**Programming Assignment No. 1: An POX Controller for ECMP Routing**

**(Due September 26 before class)**

ECMP routing is commonly used to achieve load balancing. ECMP achieves load balancing by exploiting multiple paths with equal cost and distributing TCP flows among the multiple paths. A TCP flow is identified by 5-tuple: source IP address, source port number, destination IP address, destination port number, and the protocol. Consider the following topology.

S0

B

A

S5

S1

C

S4

S2

S3

Using ECMP, the first flow from node A to B will follow path A->S1->S0->S4->B, the second and all later flows will follow the same path since there is only one shortest path. Communications from A to C will be different: the first flow from A to C would be randomly chosen from the two equal-length path, let us assume that A->S1->S0->S5->S4->C is selected. The second flow will follow the other path A->S1->S2->S3->S4->C. The third flow will again use A->S1->S0->S5->S4->C and so forth.

In this assignment, you will write a POX controller that automatically detects the topology (and topology changes) and using ECMP for load balancing in the network. Make sure to thoroughly test your server. Note: it is ok to use Opendaylight to replace POX as the NOS.