Sizing Guide for Deploying NGINX Plus in Virtualized Environments

NGINX Plus is the only all-in-one software web server, load balancer, reverse proxy, content cache, and API gateway. It's built on NGINX Open Source, which powers more of the world's websites than any other server.

A hypervisor is virtualization software that allows you to create and manage multiple virtual machines in a bare metal environment. Our testing of NGINX Plus confirms the well-established fact that virtualization introduces a relatively small but measurable amount of overhead when compared to bare metal performance.

The table outlines the hardware specifications required to achieve different levels of performance from NGINX Plus in bare metal and hypervisor environments, along with the typical cost for that hardware.

Hardware Cost[1]	CPU Cores[2]	RPS[3] – Bare Metal	RPS – Hypervisor[4]	SSL TPS[5] – Bare Metal	SSL TPS – Hypervisor
$750	1	48,000	40,000	800	750
$750	2	94,000	75,000	1,600	1,450
$1,300	4	192,000	132,000	3,200	2,900
$2,200	8	300,000	280,000	5,200	5,100

1. Prices are based on Dell PowerEdge servers with Intel NICs
2. Testing done with Intel® Xeon® CPU E5-2690 v3 @ 2.60GHz
3. 128-byte response size with keepalive connection
4. Hypervisor: VMware ESXi version 7
5. RSA 2048 bit, ECDHE-RSA-AES128-SHA, OpenSSL 1.0.2k-fips

Notes:

- NGINX Plus is provided as software only, not bundled with hardware; the hardware costs presented here are typical when purchasing from a reseller.
- Due to limitations in the testing infrastructure, the client could not generate enough requests to fully saturate a server with more than 8 cores.

About the Performance Metrics

Requests per second (RPS) – Measures the ability of NGINX Plus to process HTTP requests. The client sends requests over keepalive connections. NGINX Plus processes each request and forwards it to a web server over a separate keepalive connection.

SSL transactions per second (SSL TPS) – Measures the ability of NGINX Plus to process new SSL/TLS connections. Clients send a series of HTTPS requests, each on a new connection. NGINX Plus parses the requests and forwards them to a web server over established keepalive connections. The web server sends back a 128-byte response for each request.

Memory Sizing

NGINX Plus memory usage grows slowly as the number of concurrently active connections increases. Though dependent on the configuration, it is typically less than 10–20 KB per connection. When caching is enabled, NGINX Plus might need more memory. Size the memory so that there is sufficient unused memory to store the hot cached content in the operating system page cache.

Perfect Forward Secrecy

The SSL TPS numbers presented above are for SSL/TLS with Perfect Forward Secrecy (PFS). PFS ensures that encrypted traffic captured now cannot be decrypted later, even if the private keys generated in the key exchange are compromised. We recommend using PFS for maximum protection and user privacy.

PFS is more computationally expensive and as a result yields lower overall TPS. Most other vendors do not specify whether they are using PFS (and so probably are not); keep this in mind when doing comparisons.

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