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Questions

1. In a few sentences, describe the general architecture of your entire layout with the network monitor and interface monitors. What does each do? [0.5 mark]

The architecture consists of two monitors, the NetworkMonitor and InterfaceMonitor. The NetworkMonitor acts as a central controller, while multiple InterfaceMonitor processes monitor individual network interfaces. The NetworkMonitor manages the various InterfaceMonitor connections, establishing connections with the monitor. Then, the InterfaceMonitors pull statistics for a given network interface and send back alerts to the NetworkMonitor. In case a network interface gets shut down or interrupted. The NetworkMonitor can send a revival command to the InterfaceMonitor to get started back up.

1. Could the interface monitor and network monitor all be contained within one process, if so how? [0.5 mark]

Since the NetworkMonitor and InferfaceMonitor use multi process communication by forking. We could possibly use muti threading to contain the communication between the two in one process, where the NetworkMonitor would be the main thread and InterfaceMonitor would be secondary under the same process.

1. Could the interface monitor and network monitor all be contained within one process, assuming 128 network interfaces running at several Giga-bits per second, which require a polling interval of one millisecond per interface. [0.5 mark]

Although, it would be technically possible depending on hardware requirements coming from CPU and RAM, it would also be impractical. As one process for such high frequency polling can struggle to balance the resources effectively. Having multiple processes to tackle this approach would be more efficient, lighter on hardware components and prevent faults across the entire system.

1. What is a software defined network? In doing so, describe the applications layer, the control layer, and the forwarding layer. [1.5 marks]

Software Defined Network has a purpose to simplify network management, make it more flexible, and scalable. It essentially allows to separate the control plane from the data plane, switching from the traditional model of being hardware based to software based. Allowing the control plane to determine where to send the traffic and the data plane to forward the traffic in the hardware.

The application layer consists of network applications and services. These services are responsible for communicating with the control layer, where they request network configurations and actions.

The control layer is represented by the SNK controller, responsible for translating the requests from the application layer to network configuration and rules. As a controller it maintains the wide view of the network focusing on routing, and security policies. It communicated with the forwarding layer to enforce it’s actions.

The forwarding layer is the data plane which consists of the network devices. It handles the forwarding of data based on requirements and requests provided by the application layer. This layer is responsible for transmitting and delivering data across the network.