Transform Your Virtualized Platform to the Cloud: A SmartCloud Entry Use Case Scenario
IBM Redbooks Solution Guide

IBM® SmartCloud® Entry is a simple-to-use solution for transforming your data center from cloud-ready to a private cloud infrastructure. SmartCloud Entry provides a comprehensive cloud software stack with capabilities that you typically need to purchase in multiple products from multiple vendors. This Solution Guide describes a use case scenario that demonstrates the ease with which SmartCloud Entry can be deployed. The use case scenario includes before and after architecture diagrams, before and after process flows, and illustrations of the possibilities for improved efficiencies with SmartCloud Entry. Figure 1 shows the SmartCloud Entry main menu.
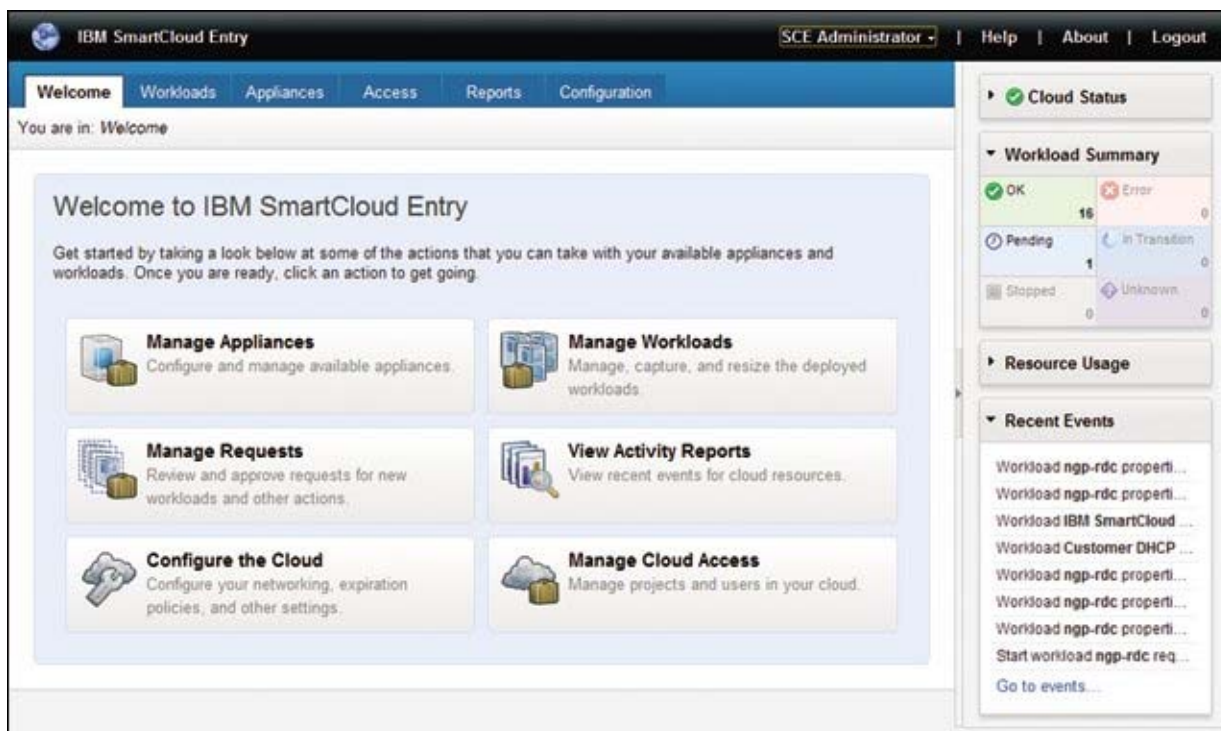

Figure 1. SmartCloud Entry moves your existing data center to a private cloud

Did you know?
If you currently have a virtualized platform, such as IBM Power Systems™ with PowerVM®, IBM System x® with VMware vSphere, IBM PureFlex™ System, or a kernel-based virtual machine (KVM), you have the infrastructure for moving to the cloud. Implementing SmartCloud Entry can take place in only one day, as our use case scenario shows. Following implementation, you can request and provision an environment quickly. Your data center can be monitored to improve efficiencies, address issues quickly, and use advanced cloud features. Fully use your IBM server investments by deploying SmartCloud Entry.

