OPEN DAYLIGHT SUMMIT

SEPTEMBER 27-29 | SEATTLE, WA

OpenDaylight OpenFlow & OVSDB Projects & Use Cases

Abhijit Kumbhare, OpenFlow Project Lead & OpenDaylight TSC Member, *Ericsson*
Anil Vishnoi, OVSDB Project Lead & OpenDaylight TSC Member, *Brocade*

Agenda

- OpenFlow Plugin Project
- OVSDB Project
- OpenDaylight Use Cases
- References

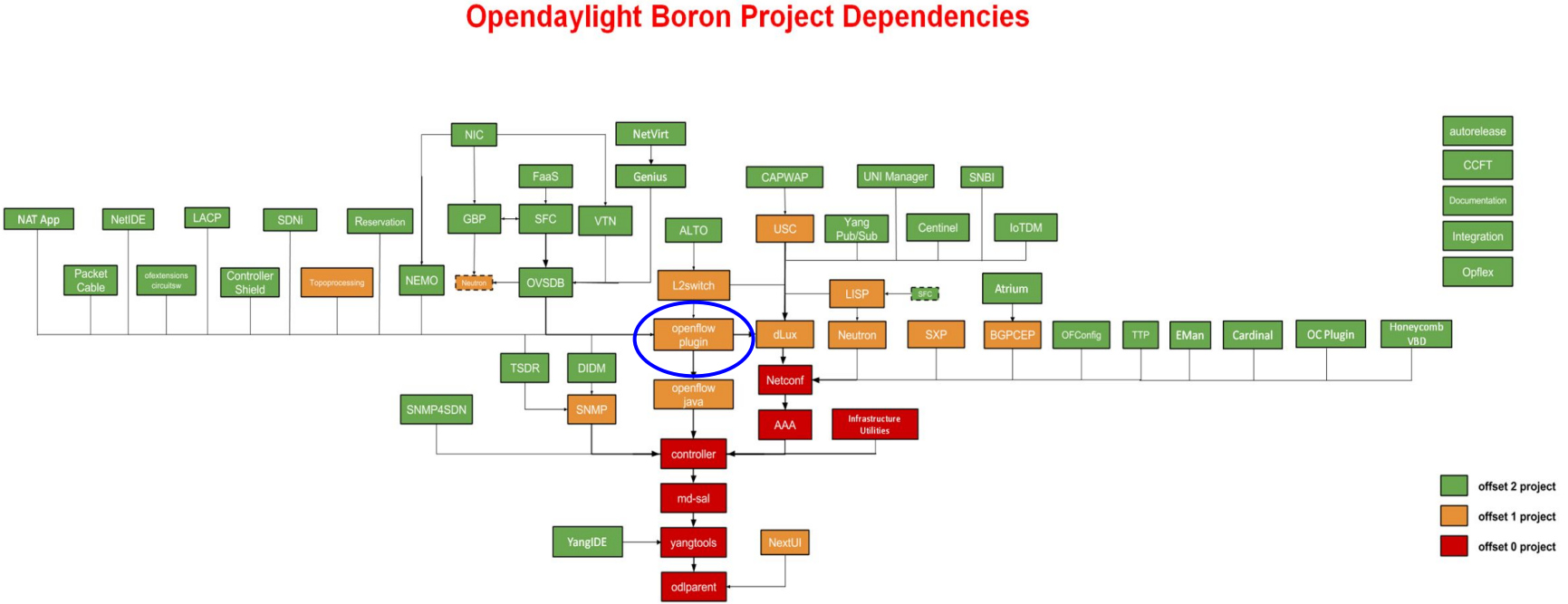
Agenda

- OpenFlow Plugin Project
  - Project Overview
  - New in Boron
  - Future Direction
- OVSDB Project
- OpenDaylight Use Cases
- References

OpenFlow Plugin Project Overview

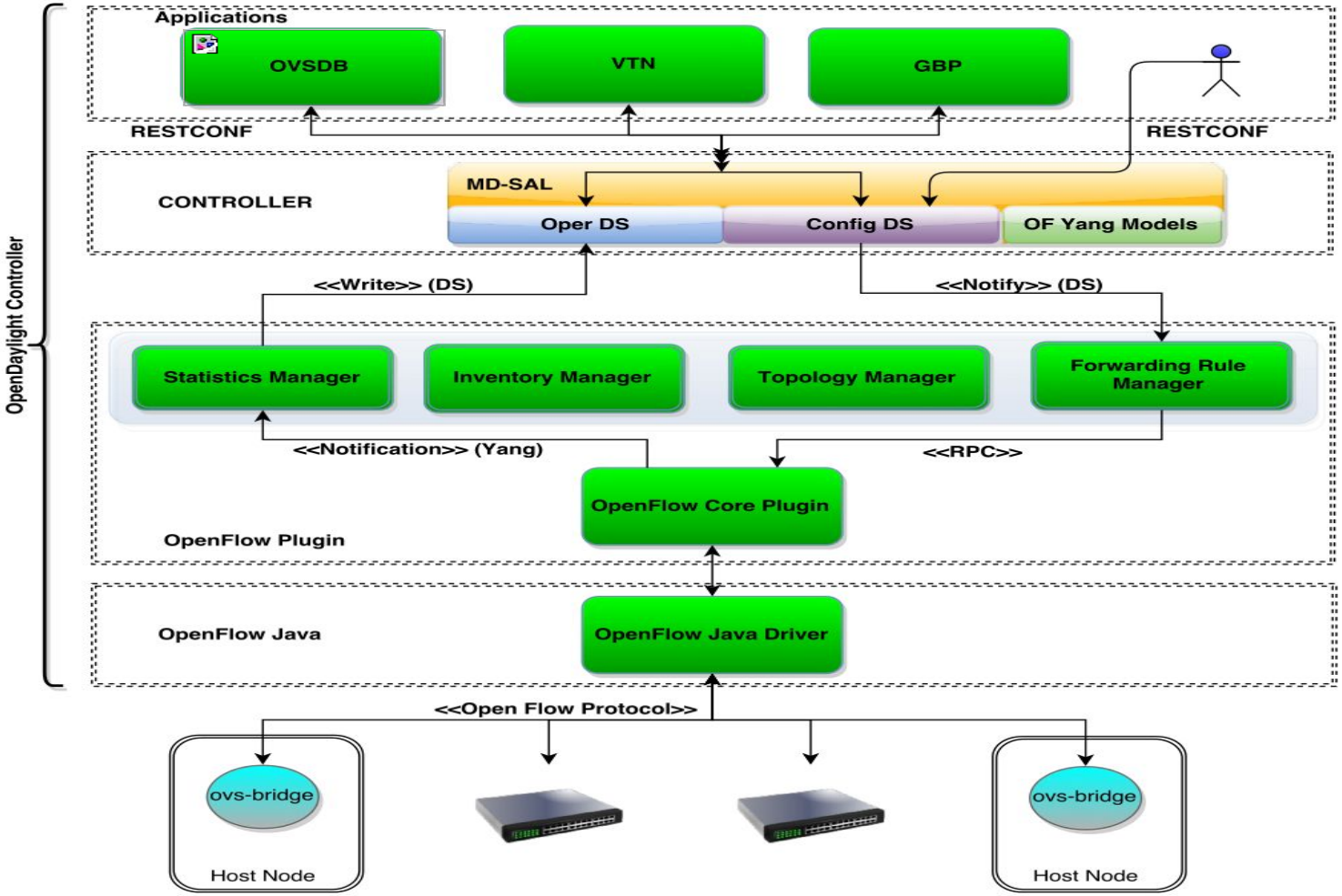
- One of the first community projects started in Hydrogen release
  - Past & Present Participants from Brocade, Cisco, Ericsson, HP, IBM, Inocybe, Intel, Pantheon, Red Hat, TCS, etc.
  - Number of contributors: 97
    - Plus contributions in other forms - CSIT, etc.
- Number of commits: ~1750
- Source code : 186 KLoCs
- Bugs fixes to-date (resolved/verified and fixed): 493

Offset 1 Project central to OpenDaylight



Consumers: 20+ ODL projects including NetVirt-VPN, SFC, VTN, GBP, NIC, etc.

OF Plugin Consumer Model



OpenFlow Plugin Feature List

- Support for OpenFlow 1.0 and 1.3 versions
- Flow programming via config datastore (using REST API) & RPCs
- Commercial Grade Robustness
  - OpenFlow clustering support
  - Reconciliation:
    - flow/meter/group provisioning functionality which ensures that switches properly reflect intended controller configurations in wake of HA scenarios like switch-restarts
  - Batch Flow Programming

OpenFlow Plugin Team*

- Andrej Leitner
- Anil Vishnoi
- Hema Gopalkrishnan
- Jozef Bacigal
- Kamal Rameshan
- Luis Gomez (Test Contact)
- Martin Bobak (Lithium-Beryllium)
- Michal Rehak (till Beryllium)
- Miroslav Macko (Tests)
- Muthukumaran K
- Renato Aguiar
- Sanjib Mahapatra (Tests)
- Shuva Jyoti Kar
- Tomas Slusny
- Yi Yang

* Major contributors last 2 releases only - many other contributors earlier.

