Software Defined Networking

(SDN 101)

Instructor: Dr. Wajid Hassan

Ph.D. Technology Management (Digital Communication)

M.S. (Electrical Engineering)

B.S. (Electronics Engineering)

CCNA, CCIE (R&S -Written) CCNP (R&S) CCIE(SP), CCIE(DC), VCP

Contact: wajidhassan@yahoo.com

http://www.logicfinder.net/wp-content/uploads/2017/01/Logic-Finder-Training-Institute-1.pdf

Introduction

This course introduces software defined networking, an emerging paradigm in computer networking that allows a logically centralized software program to control the behavior of an entire network. Separating a network's control logic from the underlying physical routers and switches that forward traffic allows network operators to write high-level control programs that specify the behavior of an entire network, in contrast to conventional networks, whereby network operators must codify functionality in terms of low-level device configuration. Logically centralized network control makes it possible for operators to specify more complex tasks that involve integrating many disjoint network functions (e.g., security, resource control, prioritization) into a single control framework, allowing network operators to create more sophisticated policies, and making network configurations easier to configure, manage, troubleshoot, and debug.

Goals

Upon successful completion of the course, participants will be able to select, design, analyze, implement, and evaluate effective controllers for a number of different robotics platforms and applications. The course will enable you to design and write network security and management applications within the context of the new Software Defined Network (SDN) paradigm.

Prerequisites

Participants should:

- Have taken at least an undergraduate-level networking course.
- Have programming experience in Python.
- Be able to write a simple client-server program in Python.
- Proficiency with basic networking concepts and facility with configuring networking in Linux environments.
- Experience with virtual machines and other virtual networking environments may also be useful.

Supplemental Resources

There are some useful videos available online; these might be a good starting point for many

people:

- Prof. Nick McKeown, Stanford

  "How SDN will Shape Networking"

- Prof. Scott Shenker, Berkeley:

  "An attempt to motivate and clarify Software-Defined Networking (SDN)"

(watch the first 35 minutes or so)

You may find the additional reading useful for introductory material:

- OpenFlow: Basic description of OpenFlow
- Open Networking Foundation: For recent OpenFlow specifications, etc.
- Mininet: Environment that allows you to emulate OpenFlow networks on a laptop.

Courses you may want to take prior to this course

- Introduction to Python
- Introduction to Computer Networking

Communication

Please communicate with the instructor and staff via the online forums. Because there are so many students, it is not possible for us to respond individually to every question.

Written language will be primary means of communication. As such, there can be miscommunication as there is no intonation in these written communications. Please be positive, supportive and constructive in your comments and forum postings. The course team reserves the right to delete comments that may be disrespectful to other students or not related to the course.

Significant Features!

- An understanding of SDN and OpenFlow concepts
- An understanding of NFV concepts
- Familiarity with SDN motivation, benefits, use cases, and applications
- Familiarity with the basic SDN concepts: control plane, data plane, flow tables
- An understanding of the relation between SDN and NFV
- Experience with Open vSwitch, Mininet and Wireshark
- An understanding of architecture and use cases of Calico and OpenContrail
- Experience with Calico and OpenContrail

	This course will cover 8 modules (one per week).
Week 1	Module 1: History and evolution of SDN
Week 2	Module 2: Control and data plane separation
Week 3	Module 3: Control Plane
Week 4	Module 4: Network Virtualization
Week 5	Module 5: Data Plane
Week 6	Module 6: Programming SDNs
Week 7	Modules 7: Verification and Debugging
Week 8	Module 8: Use Cases and Looking Forward

Detailed Table of Contents: