FUTURUM.

SUSE's Innovation Engine Roars:
SUSE Rancher Now on IBM zSystems and LinuxONE

Q2 2022

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INTRODUCTION

As organizations look to deploy cloud native applications, the adoption of Kubernetes has correspondingly accelerated; however, this pace of adoption can easily lead to challenges.

Companies are looking to comprehensively move to microservices architectures and use Kubernetes orchestration that enables DevOps and IT infrastructure teams to accelerate their digital transformation initiatives. Organizations looking to adopt Kubernetes need to be fully aware of the complexity of Day 2 operations and application deployment. These complexity concerns are amplified when a multi-provider and hybrid cloud model is the deployment chosen, the prevailing option of many large enterprises. Another factor to consider is that in many cases, organizations are adopting a plethora of chip architectures to align workloads and non-functional requirements to the underlying characteristics of the chosen platform.

Against this backdrop, many organizations have chosen IBM zSystems and LinuxONE platforms for their most mission critical Linux and open source workloads. These organizations have the same requirements for simplified Day 2 operations and management, oftentimes more so given the criticality of the workload. In this paper, the Futurum team explores the SUSE Rancher solution and how SUSE Rancher deployed on IBM zSystems and LinuxONE can deliver on the need for enhanced security, performance, and availability while delivering simplified IT operations and efficiency.
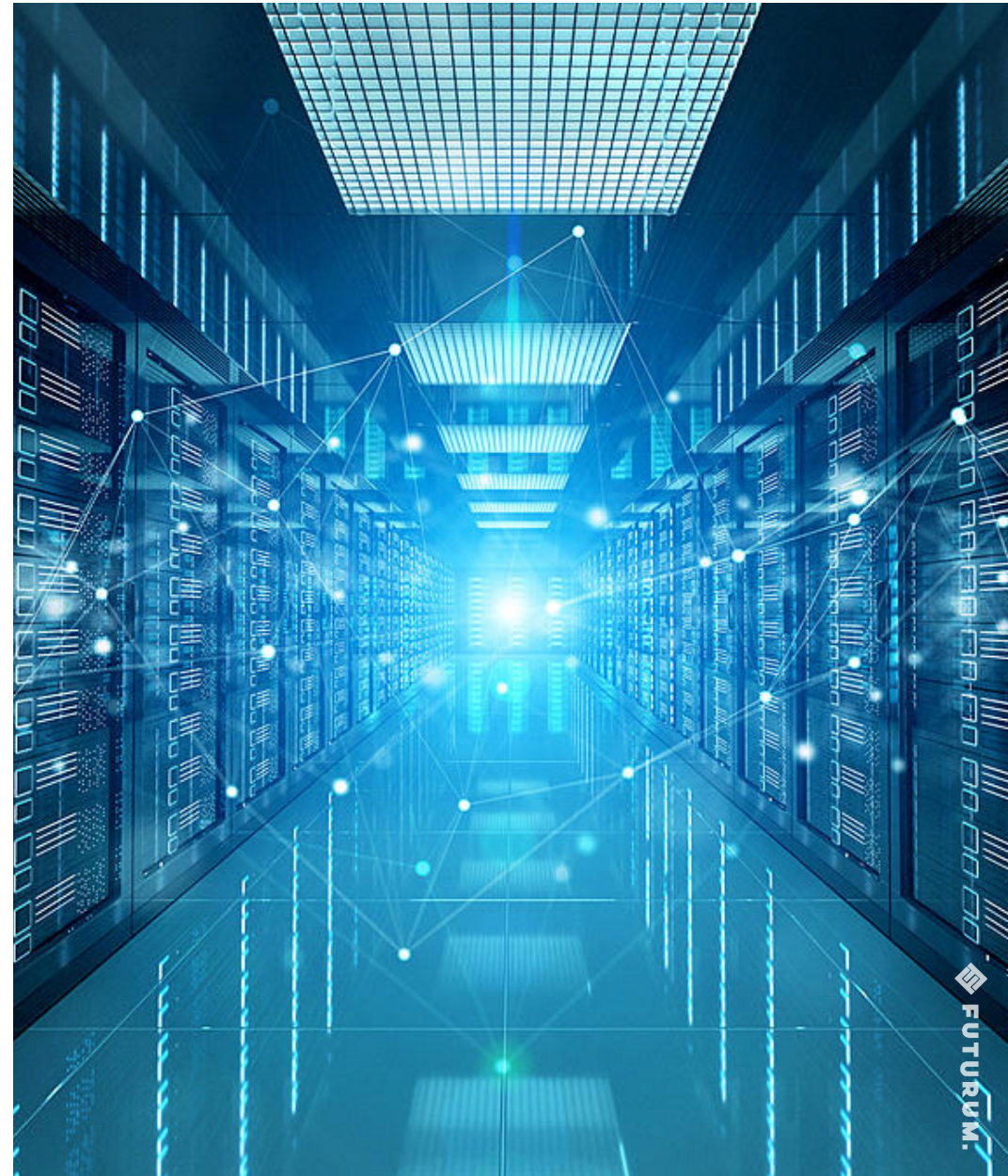
EXECUTIVE SUMMARY

