Software Defined Networking (SDN) and OpenStack

Christian Koenning
Driving Towards an Application Centric World
IT/Ops Struggle to Deliver
Challenges in Scaling Modern Datacenters

Agile

High Network Complexity

Years of deploying point products have resulted in complex, fragile network topologies

Efficient

Infrastructure integration difficulties

each with its own unique set of CLI, GUI, API and integration methods

Flexible

Difficult to Manage

Lots of Boxes

that must be balanced against unique upgrade, patch and maintenance schedules
Challenges in Scaling Modern Datacenters

Architect

Architect’s Intent

Net Engineers & Admins

Manual & Scripted Configuration

Data Plane

Clients

Router

Time Consuming

Error Prone Process

Difficult to Debug
Operators Need a New Answer

Agile Dev

**Driver:**
Rapid development of customer desired applications.

**Failed to Address:**
Rapid deployment & network operations.

DevOps

**Driver:**
Rapid deployment. Accelerate time to market.

**Failed to Address:**
Network operations.

SDN

**Driver:**
Operationalize the Network. Accelerate time to market.

✓
Today – with SDN people express the need for

VIRTUALISATION ORCHESTRATION PROGRAMABILITY DYNAMIC-SCALING AUTOMATION VISIBILITY PERFORMANCE MULTI-TENANCY SERVICE-INTEGRATION OPENNESS
F5 Definition of SDN

“SDN is a family of architectures (not technologies) for operationalizing the networks with improved time to market, reduced risks, and reduced operating expenses by centralizing control into a control plane that programmatically controls and extends all network data path elements and services via open APIs”
Operationalized Network with SDN

1. Centralized Knowledge
2. Repeatable Configuration

Architect's Intent

Programmatic Configuration via Open APIs

Architect

Net Engineers & Admins

Clients

Data Plane

Application

Router

Switch

LB

Firewall

VEs
SDN in the Software Defined Data Center
SDN in the SDDC

Control Plane

SDN Applications

NBI

SDN Controller

SDDC Orchestrator

OPEN APIs

Data Plane

Applications

LAYER 2-4 Stateless Fabric

Service Chaining

VXLAN

NVGRE

Virtual & Overlay Networks

L4-7 Stateful Services ???
Applications Rely on Stateful Layer 4-7 Services

Layer 4-7 Stateful Services:
- ADC
- Local Load Balancing
- Application Security
- Application Performance
- Secure Web Gateway
- Global Load Balancing
- DDoS Protection
- Identity and Access
- Malware Detection
- Firewall

Layer 2-4 Stateless Services:
- Router
- Switch

Virtual and Overlay Networking
Gateway Capabilities
Provides ability to bridge between any network or overlay

- VXLAN
- VLAN
- Ethernet
- EtherIP
- NVGRE
- OVS MAC in GRE
F5 Operationalizes the Network with Synthesis

“We don’t want to deal with how to chain appliances together. We want them integrated and **we want to get rid of all of the operational burden** that’s required to manage and maintain them.” – Nick Lippis, Open Networking User Group (ONUG)
F5 Synthesis Partner Ecosystem

Network/SDN
- Cisco
- VMware
- Big Switch Networks
- Arista
- Dell
- HP

System Integrators
- Acatel-Lucent
- IBM
- Dimension Data
- HP

Cloud
- Amazon Web Services
- Rackspace Hosting
- IBM
- Bluelock
- Windows Azure

Security
- Splunk
- WhiteHat Security
- Oracle
- Websense
- Webroot

Orchestration
- VMware
- Microsoft
- Openstack
- HP

Application
- Microsoft
- Oracle
- SAP
- IBM
OpenStack
Overview of OpenStack Cloud Operating System
“To produce the ubiquitous OpenSource Cloud Computing platform that will meet the needs of public and private clouds regardless of size, by being simple to implement and massively scalable”

ROCKET SCIENCE!
- Based upon the NEBULA Project, a joint effort of NASA and RACKSPACE
- Launched June 2010
- AWS EC2/S3 Compatible API
- ~2186 Core Developers @ 01/06/2014
## OpenStack – the moving parts

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Service(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compute</strong></td>
<td>Provision and manage large pools of on demand compute</td>
<td>NOVA</td>
</tr>
<tr>
<td><strong>Object Storage</strong></td>
<td>Petabytes of reliable or standard storage gear</td>
<td>SWIFT</td>
</tr>
<tr>
<td><strong>Block Storage</strong></td>
<td>Volumes on commodity storage gear, and drivers for more advanced systems like NetApp, etc.</td>
<td>CINDER</td>
</tr>
<tr>
<td><strong>Networking</strong></td>
<td>Software defined networking automation with pluggable backend</td>
<td>NEUTRON</td>
</tr>
<tr>
<td><strong>Dashboard</strong></td>
<td>Self-service, role-based web interface for users and administrators</td>
<td>HORIZON</td>
</tr>
<tr>
<td><strong>Shared Services</strong></td>
<td>Multi-tenant authentication system that ties to existing stores (e.g. LDAP) and Image Service</td>
<td>GLANCE.. etc</td>
</tr>
</tbody>
</table>
OpenStack and F5

Deployment & Scaling
HEAT

Metering
CEILOMETER

Compute
NOVA

Identity
KEYSTONE

Image Service
GLANCE

Object Store
SWIFT

Network
NEUTRON

Storage
CINDER

Management Console HORIZON

LBaaS
VPNaaS
FWaaS

L2/L3
DHCP
DNS

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OpenStack LBaaS

“Load Balancing-as-a-Service (LBaaS) enables Networking to distribute incoming requests evenly among designated instances. “

- **Round robin**
  Rotates requests evenly between multiple instances.

- **Source IP**
  Requests from a unique source IP address are consistently directed to the same instance.

- **Least connections**
  Allocates requests to the instance with the least number of active connections.

- **Monitors**
  LBaaS provides availability monitoring with the ping, TCP, HTTP and HTTPS GET methods

- **Management**
  Users perform administrative management of load balancers through either the CLI (neutron) or the OpenStack dashboard.

- **Connection limits**

- **Session persistence**
  (Cookie/SrcIP)

From http://docs.openstack.org/admin-guide-cloud/content/section_lbaas-overview.html#
OpenStack LBaaS F5 Plugin

- Community Edition Plugin
- Connects directly to BIG-IP
- Community support for Plugin
- Supports neutron Havanna
- download now from F5 Devcentral

Solutions for an application world.