

Apache CloudStack and Tungsten Fabric Integration

Solution Brief



apachecloudstack[™]
open source cloud computing

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Tungsten Fabric Overview

Tungsten Fabric is an open-source network and security orchestrator which provides secure connectivity for cloud-native environments. Tungsten Fabric enables developers, network and security operations staff to deploy zero-trust micro-segmentation within a DevOps workflow to reduce the friction in application deployment. It ensures performance and security for deployments of tens of thousands of nodes at Tier 1 service providers, major research centers and enterprises with global operations.

With Tungsten Fabric, security and network engineers can build secure microservices that can be deployed on various container orchestration platforms, allowing them to work directly within the DevOps workflow. This ensures applications and infrastructure alike are secure against sophisticated attacks, while increasing development velocity and site reliability. Tungsten Fabric analytics provide flow-level visibility, while port mirroring provides application-level visibility.

Together these features enable network and security operations staff, streamlining troubleshooting and mean time to resolution (MTTR). Tungsten Fabric manages and implements physical and virtual networking and security for cloud environments. Since the same controller and forwarding components are used in every implementation, Tungsten Fabric provides a consistent interface for managing connectivity and policy in all the environments it supports, and can provide seamless and secure connectivity between workloads managed by different orchestrators, whether virtual machines or containers.

Apache CloudStack Overview

Apache CloudStack is a virtualization management platform that provides a cloud orchestration layer, automating the creation, provisioning and configuration of IaaS components (such as virtual servers). It turns existing virtual infrastructure into a cloud-based Infrastructure as a Service (IaaS) platform. Because CloudStack leverages existing infrastructure, the costs and time for the organization to build a multi-tenant IaaS platform are greatly reduced.

Among the most significant advantages of the virtualization management platform is the simplicity and ease of use it brings, even for large-scale environments. With CloudStack, you can orchestrate hosted public and private clouds, on-premise private clouds and hybrid environments without the need to engage a huge operations team to support them in the long term.



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The Importance of SDN

Software-Defined Networking (SDN) is a network design approach in which the control plane is decoupled from the data plane, enabling programmatic, agile and dynamic control over the networking. The move to software-defined networking for companies is a vital step from the transition to a software-only approach, where dependencies on physical hardware and single vendors are eliminated.

The most common benefits of the SDN are:

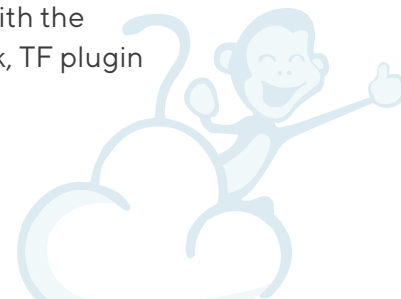
- Decreased operating and capital expenses in the long term
- Increased flexibility, allowing faster updates and changes
- Centralized networking management
- Reduced downtime, as automation eliminates human mistakes
- Improved view over the network topology for network admins
- Technology advantage in networking, allowing new functionalities to be implemented faster



CloudStack and Tungsten Fabric Integration

Tungsten Fabric (TF) comprises components like controller and vRouter; plus additional components for analytics and third-party integration. In this Solution Brief, TF integrates with CloudStack as an SDN plugin to enable rich networking capabilities and lifecycle management of VMs and containers where TF components or control functions are deployed.

The deployment and life-cycle management of Tungsten Fabric can be done with tools like Ansible. After Tungsten Fabric and CloudStack are installed, we need to create a zone with the TF isolation method, and then, when we create a network or a vm in CloudStack, TF plugin will call the TF Controller API to create the resources.



