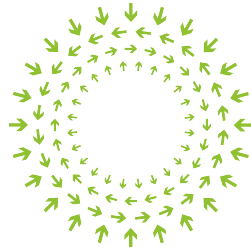




Open Network Install Environment



OPEN
Compute Summit

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Member of Technical Staff

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Overview

What Is ONIE?

Lessons Learned

ONIE Development

Demo

Project Directions

Network OS Install Environment

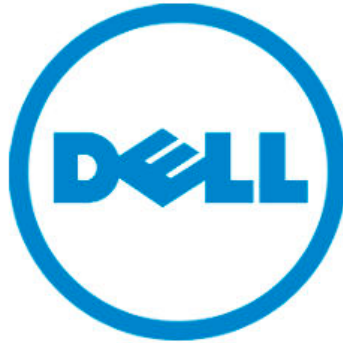
- Provides an environment for network OS installer discovery and execution
- Like a pre-installed kickstarter
- Defined by its behaviors
- Implemented using a modern Linux kernel and BusyBox

An Open Source Project within OCP

- <http://www.onie.org/>

Evolving ...

Agema



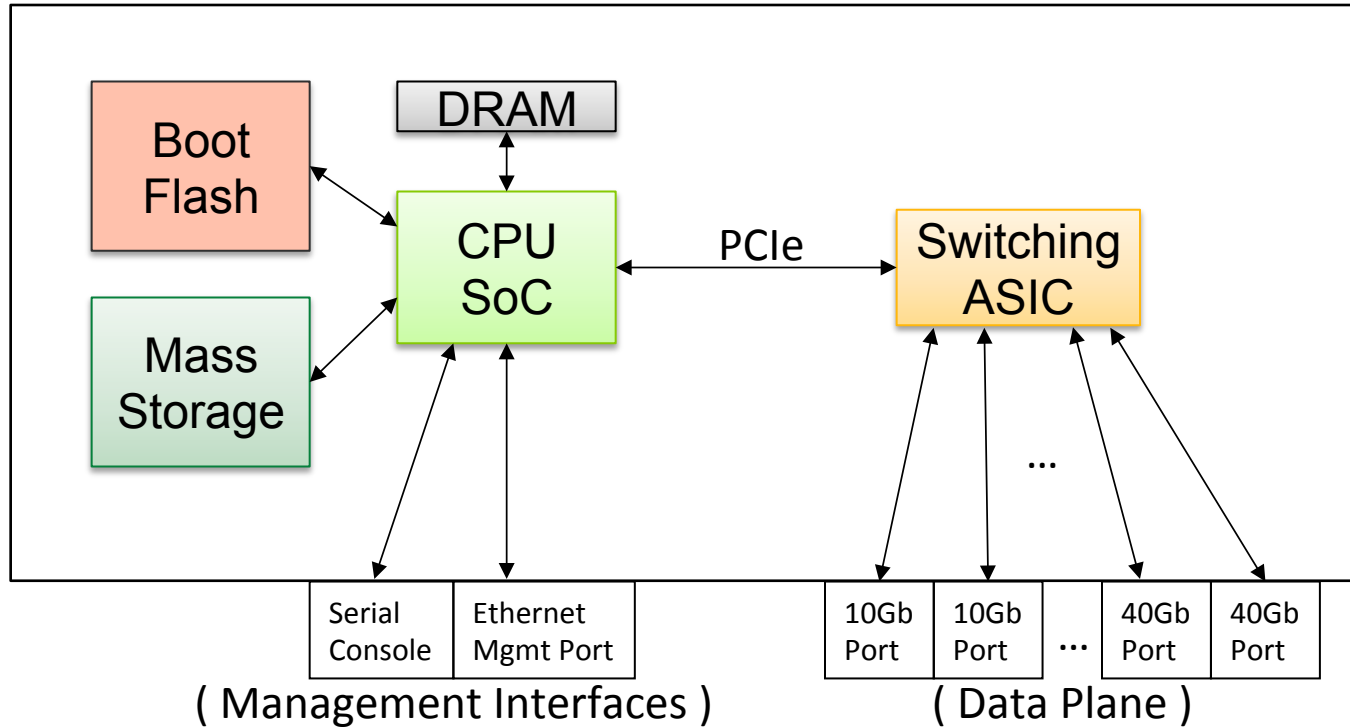
Interface Masters



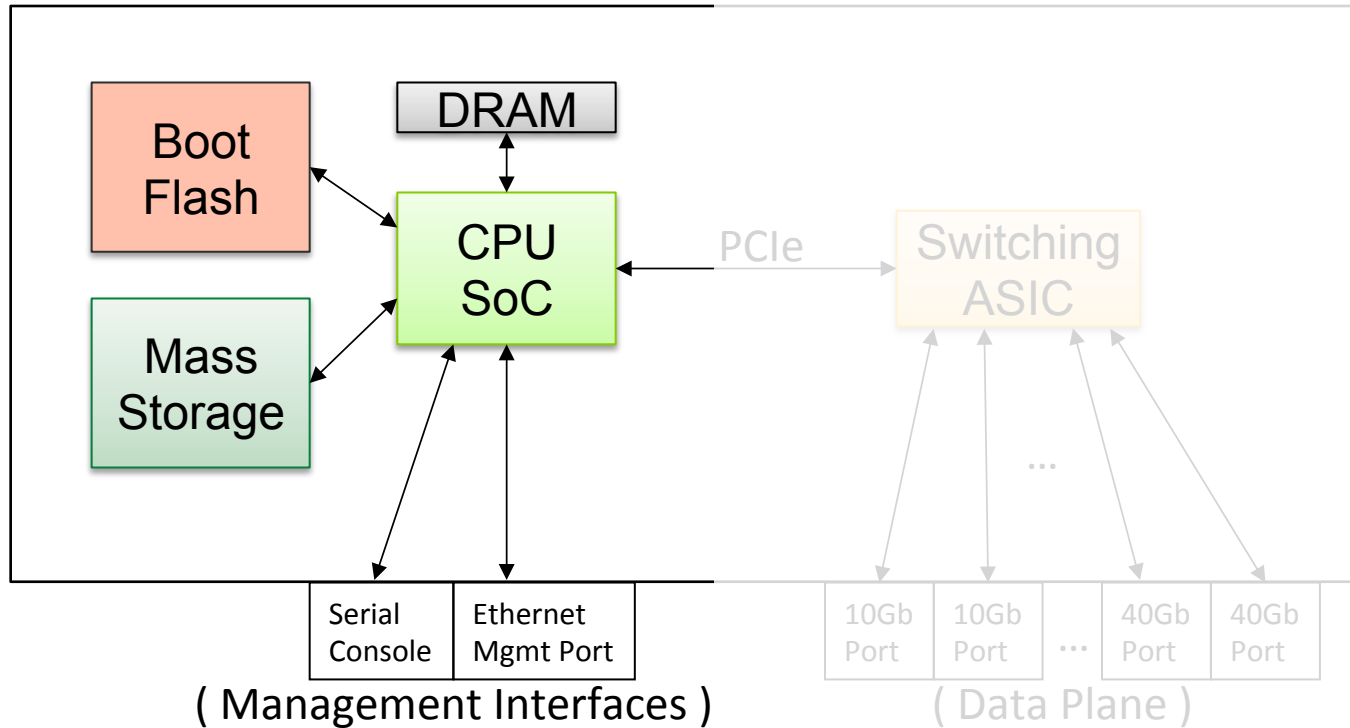
Innovative Network Solutions

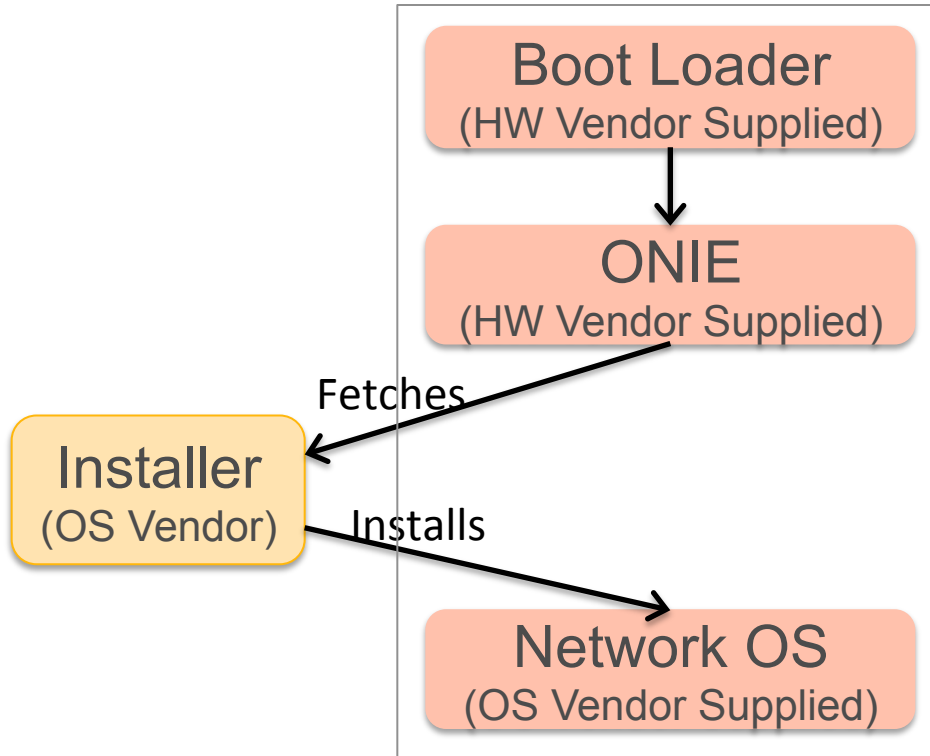






ONIE: Uses Management Interfaces





Boot Loader

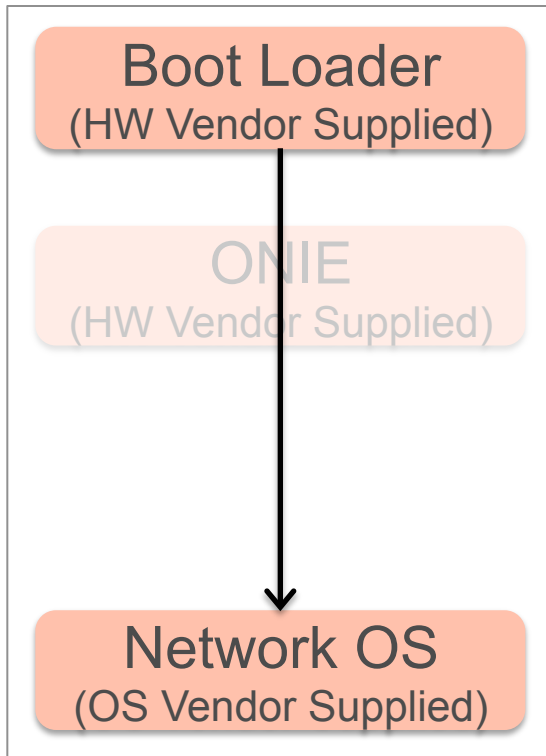
