F5 White Paper

Built to Scale

There are three proactive measures you can take during the development of an application to ensure it is secure, fast, and available when it hits superstar status.

by Lori MacVittie
Technical Marketing Manager, Application Services

Contents

Introduction

Many applications are developed today in the hopes that they will one day become "superstars" like Twitter, Facebook, and MySpace. But they aren't necessarily developed with the capacity and performance expectations that are required of superstars. Twitter, for example, is in the midst of a nearly complete architectural renovation due to its inability to scale. In the meantime, users are frustrated by the constant outages and instability of the popular Web 2.0 site.

Incorporating an Application Delivery Controller (ADC) into the architecture of a web application provides the ability to scale seamlessly without rewriting the application or suffering outages. By proactively designing a scalable application that incorporates the advanced features of an ADC, you can ensure that when your application hits superstar status, it will perform like one.

Developing a Highly Scalable Application

#1: Use Multiple Hostnames

One of the problems with application performance lies in the inherent limitations of web browsers. Internet Explorer (IE) version 7 is currently limited to opening only two connections per host (IE version 8 increases this limit to six connections per host). Mozilla Firefox allows up to eight connections per host. Neither may be enough if your web application contains two, three, or even four times that number of objects, each of which requires a separate request to retrieve from the server.

These requests either queue up on the browser, the server, or both, depending on the connection speed and resource utilization on the server. This often degrades application performance, which usually can only be addressed by re-architecting the application to spread application resources (objects) across multiple servers.

To avoid re-architecting your application in response to high usage, use multiple hostnames for different object types from the very beginning. Use one hostname for external scripts, another for images, another for the actual application, and even one for APIs (if you anticipate providing one for integration and social media collaboration). In the beginning, all the hostnames will likely resolve to the same IP address.

Use an ADC to virtualize all the hostnames on a single virtual server. Early on, this will enable the browser to open more connections and improve application performance. Later, when you need to distribute the requests, you can simply add new servers to the data center that are dedicated to a particular object type and then change the ADC to direct requests accordingly. This method enables you to quickly scale up your application to meet demand without interrupting users or changing the application.

Basically, the ADC presents a SOA-like interface; it is the endpoint for your application and, just like a web service, you can change the actual implementation inside the data center without requiring changes to clients or interrupting service. If you've prepared your application by using multiple hostnames ahead of time, it makes the process even simpler because you won't need to modify your application.

#2: Centralize Cookie Security

If you're using cookies to store data you probably want to encrypt them to prevent tampering or misuse. The best way to prevent cookies from being exploited is to encrypt them.

Modern web development languages like .NET and PHP provide encryption methods that can be used to encrypt and decrypt any content, and are often used to secure cookies. While this is a viable option, performing encryption and decryption on the server will limit your ability to scale up your application and properly load balance requests across servers. This is because every server will likely generate its own key with which cookies will be encrypted, and subsequent requests will need to always be sent back to the original server.

Modern load-balancers—otherwise known as Application Delivery Controllers—are capable of performing cookie encryption and decryption for your application. By employing an ADC to provide encryption and decryption of cookies from the very beginning, you are ensuring that your application will be better able to scale later because you can use more advanced load-balancing algorithms instead of requiring persistence (affinity) based on cookie encryption.

Implementing cookie security on an ADC further provides a boost in performance because the functions used to perform encryption and decryption on the device are accelerated with hardware.

#3: Validate as Much Input as Possible at the Edge

While you should always validate data input in your application, put as much validation as possible on the ADC. ADCs can easily inspect POST and GET requests to ensure that all required fields have data. Validating that all required fields have data in them before they reach your application will prevent unnecessary processing on the server and increase the capacity and performance of your applications.

By integrating the ADC into the application's input validation process it enables scalability by increasing the capacity of an application server due to the reduction in processing required to handle invalid requests.

ADCs can also inspect HTTP headers and filter out robots and other automatically generated requests. This validates legitimate requests and prevents invalid requests from being passed on to servers that you do not want responding to such requests anyway. This reduces the logging required on servers, which increases available resources and results in a positive impact on application performance. It also makes the logs cleaner, which makes the task of log analysis faster, easier, and more reliable when gathering usage statistics.

Key Benefits:

Improves performance

Increases capacity

Enables security without sacrificing speed

Improves quality of logs

Conclusion

Integrating the advanced functionality of an Application Delivery Controller into your application during development can improve the scalability and security of your application. By proactively designing your application to include an ADC, you reduce the potential for outages due to lack of capacity when your application experiences drastic peaks in usage.

You can alleviate the need to rewrite or re-architect your application in the future with just a bit of forethought during the initial development phase.

An ounce of prevention is worth a pound of cure.

F5 Networks, Inc.
Corporate Headquarters
401 Elliott Avenue West
Seattle, WA 98119
+1-206-272-5555 Phone
(888) 88BIGIP Toll-free
+1-206-272-5556 Fax
www.f5.com
info@f5.com

F5 Networks
Asia-Pacific
+65-6533-6103 Phone
+65-6533-6106 Fax
info.asia@f5.com

F5 Networks Ltd.
Europe/Middle-East/Africa
+44 (0) 1932 582 000 Phone
+44 (0) 1932 582 001 Fax
emeainfo@f5.com

F5 Networks
Japan K.K.
+81-3-5114-3200 Phone
+81-3-5114-3201 Fax
info@f5networks.co.jp