

Solving the Edge Platform Challenge

Delivering Centralized SaaS Management for Edge Clouds





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Executive Summary

Enterprises are witnessing a radical transformation of the intelligent edge as a key strategic component of the future network. By 2025, 30 percent of workloads will run at the edge, up from only 1 percent today. Increasing amounts of enterprise generated data (more than 50 percent for many organizations) will be created outside the traditional center or the public cloud (**See reference 1**). Macro environment issues such as the coronavirus have also accelerated the need for edge capacity for remote work, telemedicine and distance learning.

Much of the data from this brave new world will stay local, where it is best applied, rather than sent elsewhere. Low latency and high bandwidth applications will run closer to users and devices they operate, e.g. IOT and AR/VR. Regulatory fiat will also require that much data remain within state boundaries. The application environment for the edge must also change. Developers used to the public cloud model will demand scalable, easily programmable, responsive infrastructure at the edge.

Edge cloud trends are clear, but also give rise to new operational challenges. The breadth and scale of the edge makes existing architectures totally insufficient. The cost and complexity of management make traditional virtualization and process solutions at the edge far less effective. Remote management will be required to overcome lack of technical staff or easy access. Managing these sites' availability and governance will also be critical as remote sites are inherently not as secure and do not have as reliable network connectivity as central locations. Different use cases, for example, AI/ML or Big Data analytics will demand diverse workload types: containers, hypervisors, or bare metal. These different deployment types will require a shared platform to avoid duplicate or single location solutions that slow adoption.

It may be tempting to try to solve many of these issues via the public cloud model. It however, is designed for tens of homogenous regions, and existing edge infrastructure is not tethered seamlessly to the public cloud. The same holds true in following private cloud implementation blueprints. Enterprises must have an operational plan to avoid the pitfalls of the private cloud, including designing point solutions that lack agile operation or intelligent platform engineering.

Operating edge clouds at scale, whether using Kubernetes, VMs or bare metal requires a fundamentally different architectural approach and model. Enter Platform9 (**See reference 2**). Its SaaS approach for deployment provides key benefits, including faster time to market, reduced operational costs, zero touch operations and shared visibility and control across all edge infrastructure. (**See Figure 1**). A centralized SaaS approach also simplifies Day 2 management challenges, providing central management across diverse sites.





Fig. 1

The Five Platform9 Customer Freedoms

Platform 9 provides 5 key benefits, or freedoms, in deploying and operating cloud computing:





Emerging Trends at the Network Edge

The intelligent edge is a strategic focus for edge use case planners. Key trends include:

Trend	Description
Workload re-location	30 percent of workloads will run at the edge by 2025, up from 1% today.
Data generation increasingly edge focused	More than 50 percent of enterprise data will be created and processed outside the traditional data center or public cloud. The rise of intelli- gent devices at the edge and the processing of rich data they produce will increase this trend. Much of the data will require real time process- ing and response in order to be of value- e.g.: data analytics in smart retail stores, 5G cell towers, self driving cars and factory automation.
The expectation that the same tools and processes can be used to manage cloud and edge deployments	While "edge" can describe varied architectures and locations in the network to different users, software used to deploy, manage and scale cloud and edge workloads will merge. This requires the evolution of cloud software, traditionally architected on a single data center, to ad- dress areas distant from traditional data centers.
New macro environmental developments	The coronavirus crisis and ensuing economic fallout are accelerating the demand for edge capacity with applications such as remote work, distance learning, telemedicine/remote diagnosis, and remote consult- ing.
Increasing regulatory issues	Local regulations and new laws such as GDPR and CCPA (See refer- ence 3) require that data produced at the edge stay within state domin- ions.



Edge Infrastructure Challenges

To respond to edge cloud evolution, IT infrastructure and cloud operations teams will face several key challenges. Referencing approaches used historically to deploy private clouds will be instructive only if solutions use managed cloud services such as those offered by Platform9 or public clouds. The failure rate for private cloud implementations without such a plan is high (See reference 4). An edge cloud can be described as a smaller private cloud across hundreds of locations.

Takeaway for the IT leader:

A new cloud operational model is needed for a flexible edge cloud that can handle real time data and location information, and that is responsive to developments at the network edge.

Edge Infrastructure Challenge	Description	
Disparate Infrastructure- complex and distributed across many locations	Edge computing brings with it a new paradigm: managing the scale of hundreds (or thousands) of pseudo-datacenters with diverse storage, networking and other infrastructure SKUs.	
Efficiently deploying the emerging Service Edge	Edge computing will take place in devices with embedded processing, in intelligent gateways, micro-data centers and edge POPs and servers. Distinct from small IOT endpoints, these elements form the Service Edge, which holds great promise for such verticals as retail, telco, and media (See reference 5).	
Traditional virtualization and process best practices are not a panacea	Traditional data center management techniques assume highly reliable networks, security, and expensive virtualization. These solutions assume one large data center (or a few at best). The cost and complexity of a management solution can be justified in such large and well-equipped facilities, but not at the edge with its large number of sites, limited connectivity, insecure access, and limited personnel.	