New in Boron

- New design
  - Adopted as the standard design
  - Cleaner design for current & future improvements
    - Performance improvements, deterministic API, better stats collection, etc.
- Singleton Clustering
  - New Clustering Singleton approach in MD-SAL project provides & encapsulates all leadership changes
    - Now downstream project like OpenFlow do not need to take care of device clustering leadership change, and only uses clustering singleton API to react to leadership change
  - Improves robustness of the OpenFlow clustering
- Blueprint Migration
  - Improve plugin upgradeability and simpler configuration

New in Boron (contd)

- Bulk-O-Matic
  - A test application with REST interface for measuring flow programming performance
  - Can choose Datastore or RPCs for flow programming perf test
- Forwarding Rules Synchronizer
  - New OFP app for provisioning flows / groups / meters using config DS
  - Compares differences between DS changes - to send incremental updates only
  - Includes retry mechanism on failure
  - Redesign of Forwarding Rules Manager (FRM)
  - Separate feature not installed by default currently
- Various other changes: features cleanup, table features default off, etc.

Carbon Thoughts

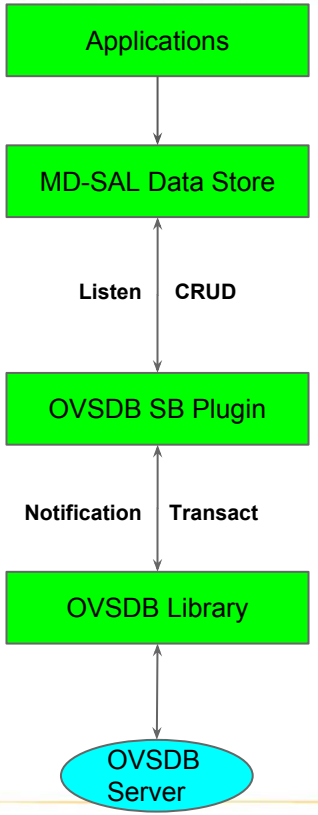
- Bulk-O-Matic PoC to study Performance Optimization by using OpenFlow Java Library models directly
  - Current flow programming uses abstracted OpenFlow Plugin models which OpenFlow Java Library translated to either OpenFlow 1.0 or 1.3 models.
  - PoC to study use of OpenFlow Java 1.3 specific models directly by apps.
- Usability improvements for apps - config parameters, flow install confirmation, CLI info commands, stats collection improvements, etc.
- Please join DDF session Wednesday 12 pm for Carbon Planning

Agenda

- OpenFlow Plugin Project
- OVSDB Project
- OpenDaylight Use Cases
- References

OVSDB Project : Overview

- OVSDB Schema Support (Ovsdb Southbound Plugin)
- Hardware VTEP Schema Support (HwVtep Southbound Plugin)
- Library for en/de - coding OVSDB json-rpc messages
- Both the plugins support clustering
- Ovsdb Southbound plugin supports - Config reconciliation
- Config reconciliation is partially supported is on the list for Hardware VTEP.
- Both the plugin can be parallelly loaded in Controller
- Looking for more details?
  - Summit Talk : http://sched.co/7Rqj
  - Wiki : https://wiki.opendaylight.org/view/OVSDB_Integration:Main

