** `scgi_max_temp_file_size size;`

**Default:** 1024m

**Context:** http, server, location

When buffering of responses from the SCGI server is enabled, and the whole response does not fit into the buffers set by the `scgi_buffer_size` and `scgi_buffers` directives, a part of the response can be saved to a temporary file. This directive sets the maximum size of the temporary file. The size of data written to the temporary file at a time is set by the `scgi_temp_file_write_size` directive.

The zero value disables buffering of responses to temporary files.

This restriction does not apply to responses that will be cached or stored on disk.

**scgi_next_upstream**

**Syntax:** `scgi_next_upstream error | timeout | invalid_header | http_500 | http_503 | http_403 | http_404 | http_429 | non_idempotent | off ...;`

**Default:** error timeout

**Context:** http, server, location

Specifies in which cases a request should be passed to the next server:

**error**

an error occurred while establishing a connection with the server, passing a request to it, or reading the response header;

**timeout**

a timeout has occurred while establishing a connection with the server, passing a request to it, or reading the response header;

**invalid_header**

a server returned an empty or invalid response;

**http_500**

a server returned a response with the code 500;

**http_503**

a server returned a response with the code 503;

**http_403**

a server returned a response with the code 403;
http_404
    a server returned a response with the code 404;
http_429
    a server returned a response with the code 429 (1.11.13);
non_idempotent
    normally, requests with a non-idempotent method (POST, LOCK, PATCH)
    are not passed to the next server if a request has been sent to an
    upstream server (1.9.13); enabling this option explicitly allows retrying
    such requests;
off
    disables passing a request to the next server.

One should bear in mind that passing a request to the next server is only
possible if nothing has been sent to a client yet. That is, if an error or timeout
occurs in the middle of the transferring of a response, fixing this is impossible.

The directive also defines what is considered an unsuccessful attempt of
communication with a server. The cases of error, timeout and invalid_header
are always considered unsuccessful attempts, even if they are not
specified in the directive. The cases of http_500, http_503, and http_-
429 are considered unsuccessful attempts only if they are specified in the
directive. The cases of http_403 and http_404 are never considered
unsuccessful attempts.

Passing a request to the next server can be limited by the number of tries
and by time.

scgi_next_upstream_timeout

    Syntax:  scgi_next_upstream_timeout time;
    Default  0
    Context: http, server, location
    This directive appeared in version 1.7.5.

    Limits the time during which a request can be passed to the next server.
The 0 value turns off this limitation.

scgi_next_upstream_tries

    Syntax:  scgi_next_upstream_tries number;
    Default  0
    Context: http, server, location
    This directive appeared in version 1.7.5.

    Limits the number of possible tries for passing a request to the next server.
The 0 value turns off this limitation.
**scgi_no_cache**

**Syntax:**  
```scgi_no_cache string ...;```

**Default** —

**Context:** http, server, location

Defines conditions under which the response will not be saved to a cache. If at least one value of the string parameters is not empty and is not equal to "0" then the response will not be saved:

```  scgi_no_cache $cookie_nocache $arg_nocache $arg_comment;
  scgi_no_cache $http_pragma $http_authorization;```

Can be used along with the `scgi_cache_bypass` directive.

**scgi_param**

**Syntax:**  
```scgi_param parameter value [if_not_empty];```

**Default** —

**Context:** http, server, location

Sets a `parameter` that should be passed to the SCGI server. The `value` can contain text, variables, and their combination. These directives are inherited from the previous configuration level if and only if there are no `scgi_param` directives defined on the current level.

Standard CGI environment variables should be provided as SCGI headers, see the `scgi_params` file provided in the distribution:

```location / {
  include scgi_params;
  ...
}```

If the directive is specified with `if_not_empty` (1.1.11) then such a parameter will be passed to the server only if its value is not empty:

```scgi_param HTTPS $https if_not_empty;```

**scgi_pass**

**Syntax:**  
```scgi_pass address;```

**Default** —

**Context:** location, if in location

Sets the address of an SCGI server. The address can be specified as a domain name or IP address, and a port:

```scgi_pass localhost:9000;```

or as a UNIX-domain socket path:
scgi_pass unix:/tmp/scgi.socket;

If a domain name resolves to several addresses, all of them will be used in a round-robin fashion. In addition, an address can be specified as a server group.

Parameter value can contain variables. In this case, if an address is specified as a domain name, the name is searched among the described server groups, and, if not found, is determined using a resolver.

scgi_pass_header

Syntax: `scgi_pass_header field;`
Default —
Context: http, server, location

Permits passing otherwise disabled header fields from an SCGI server to a client.

scgi_pass_request_body

Syntax: `scgi_pass_request_body on | off;`
Default on
Context: http, server, location

Indicates whether the original request body is passed to the SCGI server. See also the `scgi_pass_request_headers` directive.

scgi_pass_request_headers

Syntax: `scgi_pass_request_headers on | off;`
Default on
Context: http, server, location

Indicates whether the header fields of the original request are passed to the SCGI server. See also the `scgi_pass_request_body` directive.

scgi_read_timeout

Syntax: `scgi_read_timeout time;`
Default 60s
Context: http, server, location

Defines a timeout for reading a response from the SCGI server. The timeout is set only between two successive read operations, not for the transmission of the whole response. If the SCGI server does not transmit anything within this time, the connection is closed.
scgi_request_buffering

**Syntax:** `scgi_request_buffering on | off;`
**Default:** `on`
**Context:** `http, server, location`

This directive appeared in version 1.7.11.

Enables or disables buffering of a client request body.

When buffering is enabled, the entire request body is read from the client before sending the request to an SCGI server.

When buffering is disabled, the request body is sent to the SCGI server immediately as it is received. In this case, the request cannot be passed to the next server if nginx already started sending the request body.

When HTTP/1.1 chunked transfer encoding is used to send the original request body, the request body will be buffered regardless of the directive value.

scgi_send_timeout

**Syntax:** `scgi_send_timeout time;`
**Default:** `60s`
**Context:** `http, server, location`

Sets a timeout for transmitting a request to the SCGI server. The timeout is set only between two successive write operations, not for the transmission of the whole request. If the SCGI server does not receive anything within this time, the connection is closed.

scgi_socket_keepalive

**Syntax:** `scgi_socket_keepalive on | off;`
**Default:** `off`
**Context:** `http, server, location`

This directive appeared in version 1.15.6.

Configures the “TCP keepalive” behavior for outgoing connections to an SCGI server. By default, the operating system’s settings are in effect for the socket. If the directive is set to the value “on”, the `SO_KEEPALIVE` socket option is turned on for the socket.

scgi_store

**Syntax:** `scgi_store on | off | string;`
**Default:** `off`
**Context:** `http, server, location`

Enables saving of files to a disk. The `on` parameter saves files with paths corresponding to the directives alias or root. The `off` parameter disables saving of files. In addition, the file name can be set explicitly using the `string` with variables:
The modification time of files is set according to the received Last-Modified response header field. The response is first written to a temporary file, and then the file is renamed. Starting from version 0.8.9, temporary files and the persistent store can be put on different file systems. However, be aware that in this case a file is copied across two file systems instead of the cheap renaming operation. It is thus recommended that for any given location both saved files and a directory holding temporary files, set by the scgi_temp_path directive, are put on the same file system.

This directive can be used to create local copies of static unchangeable files, e.g.:

```conf
location /images/ {
  root /data/www;
  error_page 404 = /fetch$uri;
}
location /fetch/ {
  internal;
  scgi_pass backend:9000;
  ...
  scgi_store on;
  scgi_store_access user:rw group:rw all:r;
  scgi_temp_path /data/temp;
  alias /data/www/;
}
```

### scgi_store_access

**Syntax:** `scgi_store_access users:permissions ...;`

**Default:** user:rw

**Context:** http, server, location

Sets access permissions for newly created files and directories, e.g.:

```conf
scgi_store_access user:rw group:rw all:r;
```

If any group or all access permissions are specified then user permissions may be omitted:

```conf
scgi_store_access group:rw all:r;
```

### scgi_temp_file_write_size

**Syntax:** `scgi_temp_file_write_size size;`

**Default:** 8k|16k

**Context:** http, server, location
Limits the size of data written to a temporary file at a time, when buffering of responses from the SCGI server to temporary files is enabled. By default, size is limited by two buffers set by the scgi_buffer_size and scgi_buffers directives. The maximum size of a temporary file is set by the scgi_max_temp_file_size directive.

**scgi_temp_path**

Syntax:  
```  
scgi_temp_path path [level1 [level2 [level3]]];  
```

Default  
```  
scgi_temp  
```

Context: http, server, location

Defines a directory for storing temporary files with data received from SCGI servers. Up to three-level subdirectory hierarchy can be used underneath the specified directory. For example, in the following configuration

```  
scgi_temp_path /spool/nginx/scgi_temp 1 2;  
```

a temporary file might look like this:

```  
/spool/nginx/scgi_temp/7/45/00000123457  
```

See also the use_temp_path parameter of the scgi_cache_path directive.
2.44 Module ngx_http_secure_link_module

2.44.1 Summary

The ngx_http_secure_link_module module (0.7.18) is used to check authenticity of requested links, protect resources from unauthorized access, and limit link lifetime.

The authenticity of a requested link is verified by comparing the checksum value passed in a request with the value computed for the request. If a link has a limited lifetime and the time has expired, the link is considered outdated. The status of these checks is made available in the \$secure_link variable.

The module provides two alternative operation modes. The first mode is enabled by the secure_link_secret directive and is used to check authenticity of requested links as well as protect resources from unauthorized access. The second mode (0.8.50) is enabled by the secure_link and secure_link_md5 directives and is also used to limit lifetime of links.

This module is not built by default, it should be enabled with the \--with-http_secure_link_module configuration parameter.

2.44.2 Directives

secure_link

Syntax:  secure_link expression;
Default —
Context: http, server, location

Defines a string with variables from which the checksum value and lifetime of a link will be extracted.

Variables used in an expression are usually associated with a request; see example below.

The checksum value extracted from the string is compared with the MD5 hash value of the expression defined by the secure_link_md5 directive. If the checksums are different, the \$secure_link variable is set to an empty string. If the checksums are the same, the link lifetime is checked. If the link has a limited lifetime and the time has expired, the \$secure_link variable is set to “0”. Otherwise, it is set to “1”. The MD5 hash value passed in a request is encoded in base64url.

If a link has a limited lifetime, the expiration time is set in seconds since Epoch (Thu, 01 Jan 1970 00:00:00 GMT). The value is specified in the expression after the MD5 hash, and is separated by a comma. The expiration
time passed in a request is available through the \$secure_link_expires variable for a use in the secure_link_md5 directive. If the expiration time is not specified, a link has the unlimited lifetime.

**secure_link_md5**

**Syntax:** `secure_link_md5 expression;`

**Default** —

**Context:** http, server, location

Defines an expression for which the MD5 hash value will be computed and compared with the value passed in a request.

The expression should contain the secured part of a link (resource) and a secret ingredient. If the link has a limited lifetime, the expression should also contain \$secure_link_expires.

To prevent unauthorized access, the expression may contain some information about the client, such as its address and browser version.

Example:

```plaintext
location /s/ {
    secure_link $arg_md5,$arg_expires;
    secure_link_md5 "$secure_link_expires$uri$remote_addr secret";

    if ($secure_link = "") {
        return 403;
    }

    if ($secure_link = "0") {
        return 410;
    }

    ...
}
```

The “/s/link?md5=_e4Nc3iduzkWRm01TBBNYw&expires=2147483647” link restricts access to “/s/link” for the client with the IP address 127.0.0.1. The link also has the limited lifetime until January 19, 2038 (GMT).

On UNIX, the `md5` request argument value can be obtained as:

```plaintext
echo -n '2147483647/s/link127.0.0.1 secret' | \
     openssl md5 -binary | openssl base64 | tr +/ -_ | tr -d =
```

**secure_link_secret**

**Syntax:** `secure_link_secret word;`

**Default** —

**Context:** location

Defines a secret `word` used to check authenticity of requested links.

The full URI of a requested link looks as follows:

```
/prefix/hash/link
```
where hash is a hexadecimal representation of the MD5 hash computed for the concatenation of the link and secret word, and prefix is an arbitrary string without slashes.

If the requested link passes the authenticity check, the $secure_link variable is set to the link extracted from the request URI. Otherwise, the $secure_link variable is set to an empty string.

Example:

```
location /p/ {
    secure_link_secret secret;
    if ($secure_link = "") {
        return 403;
    }
    rewrite ^ /secure/$secure_link;
}
location /secure/ {
    internal;
}
```

A request of “/p/5e814704a28d9bc1914ff19fa0c4a00a/link” will be internally redirected to “/secure/link”.

On UNIX, the hash value for this example can be obtained as:

```
echo -n 'linksecret' | openssl md5 -hex
```

### 2.44.3 Embedded Variables

- **$secure_link**
  
  The status of a link check. The specific value depends on the selected operation mode.

- **$secure_link_expires**
  
  The lifetime of a link passed in a request; intended to be used only in the secure_link_md5 directive.
2.45 Module ngx_http_session_log_module

2.45.1 Summary

The ngx_http_session_log_module module enables logging sessions (that is, aggregates of multiple HTTP requests) instead of individual HTTP requests.

This module is available as part of our commercial subscription.

2.45.2 Example Configuration

The following configuration sets up a session log and maps requests to sessions according to the request client address and User-Agent request header field:

```
session_log_zone /path/to/log format=combined
    zone=one:1m timeout=30s
    md5=$binary_remote_addr$http_user_agent;

location /media/ {
    session_log one;
}
```

2.45.3 Directives

**session_log**

**Syntax:** `session_log name | off;`

**Default:** off

**Context:** http, server, location

Enables the use of the specified session log. The special value off cancels the effect of the session_log directives inherited from the previous configuration level.

**session_log_format**

**Syntax:** `session_log_format name string ...;`

**Default:** combined "..."

**Context:** http
CHAPTER 2. HTTP SERVER MODULES

2.45. MODULE NGX_HTTP_SESSION_LOG_MODULE

Specifies the output format of a log. The value of the $body_bytes_sent
variable is aggregated across all requests in a session. The values of all other
variables available for logging correspond to the first request in a session.

**session_log_zone**

**Syntax:**

```plaintext
session_log_zone path name=zone:size [format=format]
[timeout=time] [id=id] [md5=md5] ;
```

**Default** —

**Context:** http

Sets the path to a log file and configures the shared memory zone that is
used to store currently active sessions.

A session is considered active for as long as the time elapsed since the last
request in the session does not exceed the specified `timeout` (by default, 30
seconds). Once a session is no longer active, it is written to the log.

The `id` parameter identifies the session to which a request is mapped. The
`id` parameter is set to the hexadecimal representation of an MD5 hash (for
example, obtained from a cookie using variables). If this parameter is not
specified or does not represent the valid MD5 hash, nginx computes the MD5
hash from the value of the `md5` parameter and creates a new session using this
hash. Both the `id` and `md5` parameters can contain variables.

The `format` parameter sets the custom session log format configured by
the `session_log_format` directive. If `format` is not specified, the predefined
“combined” format is used.

### 2.45.4 Embedded Variables

The `ngx_http_session_log_module` module supports two embedded
variables:

- `$session_log_id`
  - current session ID;
- `$session_log_binary_id`
  - current session ID in binary form (16 bytes).
2.46 Module ngx_http_slice_module

2.46.1 Summary

The ngx_http_slice_module module (1.9.8) is a filter that splits a request into subrequests, each returning a certain range of response. The filter provides more effective caching of big responses.

This module is not built by default, it should be enabled with the `--with-http_slice_module` configuration parameter.

2.46.2 Example Configuration

```
location / {
    slice 1m;
    proxy_cache  cache;
    proxy_cache_key $uri$is_args$args$slice_range;
    proxy_set_header Range $slice_range;
    proxy_cache_valid 200 206 1h;
    proxy_pass http://localhost:8000;
}
```

In this example, the response is split into 1-megabyte cacheable slices.

2.46.3 Directives

slice

**Syntax:** `slice size;`

**Default:** 0

**Context:** http, server, location

Sets the size of the slice. The zero value disables splitting responses into slices. Note that a too low value may result in excessive memory usage and opening a large number of files.

In order for a subrequest to return the required range, the `$slice_range` variable should be passed to the proxied server as the Range request header field. If caching is enabled, `$slice_range` should be added to the cache key and caching of responses with 206 status code should be enabled.

2.46.4 Embedded Variables

The ngx_http_slice_module module supports the following embedded variables:
$slice_range
the current slice range in HTTP byte range format, for example, bytes=0-1048575.
CHAPTER 2. HTTP SERVER MODULES

2.47 Module ngx_http_split_clients_module

2.47.1 Summary

The ngx_http_split_clients_module module creates variables suitable for A/B testing, also known as split testing.

2.47.2 Example Configuration

```nginx
http {
    split_clients "${remote_addr}AAA" $variant {
        0.5% .one;
        2.0% .two;
        * "";
    }
}
server {
    location / {
        index index${variant}.html;
    }
}
```

2.47.3 Directives

**split_clients**

**Syntax:** `split_clients string $variable { ... }`

**Default** —

**Context:** http

Creates a variable for A/B testing, for example:

```nginx
split_clients "${remote_addr}AAA" $variant {
    0.5% .one;
    2.0% .two;
    * "";
}
```

The value of the original string is hashed using MurmurHash2. In the example given, hash values from 0 to 21474835 (0.5%) correspond to the value ".one" of the `$variant` variable, hash values from 21474836 to 107374180 (2%) correspond to the value ".two", and hash values from 107374181 to 4294967295 correspond to the value "" (an empty string).
2.48 Module ngx_http_ssi_module

2.48.1 Summary

The ngx_http_ssi_module module is a filter that processes SSI (Server Side Includes) commands in responses passing through it. Currently, the list of supported SSI commands is incomplete.

2.48.2 Example Configuration

```plaintext
location / {
  ssi on;
  ...
}
```

2.48.3 Directives

**ssi**

Syntax: `ssi on | off;`

Default: `off`

Context: `http, server, location, if in location`

Enables or disables processing of SSI commands in responses.

**ssi_last_modified**

Syntax: `ssi_last_modified on | off;`

Default: `off`

Context: `http, server, location`

This directive appeared in version 1.5.1.

Allows preserving the Last-Modified header field from the original response during SSI processing to facilitate response caching.

By default, the header field is removed as contents of the response are modified during processing and may contain dynamically generated elements or parts that are changed independently of the original response.
ssi_min_file_chunk

**Syntax:**  \texttt{ssi\_min\_file\_chunk size;}
**Default:** 1k
**Context:** http, server, location

Sets the minimum \textit{size} for parts of a response stored on disk, starting from which it makes sense to send them using \texttt{sendfile}.

ssi_silent_errors

**Syntax:**  \texttt{ssi\_silent\_errors on | off;}
**Default:** off
**Context:** http, server, location

If enabled, suppresses the output of the “[an error occurred while processing the directive]” string if an error occurred during SSI processing.

ssi_types

**Syntax:**  \texttt{ssi\_types mime-type ...;}
**Default:** text/html
**Context:** http, server, location

Enables processing of SSI commands in responses with the specified MIME types in addition to “text/html”. The special value “*” matches any MIME type (0.8.29).

ssi_value_length

**Syntax:**  \texttt{ssi\_value\_length length;}
**Default:** 256
**Context:** http, server, location

Sets the maximum length of parameter values in SSI commands.

### 2.48.4 SSI Commands

SSI commands have the following generic format:

\[
\text{<!--# command parameter1=value1 parameter2=value2 ... -- >}
\]

The following commands are supported:

**block**

Defines a block that can be used as a stub in the \texttt{include} command. The block can contain other SSI commands. The command has the following parameter:

\[
\text{name} \\
\text{block name.}
\]
Example:

```html
<!--# block name="one" -->
stub
<!--# endblock -->
```

**config**

Sets some parameters used during SSI processing, namely:

**errmsg**

A string that is output if an error occurs during SSI processing. By default, the following string is output:

```
[an error occurred while processing the directive]
```

**timefmt**

A format string passed to the `strftime` function used to output date and time. By default, the following format is used:

```
"%a, %d-%b-%Y %H:%M:%S %Z"
```

The “%s” format is suitable to output time in seconds.

**echo**

Outputs the value of a variable. The command has the following parameters:

**var**

The variable name.

**encoding**

The encoding method. Possible values include none, url, and entity. By default, entity is used.

**default**

A non-standard parameter that sets a string to be output if a variable is undefined. By default, “(none)” is output. The command

```html
<!--# echo var="name" default="no" -->
```

replaces the following sequence of commands:

```html
<!--# if expr="$name" -->
<!--# echo var="name" -->
<!--# elif expr="" -->
else -->no<!--# endif -->
```

**if**

Performs a conditional inclusion. The following commands are supported:

```html
<!--# if expr="..." -->
...
<!--# elif expr="..." -->
...
```
Only one level of nesting is currently supported. The command has the following parameter:

`expr` expression. An expression can be:

- variable existence check:
  ```
  <!--# if expr="$name" -->
  ...
  <!--# endif -->
  ```

- comparison of a variable with a text:
  ```
  <!--# if expr="$name = text" -->
  <!--# if expr="$name != text" -->
  ```

- comparison of a variable with a regular expression:
  ```
  <!--# if expr="$name = /text/" -->
  <!--# if expr="$name != /text/" -->
  ```

If a `text` contains variables, their values are substituted. A regular expression can contain positional and named captures that can later be used through variables, for example:

```
<!--# if expr="$name = /.+@(?P<domain>.+)/" -->
  <!--# echo var="l" -->
  <!--# echo var="domain" -->
<!--# endif -->
```  

`include` includes the result of another request into a response. The command has the following parameters:

- `file` specifies an included file, for example:
  ```
  <!--# include file="footer.html" -->
  ```

- `virtual` specifies an included request, for example:
  ```
  <!--# include virtual="/remote/body.php?argument=value" -->
  ```

Several requests specified on one page and processed by proxied or FastCGI/uwsgi/SCGI/gRPC servers run in parallel. If sequential processing is desired, the `wait` parameter should be used.
stub
a non-standard parameter that names the block whose content will be output if the included request results in an empty body or if an error occurs during the request processing, for example:

```html
<!--# block name="one" -->&nbsp;<!--# endblock -->
<!--# include virtual="/remote/body.php?argument=value" stub="one" -->
```

The replacement block content is processed in the included request context.

wait
a non-standard parameter that instructs to wait for a request to fully complete before continuing with SSI processing, for example:

```html
<!--# include virtual="/remote/body.php?argument=value" wait="yes" -->
```

set
a non-standard parameter that instructs to write a successful result of request processing to the specified variable, for example:

```html
<!--# include virtual="/remote/body.php?argument=value" set="one" -->
```

The maximum size of the response is set by the subrequest_output_buffer_size directive (1.13.10):

```latex
location /remote/ {
    subrequest_output_buffer_size 64k;
    ...}
```

Prior to version 1.13.10, only the results of responses obtained using the ngx_http_proxy_module, ngx_http_memcached_module, ngx_http_fastcgi_module (1.5.6), ngx_http_uwsgi_module (1.5.6), and ngx_http_scgi_module (1.5.6) modules could be written into variables. The maximum size of the response was set with the proxy_buffer_size, memcached_buffer_size, fastcgi_buffer_size, uwsgi_buffer_size, and scgi_buffer_size directives.

set
Sets a value of a variable. The command has the following parameters:

```latex
var
the variable name.
```

```latex
value
the variable value. If an assigned value contains variables, their values are substituted.
```
2.48.5 Embedded Variables

The `ngx_http_ssi_module` module supports two embedded variables:

\$\textit{date\_local} \\
\quad current time in the local time zone. The format is set by the \texttt{config} command with the \texttt{timefmt} parameter.

\$\textit{date\_gmt} \\
\quad current time in GMT. The format is set by the \texttt{config} command with the \texttt{timefmt} parameter.
2.49 Module ngx_http_ssl_module

2.49.1 Summary ........................................... 309
2.49.2 Example Configuration .............................. 310
2.49.3 Directives .......................................... 310
  ssl .................................................. 310
  ssl_buffer_size ................................. 310
  ssl_certificate ............................... 311
  ssl_certificate_key ......................... 312
  ssl_ciphers .................................. 312
  ssl_client_certificate ...................... 312
  ssl_conf_command .................... 312
  ssl_crl .......................................... 313
  ssl_dhparam .................................. 313
  ssl_early_data .............................. 313
  ssl_ecdh_curve ...................... 314
  ssl_ocsp ...................................... 314
  ssl_ocsp_cache .............. 315
  ssl_ocsp_responder ....................... 315
  ssl_password_file ..................... 315
  ssl_prefer_server_ciphers .......... 316
  ssl_protocols ......................... 316
  ssl_reject_handshake .............. 316
  ssl_session_cache .............. 317
  ssl_session_ticket_key .......... 317
  ssl_session_tickets .......... 318
  ssl_session_timeout .......... 318
  ssl_stapling ...................... 318
  ssl_stapling_file .............. 319
  ssl_stapling_responder .............. 319
  ssl_stapling_verify .......... 319
  ssl_trusted_certificate ................ 319
  ssl_verify_client .......... 320
  ssl_verify_depth .......... 320
2.49.4 Error Processing .............................. 320
2.49.5 Embedded Variables ......................... 320

2.49.1 Summary

The ngx_http_ssl_module module provides the necessary support for HTTPS.

This module is not built by default, it should be enabled with the
--with-http_ssl_module configuration parameter.

This module requires the OpenSSL library.
2.49.2 Example Configuration

To reduce the processor load it is recommended to

- set the number of worker processes equal to the number of processors,
- enable keep-alive connections,
- enable the shared session cache,
- disable the built-in session cache,
- and possibly increase the session lifetime (by default, 5 minutes):

```conf
worker_processes auto;

http {

  ...

  server {
    listen 443 ssl;
    keepalive_timeout 70;
    ssl_protocols TLSv1 TLSv1.1 TLSv1.2 TLSv1.3;
    ssl_ciphers AES128-SHA:AES256-SHA:RC4-SHA:DES-CBC3-SHA:RC4-MD5;
    ssl_certificate /usr/local/nginx/conf/cert.pem;
    ssl_certificate_key /usr/local/nginx/conf/cert.key;
    ssl_session_cache shared:SSL:10m;
    ssl_session_timeout 10m;

  }

  ...

}
```

2.49.3 Directives

**ssl**

**Syntax:** `ssl on | off;`

**Default:** `off`

**Context:** `http, server`

This directive was made obsolete in version 1.15.0 and was removed in version 1.25.1. The `ssl` parameter of the `listen` directive should be used instead.

**ssl_buffer_size**

**Syntax:** `ssl_buffer_size size;`

**Default:** `16k`

**Context:** `http, server`

This directive appeared in version 1.5.9.

Sets the size of the buffer used for sending data.

By default, the buffer size is 16k, which corresponds to minimal overhead when sending big responses. To minimize Time To First Byte it may be beneficial to use smaller values, for example:
ssl_buffer_size 4k;

ssl_certificate

**Syntax:**  `ssl_certificate file;`

**Default:**  —

**Context:**  http, server

Specifies a file with the certificate in the PEM format for the given virtual server. If intermediate certificates should be specified in addition to a primary certificate, they should be specified in the same file in the following order: the primary certificate comes first, then the intermediate certificates. A secret key in the PEM format may be placed in the same file.

Since version 1.11.0, this directive can be specified multiple times to load certificates of different types, for example, RSA and ECDSA:

```plaintext
server {
  listen 443 ssl;
  server_name example.com;

  ssl_certificate example.com.rsa.crt;
  ssl_certificate_key example.com.rsa.key;

  ssl_certificate example.com.ecdsa.crt;
  ssl_certificate_key example.com.ecdsa.key;

  ...
}
```

Only OpenSSL 1.0.2 or higher supports separate certificate chains for different certificates. With older versions, only one certificate chain can be used.

Since version 1.15.9, variables can be used in the file name when using OpenSSL 1.0.2 or higher:

```plaintext
ssl_certificate $ssl_server_name.crt;
ssl_certificate_key $ssl_server_name.key;
```

Note that using variables implies that a certificate will be loaded for each SSL handshake, and this may have a negative impact on performance.

The value `data:$variable` can be specified instead of the file (1.15.10), which loads a certificate from a variable without using intermediate files. Note that inappropriate use of this syntax may have its security implications, such as writing secret key data to error log.

It should be kept in mind that due to the HTTPS protocol limitations for maximum interoperability virtual servers should listen on different IP addresses.
ssl_certificate_key

Syntax:  ssl_certificate_key file;
Default  —
Context: http, server

Specifies a file with the secret key in the PEM format for the given virtual server.

The value engine:name:id can be specified instead of the file (1.7.9), which loads a secret key with a specified id from the OpenSSL engine name.

The value data:$variable can be specified instead of the file (1.15.10), which loads a secret key from a variable without using intermediate files. Note that inappropriate use of this syntax may have its security implications, such as writing secret key data to error log.

Since version 1.15.9, variables can be used in the file name when using OpenSSL 1.0.2 or higher.

ssl_ciphers

Syntax:  ssl_ciphers ciphers;
Default  HIGH:!aNULL:!MD5
Context: http, server

Specifies the enabled ciphers. The ciphers are specified in the format understood by the OpenSSL library, for example:

```
```

The full list can be viewed using the “openssl ciphers” command.

The previous versions of nginx used different ciphers by default.

ssl_client_certificate

Syntax:  ssl_client_certificate file;
Default  —
Context: http, server

Specifies a file with trusted CA certificates in the PEM format used to verify client certificates and OCSP responses if ssl_stapling is enabled.

The list of certificates will be sent to clients. If this is not desired, the ssl_trusted_certificate directive can be used.

ssl_conf_command

Syntax:  ssl_conf_command name value;
Default  —
Context: http, server

This directive appeared in version 1.19.4.

Sets arbitrary OpenSSL configuration commands.
The directive is supported when using OpenSSL 1.0.2 or higher.

Several `ssl_conf_command` directives can be specified on the same level:

```
ssl_conf_command Options PrioritizeChaCha;
ssl_conf_command Ciphersuites TLS_CHACHA20_POLY1305_SHA256;
```

These directives are inherited from the previous configuration level if and only if there are no `ssl_conf_command` directives defined on the current level.

Note that configuring OpenSSL directly might result in unexpected behavior.

**ssl_crl**

Syntax: `ssl_crl file;`

Default: —

Context: http, server

This directive appeared in version 0.8.7.

Specifies a file with revoked certificates (CRL) in the PEM format used to verify client certificates.

**ssl_dhparam**

Syntax: `ssl_dhparam file;`

Default: —

Context: http, server

This directive appeared in version 0.7.2.

Specifies a file with DH parameters for DHE ciphers.
By default no parameters are set, and therefore DHE ciphers will not be used.

Prior to version 1.11.0, built-in parameters were used by default.

**ssl_early_data**

Syntax: `ssl_early_data on | off;`

Default: off

Context: http, server

This directive appeared in version 1.15.3.

Enables or disables TLS 1.3 early data.

Requests sent within early data are subject to replay attacks. To protect against such attacks at the application layer, the `$ssl_early_data` variable should be used.
proxy_set_header Early-Data $ssl_early_data;

The directive is supported when using OpenSSL 1.1.1 or higher (1.15.4) and BoringSSL.

ssl_ecdh_curve

Syntax:  

```
ssl_ecdh_curve curve;
```

Default: auto

Context: http, server

This directive appeared in versions 1.1.0 and 1.0.6.

Specifies a curve for ECDHE ciphers.

When using OpenSSL 1.0.2 or higher, it is possible to specify multiple curves (1.11.0), for example:

```
ssl_ecdh_curve prime256v1:secp384r1;
```

The special value auto (1.11.0) instructs nginx to use a list built into the OpenSSL library when using OpenSSL 1.0.2 or higher, or prime256v1 with older versions.

Prior to version 1.11.0, the prime256v1 curve was used by default.

When using OpenSSL 1.0.2 or higher, this directive sets the list of curves supported by the server. Thus, in order for ECDSA certificates to work, it is important to include the curves used in the certificates.

ssl_ocsp

Syntax:  

```
ssl_ocsp on | off | leaf;
```

Default: off

Context: http, server

This directive appeared in version 1.19.0.

Enables OCSP validation of the client certificate chain. The leaf parameter enables validation of the client certificate only.

For the OCSP validation to work, the ssl_verify_client directive should be set to on or optional.

To resolve the OCSP responder hostname, the resolver directive should also be specified.

Example:

```
ssl_verify_client on;
ssl_ocsp on;
resolver 192.0.2.1;
```
ssl_ocsp_cache

Syntax:  `ssl_ocsp_cache off | [shared:name:size];`

Default  `off`

Context:  `http, server`

This directive appeared in version 1.19.0.

Sets name and size of the cache that stores client certificates status for OCSP validation. The cache is shared between all worker processes. A cache with the same name can be used in several virtual servers.

The `off` parameter prohibits the use of the cache.

ssl_ocsp_responder

Syntax:  `ssl_ocsp_responder url;`

Default  `-`

Context:  `http, server`

This directive appeared in version 1.19.0.

Overrides the URL of the OCSP responder specified in the “Authority Information Access” certificate extension for validation of client certificates. Only “http://” OCSP responders are supported:

```plaintext
ssl_ocsp_responder http://ocsp.example.com/;
```

ssl_password_file

Syntax:  `ssl_password_file file;`

Default  `-`

Context:  `http, server`

This directive appeared in version 1.7.3.

Specifies a `file` with passphrases for secret keys where each passphrase is specified on a separate line. Passphrases are tried in turn when loading the key.

Example:

```plaintext
http {
  ssl_password_file /etc/keys/global.pass;
  ...

  server {
    server_name www1.example.com;
    ssl_certificate_key /etc/keys/first.key;
  }

  server {
    server_name www2.example.com;
    ssl_password_file /etc/keys/fifo;
    ssl_certificate_key /etc/keys/second.key;
  }
}
```
ssl_prefer_server_ciphers

**Syntax:**
```
ssl_prefer_server_ciphers on | off;
```

**Default:** off

**Context:** http, server

Specifies that server ciphers should be preferred over client ciphers when using the SSLv3 and TLS protocols.

ssl_protocols

**Syntax:**
```
ssl_protocols [SSLv2] [SSLv3] [TLSv1] [TLSv1.1] [TLSv1.2] [TLSv1.3];
```

**Default:** TLSv1 TLSv1.1 TLSv1.2 TLSv1.3

**Context:** http, server

Enables the specified protocols.

The TLSv1.1 and TLSv1.2 parameters (1.13.0, 1.0.12) work only when OpenSSL 1.0.1 or higher is used.

The TLSv1.3 parameter (1.13.0) works only when OpenSSL 1.1.1 or higher is used.

The TLSv1.3 parameter is used by default since 1.23.4.

ssl_reject_handshake

**Syntax:**
```
ssl_reject_handshake on | off;
```

**Default:** off

**Context:** http, server

This directive appeared in version 1.19.4.

If enabled, SSL handshakes in the server block will be rejected.

For example, in the following configuration, SSL handshakes with server names other than example.com are rejected:

```nginx
server {
    listen 443 ssl default_server;
    ssl_reject_handshake on;
}
server {
    listen 443 ssl;
    server_name example.com;
    ssl_certificate example.com.crt;
    ssl_certificate_key example.com.key;
}
```

Nginx, Inc. p.316 of 542
ssl_session_cache

**Syntax:**

```plaintext
ssl_session_cache off | none | [builtin:size]
                 | [shared:name:size];
```

**Default:**
none

**Context:**
http, server

Sets the types and sizes of caches that store session parameters. A cache can be of any of the following types:

- **off**
  - The use of a session cache is strictly prohibited: nginx explicitly tells a client that sessions may not be reused.

- **none**
  - The use of a session cache is gently disallowed: nginx tells a client that sessions may be reused, but does not actually store session parameters in the cache.

- **builtin**
  - A cache built in OpenSSL; used by one worker process only. The cache size is specified in sessions. If size is not given, it is equal to 20480 sessions. Use of the built-in cache can cause memory fragmentation.

- **shared**
  - A cache shared between all worker processes. The cache size is specified in bytes; one megabyte can store about 4000 sessions. Each shared cache should have an arbitrary name. A cache with the same name can be used in several virtual servers. It is also used to automatically generate, store, and periodically rotate TLS session ticket keys (1.23.2) unless configured explicitly using the `ssl_session_ticket_key` directive.

Both cache types can be used simultaneously, for example:

```
ssl_session_cache builtin:1000 shared:SSL:10m;
```

but using only shared cache without the built-in cache should be more efficient.

ssl_session_ticket_key

**Syntax:**

```plaintext
ssl_session_ticket_key file;
```

**Default:**
—

**Context:**
http, server

This directive appeared in version 1.5.7.

Sets a file with the secret key used to encrypt and decrypt TLS session tickets. The directive is necessary if the same key has to be shared between multiple servers. By default, a randomly generated key is used.

If several keys are specified, only the first key is used to encrypt TLS session tickets. This allows configuring key rotation, for example:
The file must contain 80 or 48 bytes of random data and can be created using the following command:

```bash
openssl rand 80 > ticket.key
```

Depending on the file size either AES256 (for 80-byte keys, 1.11.8) or AES128 (for 48-byte keys) is used for encryption.

### ssl_session_tickets

**Syntax:**

```plaintext
ssl_session_tickets on | off;
```

**Default:** on

**Context:** http, server

This directive appeared in version 1.5.9.

Enables or disables session resumption through TLS session tickets.

### ssl_session_timeout

**Syntax:**

```plaintext
ssl_session_timeout time;
```

**Default:** 5m

**Context:** http, server

Specifies a time during which a client may reuse the session parameters.

### ssl_stapling

**Syntax:**

```plaintext
ssl_stapling on | off;
```

**Default:** off

**Context:** http, server

This directive appeared in version 1.3.7.

Enables or disables stapling of OCSP responses by the server. Example:

```plaintext
ssl_stapling on;
resolver 192.0.2.1;
```

For the OCSP stapling to work, the certificate of the server certificate issuer should be known. If the `ssl_certificate` file does not contain intermediate certificates, the certificate of the server certificate issuer should be present in the `ssl_trusted_certificate` file.

For a resolution of the OCSP responder hostname, the `resolver` directive should also be specified.
ssl_stapling_file

Syntax:  `ssl_stapling_file file;`

Default —  
Context: http, server  
This directive appeared in version 1.3.7.

When set, the stapled OCSP response will be taken from the specified `file` instead of querying the OCSP responder specified in the server certificate.

The file should be in the DER format as produced by the “openssl ocsp” command.

ssl_stapling_responder

Syntax:  `ssl_stapling_responder url;`

Default —  
Context: http, server  
This directive appeared in version 1.3.7.

Overrides the URL of the OCSP responder specified in the “Authority Information Access” certificate extension.

Only “http://” OCSP responders are supported:

```
ssl_stapling_responder http://ocsp.example.com/;
```

ssl_stapling_verify

Syntax:  `ssl_stapling_verify on | off;`

Default  `off`
Context: http, server  
This directive appeared in version 1.3.7.

Enables or disables verification of OCSP responses by the server.

For verification to work, the certificate of the server certificate issuer, the root certificate, and all intermediate certificates should be configured as trusted using the `ssl_trusted_certificate` directive.

ssl_trusted_certificate

Syntax:  `ssl_trusted_certificate file;`

Default —  
Context: http, server  
This directive appeared in version 1.3.7.

Specifies a `file` with trusted CA certificates in the PEM format used to verify client certificates and OCSP responses if `ssl_stapling` is enabled.

In contrast to the certificate set by `ssl_client_certificate`, the list of these certificates will not be sent to clients.
ssl_verify_client

Syntax:  

ssl_verify_client on | off | optional | optional_no_ca;

Default:  off

Context:  http, server

Enables verification of client certificates. The verification result is stored in the $ssl_client_verify variable.

The optional parameter (0.8.7+) requests the client certificate and verifies it if the certificate is present.

The optional_no_ca parameter (1.3.8, 1.2.5) requests the client certificate but does not require it to be signed by a trusted CA certificate. This is intended for the use in cases when a service that is external to nginx performs the actual certificate verification. The contents of the certificate is accessible through the $ssl_client_cert variable.

ssl_verify_depth

Syntax:  

ssl_verify_depth number;

Default:  1

Context:  http, server

Sets the verification depth in the client certificates chain.

2.49.4 Error Processing

The ngx_http_ssl_module module supports several non-standard error codes that can be used for redirects using the error_page directive:

- 495  an error has occurred during the client certificate verification;
- 496  a client has not presented the required certificate;
- 497  a regular request has been sent to the HTTPS port.

The redirection happens after the request is fully parsed and the variables, such as $request_uri, $uri, $args and others, are available.

2.49.5 Embedded Variables

The ngx_http_ssl_module module supports embedded variables:

$ssl_alpn_protocol

returns the protocol selected by ALPN during the SSL handshake, or an empty string otherwise (1.21.4);

$ssl_cipher

returns the name of the cipher used for an established SSL connection;
$ssl_ciphers
returns the list of ciphers supported by the client (1.11.7). Known ciphers are listed by names, unknown are shown in hexadecimal, for example:

\[\text{AES128-SHA:AES256-SHA:0x00ff}\]

The variable is fully supported only when using OpenSSL version 1.0.2 or higher. With older versions, the variable is available only for new sessions and lists only known ciphers.

$ssl_clientescaped_cert
returns the client certificate in the PEM format (urlencoded) for an established SSL connection (1.13.5);

$ssl_client_cert
returns the client certificate in the PEM format for an established SSL connection, with each line except the first prepended with the tab character; this is intended for the use in the proxy_set_header directive;

The variable is deprecated, the $ssl_clientescaped_cert variable should be used instead.

$ssl_client_fingerprint
returns the SHA1 fingerprint of the client certificate for an established SSL connection (1.7.1);

$ssl_client_i_dn
returns the “issuer DN” string of the client certificate for an established SSL connection according to RFC 2253 (1.11.6);

$ssl_client_i_dn_legacy
returns the “issuer DN” string of the client certificate for an established SSL connection;

Prior to version 1.11.6, the variable name was $ssl_client_i_dn.

$ssl_client_raw_cert
returns the client certificate in the PEM format for an established SSL connection;

$ssl_client_s_dn
returns the “subject DN” string of the client certificate for an established SSL connection according to RFC 2253 (1.11.6);

$ssl_client_s_dn_legacy
returns the “subject DN” string of the client certificate for an established SSL connection;
Prior to version 1.11.6, the variable name was `$$ssl_client_s_dn`.

`$$ssl_client_serial`  
returns the serial number of the client certificate for an established SSL connection;

`$$ssl_client_v_end`  
returns the end date of the client certificate (1.11.7);

`$$ssl_client_v_remain`  
returns the number of days until the client certificate expires (1.11.7);

`$$ssl_client_v_start`  
returns the start date of the client certificate (1.11.7);

`$$ssl_client_verify`  
returns the result of client certificate verification: “SUCCESS”, “FAILED: reason”, and “NONE” if a certificate was not present;

Prior to version 1.11.7, the “FAILED” result did not contain the `reason` string.

`$$ssl_curve`  
returns the negotiated curve used for SSL handshake key exchange process (1.21.5). Known curves are listed by names, unknown are shown in hexadecimal, for example:

