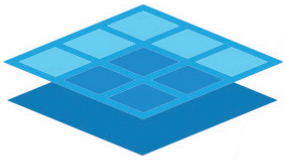
Enterprise Kubernetes Solutions

Comparing Platform9 Managed Kubernetes (PMK) and Red Hat OpenShift



PLATFORM9

Platform9 Managed Kubernetes (PMK) is the industry's only SaaS-based continuously managed Kubernetes service that runs anywhere and guarantees 99.9% SLA with remote monitoring, healing, upgrading, and security patching.

OpenShift provides three separate products:

- **OpenShift Online** offers managed Kubernetes in the public cloud,
- **OpenShift Dedicated** offers managed, single-tenant Kubernetes clusters in the public cloud
- **OpenShift Container Platform** offers deployment on-premises or any public cloud.

OpenShift Online and OpenShift Dedicated are hosted services running only on AWS and do not let you leverage your existing on-premises infrastructure or edge locations.

If you're looking to run on-premises, or on mixed, hybrid environment, then you're directed to the OpenShift Container platform. The OpenShift Container platform is a traditional data center software solution that needs to be deployed and managed by customers themselves with the need for significant Kubernetes operational expertise and having to deal with ongoing complexity of day-2 operations.

We will use OpenShift Container Platform for this comparison with PMK. Let's first review the key differences between the two solutions, before drilling into a detailed comparison table.

The three most important differences between Red Hat OpenShift and Platform9 Managed Kubernetes are:

1. **Managed Service**
2. **Implementation and integration complexity**
3. **Proprietary lock-in**

1. Managed Service

With OpenShift manage Kubernetes Clusters on your own

Red Hat OpenShift Container Platform is a set of software components that have to be installed and managed by the customer on their own infrastructure similar to traditional software products. Customer's internal IT operations team is responsible for ongoing day-2 operations such as enterprise-grade HA, RBAC and access control, security breach prevention, multi-tenancy errors, resource failures, hardware failures, security breaches into the network, vulnerabilities in Kubernetes and Docker, and preview features causing component failures or bugs in the environment. While OpenShift provides many tools needed to run Kubernetes in production, the burden is on the customer to learn and operate these systems with strict SLAs. This can pose a significant challenge because many companies lack Kubernetes operational skills and it is quite difficult to hire and retain Kubernetes talent.

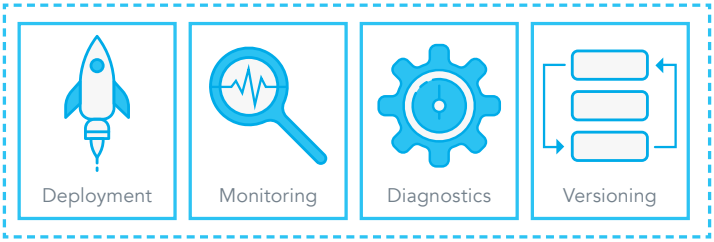
Red Hat provides traditional support subscription, where troubleshooting and on ongoing remediation are handled via support tickets. Any issues that customers encounter with managing Kubernetes at scale on their own - including manual upgrades - require engaging with the OpenShift support team, which can prolong resolution considerably.

With Platform9 managed Kubernetes, you get 99.9% uptime guarantee with no operational overhead

Platform9 Managed Kubernetes delivers Kubernetes as a fully managed SaaS solution without professional services or complex packaged software deployments. PMK eliminates the operational burden of Kubernetes at scale by freeing the internal staff, and offloading all production issues, monitoring, troubleshooting and healing to be handled automatically - by the service, with 99.9% SLA guarantee.

Some of the critical operational capabilities that are included out of the box are: zero-touch upgrades, multi-cluster operations, high availability, monitoring, diagnostics, and more.