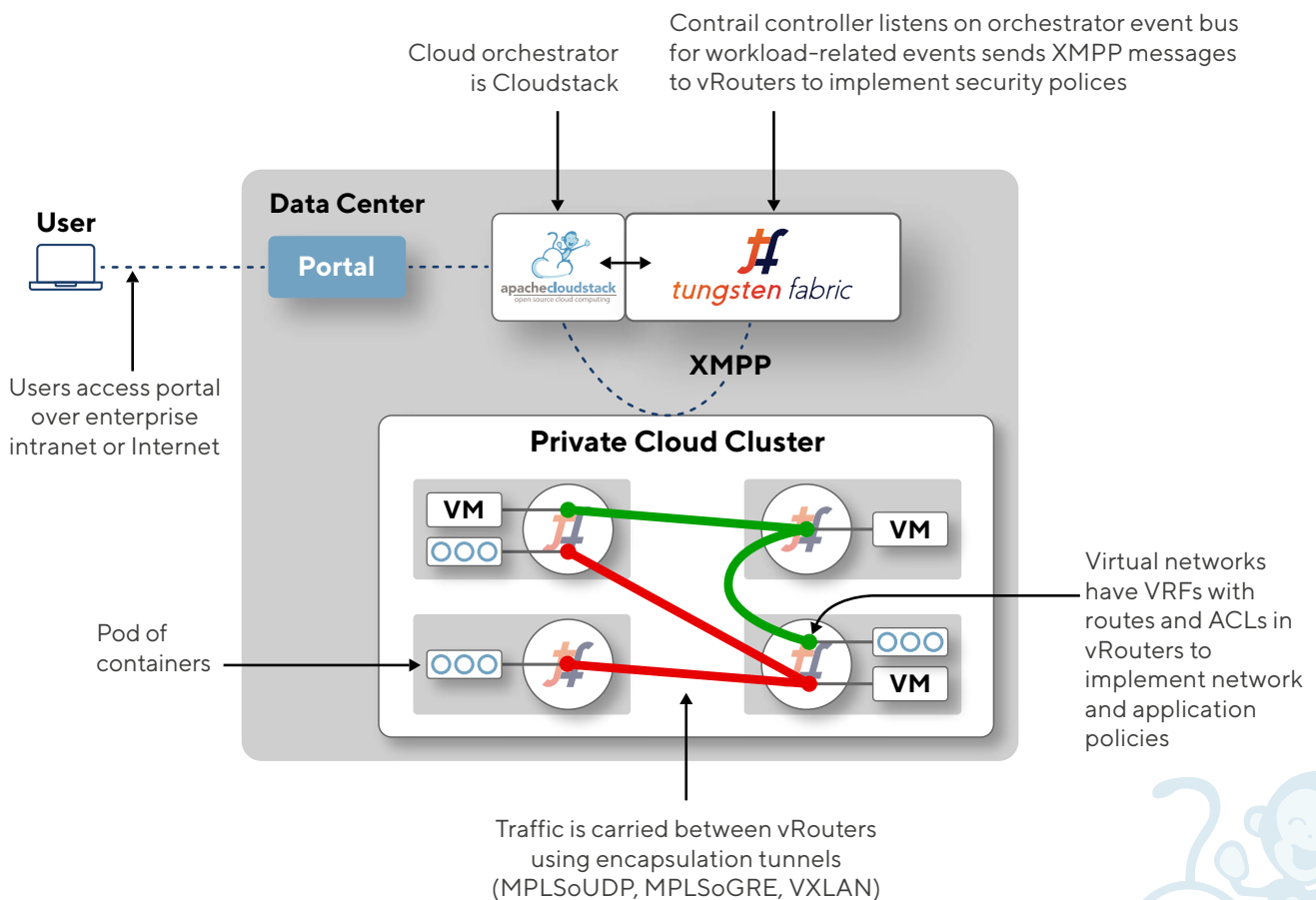
Architecture

The Tungsten Fabric controller integrates with the CloudStack cloud management system. Its function ensures that when a virtual machine (VM) or container is created, it is provided with network connectivity according to the network and security policies specified in the controller or orchestrator.

Tungsten Fabric consists of two primary pieces of software:

- **Tungsten Fabric Controller** - a set of software services that maintain a model of networks and network policies, typically running on several servers for high availability.
- **Tungsten Fabric vRouter** - installed in each host that runs workloads (virtual machines or containers), the vRouter performs packet forwarding and enforces network and security policies.