Business value

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. If these tasks were completed more efficiently, you would have time to focus on your primary goal: making your business grow. A significant way to increase business efficiency is to move to cloud technology. The IBM solution, SmartCloud Entry, enables you to take advantage of cloud efficiencies, letting you attend to the important tasks that only you can do.

You might ask, "Does this solution have the potential to address my pain points?" IBM offers solution benefits to guide you in addressing your pain points by:

- 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)
- Enabling a solution that delivers 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

In addition to addressing your key pain points, IBM cloud and virtualization solutions offer flexible approaches to the cloud. Overall, the IBM cloud:

- Works with new and existing infrastructures, including:

  - VMware vCenter environments

  - IBM System x

  - IBM Power Systems

  - IBM PureFlex Systems (the Standard and Enterprise offerings include SmartCloud Entry by default)

  - KVM

- Makes IT resources available for use more quickly.

- Enables you to respond to business requirements more promptly.

- Reduces deployment time, and shares resources more effectively with an intuitive user interface.

- Enables you to provision to multiple x86 and Power environments from a single GUI.

- Has a shared resource environment that maximizes usage.

- Is easy to use. There is no need to know the details of the infrastructure to use the product.

- Optimizes performance with dynamic scaling, expansive capacity, and continuous operation.

- Enables you to conduct business efficiently because the cloud lends itself to your focusing on your users' perspectives, rather than the IT or systems administrator's perspective.

Benefits that you can experience now

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, a number of advantages result, including that the cloud:

- Optimizes resources to reduce data center footprint
- Improves workload management and capabilities for delivering new services
- Provides for rapid services deployments, *completed in day or hours, versus 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 an optional approval mechanism
- Provides a light-weight cloud solution
- 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
- Supports heterogeneous environments
- Adapts to changing requirements and is 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 is designed to have no single point of failure.)

Benefits for future growth

SmartCloud Entry offers advanced cloud features when your business requires them. Take advantage of your existing IBM server investments and virtualized environments by deploying IBM SmartCloud Entry. You then have the essential cloud infrastructure capabilities to:

- Create images

    - Simplify storage of thousands of images.

    - Easily create new master images and virtual 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 and reduce 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 the user self-service for improved responsiveness.

    - Ensure security through VM isolation, and project-level user access controls.

    - Easy to use. There is no need to know about the details of the infrastructure.

    - Protect your investment by having the full support of your 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 defining policies, defaults, and templates.

- Simplify administration with an intuitive interface for managing projects, users, workloads, resources, billing, approvals, and metering.

Solution overview

Implementing the SmartCloud Entry solution can begin with an *IBM cloud workshop*, during which IBM evaluates your specific business needs from an IT perspective. This in-depth workshop helps IBM to identify your pain points and to understand how your processes can be improved by the usage of the cloud.

As an example of the information the IBM cloud workshop can correlate for you, consider the multiple requirements that a systems administrator needs to address, to exacting detail, for traditional (rack server) deployments. Some of the activities are tedious and repetitive, and are performed to meet business requirements. In contrast, the cloud alleviates many of these repetitive, tedious tasks, which the IBM cloud workshop outlines for you. An example of this situation is included in the use case scenario in this Solution Guide.

Many business operations can benefit from SmartCloud Entry 2.4. Features of this new version include:

- *Heterogeneous support:* SmartCloud Entry now provides heterogeneous cloud management across System x, Power Systems, PureFlex, and IBM Flex System™ environments. This unified code set allows you to control a wide variety of platform architectures from a single SmartCloud Entry GUI.

- *Multi-cloud, multi-hypervisor support:* The product enables multi-cloud management across geographies, time zones, and by grouping tiered hardware environments (for example, production clouds and test clouds). Additionally, it supports multi-hypervisors (PowerVM, VMware, and KVMs). Thus, by combining multiple cloud instances and expanded hypervisor options, 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, you 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.

Solution architecture

Figures 1, 2, and 4 in this Solution Guide are sample architectures from before (Figures 1 and 2) and after (Figure 4) the implementation of SmartCloud Entry. Your SmartCloud Entry representative can show you how this solution can integrate with your architecture.

Usage scenario

The following use case scenario demonstrates how the SmartCloud Entry solution can increase efficiency and streamline processes, leading to reduced operational impact:

- *Client:* A 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 impact for the two IT professionals is especially high during these cycles. As one example, a cycle included provisioning 30 -40 VMs, and provisioning is required within a short time.
- *Overall goal:* Decrease operational impact during high-impact business cycles.

Preexisting architecture

The architecture included VMware for providing virtual servers for both infrastructure services and faculty projects. The researchers use virtual servers to perform research tasks. The setup for the faculty included four System x servers that are running VMware ESX Server and one System x server that is running VMware vCenter to administer the virtualization platform. The institute used Microsoft Active Directory as the infrastructure for their users. For research applications, a mix of Linux and Windows VMs was used.

The preexisting architecture is depicted graphically in Figure 2.
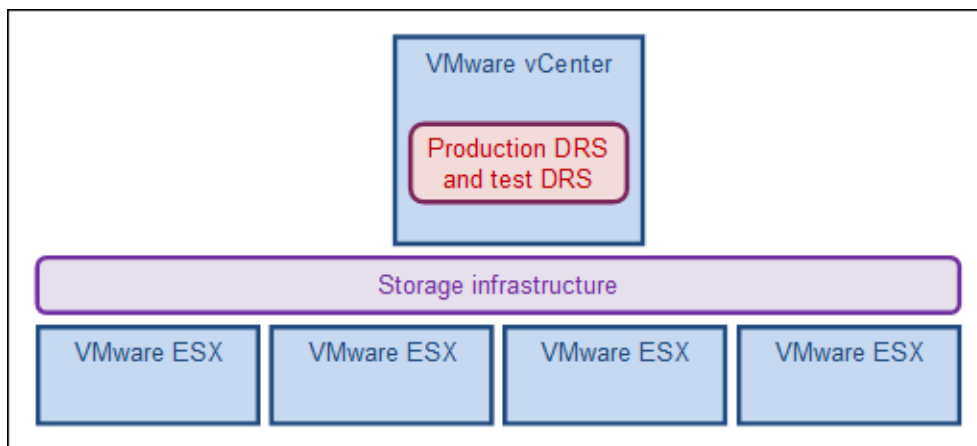

Figure 2. Use case architecture before the SmartCloud Entry implementation

Preexisting process flow

An example follows that demonstrates the preexisting process of a researcher who is ordering virtual servers:

1. A research assistant, not familiar with IT practices, needs three VMs for a six-month research project. To order the VMs, she emails the support desk.
2. The support desk replies by email with questions about project requirements, such as the required OS, processor, memory, and disk space.
3. The research assistant replies that the application named Analytics will be installed, and, therefore, sufficient resources are needed for running that application.
4. The support desk emails a colleague to determine the resources that are typically required by the Analytics application.

5. The colleague responds, noting the typical requirements for the Analytics application.
6. The support desk emails the information to the vCenter administrator, requesting that three VMs be deployed.
7. In vCenter, the administrator notes 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 involves three people and a number of emails. In addition, there are gaps in the provisioning process, in that the steps in the process are contained in personal email mailboxes.

