CSCI 5380

Network Virtualization and Orchestration

Lab 5

P4 - Programming Protocol-Independent Packet Processors

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# Summary

P4 is a programming language designed to allow programming of packet forwarding planes. In contrast to a general-purpose language such as C or Python, P4 is a domain-specific language with several constructs optimized around network data forwarding. P4 is an open-source, permissively licensed language and is maintained by a non-profit organization called the P4 Language Consortium. The purpose of this lab is to get an introductory understanding of P4 programs in a virtual environment by implementing traditional and custom network functions. The objectives of this lab are to be used as guidelines, and additional exploration by the student is strongly encouraged.

# Objective 1: Setting up environment

1. Download the P4 VM from <https://github.com/jafingerhut/p4-guide/blob/master/bin/README-install-troubleshooting.md> and follow the installation instructions.
2. Clone the following repository inside the P4 VM: <https://github.com/p4lang/tutorials>
3. Reinitialize the MAC address of the NAT adapter.
4. Login for the VM is p4:p4.

# Objective 2: P4 programming

1. Navigate to the directory tutorials/exercises.
2. There are 8 objectives to complete present in below directories –
   1. basic
   2. basic\_tunnel
   3. calc
   4. ecn
   5. load\_balance
   6. mri
   7. p4runtime
   8. source\_routing
3. For each objective, first read the README.md file present in each directory to find out what needs to be done. Use those instructions to complete the blanks in the .p4 file in each directory.
4. The steps to execute and test the code are also mentioned in the README.md file.
5. There is a reference solution in each of the ‘solution’ sub-directory. Feel free to compare your implementation to the reference.

# Deliverable

* Write the steps to complete each objective. Also, write what is the difference of completing each objective using P4 instead of using traditional or OpenFlow networking concepts.
* Create something new (your choice) in addition to the base objectives
  + Submit a simple explanation of what you created