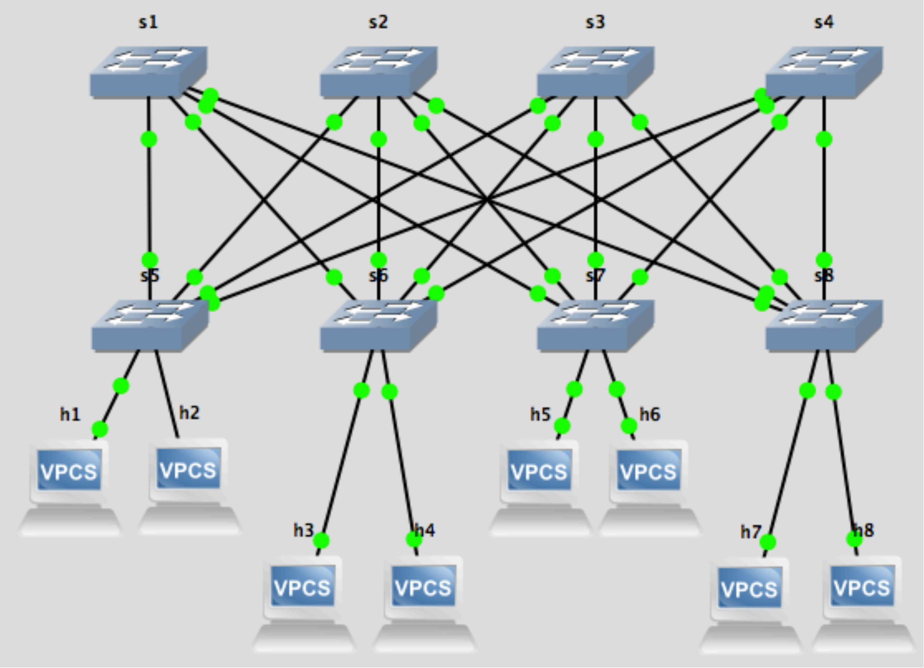
Software-Defined Networking Assignment 2 2017-18:

"Design, create and debug an SDN network consisting of multiple network elements (SDN switches and controller)."

Description

Write a Mininet script in Python to create a small data centre network, consisting of 8 switches arranged and connected in a spine-leaf topology, with 8 hosts attached – 2 to each leaf switch, (as shown) and a remote controller. Name the switches 's1', 's2',… , and the hosts 'h1', 'h2', … The switches should be Open vSwitch instances, and the remote controller can be Pox or ONOS (or other, by agreement in advance with your lecturer).



Write an application for the controller to proactively add rules that don't time out for the following functions:

- H1 and H2 should be able to exchange any kind of traffic with each other (reachability functionality).
- H3 and H4 should never be able to communicate with each other (traffic isolation, similar to VLAN functionality).
- H1 should be able to telnet and SSH to H5, but no other traffic should be allowed through (stateless firewall functionality).

Rules should be reactively configured to achieve the following functions, and the rules should have an idle timeout of 30 seconds:

- H1 should be able to telnet and SSH to H6, and H6 should be able to send any kind of traffic to H1 (stateful firewall functionality).
- For HTTP traffic going from H1 to H7/H8, every second flow should go to H7, and every other flow to H8 (load balancer functionality).

You will need to think about ARP. You can set static ARP entries on all hosts, or you can handle ARP requests in your own code (and maybe get extra marks), or use an existing controller application to deal with ARP.

You must submit a .zip file including only the following files:

- sdntopo2.py – a script to create the Mininet topology.
- policy.py or policy.java – a Pox script or Java code to implement the functions listed above. Your code must be meaningfully commented. For Java code, there may be other files required as well – pom.xml, for example.
- output.txt – something that shows that the functions are achieved by your code (e.g. output of testing with hping3 and tcpdump).