The landscape for developers and IT operations staff is more dynamic than at any time in the history of IT. Whether it is the rapid development of new services, the complexity and plethora of platform choices, or the shift in development process and tooling such as Agile Development, CI/CD, and DevSecOps — change is happening at an unprecedented rate. And that rapid pace of change is only going to continue to increase.

In order to effectively compete, and win, in this ever-changing landscape, organizations need to innovate and operate at the pace of a startup, but also deliver trust and integrity at scale.

That is often easier said than done. These seismic shifts in operations and development are fraught with challenges that include a shift from waterfall development processes where code drops happened once every 6-12 months to code updates that often happen daily or even more frequently. Teams are also experiencing an unprecedented focus on security and the ability to ensure that IT operations operate 24x7x365 without a moment's service impact.

Digitally transformed organizations require infrastructure that supports seamless integration of microservices, as well as a robust infrastructure to support non-functional requirements. Those that successfully deliver against these vectors are going to see outsized returns, enhanced customer adoption and engagement, and improved margins and operating profits.

Many organizations rely on IBM's zSystems and LinuxONE infrastructure and often this infrastructure has been in place for decades. Our assessment is that open-source adoption and IT operations that rely on technologies like Kubernetes running on IBM zSystems and LinuxONE based platforms drive transformation without sacrificing the power of rapidly emerging new operational cloud-native paradigms.

To fully take advantage of the shift to cloud native, organizations must take their current environment into account, and take a fresh look at the strategic nature of core platforms toward the goal of increasing agility and even expanding their role in reimagined cloud native infrastructures.

This document will provide details behind a solution to enable IBM zSystems and LinuxONE participation in cloud-native environments.

I. The Container Management Challenge

Containers enable organizations to efficiently package and deploy applications in standardized ways across multiple server architectures and across public and private cloud. However, managing large numbers of containers can be both unwieldy and complicated as deployments scale, creating an ever-more complex situation for developers and IT operations staff. The benefits of containers allow developers to test the same software locally that they will later deploy to full production environments, oftentimes on different architectures, while the container format also ensures that the application dependencies are baked into the image itself, which simplifies the handoff and release processes.

Despite those useful benefits, the challenges of managing large numbers of containers continue. The top challenges include:

► The containerization and migration of applications to hybrid cloud architectures

► The dual fulfillment of DevOps-driven application deployment needs and IT operations running enterprise-critical services

► The management and interoperability assurance for all Kubernetes distributions

► The flexibility of choosing Linux systems and container environments

► The administration of multiple Kubernetes clusters

The Containerization and Migration of Applications to Hybrid Cloud Architectures. As organizations modernize their IT infrastructure, they continue to move from legacy, monolithic environments to hybrid, multi-cloud stacks. With these changes, enterprises are creating new opportunities to unify their IT operations with containers and Kubernetes orchestration approaches. However, while the goals merit top priority, Kubernetes installations can often be plagued by a lack of central visibility, inconsistent security practices, and complex management processes. These Day 2 challenges can also include complex cluster operations and a lack of needed tools and services.

The Dual Fulfillment of DevOps-Driven Application Deployment Needs and IT Operations Running Enterprise-Critical Services. When it comes to the operational deployment of Kubernetes strategy, it can be a tale of two IT groups — the shared services team, which supports developers and DevOps, and the central IT team, responsible for infrastructure. Finding ways to bridge the different needs and technical requirements of these two distinct groups is another challenge that must be addressed when selecting and deploying a Kubernetes infrastructure. Each of these groups are driven by different requirements and must be able to have their individual needs addressed as the implementations are integrated and maintained.

The Management and Interoperability Assurance for all Kubernetes Distributions. Organizations managing Kubernetes can run into complications when different teams are using different Kubernetes container orchestration platforms. Inconsistencies among platforms can create configuration and management challenges that can be difficult to resolve. To avoid interoperability challenges, decision-makers need to prioritize Kubernetes platforms that interwork with other K8s applications and orchestration layers.

