Software Defined Networking

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

This Module: Programming SDNs

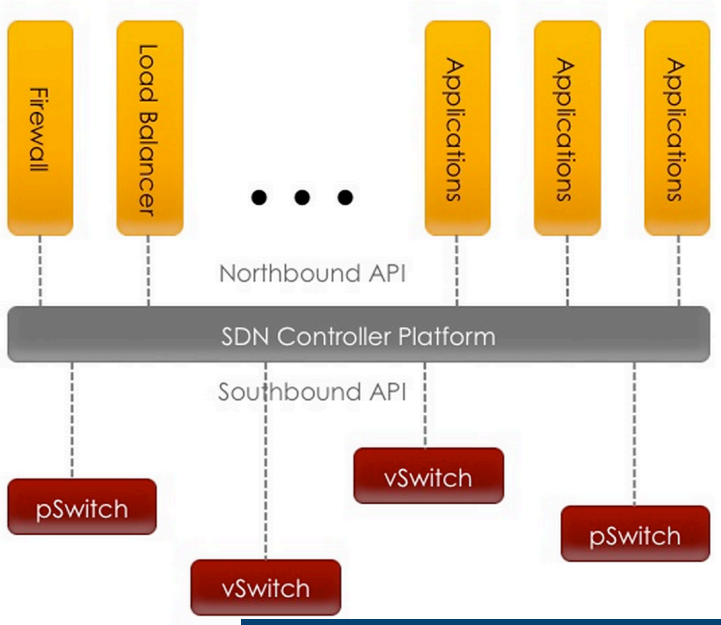
- Lessons
  - **Motivation for Programming SDNs**
  - Programming Languages for SDNs
  - Composing SDN Control
    - Pyretic
  - Kinetic: Event-Driven SDN
- Programming Assignment
- Quiz

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



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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