- Low Level boot loader, configures CPU complex
- Loads and boots ONIE

ONIE

- Linux Kernel with Busybox
- Configures management Ethernet interface
- Locates and executes an OS installer
- Provides tools and environment for installer

OS Installer

- Available from network or USB
- Linux executable
- Installs vendor OS into mass storage



Boot Loader

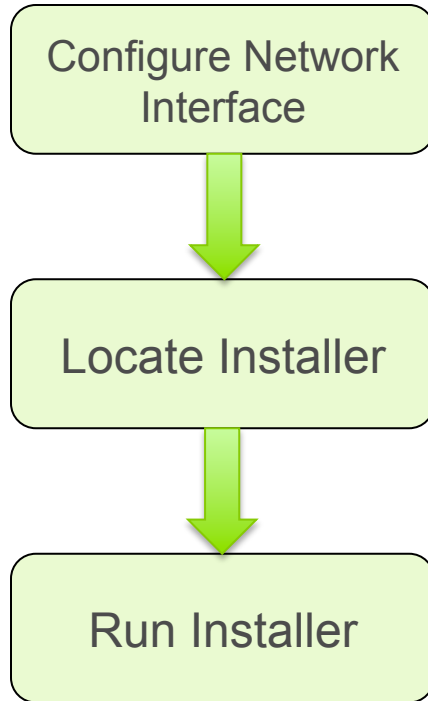
- Low Level boot loader, configures CPU complex
- Loads and boots OS vendor's installed OS