The Flexibility of Choosing Linux Systems and Container Environments. Another challenge in running Kubernetes container orchestration environments is that some Kubernetes platforms require them to be used with a specific Linux distribution. Organizations need to be mindful of using a Kubernetes platform that can work with any Linux distribution as this approach can provide a path to simplified Day 2 operations.

The Administration of Multiple Kubernetes Clusters. Organizations using Kubernetes will find that the more they use the technology, the more the need for additional capabilities will grow. That can present challenges as IT departments discover new service gaps, such as the need to configure and deploy multiple Kubernetes clusters to serve an organization's technical requirements. Ensuring that requirements such as the easy and straight-forward configuration and set-up of multiple Kubernetes clusters is an important point in any evaluation of technology or providers.

In addition, a critical criterion is to ensure that the chosen open source applications are truly open and interoperable with products from other vendors for maximum flexibility and performance and that the right support and testing are available.

II. THE KEY BENEFITS OF AN OPEN, INTEROPERABLE KUBERNETES MANAGEMENT APPROACH

To address the challenges that organizations typically face with Kubernetes environments, we believe that several capabilities are essential to ensure the successful administration of any Kubernetes distribution. These include:

Streamlined Kubernetes Operations. Streamlining Kubernetes operations is very important. For organizations adopting a Kubernetes strategy, streamlining operations means giving developers and IT staffers a single console where they can monitor, change, add, or remove any cluster in any location, upgrade Kubernetes versions, perform etcd backups, and recover degraded clusters. When choosing Kubernetes management applications, it also means finding platforms that include easy-to-use interfaces with low learning curves that enable users to quickly deploy and begin managing Kubernetes clusters.

Full Cluster Lifecycle Management. It is critical for developers and IT operations staffers to have full lifecycle management of the most popular on-premises and cloud-hosted Kubernetes distributions, including node management, autoscaling, and more so they can perform all the needed operations as required. IT teams need the capability to create and administer Kubernetes clusters with any cloud providers. Full cluster lifecycle management capabilities are important to allow all users to seamlessly import, provision, upgrade, configure, and secure clusters across EKS, GKE and AKS cloud environments, and on-premises deployments.

Unified Kubernetes Management. Unified Kubernetes management is a fundamental, strategic need when establishing and deploying Kubernetes environments. Unified Kubernetes management allows developers and IT operations workers to closely work with security teams and centrally define both how

users should interact with managed Kubernetes clusters as well as how their containerized workloads should operate in compliance with policies and standards. Kubernetes management applications that allow users to automate processes while applying consistent user access and security policies for all clusters — wherever they are running — are vital for broad and insightful systems management. Organizations gain other benefits as well, including the ability for development and IT Ops teams to collaborate because Kubernetes clusters are consistent across environments. A unified approach to Kubernetes management and deployment supports simplified operations and security, establishes increased team agility, and can accelerate the time to market of differentiating services for enterprises.

Flexible GitOps at Scale for Every Kubernetes Clusters. Architecting for maximum cluster consistency gives organizations tremendous capabilities to deploy and manage containerized applications that can multiply into the hundreds or thousands and scale-out for computing at the edge. However, trade-offs exist with simplicity and flexibility with managing complexity in an environment where cluster sprawl can be a problem. To address this common Kubernetes issue, we suggest consideration of Kubernetes fleet management as a solution to enable GitOps approaches that streamline processes across any infrastructure, including private, public, hybrid or multi-cloud environments.

By using a Git repository to store and manage application and configuration information automatically, organizations can ensure consistency in their deployments, while also making things more user friendly. GitOps approaches build on mature, well-known workflow processes for developers and operations personnel alike. By using a Git repository as the sole source of authority for the configuration, all definitions are held at the source, regardless

of whether they are Kubernetes cluster configuration definitions, application deployment definitions, or security policy definitions. Using GitOps, when developers make changes to an application, Git can push it out to Kubernetes for deployment automatically, easing management.

The SUSE Rancher solution can enable organizations to use microservices to unlock data within systems-of-record residing on IBM zSystems and LinuxONE platforms, with their vast stores of underutilized data by connecting SUSE Rancher on the mainframe to SUSE Rancher at the edge.

III. THE SUSE RANCHER VALUE PROPOSITION

The wide range of enterprise needs when using Kubernetes mean that organizations must perform intense due diligence when evaluating Kubernetes applications, vendors, and features, as well as how they collectively can solve pain points for IT infrastructures of all kinds. In our review and based on the information and data available to us at the time of writing, SUSE Rancher on IBM zSystems and IBM LinuxONE platforms are well-positioned to address the important container management challenges across today's Kubernetes cluster environments. Below we will explore the SUSE Rancher features that can help resolve these challenges.

