

Use Case Brief

CLOUD MANAGEMENT SOFTWARE AUTOMATION

Cloud Management Software can coordinate and automate server, network, and storage operations within the modern datacenter. This brief describes how Nuage Networks works with Cloud Management Software to automate your entire cloud service across hypervisors, across vendors, and across datacenters.

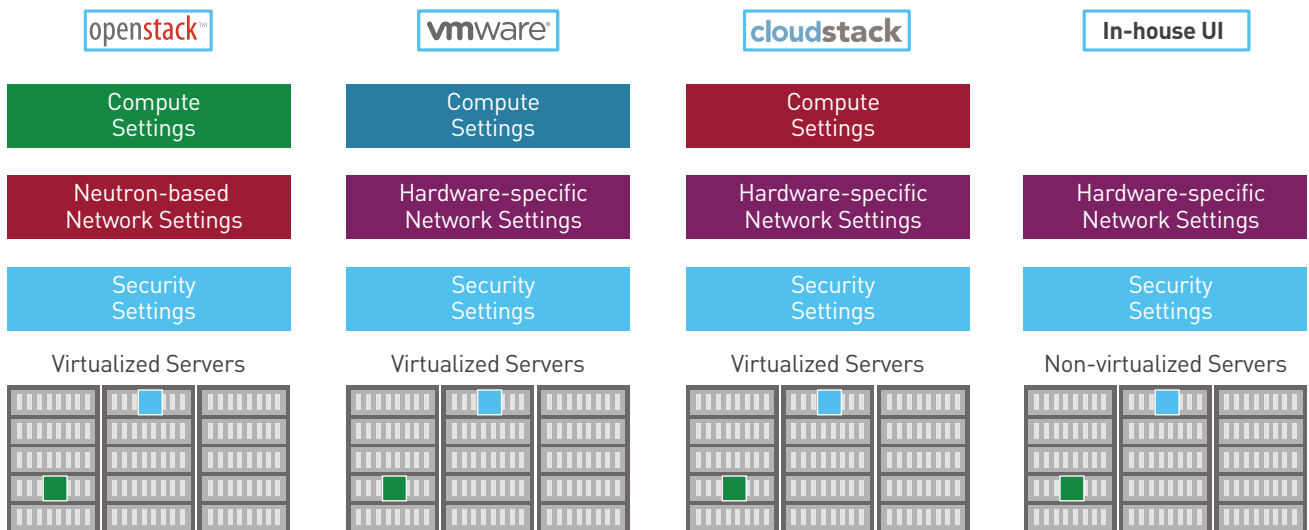
Challenges

Cloud Management Software (CMS) platforms such as OpenStack® software, CloudStack®, and VMware's offerings provide valuable overall IT orchestration. Yet, service providers are finding several challenges in implementing CMS systems for networking functionality:

- **Complexity:** CMS-based automation does not encompass network complexities such as cascading firewalls.
- **Network scalability:** CMS systems provide orchestration but not the scalability required by service providers.
- **Security and isolation:** Security and multi-tenant capabilities are limited.
- **Non-virtualized:** CMS systems typically encompass only fully virtualized resources.

These challenges are depicted in Figure 1.

