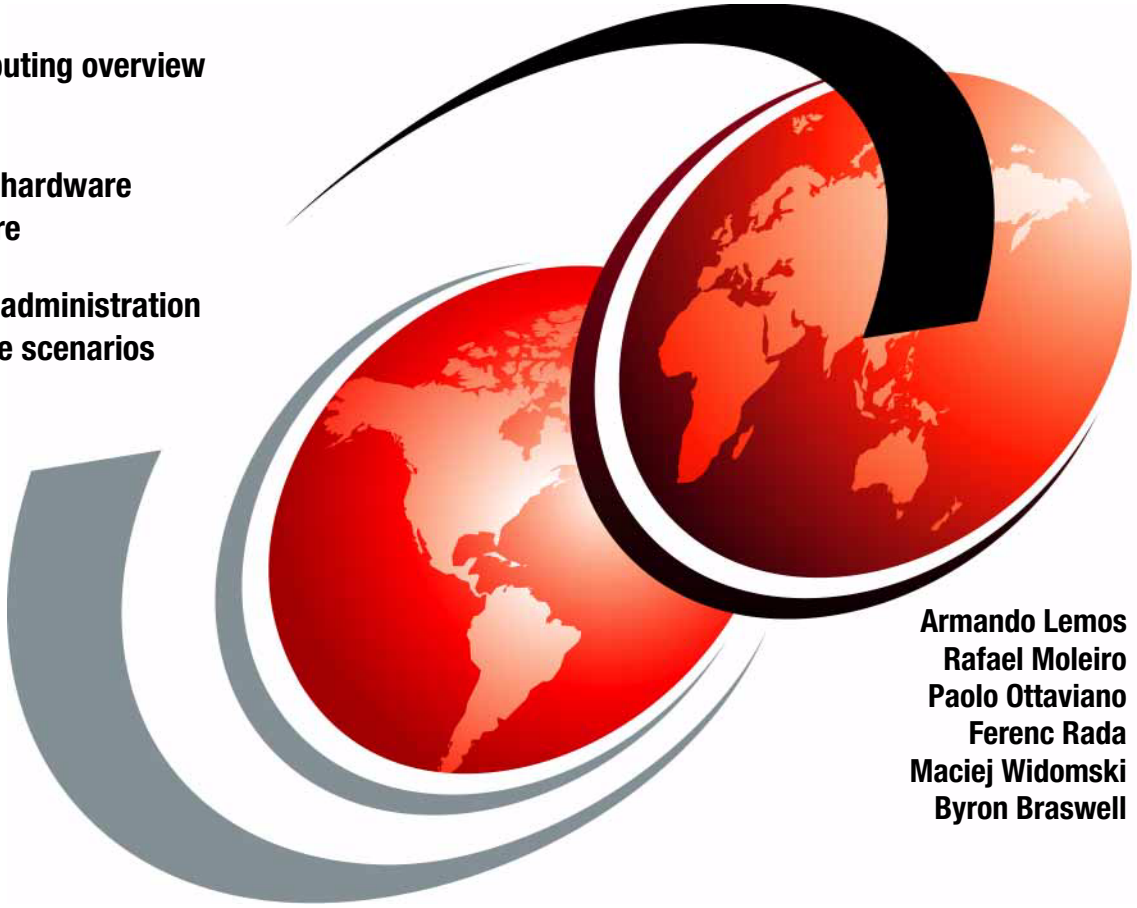
IBM CloudBurst on System x

- Cloud computing overview
- CloudBurst hardware and software
- CloudBurst administration and upgrade scenarios



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Preface

This IBM® Redbooks® publication gives an overview of Cloud solutions, followed by detailed information and usage scenarios for IBM CloudBurst® in a System x® environment. Cloud computing can be defined as a style of computing in which dynamically scalable resources, such as CPU, storage, or bandwidth, are provided as a service over the Internet. Cloud computing represents a massively scalable, self-service delivery model where processing, storage, networking, and applications can be accessed as services over the Internet. Enterprises can adopt cloud models to improve employee productivity, deploy new products and services faster and reduce operating costs—starting with workloads, such as development and test, virtual desktop, collaboration, and analytics. IBM provides a scalable variety of cloud solutions to meet these needs.

This IBM Redbooks publication helps you to tailor an IBM CloudBurst installation on System x to meet virtualized computing requirements in a private cloud environment. This book is intended for IT support personnel who are responsible for customizing IBM CloudBurst to meet business cloud computing objectives.

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Part 1

Cloud overview

In this part we introduce cloud concepts and planning considerations to implement Cloud computing in a customer environment.

1

Introduction to cloud computing

This chapter provides an overview of the cloud computing environment from the perspective of organizations that are considering the move to this technology.

First, we discuss the cloud environment as a technology:

- "What is cloud computing" on page 4
- "Deployment options for cloud" on page 14
- "Delivery models for cloud" on page 16
- "Cloud methodology process" on page 19

Second, we discuss the process of transforming from a traditional computing model to a cloud computing model, beginning on Page 19.

1.1 What is cloud computing

Cloud computing is a category of solutions in which a technology or service lets users access computing resources on demand, as needed, whether the resources are physical or virtual, dedicated or shared, and no matter how they are accessed (direct connection, LAN, WAN, or the internet). The cloud is often characterized by self-service interfaces that let customers acquire resources when needed, as long as needed. Cloud is also the concept behind an approach to building information technology (IT) services that takes advantage of the growing power of servers and virtualization technologies. To accomplish this, IT staff uses new tools to define and manage existing resources, create services, and charge for system consumption.

National Institute of Standards and Technology (NIST) definition for cloud computing:

"Cloud computing is a model for enabling 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."

Although the term "cloud" is a relatively new term in IT, it is not a new fundamental concept, in the sense that organizations have touched upon cloud technology by using virtualization, process automation, and by adopting a cloud-computing mind set. There are situations where cloud computing makes more sense than other technologies, especially when there is a standard or a pattern of requests. The benefits of cloud acceptance relate to both IT and business, which is why cloud computing is so powerful. Figure 1-1 on page 5 illustrates several of the core IT benefits that cloud computing delivers to an organization.

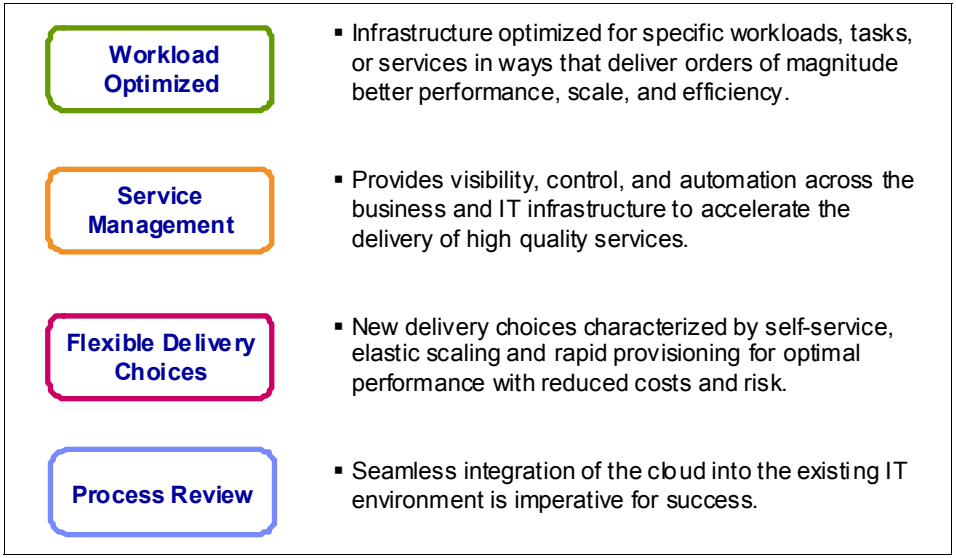


Figure 1-1 Core IT benefits of cloud technology

The importance of cloud computing rests not only in the potential of the cloud to save investment costs in infrastructure, but also to expedite development to save time in application deployment and to save resource allocation overhead.

As with all technologies, a few basic terms and definitions apply to cloud computing. Two key terms are resource and service definitions, which provide an idea of the scope and complexity of the cloud:

- The term *resource* encompasses hardware and software IT components, such as computing, storage, and communication capabilities, that a cloud can use. Resources might be physical (server, storage subsystem, or a network) or a portion of a bigger machine, usually in the form of a logical partition or virtual server. Other resources might provide a level of physical and logical allocation for data sharing. Regardless of the resource, the cloud defines each valid piece of hardware and software that is part of the cloud infrastructure. Although a cloud refers to an entity, it can span one or more instances of segregated or combined resources, depending exclusively on the strategy that the organization requires. The cloud software manages all of the links between hardware and software components and the dynamics of system allocation and release. Any process must pass a sequence of steps defined by some form of orchestrator that understands the differences in service requests and the underlying technologies to issue specific commands and transform resources into a defined service.
- A *service* is an agreement between users and providers for the delivery of an IT service. A simple example is a backup service, for which there is a Service

Level Agreement (SLA) that combines the service requirements with solutions to meet that specific need. There is usually a process involved to execute and report on the quality of the provided service, and this can relate to billing and to service improvement. A service can range from a simple virtual machine, a test environment, or a full-fledged system integration, facilitating multiple locations and with multiple system components running on a virtual and physical infrastructure. SLA metrics vary depending on the criticality of service, for example, a server might be considered working as designed if there is no downtime. Others might require that a server is up and performing at less than 90% processor and memory capacity to qualify as performing under normal conditions. Each user defines the metrics needed, but usually the combination of those metrics provides the value that represents the score of the service (good or bad). Cloud software can also evaluate the quality of running services and either promote or demote several of them to fit performance goals.

Organizations might consider a cloud as either a new project or a new investment. What is and is not part of the cloud is sometimes blurred when trying to scope its usage. Usually the analogy that the cloud suggests is something intangible, sometimes abstract and sometimes far from immediate needs. Other companies view a cloud as tangible with the actual pieces working together in the IT ecosystem and generating business value and even profit. Regardless of the maturity or needs, cloud computing is a technical solution for better service delivery.

Questions, such as “Is a cloud ready for use?”, “How many clouds are required?” or “What is the benefit of using a cloud, if my business is running without it?” reveal an opportunity to optimize IT. There are some characteristics that cloud computing explores, which are:

- *Self-servicing:* Self-servicing gives users the ability to request resources as needed, without having to consider capacity or system allocation details. This feature is the most tangible and appealing for end-users because they can request resources at any time, for any purpose, and only pay for the exact amount used. From an IT perspective, self-servicing requirements must be properly configured and set up. This includes using one or more provisioning tools to allocate and manage discrete resources, such as processor, memory, disk space, and network connections, and defining pools of resources to users. The self-servicing portal is one way to present a catalog from which users can select the needed options. Another way is to integrate with internal workflow systems to orchestrate the necessary system allocation steps as a batch operation.
- *Elasticity to grow system resources quickly and transparently for customers:* Capacity on demand is usually a similar concept for providing system capabilities in flight for the application so that new user requests can always

be fulfilled. Figure 1-2 shows an example of a number of machines giving some level of processing power to a variety of applications. In a traditional model, resource allocation is fixed and cannot shift to other workloads. As for the cloud, however, due to its virtualization strategy, resources can be better utilized and even migrated to new services either automatically or on a pre-scheduled basis.

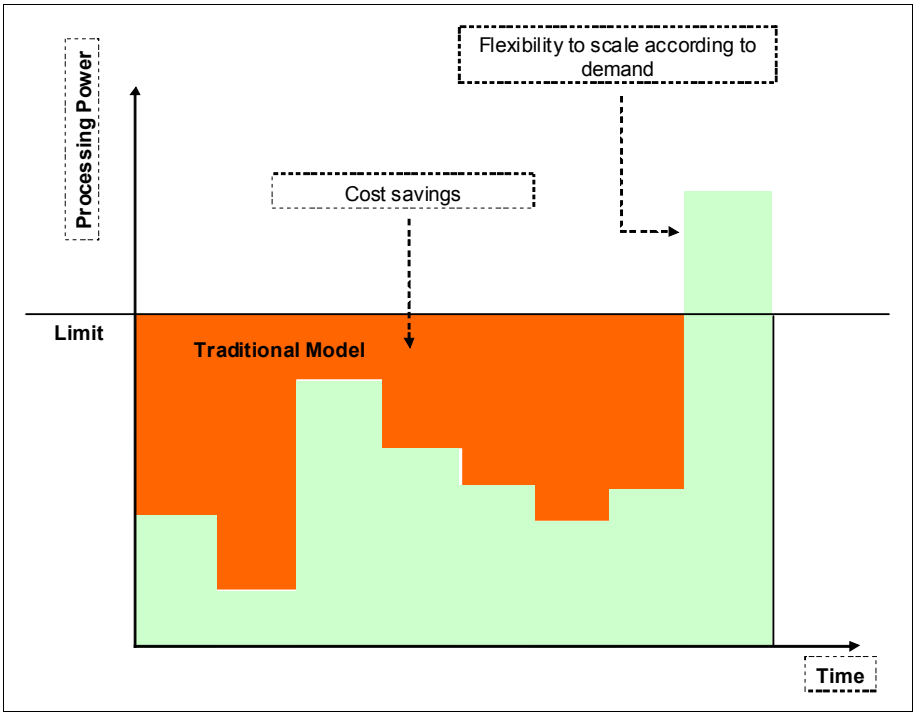


Figure 1-2 A cloud provides elasticity due to virtualization strategies

- *Abstraction to access systems using a web browser, regardless of location or the device they are using:* From a programming standpoint, this feature is more tangible as part of the Internet, using HTTP/HTTPS or other protocols, such as Representational State Transfer (REST). From a hardware standpoint, it is the ability to use several hardware systems for the same application layer (a web server, for example).
- *Integration with application programming interfaces (APIs) and other software components:* This refers to integration with APIs and other software components that enable machines to interact with cloud software in the same way the user does and also allowing fine-tuned allocation for complex systems and different platforms. As an example, a provisioning system might integrate with internal access management software and also define assets for inventory control.

- *Multi-tenancy:* Multi-tenancy enables sharing of resources and costs across a large pool of users, thus allowing better optimization of system resources that are not fully allocated and absorbing peak-capacity in one system and balancing with other less-demanding systems. This process also allows for better overall utilization and cost reduction given that multiple systems can share common hardware and avoid multiple servers with low activity.
- *Improved availability:* Availability is improved when multiple redundant sites are used because this makes well designed cloud computing suitable for business continuity and disaster recovery. This is accomplished by using virtualization, automation, and data protection.
- *Centralized management of system resources and better controls:* Centralized management of system resources and better controls assists in allocating and distributing user requests over multiple servers with differing service level agreements and cost criteria. This is both a system management and service management approach, which is an improvement over past IT models. The concept is to define responsibilities for a cloud manager to evaluate and propose the best configurations and system resources and to evaluate the service level needs and system performance for continuous operations.
- *Charge back:* This idea is to measure the service quality (SLA), all available and allocated resources and charge for such system allocation. Certain companies might not charge actual dollars, but they might define an alternate process called *show back* to demonstrate how much system resources are being consumed by any given department. Depending on the case, it might be sufficient to present this simulation. Other companies actually charge so that users are more aware that cloud computing does require management and does have its own costs.

NIST essential characteristics for cloud computing:

“On-demand self-service. A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service's provider.

Broad network access. Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (mobile phones, computers, and PDAs).

Resource pooling. The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but might be able to specify location at a higher level of abstraction (country, state, or datacenter). Examples of resources include storage, processing, memory, network bandwidth, and virtual machines.

Rapid elasticity. Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.

Measured Service. Cloud systems automatically control and optimize resource use by leveraging a metering capability1 at some level of abstraction appropriate to the type of service (storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.”

Looking at mainframe-oriented organizations, it is clear that computing was centralized and consolidated with a variety of service requirements sharing and competing for processor and memory allocations to provide timely output to meet service levels. As part of the technology realm, users access protected areas of the mainframe environment to perform tasks, such as querying databases, adding new customer information and generating lists of goods and managing system activities, such as providing more capacity to new users, upgrading system components, and even charging for some (if not all) resource usage as billed time of the system. All of these examples relate to a secure, complex, and robust infrastructure that can span more than a single machine, perhaps dozens of system components, and still provide performance and system elasticity to accommodate a variety of workloads.

Another non-IT use case worth mentioning is the power grid that connects multiple houses, companies, and public areas in every location of the globe. Unless if you work at the power company or manage a datacenter, you might not need to think about how electricity reaches the kitchen or the living room, how many power lines are available from South Dakota or far away in Brazil, or even if they connect to each other. All that matters is that consumers have electricity, as much as needed, during any season of the year. You might not like the bill, but you use it because it is the standard way of turning on the coffee machine at 6:00 am. All of these common daily processes share the same abstraction, elasticity, and pervasiveness of a cloud infrastructure that IT uses to create, manage, and deliver computer resource to customers.

The mainframe use case and the power grid are just two examples of a class of infrastructure service that IT now has the opportunity to organize and deliver as a new deployment model. This is the power of the cloud and much of the cloudburst strength to manage and provide scalability to growing needs. Figure 1-3 illustrates some of the paradigm shift in terms of standard, segregated workload, and a new shared, virtualized infrastructure as part of the foundation for building new cloud services.

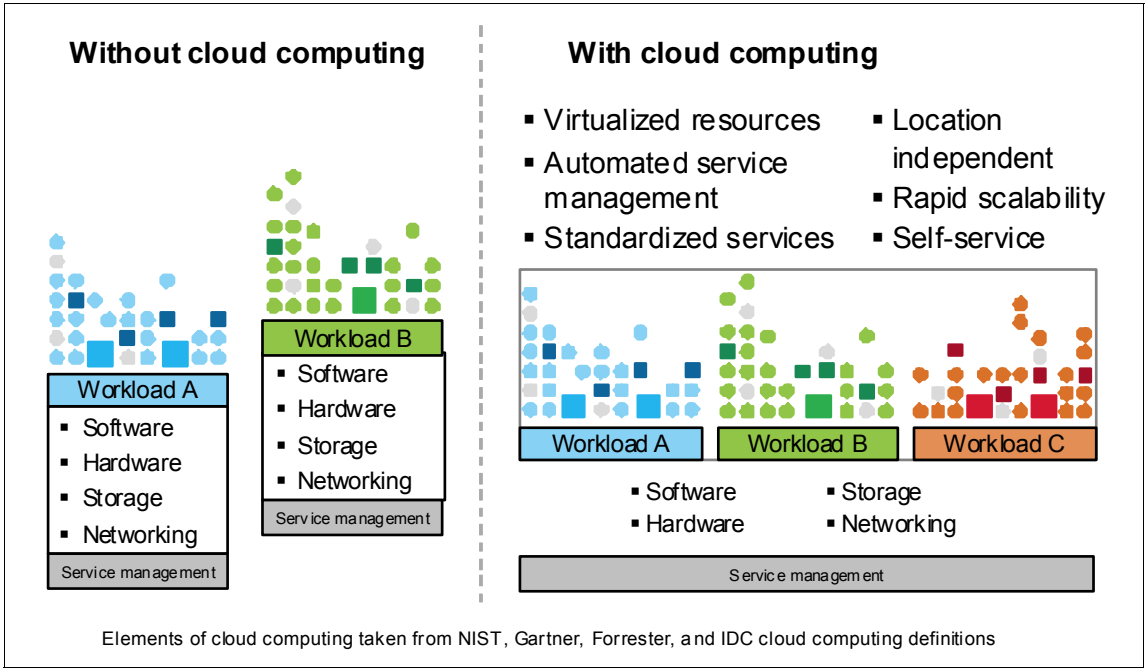


Figure 1-3 Computer models and the cloud

The structure of the cloud is evolving and new ways of leveraging its concepts are also growing. Nevertheless, some fundamental content and structure still

applies, so that the world's behavior can be explained in cloud terms. Although the cloud is changing, some of the principles that are valid include a classic combination of layers that relate to technology, process, and people:

- *The technology layer:* The technology layer is much of the tangible aspects, such as the hardware resources that a cloud might have (yes, the cloud is physical in the technology sense of the word). There is no need for brand-new or 100% hardware similarity for cloud computing. New hardware is usually desirable, and organizations can certainly benefit from it, but you can always combine and optimize your environment for a variety of workload needs to exploit the full potential of previous investments. The technology realm also encompasses the software components that provide the actual intelligence for the cloud, which includes virtualization engines, orchestration, and capacity management products, working together and paying attention to system optimization and better delivery opportunities. The infrastructure is key to creating a robust cloud. Sometimes organizations tend to simplify the infrastructure step by simply using existing resources without properly understanding the scope and the potential scalability time frame. Sooner or later cloud users start to realize that there is a finite limit to this expansion. This might not be the case for all organizations, but careful attention to planning is a good practice, and walk-through exercises with clients' internal and external users about the services and the flexibility they need is a good start to capture relevant requirements for cloud success.
- *The process layer:* The process layer deals with the usage complexity of the technology and presents it in a friendly way to service requestors. This is usually referred as portals and system catalogs that users can order and pick new services as needed. Some catalogs show static and small components or large and big deployment patterns. This strategy also requires careful thinking about the number of users that the cloud can support and the different service levels that IT can offer. There is usually a resource orchestrator that plays an important role during execution of resource allocation and management through the lifecycle of a given resource. Sometimes there is workflow software that implements a sequence of management approvals before the system starts any resource allocations. (This makes sense for organizations that charge for the whole process, and customers must agree on service ratings or SLAs beforehand.) Regardless of the number of management and orchestration complexities, cloud computing forces organizations to think about service processes and not simply IT tasks. This is one of the critical success factors for cloud computing. Without the clear understanding that a service is made up of multiple resources that span multiple IT departments, there is a risk for cloud deployment.
- *The people layer:* The people layer is the link between technology and processes. As with any complex project, there is a sequence of inception, planning, execution, and completion that requires planning and other

considerations. The role of the cloud system administrator is part of this sequence, in which the administrator understands and manipulates business and technical requirements in an orderly and prompt fashion. Some companies prefer to segregate the cloud staff as an independent service group, combining process-oriented human capital and technicians to manage and monitor cloud services. Although there is no *one size fits all* solution, some level of staff segregation for virtualization and service management makes a lot of sense in practical terms.

A cloud environment requires that administrators and service staff provide the necessary levels of availability and flexibility to end users. Nevertheless, the new deployment model poses new challenges in terms of organizational reporting, system administration, and staffing. In the past, organizations segregated key disciplines, such as operating system, database, networking, and storage, as independent teams, focusing on each separate process. The cloud is a major change in that perspective and thus, it affects the way people think about services as the *big picture*. Cloud computing proposes that users consume resources and do not have to consider whether there is a hardware limit or software restriction. The idea is to use the available resources. Therefore, what is important is not the process or the network, but, rather, the service.

There are lots of workload candidates that can run in a cloud, but that does not mean everything can run in a cloud. Figure 1-4 illustrates these types of workloads and how they fit into the classification of cloud computing.

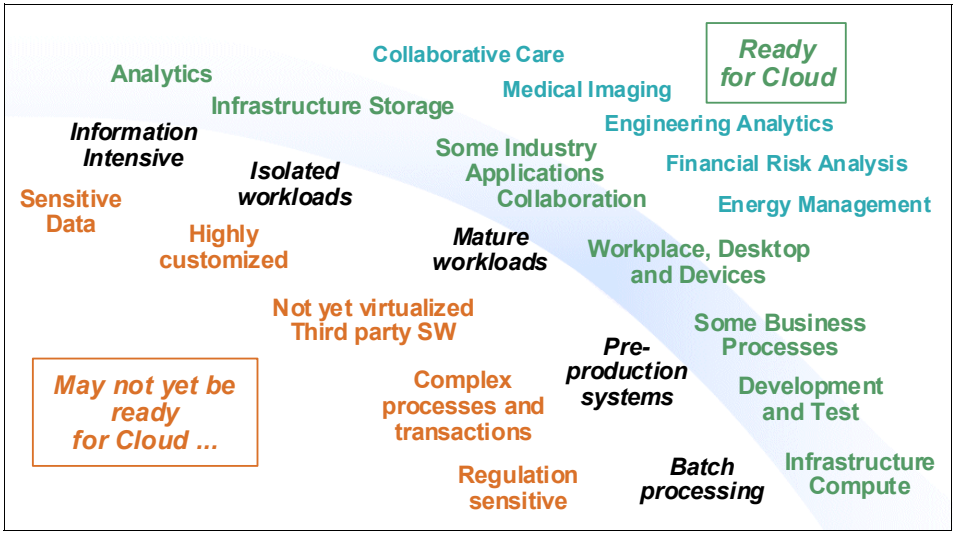


Figure 1-4 Workloads and cloud eligibility

A cloud environment is suggested for applications that involve IT management, business, or productivity, development and deployment, capacity (server or storage), and collaboration. There are many reasons why more and more companies are shifting toward IT solutions that include cloud computing:

- First, cloud computing can cut costs associated with delivering IT services. You can reduce both capital and operating costs by obtaining resources only when you need them and by paying only for what you use.
- Second, by offloading some of the burden associated with managing various resources across the enterprise, your key personnel can focus more on producing value and innovation for the business.
- Third, cloud computing models provide for business agility. Given that the entire IT infrastructure can scale up or down to meet demand, businesses can more easily meet the needs of rapidly changing markets to ensure they are always on the leading edge for their consumers.

Moving forward in the use of the cloud, there are new features to make life easier for end users. The term *portal* usually refers to a central web interface from which authorized users (if not public) can request new services. The service request is what usually determines which user community to expose the cloud to. Even though there is a lot of work behind the scenes, the portals and integration features for servicing is a hot topic for development and cloud acceptance.

Cloud computing is about efficiency to a higher and broader level that organizations had not considered viable because to its natural complexity. To give an example, consider the regular process of installing a server, which involves procurement, physical installation, networking cabling, operating system installation, networking configuration, storage configuration, infrastructure configuration, core packages, and application installation. Taking out the procurement component, the average set up time is hours or even days, depending on the number of packages, operating system interoperability with other products, application set up, and so on. This *provisioning* exercise suggests that some steps are unnecessarily long and that automation and simplification is key to better service response. Therefore, provisioning is one of the foundational principles for proper, efficient cloud delivery, such that groups of users can request IT services.

Information security plays an important and vital role in cloud computing. Traditional compute resources usually rely on physical network segregation (a separate switch from others, for example), in the form of a logical network (a virtual local area network (VLAN) in the same switch). Several additional variations, such as virtual IO system (VIOS), offer another layer of abstraction, which also opens the discussion about true resource segregation and information security exposure. A list of security requirements usually

incorporates proper access control enforcement, integrity, privacy, confidentiality, and availability, all of which govern users and system administrators.

1.2 Deployment options for cloud

Figure 1-5 shows the spectrum of classic cloud deployments that a company might implement.

For simplicity, an organization might start with a private cloud and evolve to a hybrid cloud. Depending on the business model, an organization might create a public cloud infrastructure that will serve other companies.

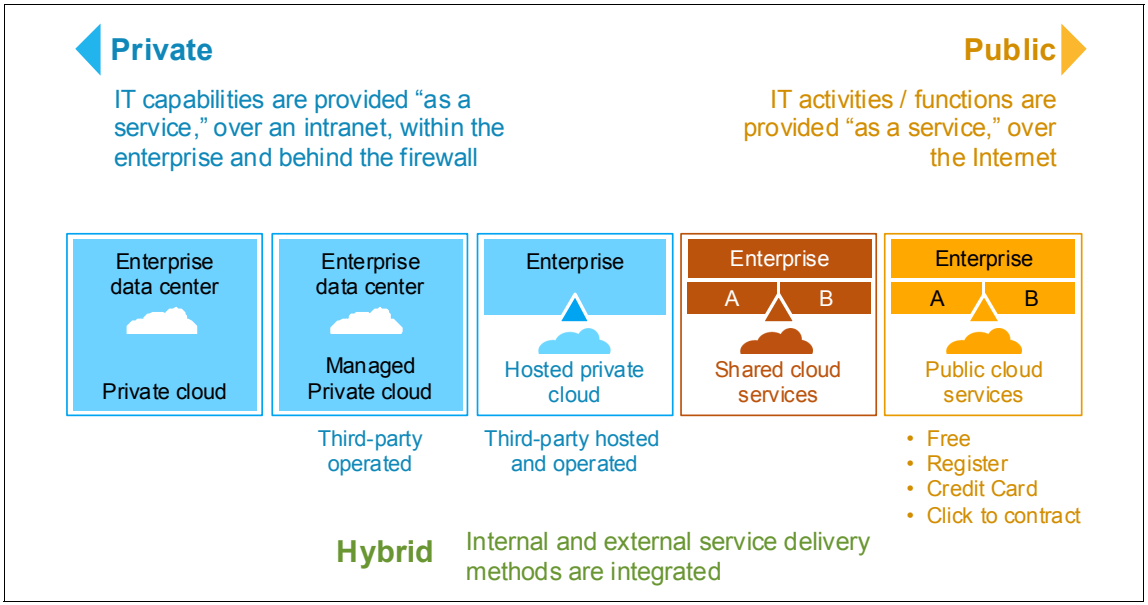


Figure 1-5 Cloud deployment models

Public clouds are cloud services provided by a third-party vendor. They exist beyond the company firewall, and they are fully hosted and managed by the cloud provider. Public clouds attempt to provide consumers with hassle-free IT elements. Whether it is software, application infrastructure, or physical infrastructure, the cloud provider takes on the responsibilities of installation, management, provisioning, and maintenance. Customers are only charged for the resources they use, so under-utilization is eliminated.

These services are usually delivered with the idea of accommodating the most common use cases. Configuration options are usually a smaller subset of what they can be if the resource were controlled directly by the consumer.

Private clouds are cloud services provided within an enterprise. These clouds exist within the company firewall, and they are managed by the enterprise. Private clouds offer many of the same benefits that public clouds do, with one major difference: the enterprise is in charge of setting up and maintaining the cloud. The difficulty and cost of establishing an internal cloud can sometimes be prohibitive, and the cost of continual operation of the cloud might exceed the cost of using a public cloud.

Private clouds do offer advantages over the public variety. Finer-grained control over the various resources making up the cloud gives a company all available configuration options. In addition, private clouds are ideal when the type of work being done is not practical for a public cloud because of security and regulatory concerns.

Hybrid clouds are a combination of public and private clouds. These clouds are typically created by the enterprise, and management responsibilities can be split between the enterprise and public cloud provider. The hybrid cloud leverages services that are in both the public and private space.

Hybrid clouds are the answer when a company needs to employ the services of both a public and private cloud. In this sense, a company can outline the goals and needs of services, and obtain them from the public or private cloud, as appropriate. A well-constructed hybrid cloud can service secure, mission-critical processes, such as receiving customer payments, as well as those that are secondary to the business, such as employee payroll processing. The major drawback to this cloud is the difficulty in effectively creating and governing such a solution. Services from a variety of sources must be obtained and provisioned as though they originated from a single location, and interactions between private and public components can make the implementation even more complicated.

NIST Deployment Models for cloud computing:

“Private cloud. The cloud infrastructure is operated solely for an organization. It can be managed by the organization or a third party and might exist on premise or off premise.

Community cloud. The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (for example, mission, security requirements, policy, and compliance considerations). It can be managed by the organizations or a third party and might exist on premise or off premise.

Public clouds. The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.

Hybrid clouds. The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (for example, cloud bursting for load balancing between clouds).”

1.3 Delivery models for cloud

In general, a public (external) cloud is an environment that exists outside of a company's firewall. It can be a service offered by a third-party vendor. It can also be referred to as a shared or multi-tenanted, virtualized infrastructure, managed by means of a self-service portal.

A private (internal) cloud reproduces the delivery models of a public cloud and does so behind a firewall for the exclusive benefit of an organization and its customers. The self-service management interface is still in place, and the IT infrastructure resources being collected are internal.

In a hybrid cloud environment, external services are leveraged to extend or supplement an internal cloud.

The delivery models that make up a cloud include:

- *Software as a service (SaaS):* This layer is perhaps most familiar to web users. The application services layer hosts applications that fit the SaaS model. These are applications that run in a cloud and are provided on demand as services to users. Sometimes the services are provided at no charge, and

providers generate revenue from, for example, web ads, and sometimes the application providers generate revenue directly from the use of the service.

Perhaps not quite as apparent to the public is that there are many applications in the application services layer that are directed to the enterprise community. There are hosted software offerings that handle payroll processing, human resource management, collaboration, customer relationship management, IBM Business Partner relationship management, and more.

Applications delivered using the SaaS model benefit consumers by relieving them from installing and maintaining the software, and the applications can be used through licensing models that support pay-for-use concepts.

- *Platform as a service (PaaS):* This is the layer in which we see application infrastructure emerge as a set of services. This includes, but is not limited to, middleware as a service, messaging as a service, integration as a service, information as a service, connectivity as a service, and so on. The services here are intended to support applications. These applications might be running in the cloud or in a more traditional enterprise data center. To achieve the scalability required within a cloud, the variety of services offered here are often virtualized, for example, by application server virtual images. Platform services enable consumers to ensure that their applications are equipped to meet users' needs by providing application infrastructure based on demand.
- *Infrastructure as a service (IaaS):* The bottom layer of the cloud is the infrastructure services layer. Here, we see a set of physical assets, such as servers, network devices, and storage disks that are offered as provisioned services to consumers. The services here support application infrastructure, regardless of whether that infrastructure is being provided using the cloud, and many more consumers. As with platform services, virtualization is a frequently used method for providing the on-demand rationing of the resources.

  Infrastructure services address the problem of properly equipping data centers by assuring computing power when needed. In addition, due to the fact that virtualization techniques are commonly employed in this layer, cost savings, brought about by more efficient resource utilization, can be realized.

Figure 1-6 shows an example of delivery models over time.

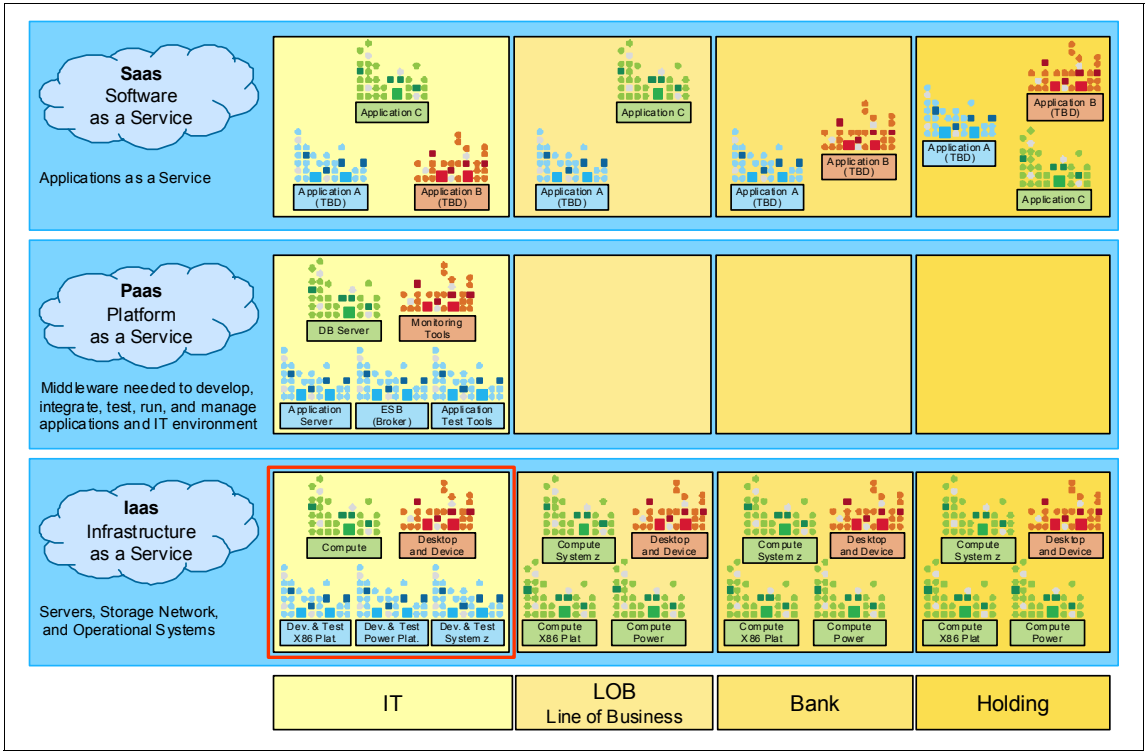


Figure 1-6 Cloud deployment evolution

Each column in Figure 1-6 shows some of the roll-out complexities that can evolve as an organization and IT feel confident with this new model. It is important to realize that some organizations might implement vertical IT approaches (focusing on IT space starting in the bottom, left square in red) and others might span to Line of Businesses (LOB) and the whole organization (for example a Branch Bank and its holding companies) as potential cloud consumers. There is no single way of evolving a cloud, so a process for maintaining the focus on significant steps and on maintaining the value of the cloud is helpful.

NIST Service Models for cloud computing:

“Cloud Software as a Service (SaaS). The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (for example, web-based email). The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.

Cloud Platform as a Service (PaaS). The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations.

Cloud Infrastructure as a Service (IaaS). The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, deployed applications, and possibly limited control of select networking components (for example, host firewalls).”

1.4 Cloud methodology process

Because of the vast complexity within organizations, a process for understanding the core requirements and expediting cloud delivery plays an important role. The CloudBurst technology and processes, combined, make a perfect match for any organization that wishes to invest the right amount of effort in a cloud infrastructure.

A clear plan is necessary for any major project. Cloud computing is no different. Organizations are wise to declare the scope and depth of the cloud initiative early on in the planning phase, so that the expectations are properly outlined. It is also important to identify a process that can drive the project from start to finish. Figure 1-7 on page 20 illustrates a process that can assist in the cloud journey for an organization of any size.

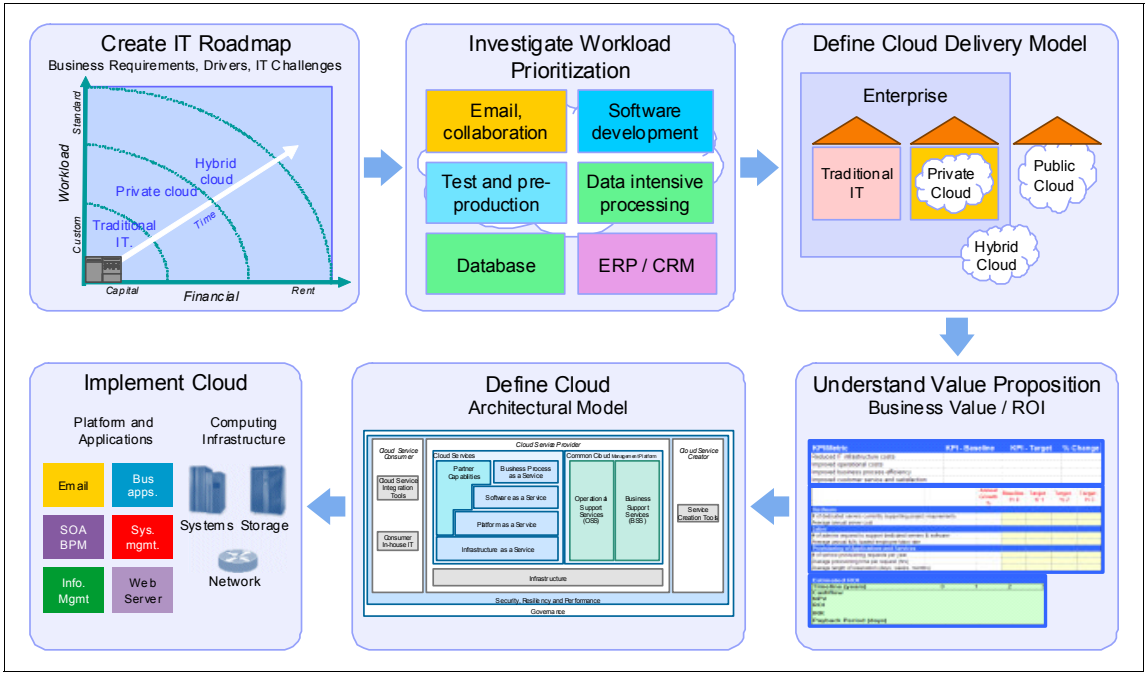


Figure 1-7 Cloud process

A CloudBurst project uses all of the steps depicted in Figure 1-7. They cover the business and workload characterizations necessary for cloud computing. The core components of this process are:

- “Create an IT roadmap” on page 20
- “Define and prioritize the workload” on page 21
- “Define your delivery models” on page 27
- “Understand the business value” on page 28
- “Define your cloud architecture and scope” on page 29
- “Implement the cloud” on page 34

1.4.1 Create an IT roadmap

The purpose of the roadmap is to provide steps and therefore the confidence in setting up a cloud project. It is extremely important to handle a project of this type as a new project, in the sense that it requires stakeholders, project management, and technical execution, followed by strict timing and project deliverables. Given that a cloud project is also a change in architecture, it also implies requirements gathering and prioritization, so that efforts are properly managed and results are clearly understood. Figure 1-8 on page 21 illustrates several of these areas to consider, such as business challenges and IT demands that must be tabulated

according to multiple workloads, while still combining key IT strategies such as virtualization, consolidation, and automation to implement a successful cloud infrastructure. The business challenges create a sequence of simpler to more complex needs, and the IT demands might expand into multiple requirements, forming a large project scope, encompassing principles and decisions in terms of the cloud deployment model and complexity.

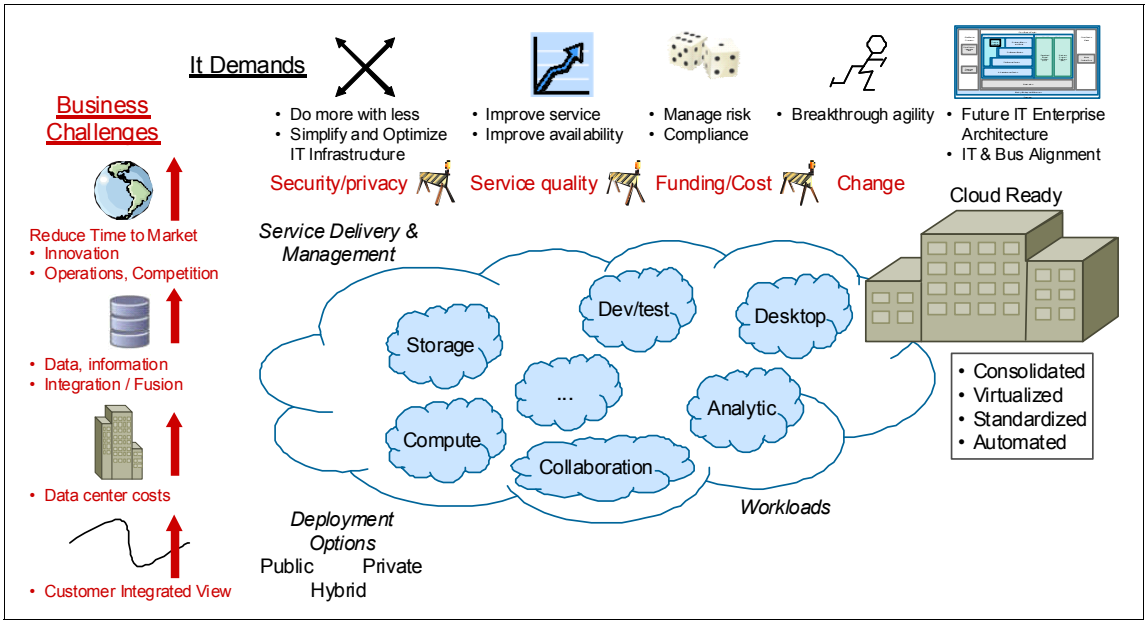


Figure 1-8 Understanding business requirements

What can define a cloud project as more complex is not only the technical challenges and roadmap, but the change in mindset of the persons working with cloud computing. For example, a new process for self-servicing cloud machines might need organizational development, the creation of new roles for proper infrastructure management, or existing departments to cooperate with each other to structure a cloud service offering. This can suggest that new roles and functions might need new processes. Communication is also important to avoid failures and unnecessary delays. As mentioned briefly in 1.1, “What is cloud computing” on page 4, cloud computing is a shift in organizational maturity and in the way we think about architecture.

1.4.2 Define and prioritize the workload

One of the building blocks for cloud computing is understanding the workload (the consumers and the resources) that the infrastructure might need. There are

a couple of workload types that an organization can use to qualify its maturity and consider for cloud usage and new areas to include in the roadmap, in the event that they require new investments. Figure 1-9 shows a sample chart for evaluating one generic workload. For example the recommended categories for cloud computing usually fall into one or a combination of the following general workloads: analytics, collaboration, desktop device, development or test, or computing and storage.

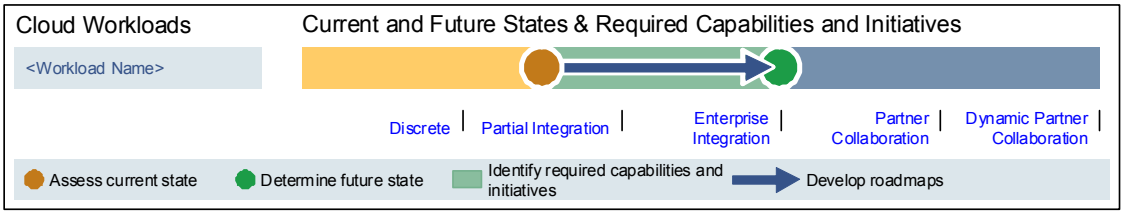


Figure 1-9 Sample workload assessment

As we can see in Figure 1-9, the key parameters involved are the current maturity level, the future state for cloud readiness, and the gap between the current and future scenarios. As a best practice, cloud computing is usually a good fit for enterprises with a level of integration and standardization, given that the service is a combination of multiple IT disciplines. The idea is to perform an internal assessment for each one of the workloads, so that the organization has a map of the strengths and weaknesses for cloud acceptance, deployment, and prioritization. All assessments lower than “enterprise integration” must produce an action plan to promote better processes and tools for cloud deployment.

As an example, consider the development and test workload. You might find that there is good maturity in this area in terms of process automation but that it lacks a standard tool (for example, there can be more than one way of doing development work). Assuming that this maturity level is classified as *partial integration*, the organization must define action plans to increase it to *enterprise integration* (one process, one tool, one standard), so that cloud computing is more effective as part of this workload.

Table 1-1 on page 23 illustrates the many aspects of each workload and the qualifications for use in evaluating its scope and proper individual assessment.

Table 1-1 Workload classification

	Workload definition	**Triggers prompting consideration of cloud delivery**	**Benefits of storage capacity through cloud delivery**
Analytics	Analysis of massive data sets in near real-time or batch mode. Synthesizing and generating new information and intelligence about the business. Iterative exploration and investigation of past business performance to gain insight and drive business planning.	New analytical application initiatives. Mergers and acquisitions. Not happy with the price or performance of the current business intelligence (BI) solution. Entire BI stack is being evaluated or standardized.	Drastically reduces the number of departmental solutions to a single BI environment, capable of supporting many users across business lines. Introduces a single point-of-control for meeting departmental business processes. Corporate security and compliance standards for easier enforcement of standardization. More effectively uses skilled BI resources to support a common BI delivery tool, which can then be made available across the enterprise. Reduces capital and operating expenses needed to support enterprise-wide BI services.
Collaboration	A set of online collaboration tools provided to organizations, often through the web. The tools include, but are not limited to: email, collaboration, web conferences, presence and instant messaging, file sharing, and enterprise social networking.	Complexities and the high cost of enforcing compliance within a standard desktop environment. Mobile or geographically distributed workforce. Extending refresh cycle.	Improve end-user productivity. Reduce end-user support complexity and costs. New green energy savings. Little to no capital or one-time expense. Highly secure hosting model. Fast provisioning.

	Workload definition	Triggers prompting consideration of cloud delivery	Benefits of storage capacity through cloud delivery
Desktop devices	The system and application software that runs on a desktop or mobile computer, or pervasive devices, such as mobile phones, organizers, and so on. Typical examples are: word processors, spreadsheets, media players, database applications, industry- or organization-specific applications designed to be executed from the desktop or mobile computer (thick client applications).	The complexities and high cost of enforcing compliance with a standard desktop environment. Mobile or geographically distributed workforce. Extending refresh cycle.	Improve end-user productivity. Reduce end-user support complexity and costs. New green energy savings. Little to no capital or one-time expense. Highly secure hosting model. Fast provisioning.
Development and test	Project environments that are used for all phases of the Software Development Life Cycle (SDLC), except production. Development environments are used to conduct activities to design and build applications. Test environments are used for various testing levels, including system integration, security, high availability, and user acceptance. Development and test environments generally occupy 30-80% of the entire data center infrastructure. They are volatile and subject to frequent changes; hence they require a high level of service management.	Poor utilization of existing assets and an increase in hardware expense and software license costs. High cost of labor for configuration, operations, management, and monitoring. Long testing cycles make it difficult to be competitive in tough economic times. Configuration errors lower overall solution quality. Increasing testing complexity.	Reduce IT labor cost by 50%. Reduce labor for configuration, operations, management, and monitoring of the environment by more than 75%. Capital utilization improvement and significant license cost reduction. Reduce provisioning cycle time from weeks to minutes. Reduce risk and improve quality. Eliminate more than 30% of defects that come from faulty configurations.

	Workload definition	Triggers prompting consideration of cloud delivery	Benefits of storage capacity through cloud delivery
Compute	A business computing model that allows companies to obtain access to computing resources as they become necessary. Provides packaging of computing resources, such as computation and storage, as a metered service similar to a traditional public utility (such as electricity, water, natural gas, or telephone network).	Required variable and dedicated server capacity for a limited period of time.	Resources provisioned in minutes versus days. Dynamic response to resource demand with elastic scalability. Consumption-based use charges.
Storage	A business computing model that allows companies to obtain access to storage resources as they become necessary. High performance and highly available consolidated storage for demanding or critical applications.	Rapid growth in storage requirements. Unreliable backups from manual operations. Large amounts of the data are located at remote sites, highly redundant, and largely unprotected. Inadequate or out-of-date business computing or disaster recovery plans and solutions. Regulations driving new data protection strategies.	Support for open standards in use in data centers today. High degree of scalability: petabytes of data and billions of files. Global namespace to eliminate data islands. Bullet-proof security that integrates into existing authentication systems. Built-in data placement and Information Lifecycle Management (ILM) using a global policy engine. Support for multiple tiers of storage, including low-cost tape technology. High performance and availability.

Another view that can present workload characterization is illustrated in Figure 1-10 on page 26 and Figure 1-11 on page 26 as *motivators* and *barriers* for cloud deployment. The *motivators* represent the positive perception of the stakeholders in terms of each candidate workload for cloud computing. The numbers are the sum of the votes (assuming multiple stakeholders) or the weight defined for each relevant item. The idea is to outline the project complexity for multiple workloads, and also to plan the areas that are potentially more challenging and termed *barriers*.

Motivators	Cloud Workload Category						
	Analytics	Collaboration	Development and test	Desktop and devices	Infrastructure compute	Infrastructure storage	Total points
Decrease Capex	1			1	1	1	4
Decrease Opex			1				1
Decrease TCO		1					1
Disaster Recovery					1	1	2
Faster deployment	1	2	2	1	1	1	8
Improve availability	3	2		1	1	1	8
Improve security				2			2
Improve IT resource utilization			1		1	1	3
Increase flexibility	2	2	2		1	1	8
Simplify management			1	2	1	1	5

Figure 1-10 Cloud motivators

Barriers	Cloud Workload Category						
	Analytics	Collaboration	Development and test	Desktop and devices	Infrastructure compute	Infrastructure storage	Total points
Cost prohibitive							
Cultural impact	2		7	1	2		12
Difficult to integrate	2				2	2	6
Doubt ROI	2			3			0
Immature technology	1	4		3	2	2	12
Inability to meet SLAs							0
Lack of skills		3			1	1	5
Less availability							0
Security							0
Vendor lock-in						2	2

Figure 1-11 Cloud barriers

This consolidated table gives the cloud project manager the ability to identify key areas in the project that require preparation. For example, the motivators show that *cultural impact* and *immature technology* are two high risks with a total of 12 points in this cloud assessment and, therefore, they are to be carefully anticipated as part of the communication effort in the project. As for the motivators, this example suggests that the business is willing to improve multiple service areas with flexibility and availability, mapped as ratings or 2 or higher in this matrix.

1.4.3 Define your delivery models

The next step in the process is to correlate and plot cloud deployment models with multiple workload types. Each intersection can be represented by three values:

- *To be defined:* This classification is for areas that do not immediately relate to phased cloud deployment. This does not mean that there will be no cloud evolution, but, rather, that there are higher priority and business needs requiring more focus at the moment.
- *Medium priority:* This classification is for areas that are important, but are of lower priority for cloud deployment. They are considered in the plan, and occasionally they relate to existing high priority items as dependencies.
- *High priority:* This classification defines the most critical and relevant areas for cloud computing as per the assessment. Any high-rated cloud workload must clearly define its scope, stakeholders, and product deliverables.

Figure 1-12 on page 28 is an example of an organization that selected a private cloud strategy and the overall priorities for a phase 1 project, by identifying the priority areas for each workload type. Here, the development and test workload is rated higher because of its relative simplicity and deliverable time frame. Some organizations might use one or more deployment models and one of more workload priorities together as part of their project plan.

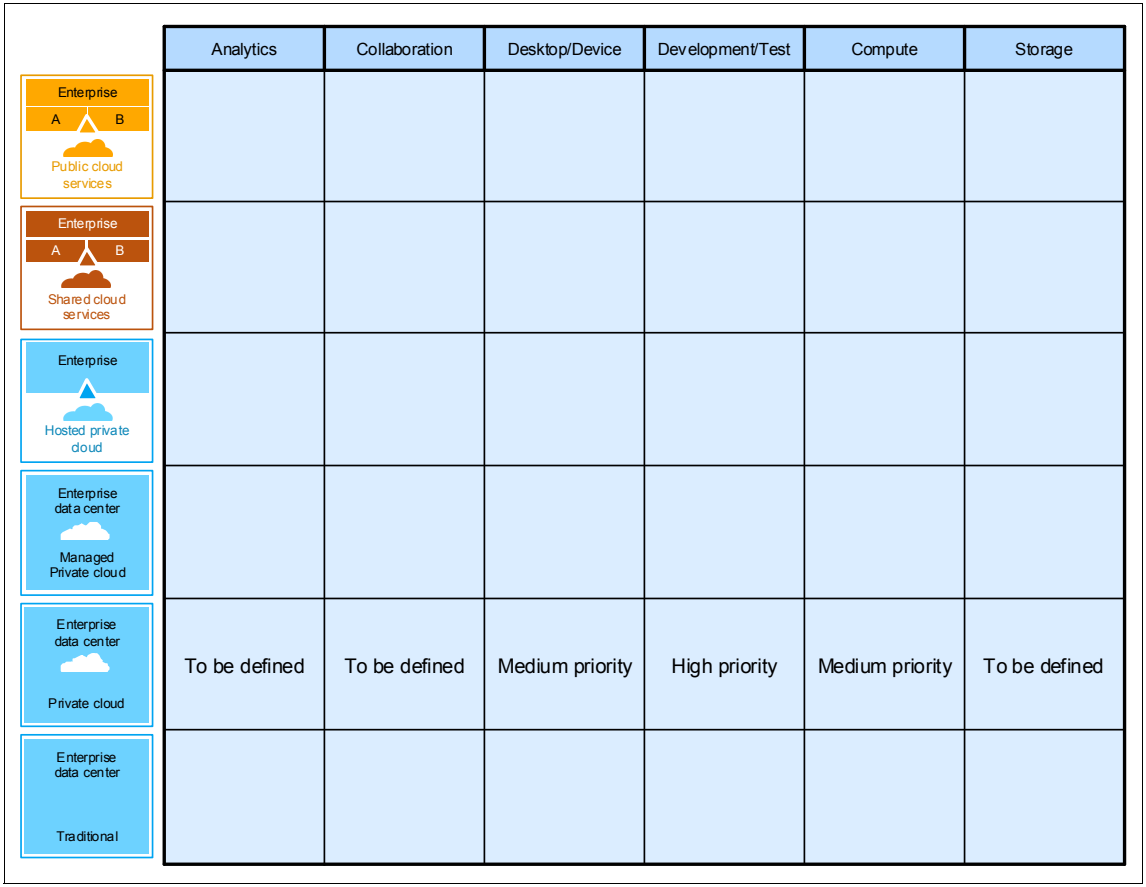


Figure 1-12 Mapping and planning workload

1.4.4 Understand the business value

One of the justifications for setting up a cloud environment is cost reduction. The project must demonstrate its value to the organization in terms of efficiency, performance, quality, and also to total cost. Each company has its processes and resources that can be mapped in terms of cost units for the first and recurring years (usually three to five). This allows the executive board to develop confidence in their investment and to anticipate the expected results. Figure 1-13 on page 29 is a representative cost model and return on investment (ROI) analysis for a project that combines CAPEX and OPEX values. The ROI, over time, is predicted both with and without cloud implementation. It is out of the scope of this book to demonstrate the ROI method or a complementary business plan. Those exercises can be done using each organization's best practices.

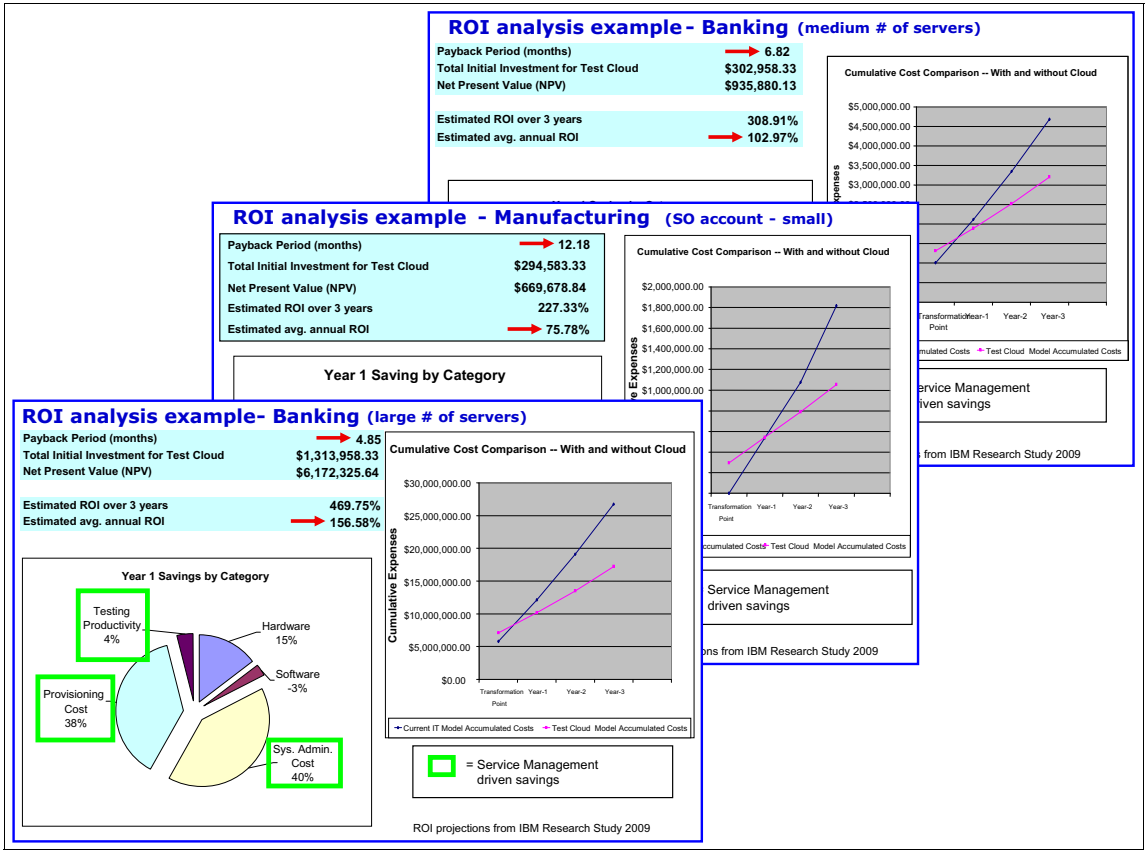


Figure 1-13 Sample cost model for cloud

1.4.5 Define your cloud architecture and scope

Architecting the cloud is also a challenge that requires a framework for consolidating the aspects of multiple disciplines, users, stakeholders, and tools. The principles for good IT governance rely on sound architecture planning and modeling. The cloud reference architecture allows a standards-based approach to cloud modeling, which is suitable for complex organizations. Nevertheless, it is a good practice to exercise cloud requirements and priorities accordingly, even for small deployments. As an example, the architecture scope typically includes a list of the following key concepts:

- *Principles:* These are the fundamental architecture ideas that the project is to honor. It can include statements for availability, data protection, and both internal and external regulatory compliance. These statements are intended

to have a defined scope, and occasionally an out-of-scope declaration, to confirm that the project will adhere to the right principles.

- *Requirements:* What makes good requirements is usually a combination of specific stakeholders' needs, properly captured in an orderly fashion, with conflicting ideas between them and achievable time frames estimated. The role of the architect is to address these concerns, by identifying and refining the stakeholders' requirements, developing views of the architecture that show how the concerns and the requirements are going to be addressed, and by showing the trade-offs that are going to be made in reconciling the potentially conflicting concerns among the stakeholders.

What is an architecture framework?

The Open Group Architecture Framework (TOGAF): "An architecture framework is a foundational structure, or set of structures, which can be used for developing a broad range of different architectures. It should describe a method for designing a target state of the enterprise in terms of a set of building blocks, and for showing how the building blocks fit together. It should contain a set of tools and provide a common vocabulary. It should also include a list of recommended standards and compliant products that can be used to implement the building blocks."

IBM CloudBurst is a key technology that implements many of the IT functions illustrated in Figure 1-14 on page 31, which are part of the cloud architecture model. There are three major roles: consumer, provider, and creator:

- *Consumer:* The Cloud Service Consumer represents the users, groups, and communities that want a service with a form of automation and transparency. The consumers can be actual users or system administrators that act on behalf of users to define and create services.
- *Provider:* The Cloud Service Provider is any organization that wants to implement such a model. There are a lot of details that include services, management platform, infrastructure, security, and governance inside the model, with additional specifications, tools, and processes, such as the Information Technology Infrastructure Library (ITIL). A service provider is a business organization with a cloud infrastructure or a third-party entity that manages and charges for this type of service. Regardless of the business model, there must be one or more system providers to manage the cloud and ensure that it keeps running as a traditional application. In case there are problems with the cloud infrastructure, the resiliency and high availability controls of the cloud can take over and ensure that there is no service interruption. Fully-staffed, 24x7 provider coverage might be necessary to manage and meet SLA requirements for cloud services if there are mission-critical applications running. It is also important to test and validate

disaster recovery processes and business continuity, in case anything goes awry with the cloud provider.

- *Creator:* The Cloud Service Creator consolidates multiple cloud services and promotes the service, selling, and structure. This is a new role in which the service is defined and sold to multiple consumers, even if it is internal for one organization. The benefit of this approach is that the quality of service and its survival depends solely upon the ability of the cloud model to provide a business value, either by a justified ROI or strategic business market share. Part of such value needs communication, selling, and acceptance by internal users, who might not be aware of the solutions at their disposal.

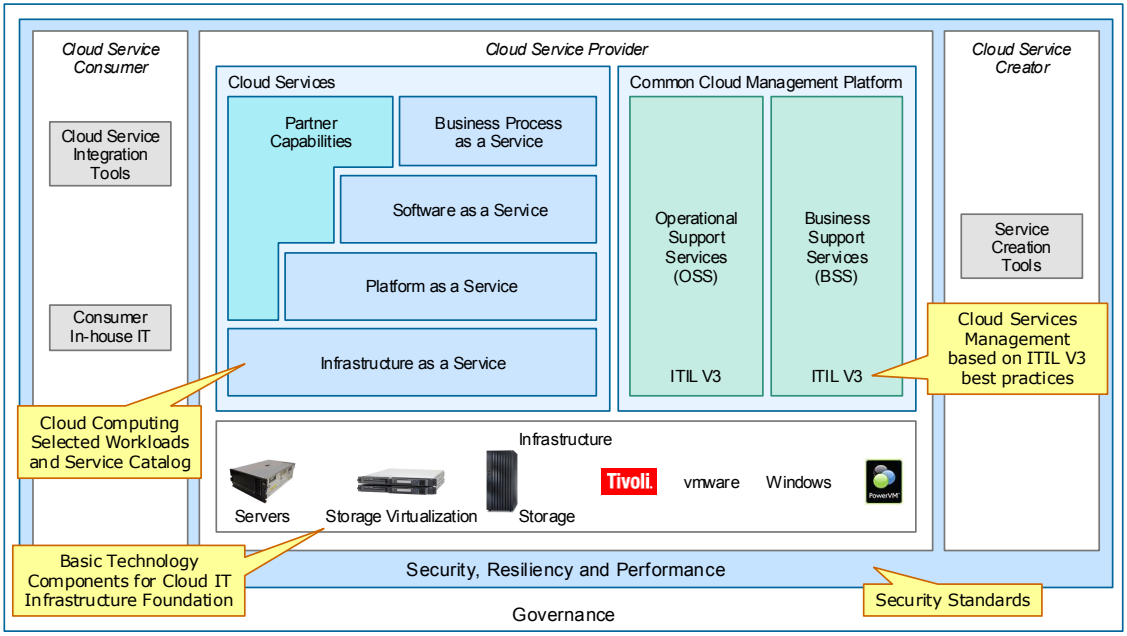


Figure 1-14 Sample framework for cloud

The deeper the framework is planned and discussed, the more confident and structured the cloud infrastructure and services will work. Figure 1-15 on page 32, Figure 1-16 on page 33 and Figure 1-17 on page 34 present some of the details that each layer might have to support a robust cloud infrastructure.

The cloud management roles show multiple ITIL disciplines segregated as Operational Support Services (OSS) and Business Support Services (BSS). Refer to Figure 1-15 on page 32. Their purpose is to define the relationship for cloud and standard frameworks that many organizations already have in place, but sometimes lack the cloud awareness. Therefore, it is not the purpose of this framework to replace existing ITIL processes, but to complement its ability with

the cloud infrastructure as supporting existing processes or allowing changes to cloud integration, such as portal application programming interface (API) and new roles and responsibilities.

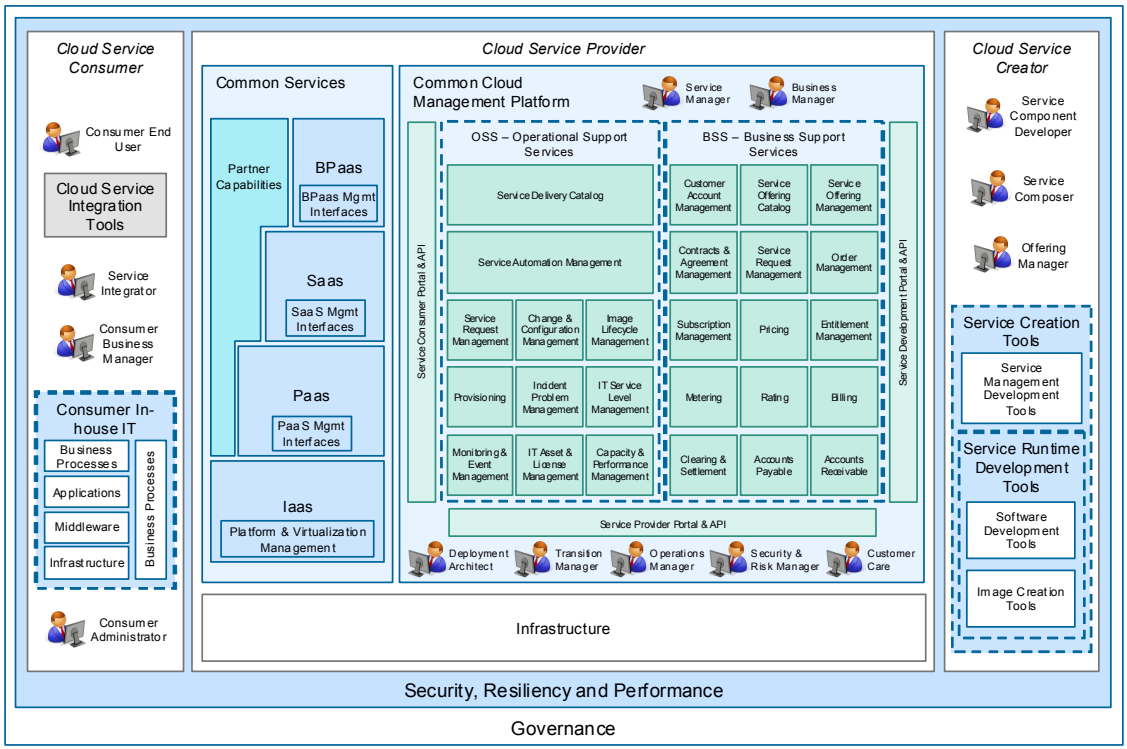


Figure 1-15 Cloud management framework breakdown

Several internal users might need to exchange information or participate in workflow approvals to execute cloud tasks. See Figure 1-16 on page 33. A control system might already exist to handle user requests, system access entitlements, and application infrastructure. These systems must be integrated and sometimes replaced by a more sophisticated workflow and orchestrator system. The complexity depends upon the size of the organization and how many users and roles can exist to manage those services. For example, a storage system administrator can predefine a disk logical unit number (LUN) for cloud usage, but it can still require managing activities to monitor thin-provisioning thresholds and avoid disk allocation issues. Other workflow integration might rely on the licensing and central inventory controls that must be updated for auditing purposes.

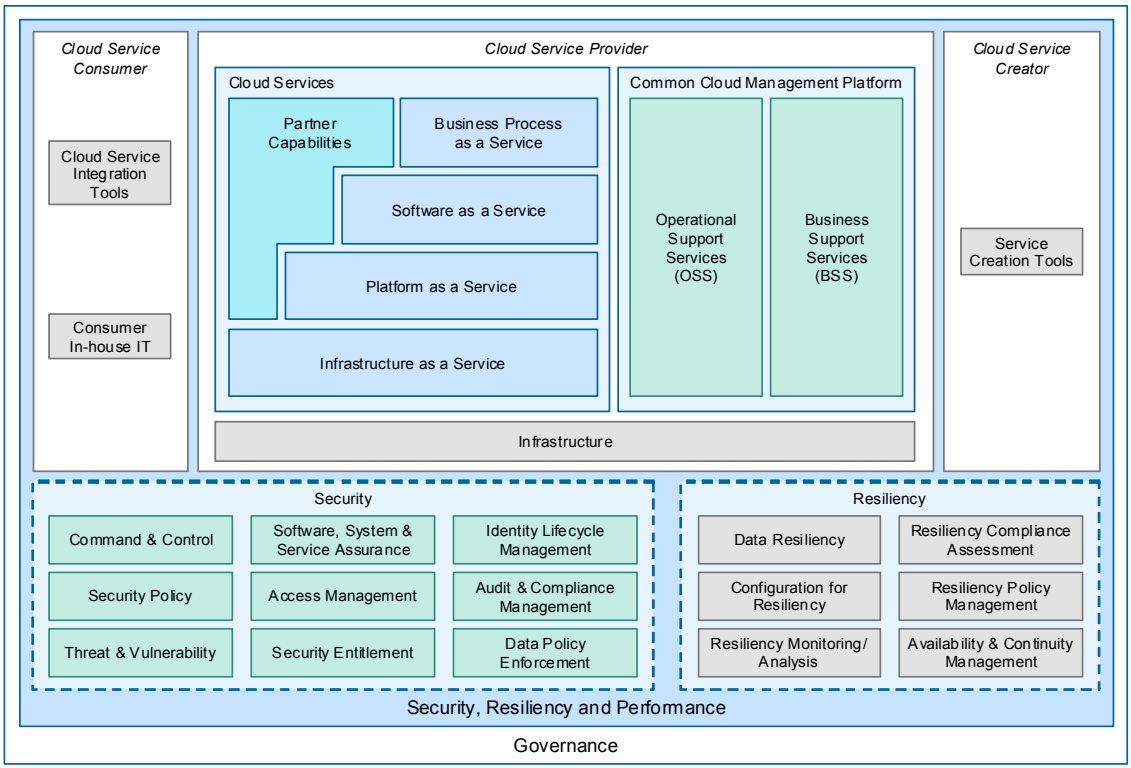


Figure 1-16 Cloud security framework breakdown

In general, the infrastructure for the cloud is made up of standard, off-the-shelf hardware. See Figure 1-17 on page 34. All servers, storage, and networking hardware must be properly planned in terms of capacity and performance. Adding resiliency in the infrastructure layer is usually a good practice, because this ensures that all critical components have proper local or even remote redundancy. CloudBurst relies on such principles to offer integrated and redundant components by itself. It is to your advantage to use CloudBurst built-in features to consolidate and expedite the infrastructure steps for cloud computing, given that the time and effort necessary for configuration can be time-consuming. This method also simplifies processes, which can rely on a solid infrastructure to grow, and avoids capacity pitfalls when merging multiple infrastructure components.

Other than the computer storage and network components, all facilities must be properly designed to hold massive processing power. It is a good practice to design the facility room in terms of high-density racks and separate several of the lower-density racks, so that energy efficiency is enhanced. Your facilities staff plays an important role in overall system availability and performance. Thus, it is

part of the scope of the architecture to plan and exercise the scalability and flexibility principles for the project with your facilities team.

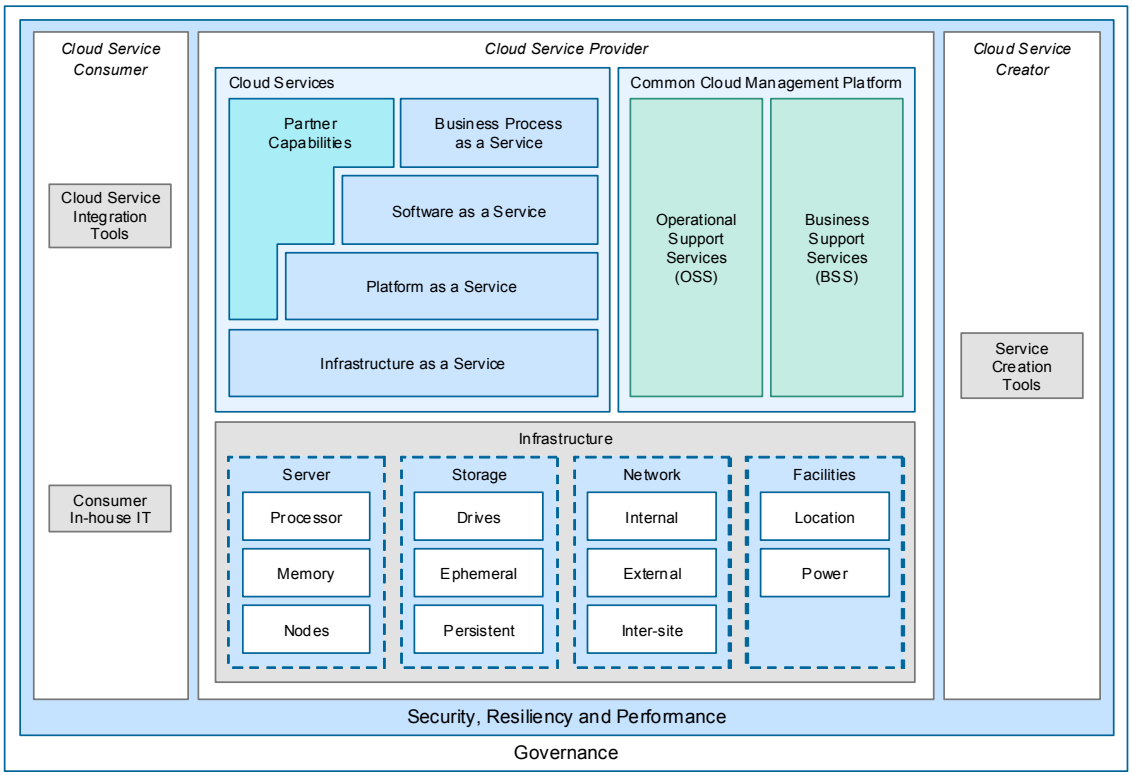


Figure 1-17 Cloud infrastructure framework breakdown

1.4.6 Implement the cloud

This steps deals with the main appeal for CloudBurst, and it opens a world of possibilities in terms of system scalability and customization. By using the processes and the suggested planning steps outlined in this chapter, cloud projects will have good formal documentation and problem anticipation. The following chapters cover the benefits and the technical improvements that CloudBurst can offer to successfully deliver sound architecture and improved service levels with a robust supporting cloud infrastructure.

