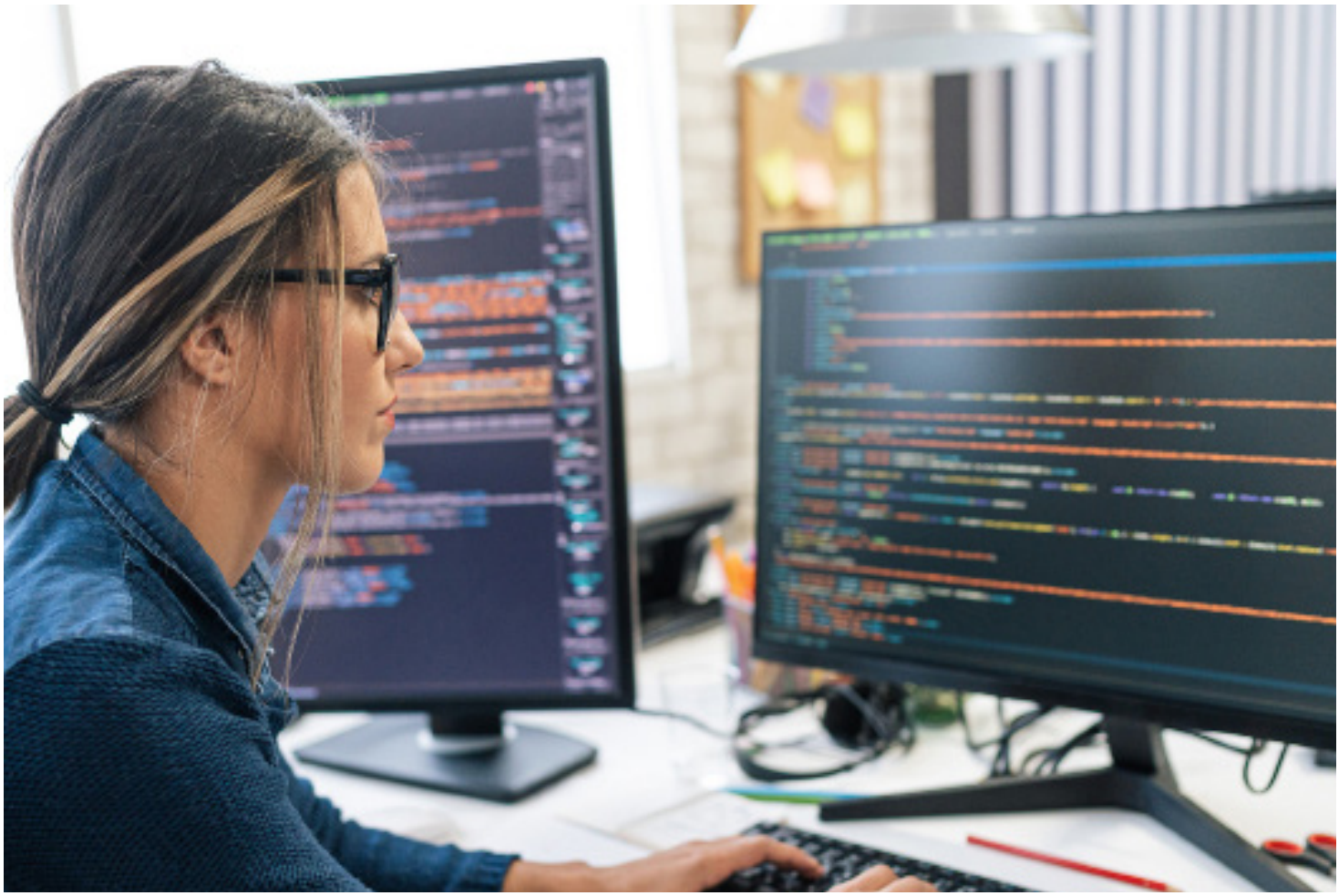
Empower how you deploy, manage, and integrate infrastructure as a service

Simplified Infrastructure-as-a-Service management on IBM Z® and IBM® LinuxONE



Introduction

Many IT organizations worldwide have turned to the agility of hybrid cloud solutions to facilitate their digital transformation journeys for all types of non-containerized and containerized workloads. They are shifting workloads to a cloud computing model that blends an on-premises infrastructure with private and public cloud computing models, unlike traditional IT.

Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS) are common 'cloud computing' models, and it's not uncommon for an organization to use all three. This paper focuses on Infrastructure-as-a-Service.

The term 'cloud computing' also refers to the technologies that make cloud computing work, such as virtualization and the infrastructure as a service management.

Virtualization enables IT organizations to get maximum use of their data center resources in the form of virtualized infrastructure, such as servers, operating system software, and networking, so that the infrastructure can be pooled and divided independently of the physical hardware. Not surprisingly, many corporations have adopted virtualization for their on-premises infrastructure to deliver maximum resource utilization, cost savings, and agility to their users.

Infrastructure management delivers the management and automation of the virtual environment – providing the IaaS capabilities. A properly managed and optimized infrastructure provides agility, efficiency and scalability and becomes more important as IT strategies evolve to multi-cloud and hybrid cloud models.

When using virtualization and infrastructure management, it's important for IT organizations to use the infrastructure platforms they have invested in, while extending into cloud computing models.

What is Infrastructure-as-a-Service?

Infrastructure-as-a-Service (IaaS) is a model of cloud computing that delivers fundamental compute, network, and storage resources to users on demand. IaaS enables users to scale and shrink resources on an as-needed basis, especially in the case of 'spiky' workloads.

The resources can be provisioned and released in an automated fashion, when offered in a self-service portal as on-demand services initiated by the users and without administrative intervention.

Managing the infrastructure as a service enables the integration of these infrastructure services into cloud computing across the enterprise. IaaS is used with non-containerized and containerized workloads.

Infrastructure on IBM Z® and IBM® LinuxONE

Many IT organizations consider their IT infrastructure as a strategic asset because the infrastructure forms the foundation to deliver business outcomes. It's important to invest in infrastructure that scales to support all types of non-containerized and containerized workloads and the different cloud computing service models. As well, the infrastructure should deliver cyber resiliency, continuous service quality, and sustainability in every aspect of its lifecycle.

IBM Z and IBM® LinuxONE deliver on-premises cloud computing platforms that provide a security-rich, scalable, and reliable environment for cloud-native development, cloud computing deployment, and automation. In particular, the IBM z16™ uses innovations and traditional IBM Z strengths to satisfy the growing demand for cloud computing, artificial intelligence, and a more flexible infrastructure.

The hypervisors IBM z/VM® and Red Hat® KVM, together with IBM Cloud Infrastructure Center, provide the foundation for on-premises cloud computing on IBM Z and IBM® LinuxONE. The workloads can be non-containerized and containerized, and they can be part of a hybrid cloud approach.

Infrastructure management with IBM Cloud Infrastructure Center

With IBM Cloud Infrastructure Center, IBM provides an Infrastructure-as-a-Service management solution on IBM Z / IBM® LinuxONE that is addressing following challenges:

Infrastructure management

IBM Cloud Infrastructure Center can manage the full lifecycle of virtual machines based on z/VM or Red Hat Enterprise Linux KVM, meaning that virtual machines can be created, started, stopped, restarted, resized, captured, and deleted. Live migration is also supported. The full lifecycle includes managing the storage, such as carving/deleting volumes from storage subsystems along with fabric management, and the management of network resources, such as IP allocation and network setup.

To create a virtual machine in Cloud Infrastructure Center, an image can be created from the ISO, or downloaded from a Linux® distribution partner website, or from a snapshot of an existing virtual machine that is managed by Cloud Infrastructure Center. The image and its deployment properties can be configured and saved as a 'deployment template', including everything necessary to create a virtual machine. Once the 'deployment template' has been created and stored, it can be used to deploy virtual machines quickly.

An image can either be based on a Linux distribution from Canonical, Red Hat, or SUSE, and can include non-containerized workloads, or on Red Hat Enterprise Linux CoreOS as part of Red Hat OpenShift® Container Platform.

Automated infrastructure deployment via self-service portal

Cloud Infrastructure Center comes with a self-service portal that provides users easy access to exploit infrastructure services.

The self-service portal enables automating infrastructure management by allowing the administrator to define infrastructure services that can be invoked by end users and makes them available in the self-service portal. The users can consume the services in an automated manner with an industry-standard user experience and don't have to worry about infrastructure details and technical skills.

Via the self-service portal, the IT organization can act as a service bureau for infrastructure services and can support different groups of tenants.

Integration of IBM Z / IBM® LinuxONE based infrastructure into enterprise cloud computing

With the built-in OpenStack-compatible APIs, Cloud Infrastructure Center supports the de facto industry standard for vendor-agnostic IaaS management. OpenStack-compatible APIs enable easy integration with cloud automation and orchestration tools that provide OpenStack integration points or plugins.

The integration capability of Cloud Infrastructure Center with cloud management tools can simplify the lifecycle management of virtual machines across the enterprise and can provide a unified hybrid cloud with a single pane of glass for the IBM Z / IBM® LinuxONE platforms. This helps to increase flexibility and to improve operational efficiency because common OpenStack skills can be leveraged, especially when integrating with tools such as IBM Cloud Pak® for Watson® AIOps, Red Hat Ansible®, Terraform, or VMware.

