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Efficient DNS based Load Balancing for Bursty Web Application Traffic

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ABSTRACT

This research proposes a new efficient load balancing algorithm which applies to the local Domain Name Service (DNS) server for web based applications and services to ease the sudden increase in demand for the services. Owing to the existing load balancing algorithms still experience server's resource congestion and slow connection to the system resulted by sudden bursty demand of services especially during special events. This is mainly due to the unbalanced distribution of workload and the insufficient of physical computing resources in service provision. To overcome this problem, most web based application service providers will have to constantly improve the capacity of their physical computing resources by either adding new server nodes to the existing server farm or renting cloud computing resources from cloud computing service provider to meet the sudden demands of the end users during the peak period. However, it is not economical to maneuver and reconfigure huge amount of permanent computing resources just to satisfy the instantaneous and short period of service demand. As a result, the need to have a more efficient load balancing algorithm which can adaptively utilize the resources available in the farm of computing resources will be of advantageous. The new algorithm will be able to directly decrease the operation cost and web services will no longer be interrupted by sudden high demand of traffic request. The proposed algorithm is evaluated via computer simulation and modeling where its performance is verified against the few selected algorithms of the same nature. Enhancement on the DNS system for load balancing is beneficial to most organizations such as government agencies and service providers running their own local DNS service, which allow the proposed algorithm to be easily implemented. Moreover, DNS setup is standard across the IP networks hence the adoption can be easy achieved with minimal changes without altering the architecture of the services provided especially in coding as well as physical set up of the server farm itself.

Keywords: Computing Resources, Load Balancing, local DNS, Performance Parameters, Sudden Traffic Web Application Services**.**

1. INTRODUCTION

Nowadays, the web application has become a common instrument in daily life, due to it easy accessibility through of operation such as towards the datelines, during promotion period and etc. During these critical periods, millions of users will be accessing a single Internet service site at the same time creating instantaneous bursty traffic to the site.

Therefore, some organizations have very little options but to spend lots of money upgrading their server farm or to purchase additional computing resources so that the problems of server traffic congestion and bursty demand can be resolved. It is not economical to acquire huge amount of permanent computing resources just to satisfy the instantaneous and periodical service demand. As a result, an efficient load balancing approach has been proposed to enhance the DNS service for handling burst demand in Web based application services.

Load balancing is used to distribute the load among overloaded servers to underutilized servers so that all of the servers in the cluster can be fully utilized. The conventional Round Robin type DNS load balancing mechanism has a few disadvantages which do not necessary reducing the server congestion and burst demand problems under certain environment, but may increase congestion on specific servers.

For example, the DNS service does not aware of the real-time status of each server in the cluster. This means that the DNS server does not know whether a server in the cluster is congested or down and will still keep directing the client requests to a problematic server.

Secondly, DNS service does not take into consideration of the computing capability of a server in its operating procedure, regardless of whether the server is overloaded or underutilized. Lastly, the DNS caching takes days to propagate and updates due to the DNS servers cache the records and will not update it until the Time to Live (TTL) expires. TTL is used to determine the duration a DNS record will be cached by the DNS server. Therefore, it can take hours or days for the whole Internet to recognize changes in the DNS information for a particular domain.

Consequently, enhancements to the current Round Robin DNS load balancing approach are needed to ease the current limitations faced by the bursty traffic environment today. First of all, the request should be distributed not just in