Part 2

IBM CloudBurst on System x

In this part, we describe IBM CloudBurst on System x hardware and software components. We then describe some of the tasks that can be performed after the CloudBurst on System x solution is installed in the customer environment. We conclude with a detailed migration scenario that covers migrating IBM Service Delivery Manager V7.2.1 (a component of IBM CloudBurst V2.1 for System x to IBM Service Delivery Manager V7.2.2.

2

CloudBurst hardware

This chapter presents a brief overview of the IBM CloudBurst on System x hardware and describes the small, medium, large, and extra large configuration options that are available with a CloudBurst solution. We discuss:

- 2.2, “CloudBurst hardware overview” on page 38
- 2.3, “CloudBurst configuration models” on page 41
- 2.4, “CloudBurst storage options” on page 51
- 2.5, “CloudBurst networks” on page 52

2.1 Introduction

IBM CloudBurst is a prepackaged and self-contained service delivery platform that can be easily and quickly implemented in a data center environment. It combines the necessary hardware, software, and services components to rapidly implement cloud computing. IBM CloudBurst on System x is built on an IBM BladeCenter platform. It provides preinstalled capabilities essential to a cloud model including:

- Fully integrated hardware and software platform with networking and storage for fast rollout
- A self-service portal interface for reservation of computing, storage, and networking resources, including virtualized resources
- Automated provisioning and de-provisioning of resources
- Prepackaged automation templates and workflows for most common resource types, such as VMware virtual machines
- Service management for cloud computing
- Real time monitoring
- Backup and recovery
- Integrated usage and accounting chargeback to track and optimize system usage
- Facility administrators with energy monitoring and management to optimize energy consumption for higher efficiency
- Supports ability to manager other heterogeneous resources outside the IBM CloudBurst environment

IBM CloudBurst on System x includes Global Technology Services (GTS) implementation services which can help ensure that a complete package of hardware and software is operational right away in your environment.

2.2 CloudBurst hardware overview

The basic hardware components and models that make up an IBM CloudBurst for System x 2.1 configuration are described in this section.

2.2.1 Basic hardware configuration

These components are part of each CloudBurst 2.1 configuration. The quantities vary between configurations:

- One 42U rack
- One System x BladeCenter chassis
- One HS22V Management Blade for IBM CloudBurst Tivoli software stack VMs
- Three managed HS22V Virtualization Blades for provisioned virtual machines
- Redundant 8 Gb Fibre Channel (FC) network - Brocade switch modules
- Redundant 10 Gb Ethernet network - BNT® switch modules
- Redundant 1 Gb Ethernet management network - SMC 8126L2
- One system storage DS3524 dual controller
- Twenty four 300 GB SAS drives
- 1 x3550 M3 Management Server

2.2.2 IBM HS22V Blade Servers

In a CloudBurst 2.1 installation, one Management Blade Server running VMware ESXi 4.1 runs the following Tivoli Provisioning software:

- Tivoli Service Automation Manager (TSAM)
- Network File System (NFS)
- IBM Tivoli Monitoring (ITM)
- Tivoli Usage and Accounting Manager (TUAM)

In a high availability (HA) environment, a second Blade Server is dedicated for backup and recovery.

There are two to 55 additional HS22V Blade Servers (depending on CloudBurst configuration size) that run the provisioned virtual machines.

Each Blade Server includes two 6 Core 2.8 Ghz processors, 72 GB RAM, a two-port 10 Gb Ethernet daughter card, and a two-port 8 Gbps Fibre Channel daughter card. The system runs from an embedded VMware hypervisor and requires no hard disk drives:

- Dual 6 Core Intel Xeon 2.8 GHz, 12 MB L2 cache, 95W
- 72 GB memory - 18x 4 GB DDR3 1066 MHz
- Hard disk drive - diskless
- VMware ESXi Hypervisor on embedded USB key

- Integrated 2-port Broadcom 5790S 1 GbE controller
- CCFh - 2-port Broadcom Gen2 2-Port 10 Gb Ethernet
- CIOv - 2-port Qlogic 8 Gb Fibre Channel

2.2.3 IBM System x3550 M3 Management Server

There is one x3550 M3 Management Server per CloudBurst 2.1 installation. The Management Server runs IBM Director for hardware discovery and provides hardware management for the CloudBurst installation.

The Management Server includes two quad core 2.4 Ghz processors, 24 GB of RAM, a ServeRAID M5015 RAID Controller with four 300 GB hard drives configured as two RAID 1 configurations. There are four 1 GbE ports and two 8 Gbps Fibre Channel ports. The system runs Windows Server 2008 Standard Edition R2 64 bit:

- Dual Quad Core Intel Xeon 2.26 GHz, 8 MB L2 cache, 80W
- 24 GB memory - 6x 4 GB DDR3 1066 MHz
- 4x 300 GB SAS 10K RPM (2 RAID 1 arrays)
- ServeRAID M5015 SAS/SATA Controller
- Integrated 2-port Broadcom 5709S 1 GbE Controller
- Daughter card - 2-port Broadcom 5709S 1 GbE Controller
- PCIe3 Card - 2-port Qlogic 8 Gb Fibre Channel
- Windows Server 2008 Standard Edition R2 64 bit
- IBM Systems Director Active Energy Manager™ V4.3
- Network Control V1.2
- IBM DB2® 9.5 ESE FP1+

Figure 2-1 on page 41 displays a conceptual view of the components that make a CloudBurst installation.

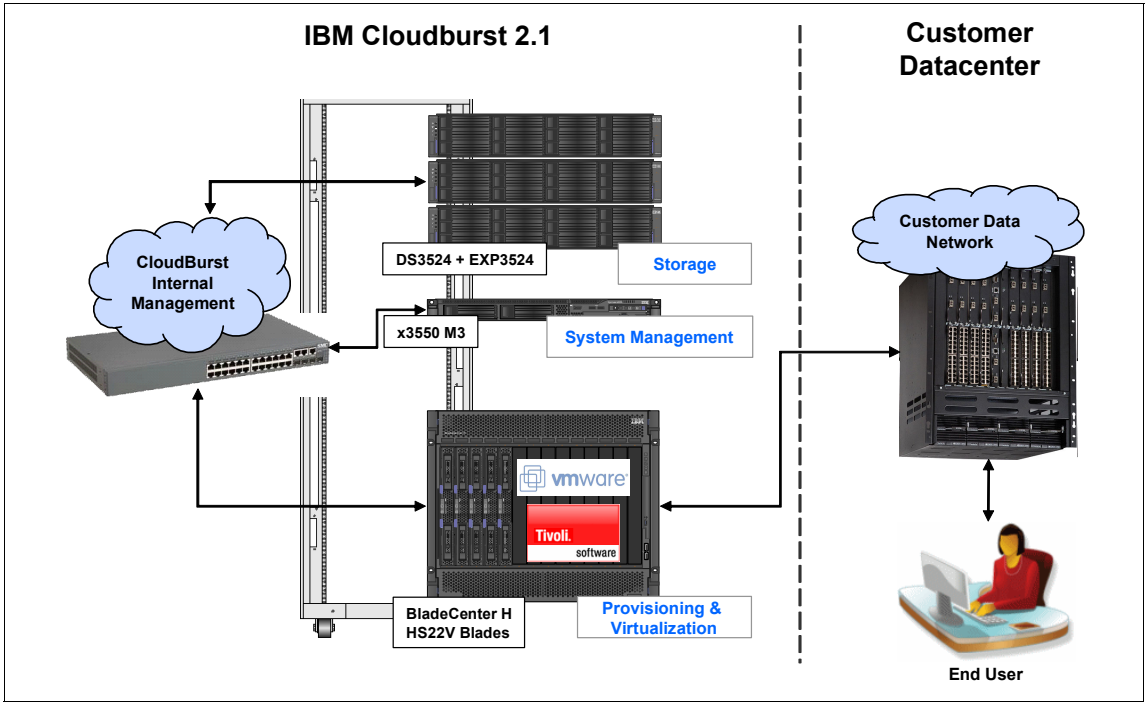


Figure 2-1 CloudBurst 2.1 hardware conceptual view

2.3 CloudBurst configuration models

IBM CloudBurst 2.1 for System x is available in four configuration models:

- Small (see 2.3.1, “Small CloudBurst configuration—4 blades” on page 41)
- Medium (2.3.2, “Medium CloudBurst configuration—5-14 blades” on page 43)
- Large (2.3.3, “Large CloudBurst configuration—15-28 blades” on page 44)
- Extra-large (see 2.3.4, “Extra-large CloudBurst configuration—29-56 blades” on page 46)

2.3.1 Small CloudBurst configuration—4 blades

A small CloudBurst 2.1 configuration (shown in Figure 2-2 on page 42) consists of the following main components:

- 1 42U rack
- 1 System x BladeCenter chassis

- 1 HS22V Management Blade for IBM CloudBurst software
- Three managed HS22V Virtualization Blades for provisioned virtual machines
- Redundant 8 Gb Fibre Channel network - Brocade switch modules
- Redundant 10 Gb Ethernet network - BNT switch modules
- Redundant 1 Gb Ethernet management network - SMC 8126L2
- 1 system storage DS3524 dual controller
- 24 300 GB SAS drives
- 1 x3550 M3 Management Server

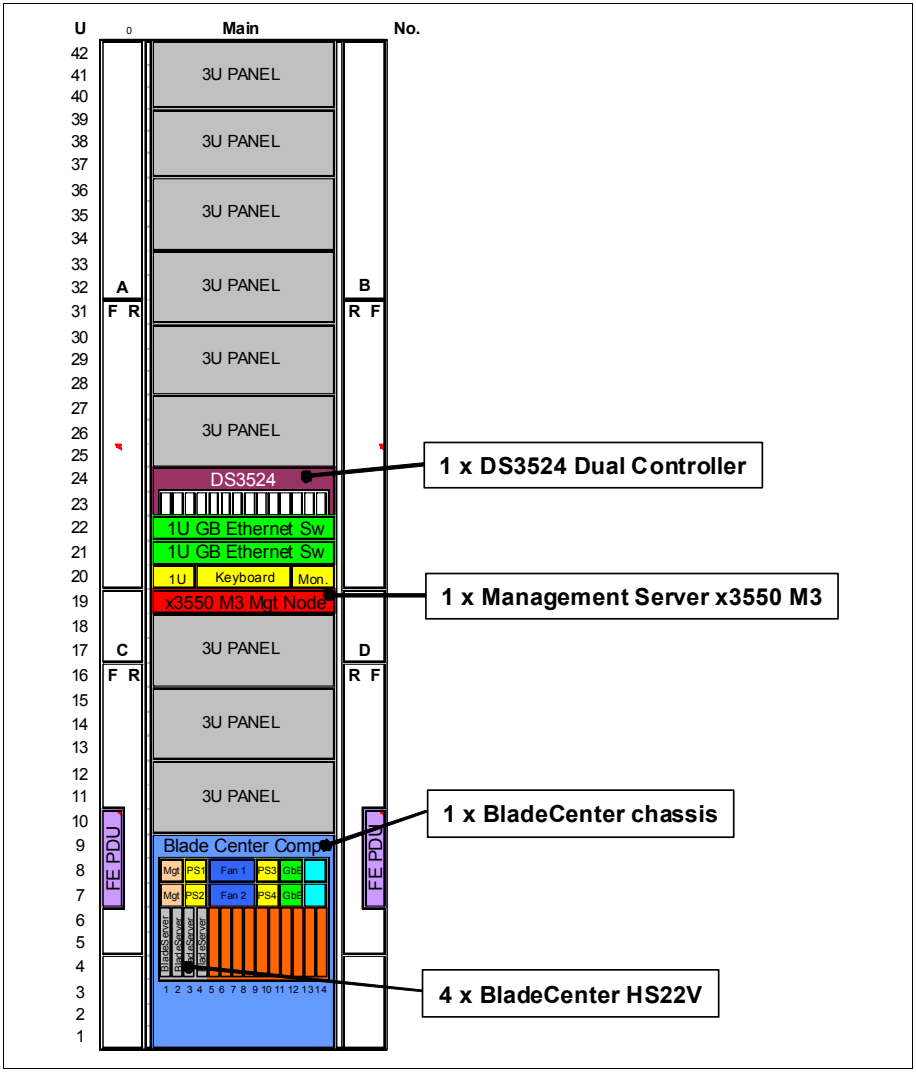


Figure 2-2 CloudBurst 2.1 small configuration

2.3.2 Medium CloudBurst configuration—5-14 blades

A medium CloudBurst 2.1 configuration (shown in Figure 2-3 on page 44) consists of the following main components:

- 1 42U rack
- 1 System x BladeCenter chassis
- 1 HS22V Management Blade for IBM CloudBurst software
- 4-13 managed HS22V Virtualization Blades for provisioned virtual machines (12 with HA)
- Redundant 8 Gb Fibre Channel (FC) network - Brocade switch modules
- Redundant 10 Gb Ethernet network - BNT switch modules
- Redundant 1 Gb Ethernet management network - SMC 8126L2
- 1 system storage DS3524 dual controller
- 1-3 EXP3524 expansion units
- 48-96 300 GB SAS HDD
- 1 x3550 M3 Management Server

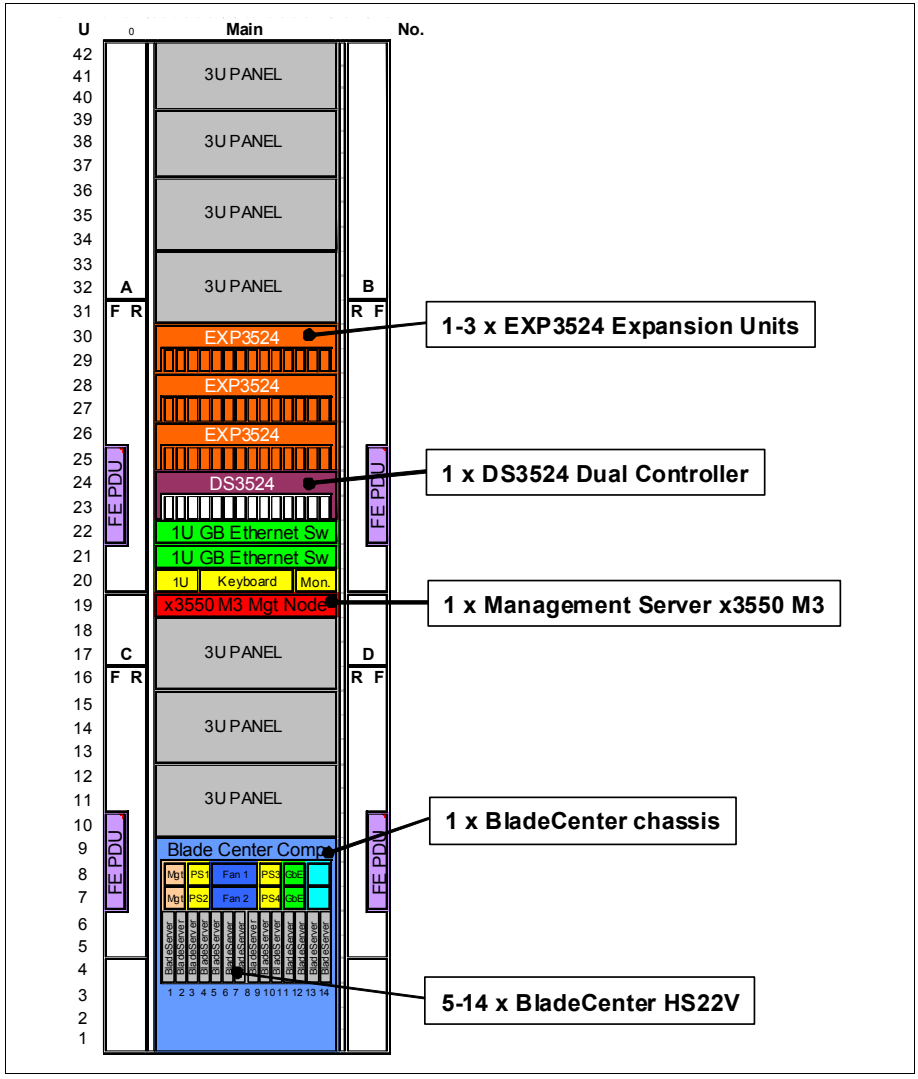


Figure 2-3 CloudBurst 2.1 medium configuration

2.3.3 Large CloudBurst configuration—15-28 blades

A large CloudBurst 2.1 configuration (shown in Figure 2-4 on page 46) consists of the following main components:

- One 42U rack
- Two System x BladeCenter chassis

- One HS22V Management Blade for IBM CloudBurst software
- 14-27 managed HS22V Virtualization Blades for provisioned virtual machines (26 with HA)
- Redundant 8 Gb Fibre Channel (FC) network - Brocade switch modules
- Redundant 10 Gb Ethernet network - BNT switch modules
- Redundant 1 Gb Ethernet management network - SMC 8126L2
- Redundant SAN24B SAN switches
- Two system storage DS3524 dual controllers
- 4-6 EXP3524 expansion units
- 120-192 300 GB SAS HDD
- 1 x3550 M3 Management Server

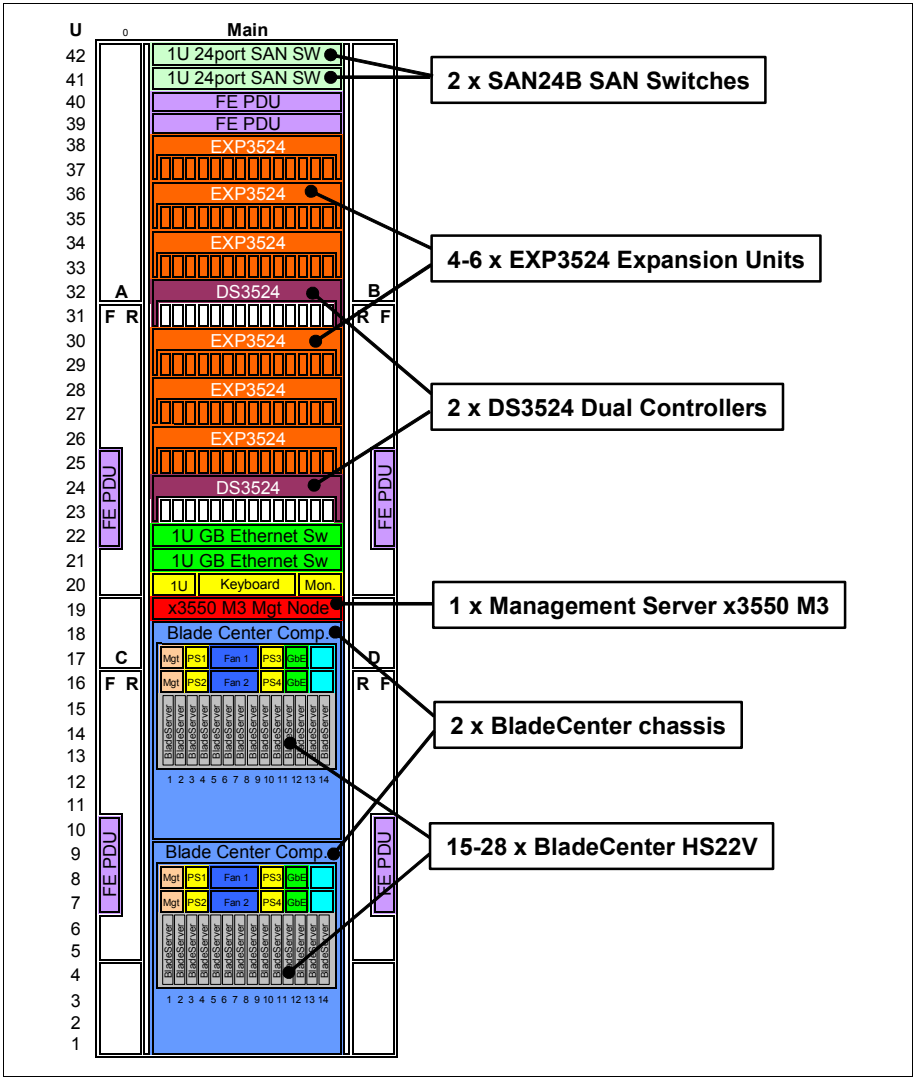


Figure 2-4 CloudBurst 2.1 large configuration

2.3.4 Extra-large CloudBurst configuration—29-56 blades

An extra-large CloudBurst 2.1 configuration (shown in Figure 2-5 on page 48) consists of the following main components:

- Two 42U racks
- 3-4 System x BladeCenter chassis

- One HS22V Management Blade for IBM CloudBurst software
- 28-55 managed HS22V Virtualization Blades for provisioned virtual machines (54 with HA)
- Redundant 8 Gb Fibre Channel (FC) network - Brocade switch modules
- Redundant 10 Gb Ethernet network - BNT switch modules
- Redundant 1 Gb Ethernet management network - SMC 8126L2
- Redundant SAN24B SAN switches
- Redundant 10 GbE rack switches - BNT G8124R
- 3-4 system storage DS3524 dual controllers
- 6-12 EXP3524 expansion units
- 216-384 300 GB SAS HDD
- 1 x3550 M3 Management Server

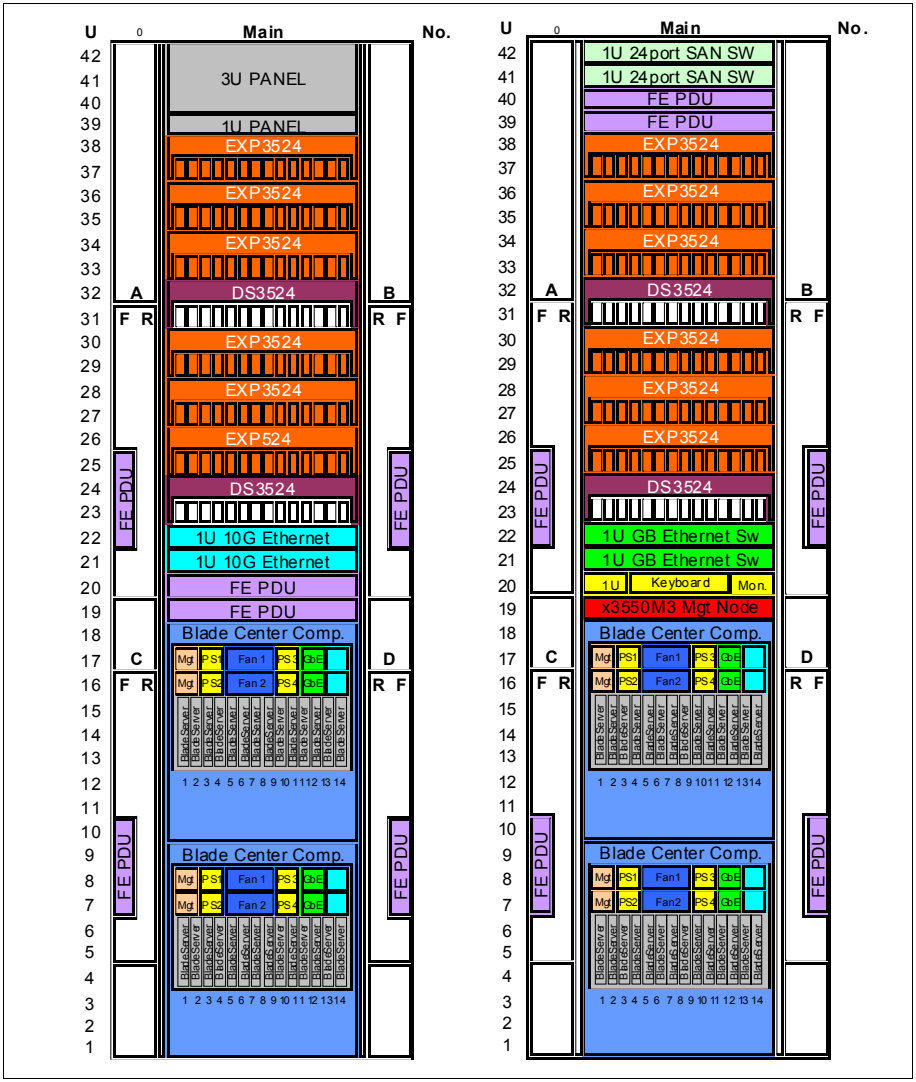


Figure 2-5 CloudBurst 2.1 extra-large configuration

2.3.5 CloudBurst configuration model differences

Table 2-1 on page 49 summarizes the major hardware differences between the various CloudBurst configuration models. There are many more differences between each model; however, the table lists only the major differences.

Table 2-1 Major hardware differences

	Small	Medium	Large	X-large
BladeCenter chassis	1	1	1	2
Virtualization Blades	3	4-13	14-27	28-55
Brocade 20 port SAN modules	2	2	4	8
SAN24B SAN switches	0	0	2	2
BNT 10 GbE switch modules	2	2	4	8
BNT 10 GbE rack switches	0	0	0	2
DS3524 controllers	1	1	2	3-4
EXP3524 expansion units	0	1-3	3-6	6-12
300 GB SAS HDD	24	48-96	120-192	216-384

2.3.6 CloudBurst configuration options

Table 2-2 lists the available options for each CloudBurst 2.1 configuration size.

Table 2-2 CloudBurst 2.1 configuration options

Options[a]	Power®	Blades	Storage	Ethernet Uplink	Ext Fibre Channel	High Availability
Small	30A, **60A**, 60A-3ph	**4**	**7.2** TB	1G or **10 G**	**Yes** or No	n/a
Medium	30A, **60A**, 60A-3ph	5-**14**	14.4 to **28.8** TB	1G or **10 G**	**Yes** or No	Yes or **No**
Large	**60A**, 60A-3ph	15-**28**	36 to **57.6** TB	**10 G**	**Yes** or No	Yes or **No**
X-Large	**60A**, 60A-3ph	29-**56**	64.8 to **115.2** TB	**10 G**	**Yes** or No	Yes or **No**

a. Bold = default configuration

Table 2-3 on page 50 and Table 2-4 on page 51 list the tested and supported options for each CloudBurst 2.1 configuration.

Table 2-3 CloudBurst 2.1 supported Ethernet configurations

	Number of blades	Ethernet Data Network (1 Gb or 10 Gb)		Ethernet Mgt Network 1 Gb	High availability option
		Ext 1 Gb uplinks	Ext 10 Gb uplinks		
Small	4	4	4	2	Not Valid
Medium	5 to 8	6	6	2	Valid
	9 to 11	6	6	2	Valid
	12 to 14	6	6	2	Valid
Large	15 to 18	Not Valid	12	2	Valid
	19 to 22	Not Valid	12	2	Valid
	23 to 25	Not Valid	12	2	Valid
	26 to 28	Not Valid	12	2	Valid
Extra-Large	29 to 32	Not Valid	18	2	Valid
	33 to 36	Not Valid	18	2	Valid
	37 to 39	Not Valid	18	2	Valid
	40 to 42	Not Valid	18	2	Valid
	43 to 46	Not Valid	24	2	Valid
	47 to 50	Not Valid	24	2	Valid
	51 to 53	Not Valid	24	2	Valid
	54 to 56	Not Valid	24	2	Valid

Table 2-4 CloudBurst 2.1 supported SAN configurations

	SAN Fibre Channel Network							
	Supported ports/switch	Ext 8 Gb FC connections	Number of DS3524s	Number of EXP3524s	EXPs/DS3524			
					1	2	3	4
Small	20	0, 4	1	0	0	0	0	0
Medium	20	0, 4	1	1	1	0	0	0
	20	0, 4	1	2	2	0	0	0
	20	0, 4	1	3	3	0	0	0
Large	20	0, 4	2	3	2	1	0	0
	20	0, 4	2	4	2	2	0	0
	20	0, 4	2	5	3	2	0	0
	20	0, 4	2	6	3	3	0	0
Extra Large	20	0, 4	3	6	2	2	2	0
	20	0, 4	3	7	3	2	2	0
	20	0, 4	3	8	3	3	2	0
	20	0, 4	3	9	3	3	3	0
	20	0, 4	4	9	3	2	2	2
	20	0, 4	4	10	3	3	2	2
	20	0, 4	4	11	3	3	3	2
	20	0, 4	4	12	3	3	3	3

2.4 CloudBurst storage options

The HS22V blades (see 2.2.2, “IBM HS22V Blade Servers” on page 39) have no local storage of their own. All CloudBurst storage is provided by a SAN-attached DS3524. The rack-mounted dual storage controller accommodates:

- Management system images
- Image repository
- Virtual machine clones
- User virtual machine images

A DS3524 has a capacity of 24 hard disk drives. All volumes are accessible to all blades.

User virtual machine image storage can be increased by adding EXP3542 storage expansion units. The EXP3524 units are dedicated to user images and have the same storage capacity as a DS3524 - 24 hard disk drives. Each DS3524 can support up to three EXP3524 storage expansion units. See Figure 2-6.

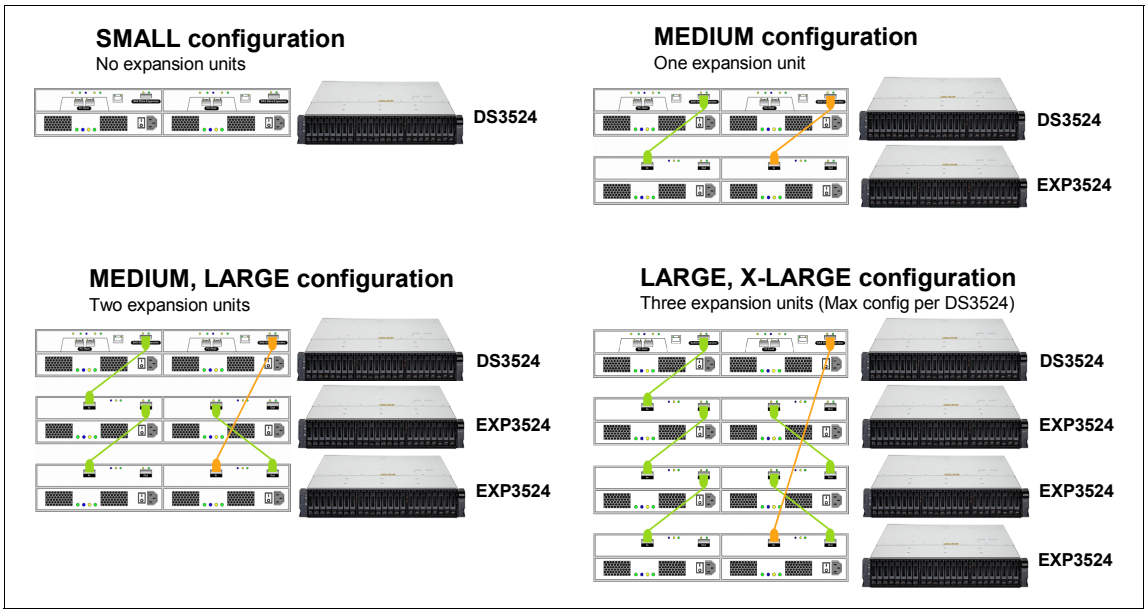


Figure 2-6 CloudBurst storage options

An EXP3524 can be added for each three-to-four blades that are above the minimum (small) configuration. Up to three EXP3524 units can support a full BladeCenter (14 blades), and up to six EXP3524 units can support a large configuration of 28 blades. More than three EXP3524 units requires a second DS3524 controller.

2.5 CloudBurst networks

The CloudBurst 2.1 networking configuration is a critical component of the overall implementation. The CloudBurst computing environment requires four physical connection types:

- A connection is required for management of the CloudBurst environment

- A connection is required for the virtual machine interconnections within the BladeCenter
- A connection is required to connect to the existing datacenter network
- A connection is required to the Fibre Channel SAN storage

A 1 Gb Ethernet network, 10 Gb Ethernet network, and an 8 Gb Fibre Channel storage network are all contained within a CloudBurst installation.

2.5.1 1 Gb Ethernet Management Network

Redundant 1 GbE SMC 8126L2 rack switches are used to connect all management components within the CloudBurst environment:

- x3550 M3 Management Server
- Power Distribution Units
- DS3524 SAN storage controllers
- 10 GbE BNT G8124R rack switches
- SAN24B Fibre Channel SAN switches
- Advance Management Modules (AMM)

Each component in the 1 GbE Management Network is redundantly connected to the SMC switches. The Management Network is used to manage and monitor the following functions:

- Energy management
- Switch configuration
- Out of band disk system management
- Hardware system events
- Remote video

2.5.2 10 Gb Ethernet networks

The 10 GbE network serves multiple purposes.

10 Gb Ethernet Management Network

This Management Network is used for hypervisor host management. The CloudBurst components on this network are:

- x3550 M3 Management Server
- 10 GbE BNT switch modules
- HS22V blades
- 10 GbE BNT G8124R rack switches

10 Gb VM Network (Tivoli)

The Tivoli management virtual machine (running on the HS22V Management Blade - see 2.2.1, “Basic hardware configuration” on page 39) and the provisioned virtual machines (running on the HS22V Virtualization Blades - see 2.2.1, “Basic hardware configuration” on page 39) have access to a private management network that is accessible over VLAN 90 (management VM communication) and VLANs 100-129 (agent monitoring). This VM Network is a separate and private logical network that is used for inter-communication between the VMs of the Tivoli software stack (see 3.3, “IBM CloudBurst software stack architecture” on page 75) and to provide monitoring function for the provisioned VMs.

The VM Network VLANs are not exposed/available to the customer data network. See “10 Gb Ethernet Customer Network” on page 54.

The CloudBurst components on this network are:

- 10 GbE BNT switch modules
- HS22V blades
- 10 GbE BNT G8124R rack switches

10 Gb Ethernet VMotion Network

VMotion is the VMware feature enabling host-to-host virtual machine migration. Each HS22V ESXi host contains a VMware VMKernel configured for VMotion. The VMotion kernel is configured to be on VLAN 80. The VMotion Network is a logical segment of the CloudBurst 10 Gb Ethernet network that is used by the VMware infrastructure for migration of VMs between the hosts in a given cluster.

The VMotion Network is not exposed/available to the customer data network. See “10 Gb Ethernet Customer Network” on page 54.

The CloudBurst components on this network are:

- 10 GbE BNT switch modules
- HS22V blades
- 10 GbE BNT G8124R rack switches

10 Gb Ethernet Customer Network

The 10 Gb Ethernet Customer Network is the CloudBurst network accessible to the customer’s data network. The 10 GbE switch module in each Blade has 2-3 ports (4-6 ports per BladeCenter chassis) pre-configured to access the customer network. This network is segmented into 30 separate VLANs (130-159), each designating a unique Customer Group.

Provisioned virtual machines created in one Customer Group cannot communicate with all other Customer Groups. This feature enables the CloudBurst infrastructure to be shared with multiple tenants.

In “10 Gb VM Network (Tivoli)” on page 54, we noted that there are 30 VLANs for the VM Network. This enables each Customer Group to have a unique private VM Network, further enforcing the customer group security.

The CloudBurst components in this network are:

- x3550 M3 Management Server
- 10 GbE BNT switch modules
- HS22V blades
- 10 GbE BNT G8124R rack switches

3

CloudBurst software

In this chapter, we provide an overview of the software that is installed as part of IBM CloudBurst 2.1 for System x.

In addition, this overview describes the software products that are part of IBM Service Delivery Manager (ISDM). We discuss:

- 3.1, “IBM CloudBurst for System x software overview” on page 58
- 3.2, “IBM CloudBurst for System x software” on page 61
- 3.3, “IBM CloudBurst software stack architecture” on page 75
- 3.4, “IBM CloudBurst for System x management software” on page 79

3.1 IBM CloudBurst for System x software overview

IBM CloudBurst for System x is an integrated cloud management platform that is designed to provide you with a private cloud computing environment rapidly.

Figure 3-1, illustrates three possible approaches for a cloud computing platform and how CloudBurst encompasses all of these approaches.

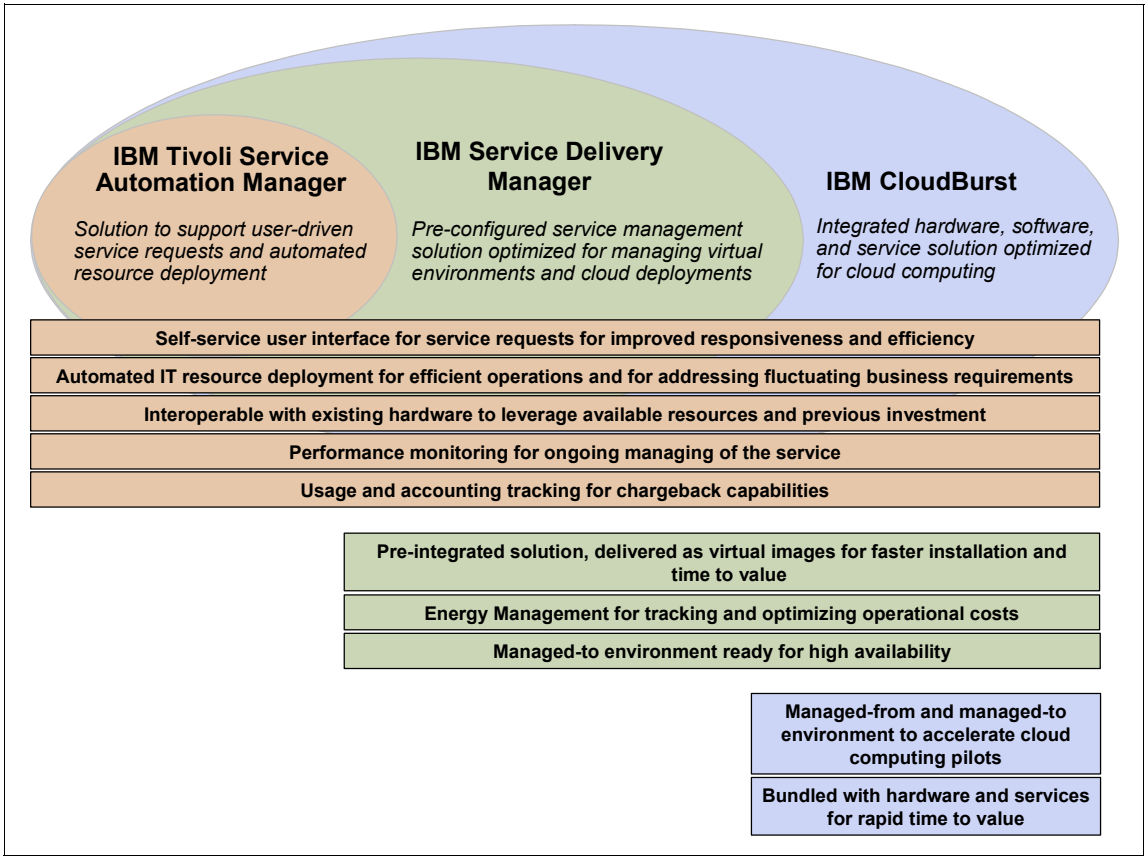


Figure 3-1 Approaches to cloud computing

IBM provides a wide range of cloud infrastructure offerings with multiple entry points for a common cloud computing platform:

- IBM Tivoli Service Automation Manager (TSAM) is intended for customers who already have the hardware for virtualization (for example, IBM BladeCenter Foundation for Cloud).

- IBM Service Delivery Manager (ISDM) is intended for customers who already have the hardware for virtualization and do not require extensive customization of the service management capabilities.
- IBM CloudBurst for System x is intended for customers who do not have the hardware for virtualization. IBM CloudBurst for System x enables them to deploy a virtual environment quickly.

IBM Service Delivery Manager is a pre-integrated software stack, delivered as a set of virtual images that automate IT service deployment in a virtual environment.

IBM CloudBurst for System x software is based on IBM Service Delivery Manager, but there are several differences between these two solutions, as shown in Table 3-1.

Table 3-1 Comparison of ISDM and CloudBurst solutions

ISDM	CloudBurst
Software stack only	Comes with hardware and hypervisor for both managing and provisioning environments
Re-locatable images	Fixed hostnames and IP addresses
High availability is disabled by default	High availability is enabled in single node mode by default on Tivoli Service Automation Manager and NFS images
Tivoli Enterprise Portal Server support Energy Manager installed	Energy Manager included (Tivoli Enterprise Portal Server support, agent, PDUs)
Tivoli Service Automation Manager must be configured for selected hypervisor	Tivoli Service Automation Manager fully configured to provision on VMware

IBM CloudBurst for System x provides pre-installed core capabilities that are essential to a cloud model, including the following main features:

- Virtualization management
- Automated provisioning and de-provisioning of resources
- Prepackaged automation templates and workflows for most common resource types, such as VMware virtual images
- A self-service portal interface for reservation of computer, storage, and networking resources, including virtualized resources
- Integrated service management for delivering cloud computing services

- Real-time monitoring and energy management
- Metering usage and accounting features
- High availability of services

Figure 3-2 shows the IBM CloudBurst preinstalled capabilities.

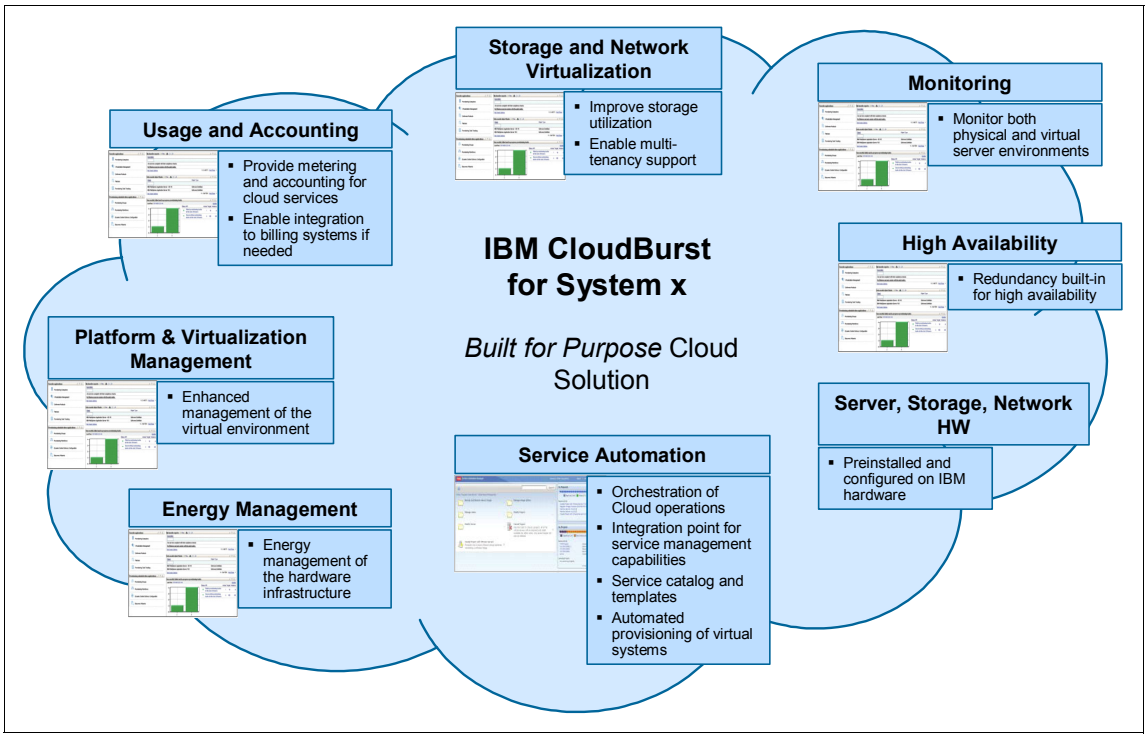


Figure 3-2 IBM CloudBurst preinstalled capabilities

The IBM CloudBurst for System x software stack enables the implementation of a complete software solution for service management automation in a virtual data center environment. It is delivered as an appliance containing a pre-integrated software stack that is deployed as a set of virtual images. This automates IT service deployment and provides resource monitoring, cost management, and provisioning of services in a cloud, enabling the data center to accelerate the creation of service platforms for a wide spectrum of workload types with a high degree of integration, flexibility, and resource optimization.

Each virtual image is dedicated to a specific function:

- Service automation
- Monitoring

- Usage and accounting
- File repository, URL redirection, mail server

Figure 3-3 illustrates the virtual images that are part of the software stack delivered as a preinstalled solution on an IBM CloudBurst for System x 2.1 system. See also Figure 3-13 on page 76.

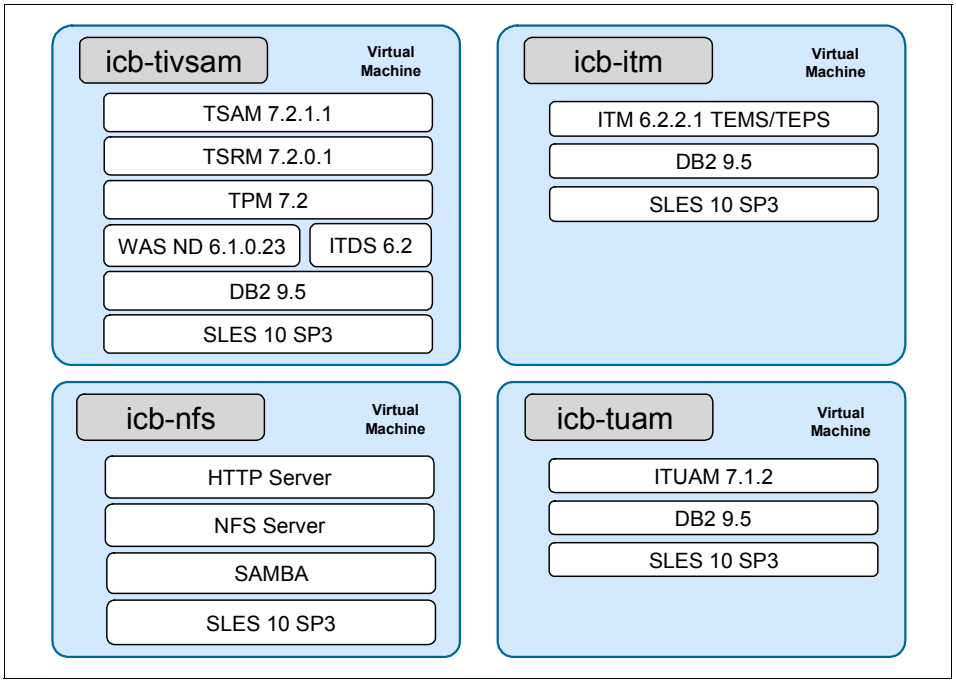


Figure 3-3 Virtual images on IBM CloudBurst pre-installed virtual machines

3.2 IBM CloudBurst for System x software

All of the capabilities provided by IBM CloudBurst for System x are delivered as a pre-installed solution on virtual images, but are based on the following list of stand-alone products:

- IBM Tivoli Service Automation Manager (TSAM):
  - IBM Tivoli Service Request Manager® (TSRM)
  - IBM Tivoli Process Automation Engine (TPAE)
  - IBM Tivoli Provisioning Manager (TPM)
- IBM Tivoli Usage and Accounting Manager (ITUAM)

- IBM Tivoli Monitoring (ITM)
- IBM Tivoli System Automation for Multiplatforms (TSA)

3.2.1 IBM Tivoli Service Automation Manager

IBM Tivoli Service Automation Manager (TSAM) enables the automated design, deployment, and management of services, such as middleware, applications, hardware, and networks. It provides the ability to automate the manual tasks involved in making services available across infrastructure components. It facilitates making these services available through a cloud delivery model. IBM Tivoli Service Automation Manager provides capabilities to request, fulfil, and manage complete software stacks. This comprises the definition, offering, request, and automated provisioning of the stack, including integrated management of the environment.

Tivoli Service Automation Manager is responsible for automated provisioning of cloud offerings.

Tivoli Service Automation Manager is built on the IBM Service Management Platform of Tivoli process automation engine interacting with a federated data subsystem. The Tivoli process automation engine supports workflows, work and job management, role-based access, service-oriented architecture (SOA) services, notification, escalation, governance, and integration. The federated data subsystem provides services, assets, and configuration items.

The IBM Service Management Platform interacts with operational management technology, consisting of the following services over a virtualized IT structure (IBM servers and storage):

- Platform management services
- Security services
- Provisioning services from Tivoli Provisioning Manager
- Usage and accounting services (Tivoli Usage and Accounting Manager)
- IBM Tivoli Monitoring services
- Energy management services

Figure 3-4 on page 63, illustrates the high-level software architecture of Tivoli Service Automation Manager.

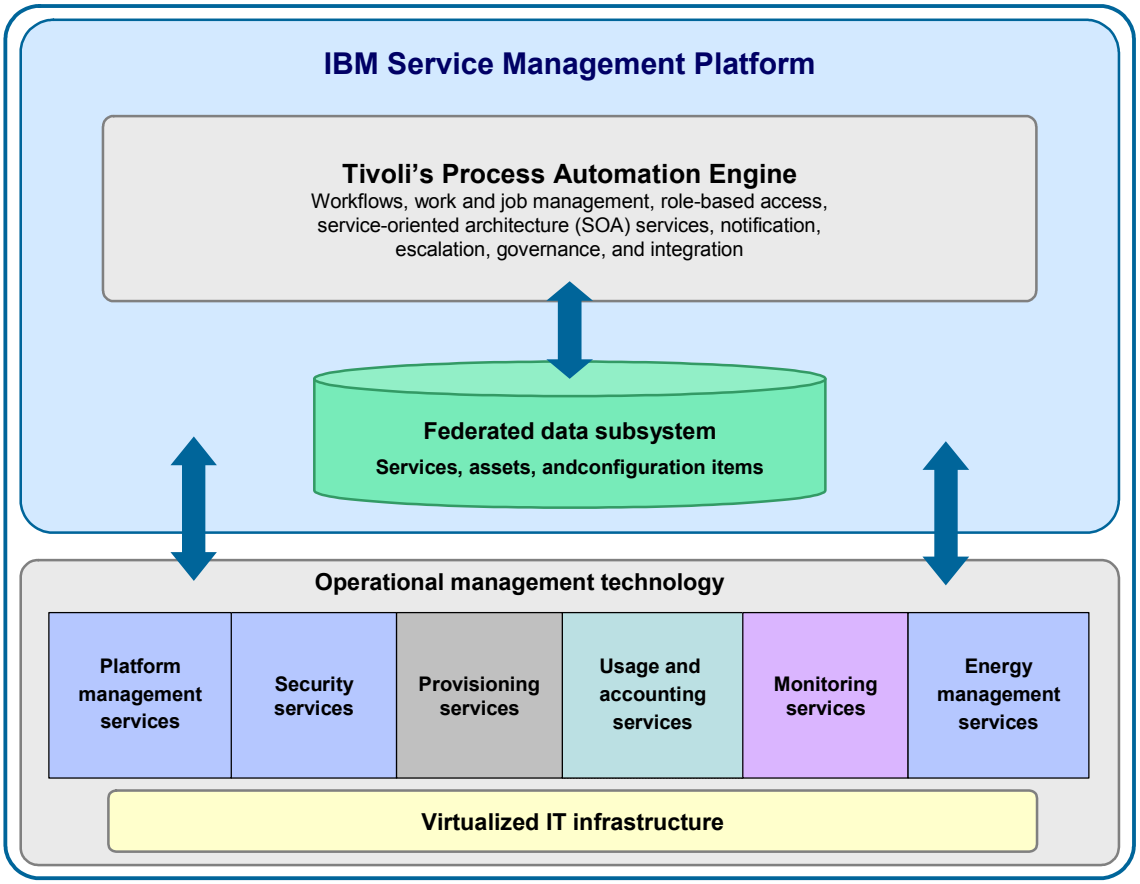


Figure 3-4 Tivoli Service Automation Manager high-level architecture

Tivoli Service Automation Manager components can be customized to integrate services across nonstandard element managers and resources. Tivoli Service Automation Manager can manage the following hypervisors:

- PowerVM® / pHyp / System p®
- zVM / System z®
- X86 / System x
- VMware vSphere Enterprise Edition 4.0 U1 or 4.1 with ESX 4 or ESXi4 and vCenter 4 Standard
- KVM
- XEN

Tivoli Service Automation Manager enables the management of the virtual environment on IBM CloudBurst for System x.

Tivoli Service Automation Manager offers two different options for user interaction:

- A self-service UI
- An administrative UI

Figure 3-5, illustrates the look and feel of the self-service UI.

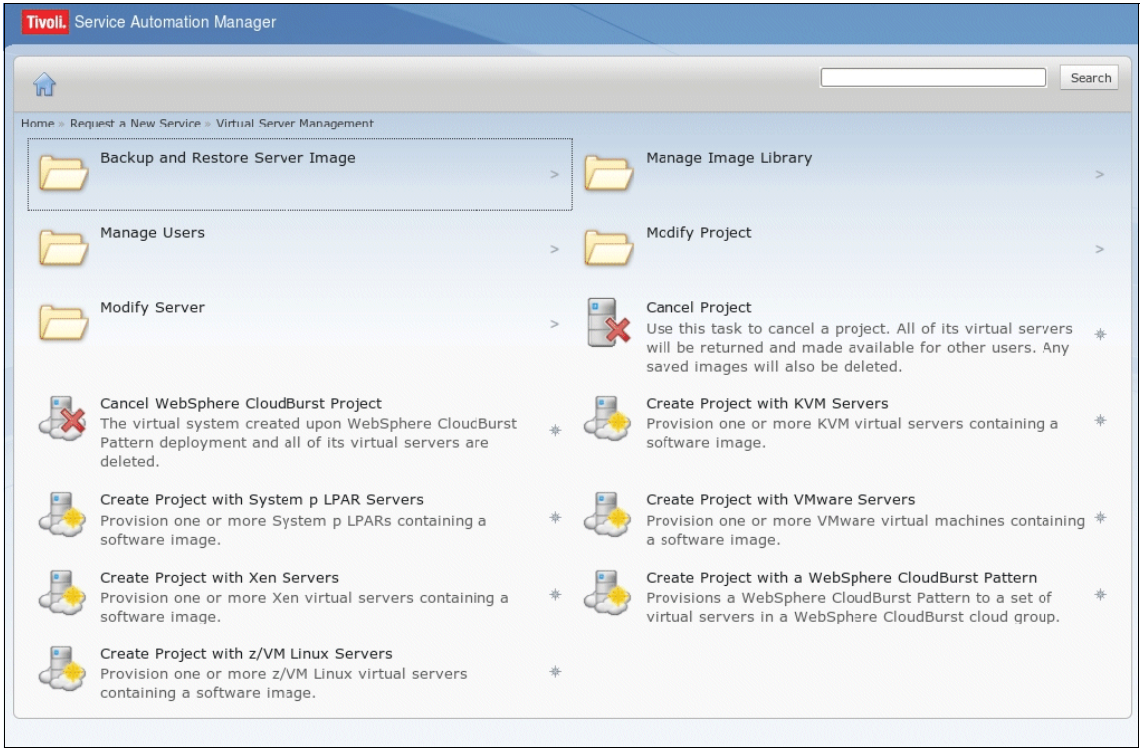


Figure 3-5 Tivoli Service Automation Manager self-service UI

The self-service UI is used by team administrators to provision and de-provision virtual servers, create backup images, and so on. The design is based on the Web 2.0 standard, which allows context-sensitive, real-time display updates, based on the user's current entry or selection.

By using the Tivoli Service Automation Manager self-service UI, a cloud administrator can accomplish the following activities:

- Create virtual servers (as part of a new deployment project or adding virtual servers to an existing project, with optional scheduling for implementation at some future time)
- Install a software image that includes an operating system and other applications that are associated with the image (for each virtual server created)
- Install additional software on the provisioned virtual machines
- Delete a virtual server (when no longer needed)
- Save virtual server images and restore the servers to their previous state
- Save and restore images of servers within the project
- Deleting individual servers
- Canceling a project and deleting all of the associated virtual servers
- Starting, stopping, and restarting virtual servers
- Resetting the administrator password on a virtual server
- Adding, removing, and modifying user profiles and user teams

Figure 3-6 illustrates the look and feel of the administrative UI interface.

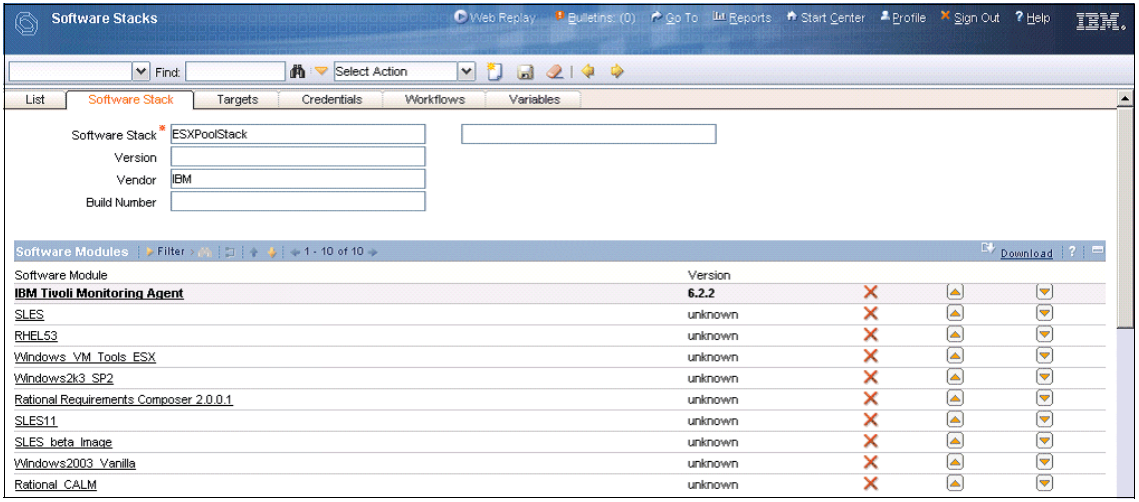


Figure 3-6 Tivoli Service Automation Manager administrative UI

The administrative UI is intended primarily for service and system administrators.

3.2.2 IBM Tivoli Service Request Manager

IBM Tivoli Service Request Manager (TSRM) provides advanced processes for creating, managing, and monitoring service fulfilment activities, such as notifications, escalations, and a key performance indicator dashboard.

In the Tivoli Service Automation Manager context, Tivoli Service Request Manager provides the Cloud-based offerings through a Service Catalog UI. This enables users to obtain IT services through published service offerings.

Tivoli Service Request Manager combines the capabilities of a *Service Desk* for day-to-day management of existing IT services and a *Service Catalog* from which users can obtain new IT services through published service offerings.

In the context of the IBM CloudBurst software stack, Tivoli Service Request Manager provides the interface for daily activities such as:

- Request, edit, approve, and cancel projects
- Manage users and groups
- Manage the images service catalog
- Back up and restore images

3.2.3 IBM Tivoli Process Automation Engine

The IBM Tivoli Process Automation Engine (TPAE) is not a product, but an integration platform that supports other process management products (PMPs). Tivoli Process Automation Engine:

- Serves as a base to build upon
- Provides an integration framework for products
- Supplies common data model to share between products
- Delivers a common UI for multiple products
- Provides role-based security and authentication for applications

Tivoli Process Automation Engine provides the workflow automation engine capabilities to assist with following process flows within organizations. It represents a common layer with all the base services and applications contained in the Maximo® package. Maximo Asset Management is an integrated productivity tool and database that helps manage all asset types on a single software platform.

Tivoli Process Automation Engine provides an interface that is customizable to suit different needs. Tivoli Process Automation Engine provides:

- Default application layouts for various user roles through Start Centers
- Menu driven system for quick application switching

Overall, Tivoli Process Automation Engine includes many applications; however, only some of them are typically enabled, depending on which other products are being installed as part of the IBM CloudBurst software stack or IBM Service Delivery Manager. Examples are the Workflow, Tivoli Service Request Manager, and Change and Configuration Management Database (CCMDB).

Figure 3-7 illustrates the IBM Tivoli Process Automation Engine UI.

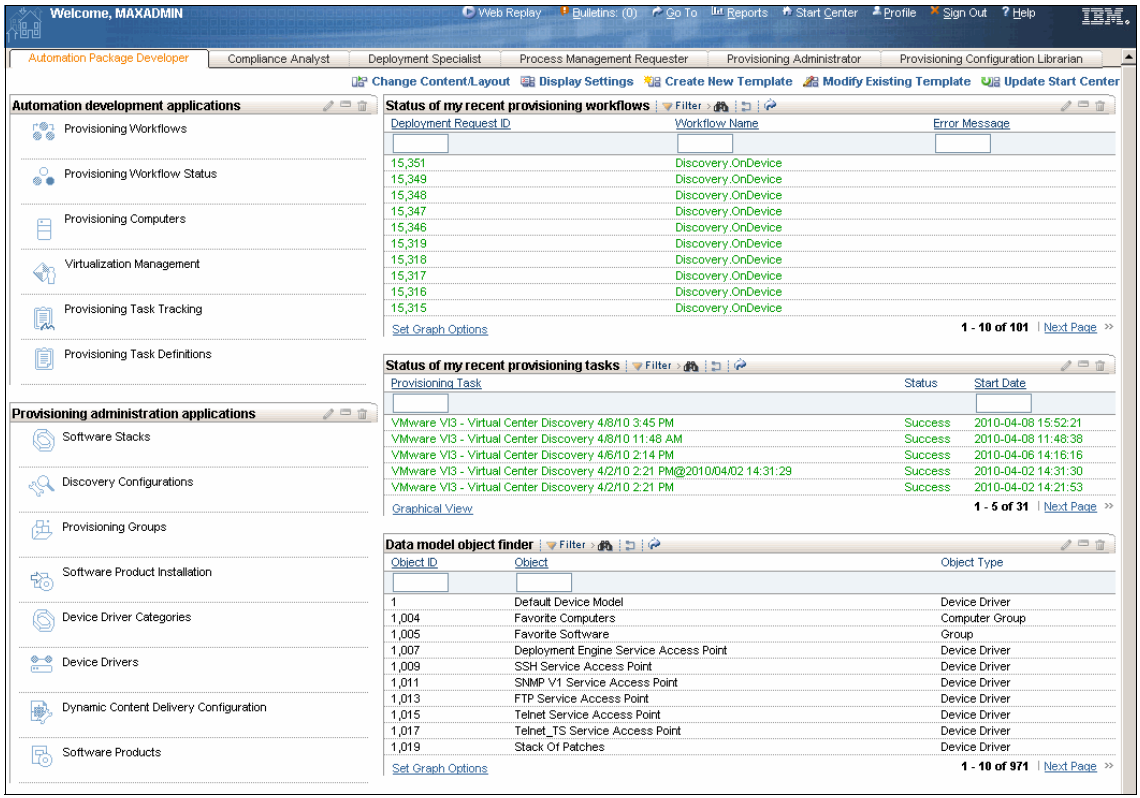


Figure 3-7 The Tivoli Process Automation Engine UI

The Tivoli Process Automation Engine UI is commonly referred to by the name of the application running under the Tivoli Process Automation Engine.

3.2.4 IBM Tivoli Provisioning Manager

IBM Tivoli Provisioning Manager (TPM) is a process management product that runs on the Tivoli Process Automation Engine framework. Tivoli Provisioning Manager provides the following capabilities:

- Provisions servers, networks, storage, and software

- Automates best practices of common data center activities
- Discovers and tracks data center resources
- Distributes software and manages patches
- Enforces enterprise software compliance policy
- Interacts with various virtualization technologies to automate the provisioning of virtualized environments

Tivoli Provisioning Manager is used to automate best practices for the provisioning of cloud-based service offerings. Provisioning activities can be connected and supported by change and release management processes, thereby optimizing efficiency, accuracy, and service delivery.

Tivoli Provisioning Manager can also be used to discover and track data center resources to enable highly accurate server provisioning and software deployments.

The main role of Tivoli Provisioning Manager, when used in the IBM CloudBurst context, is to provide the following functions:

- Discover VMware templates from VirtualCenter
- Trigger cloning of virtual machines
- Identify appropriate templates
- Specify virtual machine hardware properties
- Perform post-cloning configuration of deployed virtual machines
- Assign host names and IP addresses
- Configure networking
- Change passwords
- Configure authentication for interaction with virtual machines
- Install the IBM Tivoli Monitoring (ITM) agent
- Trigger the removal of virtual machines

3.2.5 IBM Tivoli Usage and Account Manager

As part of IBM Service Delivery Manager, IBM Tivoli Usage & Accounting Manager (ITUAM) provides the ability to allocate costs or chargeback based on service request metrics collected by IBM Tivoli Service Automation Manager. Predefined reports are provided to track these costs by user, business unit and so on:

- Provide usage and accounting functionality
- Process information about provisioned and de-provisioned virtual images
- Prepare data for invoice reporting

The main role of Tivoli Usage & Accounting Manager, when used in the IBM CloudBurst context, is to provide the following functions to improve IT financial management:

- Keep track of sources of cost by enabling accurate billing for cloud services consumed
- Allocate, track, and invoice based on real usage
- Maintain multiple criteria for charging based on department, user, or project
- Interface with IBM Tivoli Service Automation Manger to collect project resource usage information of service instances over time, about virtual machine, processor and memory

When Tivoli Usage & Accounting Manage is used in the CloudBurst context to access usage and accounting reports, you can use the Tivoli Service Automation Manager administrative UI. See Figure 3-8.

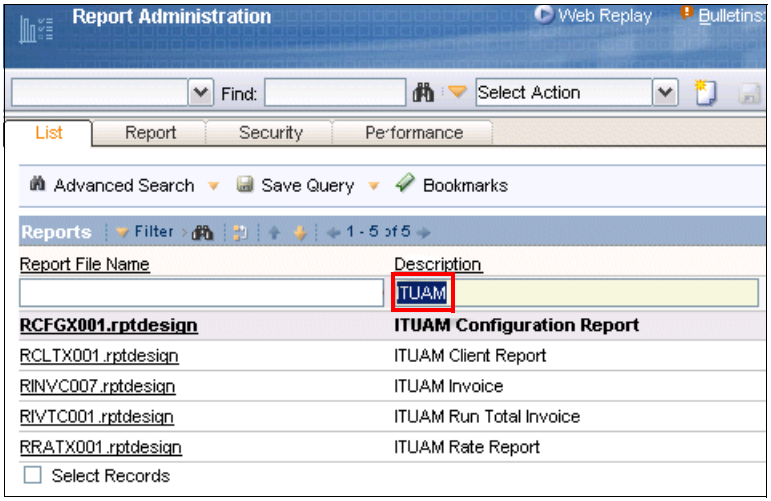


Figure 3-8 Tivoli Usage and Account Manager UI viewed with Tivoli Service Automation Manager

The following default reports are available:

- Configuration Report (RCFGX001.rptdesign)

  Contains information about report configuration

- Client Report (RCLTX001.rptdesign)

  Lists all clients registered in the Tivoli Usage and Accounting Manager database

- Invoice (RINVC007.rptdesign)

  Displays key accounting information, such as the number of server hours, memory hours, and processor hours, multiplied by the defined rate for each account code

- Run Total Invoice (RIVTC001.rptdesign)

  Displays the number of server hours, memory hours, and processor hours consumed by the entire infrastructure

- Rate Report (RRATX001.rptdesign)

  Lists the rates as defined in the Tivoli Usage and Accounting Manager database

Using the native Tivoli Usage & Accounting Manage UI, the usage and accounting reports can be customized, as shown in Figure 3-9.

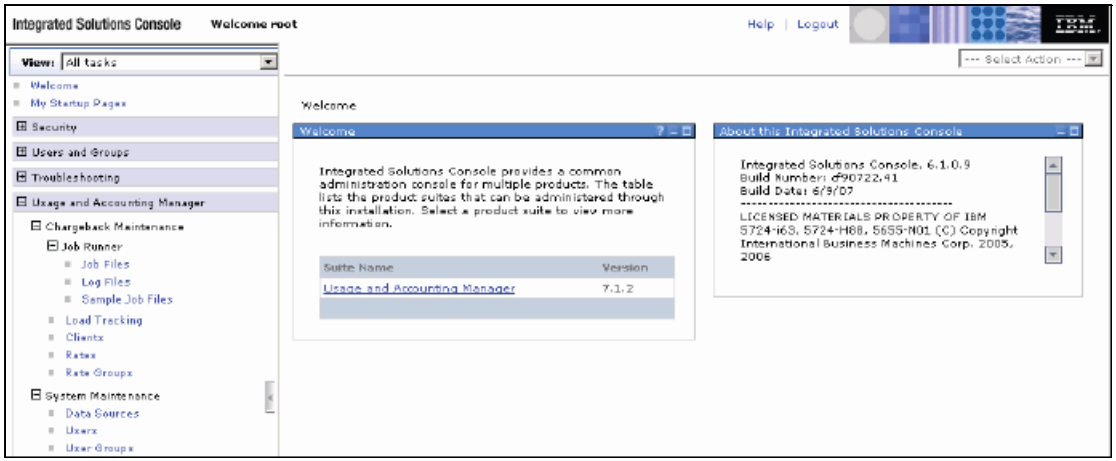


Figure 3-9 Native Tivoli Usage and Accounting Manager UI

3.2.6 IBM Tivoli Monitoring

IBM Tivoli Monitoring (ITM) provides availability monitoring of servers and applications. It offers a lightweight and scalable architecture, a data warehouse for storage or historical data, and advanced reporting capabilities.

Resource metrics managed by Tivoli Monitoring can be used to manage and measure the health and availability at each level of resources used to create cloud-based service offerings, that is, at the infrastructure, virtualization layer, andelement manager. It can also be used inside managed virtual guest systems to manage all levels of a system stack, that is, the operating system, middleware,

and application layers. All metrics can be combined into a portal view, available to many operational roles or consumer views.

When used in the context of the IBM CloudBurst software stack, IBM Tivoli Monitoring provides monitoring capabilities for:

- Cloud management infrastructure (IBM CloudBurst software stack)
- Provisioned virtual images (provides operating system-based usage metrics to the self-service UIs about memory, disk, and processor)

Figure 3-10 illustrates how the Tivoli Service Automation Manager self-service UI displays high-level monitoring data (memory, processor and disk percentages) about a deployed virtual machine.

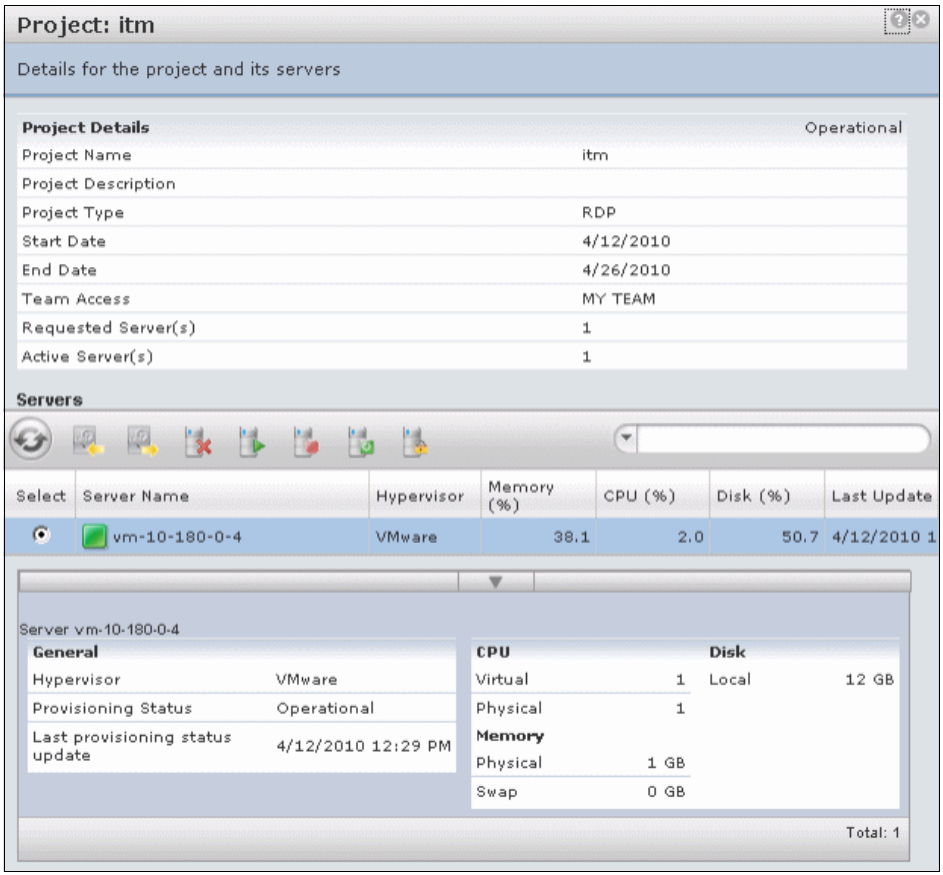


Figure 3-10 Tivoli Monitoring provides high level monitoring

Tivoli Monitoring provides the Tivoli Enterprise Portal Server (TEPS) as its interface. By providing a consolidated view of your environment, the Tivoli

Enterprise Portal Server permits you to monitor and resolve performance issues throughout the enterprise. By using Tivoli Enterprise Portal Server, you can display detailed monitoring data collected from agents. See Figure 3-11.

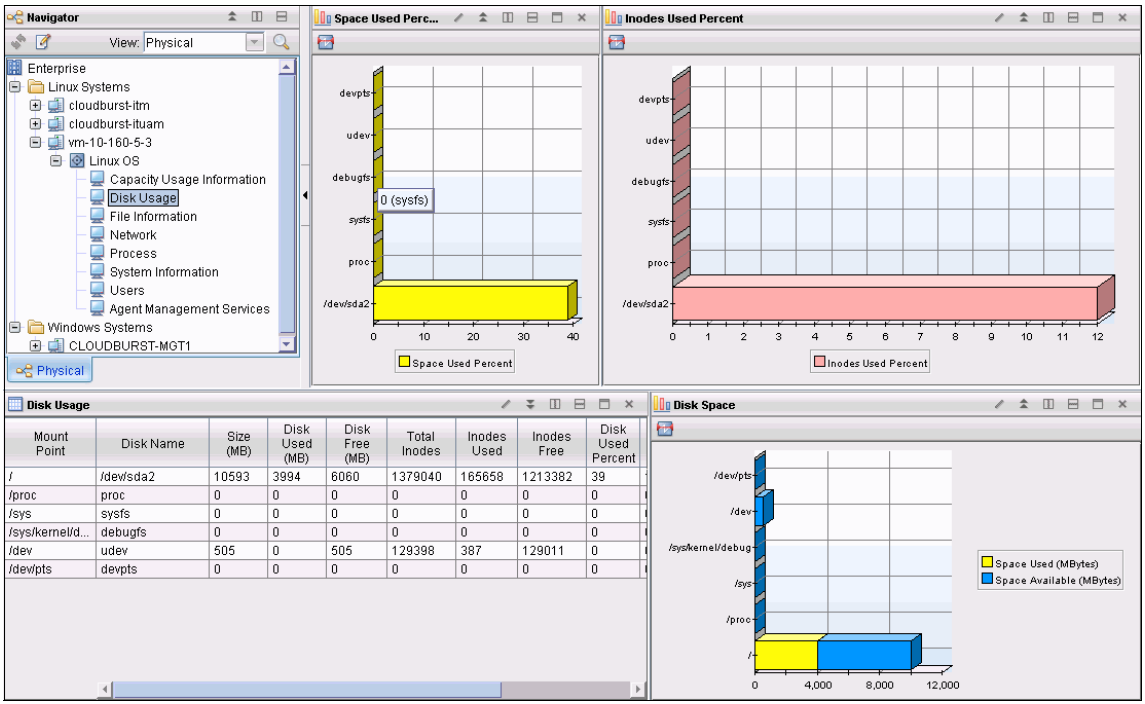


Figure 3-11 Tivoli Enterprise Portal interface to IBM Tivoli Monitoring

IBM CloudBurst for System x software includes the stand-alone version of IBM Tivoli Monitoring to monitor the enterprise environment in the areas of:

- Monitoring IBM Service Delivery Manager systems (Monitoring Agent for Linux OS):
  - Monitors for alerts using predefined or custom situations
  - Establishes custom performance thresholds
  - Uses policies to perform actions and automate manual tasks
- Tracking availability and performance:
  - Built-in agent heartbeat monitoring
  - Displays key performance indicators for resource types
- Extendablility:
  - Requires additional licenses

3.2.7 IBM Tivoli Systems Automation for Multiplatforms

The IBM Tivoli Systems Automation for Multiplatforms (TSA) component ensures high availability and policy-based automation for applications and services across heterogeneous environments by applying advanced clustering technologies.

