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# IBM WebSphere CloudBurst Appliance

What is WebSphere CloudBurst?



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This presentation provides an overview of the new IBM WebSphere® CloudBurst™ Appliance product.

## Agenda

- Background
- WebSphere CloudBurst components
- WebSphere CloudBurst life cycle

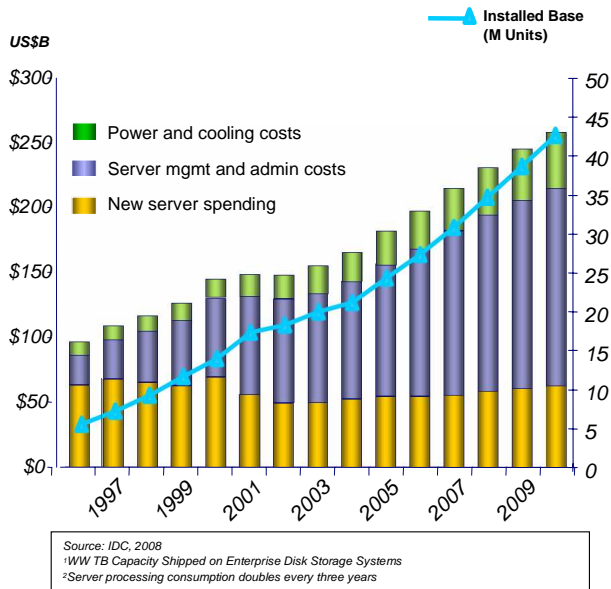
The presentation starts with a background on some of the issues facing the enterprise in terms of the increased costs, and shows how cloud computing and the WebSphere CloudBurst Appliance can help address those issues. The rest of the presentation covers the components of the WebSphere CloudBurst product, including the end-to-end life cycle for creating and managing virtual systems.

## ***Background***

The background section explains some of the hardware challenges that are driving the adoption of cloud computing technologies as an enterprise computing strategy and the value proposition of the WebSphere CloudBurst Appliance in the cloud computing space.

## Hardware challenges

- Costs to manage systems have doubled since 2000
- Costs to power and cool systems have doubled since 2000
- Devices accessing data over networks doubling every 2.5 years
- Bandwidth consumed doubling every 1.5 years
- Data doubling every 18 months<sup>1</sup>
- Server processing capacity doubling every three years<sup>2</sup>
- 10G Ethernet ports tripling over the next five years



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With high operational costs and many under-used servers consuming space and power, enterprise data center staff feel increasing pressure to better use existing resources and reduce costs. The figure on this page shows the increasing costs of power and cooling along with server management and administration costs. These costs are driving an interest in both server consolidation and improved management capabilities to offset the trend. The need for a consolidated infrastructure extends to the IBM WebSphere environments within the data center. Like other applications, current WebSphere Application Server environments, particularly development and test, often span many different servers, all running at low utilization.

In addition to consolidation to reduce power and space costs, reducing operational costs is critical. Much of the administrative cost is driven by the number of steps and decisions involved in designing, installing, configuring, and maintaining solutions composed from different software components. For example, administration of a WebSphere Application Server solution includes installing, configuring, and applying patches to operating systems, middleware, and application software across multiple servers. A faster, easily repeatable process to get WebSphere Application Server environments up and running for development, test use and for designing, configuring, and applying on-going maintenance to highly available, robust production environments is needed.

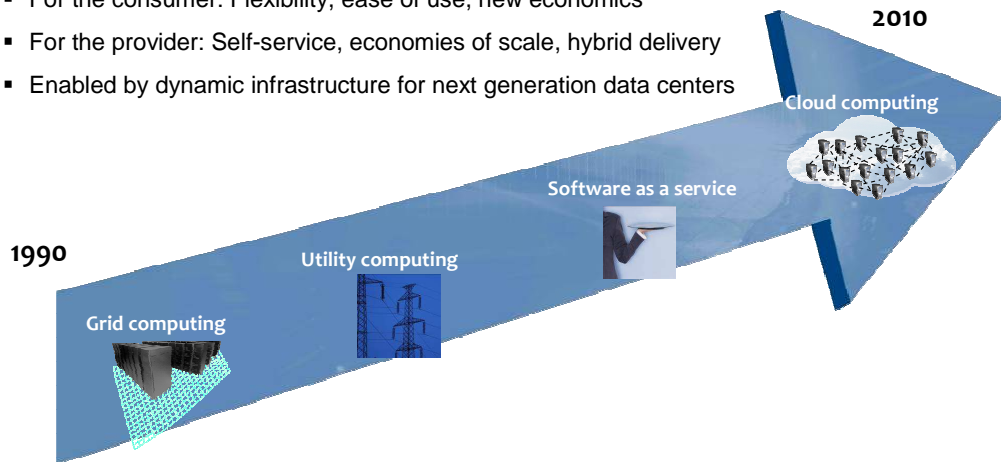


## Cloud computing – a disruptive new paradigm

**“Clouds will transform the information technology (IT) industry... profoundly change the way people work and companies operate.”**

**The Economist**

- A new paradigm for consumption and delivery of IT-based services
- For the consumer: Flexibility, ease of use, new economics
- For the provider: Self-service, economies of scale, hybrid delivery
- Enabled by dynamic infrastructure for next generation data centers



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As The Economist reported in October of 2008, cloud computing will transform the IT industry and will impact how businesses operate profoundly. Cloud computing provides massively scalable computing resources from anywhere. It simplifies service delivery. It enables rapid innovation and creates a dynamic platform for next generation data centers.

The diagram on this page shows the transition through computing models over the last twenty years. Grid computing solves large problems with parallel computing. Utility computing offers computing resources as a metered service. Software as a service enables network-based subscriptions to applications. Some say cloud computing is the same as grid or utility computing or software as a service, but it is really all of these combined. Cloud computing is anytime, anywhere access to IT resources delivered dynamically as a service.

