A10 NETWORKS OPENSTACK INTEGRATION

Overview

Growth in data center capacity and rates, new types of mobile devices, and an increasing number of applications are driving data center operators towards cloud delivery models. Data center operators need to support these growth trends while ensuring higher resource efficiencies as they scale up data center resources in an increasingly fast-paced environment. In order to gain the targeted business agility and scalability benefits, IT organizations need to develop plans that integrate emerging cloud infrastructure technologies.

Traditional data center infrastructure does not provide the agility and scalability needed to cost-effectively meet these growth targets. The challenge lies in provisioning and managing a broad range of compute, storage and network infrastructure. Manual service provisioning in a conventional data center is time-consuming and requires significant process overhead. Moreover, the delivery models are typically static and hence inflexible by design. As a result, the ability of data center administrators to react to change is adversely impacted.

To respond to these challenges, IT organizations are adopting emerging cloud delivery models. At one end of the delivery spectrum, cloud adoption is made possible through hosted applications otherwise known as software-as-a-service (SaaS), which allow users to consume software typically through a web browser. On the other end of the spectrum, hosted infrastructure-as-a-service (IaaS) architectures enable private and public data center operators to deliver virtualized infrastructure services in multi-tenant environments with automated provisioning, and they dramatically lower the cost of service delivery due to shared infrastructure. With IaaS, users can now leverage the public and private cloud infrastructure to quickly adapt to change using an elastic and cost-effective environment.

OpenStack is emerging as a leading platform for cloud data center operators (public and private IaaS) providing standards-based orchestration of virtualized, multi-tenant data centers, including compute, storage and network. But as cloud data center operators adopt these types of automatically provisioned, multi-tenant data center architectures, it is critically important that they also deliver seamless integration of application networking services with the other data center infrastructure to ensure appropriate service-level agreements (SLAs) and compliance. In order to effectively integrate advanced application networking services (L4-L7 services) into cloud platforms, a support for automated service provisioning of virtualized services per tenant is needed. This automation is an essential building block towards dynamic service chaining. It enables a compilation of networking resources and associated application networking services, and it becomes the foundation of an on-demand consumption model.

A10 Networks® provides integration with OpenStack to deliver the critical components needed for dynamic L4-L7 services provisioning, and for improved application availability, acceleration and security.

OpenStack – Ubiquitous Cloud Orchestration Platform

OpenStack aims to provide a "ubiquitous open source cloud computing platform for public and private clouds." It is touted as the Linux for cloud computing and is quickly evolving into the preferred orchestration platform for scalable, available and flexible cloud deployments. A10 Networks is an official corporate sponsor of the OpenStack Foundation, supporting the mission of protecting, empowering and promoting a standards-based approach to building public and private clouds.

OpenStack requires a higher upfront investment in the form of training and customization; however, the total cost of ownership (TCO) of the solution reduces with scale, making it an optimal choice for large deployments. Furthermore, OpenStack is a community effort, with contributions and support from key ecosystem stakeholders and no dependence on any single vendor. Lastly, OpenStack is designed from the ground up for cloud-aware applications, which maximizes the return on cloud investments. The goal is to deliver on the promise of an open, independent community approach that fosters rapid innovation and delivers the agility and scale needed for a cloud deployment.

OpenStack consists of multiple different modules (see Figure 1). A brief description of each module is listed below:

- Horizon (Dashboard): The Horizon module provides a graphical user interface to manage all data center network, compute and storage resources. The design is based on an extensible framework for building new dashboards from reusable components.
- Neutron (Networking): Neutron, formerly known as Quantum, is the networking component of OpenStack. It provides network as a service via a pluggable infrastructure so that third-party applications can integrate into the cloud.
- Nova (Compute): Nova is essentially a cloud compute fabric controller that enables users to automate and manage compute resources in a cloud. The module is hardware agnostic and is designed to interface with multiple virtualization environments as well as bare-metal workloads.

