



Retailers Guide to Software-Defined Stores with Kubernetes

In this white paper, learn about

- Examples of innovative in-store use cases
- Challenges with in-store IT management
- Why Software-Defined stores and why Kubernetes
- Challenges of managing 1000s of retail stores with Kubernetes
- A SaaS managed solution
- And more...

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Use cases transforming in-store customer experiences

Tectonic changes in customer buying patterns, tastes and consumption models means that retailers must transform their in-store and online presence to delight and engage existing and new customers.

Here are a few use cases where retailers are leveraging new technologies and applications to delight their customer and transform business economics:

Rapid click-and-collect order processing

In-store innovative applications that are integrated with point of sale and online/mobile order systems used to process customer orders faster and ensure timely availability of products for curbside or in-store pickups

AI-based in-store capability planning and forecasting

POS and ML analytics to best forecast and smooth demand of in-store products worldwide and real-time.

POS of the future and digital coupons

Gather "golden data at the customer edge" via smart POSs to better forecast customer buying patterns, predict merchandise sales and intelligently plan inventory levels. Future initiatives include providing on the spot digital coupons based on customer buying patterns and focus merchandise items

Smart Video surveillance

With 5G-enabled cameras, provide near-instantaneous AI-based detection and response to events for vastly improved premises security.

Digital Mirror

In-store AR/VR Technology for customers to experience new cosmetic products virtually.

In order to rapidly deploy such innovative new applications that drive new lines of business and transform customer experiences, retailers should develop the "Store of the Future " that is truly software-defined and agile. Software-defined store architecture helps drive both incremental business improvements as well as transformation and innovation that could lead to big payoffs down the road.

This white paper lays out the challenges of building software-defined stores and how to address these challenges

Challenges with in-store IT management

The truth is that many in-store technologies were built in a different era. This holds back retailers from delivering customer experiences that are shaped by internet consumption trends.

Let's review the common challenges:

Legacy in-store applications

Retail IT legacy systems are often dated and proprietary, many times being original investments that have either never or seldom been upgraded in store due to cost or administration issues. As such, they offer the opportunity for standardization and upgrades to modern applications that can be managed through a single pane of glass approach.

Limitation of store infrastructure and connectivity

Many retail locations lack extensive space, power and networking equipment. In remote locations, there could be issues of intermittent network connectivity. A store solution must be able these key factors.

Inefficient use of hardware resources

Most smaller retail stores have few servers with each of these servers one application on bare metal. Rolling out new applications would mean deploying new servers adding to the per-store IT infrastructure cost, increased maintenance costs, and inefficient use of resources.

High operational costs

Management of the applications at thousands of stores is a time consuming and expensive task for IT retail staff. Local store managers are often not tech savvy and, with a variety of duties, often not the best alternate candidates for IT support. Installation, troubleshooting, maintenance etc often require store visits.

Lack of network and security automation

Networking within the store and connectivity to the central data center and cloud is all manually configured and stitched together with no automation. Manual security controls often hamper quick innovation and access to the store systems.

Why software-defined stores?

The best way to visualize a software-defined store is to think of it as a "mini-cloud" or a "cloudlet". What if you can deploy and manage all the in-store IT resources – servers, networks, applications etc. –

through a Web browser with a modern UI?

What if your developers have a RESTful APIs to automate deployment and lifecycle management of innovative new applications directly to the store? What if your IT administrators are able to remotely standardize and automate network and security configurations in each store?

The promise of a software-defined store is being able to provide the agility, flexibility, and ease of use of a public cloud but leveraging the existing infrastructure footprint that already exists in the store avoiding net new investments.

The software-defined approach turns the current hardware-centric approach on its head. It solves many of the challenges outlined above delivering the following tangible benefits:

- Quickly deliver innovative applications to address changing customer needs
- Avoid expensive hardware investments and refreshes by re-using existing footprint to roll-out new applications
- Reduce operational costs by having automated and centralized remote management capabilities

Why Kubernetes for software-defined stores?

In the last few years, Kubernetes has emerged as the de facto standard platform for application development, specifically for micro-services development and container orchestration.

Kubernetes provides an extremely powerful platform for automation, scalability, and cloud-like experience

Developer and automation friendly

Application owners and developers find Kubernetes as a key to rapid application development, testing, and automated deployments especially when combined with DevOps workflows and CI/CD tool chains

Physical infrastructure abstraction

Kubernetes abstracts the underlying infrastructure so developers can deploy instances of their containerized applications to hundreds and thousands stores, data centers, and public clouds

without major re-design efforts. This means that now they don't need to spend time managing individual applications for every store using a manual cumbersome process.

Vibrant Open-Source Ecosystem

Highly innovative and vibrant ecosystem, providing full range of services that will be needed for modern cloud-native applications. Deploying Kubernetes day 1 is easy: hundreds of open source tools exist.

Challenges of building Software-Defined Stores with Kubernetes

Kubernetes is a great foundation to build software-defined stores, however, it has several gaps when it comes to addressing the unique challenges of managing geo-distributed retail locations with legacy applications and intermittent connectivity.