## WebSphere CloudBurst value proposition

- The business value of WebSphere CloudBurst is to increase efficiency, cost-effectiveness, and usability of WebSphere Application Server topologies in a data center by leveraging cloud computing principles
- WebSphere CloudBurst appliance uses key technologies
  - Server virtualization capabilities such as server consolidation, isolation and rapid provisioning
  - Virtual appliance brings with it hardened configurations allowing for repeatable deployments

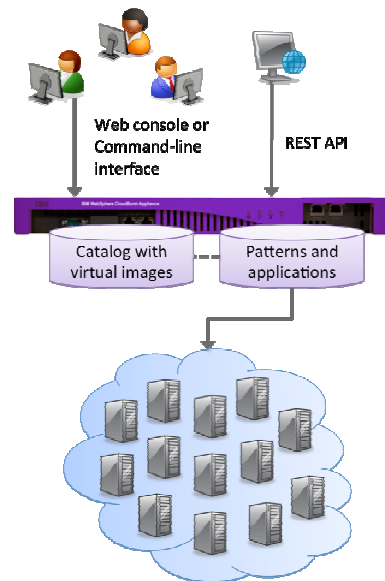
The emergence of cloud computing within the enterprise aims squarely at reducing IT costs by pooling available resources to reduce the number of physical servers required, while also bringing a new level of agility in providing self-service computing resources. At the heart of cloud computing is server virtualization technology, bringing server consolidation, isolation, and rapid provisioning capabilities. These technologies support building next generation data center cloud architectures on many platforms. WebSphere CloudBurst provides high business value through increased efficiency, cost-effectiveness, and usability of WebSphere Application Server topologies in a data center by taking advantage of cloud computing principles.

## ***WebSphere CloudBurst components***

This section explains what the WebSphere CloudBurst Appliance is, including the key components that encompass the WebSphere CloudBurst environment.

## WebSphere CloudBurst is...

- **An appliance from IBM...**
  - Includes:
    - Hardware with built-in security and trust authority
    - WebSphere CloudBurst function
    - WebSphere Application Server images
    - WebSphere Application Server patterns
- **...that manages your on-premise cloud...**
  - Bring your own enterprise cloud:
    - Hypervisors
    - Storage
    - Network
- **... comprising WebSphere Application Server virtual systems**
  - Customize and extend images and patterns for your applications
  - Dispense and run in the cloud
  - Life cycle management and optimization



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WebSphere Cloudburst is a hardware appliance that provisions hardened WebSphere Application Server topologies into a cloud of virtualized hardware. The appliance contains WebSphere Application Server virtual images and patterns. Your own hardware is used to create the cloud into which application server virtual images are dispensed and managed by the appliance.

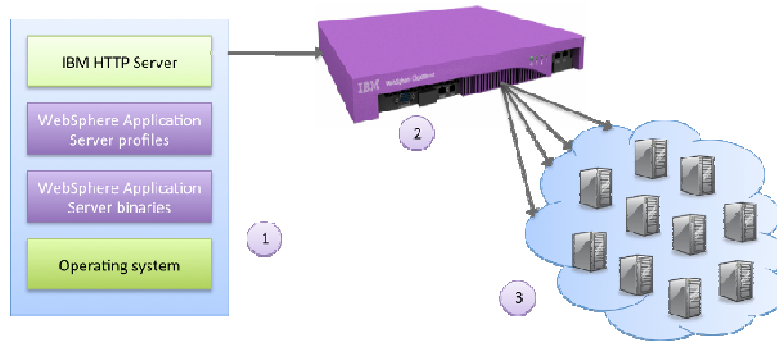
The appliance is managed using a browser or using command-line tools. External management applications can use the REST APIs exposed by the appliance to manage and view the appliance configuration.

The virtual images include WebSphere Application Server Hypervisor Edition for V6.1 or V7.0. The Hypervisor Edition images include an operating system and an installed and configured instance of the application server. These images are used by the appliance to create virtual machines and deploy them onto the cloud. The virtual images are stored in the Open Virtualization Format (OVF), which is an industry standard specification for packaging and distributing virtual appliances containing one or more virtual machines.

The appliance can be thought of as a repository of virtual images similar to what CVS is for software programs. Security and trust authority are built into the appliance. Only authorized users and administrators have access to the images. The appliance also contains pre-built topology patterns based on years of best practices of using WebSphere Application Server.

## Components of a WebSphere cloud

- **WebSphere Application Server Hypervisor Edition** virtual images provide core components for building virtual systems
- **WebSphere CloudBurst Appliance** hosts virtual images in its catalog and dispenses them to your private cloud
- **Private cloud**, hosting virtual systems managed by WebSphere CloudBurst



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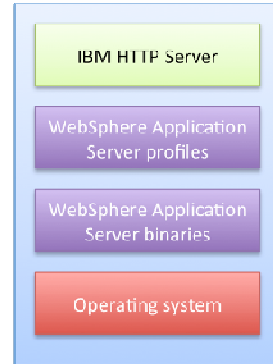
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The WebSphere cloud computing environment is made up of three pieces: the virtual images for WebSphere Application Server, the WebSphere CloudBurst Appliance itself, and the hardware and software resources that make up your private cloud. WebSphere Application Server Hypervisor Edition is a new application server product, provided by IBM. The Hypervisor Edition of WebSphere Application Server is packaged as a virtual image, including all of the components needed to build virtual systems – the operating system, application server binaries, application server profiles, and the HTTP server. The WebSphere CloudBurst Appliance stores these virtual images in its internal catalog and uses them to provide a framework for creating virtual systems inside the private cloud. The cloud itself is made up of the resources that host your virtualized WebSphere Application Server environments, including physical systems, storage, and network resources, like IP addresses. You can think of this configuration as a “bring your own cloud” environment – you provide the hardware components that make up the cloud, and the WebSphere CloudBurst Appliance offers a centralized mechanism to partition and manage WebSphere Application Server virtual systems within that cloud.

