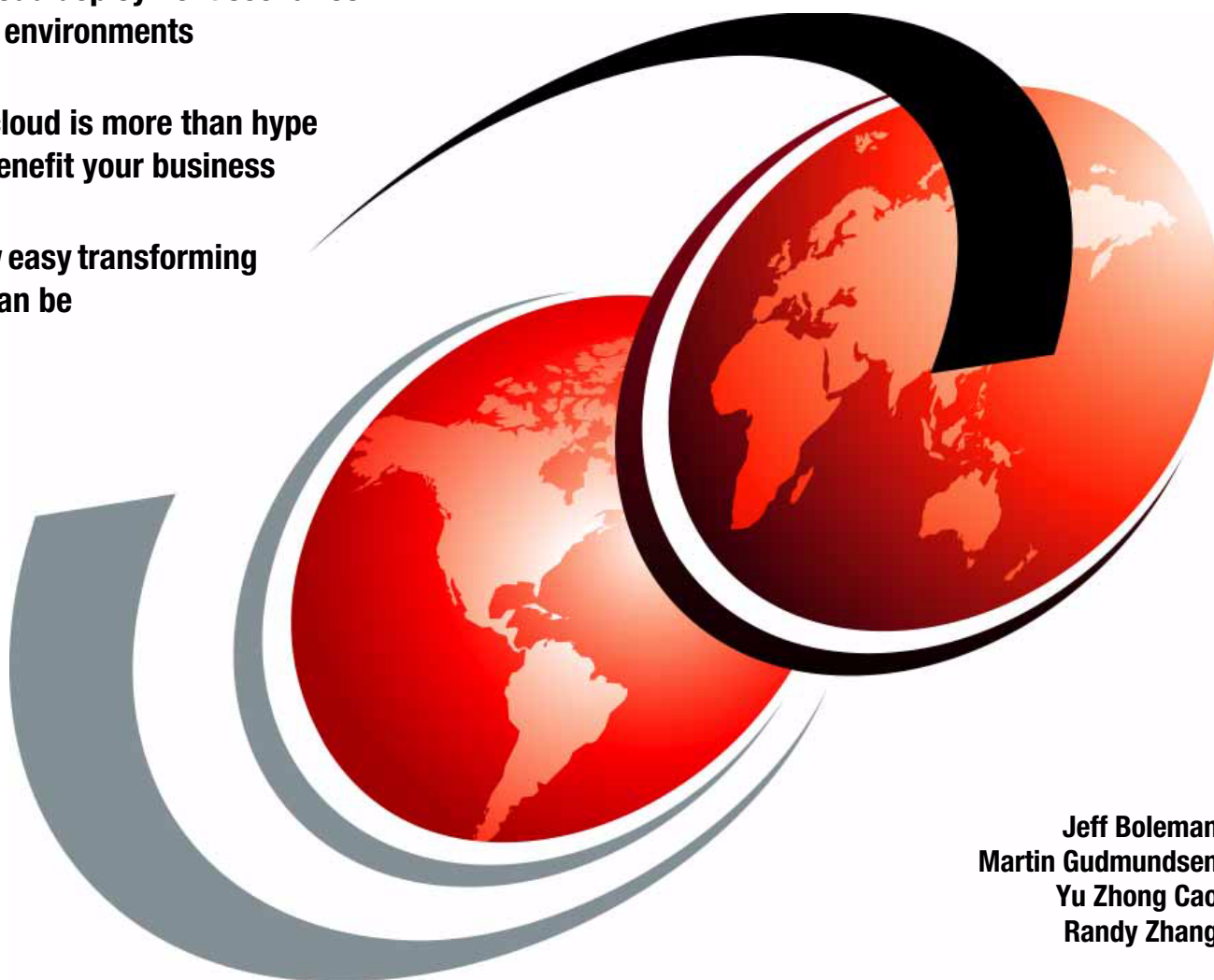


IBM SmartCloud Entry 2.4 Deployment Use Cases

Explore cloud deployment scenarios
in various environments

See how cloud is more than hype
and can benefit your business

Learn how easy transforming
to cloud can be



Jeff Boleman
Martin Gudmundsen
Yu Zhong Cao
Randy Zhang



International Technical Support Organization

IBM SmartCloud Entry 2.4 Deployment Use Cases

February 2013

Note: Before using this information and the product it supports, read the information in “Notices” on page v.

First Edition (February 2013)

This edition applies to IBM SmartCloud Entry V2.4.

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Preface

This IBM® Redpaper™ publication provides a brief overview of cloud technology, and describes how, from a user perspective, IBM SmartCloud™ Entry can easily help you access the benefits of the cloud. In particular, the product provides a comprehensive cloud software stack with capabilities that you otherwise might need to purchase separately as multiple products from multiple vendors.

Businesses with an existing virtualized platform (IBM Power Systems™ with PowerVM® or IBM System x with VMware vSphere) can be easily transformed to a private cloud. IBM SmartCloud Entry helps make this transformation possible. IBM SmartCloud Entry integrates with the IBM PureFlex™ System, so that clients with PureFlex System can also experience easier cloud-ready deployments.

IBM SmartCloud Entry adds a self-service, user portal, and basic metering to your existing virtualized platform. Overall, IBM SmartCloud Entry can be easy to implement, and delivers improved service levels. It delivers fast time-to-value result for receiving the benefits of a private cloud infrastructure.

The use cases depict the following cloud deployment scenarios:

- ▶ Scenario 1: Cloud deployment in a PureFlex environment
- ▶ Scenario 2: Cloud deployment in a VMware environment
- ▶ Scenario 3: Cloud deployment for a telecommunications company
- ▶ Scenario 4: Cloud deployment in Power Systems and x86 environment

These use cases demonstrate the ease with which IBM SmartCloud Entry can be deployed and the possibilities for improved efficiencies in your organization. Also included are two IBM SmartCloud Entry processes, showing the ease of provisioning and installing with this product.

This paper is directed at decision-makers, such as CFOs, CIOs, and CEOs, in addition to IT managers, systems administrators, enterprise architects, systems architects, and IBM Business Partners. Presales and post-sales technical staff can benefit from discussing this paper with clients and potential clients.

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IBM SmartCloud Entry deployment use cases

The use case scenarios in this paper demonstrate the ease with which IBM SmartCloud Entry can be deployed and the possibilities for improved efficiencies in your organization. Each scenario includes a *before* and *after* architecture diagram and a *before* and *after* process flow to illustrate the improvements brought about by the implementation of IBM SmartCloud Entry. Specifically, the use cases depict the following scenarios:

- ▶ Scenario 1: Cloud deployment in a PureFlex environment
- ▶ Scenario 2: Cloud deployment in a VMware environment
- ▶ Scenario 3: Cloud deployment for a telecommunications company
- ▶ Scenario 4: Cloud deployment in Power Systems and x86 environment

This paper also includes two IBM SmartCloud Entry processes, showing the ease of provisioning and installing with this product.

This IBM Redpaper publication is directed to decision-makers, such as CFOs, CIOs, and CEOs, in addition to IT managers, systems administrators, enterprise architects, systems architects, and Business Partners. Pre-sales and post-sales technical staff can benefit from discussing this paper with clients and potential clients.

1.1 The cloud is more than hype: your business requires it

Many businesses today have many of the same questions that you do:

- ▶ How do I respond to pressures to cut costs and to reduce risk and complexity?
- ▶ System architectures are already complex. How can I keep pace with technology?
- ▶ How can I react more quickly to take advantage of new business opportunities?
- ▶ How do I move my data center architecture into the future?
- ▶ With all the “buzz” about the cloud, where is the best place to start and how?

Although cloud technology has become commonplace, the technology might seem overwhelming to those who have not yet made the move. IBM works with you, so you can be more efficient and cost-effective in supporting diverse technologies.

IBM cloud and virtualization solutions offer flexible approaches to the cloud. Where you begin your journey depends on your business needs. The IBM cloud has the following benefits:

- ▶ Makes IT resources available for use more quickly, and you can respond to business requirements more promptly, reduce deployment time, and share resources more effectively
- ▶ Enables you to conduct business efficiently because, with a cloud, you can focus on the perspective of your users, rather than the perspective of IT or the systems administrator
- ▶ Has an intuitive user interface for users and cloud administrators
- ▶ Enables you to provision to multiple x86 and Power environments from a central management window
- ▶ Has a shared resource environment that maximizes utilization
- ▶ Can easily be used without having to know the details of the infrastructure to use the product
- ▶ Optimizes performance with dynamic scaling, expansive capacity, and continuous operation
- ▶ Works with new and existing infrastructures, including the following items:
 - VMware vCenter environments
 - IBM System x
 - IBM Power Systems
 - IBM PureFlex Systems (IBM SmartCloud Entry is included with Standard and Enterprise offerings of PureFlex Systems)

Facing the challenges of implementing any new technology can be exasperating. Implementing a cloud solution in your infrastructure can be a complex undertaking, but IBM SmartCloud steps you through the transformation process. You might ask, “Does this product have the potential to address my problem areas?”

IBM offers solution benefits to help you in the following ways:

- ▶ Balancing performance and cost
- ▶ Finding an affordable solution today that can be expanded in the future
- ▶ Controlling complexity, while simultaneously employing new technologies
- ▶ Finding a solution that delivers a rapid return on investment (ROI) and a lower total cost of ownership (TCO) to justify the investment

- ▶ Implementing a cloud that makes your environment simpler, “greener,” and more efficient
- ▶ Offering our self-service portal for cloud clients, with basic approval workflows and accounting capabilities

The following definition of *cloud computing*, as defined by the National Institute of Standards and Technology:

“Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (for example, networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”¹

Now, how can cloud computing help your business?

1.2 Do what is best for your business


You want to respond to customers quickly, make your business visible in the marketplace, and watch your business grow. These activities take time, but you spend exorbitant amounts of time with daily business tasks; tasks that, frankly, can be cumbersome. These tasks and processes take you away from your primary focus: making your business grow.

IBM has products and technologies that can help you to manage your business, enabling you to attend to the tasks that only you can do. One way to manage your business efficiently is to use cloud technology. IBM SmartCloud Entry is robust cloud software that enables you to request and provision an environment quickly, using a GUI and easy navigation. With IBM SmartCloud Entry, you can monitor your data center for improved efficiency and utilization and address issues quickly and efficiently.

IBM SmartCloud Entry enables you to build on your current virtualization strategies and continue to gain IT efficiency, flexibility, and control. When IT environments move to the cloud, the result is that cloud offers many advantages:

- ▶ Optimizes resources to reduce data center footprint
- ▶ Improves workload management and capabilities for delivering new services
- ▶ Provides for rapid services deployments, completed in a day or hours, not several weeks
- ▶ Has a built-in billing and metering system
- ▶ Improves IT governance, security standards, and risk management
- ▶ Reduces workload for administrators
- ▶ Reduces management costs with automated server requests and self-provisioning
- ▶ Improves efficiencies with its optional approval mechanism
- ▶ Provides a light-weight cloud solution
- ▶ Is simple to deploy, easy to use, and integrates with your existing infrastructure
- ▶ Enables you to rapidly deploy a comprehensive data center with minimal disruption
- ▶ Provides improved reliability and uptime with tested configurations
- ▶ Provides configurations that incorporate preferred practice architecture and design
- ▶ Reduces complexity with simplified management
- ▶ Can be used in line with Information Technology Infrastructure Library (ITIL) guidelines
- ▶ Support for heterogeneous environments
- ▶ Adapts to changing requirements; scalable without major infrastructure changes
- ▶ Optimizes your data center with increased automation and structured security
- ▶ Enables comprehensive management and resource sharing
- ▶ Improves business resiliency; its infrastructure design has no single point of failure

¹ *The NIST Definition of Cloud Computing*, National Institute of Standards and Technology, Special Publication 800-145, available at: <http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>



Features, benefits, roles, and more about IBM SmartCloud Entry 2.4

IBM SmartCloud Entry helps you with many business operations. IBM SmartCloud Entry v2.4 offers various new features:

- ▶ *Heterogeneous support:* IBM SmartCloud Entry now provides heterogeneous cloud management across System x, Power Systems, PureFlex, and IBM Flex Systems environments. With this unified code set, clients can control a wide variety of platform architectures from a single IBM SmartCloud Entry graphical user interface (GUI).
- ▶ *Multi-cloud, multi-hypervisor support:* The product enables multi-cloud management across geographical areas and time zones, and by grouping tiered hardware environments, for example, production clouds and test clouds. Additionally, it supports multiple hypervisors, such as PowerVM, VMware, and kernel-based virtual machines (KVMs). IBM intends to support Hyper-V platforms in the future. Thus, by combining multiple cloud instances and expanded hypervisor options, IBM SmartCloud Entry achieves greater scalability for greater choice and flexibility.
- ▶ *Enhanced project level customization:* You are empowered to configure IBM SmartCloud Entry to align with your operational structure. For example, users can set up tiered project levels, named *Resource Pools*, if one project team has sandbox test hardware, and another project team has fully production-ready hardware. Administrators can also implement virtual machine (VM) *expiration dates* to manage image proliferation better.

With IBM SmartCloud Entry, your cloud environment deploys quickly. IBM also offers advanced cloud features when your business requires them. You can take advantage of existing IBM server investments and virtualized environments to deploy IBM SmartCloud Entry with the essential cloud infrastructure capabilities:

- ▶ Create images:
 - Simplify storage of thousands of images
 - Create new *golden master* images and software appliances by using corporate standard operating systems.
 - Convert images from physical systems or between various x86 hypervisors.
 - Reliably track images to ensure compliance and minimize security risks.
 - Optimize resources, reducing the number of virtualized images and the storage that is required for them.
- ▶ Deploy VMs:
 - Reduce the time to value for new workloads from months to a few days.
 - Deploy application images across compute and storage resources.
 - Use self-service for improved responsiveness.
 - Ensure security through VM isolation, and project-level user access controls.
 - No need to know about the details of the infrastructure.
 - Protect investment with the full support of existing virtualized environments.
 - Optimize performance on IBM systems with dynamic scaling, expansive capacity, and continuous operation.
- ▶ Operate a private cloud:
 - Cut costs with efficient operations.
 - Delegate provisioning to authorized users to improve productivity.
 - Maintain full oversight to ensure an optimally running and safe cloud through automated approval and rejection.
 - Standardize deployment and configuration to improve compliance and reduce errors by setting policies, defaults, and templates.
 - Simplify administration with an intuitive interface for managing projects, users, workloads, resources, billing, approvals, and metering.

Further features and benefits of IBM SmartCloud Entry include the following items:

- ▶ Deployments:
 - Fast time-to-value for self-service provisioning of virtualized workloads for x86 and Power
 - Easy to use with simple deployment (provides a four-click deployment)
 - Easy to use deprovisioning
 - Improved productivity by delegating provisioning to authorized users
- ▶ Metering and billing:
 - Simple and easy to use
 - Pay-per-use model with accounts for billing or reporting
 - Delinquency policy for depleted accounts

- ▶ Approval policy:
 - Configured at the project level
 - Simple workflow for oversight and automated approval and rejection
 - Role-based policies for cloud administrators, users, owners, and viewers
- ▶ Expiration policy:
 - Optional: Configured at the project level
 - Avoids VM sprawl (spreading irregularly without restraint)
 - Expiration warning email messages sent to users
 - Automatic or manual deletion of VM resources
- ▶ Standardized deployment, configuration, and automation:
 - Create *golden master images* and software appliances by using corporate standards
 - Reliably track images to ensure compliance and minimize security risks
 - Improve compliance and reduce errors with policies, defaults, and templates
 - Simplify administration and automation to lower administration cost
 - Intuitive interface for managing projects, users, workloads, resources, approvals, billing, and metering
- ▶ Expand to advanced cloud offerings:

The features and benefits of IBM SmartCloud Entry v2.4 provide an excellent starting point for moving to a private cloud, especially when you consider the ease-of-implementation and fast time to value.

Details about the products that are mentioned in this paper are available in the sources that are listed in “Related publications” on page 73.

2.1 The IBM cloud workshop focuses on your IT needs

IBM also provides clients with a *cloud workshop*, during which the focus is on discerning your business needs from an IT perspective. This in-depth workshop helps us to identify your *pain points* (problem areas) and to understand how your processes can be improved by the use of the cloud.

As an example, with traditional (rack server) deployments, a systems administrator attends to every requirement with exacting detail. Some of the activities that a systems administrator does are tedious and repetitive, but are required to meet your business requirements.

In contrast, the cloud alleviates many of these repetitive, tedious tasks. The four use case scenarios in this paper describe several time-saving abilities that IBM SmartCloud offers.

2.2 Roles in a cloud environment

Five user roles are in IBM SmartCloud Entry:

- ▶ *Administrator*: The administrator has access to the entire system.
 - Has full authority over IBM SmartCloud Entry.
 - Can manage all projects.
 - Can manage all users.
 - Can manage all requests.
 - Does not need to configure IBM SmartCloud Entry; it is configured during installation.
 - Can add additional administrators when needed.
 - Uses mandatory email address for notifications.

- ▶ *Project owner*: After access is provided to a project, the project owner role is available and has administrator authority to each assigned project and its contents.
- ▶ *Project User*: After access is provided to a project, the project user role is available and has the authority to use the project and the objects within the project. For example, a project user can deploy a virtual appliance to the project and perform limited management of the project and its contents.
- ▶ *Project Viewer*: After access is provided to a project, the project viewer role is available and has authority only to view the project and the virtual appliances and workloads contained in that project.

2.3 Cloud terminology for IBM SmartCloud Entry and related products

Among the cloud products discussed in this paper (IBM SmartCloud Entry, VMware, and IBM Power Systems), the product definitions and terminologies can vary. The lists in this section are some of the product definitions and terms for those products.

2.3.1 IBM SmartCloud Entry

The following terminology is used in running IBM SmartCloud Entry:

- ▶ Account

The account is the name of the owner of the workloads. Any user who can log in to IBM SmartCloud Entry can be assigned an account. The workloads that are owned by this user are charged to that account. A user can be a member of only one account at a time.

- ▶ Appliance

The appliance is a master disk image of a virtual machine and its associated configuration parameters. An appliance is used to create new virtual machines (a template or an image). An IBM SmartCloud Entry administrator can configure the parameters of an appliance and place them in the appropriate project for assigning access.

- ▶ Capture

A capture is a method for copying an entire workload. With a capture, you can keep what is known as a *stable copy* before you make changes, so that you can revert, if you want. A capture consumes as much disk space as the original workload (for example, a clone or a re-creation).

- ▶ Image catalog

In this paper, this term describes a list of appliances that IBM SmartCloud Entry users can provision.

- ▶ Project

A project is a grouping in IBM SmartCloud Entry. Workloads and appliances are grouped into projects.

- ▶ Service catalog

A service catalog, which is an ITIL definition, is a list of services an IT department or IT provider delivers to its users or customers. In IBM SmartCloud Entry, it is possible to group services in the service catalog as projects so that every project can consist of the servers that are used to provide the service in the service catalog.

- ▶ Virtual server or workload
 - A virtual computer, similar to a physical computer that runs an operating system and applications (workload). A workload is created by deploying an appliance. It consists of a virtual server instance that runs from a copy of the master disk image in the appliance, using the parameters that are specified in the appliance configuration and those parameters that are specified during the deployment request. The copy of the master disk image to the instance disk image occurs during deployment, and the instance disk image is *ephemeral*, which means that it lives for the lifetime of the virtual server or workload and is destroyed when the virtual server or workload is deleted.
 - A system that is composed of partitioned, shared, or virtualized resources that are presented from a host system. An operating system and other software are installed on a virtual machine (virtual server).