Operations Automation



Platform9 has a team of Certified Kubernetes Admins (CKA) that are available at a moment's notice to proactively remediate issues when needed to ensure 99.9% uptime guarantee. This team are the first responders for the customer's operations team when new vulnerabilities are discovered in Docker, the OS, Cloud Providers, Kubernetes, and anything the Kubernetes cluster touches. If the issue is a serious P0 security vulnerability, the platform9's team will find a fix, test, and ship it in a few days. Platform9 is also on the private distributors list for security vulnerabilities under kubernetes/sig-release. This enables the platform9 team to get vulnerability information before the public does so they can accelerate proactive fixes.

Customers gain significant OpEx savings since they don't need to hire and retain in-demand Kubernetes experts. They can reallocate existing ops staff to work on more strategic initiatives such as CI/CD pipeline management, application performance tuning, and capacity planning instead of dealing with Kubernetes infrastructure operations.

For a detailed list of Kubernetes components and services that Platform9 remotely monitors, alerts and remediation actions, please see Appendix.

Here is a recent example of Platform9's proactive managed service in action:

11 Day Resolution of the Runc-and-CVE-2019-5736

- The Bug was identified on the same day before Kubernetes announced it on February 11th.
- By February 12th, Platform9 had a dedicated team of kubernetes experts working on a solution.
- The following week the fix was tested and it was being shipped as part of our 3.10 Release with hardening by complete by the end of week (2/22).
- The SaaS-Managed architecture allows us to push these patches and fixes almost instantaneously to the customer community and their k8s control planes

2. Implementation and integration complexity

In order to provide an enterprise-grade Kubernetes environment that includes integrated UX, API's, identify management, storage service, service catalogs, cloud automation etc, Red Hat offers a number of different products from the Red Hat portfolio that need to be integrated with OpenShift, including CloudForms, Core OS, Ceph, Red Hat OpenStack, and more. These disparate products all have their individual roadmaps and release timelines and require significant integration and testing to implement with OpenShift Kubernetes offering. In particular, CloudForms takes a very heavy scripting approach to cloud automation requiring expensive professional services, training, and certification. Red Hat's ticket-based support will become a bottleneck in maintaining SLA's and troubleshooting production outages that can span different products and integrated components.

When analyzing the potential man hours, professional services costs, and training/implementation time investments required to operationalize OpenShift, the picture begins to paint an overwhelming figure that suggests that it will not flatten cost curves in YR1 or improve efficiency in operations and development.

The customer still needs to have on-call staff to manage operations at scale. The bigger the environment, the greater the number of potential issues and the greater the number of people needed to perform day-to-day maintenance.

On the other hand, PMK is a single integrated managed service that provides the self-service enterprise-grade capabilities out-of-the box backed with 27x7x365 SLA. You can start using the service within an hour once you plug in your infrastructure credentials into the PMK portal. This improves time-to-value and lowers both implementation and admin costs.

3. Proprietary lock-in

Although Red Hat OpenShift uses open-source Kubernetes as a foundation, its implementation has forked off the pure upstream Kubernetes, and is proprietary along several dimensions. This forces customers to get locked-in to the platform with a very difficult and expensive migration path to other solutions or in order to take advantage of integrated services that use the pure open source version of Kubernetes.

The following is a short list of OpenShift features that can lock-in customers to the Red Hat platform:

1. **Differs significantly from upstream Kubernetes:** Has its own proprietary/wrapper API's that is incompatible with Kubernetes constructs and Open source API's. Users that built their containerized applications on open source Kubernetes will find that these apps will not run on OpenShift and vice versa without configuration/ code modifications thus promoting lock-in and limiting portability. To complicate matters, Red Hat has their own community distribution of Kubernetes called OKD (Origin Community Distribution) which is independent of the actual upstream Kubernetes (under CNCF) and runs parallel to it. OpenShift does not support the native Kubernetes Deployment construct & the Namespaces object. OpenShift equivalents exist for both.
2. **Supported only on Red Hat Enterprise Linux (RHEL):** No other Linux or Windows Operating Systems are supported as the OS for production deployments- limiting your infrastructure options.
3. **Difficult to integrate with external container registries:** Openshift comes with its built-in private registry but it does not work very well with external registries such as DockerHub. Because of complex security requirements and configs specific to Openshift, a user is prevented from pulling a docker image from DockerHub or other registries. A user would have to build image streams, secrets management, and built to image in a lot of cases thus effectively locking the user into using only the OpenShift private registries.
4. **It uses proprietary App Templates:** OpenShift does not support standard Helm charts, instead forcing customers to use their OpenShift templates which are nowhere near as powerful and feature-rich as Helm charts. OpenShift customers are unable to leverage the rich ecosystem of applications created by thousands of people in the community and delivered as Helm charts.