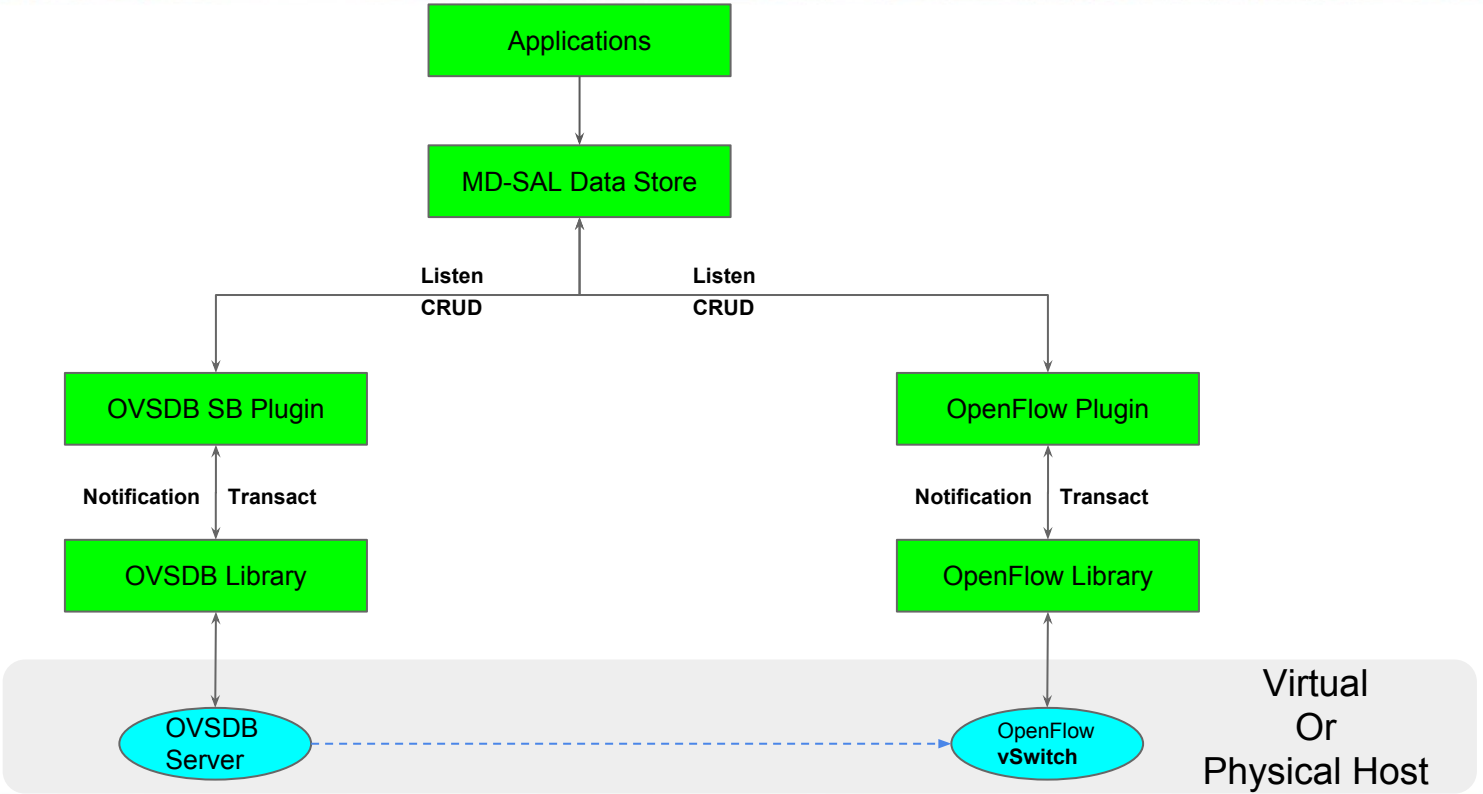


Agenda

- OpenFlow Plugin Project
- OVSDB Project
- OpenDaylight Use Cases
  - NetVirt + VPN Service
  - VTN
  - Other Examples
- References