2.3.2 VMware

The following terminology is used in running VMware:

- ▶ Clone

A clone is a method for copying an entire workload. Also known as a *capture*, it allows you to keep what is known as a *stable copy* before you make changes, so that you can revert, if you want. A capture consumes as much disk space as the original workload (for example, a *clone* or a *recreate*).
- ▶ Distributed Resources Scheduler (DRS)

A DSR is a VMware technology that groups VMware ESX (ESX) servers and so you can balance virtual machines within the DRS.
- ▶ Template

A template is an image of a virtual machine that is used to create new virtual machine (appliance).
- ▶ vCenter

The vCenter is part of the VMware infrastructure that can manage multiple ESXi servers and additional services.
- ▶ Virtual machine (VM)
 - A VM is a virtual computer, similar to a physical computer that runs an operating system and applications (workload). A workload is created by deploying an appliance. It consists of a virtual server instance that runs from a copy of the master disk image in the appliance, by using the parameters that are specified in the appliance configuration and those parameters that are specified during the deployment request. The copy of the master disk image to the instance disk image occurs during deployment, and the instance disk image is *ephemeral*, which means that it lives for the lifetime of the virtual server or workload and is destroyed when the virtual server or workload is deleted.
 - A VM is a system that is composed of partitioned, shared, or virtualized resources that are presented from a host system. An operating system and other software are installed on a virtual machine (virtual server).
- ▶ VMware ESXi (ESXi)

ESXi is an enterprise virtualization software hypervisor product that is offered by VMware.

2.3.3 IBM PowerVM

The following terminology is used with IBM PowerVM:

- ▶ Hardware Management Console (HMC)

An HMC is an appliance for configuring and managing IBM Power Systems.

- ▶ IBM Flex System™ Manager

This appliance is for configuring and managing Flex Systems that includes VMControl and HMC capabilities.

- ▶ Image

An image is a master disk image of a virtual machine and its associated configuration parameters. An appliance is used to create new virtual machines (a template or an image). An IBM SmartCloud Entry administrator can configure the parameters of an appliance and place them in the appropriate project for assigning access.

- ▶ Logical partition (LPAR)

- An LPAR is a virtual computer, similar to a physical computer that runs an operating system and applications (workload). A workload is created by deploying an appliance. It consists of a virtual server instance that runs from a copy of the master disk image in the appliance, by using the parameters that are specified in the appliance configuration and those parameters that are specified during the deployment request. The copy of the master disk image to the instance disk image occurs during deployment, and the instance disk image is *ephemeral*, which means that it lives for the lifetime of the virtual server or workload and is destroyed when the virtual server or workload is deleted.

- An LPAR is a system that is composed of partitioned, shared, or virtualized resources that are presented from a host system. An operating system and other software are installed on a virtual machine (virtual server).

- ▶ PowerVM

PowerVM is an integrated virtualization hypervisor for the IBM Power platform.

- ▶ Recreate

A *recreate* is a method for copying an entire workload. Also known as a *capture*, it allows you to keep what is known as a *stable copy* before making changes, so that you can revert, if you want. A capture consumes as much disk space as the original workload (for example, a clone or a recreate method).

- ▶ VMControl

VMControl is a virtualization management tool for PowerVM that can manage multiple Power servers and storage.

2.4 IBM and third-party products for IBM SmartCloud Entry

An IBM SmartCloud Entry environment consists of a single server installation that manages Intel x64 and IBM Power platforms. Regardless of the platforms that are managed, this server can be either of the following items:

- ▶ Intel x86-64 (Windows Server 2008 or Red Hat Linux)
- ▶ IBM Power Systems (POWER6® or POWER7®, and AIX)

If you are not using default user authentication, the user registries can be as follows:

- ▶ LDAP
- ▶ Active Directory

The following browsers are supported:

- ▶ Internet Explorer
- ▶ Mozilla Firefox
- ▶ Google Chrome

The following software components are prerequisites:

- ▶ For Intel x86 (including PureFlex):
 - VMware vSphere with vCenter
- ▶ For Power-on PureFlex Systems:
 - Flex System Manager
 - IBM VMControl
 - Virtual I/O Server (VIOS)
- ▶ For IBM Power Systems (non-PureFlex):
 - IBM Systems Director
 - IBM VMControl
 - Virtual I/O Server (VIOS)
 - Hardware Management Console (HMC) or Integrated Virtualization Manager (IVM)

Note the following information about licensing:

- ▶ The managing and managed servers must be licensed.
- ▶ Licensing is per physical server, which is based on CPU, or per chassis for PureFlex.
- ▶ IBM SmartCloud Entry is included with the PureFlex Standard and PureFlex Enterprise offerings.



Scenario 1: Cloud deployment in a PureFlex environment

In this use case scenario, a manufacturing company needed to reduce operational expenses and streamline one of the key processes of the IT Infrastructure team: VM deployment.

3.1 Client background

This scenario has the following client, task, and goal:

- ▶ *Client type:* Manufacturing company
- ▶ *Current task:* Migrate from the existing, rack server Power Systems and x86 environments to a PureFlex Standard system.
- ▶ *Overall goal:* Realize the benefits of PureFlex technology to improve operational efficiencies, time to value, and the speed of deployments for faster project turnaround.

3.2 Architecture

The existing infrastructure consists of the following components:

- ▶ Rack, x86 servers with VMware
- ▶ Power 550 and 560 servers
- ▶ Hardware Management Console (HMC)
- ▶ Network Installation Manager (NIM)

The preexisting architecture is shown in Figure 3-1.

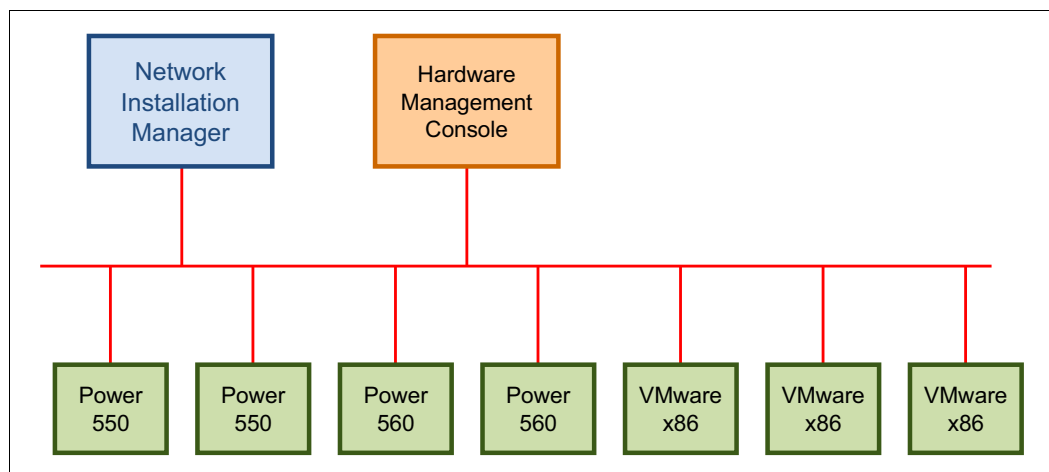


Figure 3-1 Scenario 1 architecture, before IBM SmartCloud Entry implementation

3.3 Challenges and issues

The primary challenges and issues for this use case were defined as follows:

- ▶ All projects were executed from within IT. Administrators and developers had frequent and clear communication, and requests for resources were submitted to the administrators frequently. All projects were billed to the IT department.
- ▶ The top priority of the development team was to improve project turnaround. There was limited communication between the administrators and developers, so deploying a workload took from hours to days. The CIO of this company wanted to reduce this time to minutes.
- ▶ The top priority of the IT infrastructure manager was to reduce operational overhead of the systems. Systems administrators were spending 60 - 80% of their time performing operational tasks, such as provisioning. Storage administrators found that keeping up with requests, in addition to their duties of performing backups, upgrades, and monitoring, was difficult. This manager wanted a system in place that had the ability to offload much of the provisioning work for both systems and storage administrators, and yet also increase workload-provisioning turnaround.

3.4 Requirements

A cloud workshop was conducted, resulting in a list of requirements for meeting the overall goal of this company (see 3.1, “Client background” on page 14):

- ▶ The IT infrastructure and IT development teams communicated, but perhaps not enough. The managers of both teams wanted to increase the interactions between them to alleviate any potential overlaps in job tasks, and to partner more in the way appliances were deployed. Because all projects were executed by IT as a whole, separate billing between departments and projects was not required.
- ▶ Improve project turnaround by implementing a system that is preconfigured for use, yet can be customized when needed, and provide the technology to deploy workloads quickly.
- ▶ Reduce operational expenses by increasing the efficiency of tasks, such as workload provisioning from the perspective of both teams.

3.5 Hardware and software solution

The solution was to implement the PureFlex Standard environment, with the following components:

- ▶ IBM SmartCloud Entry (per chassis license included with PureFlex Standard)
- ▶ Four IBM x86 compute nodes
- ▶ Three IBM Power compute nodes
- ▶ IBM PowerVM
- ▶ IBM Storwize® V7000 storage
- ▶ Flex System Manager
- ▶ VMware vSphere (ESXi)
- ▶ VMware vCenter

Note that IBM SmartCloud Entry integrates with the VMware vCenter application program interface (API) for x86 and the VMControl API for Power. Figure 3-2 shows the architecture for this use case after the implementation of IBM SmartCloud Entry.

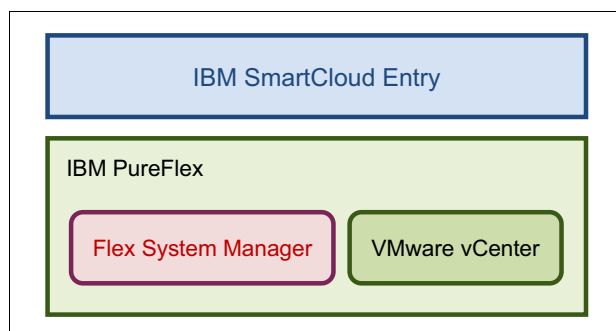


Figure 3-2 Scenario 1 architecture, after IBM SmartCloud Entry implementation

3.6 Implementation

A five-day Lab Services engagement (for details, see 8.3, “IBM Systems Lab Services and Training” on page 68) was included with the IBM PureFlex Standard Edition. The Lab Services component of PureFlex was also used for requirements-gathering in association with the installation and setup of IBM SmartCloud Entry. The result was a fully functional private cloud solution, ready for immediate use, with no configuration required.

Consider the following information about this scenario:

- ▶ Metering and billing was not needed and therefore was not enabled, making this implementation simpler.
- ▶ The users, roles, and projects were straightforward and did not need modification.
- ▶ The IBM SmartCloud Entry approval policy was set to auto-approve, because the infrastructure and development teams work closely together.
- ▶ The consumers of the cloud, which included developers, testers, and application administrators, had many questions, conveying their initial uncertainty about how the dynamics and processes might change. They were used to their current process, and change was imminent.

After IBM SmartCloud Entry was implemented, and considering the team uncertainties about process changes, it was easy to address their concerns. For example, when a user needs restricted access to only certain hardware, or needs approval for resource allocation, a separate project can be set up with a restricted approval policy and a finite set of system resource pools.

3.7 Summary and client feedback

In this scenario, although there was a learning curve with the Flex System Manager product, the benefits of managing all x86 and Power Systems as a single entity was quickly realized during the skills transfer experience of the included Lab Services. The standard Lab Services setup time is three, five, and seven days for Standard, Express, and Enterprise editions, respectively.

Organizationally, the transformation to the cloud changed the way activities were done. Traditionally, the x86 and Power Systems administrators worked in separate silos. Using cloud technology brought the teams together to manage the same hardware. The result was an increase in operational efficiency, gained by having the two silos combined into one cohesive unit. This was noticed when implementing multi-platform, distributed environments for development.

Implementing IBM SmartCloud Entry required the IT administrators of both platforms to engage more with the infrastructure consumers, who now had more control over their environments. As a result, working with a single self-provisioning web portal for both platforms streamlined the environment even more, because there were no longer two separate processes and groups of people making requests. *The benefits of this process change were realized immediately.*

After IBM SmartCloud Entry implementation, the following primary improvements are realized:

- ▶ Operational efficiencies are clearly realized. From an organizational standpoint, the x86 and Power Systems administrators functionally acted as two separate groups and are now one coherent team. This improvement benefits both the IT infrastructure team and the developers.
- ▶ Project delays are reduced with self-provisioning deployments. The old process involved multiple manual workflows across separate groups and took from days to weeks. The new process is a single, automated workflow that takes minutes.
- ▶ The IT Infrastructure team *reduced overhead from 60 - 80% to 40 - 60%*, with provisioning now being delegated by a simple-to-use, automated self-provisioning tool. The developers now control their own provisioning, so they are more closely tied to the infrastructure group. A greater partnership is now established, as is a better awareness of the resources being deployed.
- ▶ PureFlex provides an updated infrastructure. The additional benefits include the ability to add capacity without downtime and non-linear scaling from an administration standpoint. Rolling upgrades also reduce planned downtime, which saves an administrator's time in scheduling downtime.



Scenario 2: Cloud deployment in a VMware environment

In this use case scenario, operational overhead for some of the IT professionals in a research institute was especially high during certain business cycles. These cycles represent the start of research projects by non-IT users. Each cycle can require the IT staff to provision a number of VMs quickly.

4.1 Client background

This scenario has the following client, task, and goal:

- ▶ *Client type:* Research institute
- ▶ *Current task:* The IT department consists of nine people, two of whom monitor VMware and the operating systems for the institute. During numerous business cycles each year, VMs are ordered by non-IT users for starting research projects. The operational overhead for the two IT professionals was especially high during these cycles. As one example, a cycle included provisioning 30 - 40 VMs, and provisioning was required within a short time.
- ▶ *Overall goal:* Decrease operational overhead during high-overhead business cycles.

4.2 Architecture

The research institute uses virtualization with VMware to provide virtual servers for both infrastructure services and faculty projects. The researchers use virtual servers to do research tasks.

The setup for the faculty includes four System x servers running VMware ESX Server, and one System x server running VMware vCenter to administer the virtualization platform. The institute is using Microsoft Active Directory as infrastructure for its users. For research applications, both a Linux and Windows VM were used.

The preexisting architecture is shown in Figure 4-1.

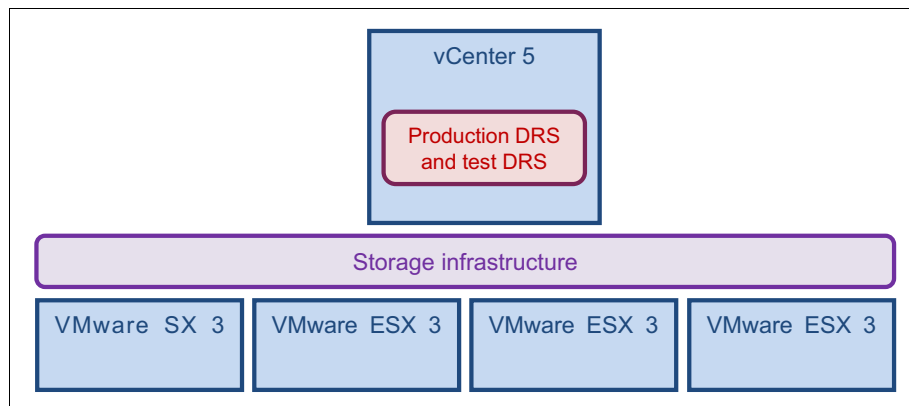


Figure 4-1 Scenario 2 architecture, before IBM SmartCloud Entry implementation

4.3 Challenges and issues

The primary challenges and issues for this use case were defined as follows:

- ▶ High overhead was especially evident when researchers started new projects, so improvement was needed in this area. A large number of temporary virtual servers were deployed, and the repetitive work for the VMware administrators, in addition to the wait times for the researchers, caused project delays. A number of typical administrative duties, such as tracking usage, ownership, and lifecycle management of the VMs, can be handled by IBM SmartCloud Entry, greatly reducing this overhead, and making these tasks obsolete for the administrator. Without IBM SmartCloud Entry, this situation became unmanageable and caused VMs to go unused for long periods of time before being decommissioned.
- ▶ In addition, the IT staff had to deploy virtual servers, based on input from the faculty researchers, using email, which was a substantially manual process. Occasionally, servers needed to be powered on, off, or in other ways adjusted, depending on changing needs for research projects. Although vCenter allowed users to log in with access to only those virtual machines and tasks to which they were assigned access, this configuration task was manual. It also required that the researchers have the vCenter client installed on their desktops. The IT staff was reluctant to allow non-IT personnel to use vCenter, because this allowed for modifications to resource consumption that was out of the control of IT staff.
- ▶ The following example demonstrates the process of a researcher ordering virtual servers:
 - A research assistant, not familiar with IT practices, needed three VMs for a six-month research project. To order the VMs, the researcher emailed the support desk. The support desk replied by email with questions about project requirements, for example, OS, processor, memory, and disk space.
 - The research assistant replied that the application named *Analytics* were to be installed, and, therefore, sufficient resources were needed for running that application. The support desk emailed a colleague to determine the resources that are typically required by Analytics. With that information available, the support desk sent an email to the vCenter administrator, requesting that three VMs be deployed. In vCenter, the administrator noted the identification of the temporary owner of the VMs and the length of time they are intended to be active.
 - Putting the three servers into production involved three people and a number of emails. In addition, there were gaps in the provisioning process, in that it (the provisioning process) was contained in personal email mailboxes.

Figure 4-2 is a flowchart of the workflow before implementing IBM SmartCloud Entry.

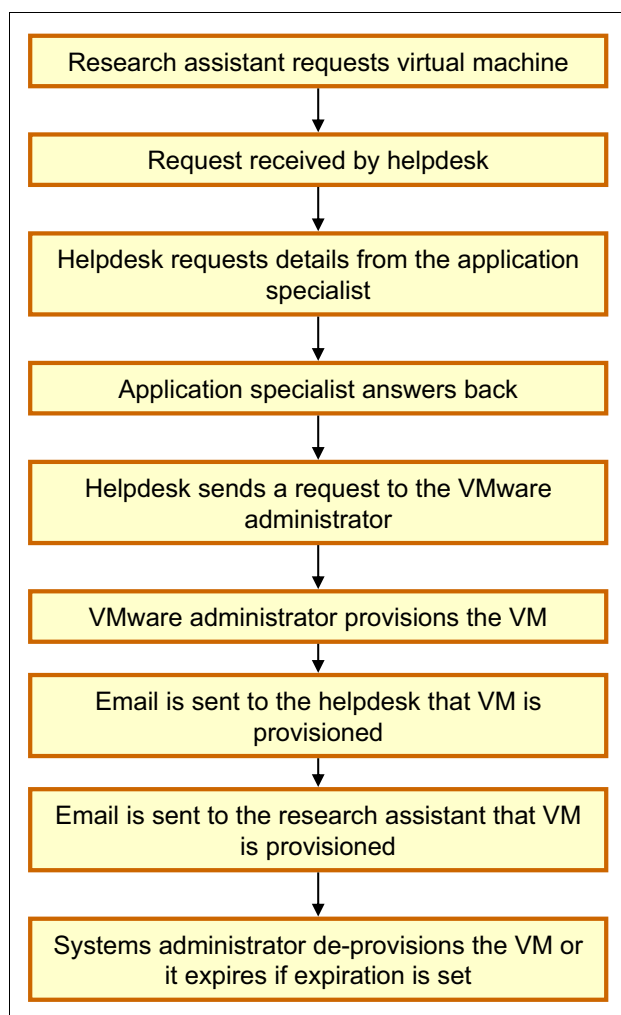


Figure 4-2 Scenario 2 provisioning workflow, before IBM SmartCloud Entry implementation

4.4 Requirements

A cloud workshop was conducted, producing a list of requirements for meeting the overall goals of the company (see 4.1, “Client background” on page 20). In this use case,

The faculty needed a self-service solution for the researchers to address their most significant issues:

- ▶ The workload of administrators needed to be reduced.
- ▶ The use of emails for VM requests and for adjustments to VMs had to be eliminated.
- ▶ The self-service portal had to be easy to use for non-IT staff.
- ▶ Users needed to perform basic VM tasks, such as starting and stopping the server.
- ▶ The system needed an expiration functionality so that deprovisioning occurred automatically.