IBM Tivoli Systems Automation for Multiplatforms delivers advanced policy-based automation to ease operational management of complex IT infrastructures. By applying these policies, Tivoli System Automation for Multiplatforms can initiate, execute, and coordinate the automated starting, stopping, restarting and failing over of individual application components or entire composite applications. Thus it will help reduce the frequency and duration of incidents that impact IT availability.

Tivoli Systems Automation for Multiplatforms provides a standard toolset that supports multiple failover scenarios involving both physical and virtual environments.

The IBM Cloudburst high-availability architecture relies on functions provided by Tivoli Systems Automation for Multiplatforms and on the high-availability features offered by the VMware vCenter. The high availability provided by VMware relies on VMotion and DRS technologies.

IBM CloudBurst for System x using Tivoli Systems Automation for Multiplatforms can be configured in single or dual node high availability mode:

- Single node high availability

  In a single node configuration, Tivoli Systems Automation for Multiplatforms is used to start and stop Tivoli Service Automation Manager, NFS, and HTTP services, but does not provide failover capabilities.

  In the single node configuration, a separate IP address is used as the base address of the Tivoli Service Automation Manager server, and a Tivoli Systems Automation for Multiplatforms service address is used as the primary address of the server. All access to the system is done through the Tivoli Systems Automation for Multiplatforms service address.

  The base address is only used if the Tivoli Systems Automation for Multiplatforms services are not working and for system maintenance.

- Dual node high availability

  In a dual node high availability configuration, two additional servers are added to the reference configuration.

  Figure 3-12 on page 74 illustrates the architecture of the dual node high-availability configuration.

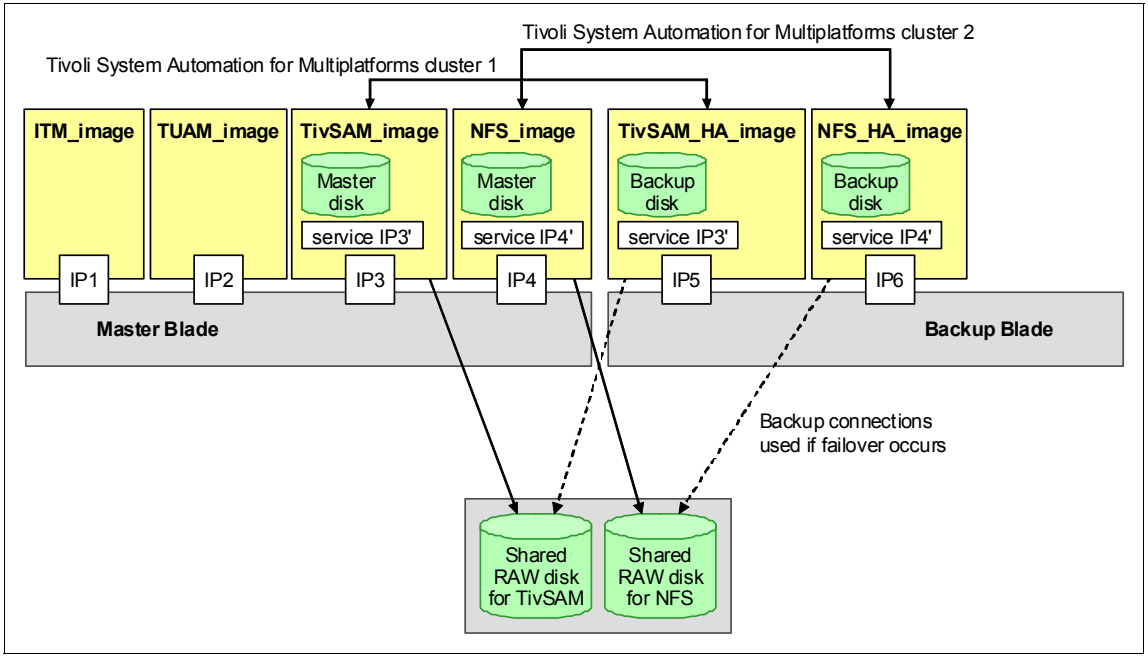


Figure 3-12 Tivoli System Automation for Multiplatforms: dual node high availability configuration

In Figure 3-12, the additional servers are TivSAM-HA and NFS-HA. These servers act as failover servers for the TivSAM and NFS servers, respectively.

In this configuration, Tivoli System Automation for Multiplatforms is used to manage the start and stop of the TivSAM and NFS services and to failover the servers to the HA servers when needed.

Separate Tivoli Systems Automation for Multiplatforms service IP addresses are assigned to the TivSAM and NFS servers. All access to the services provided by these servers is performed through the Tivoli Systems Automation for Multiplatforms service IP address.

A separate base address is assigned to the servers to allow access when the Tivoli Systems Automation for Multiplatforms services are not available and for system maintenance.

When dual node high availability is used in IBM CloudBurst, it provides significant improvements with respect to leveraging the high availability provided by the hypervisor:

- Software component failures

  Tivoli Systems Automation for Multiplatforms can detect and recover from failures of software components by restarting or failing over the software components

  The hypervisor does not detect failures of software components and cannot recover from software

- Hardware component failures

  Tivoli Systems Automation for Multiplatforms can detect blade failures, network failures, disk failures, and recover from these failures

  The hypervisor detects only the outage of a complete server; other hardware error situations such as network failures or disk failure are not detected or recovered

- System automation provides faster recovery

  The VMware solution requires a cold backup

- Tivoli Systems Automation for Multiplatforms provides application start and stop automation

  Restarting the operating system does not guarantee that the service is back up and running

Note: Since Tivoli System Automation for Multiplatforms leverages a shared disk, due to a VMware limitation, it is not possible to take snapshots of a virtual machine.

3.3 IBM CloudBurst software stack architecture

IBM CloudBurst for System x is an appliance that is preinstalled with virtual images containing cloud management software.

Figure 3-13 on page 76 illustrates the products that are part of the software stack deployed in IBM CloudBurst. Four virtual machine images (icb-nfs, icb-tuam, icb-tivsam, and icb-itm) are deployed on the Management Blade. See 2.2.2, “IBM HS22V Blade Servers” on page 39 for more information about the Management Blade.

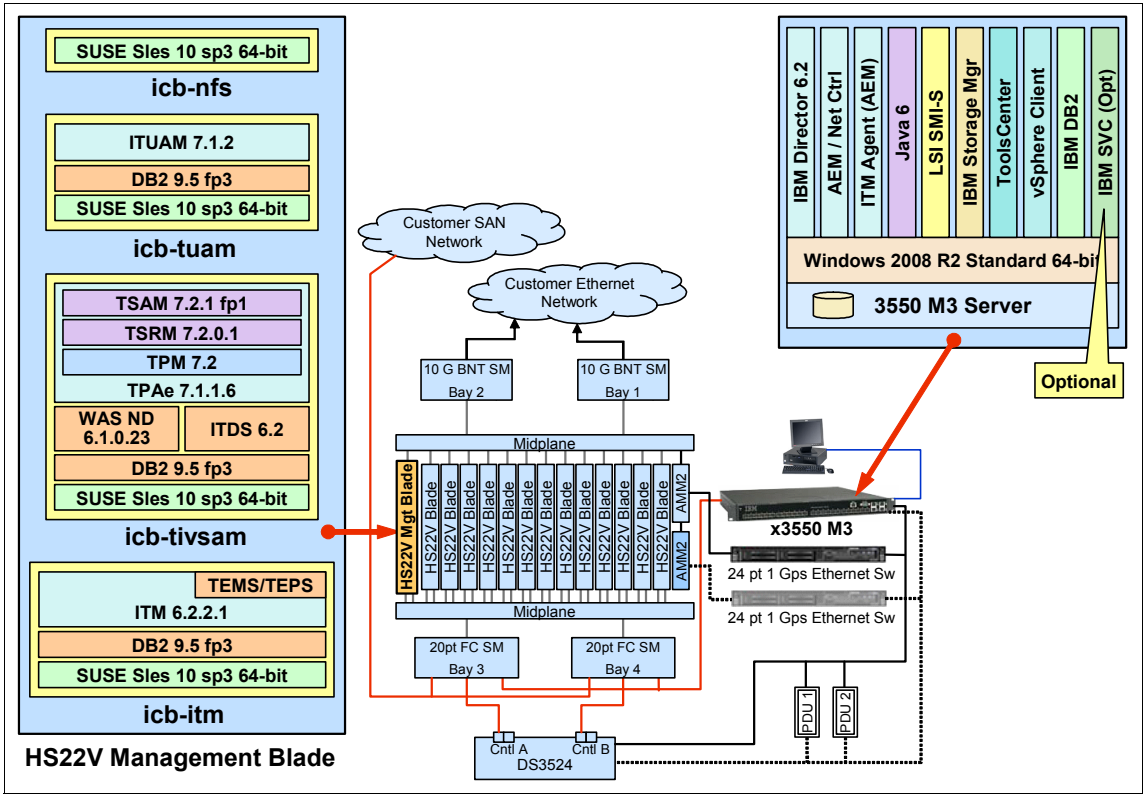


Figure 3-13 CloudBurst software

Note: In a dual node high availability implementation, the NFS (icb-nfs) and Tivoli Service Automation Manager (icb-tivsam) images are duplicated.

Based on the different hardware configurations supported in CloudBurst for System x (see Chapter 2, “CloudBurst hardware” on page 37), the provisioning nodes are part of a VMware cluster named *CloudBurst-Cluster*.

Because of a VMware vSphere 4.1 limitation with the maximum number of physical servers that can be assigned to a VMware vSphere cluster, with IBM CloudBurst extra-large configuration, two VMware clusters are defined *CloudBurst-Cluster* and *CloudBurst-Cluster1*.

3.3.1 Service automation image—icb-tivsam

This virtual machine is the core component of the IBM CloudBurst System x software stack solution. It runs the software to create, destroy, modify, and manage the virtual machines in the cloud.

The software installed on this virtual machine includes:

- Tivoli Service Automation Manager 7.2.1 Fix Pack 1
- Tivoli Service Request Manager 7.2.0.1
- Tivoli Provisioning Manager version 7.2
- DB2 ESE 9.5 Fix Pack 3
- WebSphere® Network Deployment 6.1.0.23
- Tivoli Directory Server 6.2
- IBM HTTP Server 6.1.0.23
- Tivoli System Automation for Multiplatforms 3.1.0.6

3.3.2 Monitoring image—icb-itm

This virtual machine is the monitoring engine of the solution. The software installed on it monitors the cloud management infrastructure and the provisioned virtual machines. These monitoring capabilities include:

- Disk usage
- File information
- Network information
- Processes

The software installed on this virtual image includes:

- Tivoli Enterprise Monitoring Server 6.2.2 Fix Pack 1
- Tivoli Enterprise Portal Server 6.2.2 Fix Pack 1
- IBM DB2 ESE 9.5 Fix Pack 3

One or more IBM Tivoli Monitoring agents are installed on each IBM CloudBurst for System x virtual image.

icb-itm

The virtual machine has the following components:

- lz: Monitoring Agent for Linux OS
- sy: Summarization and Pruning Agent
- hd: Warehouse Proxy
- ud: Monitoring Agent for DB2

Note: Both agents sy and hd are used to exploit the IBM Tivoli Monitoring Warehouse integration (Data Warehouse solution is already present in the customer environment) gathering historical information.

icb-nfs

The virtual machine has the following components:

- lz: Monitoring Agent for Linux OS

icb-tuam

The virtual machine has the following components:

- lz: Monitoring Agent for Linux OS
- ud: Monitoring Agent for DB2

icb-tivsam

The virtual machine has the following components:

- lz: Monitoring Agent for Linux OS
- ud: Monitoring Agent for DB2
- pe: Monitoring Agent for Tivoli Provisioning Manager

3.3.3 Usage and Accounting image—cb-tuam

This virtual machine is the usage and accounting engine for the solution. The software installed here is in charge of processing the information about provisioned and de-provisioned virtual machines and preparing the data for invoice reporting. The software installed on this virtual machine consists of:

- Tivoli Usage and Accounting Manager 7.1.2
- DB2 ESE 9.5 Fix Pack 3

3.3.4 File repository, mail server, and URL redirection image—icb-nfs

The purpose of this machine is to provide the following functions:

- File repository: The virtual image stores the binary files used by Tivoli Service Automation Manager to deploy the Tivoli Monitoring agents on a provisioned virtual machine.
- Mail server: Supports the Tivoli Service Automation Manager notification system.
- URL redirection: This virtual machine is the single access point to IBM Tivoli Usage and Accounting Manager, IBM Tivoli Service Automation Manager,

and IBM Tivoli Provisioning Manager UIs. You can use its IP address and host name in a web browser to access all three UIs, rather than using individual IP addresses and host names for each.

The software installed on this machine consists of:

- IBM HTTP Server 7.0 with WebSphere 7.0 Plug-in
- Tivoli System Automation for Multiplatforms 3.1.0.6

To exploit the file repository role, a network file system server and a SAMBA server are also running on this virtual machine.

3.3.5 Dual node high availability

Optionally, if your solution has the high availability feature implemented, there are two additional virtual images added to the CloudBurst architecture. The high availability function is supported only for the Tivoli Service Automation Manager and NFS virtual images.

icb-nfs-ha

This virtual machine can be optionally installed if you want to exploit high availability for icb-nfs and its services. Its software stack is identical to icb-nfs. Tivoli System Automation for Multiplatforms is responsible for managing high availability.

icb-tivsam-ha

This virtual machine can be optionally installed if you want to exploit high availability for icb-tivsam and its services. Its software stack is identical to icb-tivsam. Tivoli System Automation for Multiplatforms is responsible for managing the high availability.

These virtual machines are running SUSE Linux Enterprise Server 10 Service Pack 3 64 bit.

3.4 IBM CloudBurst for System x management software

IBM CloudBurst for System x is preinstalled with the software necessary to manage the hardware and virtual resources. This software is preinstalled on the System x3550 M3 Management Server. For more information about the Management Server, see 2.2.3, “IBM System x3550 M3 Management Server” on page 40.

Figure 3-14 on page 80 illustrates the capabilities that are delivered as part of the preinstalled solution.

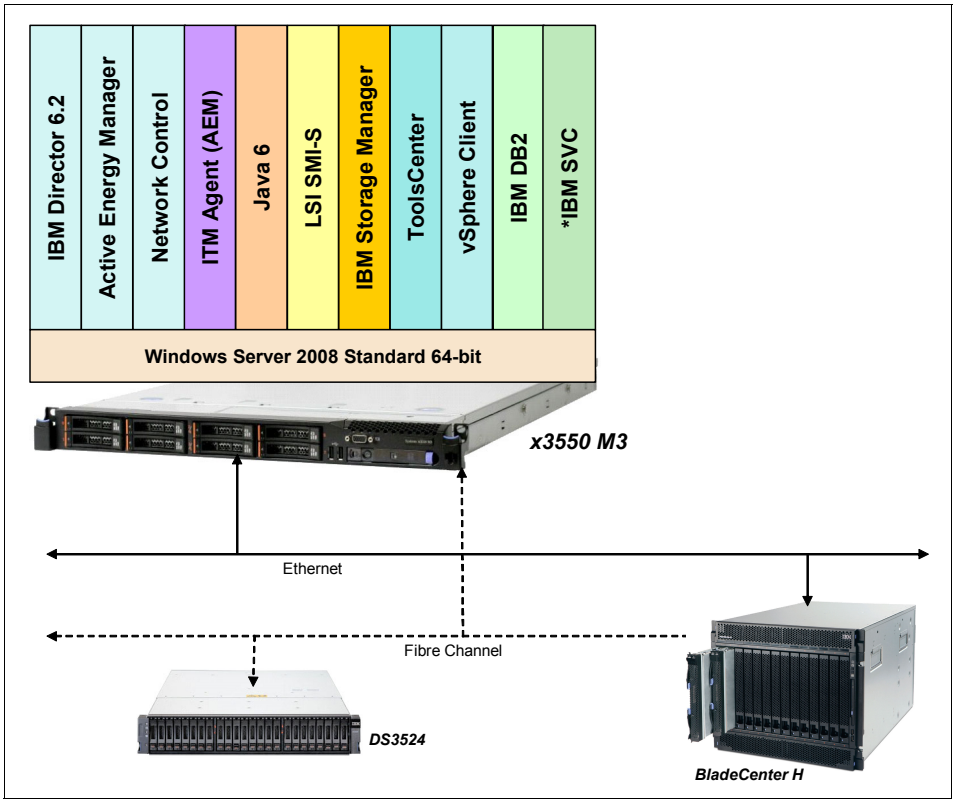


Figure 3-14 Capabilities of the CloudBurst on System x management software

The following list provides the hardware management software installed on the System x3550 M3 Management Server:

- Microsoft Windows Server 2008 R2 Enterprise Edition (64-bit)
- IBM Systems Director V6.2:
  - Active Energy Manager v4.3
  - Network Control 1.2
- BACS3 Version 12.4.5.0
- IBM System Storage® DS® Storage Manager v10.70:
  - Manages DS3542
  - Can be used to create or recreate logical drives
  - Used when adding storage capacity to CloudBurst

- Tools Center:
  - Bootable Media Creator 2.0
  - Advanced Setup Utility 3.5
  - Dynamic Systems Analysis 3.0
  - UpdateXpress System Pack Installer 4.0
- IBM DB2 Enterprise Server Edition V9.5 FP5
- LSI Eagle2 SMI-S provider:
  - Integrates IBM Systems Director with DS3542
- VMware vSphere Client 4.1

3.4.1 IBM Systems Director

IBM Systems Director is a platform management foundation that streamlines the way physical and virtual systems are managed across a multi-system environment. Leveraging industry standards, Systems Director supports multiple operating systems and virtualization technologies across IBM and non-IBM platforms. IBM Systems Director is an easy-to-use, point-and-click, simplified management solution. Through a single browser-based UI, Systems Director provides consistent views for visualizing managed systems and determining how these systems relate to one another while identifying the individual status of each.

IBM Systems Director is a platform management solution that utilizes a modular and extensible platform services foundation, which provides a way to add advanced platform management capabilities to the base offering. Advanced platform management functions can be added using plug-ins as they are required.

IBM Systems Director unifies the management of IBM systems, delivering a consistent look and feel for common management tasks, and integrates the IBM best-of-breed virtualization capabilities to provide new and radically improved ways to simplify the management of physical and virtual platform resources.

Systems Director provides multi-system support for IBM Power Systems™, Systems x, BladeCenter, System z, and Storage Systems, enabling seamless integration of IBM systems with the total infrastructure. Systems Director also manages non-IBM x86-based systems through a dedicated agent.

IBM Systems Director itself can be divided into two areas: Base Systems Director Managers and Hardware Platform Managers. Provided with IBM Systems Director, these managers deliver core capabilities for managing the full lifecycle of IBM server, storage, network, and virtualization systems.

Figure 3-15 on page 82 illustrates how the IBM System Director displays hardware inventory results.

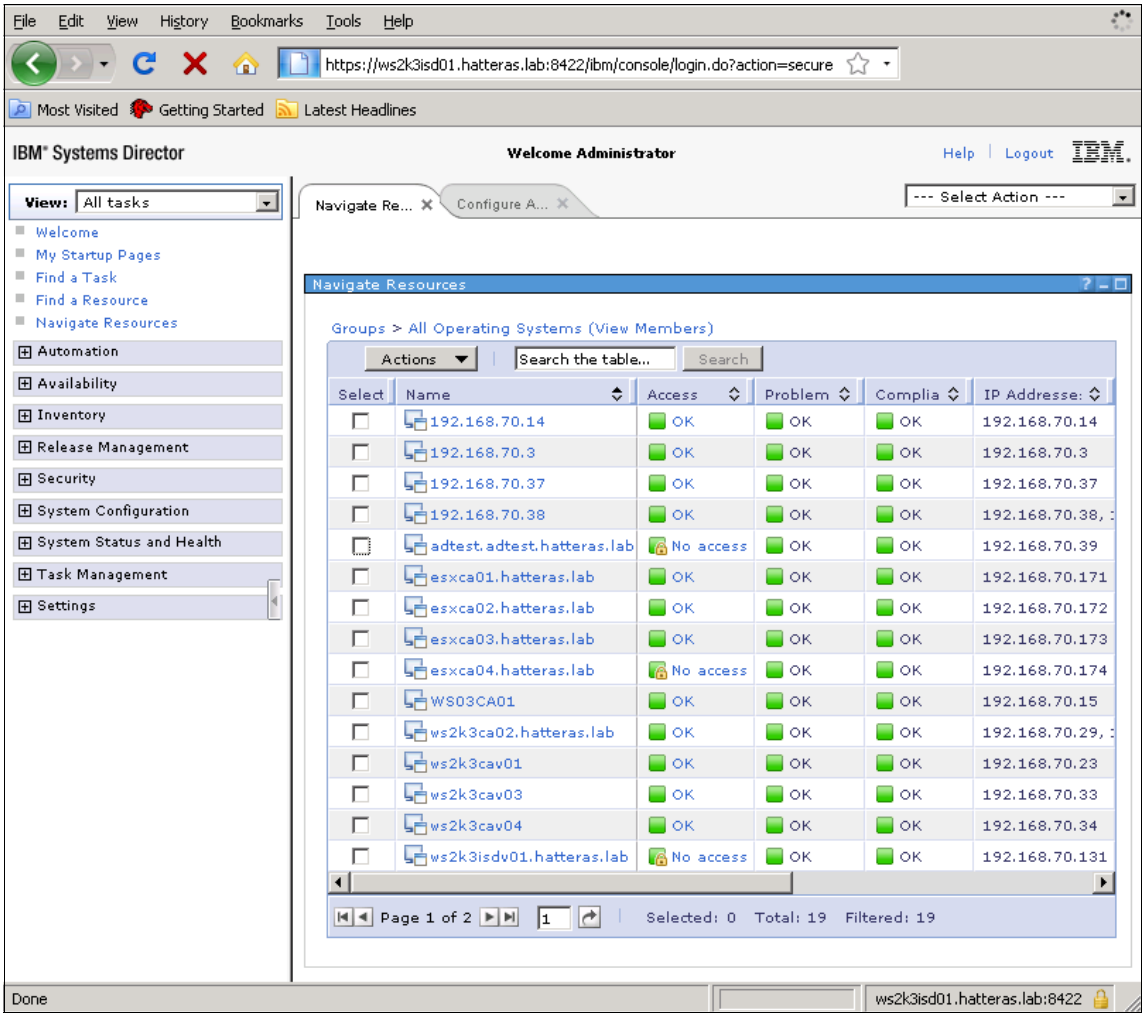


Figure 3-15 IBM Systems Director hardware inventory results

IBM Systems Director discovers, monitors, manages, and troubleshoots IBM CloudBurst for System x hardware infrastructure.

IBM Systems Director enables you to extend the base platform with additional plug-ins that are separately installed. The plug-ins used with IBM CloudBurst for System x are:

- Active Energy Manager

- Network Control

Figure 3-16 on page 83 displays the IBM Systems Director plug-ins.

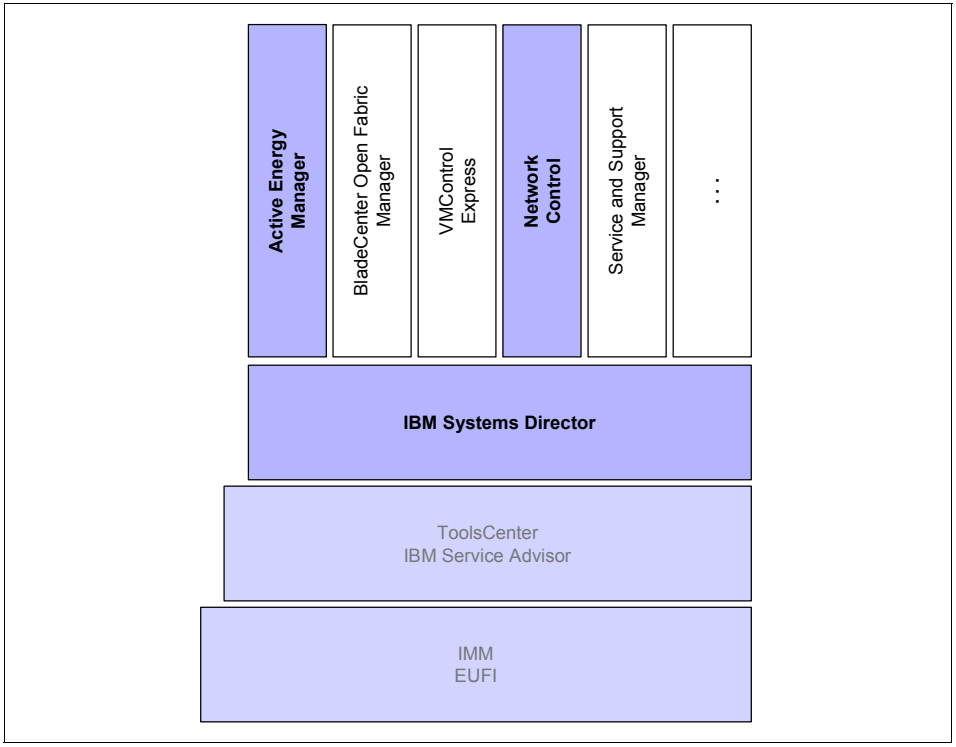


Figure 3-16 IBM Systems Director plug-ins

IBM Systems Director Active Energy Manager measures, monitors, and manages the energy components built into IBM systems, enabling a cross-platform management solution, while also extending the scope of energy management to include facility providers, thus enabling a more complete view of energy consumption within the data center. Active Energy Manager supports monitoring and management of System x and BladeCenter servers and Power Systems, System z, and PDUs and datacenter equipment and sensors.

Active Energy Manager, used in the context of IBM CloudBurst for System x, collects alerts, events, and data that is related to energy and cooling equipment. It is integrated with the IBM Tivoli Monitoring application on the CloudBurst stack to provide you with real-time and trending intelligence about power and cooling.

The cloud administrator can manage the cloud environment from an energy utilization perspective using Tivoli Monitoring for Energy Management in connection with IBM Systems Director Active Energy Manager.

With this energy management software, the cloud administrator can:

- Monitor real-time energy data
- Define automation that detects power-related error situations based on events and monitored data
- Collect and analyze historical information about the infrastructure power utilization

The Active Energy Manager agent provides energy status and data to the IBM Tivoli Monitoring software to enable the identification of common problems, notification, and problem resolution. The energy status and data information gathered by the agent can be viewed from the Tivoli Enterprise Portal using all of the features and functions it provides. The Active Energy Manager agent provides predefined Tivoli Enterprise Portal workspace for monitoring common energy data.

Figure 3-17 illustrates IBM System Directors showing power data.

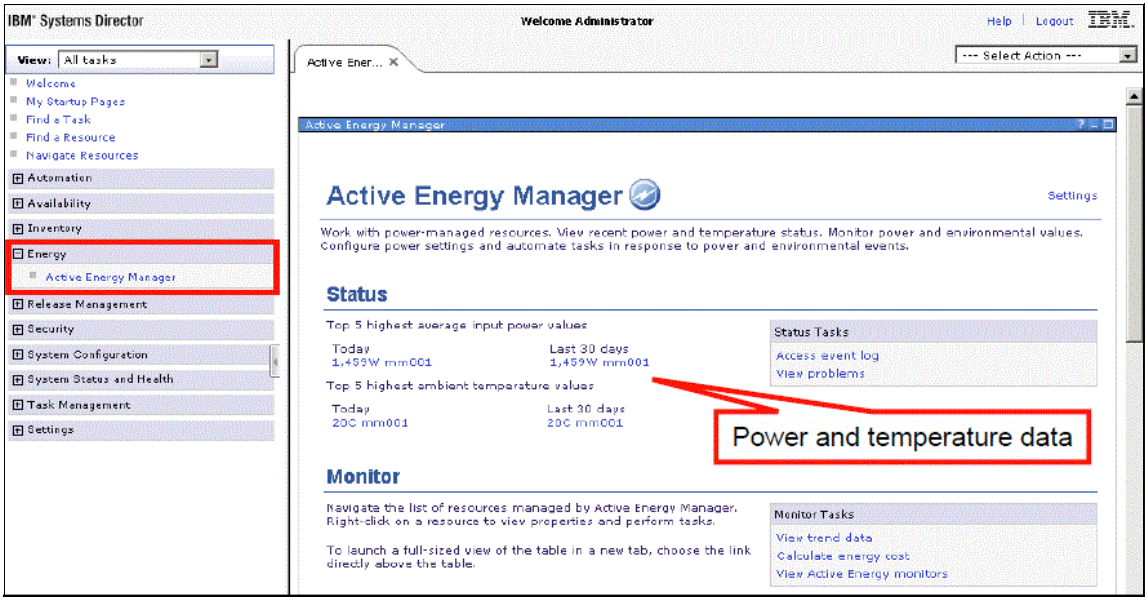


Figure 3-17 IBM Systems Director display of power and temperature data

Figure 3-18 on page 85 illustrates IBM Tivoli Monitoring showing power data.

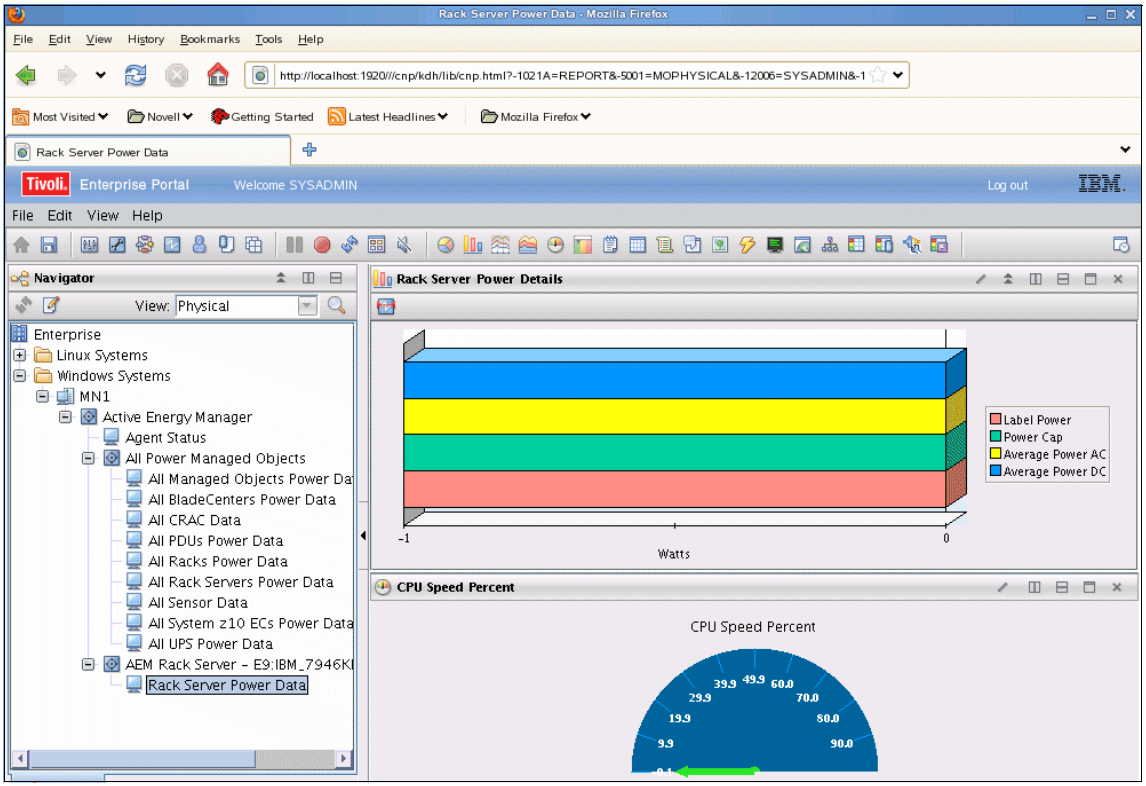


Figure 3-18 IBM Tivoli Monitoring display of power data

IBM Systems Director Network Control provides advanced network management functions for network devices. Functions include discovery, inventory, network topology, health and status monitoring, and configuration of network devices.

You can use IBM Systems Director Network Control to:

- Discover network devices in your environment
- Review your network device inventory in a tabular or network topology view
- Launch tasks to configure and manage Brocade hardware in IBM System Storage Data Center Fabric Manager (DCFM)
- Monitor the health and status of network devices
- Manage devices by groups: Ethernet switches, Fibre Channel over Ethernet, or Subnet
- View network device configuration settings, and apply templates to configure devices, including Converged Enhanced Ethernet quality of service (QoS), VLANs, and Link Layer Discovery Protocol (LLDP)

- View systems according to VLAN and subnet
- Run network diagnostic tools, for example, **`ping`** and **`traceroute`**

For more information about IBM Systems Director, see IBM Director V6.2.x at

http://publib.boulder.ibm.com/infocenter/director/v6r2x/index.jsp?topic=%2Fcom.ibm.director.main.helps.doc%2FfqmO_main.html

4

Initial setup

This chapter describes a selection of initial set up tasks that might be performed when a Cloudburst for System x environment is installed. We discuss:

- 4.1, “Creating operating system templates” on page 88
- 4.2, “Installable software” on page 103
- 4.3, “Reporting” on page 124
- 4.4, “Self-service UI customization and REST API usage” on page 139
- 4.5, “Modifying for branding” on page 151
- 4.6, “Customizing email notification templates” on page 166
- 4.7, “Lifecycle of provisioning a project” on page 170

4.1 Creating operating system templates

This section describes how to create Windows- and Linux-based operating system (OS) templates to use with CloudBurst. To begin, create your templates in line with the guidelines outlined in the Tivoli Service Automation Manager information center located at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp?topic=%2Fcom.ibm.tsam_7.2.2.doc%2Frdp%2Fc_supported_os_vmware.html

Remember that:

- To work with VMware templates, you must have the VMware Tools package installed.
- Do not create or use templates that have a MAC address that is set manually. In CloudBurst, each MAC address must be unique. MAC addresses created manually for VMware virtual servers are not supported. When copying a template with a manually set MAC address to another ESX or VirtualCenter, ensure that you edit the manual MAC address to a new unique address or set it to automatic. Figure 4-1 shows this process.
- Even when automatic MAC generation is set, the same MAC address might be generated for two templates. Ensure that the MAC address is unique for each template.
- Only virtual images without snapshots can be used. Existing snapshots must be integrated before the virtual image is converted to a template.
- Only virtual images with one hard disk configured can be deployed.

Figure 4-1 shows the automatic selection of a MAC address.

Figure 4-1 Automatic MAC address in VMware

Supported operation systems in CloudBurst 2.1 are:

- Red Hat Enterprise Linux 5.3, 5.4
- CentOS 5.3, 5.4
- SUSE Linux Enterprise Server 10.2, 11
- Microsoft Windows XP, 7, 2003, 2008

4.1.1 Creating Microsoft Windows-based templates

This section describes how to create and configure Windows-based OS templates to use with CloudBurst.

To create and configure Windows-based OS templates to use with CloudBurst:

1. From the VMware infrastructure client, click **Inventory** → **Hosts and Clusters**.
2. Select the first ESX server from the **CloudBurst-cluster**.
3. Click **File** → **New** → **Virtual Machine** to create a new virtual machine.
4. Install the Windows OS on the virtual machine with the minimum requirements for disk space and memory. During provisioning, CloudBurst automatically extends the virtual machine disk partition to the size indicated in Table 4-1.

Table 4-1 Minimum resources for the virtual machine

Windows OS	Memory	Disk space
WinXP 32 bit	128 MB	5 GB
WinXP 64 bit	256 MB	6 GB
Win7 32 bit	1 GB	16 GB
Win7 64 bit	2 GB	20 GB
Win2003	256 MB	3 GB
Win2008	512 MB	16 GB

5. Copy the Microsoft Sysprep tools files to the `C:\ProgramData\VMware\VMware VirtualCenter\Sysprep` directory on the vCenter Server machine. Microsoft includes the Sysprep tool set on the Windows installation CDs and distributes Sysprep on the Microsoft web site. Figure 4-2 on page 90 shows the Sysprep directory for the vCenter Server.

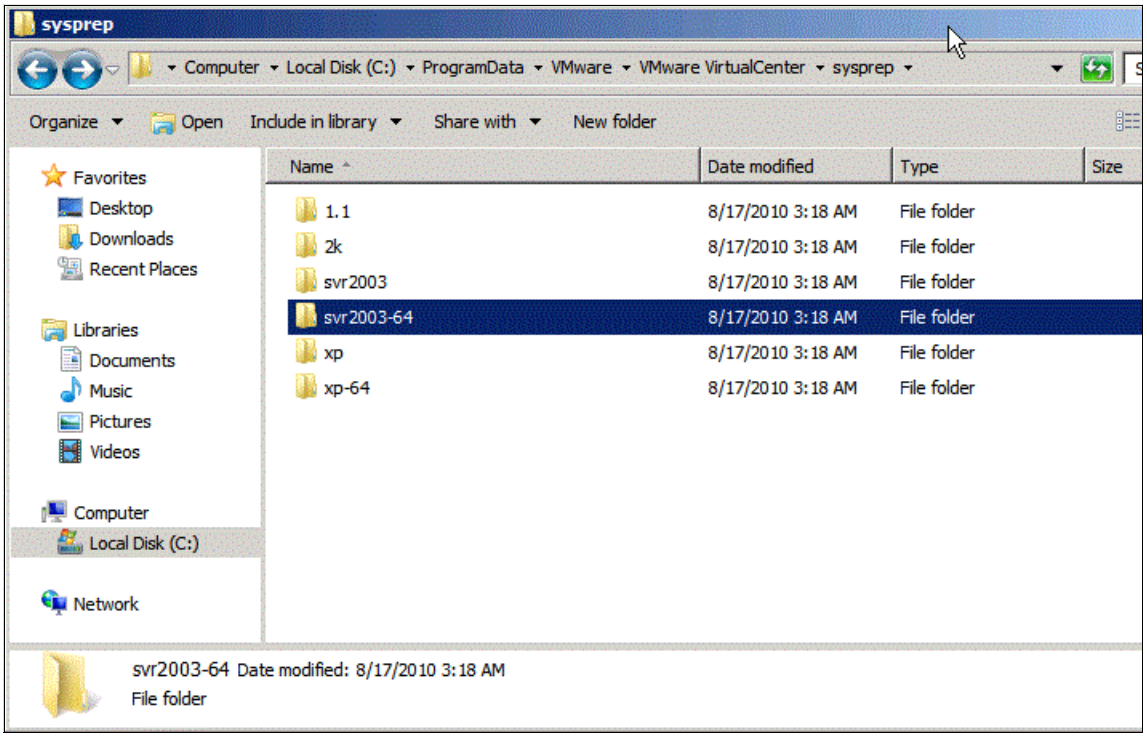


Figure 4-2 Sysprep directory on the vCenter server

6. Install VMware tools on the Windows virtual machine image by opening a console on the newly created virtual machine and selecting **VM** → **Guest** → **Install/Update VMware tools**.
7. Prepare a Cygwin installation file with the name `cloud_cygwin_install.zip`. If this file already exists, continue to Step 8 on page 92:
   a. Go to `http://www.cygwin.com` and download the latest Cygwin installable `setup.exe` file to the `C:\TEMP\CYGWIN` directory. Run it and download at least the following packages (for Windows 2008, download all available packages): `alternatives, ash, base-files, base-passwd, bash, bzip2, coreutils, crypt, csih, cygrunsrv, cygutils, cygwin, cygwin-doc, db, diffutils, editrights, expat, findutils, gawk, gdbm, gettext, grep, groff, gzip, less, libiconv, login, man, minires, ncurses, openssh, openssl, pcre, perl, popt, readline, rebase, run, sed, setup.exe, tar, tcp_wrappers, termcap, terminfo, texinfo, tzcode, unzip, which, zip, zlib`.
   b. When the Cygwin download completes, navigate to the `C:\TEMP\CYGWIN` directory. There will be a subdirectory named after the URL of the mirror

chosen during the install. Change to that directory, as shown (as an example) in Figure 4-3.

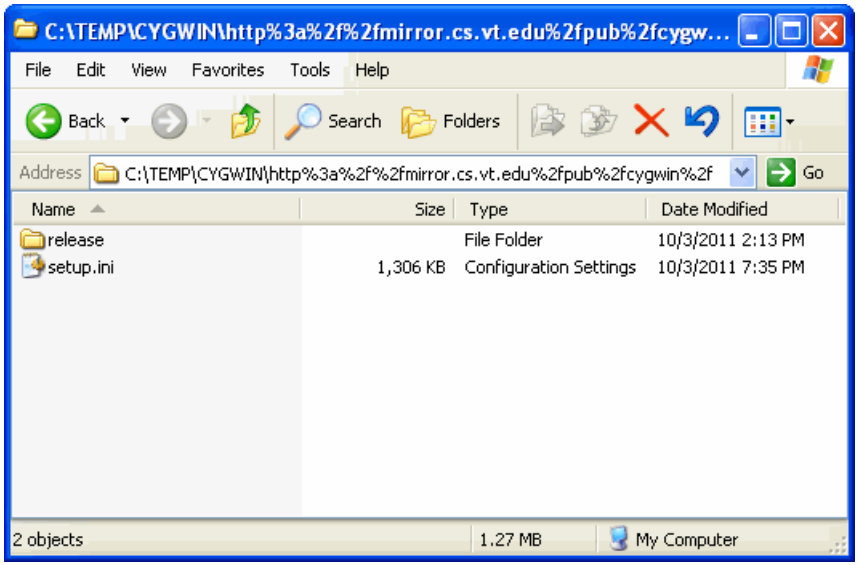


Figure 4-3 Content of the URL directory

c. Copy all files and folders from the URL subdirectory to the `C:\TEMP\CYGWIN` directory.

d. Delete the URL directory from the `C:\TEMP\CYGWIN` directory, as shown in Figure 4-4 on page 92.

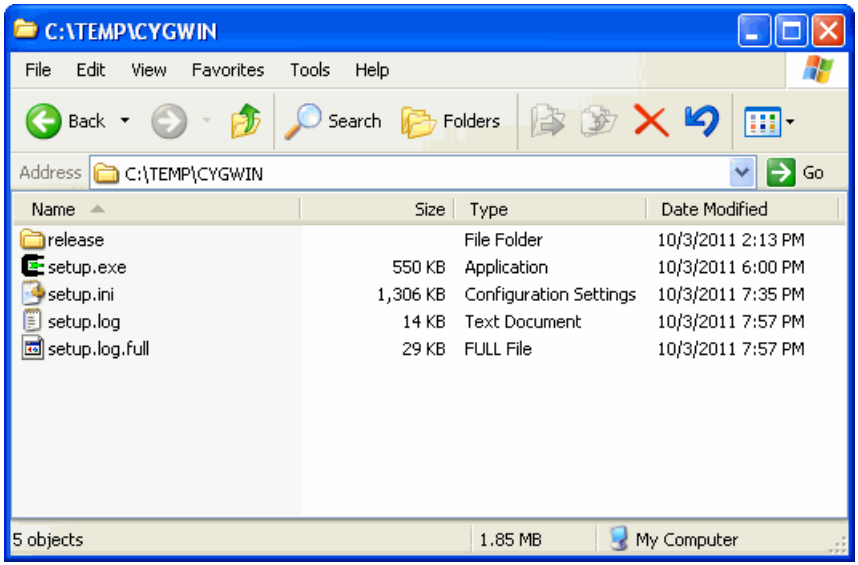


Figure 4-4 Cygwin folder for Windows installation

e. Compress the contents of the `C:\TEMP\CYGWIN` directory to create the compressed file, `cloud_cygwin_install.zip`.

8. Copy and unzip `cloud_cygwin_install.zip` to the Windows virtual machine root directory (`C:\`). The `C:\TEMP` directory contains a `CYGWIN` folder with the CloudBurst specific files shown in Figure 4-5 on page 93.

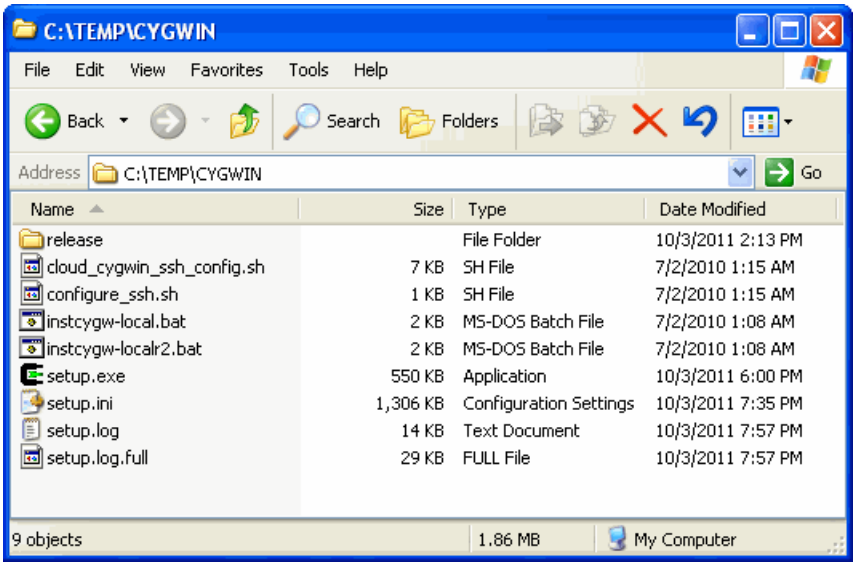


Figure 4-5 Cygwin folder with CloudBurst specific files

9. Copy and unzip the file `cloudPostinstallWindows.zip`, located in `/opt/IBM/tsam/files/` on the Tivoli Service Automation Manager server, to the root directory (`C:\`) of the Windows virtual image. Ensure that the contents of the `C:\TEMP` directory reflect the contents and structure of the compressed file, as shown in Figure 4-6.

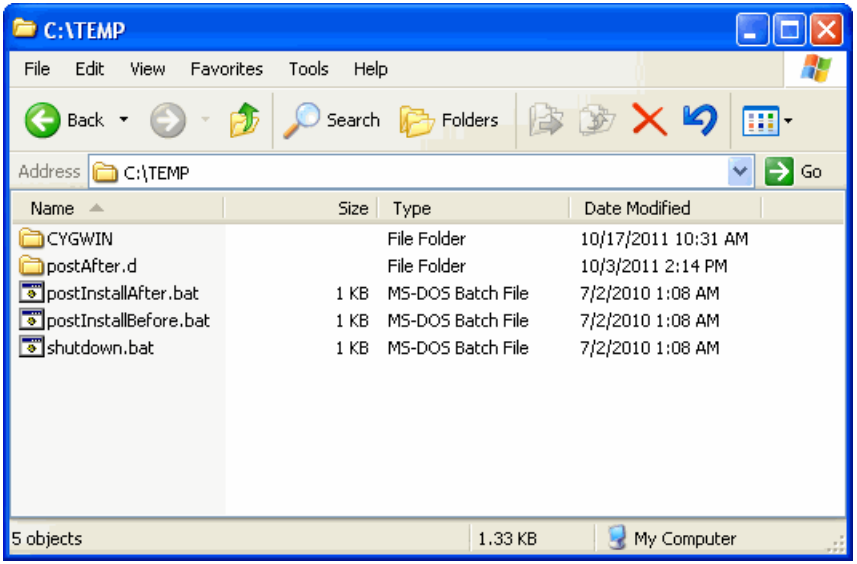


Figure 4-6 C:\TEMP directory for Windows installation

10. Disable the firewall using **Control Panel** → **Administrative Tools** → **Services**.
11. Shut down and power off the virtual machine.
12. From the VMware infrastructure client on the management blade server, right-click the virtual machine, and select **Template** → **Convert to Template**.
13. Follow the wizard instructions, and save the template to the VMware image data store.

With the template created, proceed to 4.1.3, “Creating templates with VMware vCenter Converter” on page 97.

4.1.2 Creating Linux-based templates

This section describes how to create and configure Linux-based OS templates to use with CloudBurst. To begin, create your templates in line with the guidelines outlined in the Tivoli Service Automation Manager information center located at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v1O1r1/index.jsp?topic=%2Fcom.ibm.tsam_7.2.2.doc%2Frdp%2Fc_supported_os_vmware.html.

Ensure that:

- There are no logical volumes on the hard disk.
- Partition one is the boot partition (`/boot`) and partition two the root partition (/).
- The root (/) partition is mountable externally to allow for configuring network settings. Avoid creating a swap partition to reduce provisioning time.
- Image size is reduced as much as possible before making it available for provisioning. Resize the file system to the size of data contained in the image, and resize the image hard disk to the size of the file system.
- The file system on the root partition is `ext3` or `ext4`.
- For SUSE, bootloader is installed in the Master Boot Record (MBR) and not in the partitions.
- Templates are not created with Volume groups during OS installation to avoid provisioning failures.

To create and configure Linux-based OS templates to use with CloudBurst:

1. From the VMware infrastructure client, click **Inventory** → **Hosts and Clusters**.
2. Select the first ESX server from the **CloudBurst-cluster**.

3. Create a new virtual machine.
4. Select the Linux OS.
5. Install the Linux OS on the virtual machine with the minimum requirements. During provisioning, CloudBurst automatically extends the virtual machine disk and file systems to the requested size.
6. Remove the SWAP partition, if any.
7. Carry out the OS-specific steps described in “Creating templates on Red Hat and CentOS Linux” on page 96 or in “Creating templates on SuSE” on page 96, as applicable.
8. Remove all Secure Shell (SSH) keys in the `/root` directory, if any.
9. Remove the SSH host keys, if any, using **`cd /etc/ssh; rm ssh_host*`**.
10. Install VMware tools:
    a. Open a console in the VMware client and navigate to the newly created virtual machine.
    b. From the virtual machine console, select **VM** → **Guest** → **Install/Update VMware tools**.
    c. Open a terminal and access the VMware tools by typing the commands shown in Example 4-1 as `root`.

Example 4-1 Installing VMware tools on a Linux-based system

```
mkdir -p /media/cdrom
mount /dev/cdrom /media/cdrom
ls -l /media/cdrom
cd /root
mkdir temp_vmwtools
cd temp_vmwtools
cp /media/cdrom/vmware-tools-distrib.tar.gz ./
gunzip vmware-tools-distrib.tar.gz
tar -xvf vmware-tools-distrib.tar
cd /vmware-tools-distrib
./vmware-install.pl
```

Your filename for VMware tools can be different than that shown in Example 4-1; however, it will be used again when you execute the third (`ls -l`) command.

    d. Select all of the default options, including the option to configure VMware tools. Wait for the installation to complete.
    e. Again, select **VM** → **Guest** → **End Install VMware tools**.
    f. Clean up the temporary directory using **`rm -rf /root/temp_vmwtools`**.

g. Close the terminal.

11. Shut down the guest OS, and power off the virtual machine.
12. From the VMware infrastructure client, right-click the virtual machine, and select **Template** → **Convert to Template**.
13. Follow the wizard instructions and save the template to the VMware image data store.

Creating templates on Red Hat and CentOS Linux

To create templates on the Red Hat and CentOS systems:

1. Stop the local firewall and set it to a manual start:
   a. As root, run the commands shown in Example 4-2.

   Example 4-2 Disable firewall on RHEL

   ```
   service iptables save
   service iptables stop
   chconfig iptables off
   ```

   b. Set `SELINUX=disabled` in the `/etc/selinux/config` file to disable Security Enhanced (SE) Linux.
2. Remove persistent network interfaces by removing all files matching the token `ifcfg-eth*` in `/etc/sysconfig/network-scripts` directory.
3. For Red Hat Enterprise Linux 5.4 and CentOS 5.4 templates, add the `service network restart` line to the end of the `/etc/rc.local` file.

Creating templates on SuSE

To create templates in a SuSE-specific environment:

1. Stop the local firewall and set it to manual start:
   a. Select **YaST** → **Security and Users** → **Firewall**.
   b. In the Service Start section, set the firewall startup to manual and stop the firewall.
2. Ensure that bootloader is installed in the MBR:
   a. Select **YaST** → **System** → **Boot Loader**.
   b. Click the **Boot Loader Installation** tab, and go to the Boot Loader Location section.
   c. Clear the **Boot from Boot Partition** option.
   d. Select the **Boot from Master Boot Record** option.

3. Remove persistent network interfaces by editing the `30-net_persistent_names.rules` file (for SUSE Linux Enterprise Server 11, edit `70-persistent-net.rules`) in the `/etc/udev/rules.d` directory, and remove all the network entries, leaving only comments.
4. For SUSE Linux Enterprise Server 11, verify that the red prompt is disabled on the terminal. To do so, open the terminal, and if the prompt appears in red, edit `/etc/bash.bashrc` and comment out the `PS1="\[$_bred\]$PS1\[$_sgr0\]"` line.

With the template created, proceed to 4.1.3, “Creating templates with VMware vCenter Converter” on page 97.

4.1.3 Creating templates with VMware vCenter Converter

With VMware vCenter Converter, you can create templates for CloudBurst from Windows- and Linux-based physical machines. This tool is also capable of converting an existing VMware Workstation or other third party images, for example, Microsoft Hyper-V, Microsoft Virtual Server, Microsoft Virtual PC, Parallels Desktop, Symantec Backup Exec System Recovery, Norton Ghost, Acronis, StorageCraft.

To convert a Windows XP physical machine:

1. Download and install a Local installation of the latest version of the Converter from:

   `http://www.vmware.com/products/converter/`

   > **Tip:** Install the tool on a machine from which you can reach both the convertible OS and the CloudBurst management infrastructure, for example, the `mn1.private.ibm.com` management server.

2. Copy the Microsoft Sysprep tool based on the convertible OS to the `%ALLUSERSPROFILE%\Application Data\VMware\VMware vCenter Converter Standalone\sysprep` folder on the converter machine.
3. Run the tool from the Windows Start menu.
4. Click **Convert machine**.
5. Populate the IP address or name, User name, and Password fields, and choose the correct **OS family** in the Source System step.
6. Click **Next.**
7. Click **Yes** for `Automatically uninstall the files when import succeeds.`

8. Type `cn2` as Server, `root` as User name and `Passw0rd` as Password in the Destination System step. See Figure 4-7.

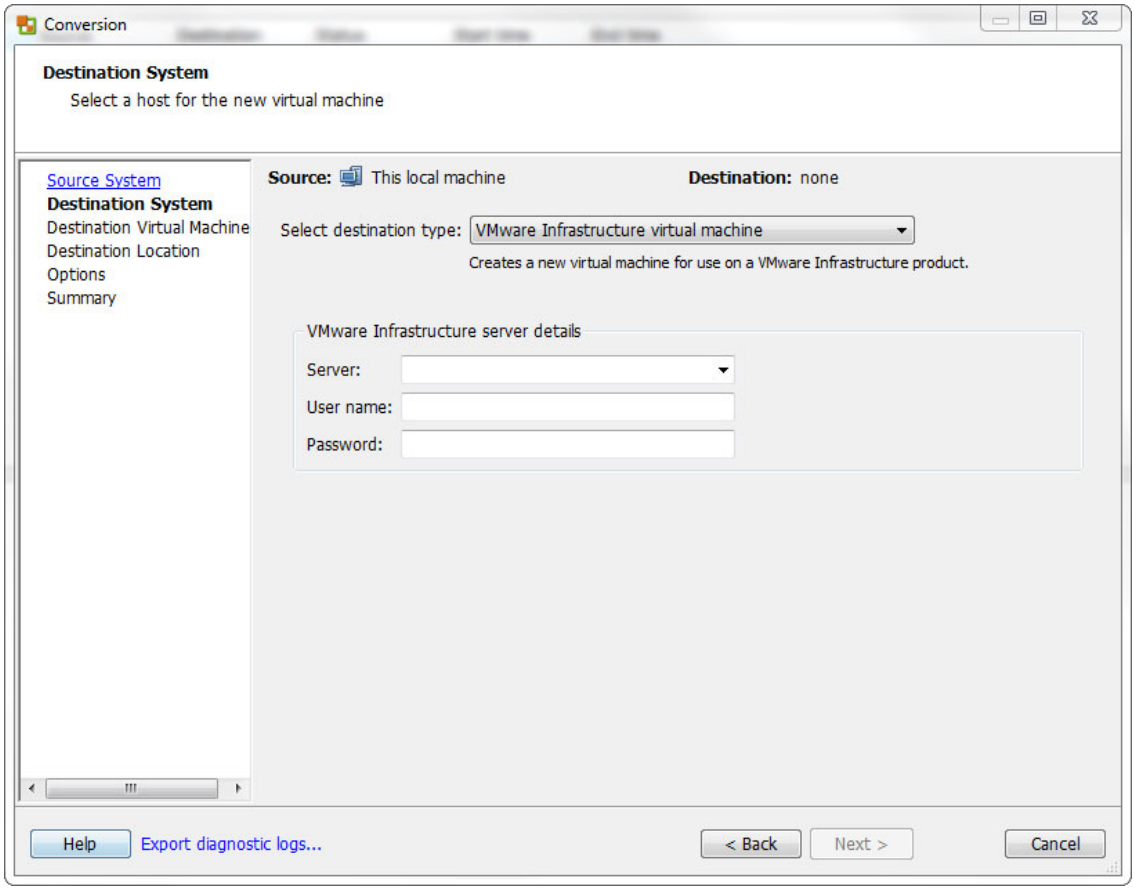


Figure 4-7 Converting a Windows XP physical machine

9. Click **Next**.
10. Type a name for the image in the Destination Virtual Machine step. See Figure 4-7.
11. Click **Next**.
12. Choose `image_repo_disk` as Datastore in the Destination Location step. See Figure 4-7.
13. Click **Next**.
14. Click **Next**.
15. Click **Finish**, and wait until the conversion task is finished.

16. Prepare the guest OS as described in 4.1.1, “Creating Microsoft Windows-based templates” on page 89, and register the image as described in 4.1.4, “Preparing the OS image template for CloudBurst” on page 99.

For other conversions, review the VMware Converter documentation at http://www.vmware.com/support/pubs/converter_pubs.html.

4.1.4 Preparing the OS image template for CloudBurst

After you successfully create the OS template, add it to the CloudBurst stack to be able to use it during provisioning. The steps that follow apply to all operating systems.

Running a Tivoli Provisioning Manager discovery

To discover the created OS templates from the hypervisor environment and add them to the data center model:

1. Log into the Tivoli Service Automation Manager administrative user interface.
2. Click **Go To** → **Service Automation** → **Cloud Pool Administration**.
3. Press Enter to display a list of all available Cloud Pools.
4. Click **VMware System x**.
5. Select the **Cloud Pool Details** tab.
6. Scroll down to the Image Template Discovery section.
7. Click **Image Discovery** to discover new images that were added.

Registering the image with the image library

In this section, we describe how to register the VMware image with the image library.

To register a VMware image:

1. Log in as PMRCDPAUSR to the Tivoli Service Automation Manager Self Service user interface at:

   http://192.168.88.4/SimpleSRM

2. In the Home panel, select **Request a new service** → **Virtual Server Management** → **Manage Image Library** → **Register VMware Image** to display the screen in Figure 4-8 on page 100.

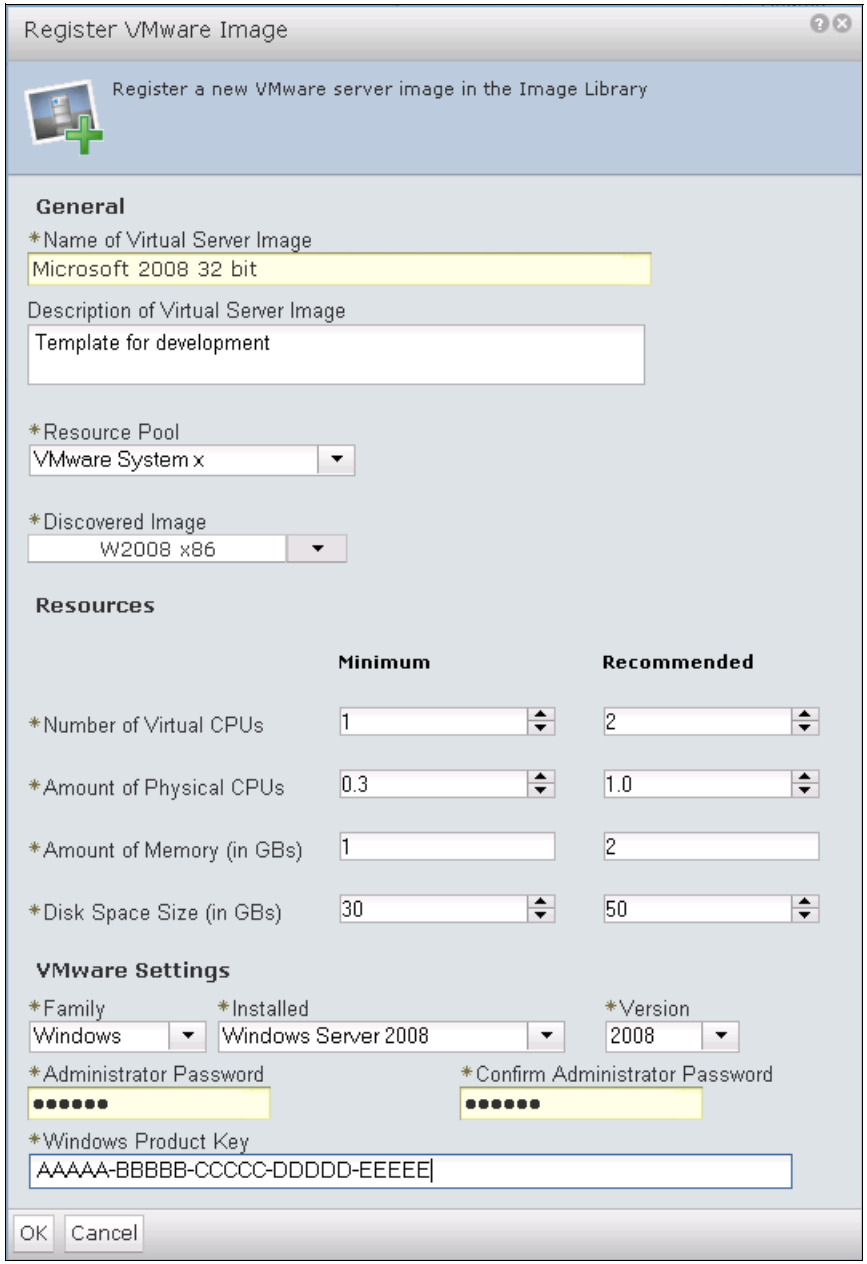


Figure 4-8 Panel for registering a new VMware template image

3. Specify the name of the image and, optionally, provide a description.
4. Select the **Resource Pool** from the list.

5. Select **Discovered Image** from the list. The list contains only unregistered images.
6. In the Network Configuration section:

> **Important:** This step is only available with CloudBurst 2.1.1 or with an upgraded CloudBurst 2.1 with ISDM 7.2.2.

   a. Select the network type. Four predefined types are available:
      - Management
      - Customer
      - Backup-Restore
      - Storage

      Figure 4-9 shows this window with the Customer network type selected.

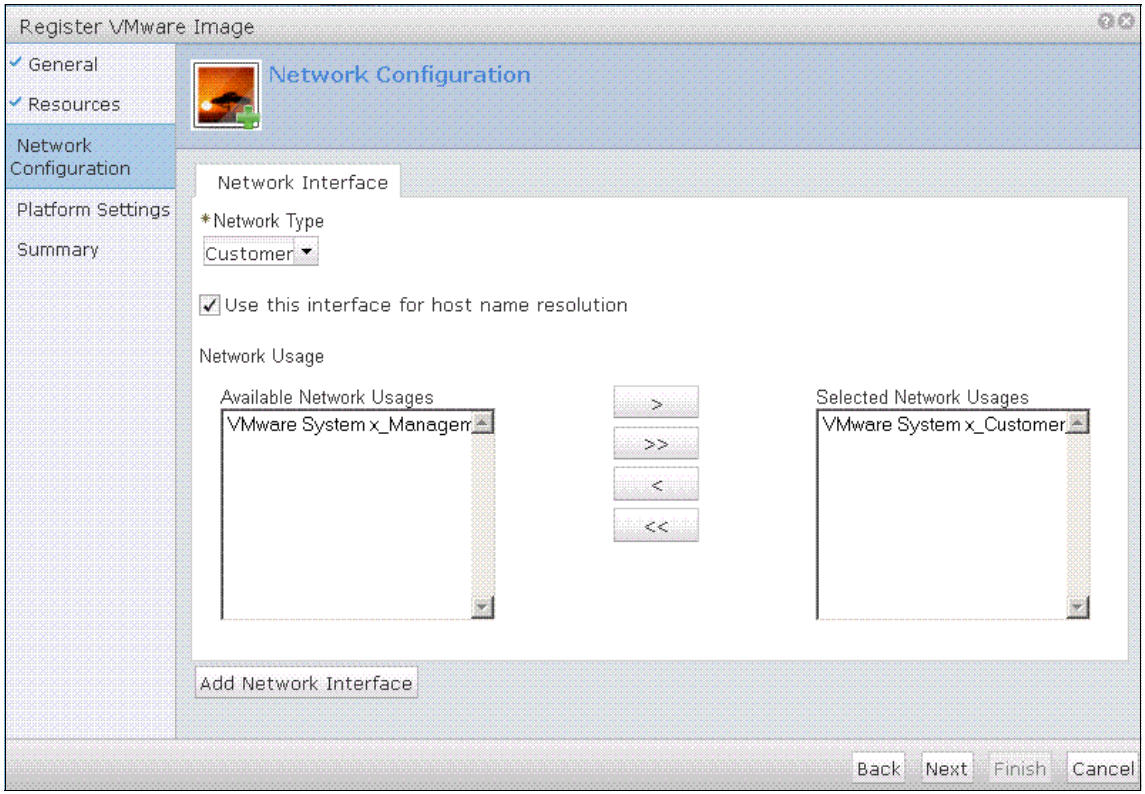


Figure 4-9 Network interface configuration for a new image

   b. If the network interface is to be used for host name resolution, select **Use this interface for host name resolution**.

c. In the Network Usage section, select the network interface to use for this network type. See Figure 4-9 on page 101 for an example.

d. To add more network interfaces, click **Add Network Interface** (see Figure 4-10) and repeat Step 6 on page 101 for the process.

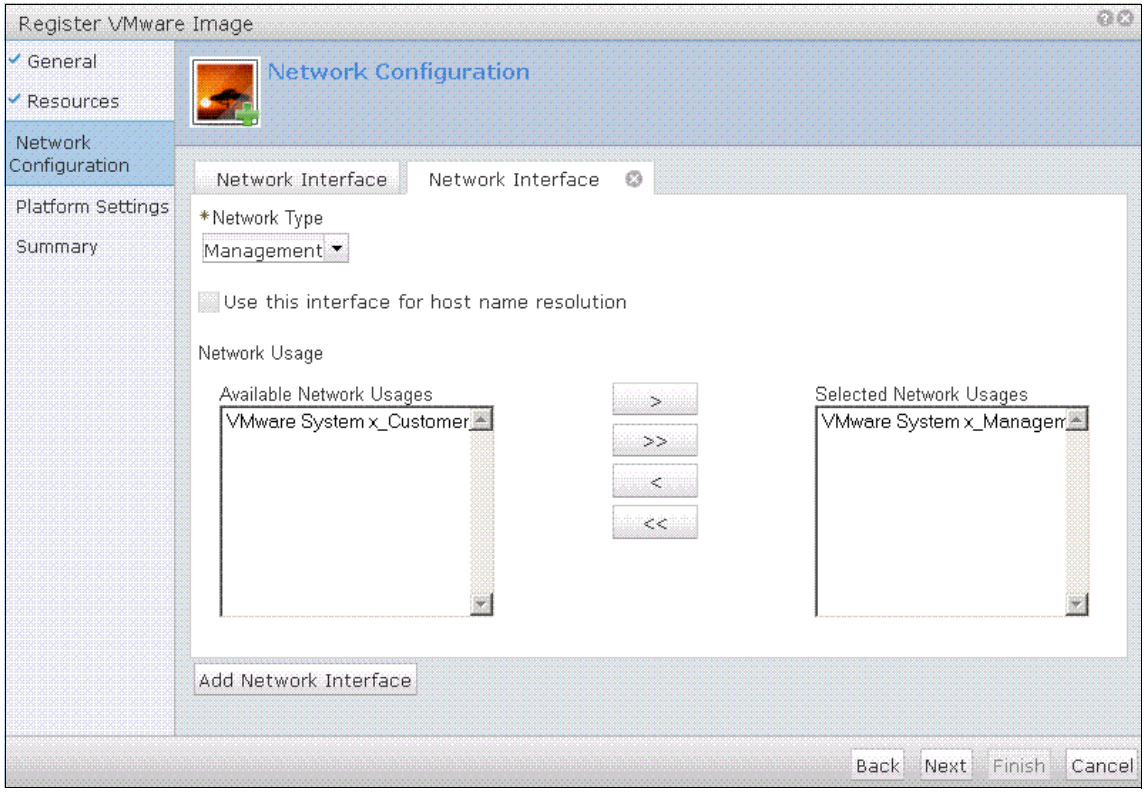


Figure 4-10 Add a second network interface for the image

7. In the Resources section, specify the Minimum and Recommended values for virtual and physical processors, memory, and disk space. See Figure 4-8 on page 100.
8. Specify the details of the image OS according to Table 4-2.

Table 4-2 OS family and version values

Family	Installed OS	Version
Linux	Red Hat Enterprise Linux	5.3 or 5.4
	CentOS	5.3 or 5.4
	SUSE Linux Enterprise Server	10.2 or 11

Family	Installed OS	Version
Windows	Windows XP	Not required
	Windows 2003	2003
	Windows 2008	2008
	Windows 2008 R2	2008
	Windows 7	7

9. Depending on the OS, specify the Administrator Password or Root Password that matches the password set on the image from which the virtual machines will be created.
10. Microsoft Windows users only: Enter the Windows Product Key. See Figure 4-8 on page 100.
11. Click **OK** to submit the request.

If a VMware template is already registered in CloudBurst and needs to be modified, do not clone the virtual machine. If you do, you will not be able to use the modified VMware template. Instead, do the following:

1. Use VirtualCenter to convert the template into a virtual machine.
2. Start the VM and modify it as required.
3. Convert the VM back into a template.

4.2 Installable software

IBM Tivoli Service Automation Manager 7.2.2 and its older versions can provision software using Tivoli Provisioning Manager, which is bundled into the Tivoli Service Automation Manager core product.

Tivoli Provisioning Manager uses the scalable distribution infrastructure for software distribution and installation, discovery, and compliance management. In this section, we discuss software distribution and installation only.

4.2.1 Simple software distribution

Tivoli Service Automation Manager provides a number of methods to distribute and install software on one or more managed target virtual servers, during or after provisioning. In this section, we discuss only Simple Software Distribution capability being a part of Tivoli Provisioning Manager functionality. This method is recommended for scenarios for which you do not need to perform extensive

post installation tasks. For these, the simple extract and install packages are sufficient. This applies for the majority of scenarios; however, it does not ensure an uninstallation process for the application to be provisioned on virtual servers.

If more complex scenarios are required to deploy a software product, an automation package must be created with corresponding provisioning workflows that can perform required actions and be exposed to Tivoli Service Automation Manager, as described in 4.2.2, “Installing software using Self-Service UI” on page 123.

Understanding the software model

Understanding the software model is a key to understanding how the software is deployed and installed on the target servers and how it is represented in the Data Center Model.

Software Definition

To begin, a *Software Definition* is provided. This is an abstract idea that describes the software. The example can be DB2 Enterprise Server Edition V9. It applies for every type of environment. However it becomes more concrete only when we specify the target environment—the operating system.

Software Installable

Software Installable is associated with binary files that are installation packages. Software Installable is operating system specific.

Multiple Software Installable packages can be associated with a particular Software Definition. In our example, DB2 ESE can have several installation files for different operating systems, such as AIX®, Linux, and Windows.

All Software Installable is provided as binary files in the file repository.

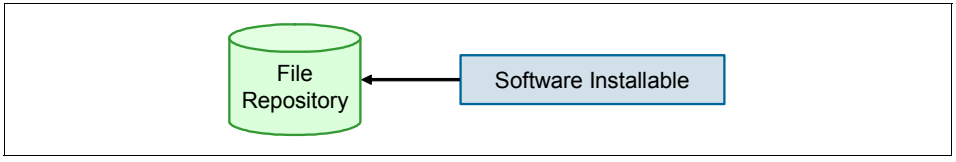


Figure 4-11 Software installable

Software Installation

Each Software Installable has its own software requirements. An *Installation Template* describes these configuration parameters for a particular installation package to define how the installable software is applied to create an installation on a specific server, as shown in Figure 4-12 on page 105.

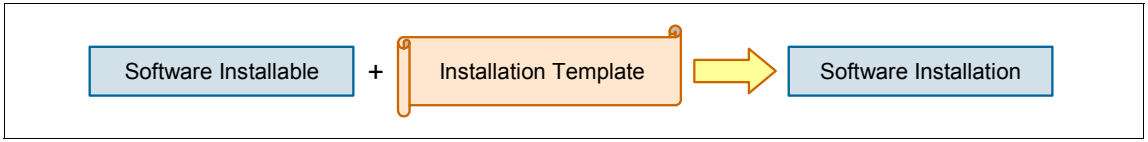


Figure 4-12 Software installation

Installation Template: Installation Template is something similar to the response file because it contains all configuration parameters to succeed the installation.

In Tivoli Service Automation Manager, the Installation Template is represented as a configuration template, as shown on Figure 4-13 on page 106.

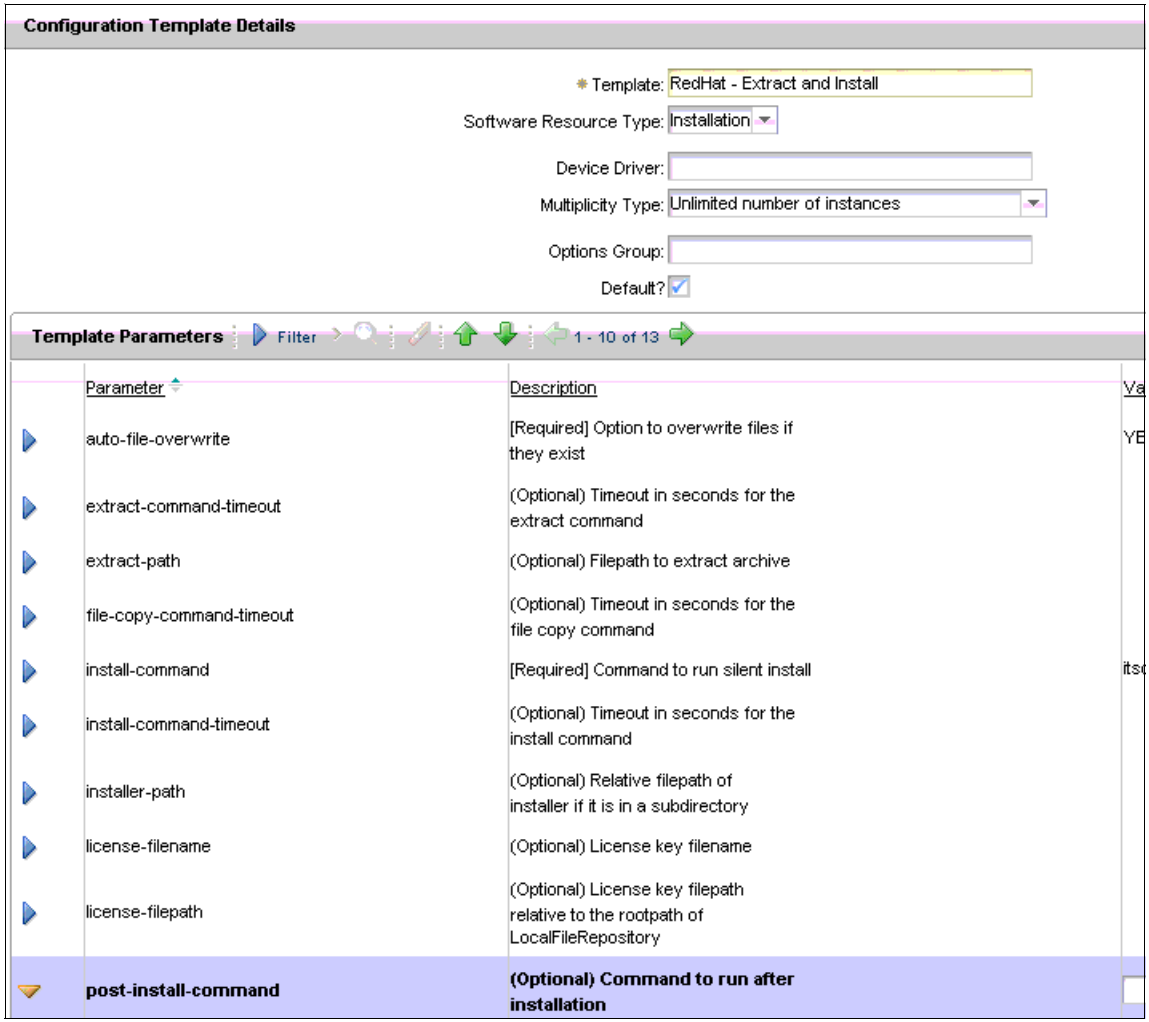


Figure 4-13 Tivoli Service Automation Manager configuration template

Software Instance

The nature of databases and web application servers is that they can have multiply instances created on a particular target server. This is the reason the Instance Template is introduced.

