CORD
How to build a POD and automate deployments
The minimum amount of hardware that can be used to perform a full test of the current CORD features

**Fabric**
- 4x white-box switches

**Compute**
- 3x standard x86 servers

**Tricks**
- Avoid company proxy servers
- Use suggested hardware

**Suggested BOM includes:**
- Server QuantaGrid D51B-1U (2x Intel E5-2630 v4 10C 2.2GHz 85W, 64GB of RAM 2133MHz DDR4, 2x hdd500GB)
- 40G NIC: Intel Ethernet Converged Network Adapters XL710 10/40 GbE PCIe 3.0, x8 Dual port
- Switches: Accton 6712 - 32x40GE
Software requirements

Dev node (operator laptops or 4\textsuperscript{th} server)
- Ubuntu 16.04 (suggested) or Ubuntu 14.04
- Ansible, Libvirt, Vagrant, Vagrant plugins (versions matter!)

Head node
- Ubuntu 14.04
- Accessible from the dev node without password, sudoer - no password

Compute nodes, switches
- We’ll take care of them!
Network connectivity: user / data plane

**Fabric**
- 4x whitebox switches

**Access devices**

**Compute**
- 3x standard x86 servers

**Head node 1**
- Connects to Leaf 1

**Leaf 1**
- Connects to Spine 1

**Spine 1**
- Connects to Spine 2

**Leaf 2**
- Connects to Spine 2

**Spine 2**
- Connects to Leaf 1 and Leaf 2

**Metro network**

**Compute node 1**
- Connects to Leaf 1

**Compute node 2**
- Connects to Leaf 2
Network connectivity: a complete view

Operator / Dev machine

External network L2 switch

Internet

Linux mgmt to external

Head node

Fabric to leafs

Linux mgmt to internal

Compute node 1

Fabric to leafs

Linux mgmt to internal

Compute node 2

Spine 1

Fabric

Spine 2

Fabric

Leaf 1

Fabric

Leaf 2

Fabric

Internal mgmt L2 switch

IPMI

Operator / Dev machine

#OpenCORD
MAAS

An “evolution” of the old PXE servers
(Basically DHCP server + TFTP)

Used to install an OS on remote machines and to customize it

The OS is installed using the Ethernet mgmt interface, and it’s started/stopped using the IPMI interface

PXE Client
The node boots from the network
It gets an IP address from the DHCP server
MAAS installs the OS
Steps to deploy:

1. Download CORD repo on the dev machine
2. Create the CORD dev VM on the dev machine
3. Fetch CORD packages on the dev machine
4. Push the software to the head node
5. Deploy and configure the head node
6. Reboot (to deploy) the compute nodes and the switches
7. Add your configurations
Steps to deploy:

1. Download CORD repo on the dev machine
2. Create the CORD dev VM on the dev machine
3. Fetch CORD packages on the dev machine
4. Push the software to the head node
5. Deploy and configure the head node
6. Reboot (to deploy) the compute nodes and the switches
7. Add your configurations
Broadcast domains

Broadcast domain 1: external network
- Routable IP addresses
- Access to Internet
- Addresses given by the administrator

Broadcast domain 2: internal/management network
- NON routable IP addresses (only internal to the POD)
- NO access to Internet
- Addresses given to clients by DHCP of CORD MAAS (configurable)
Issues

Building a CORD POD requires ~3-4 hours (human interaction)

Is there a way to automatically reset a POD?

How do I do “CI”? What if I want to test a fresh installation with the latest changes every day?
Automation: Jenkins integration

Jenkins

MAAS

Operator / Dev machine

External network L2 switch

Head node

Internet

Compute node 1
Compute node 2
Spine 1
Spine 2
Leaf 1
Leaf 2

#OpenCORD
Broadcast domains

Jenkins

MAAS

DHCP server

External network
L2 switch

Head node

Client

DHCP server

Clients

Compute node 1

Compute node 2

Spine 1

Spine 2

Leaf 1

Leaf 2

Operator / Dev machine

Internet

External network

Clients
Network connectivity: a complete view

- **Head node**
  - Linux mgmt to internal
  - Fabric to leafs

- **Compute node 1**
  - Linux mgmt to internal
  - Fabric to leafs

- **Compute node 2**
  - Linux mgmt to internal
  - Fabric to leafs

- **External network L2 switch**
  - Linux mgmt to external
  - IPMI

- **Internet**
  - IPMI

- **Internal mgmt L2 switch**
  - IPMI

- **Spine 1**
  - Mgmt

- **Spine 2**
  - Mgmt

- **Leaf 1**
  - Mgmt

- **Leaf 2**
  - Mgmt

- **Operator / Dev machine**

#OpenCORD
ONF “Jenkins as a Service”
What Jenkins does

1. Re-installs Ubuntu on the head node through the additional MAAS APIs
2. Downloads the latest source code
3. Downloads a pre-defined POD configuration
4. Builds software and push it to the head node
5. Reboots the compute nodes and the switches
Jenkins scripts overview
Automation building blocks

Jenkinsfile
- REPO_ROOT/build/Jenkinsfile.newBuildSystem

CORD POD configurations
- https://gerrit.opencord.org/pod-configs

Jenkins deployment configurations
- pod-configs repository – deployment folder
Let’s have a look at them…
**Summary**

Deploy CORD is not that difficult…

- Not lots of software required
- Two commands, few reboots

**Automation**

- People love it! Why do work, if software does it for you?
- For CI: deploy, configure, test, reset
- For CD: develop your code and test it on the fly

**Deployment on demand**

- Offered to all ONF collaborators and partners
- We take care of the setup for you
- You just need a VPN connection to us

#OpenCORD
References

Documentation

http://guide.opencord.org (!!!)

How to get help / works also from China

Mailing-list: cord-dev@opencord.org

Slack: slack.opencord.org

Presenter

Luca Prete / luca@opennetworking.org
Thank you!