Edge Infrastructure Challenge	Description
Central management and remote operation are crucial	The new edge infrastructure must be manageable centrally and remotely, which is difficult with the large number of dispersed sites and the fact that few locations will have technical staff or easy access.
Different use cases will require different infrastructure	Different use cases, for example, AI/ML or Big Data analytics will require different workload types: containers, hypervisors or bare metal
The public cloud will not ride to the rescue	It may be tempting to believe the edge can be simply outsourced to the public cloud. However, the latter is designed for tens of homogenous regions, not hundreds of non-homogenous entities. Existing edge infrastructure will require expensive integration to tether to public clouds.
Lack of consistent access to edge and core/cloud	The edge cloud needs to be both developer friendly and integrate well with core infrastructure. A single consistent API is needed across DC, Cloud and Edge to enable a standard, programmable platform.
Managing Availability and Governance is critical	Both availability and security need to be guaranteed in this distributed network model. In particular, security will be hard to maintain as remote locations are inherently not as secure as central ones.

Takeaway for the IT leader:

It's important to consult successful private cloud operational models as a starting point for edge implementation. Successful projects, such as those achieved with Platform9, rely on a SaaS-managed operational model that avoids creating solutions that are incompatible or that lack platform engineering that can provision, monitor, scale, secure and upgrade cloud services.

An Architectural Breakthrough: Platform9 SaaS Management Plane for the Edge

Operating edge clouds at scale requires a new architectural approach. Enter Platform9. Its SaaS management plane is an architectural breakthrough that directly addresses the edge challenges. (See Figure 2). Its technical innovations provide a single solution and dashboard for managing Kubernetes, VMs, and bare metal across thousands of edge locations.







Top 5 Advantages of the Platform9 Centralized SaaS Model

1. The Platform9 solution provides a SaaS management plane to implement robust SLAs across cloud operational services (e.g.: deployment, HA, monitoring, upgrades, security alert management, backup/recovery) to simplify operations and remove manual processes. This substantially speeds time to market and lowers cost envelopes.



- Faster time to market allows the customer to operationalize clouds in days, not months. Edge clouds can also be delivered with little added staffing.
- Developers can deploy applications to an added edge location in 5 minutes using the Platform9 self service model

2. The SaaS Management Plane provides central management across edge sites; it manages across datacenter, public cloud, and all edge locations from a single SaaS portal/ pane of glass. It also conquers scalability challenges by dividing sites into regions.

- SaaS management provides shared visibility and control across all infrastructure
- Zero touch operations fully automate edge infrastructure and applications

3. Platform9 provides a local control plane to K8 clusters that allows continued workload operation in case of intermittent connectivity issues.

- Intelligent local bypass of connectivity issues ensures continuous operations and guarantees high availability SLAs
- Innovations in K8s obtained by upstream sources are preserved and leveraged

4. Platform9 provides security of local infrastructure, encrypting communications to the control plane, as well as securing data at rest and in transit.

• End to end security ensures system integrity no matter how dispersed (See reference 6).

Platform9 provides legacy and future infrastructure flexibility.

- Platform9 supports Kubernetes, VMs and Bare Metal Environments
- Platform9 leverages existing or 3rd party infrastructure, avoiding net new investments.

Takeaway for the IT leader:

In summary, the Platform9 solution addresses the top challenges of edge infrastructure implementations. The SaaS management plane, local control plane, and end-to-end security allow for efficient deployment of the edge cloud while ensuring system availability and agility. The management plane also delivers central and remote management and consistent access to core and cloud. A local control plane for K8 clusters ensures workload continuity in case of intermittent connectivity gaps. Finally, Platform9 supports all workload types, whether Kubernetes,VMs or Bare Metal.



Kubernetes, VM and Bare Metal Support in Platform9

Platform9 recognizes that customers are in various phases of the journey to Kubernetes. Supporting existing environments is crucial. Whether via open source solutions that provide SaaS management or providing options that allow customers to transform their physical server infrastructure installed base, Platform9 shows the way to tomorrow's Kubernetes application environment.

Kubernetes: Ideal Underlying Platform for the Software Driven Edge

Kubernetes has emerged as the de facto standard platform for application development. The road to Kubernetes, however, is not without its challenges. The table below summarizes key Kubernetes advantages as well as challenges to be overcome.

