

# AN EFFICIENT ONLINE ALGORITHM FOR DYNAMIC SDN CONTROLLER ASSIGNMENT IN DATA CENTER NETWORKS

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## Abstract:

Legacy heterogeneous network paradigm have reached the extremity where its competence to accustom to dynamic situation has become a hindrance. These traditional network platforms are very complicated to manage due to various challenges like interoperability, upgrade which require protocols and management techniques hard-coded into the underlying network platform. Software Defined Network is an emerging network architecture which allows automation of infrastructure configuration enabling the network operators to adapt their network to meet the real time application requirements. Now-adays with the frequent and rapid inflation of number of clients associated with the network, it is very important to distribute the incoming request equally among all the servers. So by taking advantage of the overall view of the network by the controller, various load balancing strategies can be used to distribute the request in order to increase the overall performance of the system. Every load balancing technique has some pros and cons. This paper gives the comprehensive critical survey on various load balancing strategies used in SDN technology.

**Keywords**— Software Defined Networking, Load Balancing, Openflow.

## 1. INTRODUCTION

Dealing with the design and administration of traditional network seems quite difficult as they are equipped with various hardware devices such as routers, switches, and middle boxes like load balancer, network address translator, intrusion detection system, firewalls etc which are non programmable and vendor specific i.e. any alteration as per the requirement can be done only by the vendor which in case of complex network can be challenging and fallible. If there is a need to add or remove any functionality from the network, it cannot be done without tampering the network infrastructure and will directly affect its logic. Also setting up any new protocol has to pass through various testing and standardization to ensure interoperability provided by particular vendor. network framework which is programmable and vendor neutral. It conquer the shortcomings of long-established network architecture by abstracting the main intelligence of network i.e. control plane from forwarding plane (data plane). SDN architecture consists of application plane. Controller is responsible to control flow table. Lately the rapid growth of SDN has addressed various research challenges like there may be single point failure due to single centralized controller or sometime due to heavy traffic network may be overloaded which limits the scalability. SDN reduces the complexity involved in managing and developing the application by providing up to date status of the network to the programmer. Technology has completely changed the way we live our life and web services like Internet is one such technology which has akin us in a way that was hardly plausible as it handles almost all facets of our life like business, entertainment, education, social network, communication

etc. With this excellent evolution in computer technology, the demand for high speed, availability, scalability, hasty response has grown. Today Internet serves millions of customers due to which there is raise in web traffic which further leads to network congestion and loss of packets.

## 2. RELATED WORK

The SDN architecture can be either distributed or centralized. In centralized controller architecture there will be single controller responsible for everything which indeed may suffer from single point of failure. Distributed architecture can be either flat or hierarchical. In Flat, all the controllers are on same layer. In hierarchical, controllers are placed on different layers.

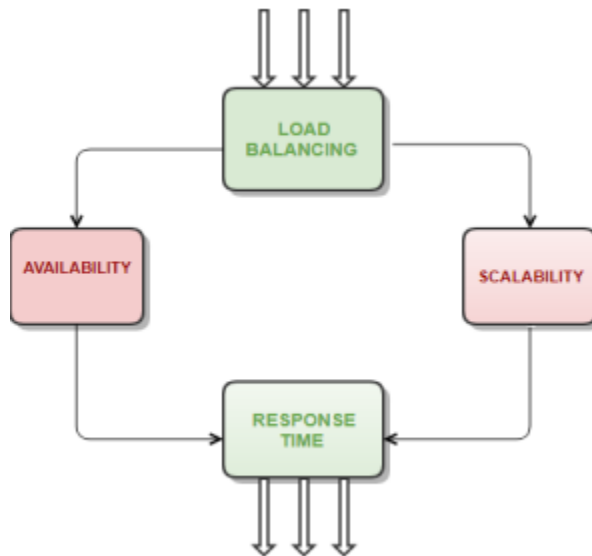


Fig.1.

Compared to centralized architecture, distributed architecture has more communication overhead. The reason is because in order to have the view of complete network all the controller has to communicate with each other about their state and the information they contain. The load balances aims to disseminate the client request among available servers to prevent the single server from being overburdened. With the advent of Software Defined Network which is programmable in nature, allows to code and implement own load balancing algorithm converting the dumb physical switches into powerful load balancer using SDN Controller. It provides agility to quickly adapt to changes and flexibility to add new trait to existing network architecture as and when required.

## 3. ANALYSIS

The load balancer responsibility is to disseminate the load among servers in transparent way without involving client to directly interact with web server. Instead client send request to load balancer which is redirected to particular web server depending upon the various load balancing strategy. Web server in turn will send the response to load balancer and load balancer will then forward the reply to client whosoever. The architecture consists of a SuperController (SC) and various clusters of Regular Controller (RC). Each cluster must contain equal number of RCs. Load balancing is performed at two levels:-low level load balancing occurs when any RC reaches its threshold value and high level load balancing occurs when on

periodical checking, initiated by SC ,it is realized that some cluster have reached its maximum load threshold. To break the interdependency between SC and RC, Cluster Vector (CV) is defined that contain the address of all the RCs in a cluster. Whenever there is cluster imbalance, SC will run partition algorithm to rearrange the RCs in a cluster and return the new CV to the controllers. So two clusters cannot directly communicate with each other without the involvement of Super controller. There can be availability problem in case the SuperController fails. The server with minimum delay handles more traffic in contrast to server with more delay. Although this strategy consider parameters like link delay, link speed which is very important from performance point of view but due to single centralized controller there can be single point of failure.

## CONCLUSION

In this paper a detailed survey of load balancing has been done. As Software Defined Network has been developed to manage large networks like cloud computing technology, wide area networks, data centre big data. Due to ossification of internet, enormous number of request is arriving at server per second. To increase the performance and efficiency of network, there is requirement of efficient algorithm to balance the load of server to avoid network degradation. The centralized controller of SDN has the global view of network which makes load balancing in SDN easy. The load balancing algorithm must consider the current load to reflect the real time change. Using single centralized controller can lead to single point of failure.

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