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Software Defined Networking



In this course, you will learn about software defined networking and how it is changing the way communications networks are managed, maintained, and secured.

Module 6.1: Programming SDNs

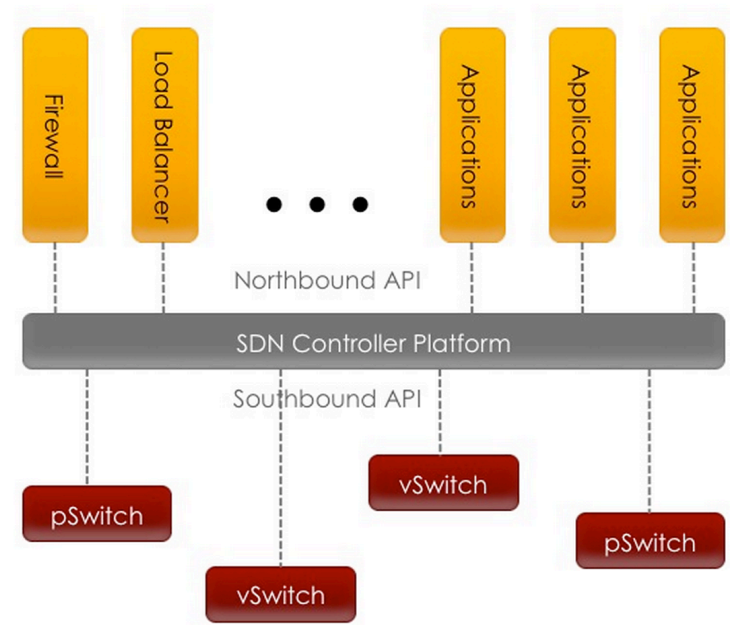
- ◎ Four Lessons
 - Motivation for Programming SDNs
 - Programming Languages for SDNs
 - Composing SDN Control
 - Event-Driven SDN
- ◎ Programming Assignment
- ◎ Quiz

OpenFlow: Programming Not Easy!

- ⦿ Difficult to perform multiple independent tasks (e.g., routing, access control)
- ⦿ OpenFlow is a low level of abstraction
- ⦿ Controller only sees events for packets that the switches do not know how to handle
- ⦿ Race conditions, if switch-level rules are not installed properly

Solution: “Northbound API”

- Programming interface that allows applications and orchestration systems to program the network
- Uses for Northbound API
 - Path computation
 - Loop avoidance
 - Routing
 - Security



Who Will Use the Northbound API?

- Sophisticated network operators
- Service providers
- Vendors
- Researchers
- ...anyone who wants to develop capabilities on top of OpenFlow

Benefits of Northbound API

- ⦿ Vendor independence
- ⦿ Ability to quickly modify or customize control through popular programming languages

Examples of Applications

- ⦿ Large virtual switch
- ⦿ Security applications
- ⦿ Resource management and control
- ⦿ Middlebox integration

Currently: No Standard

- ⦿ We will look at various APIs and programming languages
- ⦿ Each “compiles” to OpenFlow rules that are installed on switch
- ⦿ Goals: Orchestration of high-level services

Summary

- ⦿ OpenFlow is a “southbound API” technology that provides control over switches
- ⦿ It makes it possible to program networks, but it does not make it easy
- ⦿ Northbound API can help
 - Sophisticated events
 - Composition of policies
 - Event handling