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HS2020: 11072 Advanced Networking and Future Internet

Theoretical Exercises - Week 5

Jesutofunmi Ajayi
Lucas Pacheco
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OpenFlow (2 points)

Q1. Explain (in detail) the main purpose(s) of OpenFlow in SDN-based networks.

Network Planes (3 points)

Q2. Describe the three (main) planes/abstractions in traditional computer networks.

- Q2.1 Explain the advantages of separating these planes.

Software Defined Networking (2 points)

Q3. Below are 5 'facts' relating to SDN. Select (e.g. underline) the ones that are correct.

- Separation of software control from hardware
- The use of northbound APIs from the SDN controller to enable programmatic and dynamic control of the underlying network infrastructure
- Increasing manual operator intervention and computer keystrokes
- Supporting remote presence robotics to replace failed circuit switches
- Using open interfaces and protocols for communication between various network elements

OpenFlow II (3 points)

Q4. Despite the current success of OpenFlow, there are still some perceived limitations of the protocol. Explain these limitations and describe how alternative SDN-based approaches seek to overcome them.

OpenFlow Tables (6 points)

Q5. Below is a small example of an SDN-controlled network.

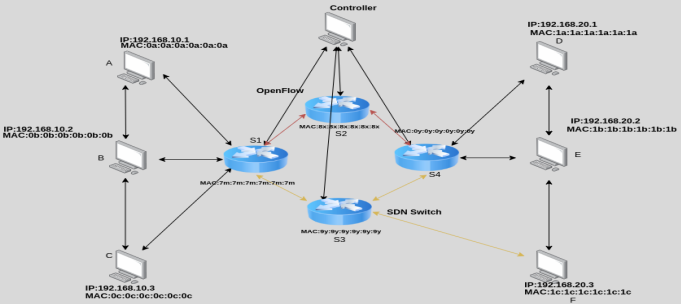

Figure: SDN-controlled Network

OpenFlow Tables (contd.)

Q5.1 Given the following scenarios, please construct an OpenFlow Table for switches **S1**,**S2**, **S3** and **S4** that would enable a packet to be sent over the network:

- An operator wants to implement a new a policy that designates Host F as a special node which can only be accessed by nodes in the same subnet (192.168.20.x), and Host A in the other subnet. The controller is used to implement this policy in the network.
- When host A sends a packet. It is received at S1 on *port 1*, where the switch checks the destination address of the packet. If the destination is host F, S1 sends the packet out on *port 2* to S3 which receives it on port 3 and forwards it to host F on port 4.
- If the packet destination is any other host in the adjoining subnet, then S1 sends the packet on *port 3* to S2 which receives it on *port 1* and forwards it to S4 on port 2. S4 receives it on *port 1* and routes it towards the destination node(s) on an output port based on the destination's MAC address.
- **Note**: For this question, you are free to introduce and assume an adequate set of actions that has to be recognized by the switches (which don't necessarily need to be compatible with the current specification of OpenFlow).

Grades

- OpenFlow (2 Pts)
- Network Planes (2 Pts)
- Software Defined Networking (2 Pts)
- OpenFlow II (3 Pts)
- OpenFlow Tables (6 Pts)
- **Deadline: 25.10.20 at 23:55**

Q/A

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- Tofunmi Ajayi: jesutofunmi.ajayi@inf.unibe.ch
- Lucas Pacheco: lucas.pacheco@inf.unibe.ch