SUSE Rancher on IBM zSystems and LinuxONE Products and Capabilities. When Linux was brought to the IBM s390x architecture in 2000, SUSE was the first Linux distribution deployed, giving SUSE a market leadership position that has remained as other Linux distributions have come to the platform. The s390x designation is the formal name given to the chip architecture for both IBM zSystems and IBM LinuxONE platforms. With this long history, SUSE has a significant customer base that is running SUSE Linux Enterprise Server (SLES) for a variety of workloads on IBM zSystems and LinuxONE. In the time since the acquisition of Rancher by SUSE, many of those customers asked SUSE to bring its SUSE Rancher products to the IBM platforms to ease overall integration and provide cross-platform administration.

RKE2 (Rancher Kubernetes Engine version 2) for s390x was initially published for proof of concepts (POCs) using Kubernetes v1.21.8. RKE2, also known as RKE Government, is Rancher's next-generation Kubernetes distribution. Presently, RKE2 versions v1.21, v1.22 and v1.23 are available for use with s390x in LPARs, IBM z/VM guests and KVM virtual machines.

At the time of this writing, SUSE is evaluating the use cases of K3s on the s390x architecture. K3s is a lightweight Kubernetes distribution, in a single binary which contains the components to run a cluster that can be deployed on as little as a single core on s390x. As such, we expect that the small footprint of K3s can help IBM Z and LinuxONE customers lower the resource overhead of internal Kubernetes components. This means that the compute capacity can be used by the containerized workloads that are important to an organization.

Rancher Manager, formerly known as Rancher or Rancher Multi Cluster Manager, provides the capabilities needed to deploy and manage any Cloud Native Computing Foundation (CNCF) certified Kubernetes. This applies to on-premises Kubernetes like Rancher Kubernetes Engine (RKE), RKE2 and the lightweight Kubernetes (K3s) as well as public cloud implementations of Kubernetes. Rancher Manager is developed with an agnostic approach to running K8s anywhere. SUSE Rancher's Kubernetes solution provides key differentiation against solutions that require integration with a single K8s implementation which can lead to vendor lock-in.

Longhorn for s390x. SUSE is actively developing this CNCF incubation project to provide highly available persistent block storage for microservices-based stateful applications. Longhorn allows containerized applications that need stateful storage to remain and store their data as needed in container storage infrastructure (CSI). Longhorn takes advantage of IBM zSystems and LinuxONE storage mechanisms.

Delivering All the Benefits of Open, Interoperable Kubernetes Management: Early adopter customer and partner Proof-of-Concepts. SUSE has early adopter customers and partners, as well as installation videos for online installs and air gapped installations. Air gapped installations are for customers that have highly secure environments where they are unable to pull directly from GitHub or Docker Hub.

Leveraging the Inherent Security of IBM zSystems and LinuxONE Hardware to Deliver Container Security. Security is top of mind for every organization today. That's why it's significant to mention that when using SUSE Rancher on IBM zSystems and LinuxONE hardware, organizations benefit from the deep built-in security found in those platforms, including encryption, restful APIs, access controls, and more. The security features in SUSE Rancher provide a boost to the security features in the hardware platforms themselves. SUSE Rancher is continuing to receive expanded security capabilities from NeuVector, which assesses and reports on all major security standards including PCI, NIST, GDPR and HIPAA.

> **"Kubernetes and Rancher manager gives you the single control plane to bridge all of your environments and to use the same human, and business processes across all your environments. Honestly, I think at the end of the day, the human and business processes are the pieces that actually matter, and those are the ones that were enabling."**
>
> *Andrew Gracey*
> *Developer Evangelist, SUSE*

> **"This is the easiest deployment of Kubernetes on Z and LinuxONE I've ever seen. It was designed to be as simple to deploy as Rancher is on any other platform. A brand-new, right out of the box deployment is as quick as under two hours, if you've done it once or twice."**
>
> *Andy Hartman*
> *IBM Z and LinuxOne Architect,*
> *Mainline Information Systems*

IV. Other Key Competitive Advantages SUSE Rancher Brings to the Market

In our evaluation of the SUSE Rancher solution, we believe there are some key competitive advantages that merit consideration. These include:

Treating All Kubernetes Distributions as First-Class Citizens. Rancher Manager treats all Kubernetes distributions as first-class citizens so that any Kubernetes release — whether it is AKS, EKS, GKE, RKE, RKE2 or any Kubernetes from another vendor — can be imported and managed through Rancher Multi-Cluster Manager. We view the overall SUSE portfolio value as in the Kubernetes distribution itself, as well as in the unified management of the multi-cluster Kubernetes deployments. SUSE Rancher supports any certified Kubernetes distribution, whether it is on-premises or deployed on the public cloud. In addition, the SUSE Rancher products for s390x can be used with any Linux distribution, including SLES and with versions from competitors as part of the company's open approach to open source.

