Investigating the Functions of CoDeeN, COMODIN, Coral, and Globule in Academic/Scientific Content Delivery Networks

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Abstract: *Large internet companies may use several servers at different parts of the world for storage and distribution of their information and facilities around the world to control their website traffic as well as internet services. Content delivery networks (CDNs) may endow the host used by the website with the power of multiple servers. Most currently available commercial CDNs fail to reveal information on the algorithms and strategies used in their development. The present study aims at precisely investigating the function of multiple available academic/scientific CDNs having a sustainable performance for a considerable period of time. Furthermore, it is hoped that the study can help the scholars of this area to familiarize with the functions of these academic/scientific CDNs and open up new horizons in this field.*

Keywords: Content delivery network, cache memory, storage information, internet, Website Traffic

1. Introduction

Over the last decades, users have seen the growth and maturity of the internet, leading to a great growth in network traffic that is driven by the rapid acceptance of bandwidth access, increased complexity of the systems, and the content enrichment [1]. The excessively evolved nature of the internet may lead to challenges in content management and transmission. For instance, eminent web services mostly suffer from the bottleneck resulted from the wide demands for their services. Content providers may consider the web as a means to provide rich content for their users. Increased quality of services along with the access delays due to several long downloads may disappoint users. Companies acquire considerable financial incentives from web-based e-commerce. Therefore, they eagerly strive to improve the quality of their services for users accessing their website. Accordingly, the recent years have witnessed the development of technology aiming at improving content transmission and service provision on the web. When the web content is simultaneously used, infrastructures support this technology to develop a new type of network generally referred to as the content network [2]. At first, multiple initiatives to develop infrastructure for the CDNs were presented. Then, Akamai technologies [3], [4] derived from a research work by MIT aimed at solving flash crowd problem. Within a couple of years, some companies became specialized in reliable as well as rapid content provision and CDNs turned into a large market for providing a huge source of revenues. The proximity of the geographic location of website users to its web server is a factor affecting the response time. Distribution of a website content among the geographically scattered servers could lead to faster loadings of web pages. By using CDNs and regarding the geographical location of the user, content may be delivered to the user through the closest server. The aforementioned service is highly effective in accelerating the speed of content delivery and bandwidth in high-traffic websites as well as global websites like Google, Yahoo, Facebook, etc. Increased loading speed and display of web pages in the users' system, increased website security, enhanced bandwidth (the ability of shared using of servers), easy installation, increased loading speed, and positive impacts on the rating of the website in search engines, among others, are advantages of CDNs. The first generation CDNs were mostly focused on the static and/or dynamic documents [5], [6]. On the other, the next generation of CDNs shifted the focus on VOD and audio/video streaming. However, they are still in the research phase and they have not fully entered the market.

CDNs[5][7][8] provide services that improve the performance of the network by maximizing bandwidth speed, improved accessibility, and guaranteed accuracy through content replication. These networks provide reliable and fast services and applications through distributing content to cache memory or edge servers located near the users [7]. CDNs constitute a combination of content-delivery, request-routing, distribution, and accounting infrastructures. The content-delivery infrastructure comprises a set of edge servers (also known as surrogates) transmitting copies of content to the end users. Request- routing infrastructure is responsible for monitoring the requests of users/customers and guiding them towards the appropriate edge servers. The aforementioned infrastructure also interacts with the distribution infrastructure to maintain the updated version of the content stored at the CDNs caches. The distribution infrastructure moves the content from the origin server to the edge servers of CDNs and ensures the consistency of content in the caches. The accounting infrastructure maintains the logs of user access and records the usage of CDNs servers. The mentioned information is used for reporting traffic and issuing the usage-based billing. In practice, CDNs frequently host static (stable) content