## WebSphere Application Server Hypervisor Edition

- WebSphere Application Server product designed to run in a virtualized cloud environment
  - Currently available for V6.1 and V7.0
- Packaged as a pre-installed and configured image in open virtualization format (OVF); includes
  - Operating system
  - Application server binaries
  - Application server profiles
  - HTTP server
- Image include parts that represent the application server topology components the image supports
  - Examples: deployment manager, custom node, stand-alone server

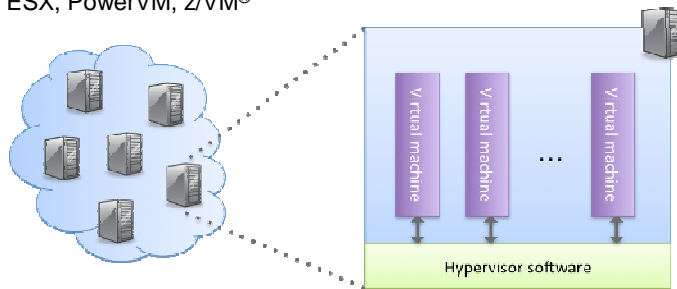


WebSphere Application Server Hypervisor Edition is a new addition to the WebSphere Application Server product family that is specifically designed to run in a virtualized cloud environment. The product is packaged as a pre-installed and configured virtual image using the open virtualization format, or OVF. Images are currently available for WebSphere Application Server V6.1 and V7.0. Each image contains all of the components that are needed to build a fully functional virtual system, or WebSphere Application Server partition, including the underlying operating system, application server binaries, expanded application server profiles, and the HTTP server. Virtual images are built to run on specific platforms. For example, the WebSphere Application Server Hypervisor Edition V6.1 virtual image for VMware ESX hypervisors is built on the 32-bit SUSE Enterprise Linux® operating system. Virtual images for PowerVM™ hypervisors, however, are built with a 64-bit version of AIX® 6.1.

Inside each image, several different parts are defined. These virtual image parts represent the application server topology components that the image supports, and you use them to define the virtual system patterns that you want to be able to deploy from your appliance. For example, the V6.1 images include parts for a deployment manager, custom node, stand-alone application server, and an HTTP server. Version 7.0 of the application server provides support for advanced flexible management topologies that include new types of profiles – a job manager and an administrative agent. The V7.0 virtual images contain image parts that correspond to those new profile types.

## Cloud resources

- The cloud is made up of the hardware, software, and network resources that host deployed virtual systems
- Cloud resources exist outside the appliance, but must be defined in the appliance configuration
  - **IP group:** a collection of IP addresses that are available for virtual systems to use
  - **Hypervisor:** a system running virtualization software, allowing multiple operating system virtual machines to access underlying hardware
    - Examples: VMware ESX, PowerVM, z/VM®
  - **Cloud group:** a group of related hypervisors, used as a target for deployment



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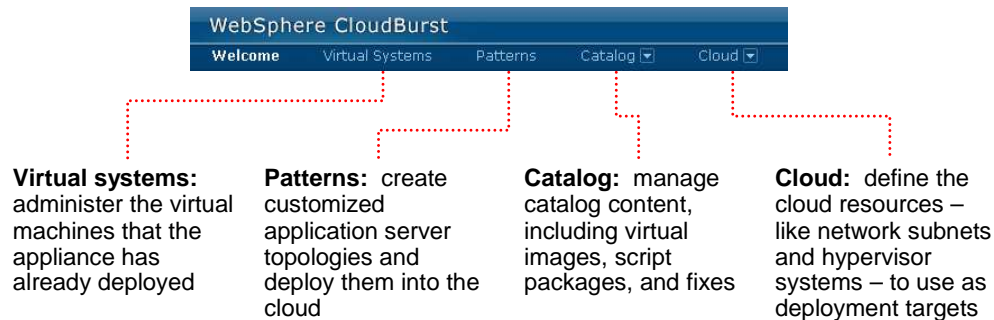
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The cloud is made up of the hardware, software, and network resources that house your deployed virtual systems. Cloud resources exist outside the scope of the appliance and need to be defined in the appliance configuration. Within WebSphere CloudBurst Appliance, there are three types of cloud resources: IP groups, hypervisors, and cloud groups. An IP group is a collection of IP addresses that are available for virtual systems to use. A hypervisor is a system running virtualization software that allows multiple operating system virtual machines to access the underlying hardware. Think of a hypervisor as an abstraction layer that allows the operating system and physical hardware to work together. Examples of hypervisors that are supported by WebSphere CloudBurst are VMware ESX, PowerVM and z/VM. A cloud group is a collection of related hypervisors. When deploying patterns to create virtual systems, you use a cloud group as the deployment target.

## WebSphere CloudBurst Appliance components

- WebSphere CloudBurst is a physical appliance that is designed to deploy and manage virtualized WebSphere Application Server environments
- Administrative capabilities of the appliance are available for:



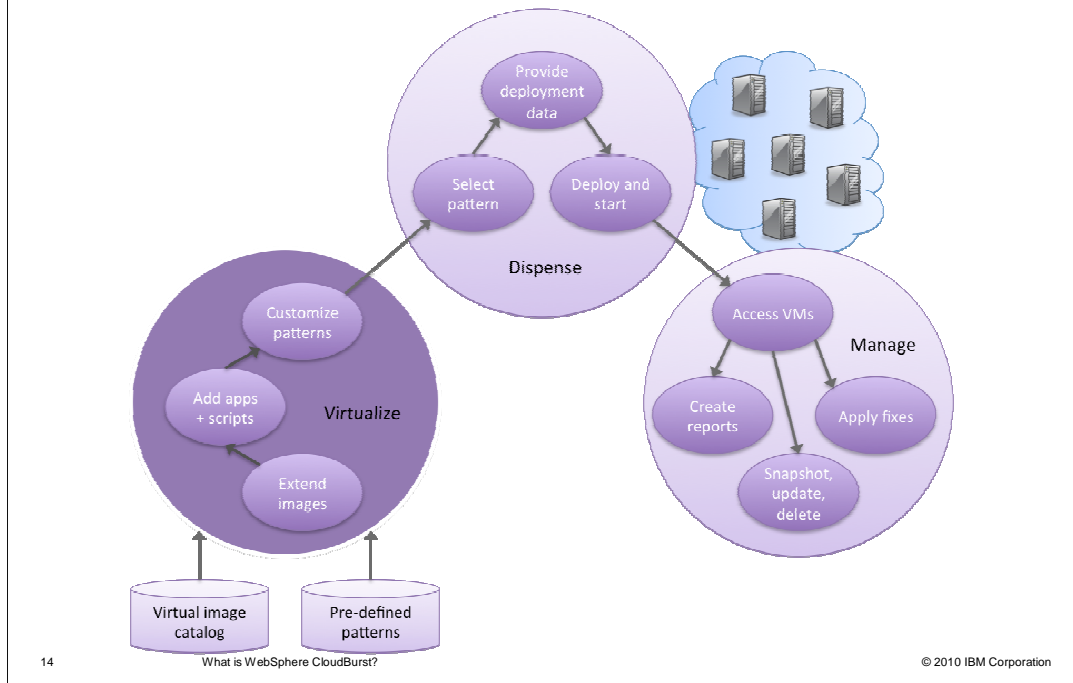
The WebSphere CloudBurst product is a physical appliance that is designed to deploy and manage virtualized WebSphere Application Server environments. The administrative capabilities of the appliance are split into four sections, as shown here in the administrative console: virtual systems, patterns, catalog and cloud. The virtual systems area allows an administrator to work with partitions that the appliance has already deployed. Using patterns, you can create customized application server topologies and deploy them into the cloud. The appliance catalog is where you store the content used to create and customize your virtual systems, including virtual images – like the WebSphere Application Server Hypervisor Edition images, script packages, and virtual system fixes. The cloud area of the console allows you to define the cloud resources in your network, like hypervisor systems and network subnets. These are the components that you use as deployment targets when you deploy patterns to create virtual systems.



## ***WebSphere CloudBurst life cycle***

This section covers the life cycle of WebSphere CloudBurst. First, you virtualize the application server topology that you want to deploy. Second, you dispense that topology into your cloud to create a functional WebSphere Application Server virtual system. Finally, you use the appliance to monitor and manage your virtual systems.

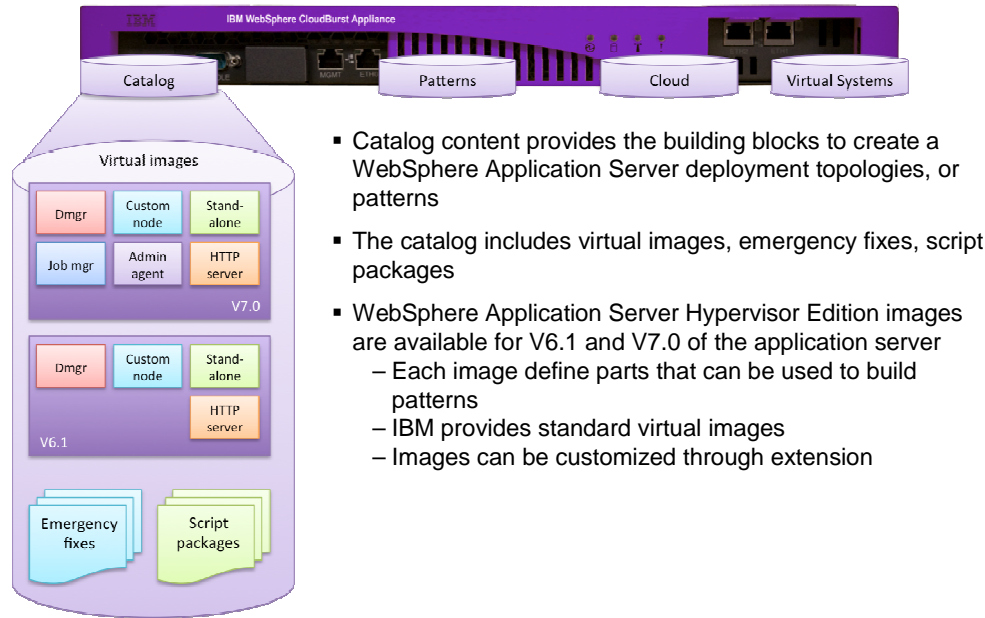
## WebSphere CloudBurst life cycle – virtualize



WebSphere CloudBurst manages the entire life cycle of WebSphere Application Server deployment. The three phases are virtualize, dispense and manage the WebSphere Application Server virtual images in the cloud. Starting from a catalog of WebSphere Application Server virtual images and pre-configured patterns provided by IBM, WebSphere CloudBurst administrators can add script packages and customize the patterns to fit specific WebSphere Application Server topologies and configurations. The custom or pre-built patterns can then be dispensed into a cloud of hypervisors. Here the specific deployment parameters are provided to the pattern, and then the pattern is deployed and started on the cloud. The final phase, managing virtual systems, is where the WebSphere CloudBurst administrator can access the virtual machines, create, update or delete the virtual machines, generate reports of the utilization of the virtual systems in the cloud, and apply maintenance to virtual systems.

The next few pages will focus on the “Virtualize” phase of the life cycle.