5. **Lags several months behind upstream Kubernetes versions:** Openshift is typically two versions behind the latest stable upstream version of Kubernetes, which means users will not be able leverage the latest features. For example, CoreDNS was delivered in Kubernetes 1.13 (in Feb 2019) and OpenShift will not have it until late summer 2019.

On the other hand, PMK deploys upstream open source versions of Kubernetes - certified by CNCF, with no forks. This ensures that customer applications are portable across any certified Kubernetes distribution using the standard Open API's. Furthermore, with PMK, the same version of upstream Kubernetes can be deployed to any target cloud provider including AWS, Azure, VMware, or bare metal. This eliminates lock-in from proprietary distributions but also avoids lock-in to the Kubernetes services offered by the public clouds such as AWS's EKS or Azure's AKS, allowing customers to deploy open source Kubernetes easily on the 'regular', much cheaper, instances types (i.e. EC2)).

PMK provides an app catalog with hundreds of pre-built applications based on Helm charts from the Kubernetes community which are available to deploy with a single click.

Detailed Comparison

The following detailed comparison table covers 18 technical and operational categories including deployment & provisioning, application & infrastructure management, and production features such as HA, zero-touch upgrades, and monitoring. The pie charts indicate level of completeness of the corresponding capability in PMK and OpenShift.

	PLATFORM9 MANAGED KUBERNETES (PMK)		RED HAT OPEN SHIFT	
Provisioning of Kubernetes Clusters	» Fully automated provisioning of clusters on any infrastructure: on-premises, public clouds, or at the edge		» With the current 3.11 release, the installation is more manual / script based with ansible scripts	
High Availability and Healing	» Built-in support for highly available clusters out of the box » Clusters of 1/3/5 masters are supported for quorum » Built-in etcd high availability support » Supports full repair or recovery of etcd upon failure		» Supports a highly available cluster deployment » The default HAProxy load balancer can be used to create a multi-master and multi-etcd cluster environment - with etcd nodes either forming their own cluster or deployed on the same node as the master	
Deployment Model(s) Supported	» Platform9's unique remotely hosted SaaS-managed offering means that customers can run their upstream open source kubernetes clusters on any infrastructure: on-premises, VMware, public clouds, or at the edge. Platform9 remotely handles all the complex monitoring, alerting, upgrading, and SLA management.		Three deployment models offered: Hosted Public Cloud Offering - trial environment only OpenShift Dedicated - Single-tenant, high-availability OpenShift clusters hosted on Amazon Web Services. Delivered as a hosted service OpenShift Container Platform - Enterprise offering available for large customers with on-prem and/or hybrid infrastructure.	

