

OpenStack Linux for Cloud Computing

OpenStack

OpenStack is rapidly becoming the de facto standard in cloud computing. OpenStack helps organizations of all verticals discover the increased flexibility and speed to market that the self-service cloud and Infrastructure as a Service (IaaS) provide. As enterprises and service providers start to adopt deployment and operational models of Web scale companies, where choice of hardware and software components have been critical to allow customers to design solutions specific to their needs, it's crucial that the clouds must be designed and deployed properly.

As an open community, OpenStack has embraced choice across software layers. Emerging projects like Ironic are leveraging contributed technologies like PXE and Supermicro's IPMI to enable bare-metal provisioning for servers. OpenStack enables systems architects to use commodity server hardware to build scale-out IT environments.

Cumulus Linux

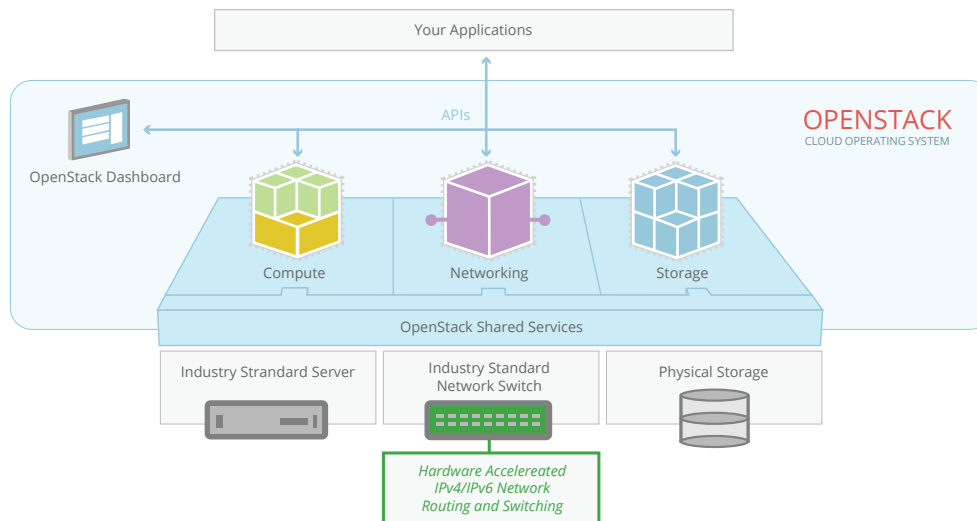
Cumulus Linux is the first full-featured Linux OS for data center networking, running seamlessly over industry-standard bare metal switches. The new disaggregated model enables the industry to build high capacity networks that are easy to deploy and affordable, helping customers realize the full promise of the software-defined data center. With the use of existing compute tool sets like Puppet or Ansible, Cumulus Linux creates a multi-platform operating system for networking hardware that simplifies building, managing and automating massive-capacity next-generation data center networks.

Further, by enabling quick, self-service deployment and automation using industry-leading open source tools, Cumulus Linux enables new support models that significantly reduce operational costs. Running Linux natively also opens the networking world to a wider ecosystem, including a range of partners in network orchestration, automation, monitoring and other domains.

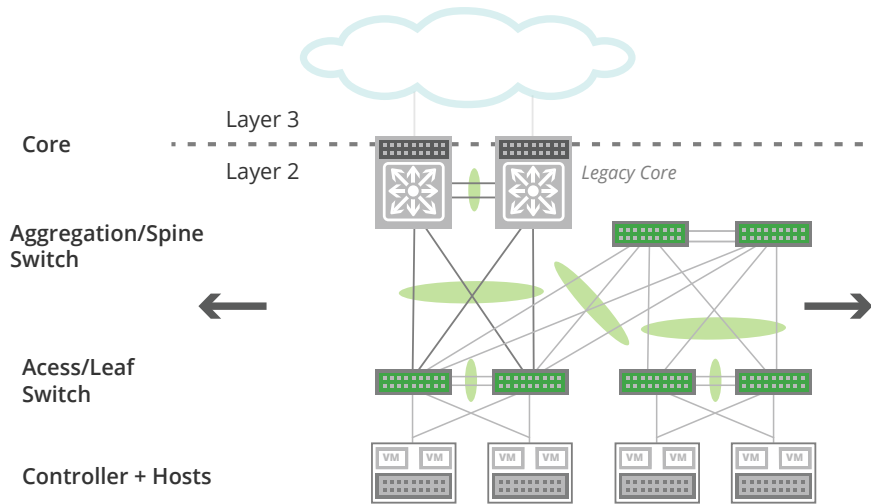
Solution

All nodes within an OpenStack cloud require some form of network connectivity. In some cases, nodes require access to more than one network segment. The design must encompass sufficient network capacity and bandwidth to ensure that all communications within the cloud, both north-south and east-west traffic, have sufficient resources available.