```
prime256v1
```

The variable is supported only when using OpenSSL version 3.0 or higher. With older versions, the variable value will be an empty string.

`$$ssl_curves`  
returns the list of curves supported by the client (1.11.7). Known curves are listed by names, unknown are shown in hexadecimal, for example:

```
0x001d:prime256v1:secp521r1:secp384r1
```

The variable is supported only when using OpenSSL version 1.0.2 or higher. With older versions, the variable value will be an empty string.

The variable is available only for new sessions.

`$$ssl_early_data`  
returns “1” if TLS 1.3 early data is used and the handshake is not complete, otherwise “” (1.15.3).

`$$ssl_protocol`  
returns the protocol of an established SSL connection;
\$ssl_server_name
returns the server name requested through SNI (1.7.0);
\$ssl_session_id
returns the session identifier of an established SSL connection;
\$ssl_session_reused
returns “r” if an SSL session was reused, or “.” otherwise (1.5.11).
2.50 Module ngx_http_status_module

2.50.1 Summary ............................................. 324
2.50.2 Example Configuration ................................. 324
2.50.3 Directives ............................................ 325
  status ................................................ 325
  status_format ....................................... 325
  status_zone .......................................... 326
2.50.4 Data .................................................. 326
2.50.5 Compatibility ....................................... 333

2.50.1 Summary

The ngx_http_status_module module provides access to various status information.

This module was available as part of our commercial subscription until 1.13.10. It was superseded by the ngx_http_api_module module in 1.13.3.

2.50.2 Example Configuration

```
http {
  upstream backend {
    zone http_backend 64k;
    server backend1.example.com weight=5;
    server backend2.example.com;
  }

  proxy_cache_path /data/nginx/cache_backend keys_zone=cache_backend:10m;

  server {
    server_name backend.example.com;

    location / {
      proxy_pass http://backend;
      proxy_cache cache_backend;
      health_check;

      status_zone server_backend;
    }

    server {
      listen 127.0.0.1;

      location /upstream_conf {
        upstream_conf;
      }

      location /status {
        status;
      }

      location = /status.html {
      }
  }
```

Nginx, Inc. p.324 of 542
Examples of status requests with this configuration:

http://127.0.0.1/status
http://127.0.0.1/status/nginx_version
http://127.0.0.1/status/caches/cache_backend
http://127.0.0.1/status/upstreams
http://127.0.0.1/status/upstreams/backend
http://127.0.0.1/status/upstreams/backend/peers/1
http://127.0.0.1/status/upstreams/backend/peers/1/weight
http://127.0.0.1/status/stream
http://127.0.0.1/status/stream/upstreams
http://127.0.0.1/status/stream/upstreams/backend
http://127.0.0.1/status/stream/upstreams/backend/peers/1
http://127.0.0.1/status/stream/upstreams/backend/peers/1/weight

The simple monitoring page is shipped with this distribution, accessible as “/status.html” in the default configuration. It requires the locations “/status” and “/status.html” to be configured as shown above.

2.50.3 Directives

status

Syntax: status;
Default —
Context: location

The status information will be accessible from the surrounding location. Access to this location should be limited.

status_format

Syntax: status_format json;
Syntax: status_format jsonp [callback];
Default json
Context: http, server, location

By default, status information is output in the JSON format. Alternatively, data may be output as JSONP. The callback parameter specifies the name of a callback function. Parameter value can contain
variables. If parameter is omitted, or the computed value is an empty string, then “ngx_status_jsonp_callback” is used.

**status_zone**

**Syntax:**

```
status_zone zone;
```

**Default:**

```
—
```

**Context:** server

Enables collection of virtual http or stream (1.7.11) server status information in the specified zone. Several servers may share the same zone.

### 2.50.4 Data

The following status information is provided:

- **version**
  - Version of the provided data set. The current version is 8.
- **nginx_version**
  - Version of nginx.
- **nginx_build**
  - Name of nginx build.
- **address**
  - The address of the server that accepted status request.
- **generation**
  - The total number of configuration reloads.
- **load_timestamp**
  - Time of the last reload of configuration, in milliseconds since Epoch.
- **timestamp**
  - Current time in milliseconds since Epoch.
- **pid**
  - The ID of the worker process that handled status request.
- **ppid**
  - The ID of the master process that started the worker process.
- **processes**
  - The total number of abnormally terminated and respawned child processes.
- **connections**
  - The total number of accepted client connections.
  - The total number of dropped client connections.
  - The current number of active client connections.
idle
   The current number of idle client connections.

ssl
   handshakes
      The total number of successful SSL handshakes.
   handshakes_failed
      The total number of failed SSL handshakes.
   session_reuses
      The total number of session reuses during SSL handshake.

requests
   total
      The total number of client requests.
   current
      The current number of client requests.

server_zones
   For each status zone:
      processing
         The number of client requests that are currently being processed.
      requests
         The total number of client requests received from clients.
      responses
         total
            The total number of responses sent to clients.
            1xx, 2xx, 3xx, 4xx, 5xx
               The number of responses with status codes 1xx, 2xx, 3xx, 4xx, and 5xx.
      discarded
         The total number of requests completed without sending a response.
      received
         The total number of bytes received from clients.
      sent
         The total number of bytes sent to clients.

slabs
   For each shared memory zone that uses slab allocator:
      pages
         used
            The current number of used memory pages.
         free
            The current number of free memory pages.

slots
   For each memory slot size (8, 16, 32, 64, 128, etc.) the following data are provided:
The current number of used memory slots.

free
The current number of free memory slots.

reqs
The total number of attempts to allocate memory of specified size.

fails
The number of unsuccessful attempts to allocate memory of specified size.

For each dynamically configurable group, the following data are provided:

peers
For each server, the following data are provided:

id
The ID of the server.

server
An address of the server.

name
The name of the server specified in the server directive.

service
The service parameter value of the server directive.

backup
A boolean value indicating whether the server is a backup server.

weight
Weight of the server.

state
Current state, which may be one of “up”, “draining”, “down”, “unavail”, “checking”, or “unhealthy”.

active
The current number of active connections.

max_conns
The max_conns limit for the server.

requests
The total number of client requests forwarded to this server.

responses

total
The total number of responses obtained from this server.

1xx, 2xx, 3xx, 4xx, 5xx
The number of responses with status codes 1xx, 2xx, 3xx, 4xx, and 5xx.

sent
The total number of bytes sent to this server.
received
The total number of bytes received from this server.

fails
The total number of unsuccessful attempts to communicate with the server.

unavail
How many times the server became unavailable for client requests (state “unavail”) due to the number of unsuccessful attempts reaching the max_fails threshold.

health_checks
checks
The total number of health check requests made.
fails
The number of failed health checks.

unhealthy
How many times the server became unhealthy (state “unhealthy”).

last_passed
Boolean indicating if the last health check request was successful and passed tests.

downtime
Total time the server was in the “unavail”, “checking”, and “unhealthy” states.
downstart
The time (in milliseconds since Epoch) when the server became “unavail”, “checking”, or “unhealthy”.

selected
The time (in milliseconds since Epoch) when the server was last selected to process a request (1.7.5).

header_time
The average time to get the response header from the server (1.7.10). Prior to version 1.11.6, the field was available only when using the least_time load balancing method.

response_time
The average time to get the full response from the server (1.7.10). Prior to version 1.11.6, the field was available only when using the least_time load balancing method.

keepalive
The current number of idle keepalive connections.

zombies
The current number of servers removed from the group but still processing active client requests.

zone
The name of the shared memory zone that keeps the group’s configuration and run-time state.
CHAPTER 2. HTTP SERVER MODULES

2.50. MODULE NGX_HTTP_STATUS_MODULE

For the requests queue, the following data are provided:

- **size**: The current number of requests in the queue.
- **max_size**: The maximum number of requests that can be in the queue at the same time.
- **overflows**: The total number of requests rejected due to the queue overflow.

For each cache (configured by `proxy_cache_path` and the likes):

- **size**: The current size of the cache.
- **max_size**: The limit on the maximum size of the cache specified in the configuration.
- **cold**: A boolean value indicating whether the “cache loader” process is still loading data from disk into the cache.
- **hit, stale, updating, revalidated responses**: The total number of responses read from the cache (hits, or stale responses due to `proxy_cache_use_stale` and the likes).
- **bytes**: The total number of bytes read from the cache.
- **miss, expired, bypass responses**: The total number of responses not taken from the cache (misses, expires, or bypasses due to `proxy_cache_bypass` and the likes).
- **bytes**: The total number of bytes read from the proxied server.
- **responses_written**: The total number of responses written to the cache.
- **bytes_written**: The total number of bytes written to the cache.

For each status zone:

- **processing**: The number of client connections that are currently being processed.
- **connections**: The total number of connections accepted from clients.
sessions
  total
    The total number of completed client sessions.
  2xx, 4xx, 5xx
    The number of sessions completed with status codes 2xx,
    4xx, or 5xx.
discarded
    The total number of connections completed without creating a
    session.
received
    The total number of bytes received from clients.
sent
    The total number of bytes sent to clients.
upstreams
  For each dynamically configurable group, the following data are
  provided:
  peers
    For each server the following data are provided:
    id
      The ID of the server.
    server
      An address of the server.
    name
      The name of the server specified in the server directive.
    service
      The service parameter value of the server directive.
    backup
      A boolean value indicating whether the server is a backup
      server.
    weight
      Weight of the server.
    state
      Current state, which may be one of “up”, “down”,
      “unavail”, “checking”, or “unhealthy”.
    active
      The current number of connections.
    max_conns
      The max_conns limit for the server.
connections
    The total number of client connections forwarded to this
    server.
connect_time
    The average time to connect to the upstream server. Prior
    to version 1.11.6, the field was available only when using
    the least_time load balancing method.
first_byte_time
The average time to receive the first byte of data. Prior to version 1.11.6, the field was available only when using the least_time load balancing method.

response_time
The average time to receive the last byte of data. Prior to version 1.11.6, the field was available only when using the least_time load balancing method.

sent
The total number of bytes sent to this server.

received
The total number of bytes received from this server.

fails
The total number of unsuccessful attempts to communicate with the server.

unavail
How many times the server became unavailable for client connections (state “unavail”) due to the number of unsuccessful attempts reaching the max_fails threshold.

health_checks
checks
The total number of health check requests made.

fails
The number of failed health checks.

unhealthy
How many times the server became unhealthy (state “unhealthy”).

last_passed
Boolean indicating if the last health check request was successful and passed tests.

downtime
Total time the server was in the “unavail”, “checking”, and “unhealthy” states.

downtart
The time (in milliseconds since Epoch) when the server became “unavail”, “checking”, or “unhealthy”.

selected
The time (in milliseconds since Epoch) when the server was last selected to process a connection.

zombies
The current number of servers removed from the group but still processing active client connections.

zone
The name of the shared memory zone that keeps the group’s configuration and run-time state.
2.50.5 Compatibility

- The `zone` field in `http` and `stream` upstreams was added in version 8.
- The `slabs` status data were added in version 8.
- The `checking` state was added in version 8.
- The `name` and `service` fields in `http` and `stream` upstreams were added in version 8.
- The `nginx_build` and `ppid` fields were added in version 8.
- The `sessions` status data and the `discarded` field in `stream server_zones` were added in version 7.
- The `zombies` field was moved from `nginx debug` version in version 6.
- The `ssl` status data were added in version 6.
- The `discarded` field in `server_zones` was added in version 6.
- The `queue` status data were added in version 6.
- The `pid` field was added in version 6.
- The list of servers in `upstreams` was moved into `peers` in version 6.
- The `keepalive` field of an upstream server was removed in version 5.
- The `stream` status data were added in version 5.
- The `generation` field was added in version 5.
- The `respawned` field in `processes` was added in version 5.
- The `header_time` and `response_time` fields in `upstreams` were added in version 5.
- The `selected` field in `upstreams` was added in version 4.
- The `draining` state in `upstreams` was added in version 4.
- The `id` and `max_conns` fields in `upstreams` were added in version 3.
- The `revalidated` field in `caches` was added in version 3.
- The `server_zones`, `caches`, and `load_timestamp` status data were added in version 2.
2.51 Module ngx_http_stub_status_module

2.51.1 Summary

The ngx_http_stub_status_module module provides access to basic status information.

This module is not built by default, it should be enabled with the --with-http_stub_status_module configuration parameter.

2.51.2 Example Configuration

```nginx
location = /basic_status {
    stub_status;
}
```

This configuration creates a simple web page with basic status data which may look like as follows:

```
Active connections: 291
server accepts handled requests
16630948 16630948 31070465
Reading: 6 Writing: 179 Waiting: 106
```

2.51.3 Directives

**stub_status**

```
Syntax: stub_status;
Default —
Context: server, location
```

The basic status information will be accessible from the surrounding location.

In versions prior to 1.7.5, the directive syntax required an arbitrary argument, for example, “stub_status on”.

Nginx, Inc. p.334 of 542
2.51.4 Data

The following status information is provided:

- **Active connections**
  - The current number of active client connections including Waiting connections.
- **accepts**
  - The total number of accepted client connections.
- **handled**
  - The total number of handled connections. Generally, the parameter value is the same as accepts unless some resource limits have been reached (for example, the worker_connections limit).
- **requests**
  - The total number of client requests.
- **Reading**
  - The current number of connections where nginx is reading the request header.
- **Writing**
  - The current number of connections where nginx is writing the response back to the client.
- **Waiting**
  - The current number of idle client connections waiting for a request.

2.51.5 Embedded Variables

The ngx_http_stub_status_module module supports the following embedded variables (1.3.14):

- **$connections_active**
  - same as the Active connections value;
- **$connections_reading**
  - same as the Reading value;
- **$connections-writing**
  - same as the Writing value;
- **$connections_waiting**
  - same as the Waiting value.
2.52 Module ngx_http_sub_module

2.52.1 Summary

The ngx_http_sub_module module is a filter that modifies a response by replacing one specified string by another.
This module is not built by default, it should be enabled with the --with-http_sub_module configuration parameter.

2.52.2 Example Configuration

```conf
location / {
    sub_filter '<a href="http://127.0.0.1:8080/"' '<a href="https://$host/";
    sub_filter '<img src="http://127.0.0.1:8080/"' '<img src="https://$host/";
    sub_filter_once on;
}
```

2.52.3 Directives

**sub_filter**

**Syntax:** `sub_filter string replacement;`

**Default:** —

**Context:** http, server, location

Sets a string to replace and a replacement string. The string to replace is matched ignoring the case. The string to replace (1.9.4) and replacement string can contain variables. Several `sub_filter` directives can be specified on the same configuration level (1.9.4). These directives are inherited from the previous configuration level if and only if there are no `sub_filter` directives defined on the current level.

**sub_filter_last_modified**

**Syntax:** `sub_filter_last_modified on | off;`

**Default:** `off`

**Context:** http, server, location

This directive appeared in version 1.5.1.

Allows preserving the Last-Modified header field from the original response during replacement to facilitate response caching.
By default, the header field is removed as contents of the response are modified during processing.

**sub_filter_once**

Syntax: `sub_filter_once on | off;`

Default: `on`

Context: `http, server, location`

Indicates whether to look for each string to replace once or repeatedly.

**sub_filter_types**

Syntax: `sub_filter_types mime-type ...;`

Default: `text/html`

Context: `http, server, location`

Enables string replacement in responses with the specified MIME types in addition to "text/html". The special value "*" matches any MIME type (0.8.29).
2.53 Module ngx_http_upstream_module

2.53.1 Summary

The ngx_http_upstream_module module is used to define groups of servers that can be referenced by the `proxy_pass`, `fastcgi_pass`, `uwsgi_pass`, `scgi_pass`, `memcached_pass`, and `grpc_pass` directives.

2.53.2 Example Configuration

```nginx
upstream backend {
    server backend1.example.com weight=5;
    server backend2.example.com:8080;
    server unix:/tmp/backend3;
    server backup1.example.com:8080 backup;
    server backup2.example.com:8080 backup;
}

server {
    location / {
        proxy_pass http://backend;
    }
}
```

Dynamically configurable group with periodic health checks is available as part of our commercial subscription:
resolver 10.0.0.1;

upstream dynamic {
    zone upstream_dynamic 64k;
    server backend1.example.com weight=5;
    server backend2.example.com:8080 fail_timeout=5s slow_start=30s;
    server 192.0.2.1 max_fails=3;
    server backend3.example.com resolve;
    server backend4.example.com service=http resolve;
    server backup1.example.com:8080 backup;
    server backup2.example.com:8080 backup;
}

server {
    location / {
        proxy_pass http://dynamic;
        health_check;
    }
}

2.53.3 Directives

upstream

**Syntax:** upstream name {...}

**Default** — Context: http

Defines a group of servers. Servers can listen on different ports. In addition, servers listening on TCP and UNIX-domain sockets can be mixed.

**Example:**

```yaml
upstream backend {
    server backend1.example.com weight=5;
    server 127.0.0.1:8080 max_fails=3 fail_timeout=30s;
    server unix:/tmp/backend3;
    server backend2.example.com:8080 backup;
    server backup1.example.com:8080 backup;
}
```

By default, requests are distributed between the servers using a weighted round-robin balancing method. In the above example, each 7 requests will be distributed as follows: 5 requests go to backend1.example.com and one request to each of the second and third servers. If an error occurs during communication with a server, the request will be passed to the next server, and so on until all of the functioning servers will be tried. If a successful response could not be obtained from any of the servers, the client will receive the result of the communication with the last server.

server

**Syntax:** server address [parameters];

**Default** — Context: upstream
Defines the address and other parameters of a server. The address can be specified as a domain name or IP address, with an optional port, or as a UNIX-domain socket path specified after the “unix:” prefix. If a port is not specified, the port 80 is used. A domain name that resolves to several IP addresses defines multiple servers at once.

The following parameters can be defined:

- **weight** = *number*
  sets the weight of the server, by default, 1.

- **max_conns** = *number*
  limits the maximum number of simultaneous active connections to the proxied server (1.11.5). Default value is zero, meaning there is no limit. If the server group does not reside in the shared memory, the limitation works per each worker process.

  If idle keepalive connections, multiple workers, and the shared memory are enabled, the total number of active and idle connections to the proxied server may exceed the max_conns value.

  Since version 1.5.9 and prior to version 1.11.5, this parameter was available as part of our commercial subscription.

- **max_fails** = *number*
  sets the number of unsuccessful attempts to communicate with the server that should happen in the duration set by the fail_timeout parameter to consider the server unavailable for a duration also set by the fail_timeout parameter. By default, the number of unsuccessful attempts is set to 1. The zero value disables the accounting of attempts. What is considered an unsuccessful attempt is defined by the proxy_next_upstream, fastcgi_next_upstream, uwsgi_next_upstream, scgi_next_upstream, memcached_next_upstream, and grpc_next_upstream directives.

- **fail_timeout** = *time*
  sets
  - the time during which the specified number of unsuccessful attempts to communicate with the server should happen to consider the server unavailable;
  - and the period of time the server will be considered unavailable.

  By default, the parameter is set to 10 seconds.

- **backup**
  marks the server as a backup server. It will be passed requests when the primary servers are unavailable.
The parameter cannot be used along with the hash, ip_hash, and random load balancing methods.

down
marksthe server as permanently unavailable.

Additionally, the following parameters are available as part of our commercial subscription:

resolve
monitors changes of the IP addresses that correspond to a domain name of the server, and automatically modifies the upstream configuration without the need of restarting nginx (1.5.12). The server group must reside in the shared memory.
In order for this parameter to work, the resolver directive must be specified in the http block or in the corresponding upstream block.

route=string
sets the server route name.

service=name
enables resolving of DNS SRV records and sets the service name (1.9.13). In order for this parameter to work, it is necessary to specify the resolve parameter for the server and specify a hostname without a port number. If the service name does not contain a dot ("."), then the RFC-compliant name is constructed and the TCP protocol is added to the service prefix. For example, to look up the _http._tcp.backend.example.com SRV record, it is necessary to specify the directive:

```sh
server backend.example.com service=http resolve;
```

If the service name contains one or more dots, then the name is constructed by joining the service prefix and the server name. For example, to look up the _http._tcp.backend.example.com and server1.backend.example.com SRV records, it is necessary to specify the directives:

```sh
server backend.example.com service=_http._tcp resolve;
service example.com service=server1.backend resolve;
```

Highest-priority SRV records (records with the same lowest-number priority value) are resolved as primary servers, the rest of SRV records are resolved as backup servers. If the backup parameter is specified for the server, high-priority SRV records are resolved as backup servers, the rest of SRV records are ignored.

slow_start=time
sets the time during which the server will recover its weight from zero to a nominal value, when unhealthy server becomes healthy, or when the server becomes available after a period of time it was considered unavailable. Default value is zero, i.e. slow start is disabled.
The parameter cannot be used along with the hash, ip_hash, and random load balancing methods.

**drain**

puts the server into the “draining” mode (1.13.6). In this mode, only requests bound to the server will be proxied to it.

Prior to version 1.13.6, the parameter could be changed only with the API module.

If there is only a single server in a group, max_fails, fail_timeout and slow_start parameters are ignored, and such a server will never be considered unavailable.

**zone**

**Syntax:** `zone name [size];`

**Default** —

**Context:** upstream

This directive appeared in version 1.9.0.

Defines the name and size of the shared memory zone that keeps the group’s configuration and run-time state that are shared between worker processes. Several groups may share the same zone. In this case, it is enough to specify the size only once.

Additionally, as part of our commercial subscription, such groups allow changing the group membership or modifying the settings of a particular server without the need of restarting nginx. The configuration is accessible via the API module (1.13.3).

Prior to version 1.13.3, the configuration was accessible only via a special location handled by `upstream_conf`.

**state**

**Syntax:** `state file;`

**Default** —

**Context:** upstream

This directive appeared in version 1.9.7.

Specifies a file that keeps the state of the dynamically configurable group. Examples:

```
state /var/lib/nginx/state/servers.conf;  # path for Linux
state /var/db/nginx/state/servers.conf;  # path for FreeBSD
```

The state is currently limited to the list of servers with their parameters. The file is read when parsing the configuration and is updated each time the
upstream configuration is changed. Changing the file content directly should be avoided. The directive cannot be used along with the server directive.

Changes made during configuration reload or binary upgrade can be lost.

This directive is available as part of our commercial subscription.

hash

Syntax:  hash key [consistent];
Default  —
Context:  upstream
This directive appeared in version 1.7.2.

Specifies a load balancing method for a server group where the client-server mapping is based on the hashed key value. The key can contain text, variables, and their combinations. Note that adding or removing a server from the group may result in remapping most of the keys to different servers. The method is compatible with the Cache::Memcached Perl library.

If the consistent parameter is specified, the ketama consistent hashing method will be used instead. The method ensures that only a few keys will be remapped to different servers when a server is added to or removed from the group. This helps to achieve a higher cache hit ratio for caching servers. The method is compatible with the Cache::Memcached::Fast Perl library with the ketama_points parameter set to 160.

ip_hash

Syntax:  ip_hash;
Default  —
Context:  upstream

Specifies that a group should use a load balancing method where requests are distributed between servers based on client IP addresses. The first three octets of the client IPv4 address, or the entire IPv6 address, are used as a hashing key. The method ensures that requests from the same client will always be passed to the same server except when this server is unavailable. In the latter case client requests will be passed to another server. Most probably, it will always be the same server as well.

IPv6 addresses are supported starting from versions 1.3.2 and 1.2.2.

If one of the servers needs to be temporarily removed, it should be marked with the down parameter in order to preserve the current hashing of client IP addresses.

Example:
upstream backend {
    ip_hash;
    server backend1.example.com;
    server backend2.example.com;
    server backend3.example.com down;
    server backend4.example.com;
}

Until versions 1.3.1 and 1.2.2, it was not possible to specify a weight for servers using the ip_hash load balancing method.

keepalive

Syntax: keepalive connections;

Default —

Context: upstream

This directive appeared in version 1.1.4.

Activates the cache for connections to upstream servers.

The connections parameter sets the maximum number of idle keepalive connections to upstream servers that are preserved in the cache of each worker process. When this number is exceeded, the least recently used connections are closed.

It should be particularly noted that the keepalive directive does not limit the total number of connections to upstream servers that an nginx worker process can open. The connections parameter should be set to a number small enough to let upstream servers process new incoming connections as well.

When using load balancing methods other than the default round-robin method, it is necessary to activate them before the keepalive directive.

Example configuration of memcached upstream with keepalive connections:

upstream memcached_backend {
    server 127.0.0.1:11211;
    server 10.0.0.2:11211;
        keepalive 32;
}

to server {
    ...}

    location /memcached/ {
        set $memcached_key $uri;
        memcached_pass memcached_backend;
    }
}

Nginx, Inc.
For HTTP, the `proxy_http_version` directive should be set to “1.1” and the Connection header field should be cleared:

```plaintext
upstream http_backend {
    server 127.0.0.1:8080;
    keepalive 16;
}
server {
    ...
    location /http/ {
        proxy_pass http://http_backend;
        proxy_http_version 1.1;
        proxy_set_header Connection "";
        ...
    }
}
```

Alternatively, HTTP/1.0 persistent connections can be used by passing the Connection: Keep-Alive header field to an upstream server, though this method is not recommended.

For FastCGI servers, it is required to set `fastcgi_keep_conn` for keepalive connections to work:

```plaintext
upstream fastcgi_backend {
    server 127.0.0.1:9000;
    keepalive 8;
}
server {
    ...
    location /fastcgi/ {
        fastcgi_pass fastcgi_backend;
        fastcgi_keep_conn on;
        ...
    }
}
```

SCGI and uwsgi protocols do not have a notion of keepalive connections.

**keepalive_requests**

**Syntax:** `keepalive_requests number;`

**Default:** 1000

**Context:** upstream

This directive appeared in version 1.15.3.

Sets the maximum number of requests that can be served through one keepalive connection. After the maximum number of requests is made, the connection is closed.
Closing connections periodically is necessary to free per-connection memory allocations. Therefore, using too high maximum number of requests could result in excessive memory usage and not recommended.

Prior to version 1.19.10, the default value was 100.

**keepalive_time**

**Syntax:** `keepalive_time time;`

**Default:** 1h

**Context:** upstream

This directive appeared in version 1.19.10.

Limits the maximum time during which requests can be processed through one keepalive connection. After this time is reached, the connection is closed following the subsequent request processing.

**keepalive_timeout**

**Syntax:** `keepalive_timeout timeout;`

**Default:** 60s

**Context:** upstream

This directive appeared in version 1.15.3.

Sets a timeout during which an idle keepalive connection to an upstream server will stay open.

**ntlm**

**Syntax:** `ntlm;`

**Default:** —

**Context:** upstream

This directive appeared in version 1.9.2.

Allows proxying requests with **NTLM Authentication**. The upstream connection is bound to the client connection once the client sends a request with the Authorization header field value starting with “Negotiate” or “NTLM”. Further client requests will be proxied through the same upstream connection, keeping the authentication context.

In order for NTLM authentication to work, it is necessary to enable keepalive connections to upstream servers. The `proxy_http_version` directive should be set to “1.1” and the `Connection` header field should be cleared:

```
upstream http_backend {
  server 127.0.0.1:8080;
  ntlm;
}
server {
  ...
```
When using load balancer methods other than the default round-robin method, it is necessary to activate them before the `ntlm` directive.

This directive is available as part of our commercial subscription.

**least_conn**

**Syntax:** `least_conn;`

**Default** —

**Context:** upstream

This directive appeared in versions 1.3.1 and 1.2.2.

Specifies that a group should use a load balancing method where a request is passed to the server with the least number of active connections, taking into account weights of servers. If there are several such servers, they are tried in turn using a weighted round-robin balancing method.

**least_time**

**Syntax:** `least_time header | last_byte [inflight];`

**Default** —

**Context:** upstream

This directive appeared in version 1.7.10.

Specifies that a group should use a load balancing method where a request is passed to the server with the least average response time and least number of active connections, taking into account weights of servers. If there are several such servers, they are tried in turn using a weighted round-robin balancing method.

If the `header` parameter is specified, time to receive the response header is used. If the `last_byte` parameter is specified, time to receive the full response is used. If the `inflight` parameter is specified (1.11.6), incomplete requests are also taken into account.

Prior to version 1.11.6, incomplete requests were taken into account by default.

This directive is available as part of our commercial subscription.
queue

**Syntax:**  queue number [timeout=time];
**Default** —
**Context:** upstream

This directive appeared in version 1.5.12.

If an upstream server cannot be selected immediately while processing a request, the request will be placed into the queue. The directive specifies the maximum number of requests that can be in the queue at the same time. If the queue is filled up, or the server to pass the request to cannot be selected within the time period specified in the timeout parameter, the 502 Bad Gateway error will be returned to the client.

The default value of the timeout parameter is 60 seconds.

When using load balancer methods other than the default round-robin method, it is necessary to activate them before the queue directive.

This directive is available as part of our commercial subscription.

random

**Syntax:**  random [two [method]];
**Default** —
**Context:** upstream

This directive appeared in version 1.15.1.

Specifies that a group should use a load balancing method where a request is passed to a randomly selected server, taking into account weights of servers.

The optional two parameter instructs nginx to randomly select two servers and then choose a server using the specified method. The default method is least_conn which passes a request to a server with the least number of active connections.

The least_time method passes a request to a server with the least average response time and least number of active connections. If least_time=header is specified, the time to receive the response header is used. If least_time=last_byte is specified, the time to receive the full response is used.

The least_time method is available as a part of our commercial subscription.

resolver

**Syntax:**  resolver address ... [valid=time] [ipv4=on|off] [ipv6=on|off]
[status_zone=zone];
**Default** —
**Context:** upstream

Nginx, Inc.  p.348 of 542
This directive appeared in version 1.17.5.

Configures name servers used to resolve names of upstream servers into addresses, for example:

```
resolver 127.0.0.1 [::1]:5353;
```

The address can be specified as a domain name or IP address, with an optional port. If port is not specified, the port 53 is used. Name servers are queried in a round-robin fashion.

By default, nginx will look up both IPv4 and IPv6 addresses while resolving. If looking up of IPv4 or IPv6 addresses is not desired, the `ipv4=off` (1.23.1) or the `ipv6=off` parameter can be specified.

By default, nginx caches answers using the TTL value of a response. An optional valid parameter allows overriding it:

```
resolver 127.0.0.1 [::1]:5353 valid=30s;
```

To prevent DNS spoofing, it is recommended configuring DNS servers in a properly secured trusted local network.

The optional `status_zone` parameter enables collection of DNS server statistics of requests and responses in the specified `zone`.

This directive is available as part of our commercial subscription.

### resolver_timeout

**Syntax:** `resolver_timeout time;`

**Default:** 30s

**Context:** `upstream`

This directive appeared in version 1.17.5.

Sets a timeout for name resolution, for example:

```
resolver_timeout 5s;
```

This directive is available as part of our commercial subscription.

### sticky

**Syntax:**

```
sticky cookie name [expires=time] [domain=domain] [httponly] [samesite=strict|lax|none] [$variable] [secure] [path=path];
sticky route $variable ...;
sticky learn create=$variable lookup=$variable zone=name:size [timeout=time] [header] [sync];
```

**Default:** —

**Context:** `upstream`
This directive appeared in version 1.5.7.

Enables session affinity, which causes requests from the same client to be passed to the same server in a group of servers. Three methods are available:

**cookie**

When the `cookie` method is used, information about the designated server is passed in an HTTP cookie generated by Nginx:

```
upstream backend {
    server backend1.example.com;
    server backend2.example.com;
    sticky cookie srv_id expires=1h domain=.example.com path=/;
}
```

A request that comes from a client not yet bound to a particular server is passed to the server selected by the configured balancing method. Further requests with this cookie will be passed to the designated server. If the designated server cannot process a request, the new server is selected as if the client has not been bound yet.

As a load balancing method always tries to evenly distribute the load considering already bound requests, the server with a higher number of active bound requests has less possibility of getting new unbound requests.

The first parameter sets the name of the cookie to be set or inspected. The cookie value is a hexadecimal representation of the MD5 hash of the IP address and port, or of the UNIX-domain socket path. However, if the “route” parameter of the `server` directive is specified, the cookie value will be the value of the “route” parameter:

```
upstream backend {
    server backend1.example.com route=a;
    server backend2.example.com route=b;
    sticky cookie srv_id expires=1h domain=.example.com path=/;
}
```

In this case, the value of the “srv_id” cookie will be either a or b.

Additional parameters may be as follows:

**expires=time**

Sets the time for which a browser should keep the cookie. The special value `max` will cause the cookie to expire on “31 Dec 2037 23:55:55 GMT”. If the parameter is not specified, it will cause the cookie to expire at the end of a browser session.

**domain=domain**

Defines the domain for which the cookie is set. Parameter value can contain variables (1.11.5).
httponly
   Adds the HttpOnly attribute to the cookie (1.7.11).

samesite=strict | lax | none | $variable
   Adds the SameSite (1.19.4) attribute to the cookie with one of the
   following values: Strict, Lax, None, or using variables (1.23.3).
   In the latter case, if the variable value is empty, the SameSite
   attribute will not be added to the cookie, if the value is resolved to
   Strict, Lax, or None, the corresponding value will be assigned,
   otherwise the Strict value will be assigned.

secure
   Adds the Secure attribute to the cookie (1.7.11).

path=path
   Defines the path for which the cookie is set.

If any parameters are omitted, the corresponding cookie fields are not
set.

route
   When the route method is used, proxied server assigns client a route
on receipt of the first request. All subsequent requests from this client
will carry routing information in a cookie or URI. This information
is compared with the “route” parameter of the server directive to
identify the server to which the request should be proxied. If the
“route” parameter is not specified, the route name will be a hexadecimal
representation of the MD5 hash of the IP address and port, or of the
UNIX-domain socket path. If the designated server cannot process a
request, the new server is selected by the configured balancing method
as if there is no routing information in the request.

The parameters of the route method specify variables that may contain
routing information. The first non-empty variable is used to find the
matching server.

Example:

```bash
map $cookie_jsessionid $route_cookie {
   ~+.\.(?P<route>\w+)$ $route;
}

map $request_uri $route_uri {
   ~jsessionid=.\.(?P<route>\w+)$ $route;
}

upstream backend {
   server backend1.example.com route=a;
   server backend2.example.com route=b;

   sticky route $route_cookie $route_uri;
}
```

Here, the route is taken from the “JSESSIONID” cookie if present in a
request. Otherwise, the route from the URI is used.

learn
   When the learn method (1.7.1) is used, nginx analyzes upstream server
responses and learns server-initiated sessions usually passed in an HTTP
cookie.