4.5 Hardware and software solution

The solution was to implement the following components into the existing research environment:

- ▶ One virtual server running IBM SmartCloud Entry
- ▶ Four IBM SmartCloud Entry for System x licenses

The architecture after IBM SmartCloud Entry implementation is shown in Figure 4-3.

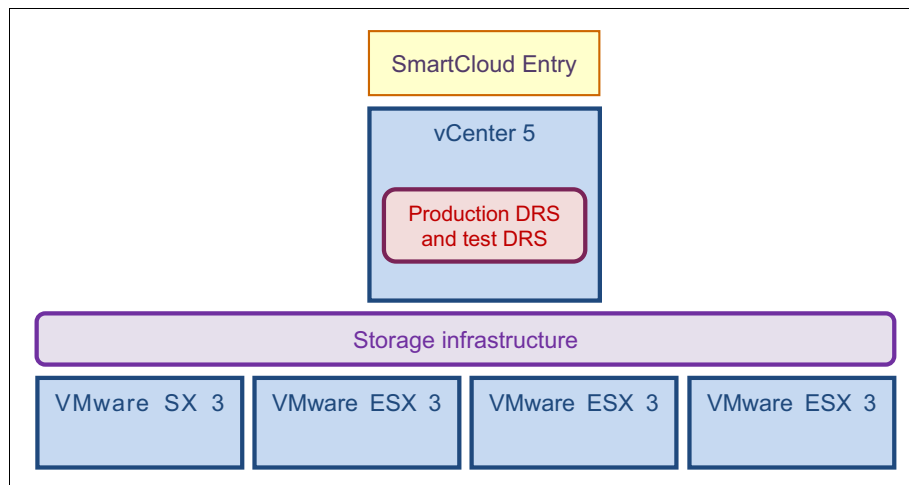


Figure 4-3 Scenario2 architecture, after IBM SmartCloud Entry implementation

4.6 Implementation

The installation of IBM SmartCloud Entry and the integration with the existing vCenters went smoothly, so the installation time was short. After IBM SmartCloud Entry was installed, all existing VMs in vCenter displayed in IBM SmartCloud Entry as workloads, and all VMware templates displayed as appliances. Because the entire VMware environment was only about 200 virtual servers, the VM administrator spent three hours to sort all of the workloads into the correct projects.

IBM SmartCloud Entry was implemented in one day, including customizations. It required no extra hardware, because a Windows 2008 R2 virtual machine was provided.¹ The installation of the software took one hour, and included completing the following customization checklist:

- ▶ Install IBM SmartCloud Entry.
- ▶ Connect IBM SmartCloud Entry to the existing VMware vCenter.
- ▶ Create projects.
- ▶ Configure lightweight directory access protocol (LDAP) to validate users in the Active Directory.
- ▶ Move existing workloads to projects.
- ▶ Move appliances to projects.
- ▶ Configure approval policies.

Testing the setup and configuration was easy, because it entailed only that a user log in and begin a deployment.

¹ For minimum system requirements, see the *IBM SmartCloud Entry 2.4 Administrators Guide*:
http://www.ibm.com/developerworks/mydeveloperworks/wikis/home/wiki/W21ed5ba0f4a9_46f4_9626_24cbbb86fbb9/page/Documentation?lang=en

4.7 Summary and client feedback

In this scenario, the benefits of IBM SmartCloud Entry proved to be many. These benefits are described here by phase and for the overall deprovision.

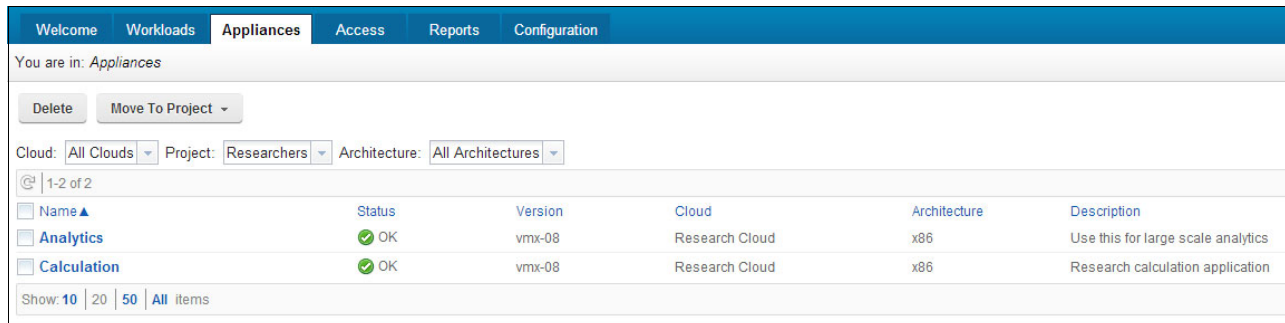
4.7.1 Benefits by phase

Each phase of the implementation had distinct benefits.

Provisioning request phase

The implementation of IBM SmartCloud Entry produces simplified processes:

- ▶ Emails are no longer required for initiating a VM request. Now, researchers log into the self-service portal with their Active Directory user name and password.
- ▶ After logging in, the researcher navigates to the Browse Deployable Appliances window and views a list of appliances that are preselected for use by the research area.
- ▶ In the Browse Deployable Appliances window, the menu that displays is, by design, intended for non-IT users, simplifying the ordering process. This design was brought about by the VMware administrator who created custom-made images that the researchers normally use. In this case, the name *Analytics* is the name of the application they are using, making it intuitive to use. The administration team preset the appliances with the specifications that are required to run this application. Therefore, determining this information does not require email. Figure 4-4 shows the information that is available on the IBM SmartCloud Entry Appliances tab.



The screenshot shows the 'Appliances' tab in the IBM SmartCloud Entry interface. At the top, there are navigation tabs: Welcome, Workloads, Appliances (selected), Access, Reports, and Configuration. Below the tabs, it says 'You are in: Appliances'. There are buttons for 'Delete' and 'Move To Project'. Below these are filters: 'Cloud: All Clouds', 'Project: Researchers', and 'Architecture: All Architectures'. A table displays a list of appliances. The table has columns: Name, Status, Version, Cloud, Architecture, and Description. There are two rows of appliances: 'Analytics' and 'Calculation'. Both have a status of 'OK', version 'vmx-08', and are on 'Research Cloud' with 'x86' architecture. The 'Analytics' description is 'Use this for large scale analytics' and the 'Calculation' description is 'Research calculation application'. At the bottom, there is a 'Show: 10 | 20 | 50 | All items' selector.

Name	Status	Version	Cloud	Architecture	Description
Analytics	OK	vmx-08	Research Cloud	x86	Use this for large scale analytics
Calculation	OK	vmx-08	Research Cloud	x86	Research calculation application

Figure 4-4 Preset values for the Analytics application eliminate the need for emails

- To request a new server, the researcher selects the appliance to deploy and clicks **Deploy**. Because the server is preset with specifications for the application to be run (Analytics, in this case), the only input the researcher adds is information that is specific to the new research project. Figure 4-5 shows how easy this is.

The screenshot shows a web interface with a top navigation bar containing 'Welcome', 'Workloads', 'Appliances', 'Access', 'Reports', and 'Configuration'. Below the navigation bar, a breadcrumb trail reads 'You are in: Appliances > Analytics > Deploy'. The main heading is 'Deploying Analytics'. The form contains the following sections:

- *Name:** A text input field containing 'Research-project Alpha'.
- Description:** A text input field containing 'Used with research project Alpha'.
- Project:** A dropdown menu showing 'Researchers' and a 'New Project' link.
- Expiration Period:** A checkbox labeled 'Set an expiration date' is checked. Below it, a text input field for '*Expiration date:' contains '2013-06-30', and a label indicates 'Days until expiration: 228'.
- Hardware:** A section titled 'System' with the subtitle 'Memory and CPU Settings'. It includes:
 - Memory (MB):** A spinner control set to '8,192'.
 - Virtual CPUs:** A spinner control set to '4'.

At the bottom of the form are three buttons: 'Deploy' (highlighted with a red box), 'Save as Draft', and 'Cancel'.

Figure 4-5 Requesting a server with pre-populated values is fast

By clicking **Deploy**, the order is sent to the administrator, with an optional confirmation email sent to the research assistant.

Thus far, in the provisioning process, the need for email or phone contact with the IT staff is eliminated. Users can do this provisioning process at their convenience. Additionally, the risk for errors is low, because the appliance is preset with specifications and settings.

Approval phase

The approvals are configured by project, as shown in Figure 4-6.

The screenshot displays the IBM SmartCloud Entry Administration interface. The top navigation bar includes 'Workloads', 'Appliances', 'Access', 'Reports', and 'Configuration'. The breadcrumb trail indicates the user is in 'Projects' > 'Finance Project 1'. The left sidebar lists 'Projects', 'Users', 'Requests', and 'Accounts'. The main content area is titled 'Finance Project 1' and shows the 'Description' as 'Finance Project 1'. Under the 'Approval Policies' section, which is currently 'Enabled (Customize settings)', there is a list of events requiring approval. The 'Customize settings' radio button is selected, and a list of events is shown with checkboxes: 'Workload initiation', 'Workload expiration extend', 'Workload resize', 'Workload capture', 'Virtual server attach storage request', 'Virtual server detach storage request', 'Virtual server save image', and 'Virtual server restore'. The 'Save' button is highlighted with a red box.

IBM SmartCloud Entry SmartCloud Entry Administrator

Workloads Appliances Access Reports Configuration

You are in: Projects > Finance Project 1

Projects Users Requests Accounts

Finance Project 1

Description: Finance Project 1

Project Members

Expiration Policies: (Use cloud default)

Approval Policies: Enabled(Customize settings)

Approval Policies set the events that require administrator approval.
If changed, this policy will override the cloud policy.

☐ Use cloud default

☒ Customize settings

Require approval for the following events:

- ☒ Workload initiation
- ☒ Workload expiration extend
- ☒ Workload resize
- ☒ Workload capture
- ☒ Virtual server attach storage request
- ☐ Virtual server detach storage request
- ☒ Virtual server save image
- ☒ Virtual server restore

☐ Select all / Deselect all

Save Cancel

Figure 4-6 Approvals are configured by project in IBM SmartCloud Entry

In the approval phase, the requester send email to the administrator, indicating that an approval is needed on an order. The administrator logs into the application and clicks **Requests** to view requests that require approval, as shown in Figure 4-7.

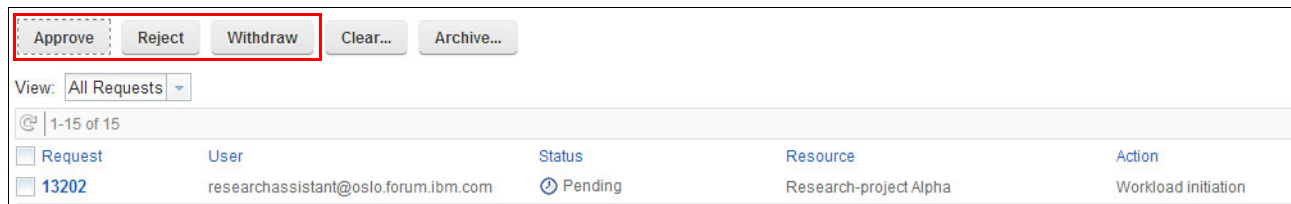


Figure 4-7 IBM SmartCloud Entry window for reviewing requests that are awaiting approval

The request can either be approved as-is, or the administrator can expand the Request number to adjust or override what the researcher ordered. By clicking **Approve**, IBM SmartCloud Entry sends a request to vCenter, and the deployment process begins. In IBM SmartCloud Entry, the user name *smartcloud*, in the *Initiated by* column, indicates that this deployment was initiated from IBM SmartCloud Entry. An administrator may also initiate a request manually. When this manual initiation occurs, the *Initiated by* column shows the administrator's name.

When the provisioning process is complete, the appliance is considered to be a workload and is listed on the Workload tab. The researcher can then begin using the application.

For this particular order, an expiry date of 31 December was entered by the researcher. A preconfigured setting in IBM SmartCloud Entry regulates how expired workloads are treated. This setting can either be left as-is (no change), or it can be set as Shut Down or Destroyed. This setting is universal within IBM SmartCloud Entry and, if Destroyed is selected, the workloads are deleted in vCenter.

4.7.2 Overall benefits

After IBM SmartCloud Entry implementation, the following primary improvements are realized:

- ▶ A web-based, self-service portal that is intuitive to non-IT staff is in place.
- ▶ An automated lifecycle, from ordering to retirement of virtual systems, results in being able to account for all running VMs, and a lower rate of storage filling because there are fewer VMs.
- ▶ An improved approval process tracks who is ordering VMs, providing the VMware administrator with more and better control of performance and capacity planning on the VMware platform.
- ▶ Specific to this scenario, a lesson was learned: the faculty must arrange for better planning before introducing IBM SmartCloud Entry. Without that preplanning step, all project names must be defined after the installation.

Figure 4-8 shows the process workflow after IBM SmartCloud Entry was introduced.

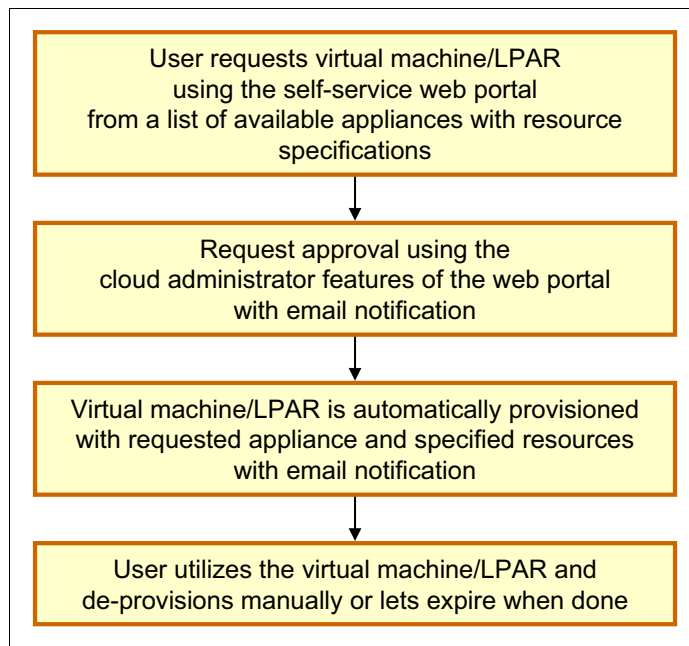



Figure 4-8 Scenario 2 provisioning workflow, after IBM SmartCloud Entry implementation



Scenario 3: Cloud deployment for a telecommunications company

In this use case scenario, a successful company wanted to streamline its business processes and realize the benefits of cloud technology.

5.1 Client background

This scenario has the following client, task, and goal:

- ▶ *Client type:* Telecommunications company
- ▶ *Current task:* This company uses IBM AIX on Power Systems. Projects are fast moving, and there are concerns about the efficiency of deployments. No cloud solution is currently in place.
- ▶ *Overall goal:* The CIO and IT infrastructure manager wanted to take advantage of cloud technology. They wanted to realize the benefits of this technology by starting their cloud journey with the provisioning capabilities of IBM SmartCloud Entry.

5.2 Architecture

The existing systems architecture consists of the following components:

- ▶ Three IBM Power 740s servers, designated for development, with 16 cores each
- ▶ Two IBM Power 750s servers, designated for testing, with 32 cores each
- ▶ IBM Hardware Management Console (HMC) VR7.4
- ▶ IBM PowerVM Enterprise Edition
- ▶ IBM PowerVM VIOS 2.2
- ▶ IBM Storwize V7000 Storage
- ▶ IBM Network Installation Manager (NIM)

This architecture is shown in Figure 5-1.

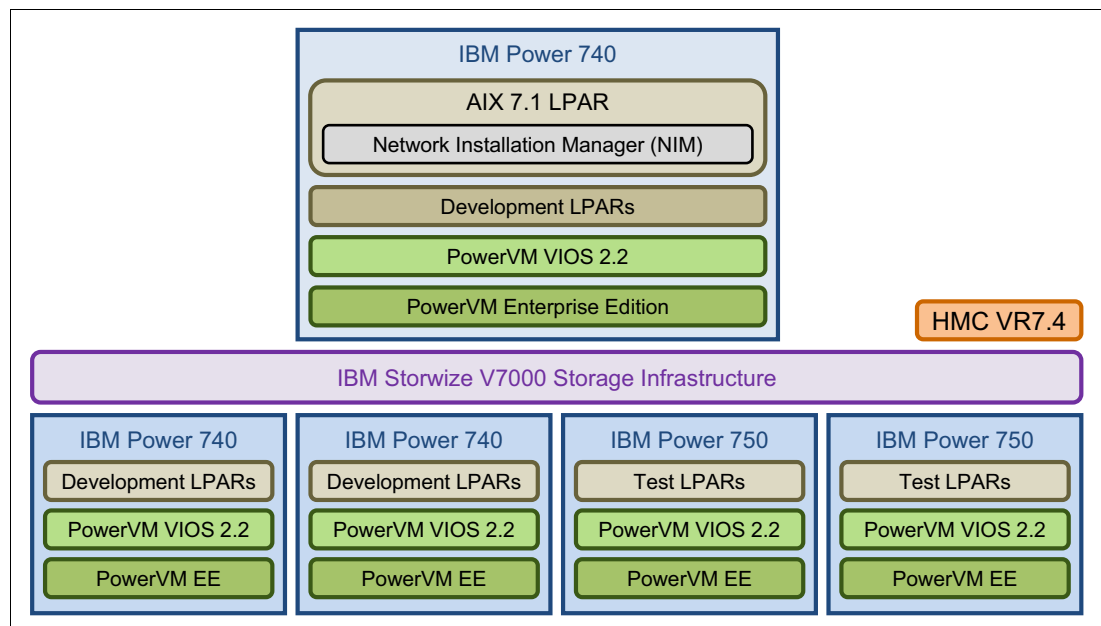


Figure 5-1 Scenario 3 architecture, before IBM SmartCloud Entry implementation

5.3 Challenges and issues

Before implementing IBM SmartCloud Entry, the systems administrators approved requests from developers and testers. A second request was made to the storage administrator for storage area network (SAN) attached disk storage, and to the network administrator for any configuration or cabling. After the disk storage and network were configured, an LPAR was created manually with HMC and was installed using NIM. The AIX LPAR was then passed to the developer or tester. When the developer or tester was finished with the LPAR, a separate request was made to deprovision the resources. The entire provisioning process took up to several weeks and involved skills with storage, network, NIM, and HMC. Figure 5-2 shows the architecture during this time.

