SOFTWARE DEFINED NETWORKING AND NETWORK FUNCTION VIRTUALIZATION

Course Code: 4463

Learn the architecture of a software-defined network (SDN) and protocols related to its implementations.

In this course, you will learn about software-defined network (SDN) architecture and the important protocols related to SDN implementations. SDN helps manage and control physical network elements as well as network function virtualization, allowing network professionals to deploy and maintain a clean integration between cloud environments and the physical network itself.

You will also learn what happens at the cloud boundary and then examine the virtual network within the cloud itself. The networking control layer changes radically with SDN and this course shows how that change is both amazing and powerful.

What You’ll Learn

- Configure and deploy the most popular network functions, routing, bridging, and OpenFlow switches
- Requisite protocols
- Integrate components in an emulated physical environment
- Perform verification testing
- OpenStack neutron
- Neutron-compute

Who Needs to Attend

- System engineers
- Network engineers
- Architects
- Data center architects
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VIRTUAL CLASSROOM LIVE $3,495 USD 5 days

Virtual Classroom Live Outline
1. Software-Defined Networking Introduction
   - Data Plane
   - Control Plane
   - Problems with the current distributed Control Plane design
   - Problems solved by the Centralized Control Plane
   - Management Plane Functions
   - Management protocols and applications
   - Northbound vs Southbound Interfaces
   - NETCONF
   - RFC 7149 SDN: A Perspective from within a Service Provider Environment
   - RFC 7426 SDN Layers and Architecture Terminology

1. Overlays and Underlays
   - Architecture for Overlay Networks (draft-ietf-nvo3-arch-04)
   - Security Requirements of NVO3 (draft-ietf-nvo3-security-requirements-06)

1. Open vs. Switch
   - Architecture and Components
   - ovsdb-server
   - Core Tables
   - Linux Bridge vs. OpenvSwitch Design
   - OpenvSwitch Daemon
• Ovs-ofctl, ovs-dpctl
• OVS Kernel Module
• Tunnels: FRE, VXLAN, LISP
• OpenFlow Interface
• Hidden Flows
• Tracing Flow
• Intel DPDK Effect

1. Simulation and Observation
   • 100% hands on labs this section

1. OpenFlow

   • OpenFlow Components
   • Controller Overview
   • OpenFlow Switches
   • Basic Operations and Messages
   • Controller Northbound Interfaces
   • Review of OpenFlow Specification (current or 1.1.0, Wire protocol 0x02)
   • Flow Tables, Pipeline processing
   • Group Table, Matching, Instructors
   • Encryption, Connection, Message Handling
   • How to Verify the Configurations?
   • Troubleshooting Steps Using OpenFlow
   • Performance
   • Debugging Tools
   • Segment Routing

1. Network Function Virtualization

   • NFV Terminology
   • NFV Architecture
   • Relationship with SDN
   • ETSI NFV Industry Specification Group Models
   • Service Function Chaining Architecture (RFC 7665)
   • NFV Reference Points
   • Example Network Virtualization Functions Use Cases

1. Securing SDN

   • Securing the Controller
   • Protecting the Controller
• Trust Establishment
• Robust Policy Framework
• Conducting Forensics
• Remediation Techniques and Implementation

1. NFV Practical Application

• NFV Networking Requirements
• How to Specify Hardware that Supports NFV
• Differences between NFV (Network Functions Virtualization) and Cloud Implementations
• The differences between NFV and Traditional Network Design Deployments
• NFV Network Challenges
• NFV Example Use Cases
• Business Processes and SDN
• Change Management in SDN
• Six Sigma
• DevOps consideration
• Scrum & Agile in the age of SDN

1. Introduction to OpenDaylight

• Setup
• Fundamentals for OpenDaylight Programming
• Maven and project building
• Karaf and feature creation
• Config subsystem
• Mininet
• Introduction to OpenDaylight Architecture
• Model-driven SAL (MD-SAL)
• YANG model
• Instance identifiers
• Data store transactions
• Advanced YANG operations
• Northbound and Southbound plugins
• Basic steps to writing an OpenDayLight Application
• Define data model
• Activation
• Event handlers and other call backs
• Sample Applications
• Tap application
• Learning Switch
• Other Prewritten Applications
• NETCONF protocol support
• ARP handler, host tracking
• Link Discovery
• API data model documentation (apidocs)

1. OpenDaylight Southbound API
   • OpenFlow
   • NETCONF Connector

1. OpenDaylight Northbound API
   • RESTconf
   • NETCONF

1. Observing and Debugging OpenDaylight

1. Writing an Application Using OpenDaylight

Virtual Classroom Live Labs
Lab 1: OpenvSwitch Deployment
Lab 2: OpenDaylight Deployment
Lab 3: North and Southbound Interface Testing and Analysis
Lab 4: OpenFlow Configuration
   1. Configure L2 (Switching)
   2. L3 (routings i.e. static/dynamic)
   3. L4 (Load balancing)
   4. Firewalling features
Lab 5: OpenFlow Protocol Analysis
Lab 6: NFV Switching Examples using the KVM Hypervisor
Lab 7: NFV Routing Examples Using the KVM Hypervisor
Lab 8: OpenStack Neutron Networking
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PRIVATE GROUP TRAINING 5 days

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