FIGURE 1. Inefficient, manually-driven silos exist in most public clouds



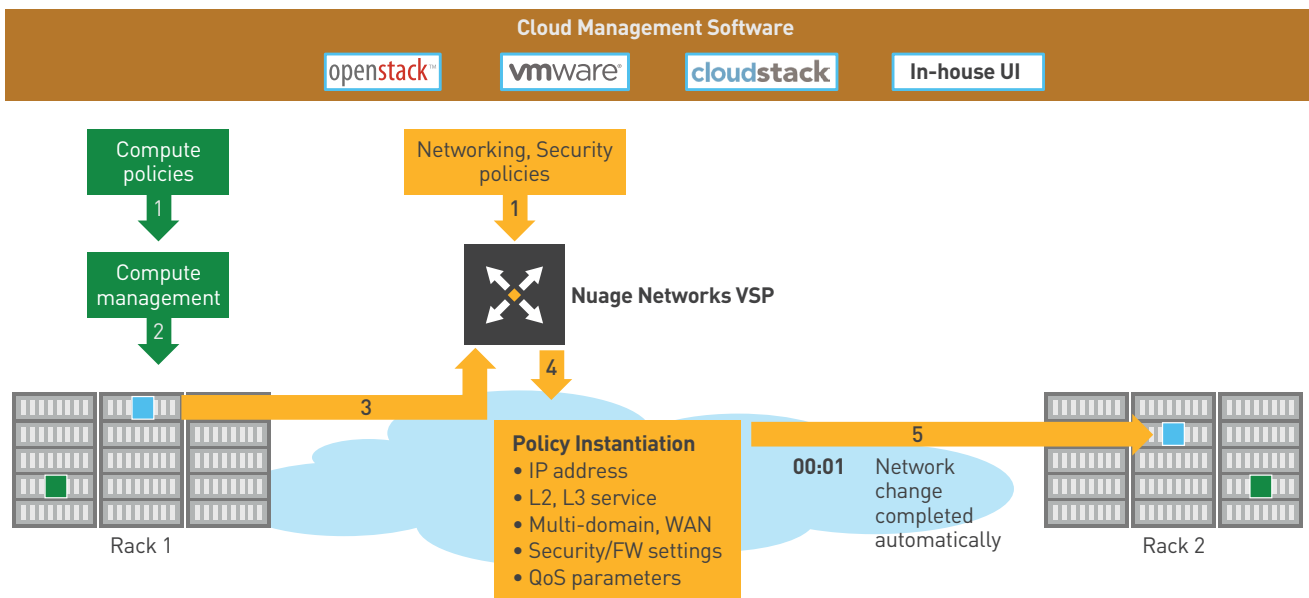
How We Help You

Nuage Networks Virtualized Services Platform (VSP) has been architected to be a non-disruptive overlay for all existing virtualized and non-virtualized network resources. No purpose-built networking hardware is required since all components are virtualized. In a way that is similar to how cell phones preserve their attributes while in roam mode, Nuage Networks VSP preserves the network attributes (required network settings including security) no matter where the workload is placed. By replacing the tie to the physical network element with a set of required network attributes, Nuage provides full network roaming capabilities for your workloads.

As shown in Figure 2, Cloud Management Software (such as the OpenStack, CloudStack and VMware platforms) orchestrates between server and network layers. Nuage Networks unifies all datacenters, network segments and both virtualized and non-virtualized resources into a unified, cohesive, and manageable cloud. Using plugins built to individual CMS standards, Nuage Networks VSP accepts instructions from, and relays information back to, the CMS.

With Nuage Networks VSP, the network flexes in real time to provision workloads — typically virtual machines (VMs) — that are being instantiated or moved. For the example below, in step 1 the CMS initiates a move request for a VM to both the server virtualization control plane (such as VMware® vCenter™) and to Nuage Networks VSP. In step 2, the server virtualization control plane initiates the move based on its policies. Nuage Networks VSP detects that the move is being initiated in step 3. In step 4, Nuage Networks VSP translates the Nuage Networks policy into required network and security attributes at Rack 2. In step 5, the VM is automatically moved and instantiated in real time with the appropriate networking profile and consistent metadata (such as networking counters and security definitions).

FIGURE 2. A public cloud with full automation across CMS systems and locations



CMS Automation Implementation and Functionality

By supporting standard, well-established network protocols such as Border Gateway Protocol (BGP), all network assets can be overlaid without requiring custom code or upgrades. Our software supports core IP products from Nokia, Arista, Cisco, Juniper and others as well as a range of load balancers, firewalls, DNS servers and other critical network components. For virtualizing bare metal physical assets, we provide optional software and hardware gateways. All components have been hardened to enterprise and service provider standards.

Nuage Networks VSP components are virtualized. Plugins for the desired CMS platforms are available from one or more sources. For example, the Open Stack Neutron plug-in can be obtained from Nuage Networks, partners such as Red Hat, or from development community sites such as GitHub. For bare metal resources, optional gateways can be installed. Once the appropriate network tunnels for communication among the components are set up, installation is complete.

To implement, Nuage Networks VSP policies (also called declarative policies) are defined in business terms by the networking team. For example, a Nuage Networks VSP policy would say that “this web interface is allowed to access this database” in place of using an explicit IP address-based method such as an ACL list. Service Chaining automation enables even the most complex automations to be performed, such as defining tiers of cascading firewalls for allowing the web interface to communicate with an application server that in turn communicates with a database server.

Policies have a hierarchical structure and are reusable. For example, the service provider’s networking team can define a master policy at the Virtualized Services Directory (VSD) level that cannot be altered. However, policies can be replicated, reused and customized across tenants and across applications or VMs. This structure ensures that the service provider can enforce overall policies, yet provide the tenant with control and customization where desired.

