The Right Container Platform(s) for Modern OSS and BSS

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EXECUTIVE SUMMARY

In the past, software applications required many different hardware and software platforms but no more with the rise of cloud-native software architectures. A single, flexible container platform for CSP's OSS, BSS, and other software is possible today and could provide major benefits, but it is, unfortunately, unrealistic. However, a policy of limiting the number of platforms to as few as possible before they proliferate into new operational problems is a prudent strategic path.

It is well understood that all enterprises need to engage in significant digital transformation of their businesses to remain competitive. However, digital transformation is not a one-time event. It should be seen as a continual adaptation to a constantly changing environment, which requires companies to design a sustainable digital transformation process. For communications service providers (CSPs), this need is very evident in the operational support systems (OSS) and business support systems (BSS) that are critical to operate and monetize increasingly sophisticated services provided by software-powered networks. 5G services, SD-WAN, internet of things (IoT), SASE, and other edge services are but a few of these. To be successful, CSPs must build a foundation for continued, sustainable digital transformation, including software application life-cycle management and optimized, flexible software deployment in multi-cloud and edge environments. **As applications and requirements are likely to evolve, this software platform needs to be ready and able to adapt accordingly.**

The open-source community has developed a large set of software tools and capabilities to address this challenge. The modern containerized, microservices-based, cloud-native software architecture has become the de facto standard for a wide variety of software applications. It allows applications with a broad array of characteristics to run on a common software platform, rather than requiring yesterday's multiple, specific software and hardware platforms built for specialized features, functions, and performance needs.

The focus of a common software platform infrastructure up to now has been mostly on the development phase. Including its modern software deployment capabilities in the day-to-day operations makes the benefits of a common infrastructure much more compelling and sustainable. These benefits include lower cost of the application, container, and infrastructure platforms, reduced training, more staff flexibility, greater reliability, consistent security implementation, faster service roll-out, and shorter time to value.

Although the benefits would be significant, implementing just a single container infrastructure platform may be unrealistic in many cases, but a CSP should adopt a policy of having as few as possible flexible, proven platforms to avoid proliferation and fragmentation of software platforms problems down the road.

The Digital Transformation Imperative for CSPs' OSS/BSS

Digital transformation is essential for business survival, and service providers' OSS and BSS are at the center of this transformation. Therefore, they need a reliable and flexible architectural and infrastructure foundation for the agile development, fast deployment, efficient, ongoing operation, and evolution of these software applications.

In the past, the various BSS and OSS software applications had different performance needs, leading to different architectures, operating systems, and computing platforms[1], but no more, as software technology has changed. Their needs are converging; they now share the same requirements, leading to the same architecture and the possibility of using the same computing infrastructure, both software platform and hardware.

In the past, custom hardware and software stacks delivered differentiation via higher performance and unique features at the cost of speed and agility to adapt to changing customer and market demands. The market has turned, and now speedy and agile operations provide successful companies their differentiation and competitive advantage more than unique technical characteristics.

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[1] For example, CRM systems were transaction based, requiring a client-server architecture. Real-time rating systems had fast lookup needs, requiring an architecture for in-memory tables. Service assurance systems were CPU bound as they sorted through millions of alarms to do a root-cause analysis. Each of these required its own distinct software architectures, running on carefully selected computing and storage hardware.

This has caused OSS/BSS systems to be much more important in differentiating the CSPs via optimized operations. These optimized operations focus on areas that:

- Support many new services quickly,
- Provision services for the customer correctly, quickly, and efficiently,
- Provide customers with timely information about the performance of their services,
- Optimize the speed and cost of ongoing operations of the new services as they grow in scale and features.

These requirements translate into the need for the OSS and BSS systems to be operationally integrated but easily evolved as the needs and technologies change.

Software Platforms and Tools Are Standardizing

Experience has shown that for virtualized network infrastructure, OSS, BSS, and network control software (in fact all software systems):

- Cloud-native software architectures are the fastest and most efficient way to design, develop, deploy, and update software systems,
- Deploying software in containers is operationally more efficient,
- Open hybrid cloud deployments are extremely robust and flexible,
- DevOps software development and deployment processes increase agility,
- Automated continuous integration/continuous delivery (CI/CD) deployment processes outpace manual processes by far.

Modern software is microservices-based, using cloud-native architecture, and deployed in containers.

As a result, all modern OSS/BSS software (and nearly all other software) is evolving to be microservices-based, using cloud-native architecture, CI/CD processes, and deployed in containers.

The Digital Transformation Imperative for CSPs' OSS/BSS

What is changing rapidly is where the software is deployed. Everything that used to be on-premises (on bespoke hardware) or provided as a managed service by vendors is now moving to the various cloud platforms: on-prem clouds, public clouds, hybrid (on-prem and public clouds) and edge.

