УДК 004.056

MULTI-CONTENT DELIVERY NETWORK AND CLOUD COMPUTING: TOWARDS AVAILABILITY IN WEB APPLICATIONS

Author: Jean Daniel Kouam Waguia (ITMO University)
Supervisor: Dr. Alexander Menshchikov (ITMO University)

The Internet is currently mostly exploited as a means to perform massive digital content distribution. Content Delivery Networks are playing a significant role in latency reduction in order to provide a better user experience on loading time of web applications. Therefore the aim of this paper is to propose a new architecture to increase availability of web applications using Multi-Content Delivery Networks.

Introduction. Content Delivery Network (CDN) is a distributed system composed of a large number of nodes deployed across the world. Each node caches the replica of the most frequently or most recently requested objects, e.g., files, images, and videos. When a user requests a certain object, the request will be forwarded to the nearby node, rather than the Web application or Content Provider (i.e., origin server). CDN not only decreases the end-to-end latency on the user side but also reduces the load on the server hosting the web application, ensuring availability in the face of Distributed Denial of Service (DDoS) attacks. Despite this advantage, several end-users over the globe are still facing low-latency's issues and even downtime of their web applications. Thus, proposing a new architecture to solve this problem is the aim of our work.

Main part. NIST defines cloud computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. Each cloud provider has a Service Level Agreement which mentions the availability of their services. Most of those cloud providers are offering an availability from 95% to 99.99% for their virtual machines. Which is a huge downtime and a loss of money for companies using cloud services. Besides that, end-users of Web-applications created by companies on the Cloud are also facing loading time issues of those applications. Having a single CDN provider is not a scalable and fail-proof approach. Especially for organizations looking at a global end-user base, finding a single CDN vendor that provides the top of the line performance throughout the globe is a challenge. Hence more organizations are looking at geo-specific CDNs. This means regularly assessing performance and evaluating new CDN vendors to fill in any potential gaps. Therefore, to tackle this issue the integration of Multi-CDN in the deployment is mandatory.

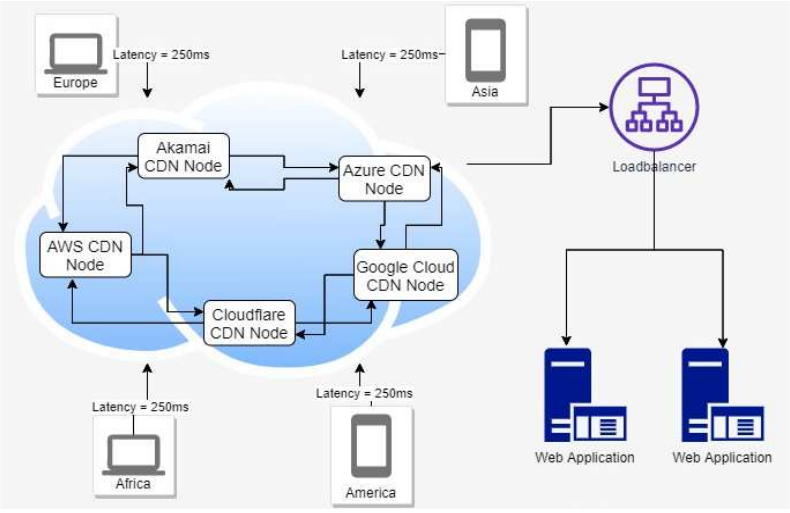

Figure 1: New Multi-CDN Architecture for Low latency and Availability

Multi-CDNs offer several attractive benefits:

1. Global performance enhancement is one potential benefit. Single CDN performance can vary by region, but Multi CDNs spread across several regions improves overall latency statistics.
2. Uninterrupted, continuous website uptime is possible with Multi-CDN. When one CDN provider experiences an outage, Multi CDN can route web traffic through another provider. Web content delivered by Multi CDNs is not affected by traffic spikes or fluctuations.
3. User expectations around streaming media can present hurdles for up-and-coming organizations. Modern websites must be able to not only deliver graphic-heavy content, but users expect that content to be of high quality and delivered near-instantly. This can be an impossible issue to overcome with single CDN setups. Multi CDNs can help ensure that websites can keep up with users' demands.
4. Using a Multi CDN provider can improve website load times by distributing content through nearby CDN servers. Faster load times can reduce bounce rates and increase the amount of time visitors spend on a website.
5. Organizations can save on bandwidth costs and overage fees by using a Multi CDN.
6. Multi CDNs can enhance security by providing features like DDoS mitigation and authentication enhancements.
7. Flexibility is a very important factor to reduce risks for both financial and technical reasons. Instead of being locked into a single CDN provider, businesses often have more flexibility when using Multi CDN to spread risks across the board.

Conclusion. In summary, it has been proven that, the usage of Multi-CDN and Cloud Computing to serve content of Web applications increases the availability and reduces the latency. Therefore, the new architecture provided aimed to raise end-users' awareness and companies to build cost effective Web applications. This study can be extended to a performance comparison between Multi-CDN and single CDN.

Jean Daniel Kouam Waguia (author)

Dr. Alexander Menshchikov (Supervisor)