

A Genetic Algorithm for Dynamic Controller Placement in Software Defined Networking

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Abstract

The Software Defined Networking paradigm has enabled dynamic configuration and control of large networks. Although the division of the control and data planes on networks has lead to dynamic reconfigurability of large networks, finding the minimal and optimal set of controllers that can adapt to the changes in the network has proven to be a challenging problem. Recent research tends to favor small solution sets with a focus on either propagation latency or controller load distribution, and struggles to find large balanced solution sets. In this paper, we propose a multi-objective genetic algorithm based approach to the controller placement problem that minimizes inter-controller latency, load distribution and the number of controllers with fitness sharing. We demonstrate that the proposed approach provides diverse and adaptive solutions to real network architectures such as the United States backbone and Japanese backbone networks. We further discuss the relevance and application of a diversity focused genetic algorithm for a moving target defense security model.

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