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DISTRIBUTED CONTROLLER FAULT TOLERANCE MODEL (DCFT) USING LOAD BALANCING IN SOFTWARE DEFINED NETWORKING

Gaurang Lakhani [1] Amit Kumar Kothari [2]

[1] Research Scholar Ph.D. (CE/IT), Gujarat Technological University, Gujarat, India.
[2] Research Scholar Ph.D. (CE/IT), Gujarat Technological University, Gujarat, India.

Abstract

Lack of Flexibility, Centralized Control, and Cost are limitations of the traditional network. Software defined networking (SDN) adds flexibility and programmability in network management by separating the control plane from the data plane. Distributed controllers with SDN are logically centralized at control plane and physically distributed at data plane. They are deployed to improve the adeptness and accuracy of the control plane, which could isolate network into few subdomains with independent SDN controllers. Traffic is dynamic and configuration between switch and controller is static. If one of the controllers fails, load imbalance arises. To address this problem of fault tolerance in distributed controller DCFT (Distributed Controller Fault Tolerance) model is proposed in this paper. A novel switch migration method with coordinator controller in a distributed SDN controller is proposed for providing fault tolerance through load balancing. The system architecture of the proposed model with different modules such as coordinator controller election, load collection, decision taking, switch migration, Inter controller messenger designed. On failure of coordinator controller switch migration discussed. Implement DCFT model in Mininet, derived results, The results show that our design could achieve load balancing among distributed controllers while fault occurs, regardless network traffic variation and outperforms static binding controller system with communication overhead, controller load balance rate, and packet delay. We compare our model with CRD (controller redundancy decision), MUSM (maximum utilization switch migration) and ZSM (Zero switch migration) techniques. Simulation analysis performed on custom topology. We compare packet delay, communication overhead and load balancing rate in a custom topology with before and after migration of switches. It's revealed that the DCFT model produces better performance in fault tolerance.

Author Keywords

Software Defined Networking, Distributed controller, Fault Tolerance, DCFT, Switch Migration, coordinator Election, Load Balancing, Data Plane, and Control Plane.

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