Each CSP has its own strategies and plans for moving its software to these various clouds, requiring that software to be portable among these with little to no modification. Some CSPs are moving some functionality into the public cloud while they are keeping certain functions in their private clouds or moving them to the edge of the network, depending on needs related to business opportunity, performance requirements, regulatory restrictions or security posture. This is an ongoing experimentation and optimization process over the next several years and having the greatest deployment flexibility with the fewest barriers to platform evolution is an imperative.

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The ability to quickly move that software to the various computing and storage platforms to provide a sustainable digital transformation process for software and software infrastructure is crucial for a CSP and their vendors as their networks and business evolve. New cloud options are becoming available: multi-cloud distributed deployments on public clouds (for reasons of cost, latency, and reliability) and new distributed options such as provider edge computing on a CSP's own platforms. The portability, thus, will become even more important to CSPs.

The computing platforms available are varied and are rapidly evolving; therefore, digital transformation is not a one-time event. It should be seen as a continual adaptation to a constantly changing environment, which is requiring companies to design a sustainable digital transformation process.

New options within each cloud are also becoming available as GPUs and other specialized computing infrastructure hardware are being introduced. The container infrastructure software is already being modified to take these into account.

CSPs expect the same flexibility and agility from their vendors' products. Vendors that need to support their CSP customers in their evolution will find it important to have those infrastructure options available to their customers while maintaining a single code base to support the expected faster service roll-out and portability, shifting from enabling new features via lengthy change requests and custom development to much shorter release cycles and faster implementations.

Looking beyond OSS/BSS Software

In addition to OSS and BSS, other software is already converging on the same requirements, changing architecture and software platform requirements:

- Internal IT business software,
- CNFs for network function virtualization,
- MEC platforms for internal, partner, and/or end-customer use,
- The new control functions of disaggregated network elements (such as the nonreal-time RIC in O-RAN where other vendors are writing SON control software).

An expanded horizontal cloud for telcos is a way for service providers to use the same infrastructure to host the different applications needed to operate. Often the infrastructure is split between IT and networks, but it is fundamentally the same for each. A horizontal cloud that supports all of what the software platform needs can remove barriers and should span infrastructure seamlessly from edge to a CSP's private cloud to hyperscalers' clouds. Applications and network functions can be packaged, containerized, and deployed on the distributed cloud.

In the new era, SOFTWARE IS SOFTWARE, independent of the use.

The challenge at hand is not only one of flexibility of development (Day -1) and deployment (Day 0) of the software but even more so for the Day 1 and Day 2 operations. Most of the effort and cost comes as the CSP's personnel or their vendor or system integrator maintain the software, update the software with new microservices, and move the software to the new computing and storage platforms as needs and technology change. The horizontal cloud with a uniform software platform directly addresses these needs.

Benefits of as Few as Possible Software Platforms

The benefits of a single container application platform across the CSP can be impressive. With the advent of widespread use of ubiquitous open-source tools and platforms that are proven in a wide variety of use cases, this approach is feasible today. These benefits of a horizontally implemented common application platform include cost, speed, deployment agility, uniform governance, larger talent pool, and simplified evolution.

Lower Cost

Financial models by ACG Research[2] and others have shown that avoiding an additional platform can reduce platform operation expense by about one-third, depending on many individual factors. This comes from not needing additional licensing and support for the software (either to a vendor or internal), greater availability of trained people, reduced training costs for the personnel, and decreased learning time for already trained staff. It avoids duplicating work for day-to-day operations across multiple platforms.

Shorter Time to Market

By using the processes already in place and optimized for a platform, the speed of any CI/CD based introduction of new software and services can be increased substantially. Platforms are changing, and it takes time for CSPs to ramp up and operate a new platform at scale. Developing and testing CI/CD processes for multiple platforms takes time and effort. Leveraging a common process across multiple areas makes it easier to integrate third-party and in-house OSS and BSS software on a common application and container platform than across multiple, different platforms. When the common platform can deploy across any infrastructure, it is easier to deploy and move software and software components. Software can be developed once and deployed anywhere as needs change.

Increased Cloud Agility

Workloads should be placed where they run optimally, based on cost, availability, and technical characteristics, such as performance or latency. In the future many workloads will not be statically placed but dynamically moved to where they can run optimally even for the potentially very short time of their use.

