Build a HA IaaS Platform Based on OpenStack using OpenDaylight

Hideyuki Tai - OpenDaylight contributor

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Who am I?

- Hideyuki Tai
- NEC
- Software Engineer
- OpenDaylight contributor
What am I doing in OpenDaylight?

Coding, testing, fixing, discussing and helping!

- Contributing from the beginning of OpenDaylight project
- The project lead of the VTN project
- Actively working on
  - VTN project
  - NIC project
  - OpenFlow plugin project
  - Neutron project
  - Integration project
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OpenDaylight project

- An open source software project for SDN platform
- One of Linux Foundation Collaborative projects
- Founded in April, 2013
- Has a new release every 6-8 months
What does OpenDaylight develop?

**Open Source SDN Platform**

- A common SDN platform on top of which vendor products and services can be built
- A multi-protocol controller infrastructure built for SDN deployments on modern heterogeneous multi-vendor networks

- **Centralized network monitoring & orchestration**
- **Network resource optimization**
- **Cloud networking**
Feature diagram

4th Release “Beryllium”
Production-Ready Open SDN Platform

Graphical User Interface Application and Toolkit (DLUX / NeXT UI)

AAA AuthN Filter

OpenDaylight APIs REST/RESTCONF/NETCONF/AMQP

Controller Platform Services/Applications

Network Abstractions (Policy/Intent)
- ALTO Protocol Manager
- Fabric as a Service
- Group Based Policy Service
- NEMO
- Network Intent Composition

Service Abstraction Layer/Core

Data Store (Config & Operational)

Messaging (Notifications / RPCs)

OpenFlow Enabled Devices

Open vSwitches

Additional Virtual & Physical Devices

Data Plane Elements (Virtual Switches, Physical Device Interfaces)

Reprinted from https://wiki.opendaylight.org/images/0/00/BerylliumDiagram_FINAL.pptx
More Information

- **OpenDaylight top page**
  - [https://www.opendaylight.org/](https://www.opendaylight.org/)

- **FAQ**
  - [https://www.opendaylight.org/faq](https://www.opendaylight.org/faq)

- **Wiki**
  - [https://wiki.opendaylight.org](https://wiki.opendaylight.org)
Is OpenDaylight becoming the de facto standard in the network industry?
Empirical Evaluation

Is OpenDaylight becoming the de-facto standard for SDN?
Empirical Evaluation - Introduction

Is it a good place to develop a SDN platform and accelerate new technologies?

- How many companies sponsor OpenDaylight?
- What kinds of development infra does OpenDaylight provide?
- How many contributors actively work?
- How many new features have been developed?
Numbers of member companies

50 members

Platinum members

Gold members

Silver members
Numbers of member companies

- 2013/4: 18
- 2013/10: 20
- 2014/4: 30
- 2014/10: 40
- 2015/04: 50
- 2015/10: 50
- 2016/04: 50

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Development infrastructures

- Wiki
- Mailing lists
- Gerrit – Code review tool
  - Manages 83 Git repositories
- Bugzilla - Bug tracking
- Jenkins - Continuous integration tool
  - 1732 jobs are defined
  - Various system tests runs automatically
- Nexus - Repository
The graph counts only contributors which submitted a patch which was merged into a Git repository of the OpenDaylight per month. This does not include contributors which contributed to the OpenDaylight in other ways.

Source: https://git.opendaylight.org/gerrit/
A project which develops SDN functionalities on top of the platform is counted as one feature in this graph such as Neutron project and VTN project. Documentation and integration project are not counted as a feature. And offset 0 project is not counted, since offset 0 project is a part of core of platform.
Empirical evaluation - Conclusion

How many companies sponsor OpenDaylight?

- 50 members
- The number has increased!

What kinds of development infra does OpenDaylight provide?

- Wiki, Mailing lists, Gerrit, Jenkins
- Various system tests automatically run, and prevent breakage

How many contributors actively work?

- Over 150 active contributors!

How many new features have been developed?

- Over 40 features!
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Background – NEC Cloud System

We provide OpenStack-based cloud infrastructure solution!

OSS-based Cloud Infrastructure Building Solution
NEC Cloud System (OSS building model)

Building Service
(Design*, Building, Test)
* Including operation design

OSS Cloud Infrastructure
(OpenStack, management, monitoring, and control OSS)

Managed Service
(Integrated operation management service)

Server
Storage
Network

Support Service
(OSS cloud infrastructure support services)
OpenStack

- A cloud computing platform
- Controls pools of compute, storage, and networking resources

Reprinted from openstack.com
OpenStack Neutron

A component for managing networks

- Manages user network configuration
- No knowledge about particular network devices

Reprinted from openstack.com
Benefits OpenDaylight brings

- Easy to adopt new technologies
- Easy to build your application for your use cases
- Centralized network management
  - Integration with underlay network management
  - OpenDaylight has a centralize view of your network, so you can probably do better routing for your traffic
- Agent less
  - You don’t have to rely on agent based architecture
How OpenDaylight works with OpenStack

- OpenDaylight exposes a single common Neutron interface
- Multiple implementations of Neutron interface in OpenDaylight
We are seeing NetVirt as a good implementation for OpenStack

Functionality

- Edge overlay based on VXLAN
- Supports a range of Neutron requests

Quality

- CSIT (Continuous System Integration Test) continually tests the functionality, detects a breakage, and keeps the quality

Community

- Many, diverse contributors are supporting the NetVirt
NetVirt

- Edge overlay based on VXLAN
- Controls OVS on compute nodes
  - OpenFlow
  - OVSDB
- Gets logical network information from Neutron
System Architecture for High Availability

Run three OpenDaylight nodes as a cluster!

- Controller Node
  - neutron-server

  - OpenDaylight Node#1
    - HA Proxy
    - OpenDaylight

  - OpenDaylight Node#2
    - HA Proxy
    - OpenDaylight

  - OpenDaylight Node#3
    - HA Proxy
    - OpenDaylight

- Compute Node#1
  - OVS

- Compute Node#2
  - OVS
Limitations of NetVirt in the latest release (Beryllium)

- Security group for OVS (version < 2.5) has some limitations
  - It works fine with OVS 2.5, but not with OVS 2.4
  - The bug will be fixed in the next stable release (Beryllium SR3)

- SNAT is not supported

- It doesn’t support dynamically adding a new node into a cluster
  - Will be supported in the next stable release
The future direction of the NetVirt

The next release will migrate to the new code base!

- The implementation of VPN Service project will be the default code base of the NetVirt
- The current NetVirt implementation would be deprecated
- Better architecture which enables easier integration with other applications
Conclusion

- OpenDaylight - An open source software project for SDN platform
- OpenDaylight is growing

- HA IaaS platform
  - NetVIRT is a good choice