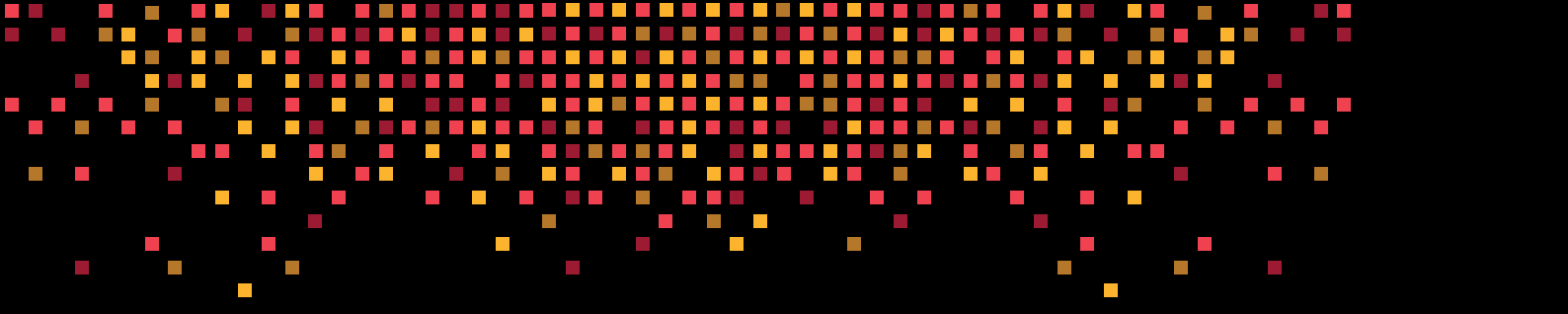# The evolving IT environment: Maximizing potential of open hybrid clouds

nuagenetworks

From Nokia

redhat®

Every enterprise, from small-and-medium businesses (SMBs) to global enterprises, needs business applications to run its business. While many enterprises use off-the-shelf software applications, most companies customize some applications or even write their own applications. Coding its own software allows an enterprise to build a specific toolset to support a unique business requirement that off-the-shelf software is not likely to provide.

The application development (app-dev) market has evolved into a significantly complex environment for enterprise IT. While historically, these requirements focused on desktop access to locally hosted applications, the options for types of applications, hosting locations and access requirements have grown significantly. In today's globally competitive environment, business applications need to be accessed from mobile devices as well as the Internet. Enterprises can host these applications in managed datacenters, public clouds and various mixed environments.

In addition to the dramatic evolution of the app-dev market, enterprise IT is rapidly evolving its overall IT environment to leverage the cloud. Many analysts are forecasting that annual cloud spending will exceed $100 billion. It is clear that enterprises are in a wholesale migration of IT to infrastructure clouds (IaaS) and app-dev clouds (PaaS), both public and private environments, and various combinations of the above. Based on these enterprise IT requirements, there is a market requirement for solutions that allow enterprise to build and manage cloud environments and dynamic networking to connect everything together.

BUILDING A DYNAMIC IT ENVIRONMENT WITH NUAGE NETWORKS AND RED HAT

Nuage Networks and Red Hat® have worked to integrate their respective cloud solutions to ensure that your IT environment is flexible, open and responsive — capable of supporting your app-dev requirements. Your cloud app-dev infrastructure will support growing business requirements, while enabling you to maintain complete control, with centralized management of one or many datacenters. Combining a proven infrastructure for open hybrid clouds with a complete network virtualization platform, your cloud will deliver to your requirements.

With integrated solutions from Nuage Networks and Red Hat you can build a highly scalable IT environment that supports dynamic application development. These solutions include:

- **Nuage Networks Virtualized Services Platform (VSP),** a Software-Defined Networking (SDN) solution that virtualizes any datacenter network infrastructure and automatically establishes connectivity between compute resources upon their creation

- **Red Hat OpenShift Enterprise 3.1**, the first enterprise-ready web-scale container application platform based on Docker™ format Linux® containers, Kubernetes™ orchestration and Red Hat Enterprise Linux 7; this solution provides full support from the operating system to application runtimes

- **Red Hat CloudForms 4.0**, a multi-cloud management platform, for complete lifecycle management across the entire infrastructure, from bare metal to hosts and virtual machines to virtual machine workloads

NUAGE NETWORKS VIRTUALIZED SERVICES PLATFORM

Nuage Networks VSP, as depicted in Figure 1, is a comprehensive networking solution built for open hybrid clouds. It supports app-dev, infrastructure and multi-cloud environments. Nuage Networks VSP can provide complete networking support for one or multiple datacenter sites globally. Nuage Networks VSP makes the network as readily consumable and flexible as an enterprise's virtualized compute resources, which is exactly what you need in highly dynamic application environments.

An SDN solution, Nuage Networks VSP virtualizes any datacenter network infrastructure and automatically establishes connectivity between compute resources as they are created. Leveraging programmable business logic and a powerful policy engine, the Nuage Networks VSP is an open and highly responsive solution that scales to meet the stringent needs of massive multi-tenant datacenters. As a software-based solution, Nuage Networks VSP can be deployed over existing datacenter network fabrics, allowing you to build app-dev, infrastructure and multi-cloud environments on top of any existing infrastructure.

Each of the three components of the Nuage Networks VSP performs a critical role in creating your flexible, highly efficient cloud environment.

FIGURE 1. Nuage Networks Virtualized Services Platform components

Nuage Networks Virtualized Services Platform (VSP)

Virtualized Services Directory (VSD)

Virtualized Services Controller (VSC)

Virtual Routing & Switching (VRS)
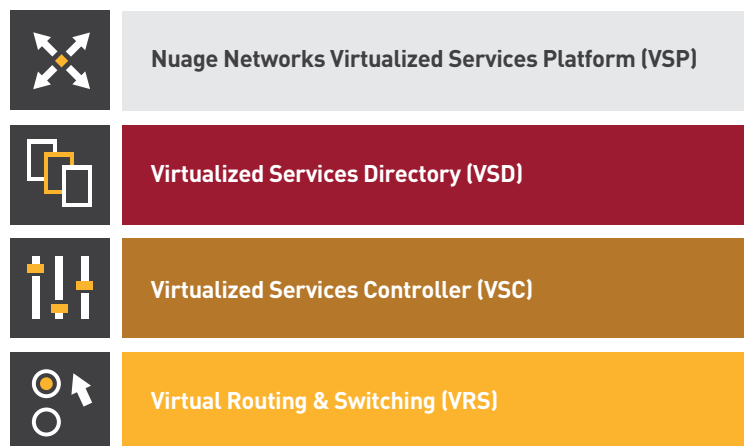
Virtualized Services Directory

The Virtualized Services Directory (VSD) is a programmable policy and analytics engine. It provides a flexible and hierarchical network policy framework that enables IT administrators to define and enforce resource policies in a user-friendly manner. The VSD contains a multi-tenanted service directory that supports role-based administration of users, compute and network resources. For service assurance, the VSD allows the definition of sophisticated statistics rules such as collection frequencies, rolling averages and samples, as well as Threshold Crossing Alerts.

Virtualized Services Controller

The Virtualized Services Controller (VSC) is the industry's most powerful SDN controller. It functions as the robust network control plane for datacenters, maintaining a full view of per-tenant network and service topologies. Through the VSC, virtual routing and switching constructs are established to program the network forwarding plane using the OpenFlow™ protocol.

Virtual Routing and Switching

The Virtual Routing and Switching (VRS) component is based on Open vSwitch (OVS) and constitutes the network forwarding plane. It encapsulates and de-encapsulates user traffic, enforcing Layer 2 to Layer 4 traffic policies as defined by the VSD. The VRS tracks virtual machine creation, migration and deletion events in order to dynamically adjust network connectivity.

FIGURE 2. Red Hat OpenShift features
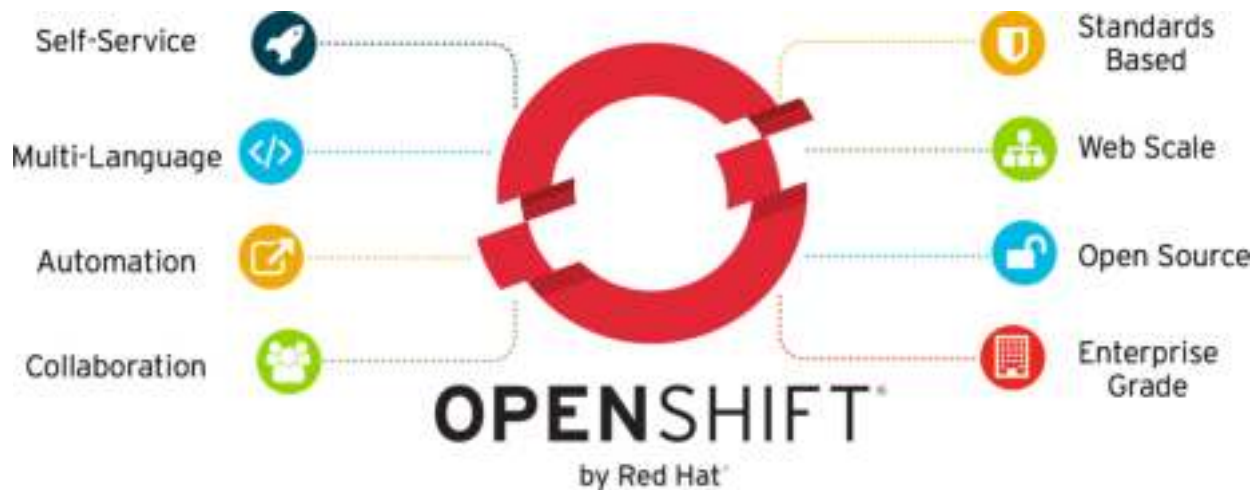
RED HAT OPENSHIFT ENTERPRISE

OpenShift Enterprise 3.1 delivers a container-based application platform based on Docker and powered by Red Hat Enterprise Linux. It provides a secure, efficient and portable way to develop, deploy and run application services. As shown in Figure 2, this solution also provides OpenShift users with access to the broadest ecosystem of packaged application components, combined with the security and trust delivered by Red Hat's Container Certification Program.

To orchestrate enterprise applications that typically span multiple containers and hosts, Red Hat OpenShift Enterprise 3.1 includes Kubernetes, a powerful, web-scale, open source, container orchestration and management engine developed with Google®. As a leading contributor to both the Docker and Kubernetes open source projects, Red Hat is not just adopting these technologies but actively building them upstream in the community.

Above this core container infrastructure platform, OpenShift adds a wide selection of tools for developers to create and collaborate on application projects, leveraging OpenShift web, command line, or integrated development environment interfaces. Developers can push their application code directly from Git and automate the Docker image build process using OpenShift's innovative source-to-image build capabilities. Developers can also manage application deployments and rollbacks and integrate these with their existing development and continuous integration tools. OpenShift Enterprise 3.1 includes enterprise middleware services from the Red Hat JBoss® Middleware portfolio including application container services with Red Hat JBoss Enterprise Application Platform, Red Hat JBoss Web Server (Tomcat) and messaging services with Red Hat JBoss A-MQ.

As you expand your adoption of container-based application delivery solutions, you need the capacity to deploy, run and manage your applications more efficiently and consistently. This shift towards containerized applications and immutable infrastructure enables you to easily deploy new microservices-based applications architectures, while also managing your existing applications across physical, virtual, private and public cloud environments. Red Hat OpenShift Enterprise 3.1 delivers a powerful and fully supported container-based development and deployment platform for managing these applications across the lifecycle.

RED HAT CLOUDFORMS

Red Hat CloudForms 4.0 provides all the advanced capabilities that you need for efficiently managing open hybrid clouds in your enterprise, including a self-service catalog, policy-based governance, service orchestration, configuration and drift management, chargeback, show-back and reporting, and IT operations management integration. These capabilities are supported across multiple virtualization and cloud technologies including Red Hat Enterprise Virtualization, VMware® vSphere®, Red Hat Enterprise Linux OpenStack® Platform, Microsoft® System Center Virtual Machine Manager and Amazon® Web Services. CloudForms cloud management will also be extended to the application development environment through integration with Red Hat OpenShift Enterprise (OSE). As highlighted in Figure 3, Nuage Networks VSP will extend networking capabilities to the CloudForms services catalog.

CloudForms adds automation to OSE delivery and installation by implementing OSE as a CloudForms Service Catalog request item. CloudForms policy then enables automated deployment and configuration of these OpenShift Enterprise service blueprints. Administrators can build pre-formed service blueprints, or go through CloudForms dialogs to set up a delivery service, which can be all-in-one or in any install hierarchy or OSE server role (message, database, broker, node).

The CloudForms "OpenShift service item" invokes a set of workflows that build an OSE cluster based on pre-defined policies. These servers can then be kick-started, cloned or ISO–installed based on requirements. Cloudforms will enumerate OSE servers and apply policies as desired, configuring each server as designated by the service designer, including msgServer, dbServer, Broker or Node. OSE gear management is also supported in the catalog for create, read, update and delete operations, and SmartManagement tags will show Red Hat policy execution and status for the gears.

With CloudForms 4.0, there is a full operational experience to OpenShift infrastructure administrators, including management of containers via Kubernetes, as well as OSE capacity, utilization, performance and provider discovered inventory.

FIGURE 3. Red Hat CloudForms, with provider model for networking

Bringing it all together

As widely forecast by many analysts, the market spend for cloud environments is huge, with some forecasts exceeding a $100 billion spend annually on cloud services. There is a massive shift by enterprises to cloud environments, which in turn means more of their IT requirements are being addressed in the cloud. These include infrastructure (IaaS) and app-dev (PaaS), both private and public environments, and many combinations of all of these. Analysts are also forecasting that the dominant cloud environment will be hybrid clouds, combining both public and private environments. Based on this migration, you need tools and capabilities to support the management of your workloads in the cloud.

Nuage Networks and Red Hat have integrated their respective cloud solutions to support enterprise IT requirements. Specifically, integrating Nuage Networks VSP with the OpenShift Enterprise orchestration layer provides dynamic networking capabilities for OpenShift app-dev workloads. This integration allows for network connections to follow app-dev workloads throughout their lifecycles, regardless of where the workloads are placed. As depicted in Figure 4, the integrated capabilities of Nuage Networks and Red Hat provide all the tools you need to support infrastructure, app-dev, and multi-cloud management as well as the networking to connect everything together.

- As enterprises migrate to hybrid cloud environments, integration capabilities for application development are based on JBoss Fuse

- Red Hat OpenShift builds a highly scalable and flexibile app-dev environment with complete lifecycle management capabilities

- Red Hat CloudForms provides complete multi-cloud management capabilities

- Through its integration capabilities, Nuage Networks underpins the Red Hat tools outlined above, to provide a globally scalable and dynamic network virtualization capability

FIGURE 4. Supporting IT requirements with an open hybrid cloud from Nuage Networks and Red Hat