The Instance Template describes the detailed configuration of a particular instance of the software to be run on a target server. In other words, it defines how the installation software is applied to create an instance on a specific server.

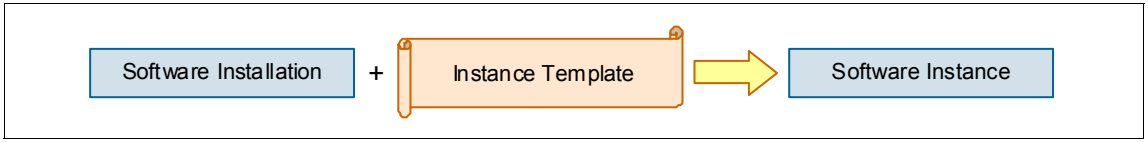


Figure 4-14 Software Instance

In Tivoli Service Automation Manager, Instance Template is represented as a child configuration template, as shown in Figure 4-15.

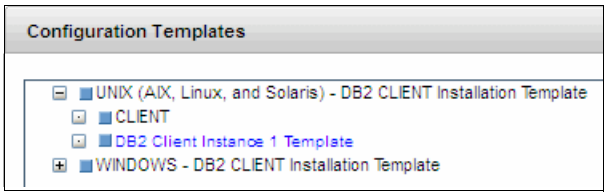


Figure 4-15 Tivoli Service Automation Manager child installation template

Configuration information is provided in the Configuration Template Details. See Figure 4-16 on page 108.

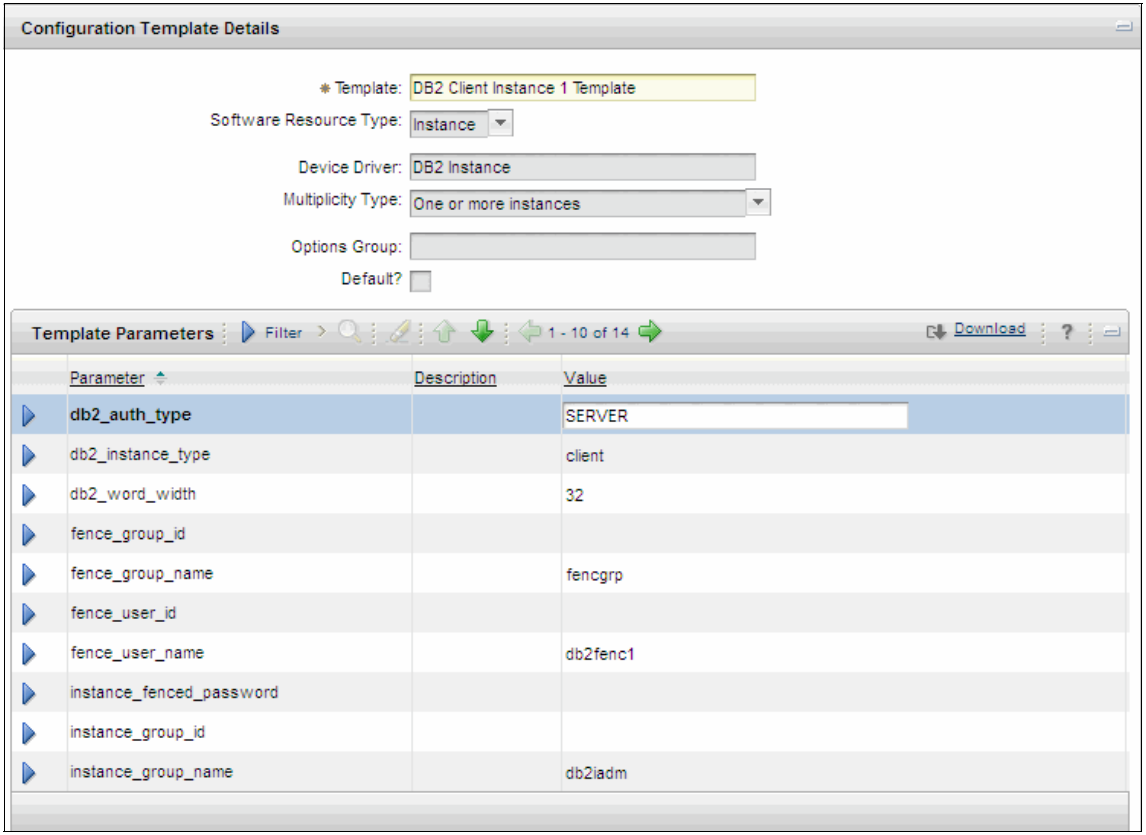


Figure 4-16 Configuration Template Details

Installation methods

The Tivoli Provisioning Manager, as an integral part of Tivoli Service Automation Manager, provides automation for simple software installations. A simple software installation includes distributing a software package to a target computer and performing one or both of the following actions:

- Extracting files from an archive file such as a compressed file
- Installing the software. You can optionally specify a response file or license key for the installation.

Note: Ensure that there are silent commands available for performing file extraction and the software installation. Any actions required during the installation process must:

- Be available from the command line
- Require **no** user interaction

The ability to fully automate an installation depends on the silent installation support provided by the vendor of the software product. Not all software installations can be automated for deployment with simple software product distribution.

Simple software product distribution supports deployment to Windows, Linux, AIX, HP-UX, and Solaris Operating Environment computers. Any installation process that uses the SoftwareInstallable.Install logical management operation can take advantage of these installation methods. If the software product does not have a specific provisioning workflow associated with the SoftwareInstallable.Install logical management operation, the HostingEnvironment.Host logical management operation is automatically called to perform simple software product distribution.

Table 4-3 describes the available methods for installing simple software without writing provisioning workflows. For all of the methods, template definitions are provided.

Table 4-3 Installation methods

Method	OS	Formats
Unzip only: Copy a compressed file to a target computer and extract the contents to a specified location. A tool is copied to the target computer to extract the contents of the compressed file. Use this option to automatically extract the contents of a compressed file.	Windows	Archive files in a compressed format only. Typical: *.zip file*

Method	OS	Formats
Unzip and install: Copy a compressed file to a target computer, extract the contents, and then install the software. A tool is copied to the target computer to extract the contents of the compressed file. Use this option to automatically extract a specified compressed file that contains a software installer. For example, if a compressed file contains a Windows .msi file, you can use this option to extract the file and then install it with the msiexec command.	Windows	Archive files in a compressed format only. Typical: *.zip file*
Extract only: Copy an archive file to a target computer and extract the contents to a specified location. Use this option to automatically extract the contents of an archive file.	UNIX Linux	Archive files in tar or compressed format. ► tar file .tar ► bzip tar file .tar.bz2, .tar.bzip2, .tbz2, .tbz ► gzip tar file .tar.gz, .tgz, .tar.gzip ► compress tar file .tar.Z, .taz ► compressed file .zip
Extract and install: Copy an archive file to a target computer, extract the contents, and then install the software. Use this option to automatically extract a software installer from an archive file.	UNIX Linux	Archive files in tar or compressed format. ► tar file .tar ► bzip tar file .tar.bz2, .tar.bzip2, .tbz2, .tbz ► gzip tar file .tar.gz, .tgz, .tar.gzip ► compress tar file .tar.Z, .taz (Linux only) ► compressed file .zip
Install Only: Copy an installation file to a target computer, and run the command to install the software. Use this option for ready-to-run programs, such as a script or an .exe installer.	Windows UNIX Linux	As above

Method	OS	Formats
Custom extract and install: Copy a compressed file to a target computer, extract the contents with a specified command, and then run the command to install the software. Use this option for archive files that are not supported by the extract and install installation method. For a list of supported file formats, see Supported archive file formats.	Windows UNIX Linux	As above

To see all templates:

1. GOTO → **IT Infrastructure** → **Software Catalog** → **Software Products**.
2. Select any software product.
3. From the Select Action menu, choose **Add SRT**.
4. Select **Create from a template definition** as a Creation Method.
5. Enter `Hosting-Environment` as the search string.

Templates that are available as an example for the Windows operating system are shown in Figure 4-17.

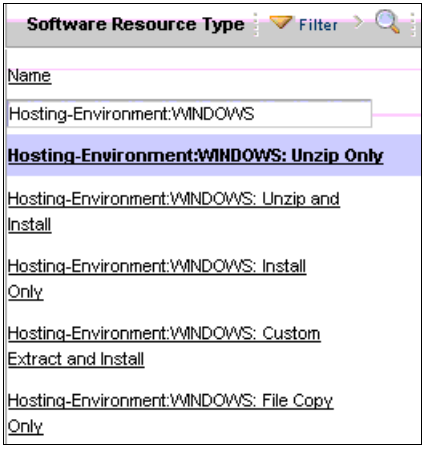


Figure 4-17 Installable templates - Windows

Configuring installable packages for a product that exists in the software catalog

For the packages already defined in Tivoli Service Automation Manager Software Catalog, installation templates are already predefined for given operating

systems. All the steps that a cloud administrator must do to prepare Software Installable package are:

1. Locate the Software Catalog entry with the required Software Installation.
2. Prepare the package (optional):
   a. zip/tar existing installation packages to create one Software Installable package, provided in an existing Configuration Template.
   b. Prepare the silent installation config file.
3. Upload binaries to the repository.
4. Adjust the existing configuration template according to needs, if required.
5. Expose the package to the Tivoli Service Automation Manager Self-Service User Interface.

Example: Installation DB2 ESE Version 9

To install DB2 V9:

1. Find the corresponding entry in the Software Catalog. Navigate to **GOTO** → **IT infrastructure** → **Software Catalog** → **Software Products**.
2. In the Filter field, enter `DB2`, as the search string, as shown in Figure 4-18 on page 113.

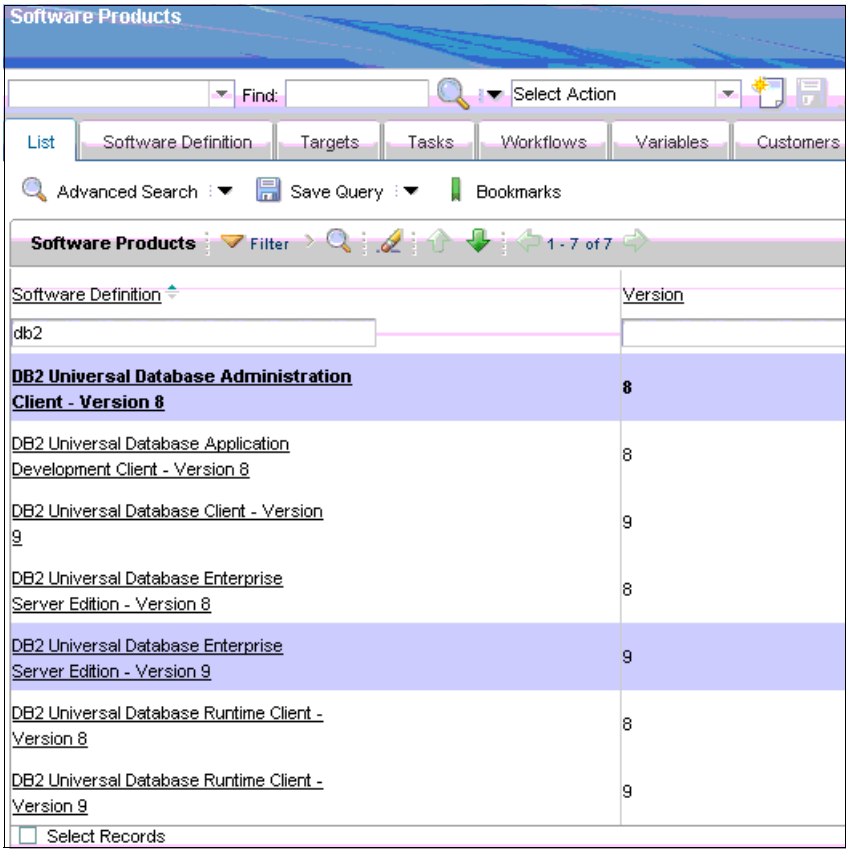


Figure 4-18 Software Products

3. Click **DB2 Universal Database™ Enterprise Server Edition - Version 9**. Here you can see all Installable Packages already predefined for DB2 ESE V9 software. See Figure 4-19 on page 114.

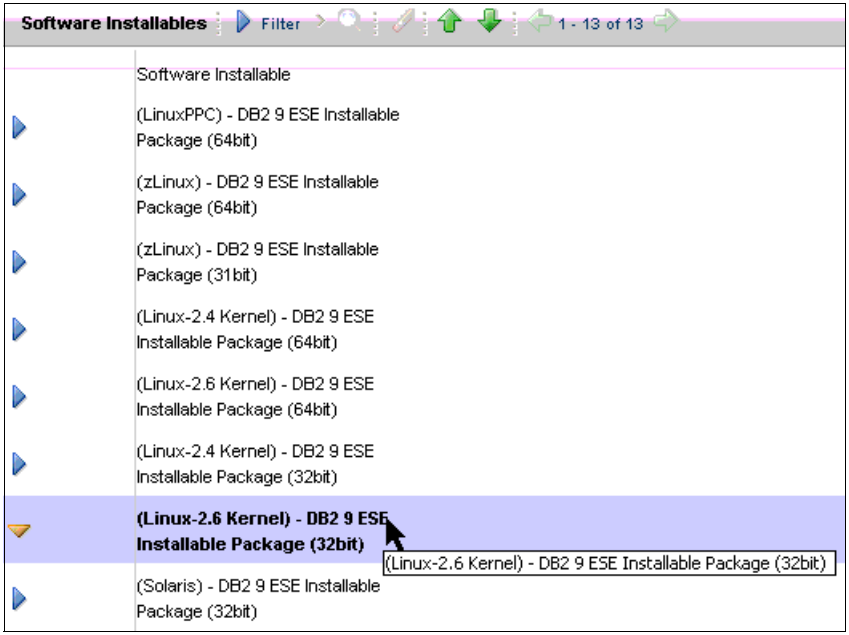


Figure 4-19 Software Installable - DB2 ESE v9

4. In this example, our target operating system is Linux SLES 9 (32-bit). Click **(Linux-2.6 Kernel) - DB2 9 ESE Installable Package (32-bit)** to expand the Installable Details tab. See Figure 4-20.

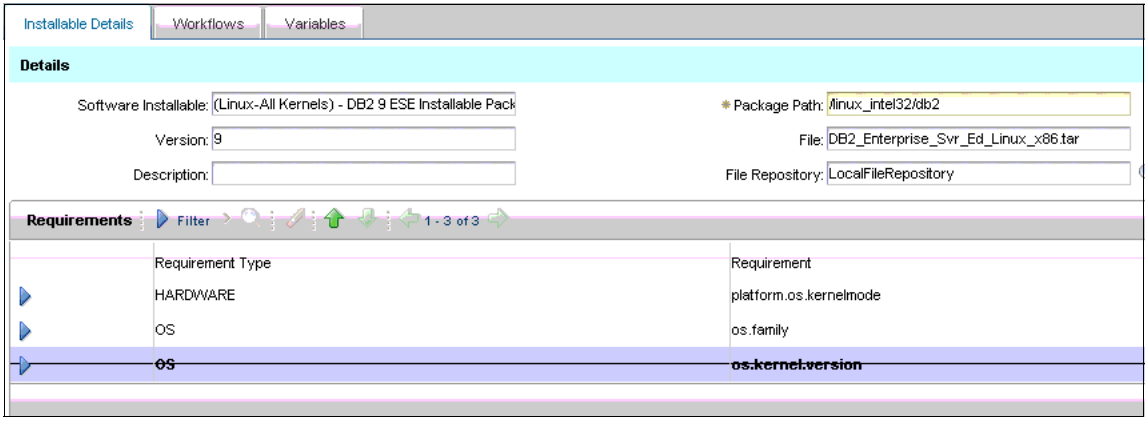


Figure 4-20 Installable Details tab

Here you can find the following information:

– Package Path: /linux_intel32/db2

– File: DB2_Enterprise_Svr_Ed_Linux_x86.tar
– File repository: LocalFileRepository

It means that Tivoli Service Automation Manager will search the Local File Repository under */linux_intel32/db2/* directory to find *DB2_Enterprise_Svr_Ed_Linux_x86.tar* package with DB2 installation binaries. By default Local File Repository is located: */opt/IBM/tivoli/tpm/repository*.

Note: To find where the *LocalFileRepository* is located in your system, select **IT infrastructure** → **Provisioning Inventory** → **File Repositories**.

5. You must upload your DB2 installation binaries to the desired location.

Note: If installation binary package:

- Is a file the and has a different name, either change its name according to the File name in Installable details or change the entry in Installable details to reflect the binary package name
- Is a folder with set of files, create a package and name it according to the File name in Installable details

Provide relevant DB2 installation parameters using Template Parameters. See Figure 4-21 on page 116.

– *DB2 Instance 1 Template* Parameters:
  - instance_fenced_password
  - instance_user_password
  - instance_port
– *DAS Template* Parameters:
  - das_user_password

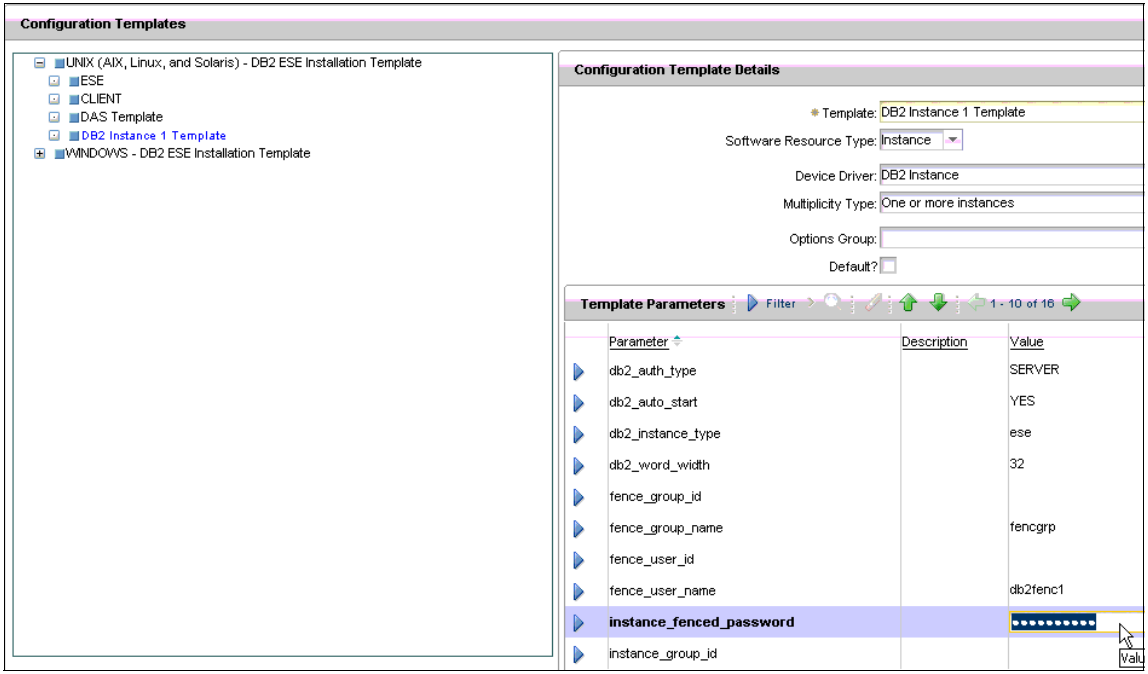


Figure 4-21 Configuration template parameters

6. When configuration of the template is done, you can expose this Software Installable to Tivoli Service Automation Manager. See Figure 4-22.

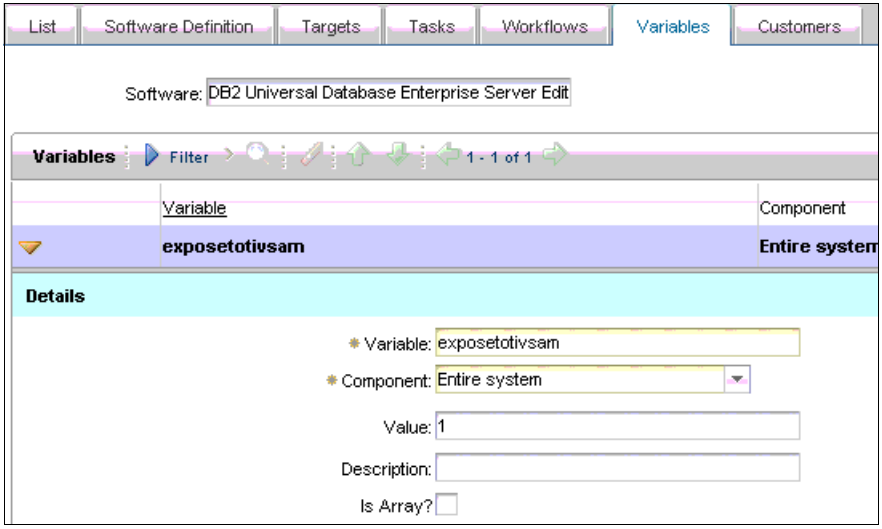


Figure 4-22 Exposing to Tivoli Service Automation Manager

Note: Make sure that the software installable is assigned to proper customer. If the software installable is going to be customer independent, mark **Assign to all customers** flag on a Customers tab.

7. Navigate to **GOTO** → **IT Infrastructure** → **Software Catalog** → **Software Stacks**, and add the DB2 product to the proper stack entry. See Figure 4-23.

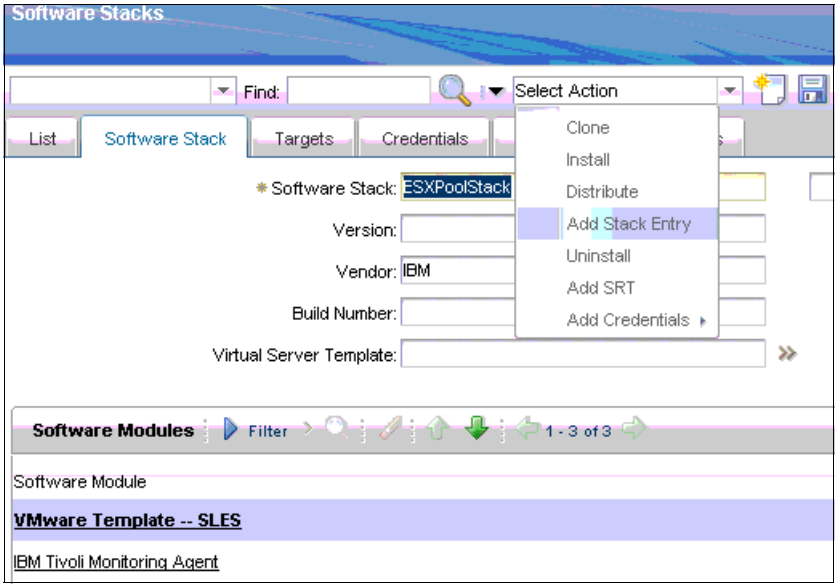


Figure 4-23 Adding DB2 Product to the ESXPoolStack stack

Now (Linux-2.6 Kernel) - DB2 9 ESE Installable Package (32-bit) is ready to be provisioned using Self-Service User Interface.

Defining new installable packages in the software catalog

To install software using the Tivoli Service Automation Manager User Interface, the software product definition must be provided. If it is not, you must create a software product definition using the Tivoli Provisioning Manager UI with proper qualification.

As described in the section “Understanding the software model” on page 104, a software configuration template defines installation options. For simple software product distribution you can use the provided Hosting Configuration Template definitions to quickly define the installation option for an automated installation.

For this scenario, a more complex installation is required. A product-specific automation package and software configuration template are required. The

automation package developer must predefine the software definition and software configuration template for the software in the automation package.

To define a new software product for simple distribution:

1. Click **Go To** → **IT Infrastructure** → **Software Catalog** → **Software Products**.
2. Click **New**.
3. Specify the software product information, including the name, description, vendor, and build number.
4. Click **New Installable**.
5. In the **Software Installable** field, type the name of the software package.
6. In the Version field, type the software package version.
7. In the File Repository field, select **LocalFileRepository** or another file repository that you created.
8. In the Installable Path field, specify the software package location. The path is relative to the default local file repository path. It can also be some other custom file repository, for example, if the repository path is configured as *T*IO_HOME/repository/, and the software package is stored in TIO_HOME/repository/package, type `/package` as the parameter value.
9. In the File field, type the file name of the software package.
10. Click **Submit**.
11. Specify the installation options in the software configuration template:
    a. Click **Select Action** → **Add SRT**.
    b. Select **Create from template definition.**
    c. Click **Select Value**.
    d. Use the filter to search for template names with the text **Hosting-Environment**.
    e. Select the software configuration template that you want to use.
    f. In the Configuration Templates section, specify the appropriate parameter values (detailed descriptions are in the Table 4-4 on page 119).
    g. Click **Save**.

The software product is now defined in the software catalog and ready to be exposed to Tivoli Service Automation Manager for further installation purposes.

Table 4-4 Parameters for deploying a software product

Parameter	Value
auto-file-overwrite	An option to overwrite files if they exist. UNIX only supports the Yes option, so ensure that users back up their existing files before performing an installation. Windows and Linux: ► *Yes*: Overwrite existing files. ► *No*: Do not overwrite existing files. If files exist, the workflow extracts files that are not duplicates but returns a failed status. UNIX Only the Yes option is available. Back up any existing files before installing the software product.
destination-filename	For the File Copy Only method, the name of the file when it is copied to the target computer.
extract-command	The silent command to extract the contents of the compressed file. The specific command and command syntax depends on the compression tool that you are using. The following examples show some simple commands. See the documentation for the tool that you want to use to uncompress the file for details about syntax and ensure that the tool is installed on target computers: ► If the target computer has the WinZip Command Line Support Add-On for WinZip installed, the following command extracts all of the files from example.zip, recreates the directory structure contained in the compressed file, and places the extracted files in c:\myfiles. **wzunzip -d example.zip c:\myfiles** ► If you are using gzip, the following command extracts files from example.zip into the current directory. **gzip -d example.zip** ► If you are using tar, the following command extracts files from example.tar to the current directory and outputs the name of each file: **tar -xvf example.tar**
extract-path	Specify the full path on the target computer where you want to extract contents of the compressed file.

Parameter	Value
install-command	The silent command to install the software. The command runs in *installer-path*, where the software installer is located. If the installation file name has spaces, enclose the file name in quotation marks. For example: `“itso installer.exe” -q` **Note:** When a response file or a license key file is required, the files will be copied to the same directory as the installer. You do not need to include absolute paths to these files in the installation command.
install-command-timeout	Timeout in seconds for the command configured for *install-command* *Windows only* This option is only supported on Windows for the Install Only, Unzip and Install, and Custom Extract and Install methods.
install-path	For the File Copy Only method, the path on the target computer where you want to copy the file.
installer-path	Type the path where the software installer is located and where the installation command runs as specified by the install-command parameter. The software installer is the program or script file that starts the installation. If the installer is not in any subdirectory, leave the value for installer-path blank. However if the installer is in a subdirectory, specify the path relative to the software installable.
rspfile-method	Indicate if a response file is required. By default, the software configuration template is configured for installation without a response file.
rsp-filepath	Type the path where the response file is located in the default file repository (LocalFileRepository). Ensure that the path is a relative to the root path of LocalFileRepository. The default root path for LocalFileRepository is *TIO_HOME/repository*.
rsp-filename	The file name of the response file.
license-filepath	Type the path where the license key file is located in the default file repository (LocalFileRepository). Ensure that the path is a relative to the root path of LocalFileRepository. The default root path for LocalFileRepository is *TIO_HOME/repository*.
license-filename	The file name of the license key file.
post-install-command	An optional command used to specify a command that you want to run after the installation succeeds. This option is supported on Windows and UNIX.

Figure 4-24 shows an example of the configuration template parameters.

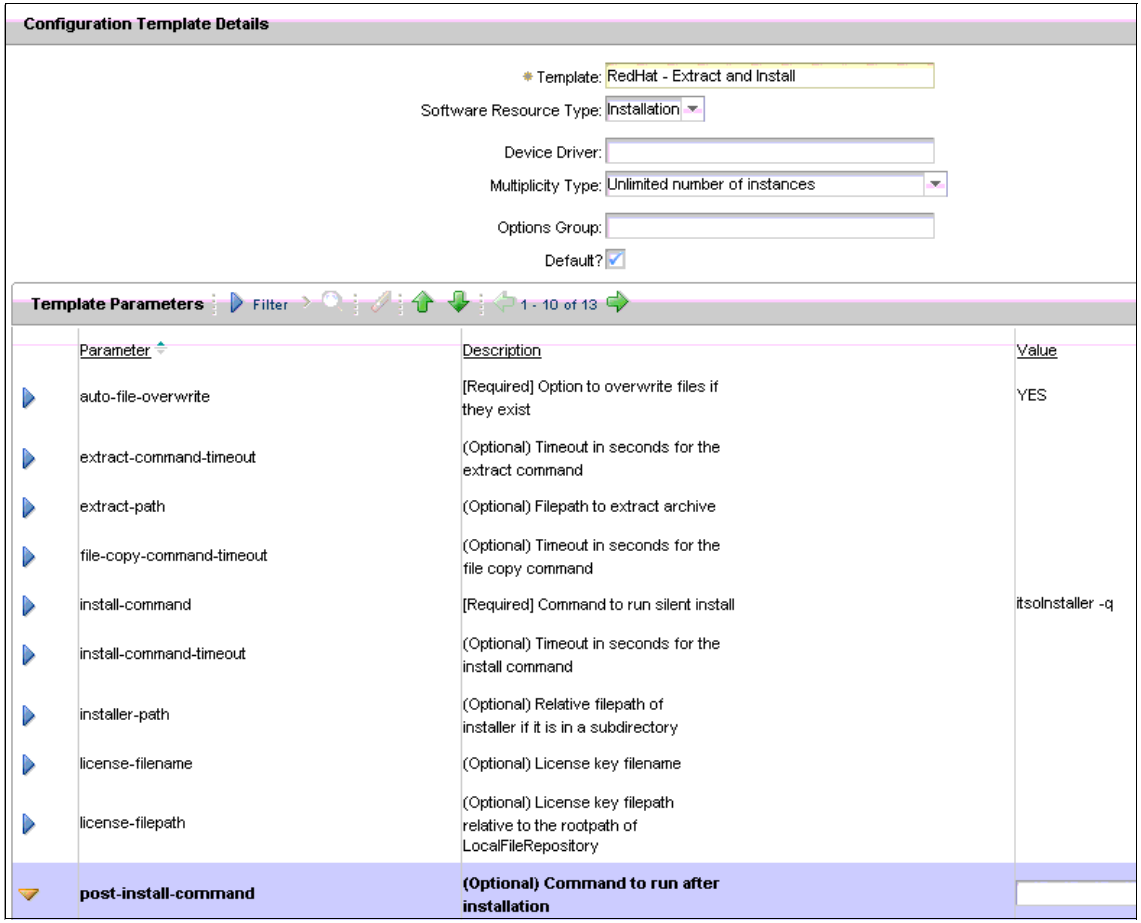


Figure 4-24 Configuration template parameters

Exposing Installable Package to Tivoli Service Automation Manager

If software exists in the software catalog, you must expose this information to Tivoli Service Automation Manager Self-Service UI. The new variable *exposetotivsam* must be defined and properly set for the software definition to enable the software product to be visible in the Self-Service UI.

In addition to that, you must configure the Software Stack to include information about the software that will be provisioned.

Tivoli Service Automation Manager 7.2.2 introduces new Customers feature. The software must be assigned to particular customer (or exposed to all customers available in the system) to be visible in Self-Service User Interface.

Exposing software to Tivoli Service Automation Manager

To expose software to Tivoli Service Automation Manager:

1. Log into the Tivoli Service Automation Manager Administration GUI.
2. Click **Goto** → **IT Infrastructure** → **Software Catalog** → **Software Products**.
3. Select the software product you want to be visible in Self-Service UI.
4. For the selected software definition, click the **Variables** tab.
5. Click **New Row** for a new variable definition. Enter the variable name and its value:
   - Variable: exposetotivsam
   - Value: 1
6. Click the **Customers** tab, and assign this software to the customers you want. If this is to be assigned to all customers, select the ***Assigned to all customers?*** option.
7. Click **Save**.

Adding information regarding the software product to Cloud Pool's Software Stack

To add information regarding the software product to Cloud Pool's Software Stack:

1. Click **Go To** → **IT Infrastructure** → **Software Catalog** → **Software Stacks**, and search for the software stack you want to add information to.
2. From the Action Menu, select **Add Stack Entry** to add the software installable for software product you want.
3. Click **Submit**
4. Save your changes to the Cloud Pool Software Stack.

Assigning OS dependent software to the customer

If you are planning to install OS dependent software modules, you must assign the target OS template to the customer as well:

1. Select **Goto** → **Service Automation** → **Configuration** → **Cloud Customer Administration**, and then select the customer.
2. In the Associated Resources section, on the IL Master Images tab, click **Detailed Menu** → **Go To Master Images**.

3. At the Software Stack, click **Detailed Menu** → **Go To Software Stack**. On the Variables tab, enter the following variables:
   - *Variable*: **swType** *Value*: **OS**
   - *Variable*: **exposetotivsam** *Value*: **1**
4. Save the changes, and return to the Cloud Customer Administration application.
5. In the Associated Resources section, on the Software Modules tab, click **Assign Software Product** to select the OS template. See Figure 4-25.
6. Save the changes.

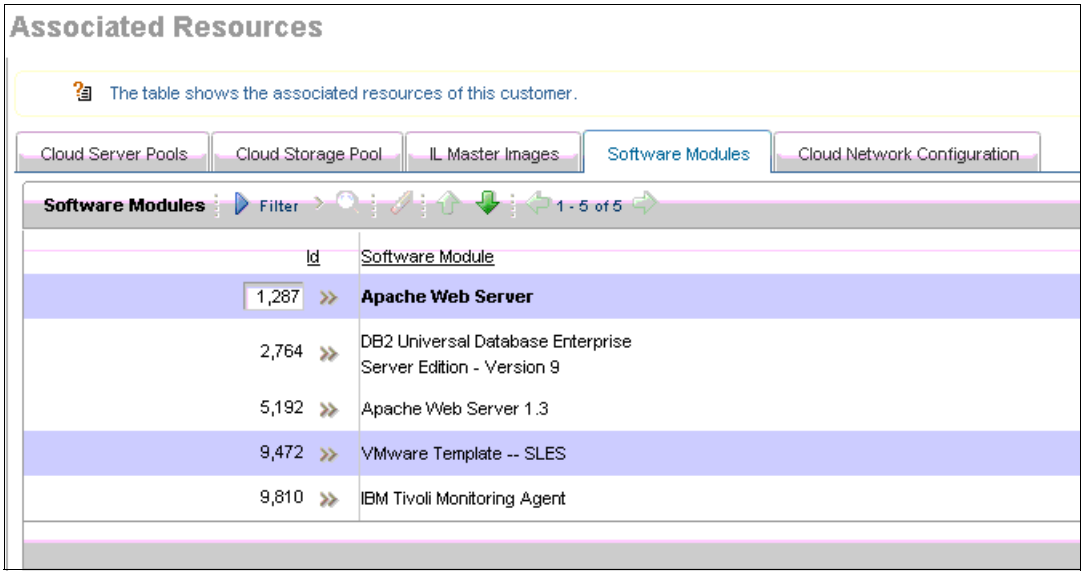


Figure 4-25 Resources associated with the customer

4.2.2 Installing software using Self-Service UI

To install new software using the Self-Service User Interface:

1. In the Tivoli Service Automation Manager Self-Service User Interface, navigate to **Home** → **Request a New Service** → **Virtual Server Management** → **Modify Server**, and select **Install Software.** See Figure 4-26 on page 124.
2. Select a server to install a software onto.
3. Select the software to be installed.
4. Optionally, you can click **Configure Software** to perform configuration activities.

5. Click **OK** to start installation

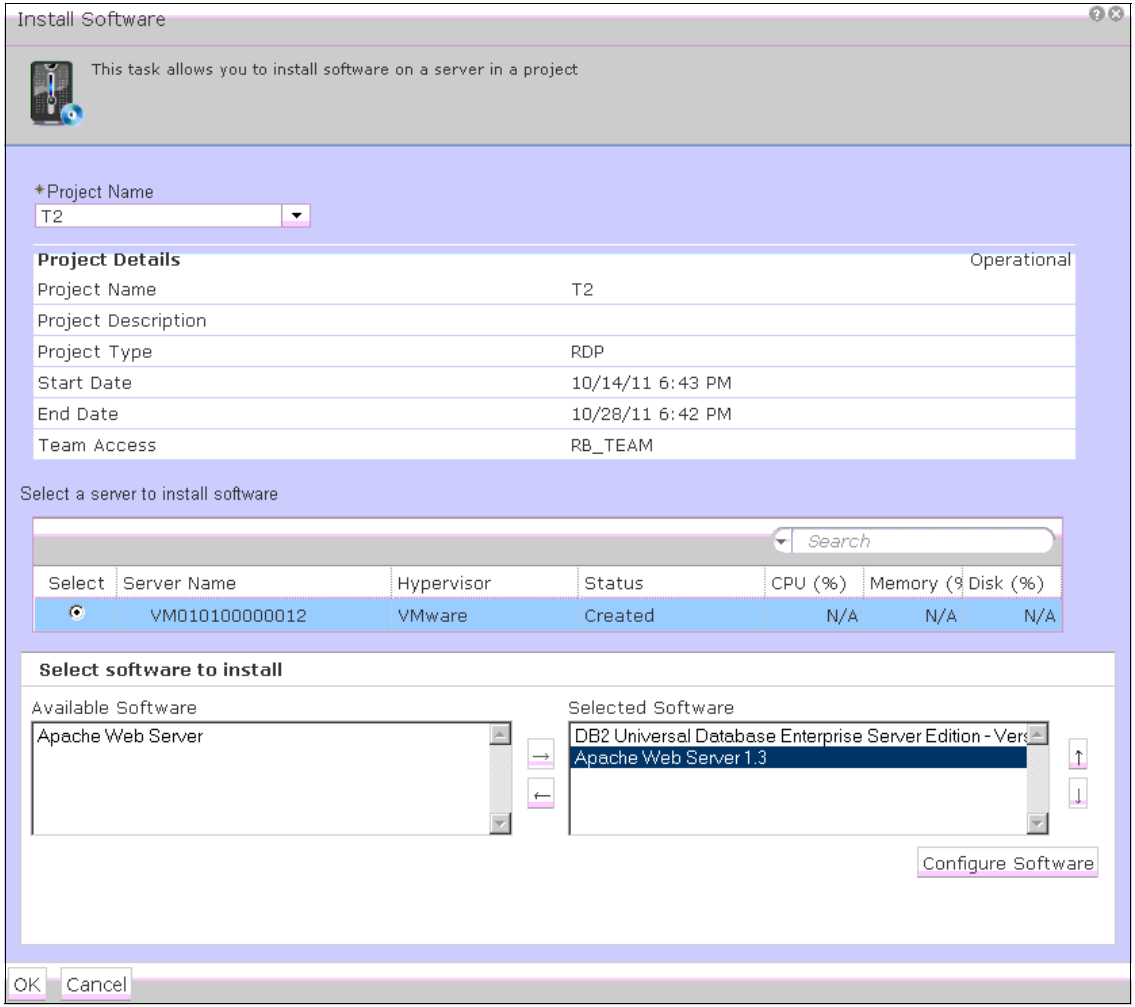


Figure 4-26 Install Software - example

4.3 Reporting

In IBM Service Delivery Manager version 7.2.2, Tivoli Usage and Accounting Manager version 7.3 is introduced. This new release of Tivoli Usage and Accounting Manager offers new capabilities which have many advantages:

- New IBM Cognos®-based Tivoli Common Reporting
- Better integration with Tivoli Service Automation Manager 7.2.2

- Role-based reporting
- New reports for accounting, trends etc
- Platform-independent reporting options

In this section, we provide you with the overall picture of the new Tivoli Usage and Accounting Manager V7.3 capabilities and data flow between its components. We also describe the core functionalities and give an example of a way to use them to create simple and advanced reports.

4.3.1 Tivoli Usage and Accounting Manager and Tivoli Service Automation Manager integration

One of the advantages of Tivoli Usage and Accounting Manager V7.3 is new IBM Cognos-based Tivoli Common Reporting with enhanced integration with IBM Service Delivery Manager 7.2.2.

Figure 4-27 depicts integration between Tivoli Service Automation Manager 7.2.2 and Tivoli Usage and Accounting Manager 7.3.

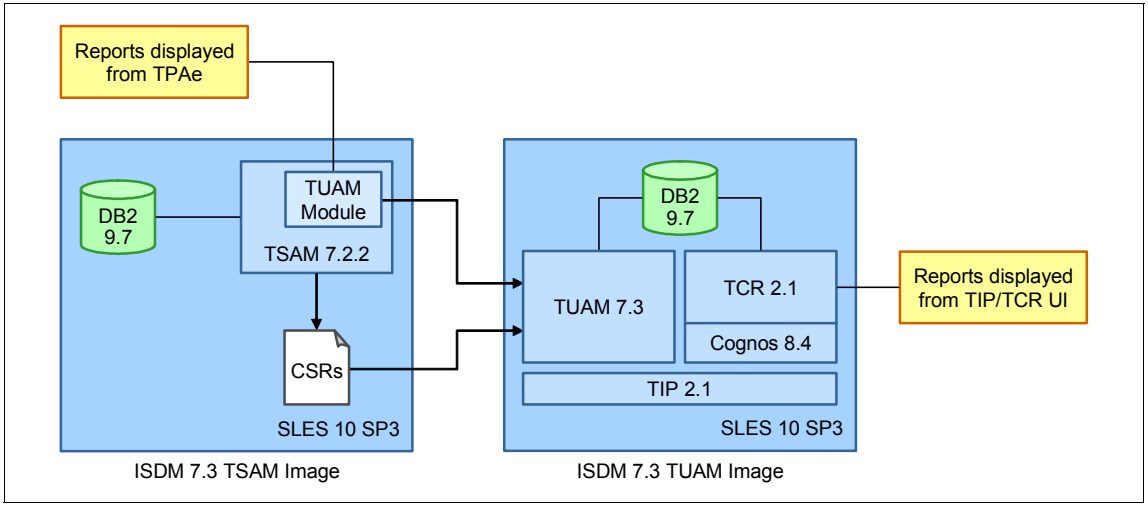


Figure 4-27 TSAM 7.2.2 -TUAM 7.3 integration

ISDM TSAM Image

There is a Tivoli Usage and Accounting Manager module, integrated with Tivoli Process Automation Engine (TPAe) that resides under Tivoli Service Automation Manager 7.2.2. It allows cloud administrators to generate usage reports directly from Tivoli Service Automation Manager - TPAe UI console.

Note: To ensure integration between Tivoli Usage and Accounting Manager and Tivoli Service Automation Manager, proper system properties must be set accordingly. Refer to “Setting up system properties” on page 131 for more details.

Service Usage Data collection remains the same. Tivoli Service Automation Manager 7.2.2 provides Tivoli Usage and Accounting Manager 7.3 compliant information in a form of CSR (Common Source Record) files that are being consumed by Tivoli Usage and Accounting Manager itself.

ISDM TUAM Image

In Tivoli Usage and Accounting Manager 7.3, a few products have been bundled.

Tivoli Common Reporting 2.1

Provides an integrated reporting solution for the products in the Tivoli portfolio It provides a single sign-on service based on the WebSphere security module and Lightweight Third-Party Authentication (LTPA).

Cognos-based Tivoli Common Reporting engine

IBM Cognos 8 Business Intelligence Reporting version 8.4.1, Fix Pack 3 resides below Tivoli Common Reporting product. The following Cognos components are available with Tivoli Common Reporting:

Framework Manager A modeling tool that allows you to create data models.

Query Studio A reporting tool for creating simple queries and reports

Report Studio A web-based tool for creating sophisticated reports against multiple databases

Cognos Connection An application where you can see all your report and manage them

Cognos gateway

A portal enabling communication between Tivoli Common Reporting Server and the Cognos-based Tivoli Common Reporting engine.

Cognos Content Store

A database that contains data that IBM Cognos 8 needs to operate, such as report specifications, published models, and the packages that contain them; connection information for data sources; information about the external namespace, and the Cognos namespace itself; and information about scheduling and bursting reports.

Tivoli Integrated Portal web user interface

Based on Tivoli Integrated Portal, the following web user interface is available for the reporting solution:

- Common Reporting: A web portal for IBM Cognos 8 and a component which interacts with the Cognos Content Store. It is a front end to publish, find, manage, organize, and view organization's reports.

Tivoli Usage and Accounting Manager web interfaces

Tivoli Integrated Portal server

In a web browser, enter the URL of the Tivoli Integrated Portal Server: http://host.domain:16310/ibm/console; or https://host.domain:16311/ibm/console if it is configured for secure access:

- host.domain is the fully qualified host name or IP address of the Tivoli Integrated Portal Server (such as *MyServer.MySubdomain.MyDomain.com* or 9.51.111.121, or *localhost* if you are running the Tivoli Integrated Portal Server locally).
- 16310 is the default non-secure port number for the administrative console and 16311 is the default secure port number. If your environment was configured with a port number other than the default, enter that number instead. If you are not sure of the port number, read the application server profile to get the correct number.
- ibm/console is the default path to the Tivoli Integrated Portal Server, however this path is configurable and might differ from the default in your environment.

After successful login, the logon window is displayed, as shown in Figure 4-28 on page 128.

Figure 4-28 Tivoli Integrated Portal - logon pane

Tivoli Common Reporting web interface

After successful login to Tivoli Integrated Portal you can work with reports using Common Reporting functionality. Navigate to **Reporting** → **Common Reporting** on the left panel to open the Common Reporting web interface.

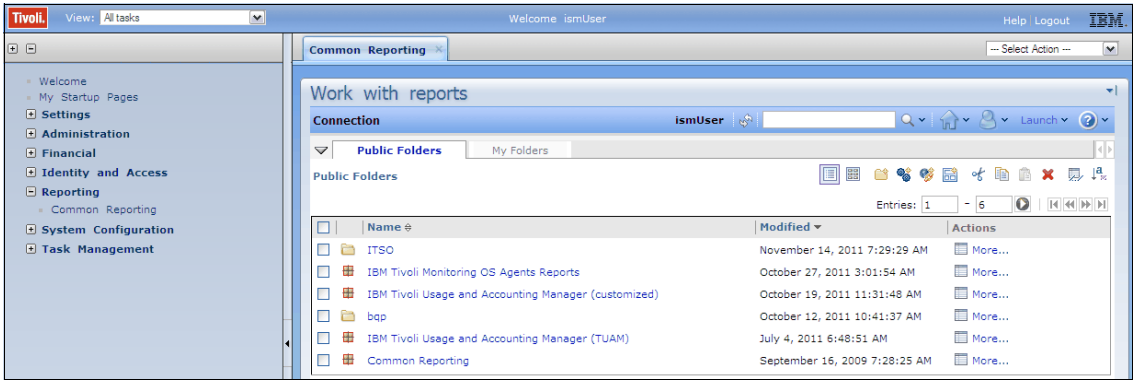


Figure 4-29 Tivoli Common Reporting - web interface

Note: If you experience some difficulties in maximizing the Common Reporting frame, place the cursor on the Common Reporting tab and press F5.

Query Studio / Report Studio

To work with reports using either Query Studio or Report Studio and to perform some Cognos administration tasks, click **Launch** on the header of Common Reporting tab. See Figure 4-30.

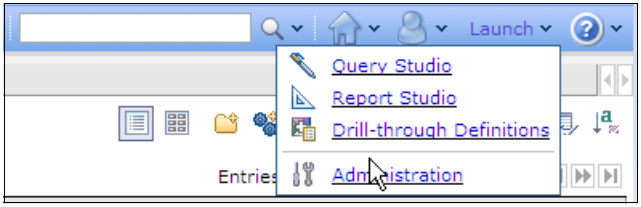


Figure 4-30 Tivoli Common Reporting - Launch drop-down

You can also select a desired report and perform one of the actions, as shown in the figure Figure 4-31.

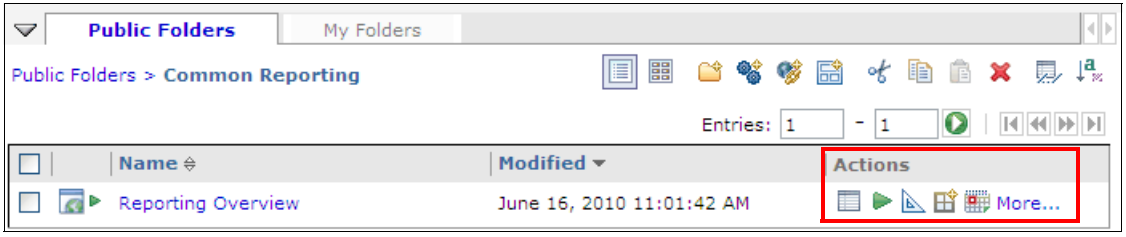


Figure 4-31 Tivoli Common Reporting - set of actions available for a report

The actions are:

- Setting the properties of the report
- Running report with options
- Working with Report Studio
- Creating a report view of the report
- Scheduling the report generation
- Moving/Copying/Creating a shortcut/Deleting the report

Data flow between Tivoli Service Automation Manager and Tivoli Usage and Accounting Manager

The cloud administrator enables Common Server Resource (CSR) file transfer between Tivoli Service Automation Manager and Tivoli Usage and Accounting Manager to exchange Service Usage information. All accounting information together with allocation/de-allocation of the resources is stored in the IBM Tivoli Change and Configuration Management Database (CCMDB), being periodically extracted and transformed into a CSR file. This data contains information about virtual machines and corresponding resources:

The identifiers are:

- Host name
- Server type
- Service type
- Deployment instance
- Deployment owner
- Chargeback owner

The resources are:

- Server hours
- CPU hours
- Memory hours
- Storage hours (new in Tivoli Usage and Accounting Manager 7.3)

Tivoli Usage and Accounting Manager uses the Job Runner application to run Data Collectors as a batch job on a defined schedule to convert usage metering data, created by the system into CSR files.

Note: A Tivoli Usage and Accounting Manager Data Collector is a program, script or a utility that reads resource usage and accounting records from CCMDB database and produces a CSR file, that is appropriate for Tivoli Usage and Accounting Manager Process Engine.

After the files are created, the data, being stored in the files is processed and the output is loaded into the Tivoli Usage and Accounting Manager database using the Usage and Accounting Engine Processing Engine.

Based on the accounting information in Tivoli Usage and Accounting Manager database Usage and Accounting Reports can be generated.

Note: For more information, refer to the Tivoli Usage and Accounting Manager: Administering data processing information center at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.ituam.doc_7.3/admin_processing/c_data_process_intro.html

4.3.2 Working with Tivoli Usage and Accounting Manager reports

In this section, we discuss Tivoli Usage and Accounting Manager reports.

Setting up system properties

The following system properties must be set in Maximo, which resides under Tivoli Service Automation Manager product, to ensure integration of Maximo itself with Cognos reporting engine. It is also required for publishing Data Models to Cognos.

mxe.report.cognos.db.schemaName

Maximo database schema name that is used by Cognos from which the metadata is being extracted.

mxe.report.cognos.db.sql.name

Catalog name that is associated with Maximo database. Required for SQL server installations.

mxe.report.cognos.db.type

Maximo database schema type being used by Cognos. Proper values are:

- "**DB2**" for DB2
- "**OR**" for ORACLE
- "**SS**" for SQL-Server

mxe.report.cognos.serverURL

This property provides Cognos Dispatcher/Gateway URI to introduce Cognos reports under Maximo. This should be complete path to the Cognos gateway.

mxe.report.cognos.namespace

Cognos namespace that stores information regarding users and their rights,

Note: If Cognos package publishing fails (for example, due to wrong system properties settings), check WebSphere `systemout.log` file, located at `<WebSphere Install Directory>/WebSphere/AppServer/profiles/AppSrv01/logs/server1`

Tip: For more details about how to integrate Maximo being present under Tivoli Service Automation Manager with Cognos Reporting engine, which resides under Tivoli Usage and Accounting Manager, refer to the Tivoli Service Automation Manager - Extension for Usage and Accounting Manager, Configuring report access information center at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v55r1/topic/com.ibm.tuam.ext.doc_1.0/config/c_configuring_report_access.html

Service Usage Data processing

Configuration of service usage data is split into two parts: Tivoli Service Automation Manager (to ensure proper generation of CSR files) and configuration of Tivoli Usage and Accounting Manager server (to ensure proper way of consuming and processing gathered data)

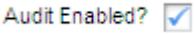
Enabling metering and accounting in Tivoli Service Automation Manager

Enabling auditing for service instances

Auditing must be enabled to track capacity changes. If it is not done, the following steps must be performed:

1. In the Tivoli Service Automation Manager administration console click **System Configuration** → **Platform Configuration** → **Database Configuration**, and find the object: PMZHBWTN.

   Note: PMZHBWTN and PMZHBWTNSPEC objects store information about Topology Nodes and their specification. Auditing allows tracking the changes that are being made to Topology Node instances.

2. For this object, select the option **Audit enabled** 

.
3. Select the **Attributes** Tab, and for every attribute, open its property, and select the **Audit Enabled** option that is located on the Advanced sub-tab.
4. Save changes.
5. Find the object PMZHBWTNSPEC.
6. For this object, select the option **Audit Enabled**.
7. Select the **Attributes** Tab, and for every attribute, open its property, and select the **Audit Enabled** option.
8. Save changes.

9. Now you must reconfigure the Maximo database to introduce the changes you made to the objects:

> **Note:** The status of the changed object must be “To Be Changed”. If it is not, make sure all of the changes were saved properly prior to reconfiguration of the Maximo database.

   a. Under Database Configuration go to the List Tab, and select **Manage Admin Mode** from the Select Action drop-down. See Figure 4-32.

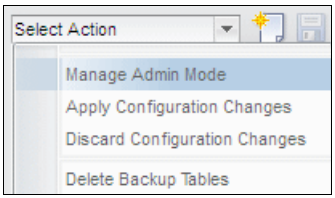


Figure 4-32 Manage Admin Mode selection

   b. On the Admin Mode panel, select **Turn Admin Mode ON** and wait for the system to switch into it.

   c. Select **Apply Configuration Changes** from the Select Action drop-down, and perform the Start Configuring the Database operation.

   d. When configuration is completed, turn off Admin Mode (Turn Admin Mode OFF on Admin Mode panel).

Setting up a project account identifier (optional)

For each project, you can distinguish between the requester of the project and the organization being charged with the project. You can define organizational information for a project by adding an (optional) project account code for the team that is using the project. Reports can then be generated based on the team and its users:

1. In the Tivoli Service Automation Manager Self-Service User Interface, navigate to **Request a New Service** → **Virtual Server Management** → **Manage Users and Teams** to create a new Team.
2. In the Project Account field, enter the desired Project Account code, as shown on Figure 4-33 on page 134.

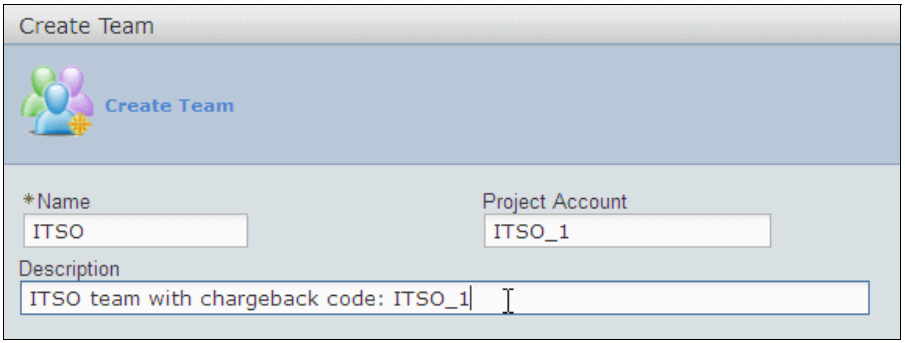


Figure 4-33 Providing project account code

3. In the Tivoli Integrated Portal, navigate to **Financial** → **Usage and Accounting** → **Rates**.
4. Create a new Rate Table or duplicate an existing one.
5. On the Properties tab, provide the Account Code with the previously created Project Account.

Defining CSR files location

To define the CSR files location:

1. Navigate to **GOTO** → **System Configuration** → **Platform Configuration** → **System Properties**, and search for the pmzhb.csr.dir property.
2. You can change the default repository for CSR files by editing the property value.
3. Save changes.
4. From the Select Action drop-down, select **Live Refresh**.

Configuring the escalation schedule to generate the CSR file

You must define the escalation that enables generation of the CSR files for the Tivoli Usage and Accounting Manager interface.

The concept of escalations triggers the extraction of data. An escalation defines a schedule, an object as the target, and a condition related to the target object. The default schedule for the escalation is once a day at 1 a.m. to extract usage and accounting data for the previous day.

The target of the escalation is the RDPVS service definition. A service-specific action is invoked that retrieves the data from the database and generates the respective CSR file.

To define the escalation that enables generation of the CSR files for the Tivoli Usage and Accounting Manager interface:

1. Navigate to **GOTO** → **System Configuration** → **Platform Configuration** → **Escalations**, and search for the PMZHBCRDPMD escalation to open it.
2. From the Select Action drop-down menu, you can now Activate / Deactivate Escalation, which results in starting and stopping the generation of CSR files.

Note: By default, the schedule is set to generate CSR files daily. You can change it by editing Schedule on the Escalation tab.

Configuring Tivoli Usage and Accounting Manager

In this section, we configure the Tivoli Usage and Accounting Manager.

Define account code structure

Each team in the self-service user interface must be assigned a project account. The project account value is part of the account code structure that is defined in Tivoli Usage and Accounting Manager.

The account code structure reflects the chargeback hierarchy for the organization. Tivoli Usage and Accounting Manager uses an account code to identify entities for billing and reporting. This code determines how Tivoli Usage and Accounting Manager interprets and reports input data.

The account code consists of the elements in Table 4-5.

Table 4-5 Account code structure

Identifier	Length in characters	Description
Account_Code	40 consisting of: ► <CUSTOMER> 12 ► <PROJECTACCOUNT> 20 ► <PERSONGROUP> 8	Account_Code consists of three values: ► <CUSTOMER> unique customer short name ► <PROJECTACCOUNT> the project account value that is specified in the Create Team and Modify Team requests ► <PERSONGROUP> unique team identifier
Deployment_Owner	30	The user that requested the project.
Service_Definition	4	First four characters of the service definition name, used to identify the service in a report.

Identifier	Length in characters	Description
Deployment_Instance	30	The name of the project the server is associated to.

The account code structure can be adjusted in Tivoli Integrated Portal. To do that, navigate to **Administration → Usage and Accounting → Account Code Structure**. See Figure 4-34.

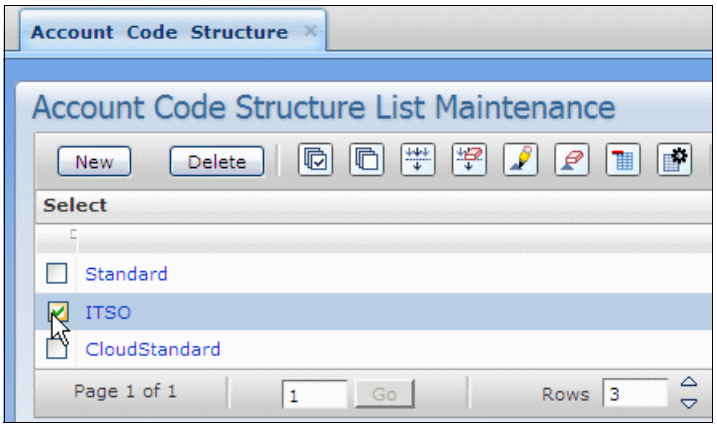


Figure 4-34 Defining Account Code Structure

Associate the account code structure with the Tivoli Service Automation Manager user that is entitled to view the reports:

1. Click **Identity and Access → Usage and Accounting → User Groups**.
2. Select the appropriate user group in your environment.
3. Edit the group to add the newly defined account code structure.

Verify that the user can view reports:

1. Click **Identity and Access → Usage and Accounting → Users**.
2. Click the selected user, and verify that the **Common Reporting** option is selected.

Defining rate group and rate codes

Rate codes need to be defined for the data retrieved from Tivoli Service Automation Manager and CSR files. The rates must be associated with the respective rate group:

1. In Tivoli Integrated Portal, go to **Financial → Usage and Accounting → Rates**.

2. Define rates and rate codes for the provided resources: SERVHRS, MEMMBHRS and CPUHRS. The descriptions specified are the descriptions that you will see in the reports.
3. Create a rate group called TivSAM, and associate the new rates with this group.

Customized processing of CSR file (Transfer and Process)

After you enable metering in Tivoli Service Automation Manager, configure Tivoli Usage and Accounting Manager server to retrieve and process the CSR file.

Note: You must have Tivoli Usage and Accounting Manager Administrator privileges to perform this task.

See the following information center items for more detailed information:

- *Configuring the Tivoli Usage and Accounting Manager job file to retrieve CSR files from Tivoli Service Automation Manager*

  http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp?topic=%2Fcom.ibm.tsam_7.2.2.doc%2Ft_tuam_retrievecsr_jobfile.html

- *Configuring the Tivoli Usage and Accounting Manager job file to process CSR files from Tivoli Service Automation Manager*

  http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/topic/com.ibm.tsam_7.2.2.doc/t_tuam_processcsr_jobfile.html

Working with reports

As mentioned in “ISDM TUAM Image” on page 126, Tivoli Usage and Accounting Manager encapsulates Tivoli Common Reporting with Cognos reporting engine. For detailed information about the reporting functionality in Tivoli Usage and Accounting Manager, refer to the Tivoli Common Reporting information center at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.tivoli.tcr.doc_211/ctcr_intro.html

The information center for Common Reporting contains the following information:

- Running the sample overview report

  After you install Tivoli Common Reporting 2.1.1, you can run a check on the reporting functionality by running your first sample report. The report can also be run for an overall reporting overview.

- Exporting Cognos report packages

  Export your report package to be able to use it, for example, on a different Tivoli Common Reporting instance.

- Copying report images to the Tivoli Common Reporting server

  Cognos report packages do not contain images, so after you import a Cognos-based report package, you must copy the static images to a folder on your computer for the images to display.

- Emailing reports

  Email your reports to share them with the group of people who do not have access to the reporting portal.

- Scheduling reports

  A report schedule is a schedule for running a report at some time in the future. You can create a schedule to run a report one time or repeatedly.

- Performing ad-hoc reporting

  Create reports ad hoc by using simple queries and formatting.

- Web-based report authoring

  Create reports in a web-based tool that professional report authors use to build sophisticated, multiple-page, multiple-query reports against multiple databases. You can create any reports that your company requires, such as invoices, statements, and weekly sales and inventory reports.

- Using parameterized URLs to perform tasks outside Tivoli Common Reporting

  Build a parameterized URL to perform a variety of tasks from a web application without opening Tivoli Common Reporting. You can place a customized URL in your web application to create a shortcut to a specific task. Authentication with Tivoli Integrated Portal user name and password is required.

- Search path

  A search path is a basic expression in IBM Cognos that allows you to find objects. It is one of the parameters that you need for performing operations on reports using commands.

Tivoli Usage and Accounting Manager v1.0 extension

A very interesting option is Tivoli Service Automation Manager extension for Tivoli Usage and Accounting Manager that provides a link between Tivoli Usage and Accounting Manager and Tivoli Service Automation Manager to enable cloud financial management services between the two products. The extension is compatible with Tivoli Service Automation Manager version 7.2.2.

The Usage and Accounting v1.0 extension provides the following features:

- Report access functionality enables users to access and view Usage and Accounting Manager Cognos reports from Tivoli Process Automation Engine.

Single sign on is configured between the two systems for report access. Cognos and Tivoli Process Automation Engine report security both work from the same set of Tivoli Process Automation Engine security users and groups.

- Role based security refers to the data synchronization of Tivoli Service Automation Manager entities, such as customers, teams, security groups and users, to Tivoli Usage and Accounting Manager entities, such as clients, users, and user groups. During the synchronization process account code security is applied to the reports that Tivoli Service Automation Manager users access. Account code security is used for customer and team reporting data segregation based on cloud roles in Tivoli Service Automation Manager.

Note: Detailed information about configuring and administering the Tivoli Usage and Accounting Manager v1.0 extension is in the information center at: http://publib.boulder.ibm.com/infocenter/tivihelp/v55r1/topic/com.ibm.tuam.ext.doc_1.0/welcome.htm

4.4 Self-service UI customization and REST API usage

In this section, we describe how to customize the Tivoli Service Automation Manager interface and how to use the REST API to integrate external products within your environment.

4.4.1 Self-service UI customization

The reasons for customizing the ready-for-use Tivoli Service Automation Manager user interface vary among users. In this example, we cover how to hide icons, that are normally used by administrators, from non-administrators. We demonstrate how to hide the Manage Users and Teams icon. See Figure 4-35 on page 140.

In Tivoli Service Automation Manager, the actions a user can perform in the UI are called *offerings*. Offerings can be customized, added, and removed according to your requirements.

Logging into the administrator console

To begin customization, log into the administrator console. The ready-for-use admin user name is maxadmin. See Example 4-3.

Example 4-3 URL for the Tivoli Service Automation Manager administrator console

```
https://ibmtsam.ral.ibm.com:9443/maximo/
```

Note: The URL shown in Table 4-6 on page 142 is an example only and will change based on your Tivoli Service Automation Manager environment.

Customizing the application for non-administrative use

To prepare the application for use by non-administrators, you might want to hide administrative icons, for example, the Manage Users and Teams icon, as shown in Figure 4-35.

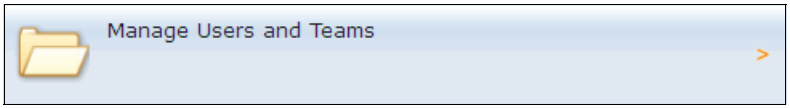


Figure 4-35 Manage Users and Teams icon can be hidden from non-administrators

Unsubscribing an offering from a catalog

To unsubscribe an offering from a catalog:

1. Log into the administrator console, as shown in Figure 4-36.

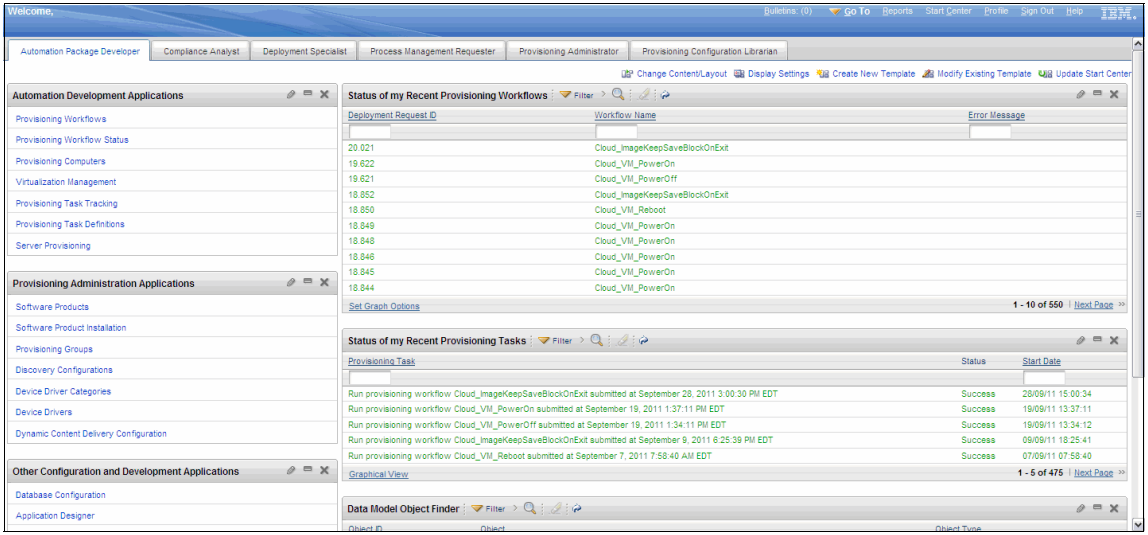


Figure 4-36 Tivoli Service Automation Manager administrator console

2. Click **GoTo** → **Service Request Manager Catalog** → **Offerings**, as shown in Figure 4-37 on page 141.

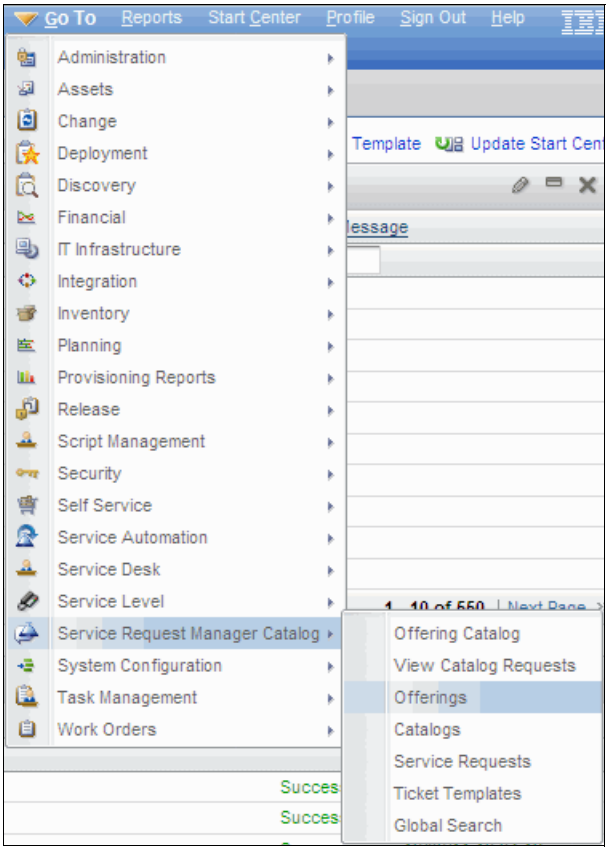


Figure 4-37 Offerings console

3. Click in the Offerings drop-down menu, and select **All Records** to display a list of all available offerings displays. See Figure 4-38.

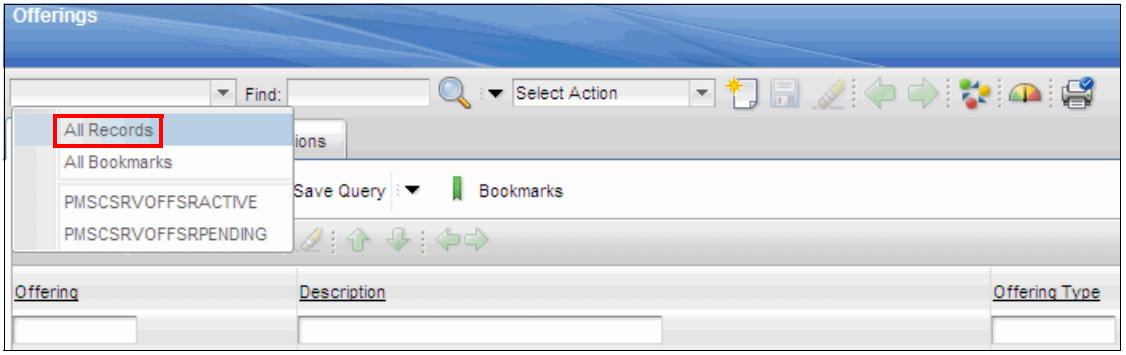


Figure 4-38 Drop-down list showing all offerings

4. To filter this list, click the right arrow located at the top of the results to show more options, or type the name of the offering in the filter, and press Enter. A menu of offerings displays. See Figure 4-39.

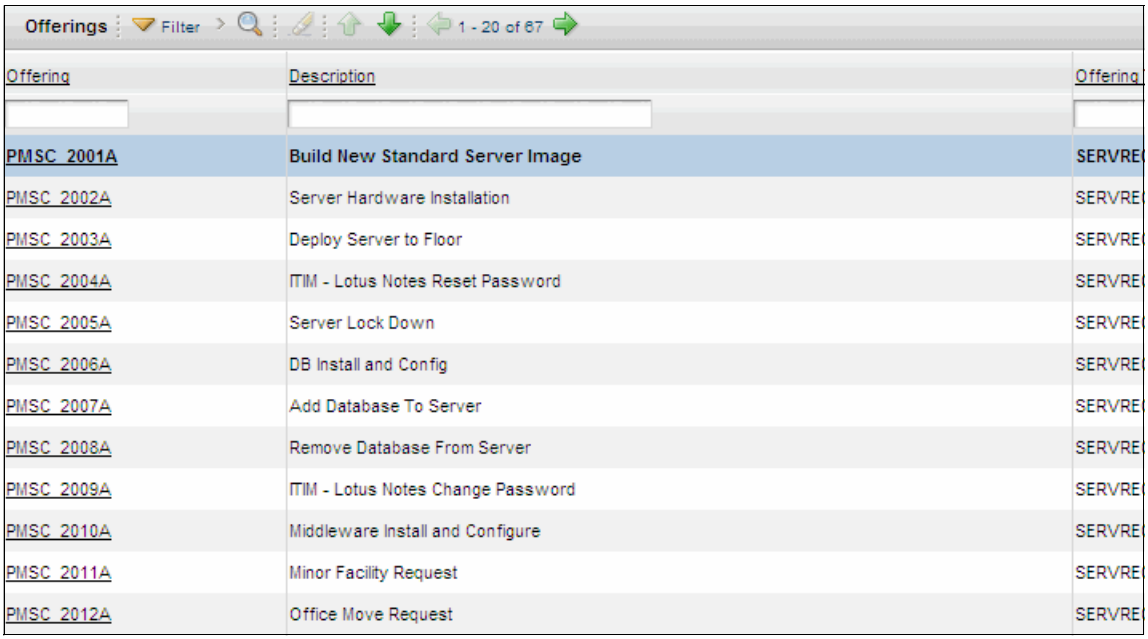


Figure 4-39 All available Tivoli Service Automation Manager offerings

The offerings we need to select are shown in Table 4-6.

Offering names: Your offering names might not be identical to those shown in this section, dependent upon the Tivoli Service Automation Manager version installed.

Table 4-6 Offerings to change for our example

Offering	Description
PMRDP_0231A_72	Create User
PMRDP_0232A_72	Modify User
PMRDP_0233A_72	Remove User
PMRDP_0235A_72	Create Team
PMRDP_0236A_72	Modify Team
PMRDP_0237A_72	Remove Team

Note: Perform Step 5 through and including Step 10 on page 145 for each offering you are customizing.

