CUMULUS

Linux Networking for the Enterprise

How linux REALLY runs your entire enterprise

April 6th, 2017

Shrijeet Mukherjee | Cumulus Networks

Datacenter and Linux

Linux boundaries today

APP
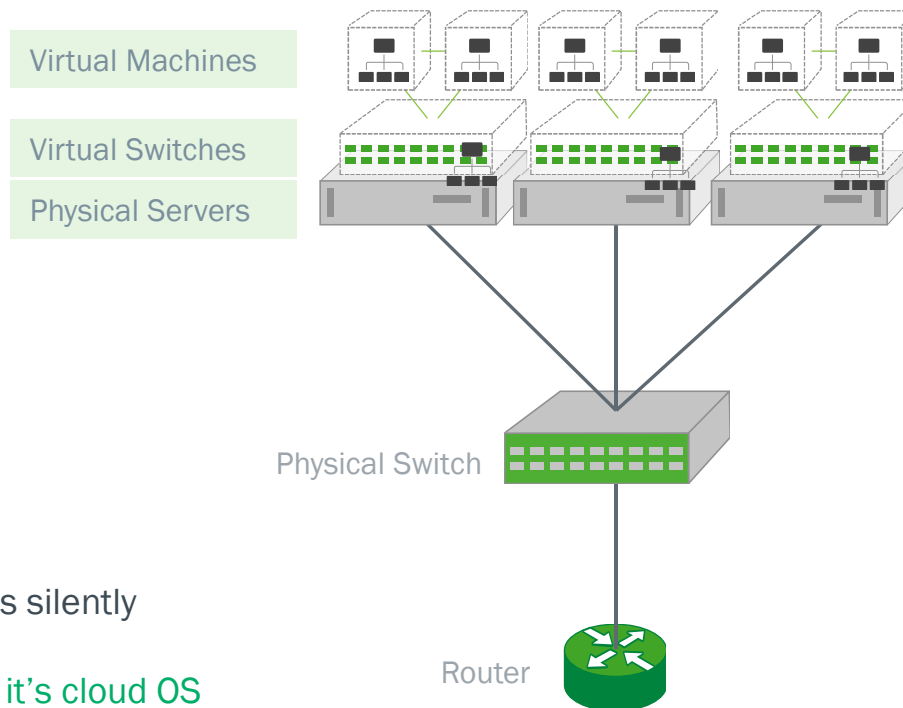- Hadoop/Zookeper

Hypervisor
- KVM/Xen

Containers
- Docker/Mesos/Kubernetes
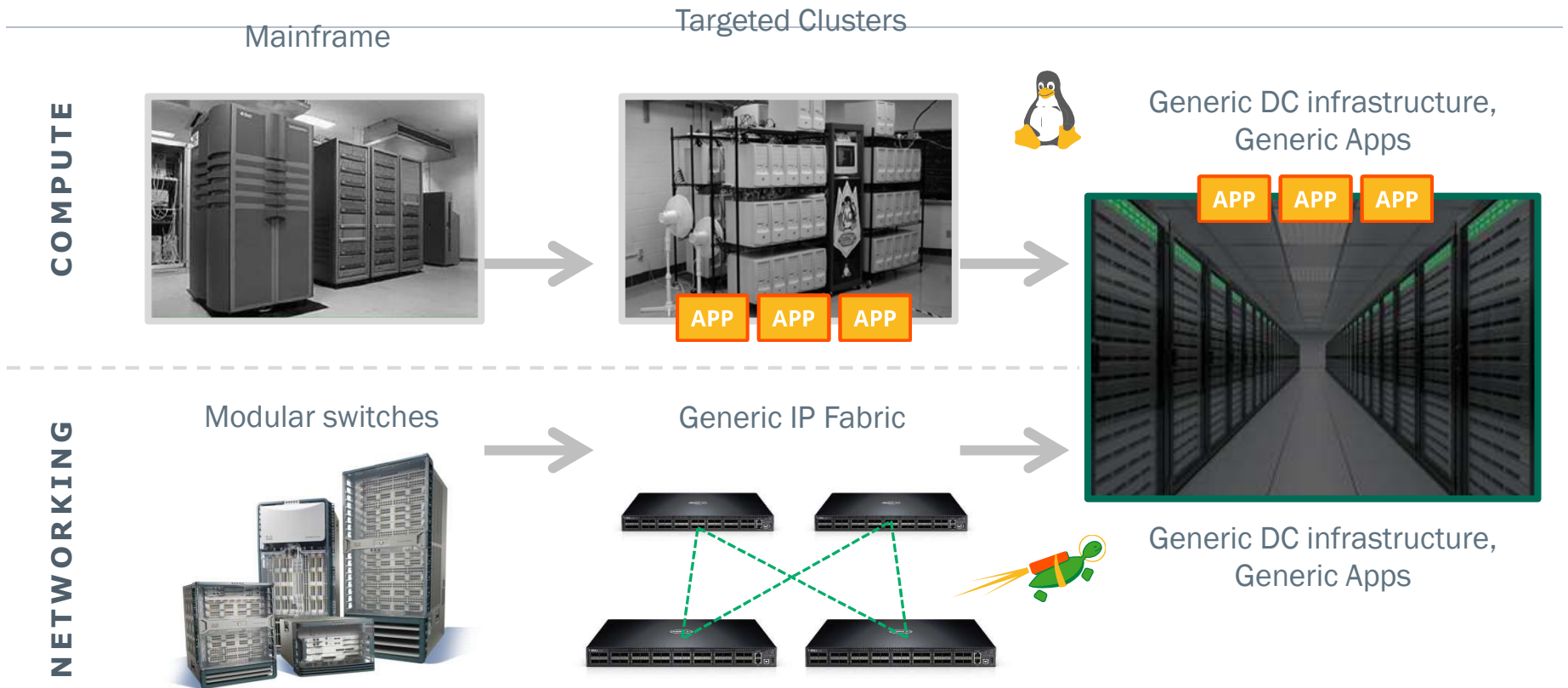
Host
- Bridges/Routers/OVS