	PLATFORM9 MANAGED KUBERNETES (PMK)		RED HAT OPEN SHIFT	
Prerequisites and Operating System Requirements	» Supports all popular enterprise Linux distributions - Red Hat, CentOS, Ubuntu		» Supports Red Hat Linux only » RHEL subscription is required and included as part of the OpenShift bundled product subscription	
Monitoring and Operations Management	» 24 x 7 live monitoring » 99.9% guaranteed SLA » Proactive repair » Automated email notifications for any issues » Automated support ticket creation and triaging of issues		» Diagnostic tools via command line for health statistics » Environmental health check information: » Prometheus is available and comes pre-configured with OpenShift 3.11.	
Cluster Upgrades	» Fully automated cluster upgrades delivered seamlessly, with no interruption to the environment » Zero-downtime upgrade		» OpenShift provides Ansible playbooks for upgrades. Built-in automated cluster upgrades are not available in OpenShift 3.11	
Multi-cluster Management	» Built-in multi-cluster support. Create any number of clusters » Admins can manage multiple clusters across different regions, data centers, and clouds		» A typical deployment creates a single Kubernetes cluster that is designed to scale up to 2000 nodes » All users of that deployment are expected to share that single cluster and achieve isolation via a combination of Kubernetes namespaces, and OpenShift multi-tenancy » Multiple clusters achieved through multiple OpenShift deployments	
Multi-tenancy, Role-based Access Control, and Single Sign-on Support	» Support for multi-region management. Built-in multi-tenancy support » Kubernetes RBAC is fully supported » Full support for Single-Sign On (SSO). Integrate with a SAML-based provider that your organization uses such as Okta, ADFS, Ping Identity, etc.		» Delivers multi-tenancy through projects, called Kubernetes namespaces » Kubernetes RBAC is utilized to define granular access policies for users » There is no cross cluster multi-tenancy	

	PLATFORM9 MANAGED KUBERNETES (PMK)		RED HAT OPEN SHIFT	
Load Balancing	» Out of the box support for cluster and service level load balancing with MetalLB load balancer » Can integrate with customer-specific load balancers (AVI and others)		» Out of the box support for cluster and service level load balancing with default HAProxy load balancer. Other load balancers are supported with plug ins.	
Private Registry Support and Image Management	» Does not provide out of the box support for private registries » Registries and secrets required to authenticate with the registries need to be managed by the customer separately		» The internal integrated Docker registry can be deployed in the OpenShift environment to locally manage images. OpenShift does not handle DockerHub well with their private registries. Because of complex security requirements and configs specific to openshift, a user is prevented from pulling a docker image. A user would have to build image streams, secrets management, and built to image in a lot of cases, unlike pure kubernetes which is much less complex.	
Hybrid Cloud Integrations and APIs	» Includes the most native integration with all major private data center/private cloud offerings and major public cloud providers » Integrates natively with VMware vSphere, Linux/KVM, OpenStack » Clusters on public clouds are created with the public cloud's IaaS layer to provide a native Kubernetes cluster experience		» Provides a managed deployment on AWS » A joint collaboration has been announced with Microsoft to support OpenShift deployment on Azure	
Enterprise Grade User Experience	» Provides an enterprise class UI and user experience » The clarity UI provides a single pane of glass across bare metal, virtualized and containerized workloads » Unify all your data centers, private clouds, and public clouds under single UI		» Provides a native UI that enables management of your Kubernetes resources and the catalog	

	PLATFORM9 MANAGED KUBERNETES (PMK)		RED HAT OPEN SHIFT	
Application Lifecycle Management - Application Catalog	» Built-in support for Application catalog that's populated with public Helm chart applications » Administrators can provide users access to applications that are private to the organization » Support for managed apps		» An extensive application catalog and PaaS layer helps with building and deploying apps » The service catalog is based on Open Service Broker API » It ships with two service brokers, one to enables applications from their built in app template library, the other is an ansible broker » The templated applications support - Rails (Ruby), Django (Python), Node.js, CakePHP (PHP), and Dancer (Perl) » The Ansible broker supports integration w/ Ansible Playbook Bundles (APB) » The service catalog offers Prometheus, EFK, Jenkins etc.	
Production Grade Service Level Agreement	» Platform9 contractually promises 99.9% cluster uptime and high availability » Provides self-healing, problem resolution through the service		» Provides traditional support via subscription model » Troubleshooting is handled via support tickets » Customers drive the manual upgrades and any issues require support team engagement	
Ease of Setup, Installation, Continuous Use, Management, and Maintenance	» Platform9's SaaS managed gets Kubernetes up and running in minutes » Create a simple Kubernetes cluster using on-prem servers, VMs or public cloud resources in minutes » Manage clusters with one-click UI-based upgrades and troubleshooting		» Installing and configuring OpenShift is a manual process which is ansible-based Several ansible playbooks are required during the installation	