Category	Kubernetes Advantage	Kubernetes Challenge
Ecosystem	Highly innovative and vibrant ecosystem, providing full range of services that will be needed for edge applications	Ecosystem is constantly evolving, with different services maturing at different rates. This can be hard to track without dedicated engineering resources.
Operations	Deploying Kubernetes day 1 is easy. Hundreds of open source tools exist.	Day 2 operations are extremely challenging. Monitoring, troubleshooting, security patching, and upgrades are not trivial.
Talent deployment and retention	If intelligently planned, Kubernetes container implementation will allow talent reassignment of personnel away from manual tasks	High caliber cloud talent is hard to hire and retain. Attrition must be closely controlled.



Category	Kubernetes Advantage	Kubernetes Challenge
K8 cluster management	Historical models of dispersed network implementations form a guide to Kubernetes cluster management.	Managing hundreds, if not thousands, of Kubernetes clusters distributed geographically is an unsolved problem.

Takeaway for the IT leader:

Platform9 provides an architectural breakthrough that addresses operational challenges in running Kubernetes at the edge.

Virtual Machines Workloads

Virtual machine environments still control the lion's share of the application/OS deployment space. Platform9 supports a mature and battle-tested OpenStack implementation using the SaaS management approach that provides the same top 5 benefits to the virtual machine world as it does to container and bare metal environments. Users can deploy VMs to the edge and manage them centrally.

Bare Metal Workloads

Platform9's Bare Metal capabilities delivers an "infrastructure-as-code" cloud which enables users to dynamically change the persona of their physical servers, instantly build clouds & effortlessly stretch to the edge. Using API-level automation, users can deploy any type of operating system, orchestration stack or workload from the bare-metal up with zero operator intervention. A bare metal server or single-tenant server can be a host machine for virtual machines with the addition of a hypervisor and virtualization software. Platform 9 also supports this classic environment.



Future Technical Innovations

Virtual Machines, Bare Metal and Containers managed by a single Kubernetes fabric

The future of application development lies squarely with Kubernetes. The platform is accelerating the transition from client-server technology by making cloud-native software development easier, better and faster.

Kubernetes brings several extensions that deliver the benefits of cloud native to virtualized environments and Bare Metal environments as well. You can combine the best of mature virtualization and bare metal management with the agile application orchestration in Kubernetes.

In particular, Platform9 is working with two Kubernetes extensions, KubeVirt and Metal3, to support these as one unified solution managed by Kubernetes.

KubeVirt

A key challenge in Kubernetes implementation is bridging the gap between containerized applications and VM environments. Platform9 is partnering closely with KubeVirt to allow deployment of virtual machines onto Kubernetes clusters. With VMs, one can deploy non-containerized applications and run them alongside cloud-native applications on a single Kubernetes cluster. As KubeVirt matures, Platform9 will deploy a managed version of this application so that customers can run VM workloads at edge sites with all management benefits outlined previously.

Takeaway for the IT leader:

Put simply, it's possible to deliver cloud-native applications using Kubernetes to orchestrate and manage IT infrastructure, as well as to manage containers, VMs, and Bare Metal — so that the whole stack, end-to-end and top-tobottom, gets the benefits of agility and cost-reduction.

Metal3

Metal3 provides a Kubernetes API to manage bare metal hosts via a provisioning stack that is also running on Kubernetes. Managing infrastructure just like applications can become a powerful next step in the evolution of infrastructure management, a key Platform 9 initiative.

Summary

The benefits provided by Platform9's centralized SaaS model directly allow the enterprise customer to realize the promise of multiple deployment environments- containers, VM and bare metal- in the most cost effective, manageable and scalable way.



References

1. Workload percent and enterprise generated data percentages: https://www.equinix.com/re-sources/analyst-reports/edge-computing-frontiers-gartner/

2. See the description of the full value of the P9 platform in Kubernetes, VM, and, bare-metal environments in the last section of this paper.

3. GDP (EU General Data Protection Regulation) and CCPA (California Consumer Privacy Act)

4. "By 2022, 75 percent of internal private cloud infrastructure initiatives that attempt to build full-function capabilities will be abandoned, up from fewer than 10 percent in 2018" (Gartner): Rethink your Internal Private Cloud, Jan 2020.

5. For more information on the Service Edge, **connect** with our solution experts to discuss topology, architecture, and deeper dive of the Service Edge for prime verticals, including retail, telco and media/entertainment.

6. See Platform 9 security paper at the link: https://platform9.com/security/





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About Platform9: Platform9 enables freedom in cloud computing for enterprises that need the ability to run private, edge or hybrid clouds. Our SaaS-managed cloud platform makes it easy to operate and scale clouds based on open-source standards such as Kubernetes and OpenStack; while supporting any infrastructure running on-premises or at the edge. Enterprises such as S&P Global, Kingfisher Retail, Cadence Design, Juniper Networks and Autodesk are using Platform9 to easily manage large scale private and edge clouds. The company is headquartered in Mountain View, CA and is backed by Redpoint Ventures, Menlo Ventures, Canvas Ventures, NGP Capital, Mubadala Capital and HPE Pathfinder.