```
upstream backend {
    server backend1.example.com:8080;
    server backend2.example.com:8081;
    sticky learn
        create=$upstream_cookie_examplecookie
        lookup=$cookie_examplecookie
        zone=client_sessions:1m;
}
```

In the example, the upstream server creates a session by setting the cookie "EXAMPLECOOKIE" in the response. Further requests with this cookie will be passed to the same server. If the server cannot process the request, the new server is selected as if the client has not been bound yet.

The parameters `create` and `lookup` specify variables that indicate how new sessions are created and existing sessions are searched, respectively. Both parameters may be specified more than once, in which case the first non-empty variable is used.

Sessions are stored in a shared memory zone, whose `name` and `size` are configured by the `zone` parameter. One megabyte zone can store about 4000 sessions on the 64-bit platform. The sessions that are not accessed during the time specified by the `timeout` parameter get removed from the zone. By default, `timeout` is set to 10 minutes.

The `header` parameter (1.13.1) allows creating a session right after receiving response headers from the upstream server.

The `sync` parameter (1.13.8) enables synchronization of the shared memory zone.

This directive is available as part of our commercial subscription.

`sticky_cookie_insert`

Syntax: 
```
sticky_cookie_insert name [expires=time] [domain=domain] [path=path];
```

Default —

Context: `upstream`

This directive is obsolete since version 1.5.7. An equivalent `sticky` directive with a new syntax should be used instead:

```
sticky cookie name [expires=time] [domain=domain] [path=path];
```

### 2.53.4 Embedded Variables

The `ngx_http_upstream_module` module supports the following embedded variables:
**$upstream_addr**

keeps the IP address and port, or the path to the UNIX-domain socket of the upstream server. If several servers were contacted during request processing, their addresses are separated by commas, e.g. “192.168.1.1:80, 192.168.1.2:80, unix:/tmp/sock”. If an internal redirect from one server group to another happens, initiated by X-Accel-Redirect or error_page, then the server addresses from different groups are separated by colons, e.g. “192.168.1.1:80, 192.168.1.2:80, unix:/tmp/sock : 192.168.10.1:80, 192.168.10.2:80”. If a server cannot be selected, the variable keeps the name of the server group.

**$upstream_bytes_received**

number of bytes received from an upstream server (1.11.4). Values from several connections are separated by commas and colons like addresses in the $upstream_addr variable.

**$upstream_bytes_sent**

number of bytes sent to an upstream server (1.15.8). Values from several connections are separated by commas and colons like addresses in the $upstream_addr variable.

**$upstream_cache_status**

keeps the status of accessing a response cache (0.8.3). The status can be either “MISS”, “BYPASS”, “EXPIRED”, “STALE”, “UPDATING”, “REVALIDATED”, or “HIT”.

**$upstream_connect_time**

keeps time spent on establishing a connection with the upstream server (1.9.1); the time is kept in seconds with millisecond resolution. In case of SSL, includes time spent on handshake. Times of several connections are separated by commas and colons like addresses in the $upstream_addr variable.

**$upstream_cookie_name**

cookie with the specified name sent by the upstream server in the Set-Cookie response header field (1.7.1). Only the cookies from the response of the last server are saved.

**$upstream_header_time**

keeps time spent on receiving the response header from the upstream server (1.7.10); the time is kept in seconds with millisecond resolution. Times of several responses are separated by commas and colons like addresses in the $upstream_addr variable.

**$upstream_http_name**

keep server response header fields. For example, the Server response header field is available through the $upstream_http_server variable. The rules of converting header field names to variable names are the same as for the variables that start with the “$http_” prefix. Only the header fields from the response of the last server are saved.

**$upstream_queue_time**

keeps time the request spent in the upstream queue (1.13.9); the time is
kept in seconds with millisecond resolution. Times of several responses are separated by commas and colons like addresses in the $upstream_addr variable.

$upstream_response_length
keeps the length of the response obtained from the upstream server (0.7.27); the length is kept in bytes. Lengths of several responses are separated by commas and colons like addresses in the $upstream_addr variable.

$upstream_response_time
keeps time spent on receiving the response from the upstream server; the time is kept in seconds with millisecond resolution. Times of several responses are separated by commas and colons like addresses in the $upstream_addr variable.

$upstream_status
keeps status code of the response obtained from the upstream server. Status codes of several responses are separated by commas and colons like addresses in the $upstream_addr variable. If a server cannot be selected, the variable keeps the 502 Bad Gateway status code.

$upstream_trailer_name
keeps fields from the end of the response obtained from the upstream server (1.13.10).
2.54 Module ngx_http_upstream_conf_module

2.54.1 Summary

The ngx_http_upstream_conf_module module allows configuring upstream server groups on-the-fly via a simple HTTP interface without the need of restarting nginx. The http or stream server group must reside in the shared memory.

This module was available as part of our commercial subscription until 1.13.10. It was superseded by the ngx_http_api_module module in 1.13.3.

2.54.2 Example Configuration

```plaintext
upstream backend {
  zone upstream_backend 64k;
  ...
}

server {
  location /upstream_conf {
    upstream_conf;
    allow 127.0.0.1;
    deny all;
  }
}
```

2.54.3 Directives

upstream_conf

Syntax: upstream_conf;

Default —

Context: location

Turns on the HTTP interface of upstream configuration in the surrounding location. Access to this location should be limited.

Configuration commands can be used to:

- view the group configuration;
- view, modify, or remove a server;
- add a new server.
Since addresses in a group are not required to be unique, specific servers in a group are referenced by their IDs. IDs are assigned automatically and shown when adding a new server or viewing the group configuration.

A configuration command consists of parameters passed as request arguments, for example:

```
http://127.0.0.1/upstream_conf?upstream=backend
```

The following parameters are supported:

**stream=**
Selects a stream upstream server group. Without this parameter, selects an http upstream server group.

**upstream=** *name*
Selects a group to work with. This parameter is mandatory.

**id=** *number*
Selects a server for viewing, modifying, or removing.

**remove=**
Removes a server from the group.

**add=**
Adds a new server to the group.

**backup=**
Required to add a backup server.

Before version 1.7.2, backup= was also required to view, modify, or remove existing backup servers.

**server=** *address*
Same as the “address” parameter of the http or stream upstream server. When adding a server, it is possible to specify it as a domain name. In this case, changes of the IP addresses that correspond to a domain name will be monitored and automatically applied to the upstream configuration without the need of restarting nginx (1.7.2). This requires the “resolver” directive in the http or stream block. See also the “resolve” parameter of the http or stream upstream server.

**service=** *name*
Same as the “service” parameter of the http or stream upstream server (1.9.13).

**weight=** *number*
Same as the “weight” parameter of the http or stream upstream server.

**max_conns=** *number*
Same as the “max_conns” parameter of the http or stream upstream server.

**max_fails=** *number*
Same as the “max_fails” parameter of the http or stream upstream server.
fail_timeout = \texttt{time}
Same as the “fail_timeout” parameter of the \texttt{http} or \texttt{stream} upstream server.

slow_start = \texttt{time}
Same as the “slow_start” parameter of the \texttt{http} or \texttt{stream} upstream server.

down =
Same as the “down” parameter of the \texttt{http} or \texttt{stream} upstream server.

drain =
Puts the \texttt{http} upstream server into the “draining” mode (1.7.5). In this mode, only requests \texttt{bound} to the server will be proxied to it.

up =
The opposite of the “down” parameter of the \texttt{http} or \texttt{stream} upstream server.

route = \texttt{string}
Same as the “route” parameter of the \texttt{http} upstream server.

The first three parameters select an object. This can be either the whole \texttt{http} or \texttt{stream} upstream server group, or a specific server. Without other parameters, the configuration of the selected group or server is shown.

For example, to view the configuration of the whole group, send:

\begin{verbatim}
http://127.0.0.1/upstream_conf?upstream=backend
\end{verbatim}

To view the configuration of a specific server, also specify its ID:

\begin{verbatim}
http://127.0.0.1/upstream_conf?upstream=backend&id=42
\end{verbatim}

To add a new server, specify its address in the “server=” parameter. Without other parameters specified, a server will be added with other parameters set to their default values (see the \texttt{http} or \texttt{stream “server” directive}).

For example, to add a new primary server, send:

\begin{verbatim}
http://127.0.0.1/upstream_conf?add=&upstream=backend&server=127.0.0.1:8080
\end{verbatim}

To add a new backup server, send:

\begin{verbatim}
http://127.0.0.1/upstream_conf?add=&upstream=backend&backup=&server=127.0.0.1:8080
\end{verbatim}

To add a new primary server, set its parameters to non-default values and mark it as “down”, send:

\begin{verbatim}
http://127.0.0.1/upstream_conf?add=&upstream=backend&server=127.0.0.1:8080&weight=2&down=
\end{verbatim}

To remove a server, specify its ID:
http://127.0.0.1/upstream_conf?remove=&upstream=backend&id=42

To mark an existing server as “down”, send:

http://127.0.0.1/upstream_conf?upstream=backend&id=42&down=

To modify the address of an existing server, send:

http://127.0.0.1/upstream_conf?upstream=backend&id=42&server=192.0.2.3:8123

To modify other parameters of an existing server, send:

http://127.0.0.1/upstream_conf?upstream=backend&id=42&max_fails=3&weight=4

The above examples are for an http upstream server group. Similar examples for a stream upstream server group require the “stream=” parameter.
Module \texttt{ngx\_http\_upstream\_hc\_module}

\subsection{Summary}

The \texttt{ngx\_http\_upstream\_hc\_module} module allows enabling periodic health checks of the servers in a \texttt{group} referenced in the surrounding location. The server group must reside in the \texttt{shared memory}.

If a health check fails, the server will be considered unhealthy. If several health checks are defined for the same group of servers, a single failure of any check will make the corresponding server be considered unhealthy. Client requests are not passed to unhealthy servers and servers in the “checking” state.

Please note that most of the variables will have empty values when used with health checks.

This module is available as part of our \texttt{commercial subscription}.

\subsection{Example Configuration}

\begin{verbatim}
upstream dynamic {
    zone upstream_dynamic 64k;
    server backend1.example.com weight=5;
    server backend2.example.com:8080 fail_timeout=5s slow_start=30s;
    server 192.0.2.1 max_fails=3;
    server backup1.example.com:8080 backup;
    server backup2.example.com:8080 backup;
}

server {
    location / {
        proxy_pass http://dynamic;
        health_check;
    }
}
\end{verbatim}

With this configuration, \texttt{nginx} will send “/” requests to each server in the \texttt{backend} group every five seconds. If any communication error or timeout occurs, or a proxied server responds with the status code other than 2xx or 3xx, the health check will fail, and the server will be considered unhealthy.

Health checks can be configured to test the status code of a response, presence of certain header fields and their values, and the body contents. Tests are configured separately using the \texttt{match} directive and referenced in the \texttt{match} parameter of the \texttt{health\_check} directive:
This configuration shows that in order for a health check to pass, the response to a health check request should succeed, have status 200, and contain “Welcome to nginx!” in the body.

### 2.55.3 Directives

**health_check**

**Syntax:**

```
health_check [parameters];
```

**Default** —

**Context:** location

Enables periodic health checks of the servers in a group referenced in the surrounding location.

The following optional parameters are supported:

- **interval=time**
  - sets the interval between two consecutive health checks, by default, 5 seconds.
- **jitter=time**
  - sets the time within which each health check will be randomly delayed, by default, there is no delay.
- **fails=number**
  - sets the number of consecutive failed health checks of a particular server after which this server will be considered unhealthy, by default, 1.
- **passes=number**
  - sets the number of consecutive passed health checks of a particular server after which the server will be considered healthy, by default, 1.
- **uri=uri**
  - defines the URI used in health check requests, by default, “/”.
- **mandatory [persistent]**
  - sets the initial “checking” state for a server until the first health check is completed (1.11.7). Client requests are not passed to servers in the “checking” state. If the parameter is not specified, the server will be initially considered healthy.
The persistent parameter (1.19.7) sets the initial “up” state for a server after reload if the server was considered healthy before reload.

**match**=*name*

specifies the match block configuring the tests that a response should pass in order for a health check to pass. By default, the response should have status code 2xx or 3xx.

**port**=*number*

defines the port used when connecting to a server to perform a health check (1.9.7). By default, equals the server port.

**type**=*grpc* [*grpc_service*=*name*] [*grpc_status*=*code*]

enables periodic health checks of a gRPC server or a particular gRPC service specified with the optional *grpc_service* parameter (1.19.5). If the server does not support the gRPC Health Checking Protocol, the optional *grpc_status* parameter can be used to specify non-zero gRPC status (for example, status code “12” / “UNIMPLEMENTED”) that will be treated as healthy:

```plaintext
health_check mandatory type=grpc grpc_status=12;
```

The *type*=*grpc* parameter must be specified after all other directive parameters, *grpc_service* and *grpc_status* must follow *type*=*grpc*. The parameter is not compatible with *uri* or *match* parameters.

**keepalive_time**=*time*

enables keepalive connections for health checks and specifies the time during which requests can be processed through one keepalive connection (1.21.7). By default keepalive connections are disabled.

### match

**Syntax:**  
`match name { ... }`

**Default** —

**Context:** http

Defines the named test set used to verify responses to health check requests. The following items can be tested in a response:

```plaintext
status 200;
  status is 200
status ! 500;
  status is not 500
status 200 204;
  status is 200 or 204
status ! 301 302;
  status is neither 301 nor 302
status 200-399;
  status is in the range from 200 to 399
```
status ! 400-599;
status is not in the range from 400 to 599
status 301-303 307;
status is either 301, 302, 303, or 307

header Content-Type = text/html;
header contains Content-Type with value text/html
header Content-Type != text/html;
header contains Content-Type with value other than text/html
header Connection ~ close;
header contains Connection with value matching regular expression close
header Connection !~ close;
header contains Connection with value not matching regular expression close
header Host;
header contains Host
header ! X-Accel-Redirect;
header lacks X-Accel-Redirect

body ~ "Welcome to nginx!";
body matches regular expression “Welcome to nginx!”
body !~ "Welcome to nginx!";
body does not match regular expression “Welcome to nginx!”

require $variable ...;
all specified variables are not empty and not equal to “0” (1.15.9).

If several tests are specified, the response matches only if it matches all tests.

Only the first 256k of the response body are examined.

Examples:

```perl
# status is 200, content type is "text/html",
# and body contains "Welcome to nginx!"
match welcome {
  status 200;
  header Content-Type = text/html;
  body ~ "Welcome to nginx!";
}

# status is not one of 301, 302, 303, or 307, and header does not have "Refresh :
match not_redirect {
  status ! 301-303 307;
  header ! Refresh;
}
```
# status ok and not in maintenance mode
match server_ok {
    status 200-399;
    body !~ "maintenance mode";
}

# status is 200 or 204
map $upstream_status $good_status {
    200 1;
    204 1;
}

match server_ok {
    require $good_status;
}
2.56 Module ngx_http_userid_module

2.56.1 Summary

The ngx_http_userid_module module sets cookies suitable for client identification. Received and set cookies can be logged using the embedded variables $uid\_got and $uid\_set. This module is compatible with the mod_uid module for Apache.

2.56.2 Example Configuration

```
userid on;
userid_name uid;
userid_domain example.com;
userid_path /;
userid_expires 365d;
userid_p3p 'policyref="/w3c/p3p.xml", CP="CUR ADM OUR NOR STA NID"';
```

2.56.3 Directives

userid

**Syntax:** userid on | v1 | log | off;

**Default:** off

**Context:** http, server, location

Enables or disables setting cookies and logging the received cookies:

**on**

enables the setting of version 2 cookies and logging of the received cookies;

**v1**

enables the setting of version 1 cookies and logging of the received cookies;
log
  disables the setting of cookies, but enables logging of the received cookies;
off
  disables the setting of cookies and logging of the received cookies.

userid_domain
  Syntax:  userid_domain name | none;
  Default: none
  Context: http, server, location

  Defines a domain for which the cookie is set. The none parameter disables
setting of a domain for the cookie.

useridExpires
  Syntax:  useridExpires time | max | off;
  Default: off
  Context: http, server, location

  Sets a time during which a browser should keep the cookie. The parameter
max will cause the cookie to expire on “31 Dec 2037 23:55:55 GMT”. The
parameter off will cause the cookie to expire at the end of a browser
session.

useridflags
  Syntax:  useridflags off | flag ...;
  Default: off
  Context: http, server, location

  This directive appeared in version 1.19.3.

  If the parameter is not off, defines one or more additional flags for
the cookie: secure, httponly, samesite=strict, samesite=lax,
  samesite=none.

useridMark
  Syntax:  useridMark letter | digit | = | off;
  Default: off
  Context: http, server, location

  If the parameter is not off, enables the cookie marking mechanism and sets
the character used as a mark. This mechanism is used to add or change
userid_p3p and/or a cookie expiration time while preserving the client identifier. A
mark can be any letter of the English alphabet (case-sensitive), digit, or the
“=” character.

  If the mark is set, it is compared with the first padding symbol in the
base64 representation of the client identifier passed in a cookie. If they do not
match, the cookie is resent with the specified mark, expiration time, and \texttt{P3P} header.

\subsection*{userid\_name}

\texttt{Syntax: userid\_name name;}
\texttt{Default: uid}
\texttt{Context: http, server, location}

Sets the cookie name.

\subsection*{userid\_p3p}

\texttt{Syntax: userid\_p3p string | none;}
\texttt{Default: none}
\texttt{Context: http, server, location}

Sets a value for the \texttt{P3P} header field that will be sent along with the cookie. If the directive is set to the special value \texttt{none}, the \texttt{P3P} header will not be sent in a response.

\subsection*{userid\_path}

\texttt{Syntax: userid\_path path;}
\texttt{Default: /}
\texttt{Context: http, server, location}

Defines a path for which the cookie is set.

\subsection*{userid\_service}

\texttt{Syntax: userid\_service number;}
\texttt{Default: IP address of the server}
\texttt{Context: http, server, location}

If identifiers are issued by multiple servers (services), each service should be assigned its own \texttt{number} to ensure that client identifiers are unique. For version 1 cookies, the default value is zero. For version 2 cookies, the default value is the number composed from the last four octets of the server’s IP address.

\section*{2.56.4 Embedded Variables}

The \texttt{ngx\_http\_userid\_module} module supports the following embedded variables:

\texttt{$uid\_got}

The cookie name and received client identifier.

\texttt{$uid\_reset}

If the variable is set to a non-empty string that is not “0”, the client identifiers are reset. The special value “\texttt{log}” additionally leads to the output of messages about the reset identifiers to the \texttt{error\_log}. 

Nginx, Inc. p.366 of 542
$uid_set

The cookie name and sent client identifier.
CHAPTER 2. HTTP SERVER MODULES

2.57 Module ngx_http_uwsgi_module

2.57.1 Summary ............................................. 369
2.57.2 Example Configuration .............................. 369
2.57.3 Directives ........................................... 369
  uwsgi_bind .............................................. 369
  uwsgi_buffer_size ................................. 370
  uwsgi_buffering ........................................ 370
  uwsgi_buffers .......................................... 371
  uwsgi_busy_buffers_size ......................... 371
  uwsgi_cache ............................................. 371
  uwsgi_cache_background_update .................... 371
  uwsgi_cache_bypass ................................. 371
  uwsgi_cache_key ........................................ 372
  uwsgi_cache_lock ....................................... 372
  uwsgi_cache_lock_age ............................... 372
  uwsgi_cache_lock_timeout ......................... 372
  uwsgi_cache_max_range_offset ..................... 373
  uwsgi_cache_methods .................................... 373
  uwsgi_cache_min_uses .................................. 373
  uwsgi_cache_path ....................................... 373
  uwsgi_cache_purge ...................................... 375
  uwsgi_cache_revalidate .............................. 376
  uwsgi_cache_use_stale ............................... 376
  uwsgi_cache_valid ...................................... 377
  uwsgi_connect_timeout .............................. 377
  uwsgi_force_ranges ..................................... 378
  uwsgi_hide_header ...................................... 378
  uwsgi_ignore_client_abort ......................... 378
  uwsgi_ignore_headers ................................. 378
  uwsgi_intercept_errors .............................. 379
  uwsgi_limit_rate ....................................... 379
  uwsgi_max_temp_file_size ............................ 379
  uwsgi_modifier1 ......................................... 380
  uwsgi_modifier2 ......................................... 380
  uwsgi_next_upstream .................................... 380
  uwsgi_next_upstream_timeout ....................... 381
  uwsgi_next_upstream_tries ......................... 381
  uwsgi_no_cache ......................................... 381
  uwsgi_param ............................................. 382
  uwsgi_pass ............................................. 382
  uwsgi_pass_header ..................................... 383
  uwsgi_pass_request_body ............................. 383
  uwsgi_pass_request_headers ....................... 383
  uwsgi_read_timeout ..................................... 383
  uwsgi_request_buffering ............................. 383
2.57.1 Summary

The ngx_http_uwsgi_module module allows passing requests to a uwsgi server.

2.57.2 Example Configuration

```
location / {
    include uwsgi_params;
    uwsgi_pass localhost:9000;
}
```

2.57.3 Directives

**uwsgi_bind**

**Syntax:** `uwsgi_bind address [transparent] | off;`

**Default:** —

**Context:** http, server, location

Makes outgoing connections to a uwsgi server originate from the specified local IP address with an optional port (1.11.2). Parameter value can contain variables (1.3.12). The special value `off` (1.3.12) cancels the effect of the `uwsgi_bind` directive inherited from the previous configuration level, which allows the system to auto-assign the local IP address and port.
The `transparent` parameter (1.11.0) allows outgoing connections to a uwsgi server originate from a non-local IP address, for example, from a real IP address of a client:

```
uwsgi_bind $remote_addr transparent;
```

In order for this parameter to work, it is usually necessary to run nginx worker processes with the `superuser` privileges. On Linux it is not required (1.13.8) as if the `transparent` parameter is specified, worker processes inherit the `CAP_NET_RAW` capability from the master process. It is also necessary to configure kernel routing table to intercept network traffic from the uwsgi server.

**uwsgi_buffer_size**

**Syntax:** `uwsgi_buffer_size size;`
**Default:** `4k|8k`
**Context:** http, server, location

Sets the size of the buffer used for reading the first part of the response received from the uwsgi server. This part usually contains a small response header. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform. It can be made smaller, however.

**uwsgi_buffering**

**Syntax:** `uwsgi_buffering on|off;`
**Default:** `on`
**Context:** http, server, location

Enables or disables buffering of responses from the uwsgi server. When buffering is enabled, nginx receives a response from the uwsgi server as soon as possible, saving it into the buffers set by the `uwsgi_buffer_size` and `uwsgi_buffers` directives. If the whole response does not fit into memory, a part of it can be saved to a temporary file on the disk. Writing to temporary files is controlled by the `uwsgi_max_temp_file_size` and `uwsgi_temp_file_write_size` directives.

When buffering is disabled, the response is passed to a client synchronously, immediately as it is received. nginx will not try to read the whole response from the uwsgi server. The maximum size of the data that nginx can receive from the server at a time is set by the `uwsgi_buffer_size` directive.

Buffering can also be enabled or disabled by passing “yes” or “no” in the `X-Accel-Buffering` response header field. This capability can be disabled using the `uwsgi_ignore_headers` directive.
uwsgi_buffers

**Syntax:**  uwsgi_buffers number size;

**Default:**  8 4k|8k

**Context:**  http, server, location

Sets the number and size of the buffers used for reading a response from the uwsgi server, for a single connection. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform.

uwsgi_busy_buffers_size

**Syntax:**  uwsgi_busy_buffers_size size;

**Default:**  8k|16k

**Context:**  http, server, location

When buffering of responses from the uwsgi server is enabled, limits the total size of buffers that can be busy sending a response to the client while the response is not yet fully read. In the meantime, the rest of the buffers can be used for reading the response and, if needed, buffering part of the response to a temporary file. By default, size is limited by the size of two buffers set by the uwsgi_buffer_size and uwsgi_buffers directives.

uwsgi_cache

**Syntax:**  uwsgi_cache zone | off;

**Default:**  off

**Context:**  http, server, location

Defines a shared memory zone used for caching. The same zone can be used in several places. Parameter value can contain variables (1.7.9). The off parameter disables caching inherited from the previous configuration level.

uwsgi_cache_background_update

**Syntax:**  uwsgi_cache_background_update on | off;

**Default:**  off

**Context:**  http, server, location

This directive appeared in version 1.11.10.

Allows starting a background subrequest to update an expired cache item, while a stale cached response is returned to the client. Note that it is necessary to allow the usage of a stale cached response when it is being updated.

uwsgi_cache_bypass

**Syntax:**  uwsgi_cache_bypass string…;

**Default:**  —

**Context:**  http, server, location
Defines conditions under which the response will not be taken from a cache. If at least one value of the string parameters is not empty and is not equal to “0” then the response will not be taken from the cache:

```plaintext
uwsgi_cache_bypass $cookie_nocache $arg_nocache $arg_comment;
uwsgi_cache_bypass $http_pragma $http_authorization;
```

Can be used along with the `uwsgi_no_cache` directive.

### uwsgi_cache_key

**Syntax:** `uwsgi_cache_key string;`

**Default:** —

**Context:** http, server, location

Defines a key for caching, for example

```plaintext
uwsgi_cache_key localhost:9000$request_uri;
```

### uwsgi_cache_lock

**Syntax:** `uwsgi_cache_lock on | off;`

**Default:** off

**Context:** http, server, location

This directive appeared in version 1.1.12.

When enabled, only one request at a time will be allowed to populate a new cache element identified according to the `uwsgi_cache_key` directive by passing a request to a uwsgi server. Other requests of the same cache element will either wait for a response to appear in the cache or the cache lock for this element to be released, up to the time set by the `uwsgi_cache_lock_timeout` directive.

### uwsgi_cache_lock_age

**Syntax:** `uwsgi_cache_lock_age time;`

**Default:** 5s

**Context:** http, server, location

This directive appeared in version 1.7.8.

If the last request passed to the uwsgi server for populating a new cache element has not completed for the specified `time`, one more request may be passed to the uwsgi server.

### uwsgi_cache_lock_timeout

**Syntax:** `uwsgi_cache_lock_timeout time;`

**Default:** 5s

**Context:** http, server, location

This directive appeared in version 1.1.12.
Sets a timeout for \texttt{uwsgi\_cache\_lock}. When the \texttt{time} expires, the request will be passed to the uwsgi server, however, the response will not be cached.

\textbf{Before 1.7.8, the response could be cached.}

\texttt{uwsgi\_cache\_max\_range\_offset}

\textbf{Syntax:} \texttt{uwsgi\_cache\_max\_range\_offset} \texttt{number};

\textbf{Default} —

\textbf{Context:} \texttt{http, server, location}

This directive appeared in version 1.11.6.

Sets an offset in bytes for byte-range requests. If the range is beyond the offset, the range request will be passed to the uwsgi server and the response will not be cached.

\texttt{uwsgi\_cache\_methods}

\textbf{Syntax:} \texttt{uwsgi\_cache\_methods} \texttt{GET | HEAD | POST ...;}

\textbf{Default} \texttt{GET HEAD}

\textbf{Context:} \texttt{http, server, location}

If the client request method is listed in this directive then the response will be cached. “GET” and “HEAD” methods are always added to the list, though it is recommended to specify them explicitly. See also the \texttt{uwsgi\_no\_cache} directive.

\texttt{uwsgi\_cache\_min\_uses}

\textbf{Syntax:} \texttt{uwsgi\_cache\_min\_uses} \texttt{number;}

\textbf{Default} \texttt{1}

\textbf{Context:} \texttt{http, server, location}

Sets the \texttt{number} of requests after which the response will be cached.

\texttt{uwsgi\_cache\_path}

\textbf{Syntax:} \texttt{uwsgi\_cache\_path} \texttt{path [levels=levels]}
\begin{itemize}
  \item \texttt{use_temp_path=on|off}
  \item \texttt{keys\_zone=name:size [inactive=time]}
  \item \texttt{max\_size=size [min\_free=size] [manager\_files=number]}
  \item \texttt{manager\_sleep=time [manager\_threshold=time]}
  \item \texttt{loader\_files=number [loader\_sleep=time]}
  \item \texttt{loader\_threshold=time [purger=on|off]}
  \item \texttt{purger\_files=number [purger\_sleep=time]}
  \item \texttt{purger\_threshold=time];}
\end{itemize}

\textbf{Default} —

\textbf{Context:} \texttt{http}

Sets the path and other parameters of a cache. Cache data are stored in files. The file name in a cache is a result of applying the MD5 function to
the cache key. The levels parameter defines hierarchy levels of a cache: from 1 to 3, each level accepts values 1 or 2. For example, in the following configuration

```
uwsgi_cache_path /data/nginx/cache levels=1:2 keys_zone=one:10m;
```

file names in a cache will look like this:

```
/data/nginx/cache/e/29/b7f54b2df7773722d382f4809d65029c
```

A cached response is first written to a temporary file, and then the file is renamed. Starting from version 0.8.9, temporary files and the cache can be put on different file systems. However, be aware that in this case a file is copied across two file systems instead of the cheap renaming operation. It is thus recommended that for any given location both cache and a directory holding temporary files are put on the same file system. A directory for temporary files is set based on the use_temp_path parameter (1.7.10). If this parameter is omitted or set to the value on, the directory set by the uwsgi_temp_path directive for the given location will be used. If the value is set to off, temporary files will be put directly in the cache directory.

In addition, all active keys and information about data are stored in a shared memory zone, whose name and size are configured by the keys_zone parameter. One megabyte zone can store about 8 thousand keys.

As part of commercial subscription, the shared memory zone also stores extended cache information, thus, it is required to specify a larger zone size for the same number of keys. For example, one megabyte zone can store about 4 thousand keys.

Cached data that are not accessed during the time specified by the inactive parameter get removed from the cache regardless of their freshness. By default, inactive is set to 10 minutes.

The special “cache manager” process monitors the maximum cache size set by the max_size parameter, and the minimum amount of free space set by the min_free (1.19.1) parameter on the file system with cache. When the size is exceeded or there is not enough free space, it removes the least recently used data. The data is removed in iterations configured by manager_files, manager_threshold, and manager_sleep parameters (1.11.5). During one iteration no more than manager_files items are deleted (by default, 100). The duration of one iteration is limited by the manager_threshold parameter (by default, 200 milliseconds). Between iterations, a pause configured by the manager_sleep parameter (by default, 50 milliseconds) is made.

A minute after the start the special “cache loader” process is activated. It loads information about previously cached data stored on file system into a cache zone. The loading is also done in iterations. During one iteration no more than loader_files items are loaded (by default, 100). Besides, the
duration of one iteration is limited by the `loader_threshold` parameter (by default, 200 milliseconds). Between iterations, a pause configured by the `loader_sleep` parameter (by default, 50 milliseconds) is made.

Additionally, the following parameters are available as part of our commercial subscription:

- `purger=on|off`
  Instructs whether cache entries that match a wildcard key will be removed from the disk by the cache purger (1.7.12). Setting the parameter to `on` (default is `off`) will activate the “cache purger” process that permanently iterates through all cache entries and deletes the entries that match the wildcard key.

- `purger_files=number`
  Sets the number of items that will be scanned during one iteration (1.7.12). By default, `purger_files` is set to 10.

- `purger_threshold=number`
  Sets the duration of one iteration (1.7.12). By default, `purger_threshold` is set to 50 milliseconds.

- `purger_sleep=number`
  Sets a pause between iterations (1.7.12). By default, `purger_sleep` is set to 50 milliseconds.

In versions 1.7.3, 1.7.7, and 1.11.10 cache header format has been changed. Previously cached responses will be considered invalid after upgrading to a newer nginx version.

**uwsgi_cache_purge**

**Syntax:**  
`uwsgi_cache_purge` string ...;  

**Default** —  

**Context:** http, server, location  

This directive appeared in version 1.5.7.

Defines conditions under which the request will be considered a cache purge request. If at least one value of the string parameters is not empty and is not equal to “0” then the cache entry with a corresponding cache key is removed. The result of successful operation is indicated by returning the 204 No Content response.

If the cache key of a purge request ends with an asterisk (“*”), all cache entries matching the wildcard key will be removed from the cache. However, these entries will remain on the disk until they are deleted for either inactivity, or processed by the cache purger (1.7.12), or a client attempts to access them.

Example configuration:

```plaintext
uwsgi_cache_path /data/nginx/cache keys_zone=cache_zone:10m;
map $request_method $purge_method {  
PURGE 1;
```

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This functionality is available as part of our commercial subscription.

uwsgi_cache_revalidate

Syntax:  uwsgi_cache_revalidate on | off;
Default  off
Context: http, server, location
This directive appeared in version 1.5.7.

Enables revalidation of expired cache items using conditional requests with the If-Modified-Since and If-None-Match header fields.

uwsgi_cache_use_stale

Syntax:  uwsgi_cache_use_stale error | timeout | invalid_header | updating | http_500 | http_503 | http_403 | http_404 | http_429 | off ...;
Default  off
Context: http, server, location

Determines in which cases a stale cached response can be used when an error occurs during communication with the uwsgi server. The directive’s parameters match the parameters of the uwsgi_next_upstream directive.

The error parameter also permits using a stale cached response if a uwsgi server to process a request cannot be selected.

Additionally, the updating parameter permits using a stale cached response if it is currently being updated. This allows minimizing the number of accesses to uwsgi servers when updating cached data.

Using a stale cached response can also be enabled directly in the response header for a specified number of seconds after the response became stale (1.11.10). This has lower priority than using the directive parameters.

• The “stale-while-revalidate” extension of the Cache-Control header field permits using a stale cached response if it is currently being updated.

• The “stale-if-error” extension of the Cache-Control header field permits using a stale cached response in case of an error.

To minimize the number of accesses to uwsgi servers when populating a new cache element, the uwsgi_cache_lock directive can be used.
uwsgi_cache_valid

**Syntax:**
```
uwsgi_cache_valid [code ...] time;
```

**Default:**

- Context: http, server, location

Sets caching time for different response codes. For example, the following directives:

```
uwsgi_cache_valid 200 302 10m;
uwsgi_cache_valid 404 1m;
```

set 10 minutes of caching for responses with codes 200 and 302 and 1 minute for responses with code 404.

If only caching `time` is specified

```
uwsgi_cache_valid 5m;
```

then only 200, 301, and 302 responses are cached.

In addition, the any parameter can be specified to cache any responses:

```
uwsgi_cache_valid 200 302 10m;
uwsgi_cache_valid 301 1h;
uwsgi_cache_valid any 1m;
```

Parameters of caching can also be set directly in the response header. This has higher priority than setting of caching time using the directive.

- The X-Accel-Expires header field sets caching time of a response in seconds. The zero value disables caching for a response. If the value starts with the @ prefix, it sets an absolute time in seconds since Epoch, up to which the response may be cached.

- If the header does not include the X-Accel-Expires field, parameters of caching may be set in the header fields Expires or Cache-Control.

- If the header includes the Set-Cookie field, such a response will not be cached.

- If the header includes the Vary field with the special value "*", such a response will not be cached (1.7.7). If the header includes the Vary field with another value, such a response will be cached taking into account the corresponding request header fields (1.7.7).

Processing of one or more of these response header fields can be disabled using the `uwsgi_ignore_headers` directive.

uwsgi_connect_timeout

**Syntax:**
```
uwsgi_connect_timeout time;
```

**Default:**

- 60s

- Context: http, server, location
CHAPTER 2. HTTP SERVER MODULES

Defines a timeout for establishing a connection with a uwsgi server. It should be noted that this timeout cannot usually exceed 75 seconds.

uwsgi_force_ranges

Syntax: uwsgi_force_ranges on | off;
Default: off
Context: http, server, location
This directive appeared in version 1.7.7.

Enables byte-range support for both cached and uncached responses from the uwsgi server regardless of the Accept-Ranges field in these responses.

uwsgi_hide_header

Syntax: uwsgi_hide_header field;
Default: —
Context: http, server, location

By default, nginx does not pass the header fields Status and X-Accel-... from the response of a uwsgi server to a client. The uwsgi_hide_header directive sets additional fields that will not be passed. If, on the contrary, the passing of fields needs to be permitted, the uwsgi_pass_header directive can be used.

uwsgi_ignore_client_abort

Syntax: uwsgi_ignore_client_abort on | off;
Default: off
Context: http, server, location

Determines whether the connection with a uwsgi server should be closed when a client closes the connection without waiting for a response.

uwsgi_ignore_headers

Syntax: uwsgi_ignore_headers field ...;
Default: —
Context: http, server, location

Disables processing of certain response header fields from the uwsgi server. The following fields can be ignored: X-Accel-Redirect, X-Accel-Expires, X-Accel-Limit-Rate (1.1.6), X-Accel-Buffering (1.1.6), X-Accel-Charset (1.1.6), Expires, Cache-Control, Set-Cookie (0.8.44), and Vary (1.7.7).

If not disabled, processing of these header fields has the following effect:

• X-Accel-Expires, Expires, Cache-Control, Set-Cookie, and Vary set the parameters of response caching;

• X-Accel-Redirect performs an internal redirect to the specified URI;
• X-Accel-Limit-Rate sets the rate limit for transmission of a response to a client;
• X-Accel-Buffering enables or disables buffering of a response;
• X-Accel-Charset sets the desired charset of a response.

uwsgi_intercept_errors

**Syntax:** `uwsgi_intercept_errors on | off;

**Default:** off

**Context:** http, server, location

Determines whether a uwsgi server responses with codes greater than or equal to 300 should be passed to a client or be intercepted and redirected to nginx for processing with the error_page directive.

uwsgi_limit_rate

**Syntax:** `uwsgi_limit_rate rate;

**Default:** 0

**Context:** http, server, location

This directive appeared in version 1.7.7.

Limits the speed of reading the response from the uwsgi server. The rate is specified in bytes per second. The zero value disables rate limiting. The limit is set per a request, and so if nginx simultaneously opens two connections to the uwsgi server, the overall rate will be twice as much as the specified limit. The limitation works only if buffering of responses from the uwsgi server is enabled.

uwsgi_max_temp_file_size

**Syntax:** `uwsgi_max_temp_file_size size;

**Default:** 1024m

**Context:** http, server, location

When buffering of responses from the uwsgi server is enabled, and the whole response does not fit into the buffers set by the uwsgi_buffer_size and uwsgi_buffers directives, a part of the response can be saved to a temporary file. This directive sets the maximum size of the temporary file. The size of data written to the temporary file at a time is set by the uwsgi_temp_file_write_size directive.

The zero value disables buffering of responses to temporary files.

This restriction does not apply to responses that will be cached or stored on disk.
uwsgi_modifier1

Syntax:  `uwsgi_modifier1 number;`

Default:  0

Context:  http, server, location

Sets the value of the `modifier1` field in the uwsgi packet header.

uwsgi_modifier2

Syntax:  `uwsgi_modifier2 number;`

Default:  0

Context:  http, server, location

Sets the value of the `modifier2` field in the uwsgi packet header.

uwsgi_next_upstream

Syntax:  `uwsgi_next_upstream error | timeout | invalid_header | http_500 | http_503 | http_403 | http_404 | http_429 | non_idempotent | off ...;`

Default:  error timeout

Context:  http, server, location

Specifies in which cases a request should be passed to the next server:

- **error**
  - an error occurred while establishing a connection with the server, passing a request to it, or reading the response header;

- **timeout**
  - a timeout has occurred while establishing a connection with the server, passing a request to it, or reading the response header;

- **invalid_header**
  - a server returned an empty or invalid response;

- **http_500**
  - a server returned a response with the code 500;

- **http_503**
  - a server returned a response with the code 503;

- **http_403**
  - a server returned a response with the code 403;

- **http_404**
  - a server returned a response with the code 404;

- **http_429**
  - a server returned a response with the code 429 (1.11.13);

- **non_idempotent**
  - normally, requests with a non-idempotent method (POST, LOCK, PATCH) are not passed to the next server if a request has been sent to an upstream server (1.9.13); enabling this option explicitly allows retrying such requests;
off
disables passing a request to the next server.

One should bear in mind that passing a request to the next server is only possible if nothing has been sent to a client yet. That is, if an error or timeout occurs in the middle of the transferring of a response, fixing this is impossible.

The directive also defines what is considered an unsuccessful attempt of communication with a server. The cases of error, timeout and invalid_header are always considered unsuccessful attempts, even if they are not specified in the directive. The cases of http_500, http_503, and http_429 are considered unsuccessful attempts only if they are specified in the directive. The cases of http_403 and http_404 are never considered unsuccessful attempts.

Passing a request to the next server can be limited by the number of tries and by time.

**uwsgi_next_upstream_timeout**

Syntax: `uwsgi_next_upstream_timeout time;`

Default: 0

Context: http, server, location

This directive appeared in version 1.7.5.

Limits the time during which a request can be passed to the next server. The 0 value turns off this limitation.

**uwsgi_next_upstream_tries**

Syntax: `uwsgi_next_upstream_tries number;`

Default: 0

Context: http, server, location

This directive appeared in version 1.7.5.

Limits the number of possible tries for passing a request to the next server. The 0 value turns off this limitation.

**uwsgi_no_cache**

Syntax: `uwsgi_no_cache string ...;`

Default: —

Context: http, server, location

Defines conditions under which the response will not be saved to a cache. If at least one value of the string parameters is not empty and is not equal to “0” then the response will not be saved:

```bash
uwsgi_no_cache $cookie_nocache $arg_nocache $arg_comment;
uwsgi_no_cache $httpPragma $http_authorization;
```

Can be used along with the `uwsgi_cache_bypass` directive.
uwsgi_param

**Syntax:**  
`uwsgi_param parameter value [if_not_empty];`

**Default:**  
-  
**Context:**  
http, server, location

Sets a `parameter` that should be passed to the uwsgi server. The `value` can contain text, variables, and their combination. These directives are inherited from the previous configuration level if and only if there are no `uwsgi_param` directives defined on the current level.

Standard CGI environment variables should be provided as uwsgi headers, see the `uwsgi_params` file provided in the distribution:

```
location / {
    include uwsgi_params;
    ...
}
```

If the directive is specified with `if_not_empty` (1.1.11) then such a parameter will be passed to the server only if its value is not empty:

```
uwsgi_param HTTPS $https if_not_empty;
```

uwsgi_pass

**Syntax:**  
`uwsgi_pass [protocol://]address;`

**Default:**  
-  
**Context:**  
location, if in location

Sets the protocol and address of a uwsgi server. As a `protocol`, “uwsgi” or “suwsgi” (secured uwsgi, uwsgi over SSL) can be specified. The address can be specified as a domain name or IP address, and a port:

```
uwsgi_pass localhost:9000;
uwsgi_pass uwsgi://localhost:9000;
uwsgi_pass suwsgi://[2001:db8::1]:9090;
```

or as a UNIX-domain socket path:

```
uwsgi_pass unix:/tmp/uwsgi.socket;
```

If a domain name resolves to several addresses, all of them will be used in a round-robin fashion. In addition, an address can be specified as a server group.

Parameter value can contain variables. In this case, if an address is specified as a domain name, the name is searched among the described server groups, and, if not found, is determined using a resolver.

Secured uwsgi protocol is supported since version 1.5.8.
uwsgi_pass_header

**Syntax:** `uwsgi_pass_header field;`
**Default:** —
**Context:** http, server, location

Permits passing otherwise disabled header fields from a uwsgi server to a client.

uwsgi_pass_request_body

**Syntax:** `uwsgi_pass_request_body on | off;`
**Default:** on
**Context:** http, server, location

Indicates whether the original request body is passed to the uwsgi server. See also the `uwsgi_pass_request_headers` directive.

uwsgi_pass_request_headers

**Syntax:** `uwsgi_pass_request_headers on | off;`
**Default:** on
**Context:** http, server, location

Indicates whether the header fields of the original request are passed to the uwsgi server. See also the `uwsgi_pass_request_body` directive.

uwsgi_read_timeout

**Syntax:** `uwsgi_read_timeout time;`
**Default:** 60s
**Context:** http, server, location

Defines a timeout for reading a response from the uwsgi server. The timeout is set only between two successive read operations, not for the transmission of the whole response. If the uwsgi server does not transmit anything within this time, the connection is closed.

uwsgi_request_buffering

**Syntax:** `uwsgi_request_buffering on | off;`
**Default:** on
**Context:** http, server, location

This directive appeared in version 1.7.11.

Enables or disables buffering of a client request body.

When buffering is enabled, the entire request body is read from the client before sending the request to a uwsgi server.

When buffering is disabled, the request body is sent to the uwsgi server immediately as it is received. In this case, the request cannot be passed to the next server if nginx already started sending the request body.
When HTTP/1.1 chunked transfer encoding is used to send the original request body, the request body will be buffered regardless of the directive value.

**uwsgi_send_timeout**

**Syntax:** `uwsgi_send_timeout time;`
**Default:** 60s
**Context:** http, server, location

Sets a timeout for transmitting a request to the uwsgi server. The timeout is set only between two successive write operations, not for the transmission of the whole request. If the uwsgi server does not receive anything within this time, the connection is closed.

**uwsgi_socket_keepalive**

**Syntax:** `uwsgi_socket_keepalive on | off;`
**Default:** off
**Context:** http, server, location

This directive appeared in version 1.15.6.

Configures the “TCP keepalive” behavior for outgoing connections to a uwsgi server. By default, the operating system’s settings are in effect for the socket. If the directive is set to the value “on”, the SO_KEEPALIVE socket option is turned on for the socket.

**uwsgi_ssl_certificate**

**Syntax:** `uwsgi_ssl_certificate file;`
**Default:** —
**Context:** http, server, location

This directive appeared in version 1.7.8.

Specifies a file with the certificate in the PEM format used for authentication to a secured uwsgi server.
Since version 1.21.0, variables can be used in the file name.

**uwsgi_ssl_certificate_key**

**Syntax:** `uwsgi_ssl_certificate_key file;`
**Default:** —
**Context:** http, server, location

This directive appeared in version 1.7.8.

Specifies a file with the secret key in the PEM format used for authentication to a secured uwsgi server.
The value `engine:name:id` can be specified instead of the file (1.7.9), which loads a secret key with a specified `id` from the OpenSSL engine `name`.
Since version 1.21.0, variables can be used in the file name.
**uwsgi_ssl_ciphers**

**Syntax:** `uwsgi_ssl_ciphers ciphers;`

**Default:** DEFAULT

**Context:** http, server, location

This directive appeared in version 1.5.8.

Specifies the enabled ciphers for requests to a secured uwsgi server. The ciphers are specified in the format understood by the OpenSSL library. The full list can be viewed using the “openssl ciphers” command.

**uwsgi_ssl_conf_command**

**Syntax:** `uwsgi_ssl_conf_command name value;`

**Default:** —

**Context:** http, server, location

This directive appeared in version 1.19.4.

Sets arbitrary OpenSSL configuration commands when establishing a connection with the secured uwsgi server.

The directive is supported when using OpenSSL 1.0.2 or higher.

Several `uwsgi_ssl_conf_command` directives can be specified on the same level. These directives are inherited from the previous configuration level if and only if there are no `uwsgi_ssl_conf_command` directives defined on the current level.

Note that configuring OpenSSL directly might result in unexpected behavior.

**uwsgi_ssl_crl**

**Syntax:** `uwsgi_ssl_crl file;`

**Default:** —

**Context:** http, server, location

This directive appeared in version 1.7.0.

Specifies a file with revoked certificates (CRL) in the PEM format used to verify the certificate of the secured uwsgi server.

**uwsgi_ssl_name**

**Syntax:** `uwsgi_ssl_name name;`

**Default:** host from uwsgi_pass

**Context:** http, server, location

This directive appeared in version 1.7.0.

Allows overriding the server name used to verify the certificate of the secured uwsgi server and to be passed through SNI when establishing a connection with the secured uwsgi server.
By default, the host part from `uwsgi_pass` is used.

**uwsgi_ssl_password_file**

**Syntax:** `uwsgi_ssl_password_file file;

**Default** —

**Context:** http, server, location

This directive appeared in version 1.7.8.

Specifies a `file` with passphrases for secret keys where each passphrase is specified on a separate line. Passphrases are tried in turn when loading the key.

**uwsgi_ssl_protocols**

**Syntax:**