Strategic Benefits to Emphasizing SUSE's Open Approach to Open Source. SUSE's commitment to community driven open source also delivers benefits for organizations as it relates to talent recruitment and retention. By leveraging a community driven approach, enterprises are finding that they can successfully upskill and retrain their IT teams to transform their infrastructures with Kubernetes and other open-source projects. This is of course beneficial not only to the organization as a whole but also for IT pros. These kinds of upskilling and retraining initiatives go a long way toward increased job satisfaction and perpetuating job stability and employee longevity within an organization. Using open source can also maximize developer agility and flexibility by allowing operations teams to focus on infrastructure and developers to deploy code the way they choose to deploy it.

By adopting a more holistic open source approach, we believe that SUSE can help technology leaders bring products to market faster and accelerate their organization's digital transformation. The SUSE approach is "open source first, upstream first". The company is committed to building open source solutions that are open and interoperable, even with competing technologies. For organizations, this approach is beneficial as it allows for a broader use of mixed technologies.

Value of SUSE's Approach to Kubernetes Management. Through the support of any certified Kubernetes distribution, simplified multi-cluster operations, unifying security, policy, and user management, and by driving adoption with shared tools and services, SUSE provides SUSE Rancher applications and services to organizations that are continuing to adopt the platform. By focusing on driving greater capabilities and value through SUSE Rancher, IBM zSystems, and IBM LinuxONE configurations and other services, we see SUSE has the ability to provide organizations with the critical trusted help, support, and services to push their Kubernetes deployments to new levels of performance.

IBM zSystems and LinuxONE Channel and Business Positives. By offering SUSE and SUSE Rancher solutions on IBM zSystems and IBM LinuxONE, we anticipate that organizations will be able to bring in new technologies such as Kubernetes using existing partner relationships and a familiar architecture that has been a fixture for decades in their datacenters. For new workload deployments bringing SUSE and SUSE Rancher solutions to IBM zSystems and LinuxONE adds power and capabilities for organizations looking to bring the platform's security, and availability to these cloud-native application.

CONCLUSIONS AND CONSIDERATIONS

Cloud native applications and the overall pivot from monolithic applications to containerized microservices represent an accelerant to digital transformation projects, however, Day 2 operation challenges exist. When accepting this dynamic and laying it over the most mission-critical applications and workloads, the challenges faced by enterprises are palpable. We believe that enterprises looking to make the pivot to containerized micro-services can gain confidence from the work that SUSE has undertaken to bring the SUSE Rancher and Longhorn technology to the IBM zSystems and LinuxONE platforms.

Enterprises considering implementing the combined SUSE Rancher with IBM zSystems and LinuxONE technology stack should consider undertaking the following three steps as part of their evaluations and decision-making criteria:

Workload Assessment. Undertake a full assessment of workload characteristics and non-functional requirements to better understand the underlying deployment architecture. If the workload is demanding along the vectors of Security, Performance, Scalability, and Availability then customers should look to evaluate the s390x chip architecture and the IBM zSystems and LinuxONE platforms as a viable option.

Open Source Approach. Evaluate Linux distributions and Kubernetes orchestration layers based on their ability to not only support multiple chip architectures natively, but also fully understand the upstream and downstream approach the vendor takes to working with the Open Source community. In addition, organizations must evaluate the interdependencies between public and private cloud deployments if they are to reap the benefits of a true hybrid cloud approach and avoid the challenges of having to use different Kubernetes tools based on the underlying cloud or platform chosen.

Beyond Kubernetes. Futurum Research believes that enterprises looking to move to cloud-native containerized applications need to extend their evaluations beyond just the Kubernetes tooling and look to evaluate solution architecture holistically. Vectors such as storage, most specifically the opportunities presented by Longhorn, should be factored into any evaluation criteria. Another area vital to any container driven deployment project is container security.

Overall, based on our evaluation and the information available to us at this time, we feel that SUSE Rancher on IBM zSystems and LinuxONE represents a compelling alternative for enterprises looking to deploy containerized micro services at scale into the most demanding and highly regulated environments and that organizations would do well to consider the value proposition SUSE Rancher provides as part of their overall solution evaluation process

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