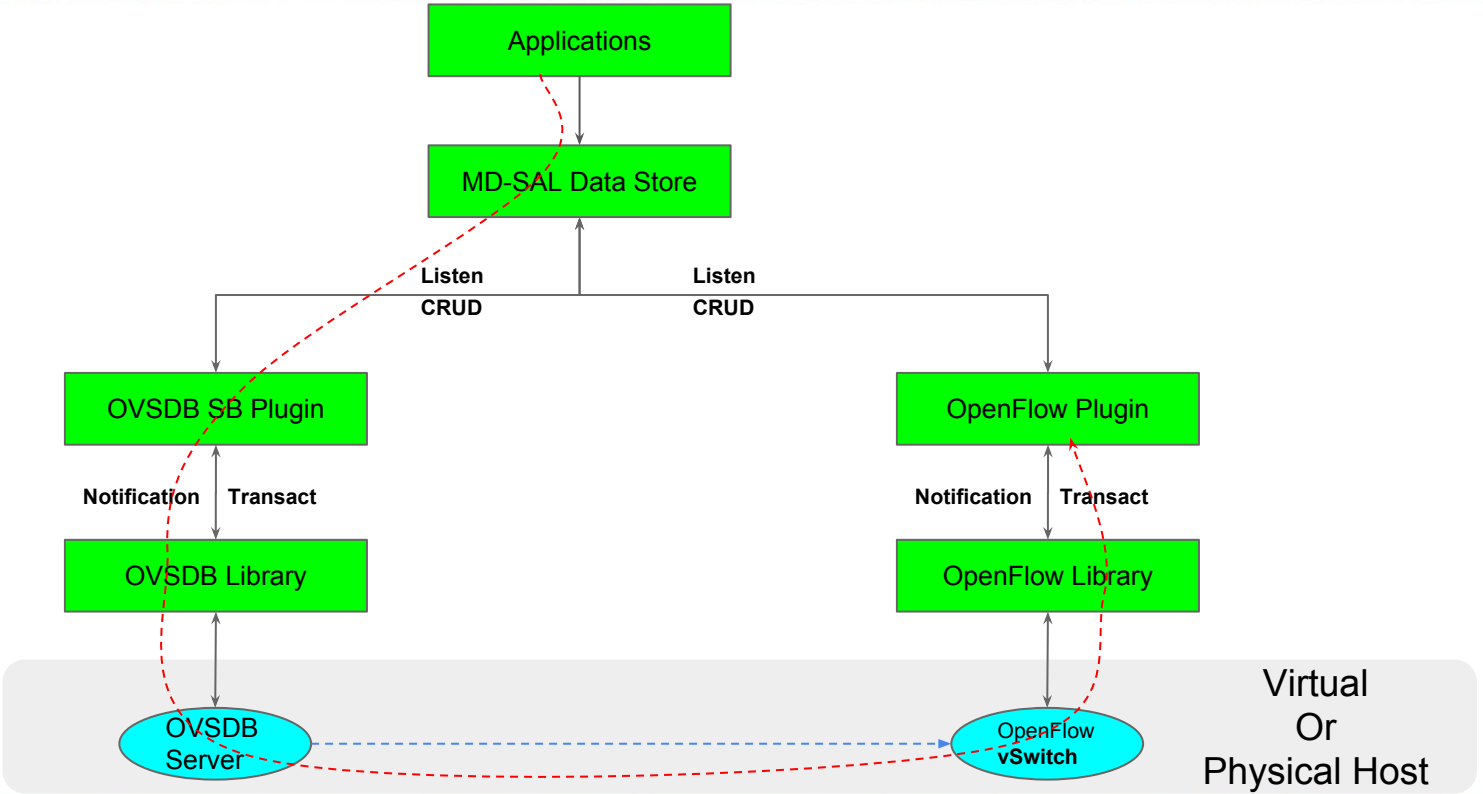
OpenFlow & OVSDB Plugin

General Usage Model by Network Virtualization Applications

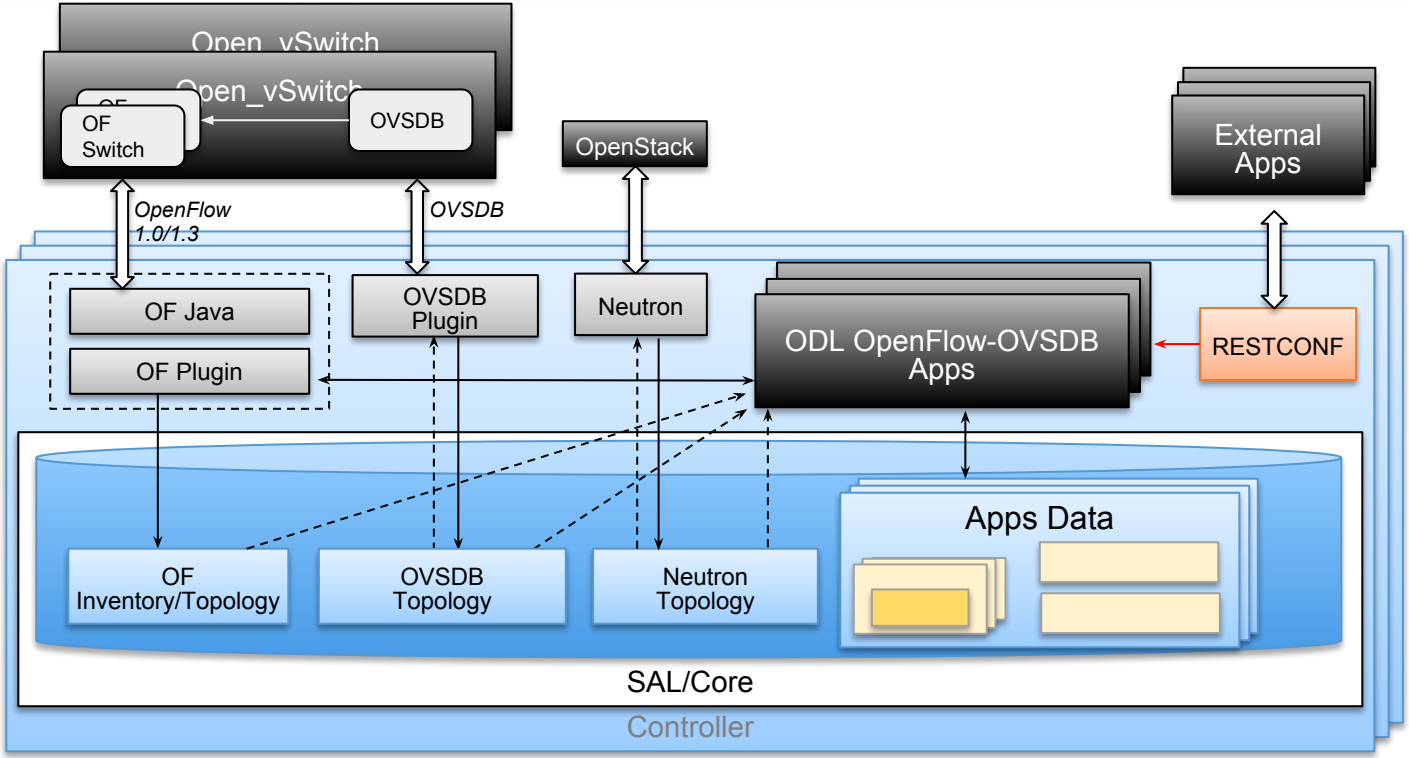