Need to run existing legacy applications

In addition to bare metal applications, retailers also run lot in-store applications in VMs, typically using VMWare as the management platform. Kubernetes does not natively orchestrate VMs. Adding Kubernetes to orchestrate containers add another management stack to run adding to the operational burden and cost.

Multiply this by the number of stores that need to be managed, you end up with control plane proliferation and inefficiency of siloed management.

In-Store bare metal is still a pain to manage

Large retailers have thousands of geographically distributed stores. Depending on the type of store, there could be just a couple or dozens of bare-metal servers that need to be provisioned, configured, and managed throughout their lifecycle. In many cases, retailers are running bare-metal workloads in the store – from Windows applications to databases. Kubernetes does not manage servers. Someone needs to set up them manually first to get the advantages of Kubernetes.

Flexibility and agility are impacted when bare metal servers need to be manually provisioned, upgraded, and scaled across 1000s of stores

End-to-end bare-metal orchestration requires a number of steps, most of which are manual:

- Provisioning bare-metal servers that just expose an IPMI interface over a network
- Deploying OS images on them, running applications on them
- Updating those applications based on network demands

- Upgrading software on the servers to keep them up to date with security patches and bug fixes
- Guaranteeing the availability of those servers in case there is an outage
- Re-provisioning servers when there are performance glitches or other issues

Not easy to centrally manage 1000s of stores with intermittent connectivity

It's quite a challenge to deploy, manage, and upgrade hundreds or thousands of distributed stores that need to be managed with low or no touch, usually with no staff and little access. Given the large distributed scale, traditional data center management processes won't apply. The edge deployments should support heterogeneity of location, remote management, and autonomy at scale; enable developers; integrate well with public cloud and/or core data centers.

While Kubernetes is great for orchestrating microservices in a cluster, managing thousands of such clusters requires another layer of management and DevOps style API-driven automation.

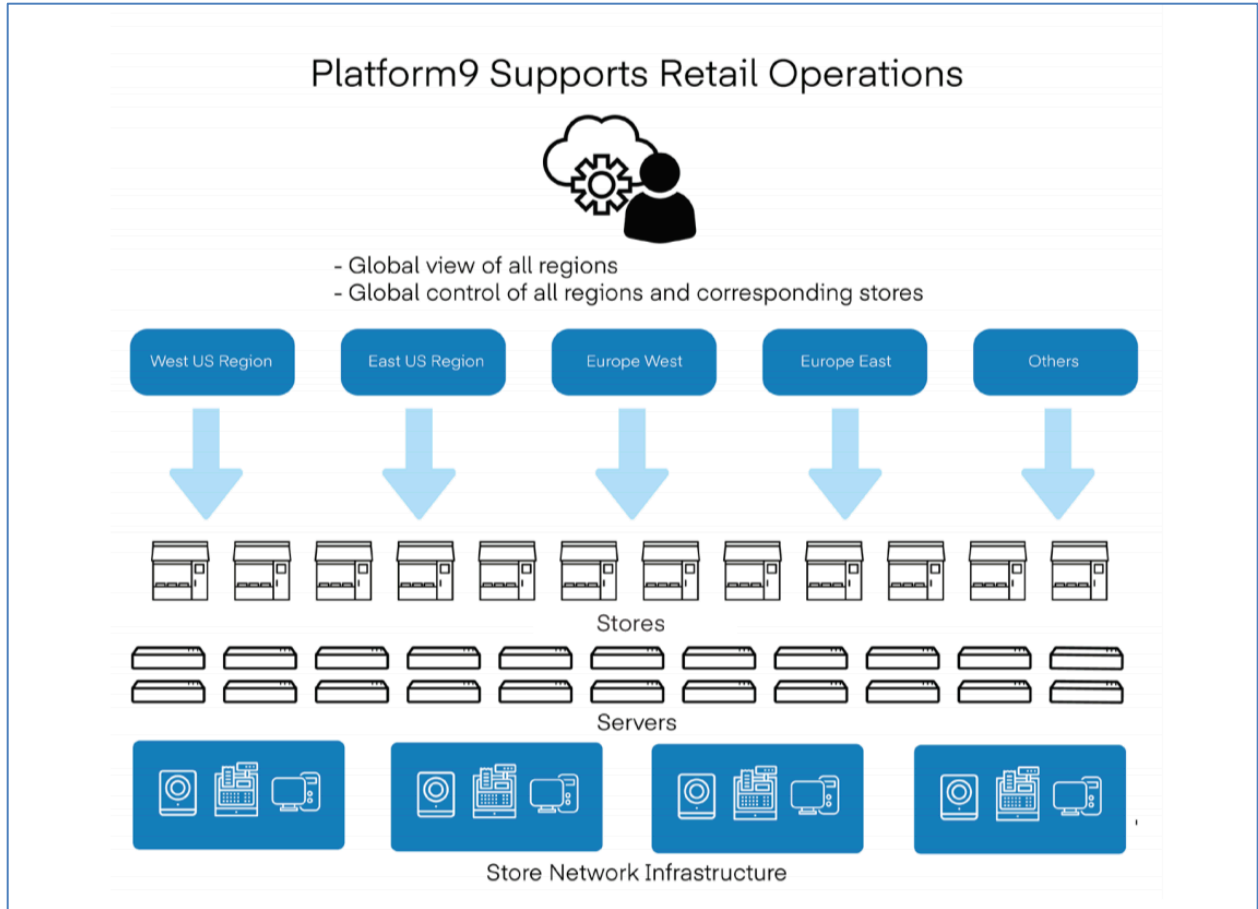
Transform your existing stores into Software-Defined with Platform9