Figure 3 shows a flowchart of the workflow before implementing IBM SmartCloud Entry.
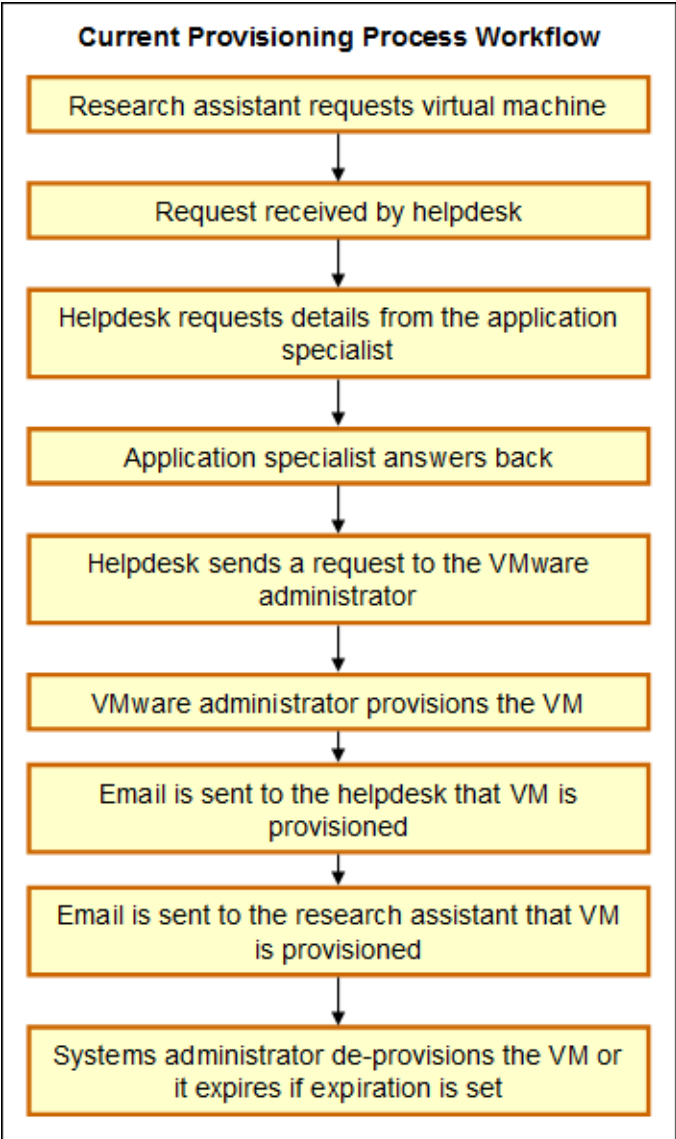

Figure 3. Use case provisioning workflow before SmartCloud Entry implementation

Challenges

The primary challenges and issues for this use case, which are defined during an IBM cloud workshop, are:

- High overhead is especially evident when researchers start new projects, so improvement is needed in this area.

    Many temporary virtual servers are deployed, and the repetitive work for the VMware administrators, in addition to the wait times for the researchers, causes project delays. A number of typical administrative duties, such as tracking usage, ownership, and lifecycle management of the VMs, can be handled by SmartCloud Entry, greatly reducing this impact, and making these tasks obsolete for the administrator. Without SmartCloud Entry, this situation becomes unmanageable and causes VMs to go unused for long periods of time before they are decommissioned.

- In addition, the IT staff has to deploy virtual servers based on input from the faculty researchers using email, which is a substantial manual process.

    Occasionally, servers need to be powered on, off, or in other ways adjusted, depending on the changing needs for research projects. Although vCenter allows users to log in with access to only those virtual machines and tasks to which the users are assigned access, this is a manual configuration task. It also requires that the researchers have the vCenter client installed on their desktops. The IT staff is reluctant to allow non-IT personnel to use vCenter, as this situation allowed for modifications to resource consumption that is out of the control of IT staff.

Requirements

The results of the cloud workshop include a list of requirements for meeting the overall goals of the company (see *Challenges).* In this use case, the faculty needs a self-service solution so that the researchers can address their most significant issues:

- The administrators' workload needs to be reduced.
- The use of emails for VM requests and for adjustments to VMs must be eliminated.
- The self-service portal must be easy to use for non-IT staff.
- Users need to perform basic VM tasks, such as starting and stopping the server.
- The system needs an expiration functionality so that de-provisioning occurs automatically.