A typical deployment of Tungsten Fabric is shown below.



Use Cases

Simplified Network Management

Cloud computing environments tend to grow on a massive scale. Based on this premise, the network assets management and the processing capacity of the generated traffic can be an obstacle to growth. In addition, as the complexity increases, network managers face a few issues:

- The deployment of middleboxes at bottlenecks (between two routers through which all traffic flows), raising concerns about robustness, accuracy, and efficiency.
- Dynamically managing traffic isolation on a network is a very tedious task.
- The IEEE 802.1q protocol limitation of the industry standard switches, supporting only 4096 VLANs, limiting the number of tenant networks.

Addressing these issues, Tungsten simplifies network management by increasing network capacity with a relatively low initial outlay compared to physical network appliance investments at the Apache CloudStack data center.

Hybrid Clouds

One of the issues when it comes to data security and simplified network communication is that cloud-native applications require workloads that are distributed across many different providers.

Tungsten's control plane is decoupled from the data plane, which can be used in different orchestrators to centralize network management. As Tungsten has centralized networking management, it enables network administrators to manage network resources everywhere, including Apache CloudStack.

Network Automation

In traditional network devices, the control plane and the data plane, both need to be programmed individually when you want to automate any task involving the network. The network administrator typically must resort to the command-line interface (CLI) of the network device's operating system.



Most of the time, technical support teams need to keep track of device-to-device configurations, often performing complex troubleshooting tasks and time-consuming traditional management models that consume budget and lower profitability.

With Tungsten, network administrators gain complete visibility into networking elements and the application layer that spans an entire infrastructure from a single point. This visibility allows administrators to enforce consistent policies, automate network functions at scale, achieve agility, and reduce troubleshooting and outage times, making it easier to manage complex networks running on an Apache CloudStack architecture.

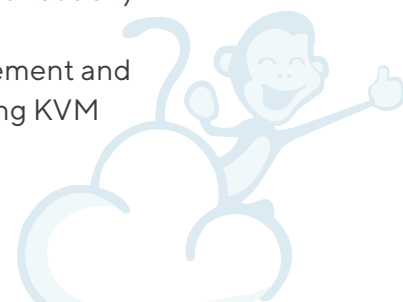


Open-Source SDN

The main idea of the SDN is to control complex operations related to the datacenter network management from a single point. This includes routing, switching, network flows, security and load-balancing. Unfortunately, many vendors have created commercial closed-source software solutions which fail to achieve the true end-to-end management and visibility that open-source alternatives provide from the start.

Open-source SDN solutions evolve much faster over time and deliver increased flexibility regarding integration with hypervisor, CMP and open standard protocols. Open-source projects tend to release new features and capabilities more quickly, compared to commercial solutions. With the latter, you are locked into the vendor's vision and feature release cadence, you are also locked into their supported ecosystem for both hardware and software, thus ending up in a vendor lock-in trap.

Tungsten is part of the Linux Foundation's CNCF (Cloud-Native Computing Foundation) umbrella and is under constant development. Recently integrated with Apache CloudStack, they together provide an end-to-end solution for network management and security in addition to services for cloud-native and VM-based applications using KVM hypervisor.





EWERK Group Deploying Tungsten Fabric SDN

The EWERK Group has customers from system-relevant industries with special requirements for SDN systems due to their regulated IT environments. The integration of Tungsten into CloudStack, allows EWERK to meet the demand for a scalable, highly available, enterprise-capable and open source-based software-defined network. This enables EWERK to meet customer's requirements and needs, such as compliance, security and advanced functionality. Currently, the EWERK Group is deploying Tungsten Fabric with several large customers in system-relevant industries. In order to enable adaptability and better integration into the EWERK Cloud Platform, thereby providing increased flexibility for our customers, we have decided to integrate the Tungsten Fabric SDN from the Linux Software Foundation into the Apache CloudStack project.