Each builds on each other and is silently interchangeable i.e Infra
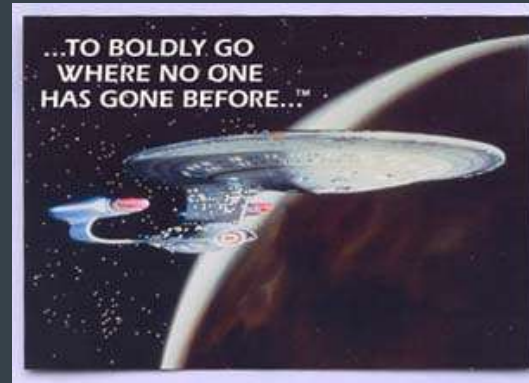- Even MSFT picked Linux for it's cloud OS

Virtual Machines

Virtual Switches

Physical Servers

Physical Switch

Router

3

Time Travel to the Modern Data Center

COMPUTE

Mainframe

Targeted Clusters

Generic DC infrastructure, Generic Apps

APP APP APP

APP APP APP

NETWORKING

Modular switches

Generic IP Fabric

Generic DC infrastructure, Generic Apps

CUMULUS

Get Linux in here !!

Linux boundaries today
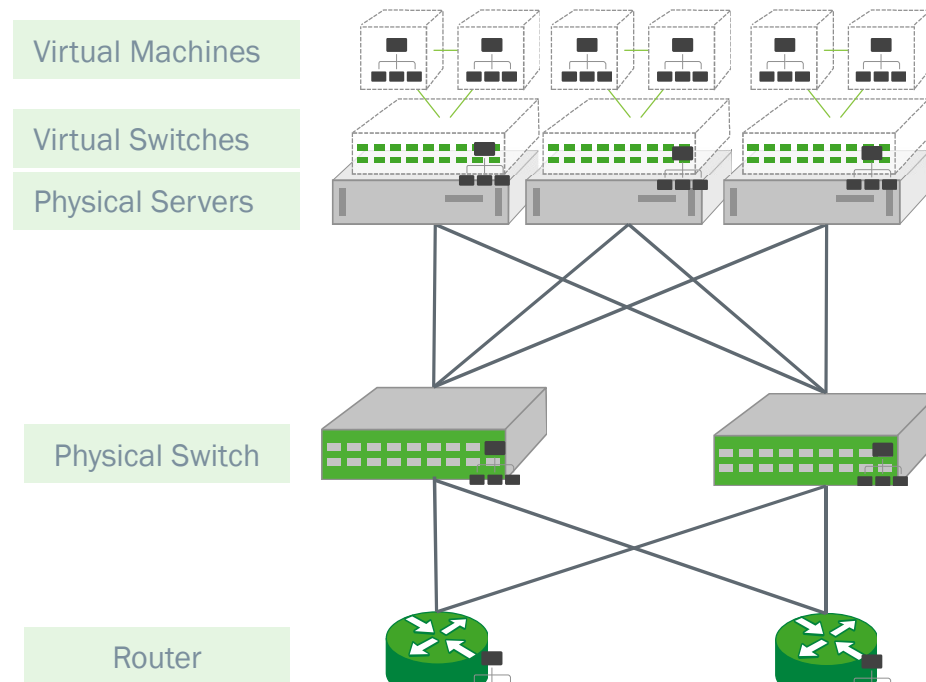
Virtual Machines

Virtual Switches

Physical Servers

Physical Switch

Physical Switches and Routers
- Multiple Chip Vendors
- Consistent Protocols
- Consistent App interface

Any User expectation for managing
servers should be met for network devices

Router

2015-2016 Features in linux (just to make a point)

Kernel Additions

- Nftables
- EBPF
- TC hw integration
- New Bridge driver
- VXLAN driver enhancements
