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Load Balancing in Data center Network

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ABSTRACT:A server pool that connects to the controller via an application module that runs on top of an SDN controller makes up the suggested method.OpenFlow switch devices. A service classification module, a dynamic service classification module, and an application module modules for load balancing and monitoring.The controller responds to all signals and oversees host maintains and pools the host's load in real time.The performance is supported by experimental findings in the suggested plan using experimentation outcomes, the SBLB shows a considerable reduction in typical response and reply times.

KEYWORDS: Data Center, Cloud Computing, Software Defined Networking, Network Load Balancing, Virtualization.

I. INTRODUCTION

The need for an ever-increasing number of servers hosting various sorts of services has driven companies to develop, implement, and migrate their products to the cloud. Many multitenant users from various locations across the world access these services. While cloud consumers expect a quick response regardless of the service requested or the volume of requests, cloud service providers (SPs) work to make the most of their current servers. In order to fulfil these demands, load balancing technologies were used to divide incoming traffic requests among available servers. Despite this, given the complexity and dynamic nature of network traffic, identifying the service type is an important undertaking. Additionally, the variety and ongoing growth of cloud services, as well as dynamic communication methods For several purposes, including security, quality of service (QoS), and network statistics, the kind of services or applications can be determined using the TC method. Numerous traffic classification methods, such as port-based categorization, deep packet inspection (DPI), and statistical data, are frequently applied with machine learning (ML) algorithms. Cloud service providers frequently host a variety of services that call for varied load balancing strategies Some of these methods include installing unique additional load balancers for every service or manually reconfiguring the hardware to accommodate new services. In addition to being costly and time-consuming, these methods are also useless. Furthermore, the majority of load balancing techniques currently in use are either integrated into built-in operating systems like Linux Virtual Server (LVS) or Microsoft Network Load Balancing, or they are implemented in dedicated hardware devices (i.e., load balancers) (NLB). While it is a difficult effort to customise built-in solutions at runtime, load balancers encounter issues when the same scheme is used for several types of services. In addition, the majority of load balancing strategies, whether dynamic or static, do not take service types into account. Designing a load balancing system for cloud servers that maximises resource usage and reduces user response time is the main goal of this effort.An developing architecture called software defined networking (SDN) separates the control plane from the data plane and manages the network through a logically centralised controller (i.e., an SDN controller), enabling better network management, control, and policy enforcement.

With SDN, the underlying infrastructure can be separated from applications and network services and made directly programmable on the control plane. A SDN controller may handle unified cloud resources thanks to this concept. Through OpenFlow, the SDN controller connects with edge devices like switches and routers. Traditional load balancers call for expensive and rigid dedicated hardware. Nevertheless, SDN load balancers are adaptable and do not require specialised hardware.

II. METHODOLOGY

A tool for simulating network operation is called OPNET. In this investigation, a comparison of LAN performance in a campus setting with low traffic is made without the use of a load balancer. Since it offers a number of advantages, we have selected OPNET IT GURU Academic Edition as the simulation tool for our study.

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i. For the development and design of topologies, OPNET IT GURU offers a full toolkit and user interface.
ii. It is widely employed and the validity of the outcomes it generates has widespread acceptance.
iii. It makes it possible to evaluate performance metrics and the efficacy of WAN design strategies in a realistic manner.

III. DEVELOPMENT OF SIMULATION ALGORITHM

In order to simulate and compare the artificial spider routing algorithm, this project makes use of OPNET (Optimized Network Engineering Tool). In the OPNET network modelling hierarchy, the process model and its supporting mechanisms use state machines to simulate the network protocol, the middle node model typically contains multiple process models for equipment simulation networks, and the top node model is connected to the others to form the network topology. Three tiers of the OPNET model were established, with each level corresponding to the structure, actual communication protocols, communication equipment, and network. The network routing protocol was evaluated, tested, and improved in order to maximise network performance. The artificial spider routing method has an excellent experimental platform provided by the OPNET program.