Implementation

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

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

- Installing SmartCloud Entry
- Connecting SmartCloud Entry to the existing VMware vCenter
- Creating projects
- Configuring lightweight directory access protocol (LDAP) to validate users in the Active Directory
- Moving existing workloads to projects
- Moving appliances to projects
- Configuring approval policies

Hardware and software solution

The solution requires that only the following components are implemented into the existing research environment:

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

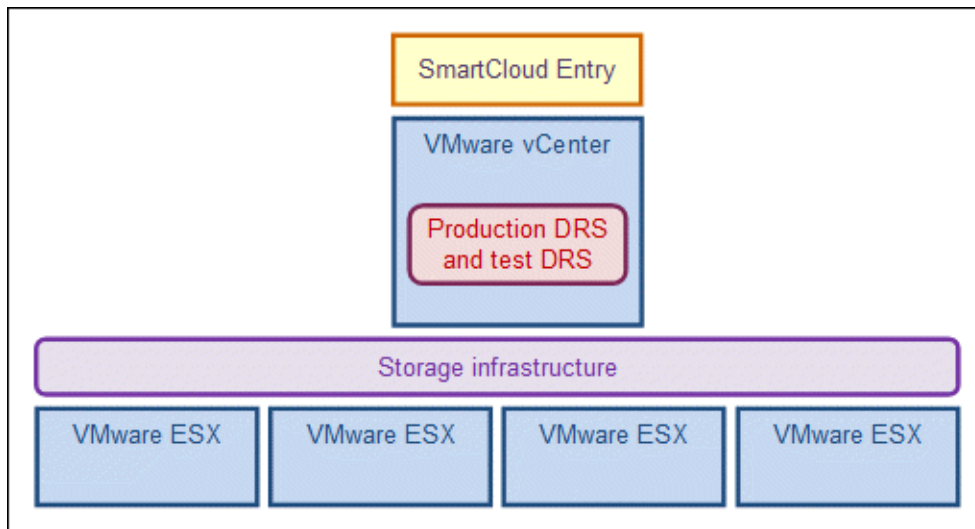The architecture after SmartCloud Entry implementation is shown in Figure 4.

Figure 4. Use case architecture after SmartCloud Entry implementation

Summary and client feedback

In this use case scenario, the primary benefits of implementing SmartCloud Entry include the following items:

- A web-based, self-service portal that is intuitive to non-IT staff.
- An automated lifecycle, from ordering to retirement of virtual systems, resulting in no VMs running that are unaccounted for, and fewer storage devices that reach capacity because there are fewer VMs.
- An approval process that tracks who is ordering VMs, providing the VMware administrator with more and better control of performance and capacity planning on the VMware platform.
- Here, a lesson learned was that the faculty should have prepared a list of project names before introducing the solution. Without that step, the project names had to be defined post-installation.

In summary, Figure 5 shows the process workflow after SmartCloud Entry is introduced.
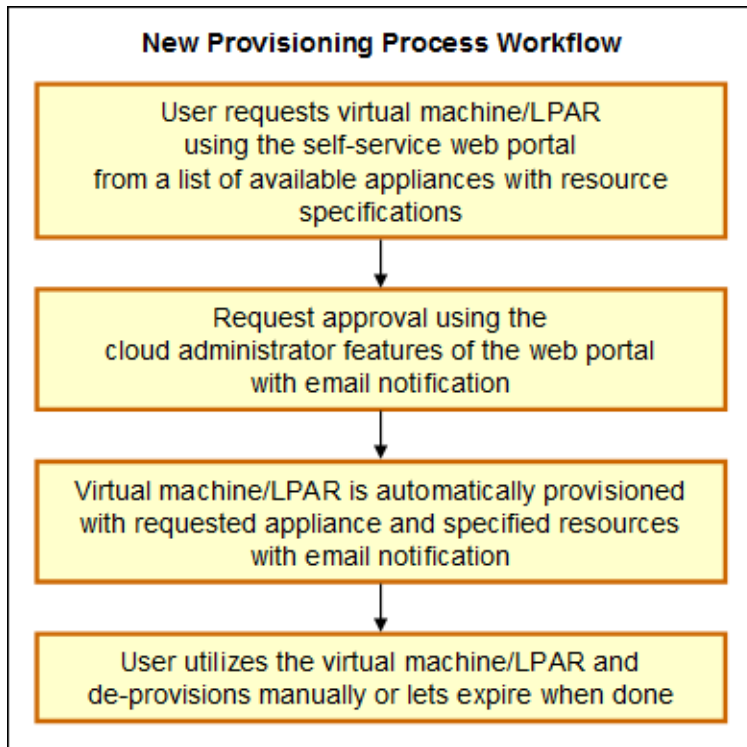