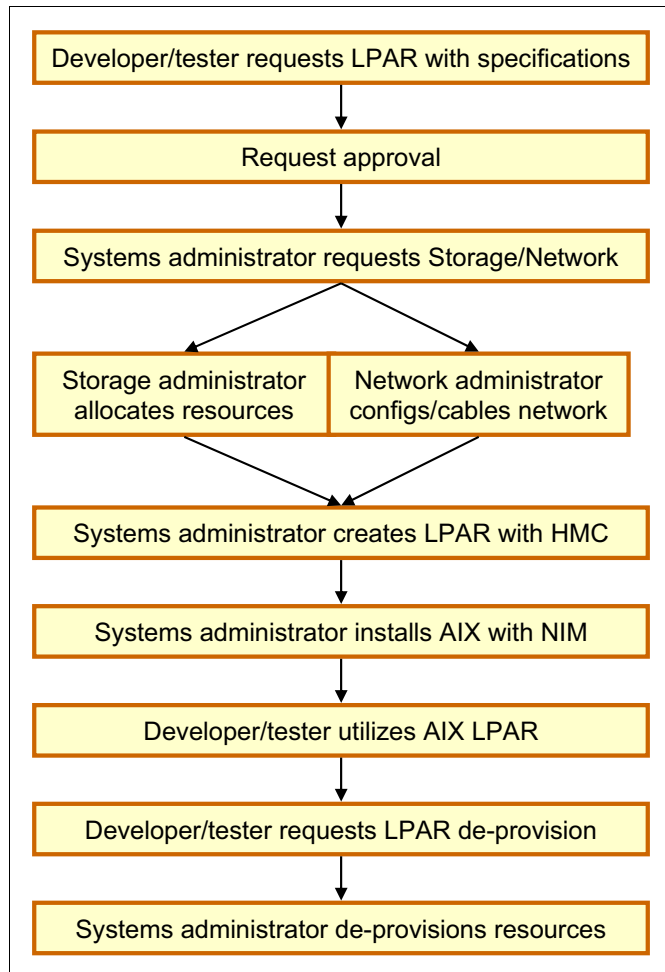


Figure 5-2 Scenario 3 provisioning workflow, before IBM SmartCloud Entry implementation

The primary challenges and issues for this use case were defined as follows:

- ▶ The CIO was concerned about project delays caused by routine IT requests. Several weeks or longer were spent to deploy a virtual Power System for development and test environments. Because this task was often on the critical path for projects, the risk of delaying entire projects was a concern. Given that telecommunications projects tend to be dynamic with constantly changing requirements, this frequently caused project delays.
- ▶ The CIO was concerned about VM sprawl and the associated costs, and so asked IT managers to report about resource utilization, specific to separate departments and projects. A formal internal billing system was not requested; however, some reporting about earlier events was requested by using common billing metrics.
- ▶ The infrastructure IT manager was concerned about accountability for approving VM creation and for adding resources in development and test environments. Although a formal and lengthy approval process was not required, the ability to have an approval or rejection policy with built-in reporting and auditing was needed.
- ▶ The IT infrastructure manager was also concerned that some projects hoarded resources that were never deprovisioned. Frequently, temporary VMs are often not released by project teams. One cause is the delay in getting systems deployed, so projects hold on to them in case they are needed.
- ▶ The IT infrastructure manager was concerned that the talents of the highly skilled senior systems administrators were not being fully used. This manager estimated that 60 - 70% of the systems administrator time was spent on operational tasks, including provisioning and managing provisioning requests. IBM SmartCloud Entry had to assist to such a degree that the administrators had additional time to spend performing higher-level duties.
- ▶ The CIO and IT infrastructure manager were new to cloud environments and wanted to start realizing the benefits before implementing this technology in production. The scope was limited to Power System development and test environments.

5.4 Requirements

A cloud workshop was conducted, producing a list of requirements for meeting the overall goals of the company (see 5.1, “Client background” on page 30):

- ▶ Reduce project delays that are caused by routine IT requests.
- ▶ Track the costs of resource utilization, specific to separate departments and projects.
- ▶ Initiate accountability for approving VM creation and for adding resources in development and test environments.
- ▶ Define a method for releasing temporary VMs by project teams.
- ▶ Use the talents of the highly skilled senior systems administrators.

5.5 Hardware and software solution

The solution was to implement the following components into the existing environment:

- ▶ IBM SmartCloud Entry (for each server license)
- ▶ IBM Systems Director (included with PowerVM Enterprise Edition)
- ▶ IBM Storage Control Plug-in (licensed for each Systems Director server)
- ▶ IBM VMControl Enterprise Edition Plug-in (licensed for each server)

Figure 5-3 shows that, after IBM SmartCloud Entry implementation, the existing environment remains essentially unchanged. Existing LPARs can stay configured as they are. New LPARs can be created by using resource pools or preconfigured hosts.

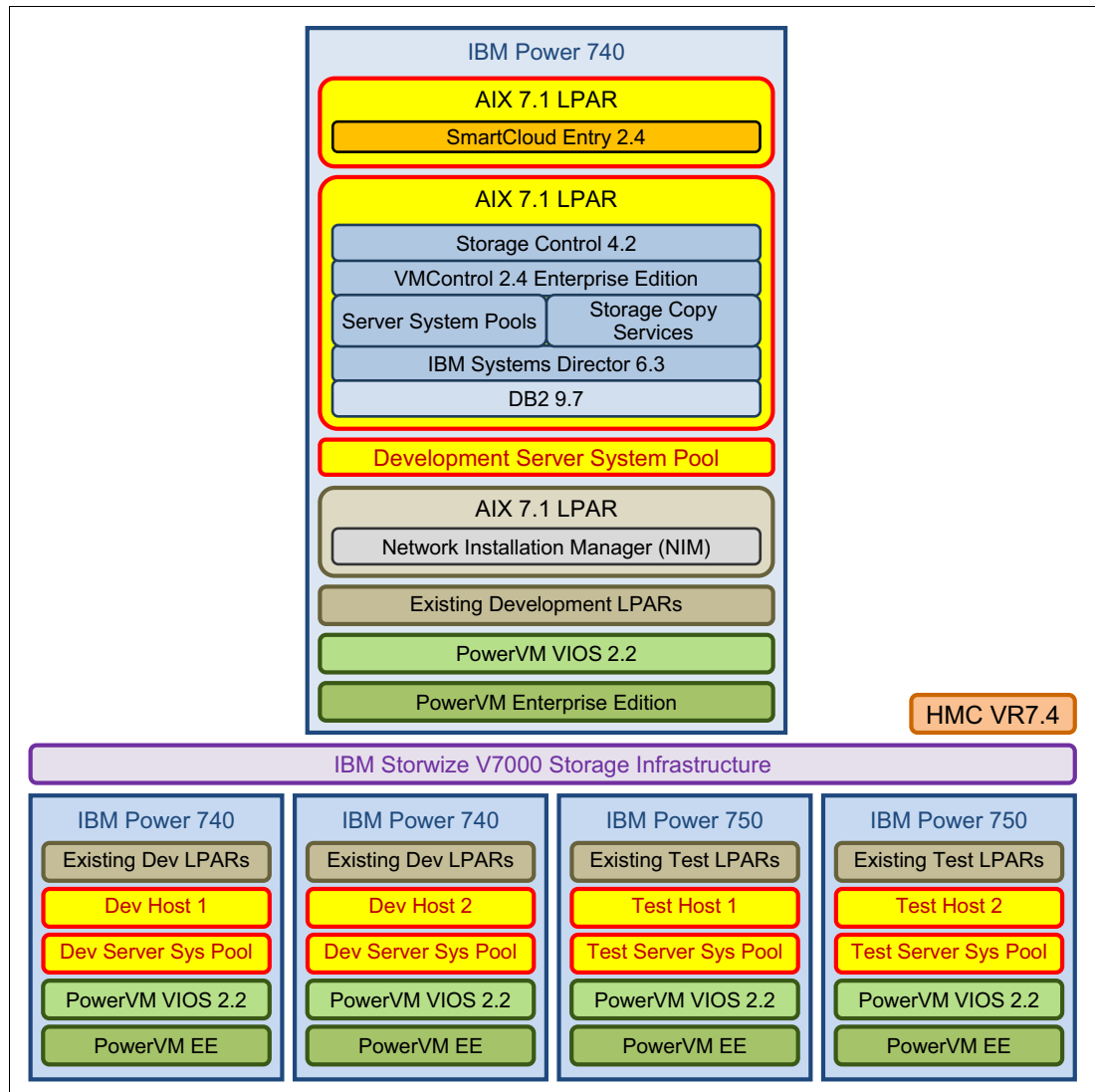


Figure 5-3 Scenario 3 architecture, after IBM SmartCloud Entry implementation

5.6 Implementation

IBM Systems Lab Services implemented IBM SmartCloud Entry and the required components, based on the cloud workshop. (For details about Lab Services, see 8.3, “IBM Systems Lab Services and Training” on page 68.) This task included the installation, configuration, and testing of Systems Director, Storage Control, VMControl, vCenter, and NIM integration.

5.6.1 Account setup

Accounts were set up for each department, and each user was associated with an account. For a deployment to be successful, there must be funds in the account, or it will not be deployed. If the account falls below the low-balance threshold, the account owner receives notification, and additional funds must be added. In this case, billing and metering were used as a metric, so funds were not actual. Rather, default billing values were used. Sample account information is shown in Table 5-1.

Table 5-1 Sample account setup, showing ownership, funding, and funding thresholds

Accounts	Finance account	Sales account	IT account
Account owners	Finance owner	Sales owner	Admin
Account members	Finance owner Finance user 1 Finance user 2 Finance viewer 1 Finance viewer 2	Sales owner Sales user 1 Sales user 2 Sales viewer 1 Sales viewer 2	- - Admin Admin2 -
Starting credits	\$100,000	\$100,000	\$100,000
Low balance threshold	\$10,000	\$10,000	\$10,000

5.6.2 Project setup

Projects were set up to use the multitenancy features of IBM SmartCloud Entry, to isolate appliances from the staff members who were not using them. This setup simplified the user experience by allowing access to the needed appliances. Sample user-level account information is shown in Table 5-2.

Table 5-2 Sample project setup to take advantage of the multitenancy feature of IBM SmartCloud Entry

Projects	Finance project 1	Finance project 2	Sales project 1	Sales project 2	IT project 1
Project owners	Admin Admin 2 Finance owner	Admin Admin 2 Finance owner	Admin Admin 2 Sales owner	Admin Admin 2 Sales owner	Admin Admin 2
Project users	Finance user 1 Finance user 2 Finance viewer 1 Finance viewer 2	Finance user 1 Finance user 2 Finance viewer 1 Finance viewer 2	Sales user 1 Sales user 2 Sales viewer 1 Sales viewer 2	Sales user 1 Sales user 2 Sales viewer 1 Sales viewer 2	Admin Admin 2

5.6.3 Approval policies

The default approval was set to *off*, but was set to *on* for finance and sales projects, so that resources were controlled. We (IBM and client) wanted an approval policy in place for everything that used resources. We did not want an additional process in place to de-allocate resources, so there was no approval needed to detach storage.

These values were set by project, so when a trusted group did not need approval, that group was set up in a project with a less restrictive policy. The cloud defaults were also used to minimize configuration on a per project basis, based on common needs, as shown in Figure 5-4.

▼ **Approval Policies: Enabled(Customize settings)**

Approval Policies set the events that require administrator approval.
If changed, this policy will override the cloud policy.

☐ Use cloud default
☒ Customize settings


Require approval for the following events:

- ☒ Workload initiation
- ☒ Workload expiration extend
- ☒ Workload resize
- ☒ Workload capture
- ☒ Virtual server attach storage request
- ☐ Virtual server detach storage request
- ☒ Virtual server save image
- ☒ Virtual server restore

Figure 5-4 Approval policy settings

5.6.4 Appliances

Additional appliances were created with captures or a number of image creation tools. Figure 5-5 is an example of the appliances that were created for all of these projects. This view is from the cloud administrator, and so all appliances are visible.

 IBM SmartCloud Entry

SmartCloud Entry Administrator | Help | About

Workloads

Appliances

Access

Reports

Configuration

You are in: Appliances

Delete

Move To Project

Cloud: All Clouds Project: All Projects Architecture: All Architectures

1-11 of 11

<input type="checkbox"/> Name	Status	Version	Cloud	Architecture	Description ▲
<input type="checkbox"/> FP1 Power AIX 7	OK		Power Cloud 1	Power	Finance Project 1 - Power AIX 7
<input type="checkbox"/> FP2 x86 Linux	OK	vmx-07	VMware Cloud 1	x86	Finance Project 2 - x86 Linux
<input type="checkbox"/> IT1 Power AIX 7 Test	OK		Power Cloud 1	Power	IT Project 1 - Power AIX 7 Test
<input type="checkbox"/> IT1 SUSE 10 Test	OK		Power Cloud 1	Power	IT Project 1 - SUSE 10 Test
<input type="checkbox"/> Public Power AIX 7	OK	1.0	Power Cloud 1	Power	Public AIX 7 Gold Master
<input type="checkbox"/> Public Power SUSE 10	OK	1.0	Power Cloud 1	Power	Public SUSE 10 for Power Gold Master
<input type="checkbox"/> Public x86 Windows 2008	OK	vmx-07	VMware Cloud 1	x86	Public Windows 2008 Template
<input type="checkbox"/> Public x86 Linux	OK	vmx-07	VMware Cloud 1	x86	Public x86 Linux Template
<input type="checkbox"/> SP1 AIX 7	OK		Power Cloud 1	Power	Sales Project 1 - AIX 7
<input type="checkbox"/> SP1 x86 Windows 2008	OK	vmx-07	VMware Cloud 1	x86	Sales Project 1 - x86 Windows 2008
<input type="checkbox"/> SP2 AIX 7	OK		Power Cloud 1	Power	Sales Project 2 - AIX

Show: 10 20 50 All items

Figure 5-5 Appliances were created for all projects and are shown in this administrator view

Non-administrators have visibility only to public appliances and appliances that are designated to projects for which the user is a member. This is a characteristic of multitenancy. For example, if logged in as salesUser1, a user might see what is shown in Figure 5-6.

Name	Status	Version	Cloud	Architecture	Description
Public Power AIX 7	OK	1.0	Power Cloud 1	Power	Public AIX 7 Gold Master
Public Power SUSE 10	OK	1.0	Power Cloud 1	Power	Public SUSE 10 for Power Gold Master
Public x86 Linux	OK	vmx-07	VMware Cloud 1	x86	Public x86 Linux Template
Public x86 Windows 2008	OK	vmx-07	VMware Cloud 1	x86	Public Windows 2008 Template
SP1 AIX 7	OK		Power Cloud 1	Power	Sales Project 1 - AIX 7
SP1 x86 Windows 2008	OK	vmx-07	VMware Cloud 1	x86	Sales Project 1 - x86 Windows 2008
SP2 AIX 7	OK		Power Cloud 1	Power	Sales Project 2 - AIX

Figure 5-6 A view of the appliances, as seen by a non-administrator, salesUser1

5.7 Summary and client feedback

In this scenario, a number of benefits resulted from IBM SmartCloud Entry implementation. These benefits are described here by phase and for the overall project.

5.7.1 Benefits by phase

Each phase of the implementation had distinct benefits:

- ▶ From an organizational standpoint, IBM SmartCloud Entry changed the way processes were carried out. Systems administrators, storage administrators, project managers, developers, and testers changed their processes.
- ▶ Systems administrators and storage administrators are quick to adapt to IBM SmartCloud Entry, after they understand the architecture and realize the operational efficiencies it affords them.
- ▶ Project managers are challenged by their greater accountability for VMs and additional resources because of the IBM SmartCloud Entry reporting functions. The result is a greater realization of the resources being used, which is now better controlled and accurately reported.
- ▶ Initially, developers and testers were hesitant to request temporary VMs that initially had an expiration date. This hesitation quickly turned to adoption, now that they see the expiration notification process, the ease of requesting temporary VMs, the expiration extensions, and the non-automated deletion of expired VMs (configurable).

5.7.2 Overall benefits

After IBM SmartCloud Entry implementation, the following primary improvements are realized:

- ▶ Project efficiency was improved by reducing deployment time from weeks to minutes. Automated self-provisioning also reduced server and storage administration time and the cost for deployments.
- ▶ Resource management is now under control. Simplified metering and billing were used to measure and report on utilization. Accountability was enhanced with an automated, project-level approval policy for deployments and resource additions. VM sprawl was eliminated by automated expiration for temporary images.
- ▶ Service is improved because consistent deployments are now made. Errors are reduced, attributed to the automation of repeatable deployment tasks.

Figure 5-7 shows the process workflow after IBM SmartCloud Entry was introduced. Notice that delays in the original process, which contained more than twice as many steps, are eliminated.

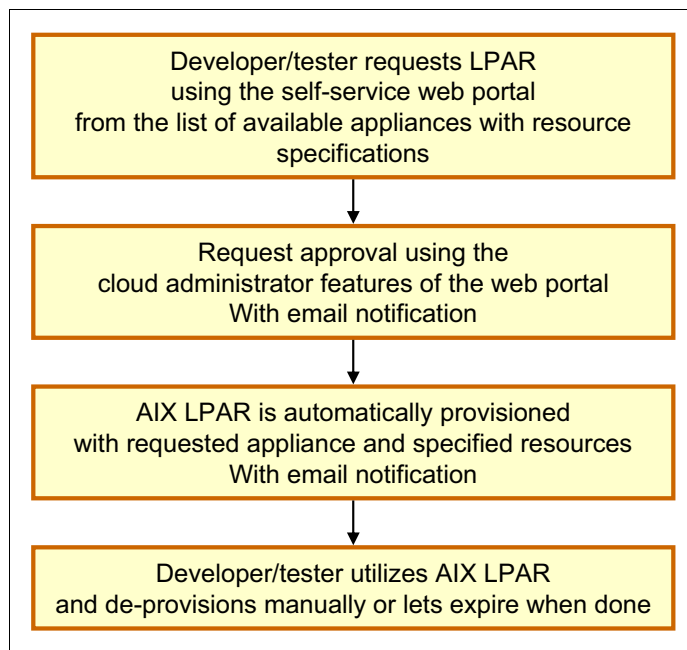



Figure 5-7 Scenario 3 provisioning workflow, after IBM SmartCloud Entry implementation



Scenario 4: Cloud deployment in Power Systems and x86 environment

In this use case scenario, a complex environment had no method of mapping users to provisioned servers. This resulted in many people and many images that were unmatched. The existing, inefficient method of providing access was problematic and confusing.

6.1 Client background

This scenario has the following client, task, and goal:

- ▶ *Client type*: Distribution company
- ▶ *Current task*: The infrastructure side of IT consisted of separate groups that implement and manage Power servers and x86 servers running VMware, storage, and network. The applications side of IT consisted of separate groups that develop and manage web applications, databases, and other applications.
- ▶ *Overall goal*: Take advantage of the benefits of IBM SmartCloud Entry in their existing Power and x86 VMware environments.

