

Ryu: Network Operating System

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June 6, 2012



Agenda

- ◆ Overview
- ◆ How it works and Demo
- ◆ Summary

Overview



What is Ryu?

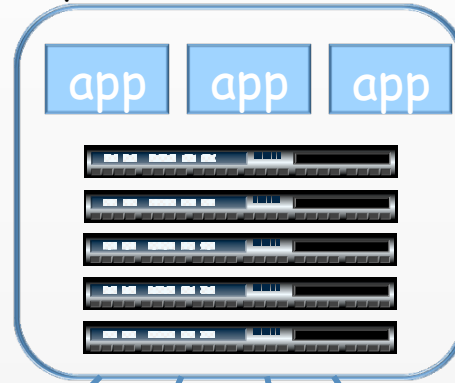
- ◇ Open-sourced network operating system
 - ◇ Network operating system
 - ◆ Programmatic network control interface
 - ◆ Logically centralized controller for thousands of switches (OVS, openflow switch)
 - ◇ Open source software (Apache v2)
 - ◆ Fully written in Python
 - ◆ Project site: <http://www.osrg.net/ryu/>
- ◇ Ryu plugin was merged into Quantum Essex
- ◇ Ryu stands for
 - ◇ 流 - Means "flow" in Japanese
 - ◇ 龍 - Means "Japanese dragon", one of water gods

Overview

Programmatic network control interface

- We can implement network management applications on top of the Ryu

Ryu network controllers

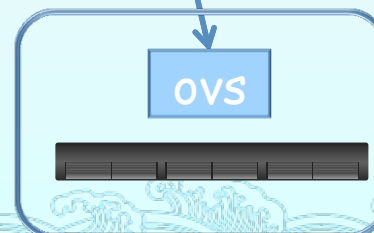
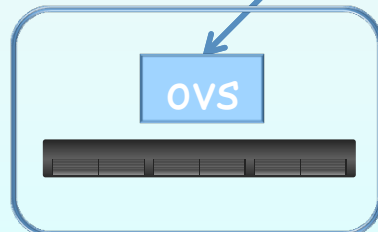


RESTful management API

Administrator

Logically centralized controller

- Decouples virtual networks from the physical network
- Supports OpenFlow 1.0 (including Nicira Extension)



Goals

- ◆ De facto OSS network operating system
- ◆ High quality enough for use in large production environment
 - ◆ Code quality
 - ◆ Functionality
 - ◆ Usability
- ◆ Become the standard network controller of OpenStack (default plugin of Quantum)
- ◆ Default Controller for fedora/debian/ubuntu

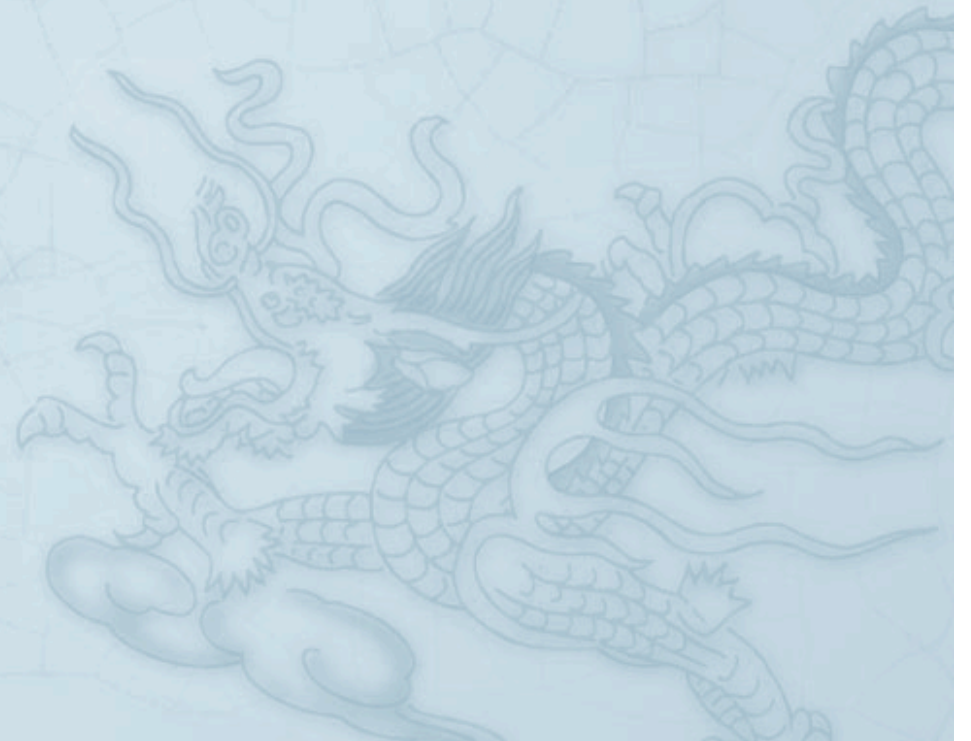
What does Ryu bring to OpenStack?