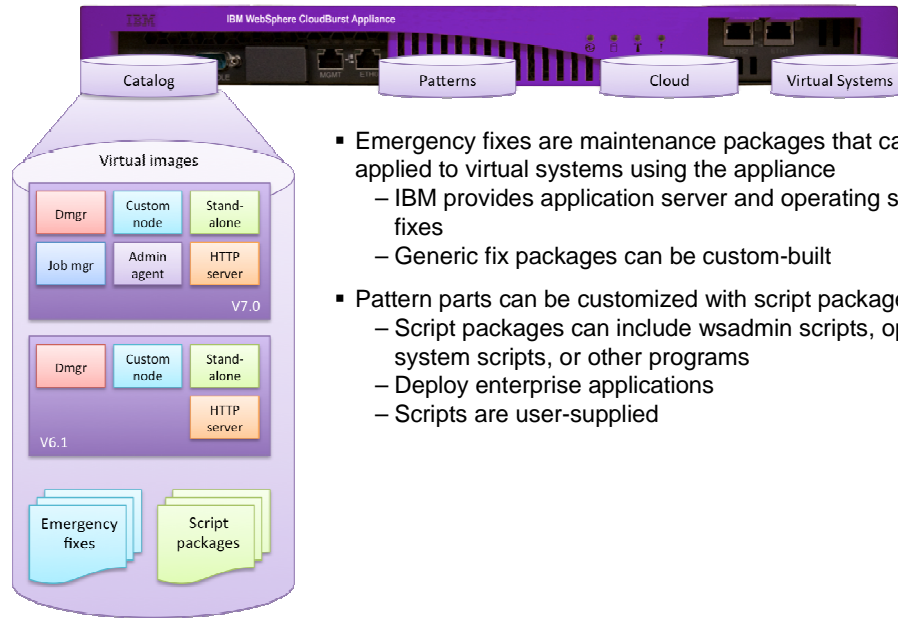
## Catalog – virtual images



- Catalog content provides the building blocks to create a WebSphere Application Server deployment topologies, or patterns
- The catalog includes virtual images, emergency fixes, script packages
- WebSphere Application Server Hypervisor Edition images are available for V6.1 and V7.0 of the application server
  - Each image define parts that can be used to build patterns
  - IBM provides standard virtual images
  - Images can be customized through extension

The appliance catalog stores three types of content: virtual images, emergency fixes, and script packages. These items are used as building blocks to create and customize your WebSphere Application Server deployment topologies, using patterns. There are WebSphere Application Server Hypervisor Edition virtual images available for V6.1 and V7.0 of the application server. Each image defines parts, like a deployment manager, custom node, or stand-alone application server that can be used to build patterns. The images themselves contain the operating system, application server binaries, profile information, and the HTTP server. You can also customize these images – by including your own custom files or installing additional software – and store them on your appliance to use as a base for future deployments. That customization process is called image extension. The next slide describes emergency fixes and script packages.

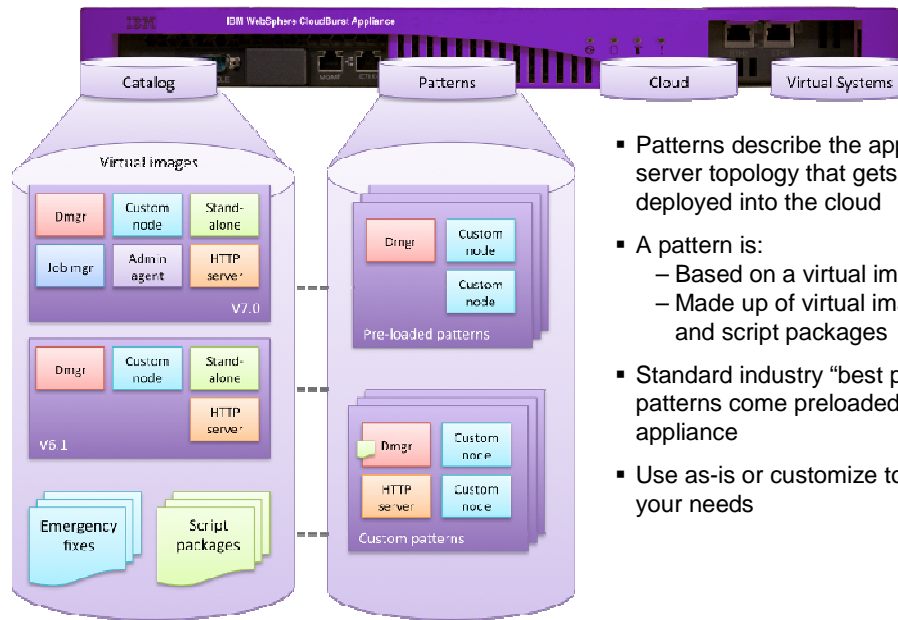
## Catalog – emergency fixes and script packages



- Emergency fixes are maintenance packages that can be applied to virtual systems using the appliance
  - IBM provides application server and operating system fixes
  - Generic fix packages can be custom-built
- Pattern parts can be customized with script packages
  - Script packages can include wsadmin scripts, operating system scripts, or other programs
  - Deploy enterprise applications
  - Scripts are user-supplied

Emergency fixes are maintenance packages that can be applied to virtual systems using the appliance. IBM provides emergency fix packages for both the application server and the underlying operating system that make up the virtual images. If you need to run a custom maintenance package, you can create your own generic fix packages and use the appliance maintenance mechanism to apply those fixes to your virtual systems. Script packages are used to customize your WebSphere Application Server deployment patterns. They can include wsadmin scripts, operating system scripts, or any other programs that you want to run on your virtual system. A common use case for script packages is to deploy enterprise applications in your environment. IBM provides some sample script packages, but the majority of scripts are user-supplied.