OpenFlow & OVSDB Plugin

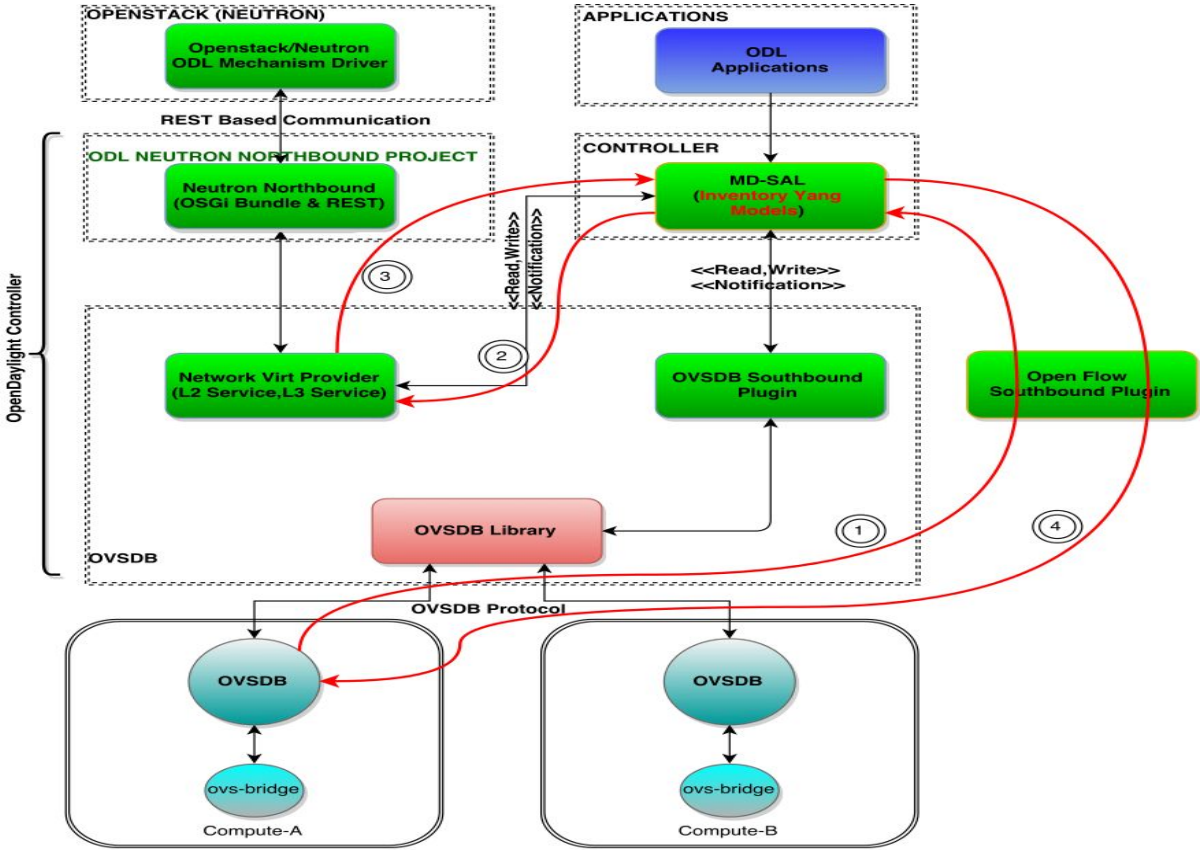
General Usage Control Flow by Network Virtualization Applications