5. Click an offering to display details specific to that offering, as shown in Figure 4-40.

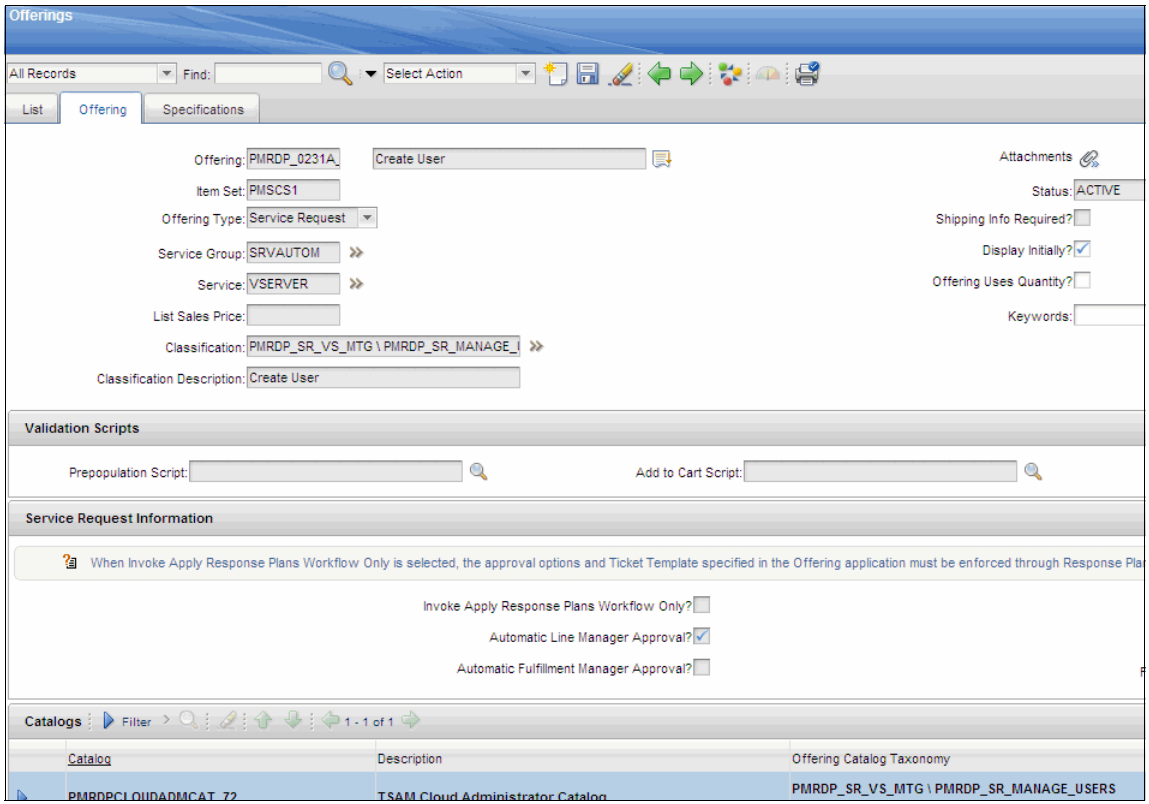


Figure 4-40 The offer in details

You must change the offering status to **Pending** to avoid problems with the interface while the changes are being made.

6. Click the icon with the circles, located in the main menu. The icon is shown in Figure 4-41.

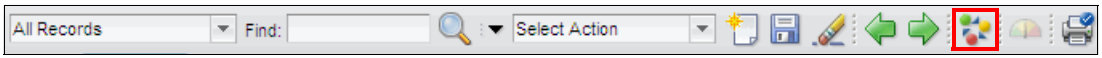


Figure 4-41 To change the status of an offering, click the icon with circles

7. Change the New Status field to **Pending**, and click **OK**, as shown in Figure 4-42.

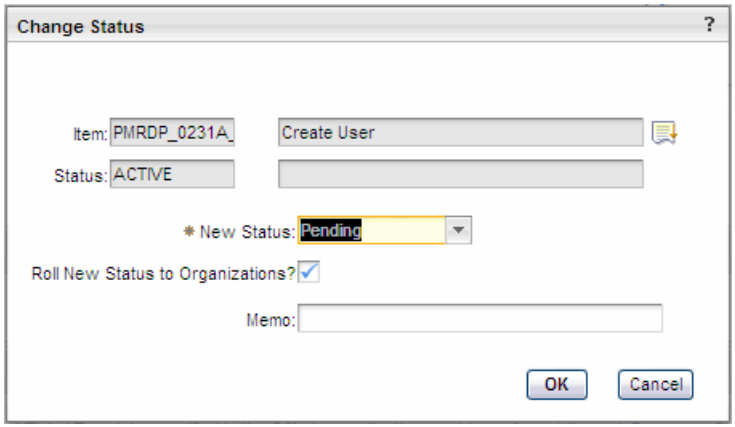


Figure 4-42 Change the New Status field to Pending

8. Display the Select Action drop-down menu, and select **Add Offering to Catalog**, as shown in Figure 4-43.

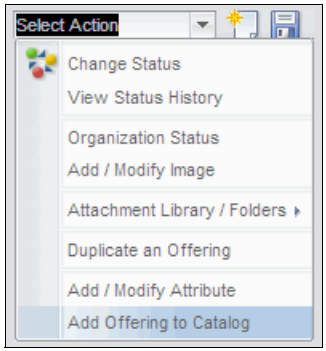


Figure 4-43 Select Action: Add Offering to Catalog

The next dialog box has a list of catalogs to which the selected offering subscribes. See Figure 4-44 on page 145.

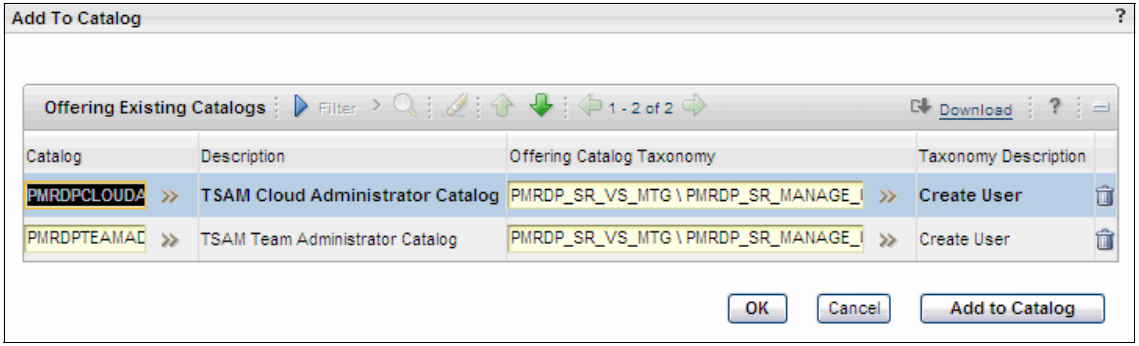


Figure 4-44 List of catalogs to which the selected offer subscribes

From this window, you can add the offering to more catalogs using the Add to Catalog button. Next, choose the catalog of interest and click **OK** in response to the confirmation window.

You can also remove a selected offering from the Catalog by using the trash icon. With the offering selected, click the trash can icon, and then click **OK** in response to the confirmation window. See Figure 4-45.

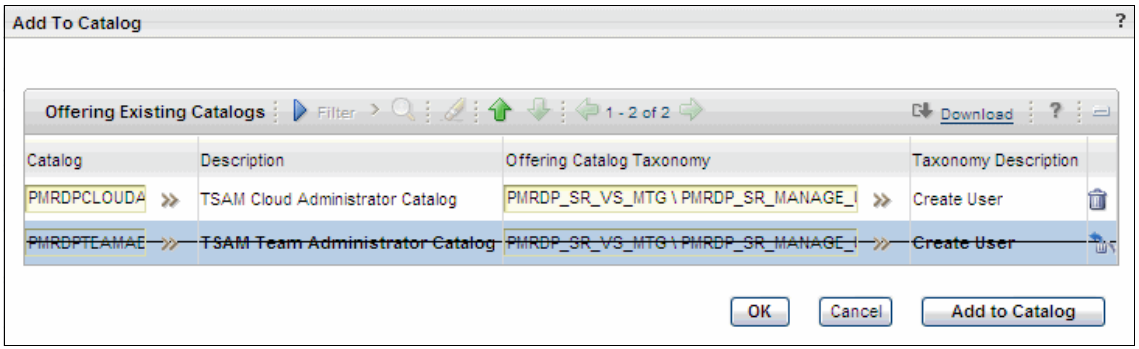


Figure 4-45 To remove from a catalog, click in the trash icon

9. With your updates to the selected offering complete, change the status back to Active using the same procedure described in Step 6 on page 143.

   To change other offerings, repeat Steps 5 on page 143 through and including Step 10.

10. With all changes complete, open the Tivoli Service Automation Manager UI to confirm that all changes were implemented correctly and meet your requirements.

4.4.2 REST API usage

Tivoli Service Automation Manager has several options that integrate with external products. One of these is the option to use the Representational State Transfer (REST) interface.

Using the REST interface, you can access the offering catalog, produce a list of users, find information about images, display system property values, and submit new provisioning. You can also submit queries and customize reports to meet your requirements.

Using the Tivoli Service Automation Manager REST interface

To use the REST interface, you must define the object structures in the Integration Framework. Tivoli Service Automation Manager already provides a set of object structures that are used by the user interface. Be sure that you do not change these object structures; otherwise, the Tivoli Service Automation Manager user interface might not work.

To display a list of objects, open the Object Structures application by clicking **Go To** → **Integration** → **Object Structures**, and filter for the object structure, for example, PMZHBR1_*, as shown in Figure 4-46.

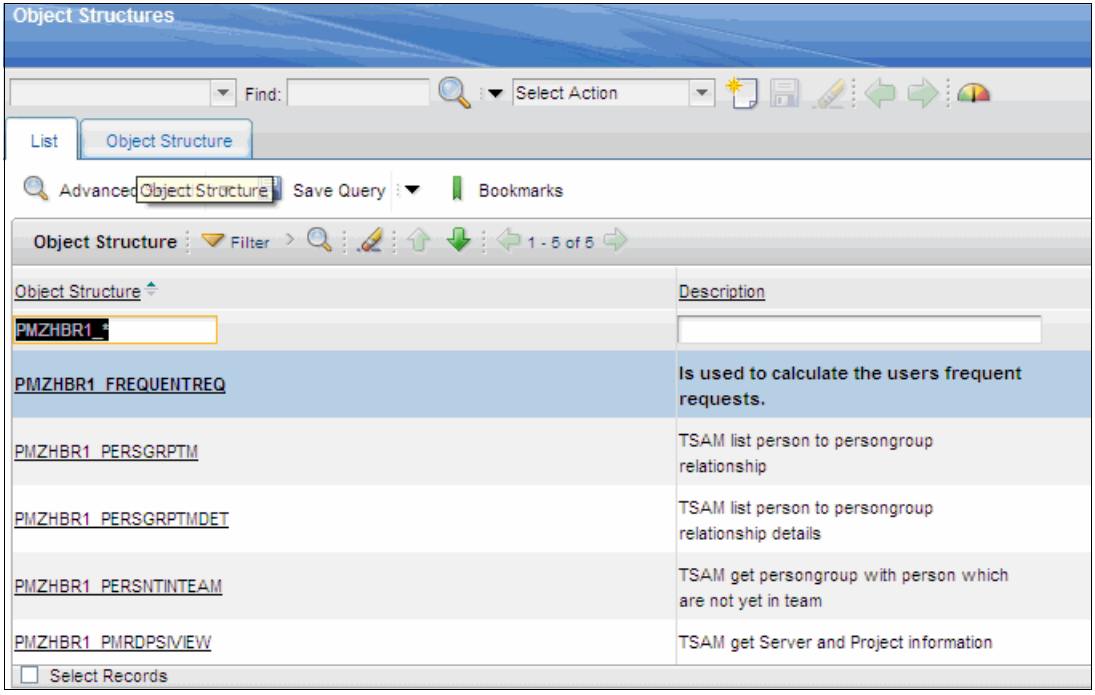


Figure 4-46 Available object structures

With these object structures, you can perform multiple tasks with Tivoli Service Automation Manager, such as creating and updating requests or querying for data structures.

Using REST to submit queries in the Cloud

REST is an interface to access the content in the Tivoli Service Automation Manager and interact with the system. With this interface, you can display a list of users, groups and group details, images, and other information. Also, you can submit a new Service Request in the system to provision a new guest. This is useful when integrating Tivoli Service Automation Manager with other products.

For more information about integrating Tivoli Service Automation Manager with other products, see *Tivoli Integration Scenarios*, SG24-7878, which includes a chapter about integrating Tivoli Service Automation Manager, IBM Tivoli Monitoring 6, and Netcool® Omnibus using REST Interface.

A simple query can be performed using a web browser. Example 4-4 shows a detailed user's list.

Example 4-4 Detailed user's list query

```
Sample URL:
http://localhost:9080/maxrest/rest/os/MBS_MAXUSERDET?_lid=maxadmin&_lpw
d=maxadmin

<QueryMBS_MAXUSERDETResponse xmlns="http://www.ibm.com/maximo"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
creationDateTime="2011-10-18T16:52:18-05:00" transLanguage="EN"
baseLanguage="EN" messageID="1318971138637701741" maximoVersion="7 1
20110105-1024 V7118-37" rsStart="0" rsCount="33" rsTotal="33">
   <MBS_MAXUSERDETSet>
      <MAXUSER>
         <LOGINID>maxadmin</LOGINID>
         <MAXUSERID>1</MAXUSERID>
         <PERSONID>MAXADMIN</PERSONID>
         <STATUS>ACTIVE</STATUS>
         <STOREROOMSITE>PMSCRTP</STOREROOMSITE>
         <USERID>MAXADMIN</USERID>
         <PERSON>
            <LANGCODE>EN</LANGCODE>
            <LASTNAME>maxadmin</LASTNAME>
            <PERSONID>MAXADMIN</PERSONID>
            <PERSONUID>3</PERSONUID>
            <PLUSPCUSTVNDTYPE>INTERNAL</PLUSPCUSTVNDTYPE>
            <STATUS>ACTIVE</STATUS>
```

```
            <STATUSDATE>2004-04-14T11:58:32-05:00</STATUSDATE>
            <SUPERVISOR>PMRDPCAUSR</SUPERVISOR>
         </PERSON>
         <SITE>
            <ACTIVE>1</ACTIVE>
            <DESCRIPTION>PMSCRTP MA Site of PMSC Inc. North
America</DESCRIPTION>
            <ORGID>PMSCIBM</ORGID>
            <SITEID>PMSCRTP</SITEID>
         </SITE>
      </MAXUSER>
   </MBS_MAXUSERDETSet>
</QueryMBS_MAXUSERDETResponse>
```

You can also query the offerings, as shown in Example 4-5.

Example 4-5 List of offerings

```
Sample URL:
http://localhost:9080/maxrest/rest/os/SRM_OFFERING?_lid=maxadmin&_lpwd=
maxadmin

<QuerySRM_OFFERINGResponse xmlns="http://www.ibm.com/maximo"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
creationDateTime="2011-10-18T16:48:30-05:00" transLanguage="EN"
baseLanguage="EN" messageID="1318970910352280110" maximoVersion="7 1
20110105-1024 V7118-37" rsStart="0" rsCount="53" rsTotal="53">
<SRM_OFFERINGSet>
   <PMSCOFFERING>
      <DESCRIPTION>Create Project with VMware Servers</DESCRIPTION>
      <DESCRIPTION_LONGDESCRIPTION>Provision one or more VMware virtual
machines containing a software image.</DESCRIPTION_LONGDESCRIPTION>
      <ITEMID>25</ITEMID>
      <ITEMNUM>PMRDP_0201A_72</ITEMNUM>
      <ITEMSETID>PMSCS1</ITEMSETID>
      <CLASSSTRUCTURE>
         <CLASSIFICATIONID>PMRDP_SR_VS_MTG</CLASSIFICATIONID>
         <CLASSSTRUCTUREUID>793</CLASSSTRUCTUREUID>
         <DESCRIPTION>Virtual Server Management</DESCRIPTION>
      </CLASSSTRUCTURE>
      <IMGLIB>
         <IMAGENAME>ge64_cloud_create_24.gif</IMAGENAME>
      </IMGLIB>
      <PMSCCATALOGOFFMAP />
      <PMSCCATALOGOFFMAP />
```

```
      <PMSCCATALOGOFFMAP />
      <PMSCCATALOGOFFMAP />
   </PMSCOFFERING>
</SRM_OFFERINGSet>
</QuerySRM_OFFERINGResponse>
```

Example 4-6 shows a sample project query.

Example 4-6 Project query

```
Sample URL:
http://localhost:9080/maxrest/rest/os/PMZHBR1_PMRDPSIVIEW?_lid=maxadmin
&_lpwd=maxadmin

<QueryPMZHBR1_PMRDPSIVIEWResponse xmlns="http://www.ibm.com/maximo"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
creationDateTime="2011-10-18T16:21:36-05:00" transLanguage="EN"
baseLanguage="EN" messageID="1318969296487686194" maximoVersion="7 1
20110105-1024 V7118-37" rsStart="0" rsCount="5" rsTotal="5">
<PMZHBR1_PMRDPSIVIEWSet>
   <PMRDPSIVIEW>
      <CLASSSTRUCTUREID>PMRDPCLCVS</CLASSSTRUCTUREID>
      <NAME>T2</NAME>
      <PERSONGROUP>RB_TEAM</PERSONGROUP>
      <PLUSPCUSTOMER>PMRDPCUST</PLUSPCUSTOMER>
      <PMZHBSSVCIID>10</PMZHBSSVCIID>
      <PMZHBWTNID>145</PMZHBWTNID>
      <PROJENDTIME>2011-10-28T17:42:00-05:00</PROJENDTIME>
      <PROJSTARTTIME>2011-10-14T17:43:16-05:00</PROJSTARTTIME>
      <SERVICEOWNER>PMRDPCAUSR</SERVICEOWNER>
      <STATUS>OPERATION</STATUS>
      <STATUSDATE>2011-10-14T18:51:41-05:00</STATUSDATE>
      <TYPE>RDP</TYPE>
      <VSCPU>2.0</VSCPU>
      <VSERVERDCMID>16387</VSERVERDCMID>
      <VSIDENTITY>545e694b-4c88-4067-98e1-2c1d1a16cad9</VSIDENTITY>
      <VSMEMORY>2048.0</VSMEMORY>
      <VSMONITORING>off</VSMONITORING>
      <VSNAME>VM010100000012</VSNAME>
      <VSPCPU>10.0</VSPCPU>
      <VSRESGRPNUM>/cloud/rest/pools/0/</VSRESGRPNUM>
      <VSSTATUS>CREATED</VSSTATUS>
      <VSSTORAGESIZE>20.0</VSSTORAGESIZE>
      <VSSWAPSIZE>0.0</VSSWAPSIZE>
      <VSTYPE>VMware</VSTYPE>
```

```
   </PMRDPSIVIEW>
</PMZHBR1_PMRDPSIVIEWSet>
</QueryPMZHBR1_PMRDPSIVIEWResponse>
```

Example 4-7 is a server information query.

Example 4-7 Server Information

```
Sample URL:
http://localhost:9080/maxrest/rest/os/PMZHBR1_PMRDPSRVVIEW?_lid=maxadmi
n&_lpwd=maxadmin&_compact=1

<QueryPMZHBR1_PMRDPSRVVIEWResponse xmlns="http://www.ibm.com/maximo"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
creationDateTime="2011-10-18T16:55:57-05:00" transLanguage="EN"
baseLanguage="EN" messageID="1318971357852752132" maximoVersion="7 1
20110105-1024 V7118-37" rsStart="0" rsCount="1" rsTotal="1">
<PMZHBR1_PMRDPSRVVIEWSet>
   <PMRDPSRVVIEW>
      <NAME>T2</NAME>
      <OBJID>145</OBJID>
      <PARTNAME>VM010100000012</PARTNAME>
      <PERSONGROUP>RB_TEAM</PERSONGROUP>
      <PLUSPCUSTOMER>PMRDPCUST</PLUSPCUSTOMER>
      <PMZHBSSVCIID>10</PMZHBSSVCIID>
      <PROJENDTIME>2011-10-28T17:42:00-05:00</PROJENDTIME>
      <PROJSTARTTIME>2011-10-14T17:43:16-05:00</PROJSTARTTIME>
      <SDIID>10</SDIID>
      <SERVICEOWNER>PMRDPCAUSR</SERVICEOWNER>
      <STATUS>OPERATION</STATUS>
      <STATUSDATE>2011-10-14T18:51:41-05:00</STATUSDATE>
      <TYPE>RDP</TYPE>
      <VSCPU>2.0</VSCPU>
      <VSERVERDCMID>16387</VSERVERDCMID>
      <VSIDENTITY>545e694b-4c88-4067-98e1-2c1d1a16cad9</VSIDENTITY>
      <VSMEMORY>2048.0</VSMEMORY>
      <VSMONITORING>off</VSMONITORING>
      <VSNAME>VM010100000012</VSNAME>
      <VSPCPU>10.0</VSPCPU>
      <VSRESGRPNUM>/cloud/rest/pools/0/</VSRESGRPNUM>
      <VSSTATUS>CREATED</VSSTATUS>
      <VSSTORAGESIZE>20.0</VSSTORAGESIZE>
      <VSSWAPSIZE>0.0</VSSWAPSIZE>
      <VSSWSTACK>9472.0</VSSWSTACK>
      <VSSWSTACKDESC>9472.0</VSSWSTACKDESC>
```

```
      <VSTYPE>VMware</VSTYPE>
   </PMRDPSRVVIEW>
</PMZHBR1_PMRDPSRVVIEWSet>
</QueryPMZHBR1_PMRDPSRVVIEWResponse>
```

Using the REST API, you can create reports, develop a customized UI, or integrate Tivoli Service Automation Manager with another product. The list of REST interfaces is in the “Tivoli Service Automation Manager REST API Reference”, located at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/topic/com.ibm.tsam_7.2.1.1.doc/t_tsamrestapireference.html

4.5 Modifying for branding

Tivoli Service Automation Manager 7.2.2 introduced a new method to extend the existing Self-Service User Interface look and functionality. In this section, we focus on the modifications regarding branding, specifically, how to change custom logos, messages, headings, and so on.

The Self-Service User Interface is built using Dojo combined with Java Script and HTML templates, leveraging Maximo REST API capabilities. It consists of a few WAR and JAR files, being stored in the MAXIMO.ear file in the following directory:

/opt/IBM/WebSphere/AppServer/profiles/ctgAppSrv01/installedApps/ctgCell01

The files of use for customization are:

- **SimpleSRM.war**

  This is the main UI client code. It provides the code of all panels, used in UI.

  Do not modify the WAR file: It is not recommended to modify this WAR file because with a new release of Tivoli Service Automation Manager this file is replaced and all of the customizations are overwritten.

- **custom_web.war**

  In this file all customizations are incorporated. Tivoli Service Automation Manager checks if any customizations are available for particular panels and, if this extension is present, it is loaded into particular Dojo skeleton, on top of the Tivoli Service Automation Manager functionality.

Note: It is highly recommended to use this WAR file for extensions because with each new Tivoli Service Automation Manager release this data remains intact. It is officially supported. The API interfaces were thoroughly tested and documented for the exact purpose of writing customer extensions.

- **SRMCommons.jar**

  It contains Self-Service User Interface configuration files and server Java code. Do not change the properties: *config.properties*, *secure_config.properties*, unless required explicitly.

In this section, all extensions are built using the **custom_web.war** file and its capabilities. This WAR file must be imported from the installation medium. For Tivoli Service Automation Manager 7.2.2, it is at:

```
TSAMBASE7220\samples\UI\custom_web.zip
```

The **custom_web.zip** file contains two projects:

- *custom_web* - project, which has the actual extensions
- *custom_web_build*, which is a tool project that contains build scripts for test and deployment

To activate extensions, **custom_web.war** must be built locally and deployed into Tivoli Service Automation Manager to finally become incorporated into the Maximo.ear.

4.5.1 Setting up the development environment

To build and deploy custom extensions, the Eclipse environment dedicated for development and build activities must be created:

1. Download and run Eclipse for Java EE Developers from http://www.eclipse.org/downloads. The supported releases are:
   - Ganymede
   - Galileo
   - Helios
2. Using Eclipse IDE, create a workspace.
3. Import *custom_web.zip* archive to your Eclipse environment:
   a. Select **File** → **Import** → **General** → **Existing Projects into Workspace**.
   b. Click **Select archive file**, and browse for custom_web.zip.
   c. Click **Finish** to import the projects.

After it is created, you can start developing your own extensions, described later in this section. When your custom extension is ready, you must build `custom_web.war` and deploy it to Tivoli Service Automation Manager.

Making a custom_web.war build

In the custom_web_build project:

1. Right-click **build.xml**.
2. Select **Run as** → **Ant build**, as shown in Figure 4-47.

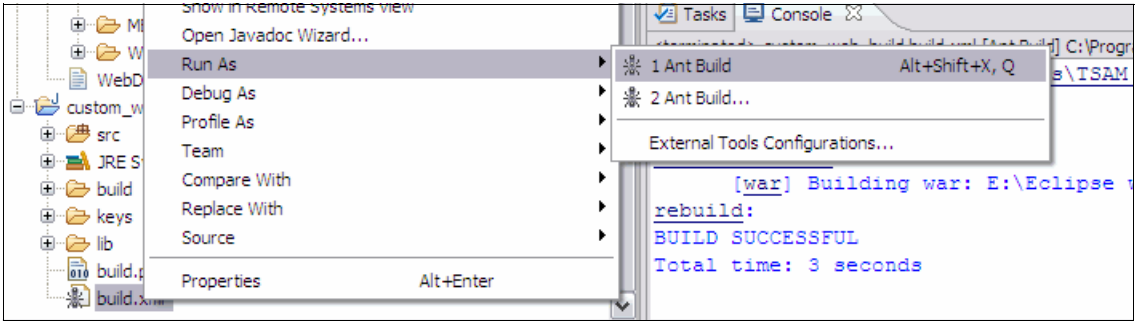


Figure 4-47 Ant build

There are two ways to deploy the extensions. You can either rebuild the whole Maximo.ear file or use the quickdeploy feature.

Rebuilding Maximo.ear

Note: This procedure can take a considerable amount of time. Therefore, only perform full deployment when your extension is finished and ready for the installation on a production system.

To rebuild Maximo.ear:

1. Copy `custom_web.war` to the maximo directory.
   By default it is: `/opt/IBM/SMP/maximo/applications/SimpleSRM`
2. Stop MXServer.
   Issue the following command (location can vary):
   `/opt/IBM/WebSphere/AppServer/profiles/ctgAppSrv01/bin/stopServer.sh MXServer –username <wasadmin> -password <wasadmin_password>`
3. Rebuild Maximo.ear.
   Issue the following command (location can vary):
   `/opt/IBM/SMP/maximo/deployment/buildmaximoear.sh`

4. Deploy Maximo.ear file.
   Issue the following command (location can vary):
   /opt/IBM/SMP/jacl/solutions/DeployApplication.sh <wasadmin> <wasadmin_password> MAXIMO ctgNode01 MXServer /opt/IBM/SMP/maximo/deployment/default/maximo.ear maximo_host webserver1
5. Start MXServer.
   Issue the following command (location can vary):
   /opt/IBM/WebSphere/AppServer/profiles/ctgAppSrv01/bin/startServer.sh MXServer –username <wasadmin> -password <wasadmin_password>

Performing quickdeploy

Note: Use this to test immediately the small changes to the code. quickdeploy assumes, that the actual custom_web.war file is already deployed on a target server and its contents (javascript, html, css) can be replaced.

To perform quickdeploy, Eclipse must have a particular Ant build defined. Refer to “Configuring quickdeploy” on page 155 for more details.

After the Ant task is established, you can perform quickdeploy.

1. Right-click build.xml.
2. Select **Run as** → **Ant build**.
3. In **Ant Configuration Selection**, select **quickdeploy**, and click **Run**, as shown in Figure 4-48 on page 155.

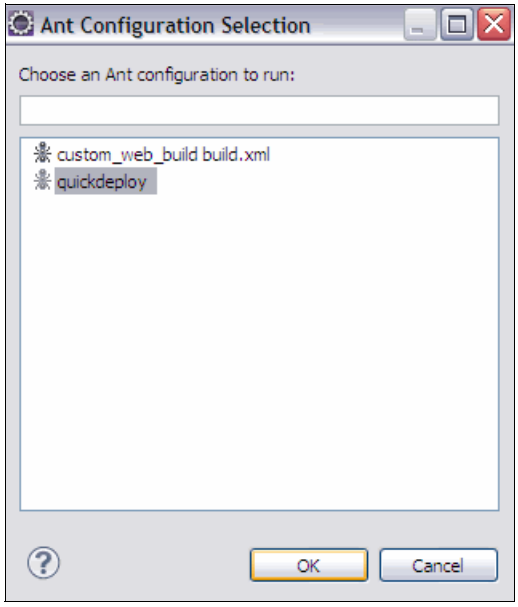


Figure 4-48 Quick deployment

Configuring quickdeploy

To perform quickdeploy, Eclipse must have particular Ant build defined. To define the quickdeploy Ant task, perform following steps:

1. In Eclipse, select **Run** → **External Tools** → **External tools and configurations**.
2. Duplicate the existing custom_web_build build.xml Ant build, as depicted in Figure 4-49 on page 156.

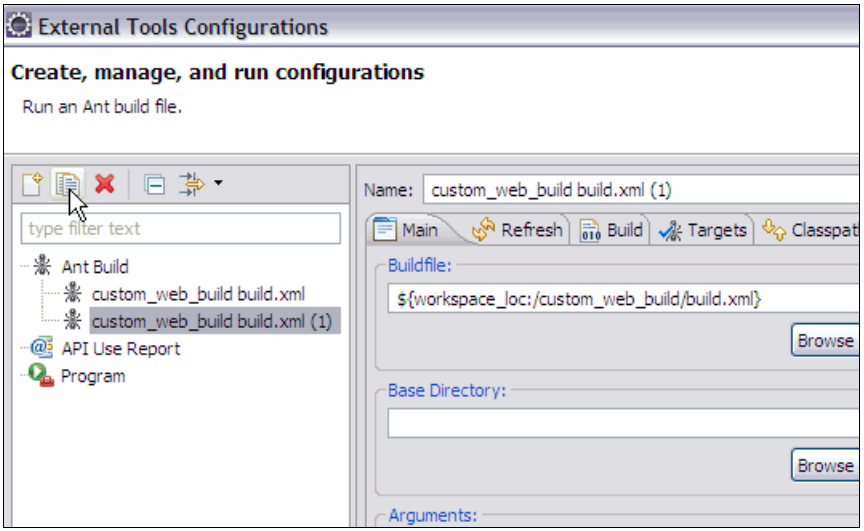


Figure 4-49 Ant build duplication

3. Rename the task using the quickdeploy name.
4. On the Targets tab, clear the **rebuild** option, and select the **quickdeploy** target.
5. On the Classpath tab:
   a. Ensure that the Ant Home points to the correct Ant version, that is, version 1.7.1 or later.
   b. Ensure that the `jsch-0.1.42.jar` library is in the class path. If it is not, add it: **Add JARs** → **custom_web_build** → **lib** → **jsch-0.1.42.jar**.
6. Apply your changes.

Now the new quickdeploy Ant task should be available for use. However, your build environment must be set up to transfer the extensions by using the public key authentication method.

Note: Because the underlying technology for transferring the extension to the target management server relies on SSH (Secure Shell), the management server must have sshd service (on the default port 22) up and running:

To use the public key authentication method to set up extensions transfer:

1. Generate a secure key pair for your client:
   a. Generate an RSA or DSA key pair from putty (`http://www.putty.org`) or a similar key tool.

b. When using putty, use **puttygen**, a key generator program included in the putty installation. Select either **SSH-2-RSA**, or **SSH-2-DSA** with a number of bits between 64 - 2048 (1024 by default).

c. Ensure that the public key is in an OpenSSH-compatible format. When you use puttygen, copy the key from the text field to an `id_dsa.pub` or `id_rsa.pub` file, depending on the cryptographic method selected.

> **Note:** Ensure that you are storing the key in an OpenSSH-compatible format. Do not click **Save public key** to ensure that you are not using putty proprietary format. Instead, copy and paste the public key from the text field to a new file and name this file `id_dsa.pub` or `id_rsa.pub`.

d. Save the private key to a file called `id_dsa` or `id_rsa` (depending on the cryptographic method selected) without the extension.

> **Note:** Ensure that you are storing the key in OpenSSH-compatible format. Do not click **Save public key** to ensure that you are not using putty proprietary format. Instead, in the Conversions menu, select **Export OpenSSH key**.

e. Place both the private and the public key into the keys folder of the custom_web_build project in Eclipse.

The keys folder in your `custom_web_build` project now contains the following files:

- `id_<dsa|rsa>` - the private key
- `id_<dsa|rsa>.pub` - the public key

2. Establish a trusted connection to the management server:

a. Copy the public key file to the target management server.

b. On the target management server, add the contents of the public key to the `authorized_keys` file in your home directory:

- `cd ~/.ssh`
- `cat /path/to/public/key/id_<dsa|rsa>.pub >> authorized_keys`

3. Edit the build.properties file in the custom_web_build project in the following way:

– sshUser: Set to your user name on the target management server.

> **Important**: This user must have *write* access to the WebSphere installation directory.

- sshUsePwd: Comment this line out. (Do not set it to no).
- sshUseKey: Set to **yes**.
- sshKeyFile: Set to **keys/id_<dsa|rsa>**.
- sshKeyPassphrase: Set the passphrase for your key (only if you have set one during key creation).
- targetHost: Set to the host name of the target management server.

If you have not installed Tivoli Service Automation Manager with default settings for WebSphere, you might need to change the following properties:

- WAS_HOME: Set to the installation directory of WebSphere.
- SERVER_NAME: Set to the name of the application server that runs Maximo.
- CELL_NAME: Set to the WebSphere cell that hosts your application server.

4. To test your setup, run the quickdeploy ant task from the build.xml.

Note: Detailed information about building the development environment and deploying custom extensions to Tivoli Service Automation Manager are in *Tivoli Service Automation Manager 7.2.2 Extension Guide* in the chapter *Extensibility - Setting up your development environment* at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp?topic=%2Fcom.ibm.tsam_7.2.2.doc%2Fext%2Ft_ext_ui_setup_env.html

4.5.2 Writing custom extensions

This section describes the process to customize a logo screen.

Predefined Dojo methods in Tivoli Service Automation Manager

To introduce the changes, you can use one of the Dojo functions being already predefined in Tivoli Service Automation Manager:

- *tsamCustomInit*

  This function initializes custom extensions. It is called before the panel shows in the Self-Service User Interface. Perform branding customizations here, using, for example, the following methods:

  - *tsamLoadCSS*

    This method loads a new stylesheet to customize the look of your dialog.

- *tsamSetLoginImage*

  It sets the image on the Login screen. The default is “automation robot”.

- *tsamSetLoginLogo*

  Loads the custom logo on the Login screen. In Tivoli Service Automation Manager 7.2.2 this logo is set to transparent mode.

- *tsamSetLoginHeading*

  Sets the heading for the Login screen

- *tsamCustomDestroy*

  This method is a cleanup function that is called before displaying the next panel.

Changing the logo screen

In this section, we modify the logon panel of the Tivoli Service Automation Manager Self-Service User Interface.

The panel without modification is depicted on Figure 4-50.

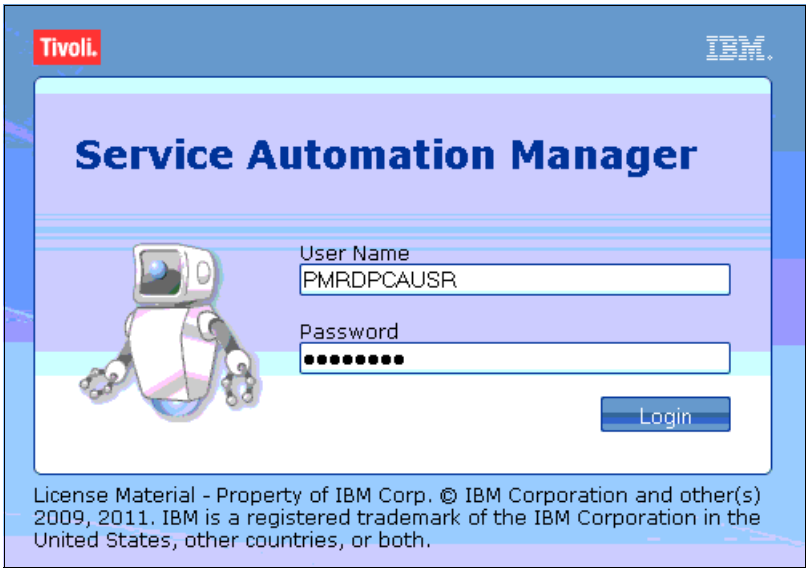


Figure 4-50 Tivoli Service Automation Manager logon panel - before modification

To change the logo screen:

1. Switch to your development environment.
2. Using Eclipse, open the custom_web project in the workspace.
3. Navigate to WebContent/js/custom/tsam/dijit.

4. Open the Login.js file.

Note: In case your Login.js file is not available in the custom_web project, you might want to copy and rename the existing Login_sample.js file, present in WebContent/js/custom/tsam/dijit/ sample folder.

In Login.js file, depending on your needs, perform the actions in the following sections.

Loading a customized CSS sheet for the logon screen

`tsamLoadCSS` is designed to support the style change.

Syntax: `tsamLoadCSS(Arg1)`

Where:

`Arg1` is a path to your `*.css` style sheet file below the `custom_web/WebContent/js` root directory (replaced with `/custom/js` in the syntax).

Example:

For the `myNewStyle.css` style sheet file, located under `custom_web/WebContent/js/custom/tsam/dijit/themes/customstyles`, the method should look as follows:

```
this.tsamLoadCSS("/custom/js/custom/tsam/dijit/themes/customstyles/myNewStyle.css");
```

Loading a customized logon screen image

`tsamSetLoginImage` is designed to change the logon image.

Syntax: `tsamSetLoginImage(Arg1, Arg2, Arg3, Arg4)`

Where:

- `Arg1` - width (pixels)
- `Arg2` - height (pixels)
- `Arg3` - (optional) alternative text (displayed when image cannot be loaded)
- `Arg4` - path to your image file.

Note: The image is best displayed with 60 pixels in width and 120 pixels in height.

Example:

For the `Redbooks-logo.png` image file, located under

`custom_web/WebContent/js/custom/tsam/dijit/themes/images`

with a width and height of 120 pixels, the method should look as follows:

```
this.tsamSetLoginImage(120,120, "",
"/custom/js/custom/tsam/dijit/themes/images/Redbooks-logo.png");
```

Note: In Figure 4-50 on page 159, the customized logon image is depicted as an “automation robot”

Setting your own company logo

`tsamSetLoginLogo` method is designed to set the logo.

Syntax: `tsamSetLoginLogo(Arg1, Arg2, Arg3, Arg4)`

Where:

- `Arg1` - width (pixels)
- `Arg2` - height (pixels)
- `Arg3` - (optional) alternative text (displayed when logo cannot be loaded)
- `Arg4` - path to your logo file

Example:

For the `LoginLogo_ITSO.png` logo file, located under `custom_web/WebContent/js/custom/tsam/dijit/themes/images`,

with a width of 42 pixels and a height of 22 pixels, the method should look as follows:

```
this.tsamSetLoginLogo(42, 22, "",
"/custom/js/custom/tsam/dijit/themes/images/LoginLogo_ITSO.png");
```

Note: In Figure 4-50 on page 159, the company logo is depicted as a Tivoli brand logo.

Example 4-8 on page 162 shows the `Login.js` file introducing all of the changes for the logon screen described in this section.

Example 4-8 Login.js - customization logon panel

```
dojo.provide("custom.tsam.dijit.Login");
dojo.require("ibm.tivoli.simplesrm.srm.dijit.Login");
dojo.declare("custom.tsam.dijit.Login",
   [ibm.tivoli.simplesrm.srm.dijit.Login],
{
   tsamCustomInit: function() {
      //load new style
this.tsamLoadCSS("/custom/js/custom/tsam/dijit/themes/customstyles/myNe
wStyle.css");

      //load new logon image
      this.tsamSetLoginImage(120,120, "",
"/custom/js/custom/tsam/dijit/themes/images/Redbook-logo.png");

      //load new company logo
      this.tsamSetLoginLogo(42, 22, "",
"/custom/js/custom/tsam/dijit/themes/images/LoginLogo_ITSO.png");

   },
   dummy_:null
});
```

Important: If you do not see any changes, clear your web browser's cache and re-open the UI console.

The modified Logon screen is shown in Figure 4-51 on page 163.

Figure 4-51 Customized Logon pane

4.5.3 Globalization

The web pages of the Tivoli Service Automation Manager user interface are dynamically created and depend on:

- The language or locale that you select
- The installed language packs
- Tivoli Process Automation Engine base language
- Tivoli Service Automation Manager offering descriptions that are stored in Tivoli Process Automation Engine database tables

The language selection mechanism works as follows:

- As long as no user is logged in, the user interface is rendered in the language set for the browser. If that particular language is not installed on the management server, the user interface is displayed in the Tivoli Process Automation Engine base language (any of the supported languages).
- If a user logs into Tivoli Service Automation Manager, the user interface is rendered in the user-preferred language. This setting can be changed with either the Modify User function or the Tivoli Process Automation Engine user application.
- Not only can you select the language, but also the locale, for example time/date format. Language and locale settings are then set for the user, not for an instance or for the service provider. The settings are fully configurable.

Note: For additional information regarding user management, refer to Tivoli Service Automation Manager information center at:
http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/topic/com.ibm.tsam_7.2.2.doc/rdp/t_rdp_managingusers.html

Developing Globalization extension

Before starting, make sure that Tivoli Service Automation Manager language pack has been installed properly in the system. For additional information about how to install language packs, see Tivoli Service Automation Manager information center at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp?topic=%2Fcom.ibm.tsam.doc_7.2%2Ft_install_base.html

Globalization dojo feature description

Tivoli Service Automation Manager Self-Service User Interface can be extended in the form of JavaScript Dojo classes. Therefore for UI globalization purposes, Dojo features must be used.

If a language pack was installed properly to the system, the following additional files are present in the system (in `custom_web.war` project):

- js/custom/tsam/dijit/nls/uiStringTable.js (default, English)
- js/custom/tsam/dijit/nls/de/uiStringTable.js (German)
- js/custom/tsam/dijit/nls/es/uiStringTable.js (Spanish)
- js/custom/tsam/dijit/nls/fr/uiStringTable.js (French)
- js/custom/tsam/dijit/nls/it/uiStringTable.js (Italian)
- js/custom/tsam/dijit/nls/ja/uiStringTable.js (Japanese)
- js/custom/tsam/dijit/nls/ko/uiStringTable.js (Korean)
- js/custom/tsam/dijit/nls/pt-br/uiStringTable.js (Portuguese / Brazilian)
- js/custom/tsam/dijit/nls/ru/uiStringTable.js (Russian)
- js/custom/tsam/dijit/nls/zh/uiStringTable.js (Chinese)
- js/custom/tsam/dijit/nls/zh-tw/uiStringTable.js (Traditional Chinese)

These files represent the translation tables for a given language. Which table is used for translation is determined by the locale that is set in the web browser used to connect to Self-Service User Interface.

When `dojo.requireLocalization (custom.tsam.dijit, uiStringTable)` method is called, Dojo searches the `nls` folder in the `custom.tsam.dijit` package for the `uiStringTable` table corresponding to the locale.

Example:

When locale in the web browser is set to German (de), the `dojo.requireLocalization (custom.tsam.dijit, uiStringTable)` method will perform the search of the `uiStringTable` on `../nls/de/..` source. What eventually returns is:

`js/custom/tsam/dijit/nls/de/uiStringTable.js` (Translation table for German)

The structure of the `uiStringTable` table is a simple JavaScript array - mapping key: value, as depicted in Example 4-9.

Example 4-9 uiStringTable example

```
{
   Key1: "value1"
   Key2: "value2"
   ...
}
```

Note: In case the required locale table is not supported, the cloud administrator can prepare the globalization `uiStringTable` table by copying the existing `uiStringTable.js` file to the location determined by language and translate the values for all keys accordingly. After this is done and `uiStringTable` is in a proper folder structure, globalization will be active.

Associating variables with a resource bundle

Having `uiStringTable` defined in the system, you can use keys, declared in the array, to load associated values into dojo string variables.

As an example, to change the `this.myPanelLabel` string, store the string value in the array, as shown in Example 4-10.

Example 4-10 Store the string value

```
{
   panelCustomLabel: "My Panel"
   ...
}
```

Perform the next steps to set `this.myPanelLabel` variable in the code:

1. Load resource bundle into an array using the `getLocalization()` method

   ```
   this.globalizationTable =
   dojo.i18n.getLocalization("custom.tsam.dijit", "uiStringTable");
   ```

2. Use the `this.globalizationTable` array variable to replace the existing `this.myPanelLabel` string.

   ```
   this.myPanelLabel(this.globalizationTable.panelCustomLabel);
   ```

This can be also done at once using the following syntax:

```
this.myPanelLabel = dojo.i18n.getLocalization("custom.tsam.dijit",
"uiStringTable").panelCustomLabel;
```

Important: Tivoli Service Automation Manager will overwrite all variables that are identical with the existing ones. They usually start with `this._` Therefore it is recommended to use different writing conventions and names.

4.6 Customizing email notification templates

IBM CloudBurst uses email notifications to inform users when:

- A Service Request approval is rejected, required, or approved
- A project is created, cancelled, pending removal due to an expired reservation, or a reservation time is modified
- A server is started, stopped, added, modified, removed, pending removal due to an expired reservation, or an operation was performed
- A virtual server image is created, saved, restored, or deleted

A subset of the built-in communication templates is included in the self-service virtual server provisioning service defined in CloudBurst. See Table 4-7.

Table 4-7 Suggested important communication templates

Template	Event that triggers notification
PMRDPAFREJA	A service request approval was rejected, and the submitting user is notified.
PMRDPNOTAS	A server was added, and the user is notified.
PMRDPNOTCP	A deployment was created, and he user is notified.
PMRDPNOTMS	A server was modified, and the user is notified.
PMRDPRBREJ	A service request approval was rejected, and the submitting user is notified.
PMRDPSRAF	A service request approval is required, and the affected user is notified.

Template	Event that triggers notification
PMRDPSROK	A service request was automatically approved, and the submitting user is notified.
PMRDPSRRB	A service request approval is required, and the user who reported the request is notified.
PMRDPNOTPEND	Removal of a server is pending due to an expired reservation.
PMRDPNOTPENDPR	Removal of a project is pending due to an expired reservation.
PMRDPNOTAPP	Approval is required.
PMRDPAPRREQ	Informs Cloud Administrator of a required approval.

To view additional templates, go to the Tivoli Service Automation Manager information center at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp?topic=%2Fcom.ibm.tsam_7.2.2.doc%2Frdp%2Fc_rdp_commtemplates.html

4.6.1 Modifying a communication template

If necessary, to modify a communication template:

1. Click **Go To** → **Administration** → **Communication Templates**.
2. Filter for the template that you want to modify, as described in Table 4-7 on page 166, or press Enter in an empty field to list all available templates. See Figure 4-52 on page 168.

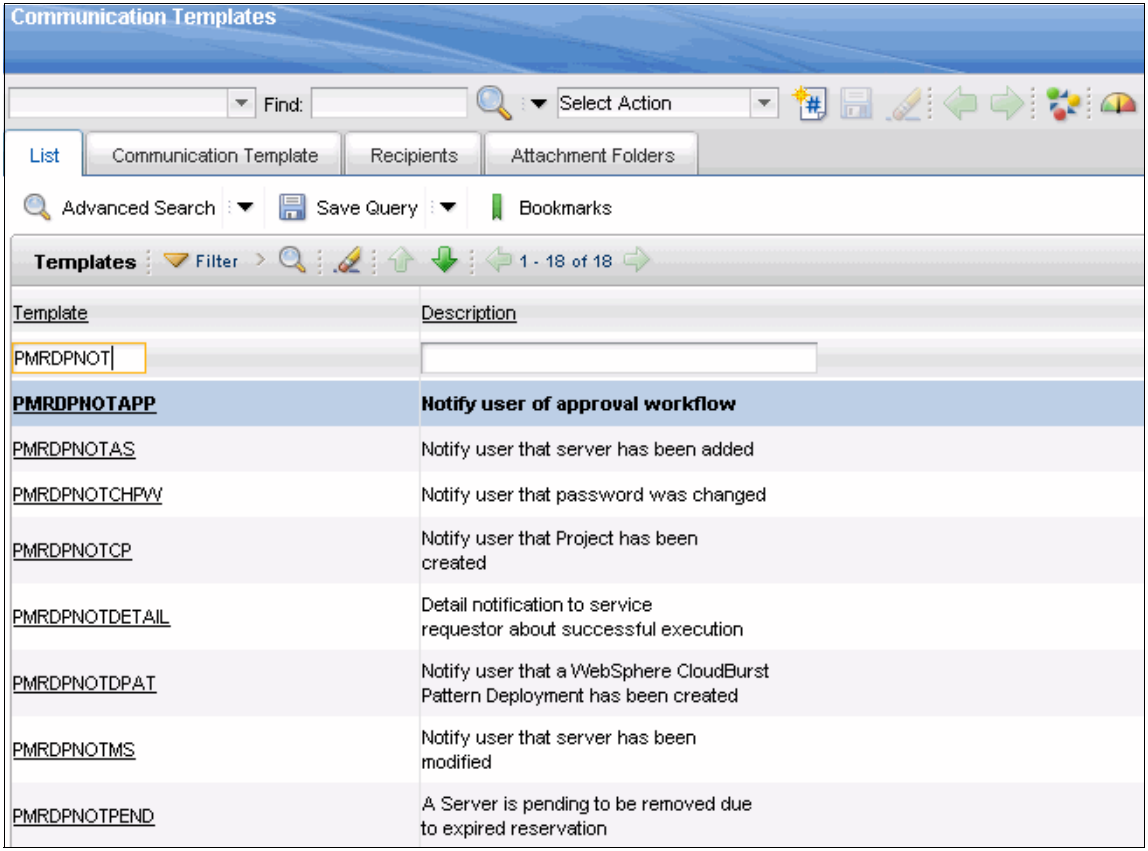


Figure 4-52 Notification template list

3. Modify the Template Details as needed. See Figure 4-53 on page 169.

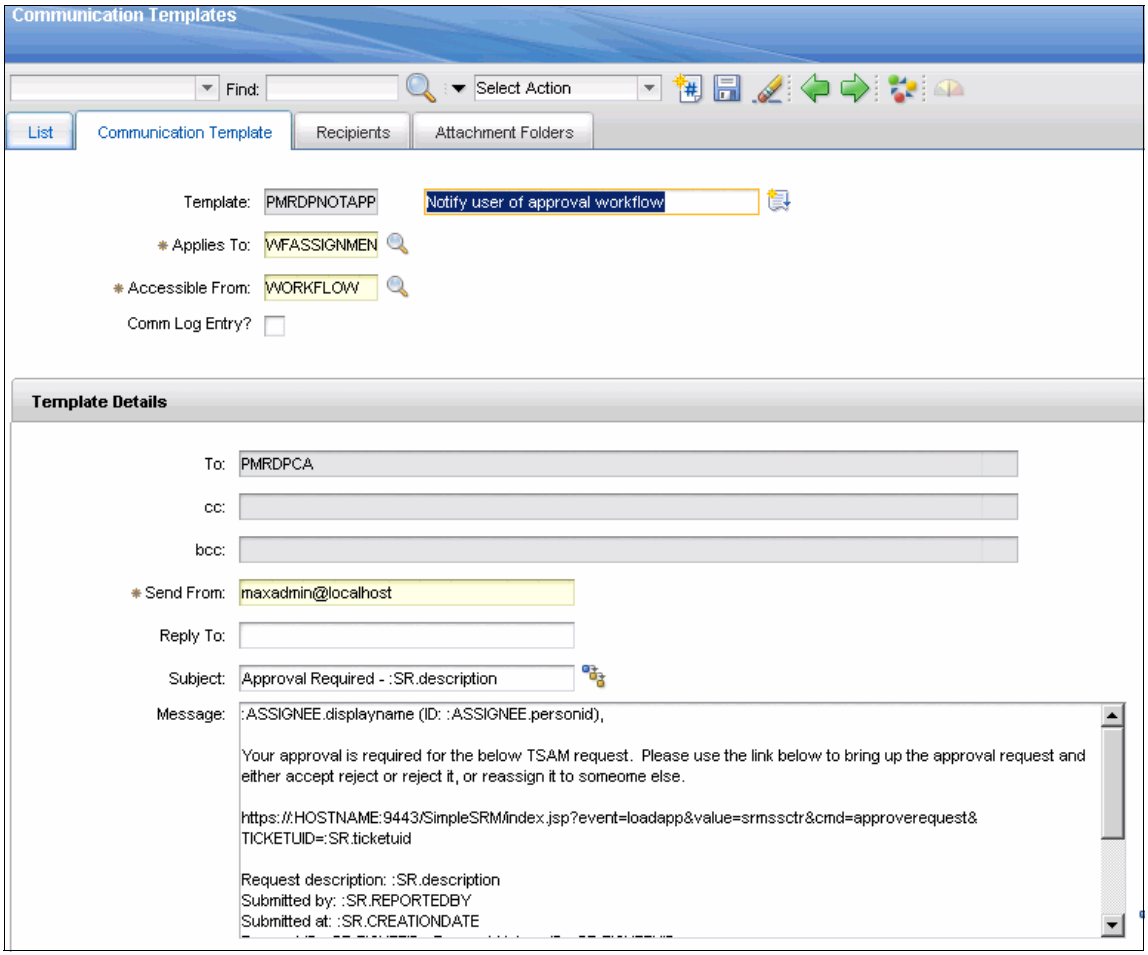


Figure 4-53 Modifying the notification template

4. Click **Save**.

By default, the requester and all customer team members receive a notification about server requests. Cloud administrators must also be registered as team members to receive notifications.

Use the roles described in Table 4-8 on page 170 to change the sender or receiver information for the templates.

Table 4-8 Roles for email notification

Role	Definition
PMRDPNOTRQ	User that issued a provisioning request.
PMRDPNOTSO	Owner of the project, that is, a user who created the project.
PMRDPNOTUG	Team of the user who issued a provisioning request. On CC list.

For more information about notification templates, visit the Tivoli Service Automation Manager information center at:
http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp?topic=%2Fcom.ibm.tsam_7.2.2.doc%2Frdp%2Fc_rdp_commtemplates.html

4.7 Lifecycle of provisioning a project

The following sections guide you through creating a project in CloudBurst on System x. They include a sample project that incorporates several tasks that typically are required during any project lifecycle, beginning with your first login to the Tivoli Service Automation Manager user interface. The scenarios covered are:

- 4.8, “Creating a customer” on page 174
- 4.9, “Creating a new team and user” on page 175
- 4.10, “Creating a sample project, Hello Cloud” on page 179

In the sample project, the following management tasks are covered:

- “Stopping, starting, and restarting servers” on page 188
- “Resetting a server password” on page 189
- “Modifying server resources” on page 190
- “Cancelling a project” on page 191

4.7.1 Tivoli Service Automation Manager interface

The Tivoli Service Automation Manager interface is used to perform the tasks we will cover. For more information about using the Tivoli Service Automation Manager, see:

http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp

The Tivoli Service Automation Manager interface is accessible at the following URL, where *tsam_mgmt_server* is the host name of your Tivoli Management Server:

`http://tsam_mgmt_server:9443/SimpleSRM/`

The login page is shown in Figure 4-54.

Figure 4-54 Tivoli Service Automation Manager login page

After the login, you will be at the home screen. Click **Request a New Service**, and in the next screen, click **Virtual Server Management**. The offerings page is displayed, as shown in Figure 4-55 on page 172.

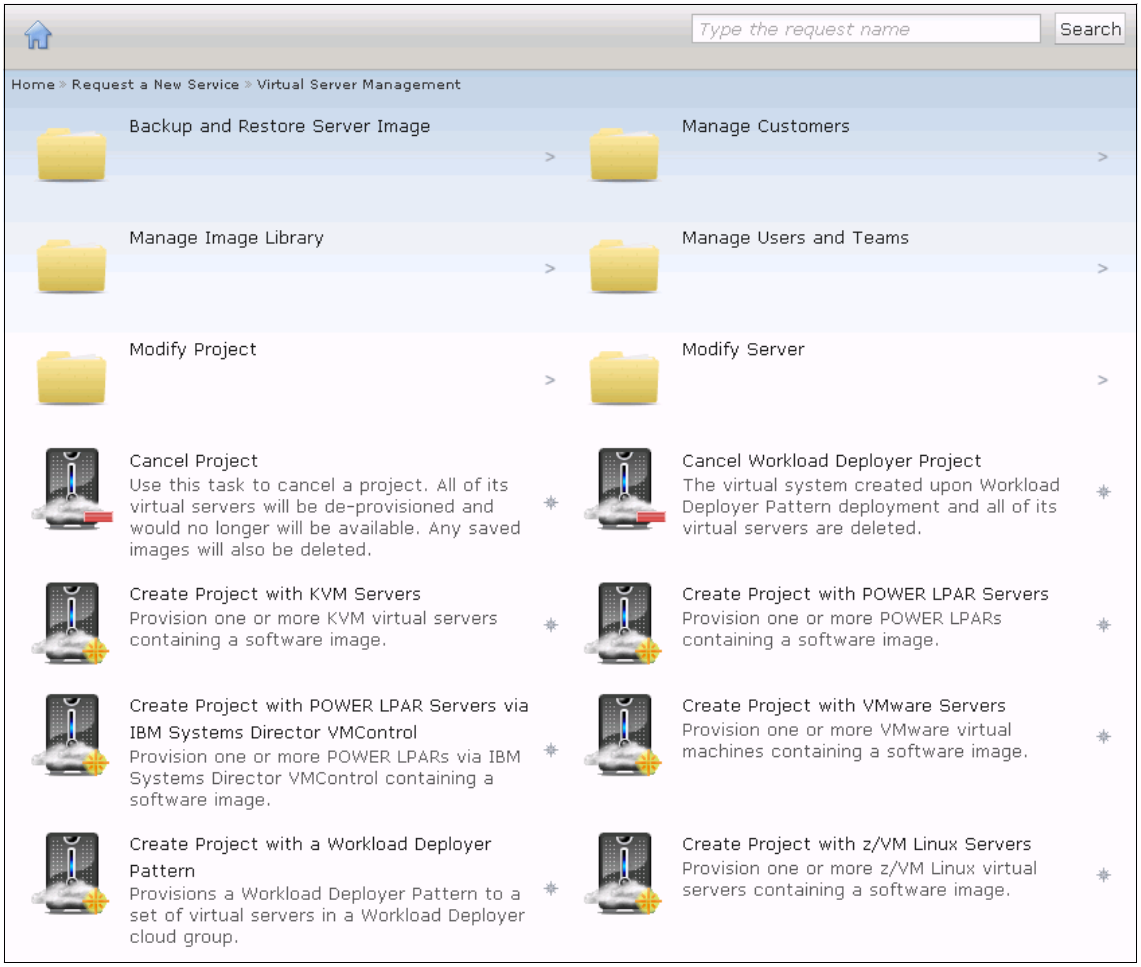


Figure 4-55 Available offerings

Backup and Restore Server Images: There are options to backup or restore a provisioned server. The options are:

- Create Server Image: Saves an image of a provisioned server.
- Remove Saved Images: Removes one or more saved images.
- Restore Server from Image: Restores a virtual server to a previous state from an image.

Manage Customers**:** In this offering you can:

- Create Customer
- Remove Customer

Manage Image Library: To add and remove images for a template. The options are:

- Register VMware Image
- Register POWER® LPAR Image
- Register KVM Image
- Register Xen Image
- Register Xen Image
- Register z/VM® Image
- Register VM Image using IBM System Director VMControl
- Unregister Image

Manage Users and Teams: To add, remove, or edit users and teams:

- Create Team
- Modify Team
- Delete Team
- Create User
- Modify User
- Delete User

Modify Project: Used to modify a project, such as add new servers, change the reservation, and remove servers from a project. The options are:

- Add Server type
- Add POWER LPAR Servers using IBM System Director VMControl
- Add Server from Saved Image
- Modify Reservation
- Remove Server

Modify Server: Actions in a specific provisioned server. The actions are:

- Reset Server Password
- Restart Server
- Stop Server
- Start Server
- Modify Resources: The resources can be Memory, CPU or Disk
- Install Software: Install an additional software

Cancel Project: This offering cancels the project. All servers provisioned in the project are deleted, and the resources become available for new provisioning.

Create project with Server type: Where *Server type* is the list of available hypervisors in your Cloud. This is the first step to provision a server.

To provision a server for the first time, you need to have access to the Tivoli Service Automation Manager console and be member of a team. See the following sections for more detail.

4.8 Creating a customer

A customer enables you to manage your cloud environment resources, users, and teams. Each user and team is associated with a specific customer. Each customer is assigned to a single cloud customer administrator who can perform a number of tasks for the customer. This feature was added in the Tivoli Service Automation Manager version 7.2.2.

To create a new customer:

1. Log into the Tivoli Service Automation Manager self-service user interface as a cloud administrator.
2. From the home page, select **Request a New Service** → **Virtual Server Management** → **Manage Customers** → **Create Customer**. The create customer window displays, as shown in Figure 4-56.

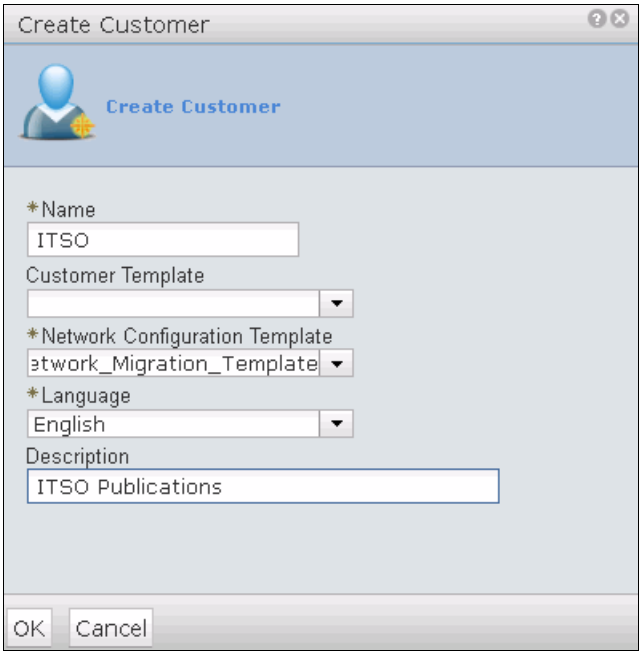


Figure 4-56 The Create Customer window

3. Enter the name of the customer. It must be unique, for example, `ITSO`.
4. Select the Network Configuration Template from the list.
5. Select the language.
6. Click **OK** to submit.

The customer is created when you see `Resolved` displayed in the right frame of the window. You can now create users and assign them to this customer, as described in 4.9, “Creating a new team and user” on page 175.

4.9 Creating a new team and user

With the customer created, you can proceed to creating teams and users. A team is a logical group of users that access the same resources. Each team is separately tracked for the collection of usage and accounting data. A user can belong to more than one team. Each project can be assigned to one team only, but the team can have access to more than one project. When you create users, you must assign a role to each one. Each role has its own set of privileges.

To create a new user:

1. Log into the Tivoli Service Automation Manager as a cloud administrator.
2. Select the customer from which to create the team from the drop-down menu, as shown in Figure 4-57.

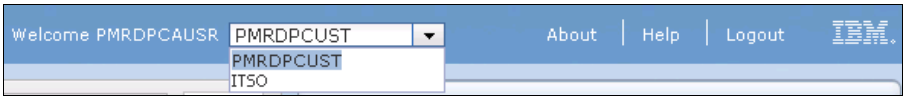


Figure 4-57 Select the customer for which a user and team will be created

3. From the home page, select **Request a New Service** → **Virtual Server Management** → **Manage Users and Teams** → **Create User**. Figure 4-58 on page 176 is displayed.

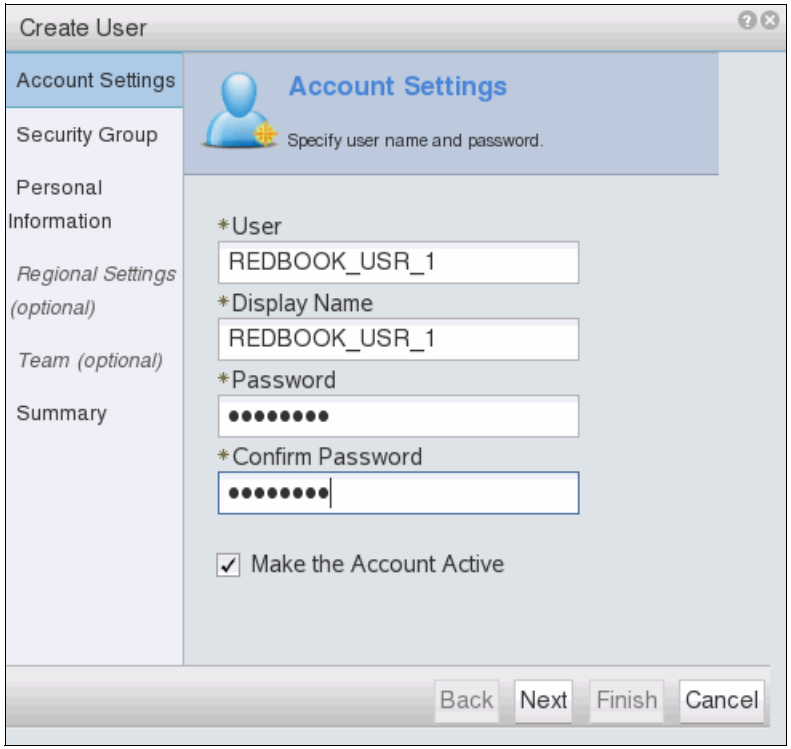


Figure 4-58 The Create User window

4. Enter the User, Display Name, Password, Confirm Password, and click **Next**.
5. In the next window, select the Security Policy, and click **Next**, as shown in Figure 4-59 on page 177.

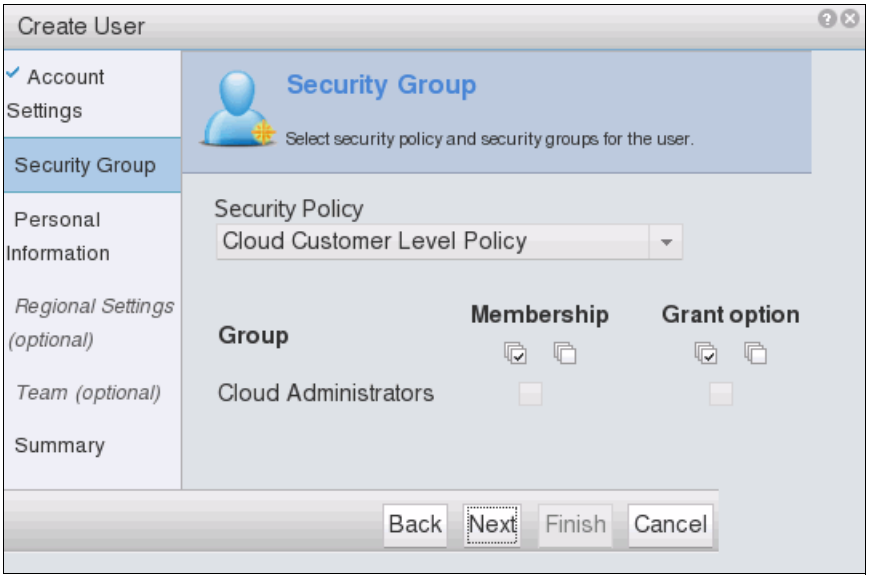


Figure 4-59 Select the Security Policy and the privileges

6. In the Personal Information tab, complete the required fields, and click **Next**.
7. In the Regional Settings tab, select your location, and click **Next**.
8. In the Team tab, select the teams that the user should be assigned to. If you have not yet created teams, you can assign users to teams later. Click **Next**.
9. In Figure 4-60 on page 178, the Summary tab is displayed. Check that the information is correct, and click **Finish** to submit the request.

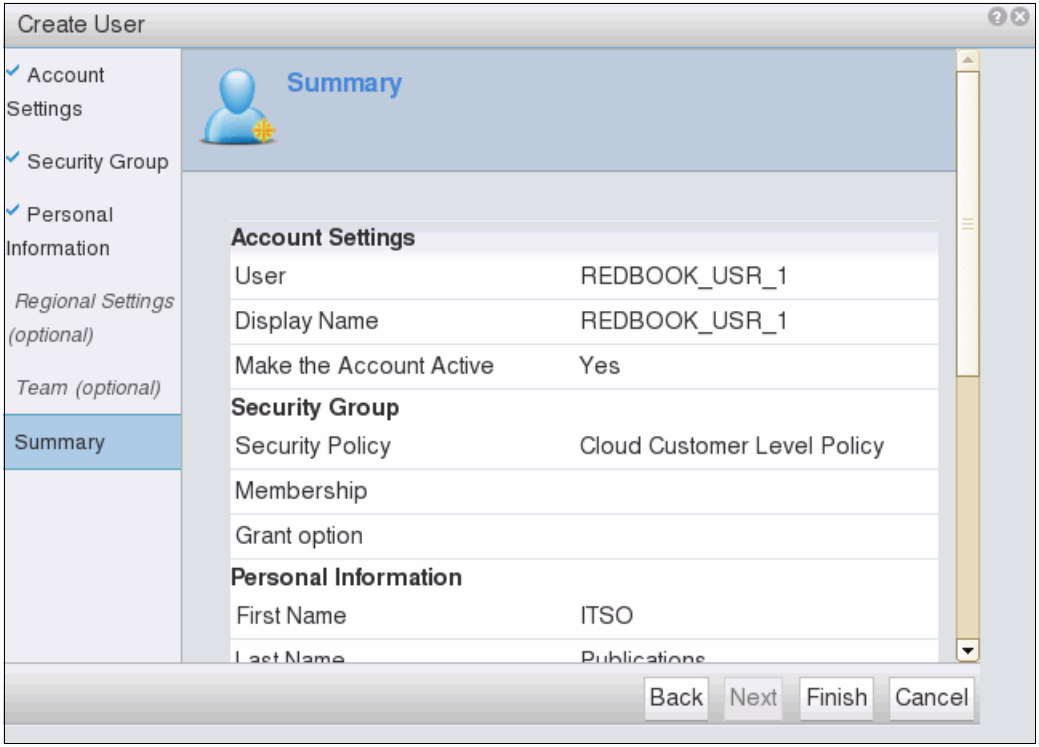


Figure 4-60 Summary tab, displaying User information

10. To create a new Team, go back to the Manage Users and Teams, as shown in Figure 4-57 on page 175, and click **Create Team**.
11. Enter the team name, select the users from the available users list, and click **OK** to submit your request, as shown in Figure 4-61 on page 179.

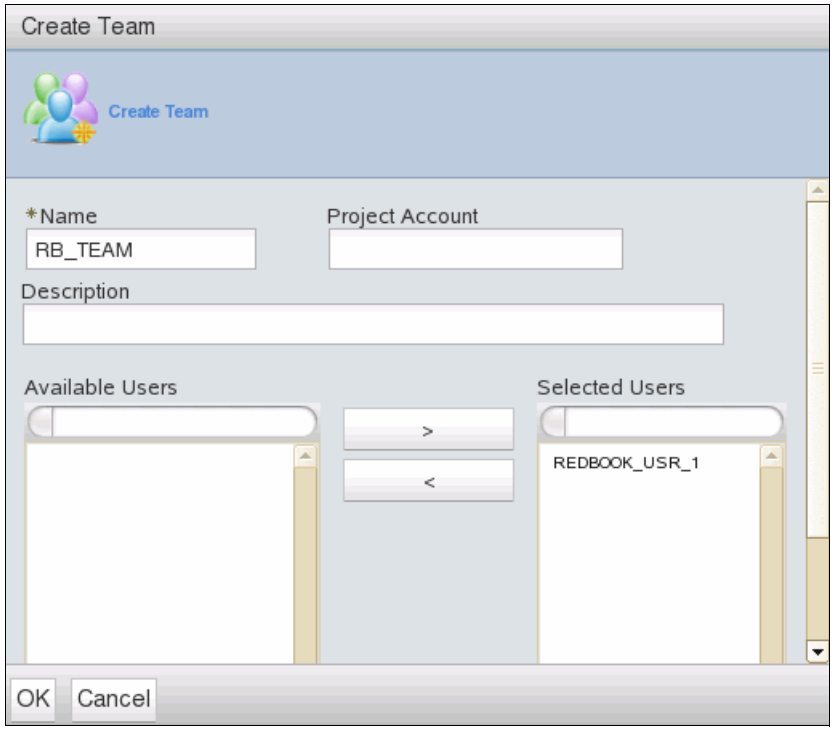


Figure 4-61 Create Team window

4.10 Creating a sample project, Hello Cloud

In this sample project, we create a new VMware project, select resources, stop and start servers, change the password, and decommission the project. We call this sample project, *Hello Cloud*. All of the steps for this project are executed along with the steps defined in 4.9, “Creating a new team and user” on page 175.

4.10.1 Creating a new project

Only cloud administrators, cloud customer administrators, and team administrators can create new projects. To create the new project:

1. Log in as a cloud administrator.
2. From the home page, select **Request a New Service** → **Virtual Server Management** → **Create Project with VMware Servers**, as shown in Figure 4-62 on page 180.

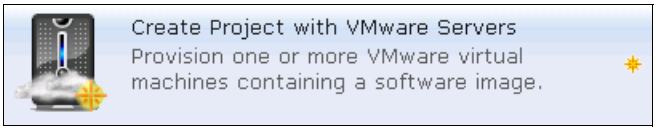


Figure 4-62 Create Project with VMware Servers window

3. In the Project Details tab (Figure 4-63), enter the required information:
   - Project Name: The name of the project. This name must be unique.
   - Team to Grant Access: The team that will have access to this project. All members of the team will have access to the project.
   - Start Date / Start Time: Date and time the project starts. Select a future date and time.
   - End Date / End Time: Date and time the project will be decommissioned. It can be `Indefinite`, if necessary.

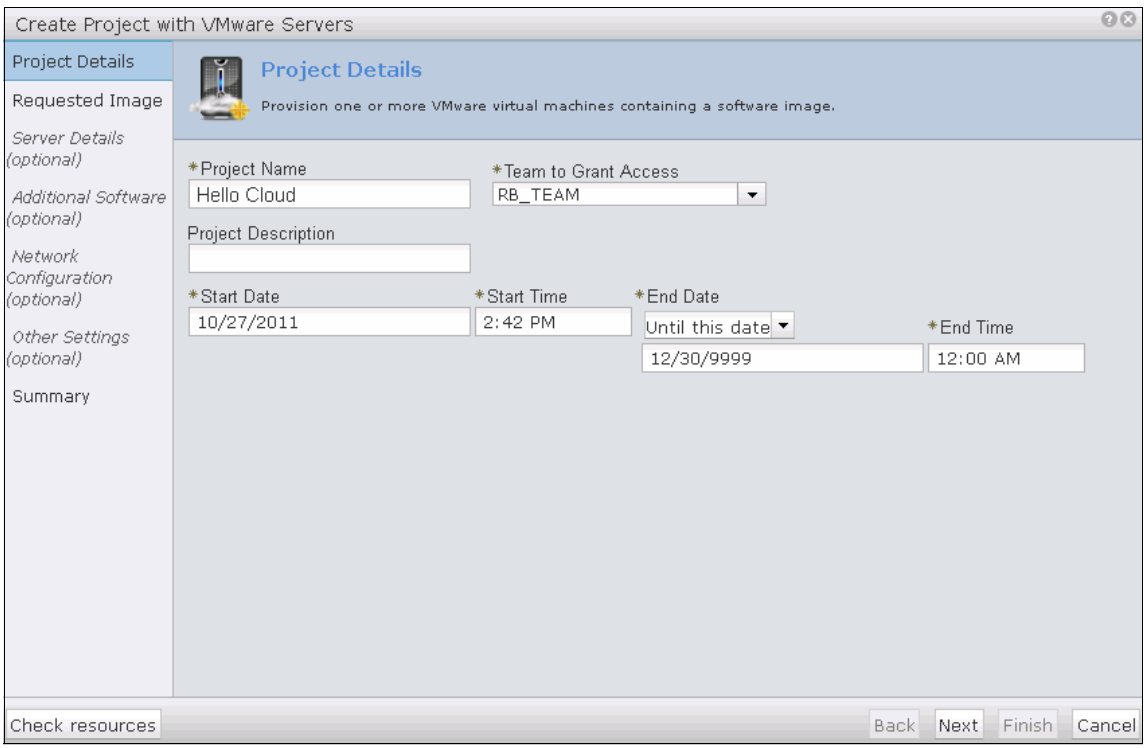


Figure 4-63 Project Details tab

4. On the Requested Image tab (Figure 4-64), select the image to be deployed and the number of servers to be provisioned for this project.