6.2 Architecture

The existing Power Systems architecture consists of the following components:

- ▶ IBM Power 770 with 64 cores
- ▶ Two IBM Power 740s with 16 cores each
- ▶ IBM Power 750 with 32 cores
- ▶ IBM Hardware Management Console (HMC) VR7.4
- ▶ IBM PowerVM Enterprise Edition
- ▶ IBM PowerVM VIOS 2.2
- ▶ IBM Systems Director 6.3
- ▶ IBM Storage Control 4.2 Plug-in
- ▶ IBM VMControl 2.4 Plug-in
- ▶ IBM Network Installation Manager (NIM)
- ▶ IBM SAN Volume Controller (SVC) to attach a variety of existing disk systems

The existing x86 systems architecture consists of two VMware environments:

- ▶ VMware vCenter v4 Environment:
 - Runs VMware distributed resource schedulers (DRSs) named *test* and *prod*
 - Includes 20 ESX hosts with about 400 VMs
 - Has IBM SAN Volume Controller (SVC) to attach a variety of existing disk systems
- ▶ VMware vCenter v5 Environment:
 - Runs a new DRS named *production*
 - Includes eight ESX hosts
 - Has IBM Storwize V7000

An added goal was to move the VMware vCenter v4 DRS, *prod*, to the VMware vCenter v5 DRS, *production*. The existing v4 DRS, *test*, will not be moved. Figure 6-1 shows the architecture for this company before IBM SmartCloud Entry was implemented.

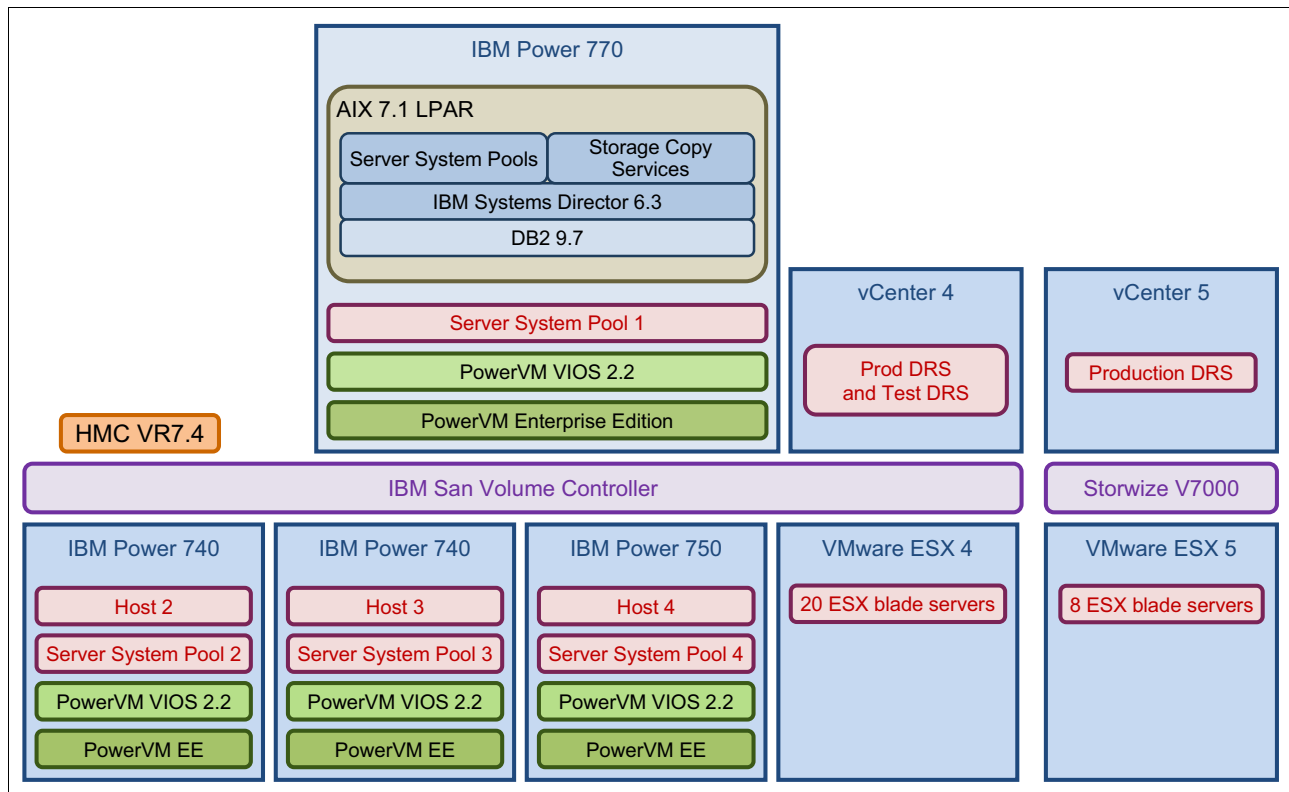


Figure 6-1 Scenario 4 architecture, prior IBM SmartCloud Entry implementation

Over time, these virtualized environments grew rapidly, both in the Power and the x86 domains, resulting in an exploding growth on the storage side. The production servers were well documented, and the controls of these were not of primary concern. The number of servers that apparently were not in production was high, and tracking who owned them and whether they were still in use was difficult. Another interesting observation was that the number of templates in the VMware environment increased, and determining who created them and whether they were still in use became even more difficult.

6.3 Challenges and issues

The primary challenges and issues for this use case were defined as follows:

- ▶ The main challenge with this case was to map the processes and people involved in the provisioning process. Because the environment was complex, with many groups of people and many images, mapping the current process was time-consuming.
- ▶ Another challenge was that many people in IT had access to root and administrator accounts, so that pinpointing who had initiated provisions was difficult. When IBM SmartCloud Entry was put into production, some people still used the old process because they had the skills and access to do so.
- ▶ The use of the old process was identified; IBM SmartCloud Entry identified new workloads that were not provisioned previously.

Figure 6-2 shows the process workflow before IBM SmartCloud Entry implementation.

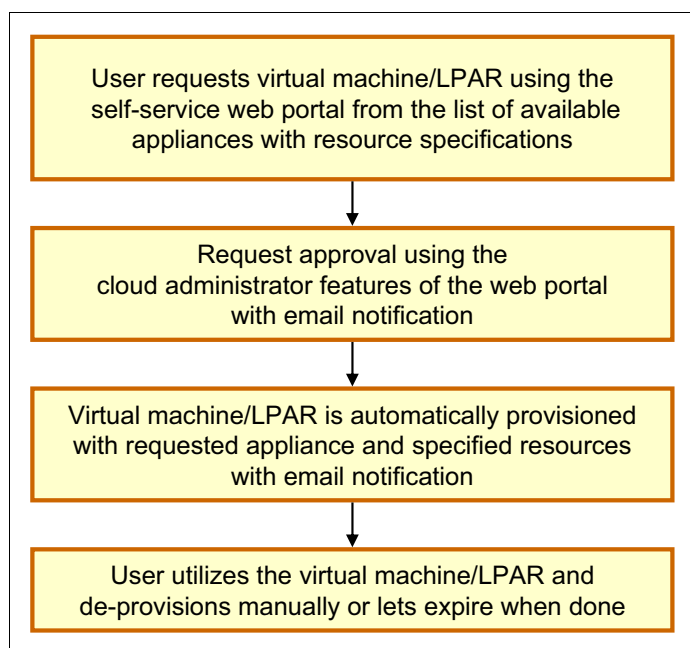


Figure 6-2 Scenario 4 provisioning workflow, before IBM SmartCloud Entry implementation

6.4 Requirements

A cloud workshop was conducted, producing a list of requirements for meeting the overall goals of the company (see 6.1, “Client background” on page 40).

The director of infrastructure needed to quickly realize the following benefits from implementing IBM SmartCloud Entry:

- ▶ Reduced time to provision workloads
- ▶ Reduced administrative overhead for routine provisioning of the infrastructure group
- ▶ Standardized appliance for self-provisioning
- ▶ An established approval policy for deployments and resource requests
- ▶ Better managed numbers of non-production workloads and appliances
- ▶ Mapped workloads, projects, or persons so that ownership is established
- ▶ An efficient deprovisioning process and temporary deployment policy
- ▶ Metering and billing for reporting purposes

6.5 Hardware and software solution

The prerequisite components were already in place, so the solution was primarily to implement IBM SmartCloud Entry, in this case, v2.4.

The customer purchased licenses for the environment:

- ▶ IBM SmartCloud Entry
- ▶ Twenty-eight IBM SmartCloud Entry for System x licenses to cover 28 ESX servers
- ▶ Four *small* Power licenses for the Power 740's (two) and 750 (one)
- ▶ One Power license for the IBM Power 770

Figure 6-3 shows the architecture for this use case after the implementation of IBM SmartCloud Entry.

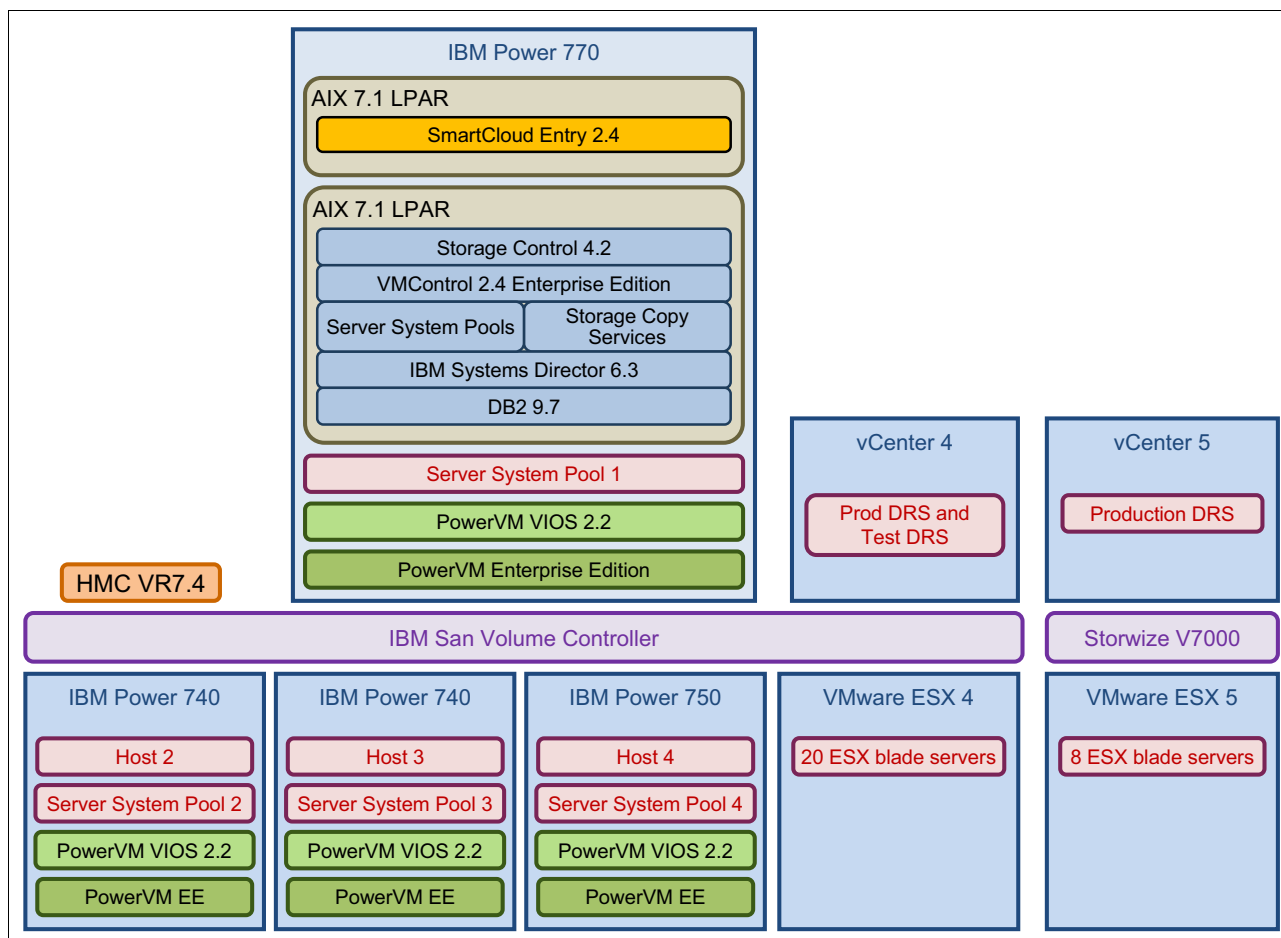


Figure 6-3 Use case 4 architecture, after IBM SmartCloud Entry implementation

6.6 Implementation

A cloud workshop was conducted, together with a consultation from an IBM cloud architect. Results follow.

6.6.1 Installation

The installation of IBM SmartCloud Entry was straightforward. It was installed on a Windows 2008 server running VMware. Connecting to the two vCenters required a separate user account with vCenter administrator permission. Then, the components for adding Power Systems support were installed. Because these prerequisites were addressed and planning was done, *the installation, configuration, and testing of IBM SmartCloud Entry was done over the course of two days.*

Production environment: At this point, no changes are made to the production environment.

6.6.2 Projects

The next preparation activity was to determine a list of projects for structuring the workloads. After some discussion, the decision was made to use the Appliance List as the template so that all servers were assigned to a project that had the name of the service they provided. In this way, the servers were easier to administer, and, more important, it helped IT management to measure the amount of resources each of the services required. Because some servers can belong to many services, they were categorized as infrastructure servers. Two infrastructure groups were set up: one for production and one for test. An interesting observation was that they no longer differed between x86 and Power System servers. Many groups consisted of *both* Power Systems and x86 servers. In IBM SmartCloud Entry, a group is known as a *project*. A partial listing of key projects in this scenario is as follows:

- ▶ Mail
- ▶ Customer relationship management (CRM)
- ▶ Web-shop
- ▶ Logistics
- ▶ Accounting
- ▶ Prod-Infrastructure
- ▶ Test-Infrastructure

6.6.3 Users

To avoid having separate user names and passwords for IBM SmartCloud Entry, it was integrated with Active Directory, where all user names were already present. The users were then assigned to their corresponding projects.

6.6.4 Workloads

After IBM SmartCloud Entry was installed, existing workloads were imported automatically and placed in the default, *public* project. In this environment, the number of existing workloads was about 400. Workloads were then placed into appropriate projects. There were 32 workloads that could not be initially grouped into a project and were placed in the *orphans* project. Other workloads were placed into the *non-compliant* project, because they did not fit into the standard categories. The long-term goal was to find a home for orphan projects and eliminate non-compliant workloads through deprovisioning or migration.

6.6.5 Appliances

To properly manage and control fewer appliances, the number of people who maintained the appliances was reduced. This step was accomplished by creating good standard appliances that were made public to all IBM SmartCloud Entry users. Good standardized appliances that meet a broad range of requirements were key. This approach greatly reduced the number of appliances in use across the enterprise.

6.6.6 Approval policy

When an approval policy for new appliances was being introduced, the approvers needed to be defined. Three persons were already responsible for the VMware environment, and an additional three persons were responsible for the Power System environment. The decision was made for these six persons to have approval rights, with the role named *cloud administrator*.

6.6.7 Metering

Because this company was introducing metering to visualize the cost of each service in the Appliance List, the company needed to define the service owner. The company determined that the administrator of each service was the service owner, and that it was that person's responsibility to report utilization to the IT manager.

6.6.8 Putting IBM SmartCloud Entry into production

The introduction of IBM SmartCloud Entry did not require changes to the existing environment. To move this into production, three tasks remained.

1. The AIX workloads that were non-compliant with IBM SmartCloud Entry had to be addressed. This task was done by creating a new resource pool on the Power System side, then limiting access to it so that IBM SmartCloud Entry did not "see" it. The management of these servers was still assigned to the AIX group. Most of these servers were planned for migration within the next few years because the company was running AIX 5, so this concern is eventually taken care of.
2. The company needed to stop the access of IT staff to vCenter, except for the cloud administrators. For the Power System users, this task was difficult, because many of them used the root account to provision servers. However, the time that was saved by using IBM SmartCloud Entry to automate the deployment was reason enough for using it. After an adjustment period, there were no exceptions.
3. The company needed to eliminate excess appliances and workloads. All of the excess appliances in the orphan project were deleted, freeing 300 GB of disk space. The orphan VMs (the ownership of these was unknown) were shut down to determine if there were any reactions. After two months without reactions, they were deleted, freeing an additional 1 TB of disk space.

It was time to examine the new capabilities that were not related to deployment of servers. IBM SmartCloud Entry has a function for metering and accounting. Because the projects were based on the Appliance List, the customer was now able to measure the amount of resources that each service used. To make this information available to IT management, a monthly report was generated for the IT manager, who was now able to relate business processes to utilization and track costs.

6.7 Summary and client feedback

After IBM SmartCloud Entry implementation, the following primary improvements are realized:

- ▶ The customer's requirements are met. They were met after the first 90 days in a production setting.
- ▶ Deployment time (including approvals) is reduced from *four to five days* to *one to two hours*.
- ▶ Infrastructure operational overhead is nearly eliminated for routine provisioning tasks.
- ▶ Workloads are now under control, contributing to more efficient capacity and performance planning.
- ▶ Appliance management and compliance are better controlled with standardized appliances. In IBM SmartCloud Entry, tracking servers on a daily basis is easier.

- ▶ Metering and billing reports provide accountability and a metric for costs associated with resource utilization for various projects and services.
- ▶ Management of operating systems and software licensing is considerably improved, now that workloads are better managed and better controlled.
- ▶ The infrastructure staff works as a whole, because customers have a common process for requesting resources.
- ▶ With IBM SmartCloud Entry installed, the existing appliances are imported automatically and placed in the default, *public* project. In this environment, the number of existing appliances was 28. This number was quickly narrowed down to eight standardized templates, including AIX, Linux, and Windows.
- ▶ The timing for implementation is short. Two days were spent with testing deployments. For the allocation of storage and virtual local area networks (VLANs), decisions were made during the process to streamline and standardize the environment.

After IBM SmartCloud Entry was introduced in this scenario, the process workflow did not change (see Figure 6-2 on page 42). The improvements in efficiency were notable, however, as indicated in this section.



Additional IBM SmartCloud Entry processes

The following IBM SmartCloud Entry processes demonstrate the ease with which these are conducted:

- ▶ Installation process
- ▶ Simple workload deployment process

7.1 Installation process

The IBM SmartCloud Entry manager server can be installed on Intel x86 (Windows Server 2008 or Red Hat Linux) or Power (AIX). Both platforms can manage these environments.

This section takes you through a sample Windows 2008 Server installation of IBM SmartCloud Entry v2.4 and a common post-installation task. The sample serves as a quick-installation guide. All of these tasks are covered in greater detail in the IBM SmartCloud Entry Administrator Guide (see “Related publications” on page 73).

For this installation, we are using the full version of IBM SmartCloud Entry 2.4. The 2.4 *trial* version, although not available as of this writing, is expected to be the same as that for the full version. Post-installation tasks are expected to be the same for IBM SmartCloud Entry 2.4 and the trial version (when available).

7.1.1 Preinstallation

Complete the following steps before installing IBM SmartCloud Entry:

1. Copy the installation directory to the c:\temp location.
2. Copy the fix pack to the c:\temp\fixpack location.

7.1.2 Installation

Start the installation:

1. Run sce240_windows_installer.exe as administrator, as shown in Figure 7-1.



Figure 7-1 Run the executable as administrator

The IBM SmartCloud Entry 2.4 splash screen opens, as shown in Figure 7-2. Click **OK**.