New Provisioning Process Workflow

User requests virtual machine/LPAR
using the self-service web portal
from a list of available appliances with resource
specifications

↓

Request approval using the
cloud administrator features of the web portal
with email notification

↓

Virtual machine/LPAR is automatically provisioned
with requested appliance and specified resources
with email notification

↓

User utilizes the virtual machine/LPAR and
de-provisions manually or lets expire when done

Figure 5 Use case provisioning workflow after SmartCloud Entry implementation

Integration

Integration with your existing IBM Power Systems with PowerVM, IBM System x with VMware vSphere, or IBM PureFlex System is easy. The software components of the SmartCloud Entry V2.4 cloud infrastructure are listed in the following tables.

Software prerequisites: IBM Systems Director VMControl

This solution is compatible with specific versions of IBM Systems Director and IBM Systems Director VMControl™ for platform management and virtualization services, as listed in Table 1.

Table 1. Version support for IBM Systems Director and IBM Systems Director VM Control

IBM Systems Director server	Versions	Notes
IBM Systems Director V6.2.x with IBM Systems Director VMControl	• IBM Systems Director V6.2.1.2 • IBM Systems Director VMControl Enterprise Edition V2.3.1.2 • IBM Systems Director VMControl Standard Edition V2.3.1.2 (limited support[1])	With latest fix pack
IBM Systems Director V6.3.x with IBM Systems Director VMControl	• IBM Systems Director V6.3.1.1 • IBM Systems Director VMControl Enterprise Edition V2.4.1.1	With latest fix pack
IBM Systems Director Storage Control (optional) [2]	• 4.2.1 • 4.2.2.1	With latest fix pack
IBM Tivoli® Storage Productivity Center (optional) [2]	• 4.2.1 interim fix 1	With latest fix pack[3]
IBM Systems Director Service and Support Manager (optional)	• 6.2.1 • 6.3.1	With latest fix pack
SMI Agent (optional) [4]	• 120.11.0	With latest fix pack

1. For more information about limited support, see *IBM SmartCloud Entry Administrator Guide 2.4,* available at:
https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en#/wiki/W21ed5ba0f4a9_46f4_9626_24cbbb86fbb9/page/Documentation
2. For N_Port ID Virtualization (NPIV) support, at least IBM Systems Director Storage Control or IBM Tivoli Storage Productivity Center must be installed.
3. For the latest information, see the *IBM Tivoli Storage Productivity Center Latest Downloads* Technote at:
https://www-304.ibm.com/support/docview.wss?uid=swg21320822
4. If you are using IBM Systems Director Storage Control or IBM Tivoli Storage Productivity Center, use the SMI Agent.

Software prerequisites: Storage Copy Services Power Systems virtualization environment

IBM SmartCloud Entry uses IBM Systems Director VMControl application programming interfaces (APIs) to deploy new servers through Storage Copy Services (SCS) using the Integrated Virtualization Manager (IVM) or Hardware Management Console (HMC) and Virtual I/O Server (VIOS). Table 2 lists the supported versions for this SCS-based Power Systems virtualization environment.

