

Nephoscale Builds Scalable, Affordable Cloud Network with Cumulus Linux

INDUSTRY: Cloud + Hosting

BUSINESS OBJECTIVE: Automated, Scalable Solution

PARTNERS: Edge-Core, Opscode, Chef, Inmon

With Cumulus Linux, manual configuration is no longer needed for provisioning new racks, applying new policy or responding to security advisories. The lifecycle is now entirely automated.

— Alan Meadows, Chief Architect at Nephoscale

Overview

Nephoscale is a cloud Infrastructure-as-a-Service (IaaS) provider and cloud software development company. Their NephOS end-to-end cloud software stack powers the IaaS platform and was developed from the ground up to accelerate and simplify provisioning, deploying, and installing highly scalable cloud infrastructure. NephOS enables a hybrid cloud solution that seamlessly ties a customer's on-premise cloud environment with their hosted off-premise cloud environment, visible in a single-pane view.

Since infrastructure is such a critical part of the business, Nephoscale needs to rely on fast, scalable, and flexible designs to meet customer needs as the business grows.

Challenges

When Nephoscale faced capacity limitations and recognized the need to upgrade their 1G environment to 10G, the team investigated options that would allow high capacity at scale, automation, and programmability. These criteria reflected their need to respond quickly to customer demands. After comparing Cisco, Arista, Dell/Force10, and open networking switches running Cumulus Linux, Nephoscale settled on Cumulus Linux to provide flexible solutions that can scale affordably.

The criteria for choosing Cumulus Linux included:

Linux for Freedom of Choice

The Nephoscale IT team is very familiar with Linux, and their data center infrastructure has been running on it. While many OSes are based on Linux, Cumulus Linux is a true Linux distribution and exposes network functionality directly to the Linux kernel. It is this architecture that allows Nephoscale to natively leverage existing tools and for this to be supported by Cumulus Networks. Other providers could not match this experience. Although most operating systems now expose a Linux-like experience, there was never a clear answer to what level Linux integration was supported. Some other platforms also use an out-of-date kernel, which makes adding modern packages difficult. Cumulus Linux just works.

Automation and Layer 3 Clos Fabric for Scale

One of the core beliefs at Nephoscale is that infrastructure needs to be built for scale, and a solution should be able to take you from one rack to hundreds of racks. From an architecture perspective, Cumulus Linux supports L3 Clos fabrics and VXLAN tunneling; these were additional important reasons to scale the infrastructure. What differentiates Cumulus Linux even more is that it provides a similar automation framework on switches as on servers. When looking at various solutions to automate the network, Cumulus Linux enabled the scalability that Nephoscale was considering, leveraging Chef, the same configuration management tool that Nephoscale uses in the rest of their infrastructure, to easily scale out their network.

We don't have to ask whether Cumulus Linux gives access to certain prompts or tools because the entire Linux experience is available to us.

— Alan Meadows, Chief Architect at Nephoscale

Solution

The solution in place at Nephoscale enables affordable high capacity that is very easy to manage.

Architecture

Nephoscale leverages EdgeCore 10G platforms running Cumulus Linux for top of rack switches. The switches are connected to spine switches in a Layer 3 Clos architecture to provide maximum flexibility and scalability.

Extensive use of BGP

The network makes extensive use of BGP not only on switches but also on some compute nodes. It also leverages IS-IS in parts of the network. Being able to utilize Quagga on both switches and servers helped provide a consistent and familiar experience.

Simplified Management

With Cumulus Linux, the process of provisioning and configuration management is entirely automated. When the switch boots for the first time, it retrieves the Cumulus Linux OS image and installs the OS almost instantly. Configuration management tools then take over the auto provisioning process. There is no need for an administrator to log in to the box, as all server and network provisioning is automated by software.

Nephoscale makes extensive use of Chef as a configuration management tool on the network infrastructure. Using configuration management tools to provision and update switches is extremely important because it guarantees that there is no discrepancy among all the switches running Cumulus Linux in various environments. This could not be guaranteed with manual configuration. Switches running Cumulus Linux are provisioned with Chef, and all user accounts and configurations in the infrastructure are driven by Chef. Using Linux as a platform is not limited to configuration management. Nephoscale uses industry-standard tools and internal tools to monitor systems. The Nephoscale team has written some plugins for Nagios that run on Cumulus Linux switches and publishes Cumulus Linux statistics into Graphite. The entire network leverages sFlow (through inMon's sFlow) to help trend capacity and pinpoint something out of the ordinary like an attack. As for internal tools, the team is free to write their own agent to interact with the switch.

The next steps to simplify installation even further is to leverage Prescriptive Topology Manager from Cumulus Networks. PTM is a cable and peer verification utility that ensures that new zones are cabled the way they are expected to be.

Results

Nephoscale's business can scale even better with an agile and flexible infrastructure.

From a savings standpoint, Nephoscale experienced a drastic reduction in OpEx over alternative solutions using automation, expanding use of existing data center tools, and leveraging the transparency of a native Linux distribution. They realized additional savings based on CapEx cost reductions of at least 3x per 10G port over "traditional" 10G providers.

In particular, Nephoscale realized OpEx savings because the network is:

Fast

Nephoscale can deploy new racks, new zones faster today- Where it used to take a couple of days to expand the network with Cisco equipment, now it takes less than a day, including the time to cable and install the rack. Installing the OS and applying standard configurations with configuration management tools accounts for most of the savings.

Reliable

Consistent configurations- Leveraging Chef for configuration management eliminates weird esoteric networking problems that arise from minor discrepancies in switch configurations because the configurations are not uniform.

Cumulus Linux allows us to leverage our existing configuration, management and monitoring tools across the data center infrastructure. Cumulus Networks has unlocked operational agility for us by giving us a network platform for any need.

— Alan Meadows, Chief Architect at Nephoscale | www.nephoscale.com



Cumulus® Linux®
Network OS

About Cumulus Networks

Cumulus Networks demystifies the complexity of networking and enables better, faster, easier networks to support your business. Our network operating system, Cumulus® Linux®, allows you to build and operate your network with the mindset of web-scale pioneers like Google and Amazon, radically reducing the costs and complexities of modern data center networks. More than 400 organizations, including some of the largest-scale data center operations in the world, run Cumulus Linux. Cumulus Networks has received venture funding from Andreessen Horowitz, Battery Ventures, Sequoia Capital, Peter Wagner and four of the original VMware founders.

For more information visit cumulusnetworks.com or follow [@cumulusnetworks](https://twitter.com/cumulusnetworks).

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