- VRF
- LWT (infra for MPLS)
- Link state management

- Optimize IPv4 FIB lookup, route driven congestion algorithm selection
- Switchdev support for Mellanox Switch, DSA devices
- NetCP (network coproc) driver support
- TCP fingerprinting

Userland Upgrades

- Quagga
- iproute2
- Ethtool
- msdpd

- lldpd
- libnl
- ifupdown2

2015-2016 Features in linux (just to make a point)

Kernel Additions

- Nftables
- EBPF
- TC hw integration
- New Bridge driver
- VRF
- LWT (infra for MPLS)
- Link state management

- Optimize IPv4 FIB lookup, route driven congestion algorithm selection
- Switchdev support for Mellanox Switch, DSA devices
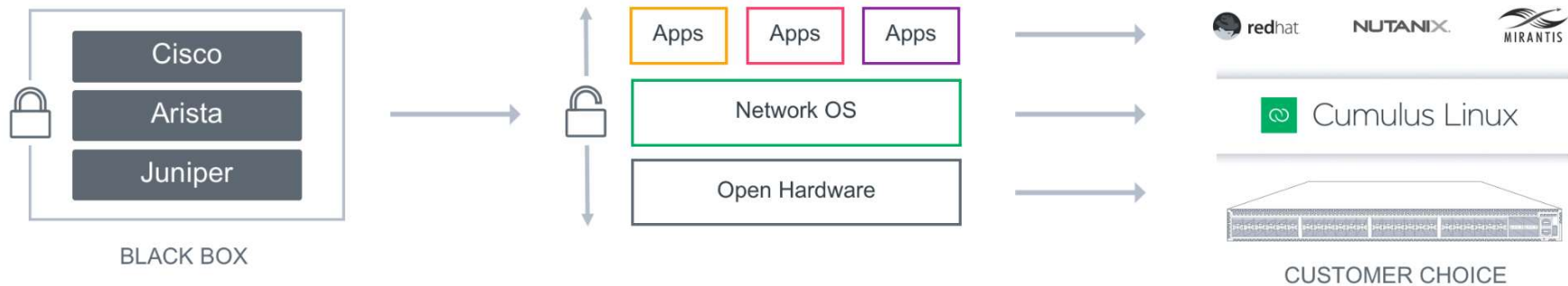- NetCP (network coproc) driver support
- TCP fingerprinting

And then there is XDP : combines with eBPF to eliminate non-standard appliances

Userland Upgrades

- Quagga
- iproute2
- Ethtool
- msdpd

- lldpd
- libnl
- ifupdown2

So .. Who is Cumulus and why does anyone care ?