Table 2. Version support for IBM Systems Director and IBM Systems Director VM Controls

Managed servers	Versions	Notes
PowerVM	PowerVM Enterprise Edition	
Kernel virtual machine (KVM)		
Virtual I/O Server (VIOS)	VIOS 2.2.1.1 FP 25	● With latest fixes[1] ● Dual VIOS is supported
Hardware Management Console (HMC)	HMC V7R7.4	● With latest fixes
Integrated Virtualization Manager (IVM)	IVM 2.2.1.3	● With latest fixes

1. The list of VIOS fixes can be viewed on the Fix Central website at: http://www-933.ibm.com/support/fixcentral.

Software prerequisites: VMware vSphere with vCenter

IBM SmartCloud Entry is compatible with the versions of VMware products that are listed in Table 3.

Table 3. Supported VMware products

VMware products	Versions
VMware vCenter Server 4	● Standard edition (version 4.1 update 1) ● Essentials (version 4.1 update 1)
VMware vCenter Server 5	● Standard edition ● Essentials edition ● The editions that are listed are supported at version 5.1.0
VMware vSphere 4	● Standard edition (version 4.1 update 1) ● Advanced edition (version 4.1 update 1) ● Enterprise edition (version 4.1 update 1) ● Essentials Plus (version 4.1 update 1)
VMware vSphere 5	● Standard edition ● Essentials Plus edition ● Enterprise edition ● Enterprise Plus edition ● Editions listed are supported at version 5.0.0

For further prerequisites, see *IBM SmartCloud Entry Administrator Guide 2.4,* available at: https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en#/wiki/W21ed5ba0f4a9_46f4_9626_24cbbb86fbb9/page/Documentation

Supported platforms

This section lists the platforms and components that are supported by SmartCloud Entry.

Supported platforms

The IBM SmartCloud Entry server is supported on the following platforms:

- Intel x86-64 (Windows or Linux)
- IBM POWER6® or IBM POWER7® (IBM AIX®)

Supported components

Table 4 lists the supported components that are required by the IBM SmartCloud Entry server.

Table 4. Supported operating systems, databases, and user registries

Components	Versions	Notes
Supported operating systems		
Windows Server 2008	R2 (64-bit)	With latest fix pack
Red Hat	Version 6.1 (64-bit)	With latest fix pack
AIX	Version 6.1 (64-bit) TL5 or 7.1 (64-bit)	With latest fix pack
Supported databases		
Integrated Derby		
IBM DB2®	Version 9.7	With latest fix pack
Supported user registries		
IBM SmartCloud Entry		
LDAP Version 3	IBM Tivoli Directory Server Version 6.1	With latest fix pack
Active Directory	Version 6.1.7601.17514	With latest fix pack

Table 5 lists the minimum hardware requirements. These requirements indicate the absolute minimum hardware levels that are needed when running with only 5 - 10 concurrent users. Table 5 also lists the recommended minimum hardware production requirements to support a small cloud. As with any software solution, hardware needs to be correctly sized for your environment to meet your specific requirements.

Table 5. Minimum hardware requirements

Description	Minimum hardware requirements [1]	Recommended minimum hardware production requirements
IBM SmartCloud Entry server [2]	0.5 CPU 650 MB free disk space 1 GB physical memory	2 CPUs 25 GB free disk space 8 GB physical memory

1. For minimum system requirements, see the *IBM SmartCloud Entry 2.4 Administrators Guide*, available at: http://www.ibm.com/developerworks/mydeveloperworks/wikis/home/wiki/W21ed5ba0f4a9_46f4_9626_24cbbb86fbb9/page/Documentation?lang=en
2. Requirements are for the IBM SmartCloud Entry server only. If other servers, such as the Director server, are installed on the same system, the requirements should be higher to account for the additional needs of the other components that are installed and running there.

Ordering information

Ordering information is shown in Table 6.