Platform9 transforms each store into software-defined mini-cloud, and then abstract 1000s of geographically distributed stores into a single shared global cloud. DevOps teams can leverage consistent tooling, APIs, and app catalog to automate and simplify application deployment and management at scale.

Propel your store into the modern cloud age with your existing infrastructure investment.

What sounds better? Deploying applications manually one store at a time taking weeks or months? or upgrade all your stores near simultaneously with the click of a few buttons?

We like the centrally managed automated approach that gives you visibility across all of your stores as if it is a single cloud environment.



Platform9’s unique capabilities enable retailers to rapidly deliver innovative in-store experiences to their customers without the need to replace the current store IT infrastructure.

Bringing cloud agility to your in-store bare metal infrastructure

Platform9 brings cloud agility to your bare metal infrastructure by providing a centralized pane of management for all of your distributed store locations. Using a unique SaaS delivery model, Platform9 automates and offloads all of your manual bare metal life-cycle management tasks. This enables your operators and developers to unleash the full performance of the physical hosts — no matter where they are located in a store network — as an elastic and flexible bare metal cloud, where they can rapidly deploy and redeploy VMs and containers at moment’s notice.

To learn more about how Platform9 brings cloud agility to your bare metal infrastructure, check out Platform9 Bare Metal Solution <https://platform9.com/bare-metal/>

Run your legacy applications alongside containerized applications

What if you can use Kubernetes as the standardized infrastructure control fabric and run *both VMs and containers*? Yes, this is possible with KubeVirt, an open-source project, that enables VMs to be

managed by Kubernetes alongside containers. Retailers can standardize on Kubernetes as a single underlying management layer thus eliminating the operational silos. This also eliminates the need to port all of the applications to containers or managing two entirely separate stacks. You can now get the best of both worlds.

For a detailed discussion on KubeVirt, read this Platform9 white paper:
<https://platform9.com/resource/kubevirt-how-to-run-vms-on-kubernetes-whitepaper/>

Minimize per store costs and global operational complexity with centralized SaaS Management

Platform9 developed a unique SaaS deployment model with a central management plane and intelligent edge software that together provides a fully-managed public cloud like experience but across all of your distributed store infrastructure. Operational complexity is minimized by automating health monitoring, runbook driven resolution of common problems, and streamlining upgrades; Hitherto, this was only available via hyperscale public clouds, but retailers looking for the simplicity and peace of mind of managed service can now get a similar SLA on any infrastructure they currently have in their stores.

This management plane is where DevOps engineers manage the entire operation. There, they store container images and inventory caches of remote locations. Synchronization ensures eventual consistency to regional and edge locations automatically, regardless of the number of locations.

Fleet management is an approach to grouping sites so that similar configurations can be managed centrally through a single policy known as a profile. This relieves operators from managing each store individually. Instead, the staff just defines a small number of profiles and indicates exceptions to policies where needed for a particular store.

Additionally, troubleshooting issues and keeping all the services up to date is an ongoing operational nightmare, especially when there are hundreds of these services deployed at each site.

Platform9 provide a SaaS based centralized management that provides the following capabilities:

- Single sign-on for distributed infrastructure locations
- Cluster profiles to ensure consistency of deployment across large number of clusters and customers
- Centralized management of tooling, APIs, and app catalog to simplify application management at scale
- Cluster monitoring and fully-automated Day-2 operations such as upgrades, security

patching, and troubleshooting.

Conclusion

The brick-and-mortar store is the new battleground for retailers. They need to deliver outstanding in-store shopping experiences that drive new revenues while maintaining operational efficiencies. With the latest development in technologies like Kubernetes and edge computing, it is possible to deploy Software-defined stores that deliver the agility and ease of use similar to a public cloud.

With Platform9 unique centrally managed SaaS solution, retailers can modernize their stores without having to rip and replace their existing hardware. They can run their existing legacy application while rolling out new innovative cloud-native AI applications using Kubernetes as the underlying cloud fabric.

This approach provides everything retailers need out of the box to build and deploy software-defined stores. Using Platform9 simplifies the journey, greatly accelerates the time to get stores up and running from months to days, and reduces operational costs by 90% as a result of hyper-automation at all layers of the store infrastructure stack across all of your geographically distributed locations.

We invite you to [request a free trial of Platform9](#) or [contact us](#) to book a demo and experience the fully managed experience where we do the hard work for you to keep your store infrastructure and Kubernetes clusters running optimally, everywhere where you have your software-defined stores.