IV. RESULTS

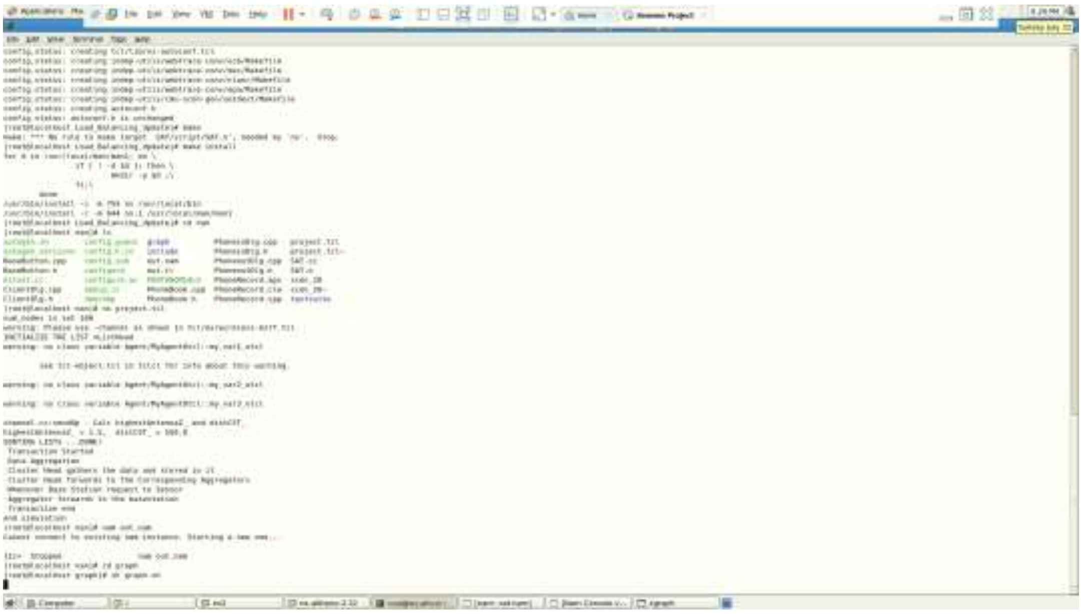

Figure 1:Running Code

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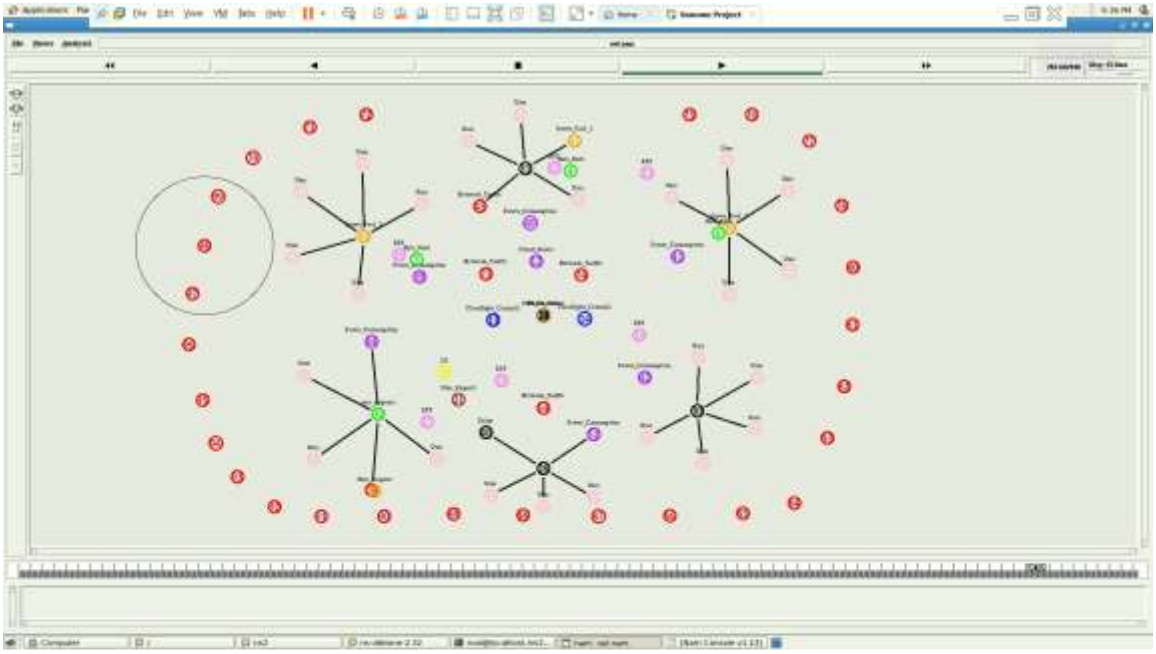