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- Swift (Object Storage): Swift component manages unstructured data to ensure data replication and consistency across a scalable horizontal storage cluster design. Inexpensive commodity hardware can be leveraged to retrieve data through APIs.
- Cinder (Block Storage): Cinder provides the ability to use persistent block-storage devices in a cloud deployment. Multiple storage platforms are supported in Cinder, providing raw storage for performance sensitive applications.
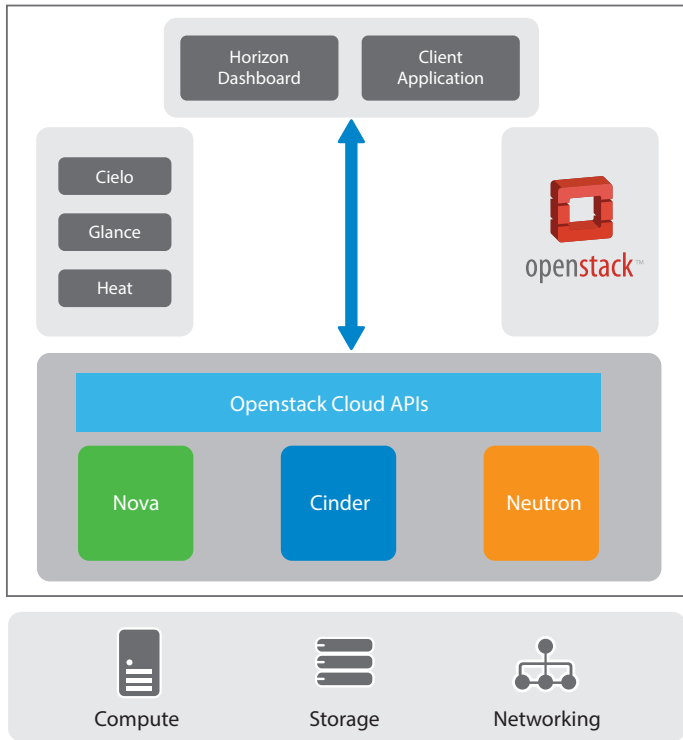

Figure 1: OpenStack Modules

In addition, OpenStack provides an image service (Glance) for management of virtual machine images, a telemetry service (Cielo) for all billing functions and a service module for orchestration (Heat).

Traditional networking and application networking devices integrate with Neutron and Horizon modules to provide a comprehensive automation of network features in the cloud environment. The integration of application networking services delivers the critical automation, service chaining and multi-tenancy necessary for creating an on-demand consumption model.

The A10 OpenStack Integration

OpenStack provides the LBaaS (load-balancer-as-a-service) extension to Neutron that introduces a load-balancing feature set into the Neutron core. A10 Networks' LBaaS plug-in module integrates with this extension to provide the functionality for interfacing with the A10 Thunder™ appliances, including physical, virtual and hybrid appliances. A10 Networks' OpenStack integration enables a dynamic provisioning of application networking (L4-L7) services on the OpenStack platform, providing the automation and agility expected in a cloud infrastructure. Figure 2 captures the components along with the APIs needed for this integration.

The A10 plug-in module allows automated enforcement of centralized tenant policy to new workloads and application services. Organizations can now manage and automate the provisioning of critical L4-L7 services required for application delivery on the underlying network fabric. Furthermore, the integration creates a choice of appliance form factors to deploy. A virtual, hybrid or physical form factor can be used to target the specific needs of IaaS infrastructure at a granular level.

Neutron Integration: The A10 LBaaS Driver integrates through Neutron's extension framework to provide networking services. The driver transforms the LBaaS object model so that it can be deployed on A10 appliances. RESTful APIs are used to manage LBaaS in a static configuration or through automation scripts. Dynamic provisioning enables application of appropriate policy as new flows arrive in the network. The performance of hybrid A10 Thunder appliances can be leveraged to run high-density multi-tenant environments. Furthermore, virtual Thunder appliances can communicate with A10 Networks' licensing infrastructure to provide an on-demand licensing model for subscription-based service. Lastly, the integration implements all three modes of load balancing to provide maximum design flexibility. The Routed mode, One-Arm mode and Direct Service Return (DSR) mode are available for deployment.