```
uwsgi_ssl_protocols [SSLv2] [SSLv3] [TLSv1] [TLSv1.1] [TLSv1.2] [TLSv1.3];
```

**Default** TLSv1 TLSv1.1 TLSv1.2 TLSv1.3

**Context:** http, server, location

This directive appeared in version 1.5.8.

Enables the specified protocols for requests to a secured uwsgi server.

The TLSv1.3 parameter is used by default since 1.23.4.

**uwsgi_ssl_server_name**

**Syntax:**

```
uwsgi_ssl_server_name on | off;
```

**Default** off

**Context:** http, server, location

This directive appeared in version 1.7.0.

Enables or disables passing of the server name through TLS Server Name Indication extension (SNI, RFC 6066) when establishing a connection with the secured uwsgi server.

**uwsgi_ssl_session_reuse**

**Syntax:**

```
uwsgi_ssl_session_reuse on | off;
```

**Default** on

**Context:** http, server, location

This directive appeared in version 1.5.8.

Determines whether SSL sessions can be reused when working with a secured uwsgi server. If the errors “`SSL3_GET_FINISHED:digest check failed`” appear in the logs, try disabling session reuse.
uwsgi_ssl_trusted_certificate

Syntax:  uwsgi_ssl_trusted_certificate file;
Default: —
Context: http, server, location
This directive appeared in version 1.7.0.

Specifies a file with trusted CA certificates in the PEM format used to verify the certificate of the secured uwsgi server.

uwsgi_ssl_verify

Syntax:  uwsgi_ssl_verify on | off;
Default: off
Context: http, server, location
This directive appeared in version 1.7.0.

Enables or disables verification of the secured uwsgi server certificate.

uwsgi_ssl_verify_depth

Syntax:  uwsgi_ssl_verify_depth number;
Default: 1
Context: http, server, location
This directive appeared in version 1.7.0.

Sets the verification depth in the secured uwsgi server certificates chain.

uwsgi_store

Syntax:  uwsgi_store on | off | string;
Default: off
Context: http, server, location

Enables saving of files to a disk. The on parameter saves files with paths corresponding to the directives alias or root. The off parameter disables saving of files. In addition, the file name can be set explicitly using the string with variables:

```
uwsgi_store /data/www$original_uri;
```

The modification time of files is set according to the received Last-Modified response header field. The response is first written to a temporary file, and then the file is renamed. Starting from version 0.8.9, temporary files and the persistent store can be put on different file systems. However, be aware that in this case a file is copied across two file systems instead of the cheap renaming operation. It is thus recommended that for any given location both saved files and a directory holding temporary files, set by the uwsgi_temp_path directive, are put on the same file system.

This directive can be used to create local copies of static unchangeable files, e.g.:
location /images/ {
  root /data/www;
  error_page 404 = /fetch$uri;
}

location /fetch/ {
  internal;
  uwsgi_pass backend:9000;
  ...
  uwsgi_store on;
  uwsgi_store_access user:rw group:rw all:r;
  uwsgi_temp_path /data/temp;
  alias /data/www/;
}

uwsgi_store_access

Syntax: uwsgi_store_access users:permissions ...;
Default: user:rw
Context: http, server, location

Sets access permissions for newly created files and directories, e.g.:

uwsgi_store_access user:rw group:rw all:r;

If any group or all access permissions are specified then user permissions may be omitted:

uwsgi_store_access group:rw all:r;

uwsgi_temp_file_write_size

Syntax: uwsgi_temp_file_write_size size;
Default: 8k|16k
Context: http, server, location

Limits the size of data written to a temporary file at a time, when buffering of responses from the uwsgi server to temporary files is enabled. By default, size is limited by two buffers set by the uwsgi_buffer_size and uwsgi_buffers directives. The maximum size of a temporary file is set by the uwsgi_max_temp_file_size directive.

uwsgi_temp_path

Syntax: uwsgi_temp_path path [level1 [level2 [level3]]];
Default: uwsgi_temp
Context: http, server, location
Defines a directory for storing temporary files with data received from uwsgi servers. Up to three-level subdirectory hierarchy can be used underneath the specified directory. For example, in the following configuration

```text
uwsgi_temp_path /spool/nginx/uwsgi_temp 1 2;
```

a temporary file might look like this:

```
/spool/nginx/uwsgi_temp/7/45/00000123457
```

See also the `use_temp_path` parameter of the `uwsgi_cache_path` directive.
2.58 Module ngx_http_v2_module

2.58.1 Summary

The ngx_http_v2_module module (1.9.5) provides support for HTTP/2.

This module is not built by default; it should be enabled with the
--with-http_v2_module configuration parameter.

2.58.2 Known Issues

Before version 1.9.14, buffering of a client request body could not
be disabled regardless of proxy_request_buffering, fastcgi_request_buffering,
uwsgi_request_buffering, and scgi_request_buffering directive values.

Before version 1.19.1, the lingering_close mechanism was not used to control
closing HTTP/2 connections.

2.58.3 Example Configuration

```plaintext
server {
    listen 443 ssl;
    http2 on;
    ssl_certificate server.crt;
    ssl_certificate_key server.key;
}
```
Note that accepting HTTP/2 connections over TLS requires the “Application-Layer Protocol Negotiation” (ALPN) TLS extension support, which is available since OpenSSL version 1.0.2.

Also note that if the ssl_prefer_server_ciphers directive is set to the value “on”, the ciphers should be configured to comply with RFC 9113, Appendix A black list and supported by clients.

2.58.4 Directives

**http2**

**Syntax:**

```
http2 on | off;
```

**Default:** off

**Context:** http, server

This directive appeared in version 1.25.1.

Enables the HTTP/2 protocol.

**http2_body_preread_size**

**Syntax:**

```
http2_body_preread_size size;
```

**Default:** 64k

**Context:** http, server

This directive appeared in version 1.11.0.

Sets the size of the buffer per each request in which the request body may be saved before it is started to be processed.

**http2_chunk_size**

**Syntax:**

```
http2_chunk_size size;
```

**Default:** 8k

**Context:** http, server, location

Sets the maximum size of chunks into which the response body is sliced. A too low value results in higher overhead. A too high value impairs prioritization due to HOL blocking.

**http2_idle_timeout**

**Syntax:**

```
http2_idle_timeout time;
```

**Default:** 3m

**Context:** http, server

This directive is obsolete since version 1.19.7. The keepalive_timeout directive should be used instead.

Sets the timeout of inactivity after which the connection is closed.
http2_max_concurrent_pushes

Syntax:  http2_max_concurrent_pushes number;
Default  10
Context:  http, server

This directive appeared in version 1.13.9.

This directive is obsolete since version 1.25.1.

Limits the maximum number of concurrent push requests in a connection.

http2_max_concurrent_streams

Syntax:  http2_max_concurrent_streams number;
Default  128
Context:  http, server

Sets the maximum number of concurrent HTTP/2 streams in a connection.

http2_max_field_size

Syntax:  http2_max_field_size size;
Default  4k
Context:  http, server

This directive is obsolete since version 1.19.7. The large_client_header_buffers directive should be used instead.

Limits the maximum size of an HPACK-compressed request header field. The limit applies equally to both name and value. Note that if Huffman encoding is applied, the actual size of decompressed name and value strings may be larger. For most requests, the default limit should be enough.

http2_max_header_size

Syntax:  http2_max_header_size size;
Default  16k
Context:  http, server

This directive is obsolete since version 1.19.7. The large_client_header_buffers directive should be used instead.

Limits the maximum size of the entire request header list after HPACK decompression. For most requests, the default limit should be enough.
http2_max_requests

Syntax: `http2_max_requests number;`
Default 1000
Context: http, server
This directive appeared in version 1.11.6.

This directive is obsolete since version 1.19.7. The `keepalive_requests` directive should be used instead.

Sets the maximum number of requests (including push requests) that can be served through one HTTP/2 connection, after which the next client request will lead to connection closing and the need of establishing a new connection.

Closing connections periodically is necessary to free per-connection memory allocations. Therefore, using too high maximum number of requests could result in excessive memory usage and not recommended.

http2_push

Syntax: `http2_push uri | off;`
Default off
Context: http, server, location
This directive appeared in version 1.13.9.

This directive is obsolete since version 1.25.1.

Pre-emptively sends (pushes) a request to the specified `uri` along with the response to the original request. Only relative URIs with absolute path will be processed, for example:

```
http2_push /static/css/main.css;
```

The `uri` value can contain variables.

Several `http2_push` directives can be specified on the same configuration level. The `off` parameter cancels the effect of the `http2_push` directives inherited from the previous configuration level.

http2_push_preload

Syntax: `http2_push_preload on | off;`
Default off
Context: http, server, location
This directive appeared in version 1.13.9.

This directive is obsolete since version 1.25.1.

Enables automatic conversion of `preload links` specified in the Link response header fields into push requests.
http2_recv_buffer_size

**Syntax:**  \texttt{http2_recv_buffer_size \textit{size};}

**Default:** 256k

**Context:** http

Sets the size of the per worker input buffer.

http2_recv_timeout

**Syntax:**  \texttt{http2_recv_timeout \textit{time};}

**Default:** 30s

**Context:** http, server

This directive is obsolete since version 1.19.7. The \texttt{client_header_timeout} directive should be used instead.

Sets the timeout for expecting more data from the client, after which the connection is closed.

### 2.58.5 Embedded Variables

The \texttt{ngx_http_v2_module} module supports the following embedded variables:

- \texttt{$http2}
  - negotiated protocol identifier: “h2” for HTTP/2 over TLS, “h2c” for HTTP/2 over cleartext TCP, or an empty string otherwise.
2.59 Module ngx_http_v3_module

2.59.1 Summary

The `ngx_http_v3_module` module (1.25.0) provides experimental support for HTTP/3.

This module is not built by default, it should be enabled with the `--with-http_v3_module` configuration parameter.

An SSL library that provides QUIC support such as BoringSSL, LibreSSL, or QuicTLS is recommended to build and run this module. Otherwise, when using the OpenSSL library, OpenSSL compatibility layer will be used that does not support early data.

2.59.2 Known Issues

The module is experimental, caveat emptor applies.

2.59.3 Example Configuration

```nginx
http {
  log_format quic '$remote_addr - $remote_user [$time_local] ' 
  '"request" $status $body_bytes_sent ' 
  '"$http_referer" "$http_user_agent" "$http3"';

  access_log logs/access.log quic;
}

server {
  # for better compatibility it's recommended
  # to use the same port for http/3 and https
  listen 8443 quic reuseport;
  listen 8443 ssl;

  ssl_certificate  certs/example.com.crt;
  ssl_certificate_key certs/example.com.key;
}
```
location / {  
    # used to advertise the availability of HTTP/3  
    add_header Alt-Svc "h3=":8443"; ma=86400";  
}  
}

Note that accepting HTTP/3 connections over TLS requires the TLSv1.3 protocol support, which is available since OpenSSL version 1.1.1.

### 2.59.4 Directives

**http3**

**Syntax:** `http3 on | off;`

**Default:** `on`

**Context:** `http, server`

Enables HTTP/3 protocol negotiation.

**http3_hq**

**Syntax:** `http3_hq on | off;`

**Default:** `off`

**Context:** `http, server`

Enables HTTP/0.9 protocol negotiation used in QUIC interoperability tests.

**http3_max_concurrent_streams**

**Syntax:** `http3_max_concurrent_streams number;`

**Default:** `128`

**Context:** `http, server`

Sets the maximum number of concurrent HTTP/3 request streams in a connection.

**http3_stream_buffer_size**

**Syntax:** `http3_stream_buffer_size size;`

**Default:** `64k`

**Context:** `http, server`

Sets the size of the buffer used for reading and writing of the QUIC streams.

**quic_active_connection_id_limit**

**Syntax:** `quic_active_connection_id_limit number;`

**Default:** `2`

**Context:** `http, server`
Sets the QUIC active_connection_id_limit transport parameter value. This is the maximum number of client connection IDs which can be stored on the server.

**quic_bpf**

**Syntax:** `quic_bpf on | off;
Default: off
Context: main

Enables routing of QUIC packets using eBPF. When enabled, this allows supporting QUIC connection migration.

The directive is only supported on Linux 5.7+

**quic_gso**

**Syntax:** `quic_gso on | off;
Default: off
Context: http, server

Enables sending in optimized batch mode using segmentation offloading.

Optimized sending is supported only on Linux featuring UDP_SEGMENT.

**quic_host_key**

**Syntax:** `quic_host_key file;
Default: —
Context: http, server

Sets a file with the secret key used to encrypt stateless reset and address validation tokens. By default, a random key is generated on each reload. Tokens generated with old keys are not accepted.

**quic_retry**

**Syntax:** `quic_retry on | off;
Default: off
Context: http, server

Enables the QUIC Address Validation feature. This includes sending a new token in a Retry packet or a NEW_TOKEN frame and validating a token received in the Initial packet.

### 2.59.5 Embedded Variables

The ngx_http_v3_module module supports the following embedded variables:
$http3

negotiated protocol identifier: “h3” for HTTP/3 connections, “hq” for hq connections, or an empty string otherwise.
2.60 Module ngx_http_xslt_module

2.60.1 Summary

The ngx_http_xslt_module (0.7.8+) is a filter that transforms XML responses using one or more XSLT stylesheets. This module is not built by default, it should be enabled with the `--with-http_xslt_module` configuration parameter.

This module requires the libxml2 and libxslt libraries.

2.60.2 Example Configuration

```http
location / {
    xml_entities /site/dtd/entities.dtd;
    xslt_stylesheet /site/xslt/one.xslt param=value;
    xslt_stylesheet /site/xslt/two.xslt;
}
```

2.60.3 Directives

**xml_entities**

**Syntax:** `xml_entities path;`

**Default** —

**Context:** http, server, location

Specifies the DTD file that declares character entities. This file is compiled at the configuration stage. For technical reasons, the module is unable to use the external subset declared in the processed XML, so it is ignored and a specially defined file is used instead. This file should not describe the XML structure. It is enough to declare just the required character entities, for example:

```xml
<!ENTITY nbsp "\xa0;">
```
**xslt_last_modified**

**Syntax:**
```
xslt_last_modified on | off;
```

**Default:**
```
off
```

**Context:** http, server, location

This directive appeared in version 1.5.1.

Allows preserving the Last-Modified header field from the original response during XSLT transformations to facilitate response caching.

By default, the header field is removed as contents of the response are modified during transformations and may contain dynamically generated elements or parts that are changed independently of the original response.

**xslt_param**

**Syntax:**
```
xslt_param parameter value;
```

**Default:**
```
—
```

**Context:** http, server, location

This directive appeared in version 1.1.18.

Defines the parameters for XSLT stylesheets. The **value** is treated as an XPath expression. The **value** can contain variables. To pass a string value to a stylesheet, the **xslt_string_param** directive can be used.

There could be several **xslt_param** directives. These directives are inherited from the previous configuration level if and only if there are no **xslt_param** and **xslt_string_param** directives defined on the current level.

**xslt_string_param**

**Syntax:**
```
xslt_string_param parameter value;
```

**Default:**
```
—
```

**Context:** http, server, location

This directive appeared in version 1.1.18.

Defines the string parameters for XSLT stylesheets. XPath expressions in the **value** are not interpreted. The **value** can contain variables.

There could be several **xslt_string_param** directives. These directives are inherited from the previous configuration level if and only if there are no **xslt_param** and **xslt_string_param** directives defined on the current level.

**xslt_stylesheet**

**Syntax:**
```
xslt_stylesheet stylesheet [parameter=value ... ];
```

**Default:**
```
—
```

**Context:** location

Defines the XSLT stylesheet and its optional parameters. A stylesheet is compiled at the configuration stage.

Parameters can either be specified separately, or grouped in a single line using the “:” delimiter. If a parameter includes the “:” character, it should be
escaped as “%3A”. Also, libxslt requires to enclose parameters that contain non-alphanumeric characters into single or double quotes, for example:

| param1='http%3A//www.example.com':param2=value2 |

The parameters description can contain variables, for example, the whole line of parameters can be taken from a single variable:

```location / {  
xslt_stylesheet /site/xslt/one.xslt  
$page_xslt_params  
param1='$value1':param2=value2  
param3=value3;  
}|
```

It is possible to specify several stylesheets. They will be applied sequentially in the specified order.

**xslt_types**

**Syntax:**  
```
xslt_types mime-type ...;  
```

**Default:** text/xml  

**Context:** http, server, location  

Enables transformations in responses with the specified MIME types in addition to “text/xml”. The special value “*” matches any MIME type (0.8.29). If the transformation result is an HTML response, its MIME type is changed to “text/html”.

---

Nginx, Inc.  
p.401 of 542
Chapter 3

Stream server modules

3.1 Module ngx_stream_core_module

3.1.1 Summary

The ngx_stream_core_module module is available since version 1.9.0. This module is not built by default, it should be enabled with the --with-stream configuration parameter.

3.1.2 Example Configuration

```
worker_processes auto;
error_log /var/log/nginx/error.log info;

events {
    worker_connections 1024;
}

stream {
    upstream backend {
```
3.1.3 Directives

**listen**

**Syntax:**

```
listen address:port [ssl] [udp] [proxy_protocol]
[fastopen=number] [backlog=number] [rcvbuf=size]
[sndbuf=size] [bind] [ipv6only=on|off] [reuseport]
[so_keepalive=on|off][keepidle][keepintvl][keepcnt];
```

**Default** —

**Context:** server

Sets the address and port for the socket on which the server will accept connections. It is possible to specify just the port. The address can also be a hostname, for example:

```
listen 127.0.0.1:12345;
listen *:12345;    # same as *:12345
listen localhost:12345;
```

IPv6 addresses are specified in square brackets:

```
listen [::1]:12345;
listen [:]:12345;
```

UNIX-domain sockets are specified with the “unix:” prefix:

```
listen unix:/var/run/nginx.sock;
```
Port ranges (1.15.10) are specified with the first and last port separated by a hyphen:

```plaintext
listen 127.0.0.1:12345-12399;
listen 12345-12399;

The `ssl` parameter allows specifying that all connections accepted on this port should work in SSL mode.

The `udp` parameter configures a listening socket for working with datagrams (1.9.13). In order to handle packets from the same address and port in the same session, the `reuseport` parameter should also be specified.

The `proxy_protocol` parameter (1.11.4) allows specifying that all connections accepted on this port should use the PROXY protocol.

The PROXY protocol version 2 is supported since version 1.13.11.

The `listen` directive can have several additional parameters specific to socket-related system calls.

`fastopen=number`

enables “TCP Fast Open” for the listening socket (1.21.0) and limits the maximum length for the queue of connections that have not yet completed the three-way handshake.

Do not enable this feature unless the server can handle receiving the same SYN packet with data more than once.

`backlog=number`

sets the backlog parameter in the `listen` call that limits the maximum length for the queue of pending connections (1.9.2). By default, `backlog` is set to -1 on FreeBSD, DragonFly BSD, and macOS, and to 511 on other platforms.

`rcvbuf=size`

sets the receive buffer size (the `SO_RCVBUF` option) for the listening socket (1.11.13).

`sndbuf=size`

sets the send buffer size (the `SO_SNDBUF` option) for the listening socket (1.11.13).

`bind`

this parameter instructs to make a separate `bind` call for a given address:port pair. The fact is that if there are several `listen` directives with the same port but different addresses, and one of the `listen` directives listens on all addresses for the given port (`*:port`), nginx will `bind` only to `*:port`. It should be noted that the `getsockname` system call will be made in this case to determine the address that accepted the connection. If the `backlog`, `rcvbuf`, `sndbuf`, `ipv6only`, `reuseport`, or `so_keepalive` parameters are used then for a given `address:port` pair a separate `bind` call will always be made.
ipv6only=on|off
this parameter determines (via the IPV6_V6ONLY socket option) whether an IPv6 socket listening on a wildcard address [::] will accept only IPv6 connections or both IPv6 and IPv4 connections. This parameter is turned on by default. It can only be set once on start.

reuseport
describes parameter (1.9.1) instructs to create an individual listening socket for each worker process (using the SO_REUSEPORT socket option on Linux 3.9+ and DragonFly BSD, or SO_REUSEPORT_LB on FreeBSD 12+), allowing a kernel to distribute incoming connections between worker processes. This currently works only on Linux 3.9+, DragonFly BSD, and FreeBSD 12+ (1.15.1).

Inappropriate use of this option may have its security implications.

so_keepalive=on|off|[keepidle]:[keepintvl]:[keepcnt]
this parameter configures the “TCP keepalive” behavior for the listening socket. If this parameter is omitted then the operating system’s settings will be in effect for the socket. If it is set to the value “on”, the SO_KEEPALIVE option is turned on for the socket. If it is set to the value “off”, the SO_KEEPALIVE option is turned off for the socket. Some operating systems support setting of TCP keepalive parameters on a per-socket basis using the TCP_KEEPIDLE, TCP_KEEPINTVL, and TCP_KEEPCNT socket options. On such systems (currently, Linux 2.4+, NetBSD 5+, and FreeBSD 9.0-STABLE), they can be configured using the keepidle, keepintvl, and keepcnt parameters. One or two parameters may be omitted, in which case the system default setting for the corresponding socket option will be in effect. For example,

```
so_keepalive=30m::10
```
will set the idle timeout (TCP_KEEPIDLE) to 30 minutes, leave the probe interval (TCP_KEEPINTVL) at its system default, and set the probes count (TCP_KEEPCNT) to 10 probes.

Different servers must listen on different address:port pairs.

preread_buffer_size

Syntax:  preread_buffer_size size;
Default 16k
Context: stream, server
This directive appeared in version 1.11.5.

Specifies a size of the preread buffer.
preread_timeout

**Syntax:** `preread_timeout timeout;`

**Default:** 30s

**Context:** stream, server

This directive appeared in version 1.11.5.

Specifies a `timeout` of the preread phase.

proxy_protocol_timeout

**Syntax:** `proxy_protocol_timeout timeout;`

**Default:** 30s

**Context:** stream, server

This directive appeared in version 1.11.4.

Specifies a `timeout` for reading the PROXY protocol header to complete. If no entire header is transmitted within this time, the connection is closed.

resolver

**Syntax:** `resolver address ...[valid=time] [ipv4=on|off] [ipv6=on|off] [status_zone=zone];`

**Default:** —

**Context:** stream, server

This directive appeared in version 1.11.3.

Configures name servers used to resolve names of upstream servers into addresses, for example:

```
resolver 127.0.0.1 [::1]:5353;
```

The address can be specified as a domain name or IP address, with an optional port. If port is not specified, the port 53 is used. Name servers are queried in a round-robin fashion.

By default, nginx will look up both IPv4 and IPv6 addresses while resolving. If looking up of IPv4 or IPv6 addresses is not desired, the `ipv4=off` (1.23.1) or the `ipv6=off` parameter can be specified.

By default, nginx caches answers using the TTL value of a response. The optional `valid` parameter allows overriding it:

```
resolver 127.0.0.1 [::1]:5353 valid=30s;
```

To prevent DNS spoofing, it is recommended configuring DNS servers in a properly secured trusted local network.

The optional `status_zone` parameter (1.17.1) enables collection of DNS server statistics of requests and responses in the specified `zone`. The parameter is available as part of our commercial subscription.
Before version 1.11.3, this directive was available as part of our commercial subscription.

**resolver_timeout**

**Syntax:** `resolver_timeout time;`

**Default:** 30s

**Context:** stream, server

This directive appeared in version 1.11.3.

Sets a timeout for name resolution, for example:

```
resolver_timeout 5s;
```

Before version 1.11.3, this directive was available as part of our commercial subscription.

**server**

**Syntax:** `server {...}

**Default:** —

**Context:** stream

Sets the configuration for a server.

**stream**

**Syntax:** `stream {...}

**Default:** —

**Context:** main

Provides the configuration file context in which the stream server directives are specified.

**tcp_nodelay**

**Syntax:** `tcp_nodelay on | off;`

**Default:** on

**Context:** stream, server

This directive appeared in version 1.9.4.

Enables or disables the use of the TCP_NODELAY option. The option is enabled for both client and proxied server connections.

**variables_hash_bucket_size**

**Syntax:** `variables_hash_bucket_size size;`

**Default:** 64

**Context:** stream
Sets the bucket size for the variables hash table. The details of setting up hash tables are provided in a separate document.

**variables_hash_max_size**

Syntax:  
`variables_hash_max_size size;`

Default: 1024

Context: stream

This directive appeared in version 1.11.2.

Sets the maximum size of the variables hash table. The details of setting up hash tables are provided in a separate document.

### 3.1.4 Embedded Variables

The `ngx_stream_core_module` module supports variables since 1.11.2.

- `$binary_remote_addr`
  
  client address in a binary form, value's length is always 4 bytes for IPv4 addresses or 16 bytes for IPv6 addresses

- `$bytes_received`
  
  number of bytes received from a client (1.11.4)

- `$bytes_sent`
  
  number of bytes sent to a client

- `$connection`
  
  connection serial number

- `$hostname`
  
  host name

- `$msec`
  
  current time in seconds with the milliseconds resolution

- `$nginx_version`
  
  nginx version

- `$pid`
  
  PID of the worker process

- `$protocol`
  
  protocol used to communicate with the client: TCP or UDP (1.11.4)

- `$proxy_protocol_addr`
  
  client address from the PROXY protocol header (1.11.4)

  The PROXY protocol must be previously enabled by setting the `proxy_protocol` parameter in the `listen` directive.

- `$proxy_protocol_port`
  
  client port from the PROXY protocol header (1.11.4)

  The PROXY protocol must be previously enabled by setting the `proxy_protocol` parameter in the `listen` directive.

- `$proxy_protocol_server_addr`
  
  server address from the PROXY protocol header (1.17.6)
The PROXY protocol must be previously enabled by setting the `proxy_protocol` parameter in the `listen` directive.

```
$proxy_protocol_server_port
```
server port from the PROXY protocol header (1.17.6)

The PROXY protocol must be previously enabled by setting the `proxy_protocol` parameter in the `listen` directive.

```
$proxy_protocol_tlv_name
```
TLV from the PROXY Protocol header (1.23.2). The `name` can be a TLV type name or its numeric value. In the latter case, the value is hexadecimal and should be prefixed with `0x`:  

```
$proxy_protocol_tlv_alpn
$proxy_protocol_tlv_0x01
```

SSL TLVs can also be accessed by TLV type name or its numeric value, both prefixed by `ssl_`:

```
$proxy_protocol_tlv_ssl_version
$proxy_protocol_tlv_ssl_0x21
```

The following TLV type names are supported:
- `alpn (0x01)` - upper layer protocol used over the connection
- `authority (0x02)` - host name value passed by the client
- `unique_id (0x05)` - unique connection id
- `netns (0x30)` - name of the namespace
- `ssl (0x20)` - binary SSL TLV structure

The following SSL TLV type names are supported:
- `ssl_version (0x21)` - SSL version used in client connection
- `ssl_cn (0x22)` - SSL certificate Common Name
- `ssl_cipher (0x23)` - name of the used cipher
- `ssl_sig_alg (0x24)` - algorithm used to sign the certificate
- `ssl_key_alg (0x25)` - public-key algorithm

Also, the following special SSL TLV type name is supported:
- `ssl_verify` - client SSL certificate verification result, zero if the client presented a certificate and it was successfully verified, and non-zero otherwise

The PROXY protocol must be previously enabled by setting the `proxy_protocol` parameter in the `listen` directive.

```
$remote_addr
```
client address

```
$remote_port
```
client port
\$server_addr
an address of the server which accepted a connection
Computing a value of this variable usually requires one system call. To avoid a system call, the listen directives must specify addresses and use the bind parameter.

\$server_port
port of the server which accepted a connection

\$session_time
session duration in seconds with a milliseconds resolution (1.11.4);

\$status
session status (1.11.4), can be one of the following:
\1200\n\  session completed successfully
\400\n\  client data could not be parsed, for example, the PROXY protocol header
\403\n\  access forbidden, for example, when access is limited for certain client addresses
\500\n\  internal server error
\502\n\  bad gateway, for example, if an upstream server could not be selected or reached.
\503\n\  service unavailable, for example, when access is limited by the number of connections

\$time_iso8601
local time in the ISO 8601 standard format

\$time_local
local time in the Common Log Format
## 3.2 Module ngx_stream_access_module

### 3.2.1 Summary

The `ngx_stream_access_module` module (1.9.2) allows limiting access to certain client addresses.

### 3.2.2 Example Configuration

```bash
server {
    ...
    deny 192.168.1.1;
    allow 192.168.1.0/24;
    allow 10.1.1.0/16;
    allow 2001:0db8::/32;
    deny all;
}
```

The rules are checked in sequence until the first match is found. In this example, access is allowed only for IPv4 networks 10.1.1.0/16 and 192.168.1.0/24 excluding the address 192.168.1.1, and for IPv6 network 2001:0db8::/32.

### 3.2.3 Directives

**allow**

**Syntax:** `allow address | CIDR | unix: | all;`

**Default**

**Context:** stream, server

Allows access for the specified network or address. If the special value `unix:` is specified, allows access for all UNIX-domain sockets.

**deny**

**Syntax:** `deny address | CIDR | unix: | all;`

**Default**

**Context:** stream, server

Denies access for the specified network or address. If the special value `unix:` is specified, denies access for all UNIX-domain sockets.
CHAPTER 3. STREAM SERVER MODULES

3.3 Module ngx_stream_geo_module

3.3.1 Summary

The ngx_stream_geo_module module (1.11.3) creates variables with values depending on the client IP address.

3.3.2 Example Configuration

```bash
geo $geo {
    default 0;
    127.0.0.1 2;
    192.168.1.0/24 1;
    10.1.0.0/16 1;
    ::1 2;
    2001:0db8::/32 1;
}
```

3.3.3 Directives

geo

**Syntax:** geo [\$address] \$variable { ... }

**Default** —

**Context:** stream

Describes the dependency of values of the specified variable on the client IP address. By default, the address is taken from the \$remote_addr variable, but it can also be taken from another variable, for example:

```bash
geo $arg_remote_addr $geo {
    ...;
}
```

Since variables are evaluated only when used, the mere existence of even a large number of declared “geo” variables does not cause any extra costs for connection processing.

If the value of a variable does not represent a valid IP address then the “255.255.255.255” address is used.

Addresses are specified either as prefixes in CIDR notation (including individual addresses) or as ranges.

The following special parameters are also supported:
delete
deletes the specified network.

default
a value set to the variable if the client address does not match any of
the specified addresses. When addresses are specified in CIDR notation,
“0.0.0.0/0” and “::/0” can be used instead of default. When
default is not specified, the default value will be an empty string.

include
includes a file with addresses and values. There can be several inclusions.

ranges
indicates that addresses are specified as ranges. This parameter should
be the first. To speed up loading of a geo base, addresses should be put
in ascending order.

Example:

```
geo $country {
    default  ZZ;
    include  conf/geo.conf;
    delete   127.0.0.0/16;
    127.0.0.0/24  US;
    127.0.0.1/32  RU;
    10.1.0.0/16   RU;
    192.168.1.0/24 UK;
}
```

The `conf/geo.conf` file could contain the following lines:

```
10.2.0.0/16   RU;
192.168.2.0/24 RU;
```

A value of the most specific match is used. For example, for the 127.0.0.1
address the value “RU” will be chosen, not “US”.

Example with ranges:

```
geo $country {
    ranges;
    default  ZZ;
    127.0.0.0-127.0.0.0  US;
    127.0.0.1-127.0.0.1  RU;
    127.0.0.1-127.0.0.255 US;
    10.1.0.0-10.1.255.255 RU;
    192.168.1.0-192.168.1.255 UK;
}
```
3.4 Module ngx_stream_geoip_module

3.4.1 Summary

The ngx_stream_geoip_module module (1.11.3) creates variables with values depending on the client IP address, using the precompiled MaxMind databases.

When using the databases with IPv6 support, IPv4 addresses are looked up as IPv4-mapped IPv6 addresses.

This module is not built by default, it should be enabled with the --with-stream_geoip_module configuration parameter.

This module requires the MaxMind GeoIP library.

3.4.2 Example Configuration

```
stream {
    geoip_country GeoIP.dat;
    geoip_city GeoLiteCity.dat;
    map $geoip_city_continent_code $nearest_server {
        default example.com;
        EU eu.example.com;
        NA na.example.com;
        AS as.example.com;
    }
}
```

3.4.3 Directives

**geoip_country**

**Syntax:** `geoip_country file;`

**Default:** —

**Context:** stream

Specifies a database used to determine the country depending on the client IP address. The following variables are available when using this database:

`$geoip_country_code`

two-letter country code, for example, “RU”, “US”.
$geoip\_country\_code3$
  three-letter country code, for example, “RUS”, “USA”.

$geoip\_country\_name$
  country name, for example, “Russian Federation”, “United States”.

**geoip\_city**

    Syntax:    geoip\_city file;
    Default    —
    Context: stream

Specifies a database used to determine the country, region, and city depending on the client IP address. The following variables are available when using this database:

$geoip\_area\_code$
  telephone area code (US only).

This variable may contain outdated information since the corresponding database field is deprecated.

$geoip\_city\_continent\_code$
  two-letter continent code, for example, “EU”, “NA”.

$geoip\_city\_country\_code$
  two-letter country code, for example, “RU”, “US”.

$geoip\_city\_country\_code3$
  three-letter country code, for example, “RUS”, “USA”.

$geoip\_city\_country\_name$
  country name, for example, “Russian Federation”, “United States”.

$geoip\_dma\_code$
  DMA region code in US (also known as “metro code”), according to the geotargeting in Google AdWords API.

$geoip\_latitude$
  latitude.

$geoip\_longitude$
  longitude.

$geoip\_region$
  two-symbol country region code (region, territory, state, province, federal land and the like), for example, “48”, “DC”.

$geoip\_region\_name$
  country region name (region, territory, state, province, federal land and the like), for example, “Moscow City”, “District of Columbia”.

$geoip\_city$
  city name, for example, “Moscow”, “Washington”.

$geoip\_postal\_code$
  postal code.
geoi_p.org

Syntax: geoi_p.org file;
Default —
Context: stream

Specifies a database used to determine the organization depending on the client IP address. The following variable is available when using this database:

$geoi_p.org

organization name, for example, “The University of Melbourne”.
3.5 Module ngx_stream_js_module

3.5.1 Summary ............................................. 417
3.5.2 Example Configuration .............................. 417
3.5.3 Directives ............................................. 419
    js_access ............................................. 419
    js_fetch_buffer_size ................................. 419
    js_fetch_ciphers ...................................... 419
    js_fetch_max_response_buffer_size ................. 419
    js_fetch_protocols .................................. 420
    js_fetch_timeout ..................................... 420
    js_fetch_trusted_certificate ....................... 420
    js_fetch_verify ....................................... 420
    js_fetch_verify_depth ............................... 420
    js_filter ............................................. 421
    js_import ............................................. 421
    js_include ........................................... 421
    js_path ............................................... 422
    js_preload_object .................................... 422
    js_preread ............................................ 422
    js_set ................................................. 423
    js_shared_dict_zone .................................. 423
    js_var ................................................ 424
3.5.4 Session Object Properties .......................... 424

3.5.1 Summary
The ngx_stream_js_module module is used to implement handlers in njs — a subset of the JavaScript language.
Download and install instructions are available here.

3.5.2 Example Configuration
The example works since 0.4.0.

```plaintext
stream {
    js_import stream.js;
    js_set $bar stream.bar;
    js_set $req_line stream.req_line;
}
server {
    listen 12345;
    js_preread stream.preread;
    return $req_line;
}
server {
    listen 12346;
    js_access stream.access;
    proxy_pass 127.0.0.1:8000;
}```
The `stream.js` file:

```javascript
var line = '';  
function bar(s) {  
  var v = s.variables;  
  s.log("hello from bar() handler!");  
  return "bar-var" + v.remote_port + "; pid=" + v.pid;  
}

function preread(s) {  
  s.on('upload', function (data, flags) {  
    var n = data.indexOf('
');  
    if (n != -1) {  
      line = data.substr(0, n);  
      s.done();  
    }  
  });  
}

function req_line(s) {  
  return line;  
}

// Read HTTP request line.  
// Collect bytes in 'req' until  
// request line is read.  
// Injects HTTP header into a client’s request  
var my_header = 'Foo: foo';  
function header_inject(s) {  
  var req = '';  
  s.on('upload', function(data, flags) {  
    req += data;  
    var n = req.search('
');  
    if (n != -1) {  
      var rest = req.substr(n + 1);  
      req = req.substr(0, n + 1);  
      s.send(req + my_header + '
' + rest, flags);  
      s.off('upload');  
    }  
  });  
}

function access(s) {  
  if (s.remoteAddress.match('^192.*')) {  
    s.deny();  
    return;  
  }  
  s.allow();  
}

export default {bar, preread, req_line, header_inject, access};
```
3.5.3 Directives

**js_access**

**Syntax:**  
`js_access function | module.function;`

**Default:**  
—

**Context:** stream, server

Sets an njs function which will be called at the access phase. Since 0.4.0, a module function can be referenced.

The function is called once at the moment when the stream session reaches the access phase for the first time. The function is called with the following arguments:

\[ s \]

the Stream Session object

At this phase, it is possible to perform initialization or register a callback with the `s.on()` method for each incoming data chunk until one of the following methods are called: `s.allow()`, `s.decline()`, `s.done()`. As soon as one of these methods is called, the stream session processing switches to the next phase and all current `s.on()` callbacks are dropped.

**js_fetch_buffer_size**

**Syntax:**  
`js_fetch_buffer_size size;`

**Default:**  
16k

**Context:** stream, server

This directive appeared in version 0.7.4.

Sets the `size` of the buffer used for reading and writing with Fetch API.

**js_fetch_ciphers**

**Syntax:**  
`js_fetch_ciphers ciphers;`

**Default:**  
HIGH:!aNULL:!MD5

**Context:** stream, server

This directive appeared in version 0.7.0.

Specifies the enabled ciphers for HTTPS connections with Fetch API. The ciphers are specified in the format understood by the OpenSSL library.

The full list can be viewed using the “openssl ciphers” command.

**js_fetch_max_response_buffer_size**

**Syntax:**  
`js_fetch_max_response_buffer_size size;`

**Default:**  
1m

**Context:** stream, server

This directive appeared in version 0.7.4.

Sets the maximum `size` of the response received with Fetch API.
js_fetch_protocols

**Syntax:**
```
js_fetch_protocols [TLSv1] [TLSv1.1] [TLSv1.2] [TLSv1.3];
```

**Default:** TLSv1 TLSv1.1 TLSv1.2

**Context:** stream, server

This directive appeared in version 0.7.0.

Enables the specified protocols for HTTPS connections with Fetch API.

js_fetch_timeout

**Syntax:**
```
js_fetch_timeout time;
```

**Default:** 60s

**Context:** stream, server

This directive appeared in version 0.7.4.

Defines a timeout for reading and writing for Fetch API. The timeout is set only between two successive read/write operations, not for the whole response. If no data is transmitted within this time, the connection is closed.

js_fetch_trusted_certificate

**Syntax:**
```
js_fetch_trusted_certificate file;
```

**Default:** —

**Context:** stream, server

This directive appeared in version 0.7.0.

Specifies a file with trusted CA certificates in the PEM format used to verify the HTTPS certificate with Fetch API.

js_fetch_verify

**Syntax:**
```
js_fetch_verify on | off;
```

**Default:** on

**Context:** stream, server

This directive appeared in version 0.7.4.

Enables or disables verification of the HTTPS server certificate with Fetch API.

js_fetch_verify_depth

**Syntax:**
```
js_fetch_verify_depth number;
```

**Default:** 100

**Context:** stream, server

This directive appeared in version 0.7.0.

Sets the verification depth in the HTTPS server certificates chain with Fetch API.
**js_filter**

**Syntax:** `js_filter function | module.function;`

**Default:** —

**Context:** stream, server

Sets a data filter. Since 0.4.0, a module function can be referenced. The filter function is called once at the moment when the stream session reaches the content phase.

The filter function is called with the following arguments:

- `s` the Stream Session object

At this phase, it is possible to perform initialization or register a callback with the `s.on()` method for each incoming data chunk. The `s.off()` method may be used to unregister a callback and stop filtering.

As the `js_filter` handler returns its result immediately, it supports only synchronous operations. Thus, asynchronous operations such as `ngx.fetch()` or `setTimeout()` are not supported.

**js_import**

**Syntax:** `js_import module.js | export_name from module.js;`

**Default:** —

**Context:** stream, server

This directive appeared in version 0.4.0.

Imports a module that implements location and variable handlers in njs. The `export_name` is used as a namespace to access module functions. If the `export_name` is not specified, the module name will be used as a namespace.