Figure2: Simulation

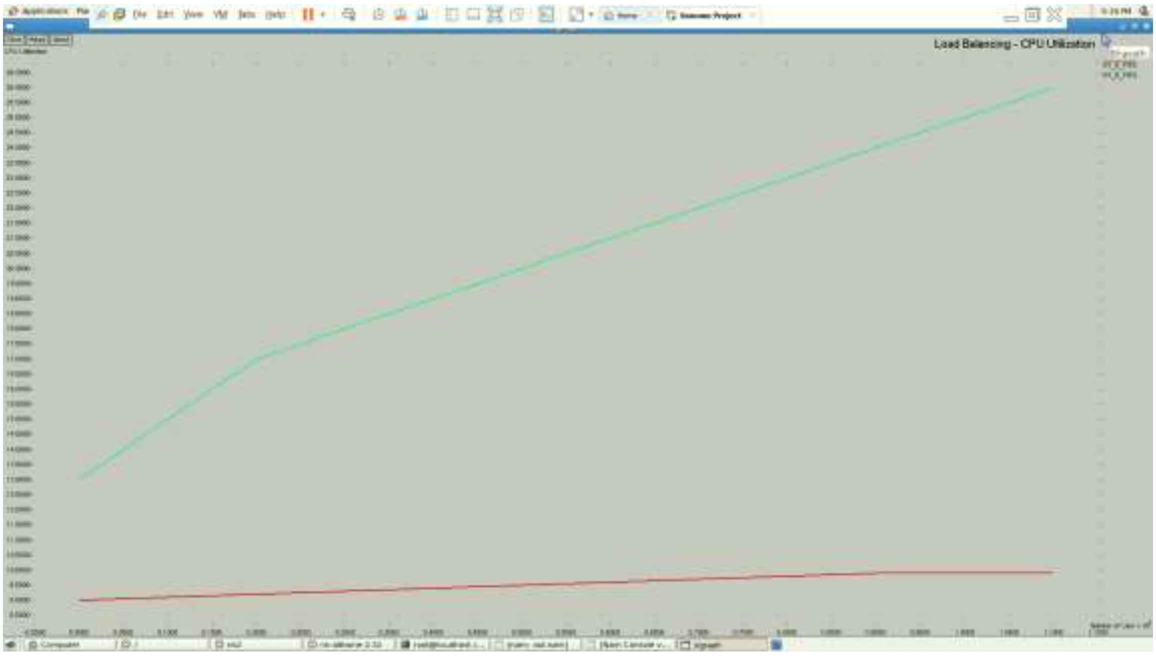

Figure 3: Graph of CPU Utilization

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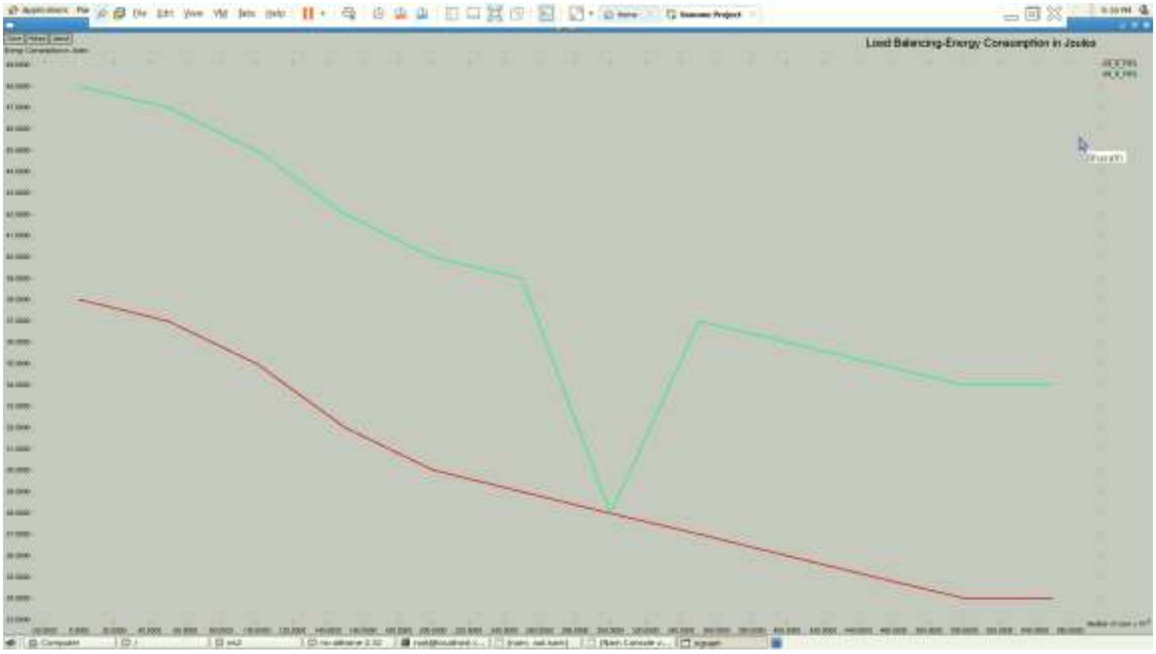