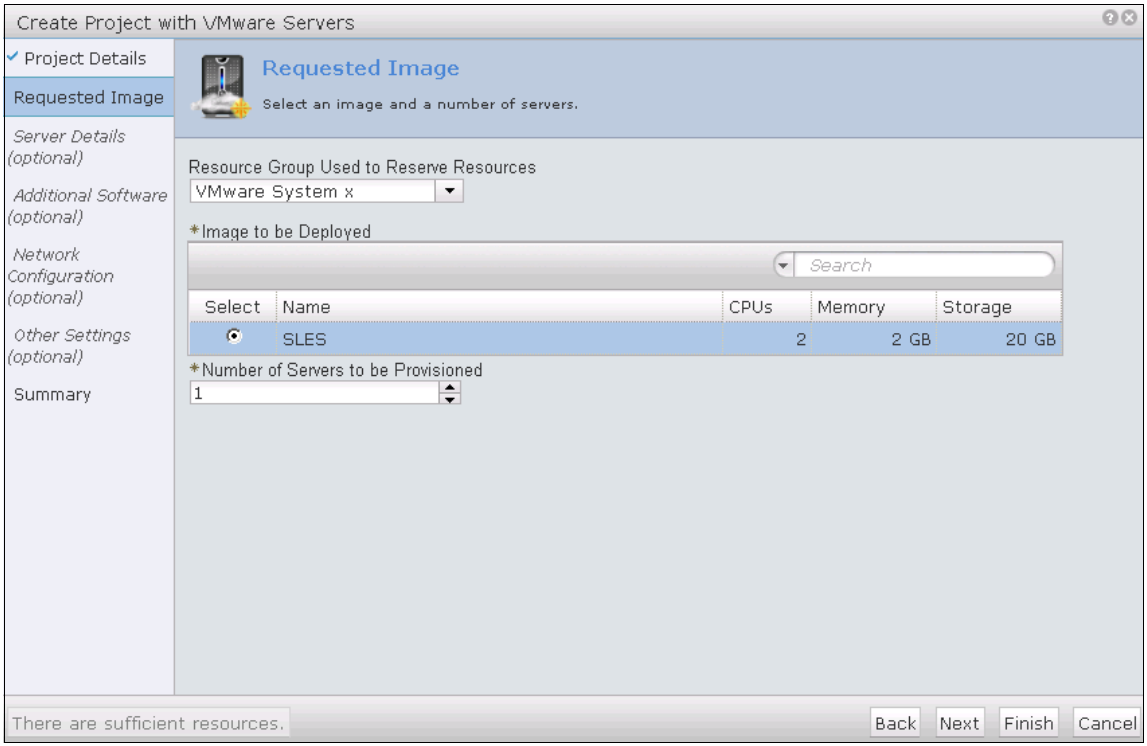


Figure 4-64 Requested Image: Select the image and number of servers for the project

5. In the Server Details tab (Figure 4-65 on page 182), change the server details for each server, as needed, such as, virtual CPU, physical CPU, main memory, swap memory, and disk.

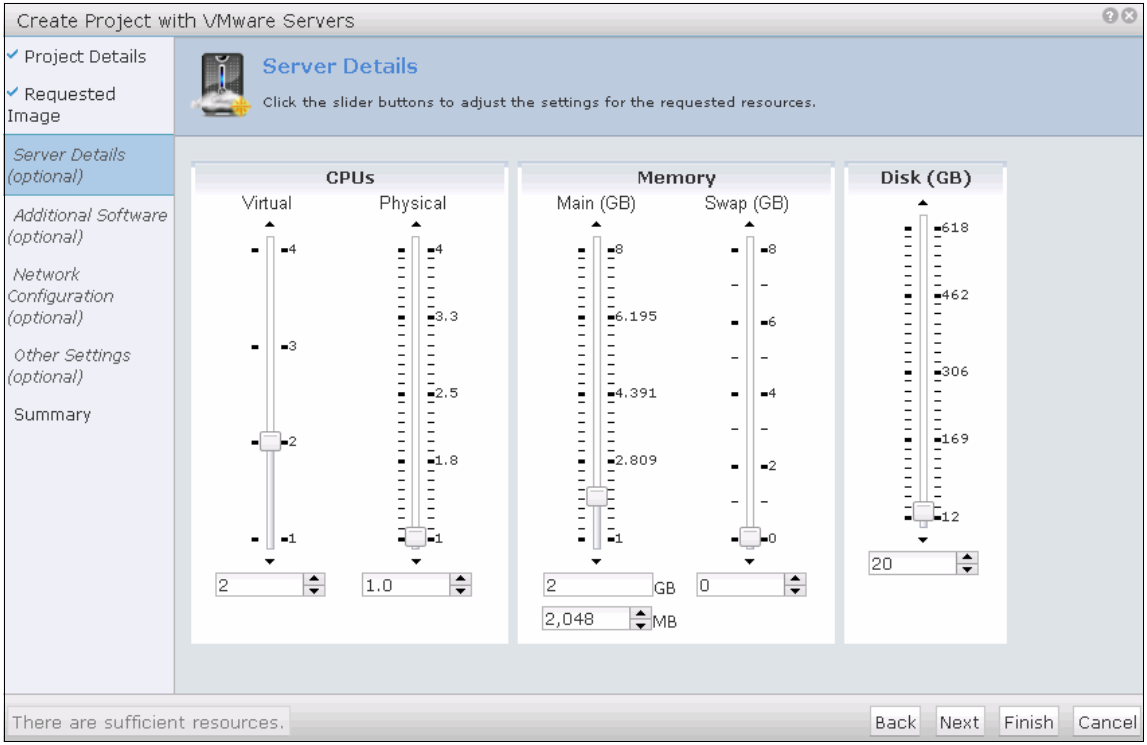


Figure 4-65 Server Details: Change resource specifications

6. In the Additional Software tab (Figure 4-66 on page 183), select the software to install after provisioning.

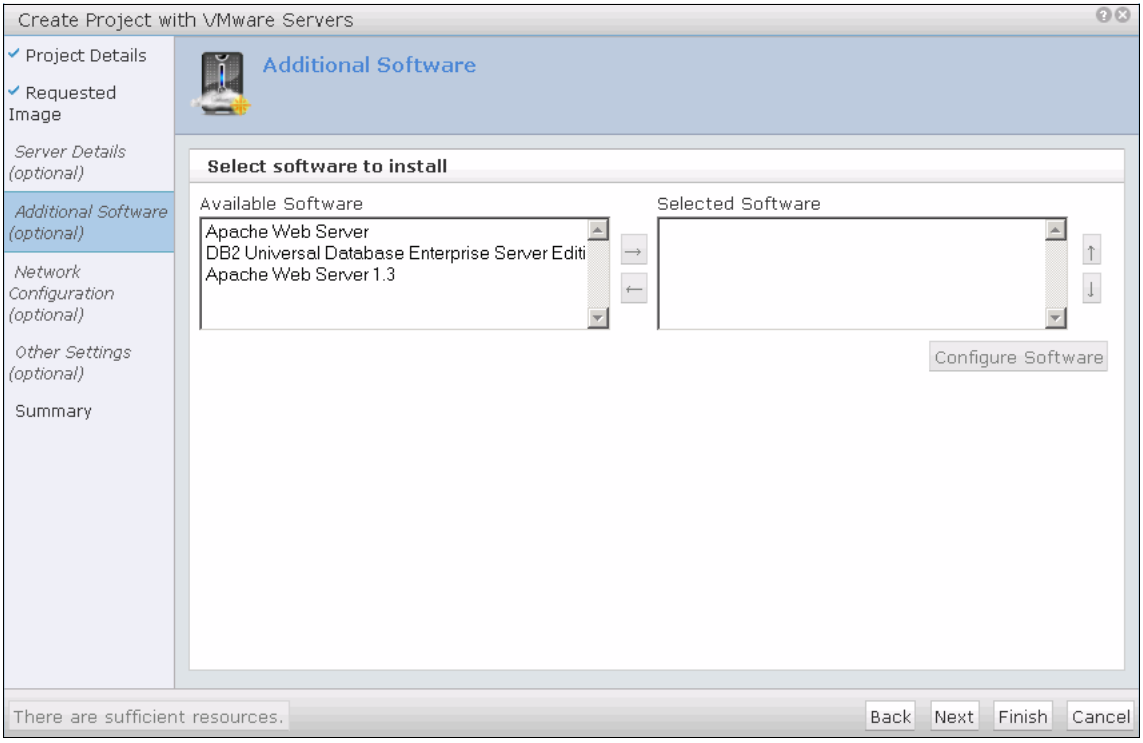


Figure 4-66 Additional Software: Select the software to install

7. In the Network Configuration tab (Figure 4-67 on page 184), select the network segment for your project. If needed, you can select more than one segment.

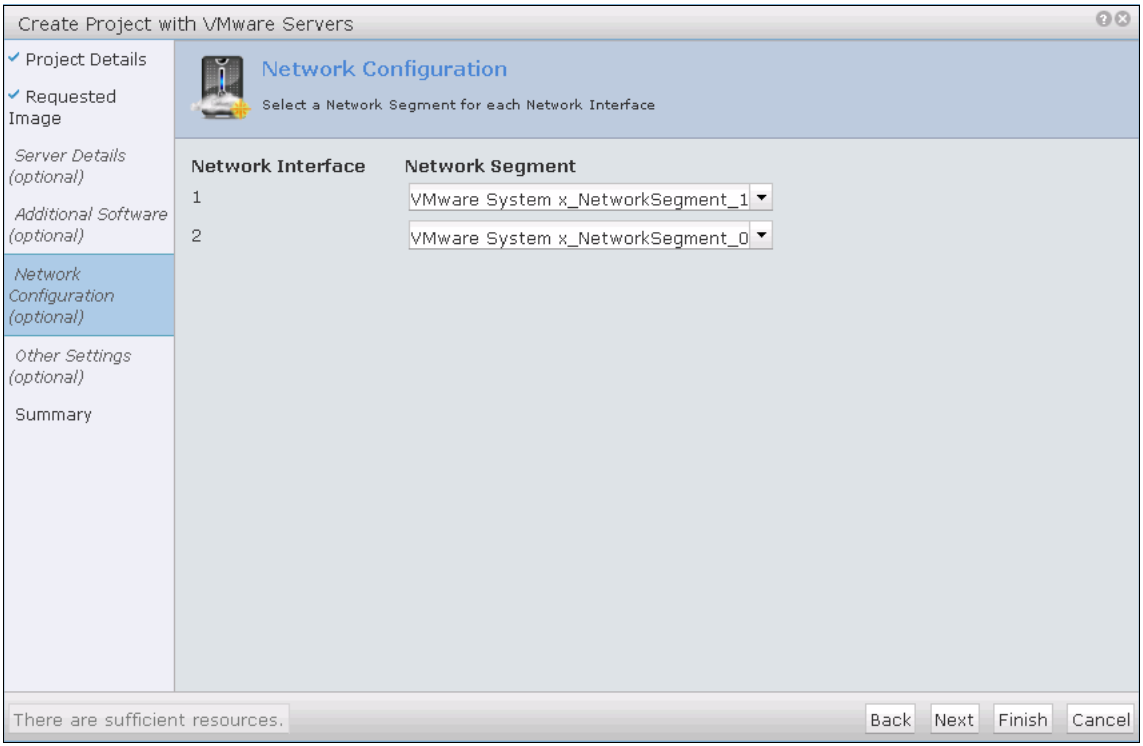


Figure 4-67 Network configuration tab

8. In the Other Settings tab (Figure 4-68 on page 185), select the following options:
   - Save an image of each server: Save one image of each server when the project reaches the end date and time, and before the project is decommissioned. This image must be deleted manually.
   - Keep existing saved image: Keep one image of each server when decommissioning the project.
   - Monitoring Agent to be Installed: Deploy the IBM Tivoli Monitoring agent on each server.

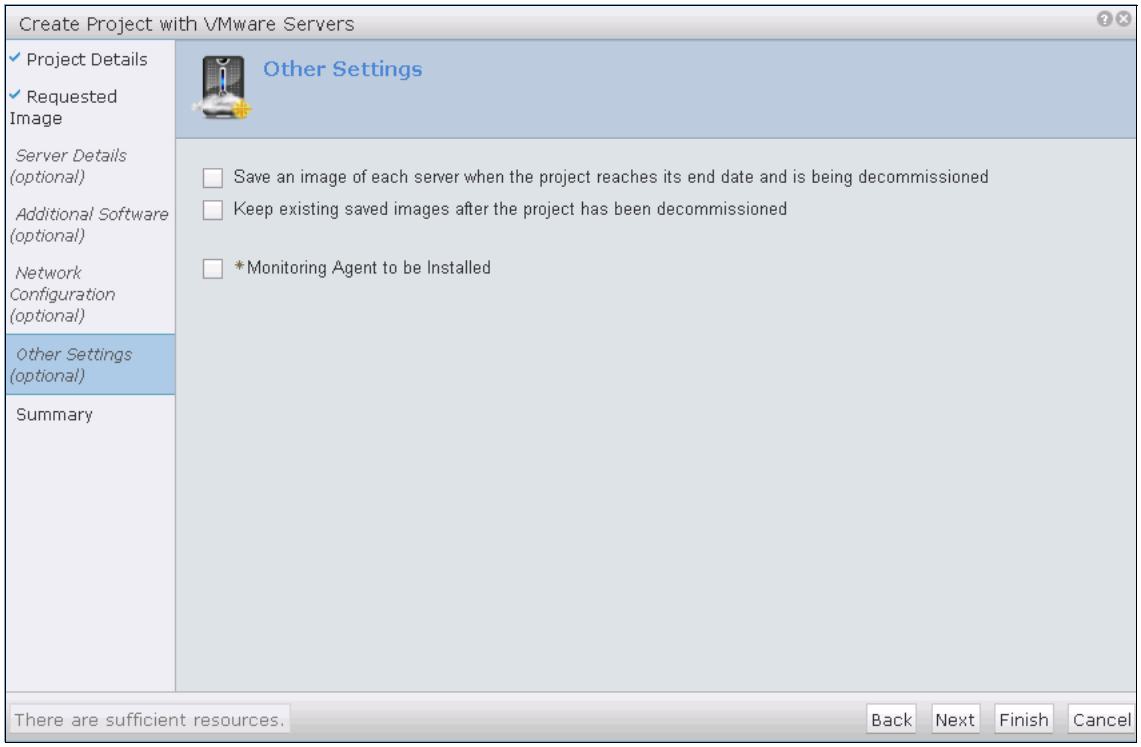


Figure 4-68 Other Settings tab

9. In the Summary tab (Figure 4-69 on page 186), verify that the project specifications are correct, and then click **Finish** to submit your request.

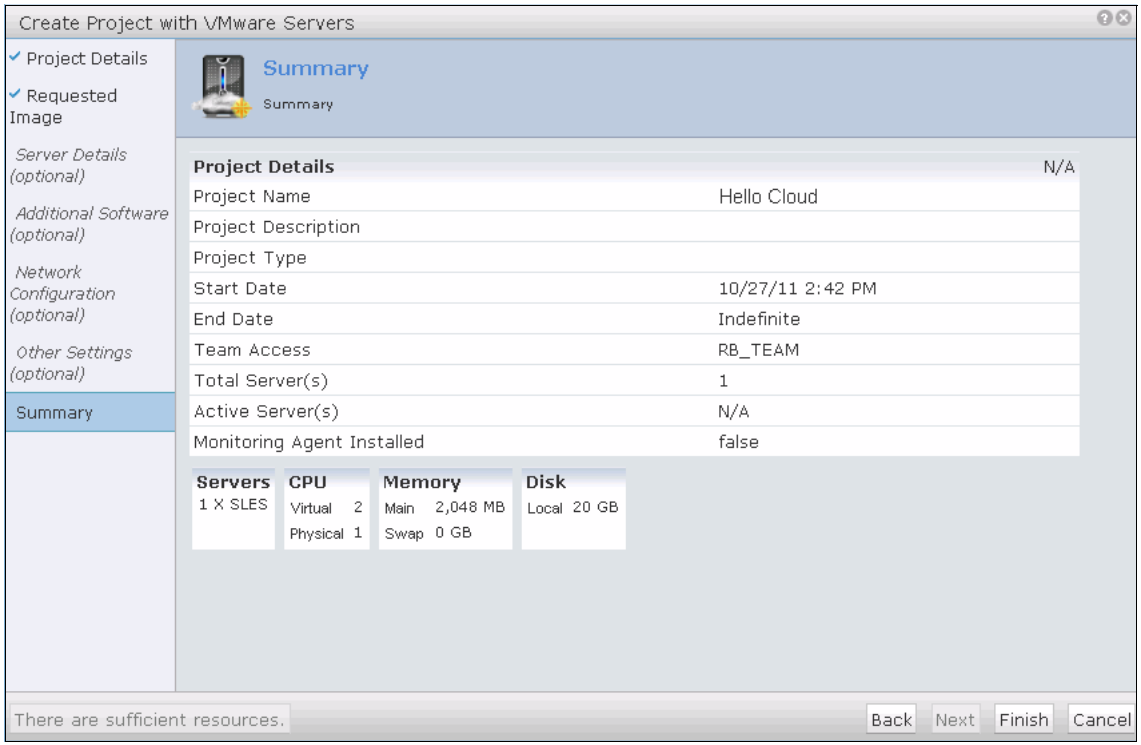


Figure 4-69 Summary tab: Verify project specifications

10. When your request is submitted, it will display as `Operational`, as shown in Figure 4-70 on page 187.

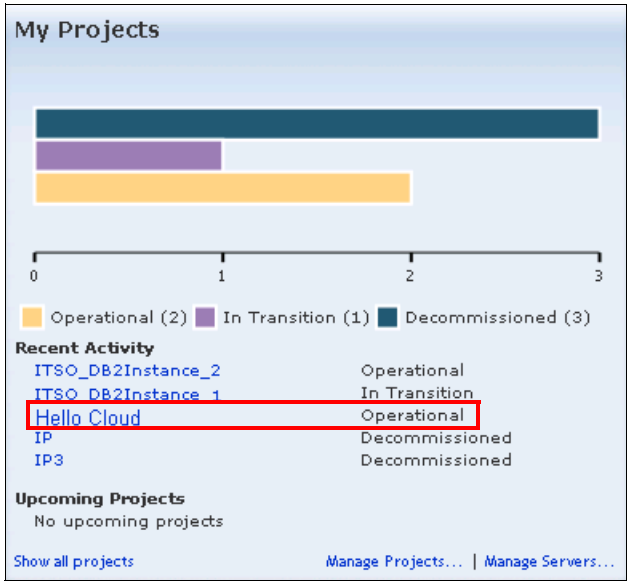


Figure 4-70 The Hello Cloud project is operational

4.10.2 Managing your project

Now that your project is operational, you can start working with your servers. You will receive an email with access information, such as IP address, host name, and administrator password. The steps are described in this section.

To manage your project, click the link for your project, as shown in Figure 4-70. The Project Details tab (Figure 4-71 on page 188) opens.

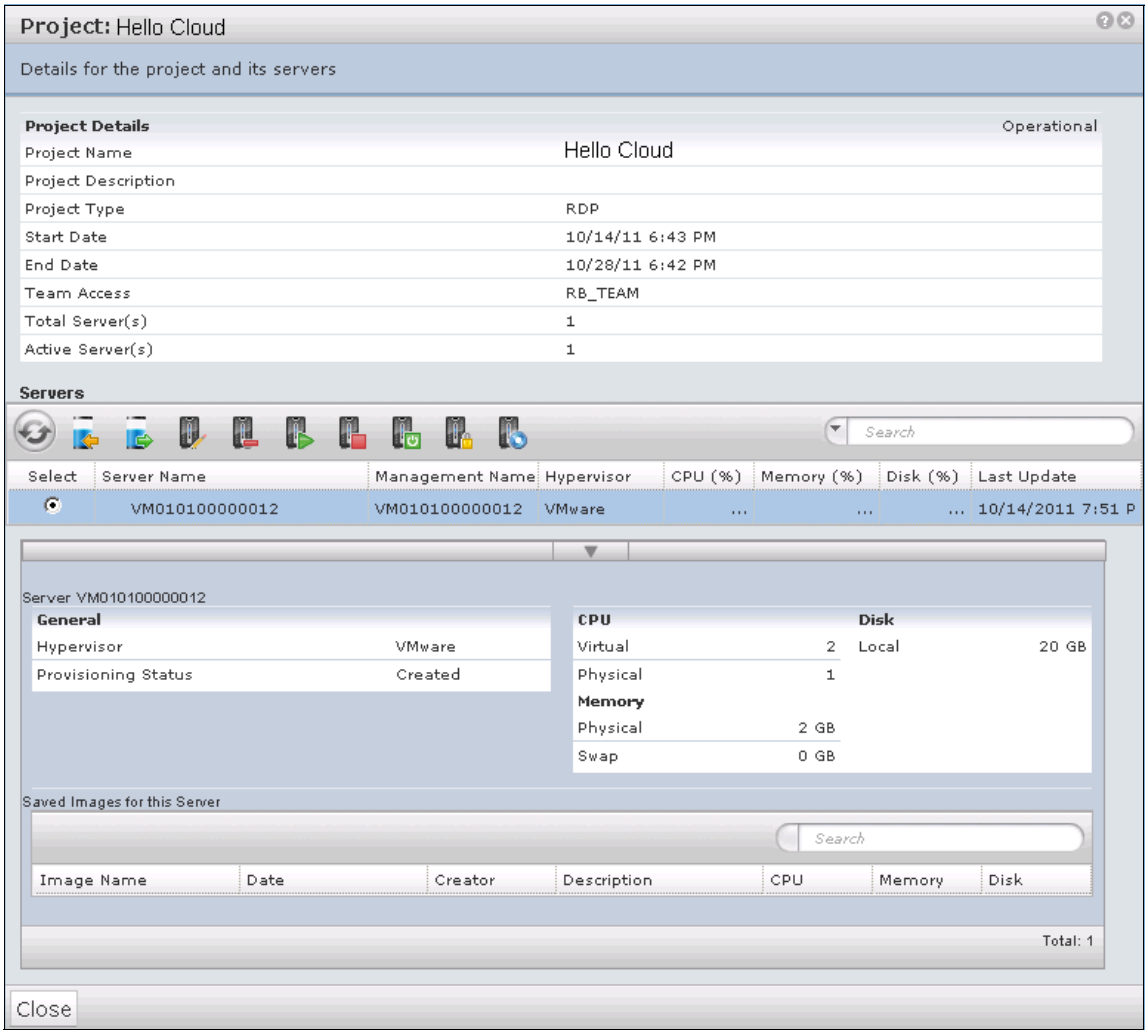


Figure 4-71 Project details tab

Stopping, starting, and restarting servers

To stop and start servers:

1. Click **Stop Server**, **Start Server**, or **Restart Server** in the menu in the Project Details tab, as shown in Figure 4-72.

Figure 4-72 Manage actions menu

2. In the tab that displays, verify that the information is correct, and click **OK**, as shown in Figure 4-73.

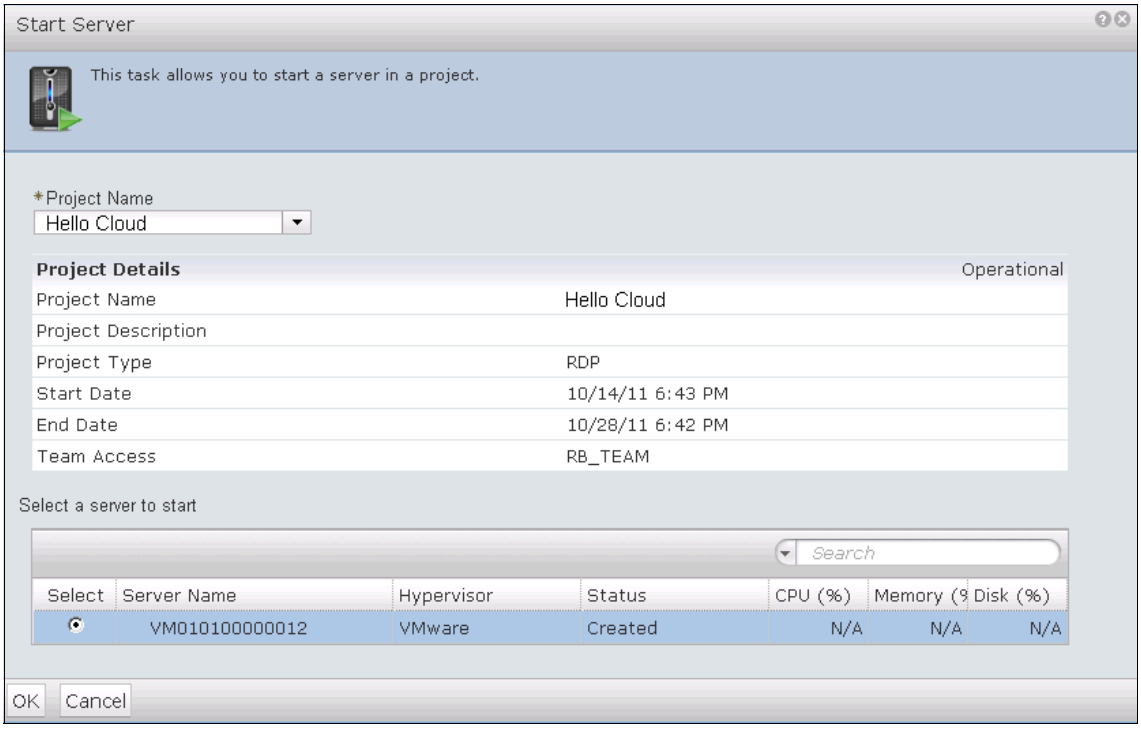


Figure 4-73 Start Server confirmation tab

The steps are the same for stopping, starting, and restarting the server.

Resetting a server password

The change password action is used to reset the admin password in a server. The new password is sent to the members of the team by email.

To change the password:

1. Click **Reset Server Password** in the menu shown in Figure 4-72 on page 188.
2. In the confirmation window that displays, as shown in Figure 4-74 on page 190, verify that the action is correct, and click **OK**. The password will be reset and sent by email.

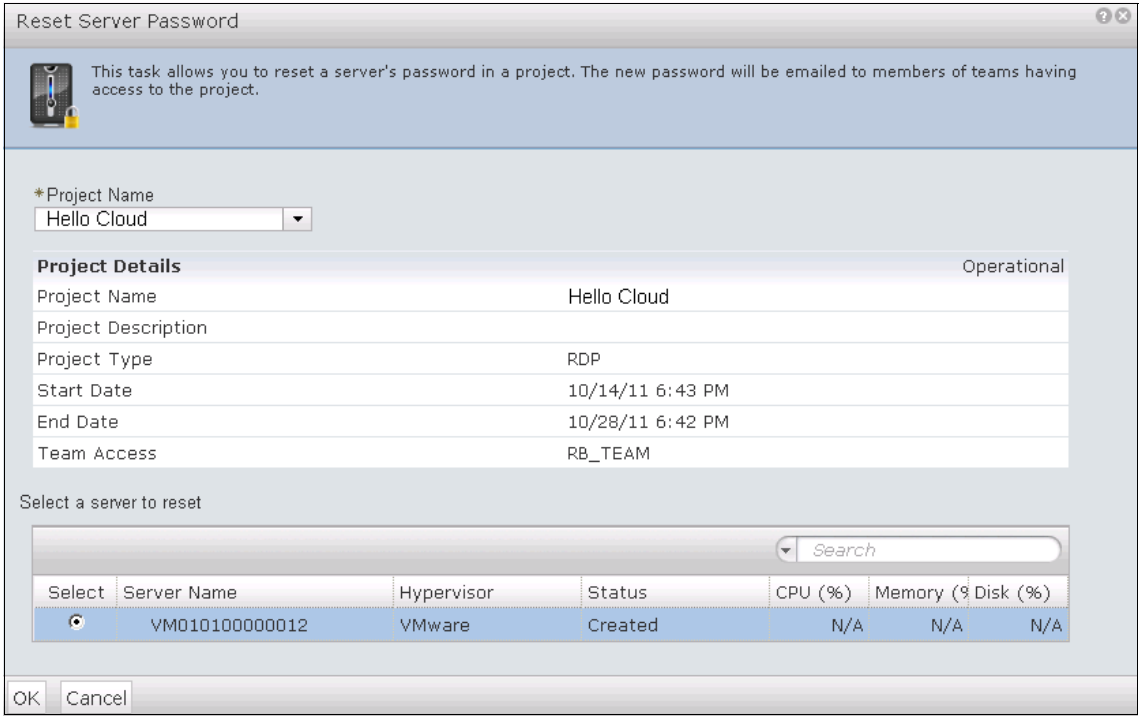


Figure 4-74 Reset Server Password confirmation window

Modifying server resources

You can modify server resources during the time when your project is operational. The changes can include: Increase CPU, increase memory, or increase disk space.

To make these modifications:

1. Click **Modify Server Resources** located in the action menu, as shown in Figure 4-72 on page 188.
2. The Modify Server Resources tab opens, as shown in Figure 4-75 on page 191. To change the resources, click the icons located in the CPU, Memory, or Disk section. Change the resources, and click **OK** to process your request.

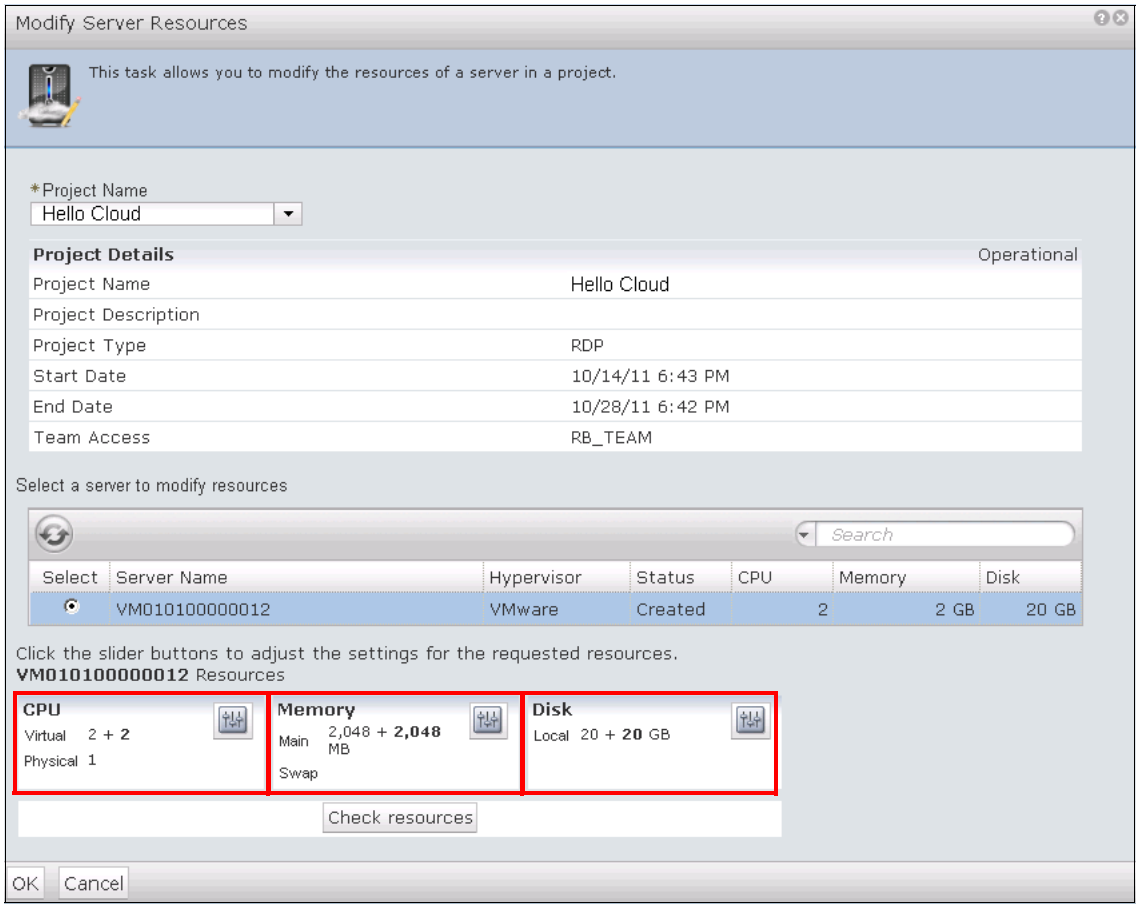


Figure 4-75 Modify Server Resources tab

Cancelling a project

Cancelling a project decommissions the project and all of the servers associated with it and releases the resources for other provisioning. A cancelled project cannot be restored; however, you can provision a new server in a new project from a saved image, if you select the option to **Keep existing saved images after the project has been decommissioned**.

To cancel a project:

1. From the main menu, click **Cancel Project**, as shown in Figure 4-76 on page 192.

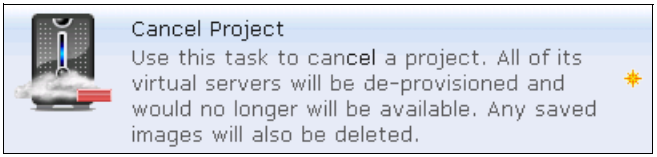


Figure 4-76 Cancel Project

2. In the Cancel Project tab (see Figure 4-77), select the Project Name to cancel. In our example, the Project Name is `Hello Cloud`.

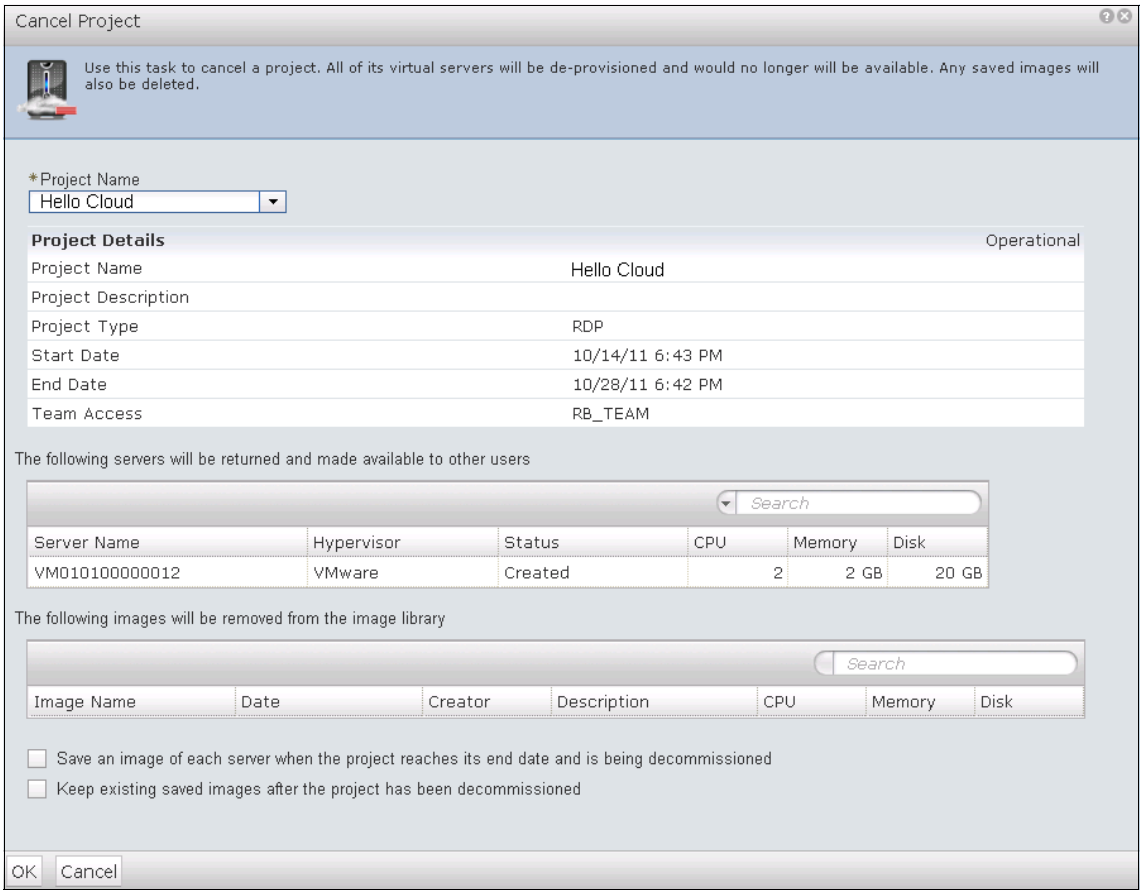


Figure 4-77 Cancel Project tab

Warning: Verify that you select the correct project to decommission. From this step forward, you cannot restore a project after it is decommissioned. See “Cancelling a project” on page 191.

3. If you want to keep a saved image after the project is decommissioned, select the box in the bottom of the page. This image will be saved until you remove it manually.
4. Click **OK** to submit your request to decommission your project.

5

Administrator scenarios

In this chapter, we introduce several functions carried out by the CloudBurst system administrator, including how to:

- 5.1, “Managing a shut down and restart of the system” on page 195, when a shutdown and restart of the system and the software stack are required
- 5.2, “IBM CloudBurst backup and restore” on page 200
- 5.3, “Managing stacked projects” on page 207
- 5.4, “Managing passwords” on page 211, such as default system passwords, changing hardware-related passwords, and changing Cloudburst passwords

5.1 Managing a shut down and restart of the system

The IBM CloudBurst software stack is configured to start automatically at image startup. For maintenance operations, you might need to stop and restart the components.

5.1.1 Shutting down the software stack

The following sections describe how to stop the CloudBurst software stack if required.

Stopping the running project servers

Before you shut down the CloudBurst middleware, it is recommended that every provisioned server be stopped first.

To stop provisioned servers:

1. Log into the Tivoli Service Automation Manager Self Service Interface as `PMRDPCAUSR` user at: `https://192.168.88.4/SimpleSRM`
2. Click **Request a New Service** → **Virtual Server Management** → **Modify Server** → **Stop Server**.
3. In the Project Name field, choose the first project.
4. In the server selection section, choose the first server.
5. Click **OK**.
6. Repeat this for all of your servers and projects.

Stopping the icb-itm

Log into the `icb-itm` as `root`, and execute the steps shown in Example 5-1.

Example 5-1 Shut down icb-itm

```
su - virtuser
cd /opt/IBM/ITM/bin/
./itmcmd agent stop sy
./itmcmd agent stop hd
./itmcmd agent stop lz
./itmcmd agent stop cq
./itmcmd agent stop kf
./itmcmd server stop TEMS
exit
su - db2inst1
db2stop
exit
halt -p
```

Stopping icb-tivsam

To stop `icb-tivsam`:

1. Log in to `icb-tivsam` as `root`, and execute the steps shown in Example 5-2

Example 5-2 Shut down icb-tivsam middleware

```
rgreq -o stop tsam-rg
lssam -V
```

2. Wait until all resources are offline. You can verify the process if you re-execute the **lssam -v** command.
3. If all resources are offline, you can shut down the server, as shown in Example 5-3.

Example 5-3 Shut down the icb-tivsam server

```
halt -p
```

Stopping the icb-tuam

To stop icb-tuam:

1. Log into `icb-tuam` as `root`, and execute the commands shown in Example 5-4.

Example 5-4 Shut down icb-tivsam middleware

```
/opt/IBM/tuam/ewas/bin/stopServer.sh server1
su - db2inst1
db2stop
halt -p
```

2. Specify `virtuser` as the userID and password to stop the WebSphere Application Server.

Stopping the icb-nfs

To stop icb-nfs:

1. Log in to the icb-nfs as `root`, and execute the commands in Example 5-5.

Example 5-5 Shutting down icb-nfs middleware

```
rgreq -o stop top-rg
lssam -V
```

2. Wait until all resources are offline. You can verify the process if you re-execute the **lssam -v** command.
3. If all resources are offline, you can shut down the server using the command shown in Example 5-6.

Example 5-6 Shut down icb-nfs server

```
halt -p
```

Stopping the icb-vctr

It is not recommended to stop the vCenter server as part of a software-only shutdown process. It can be shutdown as part of a full software and hardware shutdown process, as described in 5.1.2, “Shutting down the hardware” on page 198.

5.1.2 Shutting down the hardware

To properly shut down the CloudBurst hardware environment:

1. Log into the vCenter client as Administrator and connect to the icb-vctr server.
2. Click **Home** → **Inventory** → **Hosts and Clusters**.
3. Check that every virtual server is stopped except for icb-vctr (`if` anything else is running, refer to “Shutting down the software stack” on page 195).
4. Right-click the first provisioned server under `CloudBurst-cluster` (`cn2.private.cloud.com`), and click **Shut Down**.
5. Click **Yes**.
6. Click **OK**.
7. Repeat this process for every provisioned server in CloudBurst-cluster:
   a. If you are using HA with Mgmt-cluster, note which ESX servers are in this VMware cluster.
   b. Connect to each of these ESX servers as root, and shut down each one as described here.

   If you are not using HA, connect and shut down the cn1.private.cloud.com server (Management Blade Server) only.

   Important: If you see that icb-vctr vCenter server is running on cn1.private.cloud.com, or on any other server, you must first shut it down properly by right clicking icb-vctr, clicking **Power** → **Shut Down Guest**, and waiting until it stops.

8. Open a remote desktop connection to the mn1.private.cloud.com Management Server.
9. Click **Start** → **Windows Security**.
10. On the right-lower corner, click **Shutdown**, and wait until it stops.
11. Disconnect the power cables from all BladeCenter chassis to power off.
12. Power off all storage controllers.
13. Power off all storage expansion boxes (if any).

14. Power off all external Ethernet and fibre switches (if any).

5.1.3 Restarting the hardware

After a complete shutdown, you can restart the CloudBurst using the following steps:

1. Power on all external Ethernet and fibre switches (if any).
2. Power on all storage expansion boxes (if any).
3. Power on all storage controllers after a few minutes.
4. Connect the power cables from all BladeCenter chassis to power on.
5. Power on the x3550 M3 Management Server and wait until it starts.
6. Power on all BladeCenter servers:
   a. From a browser, connect to the first BladeCenter advanced management module at `http://bc1-mm1.private.cloud.com` as `USERID` user.
   b. Click **Blade Tasks** → **Power/Restart** on the left side of the window.
   c. Select all installed blade servers, select **Power On Blade**, and click **Perform action**.
   d. If you have more BladeCenter chassis, repeat these steps for each chassis.

5.1.4 Restarting the software stack

You must manually start the CloudBurst middleware if you manually stopped it for any reason, but did not power down the hardware (for example, when making a full backup of the software stack images). CloudBurst is configured to start every server and middleware automatically if the hardware is powered down, then powered on again.

Starting the icb-itm middleware

Log into the icb-itm as root, and execute the steps shown in Example 5-7.

Example 5-7 Starting the icb-itm middleware

```
su - db2inst1
db2start
exit
su - virtuser
cd /opt/IBM/ITM/bin/
./itmcmd server start TEMS
./itmcmd agent start cq
```

```
./itmcmd agent start lz
./itmcmd agent start hd
./itmcmd agent start sy
exit
```

Starting the icb-tivsam middleware

1. Log into icb-tivsam as root, and execute the commands in Example 5-8.

Example 5-8 Start icb-tivsam middleware

```
chrg -o online tsam-rg
lssam -V
```

2. Wait until all resources are online. You can verify the process if you re-execute the **`lssam -v`** command.

Starting the icb-tuam middleware

Log into icb-tuam as root, and execute the steps shown in Example 5-9.

Example 5-9 Start icb-tuam middleware

```
/opt/IBM/tuam/ewas/bin/startServer.sh server1
su - db2inst1
db2start
```

Starting the icb-nfs middleware

1. Log into icb-nfs as root, and execute the steps shown in Example 1.

Example 5-10 Starting the icb-nfs middleware

```
chrg -o online top-rg
lssam -V
```

2. Wait until all resources are online. You can verify the process if you re-execute the **`lssam -v`** command.

5.2 IBM CloudBurst backup and restore

In this section, we describe how to perform a backup and restore of the IBM CloudBurst on System x. We focus only on the CloudBurst software stack images and not on the backup and restore of server images because they (server

images) can be backed up using the GUI with the process documented in the Tivoli Service Automation Manager user's guide.

http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/topic/com.ibm.tsam_7.2.2.doc/rdp/t_rdp_serverimages.html

Note: All of the steps described in this section are considered as recommendations and can be modified according to the customer's requirements.

5.2.1 Backup procedure

In IBM CloudBurst for System x, there are two ways to back up the software stack:

- Backup the software stack images using the Virtual Center
- Make periodic backups using a DB2 solution

The Virtual Center solution is useful before or after any change in your environment, such as applying a fix pack, adding new software, changing configuration, or upgrading a software stack. This solution is an easy way to save your system from its current state (snapshot) and can be easily restored.

Although the Virtual Center solution is useful, it is not the best approach for periodic backups because, using this solution, only full backups can be made (no incremental backups). To make incremental or periodic backups, we follow the procedure developed using DB2 solution.

Virtual Center solution for backing up a software stack

IBM CloudBurst software stack includes the following software images. For your system to restore properly, all of these images must be saved in any temporary directory:

- icb-tivsam
- icb-tuam
- icb-itm
- icb-nfs

Creating a backup

To create a backup:

1. On the management server, log in to the Virtual Center.
2. Select **Inventory** → **Datastores**.

3. On the CloudDC cluster located in the left panel, right-click **mgmt_disk** storage, and select **Browser Datastore**.
4. In the left panel, select the root folder, "/", and select the **icb-tivsam** folder in the right panel.
5. Click the **Download a file** icon in the toolbar.
6. Browse to the location where you want to save the backup, and click **OK**.

Note: If you select tivoli_recovery as the target of your backup, you might notice that there is already a backup on the disk. This previous backup was created after IBM CloudBurst was initially set up, configured, and validated. If you want to store your backup on the same disk, remove the old backup to make space available.

7. Repeat Steps Step 4. and Step 5. for the other images you want to back up.

Restoring the software stack images using the Virtual Center

You can restore your backup to restore your system to a previous state:

1. On the management server, log in to the Virtual Center.
2. Select **Inventory** → **Datastores.**
3. On the CloudDC cluster located in the left panel, right-click **mgmt_disk** storage, and select **Browser Datastore**.
4. In the left panel, select the root folder, "/", and select the **icb-tivsam** folder in the right panel.
5. Click the **Upload folder** icon in the toolbar.
6. Browse to the location where you want to save your backup. Select the image icb-tivsam, and click **OK**.
7. You will receive a message warning that the file will be replaced. Click **OK** to begin the restore.
8. Repeat Steps Step 4. through Step 7. for other images you want to restore.

Synchronizing with the current status

After a backup is restored, you must synchronize with the current status of your environment. This is required because you might have new servers that were provisioned in your environment after the system was backed up.

Using the Provisioning Computers console, compare the computers in your system with those in the Virtual Center following these steps:

1. Open the Start Center as **maxadmin**.

2. Click **Go To** → **IT Infrastructure** → **Provisioning Inventory** → **Provisioning Computers**.
3. In the Provisioning Computers console, compare the list of servers with those in your Virtual Center. Delete any computer listed in the provisioning console that is not in the Virtual Center:
   a. Click the Delete icon (the red X icon) located in the right column, as shown in Figure 5-1.

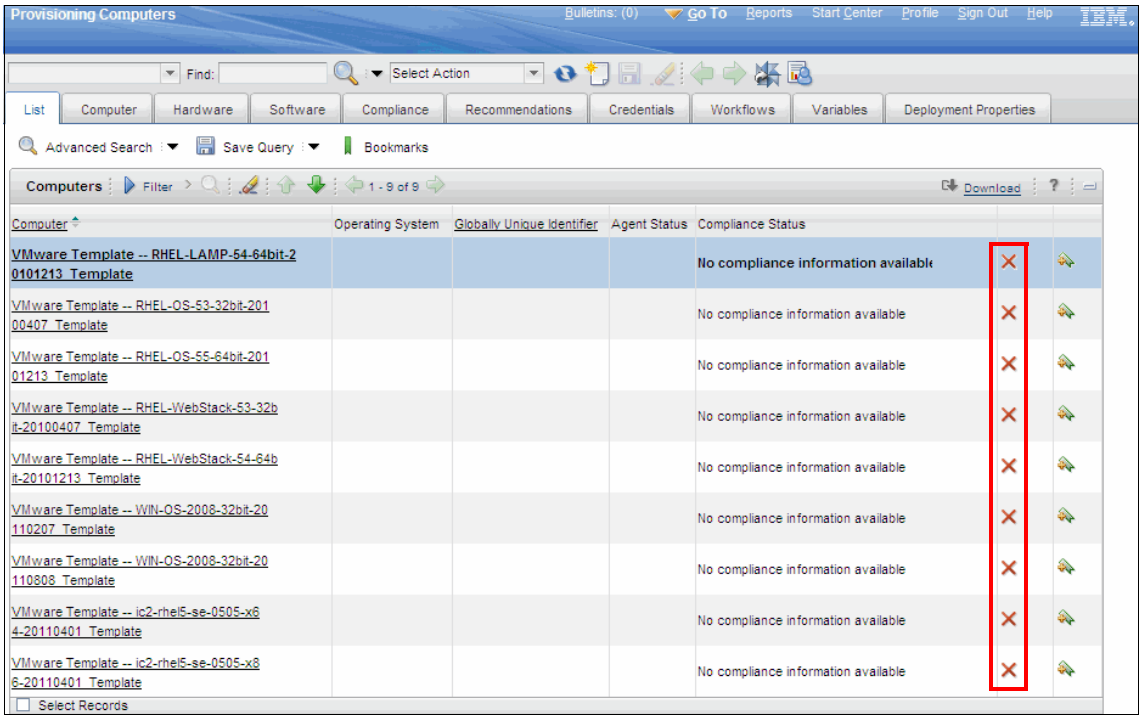


Figure 5-1 Click in the X red icon to delete a computer

4. After deleting the computers from the Maximo console, run the Virtual Center Discovery task by clicking **Go To** → **Service Automation** → **Cloud Pool Administration**.
5. In the drop-down menu, select **All Records**, as shown in Figure 5-2 on page 204.
6. Click in the Cloud Pool Name that represents your system, as shown in Figure 5-2 on page 204.

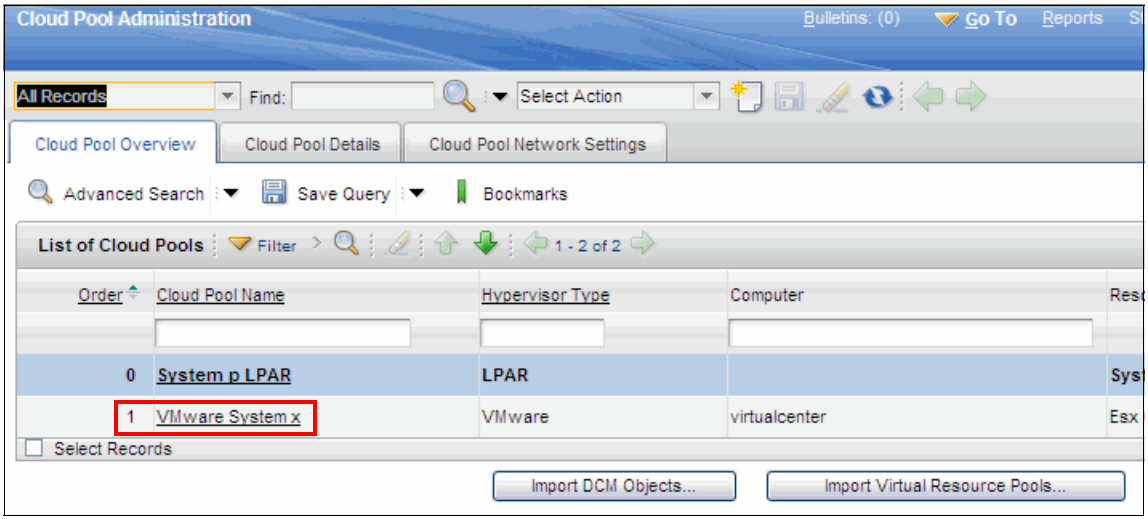


Figure 5-2 Select All Records for the Pool name that represents your system

7. In the configuration console, click **Virtual Center Discovery**, as shown in Figure 5-3.

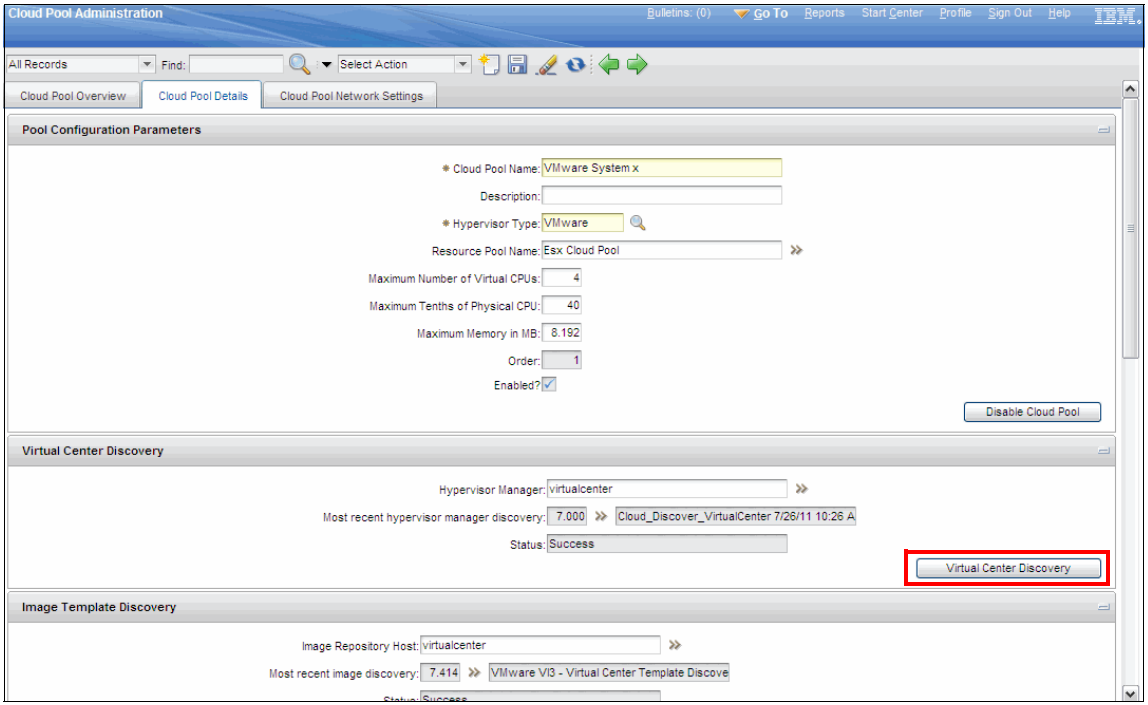


Figure 5-3 Using Virtual Center Discovery to synchronize the system

8. Click **OK** in the System message that informs that a workflow was triggered, as shown in Figure 5-4.

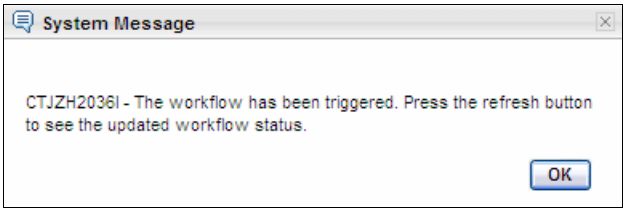


Figure 5-4 System message that the workflow has been triggered

9. Wait for the status change to complete.

After synchronization, your IBM CloudBurst is ready for daily business activities.

Periodic backup using DB2

In this section, we describe how to set up a periodic backup. A periodic backup can be daily, weekly, monthly, incremental, or full. We describe the steps for setting DB2 to perform the backup.

All of your transactions, provisionings, users, and configuration settings are stored in the Tivoli Service Automation Manager database. Therefore, to restore your system following a disaster, you also need a backup of the software stack images, as discussed in “Virtual Center solution for backing up a software stack” on page 201 and a periodical DB2 backup to restore your Cloud environment.

In the DB2 database, you can perform a full database backup that can be online or offline and configure DB2 to generate a transactions log.

More information about the DB2 backup and recovery strategies is in “Developing a backup and recovery strategy” located at:

`http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.admin.ha.doc/doc/c0005945.html`

The Tivoli Service Automation Manager database is MAXDB71. You will also need to backup database TPMFOSD. If you are using the Tivoli Directory Server that is part of IBM Service Delivery Manager, the databases LDAPDB2B and SECURITY also need to be backed up.

The command to start a full offline backup is:

```
db2 backup db MAXDB71
```

MAXDB71 is the database name. Repeat the command for other databases.

To query the backups from DB2, use the following command:

db2adutl query db MAXDB71

Example 5-11 Query results

```
Query for database MAXDB71

Retrieving FULL DATABASE BACKUP information.
    1 Time: 20111002010006  Oldest log: S0000458.LOG  DB Partition
Number: 0    Sessions: 2
    2 Time: 20110925010005  Oldest log: S0000363.LOG  DB Partition
Number: 0    Sessions: 2
    3 Time: 20110911010005  Oldest log: S0000230.LOG  DB Partition
Number: 0    Sessions: 2
    4 Time: 20110904010004  Oldest log: S0000139.LOG  DB Partition
Number: 0    Sessions: 2
    5 Time: 20110828010004  Oldest log: S0000047.LOG  DB Partition
Number: 0    Sessions: 2
    6 Time: 20110821010007  Oldest log: S0000004.LOG  DB Partition
Number: 0    Sessions: 2
    7 Time: 20110819161845  Oldest log: S0000002.LOG  DB Partition
Number: 0    Sessions: 2

Retrieving LOG ARCHIVE information.
   Log file: S0000000.LOG, Chain Num: 0, DB Partition Number: 0, Taken
at: 2011-08-19-14.49.34
   Log file: S0000001.LOG, Chain Num: 0, DB Partition Number: 0, Taken
at: 2011-08-19-14.51.45
   Log file: S0000002.LOG, Chain Num: 0, DB Partition Number: 0, Taken
at: 2011-08-19-16.21.31
   Log file: S0000003.LOG, Chain Num: 0, DB Partition Number: 0, Taken
at: 2011-08-19-17.27.06
```

Restoring a DB2 backup

The simplest way to restore a DB2 backup is to use the following command:

db2 restore db MAXDB71

This command restores the database MAXDB71 using the last backup version. A warning message is returned if the database still exists. See Example 5-12 on page 207. Accept the warning message to replace the existing database.

Example 5-12 Accept the warning message to replace the database

```
SQL2539W  Warning!  Restoring to an existing database that is the same
asthe backup image database.  The database files will be deleted.
Do you want to continue ? (y/n)
```

Repeat the same process for other databases.

After restoring the database, synchronization is mandatory to synchronize the images in the Virtual Center with those in the Tivoli Service Automation Manager. Synchronization steps are described in “Synchronizing with the current status” on page 202.

Recovery scenario

Our experience tells us that the best approach to recover a system following a disaster is the sum of the two solutions described: “Virtual Center solution for backing up a software stack” on page 201 and “Periodic backup using DB2” on page 205.

Take an image backup after an important change in your environment, such as after applying a FixPack, after changing hardware or any other upgrade in the cloud. This will prevent you from having to return to the previous state in case of a disaster.

Configure your system to take a daily database backup of your cloud. You can configure DB2 to take daily backup and set DB2 to save the transactions log.

In case of a disaster, follow these steps to restore your cloud:

1. “Restoring the software stack images using the Virtual Center” on page 202
2. “Restoring a DB2 backup” on page 206
3. “Synchronizing with the current status” on page 202

5.3 Managing stacked projects

The problem of stacked projects concerns wrong entries in a data model. It can be resolved using new functions in the *Reliability, Availability and Serviceability (RAS)* feature introduced in Tivoli Service Automation Manager 7.2.2.

When you encounter the situation that your project is *In transition* mode, and you cannot execute any actions on it, the forceCleanup function must be performed. The cleanup function was introduced in Tivoli Service Automation Manager 7.2.2 as the following REST API call, where:

- `host name`: The IP address or the name of the computer on which Tivoli Service Automation Manager is installed.
- `port`: A numeric value for the port, based on the value indicated during the Tivoli Service Automation Manager installation. The default port value is 9443.
- `sdi_id`: A numeric value for the service deployment instance ID in Tivoli Service Automation Manager.

```
https://[hostname]:[port]/maxrest/rest/forceCleanup/[sdi_id]
```

Important: When forceCleanup is called, ensure that no service requests are running because all of the associated service requests are also removed from the data model.

Possible HTTP error codes are listed in Table 5-1.

Table 5-1 RAS REST API - HTTP error codes

Error code	Description
200	Successful invocation with XML response: <result> <successful>true</successful> </result>
400	system#invalidParameter: Invalid or missing parameter
401	access#forceCleanup: User has not been granted the correct privilege to call the function
404	system#unknownobject: Given service deployment instance ID does not exist
500	Internal system errors

5.3.1 Example

In this example, we create a project named MW_ITSO. Due to unknown problems, the project creation process hangs up in the *In Transition* mode, as depicted in Figure 5-5 on page 209.

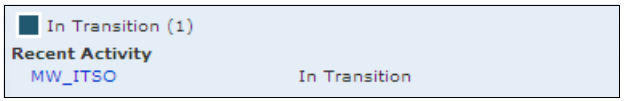


Figure 5-5 Project hangs up in In Transition mode

The cloud administrator cannot cancel or remove the project using the Manage Projects functionality. See Figure 5-6.

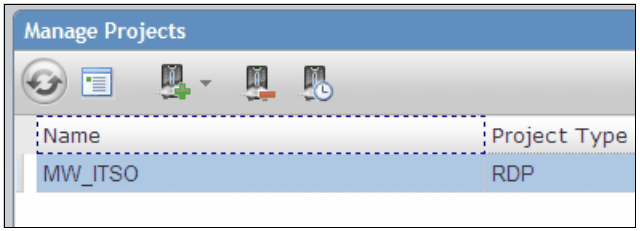


Figure 5-6 Manage Projects

The only way to clean up the User Interface and the data model is to remove this orphaned project by performing the forceCleanup REST call.

The Tivoli Service Automation Manager server host name (`host name`) must be provided and the service deployment instance ID (`sdi_id`) of the orphaned project that is about to be removed.

To find the service deployment instance ID, navigate to the My Requests panel in Self-Service UI, and select the particular **Recent Activity**, which reflects the creation of the project being removed. The View Service Request window is displayed. It displays details of the particular request, including Service deployment instance ID, as shown on Figure 5-7 on page 210.

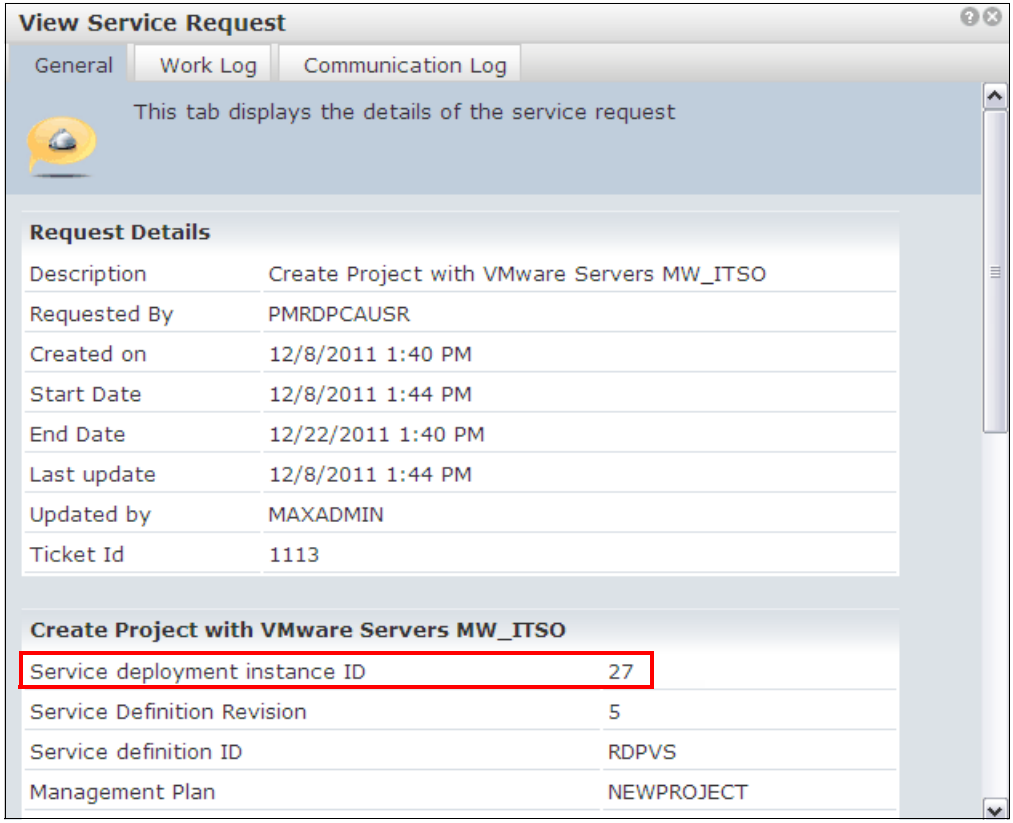


Figure 5-7 Service deployment instance ID

This ID is used to build the forceCleanup REST call.

In our example, the Tivoli Service Automation Manager server host name is ITSO.tsam.cloud.com. As shown in Figure 5-7, the service deployment instance ID for the orphaned project is 27. The full REST call is:

```
https://ITSO.tsam.cloud.com:9443/maxrest/rest/forceCleanup/27
```

As a result of this REST call, the orphaned project is removed. See Figure 5-8.

Figure 5-8 My Projects tab after forceCleanup REST call

For more information, see the *IBM IT Service Management documentation* information center at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp

5.4 Managing passwords

This section describes the default credentials for the various CloudBurst hardware and software elements, and provides guidance about changing these when necessary. For more information, see the CloudBurst 2.1 information center at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp?topic=%2Fcom.ibm.cb.doc_2.1%2Fr_cb_security.html

Note: The IP address of the power distribution unit (PDU) as described in the information center documentation is 192.168.20.x.

5.4.1 Default system passwords

In CloudBurst, there is a dedicated Management Network from which you can access all of the hardware and software elements that make up the CloudBurst solution.

The default Management Network setup is:

- IP: 192.168.x.x
- Subnet 255.255.0.0
- VLAN: 70
- Default gateway: 192.168.4.17

Hardware-related credentials

This section describes small, medium, and large configurations related to hardware credentials. For information about an extra large configuration, visit the IBM Cloudburst Information Center at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp?topic=%2Fcom.ibm.cb.doc_2.1%2Fr_cb_credentials_hw.html

Table 5-2 on page 212 describes BladeCenter configuration details for small and medium configurations. BladeCenter details for a large configuration are in

Table 5-5 on page 213. Note that “PASSW0RD” contains the number “0” and not the letter “O”.

Table 5-2 Management Network on BladeCenter: Small and medium configurations

Chassis / Bay	Component	IP address	Host name	Username / Password
1	AMM	192.168.4.17	bc1-mm1	USERID / PASSWORD
1 / 3	FC Switch	192.168.8.19	bc1-iom3	USERID / PASSWORD
1 / 4	FC Switch	192.168.8.20	bc1-iom4	USERID / PASSWORD
1 / 7	10G HSSM[a]	192.168.8.23	bc1-iom7	admin / admin
1 / 9	10G HSSM[a]	192.168.8.25	bc1-iom9	admin / admin

a. Depending on whether you use Cisco, BNT, or other HSSM, the password will differ. For Cisco 10 GbE HSSM, the default login is admin, but it does not have a password. You must set this password to Passw0rd as described at: http://publib.boulder.ibm.com/infocenter/bladectr/documentation/topic/com.ibm.bladecenter.common.nav.doc/io_esm_welcome_page.html.

Table 5-3 lists Management Server information. Note that “Passw0rd” contains the number “0” and not the letter “o”.

Table 5-3 Management network on Management Server

Component	IP address	Host name	Username / Password
x3550M3	192.168.0.1	mn1	Administrator / Passw0rd
x3550M3 Customer access	Customer defined	Customer defined	Administrator / Passw0rd
x3550M3 IMM	Customer defined	Customer defined	USERID / PASSWORD

Table 5-4 lists the credentials for external switches, storage, and PDUs.

Table 5-4 Management Network in other hardware environments

Component	IP address	Host name	Username / Password
SMC #1	192.168.16.1	sw1	admin / admin

Component	IP address	Host name	Username / Password
SMC #2	192.168.16.2	sw2	admin / admin
DS3524 #1 A	192.168.24.20	san1-sc1	shellUsr / wy3oo&w4 OR infiniti OR P@sswOrd
DS3524 #1 B	192.168.24.24	san1-sc2	shellUsr / wy3oo&w4 OR infiniti OR P@sswOrd
PDU #1	192.168.20.1	pdu1	ADMIN / 1001
PDU #2	192.168.20.2	pdu2	ADMIN / 1001
PDU #3	192.168.20.3	pdu3	ADMIN / 1001

BladeCenter details for a large configuration are described in Table 5-5.

Table 5-5 Management Network on BladeCenter: Large configuration

Chassis / Bay	Component	IP address	Host name	Username / Password
2	AMM	192.168.4.33	bc2-mm1	USERID / PASSWORD
2 / 3	FC Switch	192.168.8.35	bc2-iom3	USERID / PASSWORD
2 / 4	FC Switch	192.168.8.36	bc2-iom4	USERID / PASSWORD
2 / 7	10G HSSM[a]	192.168.8.39	bc2-iom7	admin / admin
2 / 9	10G HSSM[a]	192.168.8.41	bc2-iom9	admin / admin
n/a	SAN24B FC Switch	192.168.28.1	fcsw1	admin / password
n/a	SAN24B FC Switch	192.168.28.1	fcsw2	admin / password
n/a	DS3400 #2 A	192.168.24.36	san1-sc1	shellUsr / wy3oo&w4 OR infiniti

Chassis / Bay	Component	IP address	Host name	Username / Password
n/a	DS3400 #2 B	192.168.24.40	san1-sc2	shellUsr / wy3oo&w4 OR infiniti
n/a	PDU #5	192.168.20.5	pdu5	ADMIN / 1001
n/a	PDU #6	192.168.20.6	pdu6	ADMIN / 1001

a. Depending on whether you use Cisco, BNT or other HSSM, the password will differ. For Cisco 10 GbE HSSM, the default login is admin, but it does not have a password. You must set to Passw0rd as described at: http://publib.boulder.ibm.com/infocenter/bladectr/documentation/topic/com.ibm.bladecenter.common.nav.doc/io_esm_welcome_page.html.

Server-related credentials

All managed BladeCenter servers have an IP address, such as 192.168.72.*x*, where *x* is the sequential number of the server. Default credentials are root / Passw0rd.

Table 5-6 contains virtualization management-related information.

Table 5-6 IBM CloudBurst Management Server credentials

Module	IP Address / Subnet / DNS or URL	Username / Password
vCenter	192.168.88.9 / 255.255.0.0 / 192.168.0.1	Administrator/ Passw0rd
vMotion	192.168.8.x	
IBM System Director	https://mn1.private.cloud.com:8422/ibm/console/logon.jsp	Administrator/ Passw0rd
IBM DB2		db2admin / Passw0rd

Software stack-related credentials

To locate software stack functions using a browser, use the credentials in Table 5-7.

Table 5-7 Management software credentials

URL	Username / Password	Function	Comments
https://192.168.88.4/SimpleSRM	PMRDPCAUSR/maxadmin	Tivoli Service Automation Manager Self Service Interface	Accessed using URL redirection
https://192.168.88.1:9443/SimpleSRM	PMRDPCAUSR/maxadmin	Tivoli Service Automation Manager Self Service Interface	Accessed using icb-tivsam eth1 IP address
https://192.168.88.2:9443/SimpleSRM	PMRDPCAUSR/maxadmin	Tivoli Service Automation Manager Self Service Interface	Accessed using the service IP address on icb-tivsam
https://192.168.88.4/maximo	maxadmin/password	Tivoli Service Automation Manager administrative interface	Accessed using URL redirection
https://192.168.88.1:9443/maximo	maxadmin/password	Tivoli Service Automation Manager administrative interface	Accessed using icb-tivsam eth1 IP address
https://192.168.88.2:9443/maximo	maxadmin/password	Tivoli Service Automation Manager administrative interface	Accessed using the service IP address on icb-tivsam
https://192.168.88.1:9043/ibm/console	wasadmin/password	WebSphere Console on icb-tivsam	Accessed using icb-tivsam eth1 IP address
https://192.168.88.2:9043/ibm/console	wasadmin/password	WebSphere Console on icb-tivsam	Accessed using the service IP address on icb-tivsam

URL	Username / Password	Function	Comments
http://192.168.88.7:1920	sysadmin/password	IBM Tivoli Monitoring user interface	
http://192.168.88.4/ibm/console	virtuser/password	Tivoli Usage and Accounting Manager user interface	Accessed using URL redirection
http://192.168.88.8:11052/ibm/console	virtuser/password	Tivoli Usage and Accounting Manager user interface	Accessed using icb-tivsam eth1 IP address

You can directly access the operating system on which the CloudBurst software stack is running.

Table 5-8 shows credentials for authenticating with the `icb-tivsam` server for a variety of functions.

Table 5-8 icb-tivsam credentials

Software product	User ID	Passphrase
OS	root	password
OS	tioadmin	ssh4cloud
Tivoli Provisioning Manager	tioadmin	password
Tivoli Provisioning Manager Agent Manager	tioadmin	password
DB2 instance	ctginst1	password
DB2	dasusr1	password
DB2	maximo	password
WebSphere	wasadmin	password
DB2 fence user	db2fenc1	password
DB2 DAS user	dasusr1	password
Tivoli Directory Server	idsccmdb	password

Software product	User ID	Passphrase
Tivoli Directory Server Instance	idsldap	
Tivoli Directory Server	(cn=root)	password
IBM Activation Engine	virtuser	password
Maximo Administrator	maxadmin	password
Tivoli Service Automation Manager user interface	PMRDPCAUSR PMSCADMUSR maxreg mxintadm	maxadmin

For the icb-nfs server, use the credentials in Table 5-9.

Table 5-9 icb-nfs credentials

Software product	User ID	Passphrase
OS	root	password
OS	virtuser	password

For the icb-itm server, use the credentials in Table 5-10.

Table 5-10 icb-itm credentials

Software product	User ID	Passphrase
OS	root	password
OS	virtuser	password
IBM Tivoli Monitoring	sysadmin	password
IBM Tivoli Monitoring	itmuser	password
DB2 instance	db2inst1	password
DB2 fence user	db2fenc1	password
DB2 DAS user	dasusr1	password

For the icb-tuam server, use the credentials in Table 5-11 on page 218.

Table 5-11 icb-tuam credentials

Software product	User ID	Passphrase
OS	root	password
DB2 instance	db2inst1	password
Tivoli Usage and Accounting Manager	virtuser	password

5.4.2 Changing hardware-related passwords

This section describes how to set hardware-related passwords in CloudBurst.

Important: If you change any hardware-related password, it is suggested that you also change the password for the same element in IBM System Director. For the steps to do so, see “IBM Systems Director resource” on page 220.

BladeCenter

To change the default password of BladeCenter chassies:

1. Open a browser and log in to the BladeCenter at:

   http://bc1-mm1.private.cloud.com

2. Click **MM Control** → **Login Profiles**.
3. Click the USERID of interest in the Login Profiles list.
4. Complete the New password and Confirm Password fields.
5. Click **Save**.

To change the password for BladeCenter I/O modules, visit:

http://publib.boulder.ibm.com/infocenter/bladectr/documentation/topic/com.ibm.bladecenter.common.nav.doc/io_esm_welcome_page.html.

For other external devices, such as PDUs and switches, refer to the manufacturer’s documentation.

Management Server and IBM Systems Director

You can change the Management Server and IBM Systems Director password using the Windows password change process:

1. Log in to the mn1.private.cloud.com Management Server as Administrator.

2. Click **Start** → **Control Panel** → **Administrative Tools** → **Computer Management**.
3. Open **Computer Management (local)** → **Local Users and Groups** → **Users**.
4. Right-click **Administrator**.
5. Click **Set Password**.
6. Click **Proceed**.
7. Complete the New password and Confirm Password fields.
8. Click **OK**.