```plaintext
js_import stream.js;
```

Here, the module name `stream` is used as a namespace while accessing exports. If the imported module exports `foo()`, `stream.foo` is used to refer to it.

Several `js_import` directives can be specified.

The directive can be specified on the server level since 0.7.7.

**js_include**

**Syntax:** `js_include file;`

**Default:** —

**Context:** stream

Specifies a file that implements server and variable handlers in njs:
The directive was made obsolete in version 0.4.0 and was removed in version 0.7.1. The \texttt{js_import} directive should be used instead.

\textbf{js_path}

\texttt{Syntax: } \texttt{js_path path};
\texttt{Default} —
\texttt{Context: stream, server}

This directive appeared in version 0.3.0.

Sets an additional path for njs modules.

The directive can be specified on the \texttt{server} level since 0.7.7.

\textbf{js_preload_object}

\texttt{Syntax: } \texttt{js_preload_object name.json | name from file.json};
\texttt{Default} —
\texttt{Context: stream, server}

This directive appeared in version 0.7.8.

Preloads an immutable object at configure time. The name is used a name of the global variable though which the object is available in njs code. If the name is not specified, the file name will be used instead.

\begin{verbatim}
js_preload_object map.json;
\end{verbatim}

Here, the \texttt{map} is used as a name while accessing the preloaded object. Several \texttt{js_preload_object} directives can be specified.

\textbf{js_preread}

\texttt{Syntax: } \texttt{js_preread function | module.function};
\texttt{Default} —
\texttt{Context: stream, server}

Sets an njs function which will be called at the preread phase. Since 0.4.0, a module function can be referenced.
The function is called once at the moment when the stream session reaches
the preread phase for the first time. The function is called with the following
arguments:

`s`
the Stream Session object

At this phase, it is possible to perform initialization or register a callback
with the `s.on()` method for each incoming data chunk until one of the
following methods are called: `s.allow()`, `s.decline()`, `s.done()`. When one of these methods is called, the stream session switches to the next
phase and all current `s.on()` callbacks are dropped.

As the `js_preread` handler returns its result immediately, it supports
only synchronous callbacks. Thus, asynchronous callbacks such as
`ngx.fetch()` or `setTimeout()` are not supported. Nevertheless,
asynchronous operations are supported in `s.on()` callbacks in the preread
phase. See this example for more information.

`js_set`

**Syntax:**

```
js_set $variable function | module.function;
```

**Default** —

**Context:** stream, server

Sets an njs function for the specified variable. Since 0.4.0, a module
function can be referenced.

The function is called when the variable is referenced for the first time for
a given request. The exact moment depends on a phase at which the variable
is referenced. This can be used to perform some logic not related to variable
evaluation. For example, if the variable is referenced only in the `log_format`
directive, its handler will not be executed until the log phase. This handler
can be used to do some cleanup right before the request is freed.

As the `js_set` handler returns its result immediately, it supports only
synchronous callbacks. Thus, asynchronous callbacks such as `ngx.fetch()` or
`setTimeout()` are not supported.

The directive can be specified on the server level since 0.7.7.

`js_shared_dict_zone`

**Syntax:**

```
js_shared_dict_zone zone=name:size [timeout=time]
[type=string|number] [evict];
```

**Default** —

**Context:** stream

This directive appeared in version 0.8.0.
Sets the name and size of the shared memory zone that keeps the key-value dictionary shared between worker processes.

By default the shared dictionary uses a string as a key and a value. The optional type parameter allows redefining the value type to number.

The optional timeout parameter sets the time after which all shared dictionary entries are removed from the zone.

The optional evict parameter removes the oldest key-value pair when the zone storage is exhausted.

Examples:

```conf
example.conf:
  # Creates a 1Mb dictionary with string values,
  # removes key-value pairs after 60 seconds of inactivity:
  js_shared_dict_zone zone=foo:1M timeout=60s;

  # Creates a 512Kb dictionary with string values,
  # forcibly removes oldest key-value pairs when the zone is exhausted:
  js_shared_dict_zone zone=bar:512K timeout=30s evict;

  # Creates a 32Kb permanent dictionary with number values:
  js_shared_dict_zone zone=num:32k type=number;
```

```js
example.js:
  function get(r) {
    r.return(200, ngx.shared.foo.get(r.args.key));
  }

  function set(r) {
    r.return(200, ngx.shared.foo.set(r.args.key, r.args.value));
  }

  function delete(r) {
    r.return(200, ngx.shared.bar.delete(r.args.key));
  }

  function increment(r) {
    r.return(200, ngx.shared.num.incr(r.args.key, 2));
  }
```

### js_var

**Syntax:** `js_var $variable [value];`

**Default** —

**Context:** stream, server

This directive appeared in version 0.5.3.

Declares a writable variable. The value can contain text, variables, and their combination.

The directive can be specified on the server level since 0.7.7.

### 3.5.4 Session Object Properties

Each stream njs handler receives one argument, a stream session object.
3.6 Module ngx_stream_keyval_module

3.6.1 Summary

The ngx_stream_keyval_module module (1.13.7) creates variables with values taken from key-value pairs managed by the API or a variable that can also be set with njs.

This module is available as part of our commercial subscription.

3.6.2 Example Configuration

http {
    server {
        ...
        location /api {
            api write=on;
        }
    }
}
stream {
    keyval_zone zone=one:32k state=/var/lib/nginx/state/one.keyval;
    keyval $ssl_server_name $name zone=one;
    server {
        listen 12345 ssl;
        proxy_pass $name;
        ssl_certificate /usr/local/nginx/conf/cert.pem;
        ssl_certificate_key /usr/local/nginx/conf/cert.key;
    }
}

3.6.3 Directives

keyval

Syntax: keyval key $variable zone=name;
Default —
Context: stream

Creates a new $variable whose value is looked up by the key in the key-value database. Matching rules are defined by the type parameter of the keyval_zone directive. The database is stored in a shared memory zone specified by the zone parameter.
keyval_zone

**Syntax:**
```
keyval_zone zone=name: size [state=file] [timeout=time] 
[type=string|ip|prefix] [sync];
```

**Default** — 

**Context:** stream

Sets the *name* and *size* of the shared memory zone that keeps the key-value database. Key-value pairs are managed by the API.

The optional *state* parameter specifies a *file* that keeps the current state of the key-value database in the JSON format and makes it persistent across nginx restarts. Changing the file content directly should be avoided.

Examples:
```
keyval_zone zone=one:32k state=/var/lib/nginx/state/one.keyval; # path for Linux
keyval_zone zone=one:32k state=/var/db/nginx/state/one.keyval; # path for FreeBSD
```

The optional *timeout* parameter (1.15.0) sets the time after which key-value pairs are removed from the zone.

The optional *type* parameter (1.17.1) activates an extra index optimized for matching the key of a certain type and defines matching rules when evaluating a `keyval $variable`.

The index is stored in the same shared memory zone and thus requires additional storage.

**type=string**
- default, no index is enabled; variable lookup is performed using exact match of the record key and a search key

**type=ip**
- the search key is the textual representation of IPv4 or IPv6 address or CIDR range; to match a record key, the search key must belong to a subnet specified by a record key or exactly match an IP address

**type=prefix**
- variable lookup is performed using prefix match of a record key and a search key (1.17.5); to match a record key, the record key must be a prefix of the search key

The optional *sync* parameter (1.15.0) enables synchronization of the shared memory zone. The synchronization requires the *timeout* parameter to be set.

If the synchronization is enabled, removal of key-value pairs (no matter *one* or *all*) will be performed only on a target cluster node. The same key-value pairs on other cluster nodes will be removed upon *timeout*. 
3.7 Module ngx_stream_limit_conn_module

3.7.1 Summary

The ngx_stream_limit_conn_module module (1.9.3) is used to limit the number of connections per the defined key, in particular, the number of connections from a single IP address.

3.7.2 Example Configuration

```nginx
stream {
    limit_conn_zone $binary_remote_addr zone=addr:10m;
    ...
    server {
        ...
        limit_conn addr 1;
        limit_conn_log_level error;
    }
}
```

3.7.3 Directives

**limit_conn**

**Syntax:** `limit_conn zone number;`

**Default** —

**Context:** stream, server

Sets the shared memory zone and the maximum allowed number of connections for a given key value. When this limit is exceeded, the server will close the connection. For example, the directives

```nginx
limit_conn_zone $binary_remote_addr zone=addr:10m;
server {
    ...
    limit_conn addr 1;
}
```
allow only one connection per an IP address at a time.
When several limit_conn directives are specified, any configured limit will apply.
These directives are inherited from the previous configuration level if and only if there are no limit_conn directives defined on the current level.

**limit_conn_dry_run**

**Syntax:**  
```plaintext
limit_conn_dry_run on | off;
```
**Default:**  
off
**Context:** stream, server

This directive appeared in version 1.17.6.

Enables the dry run mode. In this mode, the number of connections is not limited, however, in the shared memory zone, the number of excessive connections is accounted as usual.

**limit_conn_log_level**

**Syntax:**  
```plaintext
limit_conn_log_level info | notice | warn | error;
```
**Default:**  
error
**Context:** stream, server

Sets the desired logging level for cases when the server limits the number of connections.

**limit_conn_zone**

**Syntax:**  
```plaintext
limit_conn_zone key zone=name:size;
```
**Default:**  
—
**Context:** stream

Sets parameters for a shared memory zone that will keep states for various keys. In particular, the state includes the current number of connections. The `key` can contain text, variables, and their combinations (1.11.2). Connections with an empty key value are not accounted. Usage example:

```plaintext
limit_conn_zone $binary_remote_addr zone=addr:10m;
```

Here, the key is a client IP address set by the `$binary_remote_addr` variable. The size of `$binary_remote_addr` is 4 bytes for IPv4 addresses or 16 bytes for IPv6 addresses. The stored state always occupies 32 or 64 bytes on 32-bit platforms and 64 bytes on 64-bit platforms. One megabyte zone can keep about 32 thousand 32-byte states or about 16 thousand 64-byte states. If the zone storage is exhausted, the server will close the connection.

Additionally, as part of our commercial subscription, the status information for each such shared memory zone can be obtained or reset with the API since 1.17.7.
3.7.4 Embedded Variables

$\text{limit_conn_status}$

keeps the result of limiting the number of connections (1.17.6): PASSED, REJECTED, or REJECTED\_DRY\_RUN
3.8 Module ngx_stream_log_module

3.8.1 Summary
The ngx_stream_log_module module (1.11.4) writes session logs in the specified format.

3.8.2 Example Configuration

```
log_format basic '$remote_addr [$time_local] ' ' $protocol $status $bytes_sent $bytes_received ' ' $session_time';
access_log /spool/logs/nginx-access.log basic buffer=32k;
```

3.8.3 Directives

**access_log**

**Syntax:**
```
access_log path format [buffer=size] [gzip=[level]] [flush=time] [if=condition];
```

**Default:** off

**Context:** stream, server

Sets the path, format, and configuration for a buffered log write. Several logs can be specified on the same configuration level. Logging to syslog can be configured by specifying the “syslog:” prefix in the first parameter. The special value off cancels all access_log directives on the current level.

If either the buffer or gzip parameter is used, writes to log will be buffered.

The buffer size must not exceed the size of an atomic write to a disk file. For FreeBSD this size is unlimited.

When buffering is enabled, the data will be written to the file:

- if the next log line does not fit into the buffer;
- if the buffered data is older than specified by the flush parameter;
- when a worker process is re-opening log files or is shutting down.
If the gzip parameter is used, then the buffered data will be compressed before writing to the file. The compression level can be set between 1 (fastest, less compression) and 9 (slowest, best compression). By default, the buffer size is equal to 64K bytes, and the compression level is set to 1. Since the data is compressed in atomic blocks, the log file can be decompressed or read by “zcat” at any time.

Example:

```plaintext
access_log /path/to/log.gz basic gzip flush=5m;
```

For gzip compression to work, nginx must be built with the zlib library.

The file path can contain variables, but such logs have some constraints:

- the user whose credentials are used by worker processes should have permissions to create files in a directory with such logs;
- buffered writes do not work;
- the file is opened and closed for each log write. However, since the descriptors of frequently used files can be stored in a cache, writing to the old file can continue during the time specified by the open_log_file_cache directive’s valid parameter.

The if parameter enables conditional logging. A session will not be logged if the condition evaluates to “0” or an empty string.

**log_format**

**Syntax:**

```
log_format name [escape=default|json|none] string...;
```

**Default** —

**Context:** stream

Specifies the log format, for example:

```plaintext
log_format proxy '$remote_addr [$time_local] ' 
' $protocol $status $bytes_sent $bytes_received ' 
' $session_time "$upstream_addr" ' 
' "$upstream_bytes_sent" "$upstream_bytes_received" ' 
' $upstream_connect_time";
```

The escape parameter (1.11.8) allows setting json or default characters escaping in variables, by default, default escaping is used. The none parameter (1.13.10) disables escaping.

For default escaping, characters “"”, “\”, and other characters with values less than 32 or above 126 are escaped as “\xxx”. If the variable value is not found, a hyphen (“-”) will be logged.

For json escaping, all characters not allowed in JSON strings will be escaped: characters “"” and “\” are escaped as “\"” and “\\”, characters with values less than 32 are escaped as “\n”, “\r”, “\t”, “\b”, “\f”, or “\u00XX”.

Nginx, Inc.  p.431 of 542
**open_log_file_cache**

**Syntax:**
```
open_log_file_cache max=N[inactive=time] [min_uses=N] [valid=time];
```

**Syntax:**
```
open_log_file_cache off;
```

**Default**
```
off
```

**Context:** stream, server

Defines a cache that stores the file descriptors of frequently used logs whose names contain variables. The directive has the following parameters:

- **max**
  sets the maximum number of descriptors in a cache; if the cache becomes full the least recently used (LRU) descriptors are closed

- **inactive**
  sets the time after which the cached descriptor is closed if there were no access during this time; by default, 10 seconds

- **min_uses**
  sets the minimum number of file uses during the time defined by the inactive parameter to let the descriptor stay open in a cache; by default, 1

- **valid**
  sets the time after which it should be checked that the file still exists with the same name; by default, 60 seconds

- **off**
  disables caching

**Usage example:**
```
open_log_file_cache max=1000 inactive=20s valid=1m min_uses=2;
```
3.9 Module ngx_stream_map_module

3.9.1 Summary

The ngx_stream_map_module module (1.11.2) creates variables whose values depend on values of other variables.

3.9.2 Example Configuration

map $remote_addr $limit {
127.0.0.1 "";
default $binary_remote_addr;
}
limit_conn_zone $limit zone=addr:10m;
limit_conn addr 1;

3.9.3 Directives

map

Syntax: map string $variable {...}

Default —

Context: stream

Creates a new variable whose value depends on values of one or more of the source variables specified in the first parameter.

Since variables are evaluated only when they are used, the mere declaration even of a large number of “map” variables does not add any extra costs to connection processing.

Parameters inside the map block specify a mapping between source and resulting values.

Source values are specified as strings or regular expressions.

Strings are matched ignoring the case.

A regular expression should either start from the “~” symbol for a case-sensitive matching, or from the “~*” symbols for case-insensitive matching. A regular expression can contain named and positional captures that can later be used in other directives along with the resulting variable.
If a source value matches one of the names of special parameters described below, it should be prefixed with the “\” symbol.

The resulting value can contain text, variable, and their combination.

The following special parameters are also supported:

- **default**
  - sets the resulting value if the source value matches none of the specified variants. When default is not specified, the default resulting value will be an empty string.

- **hostnames**
  - indicates that source values can be hostnames with a prefix or suffix mask:

    ```
    *.example.com 1;
    example.* 1;
    ```

  The following two records

    ```
    example.com 1;
    *.example.com 1;
    ```

  can be combined:

    ```
    .example.com 1;
    ```

  This parameter should be specified before the list of values.

- **include**
  - includes a file with values. There can be several inclusions.

- **volatile**
  - indicates that the variable is not cacheable (1.11.7).

If the source value matches more than one of the specified variants, e.g. both a mask and a regular expression match, the first matching variant will be chosen, in the following order of priority:

1. string value without a mask
2. longest string value with a prefix mask, e.g. “*.example.com”
3. longest string value with a suffix mask, e.g. “mail.*”
4. first matching regular expression (in order of appearance in a configuration file)
5. default value

**map_hash_bucket_size**

Syntax: `map_hash_bucket_size size;`

Default: 32|64|128

Context: stream

Nginx, Inc. p.434 of 542
Sets the bucket size for the map variables hash tables. Default value depends on the processor's cache line size. The details of setting up hash tables are provided in a separate document.

**map_hash_max_size**

Syntax: `map_hash_max_size size;`
Default: 2048
Context: stream

Sets the maximum size of the map variables hash tables. The details of setting up hash tables are provided in a separate document.
3.10 Module ngx_stream_mqtt_filter_module

3.10.1 Summary

The ngx_stream_mqtt_filter_module module (1.23.4) provides support for Message Queuing Telemetry Transport protocol (MQTT) versions 3.1.1 and 5.0.

This module is available as part of our commercial subscription.

3.10.2 Example Configuration

```nginx
listen 127.0.0.1:18883;
proxy_pass backend;
proxy_buffer_size 16k;

mqtt on;
mqtt_set_connect clientid "$client";
mqtt_set_connect username "$name";
```

3.10.3 Directives

mqtt

**Syntax:** `mqtt on | off;`

**Default:** `off`

**Context:** `stream, server`

Enables the MQTT protocol for the given virtual server.

mqtt_buffers

**Syntax:** `mqtt_buffers number size;`

**Default:** `100 1k`

**Context:** `stream, server`

This directive appeared in version 1.25.1.

Sets the `number` and `size` of the buffers used for handling MQTT messages, for a single connection.
**mqtt_rewrite_buffer_size**

**Syntax:**    
`mqtt_rewrite_buffer_size size;`

**Default:**  
4k | 8k

**Context:** server

This directive is obsolete since version 1.25.1. The `mqtt_buffers` directive should be used instead.

Sets the `size` of the buffer used for writing a modified message. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform. It can be made smaller, however.

**mqtt_set_connect**

**Syntax:**    
`mqtt_set_connect field value;`

**Default:** —

**Context:** server

Sets the message `field` to the given `value` for CONNECT message. The following fields are supported: `clientid`, `username`, and `password`. The value can contain text, variables, and their combination.

Several `mqtt_set_connect` directives can be specified on the same level:

```
mqtt_set_connect clientid "$client";
mqtt_set_connect username "$name";
```
CHAPTER 3. STREAM SERVER MODULES

3.11 Module ngx_stream_mqtt_preread_module

3.11.1 Summary

The ngx_stream_mqtt_preread_module module (1.23.4) allows extracting information from the CONNECT message of the Message Queuing Telemetry Transport protocol (MQTT) versions 3.1.1 and 5.0, for example, a username or a client ID.

This module is available as part of our commercial subscription.

3.11.2 Example Configuration

```/nginx
mqtt_preread on;
return $mqtt_preread_clientid;
```

3.11.3 Directives

`mqtt_preread`

Syntax: `mqtt_preread on | off;`

Default: off

Context: stream, server

Enables extracting information from the MQTT CONNECT message at the preread phase.

3.11.4 Embedded Variables

- `$mqtt_preread_clientid`:
  
  the clientid value from the CONNECT message

- `$mqtt_preread_username`:
  
  the username value from the CONNECT message
3.12 Module ngx_stream_proxy_module

3.12.1 Summary

The ngx_stream_proxy_module module (1.9.0) allows proxying data streams over TCP, UDP (1.9.13), and UNIX-domain sockets.

3.12.2 Example Configuration

```nginx
server {
    listen 127.0.0.1:12345;
    proxy_pass 127.0.0.1:8080;
}
```

Nginx, Inc. p.439 of 542
3.12.3 Directives

**proxy_bind**

**Syntax:**  
`proxy_bind address [transparent] | off;`

**Default:**  
off

**Context:**  
stream, server

This directive appeared in version 1.9.2.

Makes outgoing connections to a proxied server originate from the specified local IP address. Parameter value can contain variables (1.11.2). The special value off cancels the effect of the `proxy_bind` directive inherited from the previous configuration level, which allows the system to auto-assign the local IP address.

The transparent parameter (1.11.0) allows outgoing connections to a proxied server originate from a non-local IP address, for example, from a real IP address of a client:

```
proxy_bind $remote_addr transparent;
```

In order for this parameter to work, it is usually necessary to run nginx worker processes with the superuser privileges. On Linux it is not required (1.13.8) as if the transparent parameter is specified, worker processes inherit the CAP_NET_RAW capability from the master process. It is also necessary to configure kernel routing table to intercept network traffic from the proxied server.

**proxy_buffer_size**

**Syntax:**  
`proxy_buffer_size size;`

**Default:**  
16k

**Context:**  
stream, server

This directive appeared in version 1.9.4.
Sets the size of the buffer used for reading data from the proxied server. Also sets the size of the buffer used for reading data from the client.

**proxy_connect_timeout**

**Syntax:**  
`proxy_connect_timeout time;`

**Default:** 60s

**Context:** stream, server

Defines a timeout for establishing a connection with a proxied server.

**proxy_download_rate**

**Syntax:**  
`proxy_download_rate rate;`

**Default:** 0

**Context:** stream, server

This directive appeared in version 1.9.3.

Limits the speed of reading the data from the proxied server. The rate is specified in bytes per second. The zero value disables rate limiting. The limit is set per a connection, so if nginx simultaneously opens two connections to the proxied server, the overall rate will be twice as much as the specified limit.

Parameter value can contain variables (1.17.0). It may be useful in cases where rate should be limited depending on a certain condition:

```bash
map $slow $rate {
    1 4k;
    2 8k;
}

proxy_download_rate $rate;
```

**proxy_half_close**

**Syntax:**  
`proxy_half_close on | off;`

**Default:** off

**Context:** stream, server

This directive appeared in version 1.21.4.

Enables or disables closing each direction of a TCP connection independently (“TCP half-close”). If enabled, proxying over TCP will be kept until both sides close the connection.

**proxy_next_upstream**

**Syntax:**  
`proxy_next_upstream on | off;`

**Default:** on

**Context:** stream, server

When a connection to the proxied server cannot be established, determines whether a client connection will be passed to the next server.
Passing a connection to the next server can be limited by the number of tries and by time.

**proxy_next_upstream_timeout**

**Syntax:**

`proxy_next_upstream_timeout time;`

**Default:** 0

**Context:** stream, server

Limits the time allowed to pass a connection to the next server. The 0 value turns off this limitation.

**proxy_next_upstream_tries**

**Syntax:**

`proxy_next_upstream_tries number;`

**Default:** 0

**Context:** stream, server

Limits the number of possible tries for passing a connection to the next server. The 0 value turns off this limitation.

**proxy_pass**

**Syntax:**

`proxy_pass address;`

**Default:** —

**Context:** server

Sets the address of a proxied server. The address can be specified as a domain name or IP address, and a port:

```plaintext
proxy_pass localhost:12345;
```

or as a UNIX-domain socket path:

```plaintext
proxy_pass unix:/tmp/stream.socket;
```

If a domain name resolves to several addresses, all of them will be used in a round-robin fashion. In addition, an address can be specified as a server group.

The address can also be specified using variables (1.11.3):

```plaintext
proxy_pass $upstream;
```

In this case, the server name is searched among the described server groups, and, if not found, is determined using a resolver.

**proxy_protocol**

**Syntax:**

`proxy_protocol on | off;`

**Default:** off

**Context:** stream, server
This directive appeared in version 1.9.2.

Enables the PROXY protocol for connections to a proxied server.

**proxy_requests**

**Syntax:** `proxy_requests number;`

**Default:** 0

**Context:** stream, server

This directive appeared in version 1.15.7.

Sets the number of client datagrams at which binding between a client and existing UDP stream session is dropped. After receiving the specified number of datagrams, next datagram from the same client starts a new session. The session terminates when all client datagrams are transmitted to a proxied server and the expected number of responses is received, or when it reaches a timeout.

**proxy_responses**

**Syntax:** `proxy_responses number;`

**Default:** —

**Context:** stream, server

This directive appeared in version 1.9.13.

Sets the number of datagrams expected from the proxied server in response to a client datagram if the UDP protocol is used. The number serves as a hint for session termination. By default, the number of datagrams is not limited.

If zero value is specified, no response is expected. However, if a response is received and the session is still not finished, the response will be handled.

**proxy_session_drop**

**Syntax:** `proxy_session_drop on | off;`

**Default:** off

**Context:** stream, server

This directive appeared in version 1.15.8.

Enables terminating all sessions to a proxied server after it was removed from the group or marked as permanently unavailable. This can occur because of re-resolve or with the API DELETE command. A server can be marked as permanently unavailable if it is considered unhealthy or with the API PATCH command. Each session is terminated when the next read or write event is processed for the client or proxied server.

This directive is available as part of our commercial subscription.
CHAPTER 3. STREAM SERVER MODULES 3.12. MODULE NGX_STREAM_PROXY_MODULE

proxy_socket_keepalive

Syntax:  proxy_socket_keepalive on | off;
Default  off
Context: stream, server
This directive appeared in version 1.15.6.

Configures the “TCP keepalive” behavior for outgoing connections to a proxied server. By default, the operating system’s settings are in effect for the socket. If the directive is set to the value “on”, the SO_KEEPALIVE socket option is turned on for the socket.

proxy_ssl

Syntax:  proxy_ssl on | off;
Default  off
Context: stream, server

Enables the SSL/TLS protocol for connections to a proxied server.

proxy_ssl_certificate

Syntax:  proxy_ssl_certificate file;
Default  —
Context: stream, server

Specifies a file with the certificate in the PEM format used for authentication to a proxied server.
Since version 1.21.0, variables can be used in the file name.

proxy_ssl_certificate_key

Syntax:  proxy_ssl_certificate_key file;
Default  —
Context: stream, server

Specifies a file with the secret key in the PEM format used for authentication to a proxied server.
Since version 1.21.0, variables can be used in the file name.

proxy_ssl_ciphers

Syntax:  proxy_ssl_ciphers ciphers;
Default  DEFAULT
Context: stream, server

Specifies the enabled ciphers for connections to a proxied server. The ciphers are specified in the format understood by the OpenSSL library.
The full list can be viewed using the “openssl ciphers” command.
proxy_ssl_conf_command

Syntax:  `proxy_ssl_conf_command name value;`

Default  —

Context:  `stream`, `server`

This directive appeared in version 1.19.4.

Sets arbitrary OpenSSL configuration commands when establishing a connection with the proxied server.

The directive is supported when using OpenSSL 1.0.2 or higher.

Several `proxy_ssl_conf_command` directives can be specified on the same level. These directives are inherited from the previous configuration level if and only if there are no `proxy_ssl_conf_command` directives defined on the current level.

Note that configuring OpenSSL directly might result in unexpected behavior.

proxy_ssl_crl

Syntax:  `proxy_ssl_crl file;`

Default  —

Context:  `stream`, `server`

Specifies a file with revoked certificates (CRL) in the PEM format used to verify the certificate of the proxied server.

proxy_ssl_name

Syntax:  `proxy_ssl_name name;`

Default  `host from proxy_pass`

Context:  `stream`, `server`

Allows overriding the server name used to verify the certificate of the proxied server and to be passed through SNI when establishing a connection with the proxied server. The server name can also be specified using variables (1.11.3).

By default, the host part of the `proxy_pass` address is used.

proxy_ssl_password_file

Syntax:  `proxy_ssl_password_file file;`

Default  —

Context:  `stream`, `server`

Specifies a file with passphrases for secret keys where each passphrase is specified on a separate line. Passphrases are tried in turn when loading the key.
proxy_ssl_protocols

Syntax: `proxy_ssl_protocols [SSLv2] [SSLv3] [TLSv1] [TLSv1.1] [TLSv1.2] [TLSv1.3];`

Default: TLSv1 TLSv1.1 TLSv1.2 TLSv1.3

Context: stream, server

Enables the specified protocols for connections to a proxied server.

The TLSv1.3 parameter is used by default since 1.23.4.

proxy_ssl_server_name

Syntax: `proxy_ssl_server_name on | off;`

Default: off

Context: stream, server

Enables or disables passing of the server name through TLS Server Name Indication extension (SNI, RFC 6066) when establishing a connection with the proxied server.

proxy_ssl_session_reuse

Syntax: `proxy_ssl_session_reuse on | off;`

Default: on

Context: stream, server

Determines whether SSL sessions can be reused when working with the proxied server. If the errors “SSL3_GET_FINISHED: digest check failed” appear in the logs, try disabling session reuse.

proxy_ssl_trusted_certificate

Syntax: `proxy_ssl_trusted_certificate file;`

Default: —

Context: stream, server

Specifies a file with trusted CA certificates in the PEM format used to verify the certificate of the proxied server.

proxy_ssl_verify

Syntax: `proxy_ssl_verify on | off;`

Default: off

Context: stream, server

Enables or disables verification of the proxied server certificate.
proxy_ssl_verify_depth

**Syntax:**  
proxy_ssl_verify_depth number;

**Default:**  1  
**Context:**  stream, server

Sets the verification depth in the proxied server certificates chain.

proxy_timeout

**Syntax:**  
proxy_timeout timeout;

**Default:**  10m  
**Context:**  stream, server

Sets the *timeout* between two successive read or write operations on client or proxied server connections. If no data is transmitted within this time, the connection is closed.

proxy_upload_rate

**Syntax:**  
proxy_upload_rate rate;

**Default:**  0  
**Context:**  stream, server

This directive appeared in version 1.9.3.

Limits the speed of reading the data from the client. The *rate* is specified in bytes per second. The zero value disables rate limiting. The limit is set per a connection, so if the client simultaneously opens two connections, the overall rate will be twice as much as the specified limit.

Parameter value can contain variables (1.17.0). It may be useful in cases where rate should be limited depending on a certain condition:

```plaintext
map $slow $rate {
  1  4k;
  2  8k;
}

proxy_upload_rate $rate;
```
## 3.13 Module ngx_stream_proxy_protocol_vendor_module

### 3.13.1 Summary

The `ngx_stream_proxy_protocol_vendor_module` module (1.23.3) allows obtaining additional information about a connection in cloud platforms from application-specific TLVs of the PROXY protocol header.

Supported cloud platforms:

- Amazon Web Services
- Google Cloud Platform
- Microsoft Azure

The PROXY protocol must be previously enabled by setting the `proxy_protocol` parameter in the `listen` directive.

This module is available as part of our commercial subscription.

### 3.13.2 Example Configuration

```nginx
server {
    listen 12345 proxy_protocol;
    return $proxy_protocol_tlv_gcp_conn_id;
}
```

### 3.13.3 Embedded Variables

- **$proxy_protocol_tlv_aws_vpce_id**
  - TLV value from the PROXY Protocol header representing the ID of AWS VPC endpoint

- **$proxy_protocol_tlv_azure_pei_id**
  - TLV value from the PROXY Protocol header representing the LinkID of Azure private endpoint

- **$proxy_protocol_tlv_gcp_conn_id**
  - TLV value from the PROXY Protocol header representing Google Cloud PSC connection ID
3.14 Module ngx_stream_realip_module

3.14.1 Summary

The ngx_stream_realip_module module is used to change the client address and port to the ones sent in the PROXY protocol header (1.11.4). The PROXY protocol must be previously enabled by setting the `proxy_protocol` parameter in the `listen` directive.

This module is not built by default, it should be enabled with the `--with-stream_realip_module` configuration parameter.

3.14.2 Example Configuration

```
listen 12345 proxy_protocol;
set_real_ip_from 192.168.1.0/24;
set_real_ip_from 192.168.2.1;
set_real_ip_from 2001:0db8::/32;
```

3.14.3 Directives

**set_real_ip_from**

**Syntax:**
```
set_real_ip_from address | CIDR | unix:;
```

**Default:** —

**Context:** stream, server

Defines trusted addresses that are known to send correct replacement addresses. If the special value `unix:` is specified, all UNIX-domain sockets will be trusted.

3.14.4 Embedded Variables

**$realip_remote_addr**

keeps the original client address

**$realip_remote_port**

keeps the original client port
3.15 Module ngx_stream_return_module

3.15.1 Summary

The ngx_stream_return_module module (1.11.2) allows sending a specified value to the client and then closing the connection.

3.15.2 Example Configuration

```nginx
server {
    listen 12345;
    return $time_iso8601;
}
```

3.15.3 Directives

**return**

*Syntax:* `return value;`

*Default:* —

*Context:* server

Specifies a *value* to send to the client. The value can contain text, variables, and their combination.
3.16 Module ngx_stream_set_module

3.16.1 Summary

The ngx_stream_set_module module (1.19.3) allows setting a value for a variable.

3.16.2 Example Configuration

```latex
server {
  listen 12345;
  set $true 1;
}
```

3.16.3 Directives

set

**Syntax:** \texttt{set \$variable value;}

**Default:** —

**Context:** server

Sets a \textit{value} for the specified \textit{variable}. The \textit{value} can contain text, variables, and their combination.
3.17 Module ngx_stream_split_clients_module

3.17.1 Summary

The ngx_stream_split_clients_module module (1.11.3) creates variables suitable for A/B testing, also known as split testing.

3.17.2 Example Configuration

```plaintext
stream {
...
  split_clients "${remote_addr}AAA" $variant {
    0.5%   feature_test1;
    2.0%   feature_test2;
    *      production;
  }
}
server {
...
  proxy_pass $upstream;
}
```

3.17.3 Directives

**split_clients**

**Syntax:** `split_clients string $variable { ... }`

**Default:** —

**Context:** `stream`

Creates a variable for A/B testing, for example:

```plaintext
split_clients "${remote_addr}AAA" $variant {
  0.5%   .one;
  2.0%   .two;
  *      "";
}
```

The value of the original string is hashed using MurmurHash2. In the example given, hash values from 0 to 21474835 (0.5%) correspond to the value ".one" of the `$variant` variable, hash values from 21474836 to 107374180 (2%) correspond to the value ".two", and hash values from 107374181 to 4294967295 correspond to the value "" (an empty string).
3.18 Module ngx_stream_ssl_module

3.18.1 Summary

The ngx_stream_ssl_module module (1.9.0) provides the necessary support for a stream proxy server to work with the SSL/TLS protocol. This module is not built by default, it should be enabled with the --with-stream_ssl_module configuration parameter.

3.18.2 Example Configuration

To reduce the processor load, it is recommended to

- set the number of worker processes equal to the number of processors,
- enable the shared session cache,
- disable the built-in session cache,
- and possibly increase the session lifetime (by default, 5 minutes):
worker_processes auto;

stream {
...

server {
listen 12345 ssl;
ssl_protocols TLSv1 TLSv1.1 TLSv1.2 TLSv1.3;
ssl_ciphers AES128-SHA:AES256-SHA:RC4-SHA:DES-CBC3-SHA:RC4-MD5;
ssl_certificate /usr/local/nginx/conf/cert.pem;
ssl_certificate_key /usr/local/nginx/conf/cert.key;
ssl_session_cache shared:SSL:10m;
ssl_session_timeout 10m;
...}

3.18.3 Directives

ssl_alpn

Syntax: `ssl_alpn protocol ...;`
Default —
Context: stream, server
This directive appeared in version 1.21.4.

Specifies the list of supported ALPN protocols. One of the protocols must be negotiated if the client uses ALPN:

```plaintext
map $ssl_alpn_protocol $proxy {
  h2 127.0.0.1:8001;
  http/1.1 127.0.0.1:8002;
}
server {
  listen 12346;
  proxy_pass $proxy;
  ssl_alpn h2 http/1.1;
}
```

ssl_certificate

Syntax: `ssl_certificate file;`
Default —
Context: stream, server

Specifies a file with the certificate in the PEM format for the given server. If intermediate certificates should be specified in addition to a primary certificate, they should be specified in the same file in the following order: the primary certificate comes first, then the intermediate certificates. A secret key in the PEM format may be placed in the same file.

Since version 1.11.0, this directive can be specified multiple times to load certificates of different types, for example, RSA and ECDSA:
Only OpenSSL 1.0.2 or higher supports separate certificate chains for different certificates. With older versions, only one certificate chain can be used.

Since version 1.15.9, variables can be used in the file name when using OpenSSL 1.0.2 or higher:

```plaintext
ssl_certificate_key $ssl_server_name.key;
```

Note that using variables implies that a certificate will be loaded for each SSL handshake, and this may have a negative impact on performance.

The value `data:$variable` can be specified instead of the `file` (1.15.10), which loads a certificate from a variable without using intermediate files. Note that inappropriate use of this syntax may have its security implications, such as writing secret key data to error log.

### ssl_certificate_key

**Syntax:**  `ssl_certificate_key file;`

**Default:**  

**Context:**  stream, server

Specifies a file with the secret key in the PEM format for the given server. The value `engine:name:id` can be specified instead of the `file`, which loads a secret key with a specified `id` from the OpenSSL engine `name`.

The value `data:$variable` can be specified instead of the `file` (1.15.10), which loads a secret key from a variable without using intermediate files. Note that inappropriate use of this syntax may have its security implications, such as writing secret key data to error log.

Since version 1.15.9, variables can be used in the `file` name when using OpenSSL 1.0.2 or higher.

### ssl_ciphers

**Syntax:**  `ssl_ciphers ciphers;`

**Default:**  `HIGH:!aNULL:!MD5`

**Context:**  stream, server
CHAPTER 3. STREAM SERVER MODULES

3.18. MODULE NGX_STREAM_SSL_MODULE

Specifies the enabled ciphers. The ciphers are specified in the format understood by the OpenSSL library, for example:

```plaintext
```

The full list can be viewed using the “openssl ciphers” command.

**ssl_client_certificate**

Syntax: `ssl_client_certificate file;`

**Default** — Context: stream, server

This directive appeared in version 1.11.8.

Specifies a file with trusted CA certificates in the PEM format used to verify client certificates.

The list of certificates will be sent to clients. If this is not desired, the `ssl_trusted_certificate` directive can be used.

**ssl_conf_command**

Syntax: `ssl_conf_command name value;`

**Default** — Context: stream, server

This directive appeared in version 1.19.4.

Sets arbitrary OpenSSL configuration commands.

The directive is supported when using OpenSSL 1.0.2 or higher.

Several `ssl_conf_command` directives can be specified on the same level:

```plaintext
ssl_conf_command Options PrioritizeChaCha;
ssl_conf_command Ciphersuites TLS_CHACHA20_POLY1305_SHA256;
```

These directives are inherited from the previous configuration level if and only if there are no `ssl_conf_command` directives defined on the current level.

Note that configuring OpenSSL directly might result in unexpected behavior.

**ssl_crl**

Syntax: `ssl_crl file;`

**Default** — Context: stream, server

This directive appeared in version 1.11.8.

Specifies a file with revoked certificates (CRL) in the PEM format used to verify client certificates.
ssl_dhparam

**Syntax:**  `ssl_dhparam file;`
**Default:** —
**Context:** stream, server

Specifies a file with DH parameters for DHE ciphers.
By default no parameters are set, and therefore DHE ciphers will not be used.

Prior to version 1.11.0, builtin parameters were used by default.

ssl_ecdh_curve

**Syntax:**  `ssl_ecdh_curve curve;`
**Default:** auto
**Context:** stream, server

Specifies a curve for ECDHE ciphers.
When using OpenSSL 1.0.2 or higher, it is possible to specify multiple curves (1.11.0), for example:

```bash
ssl_ecdh_curve prime256v1:secp384r1;
```

The special value `auto` (1.11.0) instructs nginx to use a list built into the OpenSSL library when using OpenSSL 1.0.2 or higher, or `prime256v1` with older versions.

Prior to version 1.11.0, the `prime256v1` curve was used by default.

When using OpenSSL 1.0.2 or higher, this directive sets the list of curves supported by the server. Thus, in order for ECDSA certificates to work, it is important to include the curves used in the certificates.

ssl_handshake_timeout

**Syntax:**  `ssl_handshake_timeout time;`
**Default:** 60s
**Context:** stream, server

Specifies a timeout for the SSL handshake to complete.

ssl_password_file

**Syntax:**  `ssl_password_file file;`
**Default:** —
**Context:** stream, server
Specifies a file with passphrases for secret keys where each passphrase is specified on a separate line. Passphrases are tried in turn when loading the key.

Example:

```
stream {
    ssl_password_file /etc/keys/global.pass;
    ...

    server {
        listen 127.0.0.1:12345;
        ssl_certificate_key /etc/keys/first.key;
    }

    server {
        listen 127.0.0.1:12346;

        # named pipe can also be used instead of a file
        ssl_password_file /etc/keys/fifo;
        ssl_certificate_key /etc/keys/second.key;
    }
}
```

### ssl_prefer_server_ciphers

**Syntax:** `ssl_prefer_server_ciphers on | off;`

**Default:** `off`

**Context:** `stream, server`

Specifies that server ciphers should be preferred over client ciphers when the SSLv3 and TLS protocols are used.

### ssl_protocols

**Syntax:** `ssl_protocols [SSLv2] [SSLv3] [TLSv1] [TLSv1.1] [TLSv1.2] [TLSv1.3];`

**Default:** `TLSv1 TLSv1.1 TLSv1.2 TLSv1.3`

**Context:** `stream, server`

Enables the specified protocols.

The `TLSv1.1` and `TLSv1.2` parameters work only when OpenSSL 1.0.1 or higher is used.

The `TLSv1.3` parameter (1.13.0) works only when OpenSSL 1.1.1 or higher is used.

The `TLSv1.3` parameter is used by default since 1.23.4.
ssl_session_cache

**Syntax:**
ssl_session_cache off | none | [builtin[size]]
[shared:name:size];

**Default:** none

**Context:** stream, server

Sets the types and sizes of caches that store session parameters. A cache can be of any of the following types:

- **off**
  the use of a session cache is strictly prohibited: nginx explicitly tells a client that sessions may not be reused.

- **none**
  the use of a session cache is gently disallowed: nginx tells a client that sessions may be reused, but does not actually store session parameters in the cache.

- **builtin**
  a cache built in OpenSSL; used by one worker process only. The cache size is specified in sessions. If size is not given, it is equal to 20480 sessions. Use of the built-in cache can cause memory fragmentation.

- **shared**
  a cache shared between all worker processes. The cache size is specified in bytes; one megabyte can store about 4000 sessions. Each shared cache should have an arbitrary name. A cache with the same name can be used in several servers. It is also used to automatically generate, store, and periodically rotate TLS session ticket keys (1.23.2) unless configured explicitly using the ssl_session_ticket_key directive.

Both cache types can be used simultaneously, for example:

```plaintext
ssl_session_cache builtin:1000 shared:SSL:10m;
```

but using only shared cache without the built-in cache should be more efficient.

ssl_session_ticket_key

**Syntax:**
ssl_session_ticket_key file;

**Default:** —

**Context:** stream, server

Sets a file with the secret key used to encrypt and decrypt TLS session tickets. The directive is necessary if the same key has to be shared between multiple servers. By default, a randomly generated key is used.

If several keys are specified, only the first key is used to encrypt TLS session tickets. This allows configuring key rotation, for example:

```plaintext
ssl_session_ticket_key current.key;
ssl_session_ticket_key previous.key;
```
The file must contain 80 or 48 bytes of random data and can be created using the following command:

```
openssl rand 80 > ticket.key
```

Depending on the file size either AES256 (for 80-byte keys, 1.11.8) or AES128 (for 48-byte keys) is used for encryption.

### ssl_session_tickets

**Syntax:** `ssl_session_tickets on | off;`

**Default:** on

**Context:** stream, server

Enables or disables session resumption through TLS session tickets.

### ssl_session_timeout

**Syntax:** `ssl_session_timeout time;`

**Default:** 5m

**Context:** stream, server

Specifies a time during which a client may reuse the session parameters.

### ssl_trusted_certificate

**Syntax:** `ssl_trusted_certificate file;`

**Default:** —

**Context:** stream, server

This directive appeared in version 1.11.8.

Specifies a file with trusted CA certificates in the PEM format used to verify client certificates.

In contrast to the certificate set by `ssl_client_certificate`, the list of these certificates will not be sent to clients.

### ssl_verify_client

**Syntax:** `ssl_verify_client on | off | optional | optional_no_ca;`

**Default:** off

**Context:** stream, server

This directive appeared in version 1.11.8.

Enables verification of client certificates. The verification result is stored in the `$ssl_client_verify` variable. If an error has occurred during the client certificate verification or a client has not presented the required certificate, the connection is closed.

The `optional` parameter requests the client certificate and verifies it if the certificate is present.

The `optional_no_ca` parameter requests the client certificate but does not require it to be signed by a trusted CA certificate. This is intended for...
the use in cases when a service that is external to nginx performs the actual certificate verification. The contents of the certificate is accessible through the $ssl_client_cert variable.

**ssl_verify_depth**

**Syntax:** `ssl_verify_depth number;`

**Default:** 1

**Context:** stream, server

This directive appeared in version 1.11.8.

Sets the verification depth in the client certificates chain.

### 3.18.4 Embedded Variables

The `ngx_stream_ssl_module` module supports variables since 1.11.2.

$ssl_alpn_protocol

returns the protocol selected by ALPN during the SSL handshake, or an empty string otherwise (1.21.4);

$ssl_cipher

returns the name of the cipher used for an established SSL connection;

$ssl_ciphers

returns the list of ciphers supported by the client (1.11.7). Known ciphers are listed by names, unknown are shown in hexadecimal, for example:

```
AES128-SHA:AES256-SHA:0x00ff
```

The variable is fully supported only when using OpenSSL version 1.0.2 or higher. With older versions, the variable is available only for new sessions and lists only known ciphers.

$ssl_client_cert

returns the client certificate in the PEM format for an established SSL connection, with each line except the first prepended with the tab character (1.11.8);

$ssl_client_fingerprint

returns the SHA1 fingerprint of the client certificate for an established SSL connection (1.11.8);

$ssl_client_i_dn

returns the “issuer DN” string of the client certificate for an established SSL connection according to RFC 2253 (1.11.8);

$ssl_client_raw_cert

returns the client certificate in the PEM format for an established SSL connection (1.11.8);
$ssl\_client\_s\_dn
returns the “subject DN” string of the client certificate for an established
SSL connection according to RFC 2253 (1.11.8);

$ssl\_client\_serial
returns the serial number of the client certificate for an established SSL
collection (1.11.8);

$ssl\_client\_v\_end
returns the end date of the client certificate (1.11.8);

$ssl\_client\_v\_remain
returns the number of days until the client certificate expires (1.11.8);

$ssl\_client\_v\_start
returns the start date of the client certificate (1.11.8);

$ssl\_client\_verify
returns the result of client certificate verification (1.11.8): “SUCCESS”,
“FAILED: reason”, and “NONE” if a certificate was not present;

$ssl\_curve
returns the negotiated curve used for SSL handshake key exchange
process (1.21.5). Known curves are listed by names, unknown are shown
in hexadecimal, for example:

```
prime256v1
```

The variable is supported only when using OpenSSL version 3.0 or
higher. With older versions, the variable value will be an empty string.

$ssl\_curves
returns the list of curves supported by the client (1.11.7). Known curves
are listed by names, unknown are shown in hexadecimal, for example:

```
0x001d:prime256v1:secp521r1:secp384r1
```

The variable is supported only when using OpenSSL version 1.0.2 or
higher. With older versions, the variable value will be an empty string.

The variable is available only for new sessions.

$ssl\_protocol
returns the protocol of an established SSL connection;

$ssl\_server\_name
returns the server name requested through SNI;

$ssl\_session\_id
returns the session identifier of an established SSL connection;

$ssl\_session\_reused
returns “r” if an SSL session was reused, or “.” otherwise.
3.19 Module ngx_stream_ssl_preread_module

3.19.1 Summary

The ngx_stream_ssl_preread_module module (1.11.5) allows extracting information from the ClientHello message without terminating SSL/TLS, for example, the server name requested through SNI or protocols advertised in ALPN. This module is not built by default, it should be enabled with the --with-stream_ssl_preread_module configuration parameter.

3.19.2 Example Configuration

Selecting an upstream based on server name:

```plaintext
map $ssl_preread_server_name $name {
    backend.example.com backend;
    default backend2;
}
upstream backend {
    server 192.168.0.1:12345;
    server 192.168.0.2:12345;
}
upstream backend2 {
    server 192.168.0.3:12345;
    server 192.168.0.4:12345;
}
server {
    listen 12346;
    proxy_pass $name;
    ssl_preread on;
}
```

Selecting an upstream based on protocol:

```plaintext
map $ssl_preread_alpn_protocols $proxy {
    ~\bh2\b 127.0.0.1:8001;
    ~\bhttp/1.1\b 127.0.0.1:8002;
    ~\bxmpp-client\b 127.0.0.1:8003;
}
server {
    listen 9000;
    proxy_pass $proxy;
    ssl_preread on;
}
```

Selecting an upstream based on SSL protocol version:
3.19.3 Directives

ssl_preread

Syntax: \texttt{ssl\_preread on | off;}
Default: \texttt{off}
Context: stream, server

Enables extracting information from the ClientHello message at the preread phase.

3.19.4 Embedded Variables

\$\texttt{ssl\_preread\_protocol}
the highest SSL protocol version supported by the client (1.15.2)

\$\texttt{ssl\_preread\_server\_name}
server name requested through SNI

\$\texttt{ssl\_preread\_alpn\_protocols}
list of protocols advertised by the client through ALPN (1.13.10). The values are separated by commas.
3.20 Module ngx_stream_upstream_module

3.20.1 Summary

The ngx_stream_upstream_module module (1.9.0) is used to define groups of servers that can be referenced by the \texttt{proxy\_pass} directive.

3.20.2 Example Configuration

```nginx
upstream backend {
    hash $remote_addr consistent;
    server backend1.example.com:12345 weight=5;
    server backend2.example.com:12345;
    server unix:/tmp/backend3;
    server backup1.example.com:12345 backup;
    server backup2.example.com:12345 backup;
}

server {
    listen 12346;
    proxy_pass backend;
}
```

Dynamically configurable group with periodic health checks is available as part of our commercial subscription:

```nginx
resolver 10.0.0.1;
upstream dynamic {
    zone upstream_dynamic 64k;
    server backend1.example.com:12345 weight=5;
    server backend2.example.com:12345 fail_timeout=5s slow_start=30s;
    server 192.0.2.1:12345 max_fails=3;
    server backend3.example.com:12345 resolve;
    server backend4.example.com service=http resolve;
    server backup1.example.com:12345 backup;
}
```

Nginx, Inc. p.465 of 542
```plaintext
server backup2.example.com:12345 backup;
}
server {
    listen 12346;
    proxy_pass dynamic;
    health_check;
}
```

### 3.20.3 Directives

#### `upstream`

**Syntax:** `upstream name {...}`

**Default** —

**Context:** `stream`

Defines a group of servers. Servers can listen on different ports. In addition, servers listening on TCP and UNIX-domain sockets can be mixed.

**Example:**

```
upstream backend {
    server backend1.example.com:12345 weight=5;
    server 127.0.0.1:12345 max_fails=3 fail_timeout=30s;
    server unix:/tmp/backend2;
    server backend3.example.com:12345 resolve;
    server backup1.example.com:12345 backup;
}
```

By default, connections are distributed between the servers using a weighted round-robin balancing method. In the above example, each 7 connections will be distributed as follows: 5 connections go to backend1.example.com:12345 and one connection to each of the second and third servers. If an error occurs during communication with a server, the connection will be passed to the next server, and so on until all of the functioning servers will be tried. If communication with all servers fails, the connection will be closed.

#### `server`

**Syntax:** `server address [parameters];`

**Default** —

**Context:** `upstream`

Defines the `address` and other `parameters` of a server. The address can be specified as a domain name or IP address with an obligatory port, or as a UNIX-domain socket path specified after the “`unix:`” prefix. A domain name that resolves to several IP addresses defines multiple servers at once.

The following parameters can be defined:

- `weight=number`
  
  sets the weight of the server, by default, 1.
**max_conns=number**

limits the maximum *number* of simultaneous connections to the proxied server (1.11.5). Default value is zero, meaning there is no limit. If the server group does not reside in the shared memory, the limitation works per each worker process.

Prior to version 1.11.5, this parameter was available as part of our commercial subscription.

**max_fails=number**

sets the number of unsuccessful attempts to communicate with the server that should happen in the duration set by the *fail_timeout* parameter to consider the server unavailable for a duration also set by the *fail_timeout* parameter. By default, the number of unsuccessful attempts is set to 1. The zero value disables the accounting of attempts. Here, an unsuccessful attempt is an error or timeout while establishing a connection with the server.

**fail_timeout=time**

sets

- the time during which the specified number of unsuccessful attempts to communicate with the server should happen to consider the server unavailable;
- and the period of time the server will be considered unavailable.

By default, the parameter is set to 10 seconds.

**backup**

marks the server as a backup server. Connections to the backup server will be passed when the primary servers are unavailable.

The parameter cannot be used along with the hash and random load balancing methods.

**down**

marks the server as permanently unavailable.

Additionally, the following parameters are available as part of our commercial subscription:

**resolve**

monitors changes of the IP addresses that correspond to a domain name of the server, and automatically modifies the upstream configuration without the need of restarting nginx. The server group must reside in the shared memory.

In order for this parameter to work, the resolver directive must be specified in the stream block or in the corresponding upstream block.
service = name

enables resolving of DNS SRV records and sets the service name (1.9.13).
In order for this parameter to work, it is necessary to specify the resolve parameter for the server and specify a hostname without a port number.
If the service name does not contain a dot ("."), then the RFC-compliant name is constructed and the TCP protocol is added to the service prefix.
For example, to look up the _http._tcp.backend.example.com SRV record, it is necessary to specify the directive:

```
server backend.example.com service=http resolve;
```

If the service name contains one or more dots, then the name is constructed by joining the service prefix and the server name. For example, to look up the _http._tcp.backend.example.com and server1.backend.example.com SRV records, it is necessary to specify the directives:

```
server backend.example.com service=_http._tcp resolve;
server example.com service=server1.backend resolve;
```

Highest-priority SRV records (records with the same lowest-number priority value) are resolved as primary servers, the rest of SRV records are resolved as backup servers. If the backup parameter is specified for the server, high-priority SRV records are resolved as backup servers, the rest of SRV records are ignored.

slow_start = time

sets the time during which the server will recover its weight from zero to a nominal value, when unhealthy server becomes healthy, or when the server becomes available after a period of time it was considered unavailable. Default value is zero, i.e. slow start is disabled.

The parameter cannot be used along with the hash and random load balancing methods.

If there is only a single server in a group, max_fails, fail_timeout and slow_start parameters are ignored, and such a server will never be considered unavailable.

zone

Syntax:  zone name [size];

Default —

Context:  upstream

Defines the name and size of the shared memory zone that keeps the group’s configuration and run-time state that are shared between worker processes. Several groups may share the same zone. In this case, it is enough to specify the size only once.
Additionally, as part of our commercial subscription, such groups allow changing the group membership or modifying the settings of a particular server without the need of restarting nginx. The configuration is accessible via the API module (1.13.3).

Prior to version 1.13.3, the configuration was accessible only via a special location handled by `upstream_conf`.

### state

**Syntax:** \texttt{state file;}

**Default** —

**Context:** upstream

This directive appeared in version 1.9.7.

Specifies a file that keeps the state of the dynamically configurable group.

**Examples:**

```text
state /var/lib/nginx/state/servers.conf; # path for Linux
state /var/db/nginx/state/servers.conf; # path for FreeBSD
```

The state is currently limited to the list of servers with their parameters. The file is read when parsing the configuration and is updated each time the upstream configuration is changed. Changing the file content directly should be avoided. The directive cannot be used along with the `server` directive.

Changes made during configuration reload or binary upgrade can be lost.

This directive is available as part of our commercial subscription.

### hash

**Syntax:** \texttt{hash key [consistent];}

**Default** —

**Context:** upstream

Specifies a load balancing method for a server group where the client-server mapping is based on the hashed key value. The key can contain text, variables, and their combinations (1.11.2). Usage example:

```text
hash $remote_addr;
```

Note that adding or removing a server from the group may result in remapping most of the keys to different servers. The method is compatible with the Cache::Memcached Perl library.

If the consistent parameter is specified, the ketama consistent hashing method will be used instead. The method ensures that only a few keys will be remapped to different servers when a server is added to or removed from the
group. This helps to achieve a higher cache hit ratio for caching servers. The method is compatible with the Cache::Memcached::Fast Perl library with the \textit{ketama\_points} parameter set to 160.

\textbf{least\_conn}

\textbf{Syntax:} \texttt{least\_conn;}
\textbf{Default} —
\textbf{Context:} upstream

Specifies that a group should use a load balancing method where a connection is passed to the server with the least number of active connections, taking into account weights of servers. If there are several such servers, they are tried in turn using a weighted round-robin balancing method.

\textbf{least\_time}

\textbf{Syntax:} \texttt{least\_time} connect | first\_byte | last\_byte [inflight];
\textbf{Default} —
\textbf{Context:} upstream

Specifies that a group should use a load balancing method where a connection is passed to the server with the least average time and least number of active connections, taking into account weights of servers. If there are several such servers, they are tried in turn using a weighted round-robin balancing method.

If the \texttt{connect} parameter is specified, time to \texttt{connect} to the upstream server is used. If the \texttt{first\_byte} parameter is specified, time to receive the first byte of data is used. If the \texttt{last\_byte} is specified, time to receive the last byte of data is used. If the \texttt{inflight} parameter is specified (1.11.6), incomplete connections are also taken into account.

Prior to version 1.11.6, incomplete connections were taken into account by default.

This directive is available as part of our \textit{commercial subscription}.

\textbf{random}

\textbf{Syntax:} \texttt{random} \texttt{[two [method]];}
\textbf{Default} —
\textbf{Context:} upstream

This directive appeared in version 1.15.1.

Specifies that a group should use a load balancing method where a connection is passed to a randomly selected server, taking into account weights of servers.

The optional \texttt{two} parameter instructs nginx to randomly select two servers and then choose a server using the specified \texttt{method}. The default method is
least_conn which passes a connection to a server with the least number of active connections.

The least_time method passes a connection to a server with the least average time and least number of active connections. If least_time=connect parameter is specified, time to connect to the upstream server is used. If least_time=first_byte parameter is specified, time to receive the first byte of data is used. If least_time=last_byte is specified, time to receive the last byte of data is used.

The least_time method is available as a part of our commercial subscription.

resolver

**Syntax:** `resolver address ... [valid=time] [ipv4=on|off] [ipv6=on|off] [status_zone=zone];`

**Default** —

**Context:** upstream

This directive appeared in version 1.17.5.

Configures name servers used to resolve names of upstream servers into addresses, for example:

```
resolver 127.0.0.1 [::1]:5353;
```

The address can be specified as a domain name or IP address, with an optional port. If port is not specified, the port 53 is used. Name servers are queried in a round-robin fashion.

By default, nginx will look up both IPv4 and IPv6 addresses while resolving. If looking up of IPv4 or IPv6 addresses is not desired, the ipv4=off (1.23.1) or the ipv6=off parameter can be specified.

By default, nginx caches answers using the TTL value of a response. The optional valid parameter allows overriding it:

```
resolver 127.0.0.1 [::1]:5353 valid=30s;
```

To prevent DNS spoofing, it is recommended configuring DNS servers in a properly secured trusted local network.

The optional status_zone parameter enables collection of DNS server statistics of requests and responses in the specified zone.

This directive is available as part of our commercial subscription.
resolver_timeout

**Syntax:** resolver_timeout time;

**Default:** 30s

**Context:** upstream

This directive appeared in version 1.17.5.

Sets a timeout for name resolution, for example:

```
resolver_timeout 5s;
```

This directive is available as part of our commercial subscription.

### 3.20.4 Embedded Variables

The ngx_stream_upstream_module module supports the following embedded variables:

- **$upstream_addr**
  keeps the IP address and port, or the path to the UNIX-domain socket of the upstream server (1.11.4). If several servers were contacted during proxying, their addresses are separated by commas, e.g. “192.168.1.1:12345, 192.168.1.2:12345, unix:/tmp/sock”. If a server cannot be selected, the variable keeps the name of the server group.

- **$upstream_bytes_received**
  number of bytes received from an upstream server (1.11.4). Values from several connections are separated by commas like addresses in the $upstream_addr variable.

- **$upstream_bytes_sent**
  number of bytes sent to an upstream server (1.11.4). Values from several connections are separated by commas like addresses in the $upstream_addr variable.

- **$upstream_connect_time**
  time to connect to the upstream server (1.11.4); the time is kept in seconds with millisecond resolution. Times of several connections are separated by commas like addresses in the $upstream_addr variable.

- **$upstream_first_byte_time**
  time to receive the first byte of data (1.11.4); the time is kept in seconds with millisecond resolution. Times of several connections are separated by commas like addresses in the $upstream_addr variable.

- **$upstream_session_time**
  session duration in seconds with millisecond resolution (1.11.4). Times of several connections are separated by commas like addresses in the $upstream_addr variable.
3.21 Module ngx_stream_upstream_hc_module

3.21.1 Summary

The ngx_stream_upstream_hc_module module (1.9.0) allows enabling periodic health checks of the servers in a group. The server group must reside in the shared memory.

If a health check fails, the server will be considered unhealthy. If several health checks are defined for the same group of servers, a single failure of any check will make the corresponding server be considered unhealthy. Client connections are not passed to unhealthy servers and servers in the “checking” state.

This module is available as part of our commercial subscription.

3.21.2 Example Configuration

```
upstream tcp {
    zone upstream_tcp 64k;
    server backend1.example.com:12345 weight=5;
    server backend2.example.com:12345 fail_timeout=5s slow_start=30s;
    server 192.0.2.1:12345 max_fails=3;
    server backup1.example.com:12345 backup;
    server backup2.example.com:12345 backup;
}
server {
    listen 12346;
    proxy_pass tcp;
    health_check;
}
```

With this configuration, nginx will check the ability to establish a TCP connection to each server in the tcp group every five seconds. When a connection to the server cannot be established, the health check will fail, and the server will be considered unhealthy.

Health checks can be configured for the UDP protocol:

```
upstream dns_upstream {
```

Nginx, Inc. p.473 of 542
In this case, the absence of ICMP “Destination Unreachable” message is expected in reply to the sent string “nginx health check”.

Health checks can also be configured to test data obtained from the server. Tests are configured separately using the match directive and referenced in the match parameter of the health_check directive.

3.21.3 Directives

health_check

Syntax: health_check [parameters];

Default —

Context: server

Enables periodic health checks of the servers in a group.

The following optional parameters are supported:

interval=time
sets the interval between two consecutive health checks, by default, 5 seconds.

jitter=time
sets the time within which each health check will be randomly delayed, by default, there is no delay.

fails=number
sets the number of consecutive failed health checks of a particular server after which this server will be considered unhealthy, by default, 1.

passes=number
sets the number of consecutive passed health checks of a particular server after which the server will be considered healthy, by default, 1.

mandatory [persistent]
s sets the initial “checking” state for a server until the first health check is completed (1.11.7). Client connections are not passed to servers in the “checking” state. If the parameter is not specified, the server will be initially considered healthy.

The persistent parameter (1.21.1) sets the initial “up” state for a server after reload if the server was considered healthy before reload.

match=name
specifies the match block configuring the tests that a successful connection should pass in order for a health check to pass. By default,
for TCP, only the ability to establish a TCP connection with the server is checked. For UDP, the absence of ICMP “Destination Unreachable” message is expected in reply to the sent string “nginx health check”.

Prior to version 1.11.7, by default, UDP health check required a match block with the send and expect parameters.

\textbf{port=number}  
defines the port used when connecting to a server to perform a health check (1.9.7). By default, equals the server port.

\textbf{udp}  
specifies that the UDP protocol should be used for health checks instead of the default TCP protocol (1.9.13).

\textbf{health_check_timeout}  
\textbf{Syntax:} health_check_timeout \texttt{timeout;}
\textbf{Default:} 5s
\textbf{Context:} stream, server

Overrides the proxy_timeout value for health checks.

\textbf{match}  
\textbf{Syntax:} match name \{ ... \}
\textbf{Default:} —
\textbf{Context:} stream

Defines the named test set used to verify server responses to health checks. The following parameters can be configured:

\textbf{send string;}  
sends a string to the server;

\textbf{expect string | ~ regex;}  
a literal string (1.9.12) or a regular expression that the data obtained from the server should match. The regular expression is specified with the preceding “~*” modifier (for case-insensitive matching), or the “~” modifier (for case-sensitive matching).

Both send and expect parameters can contain hexadecimal literals with the prefix “\x” followed by two hex digits, for example, “\x80” (1.9.12).

Health check is passed if:
\begin{itemize}
  \item the TCP connection was successfully established;
  \item the \texttt{string} from the \texttt{send} parameter, if specified, was sent;
  \item the data obtained from the server matched the string or regular expression from the \texttt{expect} parameter, if specified;
\end{itemize}
• the time elapsed does not exceed the value specified in the `health_check_timeout` directive.

Example:

```nginx
upstream backend {
    zone upstream_backend 10m;
    server 127.0.0.1:12345;
}

match http {
    send   "GET / HTTP/1.0\r\n\nHost: localhost\r\n\n";
    expect ~ "200 OK";
}

server {
    listen 12346;
    proxy_pass backend;
    health_check match=http;
}
```

Only the first `proxy_buffer_size` bytes of data obtained from the server are examined.
3.22 Module ngx_stream_zone_sync_module

3.22.1 Summary

The ngx_stream_zone_sync_module module (1.13.8) provides the necessary support for synchronizing contents of shared memory zones between nodes of a cluster. To enable synchronization for a particular zone, a corresponding module must support this feature. Currently, it is possible to synchronize HTTP sticky sessions, information about excessive HTTP requests, and key-value pairs both in http and stream.

This module is available as part of our commercial subscription.

3.22.2 Example Configuration

Minimal configuration:
http {
    ...
    upstream backend {
        server backend1.example.com:8080;
        server backend2.example.com:8081;
        sticky learn
        create=$upstream_cookie_examplecookie
        lookup=$cookie_examplecookie
        zone=client_sessions:1m sync;
    }
    ...
}
stream {
    ...
    server {
        zone_sync;
        listen 127.0.0.1:12345;
        # cluster of 2 nodes
        zone_sync_server a.example.com:12345;
        zone_sync_server b.example.com:12345;
    }
}

A more complex configuration with SSL enabled and with cluster members defined by DNS:

    ...
    stream {
        ...
        resolver 127.0.0.1 valid=10s;
        server {
            zone_sync;
            # the name resolves to multiple addresses that correspond to cluster nodes
            zone_sync_server cluster.example.com:12345 resolve;
            listen 127.0.0.1:4433 ssl;
            ssl_certificate localhost.crt;
            ssl_certificate_key localhost.key;
            zone_sync_ssl on;
            zone_sync_ssl_certificate localhost.crt;
            zone_sync_ssl_certificate_key localhost.key;
        }
    }

Nginx, Inc.
3.22.3 Directives

zone_sync

Syntax:  zone_sync;
Default: —
Context: server

Enables the synchronization of shared memory zones between cluster nodes. Cluster nodes are defined using zone_sync_server directives.

zone_sync_buffers

Syntax:  zone_sync_buffers number size;
Default: 8 4k|8k
Context: stream, server

Sets the number and size of the per-zone buffers used for pushing zone contents. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform.

A single buffer must be large enough to hold any entry of each zone being synchronized.

zone_sync_connect_retry_interval

Syntax:  zone_sync_connect_retry_interval time;
Default: 1s
Context: stream, server

Defines an interval between connection attempts to another cluster node.

zone_sync_connect_timeout

Syntax:  zone_sync_connect_timeout time;
Default: 5s
Context: stream, server

Defines a timeout for establishing a connection with another cluster node.

zone_sync_interval

Syntax:  zone_sync_interval time;
Default: 1s
Context: stream, server

Defines an interval for polling updates in a shared memory zone.
### zone_sync_recv_buffer_size

**Syntax:** `zone_sync_recv_buffer_size size;`

**Default:** 4k|8k

**Context:** stream, server

Sets `size` of a per-connection receive buffer used to parse incoming stream of synchronization messages. The buffer size must be equal or greater than one of the `zone_sync_buffers`. By default, the buffer size is equal to `zone_sync_buffers size` multiplied by `number`.

### zone_sync_server

**Syntax:** `zone_sync_server address [resolve];`

**Default:** —

**Context:** server

Defines the `address` of a cluster node. The address can be specified as a domain name or IP address with a mandatory port, or as a UNIX-domain socket path specified after the “unix:” prefix. A domain name that resolves to several IP addresses defines multiple nodes at once.

The `resolve` parameter instructs nginx to monitor changes of the IP addresses that correspond to a domain name of the node and automatically modify the configuration without the need of restarting nginx.

Cluster nodes are specified either dynamically as a single `zone_sync_server` directive with the `resolve` parameter, or statically as a series of several directives without the parameter.

Each cluster node should be specified only once.

All cluster nodes should use the same configuration.

In order for the `resolve` parameter to work, the `resolver` directive must be specified in the `stream` block. Example:

```plaintext
stream {
    resolver 10.0.0.1;
    server {
        zone_sync;
        zone_sync_server cluster.example.com:12345 resolve;
        ...
    }
}
```

### zone_sync_ssl

**Syntax:** `zone_sync_ssl on | off;`

**Default:** off

**Context:** stream, server

Enables the SSL/TLS protocol for connections to another cluster server.
zone_sync_ssl_certificate

Syntax:  zone_sync_ssl_certificate file;
Default —
Context: stream, server

Specifies a file with the certificate in the PEM format used for authentication to another cluster server.

zone_sync_ssl_certificate_key

Syntax:  zone_sync_ssl_certificate_key file;
Default —
Context: stream, server

Specifies a file with the secret key in the PEM format used for authentication to another cluster server.

zone_sync_ssl_ciphers

Syntax:  zone_sync_ssl_ciphers ciphers;
Default DEFAULT
Context: stream, server

Specifies the enabled ciphers for connections to another cluster server. The ciphers are specified in the format understood by the OpenSSL library.
The full list can be viewed using the “openssl ciphers” command.

zone_sync_ssl_conf_command

Syntax:  zone_sync_ssl_conf_command name value;
Default —
Context: stream, server
This directive appeared in version 1.19.4.

Sets arbitrary OpenSSL configuration commands when establishing a connection with another cluster server.

The directive is supported when using OpenSSL 1.0.2 or higher.

Several zone_sync_ssl_conf_command directives can be specified on the same level. These directives are inherited from the previous configuration level if and only if there are no zone_sync_ssl_conf_command directives defined on the current level.

Note that configuring OpenSSL directly might result in unexpected behavior.
zone_sync_ssl_crl

Syntax:  `zone_sync_ssl_crl file;`

Default: —

Context: stream, server

Specifies a file with revoked certificates (CRL) in the PEM format used to verify the certificate of another cluster server.

zone_sync_ssl_name

Syntax:  `zone_sync_ssl_name name;`

Default: host from zone_sync_server

Context: stream, server

This directive appeared in version 1.15.7.

Allows overriding the server name used to verify the certificate of a cluster server and to be passed through SNI when establishing a connection with the cluster server.

By default, the host part of the zone_sync_server address is used, or resolved IP address if the resolve parameter is specified.

zone_sync_ssl_password_file

Syntax:  `zone_sync_ssl_password_file file;`

Default: —

Context: stream, server

Specifies a file with passphrases for secret keys where each passphrase is specified on a separate line. Passphrases are tried in turn when loading the key.

zone_sync_ssl_protocols

Syntax:  `zone_sync_ssl_protocols [SSLv2] [SSLv3] [TLSv1] [TLSv1.1] [TLSv1.2] [TLSv1.3];`

Default: TLSv1 TLSv1.1 TLSv1.2

Context: stream, server

Enables the specified protocols for connections to another cluster server.

zone_sync_ssl_server_name

Syntax:  `zone_sync_ssl_server_name on | off;`

Default: off

Context: stream, server

This directive appeared in version 1.15.7.

Enables or disables passing of the server name through TLS Server Name Indication extension (SNI, RFC 6066) when establishing a connection with another cluster server.
zone_sync_ssl_trusted_certificate

Syntax: zone_sync_ssl_trusted_certificate file;
Default —
Context: stream, server

Specifies a file with trusted CA certificates in the PEM format used to verify the certificate of another cluster server.

zone_sync_ssl_verify

Syntax: zone_sync_ssl_verify on | off;
Default off
Context: stream, server

Enables or disables verification of another cluster server certificate.

zone_sync_ssl_verify_depth

Syntax: zone_sync_ssl_verify_depth number;
Default 1
Context: stream, server

Sets the verification depth in another cluster server certificates chain.

zone_sync_timeout

Syntax: zone_sync_timeout timeout;
Default 5s
Context: stream, server

Sets the timeout between two successive read or write operations on connection to another cluster node. If no data is transmitted within this time, the connection is closed.

3.22.4 API endpoints

The synchronization status of a node is available via the /stream/zone_sync/ endpoint of the API which returns the following metrics.

3.22.5 Starting, stopping, removing a cluster node

To start a new node, update a DNS record of a cluster hostname with the IP address of the new node and start an instance. The new node will discover other nodes from DNS or static configuration and will start sending updates to them. Other nodes will eventually discover the new node using DNS and start pushing updates to it. In case of static configuration, other nodes need to be reloaded in order to send updates to the new node.

To stop a node, send the QUIT signal to the instance. The node will finish zone synchronization and gracefully close open connections.
To remove a node, update a DNS record of a cluster hostname and remove the IP address of the node. All other nodes will eventually discover that the node is removed, close connections to the node, and will no longer try to connect to it. After the node is removed, it can be stopped as described above. In case of static configuration, other nodes need to be reloaded in order to stop sending updates to the removed node.
Chapter 4

Mail server modules

4.1 Module ngx_mail_core_module

4.1.1 Summary

This module is not built by default, it should be enabled with the --with-mail configuration parameter.

4.1.2 Example Configuration

```plaintext
worker_processes auto;
error_log /var/log/nginx/error.log info;

events {
  worker_connections 1024;
}

mail {
  server_name mail.example.com;
  auth_http localhost:9000/cgi-bin/nginxauth.cgi;
  imap_capabilities IMAP4rev1 UIDPLUS IDLE LITERAL+ QUOTA;
  pop3_auth plain apop cram-md5;
  pop3_capabilities LAST TOP USER PIPELINING UIDL;
}
```
CHAPTER 4. MAIL SERVER MODULES

4.1. MODULE ngx_mail_core_module

smtp_auth login plain cram-md5;
smtcapabilities "SIZE 10485760" ENHANCEDSTATUSCODES 8BITMIME DSN;
xclient off;

server {
    listen 25;
    protocol smtp;
}
server {
    listen 110;
    protocol pop3;
    proxy_pass_error_message on;
}
server {
    listen 143;
    protocol imap;
}
server {
    listen 587;
    protocol smtp;
}

4.1.3 Directives

listen

Syntax: listen address:port [ssl] [proxy_protocol] [backlog=number]
[rcvbuf=size] [sndbuf=size] [bind] [ipv6only=on|off]
[so_keepalive=on|off][[keepidle]:[keepintvl]:[keepcnt]];

Default —

Context: server

Sets the address and port for the socket on which the server will accept
requests. It is possible to specify just the port. The address can also be a
hostname, for example:

listen 127.0.0.1:110;
listen *:110;
listen 110; # same as *:110
listen localhost:110;

IPv6 addresses (0.7.58) are specified in square brackets:

listen [::1]:110;
listen [::]:110;

UNIX-domain sockets (1.3.5) are specified with the “unix:” prefix:

listen unix:/var/run/nginx.sock;

Different servers must listen on different address:port pairs.
The ssl parameter allows specifying that all connections accepted on this
port should work in SSL mode.
The proxy_protocol parameter (1.19.8) allows specifying that all
connections accepted on this port should use the PROXY protocol. Obtained
information is passed to the authentication server and can be used to change the client address.

The listen directive can have several additional parameters specific to socket-related system calls.

backlog=number
sets the backlog parameter in the listen call that limits the maximum length for the queue of pending connections (1.9.2). By default, backlog is set to -1 on FreeBSD, DragonFly BSD, and macOS, and to 511 on other platforms.

rcvbuf=size
sets the receive buffer size (the SO_RCVBUF option) for the listening socket (1.11.13).

sndbuf=size
sets the send buffer size (the SO_SNDBUF option) for the listening socket (1.11.13).

bind
this parameter instructs to make a separate bind call for a given address:port pair. The fact is that if there are several listen directives with the same port but different addresses, and one of the listen directives listens on all addresses for the given port (*:port), nginx will bind only to *:port. It should be noted that the getsockname system call will be made in this case to determine the address that accepted the connection. If the backlog, rcvbuf, sndbuf, ipv6only, or so_keepalive parameters are used then for a given address:port pair a separate bind call will always be made.

ipv6only=on|off
this parameter determines (via the IPV6_V6ONLY socket option) whether an IPv6 socket listening on a wildcard address [::] will accept only IPv6 connections or both IPv6 and IPv4 connections. This parameter is turned on by default. It can only be set once on start.

so_keepalive=on|off|[keepidle]:[keepintvl]:[keepcnt]
this parameter configures the “TCP keepalive” behavior for the listening socket. If this parameter is omitted then the operating system’s settings will be in effect for the socket. If it is set to the value “on”, the SO_KEEPALIVE option is turned on for the socket. If it is set to the value “off”, the SO_KEEPALIVE option is turned off for the socket. Some operating systems support setting of TCP keepalive parameters on a per-socket basis using the TCP_KEEPIDLE, TCP_KEEPINTVL, and TCP_KEEPCNT socket options. On such systems (currently, Linux 2.4+, NetBSD 5+, and FreeBSD 9.0-STABLE), they can be configured using the keepidle, keepintvl, and keepcnt parameters. One or two parameters may be omitted, in which case the system default setting for the corresponding socket option will be in effect. For example,
will set the idle timeout (TCP_KEEPIDLE) to 30 minutes, leave the probe interval (TCP_KEEPINTVL) at its system default, and set the probes count (TCP_KEEPCNT) to 10 probes.

**mail**

**Syntax:**  
```mail { ... }```

**Default:** —

**Context:** main

Provides the configuration file context in which the mail server directives are specified.

**max_errors**

**Syntax:**  
```max_errors number;```

**Default:** 5

**Context:** mail, server

This directive appeared in version 1.21.0.

Sets the number of protocol errors after which the connection is closed.

**protocol**

**Syntax:**  
```protocol imap | pop3 | smtp;```

**Default:** —

**Context:** server

Sets the protocol for a proxied server. Supported protocols are IMAP, POP3, and SMTP.

If the directive is not set, the protocol can be detected automatically based on the well-known port specified in the listen directive:

- imap: 143, 993
- pop3: 110, 995
- smtp: 25, 587, 465

Unnecessary protocols can be disabled using the configuration parameters `--without-mail_imap_module`, `--without-mail_pop3_module`, and `--without-mail_smtp_module`.