- **OpenStack networking can be implemented in two separate ways. In this guide, we use nova-net, as it is the most commonly deployed networking method in production OpenStack clusters.**
- **This implementation supports tenant isolation using VLAN, in multi_host mode, for a distributed Layer 3 agent, avoiding the scalability bottleneck and single point of failure of a single L3 agent.**
- **If you are interested in Neutron, we can advise you on a customized approach tailored to your environment.**



The figure below depicts the topology of the Layer 2 design architecture for production deployments of OpenStack today



Solution Benefits

Large-scale cloud providers are showing success through deploying repeatable and scalable infrastructure that adopts a scale-out model rather than a traditional scale-up model espoused by traditional network vendors. Cumulus Linux can provide a solution for both a simple VLAN or the modern VXLAN implementation.

Business Benefits

- **Business Agility:** By enabling true cloud capabilities through a scale-out, Web-scale architectural approach, Cumulus Linux enables OpenStack deployments to achieve the same goals that hyper-scale Web companies can in terms of automation and business agility — such as minimal downtime, improved SLAs, scalability, and the ability to respond to market dynamics in a full self-service and on-demand manner.
- **CapEx:** OpenStack represents the emergence of a commodity cloud approach. By deploying OpenStack in conjunction with Cumulus Linux, similar vendor choice in hardware can be achieved, leading to significant lowering of capital expenditures.
- **OpEx:** Beyond CapEx, significant benefits of deploying OpenStack with Cumulus Linux are realized through vast reductions in OpEx, including improvements in automation and self service that enable networks to be managed in conjunction with compute resources.

Technical Benefits

- **Scale Out:** To deploy OpenStack in the most scalable manner possible, compute and storage resources are deployed using a high performance, non-blocking, Layer 3, Clos-based, leaf-spine network fabric, which is enabled by Cumulus Linux.
- **High Availability:** Host HA is a set of Layer 2 and Layer 3 features, including Host-MLAG, supporting high availability for hosts. It utilizes features such as link aggregation group/LAG, EtherChannel, port group, or trunk to connect ports to different switches and operate as if they are connected to a single, logical switch, thus providing greater redundancy and greater system throughput.
- **Automated Cloud Deployment:** The Cumulus Linux framework to simplify the network and easily automate, by way of technologies such as ONIE, zero touch provisioning and Puppet, enables a unified set of tools to install and configure switches and servers. From a simple configuration file, an entire pod of switches and servers can be brought up with minimal human intervention. The combination of bare-metal hardware with a consistent Linux platform enables you to leverage automation to deploy compute, storage and networks together.

Challenges Addressed

OpenStack has complex networking requirements for several reasons. Many components interact at different levels of the system stack, which adds complexity:

- Data in an OpenStack cloud moves both between instances across the network (also known as east-west), as well as in and out of the system (also known as north-south).
- Physical server nodes have network requirements that are independent of those used by instances, which need to be isolated from the core network to account for scalability.
- It is also recommended to functionally separate the networks for security purposes and tune performance through traffic shaping. Support for integrated, end-to-end application deployment starting with provisioning the VM, through full-stack provisioning.

Conclusion

A well-designed cloud provides a stable IT environment that offers easy access to needed resources, usage-based expenses, extra capacity on demand, disaster recovery and a secure environment. This requires careful consideration of a multitude of factors, both technical and non-technical:

- OpenStack is on its tenth major version, and analysts are predicting that the Juno release has reached a level of maturity that significant adoption of OpenStack should be expected, especially in the enterprise market.
- Cumulus Linux has experienced tremendous customer traction and adoption due to a variety of use cases, crossing over a total of 1 million ports in production over the last year.
- Both Cumulus Linux and Linux/OpenStack run on top of industry-standard bare metal hardware. The software defines the performance and behavior of the environment and allows the administrator to exercise version control and programmatic approaches that are already in use by software development teams.
- These technologies complement each other and can be combined to achieve the best-in-class cloud computing capabilities, and help combine the vision of a flexible open standards-based software stack without proprietary vendor lock-in.

Get Started!

- Try out Cumulus Linux with Ansible on our Cumulus Workbench: <http://cumulusnetworks.com/cumulus-workbench/>
- Download the latest version of Cumulus Linux: <http://cumulusnetworks.com/downloads/>
- For partner distributions related to OpenStack: <http://www.openstack.org/marketplace/distros/>
- To get a copy of an OpenStack project, you can clone a repository from git.openstack.org and browse the source code at git.openstack.org/cgit.

About Cumulus Networks®

Cumulus Networks is bringing the Linux revolution to networking. Founded by veteran networking engineers from Cisco and VMware, Cumulus Networks makes the first Linux operating system for networking hardware and fills a critical gap in realizing the true promise of a software-defined data center. For more information visit cumulusnetworks.com or follow us on Twitter [@cumulusnetworks](https://twitter.com/cumulusnetworks).

About OpenStack

The OpenStack project is provided under the Apache 2.0 license. Openstack.org is powered by Rackspace Cloud Computing.