Table 6. Ordering information for SmartCloud Entry by IBM server product

Program name/ order number	PID number: One year of maintenance	PID number: Three years of maintenance
SmartCloud Entry for Power		
5765-SKC	5660-SKC	5662-SKC
	5661-SKC	5663-SKC
		5664-SKC
SmartCloud Entry for Power bundle		
5765-SKP	5660-SKP	5662-SKP
	5661-SKP	5663-SKP
		5664-SKP
SmartCloud Entry for System x , V2.x		
	5641-SX1	5641-SX3
SmartCloud Entry for System x bundle , V2.x		
	5641-SK1	5641-SK3
SmartCloud Entry for Flex System		
5765-SCP	5660-SCP	5662-SCP
	5661-SCP	5663-SCP
		5664-SCP
SmartCloud Entry for Flex System bundle , V2.x		
	5641-SC1	5641-SC3

Additional information about required components (racks and power elements, compute and management cluster components, storage elements, and network elements) are included in *IBM Reference Configuration for VMware on System x with SmartCloud Entry,* REDP-4853, available at:
http://www.redbooks.ibm.com/redpapers/pdfs/redp4853.pdf

Related information

For more information, see the following documents:

- IBM Offering Information page (to search on announcement letters, sales manuals, or both):
  http://www.ibm.com/common/ssi/index.wss?request_locale=en

  On this page, enter `<solution name; remove angle brackets>`, select the information type, and then click **Search**. On the next page, narrow your search results by geography and language.

- *IBM SmartCloud Entry for Power Systems*
  http://www-03.ibm.com/systems/power/solutions/cloud/smartcloudentry/index.html

- *IBM SmartCloud Entry for System x*
  http://www-03.ibm.com/systems/x/solutions/cloud/starterkit/index.html

- *IBM Smart Storage Cloud*, REDP-4873
  http://www.redbooks.ibm.com/abstracts/redp4873.html

- *IBM SmartCloud Desktop Infrastructure: VMware View on IBM Flex System*, TIPS0920
  http://www.redbooks.ibm.com/abstracts/tips0920.html?Open

- *IBM SmartCloud Desktop Infrastructure: Citrix XenDesktop on IBM Flex System*, TIPS0928
  http://www.redbooks.ibm.com/abstracts/tips0928.html?Open

- *IBM SmartCloud Desktop Infrastructure: IBM Virtual Desktop for Smart Business on IBM Flex System*, TIPS0929
  http://www.redbooks.ibm.com/abstracts/tips0929.html?Open

- *IBM SmartCloud Entry 2.4 Administrators Guide*
  https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en#/wiki/W21ed5ba0f4a9_46f4_9626_24cbbb86fbb9/page/Documentation

- *IBM Reference Configuration for VMware on System x with SmartCloud Entry* , REDP-4853
  http://www.redbooks.ibm.com/redpapers/pdfs/redp4853.pdf

- *IBM SmartCloud Entry for Power V2.4* (sales manual)
  http://www-01.ibm.com/common/ssi/ShowDoc.wss?docURL=/common/ssi/rep_sm/c/897/ENUS5765-SKC/index.html&lang=en&request_locale=en

- *IBM SmartCloud Entry for Power bundle V2.4* (sales manual)
  http://www-01.ibm.com/common/ssi/ShowDoc.wss?docURL=/common/ssi/rep_sm/p/897/ENUS5765-SKP/index.html&lang=en&request_locale=en

- *IBM SmartCloud Entry for IBM Flex System V2.4* (sales manual)
  http://www-01.ibm.com/common/ssi/ShowDoc.wss?docURL=/common/ssi/rep_sm/p/897/ENUS5765-SCP/index.html&lang=en&request_locale=en

- *IBM SmartCloud Entry for Flex System With S&S V2.4* (sales manual)
  http://www-01.ibm.com/common/ssi/ShowDoc.wss?docURL=/common/ssi/rep_sm/1/897/ENUS5641-SC1/index.html&lang=en&request_locale=en

- *IBM SmartCloud Entry for System x and System x Bundle V2.4* (sales manual)
  http://www-01.ibm.com/common/ssi/ShowDoc.wss?docURL=/common/ssi/rep_sm/1/897/ENUS5641-SK1/index.html&lang=en&request_locale=en

- *IBM SmartCloud Patch Management V8.2* (sales manual)
  http://www-01.ibm.com/common/ssi/ShowDoc.wss?docURL=/common/ssi/rep_sm/6/897/ENUS5725-I16/index.html&lang=en&request_locale=en

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