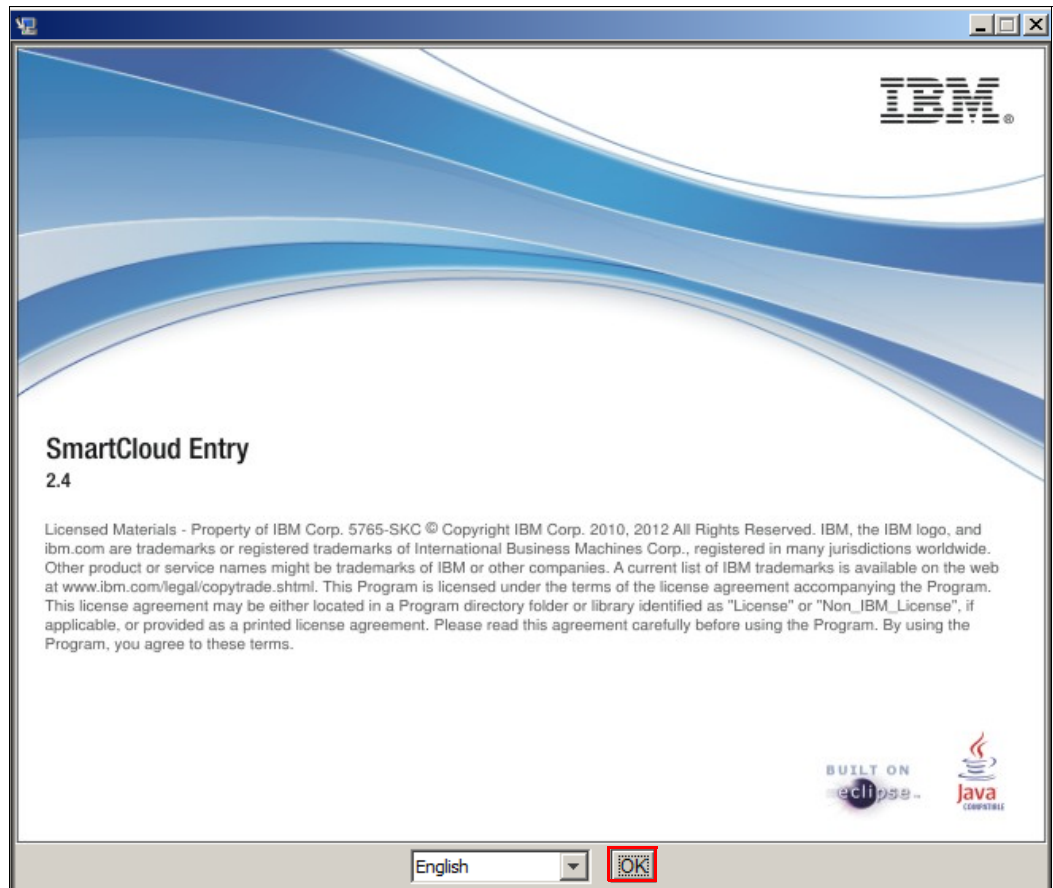


Figure 7-2 IBM SmartCloud Entry 2.4 splash window

The Introduction window opens, as shown in Figure 7-3. Click **Next**.

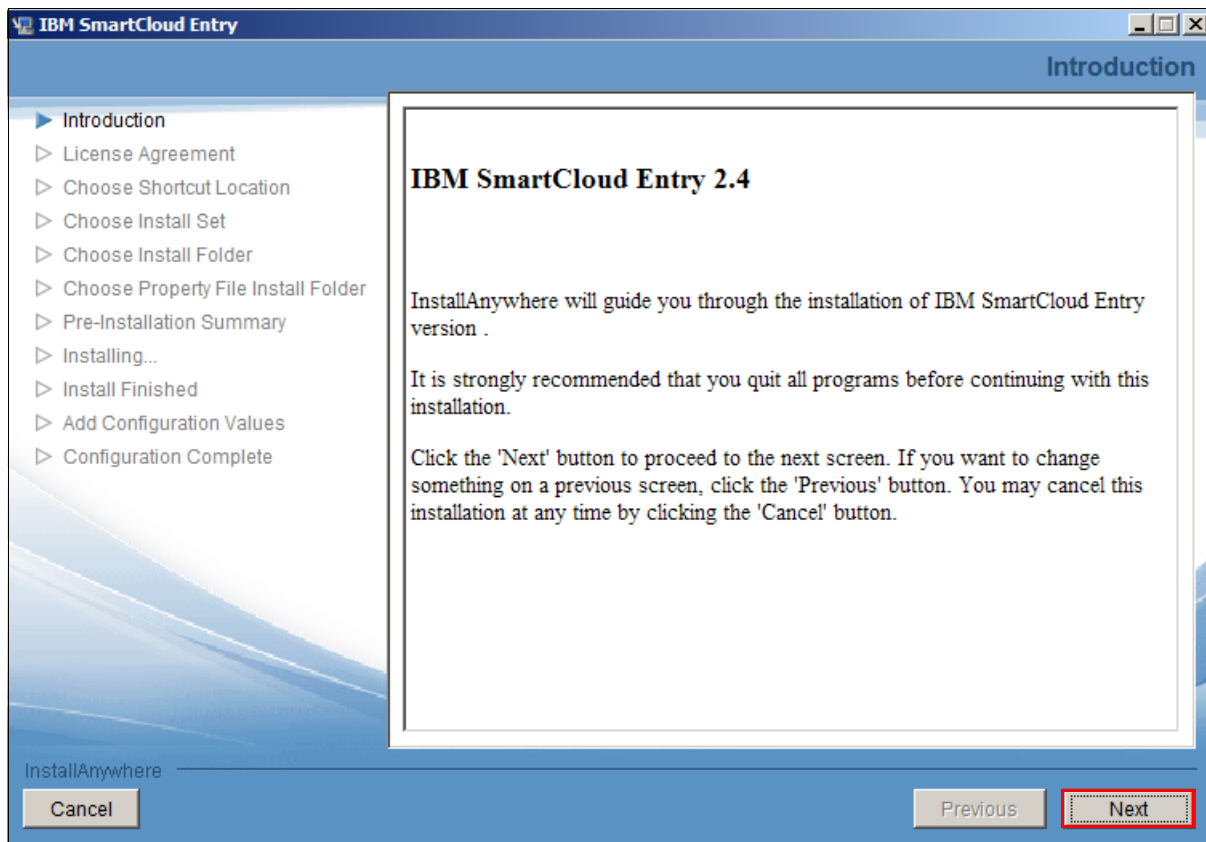


Figure 7-3 IBM SmartCloud Entry 2.4 Introduction window

2. Read and accept the terms of the License Agreement, as shown in Figure 7-4. Click **Next**.

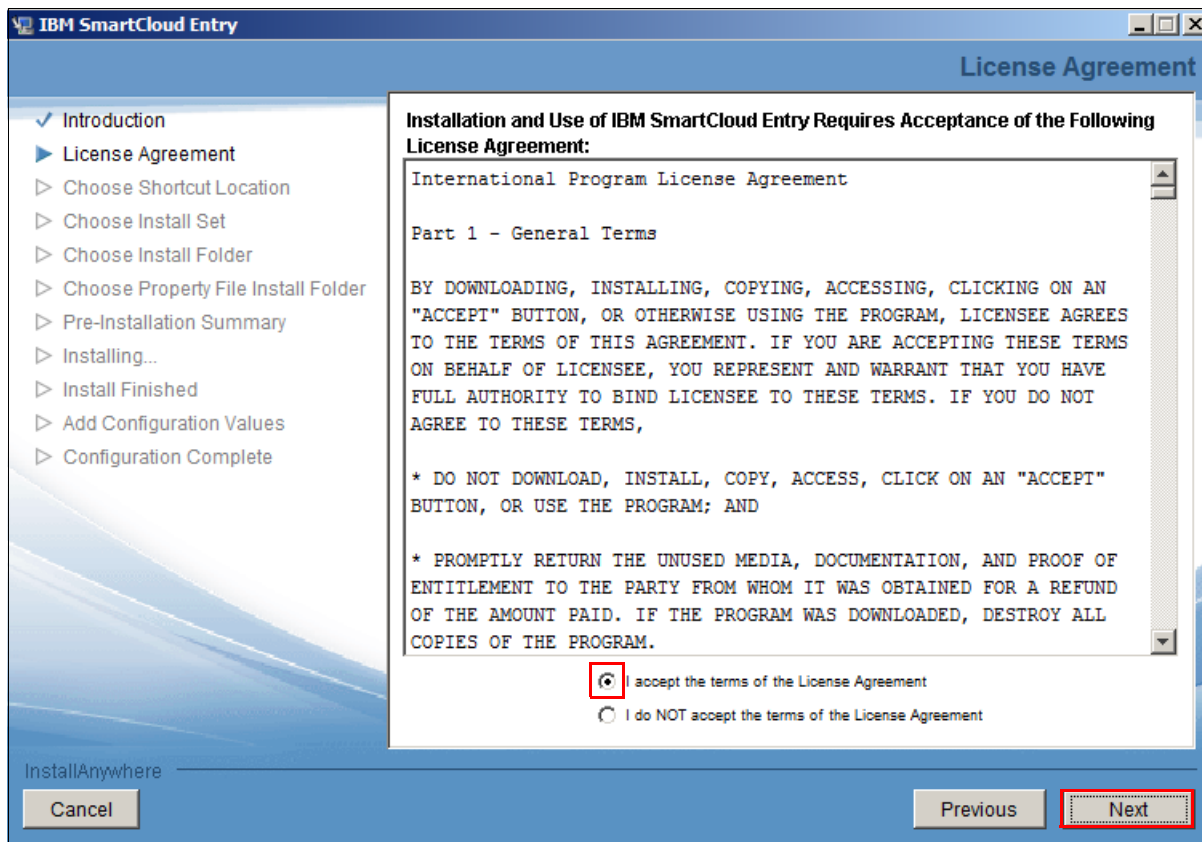


Figure 7-4 Accept the License Agreement

3. Select the location or locations for IBM SmartCloud Entry shortcuts, as shown in Figure 7-5. Click **Next**.

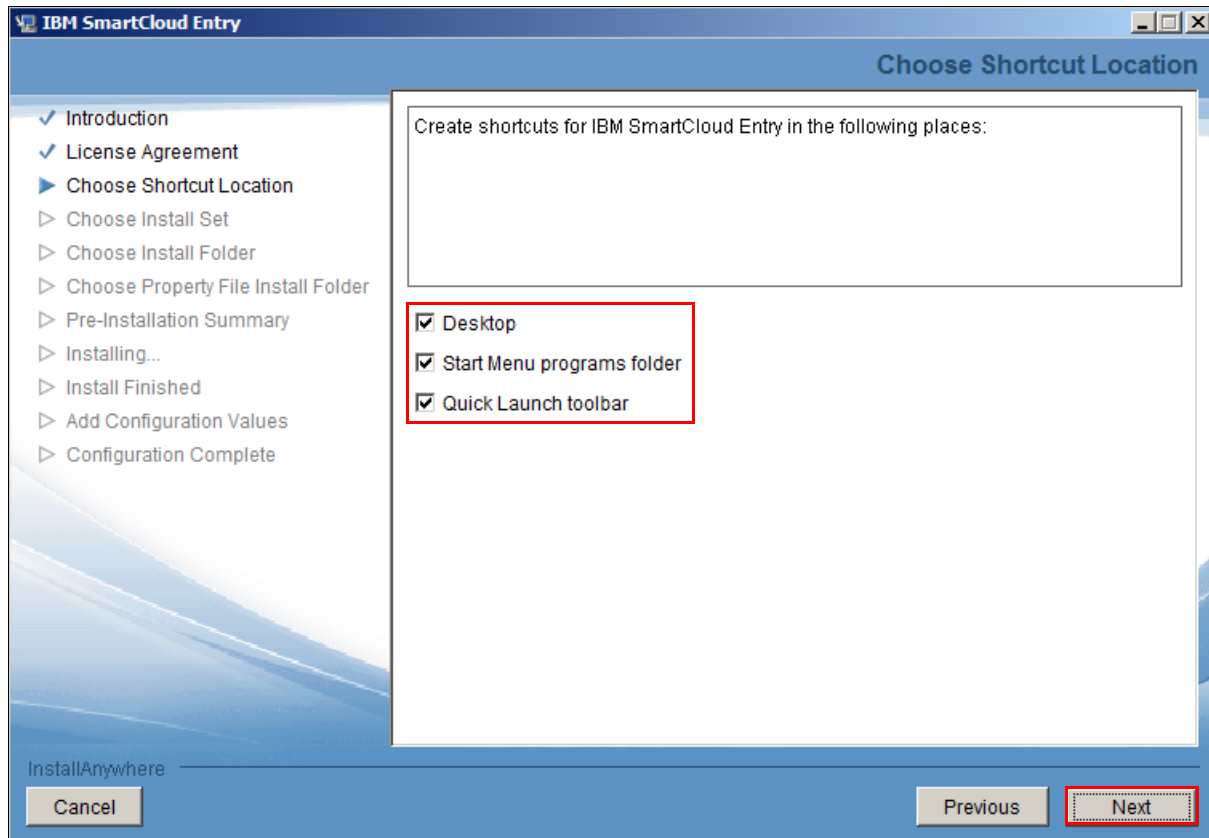


Figure 7-5 Choose the location for IBM SmartCloud Entry shortcuts

4. Select a folder for IBM SmartCloud Entry application files, as shown in Figure 7-6. Click **Next**.

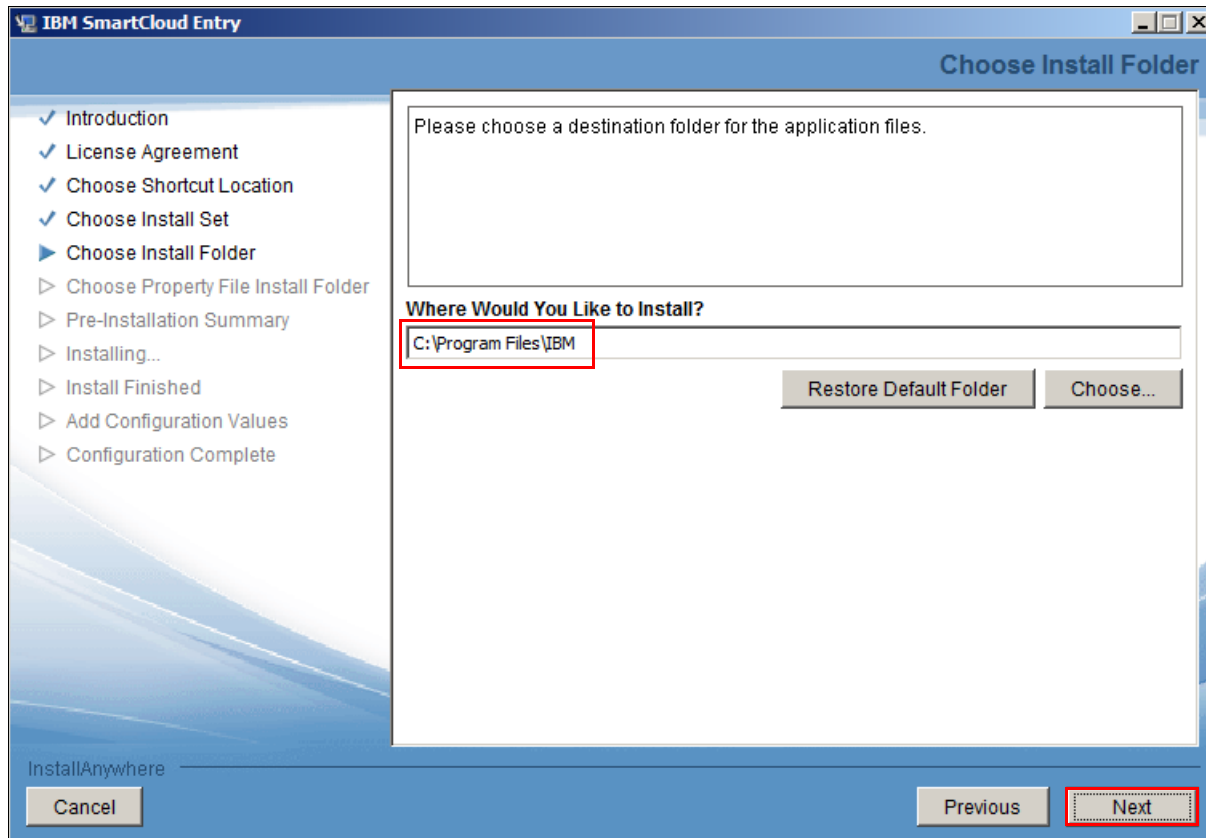


Figure 7-6 Choose the location for application files

5. Select the destination folder for the property files, as shown in Figure 7-7. We suggest putting this directory in the installation directory under the C:\Program Files\IBM location. Click **Next**.

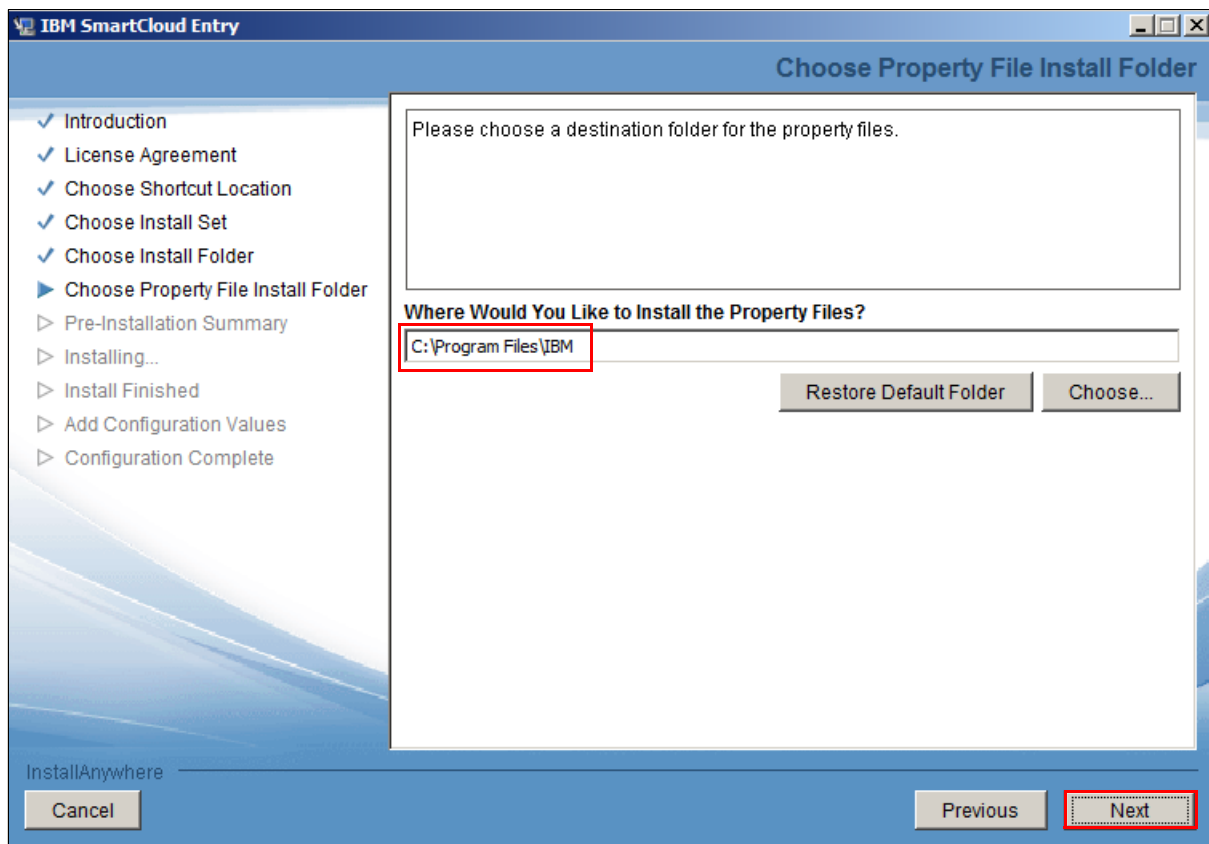


Figure 7-7 Choose the location for property files

6. Review the summary panel (Figure 7-8) to verify that the property files are not located in a user's home directory. When these settings are correct, click **Install**.