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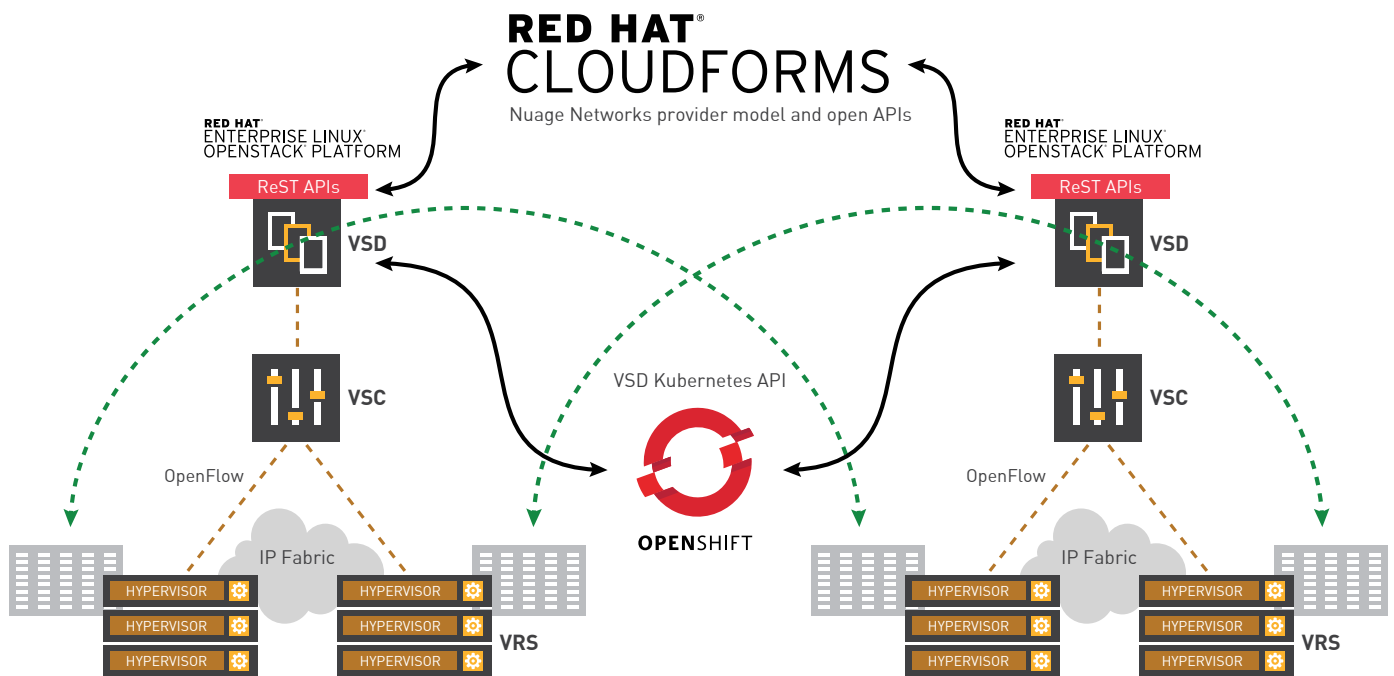
JOINT PROFESSIONAL SERVICES TO SUPPORT CLOUD READINESS

Nuage Networks and Red Hat also offer integrated professional services to ensure you get maximum benefit from your cloud solution. By calling on the experience of these two industry leaders, you can ease the transition to a virtualized datacenter and:

- Maximize the value to your business by adopting SDN for your app-dev, infrastructure and multi-cloud environments
- Minimize the risk and business impact of implementing cloud technologies
- Improve efficiency with integrated business applications, IT infrastructure and datacenter networking

Analysts are forecasting that the dominant cloud environment will be hybrid clouds, combining both public and private environments.