Web scale networking for Enterprise Clouds

CUMULUS

So what's a community to do

Make the package enterprise friendly

Kernel features that have major impact in the Enterprise

Ethtool
- Interface naming
- 25g, 100g standards and management

Bridging model
- Active-Active (mlag)
- IP mcast, igmp
- VXLan scale

Route path selection
- IPv4/IPv6 uniformity

VRF

MPLS
- LWT
- MPLS datapath

But you need a greater ecosystem (driven by the kernel)

Ecosystem
- ONIE
  Created the platform separation
- FRR
  Routing performance, Protocols like MPLS
  Capacity management => Switchdev

User Interface
- Ifupdown2
  Cannot handle scale without it
- NCLU

Protocols
- EVPN
- MPLS

Highly scalable interface manager

- Supports templates
- Handle dependencies
- Validates configurations
- Extensible

Now coming to a Debian distribution near you

Ubuntu – Package Se... ×

← → C ⓘ packages.ubuntu.com/search?keywords=ifupdown2

ubuntu packages

ifupdown2

Search all options

package names

» Ubuntu » Packages » Package Search Results

Search in specific suite: [precise] [precise-updates] [precise-backports] [trusty] [trusty-updates] [trusty-backports] [xenial] [xenial-updates] [xenial-backports] [yakkety] [yakkety-updates] [yakkety-backports] [zesty]
Limit search to a specific architecture: [i386] [amd64] [powerpc] [arm64] [armhf] [ppc64el] [s390x]

You have searched for packages that names contain *ifupdown2* in all suites, all sections, and all architectures. Found **1** matching packages.

Exact hits

Package ifupdown2

- xenial (16.04LTS) (admin): Network Interface Management tool similar to ifupdown [**universe**]
  1.0~git20151029-1: all
- yakkety (16.10) (admin): Network Interface Management tool similar to ifupdown [**universe**]
  1.0~git20160525-1: all
- zesty (admin): Network Interface Management tool similar to ifupdown [**universe**]
  1.0~git20170114-1: all

This page is also available in the following languages:

Български (Bəlgarski) Deutsch suomi français magyar 日本語 (Nihongo) Nederlands polski Русский (Russkij) slovensky svenska Türkçe українська (ukrajins'ka) 中文 (Zhongwen,简) 中文 (Zhongwen,繁)

Content Copyright © 2017 Canonical Ltd.; See license terms. Ubuntu is a trademark of Canonical Ltd. Learn more about this site.

Report a bug on this site.

What is NCLU?

A Network Command Line Utility for Cumulus Linux

- Simple to configure

- Guardrails to prevent typos & mistakes
  All linux tools are preserved

- Context sensitive prompt, embedded help, and examples
  No Documentation needed !!

- Rollback to a previous configuration

- Configure within bash shell

  Bash access programmability

IP Routing Suite for Linux and Unix systems

for VMs, containers, switching, routing, and Internet peering
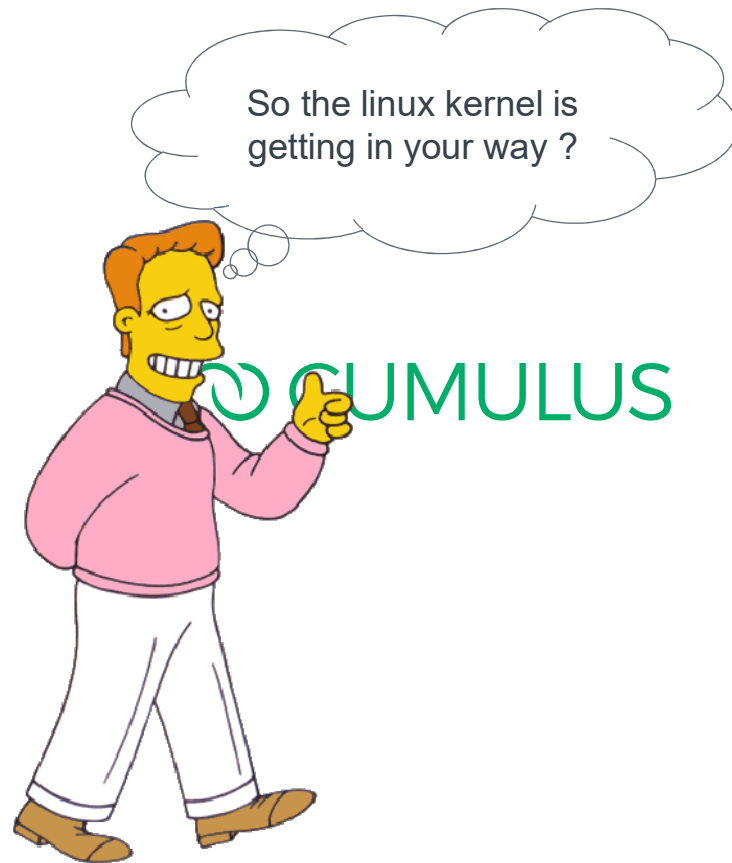
BGP4   ISIS   LDP   OSPF   RIP

