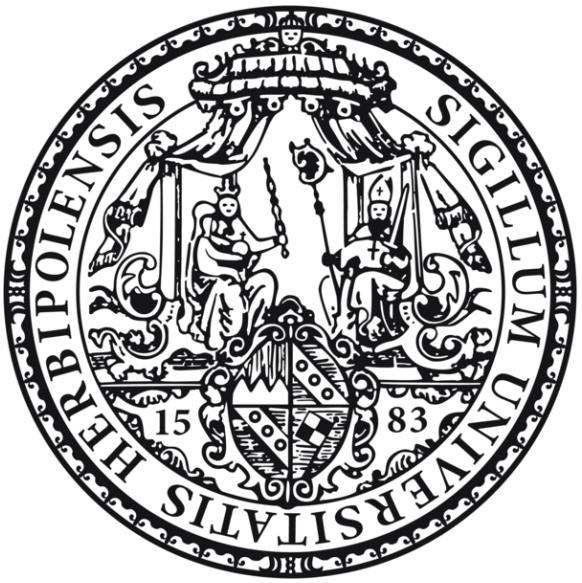
Hardwarepraktikum Internet-Technologien

Comprehension Questions of Task 8: Software-Defined Network



Julius-Maximilians-Universität Würzburg

Chair of Computer Science III

A project report submitted by **group 11**

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1. Look at the following example network:
Assume that the SDN controller is using the reactive forwarding strategy. Both switches have no flow rules installed at the moment. PC A now attempts to open a TCP connection to PC B and starts a TCP handshake (SYN, SYN-ACK, ACK). Complete the following sequence diagram by inserting the communication between data plane devices as well as switch-controller interaction in the correct order.

PC A->SYN->Switch 1 ->SYN->Controller->SYN->Switch 2-> SYN->PC B

PC A->ACK<-Switch 1 <-ACK<-Controller<-ACK<-Switch 2<- ACK<-PC B

2. The available (fast) memory for flow rules in SDN switches is limited. How could you prevent that the memory overflows at some point and makes the network inoperable as a result?

By removing from time to time rules that have not been used recently or infrequently, with the most frequently used rules having a higher priority to remain in the switch.

3. What are the benefits of using a single central SDN controller as opposed to giving each switch its own software-based external controller? Are there also any situations where having multiple controllers could be beneficial? How could they be organized?

That would reduce costs at the time of implementation, as we would only have a single SDN switch, but if a large number of standards are required or a high amount of data traffic is to be used, using more than one switch could be beneficial to avoid router congestion.

4. At the end of Section 6.3 you used simple flow rules to achieve forwarding based on IP addresses that were located in the same network. Which flow rules would you have to install in addition to those if the IP addresses were located in different networks? Keep in mind that end devices would now contact the SDN switch directly as their gateway

Rules to specify for each network, because if they are not added, the switch will not let the packets pass, since it does not know which is the network and how to proceed if packets arrive from that network (rules to know whether to drop the packets or not, rules to know where to send the packets from that network, rules to know how to treat them,...).

5. Can OpenFlow and the OpenVSwitch support arbitrary new protocols, e.g., instead of IP? What would be necessary to achieve that?

No, since it is a Brownfiweld you have to work on what is specified. Reconfigure the entire OpenFlow protocol.

6. SDN is being used by many big companies (Google, Facebook, ...) in their internal networks32. However, their public (user-faced) networks are still using traditional networking hardware and conventional protocols. Can you imagine that the public Internet would be replaced entirely by the SDN concept at some point? Why hasn't this happened yet? What would be necessary for that to happen?

Because it would require an infinite number of different rules for each network, and given the increasing number of IP networks, this would be practically unfeasible if every time someone wants to access a network as large as Facebook, the SDN switch would have to check the accesses (switch congestion). Apart from all the number of switches needed to store the rules and allow or disallow the packets to circulate.