ONIE

- Still exists, but is not used
- Available for uninstall / re-install operations

Network OS

- Configures Switching ASIC
- Runs Network Protocols
- Provides CLI



- Uses DHCPv4, DHCPv6
- Configures Ethernet interface for IPv4 / IPv6
- Configures DNS and hostname
- Determines the location of an installer executable
- Examines local file systems, e.g. USB flash drives
- Uses DHCP options, DNS Service Discovery, Multicast DNS and IPv6 Neighbors
- Downloads installer via URL
- Passes various environment variables to installer
- Launches installer

- IPv6 and HTTP out of the box
- Use existing Linux device drivers. No need to write new ones
- Integrated automation

Reinstall	Remove currently installed OS and return to the “out of box” provisioning state
Uninstall	Completely wipe out everything, except ONIE
Rescue	Reboot box into ONIE for repair, debug and forensics
Update	Install a new ONIE version
Diag	Run HW Vendor’s diag (optional)

Provides a mechanism for a network OS to invoke the above behaviors.

Hardware Platforms

- Diverse mix of CPU complex designs, even within a single CPU family.
- HW Vendors need freedom to customize ONIE
- Need mechanism to run HW vendor diag

Recurring Themes

- TLV based EEPROM format widely adopted
- Common HW designs reduce development time

Support Multiple CPU Architectures

- PowerPC – Today
- x86 – VM Prototype available today
- Thinking about ARM, MIPS
- Maintain ONIE behaviors across architectures

Testing and Compliance

- Enhance and extend regression test suites
- Develop compliance test suites

New Features

- DHCPv6
- DNS Service Discovery / Multicast DNS discovery
- HW Vendor diagnostic

Releases

- Quarterly release cadence
- Ongoing maintenance
- Enhancements

- Use existing BIOS from hardware vendors
- During manufacturing install GRUB2 and ONIE-x86 on the mass storage block device
- NOS Installer adds partitions, installs software and updates GRUB2 configuration.

Partition #	Name	R/W	Notes
1	GRUB Boot	r/o	Used by GRUB and GPT
2	ONIE BOOT	r/o	ONIE Kernel
3	ONIE CONFIG	r/w	Configuration
4+			For NOS use

- Partition using [GUID Partition Table](#) (GPT) format
- GPT supported by Linux, GRUB, UEFI
- Supports dual-booting multiple operating systems

```
GNU GRUB  version 2.00

+-----+
| ONIE: Install OS |
| ONIE: Rescue     |
| ONIE: Uninstall OS |
| ONIE: Update ONIE |
+-----+

Use the ^ and v keys to select which entry is highlighted.
Press enter to boot the selected OS, `e' to edit the commands
before booting or `c' for a command-line. ESC to return
previous menu.
```

- Create new GPT partition(s)
- Create file systems on partition(s)
- Install NOS files into partition(s)
- Update ONIE-CONFIG using ONIE provided CLIs
 - `onie-boot-entry-add`
 - `onie-boot-entry-remove`
 - `onie-boot-entry-show`
 - `onie-boot-default`
 - `onie-boot-update`

- Interface Masters Box with ONIE
- HTTP based install
- DHCP server configuration
- Install the ONIE Demo OS
- Go back and Install Cumulus Linux

Administrative

- Update ONIE draft specification with community
- Improve documentation
- Meeting cadence, e.g. monthly phone conference
- Area specialists, contributors, testers

ONIE Websites

- Main Page: <http://www.onie.org/>
- Source Code: <https://github.com/onie/onie/>
- Documentation: <http://onie.github.io/onie/>



Thank You!

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- Read-Only, except when updating ONIE itself
- Contains default GRUB config file
- Contains ONIE kernel and initramfs

- Read-Write
- Contains GRUB configuration files
- The NOS installer updates the GRUB configuration by changing files in this partition

- BIOS loads GRUB from block device Master Boot Record
- GRUB checks the following:

```
if exists ONIE-CONFIG/grub.cfg {  
    load ONIE-CONFIG/grub.cfg  
} else {  
    load ONIE-BOOT/grub-default.cfg  
}
```

On a fresh install grub-default.cfg boots ONIE in the installer mode. Otherwise load the grub.cfg a NOS installer has setup.