Horizon Integration: A10 Thunder OpenStack services drivers deliver the RESTful APIs needed for provisioning and management of LBaaS. Administrators and developers can access the Horizon dashboard to qualify and select LBaaS services. Virtual, hybrid and physical form factors can be used for service delivery.

The OpenStack Integration can be leveraged to drive application acceleration, improve availability while consolidating equipment and increasing efficiency of data center resources.
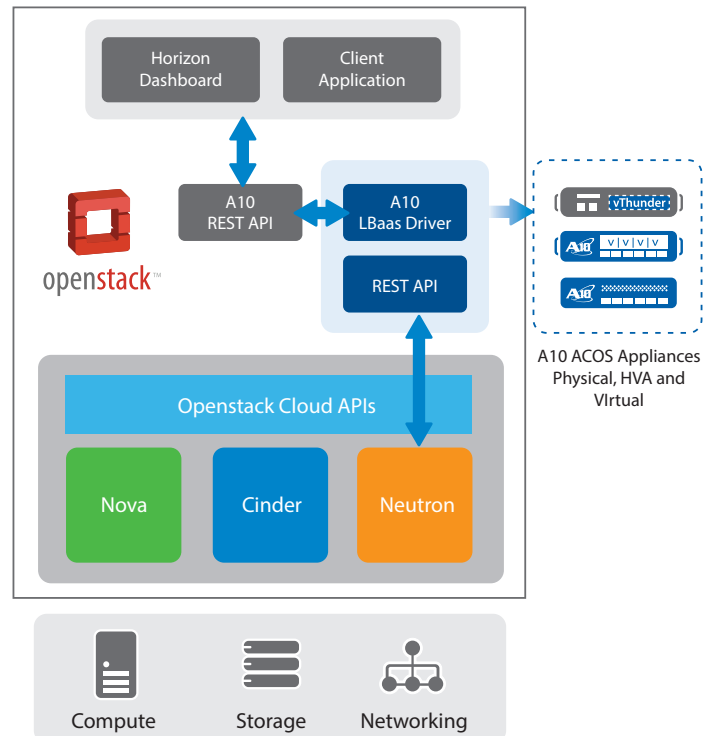

Figure 2: A10 Networks' OpenStack Integration

A10 OpenStack Integration Benefits

The A10 OpenStack integration ensures that tenant policies are automatically enforced on the OpenStack platform, delivering significant improvements in provisioning speed and reduction in operating costs. A choice of virtual, hybrid and traditional form factor allows complete flexibility in architecting an open and standards-based IaaS. A flexible solution along with the provisioning speed enabled by automation gives IT administrators the ability to quickly react to change. Furthermore, A10 products provide the necessary capacity so that web and key infrastructure services can scale seamlessly to meet elastic demands for resource intensive tasks such as L7 processing, SSL decryption and security functionality. Lastly, the CAPEX savings provided by A10's optimized pay-as-you-go licensing model for IaaS cloud operators reduces the total cost of ownership. The A10 solution thus offers the agility, scale, and necessary resource efficiency required for cloud operations.

The A10 Advantage

A10's OpenStack integration delivers a comprehensive orchestration layer by adding critical L4-L7 services. In addition, the A10 Networks aCloud™ Services Architecture provides increased agility and resource efficiencies through an on-demand subscription model and dynamic service chaining per tenant, while driving down TCO. With a range of physical and virtual form factors, the aCloud offering provides the flexibility needed for a diverse cloud scale deployment.

aCloud Services Architecture: The aCloud Services Architecture includes a portfolio of products and features that integrate with Software Defined Networking (SDN) network fabrics and cloud orchestration platforms, dynamically delivering application and security services and policies per tenant. The design incorporates five major architecture elements that enable the achievement of these objectives: 1) High performance physical appliances provide capacity for resource intensive operations; 2) Virtualized and hybrid appliances enable service provisioning to the host; 3) On-demand licensing reduces CAPEX; 4) SDN integration provides seamless integration with network fabrics; and 5) Cloud orchestration simplifies and accelerates service delivery. Overall, the design ensures that tenant policies are enforced with significant improvements in provisioning speed and scale, while reducing TCO. The benefits of aCloud Services Architecture are:

- **Automation**: A10 Networks aCloud Services Architecture enables customers to build an automatically provisioned application networking infrastructure by integrating plug-in service modules that support leading cloud orchestration and SDN platforms, including OpenStack.
- **Agility**: The architecture also supports emerging Cloud data center requirements to deliver application subscription services with on-demand virtual appliance licensing consistent with the way these data center operators deliver their other cloud subscription services.

- **Dynamic service chaining per tenant**: Cloud operators can enable their tenants to spawn new instances for Application Delivery Controller (ADC) (including advanced security services) or Carrier Grade Networking services on demand, and support dynamic L4-L7 service insertion according to tenant-defined or provider-defined policies.
- **Lower TCO**: A10 aCloud Services Architecture reduces total cost of ownership through a variety of means. Automated service provisioning eliminates manual provision overhead, time and costs. On-demand pay-as-you-go licensing models allow service providers to eliminate CAPEX, and only pay for services as they are consumed. And, cloud orchestration and SDN platform integration reduces operational costs by avoiding manual configuration tasks and reducing implementation times.

Efficiency and Flexibility for Cloud Architectures: A10 offers a portfolio of products that address varying IT delivery models, with a range of form factors, including physical and virtual appliances for dedicated data centers. Virtualized and partitioned appliances are also offered for multi-tenant hosted data centers, along with pay-as-you-go licensing models offering utility computing and networking services. All A10 products are built on Advanced Core Operating System (ACOS®), a platform of advanced networking technologies, which is designed to enable A10's products to deliver substantially greater performance and security relative to prior generation application networking products. The innovative ACOS architecture allows the system to maximize utilization of CPU resources, making A10 products ideal for cloud scale and performance requirements. The ACOS platform leverages Shared Memory Architecture and Flexible Traffic Accelerator to efficiently utilize multi-core processors and scale performance linearly with increasing CPU/processor density, providing following benefits:

- **Efficient Design**: Cloud-based data centers require high capacity, giving rise to a critical need to squeeze more from the same power, cooling and rack space to achieve world-class cost per workload. The ACOS platform has the industry's most efficient data center design, delivering significantly more throughput per unit of power and size. These efficiency benefits are a direct result of the high-performance design described above, which requires dramatically fewer CPU cores and memory to achieve a comparable capacity relative to conventional designs.
- **Flexible Software-Based Platform**: ACOS is inherently flexible because it is software-based. This makes it possible to constantly evolve and expand the feature set to address new market needs such as cloud orchestration. Whether you are using a physical or virtual appliance, the ACOS features and configurations are identical and transferrable across all appliance form factors.

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Summary

OpenStack gives IT organizations an open and standards-based approach to a scalable and agile cloud deployment. A10 Networks' OpenStack integration delivers the essential L4-L7 network application services to provide a homogenous solution for cloud provisioning and management. Cloud data center operators can now provide seamless integration of application networking services with the other data center infrastructure to ensure appropriate SLAs and compliance. A choice of form factor gives providers the flexibility to create a tailored offering in a high-density multi-tenant environment. With A10 Networks aCloud Services Architecture and ACOS platform, cloud operators can dynamically deliver application and security services and policies per tenant. Dynamic service chaining allows creation of an on-demand service model. In summary, the A10 OpenStack integration provides agility, scalability and reduced cost of ownership, helping businesses achieve the productivity gains and resource efficiencies necessary for success.

About A10 Networks

A10 Networks is a leader in application networking, providing a range of high-performance application networking solutions that help organizations ensure that their data center applications and networks remain highly available, accelerated and secure. Founded in 2004, A10 Networks is based in San Jose, California, and serves customers globally with offices worldwide. For more information, visit: **www.a10networks.com**

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