**resolver**

**Syntax:**  
```resolver address ...[valid=time][ipv4=on|off][ipv6=on|off][status_zone=zone];```

**Default:** `off`

**Context:** mail, server
CHAPTER 4. MAIL SERVER MODULES

4.1. MODULE NGX_MAIL

Configures name servers used to find the client’s hostname to pass it to the authentication server, and in the XCLIENT command when proxying SMTP. For example:

```text
resolver 127.0.0.1 [::1]:5353;
```

The address can be specified as a domain name or IP address, with an optional port (1.3.1, 1.2.2). If port is not specified, the port 53 is used. Name servers are queried in a round-robin fashion.

Before version 1.1.7, only a single name server could be configured. Specifying name servers using IPv6 addresses is supported starting from versions 1.3.1 and 1.2.2.

By default, nginx will look up both IPv4 and IPv6 addresses while resolving. If looking up of IPv4 or IPv6 addresses is not desired, the `ipv4=off` (1.23.1) or the `ipv6=off` parameter can be specified.

Resolving of names into IPv6 addresses is supported starting from version 1.5.8.

By default, nginx caches answers using the TTL value of a response. An optional `valid` parameter allows overriding it:

```text
resolver 127.0.0.1 [::1]:5353 valid=30s;
```

Before version 1.1.9, tuning of caching time was not possible, and nginx always cached answers for the duration of 5 minutes.

To prevent DNS spoofing, it is recommended configuring DNS servers in a properly secured trusted local network.

The optional `status_zone` parameter (1.17.1) enables collection of DNS server statistics of requests and responses in the specified `zone`. The parameter is available as part of our commercial subscription.

The special value `off` disables resolving.

**resolver_timeout**

**Syntax:** `resolver_timeout time;`

**Default:** 30s

**Context:** mail, server

Sets a timeout for DNS operations, for example:

```text
resolver_timeout 5s;
```
server

Syntax:  

```
server { ... }
```

Default  

Context: mail

Sets the configuration for a server.

server_name

Syntax:  

```
server_name name;
```

Default  hostname

Context: mail, server

Sets the server name that is used:

- in the initial POP3/SMTP server greeting;
- in the salt during the SASL CRAM-MD5 authentication;
- in the EHLO command when connecting to the SMTP backend, if the passing of the XCLIENT command is enabled.

If the directive is not specified, the machine’s hostname is used.

timeout

Syntax:  

```
timeout time;
```

Default  60s

Context: mail, server

Sets the timeout that is used before proxying to the backend starts.
4.2 Module ngx_mail_auth_http_module

4.2.1 Directives

**auth_http**

Syntax: `auth_http URL;
Default: —
Context: mail, server

Sets the URL of the HTTP authentication server. The protocol is described below.

**auth_http_header**

Syntax: `auth_http_header header value;
Default: —
Context: mail, server

Appends the specified header to requests sent to the authentication server. This header can be used as the shared secret to verify that the request comes from nginx. For example:

```
auth_http_header X-Auth-Key "secret_string";
```

**auth_http_pass_client_cert**

Syntax: `auth_http_pass_client_cert on | off;
Default: off
Context: mail, server
This directive appeared in version 1.7.11.

Appends the Auth-SSL-Cert header with the client certificate in the PEM format (urlencoded) to requests sent to the authentication server.

**auth_http_timeout**

Syntax: `auth_http_timeout time;
Default: 60s
Context: mail, server

Sets the timeout for communication with the authentication server.
### 4.2.2 Protocol

The HTTP protocol is used to communicate with the authentication server. The data in the response body is ignored, the information is passed only in the headers.

Examples of requests and responses:

**Request:**

```
GET /auth HTTP/1.0
Host: localhost
Auth-Method: plain # plain/apop/cram-md5/external
Auth-User: user
Auth-Pass: password
Auth-Protocol: imap # imap/pop3/smtp
Auth-Login-Attempt: 1
Client-IP: 192.0.2.42
Client-Host: client.example.org
```

**Good response:**

```
HTTP/1.0 200 OK
Auth-Status: OK
Auth-Server: 198.51.100.1
Auth-Port: 143
```

**Bad response:**

```
HTTP/1.0 200 OK
Auth-Status: Invalid login or password
Auth-Wait: 3
```

If there is no Auth-Wait header, an error will be returned and the connection will be closed. The current implementation allocates memory for each authentication attempt. The memory is freed only at the end of a session. Therefore, the number of invalid authentication attempts in a single session must be limited — the server must respond without the Auth-Wait header after 10-20 attempts (the attempt number is passed in the Auth-Login-Attempt header).

When the APOP or CRAM-MD5 are used, request-response will look as follows:

**Request:**

```
GET /auth HTTP/1.0
Host: localhost
Auth-Method: apop
Auth-User: user
Auth-Salt: <238188073.1163692009@mail.example.com>
Auth-Pass: auth_response
Auth-Protocol: imap
Auth-Login-Attempt: 1
Client-IP: 192.0.2.42
Client-Host: client.example.org
```

**Good response:**

```
HTTP/1.0 200 OK
Auth-Status: OK
Auth-Server: 198.51.100.1
```
If the Auth-User header exists in the response, it overrides the username used to authenticate with the backend.

For the SMTP, the response additionally takes into account the Auth-Error-Code header — if exists, it is used as a response code in case of an error. Otherwise, the 535 5.7.0 code will be added to the Auth-Status header.

For example, if the following response is received from the authentication server:

```
HTTP/1.0 200 OK
Auth-Status: Temporary server problem, try again later
Auth-Error-Code: 451 4.3.0
Auth-Wait: 3
```

then the SMTP client will receive an error

```
451 4.3.0 Temporary server problem, try again later
```

If proxying SMTP does not require authentication, the request will look as follows:

```
GET /auth HTTP/1.0
Host: localhost
Auth-Method: none
Auth-User: 
Auth-Password: 
Auth-Protocol: smtp
Auth-Login-Attempts: 1
Client-IP: 192.0.2.42
Client-Host: client.example.org
Auth-SMTP-Helo: client.example.org
Auth-SMTP-From: MAIL FROM: <>
Auth-SMTP-To: RCPT TO: <postmaster@mail.example.com>
```

For the SSL/TLS client connection (1.7.11), the Auth-SSL header is added, and Auth-SSL-Verify will contain the result of client certificate verification, if enabled: “SUCCESS”, “FAILED: reason”, and “NONE” if a certificate was not present.

Prior to version 1.11.7, the “FAILED” result did not contain the reason string.

When the client certificate was present, its details are passed in the following request headers: Auth-SSL-Subject, Auth-SSL-Issuer, Auth-SSL-Serial, and Auth-SSL-Fingerprint. If auth_http_pass-client_cert is enabled, the certificate itself is passed in the Auth-SSL-Cert header. The protocol and cipher of the established connection are passed in the Auth-SSL-Protocol and Auth-SSL-Cipher headers (1.21.2). The request will look as follows:
GET /auth HTTP/1.0
Host: localhost
Auth-Method: plain
Auth-User: user
Auth-Pass: password
Auth-Protocol: imap
Auth-Login-Attempt: 1
Client-IP: 192.0.2.42
Auth-SSL: on
Auth-SSL-Protocol: TLSv1.3
Auth-SSL-Cipher: TLS_AES_256_GCM_SHA384
Auth-SSL-Verify: SUCCESS
Auth-SSL-Issuer: /CN=example.com
Auth-SSL-Serial: C07AD56B846B5BFF
Auth-SSL-Fingerprint: 29d6a80a123d13355ed16b4b04605e29cb55a5ad

When the PROXY protocol is used, its details are passed in the following request headers: Proxy-Protocol-Addr, Proxy-Protocol-Port, Proxy-Protocol-Server-Addr, and Proxy-Protocol-Server-Port (1.19.8).
4.3 Module ngx_mail_proxy_module

4.3.1 Directives

proxy_buffer

Syntax: proxy_buffer size;
Default: 4k | 8k
Context: mail, server

Sets the size of the buffer used for proxying. By default, the buffer size is equal to one memory page. Depending on a platform, it is either 4K or 8K.

proxy_pass_error_message

Syntax: proxy_pass_error_message on | off;
Default: off
Context: mail, server

Indicates whether to pass the error message obtained during the authentication on the backend to the client.

Usually, if the authentication in nginx is a success, the backend cannot return an error. If it nevertheless returns an error, it means some internal error has occurred. In such case the backend message can contain information that should not be shown to the client. However, responding with an error for the correct password is a normal behavior for some POP3 servers. For example, CommuniGatePro informs a user about mailbox overflow or other events by periodically outputting the authentication error. The directive should be enabled in this case.

proxy_protocol

Syntax: proxy_protocol on | off;
Default: off
Context: mail, server

This directive appeared in version 1.19.8.

Enables the PROXY protocol for connections to a backend.
proxy_smtp_auth

Syntax:  proxy_smtp_auth on | off;
Default  off
Context:  mail, server

This directive appeared in version 1.19.4.

Enables or disables user authentication on the SMTP backend using the AUTH command.
If XCLIENT is also enabled, then the XCLIENT command will not send the LOGIN parameter.

proxy_timeout

Syntax:  proxy_timeout timeout;
Default  24h
Context:  mail, server

Sets the timeout between two successive read or write operations on client or proxied server connections. If no data is transmitted within this time, the connection is closed.

xclient

Syntax:  xclient on | off;
Default  on
Context:  mail, server

Enables or disables the passing of the XCLIENT command with client parameters when connecting to the SMTP backend.
With XCLIENT, the MTA is able to write client information to the log and apply various limitations based on this data.
If XCLIENT is enabled then nginx passes the following commands when connecting to the backend:

- EHLO with the server name
- XCLIENT
- EHLO or HELO, as passed by the client

If the name found by the client IP address points to the same address, it is passed in the NAME parameter of the XCLIENT command. If the name could not be found, points to a different address, or resolver is not specified, the [UNAVAILABLE] is passed in the NAME parameter. If an error has occurred in the process of resolving, the [TEMPUNAVAIL] value is used.
If XCLIENT is disabled then nginx passes the EHLO command with the server name when connecting to the backend if the client has passed EHLO, or HELO with the server name, otherwise.
4.4 Module ngx_mail_realip_module

4.4.1 Summary

The ngx_mail_realip_module module is used to change the client address and port to the ones sent in the PROXY protocol header (1.19.8). The PROXY protocol must be previously enabled by setting the proxy_protocol parameter in the listen directive.

4.4.2 Example Configuration

```
listen 110 proxy_protocol;
set_real_ip_from 192.168.1.0/24;
set_real_ip_from 192.168.2.1;
set_real_ip_from 2001:0db8::/32;
```

4.4.3 Directives

set_real_ip_from

**Syntax:** `set_real_ip_from address | CIDR | unix:;`

**Default** —

**Context:** mail, server

Defines trusted addresses that are known to send correct replacement addresses. If the special value `unix:` is specified, all UNIX-domain sockets will be trusted.
4.5 Module ngx_mail_ssl_module

4.5.1 Summary

The ngx_mail_ssl_module module provides the necessary support for a mail proxy server to work with the SSL/TLS protocol.

This module is not built by default, it should be enabled with the --with-mail_ssl_module configuration parameter.

This module requires the OpenSSL library.

4.5.2 Example Configuration

To reduce the processor load, it is recommended to

- set the number of worker processes equal to the number of processors,
- enable the shared session cache,
- disable the built-in session cache,
- and possibly increase the session lifetime (by default, 5 minutes):
worker_processes auto;

mail {
...

server {
  listen 993 ssl;
  ssl_protocols TLSv1 TLSv1.1 TLSv1.2 TLSv1.3;
  ssl_ciphers AES128-SHA:AES256-SHA:RC4-SHA:DES-CBC3-SHA:RC4-MD5;
  ssl_certificate /usr/local/nginx/conf/cert.pem;
  ssl_certificate_key /usr/local/nginx/conf/cert.key;
  ssl_session_cache shared:SSL:10m;
  ssl_session_timeout 10m;
...
}

4.5.3 Directives

ssl

Syntax: ssl on | off;
Default: off
Context: mail, server

This directive was made obsolete in version 1.15.0 and was removed in version 1.25.1. The ssl parameter of the listen directive should be used instead.

ssl_certificate

Syntax: ssl_certificate file;
Default: —
Context: mail, server

Specifies a file with the certificate in the PEM format for the given server. If intermediate certificates should be specified in addition to a primary certificate, they should be specified in the same file in the following order: the primary certificate comes first, then the intermediate certificates. A secret key in the PEM format may be placed in the same file.

Since version 1.11.0, this directive can be specified multiple times to load certificates of different types, for example, RSA and ECDSA:

server {
  listen 993 ssl;
  ssl_certificate example.com.rsa.crt;
  ssl_certificate_key example.com.rsa.key;
  ssl_certificate example.com.ecdsa.crt;
  ssl_certificate_key example.com.ecdsa.key;
...
}
Only OpenSSL 1.0.2 or higher supports separate certificate chains for different certificates. With older versions, only one certificate chain can be used.

The value `data:certificate` can be specified instead of the `file` (1.15.10), which loads a certificate without using intermediate files. Note that inappropriate use of this syntax may have its security implications, such as writing secret key data to `error log`.

**ssl_certificate_key**

**Syntax:**

```plaintext
ssl_certificate_key file;
```

**Default**

```plaintext
—
```

**Context:** mail, server

Specifies a file with the secret key in the PEM format for the given server.

The value `engine:name:id` can be specified instead of the `file` (1.7.9), which loads a secret key with a specified id from the OpenSSL engine `name`.

The value `data:key` can be specified instead of the `file` (1.15.10), which loads a secret key without using intermediate files. Note that inappropriate use of this syntax may have its security implications, such as writing secret key data to `error log`.

**ssl_ciphers**

**Syntax:**

```plaintext
ssl_ciphers ciphers;
```

**Default**

```plaintext
HIGH:!aNULL:!MD5
```

**Context:** mail, server

Specifies the enabled ciphers. The ciphers are specified in the format understood by the OpenSSL library, for example:

```plaintext
```

The full list can be viewed using the “openssl ciphers” command.

The previous versions of nginx used different ciphers by default.

**ssl_client_certificate**

**Syntax:**

```plaintext
ssl_client_certificate file;
```

**Default**

```plaintext
—
```

**Context:** mail, server

This directive appeared in version 1.7.11.

Specifies a file with trusted CA certificates in the PEM format used to verify client certificates.

The list of certificates will be sent to clients. If this is not desired, the `ssl_trusted_certificate` directive can be used.
ssl_conf_command

**SYNTAX:**  
`ssl_conf_command name value;`

**DEFAULT** —

**CONTEXT:** mail, server

This directive appeared in version 1.19.4.

Sets arbitrary OpenSSL configuration commands.

The directive is supported when using OpenSSL 1.0.2 or higher.

Several `ssl_conf_command` directives can be specified on the same level:

```
ssl_conf_command Options PrioritizeChaCha;
ssl_conf_command Ciphersuites TLS_CHACHA20_POLY1305_SHA256;
```

These directives are inherited from the previous configuration level if and only if there are no `ssl_conf_command` directives defined on the current level.

Note that configuring OpenSSL directly might result in unexpected behavior.

ssl_crl

**SYNTAX:**  
`ssl_crl file;`

**DEFAULT** —

**CONTEXT:** mail, server

This directive appeared in version 1.7.11.

Specifies a file with revoked certificates (CRL) in the PEM format used to verify client certificates.

ssl_dhparam

**SYNTAX:**  
`ssl_dhparam file;`

**DEFAULT** —

**CONTEXT:** mail, server

This directive appeared in version 0.7.2.

Specifies a file with DH parameters for DHE ciphers.

By default no parameters are set, and therefore DHE ciphers will not be used.

Prior to version 1.11.0, builtin parameters were used by default.

ssl_ecdh_curve

**SYNTAX:**  
`ssl_ecdh_curve curve;`

**DEFAULT** `auto`

**CONTEXT:** mail, server
This directive appeared in versions 1.1.0 and 1.0.6.

Specifies a curve for ECDHE ciphers.

When using OpenSSL 1.0.2 or higher, it is possible to specify multiple curves (1.11.0), for example:

```
ssl_ecdh_curve prime256v1:secp384r1;
```

The special value `auto` (1.11.0) instructs nginx to use a list built into the OpenSSL library when using OpenSSL 1.0.2 or higher, or `prime256v1` with older versions.

Prior to version 1.11.0, the `prime256v1` curve was used by default.

When using OpenSSL 1.0.2 or higher, this directive sets the list of curves supported by the server. Thus, in order for ECDSA certificates to work, it is important to include the curves used in the certificates.

**ssl_password_file**

**Syntax:**

```
ssl_password_file file;
```

**Default** —

**Context:** mail, server

This directive appeared in version 1.7.3.

Specifies a file with passphrases for secret keys where each passphrase is specified on a separate line. Passphrases are tried in turn when loading the key.

**Example:**

```
mail {
    ssl_password_file /etc/keys/global.pass;
    ...
    server {
        server_name mail1.example.com;
        ssl_certificate_key /etc/keys/first.key;
    }
    server {
        server_name mail2.example.com;
        # named pipe can also be used instead of a file
        ssl_password_file /etc/keys/fifo;
        ssl_certificate_key /etc/keys/second.key;
    }
}
```

**ssl_prefer_server_ciphers**

**Syntax:**

```
ssl_prefer_server_ciphers on | off;
```

**Default** on

**Context:** mail, server

Nginx, Inc. p.502 of 542
CHAPTER 4. MAIL SERVER MODULES

4.5. MODULE NGX_MAIL_SSL_MODULE

Specifies that server ciphers should be preferred over client ciphers when the SSLv3 and TLS protocols are used.

### ssl_protocols

**Syntax:**
```
ssl_protocols [SSLv2] [SSLv3] [TLSv1] [TLSv1.1] [TLSv1.2] [TLSv1.3];
```

**Default:** TLSv1 TLSv1.1 TLSv1.2 TLSv1.3

**Context:** mail, server

Enables the specified protocols.

The TLSv1.1 and TLSv1.2 parameters (1.1.13, 1.0.12) work only when OpenSSL 1.0.1 or higher is used.

The TLSv1.3 parameter (1.13.0) works only when OpenSSL 1.1.1 or higher is used.

The TLSv1.3 parameter is used by default since 1.23.4.

### ssl_session_cache

**Syntax:**
```
ssl_session_cache off | none | [builtin:[size]] [shared:name:size];
```

**Default:** none

**Context:** mail, server

Sets the types and sizes of caches that store session parameters. A cache can be of any of the following types:

**off**
the use of a session cache is strictly prohibited: nginx explicitly tells a client that sessions may not be reused.

**none**
the use of a session cache is gently disallowed: nginx tells a client that sessions may be reused, but does not actually store session parameters in the cache.

**builtin**
a cache built in OpenSSL; used by one worker process only. The cache size is specified in sessions. If size is not given, it is equal to 20480 sessions. Use of the built-in cache can cause memory fragmentation.

**shared**
a cache shared between all worker processes. The cache size is specified in bytes; one megabyte can store about 4000 sessions. Each shared cache should have an arbitrary name. A cache with the same name can be used in several servers. It is also used to automatically generate, store, and periodically rotate TLS session ticket keys (1.23.2) unless configured explicitly using the `ssl_session_ticket_key` directive.
Both cache types can be used simultaneously, for example:

```plaintext
ssl_session_cache builtin:1000 shared:SSL:10m;
```

but using only shared cache without the built-in cache should be more efficient.

**ssl_session_ticket_key**

**Syntax:** `ssl_session_ticket_key file;`

**Default** —

**Context:** mail, server

This directive appeared in version 1.5.7.

Sets a file with the secret key used to encrypt and decrypt TLS session tickets. The directive is necessary if the same key has to be shared between multiple servers. By default, a randomly generated key is used.

If several keys are specified, only the first key is used to encrypt TLS session tickets. This allows configuring key rotation, for example:

```plaintext
ssl_session_ticket_key current.key;
ssl_session_ticket_key previous.key;
```

The file must contain 80 or 48 bytes of random data and can be created using the following command:

```plaintext
openssl rand 80 > ticket.key
```

Depending on the file size either AES256 (for 80-byte keys, 1.11.8) or AES128 (for 48-byte keys) is used for encryption.

**ssl_session_tickets**

**Syntax:** `ssl_session_tickets on | off;`

**Default** on

**Context:** mail, server

This directive appeared in version 1.5.9.

Enables or disables session resumption through TLS session tickets.

**ssl_session_timeout**

**Syntax:** `ssl_session_timeout time;`

**Default** 5m

**Context:** mail, server

Specifies a time during which a client may reuse the session parameters.
ssl_trusted_certificate

Syntax:  ssl_trusted_certificate file;

Default —

Context: mail, server

This directive appeared in version 1.7.11.

Specifies a file with trusted CA certificates in the PEM format used to verify client certificates.

In contrast to the certificate set by ssl_client_certificate, the list of these certificates will not be sent to clients.

ssl_verify_client

Syntax:  ssl_verify_client on | off | optional | optional_no_ca;

Default off

Context: mail, server

This directive appeared in version 1.7.11.

Enables verification of client certificates. The verification result is passed in the Auth-SSL-Verify header of the authentication request.

The optional parameter requests the client certificate and verifies it if the certificate is present.

The optional_no_ca parameter requests the client certificate but does not require it to be signed by a trusted CA certificate. This is intended for the use in cases when a service that is external to nginx performs the actual certificate verification. The contents of the certificate is accessible through requests sent to the authentication server.

ssl_verify_depth

Syntax:  ssl_verify_depth number;

Default 1

Context: mail, server

This directive appeared in version 1.7.11.

Sets the verification depth in the client certificates chain.

starttls

Syntax:  starttls on | off | only;

Default off

Context: mail, server

on

allow usage of the STLS command for the POP3 and the STARTTLS command for the IMAP and SMTP;

off

deny usage of the STLS and STARTTLS commands;
only
require preliminary TLS transition.
4.6 Module ngx_mail_imap_module

4.6.1 Directives

imap_auth

Syntax: `imap_auth method ...`;

Default: plain

Context: mail, server

Sets permitted methods of authentication for IMAP clients. Supported methods are:

- **plain**
  - `LOGIN, AUTH=PLAIN`
- **login**
  - `AUTH=LOGIN`
- **cram-md5**
  - `AUTH=CRAM-MD5`. In order for this method to work, the password must be stored unencrypted.
- **external**
  - `AUTH=EXTERNAL (1.11.6)`.

Plain text authentication methods (the `LOGIN` command, `AUTH=PLAIN`, and `AUTH=LOGIN`) are always enabled, though if the plain and login methods are not specified, `AUTH=PLAIN` and `AUTH=LOGIN` will not be automatically included in `imap_capabilities`.

imap_capabilities

Syntax: `imap_capabilities extension ...`;

Default: IMAP4 IMAP4rev1 UIDPLUS

Context: mail, server

Sets the IMAP protocol extensions list that is passed to the client in response to the `CAPABILITY` command. The authentication methods specified in the `imap_auth` directive and `STARTTLS` are automatically added to this list depending on the `starttls` directive value.

It makes sense to specify the extensions supported by the IMAP backends to which the clients are proxied (if these extensions are related to commands used after the authentication, when nginx transparently proxies a client connection to the backend).

The current list of standardized extensions is published at www.iana.org.
imap_client_buffer

**Syntax:**  \texttt{imap_client_buffer size;}

**Default:**  4k | 8k

**Context:**  mail, server

Sets the size of the buffer used for reading IMAP commands. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform.
4.7 Module ngx_mail_pop3_module

4.7.1 Directives

pop3_auth

Syntax: `pop3_auth method ...;`

Default: plain

Context: mail, server

Sets permitted methods of authentication for POP3 clients. Supported methods are:

- plain
  - USER/PASS, AUTH PLAIN, AUTH LOGIN
- apop
  - APOP. In order for this method to work, the password must be stored unencrypted.
- cram-md5
  - AUTH CRAM-MD5. In order for this method to work, the password must be stored unencrypted.
- external
  - AUTH EXTERNAL (1.11.6).

Plain text authentication methods (USER/PASS, AUTH PLAIN, and AUTH LOGIN) are always enabled, though if the plain method is not specified, AUTH PLAIN and AUTH LOGIN will not be automatically included in pop3_capabilities.

pop3_capabilities

Syntax: `pop3_capabilities extension ...;`

Default: TOP USER UIDL

Context: mail, server

Sets the POP3 protocol extensions list that is passed to the client in response to the CAPA command. The authentication methods specified in the pop3_auth directive (SASL extension) and STLS are automatically added to this list depending on the starttls directive value.

It makes sense to specify the extensions supported by the POP3 backends to which the clients are proxied (if these extensions are related to commands used after the authentication, when nginx transparently proxies the client connection to the backend).

The current list of standardized extensions is published at www.iana.org.
4.8 Module ngx_mail_smtp_module

4.8.1 Directives

smtp_auth

Syntax: smtp_auth method ...;
Default: plain login
Context: mail, server

Sets permitted methods of SASL authentication for SMTP clients. Supported methods are:

- plain
  - AUTH PLAIN
- login
  - AUTH LOGIN
- cram-md5
  - AUTH CRAM-MD5. In order for this method to work, the password must be stored unencrypted.
- external
  - AUTH EXTERNAL (1.11.6).
- none
  - Authentication is not required.

Plain text authentication methods (AUTH PLAIN and AUTH LOGIN) are always enabled, though if the plain and login methods are not specified, AUTH PLAIN and AUTH LOGIN will not be automatically included in smtp_capabilities.

smtp_capabilities

Syntax: smtp_capabilities extension ...;
Default: —
Context: mail, server

Sets the SMTP protocol extensions list that is passed to the client in response to the EHLO command. The authentication methods specified in the smtp_auth directive and STARTTLS are automatically added to this list depending on the starttls directive value.

It makes sense to specify the extensions supported by the MTA to which the clients are proxied (if these extensions are related to commands used after
the authentication, when nginx transparently proxies the client connection to the backend).

The current list of standardized extensions is published at www.iana.org.

**smtp_client_buffer**

**Syntax:** `smtp_client_buffer size;`

**Default:** 4k | 8k

**Context:** mail, server

Sets the size of the buffer used for reading SMTP commands. By default, the buffer size is equal to one memory page. This is either 4K or 8K, depending on a platform.

**smtp_greeting_delay**

**Syntax:** `smtp_greeting_delay time;`

**Default:** 0

**Context:** mail, server

Allows setting a delay before sending an SMTP greeting in order to reject clients who fail to wait for the greeting before sending SMTP commands.
Chapter 5

Miscellaneous

5.1 Command-line parameters

5.1.1 Overview

nginx supports the following command-line parameters:

- `--help` | `-h` — print help for command-line parameters.
- `--config-file file` — use an alternative configuration file instead of a default file.
- `--error-log file` — use an alternative error log file to store the log instead of a default file (1.19.5). The special value `stderr` selects the standard error file.
- `--global-directives` — set global configuration directives, for example,

```
nginx -g "pid /var/run/nginx.pid; worker_processes 'sysctl -n hw.ncpu';"
```

- `--prefix prefix` — set nginx path prefix, i.e. a directory that will keep server files (default value is `/usr/local/nginx`).
- `--quiet` — suppress non-error messages during configuration testing.
- `--signal signal` — send a signal to the master process. The argument `signal` can be one of:
  - `stop` — shut down quickly
  - `quit` — shut down gracefully
  - `reload` — reload configuration, start the new worker process with a new configuration, gracefully shut down old worker processes.
  - `reopen` — reopen log files
- `--test` — test the configuration file: nginx checks the configuration for correct syntax, and then tries to open files referred in the configuration.
• `-T` — same as `-t`, but additionally dump configuration files to standard output (1.9.2).

• `-v` — print nginx version.

• `-V` — print nginx version, compiler version, and configure parameters.
5.2 Module ngx_otel_module

5.2.1 Summary ............................................ 514
5.2.2 Example Configuration ............................ 514
5.2.3 Directives ........................................... 515
   otel_exporter ....................................... 515
   otel_service_name ................................. 515
   otel_trace ....................................... 515
   otel_trace_context ............................... 516
   otel_span_name .................................. 516
   otel_span_attr .................................. 516
5.2.4 Default span attributes ......................... 516
5.2.5 Embedded Variables .............................. 517

5.2.1 Summary

The ngx_otel_module module (1.23.4) provides OpenTelemetry distributed tracing support. The module supports W3C context propagation and OTLP/gRPC export protocol.

This module is available as part of our commercial subscription in nginx-plus-module-otel package. After installation, the module can be loaded dynamically.

5.2.2 Example Configuration

```nginx
load_module modules/ngx_otel_module.so;

events {
}

http {

   otel_exporter {
      endpoint localhost:4317;
   }

   server {
      listen 127.0.0.1:8080;
      location / {
         otel_trace on;
         otel_trace_context inject;
         proxy_pass http://backend;
      }
   }
}
```
### 5.2.3 Directives

**otel_exporter**

Syntax:  
`otel_exporter { ... }`

Default —

Context: http

Specifies OTel data export parameters:

- **endpoint**
  the address of OTLP/gRPC endpoint that will accept telemetry data.

- **interval**
  the maximum interval between two exports, by default is 5 seconds.

- **batch_size**
  the maximum number of spans to be sent in one batch per worker, by default is 512.

- **batch_count**
  the number of pending batches per worker, spans exceeding the limit are dropped, by default is 4.

**Example:**

```
otel_exporter {
  endpoint localhost:4317;
  interval 5s;
  batch_size 512;
  batch_count 4;
}
```

**otel_service_name**

Syntax:  
`otel_service_name name;`

Default unknown_service:nginx

Context: http

Sets the “service.name” attribute of the OTel resource.

**otel_trace**

Syntax:  
`otel_trace on | off | $variable;`

Default off

Context: http, server, location

Enables or disables OpenTelemetry tracing. The directive can also be enabled by specifying a variable:

```
split_clients "$otel_trace_id" $ratio_sampler {
  10% on;
  * off;
}
```

```
location / {
    otel_trace $ratio_sampler;
    otel_trace_context inject;
    proxy_pass http://backend;
}

otel_trace_context

**Syntax:** `otel_trace_context extract | inject | propagate | ignore;`
**Default:** `ignore`
**Context:** `http, server, location`

Specifies how to propagate `traceparent/tracestate` headers:

- **extract**
  uses an existing trace context from the request, so that the identifiers of
  a `trace` and the `parent span` are inherited from the incoming request.

- **inject**
  adds a new context to the request, overwriting existing headers, if any.

- **propagate**
  updates the existing context (combines `extract` and `inject`).

- **ignore**
  skips context headers processing.

otel_span_name

**Syntax:** `otel_span_name name;`
**Default:** `—`
**Context:** `http, server, location`

Defines the name of the OTel span. By default, it is a name of the location
for a request. The name can contain variables.

otel_span_attr

**Syntax:** `otel_span_attr name value;`
**Default:** `—`
**Context:** `http, server, location`

Adds a custom OTel span attribute. The value can contain variables.

### 5.2.4 Default span attributes

The following span attributes are added automatically:

- `http.method`
- `http.target`
- `http.route`
5.2.5 Embedded Variables

$otel_trace_id
the identifier of the trace the current span belongs to, for example, 56552bc4da3bf39c08362527e1dd6c4

$otel_span_id
the identifier of the current span, for example, 4c0b8531ec38ca59

$otel_parent_id
the identifier of the parent span, for example, dc94d281b0f884ea

$otel_parent_sampled
the “sampled” flag of the parent span, can be “1” or “0”
Appendix A

Changelog for NGINX Plus

This appendix contains the most important changes that may apply to both NGINX Plus and nginx/OSS. Full changelog for nginx/OSS is available in the packages and by the following link: https://nginx.org/en/CHANGES

- **NGINX Plus R30 (1.25.1), released August 15, 2023**
  - Native support for HTTP/3 and QUIC
  - API version 9 update:
    * Per-worker connection statistics
    - The nja-prometheus-module now supports version 9 of the API
    - DNS reload optimization: now DNS name expiry time for dynamically-resolved upstream hosts is preserved across reloads
    - The new mqtt_buffers directive in the MQTT Filter module that specifies the number of buffers allocated per connection, the directive also supersedes the mqtt_rewrite_buffer_size directive
    - The ssl directive deprecated in NGINX Plus Release 16 and nginx/OSS 1.15.0 was removed, the ssl parameter of the listen directive should be used instead
    - The new http2 directive obsoletes the http2 parameter of the listen directive which is now deprecated
    - HTTP/2 server push removed, the http2_push http2_push_preload http2_max_concurrent_pushes directives are made obsolete
    - Optional NGINX diagnostic scripts that collect the data required for troubleshooting are available as a separate download package
    - New features in njs:
      * global NGINX properties: ngx.build, ngx.conf_file_path, ngx.error_log_path, ngx.prefix, ngx.version, ngx.version_number, ngx.worker_id
      * the js_shared_dict_zone directive for http and stream that allows declaring a dictionary shared between worker processes
      * ES13-compliant Array methods: Array.from(), Array.prototype.toSorted(), Array.prototype.toSpliced(), Array.prototype.toReversed()
      * CryptoKey properties in WebCrypto API. The following properties were added: algorithm, extractable, type, usages
  - The GeoIP2 module is no longer available for Amazon Linux 2 as the EPEL repository doesn’t provide the libmaxminddb library required to build the module.

- **NGINX Plus R29 (1.23.4), released May 3, 2023**
– HTTP/3 and QUIC support in separate experimental packages (package name is nginx-plus-http3).
– MQTT Preread and MQTT Filter modules that add MQTT support.
– New dynamic module: OTel that adds OpenTelemetry distributed tracing support (package name is nginx-plus-module-otel)
– SAML Authentication reference implementation based on native njs XML support.
– TLS v1.3 is enabled by default in the ssl_protocols directive
– The internal_redirect module that allows internal redirects after checking request and connection processing limits, and access limits.
– New features in njs: extended Fetch API and WebCrypto API. XML module to parse and modify XML documents, Zlib module to support compression.
– The njs-prometheus-module now supports version 8 of the API, including SSL extended statistics for each HTTP upstream and stream upstream, SSL extended statistics for each HTTP server zone and stream server zone, and extended statistics for SSL.

• NGINX Plus R28 (1.23.2), released November 29, 2022
  – API version 8 update:
    * SSL extended statistics for each HTTP upstream and stream upstream
    * SSL extended statistics for each HTTP server zone and stream server zone
    * Extended statistics for SSL
  – PROXY protocol v2 TLV variables for Amazon Web Services, Google Cloud Platform, and Microsoft Azure in HTTP and stream
  – The proxy_protocol_tlv_variable for HTTP and stream
  – Variables support for sticky cookie sameSite flag in the HTTP upstream module
  – Nginx Plus Dashboard now support extended HTTP codes and extended SSL counters
  – TLS session tickets encryption keys are now automatically rotated when using shared memory in the ssl_session_cache directive
  – Looking up of IPv4 addresses while resolving can now be disabled with the ipv4=off parameter of the resolver directive
  – Processing of a specially crafted mp4 file by the ngx_http_mp4_module might cause a worker process crash, worker process memory disclosure, or might have potential other impact (CVE-2022-41741, CVE-2022-41742)

• NGINX Plus R27 (1.21.6), released June 28, 2022
  – API version 8:
    * SSL statistics for each HTTP upstream and stream upstream
    * SSL statistics for each HTTP server zone and stream server zone
  – HTTP health checks: introduced the keepalive_time parameter of the health_check directive that enables keepalive connections for health checks and specifies the time during which requests can be processed through one keepalive connection
  – JWT Authentication; error code can be customized with the error parameter of the auth_jwt_require directive if any additional condition of JWT validation fails
  – The njs-prometheus-module now supports version 7 of the API, including /stream/limit_conns/, /http/limit_conns/, /http/limit_req/ data, and HTTP status code statistics for upstreams, server zones, and location zones
• NGINX Plus R26 (1.21.5), released Feb 15, 2022
  – JWT key caching with the auth_jwt_key_cache directive
  – Enhanced ALPN support with the ssl_alpn directive for stream, and the
    $ssl_alpn_protocol variable for HTTP and stream
  – The $ssl_curve variable that returns the negotiated curve used for SSL
    handshake key exchange process
  – The proxy_half_close directive for stream that allows closing one side of a
    connection while the data is still transmitted
  – The mp4_start_key_frame directive in the MP4 module that forces a video to
    always start with a key frame

• NGINX Plus R25 (1.21.3), released Sep 21, 2021
  – JWT authentication:
    * support for signed and then encrypted Nested JWT with the nested
      parameter of the auth_jwt_type directive
    * additional conditions for JWT validation can be specified with the
      auth_jwt_require directive
    * the $jwt_payload variable that returns either enclosed JWS token for
      Nested JWT, or JSON with claims for JWE
    * multiple sources of JSON Web Key Sets can be specified in
      auth_jwt_key_file and auth_jwt_key_request directives
    * asymmetric RSA-OAEP cryptographic algorithms for JWE
  – API version 7: HTTP status code statistics are now collected per-code, in
    addition to aggregation per-class, for upstreams, server zones, and location
    zones.
  – Stream health checks: introduced the persistent parameter of the
    health_check directive that enables persistence to mandatory health checks
    after reload.
  – TCP Fast Open support with the fastopen parameter of the listen directive
    in the stream module.
  – Mail proxy:
    * the number of errors before closing the connection can be specified with the
      max_errors directive to mitigate against ALPACA attack
    * support for POP3 and IMAP pipelining
    * the Auth-SSL-Protocol and Auth-SSL-Cipher header lines are
      now passed to the mail proxy authentication server
  – Security hardening of HTTP request parsing. NGINX Plus will return an
    error if:
    * spaces or control characters are found in the request line, header names,
      or the Host request header line
    * the CONNECT method is used
    * both Content-Length and Transfer-Encoding header lines are
      present in the request
  – Request body filters API now permits buffering of the data being processed.
  – Added support for dynamic SSL certificate loading for http, grpc and uwsgi
    backends.

• NGINX Plus R24 (1.19.10), released Apr 27, 2021
  – Added support for JSON Web Encryption to the JSON Web Token
    authorization module (the auth_jwt_type directive).
  – HTTP health checks: introduced the persistent parameter of the
    health_check directive that enables persistence to mandatory health checks
    after reload.
  – Flags in the proxy_cookie_flags directive can now contain variables.
– Added PROXY protocol support for mail (the proxy_protocol parameter of the listen directive, the proxy_protocol and set_real_ip_from directives).
– If free worker connections are exhausted, NGINX Plus starts closing not only keepalive connections, but also connections in lingering close.
– The maximum duration of a persistent connection can be limited with the keepalive_time directive for http and upstream servers.
– New variable, $connection_time, contains connection time.

• NGINX Plus R23 (1.19.5), released Dec 8, 2020
  – gRPC health checks: introduced the type=grpc parameter in the health_check directive that enables active health checks of gRPC upstream servers.
  – Sticky cookie now can accept the SameSite attribute with Strict, Lax, or None values.
  – Support for cookie flags with the proxy_cookie_flags and userid_flags directives.
  – Introduced script that performs unprivileged installation of NGINX Plus.
  – New command-line switch to redefine an error log file: -e.
  – New set directive for stream that allows setting a value for a variable.
  – Added support for arbitrary OpenSSL configuration commands with the ssl_conf_command directive.
  – The sslReject_handshake directive that allows rejecting the SSL handshake in the server block.
  – Support for user authentication on the SMTP backend in mail proxy.
  – Cache manager improved to monitor the minimum amount of free space (see the min_free parameter of the proxy_cache_path directive).

• NGINX Plus R22 (1.19.0), released Jun 9, 2020
  – Client certificate validation with OCSP.
  – Unauthorized requests can now be delayed with the auth_delay directive.
  – Updated status dashboard with new visualizations of limit_conn and limit_req statistics.

• NGINX Plus R21 (1.17.9), released Apr 7, 2020
  – The grpc_pass directive can now contain variables.

• NGINX Plus R20 (1.17.6), released Dec 3, 2019
  – Key-value storage: added support for matching a key based on a substring (the type parameter of the keyval_zone directive was extended with the prefix option).
  – DNS resolvers can now be specified in upstream context.
  – Rate limiting: the $limit_req_status variable keeps the result of limiting a request processing rate. Corresponding metrics are available through the /http/limit_reqs/ endpoint in the API module.
  – The connection limiting facility now has dry run mode. The $limit_conn_status variable keeps the result of limiting a number of connections. Corresponding metrics are available through the /http/limit_conns/ endpoint in the API module.
  – Additional variables were introduced to keep original IP address and port of the server that a client originally connected to when PROXY protocol was used: $proxy_protocol_server_addr, $proxy_protocol_server_port.
• NGINX Plus R19 (1.17.3), released Sep 3, 2019
  – Metrics provided by the status_zone directive can now be collected per location.
  – A set of metrics related to DNS resolver functionality is now available (the status_zone parameter of the resolver directive).
  – The request limiting facility now has dry run mode.
  – Key-value storage now has optimized mode for storing IP addresses in CIDR notation (the type parameter of the keyval_zone directive).
  – Each key-value pair can now have its own custom expiration timer, either set at creation time for new entry, or modified for existing entry.
  – The limit_rate and limit_rate_after directives can now contain variables.
  – The proxy_download_rate and proxy_upload_rate directives can now contain variables.
  – Updated status dashboard with new visualizations for per-location statistic, resolver metrics, and zone sync status.

• NGINX Plus R18 (1.15.10), released Apr 9, 2019
  – Added support for dynamic SSL certificate loading, either from file or from key-value storage (variable should be prefixed with data: for the latter case).
  – Active health checks extended with additional logic of verifying arbitrary variables (the require parameter of the match directive).
  – Clustering enhancement: a single zone sync configuration can now be used for all instances in a cluster with the help of wildcard support in the listen directive.
  – Port ranges can now be used in the listen directive.
  – Stream proxy: added an ability to explicitly close existing connections to the particular upstream server after it was removed from the group due to health check failure, API call, or re-resolve action (the proxy_session_drop directive).
  – New variable, $upstream_bytes_sent, contains number of bytes sent to an upstream server.

• NGINX Plus R17 (1.15.7), released Dec 11, 2018
  – Added support for TLS v1.3 early data. Check out the $ssl_early_data variable which can be used to protect against replay attacks at the application layer.
  – Introduced two-stage rate limiting (the delay parameter of the limit_req directive).
  – Added support for retrieving JSON Web Key (JWK) set from a subrequest.
  – Added support for the Ed25519 and Ed448 cryptographic algorithms to the JSON Web Token authorization module.
  – Added an option to enable TCP keepalives for outgoing connections to proxied servers (the proxy_socket_keepalive and friends).
  – Fine-grained control over persistent connections to upstreams with the keepalive_timeout and keepalive_requests directives.
  – Added ability to restrict UDP session to a particular number of packets with the proxy_requests directive.

• NGINX Plus R16 (1.15.2), released Sep 5, 2018
  – IMPORTANT: status and upstream_conf modules deprecated since R13 were finally removed in favor to the API module.
  – Shared zones synchronization extended to support keyval and limit_req modules.
– Key-value pairs can now be expired after configured timeout (the `timeout` parameter of the `keyval_zone` directive).
– Introduced new load balancing algorithm: `random` with two choices (optional).
– UDP load balancing extended to support multiple incoming datagrams from a client within a single session, thus allowing to proxy/load balance of more complex applications.
– Added support for PROXY protocol version 2 in HTTP and stream modules.
– New variable, `$ssl_preread_protocol`, of stream module contains the highest SSL protocol version supported by the client.