## Patterns



- Patterns describe the application server topology that gets deployed into the cloud
- A pattern is:
  - Based on a virtual image
  - Made up of virtual image parts and script packages
- Standard industry “best practices” patterns come preloaded on the appliance
- Use as-is or customize to suit your needs

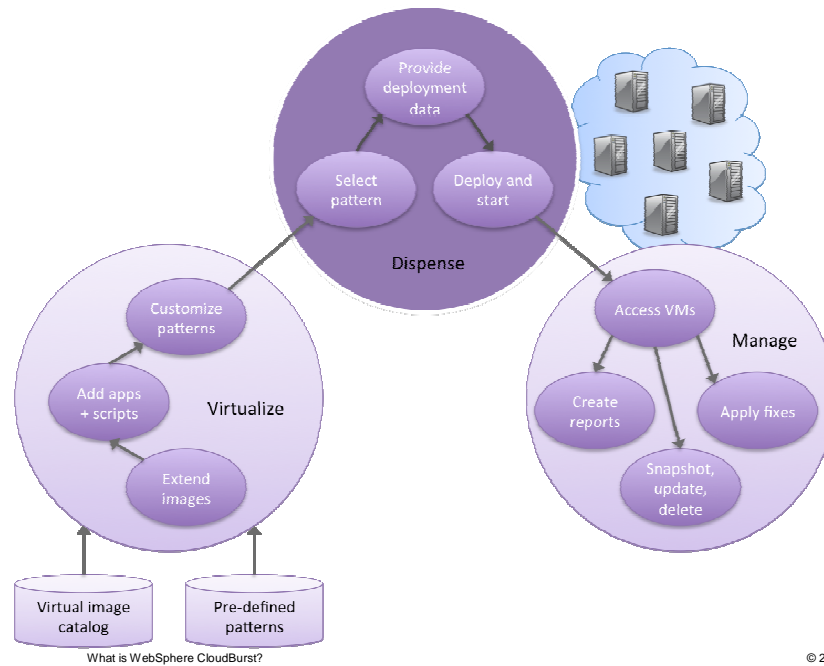
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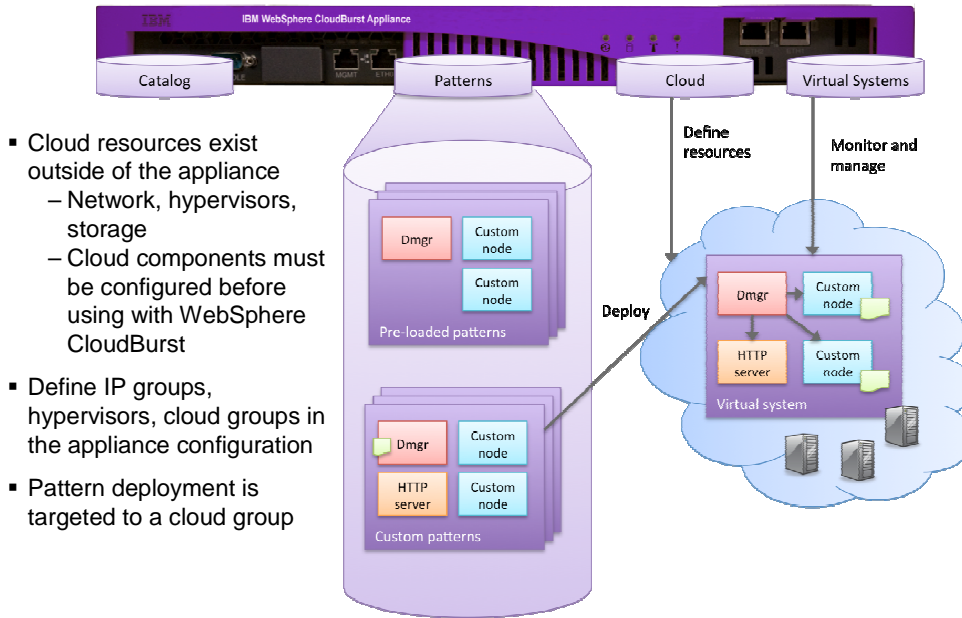
The content from the catalog is used to create the patterns that describe the application server topologies that you want to deploy into your cloud. A pattern is based on a virtual image and is made up of a group of virtual image parts. Parts are defined in the virtual image, so different image parts are available for a pattern, depending on the type of image being used. Typical image parts for WebSphere Application Server are a deployment manager, custom node, or stand-alone application server. After virtual image parts have been added to a pattern, these parts can be customized using script packages. The appliance comes with several pre-loaded patterns that represent standard industry best practices, such as clustering. You can use these patterns as-is, customize them to suit your needs, or build your own patterns from scratch. The diagram on this page shows two patterns. The top pattern is one of the pre-loaded patterns, typically used for doing testing in a clustered environment; it contains one deployment manager that manages two custom nodes. The bottom pattern is a custom pattern. In addition to the small cluster, this pattern contains an HTTP server and a script package associated with the deployment manager.

## WebSphere CloudBurst life cycle – dispense



This sub-section focuses on the “Dispense” phase of the life cycle. In this phase, once the pattern is selected and customized, the deployment parameters are entered to create the virtual systems. These virtual systems are then deployed onto hypervisors in the cloud.

## Cloud resources



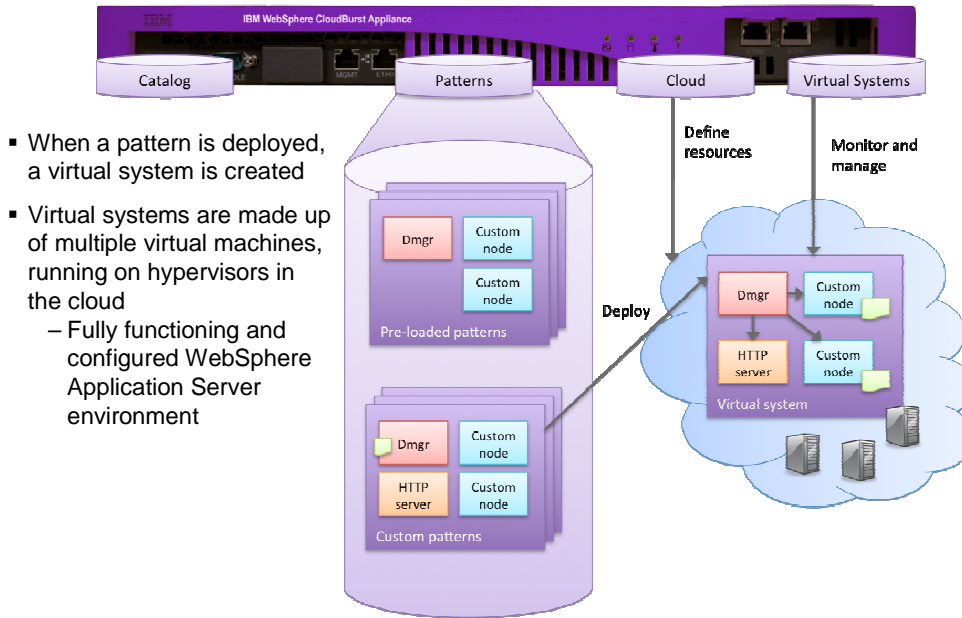
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Cloud resources – like hypervisors, network resources, IP addresses, and storage – exist outside of the appliance, but they need to be defined within the appliance configuration. There are three cloud components that you need to define: IP groups, hypervisors, and cloud groups. A cloud group is a collection of hypervisors. The cloud group needs to be associated with an IP group – a pool of available IP addresses that can be assigned to virtual systems – before you can deploy any patterns to it. When deploying a pattern, you choose a cloud group as a target for the deployment. Then, the appliance automatically places the virtual systems on appropriate hypervisors within that cloud group, assigning IP addresses from the associated IP group to the virtual systems being created.