Popular use cases of IBM Cloud Infrastructure Center

Cloud Infrastructure Center's adoption patterns include four common use cases, although that doesn't exclude others.

Deployment of on-premises database-as-a-service

As described above, Cloud Infrastructure Center can deploy Linux based images which include non-containerized workloads. Using this capability, an administrator can build an image that consists of a Linux distribution and a database, and users can deploy it as a database-as-a-service on IBM Z / IBM® LinuxONE.

The administrator can build multiple variations of such a database-as-a-service image, using different Linux distributions, different data bases, and different configuration settings. Each variation can be saved as a 'deployment template', and the collection of 'deployment templates' can be offered as available services in the service portal to users and teams (services to deploy a database).

The thought behind it: create once and deploy quickly and easily.

While database-as-a-service is a very popular case, - for example MongoDB-as-a-service is used as caching database for read-only queries of the backend database - the 'as-a-service' approach can be used for other kinds of workloads in the same manner.

Deployment of Red Hat OpenShift clusters

The Red Hat OpenShift Container Platform on IBM Z / IBM® LinuxONE empowers organizations to integrate and modernize applications with great agility through integrated tooling and a secure and resilient foundation for cloud-native development and deployment on IBM Z / IBM® LinuxONE.

Cloud Infrastructure Center supports the provisioning of Red Hat OpenShift Container Platform clusters via the deployment of Red Hat Enterprise Linux CoreOS as part of Red Hat OpenShift, and the management of the virtual machines used for the deployment of the cluster.

A Red Hat OpenShift image can be deployed into a virtual machine that is based on z/VM or Red Hat KVM, as with every other image.

Cloud Infrastructure Center supports a fully automated Red Hat OpenShift cluster deployment in a user provisioned infrastructure model via Red Hat Ansible®[1] or Terraform.

Automation is a major strategic differentiator for organizations looking to improve the efficiency, management, scale, and performance of their IT stacks, and Ansible is a robust and flexible technology that can help organizations get there and is very popular in the industry.

[1] An Ansible Playbook example is available for download, and a technical blog describes the details.

Infrastructure as a service management for service providers

Service providers need tools that can take advantage of the virtualized infrastructure to offer their services in a secure way. Cloud Infrastructure Center can serve as the management system for the virtualized infrastructure to support different types of cloud computing models. With the built-in OpenStack-compatible APIs, Cloud Infrastructure Center can satisfy a wide range of infrastructure management demands and can integrate various components to automate infrastructure services and thereby reduce cost and complexity.

Virtualization technologies in combination with the IBM Z / IBM® LinuxONE capabilities provide impressive scalability—horizontally and vertically. Resources can be assigned dynamically and efficiently between workloads, whenever and wherever they are needed. A single IBM Z / IBM® LinuxONE system can run up to thousands of virtual Linux servers, which can result in less effort for the systems and operational management, and cost savings.

Important when serving multiple customers is accurately charging the allocated resources to each customer. Cloud Infrastructure Center, integrated with the IBM Cloud Pak for Watson AIOps, enables monitoring and recording the resources consumed by the virtual machines that are managed by Cloud Infrastructure Center.

Simplified experience with virtualization on IBM Z / IBM® LinuxONE

Having a great experience with the IBM Z / IBM® LinuxONE platforms is of interest for clients who are starting on these platforms, as well as for clients who have been using IBM Z / IBM® LinuxONE for years. All clients are looking for simple but effective management of the virtualized infrastructure.

Using virtualized infrastructure can help organizations achieving their corporate sustainability goals. IBM Z / IBM® LinuxONE are ideal platforms to reduce the carbon footprint. Continuing the history of improved sustainability factors, such as increased system capacity per kW, in every release, workloads on IBM Z / IBM® LinuxONE can consume less energy compared to distributed server environments, contributing to fewer greenhouse gas emissions.

The capabilities of Cloud Infrastructure Center in ‘infrastructure management’, ‘automated deployment via the self-service portal’, and the ‘integration of IBM Z / IBM® LinuxONE based infrastructure into enterprise cloud computing’ are all based on the industry standard and vendor-agnostic technology for IaaS management and deliver a major step towards simplifying the management of virtualized infrastructure.

Summary

Infrastructure-as-a-Service is the most mature compute model in cloud computing. IaaS provides the capability to integrate on-premises non-containerized and containerized workloads into an enterprise hybrid cloud approach.

The IaaS management solution for IBM Z / IBM® LinuxONE is IBM Cloud Infrastructure Center and the four described adoption patterns have emerged among clients.

IBM Cloud Infrastructure Center can be used in any combination to support efficient and simple infrastructure management on IBM Z / IBM® LinuxONE.

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