• NGINX Plus R15 (1.13.10), released Apr 10, 2018
  – Added gRPC proxy support.
  – Added HTTP/2 push support.
  – Introduced shared zone synchronization between NGINX Plus nodes. Currently, it is possible to synchronize sticky sessions when using `learn` method.
  – Added an ability to completely disable any escaping in access log (the `escape=none` parameter of the `log_format` directive).
  – It is no longer required to run nginx under superuser when using the `proxy_bind` directive with `transparent` parameter on Linux, as worker processes now inherit the `CAP_NET_RAW` capability from the master process.
  – Added the `auth_jwt_leeway` directive used to configure a leeway to account for clock skew when verifying `exp` and `nbf` claims, as per RFC 7519.
  – Stream SSL pre-read module now can extract list of protocols advertised by the client through ALPN (the `$ssl_preread_alpn_protocols` variable).
  – New variable, `$upstream_queue_time`, contains time the request spent in the upstream queue.

• NGINX Plus R14 (1.13.7), released Dec 12, 2017
  – Added refactored status dashboard v2 (`dashboard.html` in packages) that uses recently introduced API subsystem instead of older `status` and `upstream_conf` interfaces. Previous dashboard v1 is still available (`status.html` in packages). Please note that older status and upstream_conf interfaces, as well as dashboard v1, are going to be removed in NGINX Plus R16.
  – Dynamic key-value pairs support added to the `stream` proxy. API version has changed to 2 (see the "Compatibility" section for details).
  – The `auth_jwt_header_set` and `auth_jwt_claim_set` directives can now handle multiple values, providing complex JWT claims support.
  – Additional cryptographic algorithms were introduced in the JSON Web Token authorization module.
  – Upstream servers configured with the `resolve` parameter are now being pre-resolved on configuration reload.
  – The `drain` parameter of the `server` directive can now be specified in configuration.
  – New variable: `$ssl_client_escaped_cert`.
  – Swagger UI was adjusted to support custom ports in URLs.

• NGINX Plus R13 (1.13.4), released Aug 29, 2017
  – Introduced new API for accessing various status information, configuring upstream server groups on-the-fly, and managing key-value pairs. Swagger specification and UI is bundled in the `nginx-plus` packages for easy try-out.
- Introduced new module that creates variables based on key-value pairs, dynamically managed by the new API.
- Introduced new module for mirroring requests by creating background mirror subrequests and ignoring their responses.
- Added support for HTTP trailers.
- New worker_shutdown_timeout directive allows configuring a timeout for graceful shutdown of worker processes.
- Sticky cookie with expires parameter now also includes the max-age attribute defined in RFC 6265.
- Sticky learn session affinity mechanism extended with the header parameter used to indicate that a session should be created immediately after receiving response headers from upstream server.
- The proxy_next_upstream directive extended with the new http_429 parameter ("Too Many Requests").
- Added the ability to specify network buffer sizes in stream and mail modules.
- SSL renegotiation is now allowed on backend connections.
- Added initial support for TLS 1.3.

- NGINX Plus R12 (1.11.10), released Mar 14, 2017
  - Status module dataset updated with nginx build name (nginx_build), shared zones usage statistics (the slabs/subtree), and additional upstream fields (name, service).
  - Status dashboard now shows NGINX Plus version, response time metrics, shared zones memory usage, and server names in upstreams.
  - Added support for the stale-while-revalidate and stale-if-error Cache-Control extensions, as defined by RFC 5861.
  - Introduced flexible control of caching byte-range responses (the proxy_cache_max_range_offset directive).
  - Cache header Vary and ETag lengths increased to 128 bytes. Note that the on-disk cache format has changed, so cached content will be invalidated after the upgrade.
  - Introduced the mandatory parameter in the health_check directive, requiring all new servers to pass the associated health check before accepting real traffic.
  - UDP health checks now may be configured without specifying match block.
  - Stream module now supports client SSL certificates verification.
  - Added a number of SSL variables representing various details about client certificates and capabilities ($ssl_client_v_end, $ssl_client_v_start, $ssl_client_v_remain, $ssl_curves, $ssl_ciphers). The $ssl_client_verify variable was extended to include a reason of failure.
  - The $ssl_client_id and $ssl_client_s_dn variables are now compliant with RFC 2253; legacy variants are available as $ssl_client_idLegacy and $ssl_client_s_dnLegacy, accordingly.
  - Support for accessing arbitrary JWT fields as variables.
  - Added support for JSON escaping in access logs (the escape parameter of the log_format directive).
  - WebP support added to the image filter module.
  - Duplicate configuration parts excluded from nginx -T output.
  - Various improvements in memory usage and performance, including upstream queue optimization.

- NGINX Plus R11 (1.11.5), released Oct 25, 2016
  - Introduced dynamic modules binary compatibility between NGINX Plus and corresponding version of nginx/OSS.
Stream module enhancements (custom logging with a number of additional variables, PROXY protocol support for incoming connections, support for obtaining real IP address and port from PROXY protocol header, ability to extract server name from SNI to a variable for various purposes, e.g. custom routing).

Status module dataset updated with additional stream metrics (sessions, discarded).

Cache manager improved to support iterative operations mode when deleting old cache files, reducing the disk load (see the manager_files, manager_threshold, and manager_sleep parameters of the proxy_cache_path directive).

Added support for using variables in the domain parameter of the sticky directive.

New variable: $upstream_bytes_received.

• NGINX Plus R10 (1.11.3), released Aug 23, 2016

  - New dynamic module: ModSecurity (package name is nginx-plus-module-modsecurity). This is the early release candidate of ModSecurity 3.0.
  - New dynamic module: nginxScript (package name is nginx-plus-module-njs).
  - Support for client authorization using the JSON Web Token (JWT).
  - Stream module enhancements (embedded variables, resolver support, map module, geo and geoip modules, A/B testing support).
  - Support for multiple SSL certificate types per SSL server or SNI name (e.g., RSA and ECDSA).
  - Transparent proxy mode support (the transparent parameter of the proxy_bind directive).
  - Support for the IP_BIND_ADDRESS_NO_PORT socket option where available, allowing for many more upstream connections.
  - HTTP/2 improvements: unbuffered upload support, general bugfixes.
  - New variables: $request_id, $proxy_protocol_port, $realip_remote_port.
  - Lua module updated to version 0.10.6 (nginx-plus-extras, nginx-plus-module-lua).
  - Passenger module updated to version 5.0.30 (nginx-plus-extras, nginx-plus-module-passenger).
  - headers-more module updated to version 0.31 (nginx-plus-extras, nginx-plus-module-headers-more).
  - set-misc module updated to version 0.31 (nginx-plus-extras, nginx-plus-module-headers-more).

NGINX Plus R10 will be the last release to provide the NGINX Plus Extras package. Users should migrate to the NGINX Plus package and use the equivalent dynamic modules.

• NGINX Plus R9 (1.9.13), released Apr 12, 2016

  - Introduced a number of standalone packages with dynamic modules for NGINX Plus (both official and third-party). Packages with official modules:
    * nginx-plus-module-geoip (doc)
    * nginx-plus-module-image-filter (doc)
    * nginx-plus-module-perl (doc)
    * nginx-plus-module-xslt (doc)
Packages with third-party modules:

* nginx-plus-module-headers-more (site)
* nginx-plus-module-lua (site)
* nginx-plus-module-passenger (site)
* nginx-plus-module-rtmp (site)
* nginx-plus-module-set-misc (site)

- UDP proxy support added to the stream module.
- Added support for retrieving upstream servers configuration via DNS SRV records (the service parameter of the server directive).
- Resolver: added support for TCP fallback on retrieving large DNS responses.
- Change: requests with non-idempotent method (POST, LOCK, PATCH) are not passed to the next server in upstream group if a request has already been sent to an upstream server. Enabling the non_idempotent option in the proxy_next_upstream directive explicitly allows retrying such requests.
- Automatic binding of worker processes to available CPUs (the auto parameter of the worker_cpu_affinity directive).
- Some write operations can now be offloaded to thread pools.
- Added support for customizing the Server response header field, as well as the signature in standard error messages.
- Lua module updated to version 0.10.2 (nginx-plus-extras, nginx-plus-module-lua).
- Passenger module updated to version 5.0.26 (nginx-plus-extras, nginx-plus-module-passenger).
- headers-more module updated to version 0.29 (nginx-plus-extras, nginx-plus-module-headers-more).
- Updated status dashboard.

**NGINX Plus R8 (1.9.9), released Dec 29, 2015**

- HTTP/2 support is now included into the nginx-plus and nginx-plus-extras packages. The nginx-plus-http2 and nginx-plus-lua packages are deprecated.
- Caching improvements, including support of caching HEAD requests and more effective caching of big responses with the slice module.
- Dynamically configured upstream groups now can be configured to keep states between reloads.
- Support for arbitrary port in health check requests (the port parameter of the health_check directive).
- Enhancement in the real IP module: the $realip_remote_addr variable.
- Enhancement in syslog logging: the nohostname parameter.
- Lua module updated to version 0.9.20 (nginx-plus-extras).
- The lua-resty-redis Lua module updated to version 0.21 (nginx-plus-extras).
- Passenger module updated to version 5.0.22 (nginx-plus-extras).
- headers-more module updated to version 0.28 (nginx-plus-extras).
- Updated status dashboard.

**NGINX Plus R7 (1.9.4), released Sep 15, 2015**

Nginx, Inc.  p.526 of 542
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- Introduced separate family of nginx-plus-http2 packages with HTTP/2 support included in favor of SPDY. General nginx-plus packages still have SPDY support. Please refer to the listen directive documentation for the instructions on how to enable HTTP/2.

- TCP proxy enhancements (access control; connection limiting; upload and download bandwidth control; client-side PROXY protocol support; ability to choose local IP address for outgoing connections; the backlog parameter of the listen directive; the tcp_nodelay directive).

- More efficient connections distribution between worker processes (the reuseport parameter of the listen directive).

- Introduced thread pools used for multi-threaded reading and sending files without blocking worker processes.

- Enhanced support for modifying HTTP responses (multiple substitutions support, variables support in search strings).

- A number of additional metrics in the new version (6) of the status dataset (SSL handshakes and upstream queue overflows in particular).

- Updated status dashboard.

- Additional arguments to playlists in the HLS module (start, end and offset).

- Support for proxying requests with NTLM authentication.

- New command-line switch to dump configuration to standard output: -T.

- Added lua-resty-redis Lua module (nginx-plus-extras).

- Lua module updated to version 0.9.16 (nginx-plus-lua, nginx-plus-extras).

- Passenger module updated to version 5.0.15 (nginx-plus-extras).

- Headers-more module updated to version 0.26 (nginx-plus-extras).

- Set-misc module updated to version 0.29 (nginx-plus-extras).

---

- NGINX Plus R6 (1.7.11), released Apr 14, 2015

  - TCP proxy enhancements (health checks, dynamic reconfiguration, SSL support, logging, status counters).

  - New least_time load balancing method.

  - Unbuffered upload support (proxy_request_buffering and friends).

  - Proxy SSL authentication support for http and uwsgi.

  - Proxy cache enhancements (variables support in proxy_cache, use_temp_path parameter in proxy_cache_path).

  - Client SSL certificates support in mail proxy.

  - Autoindex module enhancement (the autoindex_format directive).

  - New status dashboard.

  - Lua module updated to version 0.9.16rc1 (nginx-plus-lua, nginx-plus-extras).

  - Passenger module updated to version 4.0.59 (nginx-plus-extras).

  - Set-misc module updated to version 0.28 (nginx-plus-extras).

---

- NGINX Plus R5 (1.7.7), released Dec 1, 2014

  - New TCP proxying and load balancing mode (the stream module).

  - Sticky session timeout now applies from the most recent request in the session.
Upstream “draining” can be used to remove an upstream server without interrupting any user sessions (the drain command of the upstream_conf dynamic configuration interface).

Improved control over request retries in the event of failure, based on number of tries and time. Also available for fastcgi, uwsgi, scgi and memcached modules.

Caching: the Vary response header is correctly handled (multiple variants of the same resource can be cached). Note that the on-disk cache format has changed, so cached content will be invalidated after the upgrade.

Caching: improved support for byte-range requests.

Ability to control upstream bandwidth with the proxy_limit_rate directive.

Lua module updated to version 0.9.13 (nginx-plus-lua, nginx-plus-extras).

Passenger module updated to version 4.0.53 (nginx-plus-extras).

- NGINX Plus R4 (1.7.3), released Jul 22, 2014
  - MP4 module now supports the end query argument which sets the end point of playback.
  - Added the ability to verify backend SSL certificates.
  - Added support for SNI while working with SSL backends.
  - Added conditional logging for requests (the if parameter of the access_log directive).
  - New load balancing method based on user-defined keys with optional consistency.
  - Cache revalidation now uses If-None-Match header if possible.
  - Passphrases for SSL private keys can now be stored in an external file.
  - Introduced a new session affinity mechanism (sticky learn) based on server-initiated sessions.
  - Added the ability to retrieve a subset of the extended status data.
  - Lua module updated to version 0.9.10 (nginx-plus-lua, nginx-plus-extras).
  - Passenger module updated to version 4.0.45 (nginx-plus-extras).

- NGINX Plus R3 (1.5.12), released Apr 2, 2014
  - SPDY protocol updated to version 3.1. SPDY/2 is no longer supported.
  - Added PROXY protocol support (the proxy_protocol parameter of the listen directive).
  - IPv6 support added to resolver.
  - DNS names in upstream groups are periodically re-resolved (the resolve parameter of the server directive).
  - Introduced limiting connections to upstream servers (the max_conns parameter) with optional support for connections queue.

- NGINX Plus R2 (1.5.7), released Dec 12, 2013
  - Enhanced sticky routing support.
  - Additional status metrics for virtual hosts and cache zones.
  - Cache purge support (also available for FastCGI).
  - Added support for cache revalidation.
• New module: *ngx_http_auth_request_module* (authorization based on the result of a subrequest).

*NGINX Plus R1 (1.5.3), released Aug 12, 2013*

  - Enhanced status monitoring.
  - Load balancing: slow start feature.
  - Added syslog support for both error_log and access_log.
  - Support for Apple HTTP Live Streaming.

*NGINX Plus 1.5.0-2, released May 27, 2013*

  - Added support for active health checks.

*NGINX Plus 1.5.0, released May 7, 2013*


*NGINX Plus 1.3.16, released Apr 19, 2013*

  - Added SPDY support.

*NGINX Plus 1.3.13, released Feb 22, 2013*

  - Added sticky sessions support.
  - Added support for proxying WebSocket connections.

*NGINX Plus 1.3.11, released Jan 18, 2013*

  - Added base module *ngx_http_gunzip_module*.
  - New extra module: *ngx_http_session_log_module* (aggregated session logging).

*NGINX Plus 1.3.9-2, released Dec 20, 2012*

  - License information updated.
  - End-User License Agreement added to the package.

*NGINX Plus 1.3.9, released Nov 27, 2012*

  - Added dynamic upstream management feature.
  - PDF documentation bundled into package.

*NGINX Plus 1.3.7, released Oct 18, 2012*

  - Initial release of NGINX Plus package.
Appendix B

Legal Notices

Open source components included in the NGINX Plus (package name is nginx-plus) are:

- nginx/OSS (1.25.1), distributed under 2-clause BSD license.
  
  https://nginx.org/

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- Internal MD5 implementation based on Alexander Peslyak’s public domain implementation:
  
  This is an OpenSSL-compatible implementation of the RSA Data Security, Inc. MD5 Message-Digest Algorithm (RFC 1321).

  Homepage:
  

  Author: Alexander Peslyak, better known as Solar Designer <solar at openwall.com>

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- MurmurHash algorithm (version 2), distributed under MIT license.
  https://sites.google.com/site/murmurhash/

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Components used in status monitoring dashboard v2 only (dashboard.html in nginx-plus package) and distributed under MIT license:

- @babel-core, Babel compiler core (7.18.2).
  https://github.com/babel/babel/tree/master/packages/babel-core
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- @babel/plugin-proposal-object-rest-spread, produces spec-compliant code by using Babel's objectSpread helper (7.18.0).

- @babel/plugin-transform-runtime, makes helpers reference the module babel-runtime to avoid duplication across your compiled output (7.18.2).
  https://github.com/babel/babel/tree/master/packages/babel-plugin-transform-runtime

- @babel/preset-env, a Babel preset for each environment (7.18.2).
  https://github.com/babel/babel/tree/master/packages/babel-preset-env

- @babel/preset-react, a Babel preset for all React plugins (7.17.12).
  https://github.com/babel/babel/tree/master/packages/babel-preset-react

- autoprefixer, a PostCSS plugin to parse CSS and add vendor prefixes to CSS rules (10.4.7).
  https://github.com/postcssautoprefixer
  Copyright © 2013 Andrey Sitnik <andrey@sitnik.ru>

- babel-loader, allows transpiling JavaScript files using Babel and webpack (8.2.5).
  https://github.com/babel/babel-loader
  Copyright © 2014-2019 Luís Couto <hello@lucounto.pt>

- babel-plugin-istanbul, a babel plugin that adds istanbul instrumentation to ES6 code (6.1.1).
  https://github.com/istanbuljs/babel-plugin-istanbul
  Copyright © 2016, Istanbul Code Coverage
• core-js, a modular standard library for JavaScript (3.22.8).
  https://github.com/zloirock/core-js
  Copyright © 2014-2022 Denis Pushkarev

• css-loader, interprets @import and url() like import/require() and will resolve them (6.7.1).
  https://github.com/webpack-contrib/css-loader
  Copyright © JS Foundation and other contributors

• cssnano, a modular minifier, built on top of the PostCSS ecosystem (5.1.11).
  https://github.com/cssnano/cssnano
  Copyright © Ben Briggs <beneb.info@gmail.com>

• eslint, a tool for identifying and reporting on patterns found in ECMAScript/JavaScript code (8.17.0).
  https://www.npmjs.com/package/eslint
  Copyright OpenJS Foundation and other contributors, <www.openjsf.org>

• eslint-config-airbnb, exports some ESLint configurations (19.0.4).
  https://www.npmjs.com/package/eslint-config-airbnb
  Copyright (c) 2012 Airbnb

• eslint-plugin-import, supports linting of ES2015+ (ES6+) import/export syntax and prevent issues with misspelling of file paths and import names (2.26.0).
  https://www.npmjs.com/package/eslint-plugin-import
  Copyright (c) 2015 Ben Mosher

• eslint-plugin-jsx-a11y, static AST checker for accessibility rules on JSX elements (6.5.1).
  https://www.npmjs.com/package/eslint-plugin-jsx-a11y
  Copyright (c) 2016 Ethan Cohen

• eslint-plugin-react, react specific linting rules for eslint (7.30.0).
  https://www.npmjs.com/package/eslint-plugin-react
  Copyright (c) 2014 Yannick Croissant

• eslint-webpack-plugin, uses eslint to find and fix problems in the JavaScript code (3.1.1).
  https://www.npmjs.com/package/eslint-webpack-plugin
  Copyright JS Foundation and other contributors

• history, manage session history with JavaScript (4.10.1).
  https://github.com/ReactTraining/history
  Copyright © React Training 2016-2020 Copyright © Remix Software 2020-2021

• html-inline-css-webpack-plugin, converts external stylesheet to embedded stylesheet, aka document stylesheet (1.11.1).
  Copyright © 2018 Huang

• html-webpack-plugin, simplifies creation of HTML files to serve your webpack bundles (5.5.0).
  https://github.com/jantimon/html-webpack-plugin
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• mini-css-extract-plugin, extracts CSS into separate files (2.6.0).
  https://github.com/webpack-contrib_mini-css-extract-plugin
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• postcss, a tool for transforming styles with JS plugins (8.4.14).
  https://github.com/postcss/postcss
  Copyright 2013 Andrey Sitnik <andrey@sitnik.ru>
postcss-loader, PostCSS loader for webpack (6.2.1).
https://github.com/postcss/postcss-loader
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postcss-url, PostCSS plugin to rebase url(), inline or copy asset (10.1.3).
https://github.com/postcss/postcss-url
Copyright © 2014 Maxime Thirouin

preact, fast 3kb React alternative with the same ES6 API (10.7.3).
https://github.com/developit/preact
Copyright © 2015-present Jason Miller

react-dev-utils, utilities used by Create React App (12.0.1).
https://github.com/facebook/create-react-app
Copyright © 2013-present, Facebook, Inc.

regenerator-runtime, standalone runtime for Regenerator-compiled generator and async functions (0.13.9).
https://github.com/facebook/regenerator
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style-loader, injects CSS into the DOM (3.3.1).
https://github.com/webpack-contrib/style-loader
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webpack, a bundler for javascript and friends (5.73.0).
https://github.com/webpack/webpack
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webpack-cli, provides the interface of options webpack uses in its configuration file (4.10.0).
https://github.com/webpack/webpack-cli
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whatwg-fetch, a window.fetch JavaScript polyfill (2.0.4).
https://github.com/github/fetch
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• npm-font-open-sans, Open Sans font family - incl. usage of CSS, SCSS, LESS (1.1.0), distributed under Apache 2.0 license.

https://github.com/dasrick/npm-font-open-sans

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Optional add-on and third-party modules provided with NGINX Plus may include additional open-source components. The licenses for these components are included in the installation package for each module.
Index

absolute_redirect, 21
accept_mutex, 7
accept_mutex_delay, 7
access_log, 213, 430
add_after_body, 61
add_before_body, 61
add_header, 180
add_trailer, 180
addition_types, 62
aio, 21
aio_write, 22
alias, 22
allow, 59, 411
ancient_browser, 128
ancient_browser_value, 128
api, 64
auth_basic, 116
auth_basic_user_file, 116
auth_delay, 23
auth_http, 491
auth_http_header, 491
auth_http_pass_client_cert, 491
auth_http_timeout, 491
auth_jwt, 119
auth_jwt_claim_set, 119
auth_jwt_header_set, 120
auth_jwt_key_cache, 120
auth_jwt_key_file, 120
auth_jwt_key_request, 121
auth_jwt_leeway, 121
auth_jwt_require, 122
auth_jwt_type, 122
auth_request, 123
auth_request_set, 124
autoindex, 125
autoindex_exact_size, 125
autoindex_format, 125
autoindex_localtime, 126
break, 271
charset, 129
charset_map, 130
charset_types, 131
chunked_transfer_encoding, 23
client_body_buffer_size, 24
client_body_in_file_only, 24
client_body_in_single_buffer, 24
client_body_temp_path, 24
client_body_timeout, 25
client_header_buffer_size, 25
client_header_timeout, 25
client_max_body_size, 25
collection_pool_size, 26
create_full_put_path, 132
daemon, 7
dav_access, 133
dav_methods, 133
debug_connection, 8
debug_points, 8
default_type, 26
deny, 59, 411
directio, 26
directio_alignment, 26
disable_symlinks, 27
empty_gif, 135
eqv, 8
error_log, 9
error_page, 28
etag, 29
events, 10
expires, 181
f4f, 136
f4f_buffer_size, 136
fastcgi_bind, 138
fastcgi_buffer_size, 139
fastcgi_buffering, 139
fastcgi_buffers, 139
fastcgi_busy_buffers_size, 140
fastcgi_cache, 140
fastcgi_cache_background_update, 140
fastcgi_cache_bypass, 140
fastcgi_cache_key, 141
fastcgi_cache_lock, 141
fastcgi_cache_lock_age, 141
fastcgi_cache_max_range_offset, 142
fastcgi_cache_methods, 142
fastcgi_cache_min_uses, 142
fastcgi_cache_path, 142
fastcgi_cache_purge, 144
fastcgi_cache_revalidate, 145
fastcgi_cache_use_stale, 145
fastcgi_cache_valid, 146
fastcgi_catch_stderr, 146
fastcgi_connect_timeout, 147
fastcgi_force_ranges, 147
fastcgi_hide_header, 147
fastcgi_ignore_client_abort, 147
fastcgi_ignore_headers, 148
fastcgi_index, 148
fastcgi_intercept_errors, 148
fastcgi_keep_conn, 149
fastcgi_limit_rate, 149
fastcgi_max_temp_file_size, 149
fastcgi_next_upstream, 149
fastcgi_next_upstream_timeout, 150
fastcgi_next_upstream_tries, 151
fastcgi_no_cache, 151
fastcgi_param, 151
fastcgi_pass, 152
fastcgi_pass_header, 152
fastcgi_pass_request_body, 152
fastcgi_pass_request_headers, 153
fastcgi_read_timeout, 153
fastcgi_request_buffering, 153
fastcgi_send_lowat, 153
fastcgi_send_timeout, 154
fastcgi_socket_keepalive, 154
fastcgi_split_path_info, 154
fastcgi_store, 154
fastcgi_store_access, 155
fastcgi_temp_file_write_size, 156
fastcgi_temp_path, 156
flv, 158
geo, 159, 412
geoip_city, 163, 415
geoip_country, 162, 414
geoip_org, 164, 416
geoip_proxy, 164
geoip_proxy_recursive, 164
grpc_bind, 166
grpc_buffer_size, 166
grpc_connect_timeout, 166
grpc_hide_header, 167
grpc_ignore_headers, 167
grpc_intercept_errors, 167
grpc_next_upstream, 167
grpc_next_upstream_timeout, 168
grpc_next_upstream_tries, 169
grpc_pass, 169
grpc_read_timeout, 170
grpc_set_header, 170
grpc_socket_keepalive, 170
grpc_ssl_certificate, 171
grpc_ssl_certificate_key, 171
grpc_ssl_ciphers, 171
grpc_ssl_conf_command, 171
grpc_ssl_crl, 172
grpc_ssl_name, 172
grpc_ssl_password_file, 172
grpc_ssl_protocols, 172
grpc_ssl_server_name, 172
grpc_ssl_session_reuse, 173
grpc_ssl_trusted_certificate, 173
grpc_ssl_verify, 173
grpc_ssl_verify_depth, 173
gunzip, 174
gunzip_buffers, 174
gzip, 175
gzip_buffers, 176
gzip_comp_level, 176
gzip_disable, 176
gzip_http_version, 176
gzip_min_length, 176
gzip_proxied, 177
gzip, 179
gzip_types, 177
gzip_vary, 178

hash, 343, 469
health_check, 360, 474
health_check_timeout, 475
hls, 184
hls_buffers, 184
hls_forward_args, 184
hls_fragment, 185
hls_mp4_buffer_size, 185
hls_mp4_max_buffer_size, 186
http, 29
http2, 391
http2_body_preread_size, 391
http2_chunk_size, 391
http2_idle_timeout, 391
http2_max_concurrent_pushes, 392
http2_max_concurrent_streams, 392
http2_max_field_size, 392
http2_max_header_size, 392
http2_max_requests, 393
http2_push, 393
http2_push_preload, 393
http2_recv_buffer_size, 394
http2_recv_timeout, 394
http3, 396
http3_hq, 396
http3_max_concurrent_streams, 396
http3_stream_buffer_size, 396

if, 272
if_modified_since, 29
ignore_invalid_headers, 29
image_filter, 188
image_filter_buffer, 189
image_filter_interlace, 189
image_filter_jpeg_quality, 189
image_filter_sharpen, 189
image_filter_transparency, 189
image_filter_webp_quality, 190
imap_auth, 507
imap_capabilities, 507
imap_client_buffer, 508
include, 10
index, 191

internal, 30
internal_redirect, 192
ip_hash, 343
js_access, 419
js_body_filter, 196
js_content, 197
js_fetch_buffer_size, 197, 419
js_fetch_ciphers, 197, 419
js_fetch_max_response_buffer_size, 197, 419
js_fetch_protocols, 198, 420
js_fetch_timeout, 198, 420
js_fetch_trusted_certificate, 198, 420
js_fetch_verify, 198, 420
js_fetch_verify_depth, 198, 420
js_filter, 421
js_header_filter, 199
js_import, 199, 421
js_include, 199, 421
js_path, 200, 422
js_preload_object, 200, 422
js_preread, 422
js_set, 200, 423
js_shared_dict_zone, 201, 423
js_var, 202, 424

keepalive, 344
keepalive_disable, 30
keepalive_requests, 31, 345
keepalive_time, 31, 346
keepalive_timeout, 31, 346
keyval, 203, 425
keyval_zone, 204, 426

large_client_header_buffers, 32
least_conn, 347, 470
least_time, 347, 470
limit_conn, 205, 427
limit_conn_dry_run, 206, 428
limit_conn_log_level, 206, 428
limit_conn_status, 207
limit_conn_zone, 207, 428
limit_except, 32
limit_rate, 32
limit_rate_after, 33
limit_req, 209
limit_req_dry_run, 210
limit_req_log_level, 210
limit_req_status, 211
limit_req_zone, 211
limit_zone, 207
lingering_close, 33
lingering_time, 34
lingering_timeout, 34
listen, 35, 403, 486
load_module, 10
location, 38
lock_file, 10
log_format, 215, 431
log_not_found, 39
log_subrequest, 40
mail, 488
map, 217, 433
map_hash_bucket_size, 219, 434
map_hash_max_size, 219, 435
master_process, 11
match, 361, 475
max_errors, 488
max_ranges, 40
memcached_bind, 220
memcached_buffer_size, 221
memcached_connect_timeout, 221
memcached_gzip_flag, 221
memcached_next_upstream, 222
memcached_next_upstream_timeout, 222
memcached_next_upstream_tries, 222
memcached_pass, 223
memcached_read_timeout, 223
memcached_send_timeout, 223
memcached_socket_keepalive, 223
merge_slashes, 40
min_delete_depth, 133
mirror, 225
mirror_request_body, 225
modern_browser, 128
modern_browser_value, 128
mp4, 228
mp4_buffer_size, 228
mp4_limit_rate, 229
mp4_limit_rate_after, 229
mp4_max_buffer_size, 229
mp4_start_key_frame, 229
mqtt, 436
mqtt_buffers, 436
mqtt_preread, 438
mqtt_rewrite_buffer_size, 437
mqtt_set_connect, 437
msie_padding, 41
msie_refresh, 41
multi_accept, 11
ntlm, 346
open_file_cache, 41
open_file_cache_errors, 42
open_file_cache_min_uses, 42
open_file_cache_valid, 42
open_log_file_cache, 216, 432
otel_cache, 216, 432
otel_service_name, 515
otel_span_attr, 516
otel_span_name, 516
otel_trace, 515
otel_trace_context, 516
output_buffers, 42
override_charset, 131
pcre_jit, 11
perl, 231
perl_modules, 232
perl_require, 232
perl_set, 232
pid, 11
pop3_auth, 509
pop3_capabilities, 509
port_in_redirect, 42
postpone_output, 43
preread_buffer_size, 405
preread_timeout, 406
protocol, 488
proxy_bind, 238, 440
proxy_buffer, 495
proxy_buffer_size, 238, 440
proxy_buffering, 238
proxy_buffers, 239
proxy_busy_buffers_size, 239
proxy_cache, 239
proxy_cache_background_update, 239
proxy_cache_bypass, 240
proxy_cache_convert_head, 240
proxy_cache_key, 240
proxy_cache_lock, 240
proxy_cache_lock_age, 241
proxy_cache_lock_timeout, 241
proxy_cache_max_range_offset, 241
proxy_cache_methods, 241
proxy_cache_min_uses, 242
proxy_cache_path, 242
proxy_cache_purge, 244
proxy_cache_revalidate, 244
proxy_cache_use_stale, 245
proxy_cache_valid, 245
proxy_connect_timeout, 246, 441
proxy_cookie_domain, 246
proxy_cookie_flags, 247
proxy_cookie_path, 248
proxy_download_rate, 441
proxy_force_ranges, 248
proxy_half_close, 441
proxy_headers_hash_bucket_size, 249
proxy_headers_hash_max_size, 249
proxy_hide_header, 249
proxy_http_version, 249
proxy_ignore_client_abort, 249
proxy_ignore_headers, 250
proxy_intercept_errors, 250
proxy_limit_rate, 250
proxy_max_temp_file_size, 251
proxy_method, 251
proxy_next_upstream, 251, 441
proxy_next_upstream_timeout, 252, 442
proxy_next_upstream_tries, 252, 442
proxy_no_cache, 253
proxy_pass, 253, 442
proxy_pass_error_message, 495
proxy_pass_header, 254
proxy_pass_request_body, 255
proxy_pass_request_headers, 255
proxy_protocol, 442, 495
proxy_protocol_timeout, 406
proxy_read_timeout, 255
proxy_redirect, 255
proxy_request_buffering, 257
proxy_requests, 443
proxy_responses, 443
proxy_send_lowat, 257
proxy_send_timeout, 257
proxy_session_drop, 443
proxy_set_body, 258
proxy_set_header, 258
proxy_smtp_auth, 496
proxy_socket_keepalive, 259, 444
proxy_ssl, 444
proxy_ssl_certificate, 259, 444
proxy_ssl_certificate_key, 259, 444
proxy_ssl_ciphers, 259, 444
proxy_ssl_conf_command, 260, 445
proxy_ssl_crl, 260, 445
proxy_ssl_name, 260, 445
proxy_ssl_password_file, 260, 445
proxy_ssl_protocols, 261, 446
proxy_ssl_server_name, 261, 446
proxy_ssl_session_reuse, 261, 446
proxy_ssl_trusted_certificate, 261, 446
proxy_ssl_verify, 262, 446
proxy_ssl_verify_depth, 262, 447
proxy_store, 262
proxy_store_access, 263
proxy_temp_file_write_size, 263
proxy_temp_path, 264
proxy_timeout, 447, 496
proxy_upload_rate, 447
queue, 348
quic_active_connection_id_limit, 396
quic_bpf, 397
quic_gso, 397
quic_host_key, 397
quic_retry, 397
random, 348, 470
random_index, 266
readAhead, 43
real_ip_header, 267
real_ip_recursive, 268
recursive_error_pages, 43
referer_hash_bucket_size, 269
referer_hash_max_size, 269
request_pool_size, 43
reset_timeout_connection, 43
resolver, 44, 348, 406, 471, 488
resolver_timeout, 45, 349, 407, 472, 489
return, 273, 450
rewrite, 273
rewrite_log, 275
root, 45
satisfy, 45
scgi_bind, 278
scgi_buffer_size, 278
scgi_buffering, 279
scgi_buffers, 279
scgi_busy_buffers_size, 279
scgi_cache, 280
scgi_cache_background_update, 280
scgi_cache_bypass, 280
scgi_cache_key, 280
scgi_cache_lock, 280
scgi_cache_lock_age, 281
scgi_cache_lock_timeout, 281
scgi_cache_max_range_offset, 281
scgi_cache_methods, 281
scgi_cache_min_uses, 282
scgi_cache_path, 282
scgi_cache_purge, 284
scgi_cache_revalidate, 284
scgi_cache_use_stale, 284
scgi_cache_valid, 285
scgi_connect_timeout, 286
scgi_force_ranges, 286
scgi_hide_header, 286
scgi_ignore_client_abort, 287
scgi_ignore_headers, 287
scgi_intercept_errors, 287
scgi_limit_rate, 287
scgi_max_temp_file_size, 288
scgi_next_upstream, 288
scgi_next_upstream_timeout, 289
scgi_next_upstream_tries, 289
scgi_no_cache, 290
scgi_param, 290
scgi_pass, 290
scgi_pass_header, 291
scgi_pass_request_body, 291
scgi_pass_request_headers, 291
scgi_read_timeout, 291
scgi_request_buffering, 292
scgi_send_timeout, 292
scgi_socket_keepalive, 292
scgi_store, 292
scgi_store_access, 293
scgi_temp_file_write_size, 293
scgi_temp_path, 294
secure_link, 295
secure_link_md5, 296
secure_link_secret, 296
send_lowat, 46
send_timeout, 46
sendfile, 46
sendfile_max_chunk, 47
server, 47, 339, 407, 466, 490
server_name, 47, 490
server_name_in_redirect, 49
server_names_hash_bucket_size, 49
server_names_hash_max_size, 49
server_tokens, 50
session_log, 298
session_log_format, 298
session_log_zone, 299
set, 275, 451
set_real_ip_from, 267, 449, 497
slice, 300
smtp_auth, 510
smtp_capabilities, 510
smtp_client_buffer, 511
smtp_greeting_delay, 511
source_charset, 131
split_clients, 302, 452
ssi, 303
ssi_last_modified, 303
ssi_min_file_chunk, 304
ssi_silent_errors, 304
ssi_types, 304
ssi_value_length, 304
ssl, 310, 499
ssl_alpn, 454
ssl_buffer_size, 310
ssl_certificate, 311, 454, 499
ssl_certificate_key, 312, 455, 500
ssl_ciphers, 312, 455, 500
ssl_client_certificate, 312, 456, 500
ssl_conf_command, 312, 456, 501
ssl_crl, 313, 456, 501
types_hash_bucket_size, 53
types_hash_max_size, 53

ssl_dhparam, 313, 457, 501
underscores_in_headers, 54

ssl_early_data, 313
uninitialized_variable_warn, 275

ssl_ecdh_curve, 314, 457, 501
upstream, 339, 466

ssl_engine, 11
upstream_conf, 355

ssl_handshake_timeout, 457
use, 12

ssl_ocsp, 314
user, 13

ssl_ocsp_cache, 315
userid, 364

ssl_ocsp_responder, 315
userid_domain, 365

ssl_password_file, 315, 457, 502
useridExpires, 365

ssl_prefer_server_ciphers, 316, 458, 502
userid_flags, 365

ssl_preread, 464
userid_mark, 365

ssl_protocols, 316, 458, 503
userid_name, 366

ssl拒绝握手, 316
userid_p3p, 366

ssl resolve handshake, 316
userid_path, 366

ssl reject handshake, 316
userid_service, 366

ssl session cache, 317, 459, 503
uwsgi_bind, 369

ssl session ticket key, 317, 459, 504
uwsgi_buffering, 370

ssl session tickets, 318, 460, 504
uwsgi_buffers, 371

ssl session timeout, 318, 460, 504
uwsgi_busy_buffers_size, 371

ssl stapling, 318
uwsgi_cache, 371

ssl stapling file, 319
uwsgi_cache_background_update, 371

ssl stapling responder, 319
uwsgi_cache_bypass, 371

ssl stapling verify, 319
uwsgi_cache_key, 372

ssl trusted certificate, 319, 460, 505
uwsgi_cache_lock, 372

ssl verify client, 320, 460, 505
uwsgi_cache_lock_age, 372

ssl verify depth, 320, 461, 505
uwsgi_cache_lock_timeout, 372

starttls, 505
uwsgi_cache_max_range_offset, 373

state, 342, 469
uwsgi_cache_methods, 373

status, 325
uwsgi_cache_min_uses, 373

status_format, 325
uwsgi_cache_path, 373

status_zone, 65, 326
uwsgi_cache_purge, 375

sticky, 349
tcp_force_ranges, 378

sticky_cookie_insert, 352
tcp_hide_header, 378

stream, 407
tcp_ignore_client_abort, 378

stub_status, 334
tcp_ignore_headers, 378

sub_filter, 336
uwsgi_intercept_errors, 379

sub_filter_last_modified, 336
uwsgi_limit_rate, 379

sub_filter_once, 337
uwsgi_max_temp_file_size, 379

sub_filter_types, 337
uwsgi_modified1, 380

subrequest_output_buffer_size, 50
uwsgi

Nginx, Inc.
uwsgi_modifer2, 380
uwsgi_next_upstream, 380
uwsgi_next_upstream_timeout, 381
uwsgi_next_upstream_tries, 381
uwsgi_no_cache, 381
uwsgi_param, 382
uwsgi_pass, 382
uwsgi_pass_header, 383
uwsgi_pass_request_body, 383
uwsgi_pass_request_headers, 383
uwsgi_read_timeout, 383
uwsgi_request_buffering, 383
uwsgi_send_timeout, 384
uwsgi_socket_keepalive, 384
uwsgi_ssl_certificate, 384
uwsgi_ssl_certificate_key, 384
uwsgi_ssl_ciphers, 385
uwsgi_ssl_conf_command, 385
uwsgi_ssl_crl, 385
uwsgi_ssl_name, 385
uwsgi_ssl_password_file, 386
uwsgi_ssl_protocols, 386
uwsgi_ssl_server_name, 386
uwsgi_ssl_session_reuse, 386
uwsgi_ssl_trusted_certificate, 387
uwsgi_ssl_verify, 387
uwsgi_ssl_verify_depth, 387
uwsgi_store, 387
uwsgi_store_access, 388
uwsgi_temp_file_write_size, 388
uwsgi_temp_path, 388

valid_referers, 270
variables_hash_bucket_size, 54, 407
variables_hash_max_size, 54, 408

worker_aio_requests, 13
worker_connections, 13
worker_cpu_affinity, 13
worker_priority, 14
worker_processes, 14
worker_rlimit_core, 15
worker_rlimit_nofile, 15
worker_shutdown_timeout, 15
working_directory, 15

xml_entities, 399
xslt_last_modified, 400
xslt_param, 400
xslt_string_param, 400
xslt_stylesheet, 400
xslt_types, 401

zone, 342, 468
zone_sync, 479
zone_sync_buffers, 479
zone_sync_connect_retry_interval, 479
zone_sync_connect_timeout, 479
zone_sync_interval, 479
zone_sync_recv_buffer_size, 480
zone_sync_server, 480
zone_sync_ssl, 480
zone_sync_ssl_certificate, 481
zone_sync_ssl_certificate_key, 481
zone_sync_ssl_ciphers, 481
zone_sync_ssl_conf_command, 481
zone_sync_ssl_crl, 482
zone_sync_ssl_server_name, 482
zone_sync_ssl_trusted_certificate, 483
zone_sync_ssl_verify, 483
zone_sync_ssl_verify_depth, 483
zone_sync_timeout, 483

xclient, 496