IBM DS Storage

To change the IBM DSxxxx Storage password:

1. Log in to the Management Server as Administrator.
2. Start the DS Storage Manager 10 Client from the Start menu.
3. If the Windows **User Account Control** appears, click **Yes**.
4. Double-click the storage device of interest from the Devices list.
5. Depending on your system, enter the default password `wy3oo&w4` OR `infiniti` OR `P@sswOrd`, if required.
6. Click **Storage Subsystem** → **Set Password**.
7. Complete the Current password, New Password and the Confirm New Password fields.
8. Click **OK**

VMware Virtual Center

You can change the VMware Virtual Center password using the Windows password change process. Following that, you must set the same password for the software stack.

1. Log into the `icb-vctr.private.cloud.com` server as Administrator.
2. Click **Start** → **Control Panel** → **Administrative Tools** → **Computer Management**.
3. Open **Computer Management (local)** → **Local Users and Groups** → **Users**.
4. Right-click **Administrator**.
5. Click **Set Password**.
6. Click **Proceed**.

7. Populate the New password and Confirm password fields.
8. Click **OK**.
9. Log into the Tivoli Service Automation Manager administrative console as `maxadmin` with password, `password`, at:

   `https://192.168.88.4/maximo`
10. Click **Go to** → **IT Infrastructure** → **Provisioning Inventory** → **Provisioning Computers**.
11. Click **vsphere** from the list.
12. Select the **Credentials** tab.
13. Open **HTTPS** from the **Service Access Points**.
14. Open **VMware** from **Password Credentials**.
15. Type your new password in the Password and Confirm Password fields.
16. Click **Save**.

IBM Systems Director resource

If you change a hardware-related password, it is suggested that you also change the password in IBM Systems Director. If not, the Director server cannot monitor your full environment.

To change a hardware resource password:

1. Log into System Director as Administrator at:

   `https://mn1.private.cloud.com:8422/ibm/console/logon.jsp`
2. Click the **Navigate Resources** menu on the left.
3. Click **All Systems** from the list on the right.
4. Select the item what you want to modify.
5. Click **Actions** → **Security** → **Configure Access**.
6. Select the Remote Service Access Point you want to modify.
7. Select the user.
8. Click **Edit**.
9. Click **Next** on the Welcome window.
10. Complete the new Password and the Verify password fields.
11. Click **Next**.
12. Click **Finish** on the Summary window.

5.4.3 Changing CloudBurst passwords

This section describes how to change the software stack-related passwords for CloudBurst.

Tivoli Service Automation Manager

To change the default password for IBM Tivoli Service Automation Manager:

1. If you are using single- or dual-node high availability, execute: `samctrl -M t`.
2. Change the `idsccmdb` user password for IBM Tivoli Directory Server:
   a. Log into the `icb-tivsam` as `root`.
   b. Stop the Tivoli Provisioning Manager processes using the commands shown in Example 5-13.

   Example 5-13 Commands to stop the Tivoli Provisioning Manager processes on icb-tivsam

   ```
   su - tioadmin
   cd $TIO_HOME/tools
   ./tio.sh stop wasadmin <wasadmin_password>
   exit
   ```

      i. To change the password for the `idsccmdb` user, use the command in Example 5-14.

      Example 5-14 Password change command on icb-tivsam

      ```
      echo "idsccmdb:<new_password>" | chpasswd
      ```

      ii. Stop and restart DB2 as idsccmdb. See Example 5-15.

      Example 5-15 DB2 stop and restart on icb-tivsam

      ```
      su - idsccmdb
      db2stop force
      db2start
      ```

      iii. Change the passwords for IBM Tivoli Provisioning Manager.

   Table 5-12 on page 222 lists the user IDs on the `icb-tivsam` image and the associated systems for which the passwords must be changed

Table 5-12 Change Tivoli Provisioning Manager users in the following systems

User ID	Change in OS	Change in Tivoli Provisioning Manager	Change in Tivoli Directory Server	Change in WebSphere Application Server
maximo	Yes	Yes		Yes
tioadmin	Yes	Yes	No	No
ctginst1	Yes	No	No	No
dausr1	Yes	No	No	No
db2fenc1	Yes	No	No	No
virtuser	Yes	No	No	No
root	Yes	No	No	No
idsldap	Yes	No	No	No
wasadmin	No	No	Yes	Yes
maxadmin	No	No	Yes	No
PMSCADMUSR	No	No	No	No

a. To change password for `wasadmin`, log into `icb-tivsam` as `root`, and execute the commands in Example 5-16.

Example 5-16 Change `wasadmin` password

```
su - tioadmin
$TIO_HOME/tools/tio.sh stop wasadmin <wasadmin_password>

cd /opt/IBM/WebSphere/AppServer/profiles/casprofile/logs/server1
rm SystemOut.log

cd /opt/IBM/WebSphere/AppServer/profiles/casprofile/bin
echo "AdminTask.changeFileRegistryAccountPassword(['-userId',
'wasadmin', '-password',
'<new_wasadmin_password>', '-uniqueName',
'uid=wasadmin,o=defaultWIMFileBasedRealm'])
AdminConfig.save()" >/tmp/test.py
./wsadmin.sh -lang jython -user wasadmin -password <old wasadmin
password> -f /tmp/test.py
```

```
./stopServer.sh server1 –user wasadmin –password
<old_wasadmin_password>

exit
```

iv. To change the `wasadmin` password in Tivoli Directory Server, log into the `icb-tivsam` as `root`, and execute the commands from Example 5-17.

Example 5-17 Change `wasadmin` password in Tivoli Directory Server

```
su - idsccmdb

echo "dn: cn=wasadmin,OU=users,OU=SWG,O=IBM,C=US"
>/tmp/chgpwd.ldif
echo "changetype: modify" >>/tmp/chgpwd.ldif
echo "replace: userpassword" >>/tmp/chgpwd.ldif
echo "userpassword: <new password>" >>/tmp/chgpwd.ldif

cd /opt/IBM/ldap/V6.2/bin
./ldapmodify –D cn=root –w password –i /tmp/chgpwd.ldif

exit

su - tioadmin
$TIO_HOME/tools/tio.sh start wasadmin <new_wasadmin_password>
exit
```

v. Verify Tivoli Provisioning Manager and WebSphere.

i. Log into the Tivoli Provisioning Manager user interface by accessing the following web address in a web browser:

`https://icb-nfs.private.cloud.com/maximo`

ii. When prompted for MAXIMO web Application Realm authentication, enter:

user ID `maxadmin`

password <maxadmin_password>

The default `maxadmin` password is `password`.

iii. Access the following web address to launch the WebSphere administrative console, and log in as the `wasadmin` user with the new password:

`http://icb-tivsam.private.cloud.com:9060/admin`

b. To change the `maxadmin` user password, log into the `icb-tivsam` as `root`, and execute the commands shown in Example 5-18.

Example 5-18 Change `maxadmin` user password

```
su - tioadmin
$TIO_HOME/tools/tio.sh stop wasadmin <wasadmin_password>
exit

su - idsccmdb

echo "dn: cn=maxadmin,OU=users,OU=SWG,O=IBM,C=US"
>/tmp/chgpwd.ldif
echo "changetype: modify" >>/tmp/chgpwd.ldif
echo "replace: userpassword" >>/tmp/chgpwd.ldif
echo "userpassword: <new password>" >>/tmp/chgpwd.ldif

cd /opt/IBM/ldap/V6.2/bin
./ldapmodify –D cn=root –w password –i /tmp/chgpwd.ldif

exit

su - tioadmin
$TIO_HOME/tools/tio.sh start wasadmin <new_wasadmin_password>
exit
```

Verify that the Tivoli Provisioning Manager user interface at `https://icb-nfs.private.cloud.com/maximo` can be launched from a web browser, and log in with the new user credentials.

c. Change the `maximo` user password:

i. Log into the `icb-tivsam` as `root`, and execute the commands shown in Example 5-19.

Example 5-19 Change `maximo` user password

```
su - tioadmin
$TIO_HOME/tools/tio.sh stop wasadmin <wasadmin_password>

cd
/opt/IBM/WebSphere/AppServer/profiles/casprofile/logs/server1
rm SystemOut.log

cd /opt/IBM/WebSphere/AppServer/profiles/casprofile/bin
./startServer.sh server1
```

```
exit
```

ii. Login as `wasadmin` to WebSphere administrative console at:

`http://10.90.0.1:21001/admin`

iii. Click **Resources** → **JDBC** → **Data Sources**.

iv. Click **AgentRegistry** in the list of Data sources that displays. The Agent Registry dialog opens.

v. In the Related Items section on the right side of the dialog, click **JAAS – J2C authentication data**.

vi. Click **AgentRegistryDBAuth**.

vii. In the Configuration window, enter the new password for the user ID `maximo`, and click Apply.

viii. When the dialog is updated with options to save the changes directly to the master configuration, select **Save directly to the master configuration**.

ix. Log out of the WebSphere administrative console, and close the web browser.

x. Log into the `icb-tivsam` as `root`, and execute the commands shown in Example 5-20.

Example 5-20 Finalize maximo user password change

```
su - tioadmin
cd /opt/IBM/WebSphere/AppServer/profiles/casprofile/bin
./stopServer.sh server1 –user wasadmin –password <wasadmin_password>
```

xi. Change the database password for MXServer.

i. Log into the `icb-tivsam` as `root`, and execute the commands shown in Example 5-21.

Example 5-21 Prepare environment for password change for MXServer

```
su - tioadmin

cd /opt/IBM/WebSphere/AppServer/profiles/ctgDmgr01/bin
./startManager.sh

cd /opt/IBM/WebSphere/AppServer/profiles/ctgAppSrv01/bin/
./startNode.sh

exit
```

ii. Log in as `wasadmin` to WebSphere administrative console at:

`http://10.90.0.1:9060/admin`

iii. Select **Resources** → **JDBC** → **Data Sources**.

iv. Click **CDSDataSource** in the list of Data sources.

v. In the Related Items section on the right side of the dialog, click **JAAS – J2C authentication data**.

vi. Click **CDSDataAuth**.

vii. Enter the new password for the `maximo` user, and click **Apply**.

viii. When the dialog is updated with options to save the changes directly to the master configuration, select **Save directly to the master configuration**.

ix. Click **OK** in the next dialog, informing of the status of the nodes.

x. Select **System administration** → **Nodes**, select **ctgNode01**, and click **Synchronize** (located just underneath Preferences):

If the node synchronization succeeds, this section is complete.

If the node synchronization `fails`, the node must be synchronized manually (see Example 5-23).

To determine the SOAP port number, execute the commands shown in Example 5-22 as `root` on `icb-tivsam`.

Example 5-22 Determine the SOAP port number

```
cd
/opt/IBM/WebSphere/AppServer/profiles/ctgAppSrv01/config/cells/ctgCell0
1/nodes/ctgCellManger01
cat serverindex.xml | grep EndPoint_4 | grep icb-tivsam
```

To manually synchronize the node, run the commands shown in Example 5-23 as root.

Example 5-23 Synchronize a node manually

```
su - tioadmin

cd /opt/IBM/WebSphere/AppServer/profiles/ctgDmgr01/bin
./startManager.sh

cd /opt/IBM/WebSphere/AppServer/profiles/ctgAppSrv01/bin
./stopNode.sh -user wasadmin -password <wasadmin_password>

syncNode.sh cloudburst-tpm.ibm.com <port_number> -username wasadmin
-password <wasadmin_password>
```

```
cd /opt/IBM/WebSphere/AppServer/profiles/ctgDmgr01/bin
./stopManager.sh

cd /opt/IBM/WebSphere/AppServer/profiles/ctgDmgr01/wstemp
rm –rf *

cd /opt/IBM/WebSphere/AppServer/profiles/ctgDmgr01/bin
./startManager.sh

cd /opt/IBM/WebSphere/AppServer/profiles/ctgAppSrv01/bin
./startNode.sh

exit
```

d. To change a password using Device Manager, execute the commands shown in Example 5-24 as root on icb-tivsam.

Example 5-24 Change password in Device Manager

```
cd /opt/IBM/DeviceManager/bin
./dmsetpw.sh –new <new_password> -db –user wasadmin –password
<wasadmin_password>

su – tioadmin
$TIO_HOME/tools/tio.sh stop wasadmin <wasadmin_password>
exit

echo "maximo:<new_password>" | chpasswd
```

e. Change `maximo.properties` in two locations:

i. Log into `icb-tivsam` as `root`, and execute the commands shown in Example 5-25.

Example 5-25 Backup maximo.properties

```
cd
$TIO_HOME/lwi/runtime/tpm/eclipse/plugins/tpm_pmp/properties
cp –p maximo.properties maximo.properties.org
```

ii. Edit and save the `maximo.properties` file:

Delete the following line: `mxe.encrypted=true`

Delete the last line in the file, which is the encrypted password.

Add the following line: `mxe.db.password=<new maximo password>`

iii. To encrypt the `maximo.properties` file again, perform the steps as shown in Example 5-26 on page 228.

Example 5-26 Encrypt maximo.properties

```
cd /opt/IBM/SMP/maximo/applications/maximo/properties
cp -p maximo.properties maximo.properties.orig
cp -p /opt/IBM/tivoli/tpm/lwi/runtime/tpm/eclipse/plugins/tpm_pmp/properties/maximo.properties
.
cd /opt/IBM/SMP/maximo/tools/maximo
encryptproperties.sh
cp -p /opt/IBM/SMP/maximo/applications/maximo/properties/maximo.properties
/opt/IBM/tivoli/tpm/lwi/runtime/tpm/eclipse/plugins/tpm_pmp/properties/maximo.properties
cp -p /opt/IBM/SMP/maximo/applications/maximo/properties/maximo.properties.orig
/opt/IBM/SMP/maximo/applications/maximo/properties/maximo.properties
```

iv. Back up the second `maximo.properties` file, as shown in Example 5-27.

Example 5-27 Backup second maximo.properties

```
cd $TIO_HOME/eclipse/plugins/tpm_pmp/properties
cp –p maximo.properties maximo.properties.org
```

v. Edit and save the `maximo.properties` file:

Delete the following line: `mxe.encrypted=true`

Delete the last line in the file, which is the encrypted password.

Add the following line: `mxe.db.password=<new maximo password>`

vi. To encrypt the `maximo.properties` file again, perform the steps shown in Example 5-28.

Example 5-28 Encrypt maximo.properties

```
cd /opt/IBM/SMP/maximo/applications/maximo/properties
cp -p maximo.properties maximo.properties.orig
cp -p /opt/IBM/tivoli/tpm/eclipse/plugins/tpm_pmp/properties/maximo.properties .
cd /opt/IBM/SMP/maximo/tools/maximo
encryptproperties.sh
cp -p /opt/IBM/SMP/maximo/applications/maximo/properties/maximo.properties
/opt/IBM/tivoli/tpm/eclipse/plugins/tpm_pmp/properties/maximo.properties
cp -p /opt/IBM/SMP/maximo/applications/maximo/properties/maximo.properties.orig
/opt/IBM/SMP/maximo/applications/maximo/properties/maximo.properties
```

f. To update `properties.jar`, login as `root` to `icb-tivsam`, and execute the commands shown in Example 5-29.

Example 5-29 Update properties.jar

```
cd
/opt/IBM/WebSphere/AppServer/profiles/ctgAppSrv01/installedApps/ctgCell01/MAXIMO.ear
```

```
cp –p properties.jar /home/tioadmin
mkdir tmp
cd tmp
/opt/IBM/WebSphere/AppServer/java/bin/jar –xvf ../properties.jar
cp –p $TIO_HOME/eclipse/plugins/tpm_pmp/properties/maximo.properties .
/opt/IBM/WebSphere/AppServer/java/bin/jar –cvf ../properties.jar *

su - tioadmin
$TIO_HOME/tools/tio.sh start wasadmin <wasadmin_password>
exit
```

g. To verify the password change of `maxadmin`, log into the Tivoli Provisioning Manager user interface as `maxadmin` at:

   http://icb-nfs.private.cloud.com/maximo/ui/login

h. Change the OS userID passwords. You can change the following user passwords in the operating system:

   - tioadmin
   - ctginst1
   - dasusr1
   - db2fenc1
   - virtuser
   - root

   To change the password, execute the following as root:

   ```
   echo "userid:<new password>" | chpasswd
   ```

3. Change the cloud administrator password:

   a. Log into the cloud management console as `PMRDPCAUSR` with `maxadmin` password, at:

      https://icb-nfs.private.cloud.com/SimpleSRM/login.jsp

      The cloud administrator home page displays

   b. Click **Request a New Service** → **Virtual Server Management** → **Manage Users** → **Modify User**.

   c. From the drop-down list, select the **PMRDPCAUSR** user, and click **OK**.

   d. Specify the new password in the Password and Confirm Password fields, and click **OK**

   e. Log out from the UI, and then login again as `PMRDPCAUSR`, and enter the new password.

4. If your are using single or dual node high availability, execute: `samctrl -M f`.

NFS

Follow the steps described in this section to change the default passwords for the NFS server.

1. Change the Samba password:
   a. Log in to `icb-nfs` as `root`.
   b. Change the directory to `/etc/samba`.
   c. Type the command: `smbpasswd –a Administrator`.
   d. Enter the new password when prompted, and re-enter the new password when prompted.
   e. Log into the Tivoli Service Automation Manager administrative UI at:

      `https://icb-nfs.private.cloud.com/maximo`

   f. Select **Go To** → **IT Infrastructure** → **Provisioning Inventory** → **File Repositories**.
   g. Search for the Cloud Windows File Repository, and select it.
   h. Click the **Credentials** tab.
   i. In the Service Access Points section, expand SMB.
   j. In the Password Credentials section, specify a new password to access Samba as Administrator.
2. Change the OS user password:

   The passwords for the following users can be changed on the `icb-itm` image:

   - virtuser
   - root
   - Administrator

   Log in as root and run the command shown in Example 5-30 for all users for whom a password change is required.

   Example 5-30 Password change command on icb-nfs

```
echo "user_id:new_password" | chpasswd
```

IBM TIvoli Monitoring

To change the default passwords for IBM Tivoli Monitoring:

1. Stop IBM Tivoli Monitoring and DB2:
   a. Log into the icb-itm image as virtuser.
   b. Execute `/opt/IBM/ITM/bin/cinfo`.

c. Type `2`, and press Enter to see the status for the IBM Tivoli Monitoring processes.

d. Type `4`, and press Enter to exit.

e. As virtuser, stop the IBM Tivoli Monitoring processes, if running, as shown in Example 5-31.

Example 5-31 Stop IBM Tivoli Monitoring processes

```
/opt/IBM/ITM/bin/itmcmd agent stop sy
/opt/IBM/ITM/bin/itmcmd agent stop hd
/opt/IBM/ITM/bin/itmcmd agent stop lz
/opt/IBM/ITM/bin/itmcmd agent stop cq
/opt/IBM/ITM/bin/itmcmd agent stop kf
/opt/IBM/ITM/bin/itmcmd server stop TEMS
```

vii. Repeat Step b. through Step d. to confirm that IBM Tivoli Monitoring is stopped.

f. Stop DB2 as `db2inst1` user, if running, as shown in Example 5-32.

Example 5-32 Stop DB2 on icb-itm

```
su - db2inst1
db2stop
logout
```

g. Change the OS passwords.

The passwords for the following users can be changed on the icb-itm image:

- dasusr1
- db2fenc1
- virtuser
- db2inst1
- sysadmin
- itmuser
- root

Log in as root, and run the commands, as shown in Example 5-33 for all users for whom a password change is required.

Example 5-33 Password change command on icb-itm

```
echo "user_id:new_password" | chpasswd
```

2. Start DB2, as shown in Example 5-34 on page 232.

Example 5-34 Start DB2 on icb-itm

```
su - db2inst1
db2start
```

3. Verify that users can access DB2, as shown in Example 5-35.

Example 5-35 Check DB2 access for virtuser

```
su - virtuser
db2 list db directory
db2 connect to TEPS user virtuser using <virtuser_new_password>
db2 connect to TEPS user db2inst1 using <db2inst1_new_password>
db2 connect to TEPS user itmuser using <itmuser_new_password>
```

4. Change the passwords for db2inst1 and itmuser:
   a. Login as root, and run the IBM Tivoli Monitoring configuration, as shown in Example 5-36.

Example 5-36 Run IBM Tivoli Monitoring configuration after a password change

```
cd /opt/IBM/ITM/bin
./itmcmd config -A cq
```

   You will be prompted to connect to Tivoli Enterprise Monitoring Server.

   b. Enter **2** to skip the message that is displayed. You will be prompted to connect to the Tivoli Enterprise Monitoring Server.
   c. Press Enter to accept the default.
   d. For all remaining prompts, accept the default value for all questions by pressing Enter, except when:
      i. Prompted to enter and retype the password for DB2 admin ID, db2inst1
      ii. Prompted to enter and retype the password for TEPS DB user, itmuser
      iii. Prompted to enter and retype the password for Warehouse user, itmuser
   e. Wait until the agent configuration completes.
5. Start IBM Tivoli Monitoring:
   a. Log into the icb-itm image as virtuser.
   b. As virtuser, start the IBM Tivoli Monitoring processes as shown in Example 5-37.

Example 5-37 Start the IBM Tivoli Monitoring processes

```
/opt/IBM/ITM/bin/itmcmd server start TEMS
```

```
/opt/IBM/ITM/bin/itmcmd agent start cq
/opt/IBM/ITM/bin/itmcmd agent start lz
/opt/IBM/ITM/bin/itmcmd agent start hd
/opt/IBM/ITM/bin/itmcmd agent start sy
```

iv. Execute `/opt/IBM/ITM/bin/cinfo` to verify that all processes are running.

c. Type **2**, and press Enter to display the status of the IBM Tivoli Monitoring processes.

d. Type **4**, and press Enter to exit.

6. Change the password for sysadmin:

a. Log into the Tivoli Service Automation Manager administrative interface at:

`https://icb-nfs.private.cloud.com/maximo`

b. Select **Go To** → **Integration** → **End Points**.

c. Filter for PMRDPITM, select it, and the Properties section is displayed.

d. Expand the PASSWORD property, and type the new password for sysadm in the Value field.

e. **Save** the changes.

Tivoli Usage and Accounting Manager

To change the default passwords for Tivoli Usage and Accounting Manager:

1. Stop DB2 and Tivoli Usage and Accounting Manager:

a. Log in to the icb-tuam image as root.

b. Verify which processes are running with the following command:

i. `/opt/IBM/tuam/ewas/bin/serverStatus.sh server1 -user virtuser -password <password>`

The status will be `STARTED`.

ii. When prompted for credentials, specify `virtuser` as user and type the password.

c. Stop the Embedded WebSphere Application Server:

i. `/opt/IBM/tuam/ewas/bin/stopServer.sh server1`

The status will be `STOPPED`

ii. When prompted for credentials, specify `virtuser` as user and type its password.

d. Stop DB2 using the command shown in Example 5-38 on page 234.

Example 5-38 Stop DB2 on icb-tuam

```
su - db2inst1
db2stop
logout
```

e. Change OS user password.

The passwords for the following users can be changed on the `icb-itm` image:

- root
- db2inst1
- virtuser

Log in as `root`, and run the command shown in Example 5-39 for all users for whom a password change is required.

Example 5-39 Password change command on icb-itm

```
echo "user_id:new_password" | chpasswd
```

2. Update the data source configuration:
   a. Log in as `virtuser` to the Tivoli Usage and Accounting Manager interface at:

      `http://192.168.88.4/ibm/console`

   b. Click **Usage and Accounting Manager** → **System Maintenance** → **Data Sources**.
   c. In the Data Source Name column, click the **>>** icon next to default, and select **Edit Data Source**.
   d. Type the new password for virtuser.
   e. Click **Test** to verify that you can connect to the database.
   f. Click **OK** to save the changes.
3. Update the `virtuser` password on the `icb-tivsam` image:
   a. Log in to the `icb-tivsam` image as root.
   b. Edit the following file:
      `/opt/IBM/SMP/maximo/reports/birt/libraries/TUAM_library.rptlibrary`
   c. Edit the `odaPassword` tag for `virtuser`, and replace `old_encrypted_password_for_virtuser` with the new password in base64 encryption (see Example 5-40 on page 235).

Example 5-40 Change the virtuser password on icb-tivsam

```
<property name="odaUser">virtuser</property>
  <encrypted-property
name="odaPassword">old_encrypted_password_for_virtuser</encrypted
-property>
```

To get your base64 encrypted password, use openssl (see Example 5-41).

Example 5-41 Get base64 encoded password

```
echo "new_password" > myfile
openssl enc -base64 -in myfile -out myfile.b64
cat myfile.b64
rm -rf myfile
rm -rf myfile.b64
```

d. Save your changes.

e. Ensure that you are logged in to the `icb-tivsam` image as root.

f. Use the following command to import the changed library:

```
/opt/IBM/SMP/maximo/reports/birt/tools/importreports.sh libraries
```

4. Verify DB2 as shown in Example 5-42.

Example 5-42 Verify DB2 on icb-tuam

```
su - db2inst1
db2start
db2 list db directory
db2 connect to TUAM712 user db2inst1 using <db2inst1_new_password>
```

5. Verify Tivoli Usage and Accounting Manager:

a. Log in to the `icb-tuam` image as root.

b. Start the Embedded WebSphere Application Server with the following command:

```
/opt/IBM/tuam/ewas/bin/startServer.sh server1
```

When prompted for credentials, specify `virtuser` as the user and type the password.

c. Verify which processes are running:

i. `/opt/IBM/tuam/ewas/bin/serverStatus.sh server1 -user virtuser -password <password>`

The status will be `STARTED`.

ii. When prompted for credentials, specify `virtuser` as user, and type the password.

d. Login as `virtuser` to the Tivoli Usage and Accounting Manager user interface at:

   `http://192.168.88.4/ibm/console`

e. Navigate to **Usage and Accounting Manager** → **Chargeback Maintenance** → **Clients**. Verify that this displays with no errors (DB2 is working after changing the `virtuser` password).

6

IBM Service Delivery Manager 7.2.2

This chapter describes how to upgrade to CloudBurst 2.1.1 with IBM Service Delivery Manager 7.2.2. The release of IBM Service Delivery Manager 7.2.2 introduces a number of new functionalities. This chapter describes the upgrade process that makes these functionalities available to CloudBurst 2.1 users.

We describe the upgrade process for each of the following virtual images:

- icb-tivsam (for IBM Tivoli Service Automation Manager)
- icb-tuam (for IBM Tivoli Usage and Accounting Manager)
- icb-itm (for IBM Tivoli Monitoring)
- icb-nfs (for IBM Tivoli Monitoring)

We also describe the specifics about how to:

- “Editing your servers settings” on page 242
- “Pre-upgrade steps” on page 243
- “Using the maintenance tool” on page 244
- “Upgrading the software products” on page 248
- “Post-upgrade steps” on page 285

6.1 Upgrading to CloudBurst 2.1.1 with IBM Service Delivery Manager 7.2.2

With the release of IBM Service Delivery Manager 7.2.2, new functionalities have been introduced. By upgrading the CloudBurst software stack from IBM Service Delivery Manager 7.2.1, you can take advantage of these features.

The following list contains new product features and enhancements that were added to IBM Service Delivery Manager 7.2.2:

- Maintenance tool
- Ability to collect and display historical monitoring reports
- URL redirection
- Integration with external IBM Tivoli Monitoring and Tivoli Usage and Accounting Manager
- Improved Tivoli Usage and Accounting Manager reports
- Service provider support
- Monitoring of the infrastructure
- Exploiting the configuration tools provided with Tivoli Service Automation Manager V7.2.2
- Automatic synchronization of Tivoli Service Automation Manager customer data structure with Tivoli Usage and Accounting Manager

The maintenance tool helps you to understand the difference between a version upgrade, a maintenance level upgrade of the Software stack installed in CloudBurst for System x, and those provided with a specific IBM Service Delivery Manager fix pack or version.

The maintenance tool determines the steps that are necessary to upgrade your existing implementation, and it points you to URLs from which you can run the required upgrades.

The data collected by IBM Tivoli Monitoring agents can be stored in an external data warehouse (connected to the CloudBurst) and used to generate reports with information about the availability and performance of your environment for a specific time frame. It also possible to generate trend analysis, including information related to the hypervisor. Historical reports are processed and displayed by Tivoli Common Reporting.

The URL redirection functionality has been extended to cover IBM Tivoli Monitoring user interfaces. Using a single host name or IP address, you can now

access all of the user interfaces provided with IBM CloudBurst for System x software stack:

- Tivoli Service Automation Manager self-service user interface
- Tivoli Service Automation Manager administrative user interface
- Tivoli Usage and Accounting Manager user interface
- Tivoli Enterprise Portal user interface
- Tivoli Common Reporting user interface

There are a number of URLs for previous versions of the software stack (IBM Service Delivery Manager 7.2.1):

- Tivoli Service Automation Manager:

https://NFS_image/tivsam/admin	Administrative UI
https://NFS_image/tivsam/wasadmin	WAS admin console
https://NFS_image/tivsam/SimpleSRM	Self Service UI

- IBM Tivoli Monitoring:

https://NFS_image/itm/teps	TEPS UI
https://NFS_image/itm/tcr	Tivoli Common Reporting UI

- Tivoli Usage and Accounting Manager:

https://NFS_image/tuam/wasadmin	WAS admin console
https://NFS_image/tuam/tip	Tivoli Integrated Portal

It is now possible to automatically configure (using the Service Connection Engine) the CloudBurst Software stack to integrate with IBM Tivoli Monitoring and Tivoli Usage and Accounting Manager instances that are already in your environment.

A wider set of usage and accounting reports is provided, including, for example, resource trends, invoice by rate groups, and account summary. Moreover, the reports can be viewed with Tivoli Common Reporting. You no longer need to access the Tivoli Service Automation Manager administrator UI to generate and display reports. A sample report in shown in Figure 6-1 on page 240.

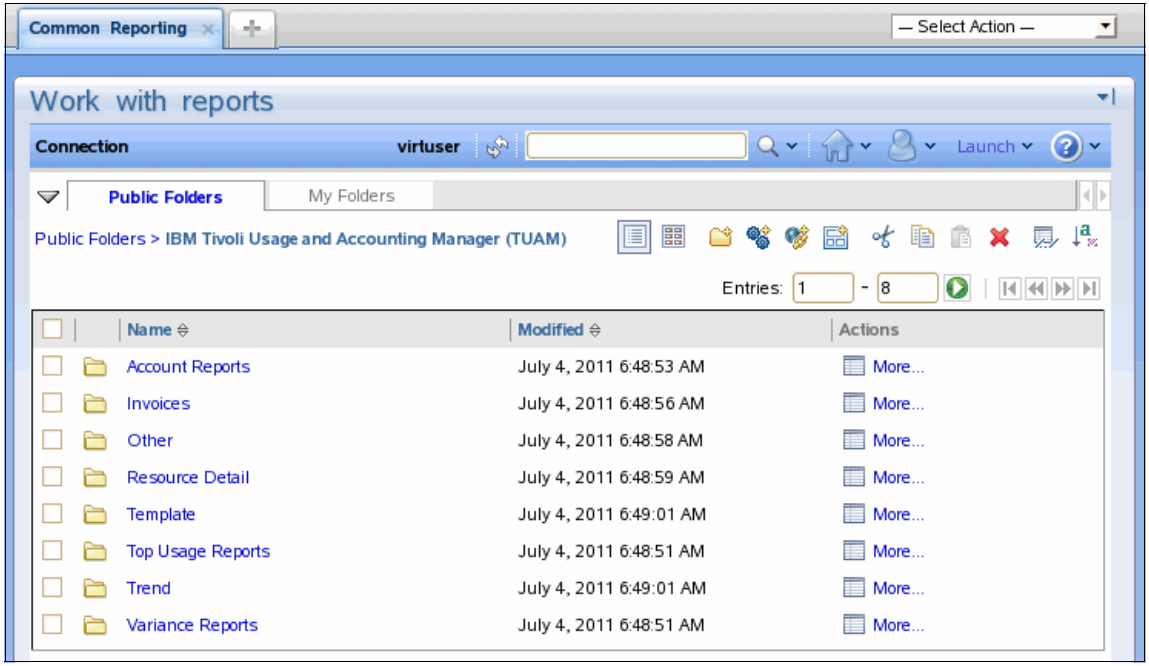


Figure 6-1 New Tivoli Usage and Accounting Manager functionality

Now you can create clouds that can be used by multiple customers. Two types of resources are available within a cloud:

- Single customer objects that are assigned to individual customers
- Multi-customer objects that can be shared among customers

A new enhancement introduced with IBM Service Delivery Manager V7.2.2 is the extension of the monitoring capabilities. Now, you can monitor the hypervisor and the underlying hardware by using IBM Tivoli Monitoring for Virtual Server agent on System x.

The following applications have been added to allow you to configure and administer cloud resources:

- Cloud Storage Pool Administration application
- Cloud Network Configuration application
- Cloud Customer Administration application

IBM Service Delivery Manager V7.2.2 includes Tivoli Service Automation Manager - Extension for Usage and Accounting V1.0. Using this extension, the Tivoli Service Automation Manager entities such as users, customers, and teams, are automatically synchronized with Tivoli Usage and Accounting Manager entities.

The following section describes how can you upgrade CloudBurst 2.1 software stack to the new version with IBM Service Delivery Manager 7.2.2 in a single node environment. If you are using dual-node, high availability, visit the following URL:
http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/topic/com.ibm.isdm_7.2.2.doc/c_upgrading_dualHA.html#c_upgrading_dualHA

Information:

Currently, no official upgrade path or upgrade documentation is available for IBM CloudBurst for System x. The upgrade steps documented here were based on IBM Service Delivery Manager 7.2.1. The processes described in this chapter are based on the IBM Service Delivery Manager upgrade procedure located at
http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/topic/com.ibm.isdm_7.2.2.doc/c_maintenance_tools.html

In order for the processes in this chapter to run successfully, it is expected that you are using the:

- default IP
- default host name settings
- default user credentials for the middleware

Also ensure that there are:

- No projects running
- No projects scheduled
- No modification to the UI

The full IBM Service Delivery Manager upgrade process contains both product maintenance upgrades, and some product version upgrades. IBM Service Delivery Manager provides you with a maintenance tool that guides you through both types of upgrade: a version upgrade and a maintenance level upgrade.

Upgrade the virtual images in the following order:

- icb-tivsam
- icb-tuam
- icb-itm
- icb-nfs

The upgrade procedure for each virtual image is divided into three steps:

1. Pre-upgrade to increase the disk space and configure the software stack to prepare for the upgrade procedure

2. Upgrade the products installed on the virtual images with guidance from the maintenance tool
3. Post-upgrade to run additional configuration steps to integrate the additional software that is not present in the previous version

Recommendation: Before you begin the upgrade process:

- Cancel all running and scheduled projects on the Tivoli Service Automation Manager self service interface
- Properly shut down the middleware software stack as described in 5.1.1, “Shutting down the software stack” on page 195
- Make a full backup from each server as described in 5.2, “IBM CloudBurst backup and restore” on page 200.

6.1.1 Editing your servers settings

Based on upgrade requirements, edit your server settings for each server as described in Table 6-1.

Table 6-1 Hardware settings for upgraded middleware servers

Server	Hard disk	Swap	RAM
icb-tivsam	70 G (sda) 40 G (sdb)	24 G	16 G
icb-tuam	14 G	3 G	4 G
icb-itm	25 G	6 G	6 G
icb-nfs	20 G (sda) 5 G (sdb)[a]	3 G	2 G

a. Assign an additional 300 MB to the /dev/sdb1 on the icb-nfs server.

In Table 6-1, `sda` is the first hard disk, `sdb` is the second hard disk, and `sdb1` is the first partition on the second hard disk.

Tip: If you have the capacity during the upgrade process, add more memory to the `icb-tivsam` server to reduce the installation time.

To change the setting for each server in the vSphere Client (as indicated in Table 6-1):

1. Click the server you want to modify.

2. Select the **Summary** tab.
3. Click **Edit Settings**.
4. Select **Memory** from the list and increase as necessary.
5. Select **Hard Disk 1** and increase it as necessary.
6. Select **Hard Disk 2** (if you have one) and increase it as necessary.

To increase the space on your hard drive and to increase swap file size, we suggest using GParted, a tool for managing partition size. Visit http://gparted.sourceforge.net/

6.1.2 Pre-upgrade steps

Pre-upgrade steps for the `icb-tivsam` and `icbv-nfs` servers follow.

icb-tivsam

To prepare the `icb-tivsam` server, run the commands in Example 6-1 as `root`.

Example 6-1 Pre-upgrade commands on the icb-tivsam

```
cd /opt/IBM/SMP/wasclient/
./ThinWsadmin.sh -username wasadmin -password password -lang jython -c
"AdminTask.help()"
cd /opt/IBM/tivoli/tpm/properties/version
rm 7.2.0.0-TIV-TPM-Multi-IF00001.efix
rm history/7.2.0.0-TIV-TPM-Multi-IF00001*
/usr/ibm/common/acsi/bin/de_chghostname.sh
cd /usr/IBM/WebSphere/AppServer/logs/manageprofiles
chown tioadmin:tioadmin ctgDmgr01
chown tioadmin:tioadmin ctgAppSrv01
chown tioadmin:tioadmin casprofile
samctrl -M t
```

icb-nfs

Before you begin the upgrade process, execute the command in Example 6-2 on the `icb-nfs` server as `root`.

Example 6-2 Pre-upgrade command on the icb-nfs

```
samctrl -M t
```

6.1.3 Using the maintenance tool

As stated in 6.1, “Upgrading to CloudBurst 2.1.1 with IBM Service Delivery Manager 7.2.2” on page 238, the maintenance tool helps you to understand the difference between a version upgrade, a maintenance level upgrade of the Software stack installed in CloudBurst for System x, and those provided with a specific IBM Service Delivery Manager fix pack or version.

Note: An executable version of the maintenance tool can be downloaded from the following website:

`https://www-304.ibm.com/support/docview.wss?uid=swg21566630`

In the procedure that follows, the maintenance tool is used to define the readiness for upgrade for all software on an image. Run this procedure on each image:

1. Uncompress the `ISDM_for_x86_2of15_V722.tar` file to any directory.
2. Navigate to `maintenanceTool.tar` file, and uncompress it.
3. Change directory to `launchpad\disk1`.
4. Start the maintenance tool:
   - On Microsoft Windows: `launchpad.exe\`
   - On Linux: `./launchpad.sh`
5. Click **Next** on the **Welcome** window.
6. Choose the `isdm/isdm722_VMware_upgrade.ovf` file on the **Choose update descriptor**.
7. Click **Next**.
8. The Update Information window displays a list of the products and versions contained in the IBM Service Delivery Manager V7.2.2.
9. Click **Next**.
10. Specify the host name and access credentials for all of the virtual servers as you see. See Figure 6-2 on page 245.

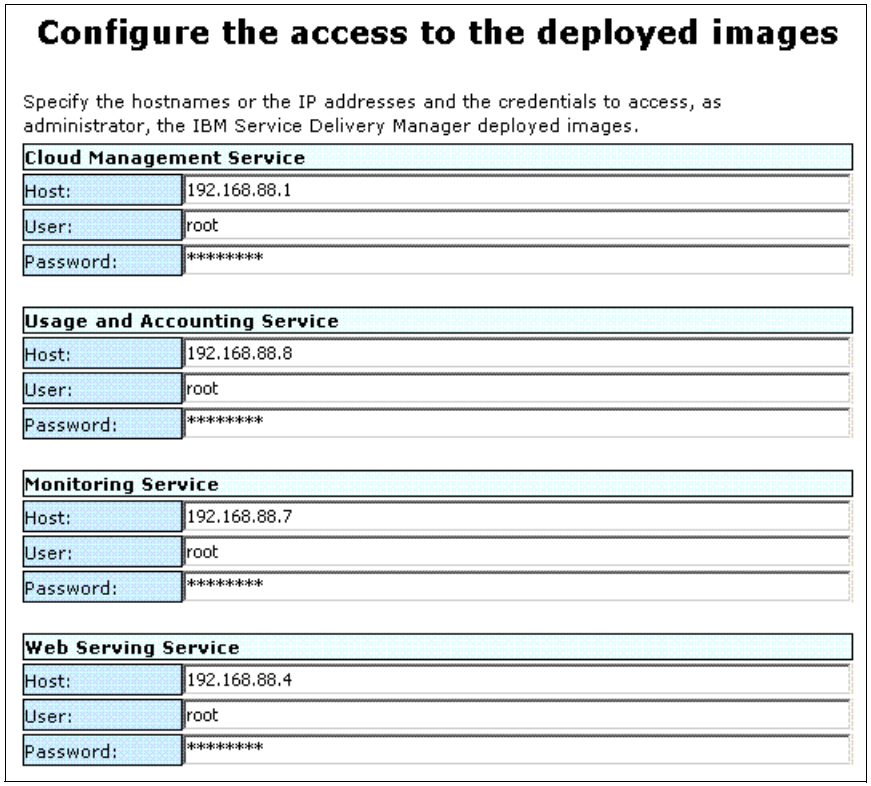


Figure 6-2 Specify the host name and access credentials for all virtual servers

11. Click **Next**.
12. The current versions of installed software are detected and compared with the versions specified in the .ovf file, and then displayed in the Product Versions window, as shown in Figure 6-3 on page 246. In this window, you will see the following for each product that needs to be updated:
    - The version of the software currently installed on the virtual image and whether the software is ready for upgrade
    - The version of the product that is available with IBM Service Delivery Manager V7.2.2

Product versions

The following table shows the current levels of the product installed with the IBM Service Delivery Manager images and the recommended versions included in the upgrade or Fix Pack.

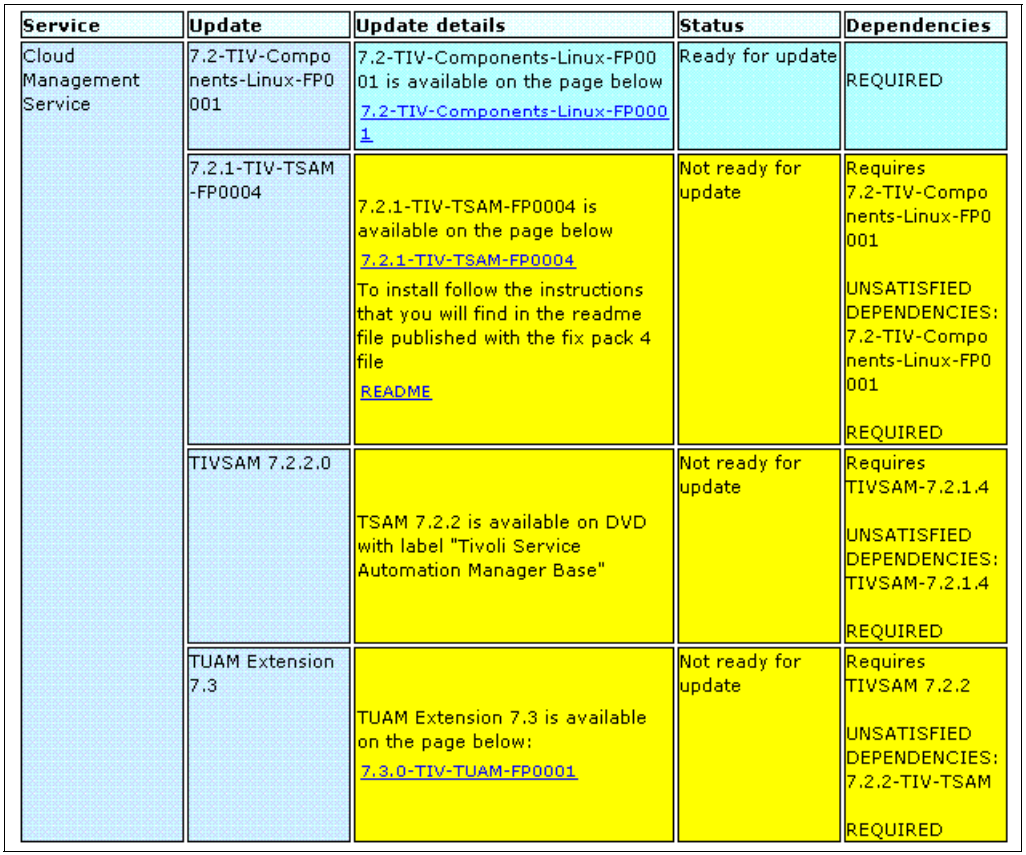
Service	Solution	Update	Current Version	Status	Recommended Version
Cloud Management Service		7.2-TIV-Components-Linux-FP0001	7.2.0	Ready for update	7.2.0.1
		7.2.1-TIV-TSAM-FP0004	7.2.1.1	Not ready for update	7.2.1.4
		TIVSAM 7.2.2.0	7.2.1.1	Not ready for update	7.2.2.0
		TUAM Extension 7.3		Not ready for update	7.3
		6.2.2-TIV-ITM_TMV-Agents-FP0004	06.2.2.01.00	Ready for update	6.2.2.4
		ISDM 7.2.2 package		Not ready for update	7.2.2
Usage and Accounting Service		TCR 2.1		Ready for update	2.1
		TUAM 7.3	7.1.2.0	Not ready for update	7.3
		7.3-TIV-TUAM-FP0001	7.1.2.0	Not ready for update	7.3.0.1
		ITM Agent 6.2.2 Fix Pack 4	06.2.2.01.00	Ready for update	6.2.2.4
		ISDM 7.2.2 package		Ready for update	7.2.2
Monitoring Service		ITM 6.2.2 Fix Pack 4	06.2.2.01.00	Ready for update	6.2.2.4
		ITM Agent 6.2.2 Fix Pack 4	06.2.2.01.00	Ready for update	6.2.2.4
		IHS 7.0		Ready for update	7.0.0.0
		TCR 1.3		Ready for update	1.3
		IBM Tivoli Monitoring Performance Analyzer 6.2.2.2		Ready for update	6.2.2.2
		ITM Agent for VMware VI 6.2.3		Ready for update	6.2.3
		ISDM 7.2.2 package		Not ready for update	7.2.2
Web Serving Service		ITM Agent 6.2.2 Fix Pack 4	06.2.2.01.00	Ready for update	6.2.2.4
		ISDM 7.2.2 package	7.2.1	Ready for update	7.2.2

Refresh

Figure 6-3 Product versions comparison

13. Click **Next**.
14. In the installation instructions window in Figure 6-4 on page 247, you can see:
    - The list of the fix packs or product versions to be installed to reach the required level and the correct order to install them
    - Links to FixCentral URLs from which you can download product fix packs

– The labels of the DVDs containing the product updates
– Any known limitation or dependency related to the installation



Service	Update	Update details	Status	Dependencies
Cloud Management Service	7.2-TIV-Components-Linux-FP0001	7.2-TIV-Components-Linux-FP0001 is available on the page below 7.2-TIV-Components-Linux-FP0001	Ready for update	REQUIRED
	7.2.1-TIV-TSAM-FP0004	7.2.1-TIV-TSAM-FP0004 is available on the page below 7.2.1-TIV-TSAM-FP0004 To install follow the instructions that you will find in the readme file published with the fix pack 4 file README	Not ready for update	Requires 7.2-TIV-Components-Linux-FP0001 UNSATISFIED DEPENDENCIES: 7.2-TIV-Components-Linux-FP0001 REQUIRED
	TIVSAM 7.2.2.0	TSAM 7.2.2 is available on DVD with label "Tivoli Service Automation Manager Base"	Not ready for update	Requires TIVSAM-7.2.1.4 UNSATISFIED DEPENDENCIES: TIVSAM-7.2.1.4 REQUIRED
	TUAM Extension 7.3	TUAM Extension 7.3 is available on the page below: 7.3.0-TIV-TUAM-FP0001	Not ready for update	Requires TIVSAM 7.2.2 UNSATISFIED DEPENDENCIES: 7.2.2-TIV-TSAM REQUIRED

Figure 6-4 Installation instructions

The status of the products installed in your environment are listed with regard to readiness for update. See Table 6-2.

Table 6-2 Status of products in the maintenance tool

Status	Description
Ready for update	All the dependencies are resolved and the product can be updated.
Not ready for update	There is at least one dependency that is not resolved. The product cannot be updated.

Status	Description
Already updated	The product is already at the level required in the specified OVF file. No update is required.
Not checked	The level of the product has not been compared to the level required in the OVF file.

15. Click **Back** and **Refresh** to update the status of the installed products. If you run these steps successfully, the status of all product will be green and read `Already updated`.
16. Repeat this process steps for each image. Follow the instructions provided by the tool and refer to 6.1.4, “Upgrading the software products” on page 248.
17. Click **Exit** to close the tool.

6.1.4 Upgrading the software products

New and updated versions of supported products (at the time this IBM Redbooks Publication was written) are as follows. See also Figure 6-5 on page 249.

- Tivoli Service Automation Manager:
  - Tivoli Service Automation Manager 7.2.2 + HF0001
  - IBM Tivoli Service Automation Manager - Extension for Usage and Accounting v1.0
  - Tivoli Service Request Manager 7.2.0
  - Tivoli Provisioning Manager v7.2 FP2
  - DB2 ESE 9.7 FP3 (a DB2 upgrade is not required to upgrade ISDM)
  - WebSphere Network Deployment 6.1.0.29
  - Tivoli Directory Server 6.2
  - IBM HTTP Server 6.1.0.23
  - Tivoli System Automation for Multiplatforms 3.1.0.6
- IBM Tivoli Monitoring:
  - Tivoli Enterprise Monitoring 6.2.2 FP4
  - Tivoli Enterprise Portal Server 6.2.2 FP4
  - Tivoli Data Warehouse database V6.2.2 FP4
  - IBM Tivoli Monitoring for Virtual Servers 6.2.3
  - Tivoli Common Reporting 1.3
  - IBM HTTP Server 7.0

– IBM DB2 ESE 9.7 FP3 (a DB2 upgrade is not required to upgrade ISDM)

Note: Tivoli Enterprise Monitoring 6.2.2 FP4 and Tivoli Common Reporting 1.3 are the minimum supported releases of these products. You must consider installing IBM Tivoli Enterprise Monitoring V6.2.3 (which includes Performance Analyzer V6.2.3) and Tivoli Common Reporting V2.1.1.

- Tivoli Usage and Accounting Manager:
  - Tivoli Usage and Accounting Manager 7.3 FP1
  - DB2 ESE 9.7 FP 3 (a DB2 upgrade is not required to upgrade ISDM)
  - Tivoli Common Reporting 2.1
- URL redirection, file repository, mail server:
  - IBM HTTP Server 7.0 with WebSphere 7.0 Plug-in
  - nfs, postfix and samba server
  - Tivoli System Automation for Multiplatforms 3.1.0.6

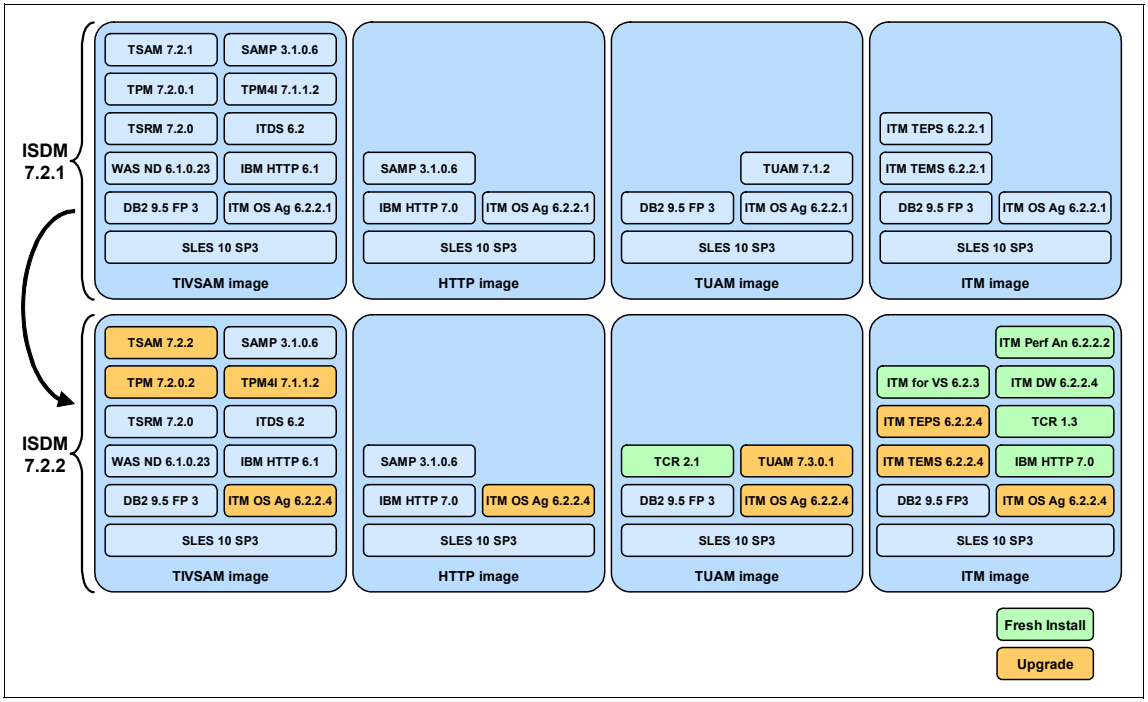


Figure 6-5 Software products in IBM Service Delivery Manager 7.2.1 and 7.2.2

The software packages can be downloaded from Fix Central and Passport Advantage® using the following link:

`http://www.ibm.com/software/lotus/passportadvantage/pacustomers.html`

- CZPD2ML: IBM Tivoli Service Request Mgr for Service Providers V7.2.0
- CI03BML: Tivoli Service Automation Manager Base V7.2.2
- CI01JML: Tivoli Common Reporting 2.1.1 Linux 64 Bit
- CZXZ4ML: IBM Tivoli Usage and Accounting Manager Enterprise Edition V7.3.0 for Linux IA32
- IBM Tivoli Monitoring 6.2.3 (Recommended, includes Tivoli Performance Analyzer)
  - CZZ3DEN: IBM Tivoli Monitoring V6.2.3 Base Linux
  - CZZ3HEN: IBM Tivoli Monitoring V6.2.3 Agent

- Tivoli Provisioning Manager Fix Pack 7.2.0.1 Core and Web Components (7.2.0-TIV-TPM-FP0001)

  http://www.ibm.com/support/docview.wss?uid=swg24028660

- Tivoli Provisioning Manager Fix Pack 7.2.0.2 Core and Web Components (7.2.0-TIV-TPM-FP0002)

  http://www.ibm.com/support/docview.wss?uid=swg24029847

- Tivoli Provisioning Manager, Interim Fix 7.2.0.2-TIV-TPM-IF00001

  http://www.ibm.com/support/docview.wss?uid=swg24030385

- Tivoli Service Automation Manager 7.2.2 Hot Fix 1 (7.2.2.0-TIV-TSAM-HF0001)

  http://www.ibm.com/support/docview.wss?uid=swg24030642

- Tivoli Service Automation Manager Fix Pack 4 7.2.1-TIV-TSAM-FP0004

  http://www.ibm.com/support/docview.wss?uid=swg24029547

- Tivoli Service Request Manager Fix Pack 7.2.0.1 (7.2.0.1-TIV-SRM-FP)

  https://www.ibm.com/support/docview.wss?uid=swg24028142

- IBM Tivoli Monitoring 6.2.2 FP06 (Latest 6.2.2 Fix Pack)
  IBM Tivoli Monitoring 6.2.2 Fix Pack 6 (6.2.2-TIV-ITM-FP0006)

  http://www.ibm.com/support/docview.wss?uid=swg24030135

- IBM Tivoli Monitoring 6.2.2 FP04 (Minimum version to use for TivSAM/ISDM 7.2.2)
  IBM Tivoli Monitoring 6.2.2 Fix Pack 4 (6.2.2-TIV-ITM-FP0004)

  http://www.ibm.com/support/docview.wss?uid=swg24027751

- IBM Tivoli Usage and Accounting Manager 7.3, Fix Pack 1, 7.3.0-TIV-TUAM-FP0001

  http://www.ibm.com/support/docview.wss?uid=swg24030313

- IBM Tivoli Usage and Accounting Manager 7.3, Fix Pack 2, 7.3.0-TIV-TUAM-FP0002

  http://www.ibm.com/support/docview.wss?uid=swg24031117

Software on the following servers will be upgraded:

- “Upgrading the icb-tivsam server” on page 251
- “Upgrading the icb-tuam server” on page 278
- “Upgrading icb-itm server” on page 281
- “Upgrading the icb-nfs server” on page 285

Upgrading the icb-tivsam server

To upgrade the `icb-tivsam` server, you need to install the packages listed in the following sections:

- “Installing IBM Tivoli Provisioning Manager 7.2.0 Fix Pack 1” on page 251
- “Installing IBM Tivoli Service Automation Manager 7.2.1 Fix Pack 4” on page 253
- “Installing IBM Tivoli Service Automation Manager 7.2.2” on page 254
- “Installing IBM Tivoli Usage and Accounting Manager 7.3.0 Extension” on page 277
- “Installing IBM Tivoli Monitoring Agent 6.2.2 Fix Pack 4” on page 277
- “Installing IBM Tivoli Common Reporting 2.1” on page 278

Installing IBM Tivoli Provisioning Manager 7.2.0 Fix Pack 1

To install IBM Tivoli Provisioning Manager 7.2.0 Fix Pack 1:

1. Log in as `root` to the server.
2. Upload and uncompress the following files to the `/root/upgrade` directory:
   - 7.2-TIV-Components-Linux-FP0001.tar
   - 7.2-TIV-TPM-Linux-FP0001.tar
   - 7.2-TIV-WebComp-UNIX-FP0001.tar
3. Execute the commands shown in Example 6-3.

Example 6-3 Prepare Tivoli Provisioning Manager fix pack 1 installation

```
su - tioadmin
cd $TIO_HOME/tools
./tio.sh stop tpm
/opt/IBM/AgentManager/bin/startServer.sh
exit

su - ctginst1
```

```
db2 connect to MAXDB71 user ctginst1
db2 update db cfg for MAXDB71 using LOGPRIMARY 30
db2 update db cfg for MAXDB71 using LOGSECOND 20
db2 update db cfg using dbheap automatic
db2 update db cfg using stat_heap_sz automatic
db2 terminate
cd /home/ctginst1/sqllib
./db2profile
db2 connect to MAXDB71 user ctginst1
db2 connect reset
exit
```

4. Install the Tivoli Provisioning Manager Component Upgrade by executing:
   `/root/upgrade/unixCoreCompUpgrade.sh -WASadmin wasadmin -WASadminPWD password -DBAdmin ctginst1 -DBAdminPWD password -AMPWD password`
5. Start the WebSphere Application Server as `tioadmin`:
   `$TIO_HOME/tools/tio.sh start wasadmin password`
6. Verify that the deployment engine is working properly by running the following command as `root`:
   `/usr/ibm/common/acsi/bin/listIU.sh`
   If you have output from this command, then the engine is working properly.
7. Make sure there are no new certificates to be accepted, and if there are let us accept them now by running the following command:
   `/opt/IBM/SMP/wasclient/ThinWsadmin.sh -username wasadmin -password password -lang jython -c "AdminTask.help()"`
   Accept the option to add the requested certificate by entering “y.” (This option might not display in all environments.)
8. Run the web components installer GUI:
   `/opt/IBM/SMP/bin/solutionInstallerGUI.sh`
9. Select your language of choice, and click **OK**.
10. Select **Next** in the Introduction window.
11. Choose the `/root/upgrade/repository/delta_tpm_pmp_7.2.0.1.zip` file.
12. Click **Next**.
13. Click **Next** in the Package Validation Results window.
14. Enter the WebSphere Admin, WebSphere Remote, and Maximo DB passwords as `password`.
15. Click **Next** in the Package Options window.
16. Click **Next** in the Pre-Install Summary window.
17. Click **Next** in the Package Successfully Deployed window.

18. Click **Done**.

Installing IBM Tivoli Service Automation Manager 7.2.1 Fix Pack 4

To install IBM Tivoli Service Automation Manager 7.2.1 Fix Pack 4:

1. Log in as `root` to the server.
2. Upload and uncompress the `7.2.1-TIV-TSAM-FP0004.tar` file to `/root/upgrade` directory.
3. Verify that all Tivoli Service Automation Manager middleware is running by executing the command shown in Example 6-4.

Example 6-4 Verify Tivoli Service Automation Manager middleware status

```
su - tioadmin
cd $TIO_HOME/tools
./tio.sh start wasadmin password
./tio.sh stop tpm
exit
```

4. Start the fix pack installation by entering `/opt/IBM/SMP/bin/solutionInstallerGUI.sh`
5. Select your language of choice and click **OK**.
6. Select **Next** in the Introduction window.
7. Choose the `/root/upgrade/install/PMP/tsam_pmp_7.2.1.4.zip` file.
8. Click **Next**.
9. Click **Next** in the Package Validation Results window.
10. Type the WebSphere Admin, WebSphere Remote and Maximo DB passwords as `password`.
11. Click **Next** in the Package Options window.
12. Click **Next** in the Pre-Install Summary window.
13. Click **Next** in the Package Successfully Deployed window.
14. Click **Done**.
15. Execute the post install steps shown in Example 6-5.

Example 6-5 Post-install steps for Tivoli Service Automation Manager 7.2.1 FP 4

```
su - tioadmin
cd $TIO_HOME/tools
./tio.sh stop wasadmin password
./tio.sh start wasadmin password
./tio.sh stop tpm
```

```
exit

/root/upgrade/install/tools/installAutomationPackages.sh

cd /opt/IBM/WebSphere/AppServer/profiles/ctgAppSrv01/bin
./setupCmdLine.sh

/root/upgrade/install/postinstall/configureTSAMfixpack.sh

su - ctginst1
db2 connect to maxdb71
db2 set schema maximo
db2 "update PMRDPVRP set DUALVIO_MODE=0 where NAME='VMware System
x'"
db2 "update PMRDPVRP set SMI_UNLIMITED_IMAGES=1 where NAME='VMware
System x'"
db2 "update PMRDPVRP set SMI_BLOCKIPADDRESSONEXIT=1 where
NAME='VMware System x'"
db2 commit
db2 "update PMRDPVRP set DUALVIO_MODE=0 where NAME='System p LPAR'"
db2 "update PMRDPVRP set SMI_UNLIMITED_IMAGES=1 where NAME='System p
LPAR'"
db2 "update PMRDPVRP set SMI_BLOCKIPADDRESSONEXIT=1 where
NAME='System p LPAR'"
db2 commit
db2 terminate
exit

su - tioadmin
cd $TIO_HOME/tools
./tio.sh stop wasadmin password
./tio.sh start wasadmin password
exit
```

Installing IBM Tivoli Service Automation Manager 7.2.2

To upgrade the Tivoli Service Automation Manager from 7.2.1 FP4 to Tivoli Service Automation Manager 7.2.2:

- Install TSRM for Service Providers 7.2
- Install TPM fix pack 2
- Install TPM fix pack interim fix 1
- Install Tivoli Service Automation Manager 7.2.2

To prepare for the installation, deactivate CSR file generation:

1. Log in to Tivoli Service Automation Manager administrative UI as `maxadmin` at `https://TivSam:9443/maximo/ui/login`
2. Click **Go To** → **System Configuration** → **Platform Configuration** → **Escalations**.
3. Search for the `PMZHBCRDPMD` escalation and open it.
4. In the **Select Action** menu, click **Activate/Deactivate Escalation**.

To set up the installation environment, first check the status of the middleware software and upload the installation files:

1. Log in as `root` to the `icb-tivsam` server.
2. Ensure that the middleware servers are running by executing `lssam -V`
3. If the TPM server is running, stop it as `tioadmin` user using `$TIO_HOME/tools/tio.sh stop tpm`
4. If the MXServer is running, stop it as `root` user using `/opt/IBM/WebSphere/AppServer/bin/stopServer.sh MXServer -username wasadmin -password password`
5. Upload and decompress the files listed in Table 6-3 to the directories listed as well.

Table 6-3 Installation files for Tivoli Service Automation Manager 7.2.2

File	Directory
7.2-TIV-Components-Linux-FP0002.tar	/root/upgrade/tpmfp2core
7.2-TIV-TPM-Linux-FP0002.tar	7.2-TIV-TPM-Linux-FP0002.tar
7.2.0.2-TIV-TPM-Linux-IF00001.tar	/root/upgrade/tpmfp2ifix
7.2.0.2-TIV-Components-Linux-IF00001.tar	/root/upgrade/tpmfp2ifix/tpm_core
7.2-TIV-WebComp-UNIX-FP0002.tar	/root/upgrade/tpmfp2web
TivSam_Base_V722.zip	/root/upgrade/tsam722
TSRMfSP_V720.tar	/root/upgrade/tsrm
7.2.0.1-TIV-SRM-FP0001-REFRESH.tar	/root/upgrade/tsrmfp

6. Start the launchpad as `root`: `/root/upgrade/tsam722/TSAMBASE7220/launchpad.sh`

Set up the launchpad environment:

1. Click **Product Installation** → **License Agreement** in the launchpad menu.

2. Click **Install the license agreement** on the right panel.
3. Click **OK**.
4. Accept the license and click **Install**.
5. Click **Done**.
6. Click **Installation Planning** in the launchpad menu.
7. As shown in Figure 6-6, select the following options: **The current system is used as a Management Server** and **The current system is used as an administrative server**.

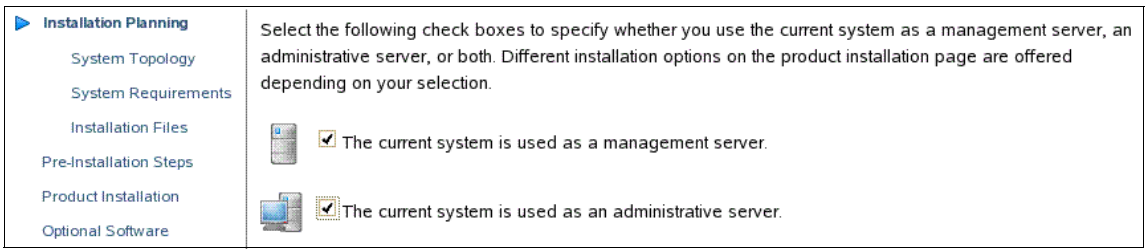


Figure 6-6 Set up installation mode in the Tivoli Service Automation Manager 7.2.2 launchpad

8. Click **Installation Planning** → **Installation Files** in the launchpad menu.
9. Fill the installation folders as shown in Figure 6-7 on page 257. *Leave all other fields empty!*

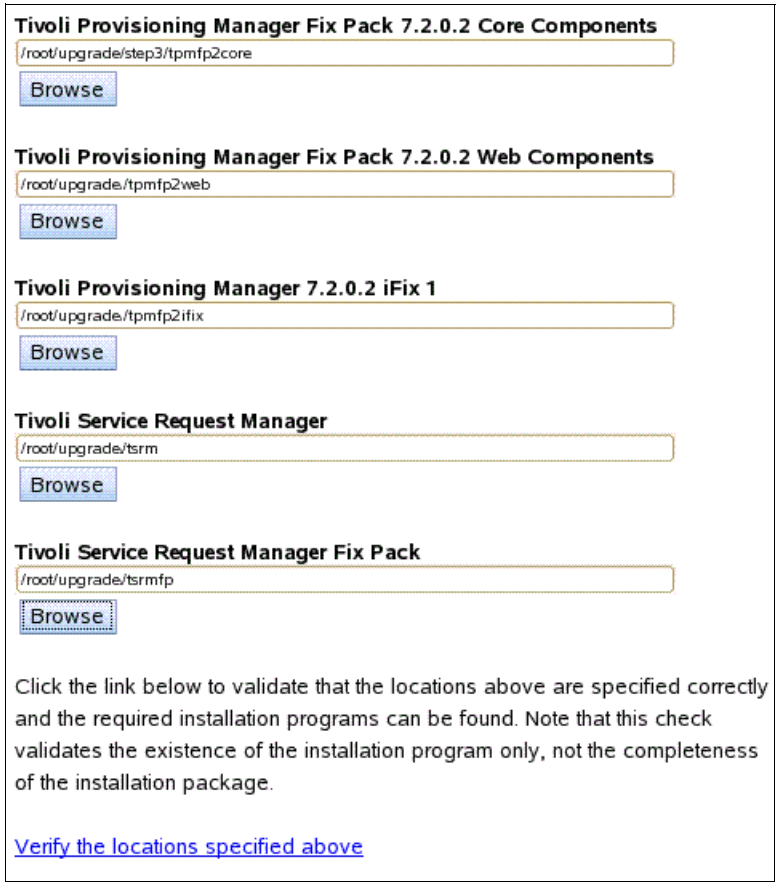


Figure 6-7 Set up installation folders in launchpad of Tivoli Service Automation Manager 7.2.2

10. Click **Verify the locations specified above**. You will see validation results, as shown in Figure 6-8 on page 258.

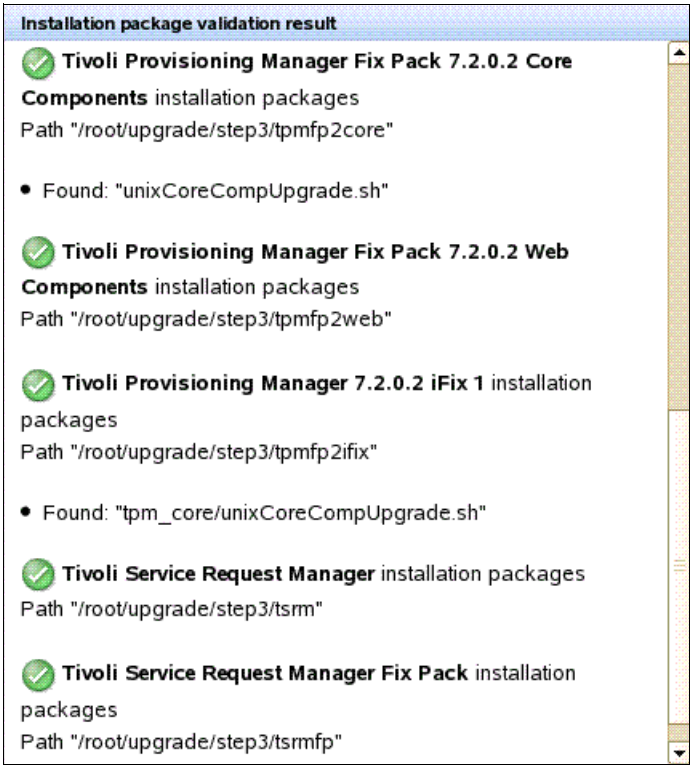


Figure 6-8 Installation package validation result for Tivoli Service Automation Manager 7.2.2

11. Click **Product Installation** → **Base Service Fix Pack** in the launchpad menu.

To install Tivoli Service Automation Manager 7.2.2, follow the steps in Figure 6-9 on page 259, from 10.1 Verify the Base Services Upgrade prerequisites to 20.1 Install automation packages for Tivoli Service Automation Manager.

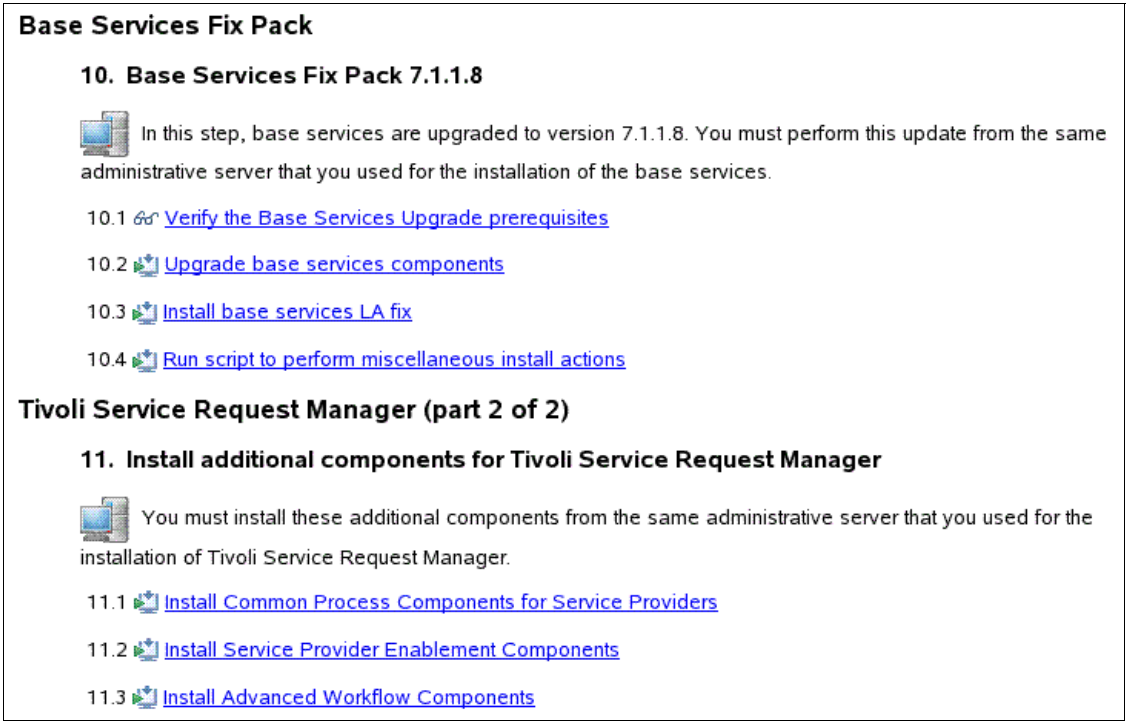


Figure 6-9 Install steps for the Base Services Fix Pack and additional components for TSRM

1. To complete Step 10.1 in Figure 6-9:
   a. Click the link provided in Step 10.1.
   b. Select **I have verified the above prerequisites**.
   c. Click **Back to the product installation page**.
2. For Step 10.2 in Figure 6-9:
   a. Click the link provided in Step 10.2.
   b. Select your language of choice, and click **OK**.
   c. Click **Next** in the **Introduction** window.
   d. Wait for the installer to performs a pre-installation check.
   e. Click **Next** in the **Package Summary** window.
   f. Accept the license agreement and click **Next**.
   g. Check **Database is ready for upgrade** and click **Next**.
   h. Click **Next** in the **Run Configuration Step** window.
   i. Click **Next** in the **Input Summary** window.
   j. Click **Install** in the **Pre-Installation Summary** window.
   k. Click **Done** un the **Install Complete** window.

3. To complete Step 10.3 in Figure 6-9 on page 259:
   a. Click the link provided in Step 10.3.
   a. Select your language of choice and click **OK**.
   b. Click **Next** in the Package Validation Results window.
   c. Type the passwords as shown in Table 6-4.

   Table 6-4 Systems, user IDs, and passwords

System	User	Password
Maximo DB	maxadmin	password
WAS	wasadmin	password
WS remote	tioadmin	password

   iii. Click **Next** in the Package Options window.
   d. Wait for the System Check to finish.
   e. Click **Next** in the Pre-Install Summary window (presuming the request has passed the system check).
   f. Wait for the Deployment Progress to finish.
   g. Click **Done** in the Package Successfully Deployed window.
4. To complete Step 10.4 in Figure 6-9 on page 259:
   a. Click the link provided in Step 10.4.
   b. Click **Run script to perform the above steps**.
   c. Select **I confirm that the script has been run and completed without errors**.
   d. Click **Back to the product installation page**.
5. For Step 11.1, click the link provided and follow the steps described for Step 10.3 in Figure 6-9 on page 259. In the Add Features window, check all features listed. Specify only two users: maximo and wasadmin, with passw0rd password
6. For Step 11.2, click the link provided and follow the steps described for Step 10.3 in Figure 6-9 on page 259. In the Add Features window, check all features listed.
7. For Step 11.3, click the link provided and follow the steps described for Step 10.3 in Figure 6-9 on page 259. In the Add Features window, check all features listed.

The next step is to install TPM Fix Pack 2 as described on Figure 6-10 on page 261.