FRROUTING

| Quagga offshoot | 100's production deployments | Fast, Open Development | Community Driven |

6WIND · ARCHITECTURE TECHNOLOGY CORPORATION · CUMULUS · LabN Consulting LLC · netDEF The Network Device Education Foundation · orange · VOLTA Networks

Where in the stack is the right place to be innovative

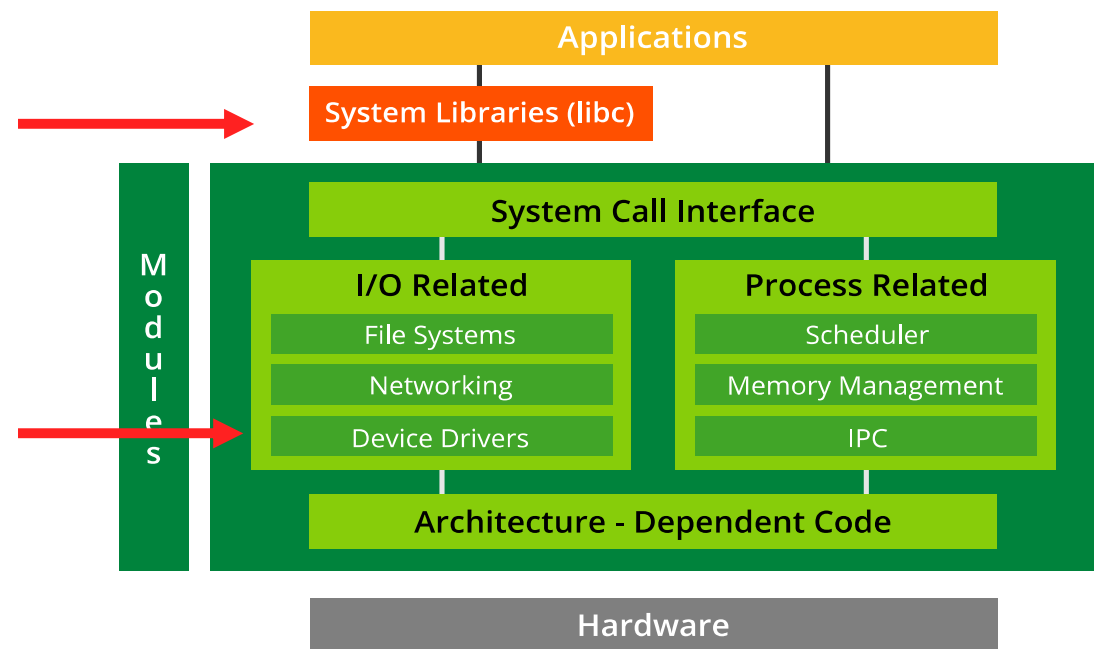Application interface: Portable and maintainable apps can use this layer

Innovation here leads to
- Non-portable apps/infra
- Highlighting narrow use cases
- Hair pulling

Low level device interface; Empowers system software developers, but only useful in the context of the full system around it

Innovation here
- Is good
- Leads to increasing improved experiences

Applications

System Libraries (libc)

Modules

System Call Interface

I/O Related	Process Related
File Systems	Scheduler
Networking	Memory Management
Device Drivers	IPC

Architecture - Dependent Code

Hardware

Challenges to the model

Networking is just an App, the full stack gets in the way

- Sonic
- Openswitch
- Fboss
- Other networking stacks that use linux as a boot loader

If you use Linux, then you do not have to make the choice

- Your Hosts already run it, so tools will likely integrate better
- Switchdev, Ethtool etc formulate the layer to integrate at
- And you get the largest software community as built in support

Challenges to the model

Networking is just an App

- Sonic
- Openswitch
- Eboss
- Other networking stacks that use linux as a boot loader

Bottom Line : Use the Linux Kernel as the model and become part of the solution

CUMULUS

Thank you!

Visit us at **cumulusnetworks.com** or follow us **@cumulusnetworks**

Cumulus Networks' customers

28%
of Fortune
50 Companies

25%
of Mega-Scale
Public Clouds

>2M
Ports Powered by
Cumulus Technology

600+
Customers Across
Many Industry Verticals