## Virtual systems



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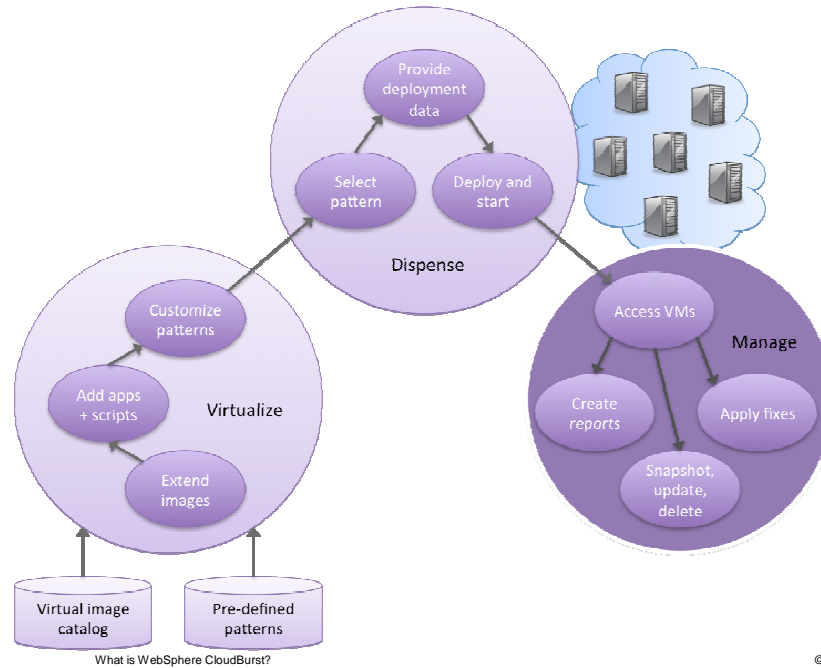
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When a pattern is deployed a virtual system is created. Virtual systems are made up of multiple virtual machines, running on hypervisors in the cloud. The virtual system represents a fully functioning and configured WebSphere Application Server environment. The example on this page shows deployment of a custom pattern, made up of a deployment manager with a script package, two custom nodes, and an HTTP server instance. When deployed, all of those virtual image parts are instantiated into virtual machines. The HTTP server is configured to intercept traffic coming in to the deployment manager, and the two custom nodes are federated into the deployment manager's cell. After the virtual machines have been created, the deployment manager runs its associated script package. In this case, the script deployed applications to the nodes in the cluster. The appliance provides monitoring and management capabilities for deployed virtual systems, or you can use standard administrative tools for WebSphere Application Server, like the administrative console.

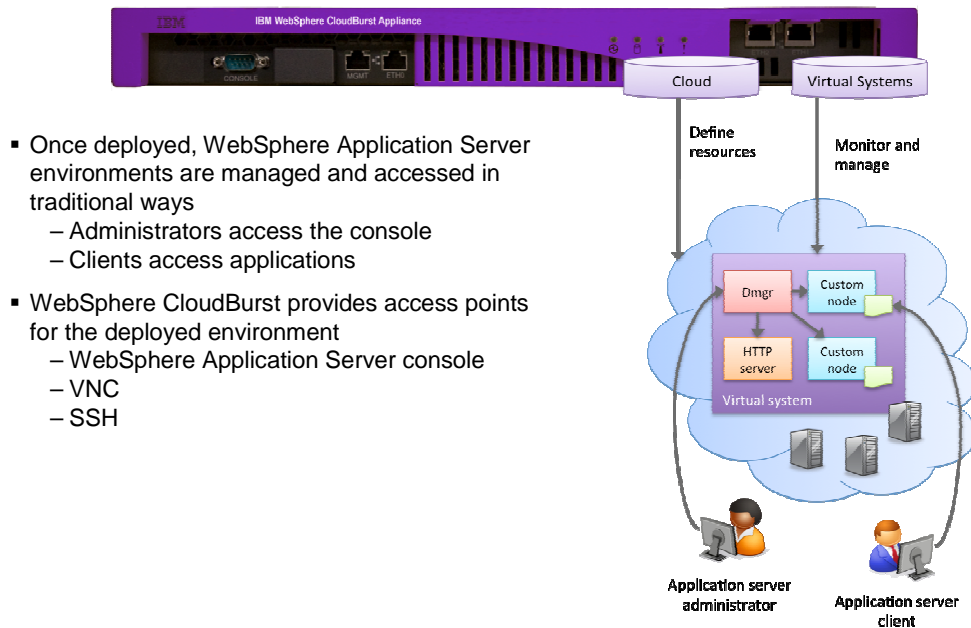


## WebSphere CloudBurst life cycle – manage



This sub-section focuses on the “Manage” phase of the life cycle. In this phase, the administrator manages the virtual systems, creates reports as needed, is able to update and delete the virtual systems, and takes snap shots of the virtual systems.