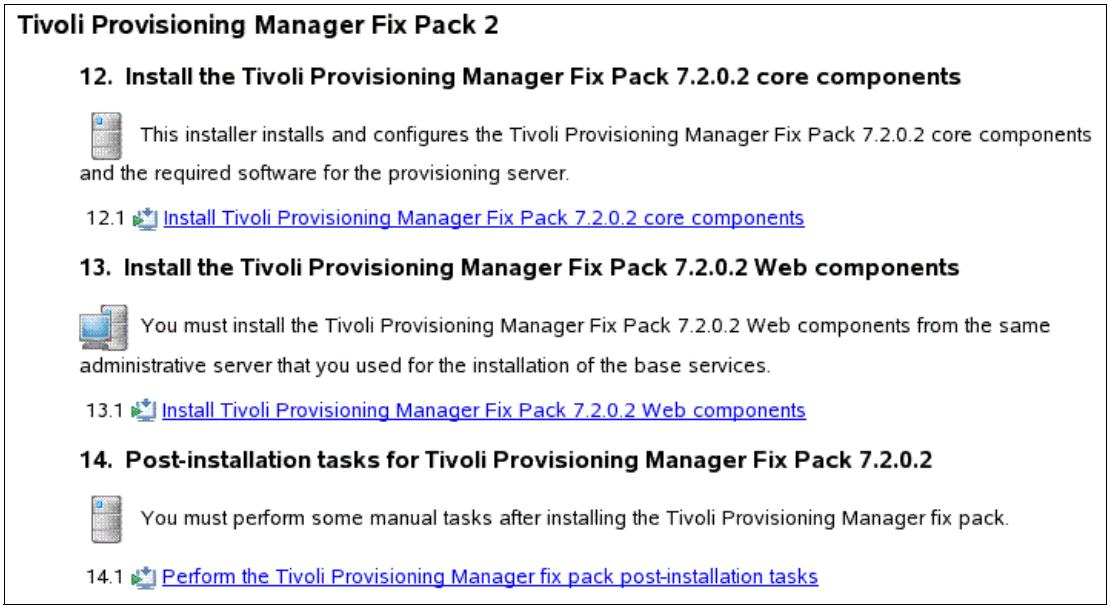


Figure 6-10 Installation steps for TPM Fix Pack 2

1. For Step 12:
   a. Click the link provided in Step 12.1 shown in Figure 6-10.
   b. Perform the following actions:
      - Type `ctginst1` as users and `password` as passwords for DB2
      - Type `wasadmin` as user and `password` as password for WebSphere Application Server
      - Type `password` as password for Agent Manager. See Figure 6-11 on page 262.

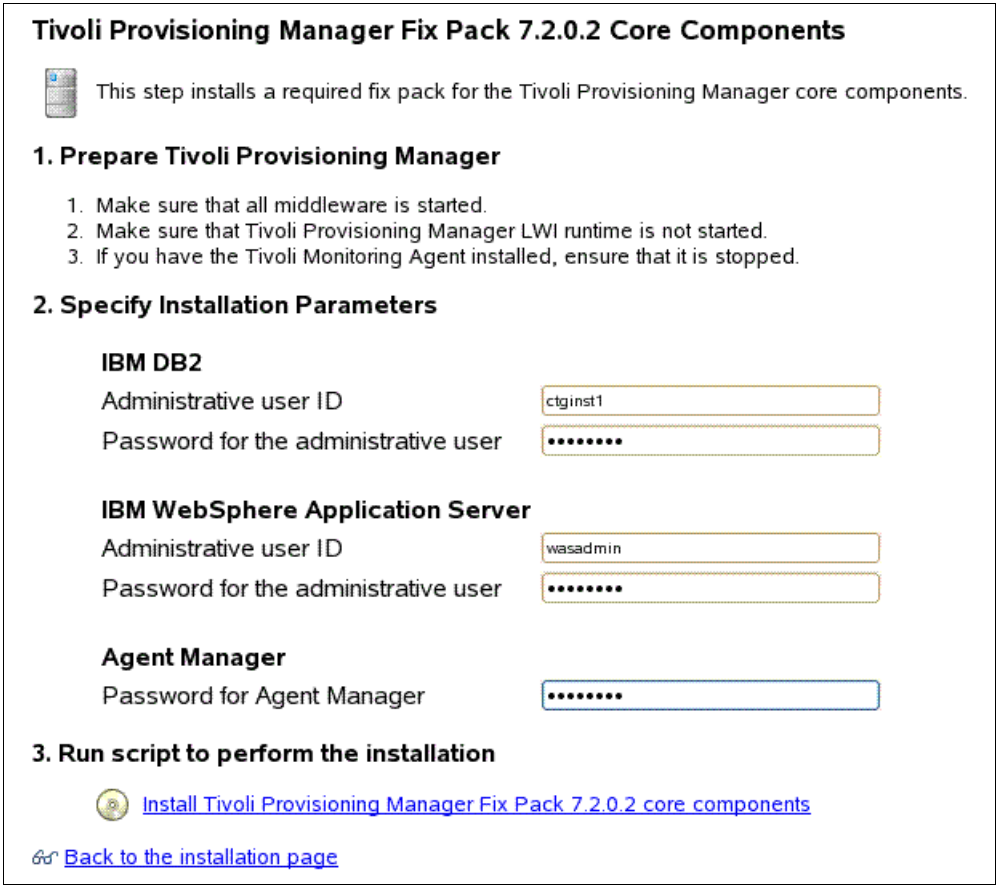


Figure 6-11 Input for TPM 7.2.0.2 core components

c. Click **Install Tivoli Provisioning Manager Fix Pack 7.2.0.2 core components** as shown in Figure 6-11.

d. Wait until the installation completes and `Installation completed` displays.

e. Click **Back to the installation page**.

2. For Step 13, click the link provided in Step 13.1 shown in Figure 6-10 on page 261, and follow the steps described for Step 10.3 in Figure 6-9 on page 259.

3. For Step 14:

a. Click the link provided in Step 14.1 as shown in Figure 6-10 on page 261.

b. Execute the commands as shown in Figure 6-12 on page 263.

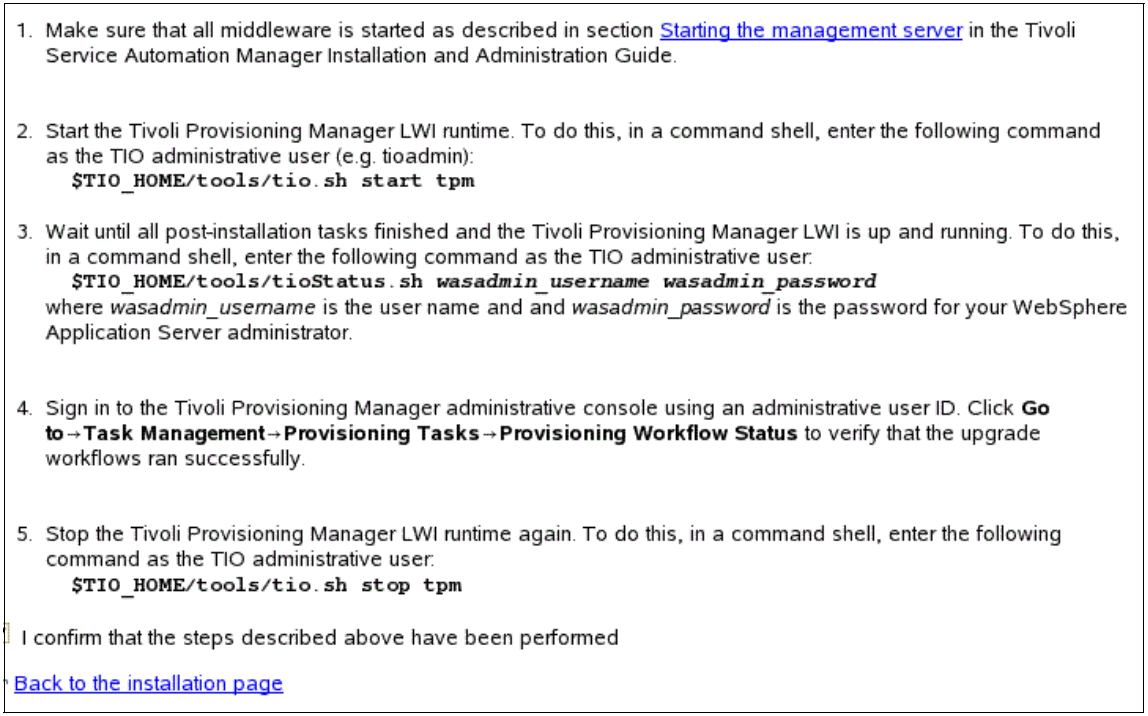


Figure 6-12 Post-install commands for TPM 7.2.0.2

c. Select **I confirm that the steps described above have been performed**.

d. Click **Back to the installation page**.

The next step is to install Tivoli Provisioning Manager iFix 1 as described on Figure 6-13 on page 264.

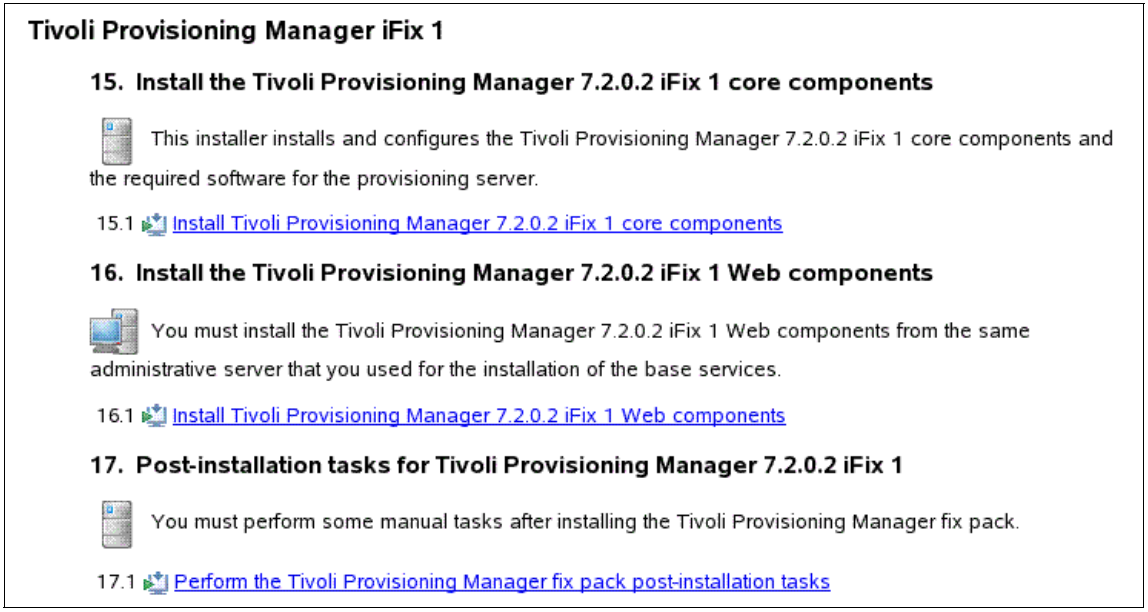


Figure 6-13 Installation steps for TPM iFix1

1. For Step 15 shown in Figure 6-13:
   a. Click the link provided in Step 15.1.
   b. Type `ctginst1` as users and `password` as passwords for DB2, `wasadmin` as user and `password` as password for WebSphere Application Server, `password` as Agent Manager password as you see on Figure 6-14 on page 265.

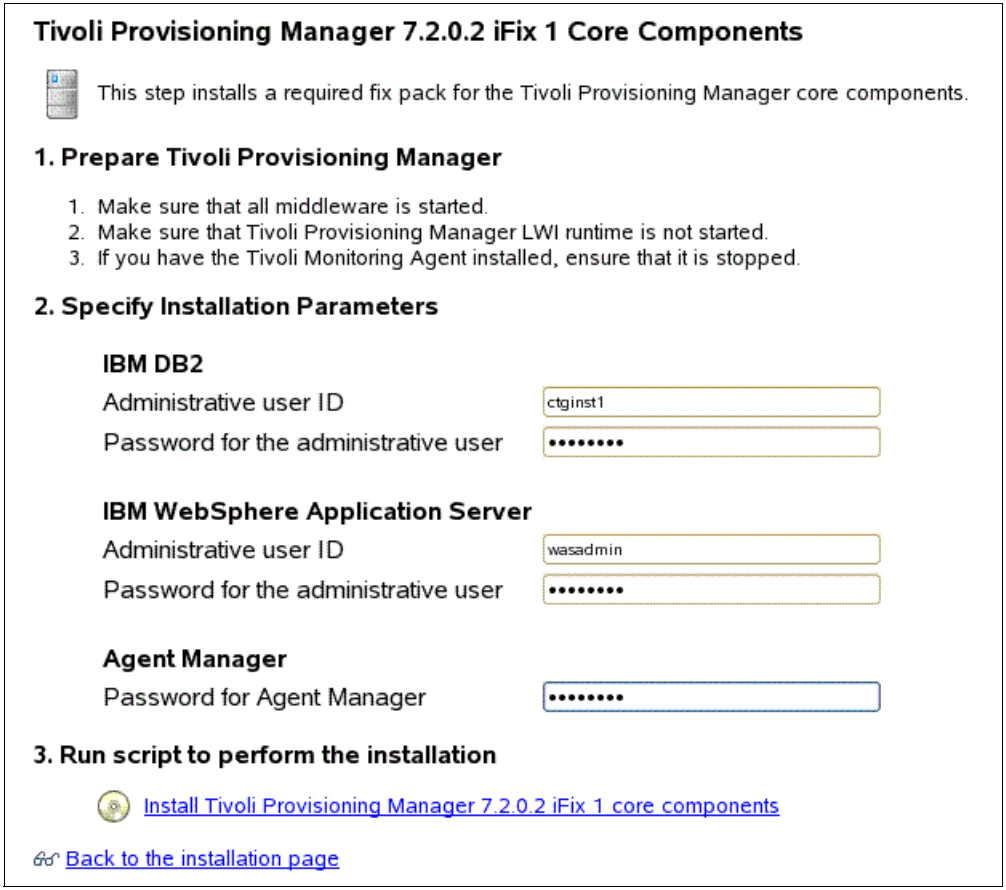


Figure 6-14 Input for TPM 7.2.0.2 iFix 1 core components

c. Click **Install Tivoli Provisioning Manager 7.2.0.2 iFix 1 core components** (as shown in Figure 6-14).

d. Wait until the installation completes and `Installation completed` displays.

e. Click **Back to the installation page**.

2. For Step 16:

a. Click the link provided in Step 16.1 (shown in Figure 6-13 on page 264) and follow the steps described for Step 10.3 as shown inFigure 6-9 on page 259.

3. For Step 17:

a. Click the link provided in Step 17.1 shown in Figure 6-13 on page 264.

b. Execute the commands as shown in Figure 6-15 on page 266.

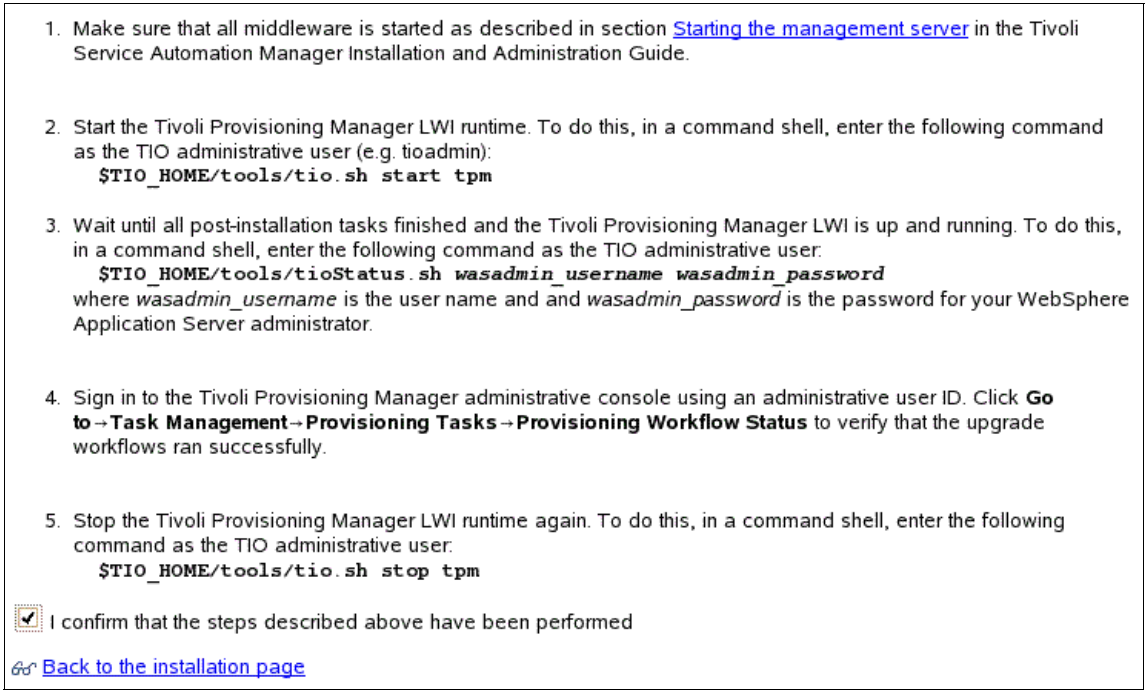


Figure 6-15 Post-install commands for TPM 7.2.0.2 iFix 1

c. Check **I confirm that the steps described above have been performed**.

d. Click **Back to the installation page**.

The next step is to install Tivoli Service Automation Manager 7.2.2 as described in Figure 6-16 on page 267.

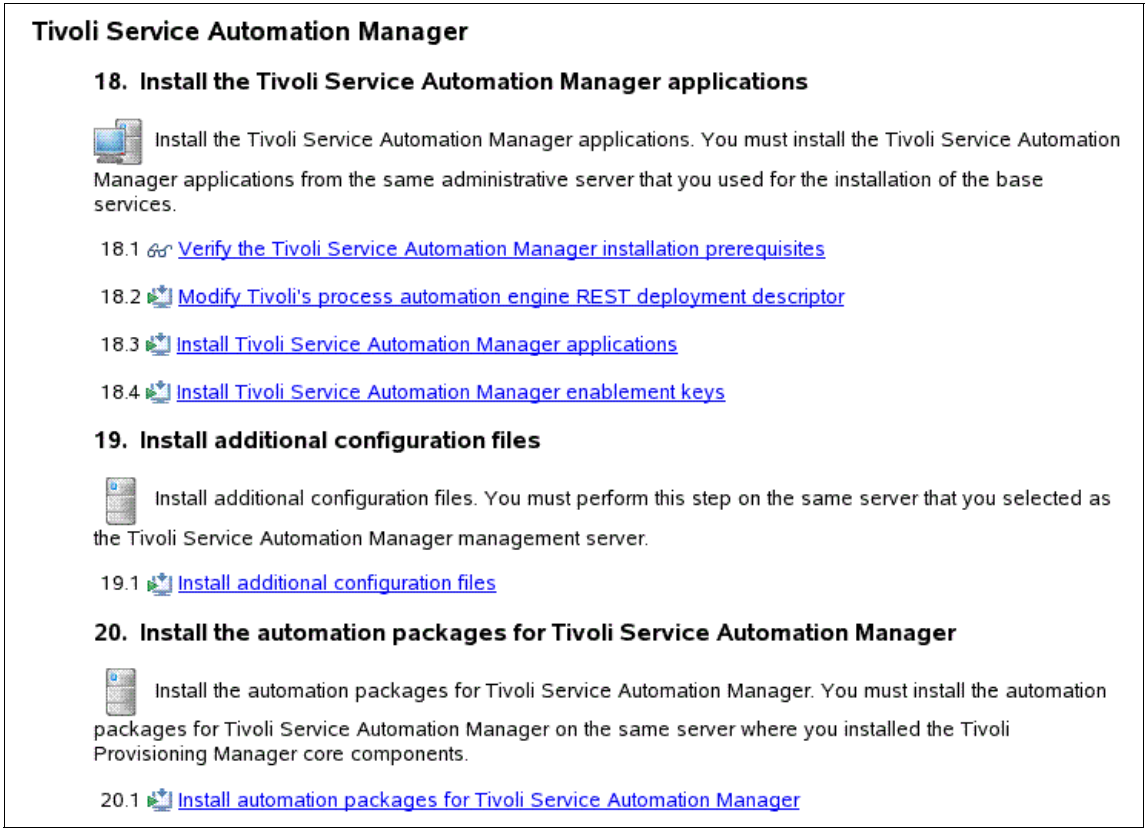


Figure 6-16 Installation steps for Tivoli Service Automation Manager 7.2.2

1. For Step 18.1:
   a. Click the link provided in Step 18.1.
   b. Check **I have verified the Tivoli Service Automation Manager installation prerequisites**.
   c. Click **Back to the product installation page**.
2. For Step 18.2:
   a. Click the link provided in Step 18.2.
   b. Navigate to the directory, `/opt/IBM/SMP/maximo/applications/maximo/maxrestweb/webmodule/WEB-INF`
   c. Back up the file `web.xml`, saving it with the file name `web.xml.old`
   d. Open the file `web.xml` in an editor.

e. Add the lines in Example 6-6 to the file.

Example 6-6 Lines to add to web.xml

```
<init-param>
   <param-name>handler.cancel</param-name>
   <param-value>com.ibm.tivoli.tsam.rest.CancelHandler</param-value>
</init-param>
<init-param>
   <param-name>handler.deleteVMs</param-name>
   <param-value>com.ibm.tivoli.tsam.rest.DeleteVMsOnHostHandler</param-value>
</init-param>
<init-param>
   <param-name>handler.forceCleanup</param-name>
   <param-value>com.ibm.tivoli.tsam.rest.ForcedCleanupHandler</param-value>
</init-param>
<init-param>
   <param-name>handler.listVMs</param-name>
   <param-value>com.ibm.tivoli.tsam.rest.ListVMsOnHostHandler</param-value>
</init-param>
<init-param>
   <param-name>handler.status</param-name>
   <param-value>com.ibm.tivoli.tsam.rest.RequestStatusHandler</param-value>
</init-param>
<init-param>
   <param-name>handler.VMexistance</param-name>
   <param-value>com.ibm.tivoli.tsam.rest.VMExistanceReportHandler</param-value>
</init-param>
<init-param>
   <param-name>handler.pmzhbnetcfg</param-name>
   <param-value>com.ibm.tivoli.maximo.rest.NetCfgRequestHandler</param-value>
</init-param>
```

f. Remove the lines in Example 6-7 from the file.

Example 6-7 Lines to remove from web.xml

```
<init-param>
   <param-name>handler.mbo</param-name>
   <param-value>com.ibm.tivoli.maximo.rest.MboResourceRequestHandler</param-value>
</init-param>
```

g. Check **I confirm that the steps described above have been performed**.

h. Click **Back to the product installation page**.

3. For Step 18.3, click the link provided, and follow the steps described for Step 10.3 as shown inFigure 6-9 on page 259.
4. For Step 18.4, click the link provided and follow the steps described for Step 10.3 as shown inFigure 6-9 on page 259.
5. For Step 19:
   a. Click the link provided in Step 19.1.
   b. Type `tioadmin` as the **Tivoli Provisioning Manager administrative user ID**.
   c. Type `ctgCell01` as the IBM WebSphere Application Server Cell name.
   d. Click **Run installation script**.
   e. Wait until the installation completes.
   f. Click **Back to the installation page**.
6. For Step 20:
   a. Click the link provided in Step 20.1.
   b. Type `tioadmin` as the Tivoli Provisioning Manager administrative user ID.
   c. Click **Run installation script**.
   d. Wait until the installation completes.
   e. Click **Back to the installation page**.

Several post-install steps for Tivoli Service Automation Manager 7.2.2 are required. These are:

1. Execute the commands in Example 6-8 as `root` on the `icb-tivsam` server to set up the middleware stack status.

Example 6-8 Middleware base services status set up

```
su - tioadmin
cd $TIO_HOME/tools
./tio.sh start wasadmin password
./tio.sh stop tpm
```

2. Finalize Tivoli Service Automation Manager 7.2.2 installation:
   a. Execute the command `/root/upgrade/tsam722/TSAMBASE7220/install/postinstall/configureTSAMupgrade.sh`
   b. Type `wasadmin` as the WebSphere Application Server administrative user name.

c. Type `password` as the WebSphere Application Server administrative user password.

d. Type `9443` as the WebSphere Application Server secure port.

e. Press **Enter** to quit when installation is finished.

3. Upgrade the existing service definitions:

a. Connect to `https://192.168.88.4/maximo` and log in as `maxadmin` in the Tivoli Service Automation Manager administrative UI.

b. Click **Go To** → **Service Automation** → **Service Update Packages**.

c. Select **RDPVS Revision 5** on the List tab.

d. Click the **Service Definition Deployments** tab.

e. Click **Deploy on Service Definitions**.

f. In the Deploy Service Update Package on Service Definitions box, select the service definitions you want to upgrade.

g. Click **Deploy on Service Definitions** to start the deployment for the selected service definitions.

h. Click **Refresh** in the Status History section to update the status of the deployment process.

i. Verify that the status is `Applied` for each Service Package deployment to ensure the upgrading process succeeded.

4. Upgrading service deployment instances:

a. Click the **Service Instance Deployments** tab.

b. Click **Deploy on Service Deployment Instances**. The Deploy Service Update Package on Service Deployment Instances window is displayed.

c. Select the service deployment instances that you want to upgrade.

d. Click **Deploy on Service Deployment Instances** to start the deployment for the selected service deployment instances.

e. Click **Yes** when prompted about the execution of the management plan after deploying the update package.

f. Click **Refresh** in the toolbar menu.

g. Verify that the status is `Applied` for each Service Update Package deployment to ensure the upgrading process succeeded.

5. Enter Admin Mode:

a. Click **Go To** → **System Configuration** → **Platform Configuration** → **Database Configuration**.

b. In the Select Action menu, click **Manage Admin Mode**.

c. Click **Turn Admin Mode ON**.

6. Upgrading to the customer model:

   a. Click **Go To** → **Service Automation** → **Configuration** → **Cloud Customer Administration**.

   b. From the Select Action menu on the top, select **Migrate Customer Objects**.

   c. Click **Start Migration** in the dialog.

   d. Click **Refresh Status** to view the detail of the process as you see on Figure 6-17.

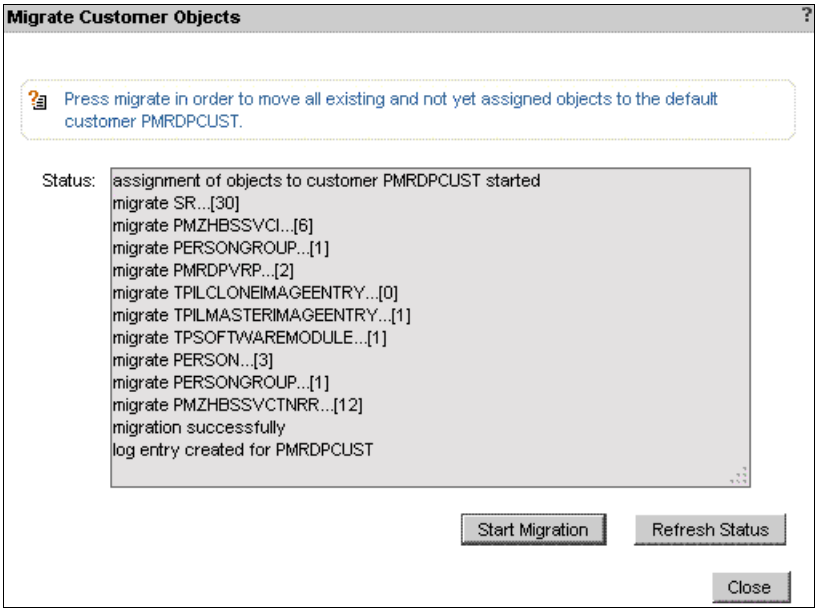


Figure 6-17 Migrate Customer Objects

7. Upgrading to the new security groups:

   a. Connect to `https://192.168.88.4/maximo` and log in as `maxadmin` in the Tivoli Service Automation Manager administrative UI.

   b. Click **Go To** → **Service Automation** → **Configuration** → **Cloud Customer Administration**.

   c. From the Select Action menu on the top, select **Migrate Users**.

   d. Click **Start Migration** in the dialog.

   e. Click **Refresh Status** to view the detail of the process as you see on Figure 6-18 on page 272.

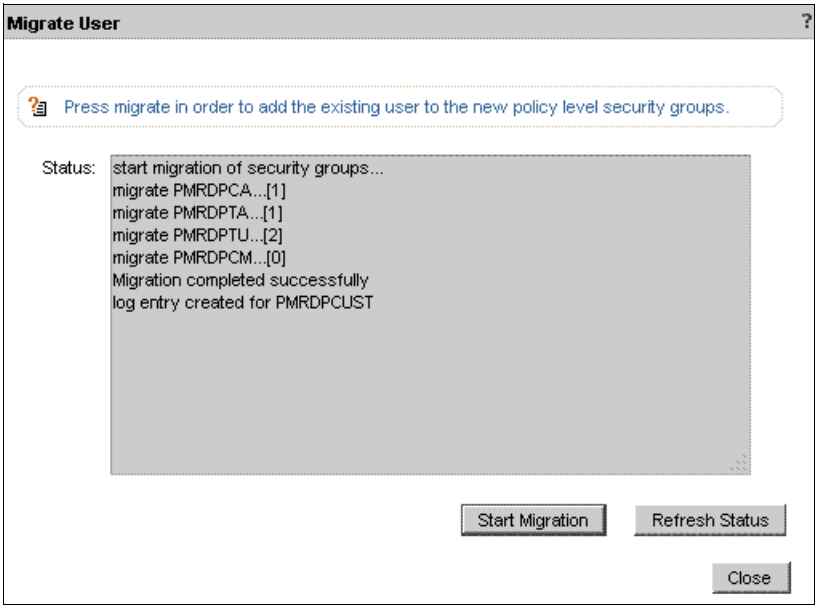


Figure 6-18 Migrate Users

8. Exit from Admin Mode:
   a. Connect to `https://192.168.88.4/maximo` and log in as `maxadmin` in the Tivoli Service Automation Manager administrative UI.
   b. Click **Go To** → **System Configuration** → **Platform Configuration** → **Database Configuration**.
   c. In the Select Action menu, click **Manage Admin Mode**.
   d. Click **Turn Admin Mode OFF**.
9. Upgrading the network model
   a. Click **Go To** → **Service Automation** → **Configuration** → **Cloud Network Administration**.
   b. From the Select Action menu on the top, select **Migration from TivSAM 7.2.1**.
   c. Click **OK** in the pop-up windows as on Figure 6-19 on page 273.

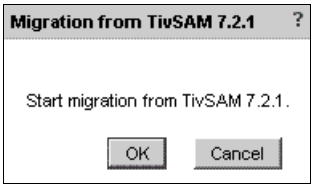


Figure 6-19 Upgrade the network model

d. Wait for the migration to complete as on Figure 6-20.

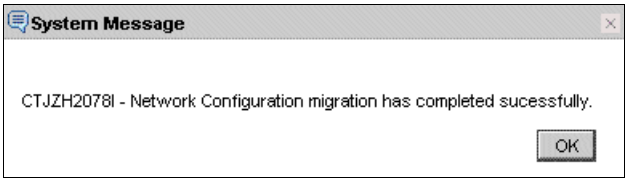


Figure 6-20 Upgrade the network model finished

10. Activating the default customer:
    a. Log in as `PMRDPCAUSR` to the Tivoli Service Automation Manager self-service user interface at `https://192.168.88.4/SimpleSRM`
    b. Click **Request a New Service** → **Virtual Server Management** → **Manage Customers** → **Create Customer**.
    c. Specify the network template.
    d. Click **OK**.
11. Updating the CSR records:
    a. Log in as `maxadmin` to the Tivoli Service Automation Manager administrative UI at `https://192.168.88.4/maximo`
    b. Click **Go To** → **System Configuration** → **Platform Configuration** → **System Properties**.
    c. Filter and open **pmrdp.team.projectaccount.compatibilitymode** as shown in Figure 6-21 on page 274.

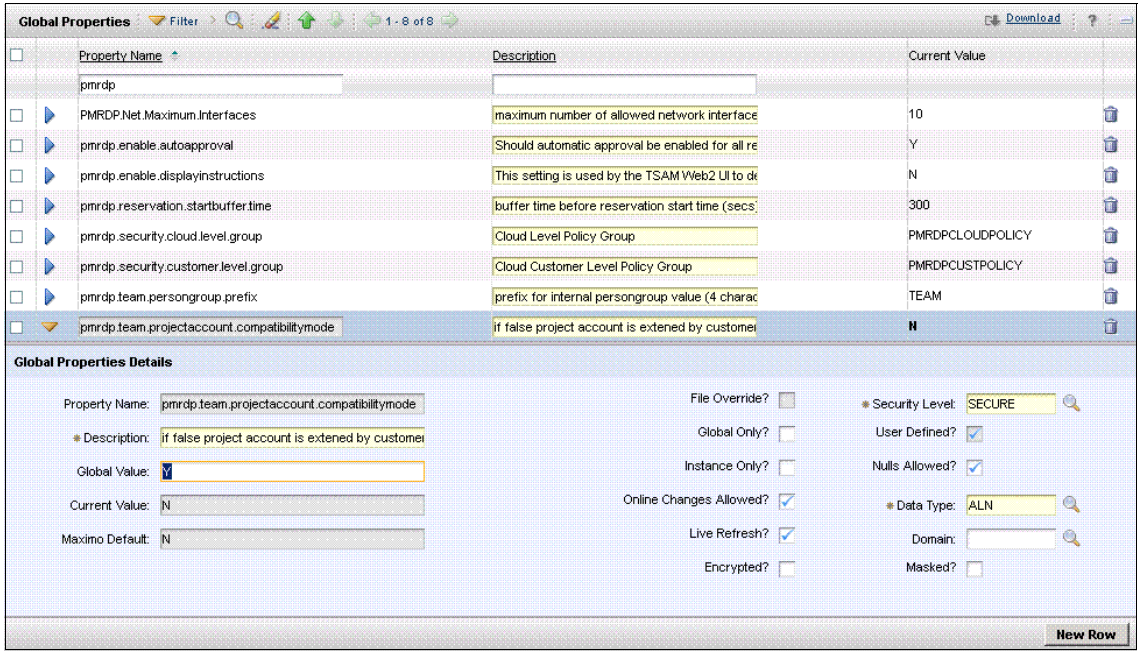


Figure 6-21 Updating the CSR records

d. Change the Global Value from `N` to `Y`.

e. Mark the check box to the left of the property name.

f. Click **Live Refresh** on the top, and a dialog displays, as shown in Figure 6-22.

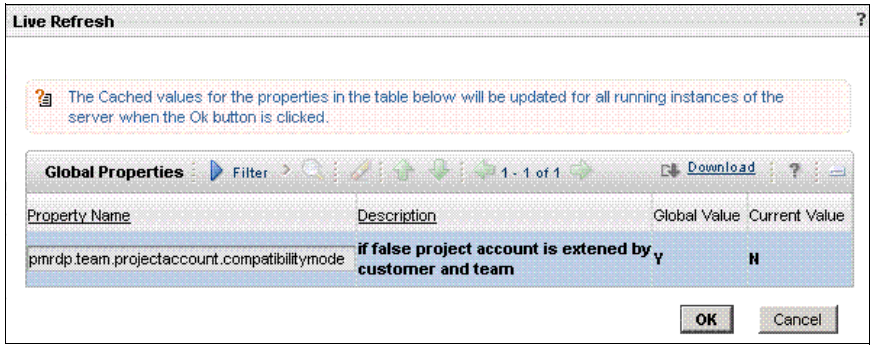


Figure 6-22 Live Refresh confirmation

g. Click **OK**.

12. Activating CSR file generation:
    a. Click **Go To** → **System Configuration** → **Platform Configuration** → **Escalations**.
    b. Search for the `PMZHBCRDPMD` escalation and open it.
    c. If the escalation is inactive, then, in the Select Action menu on the top, click **Activate/Deactivate Escalation**.
13. To reactivate the view to show projects and provisioned servers, run the commands as shown in Example 6-9 as `root` on the icb-`tivsam` server.

Example 6-9 Activate new views

```
su - tioadmin
$TIO_HOME/tools/tio.sh stop wasadmin password
exit

cd /opt/IBM/SMP/maximo/tools/maximo/internal
./importObject.sh
-input=../en/rdp_pmp/V750_06.content/RDP_pmrdpsiview_chg.xml
./importObject.sh
-input=../en/rdp_pmp/V750_06.content/NBAPITSAM_maxintobject_change.xml
cd ..
./configdb.sh

su - tioadmin
$TIO_HOME/tools/tio.sh start wasadmin password
```

14. Reactivating the monitoring agent installation:
    a. Enable monitoring agent installation during provisioning for each of the following offerings:
        - PMRDP_0211A_72 (Add VMware Servers)
        - PMRDP_0201A_72 (Create Project with VMware Servers)
    b. Log in as `maxadmin` to the Tivoli Service Automation Manager administrative UI at `https://192.168.88.4/maximo`
    c. Click **Go To** → **Service Request Manager Catalog** → **Offerings**.
    d. Click the offering to open it.
    e. Click the **Change Status** button, and change the status of the offering to `Pending` as shown in Figure 6-23 on page 276.

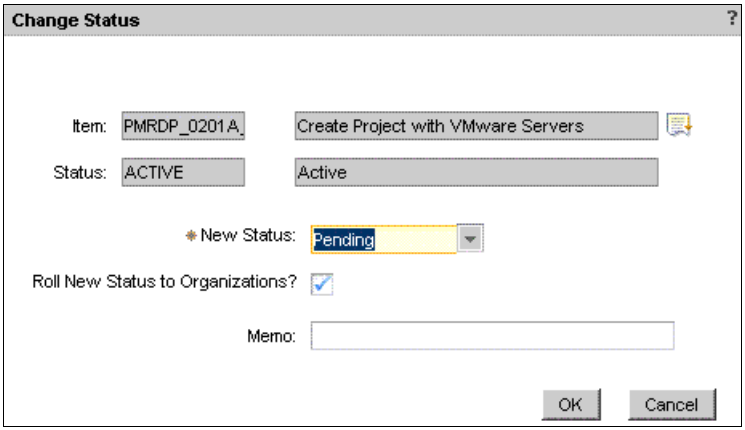


Figure 6-23 Change status

f. Click the **Specifications** tab.

g. In the Presentation section, select the **Mandatory** option, and deselect the **Hidden** option. These correspond to the offering attribute `PMRDPCLSWS_MONITORING` as shown in Figure 6-24.

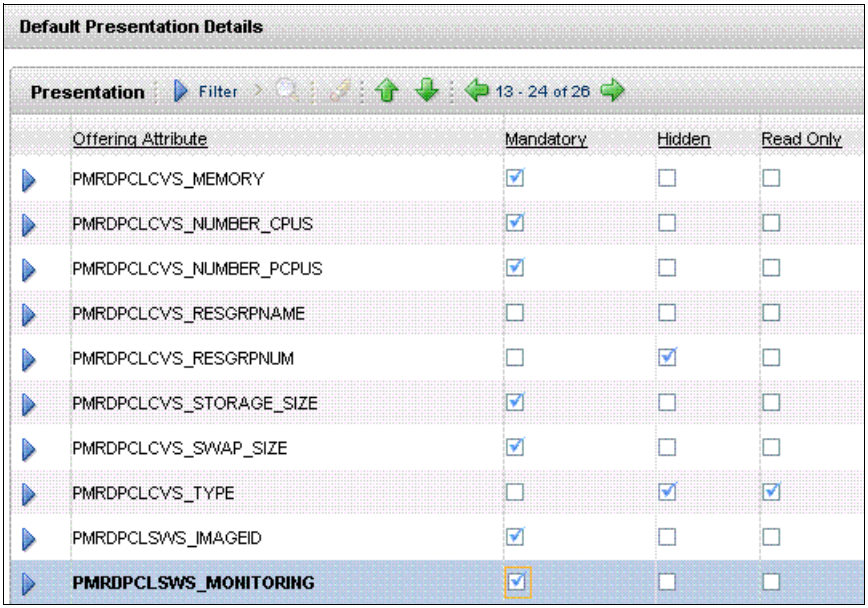


Figure 6-24 Change the monitoring deployment

h. Change the status of this offering to `Active`.

i. Save your changes.

Installing IBM Tivoli Usage and Accounting Manager 7.3.0 Extension

To install the Tivoli Usage and Accounting Manager extension:

1. Log in as `root` to the `icb-tivsam` server.
2. Upload and uncompress the `7.3.0-TIV-TUAM-FP0001.zip` file to the `/root/upgrade` directory.
3. Change to the `6.2.2-TIV-ITM_TMV-Agents-FP0004` directory created in the previous step.
4. Execute the following command:
   ```
   /opt/IBM/SMP/bin/solutionInstaller.sh -action install -pkgpath
   /root/upgrade/cloudlet/cl_ua_pmp_psi.zip -license accept -dbuser
   ctginst1 -dbpwd password -wasuser wasadmin -waspwd password
   -wasrxauser tioadmin -wasrxapwd password
   ```

Installing IBM Tivoli Monitoring Agent 6.2.2 Fix Pack 4

To install a new IBM Tivoli Monitoring Agent to a server:

1. Log in as `root` to the `icb-tivsam` server.
2. Upload and uncompress the `6.2.2-TIV-ITM_TMV-Agents-FP0004.tar` file to the `/root/upgrade` directory.
3. Change to the `6.2.2-TIV-ITM_TMV-Agents-FP0004` directory.
4. Execute `./install.sh`.
5. Press **Enter** to accept the default `/opt/IBM/ITM` home directory.
6. Type `1` and press **Enter** to continue the installation.
7. Type `1` and press **Enter** to install the product to the local host.
8. Type `1` and press **Enter** to accept the agreement.
9. Type `1` and press **Enter** to install the prerequisites.
10. Type `6` and press **Enter** to install the `Monitoring Agent for Linux OS V06.22.04.00`
11. Type `1` and press **Enter** to confirm your selection.
12. Type `2` and press **Enter** to skip additional products.
13. Start running the agent

    ```
    /opt/IBM/ITM/bin/itmcmd agent start lz
    ```

Upgrading the icb-tuam server

To upgrade the icb-tuam server, you need to install the packages listed in the following sections. Install them in the order listed.

- “Installing IBM Tivoli Common Reporting 2.1” on page 278.
- “Installing IBM Tivoli Usage and Accounting Manager 7.3.0” on page 280.
- “Installing IBM Tivoli Usage and Accounting Manager 7.3.0 Fix pack 1” on page 280
- “Installing IBM Tivoli Monitoring Agent 6.2.2 Fix Pack 4” on page 281

Installing IBM Tivoli Common Reporting 2.1

Make sure the old Tivoli Usage and Accounting Manager 7.1.x is not running by issuing the following command:

```
/opt/ibm/tuam/ewas/bin/stopServer.sh server1 -username virtuser
-password PasswOrd
```

To install IBM Tivoli Common Reporting:

1. Log in as `root` to the `icb-tuam` server.
2. Upload and uncompress the `CZQ80ML.tar.gz` file to the `/root/upgrade` directory.
3. Execute `./launchpad.sh`
4. Click **Install IBM Tivoli Common Reporting 2.1**.
5. Select your language of choice and click **OK**.
6. Click **Next** in the Welcome window.
7. Accept the license agreement and click **Next**.
8. Choose **Install a new instance of Tivoli Common Reporting** in the Installation Mode window.
9. Click **Next**.
10. Select **Single-computer installation** in the Installation Scenario Selection window.
11. Click **Next** in the Installation Directory Selection window.
12. Click **Next** in the Advanced Configuration Selection window.
13. Type `virtuser` as the UserID.
14. Type `password` in the Password and Confirm Password fields.
15. Type `17310` as the Port Number.
16. Click **Next**.

17. Type `1527` as the port number for IBM Cognos content database.
18. Click **Next**.
19. Click **Next** at the Pre-Installation Summary.
20. Click **Done** when `Installation complete` displays.

After Tivoli Common Reporting 2.1 is installed, you need to configure the database connection:

1. Log in to the Tivoli Usage and Accounting Manager UI as `virtuser` at `http://TuamMachine:17310/ibm/console`
2. Click **Reporting** → **Common Reporting**.
3. Click the **Launch** drop-down list on the right and choose **Administration**.
4. Add a new data source with the  icon on the right top.
5. Type `TUAM` as the Name of the new data source.
6. Click **Next**.
7. Select `DB2` as the Type from the list.
8. Click **Next**.
9. Type `virtuser` as User ID at the bottom of the window.
10. Type `password` in the Password and Confirm Password fields.
11. Click the **Test the connection** link.
12. Click **Test**.
13. The Status must be `Succeeded`. If not, restart the test and check for the correct input.
14. Click **Close**.
15. Click **Finish**.

Add the following lines to the `/opt/IBM/tivoli/tipv2Components/TCRComponent/bin/startTCRserver.sh` file as shown in Example 6-10.

Example 6-10 Modify the startTCRserver.sh file

```
LD_LIBRARY_PATH=/opt/ibm/db2/V9.5/lib32:$LD_LIBRARY_PATH
export LD_LIBRARY_PATH
. /home/db2inst1/sqllib/db2profile
```

Installing IBM Tivoli Usage and Accounting Manager 7.3.0

To install IBM Tivoli Usage and Accounting Manager Enterprise Edition:

1. Log in as `root` to the server.
2. Upload and uncompress the `TUAM_Ent_ed_730_Linux_IA32.tar` file to the `/root/upgrade` directory.
3. Change to the `EE` directory.
4. Execute the following command:
   ```
   export
   CLASSPATH=/opt/ibm/db2/V9.5/java/db2jcc.jar:/opt/ibm/db2/V9.5/java/d
   b2jcc_license_cu.jar
   ```
5. Execute `./setup-tuam-ee-7-3-0-0_linux_ia32.bin`
6. Select your language of choice, and click **OK**.
7. Click **Next** in the Welcome window.
8. Select **Migrate configuration data**.
9. Click **Next**.
10. Accept the license agreement and click **Next**.
11. Click **Next** in the Install directory window.
12. Type `virtuser` as TIP Administration User.
13. Type `password` as TIP Administration Password.
14. Click **Next**.
15. Click **Install**.
16. Click **Next** on the Installation Summary.
17. Click **Done** in the Install Complete window.

Installing IBM Tivoli Usage and Accounting Manager 7.3.0 Fix pack 1

Note: At the time this IBM Redbooks publication was written, the documentation for the installation of Tivoli Usage and Account Manager 7.3.0 Fix pack 1 was in error. Ignore the following installation step:

- Add the following statements to the export section of the file named TUAM_Ent_Ed_730_Linux_IA32/EE/COI/PackageSteps/TUAM_APP/TUAM_APP.pre.install.xml:

  ```
  <pathelement
  path="/opt/ibm/db2/V9.5/java/db2jcc_license_cu.jar"/>
  <pathelement path="/opt/ibm/db2/V9.5/java/db2jcc.jar"/>
  ```

To install IBM Tivoli Usage and Accounting fix pack:

1. Log in as `root` to the server.
2. Upload and uncompress the `7.3.0-TIV-TUAM-FP0001.zip` file to the `/root/upgrade` directory.
3. Execute `./applyFixpack.sh virtuser password`

Installing IBM Tivoli Monitoring Agent 6.2.2 Fix Pack 4

To install this agent, see “Installing IBM Tivoli Monitoring Agent 6.2.2 Fix Pack 4” on page 277.

Upgrading icb-itm server

To upgrade the icb-itm server, you need to install the packages listed in the following sections:

- “Installing IBM Tivoli Monitoring Server 6.2.2 Fix Pack 4” on page 281
- “Installing IBM Tivoli Monitoring Agent 6.2.2 Fix Pack 4” on page 282
- “Installing IBM HTTP Server 7.0” on page 282
- “Installing IBM Tivoli Common Reporting 1.3” on page 283
- “Installing IBM Tivoli Monitoring Performance Analyzer 6.2.2.2” on page 284
- “Installing IBM Tivoli Monitoring Agent for VMware VI 6.2.3” on page 284 I

Note: Ensure that you install the IBM Tivoli Monitoring products as `virtuser`!

Before upgrading the icb-itm machine, stop all agents using the following commands:

```
su - virtuser
/opt/IBM/ITM/bin/itmcmd agent stop lz
/opt/IBM/ITM/bin/itmcmd agent stop sy
/opt/IBM/ITM/bin/itmcmd agent stop hd
/opt/IBM/ITM/bin/itmcmd agent stop cq
/opt/IBM/ITM/bin/itmcmd agent -f stop kf
/opt/IBM/ITM/bin/itmcmd server stop TEMS
```

Installing IBM Tivoli Monitoring Server 6.2.2 Fix Pack 4

To install a new IBM Tivoli Enterprise Monitoring server:

1. Log in as `virtuser` to the `icb-itm` server.
2. Upload and decompress the `6.2.2-TIV-ITM_TMV-Linux-FP0004.tar` file to the `/home/virtuser/upgrade` directory.
3. Change to the `6.2.2-TIV-ITM_TMV-Linux-FP0004` directory.

4. Execute `./install.sh`
5. Press **Enter** to accept the default `/opt/IBM/ITM` home directory.
6. Type `1` and press **Enter** to continue the installation.
7. Type `1` and press **Enter** to install the product to the local host.
8. Type `1` and press **Enter** to accept the agreement.
9. Type `1` and press **Enter** to install the prerequisites.
10. Type `1` and press **Enter** to install `IBM Tivoli Monitoring components for this operating system`.
11. Type `1` and press **Enter** to confirm your selection.
12. Type `6` and press **Enter** to install all five products.
13. Type `1` and press **Enter** to confirm your selection.
14. Type `2` and press **Enter** to skip the install for the same version.
15. Type `2` and press **Enter** to skip additional products.
16. Type `1` and press **Enter** to seed product support.
17. Type `2` and press **Enter** to select NONE to add to the default managed system group.
18. Wait until the installation completes.

Installing IBM Tivoli Monitoring Agent 6.2.2 Fix Pack 4

Refer to “Installing IBM Tivoli Monitoring Agent 6.2.2 Fix Pack 4” on page 277 for steps to install IBM Tivoli Monitoring Agent for your server.

Note: Ensure that you install the agent as `virtuser`!

Installing IBM HTTP Server 7.0

To install IBM HTTP Server:

1. Log in as `root` to the `icb-itm` server.
2. Upload and uncompress the `C1G00ML.tar.gz` file to the `/root/upgrade` directory.
3. Execute `./launchpad.sh`
4. Click **Launch the installation wizard for IBM HTTP Server** on the right side of the Welcome window.
5. Click **Next** in the Welcome window of the installer.
6. Accept the license agreement and click **Next**.
7. Click **Next** on Passed System Prerequisites Check.

8. Click **Next** to accept the default installation location.
9. Specify `8080` as the HTTP port and click **Next**.
10. Deselect the **Create a user ID for IBM HTTPServer administration server authentication** and click **Next**.
11. Deselect the **Create a unique user ID and group for IBM HTTPServer administration files**.
12. Deselect the **Setup IBM HTTP Server administration server to administer IBM HTTP Server**.
13. Click **Next**.
14. Deselect the **Install the IBM HTTP Server Plug-in for IBM WebSphere Application Server**, and click **Next**.
15. Click **Next** in the Installation summary window.
16. Click **Finish** when the installation result states `Success`.

Installing IBM Tivoli Common Reporting 1.3

To install IBM Tivoli Common Reporting:

1. Log in as `root` to the server.
2. Upload and uncompress the `CZ6SXML.tar.gz` file to the `/root/upgrade` directory.
3. Execute `./launchpad.sh`
4. Click **Install IBM Tivoli Common Reporting for Asset and Performance Management**.
5. Select your language of choice, and click **OK**.
6. Click **Next** in the Welcome window.
7. Accept the license agreement and click **Next**.
8. Choose **Single-computer installation** in the Installation Scenario Selection window.
9. Click **Next** in the Installation Directory Selection window.
10. Click **Next** in the Advanced Configuration Selection window.
11. Type `virtuser` as UserID.
12. Type `password` in the Password and Confirm Password fields.
13. Type `17310` as Port Number.
14. Click **Next**.
15. Click **Next** at the Pre-Installation Summary.
16. Click **Done** when the results state `Installation complete.`

Installing IBM Tivoli Monitoring Performance Analyzer 6.2.2.2

To install IBM Tivoli Monitoring Performance Analyzer:

1. Log in as `virtuser` to the server.
2. Upload and decompress the `CZF7XEN.tar` file to the `/home/virtuser/upgrade` directory.
3. Execute `./install.sh`
4. Press **Enter** to accept the default `/opt/IBM/ITM` home directory.
5. Type `1` and press **Enter** to continue the installation.
6. Type `1` and press **Enter** to install the product to the local host.
7. Type `1` and press **Enter** to accept the agreement.
8. Type `1` and press **Enter** to install IBM Tivoli Monitoring components for this operating system.
9. Type `1` and press **Enter** to confirm your selection.
10. Type `1` and press **Enter** to install Performance Analytics for TEP V06.22.02.00.
11. Type `2` and press **Enter** to skip additional products.

Installing IBM Tivoli Monitoring Agent for VMware VI 6.2.3

To install IBM Tivoli Monitoring Agent for VMware VI:

1. Log in as `virtuser` to the server.
2. Upload and decompress the `CZ5QEN.tar` file to he `/home/virtuser/upgrade` directory.
3. Execute `./install.sh`
4. Press **Enter** to accept the default `/opt/IBM/ITM` home directory.
5. Type `1` and press **Enter** to continue the installation.
6. Type `1` and press **Enter** to install the product to the local host.
7. Type `1` and press **Enter** to accept the agreement.
8. Press **Enter** to continue the installation when the warning message shown in Example 6-11 is displayed.

Example 6-11 Warning message

```
KCIIN2463W Warning: This installation media does not contain any
components which can be run on the current system platform
architecture. To install components which can run on this system,
please locate the installation media containing files similiar to
*lx82*.jar.
```

```
NOTE: IF YOU ARE INSTALLING APPLICATION SUPPORT, CONTINUE WITH THE
INSTALLATION TO SEE A LIST OF SUPPORT
FILES.
```

9. Type `4` and press **Enter** to install `Tivoli Enterprise Monitoring Server support.`
10. Type `1` and press **Enter** to confirm your selection is correct.
11. Type `4` and press **Enter** to install all available Monitoring Agents.
12. Type `2` and press **Enter** to skip additional products.
13. Type `1` and press **Enter** to seed product support.
14. Type `2` and press **Enter** to select ALL to add to the default managed system group.
15. Wait until the installation completes.

Start all the processes including the new agent using the following commands:

```
su - virtuser
/opt/IBM/ITM/bin/itmcmd server start TEMS
/opt/IBM/ITM/bin/itmcmd agent start cq
/opt/IBM/ITM/bin/itmcmd agent start hd
/opt/IBM/ITM/bin/itmcmd agent start sy
/opt/IBM/ITM/bin/itmcmd agent start lz
/opt/IBM/ITM/bin/itmcmd agent -o isdm722 start vm
```

To view the installed products, you can run the following command:

```
/opt/IBM/ITM/bin/cinfo -t
```

Upgrading the icb-nfs server

To upgrade the icb-itm server, you need to install only the fix pack for the IBM Tivoli Monitoring agent.

Installing IBM Tivoli Monitoring Agent 6.2.2 Fix Pack 4

Refer to “Installing IBM Tivoli Monitoring Agent 6.2.2 Fix Pack 4” on page 277 for installing the IBM Tivoli Monitoring Agent.

6.1.5 Post-upgrade steps

To finalize the installation, install IBM Service Delivery Manager 7.2.2 for the servers, then do configuration steps.

Installing IBM Service Delivery Manager 7.2.2 support

To finish the installation and install IBM Service Delivery Manager 7.2.2 support for your environment:

1. Uncompress the `ISDM_for_x86_2of15_V722.tar` file to the directory of choice.
2. The following files will be listed:
   - ITM_SLES_upgrade.tar
   - maintenanceTool.tar
   - NFS_SLES_upgrade.tar
   - TIVSAM_SLES_upgrade.tar
   - TUAM_SLES_upgrade.tar
3. Upload and uncompress the `TIVSAM_SLES_upgrade.tar` file to the `/root/upgrade` directory on `icb-tivsam` server.
4. Log in as `root` to the `icb-tivsam` server.
5. Execute `/root/upgrade/upgradeTSAMMachine.sh`

   Note: At the time this IBM Redbooks publication was written, Step 5 above caused a problem with a file. We were required to run the commands shown in Step 6 to correct the problem. See APAR IV11003 for more information.

6. Run the commands shown in Example 6-12:

   Example 6-12 Fix the upgrade

```
cd /opt/IBM/WebSphere/AppServer/java/jre/security
mv cacerts cacerts-old
ln -s /shared/`pwd`/cacerts cacerts
```

   Note: Another way to fix the problem caused by running the script in Step 5 above is to replace the following line in the `upgradeTSAMMachine.sh` script:

   Replace

```
ln -sf /shared${DIR} ${FILE}
```

   with

```
ln -sf /shared${FILE} ${FILE}
```

   Run the `upgradeTSAMMachine.sh` script.

7. Upload and uncompress the `TUAM_SLES_upgrade.tar` file to the `/root/upgrade` directory on `icb-tuam` server.

8. Log in as `root` to the `icb-tuam` server.
9. Execute `/root/upgrade/upgradeTUAMMachine.sh icb-tivsam.private.cloud.com icb-nfs.private.cloud.com password`
10. Upload and uncompress the `ITM_SLES_upgrade.tar` file to the `/root/upgrade` directory on `icb-itm` server.
11. Log in as `root` to the `icb-itm` server.
12. Execute `/root/upgrade/upgradeITMMachine.sh`
13. Upload and decompress the `NFS_SLES_upgrade.tar` file to the `/root/upgrade` directory on the `icb-nfs` server.
14. Log in as `root` to the `icb-nfs` server.
15. Execute `/root/upgrade/upgradeNFSMachine.sh icb-itm.private.cloud.com icb-tuam.private.cloud.com icb-tivsam.private.cloud.com`

Note: After we performed the previous steps in our test environment, the `icb-tivsam` and `icb-nfs` software server stacks would not start after a reboot. When we checked with the command `lssam -V`, there appeared to be a problem with the eth0 vlan 100 interface. This might have been due to our particular configuration.

We fixed this with the following commands:

- `modprobe 8201q`
- `vconfig add eth0 100`
- `ifconfig eth0.100 up`

After a few seconds, the software stacks then started automatically.

Running post-upgrade steps on icb-tivsam

Run `samctrl -M f` to put Tivoli System Automation for Multiplatforms into automatic mode.

Running post-upgrade steps on the icb-tuam server

To complete the upgrade process on Tivoli Usage and Accounting Manager:

1. Add virtuser to the Tivoli Usage and Accounting Manager administration group:
   a. Log in to Tivoli Usage and Accounting Manager as `virtuser` at `http://TuamMachine:17310/ibm/console`
   b. Click **Identity and Access** → **Usage and Accounting** → **Users**.
   c. Click **New** and select `virtuser` from the list of **Search Central User Registry** as shown in Figure 6-25 on page 288.

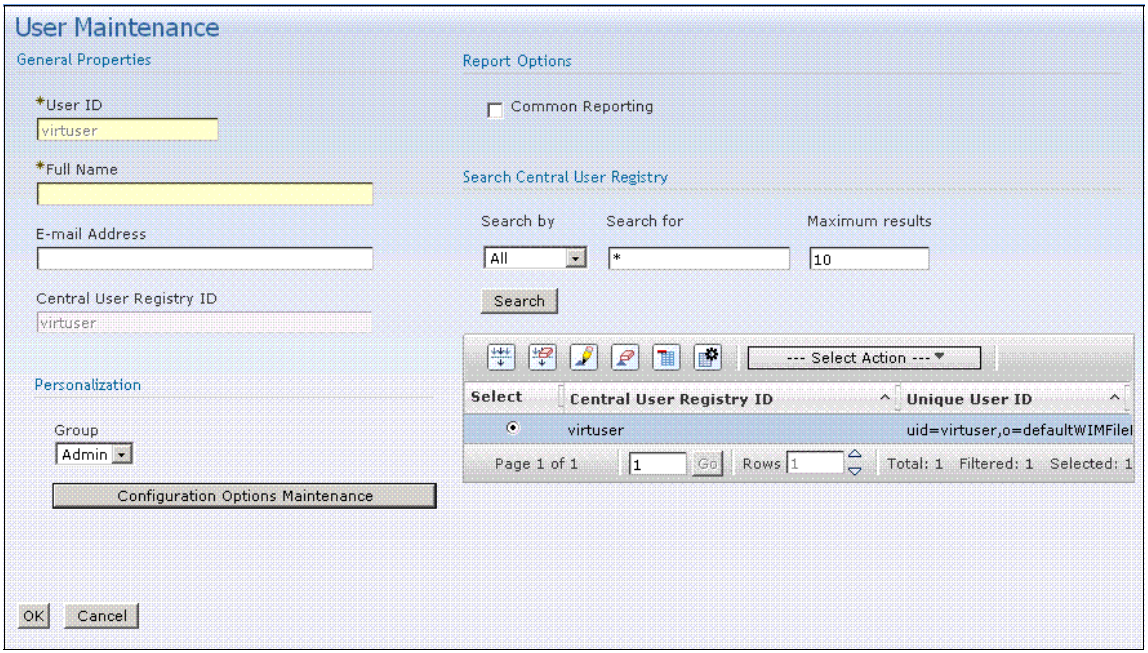


Figure 6-25 Add virtuser to Tivoli Usage and Accounting Manager

2. Uninstall the previous Tivoli Usage and Accounting Manager version: `/opt/ibm/tuam/_uninst/uninstaller.bin`
   a. Click **Next** in the Welcome window.
   b. Type `virtuser` and `password`.
   c. Click **Next**.
   d. Click **Uninstall**.
   e. Click **Finish**.
   f. Remove the old directories and files using the following commands:

```
rm -rf /root/InstallShield
rm -rf /opt/ibm/tuam
rm -rf /opt/ibm/tivoli
rm -f  /root/runRefreshDB.sh /root/*.log
```

3. Create a new Account Code Structure named CloudStandard:
   a. Log in to Tivoli Usage and Accounting Manager as `virtuser` at `http://TuamMachine:17310/ibm/console`

b. Click **Administration** → **Usage and Accounting** → **Account code Structure**.

c. Click **New**.

d. Complete the form as shown in Figure 6-26

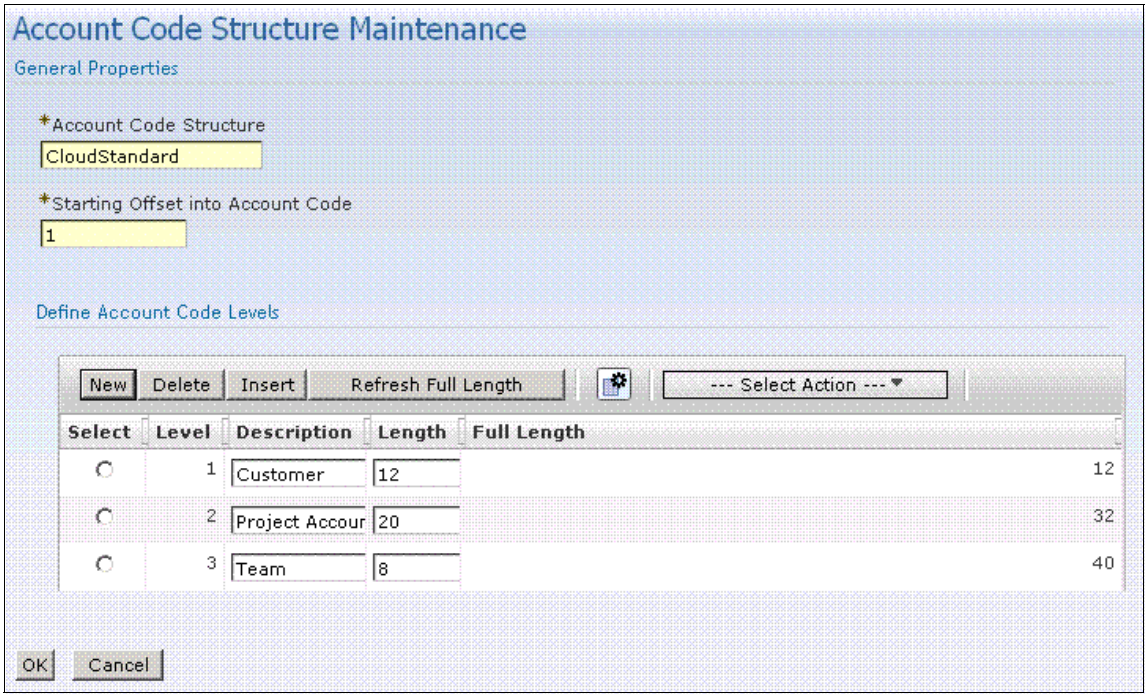


Figure 6-26 CloudStandard Account Code Structure

4. Link the CloudStandard to the Tivoli Usage and Accounting Manager Administration User Group:

   a. Click **Identity and Access** → **Usage and Accounting** → **User Groups**.

   b. Edit the user group **Administrators**.

   c. Add the CloudStandard Account Code Structure as shown in Figure 6-27 on page 290.

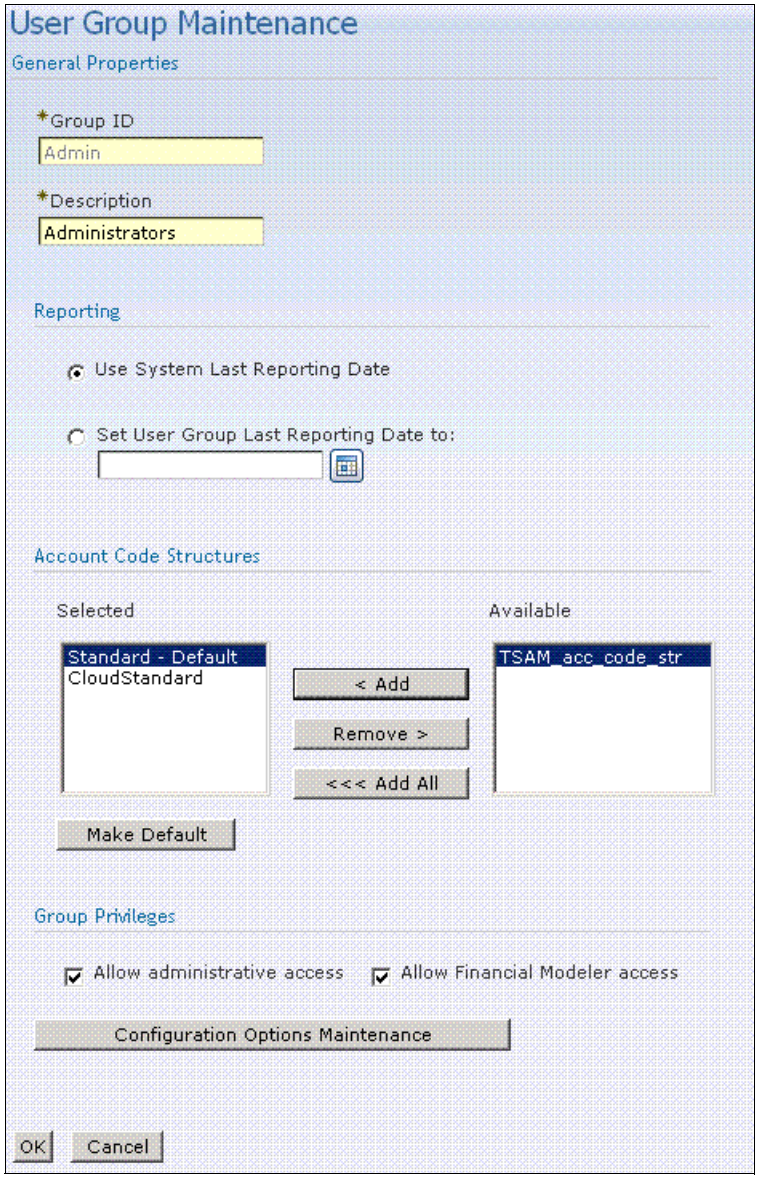


Figure 6-27 Link CloudStandard to Tivoli Usage and Accounting Manager Administrators

5. Click **Financial** → **Usage and Accounting** → **Rate Groups**.
6. Create the rate groups as listed in Table 6-5 on page 291. For this you need to click the icon next to Rate Groups as shown in Figure 6-28 on page 291.

Figure 6-28 Create a new rate group

Table 6-5 New rate groups

Rate Group	Description
RDPV	Virtual Server Service - VMware

Note: If you are using virtualization other then VMware, refer to http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/topic/com.ibm.isdm_7.2.2.doc/t_afterupgrading_tuam.html

Running post-upgrade steps on icb-itm

To complete the upgrade process on the icb-itm server:

1. Log in as `root` to `icb-itm`
2. Execute `/opt/IBM/ITM/bin/itmcmd manage`
3. Select, then right-click the **Tivoli Enterprise Portal Server**.
4. Click **Configure**.
5. Click **Yes** if TEPS need to be stopped.
6. Select the **Agent Parameters** tab.
7. Set Warehouse database name as `WAREHOUS`.
8. Set Warehouse DB user ID as `db2inst1`.
9. Type `password` in the Warehouse user password and Re-type warehouse user password fields.
10. Click **Save**.
11. Select, then right-click **Warehouse Proxy**.
12. Click **Configure**.
13. Select the **Agent Parameters** tab.
14. On the Sources tab under the Agent Parameters tab, set the following items:

    JDBC Drivers: /opt/ibm/db2/V9.7/java/db2jcc.jar
    /opt/ibm/db2/V9.7/java/db2jcc_license_cu.jar

    Warehouse URL: jdbc:db://localhost:50001/WAREHOUS

Warehouse Driver: com.ibm.db2.jcc.DB2Driver

Warehouse User: db2inst1

Warehouse Password: password

TEP Server Host: localhost

TEP Server Port 1920

15. On the Scheduling tab, select **Fixed** and set the schedule to run every day at 02:00AM.
16. Click **Save**.
17. Click **Action** → **Exit**.
18. Configure the monitoring agent for VMware VI:
    a. Set the values from Table 6-6 in the file `/opt/IBM/ISDM/templates/VIconfig.txt`

Table 6-6 Configure the monitoring agent

Name of the parameter	Value
<INSTANCE>	ManageForm
<VALIDATE_SLL>	Yes
<MAX_LOG_FILE_COUNT>	10
<MAX_LOG_FILE_SIZE>	5190
<MAX_LOG_LEVEL>	INFO
<DIRECTOR_AUTHENTICATION>	No
<DIRECTOR_HOST_ADDRESS>	Leave this field empty.
<DIRECTOR_PORT_NUMBER>	Leave this field empty.
<STORAGE_AGENT_MSN>	Leave this field empty.
<DATASOURCE_ID>	ManageForm
<DATASOURCE_HOST_ADDRESS>	192.168.88.9
<DATASOURCE_USERNAME>	Administrator
<DATASOURCE_PASSWORD>	PasswOrd
<DATASOURCE_USES_SSL>	Yes

iv. Run the following command:

```
/opt/IBM/ISDM/bin/create_ITM_VI_instance.sh -instance ManageFrom
-cert /opt/IBM/SC/certs/rui.crt -password ITMVMWAREVI -option
/opt/IBM/ISDM/templates/VIconfig.txt
```

Note: ITMVMWAREVI is the default password for the $CANDLE_HOME/lx8266/vm/etc/kvm.truststore. For more information, see the following information center page:

http://publib.boulder.ibm.com/infocenter/tivihelp/v24r1/topic/com.ibm.tivoli.itmvs.doc_6.2.2/vmware622_user19.htm?path=2_9_4_3_2_2#localinstall

b. Check the configuration file

```
/opt/IBM/ITM/config/icb-itm_vm_ManageFrom.cfg
```

The entry must have an instance name. If not, edit it and add the instance. Here is an excerpt of what you might see:

```
INSTANCE= [  SECTION=DATA_PROVIDER [ { KVM_LOG_FILE_MAX_COUNT=10 }
...
```

It must have the following syntax:

```
INSTANCE=ManageFrom [  SECTION=DATA_PROVIDER [ {
KVM_LOG_FILE_MAX_COUNT=10 } ...
```

Then you can start this agent with the following command:

```
/opt/IBM/ITM/bin/itmcmd agent -o ManageFrom start vm
```

Running post-upgrade steps on icb-nfs

Run `samctrl -M f` to set Tivoli System Automation for Multiplatforms into automatic mode.

Abbreviations and acronyms

AMM	Advanced Managmemt Module
API	application programming interface
BCH	BladeCenter H
BI	business intelligence
BOFM	BladeCenter Open Fabric Manager
BSS	Business Support Services
CCMDB	IBM Tivoli Change and Configuration Management Database
CEE	Converged Enhanced Ethernet
CISSP	Certified Information Systems Security Professional
CSR	Common Server Resource
DCFM	Data Center Fabric Manager
FC	Fibre Channel
FCoE	Fibre Channel over Ethernet
GTS	Global Technology Services
HA	high availability
HSSM	high speed switch module
HTTP	hypertext transfer protocol
IaaS	Infrastructure as a Service
IBM	International Business Machines Corporation
ILM	Information Lifecycle Management
ISAAC	IBM Service Agility Accelerator for Cloud
ISDM	IBM Service Delivery Manager
ITIL	Information Technology Infrastructure Library
ITM	IBM Tivoli Monitoring
ITSO	International Technical Support Organization
ITUAM	IBM Tivoli Usage and Accounting Manager
LLDP	Link Layer Discovery Protocol
LOB	Line of Businesses
LTPA	Lightweight Third-Party Authentication
LUN	logical unit number
MBR	Master Boot Record
NFS	Network File System
NIC	network interface connection
OSS	Operational Support Services
PaaS	Platform as a Service
PDU	power distribution unit
PMPs	process management products
QoS	quality of service
RAS	Reliability, Availability and Serviceability
REST	Representational State Transfer
ROI	return on investment
SaaS	Software as a Service
SAN	storage area network
sdi_id	service deployment instance ID
SDLC	Software Development Life Cycle
SE	Security Enhanced
SLA	Service Level Agreement
SOA	service-oriented architecture
SSH	Secure Shell
SVC	SAN Volume Controller
TCR	Tivoli Common Reporting
TDS	Tivoli Directory Server
TEM	Tivoli Enterprise Monitoring
TEMA	Tivoli Enterprise Monitoring Agent
TEMS	Tivoli Enterprise Monitoring Server
TEP	Tivoli Enterprise Portal
TEPS	Tivoli Enterprise Portal Server
TivSAM	Tivoli Service Automation Manager

TOGAF	The Open Group Architecture Framework
TPAE	Tivoli Process Automation Engine
TPAe	Tivoli Process Automation Engine
TPM	Tivoli Provisioning Manager
TSA	Tivoli System Automation
TSAM	Tivoli Service Automation Manager
TSRM	Tivoli Service Request Manager
TUAM	Tivoli Usage and Accounting Manager
UEFI	Unified Extensible Firmware Interface
VIOS	virtual IO system
VLAN	virtual LAN

Related publications

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

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:

- *Configuring ISDM in a Power Systems Cloud,* SG24-7983
- *Tivoli Integration Scenarios*, SG24-7878
- *IBM BladeCenter Foundation for Cloud: Integration Guide*, REDP-4773
- *Implementing IBM Systems Director 6.1*, SG24-7694

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

Other publications

These publications are also relevant as further information sources:

- Learning Technologies Client Technical Specialist - System x and BladeCenter Lecture

  IBM Cloudburst 2.1 Overview (xtw110: Aug 2010 - 19 mins.), Ross Hamilton

- White Paper

  IBM Tivoli Service Automation Manager v7.2 and Microsoft Active Directory Configuration Guide, Edson Manoel, Franco Potepan

- *IBM Service Delivery Manager Version 7.2.2,* SC34-2622-00

Online resources

These websites are also relevant as further information sources:

- IBM CloudBurst information center

  http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp?topic=%2Fcom.ibm.cb.doc_2.1%2Fcloudburst_welcome.html

- IBM Tivoli Service Automation Manager

  http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp?topic=%2Fcom.ibm.tsam_7.2.1.1.doc%2Ftsam_welcome.html

- IBM Tivoli Provisioning Manager information center

  http://publib.boulder.ibm.com/infocenter/tivihelp/v28r1/index.jsp

- IBM IT Service Management documentation

  http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp

- Simple software product distribution

  http://publib.boulder.ibm.com/infocenter/tivihelp/v28r1/index.jsp?topic=%2Fcom.ibm.tivoli.tpm.scenario.doc%2Fsoftware%2Fcsfd_proddistovw.html

Help from IBM

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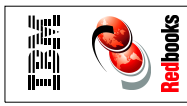

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