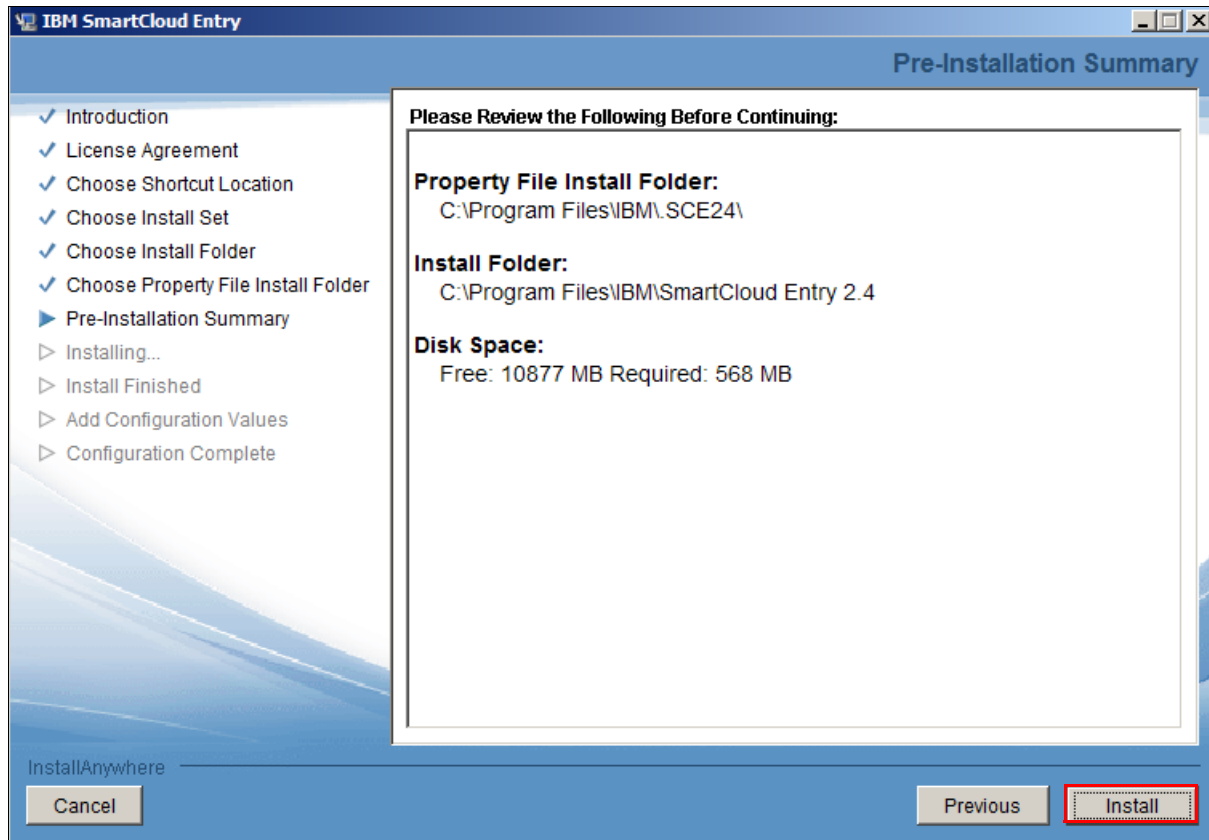


Figure 7-8 Confirm file locations prior to installing IBM SmartCloud Entry

7. If this is a new installation, and you do not need to migrate data from a previous IBM SmartCloud Entry installation, select **I want to configure the user data now**, and click **Next**.

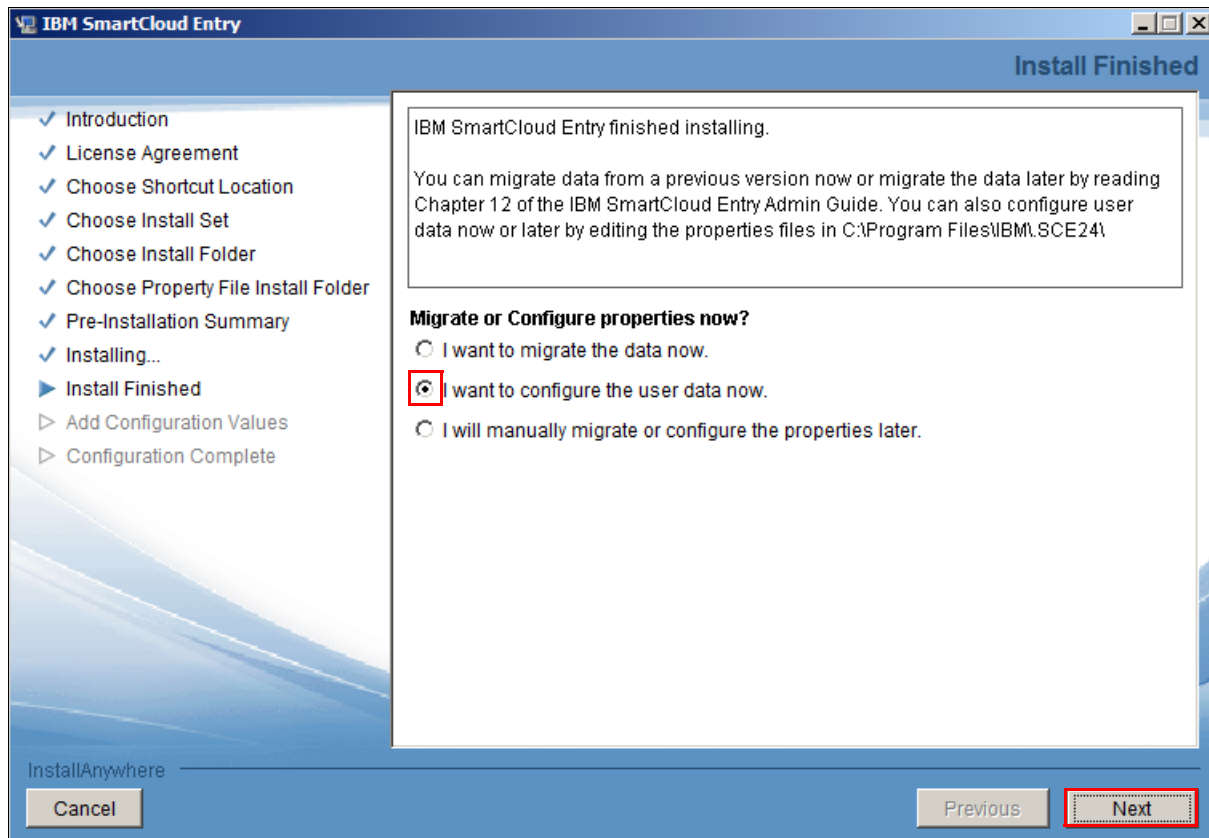


Figure 7-9 Optionally, edit the properties files to configure your user data, or perform this step later

8. Confirm the configuration values, as shown in Figure 7-10. Click **Next**.

Tip: Do not change the default administrator name at this time. It can be changed later in the `authentication.properties` file.

IBM SmartCloud Entry

Add Configuration Values

Changing these properties is optional. All options can be changed after install in
C:\Program Files\IBM\SCE24\authentication.properties

- ✓ Introduction
- ✓ License Agreement
- ✓ Choose Shortcut Location
- ✓ Choose Install Set
- ✓ Choose Install Folder
- ✓ Choose Property File Install Folder
- ✓ Pre-Installation Summary
- ✓ Installing...
- ✓ Install Finished
- ▶ Add Configuration Values
- ▷ Configuration Complete

* Initial administrator user name:
admin

* Initial administrator name:
SmartCloud Entry Administrator

* Initial administrator password:

* Verify initial administrator password:

InstallAnywhere

Cancel Previous **Next**

Figure 7-10 Confirm your configuration values

9. IBM SmartCloud Entry is now installed. To add an optional silent install response file, select the check box, as shown in Figure 7-11. Click **Done**.

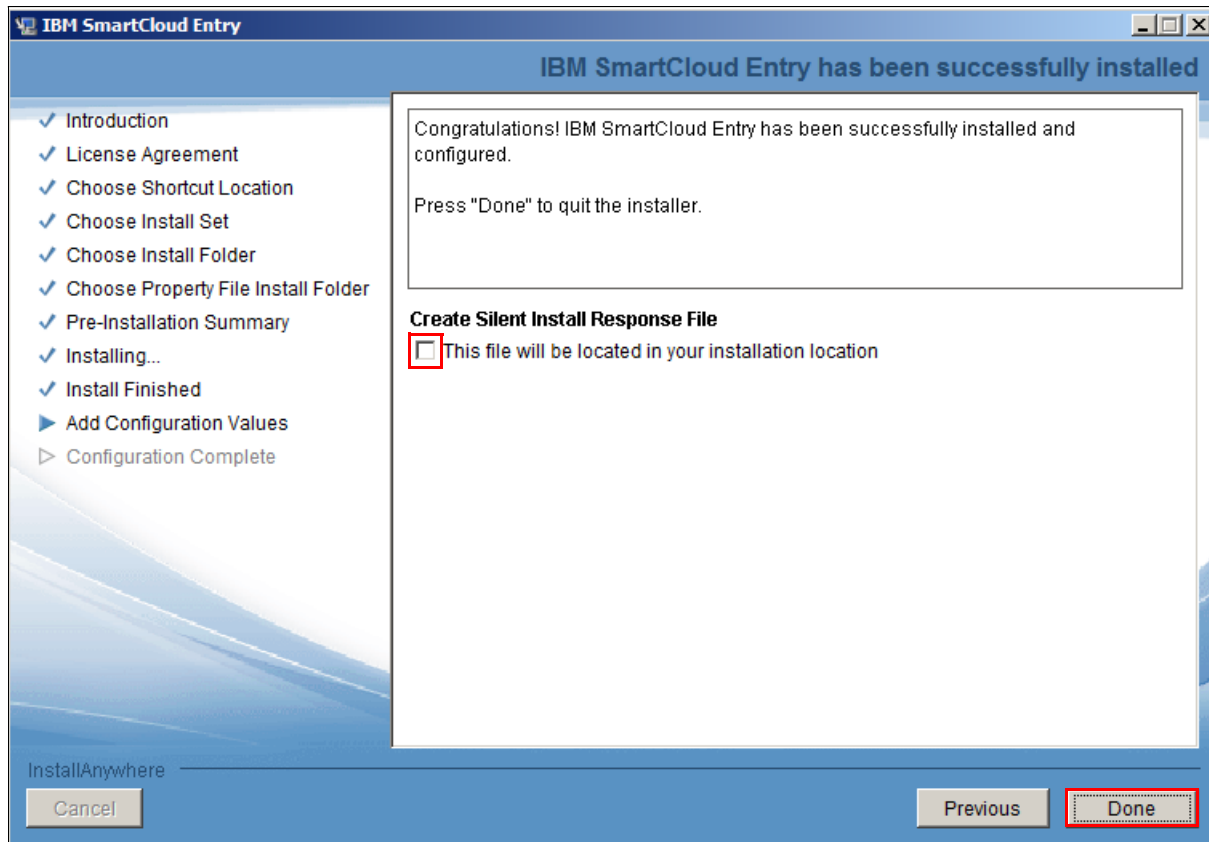


Figure 7-11 Create Silent Install Response File (optional)

10. With the installation complete, double-click the IBM SmartCloud Entry icon to launch the application.
11. The IBM SmartCloud Entry login window opens (Figure 7-12). Enter your User ID and Password, and then click **Log In**.

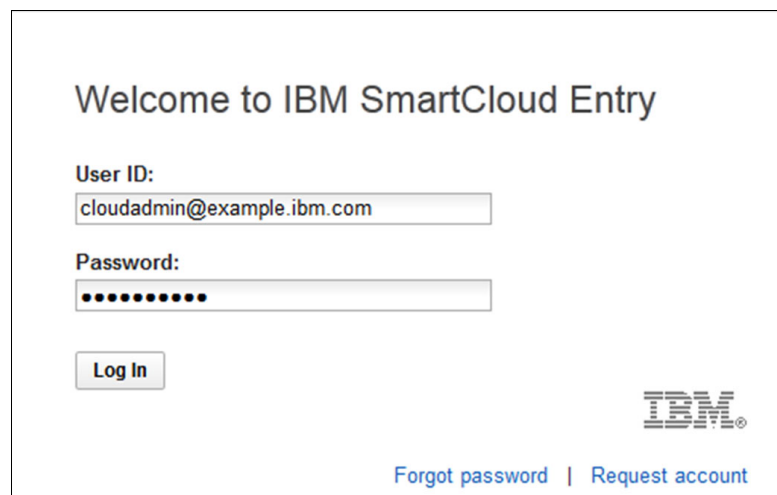


Figure 7-12 Logging into IBM SmartCloud Entry

7.1.3 Post-installation

Post-installation steps are as follows:

- Required: Installing the fix pack
- Optional: Configuring LDAP

Installing the fix pack

Complete the following steps to install the fix pack:

1. Download the fix pack, extract it, and copy it the file to C:\Temp\fixpack.
2. Run the following commands in the IBM SmartCloud Entry console:

```
version
showrepos
addrepo file://c:/temp/fp1
checkupdates
installupdates
close
```

These commands are shown in Example 7-1. IBM then shuts down.

Example 7-1 Commands for installing IBM SmartCloud Entry fix pack

```
osgi> version
2.4.0.0-201208290130

osgi> showrepos
Metadata repositories:
Artifacts repositories:
  file:/C:/Program%20Files/IBM/SmartCloud%20Entry%202.4/
  file:/C:/Program%20Files/IBM/SmartCloud%20Entry%202.4/p2/org.eclipse.equinox.p2.core/cache/

osgi> addrepo file:/c:/temp/fixpack
SmartCloud Entry update repository added

osgi> showrepos
Metadata repositories:
  file:/c:/temp/fixpack
Artifacts repositories:
  file:/C:/Program%20Files/IBM/SmartCloud%20Entry%202.4/
  file:/c:/temp/fixpack
  file:/C:/Program%20Files/IBM/SmartCloud%20Entry%202.4/p2/org.eclipse.equinox.p2.core/cache/

osgi> checkupdates
SmartCloud Entry updates found:
  com.ibm.cfs.product 2.4.0.0-201208290130 ==> com.ibm.cfs.product 2.4.0.1-201209171000

osgi> installupdates
SmartCloud Entry updates to install:
  com.ibm.cfs.product 2.4.0.0-201208290130 ==> com.ibm.cfs.product 2.4.0.1-201209171000
SmartCloud Entry update done

osgi> close_
```

3. Double-click the IBM SmartCloud Entry icon on your desktop and restart the application.
4. Issue the following commands:

```
version
showrepos
delrepo file:/c:/temp/fixpack
```

Configuring LDAP to use Microsoft Active Directory

If you want to do the following tasks, do them at the end of the setup process because you will need a user to log in when you test the Active Directory configuration:

- ▶ Configure LDAP authentication with Active Directory.
- ▶ Change the default administrator user name from *admin*.

LDAP authentication is described in more detail in the IBM SmartCloud Administrator Guide. The following configuration demonstrates how to connect to Active Directory; in this process, you will be working with two files (*authentication.properties* and *ldap.xml*), which are both in the *.SCE24* directory:

1. With a text editor, open the *authentication.properties* file in the *.SCE24* directory.
2. Find the following line:

```
authentication.type=LOCAL
```

Change it to read as follows:

```
authentication.type=LDAP
```
3. To control which users will automatically be assigned as administrators in IBM SmartCloud Entry, uncomment the following line:

```
#ldap.admin.users=admin@ibm.com
```
4. Change users to LDAP users:

```
ldap.admin.users=vmwareadmin@example.ibm.com,cloudadmin@example.ibm.com
```

Administrator rights: Users can be granted administrator access from the GUI. This is intended as a way to control which users are automatically assigned administrator rights at their first login. Users with administrator access have to be included in Active Directory.

5. Change the user name of the default administrator.

If you need to carry out this task, do so at the end of the setup process, because you will need a user to log in when you test the Active Directory configuration.

Unless otherwise specified, the default user name is *admin*. To change the administrator user name, change *admin.username=admin* to *admin.username=123admin456* in the *authentication.properties* file.

6. Open the *ldap.xml*, which is in the *.SCE24* directory.

Example 7-2 on page 61 shows a sample file that allows users from the *Users* OU in an Active Directory named *example.ibm.com*.


```
<?xml version="1.0"?>
<config>
  <host>ldap://adcontroller.example.ibm.com</host>
  <step>
    <authDN
password="{LDAP_SEARCH_DN_PASSWORD}">{LDAP_SEARCH_DN}</authDN>
    <searchFilter>(|(userPrincipalName={FILTER}))</searchFilter>
    <searchContext>OU=Users,DC=example,DC=ibm,DC=com</searchContext>
    <outputs>
      <output>
        <get>cn</get>
        <pass>cn</pass>
      </output>

      <output attribute="fullname">
        <get>cn</get>
      </output>
      <output attribute="email">
        <get>mail</get>
      </output>
    </outputs>
  </step>
  <step>
    <authDN>{PERSON_DN}</authDN>
  </step>
</config>
```

7. To search for users further down in the OU structure, add another OU to <searchContext>. So, if the users are in the *adminusers* OU, one level below *users*, the string is:
<searchContext> OU=adminusers,OU=Users,DC=example,DC=ibm,DC=com</searchContext>
8. Save the file and restart IBM SmartCloud Entry. At the login prompt, enter your LDAP user ID and password, as shown in Figure 7-13.

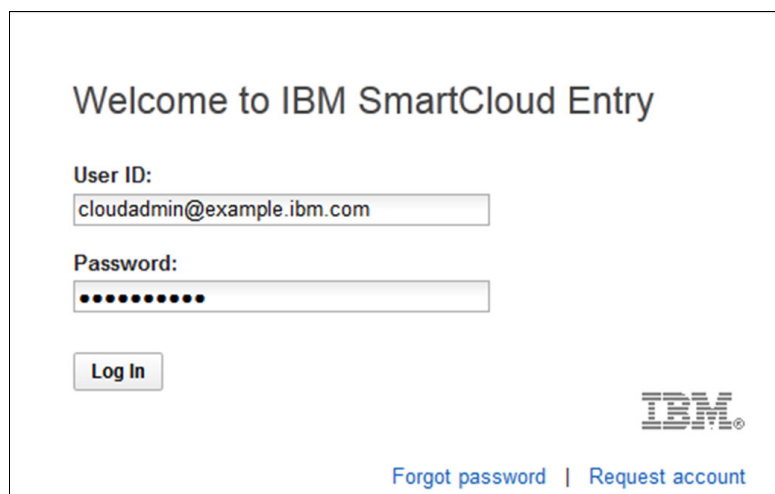


Figure 7-13 Logging into IBM SmartCloud Entry

7.1.4 Enable billing

Billing is not enabled by default. To enable billing, complete the following steps:

1. Use a text editor to open the `billing.properties` file, which is in the `.SCE24` directory
2. Find the following line:

```
com.ibm.cfs.billing.enabled=false
```

Change the line so it reads as follows:

```
com.ibm.cfs.billing.enabled=true
```

3. Restart IBM SmartCloud Entry by typing **close** in the IBM SmartCloud Entry terminal window.

7.1.5 Set default values for network configuration

This step is optional; it applies to appliance configuration in IBM SmartCloud Entry. When a device is deployed, some network configuration must be done. In less complex infrastructures, some of the settings apply to most of the appliances, such as DNS settings, domains, and domain suffixes. To work more efficiently with appliances, some defaults can be entered in the `networkConfiguration.properties` file. This file is self-explanatory, and so we do not provide an example in this paper; however, we do suggest that you take advantage of this file for your own efficiency.