FIGURE 5. Nuage Networks and Red Hat integrated professional and consulting services
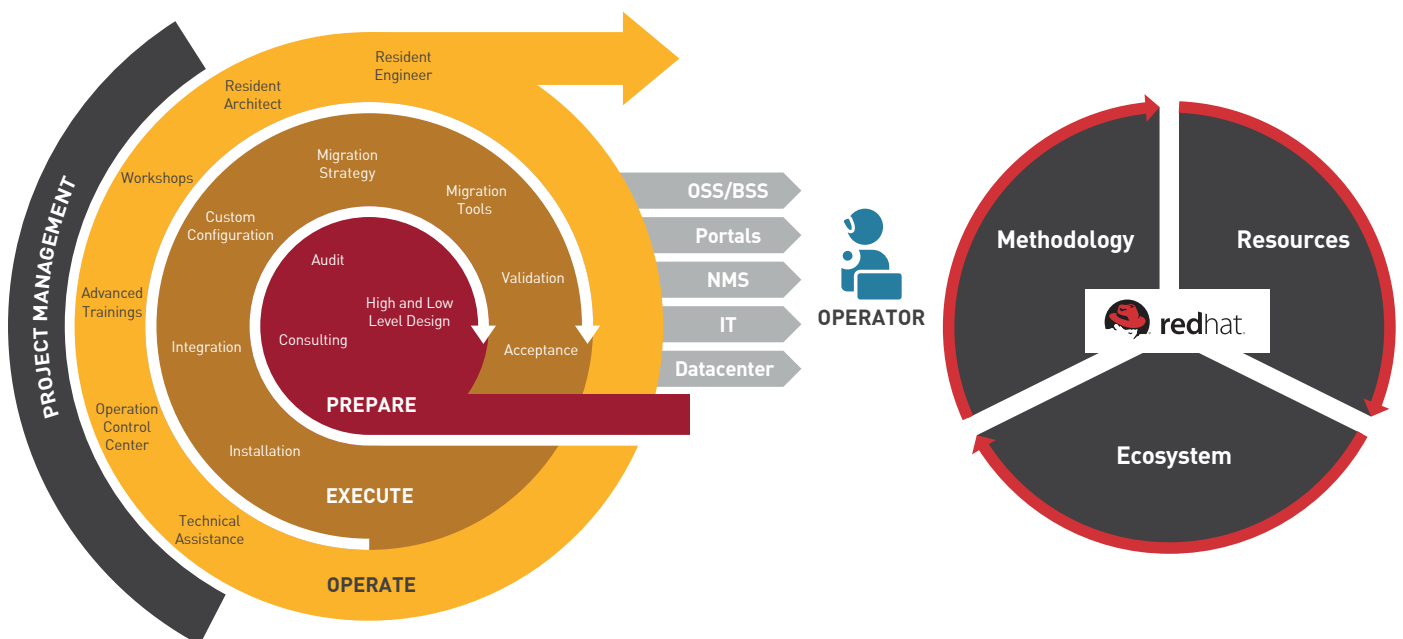
Get on board

Effective use of cloud technologies is rapidly becoming a significant competitive differentiator. To keep up with the dynamic pace of business today, you need a secure and dynamic cloud-optimized infrastructure. You need to be able to take advantage of all the virtues of the cloud — flexibility, adaptability, scalability, time-to-market — without burdening operations or putting your business at risk.

Nuage Networks and Red Hat can deliver what you need.

About Red Hat

Red Hat is the world's leading provider of open source software solutions, using a community-powered approach to reliable and high-performing cloud, Linux, middleware, storage, and virtualization technologies. Red Hat also offers award-winning support, training, and consulting services. As a connective hub in a global network of enterprises, partners, and open source communities, Red Hat helps create relevant, innovative technologies that liberate resources for growth and prepare customers for the future of IT.

Learn more www.redhat.com

About Nuage Networks

Nuage Networks (www.nuagenetworks.net) brings a unique combination of groundbreaking technologies and unmatched networking expertise to the enterprise and telecommunications industries. The Silicon Valley-based business has applied radically new thinking to the problem of delivering massively scalable and highly programmable SDN solutions within and across the datacenter and out to the wide area network with the security and availability required by business-critical environments. Nuage Networks, backed by the rapidly growing IP/Optical Networks business of Nokia, has the pedigree to serve the needs of the world's biggest clouds. The cloud has made promises — the mission of Nuage Networks is to help you realize them.

Learn more about Nuage Networks and Red Hat SDN-based hybrid cloud solutions at www.nuagenetworks.net/partners/red-hat.