Components: ODL OpenFlow+OVSDB Use Cases



NetVirt (+ VPN Service) Project



OpenFlow Plugin Services consumed by NetVirt:

- OpenFlow node connectivity
- Flow Installation, modification & removal
- Nicira extensions
- Packet-in

OPEN DAYLIGHT SUMMIT

Service Function Chaining

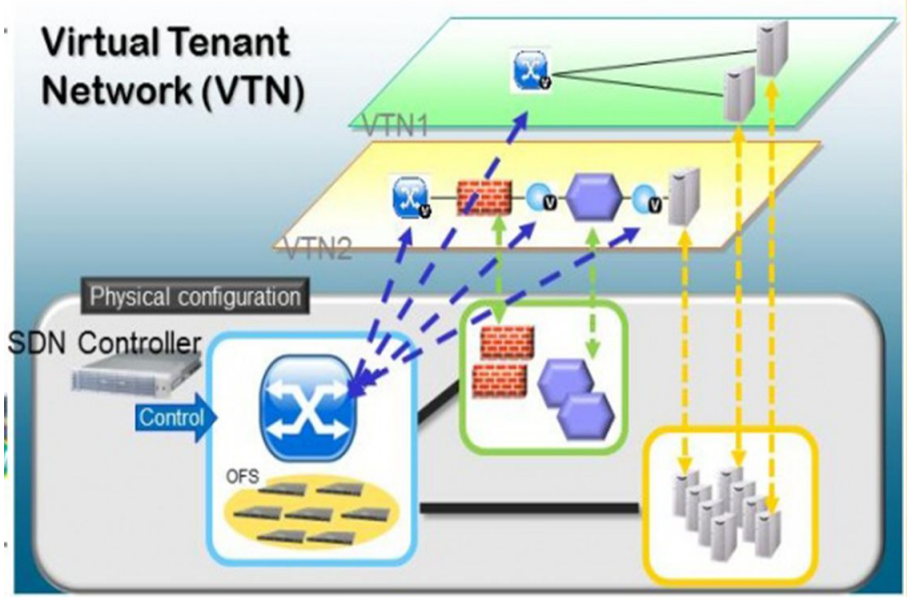
- Provide API's to create Service Function Chain and flow classifiers.
- Support multiple devices -- OVS, VPP, NetConf etc
- Rendered are developed for each type of device
- SFC configuration requires
  - Vxgpe termination point creation
  - Flows on the OpenFlow bridges to steer traffic
- OVS renderer create Bridge/Termination point (e.g vxgpe port) on OVS device using OVSDB plugin to configure chain.
- OpenFlow renderer installs the flows using OpenFlow plugin to route the traffic
- SFC extensively uses OpenFlow plugin's nicira extensions.

Virtual Tenant Network (VTN)