- ◆ Flat L2 networks regardless of the underlying physical network
- ◆ Scalable multi-tenant isolations
 - ◆ Ryu provides tunneling based isolations
 - ◆ VLAN doesn't scale larger than 4096
 - ◆ We don't need high-end switches

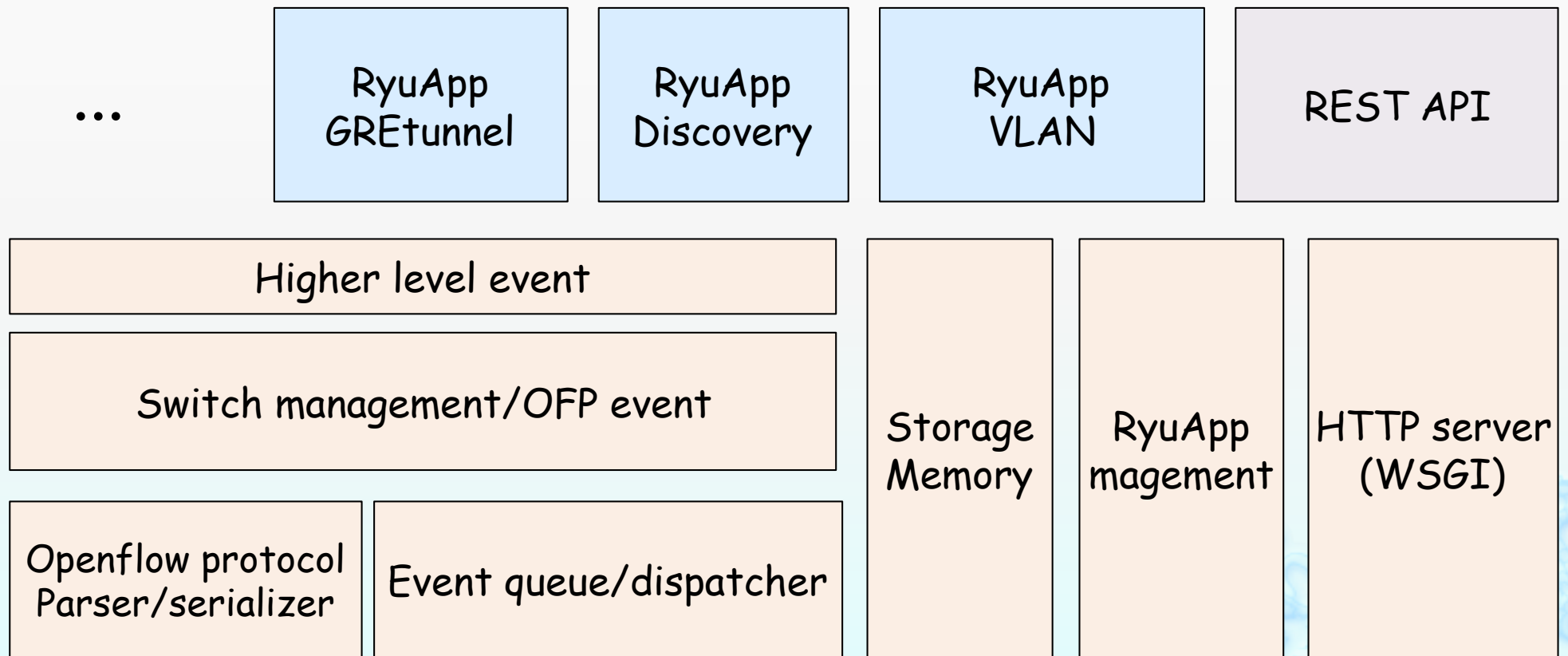
What does Ryu provide?

