Week7 research note

-A multicontroller architecture is a set of controllers working together to achieve some level of performance and scalability. In a SDN, multicontroller architectures can have differences between aspects and characteristics. The differences between logically or physically centralized and distributed architectures, and flat and hierarchical designs.

- Physically Centralized versus Physically Distributed

In a software-defined network, there are two types of architectures, physically centralized and physically distributed. When SDN appeared, the main tendency was to have a physically centralized controller; however, due to some issues, like the single point of failure and the scalability problem, network experts suggest physically distributed designs.

Controllers like Beacon and NOX have used multithreading techniques to split a single controller logically to increase its performance. In this case, it is so obvious, since we have a single controller, that we are not talking about a multicontroller architecture.

A physically distributed network can differ on various levels, like how to place controllers and also which type of communication to use among them.

- Logically Distributed versus Logically Centralized

Logically centralized means that we take advantage of the concept of a multicontroller design, but at the same time, we always consider that we have a single controller. In other words, we take the charge, and we distribute it among the multiple controllers; however, for the underlying layer, it is like there is just one controller that commands the whole network.

In a logically distributed architecture, the controllers are physically and logically distributed. Additionally, every controller has just a view of the domain it is responsible for, and it can take decisions for it, unlike a logically centralized design, where each controller makes a decision based on the global network view.

-intercontrollers communication

Communication intercontrollers are the method used to allow exchanging information among the multiple controllers of a software-defined network.

Building a global network view is always connected to the notion of consistency. This last mentioned one can be either weak, which implies that updates between controllers take a period to be fully applied, or strong that signifies that the multiple controllers read the updates at the same time, which affects the performance of the network positively.

- Placement Problem in Multicontroller Software-Defined Architecture

The number of used controllers and their positions in distributed network architectures will certainly impact the overall performance of the control plane, which is a significant challenge for network designers. A research paper discusses this problem deeply, called the placement problem of controllers. It tries to solve the placement problem of controllers in WAN networks by improving the delay between a controller and a switch, as well as between two controllers, in order to minimize the response time and enhance the ability of the network to interact more quickly.

surprisingly a single controller is enough to meet response time requirements in a medium-size network.