To scale the implementation, additional Virtualized Services Controllers (VSCs) and Virtualized Routing and Switching (VRS) agents (all installed in VMs) can be added seamlessly. This architecture, effective for a single rack in a datacenter, is consistent and effective up to Fortune 500 enterprise and service provider scale.

Then, when any CMS platform boots, moves or clones an application or VM, Nuage Networks VSP takes the appropriate response — programmatically and in seconds. All complexities, differences and process differences in the underlying fabric are masked from the VM, application and administrator.

How this Approach Changes the Game

This innovative approach provides game-changing functionality for CMS automation in a public cloud. These capabilities often exceed those of public cloud leaders. A few capabilities are highlighted below.

Benefits

- **Increases customer responsiveness:** Automation of Nuage Networks VSP efficiencies eliminates drudgery, shaves OPEX and minimizes manual interventions. As a result, responsiveness to customers is increased. For example, Nuage Networks VSP brings up new VMs and copies of applications much faster (one customer study measured a 10x speed improvement) than legacy approaches.
- **Increases reliability and predictability:** Service providers typically rely on an extensive library of customizable scripts for operations. Nuage Networks replaces these custom-built, unwieldy scripts with a single, robust automation architecture with the hardening, scalability, security and flexibility needed for service provider deployments. The net benefit is increased operations reliability and predictability.
- **Standardizes network resources:** Nuage Networks VSP delivers a unified and consistent model for consumption of network resources – across stacks, virtualized resources, and non-virtualized resources.

- **Complete UI-driven Self-service:** End users can literally control every aspect of their virtualized environment via their choice of user interface (such as a CMS interface, Nuage Networks VSP, or an in-house interface). This capability both increases customer control and enables private clouds to handle staggering volumes of customers, VMs, and request volumes.
- **Fully Automated Elasticity:** With complete end-to-end automation, VMs can be provisioned within seconds and new hardware can be added to the cloud within minutes.
- **High Security within the Datacenter:** Legacy security approaches focus on external threats rather than threats within the datacenter. The built-in security of Nuage Networks VSP, including the default “Zero Trust” model, operates at the VM and virtual network levels. By protecting the datacenter at the first connection point to the network for VMs and applications, full security and isolation are provided within the rack, within each customer’s operations, and within the datacenter.
- **Full Multi-tenant Isolation:** By removing the constraints imposed by legacy and hypervisor-based networking, Nuage Networks VSP enables full network isolation by tenant (customer/customer department). As a result, resource demands made by one tenant do not impact others. Further, Distributed Denial of Service (DDoS) attacks against one tenant do not compromise the performance of other tenants.
- **Scale-out Resource Model:** Nuage Networks scales out via federated controllers to present a unified network fabric to any size cloud. A unified fabric enables a number of leading-edge capabilities including consistent network service independent of underlying hardware, full workload portability among datacenters, and full programmability for future services.
- **Predictable Cloud SLAs:** By leveraging the capabilities of Nuage Networks VSP, private cloud service providers are able to provide predictable Service Level Agreements (SLAs). Nuage Networks VSP virtualizes the network to provide consistent, committed performance that is independent of the underlying server and network hardware. Further, SLAs can be defined for different levels of service.
- **Full Support across CMS Systems and Hypervisors at Scale:** The support of Nuage Networks VSP across CMS stacks and across hypervisors at scale is the foundation for a large-scale public cloud. These capabilities not only reduce infrastructure complexity but also provide the feature set necessary for efficient consolidation across datacenters and around the globe.

Why our SDN is Unmatched for CMS Automation

Nuage Networks is the best software defined networking choice for CMS Automation. Our products include sophisticated automation and integration capabilities that cannot be matched by any other vendor.

Delivers only end to end automation approach

Nuage Networks provides full end-to-end automation from a range of CMS systems across hypervisors, network hardware, and physical datacenters. Handling network complexities such as cascading firewalls is easy with capabilities such as Service Chaining.

Only product that brings both virtualized and non-virtualized resources under full CMS control

No one makes it easier than Nuage Networks to manage bare metal servers alongside virtualized resources. A software gateway meets most needs, and for more network-intensive requirements a hardware gateway is available.

Level-sets operations across the board

Nuage Networks drops-in and level-sets automation across existing datacenters — independent of hardware and software configuration and build-out.