- ◆ Intergrated feature with OpenStack
- ◆ Ryu application
 - ◆ GRE tunneling
 - ◆ VLAN support
 - ◆ Topology discovery
 - ◆ MAC based segregation

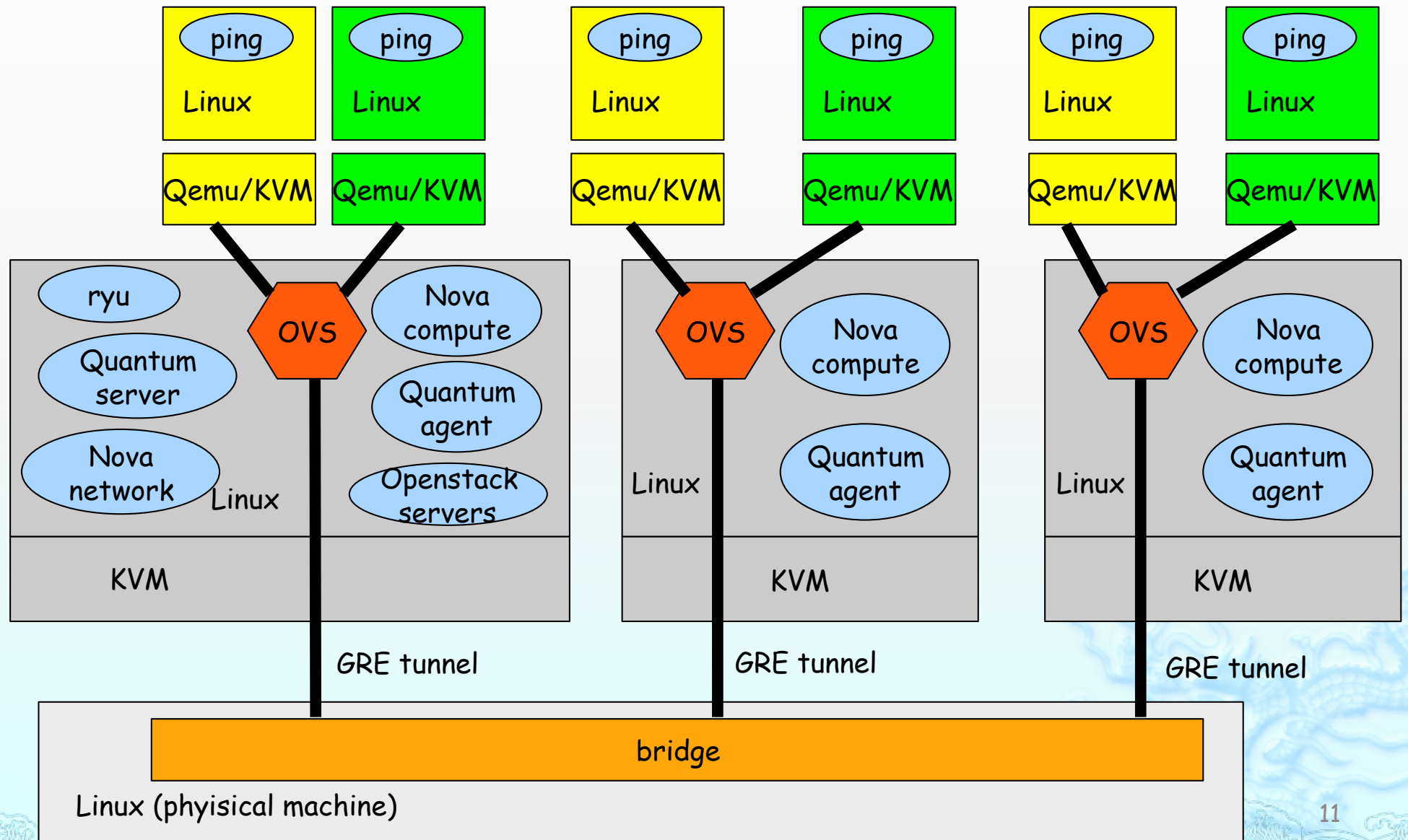