	PLATFORM9 MANAGED KUBERNETES (PMK)		RED HAT OPEN SHIFT	
Networking Support and Integrations	» Provides full CNI support » Integrates OOB with Flannel, Calico, Weave, and OpenContrail » Other CNI compatible integrations possible on customer request		» OpenShift provides CNI support and can integrate with any CNI based SDN » By default OpenShift SDN is deployed, which configures an overlay network using Open vSwitch (OVS) and supports 3 modes: – Flat network model with ovs-subnet plugin where every pod can communicate with every other pod – Project level isolation for pods – Services using ovs-multitenant plugin, and which enables administrators to configure their own isolation policies using Network Policy objects with ovs-network policy plug-in » Out of the box third party CNI plugins supported: Flannel, Nuage and Kuryer	
Storage Support and Integrations	» Supports integration with any flexvolume drivers » Integrates with any cinder supported storage backend. - Supports integration with all popular storage backends such as NetApp, Pure Storage, etc.		» Supports integration with network based persistent storage using the Kubernetes persistent volume framework » Supports a wide variety of persistent storage endpoints such as NFS, GlusterFS, OpenStack Cinder, FlexVolume, VMware vSphere etc	
Self Service Provisioning	» Complete self-service provisioning enabled via Platform9's clarity UI » Users log into the UI as part of a specific Tenant (eg dev/test/production) and are able to access clusters provided they have been granted access » Quick deployment of pods, deployments, and services via a wizard		» Provides a self-service UI that is separate from the default Kubernetes dashboard UI to enable self-service for developers and administrators	

	PLATFORM9 MANAGED KUBERNETES (PMK)		RED HAT OPEN SHIFT	
Built-in CI/CD Support	» Provides Spinnaker and Jenkins via the Helm application catalog		» Pipelines and Build Strategies simplifies the creation and automation of dev/test and production pipelines » Ships out of the box with a Jenkins build strategy and client plugin to create a Jenkins pipeline. However, the setup to create and configure production pipelines is manual and time consuming. » The pipeline build configuration creates a Jenkins master pod (if one doesn't exist) and then auto-matically creates slave pods to scale jobs & assign different pods for jobs with different runtimes	

Summary

Kubernetes is enormously complicated to operate at scale. The Appendix lists just a small subset of SLA events that can occur in an actual production environment. Monitoring these events, triggering alerts, proactively preventing production outages to maintain enterprise SLA's requires a sophisticated monitoring/alerting system combined with Kubernetes experts who are available on call to fix issues 24x7.

Red Hat does not invest time or resources for managing any of this on behalf of the customer other than providing assistance in implementing and servicing any issues that may occur as part of standard customers ticket-based support contract or otherwise offering expensive professional services.

Platform9 Managed Kubernetes is the industry's first SaaS-based continuously managed service is production ready and easy to use. Benefit from the open source innovation with our 100% pure upstream Kubernetes, avoid lock-in, and ensure portability across environments. Let platform9 handle all the complex operational tasks including zero-touch upgrades, patching, logging, monitoring, alerting, and high availability.

To learn more, please visit

platform9.com/managed-kubernetes

Appendix: Platform9 provides End-to-End Financially Backed SLAs across all Kubernetes components

Platform9 provides live real-time monitoring, alerting, and proactive remediation for all the following Core Kubernetes System & Resource Components (Listed, not limited to):

SLA EVENT SCENARIO	ALERT DETAILS/ CONDITIONS CHECKED	TRIGGERS	POSSIBLE REMEDIATION ACTIONS
host-down	Node is offline (Both Platform9 hostagent and Platform9 sidekick service responsible to monitor the health of hostagent are not responding). (Triggered for master and worker nodes)	» automail-customer	» env-fix
host-massacre	Greater than half of the nodes in given region are determined to be offline (Both Platform9 hostagent and Platform9 sidekick service responsible to monitor the health of hostagent are not responding)	» p0-ticket-ops » automail-customer » manualmail-customer	» bug-fix » env-fix
role-not-converged	One or more of the roles applied by Platform9 is either not currently running, or is not correctly installed and hostagent was unable to self-heal the service. (Triggered for master and worker nodes)	» page-ops » p0-ticket-ops » automail-customer » manualmail-customer	» bug-fix
kube-node-not-ready	Kubernetes node status is not-ready and scheduling is not disabled on the node	» page-ops » p0-ticket-ops » automail-customer » manualmail-customer	» bug-fix » env-fix