2 See "Telco cloud: Business impact of open platforms" August 2021.

Obviously, it is easier to move functions quickly across a single open hybrid cloud platform than across and onto multiple individual cloud platforms. This will be highly relevant as new business models may depend on moving workloads across multiple clouds or to the edge, often in a matter of minutes or seconds. As CSPs and the industry continue to experiment to find compelling business models and optimal performance architectures, it is not clear yet where workloads should be deployed nor is it to be expected that this will be a static scenario. Moving workloads and having the option to select applications and services from multiple cloud providers and changing choices over time are desired capabilities. For example, a CSP may select one cloud today for its AI features and another for lower cost. Tomorrow, the AI features on a third cloud may be more attractive for its business model or for new strategic or even tactical partnerships. Maximizing and maintaining cloud flexibility and agility will be a key requirement to keep business options open.

Uniform Governance

Standard security and operational procedures can more easily be defined, implemented, and governed across areas that are using a common platform. This not only increases efficiency but also makes the governance process more manageable while making it easier to address security vulnerabilities. As regional regulatory compliance becomes increasingly important to do business, removing a layer of platform complexity avoids extra and redundant work in implementing and documenting that platforms and services follow rules and regulations.

Larger Talent Pool

Finding, hiring, training, and retaining staff with experience in cloud-native technology development, integration, and deployment is currently a major problem for all companies but even more so for many CSPs that are not often known as leading-edge places to work.

With the use of a common platform based on open-source software that is also widely used by developers, the available talent pool is extended. When employing state-of-the art technology the job becomes more desirable for candidates as it adds to their resume and is usually a more satisfying work environment. Internally, the common platform creates larger pools of people who can be redeployed across the various areas as the needs or interests of employees and businesses change.

Simplified Evolution

Technology inevitably changes, and most software innovation is driven by the growing open-source community. Therefore, a fully open-source-based application platform provides an excellent opportunity to benefit from that innovation potential.

Business evolution and software evolution go hand in hand as they feed each other. It is a reality that services depend on multiple vendors and contributors and require alignment of many roadmaps and development resources and funds. Business differentiation is not driven by a software platform but rather by the applications that run on them. Aligning platform roadmaps should be a small effort in the larger scheme of things, and a common platform cuts complexity and time of that activity.

Operations Hyper Automation

Automation is fundamental for operating future networks and should be applied as much as possible. The many open-source automation tools that already have been developed for the automation of the development, deployment, and management of the software infrastructure, such as GitHub, Ansible, open-cluster management, Kubernetes operators, and many more, are used to do task and process automation, development, and life-cycle management of the OSS/BSS infrastructure. Automation teams can be more effective in defining end-to-end automation processes and service roll-outs when working with a common set of automation tools rather than implementing the same processes across different platforms.

How Many Software Platforms?

How many platforms should a CSP use across all the deployed and new software? Trying to limit to one ubiquitous platform is unrealistic, due to legacy platforms already in place, differing decisions in disparate organizations, and ongoing M&A activity. Practically, a CSP should deploy as few different software platforms as necessary in its operations. When optimizing the network and transitioning workloads to new cloud platforms, the CSP should build in flexibility with a modern cloud-native application platform that can adapt more readily to the unknown future. A new platform should support digital transformation at the CSP's pace and should support any and all applications to modernize or move to the cloud. The key value a platform should provide is speed, agility, and ease of operations and should not be limited to a niche deployment.

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Red Hat OpenShift as a Primary Infrastructure Platform

Red Hat OpenShift is a strong OSS/BSS foundation. Accepted by many service providers for its telco-grade qualities and deployed by thousands of enterprises for its security focus, streamlined ease-of-use and integrated tooling for development, CI/CD, and operations, Red Hat provides a strong platform across all service providers' needs.

Red Hat OpenShift gives organizations a unified application platform to enhance business innovation and modernize their applications and infrastructure, accelerating their digital transformation. Built by the commercial enterprise open source leader, Red Hat OpenShift includes an enterprise and a telco-ready Kubernetes solution to build, deploy and manage container- and VM-based applications and services with a choice of deployment and consumption options to meet the needs of the business. Red Hat's broad, robust ecosystem allows CSPs to choose their best partners among the validated and certified solutions with the confidence to deliver services fast and reliably.

Avoid lock-in to narrow, proprietary software stacks and instead lock onto the power of open source with Red Hat across the business.

Leading service providers, financial services, insurance, global auto manufacturers, governments, and many other enterprises rely on Red Hat OpenShift to quickly build, deploy, run, and manage applications anywhere, securely and at scale. With Red Hat OpenShift, organizations have the flexibility to build new applications, modernize existing applications, run third-party independent software vendors' applications or connect to public cloud services. This allows organizations to support a variety of use cases, such as OSS, BSS, artificial intelligence and machine learning, big data, edge computing for IoT, and 5G initiatives. Red Hat OpenShift addresses these use cases with consistent management and operations of the underlying application platform across all the environments used in today's hybrid, multi-cloud world.