How it works & Demo



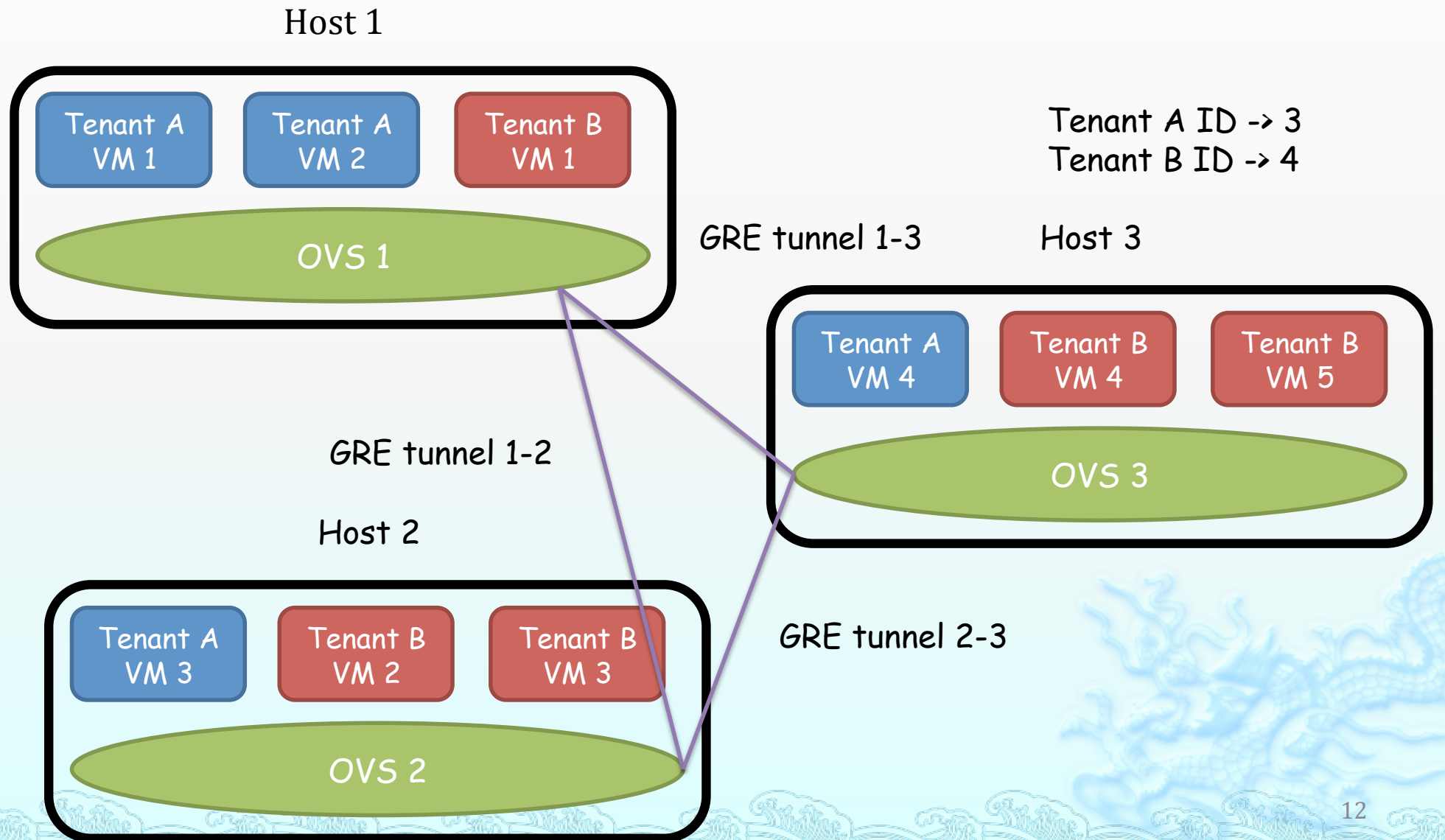
Block diagram of Ryu



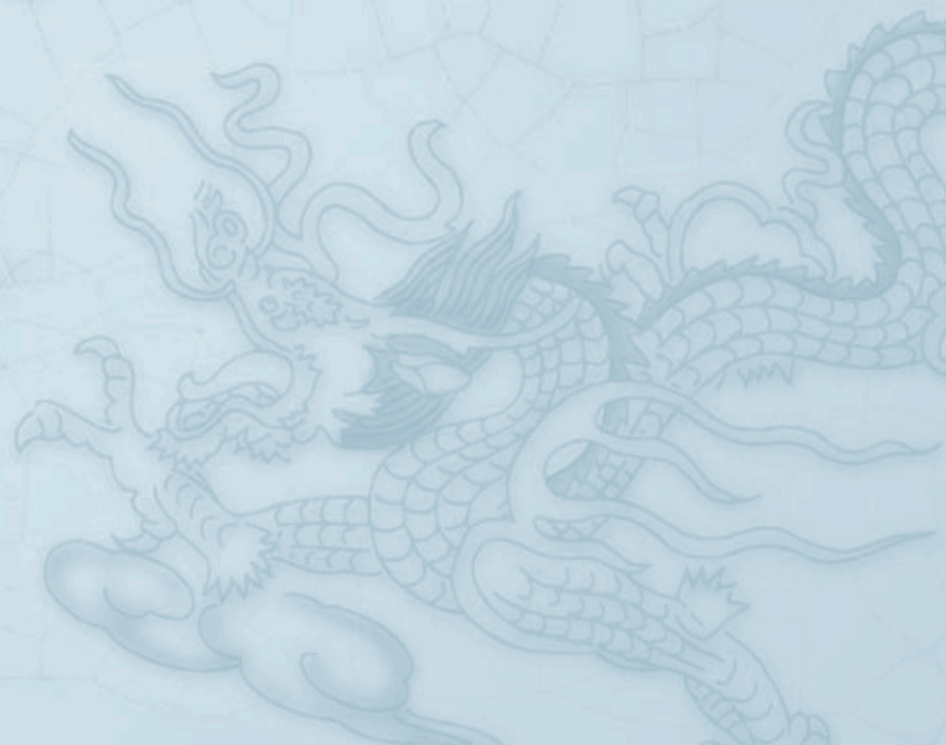
Ryu demo (GRE tunneling)