SLA EVENT SCENARIO	ALERT DETAILS/ CONDITIONS CHECKED	TRIGGERS	POSSIBLE REMEDIATION ACTIONS
kube-autoscale	Desired state count of master or worker nodes is different from actual count of master or worker nodes in the cluster	» page-ops » p0-ticket-ops » automail-customer » manualmail-customer	» bug-fix » env-fix
kube-az	Desired distribution of master nodes across AZs is different from actual distribution of masters across AZs	» page-ops » p0-ticket-ops » automail-customer » manualmail-customer	
cluster-masters-load-avg	CPU load average captured at 1 minute frequency over a 5 minute interval is at minimum 2.5 AND becomes equal to the number of cores	» automail-customer	
node-mem-usage	Memory avg utilization captured at 1 minute frequency averaged over 5 minute interval becomes equal to 97% of configured capacity	» automail-customer	
node-disk-usage	Node root disk space and/ or /var/lib/docker (still to be added) used 5 minutes avg captured at 1 minute frequency is >97% of available capacity	» automail-customer	
k8sapi-fail	k8s api server is down on ALL master nodes	» page-ops » p0-ticket-ops » automail-customer » manualmail-customer	» bug-fix » env-fix » cluster-resize
docker-fail	Docker daemon down on any of the nodes (indicated by failure to create a test container using docker)- measured every 5 minutes	» page-ops » p0-ticket-ops » manualmail-customer	» bug-fix » env-fix » cluster-resize

Resource Based SLAs and Events (Several Examples):

ALERT NAME	ALERT DETAILS/ CONDITIONS CHECKED	TRIGGERS	POSSIBLE REMEDIATION ACTIONS
du-load-average	CPU 5 minute load average captured at 1m frequency becomes equal to the number of cores - OR 2.5 (whichever is higher) - for management plane	» page-ops » p0-ticket-ops » manualmail-customer	» bug-fix » du-resize
du-disk-full	Disk space usage for the database instance is > 93% for 5 consecutive minutes captured at 1m frequency.	» page-ops » p0-ticket-ops » manualmail-customer	» bug-fix » du-resize
rds-load-average	CPU 5 minute load average captured at 1h frequency becomes equal to number of cores OR 2.5 (whichever is higher) - for database used by management plane	» page-ops » p0-ticket-ops » automail-customer » manualmail-customer	» bug-fix » du-resize
rds-swap	Swap usage on the data-base instance captured at 1 hour internal becomes equal to or greater than 70%	» page-ops » p0-ticket-ops » manualmail-customer	» bug-fix » du-resize » db-maintenance
rds--disk-full	Disk space usage for the database instance is > 85% captured at 1 hour interval.	» page-ops » p0-ticket-ops » manualmail-customer	» bug-fix » du-resize

Definition of MTTR Based Actions

ACTION NAME	ACTION DESCRIPTION
page-ops	VictorOps page to Platform9 Ops team
p0-ticket-ops	Blocker ticket created on Platform9 Ops team w/ data
automail-customer	Automated email alert sent to customer notifying them of the issue
manualmail-customer	Manual email sent to customer by Platform9 team notifying them of possible scheduled downtime for maintenance