Figure 4:Graph of Energy consumption

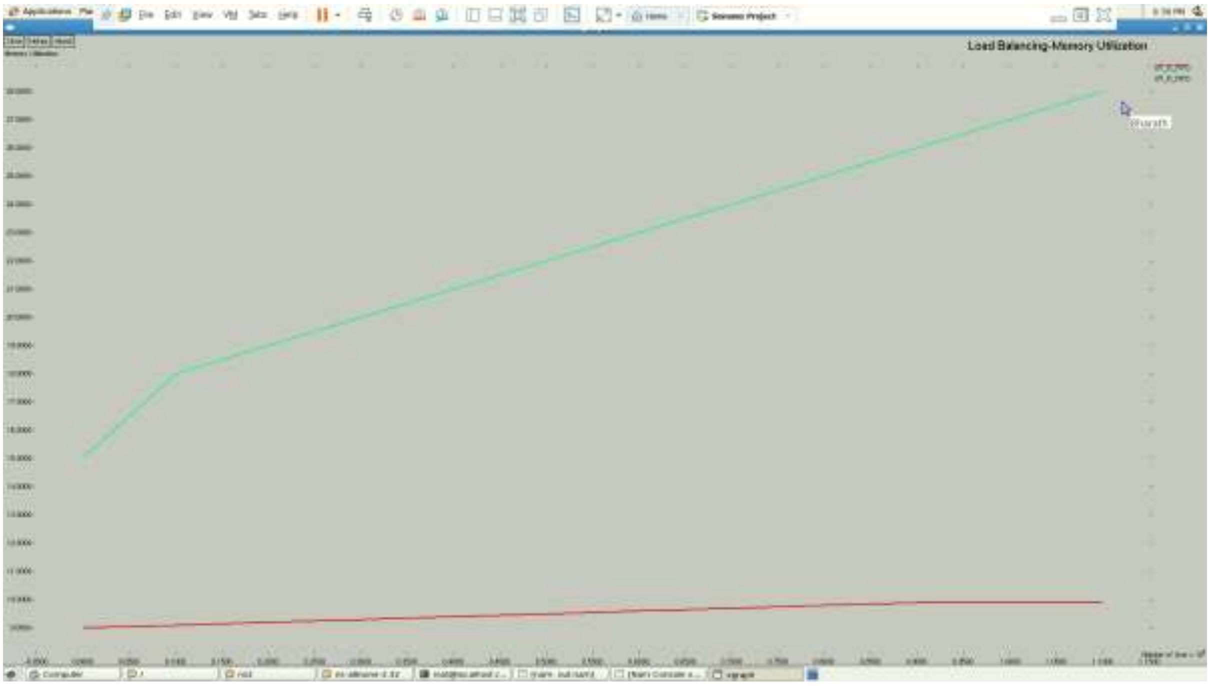

Figure 5:Graph of Memory utilization

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Figure 6:Queueing Length

Figure 7:Graph of Power consumption

V. CONCLUSION

In order to identify and choose the most ideal and eminent load balancing solution that offers better performance improvements in resource utilisation in data centres, minimising energy consumption, memory utilisation, CPU utilisation, and other costs, this paper provided a performance comparison of various load balancing techniques, such as FIFO and LIFO, queueing analysis, and other methods.

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