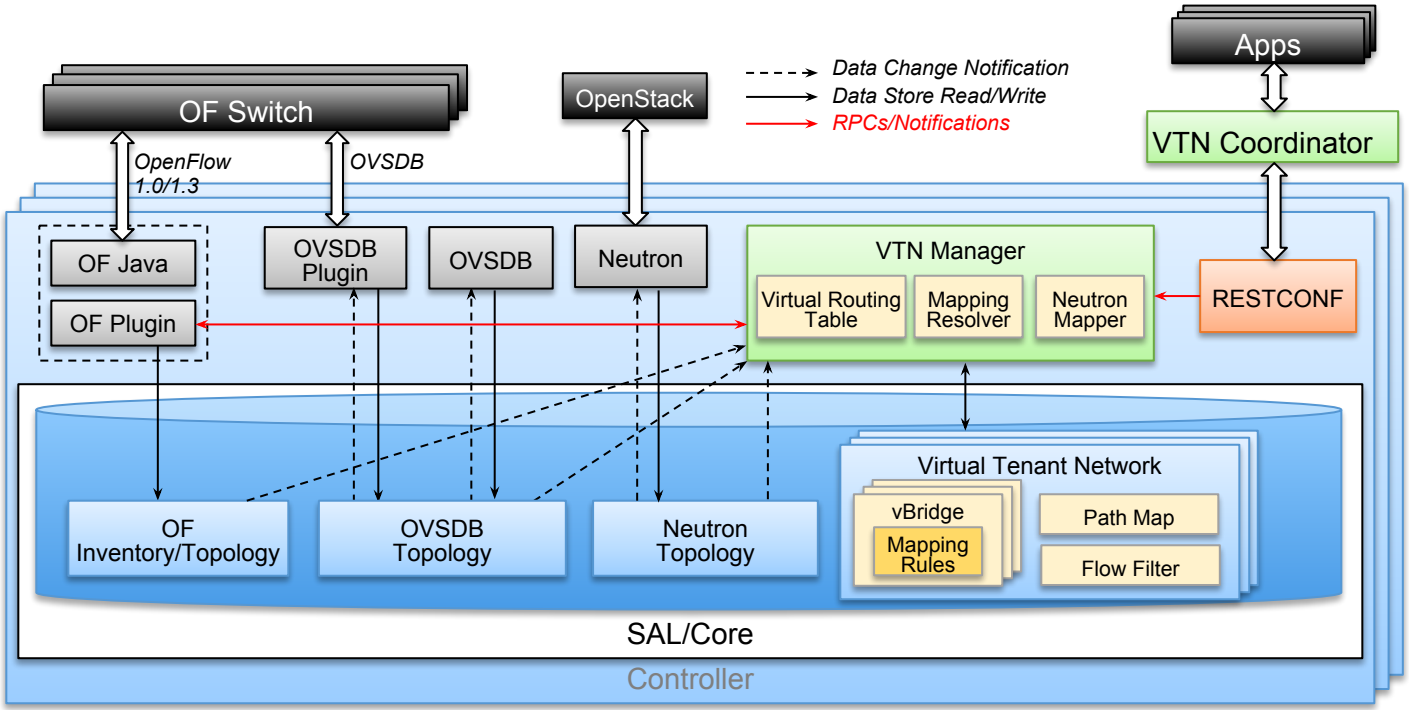
- Network Virtualization Project in ODL that supports
  - Multi Tenant Virtualization implementation on Openflow switches
  - Fault Tolerant
  - Supports Openstack Integration
  - Supports operating in a Cluster also
- Other Details
  - Available in Opendaylight since Hydrogen release

Key Idea

- VTN is a logical abstraction plane which enables complete separation of logical plane from physical plane
  - Users can define a logical network topology without knowing the physical network topology
  - Once logical network designed - VTN will map it to underlying physical network & push the network rules on the switches using OpenFlow
- Advantages
  - Hide the complexity of the underlying network from the tenant administrator
  - Better manage network resources
  - Minimize network config errors



VTN: Components and Dependencies



VTN Dependency on OpenFlow Plugin

- VTN extensively uses
  - Openflowplugin events related to the network (especially inventory related, flow entry removal, packet in received from switch) and handle the changes.
  - Use OpenFlow Plugin RPC to Install/Update/Remove Flow entries
  - Use OpenFlow Plugin RPC to Get statistics of Openflow ports

Note: VTN is a reactive implementation that computes flow entries based on the VTN model created by user and the packet received from switch.

Agenda

- OpenFlow Plugin Project
- OVSDB Project
- OpenDaylight Use Cases
- References

References

- OpenFlow Plugin Project:
  - Project Wiki
  - IRC channel: #opendaylight-openflowplugin
  - Project Lead Contact Info: Abhijit Kumbhare <abhijitkoss@gmail.com> (email), #abhijitkumbhare (IRC handle)
  - Weekly Meeting: Thursdays from 08:00-9:00 am PST/PDT | 11:00-12:00 EST/EDT | 15:00-16:00 UTC during Daylight Time/16:00-17:00 UTC during Standard Time
  - Boron Documentation:
    - User Guide
    - Developer Guide
  - Spec:
    - OpenFlow 1.3.2
    - OpenFlow 1.0.0

References (contd)

- OVSDB Project:
  - Project Wiki
  - IRC channel: #opendaylight-openflowplugin
  - Project Lead Contact Info: Anil Vishnoi <vishnoianil@gmail.com> (email), #vishnoianil or #avishnoi (IRC handle)
  - Weekly Meeting: Tuesday from 10:00-11:00a PST/PDT | 13:00-14:00 EST/EDT | 17:00-18:00 UTC during Daylight Time/18:00-19:00 UTC during Standard Time
  - Boron Documentation:
    - User Guide
    - Developer Guide
  - Spec:
    - RFC 7047 - The Open vSwitch Database Management Protocol