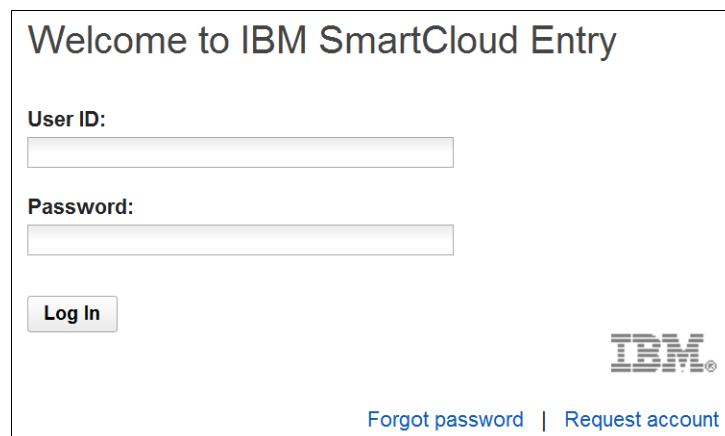
7.2 Simple workload deployment process

This simple deployment takes place in the following scenario:

- ▶ The user is not a cloud administrator.
- ▶ Appliances that display are associated with projects to which the user has access.
- ▶ Workloads that display are associated with projects to which the user has access.
- ▶ The approval functionality is deactivated for this scenario.

The deployment process is simple and fast:

1. Log in to the application, as shown in Figure 7-14.



Welcome to IBM SmartCloud Entry

User ID:

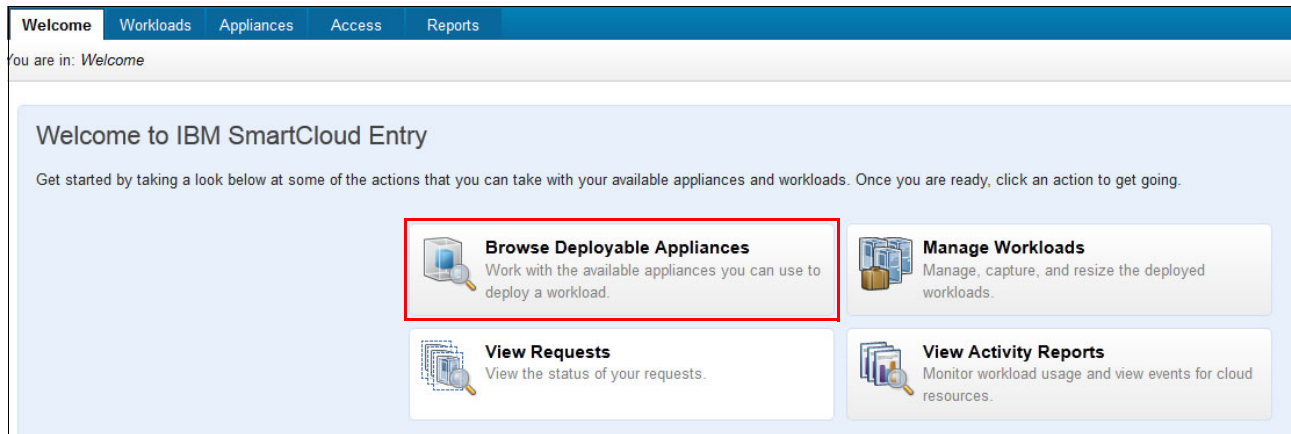
Password:

IBM

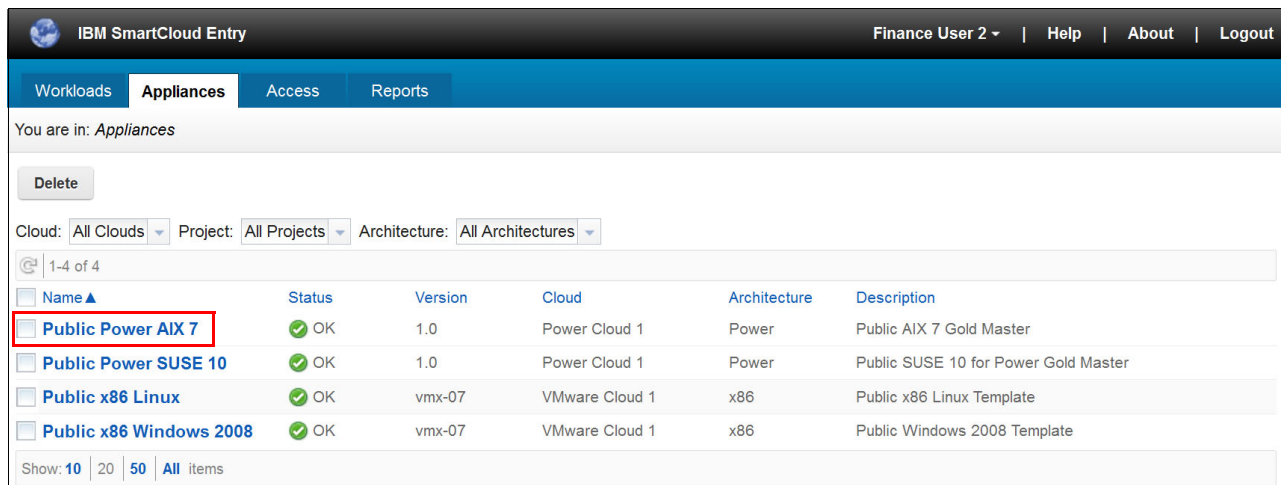
[Forgot password](#) | [Request account](#)

Figure 7-14 IBM SmartCloud Entry login window

2. The Welcome window opens, as shown in Figure 7-15. Select **Browse Deployable Appliances** (or select the Appliance tab).



3. Results are shown in Figure 7-16. Select the **Public Power AIX 7** image for deployment.



4. Figure 7-17 shows that the *Public Power AIX 7* image is selected for deployment. Click **Deploy**.

The screenshot shows the IBM SmartCloud Entry interface. At the top, there's a navigation bar with 'Workloads', 'Appliances' (selected), 'Access', and 'Reports'. Below this, a breadcrumb trail says 'You are in: Appliances > Public Power AIX 7'. The main content area displays details for the 'Public Power AIX 7' appliance. A 'Deploy' button is at the top left of the details section. The details include: State (OK with a green checkmark), Description (Public AIX 7 Gold Master), Project (Public with a 'Move To Project' dropdown), Last modified (Today 10:29 AM), Version (1.0), Revision (1), Revision comments (Comments), Cloud (Power Cloud 1), and Logs ([VMControl] Image captured.). A 'Close' button is at the bottom left.

IBM SmartCloud Entry			
Workloads	Appliances	Access	Reports
You are in: Appliances > Public Power AIX 7			
Deploy			
Public Power AIX 7			
State:	OK		
Description:	Public AIX 7 Gold Master		
Project:	Public	Move To Project	
Last modified:	Today 10:29 AM		
Version:	1.0		
Revision:	1		
Revision comments:	Comments		
Cloud:	Power Cloud 1		
Logs:	[VMControl] Image captured.		
Close			

Figure 7-17 The Public Power AIX 7 image, selected for deployment

5. Enter your Name (required) and Description, and then click **Deploy** again (Figure 7-18).

The screenshot shows the IBM SmartCloud Entry interface. At the top, there's a navigation bar with 'Workloads', 'Appliances', 'Access', and 'Reports'. Below this, a breadcrumb trail reads 'You are in: Appliances > Public Power AIX 7 > Deploy'. The main heading is 'Deploying Public Power AIX 7'. A red box highlights the 'Name' and 'Description' fields. The 'Name' field contains 'MyAix7' and the 'Description' field contains 'My AIX 7 Workload'. Below these are the 'Project' dropdown (set to 'Public'), an 'Expiration Period' checkbox (unchecked), and 'Basic Settings' for 'CPU' (set to 1) and 'RAM' (set to 2,048). At the bottom, a red box highlights the 'Deploy' button, with 'Save as Draft' and 'Cancel' buttons next to it.

IBM SmartCloud Entry

Workloads Appliances Access Reports

You are in: Appliances > Public Power AIX 7 > Deploy

Deploying Public Power AIX 7

***Name:**
MyAix7

Description:
My AIX 7 Workload

Project:
Public

Expiration Period
☐ Set an expiration date

Basic Settings

CPU:
1

RAM:
2,048

Deploy Save as Draft Cancel

Figure 7-18 With the name and description of the deployment entered, deployment begins

6. Select the Workload tab to view the status of the deployment, as shown in Figure 7-19. The status changes to *Pending* if approval for deployments is enabled.

The screenshot displays the IBM SmartCloud Entry interface. At the top, the header shows the IBM logo, 'IBM SmartCloud Entry', and the user 'Finance User 2'. Below the header is a navigation bar with tabs: 'Workloads' (selected), 'Appliances', 'Access', and 'Reports'. Under the 'Workloads' tab, it says 'You are in: Workloads'. There are four buttons: 'Capture', 'Start/Stop', 'Delete', and 'Move To Project'. Below these are filters: 'Cloud: All Clouds', 'Project: All Projects', and 'Architecture: All Architectures'. A table shows three workloads. The first two, 'junit virtual machine' and 'storageTestVM', have a status of 'OK'. The third, 'MyAix7', has a status of 'Deploying', which is highlighted with a red box. The table has columns for Name, Status, Cloud, Architecture, and Description. At the bottom, it says 'Show: 10 | 20 | 50 items'.

Name	Status	Cloud	Architecture	Description
junit virtual machine	OK	VMware Cloud 1	x86	junit VM
MyAix7	Deploying	Power Cloud 1	Power	My AIX 7 Workload
storageTestVM	OK	VMware Cloud 1	x86	storage management test VM

Figure 7-19 The deployment progress is displayed on the Workloads tab



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- ▶ Balancing performance and cost
- ▶ Finding an affordable solution today that can be expanded upon in the future
- ▶ Controlling complexity, and simultaneously employing new technologies
- ▶ Finding a solution that delivers a rapid ROI and a lower TCO to justify the investment
- ▶ Implementing a cloud system that makes your environment simpler, “greener,” and efficient
- ▶ Taking advantage of our self-service portal for cloud consumers, with basic approval workflows and accounting capabilities

Our experience and dedication have become our strength. IBM continually builds on this strength to provide benefits and technologies to you, such as the following examples:

- ▶ Automated deployment
- ▶ Transfer of skills to your IT staff
- ▶ Simple-to-use technologies and products
- ▶ Automated and simplified workload lifecycle
- ▶ VM lifecycle management, defining and describing how IBM provides it
- ▶ Single portal for monitoring all systems on the cloud

8.1 A talented support team

The IBM support team helps you receive the most from your software by ensuring that you have continuing access to the latest version, upgrades, fix packs, and access to our talented support team, by phone or electronically.

IBM provides an array of support levels to suit your needs. For further details about these software support offerings, see the *Software Support Handbook* website:

<http://www14.software.ibm.com/webapp/set2/sas/f/handbook/offerings.html>

8.2 Global Financing, competitive programs and promotions

IBM Global Financing operates in more than 50 countries. For details, contact your local IBM Global Financing specialist or visit the following website:

<http://ibm.com/financing>

Competitive financing programs and promotions

IBM also provides an array of competitive financing programs and special promotions on a range of products and IT solutions. For details, visit the following location:

<http://www.ibm.com/financing/nz/lifecycle/acquire/promotions/index.html>

8.3 IBM Systems Lab Services and Training

IBM Systems Lab Services and Training helps to infuse intelligence in the way information technology works in the world. The focus of IBM is on decreasing costs by designing flexible infrastructures, and also managing risk by the use of technical skills and training expertise. For details, visit the following location:

<http://www.ibm.com/systems/services/labservices/>

8.4 Other training

IBM offers comprehensive technical training services, including no-charge and chargeable training sessions such as the following types:

- ▶ Classroom training
- ▶ Software conferences and events
- ▶ Online training
- ▶ Customized training for your facility and your specific projects

To get started with these and other training opportunities, see the following training websites:

- ▶ Brand or product-specific training and certification programs

<http://www.ibm.com/software/sw-training/>

- ▶ IBM Redbooks

<http://www.redbooks.ibm.com/>

- ▶ IBM product information centers
<http://www.ibm.com/support/publications/us/library/index.shtml>
- ▶ Standard classroom training
<http://www-304.ibm.com/jct03001c/services/learning/content/ites.wss/us/en?pageType=page&c=a0000048>
- ▶ e-Learning
<http://www.ibm.com/training/us/elearning>
- ▶ Instructor-led online training (virtual classroom)
<http://www-304.ibm.com/jct03001c/services/learning/ites.wss/us/en?pageType=page&c=a0013864>



Frequently asked questions (FAQs) about IBM SmartCloud Entry

The following questions and answers have assisted other clients:

- ▶ *When I have general questions about IBM SmartCloud Entry, what central resource can I use?*

Start by visiting the IBM developerWorks® website and use the search function:

<http://www.ibm.com/developerworks/>

- ▶ *Is a trial version of IBM SmartCloud Entry available?*

Yes, a trial version is available at the following web location:

http://www14.software.ibm.com/webapp/iwm/web/reg/pick.do?source=swg-smartcloud&lang=en_U

IBM SmartCloud Entry runs on Intel x86 (Windows or Linux) or Power (AIX). The trial version is only for Windows, but the functionality is the same, regardless of the IBM SmartCloud Entry server platform.

- ▶ *What is the licensing model for IBM SmartCloud Entry in an x86 environment?*

For x86, the product is licensed per VMware server. So, if your VMware environment consists of 10 ESX or ESXi servers, you need 10 licenses. You can choose to purchase either a one-year or a three-year subscription and support.

- ▶ *What is the licensing model for IBM SmartCloud Entry in a PureFlex environment?*

The IBM SmartCloud Entry license is included in PureFlex Standard and Enterprise. If you purchased PureFlex without IBM SmartCloud Enterprise, you can purchase a chassis-license. One chassis-license covers one PureFlex chassis.

- *What is the licensing model for IBM SmartCloud Entry in a Power environment?*

For Power servers, the license model is based on the model of the Power server and the number of cores. The three licenses are small, medium, and large:

- Small: For models up to and including Power 750
- Medium: For Power 770
- Large: For Power 780 and Power 795

If you have two Power 750 servers with 16 cores each, and one Power 795 with 32 cores, you will need 32 small and 16 large licenses.

There are options for both one year and three years subscription and support.

- *If I purchase a one-year subscription and support, what happens after the first year?*

You will need to purchase subscription and support to be able to continue using IBM SmartCloud Entry.

- *If I purchase a three-year subscription and service, what happens after three years?*

You will need to purchase software maintenance after three years to continue using IBM SmartCloud Entry.

- *If I have a PureFlex system with both Power and Intel x86 servers, can I use the chassis license?*

Yes, you may use the license.

- *Do I have to run IBM SmartCloud Entry on a 64-bit operating system?*

Yes, IBM SmartCloud Entry is licensed per chassis on PureFlex systems.

- *Can I run IBM SmartCloud Entry as a virtual machine?*

Yes, be aware that IBM SmartCloud Entry is also delivered as a virtual appliance (vApp) for use with VMware. You can choose to use either one when purchasing IBM SmartCloud Entry.

- *I run IBM SmartCloud Entry as a Windows server, but how can I connect to it to see the console so I can do updates?*

You will need to use Telnet to connect to it.

- *Can I use my existing IBM Systems Director installation with IBM SmartCloud Entry?*

Yes, if the versions meet the requirements and if provisioning can be done with VMControl.

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this paper.

IBM Redbooks

The following IBM Redbooks publications provide additional information about the topic in this document. Note that some publications referenced in this list might be available in softcopy only.

- ▶ *IBM Reference Configuration for VMware on System x with SmartCloud Entry, REDP-4853*
- ▶ *IBM Smart Storage Cloud, REDP-4873*

You can search for, view, download or order these documents and other Redbooks, Redpapers, Web Docs, draft and additional materials, at the following website:

ibm.com/redbooks

Online resources

These websites are also relevant as further information sources:

- ▶ IBM SmartCloud services trial
<http://www.ibm.com/developerworks/cloud/cloudtrial.html>
- ▶ IBM developerWorks main search page
https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en/wiki/W21ed5ba0f4a9_46f4_9626_24cbbb86fbb9
- ▶ IBM SmartCloud Entry Documentation, from IBM developerWorks
http://www.ibm.com/developerworks/mydeveloperworks/wikis/home/wiki/W21ed5ba0f4a9_46f4_9626_24cbbb86fbb9/page/Documentation?lang=en
- ▶ Included here are the following documents:
 - IBM SmartCloud Entry 2.4 User Guide
 - IBM SmartCloud Entry 2.4 Administrators Guide
 - IBM SmartCloud Entry 2.4 Software Development Kit (SDK) ReferenceDocumentation for earlier versions of SmartCloud Entry is located here also.
- ▶ Learn about IBM SmartCloud Entry, from IBM developerWorks
<http://www.ibm.com/developerworks/topics/ibm%20smartcloud%20entry/>
- ▶ Cloud Computing in a day? Hands-on how-to video IBM SmartCloud Entry 2.4
http://www.youtube.com/watch?v=Ufq_Xm_8V8EDescription1

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Redpaper™

IBM SmartCloud Entry 2.4 Deployment Use Cases

**Explore cloud
deployment scenarios
in various
environments**

**See how cloud is more
than hype and can
benefit your business**

**Learn how easy
transforming to cloud
can be**

This IBM Redpaper publication provides a brief overview of cloud technology, and describes how, from a user perspective, IBM SmartCloud Entry can help you access the benefits of the cloud. In particular, the product provides a comprehensive cloud software stack with capabilities that you otherwise might need to purchase separately as multiple products from multiple vendors.

Businesses with an existing virtualized platform (IBM Power Systems with PowerVM or IBM System x with VMware vSphere) can be transformed to a private cloud. IBM SmartCloud Entry makes this transformation possible. IBM SmartCloud Entry integrates with the IBM PureFlex System, so that clients with PureFlex System can also experience easier cloud-ready deployments.

IBM SmartCloud Entry adds a self-service, user portal, and basic metering to your existing virtualized platform. Overall, IBM SmartCloud Entry delivers improved service levels and fast time-to-value results for receiving the benefits of a private cloud infrastructure.

The four use cases demonstrate how easily IBM SmartCloud Entry can be deployed and the possibilities for improved efficiencies in your organization. The cases demonstrate cloud deployment in PureFlex, VMware, Power Systems and x86 environments, and a telecom company. Also described are two IBM SmartCloud Entry processes, showing the ease of provisioning and installing with this product.

This paper is directed at decision-makers, such as CFOs, CIOs, CEOs, IT managers, systems administrators, enterprise architects, systems architects, and IBM Business Partners. Presales and post-sales technical staff can benefit from discussing this paper with clients and potential clients.

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