Ryu demo (GRE tunneling)



Summary



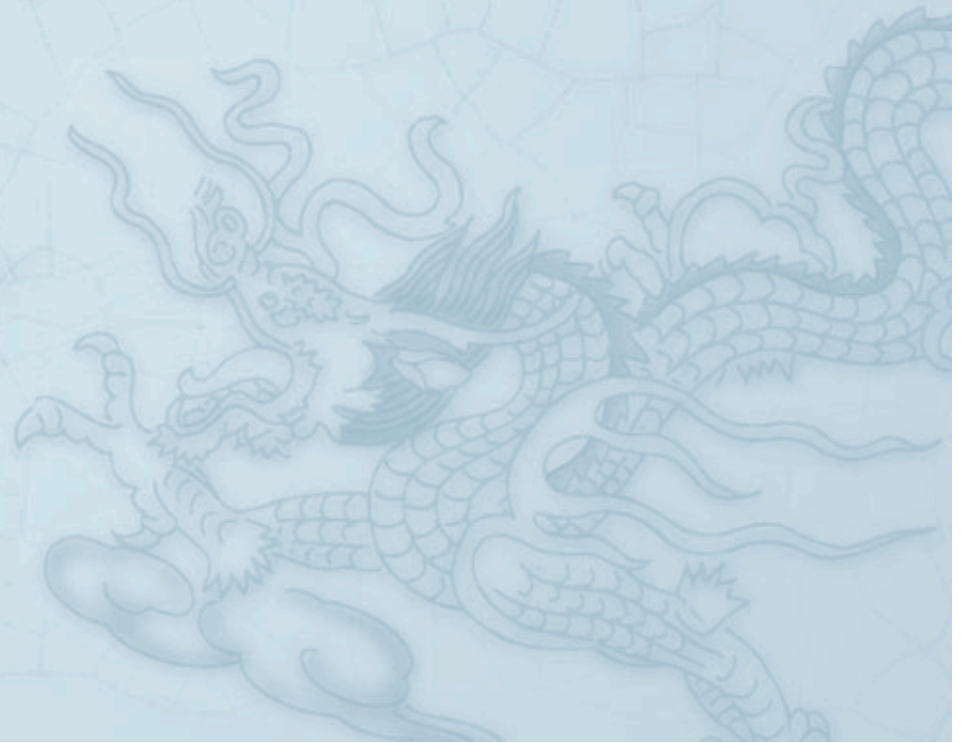
Future items

- ◆ Integration with Quantum IPAM and L3 API
- ◆ Firewall
- ◆ Virtual network to physical network, and vice versa
 - ◆ Convert among GRE key, VLAN tag, ...
- ◆ Distributed controllers
 - ◆ No single point of failure
 - ◆ Datacenter-wide scalability

Summary

- ◆ Ryu is an open-sourced network operating system licensed under Apache License v2.
 - ◆ Site: <http://www.osrg.net/ryu/>
 - ◆ ML: ryu-devel@lists.sourceforge.net
- ◆
- ◆ Ryu OpenStack easy set up VM
 - ◆ <https://github.com/osrg/ryu/wiki/RYU-OpenStack-environment-VM-image-file-HOWTO>

Appendix



OpenStack basics

- ◆ OpenStack
 - ◆ Nova: cloud management system
 - ◆ Quantum: network management system
- ◆ Nova compute node
 - ◆ Physical machine that runs guest VM instances
- ◆ Nova network node
 - ◆ Physical machine that runs networks gateway to the outside network
- ◆ Quantum server
 - ◆ Manages network configuration
 - ◆ Nova requests quantum-server for network configuration
- ◆ Quantum agent
 - ◆ It runs on nova compute/network node
- ◆ Quantum plugin
 - ◆ Plugin for each network technology
 - ◆ Ryu plugin