EWERK on Apache CloudStack

When deploying a hyperconverged cloud, the main goals are usually to gain simplicity, performance, and efficiency without sacrificing features or reliability. The benefits of the proposed hyperconverged cloud architecture are as follows:

Sven Vogel

Senior Manager R&D
for Cloud and Infrastructure



Apache CloudStack is a private cloud management tool for IaaS environments, which now also offers control of PaaS systems. The Apache Software Foundation leads the development of this forward-looking tool. It ensures great flexibility for the project, a stable and for manufacturers neutral further development of Apache CloudStack. For me personally, the slogan "Community Over Code", the cooperation and cohesion of the community is very important. In addition, the large feature set of Apache CloudStack leaves hardly anything to be desired. Due to the open source code, it is always possible to extend Apache CloudStack with a manageable effort and corresponding development resources.



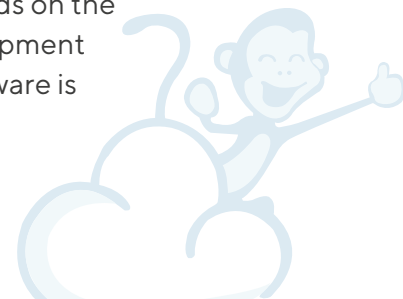
Why EWERK Chose Tungsten

Tungsten Fabric, formerly known as OpenContrail, was developed by Juniper Networks. After the code was released as an open source project to get the community, especially the service providers, more involved, it was necessary to find a patron or governance model similar to the Apache Software Foundation. In this process the project was renamed to Tungsten Fabric and handed over to the Linux Software Foundation. This allows for coordinated development within the community and long-term participation and commitment to the project.



EWERK on the Integration of Apache CloudStack and Tungsten Fabric

The EWERK Group mainly serves organizations in system-relevant industries with regulated IT. In these industries, highly complex IT infrastructure projects place special demands on the network. In order to meet these requirements, a future-oriented further development with the highest demand on technological know-how and flexibility of the software is needed. The support of Tungsten Fabric helps us to meet these requirements.

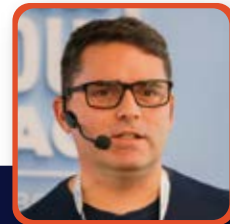


ENA Integrating Tungsten Fabric with CloudStack

When Education Networks of America (ENA) was founded in 1996, their vision was to provide Internet access to every K-12 school in Tennessee, USA. Today, that vision has been greatly expanded. ENA now delivers future-ready connectivity, communication, cloud, cybersecurity, and technology services to education, library, healthcare, and government organizations across the United States.

ENA serve community institutions that play a critical role in maintaining and growing overall socioeconomic well-being. That is why delivering exceptional customer care is more than a priority for ENA –it is part of the ENA DNA. Their 99% customer satisfaction rating and 81 World Class Net Promoter Score (NPS), which measures customer loyalty, reflect their commitment to providing their customers with the quality of service they need to meet their objectives and goals.

Simon Weller
ENA's VP of Technology



ENA is committed to the continued success of Apache Cloudstack and we felt integrating Tungsten Fabric, a class leading open source Software Defined Networking (SDN) product addresses a key feature gap. ENA has been part of Apache Cloudstack since its inception and we're proud that we're able to continue our work within the ACS community



Apache CloudStack and Tungsten Fabric - Key Outcomes for the Users

Apache Cloudstack has long provided flexibility regarding network configuration to serve the needed use case. Along with built-in functionality, ACS has supported a number of different Software Defined Networking (SDN) controllers, including VMware NSX multi-hypervisor (formally Nicara), Nuage and others.

However, Apache CloudStack lacked a fully-featured open-source SDN controller to deliver advanced networking features.

Apache Cloudstack's integration with Tungsten Fabric will finally close this feature gap providing many long sought-after features, including BGP, MPLS, service stitching and deep security policy capabilities to meet even the most stringent industry requirements.

CloudStack will be able to manage these advanced functions via tight integration with the underlying best-of-breed network controller, while Tungsten Fabric handles the network fabric.





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about Apache CloudStack?**

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