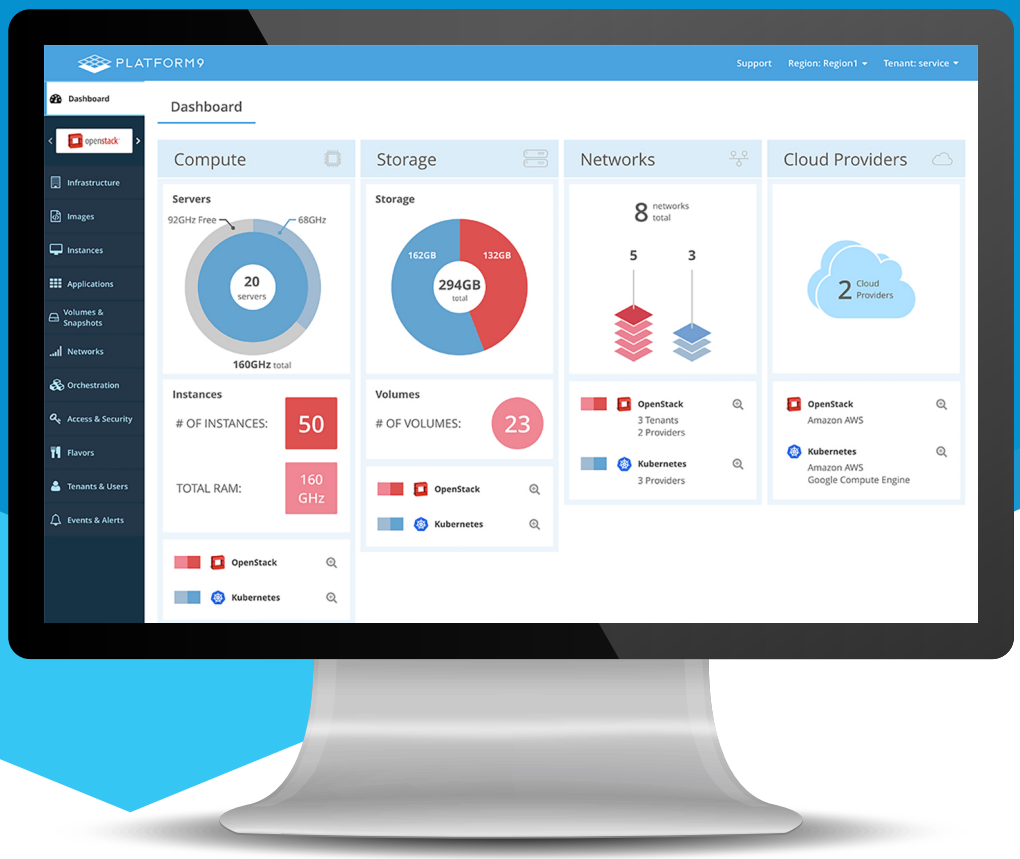
Possible Remediation Actions

ACTION NAME	ACTION DESCRIPTION
bug-fix	Code or config issues / bugs that needs to be triaged and fixed
du-resize	Resize of management plane
cluster-resize	Cluster needs resizing with more resources
env-fix	Customer needs to change permissions or other properties related to their infrastructure
db-maintenance	Maintenance and/or resize of the management plane database

Platform9 Managed Kubernetes

Platform9 Managed Kubernetes is the industry's only SaaS-based continuously managed Kubernetes service that provides:

- Guaranteed 99.9% SLA
- Remote Monitoring and Healing
- Remote Upgrading and Instant Security Patching
- Central management across on-prem data centers, public clouds, and at the Edge.
- Upstream open source Kubernetes



To learn more, please visit

platform9.com/managed-kubernetes

PLATFORM9

About Platform9

Platform9 (platform9.com) delivers a SaaS-managed hybrid cloud solution that turns existing infrastructure into a cloud, instantly. We help enterprises drive digital transformation by enabling them to manage VMs, Containers and Serverless Functions on ANY infrastructure — on-premises, in public clouds, or at the edge – with a self-service, simple and unified experience. Customers such as Cadence, Autodesk, Veritas, Nanometrics, EBSCO, Bitly, LogMeIn, and Aruba see upwards of 300 percent improvement in IT efficiency, 33 percent faster time to market, and 50-80 percent improvement in data center utilization and cost reduction. The company is headquartered in Sunnyvale, CA, and is backed by Redpoint Ventures, Menlo Ventures, Canvas Ventures, and HPE.