## WebSphere Application Server management



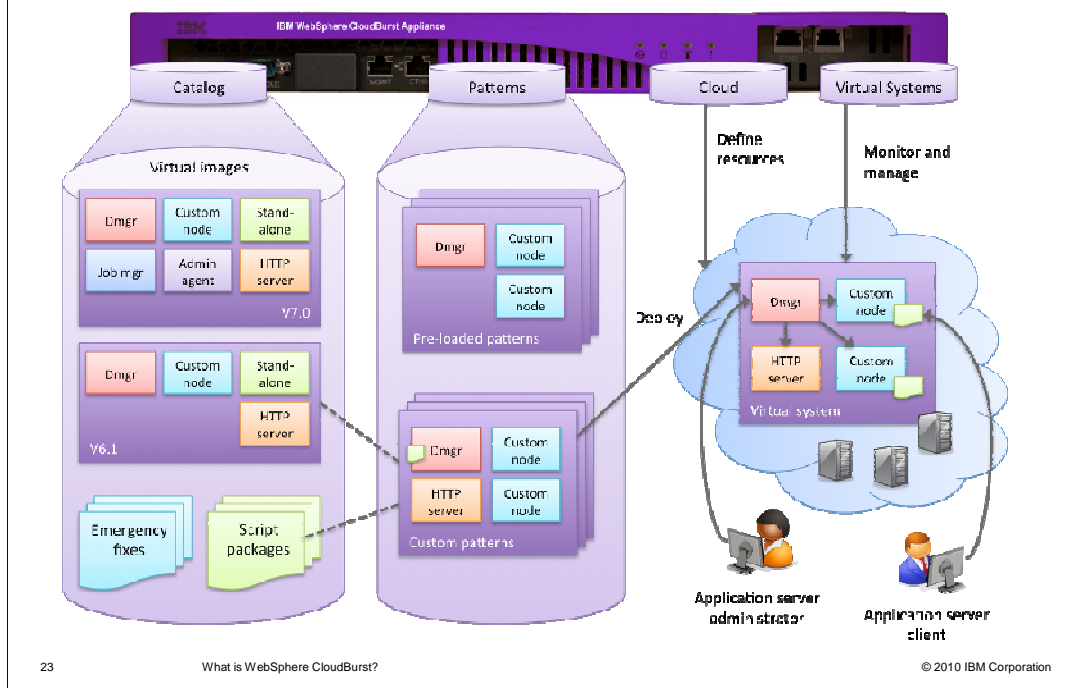
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Once the WebSphere Application Server virtual systems are deployed, they are managed just like any other application server deployments. Each virtual machine has an IP address, and you can access the servers knowing the IP address of the virtual machine. You have access to the administrative console, or you can use the wsadmin to connect to the server, configure it, or install any applications. Most of the configuration, including installing applications, is done through the scripts that are added to the pattern before deployment. However, you can still continue to perform any post deployment configuration changes to the application servers.

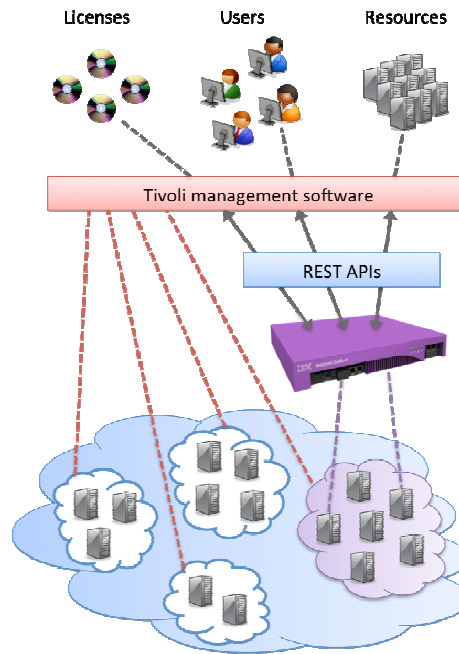
## Full deployment model



This page provides a recap of the overall WebSphere CloudBurst deployment model. The virtual images and script packages in the catalog provide the building blocks for creating customized patterns. In this example, a custom pattern is created using a small cell topology with a script package designed to deploy applications. Before the pattern can be deployed, cloud resources – like hypervisors and IP addresses – need to be defined in the appliance configuration. During pattern deployment, a virtual system is created, made up of multiple virtual machines that mirror the application server topology described in the pattern. The virtual system is an installed and fully configured WebSphere Application Server environment. While the appliance provides some capabilities to monitor and manage the application server, you can also use traditional methods to interact with your application server environment – like an application client for deployed applications or the administrative console to manage the deployed environment.

## Data center integration

- Points of integration into broader data center management solutions:
  - Automation / resource provisioning
  - License management
  - Monitoring
  - User management
  - Metering / billing



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Now that you have seen the WebSphere CloudBurst deployment life cycle for WebSphere Application Server environments, consider how the appliance can fit into your existing data center. This page shows the role of WebSphere CloudBurst within the enterprise, being managed by a broader enterprise service management and automation tool like Tivoli® management software.

Using WebSphere CloudBurst's REST-based APIs, enterprise service management tools can manage and configure the entire appliance, similar to what you do using the browser-based console or command-line interface. The enterprise service management tools can define the users, the resources available for the appliance, manage licenses, and essentially drive the appliance to be managed as part of the data center resources.

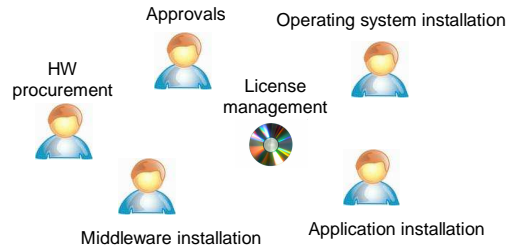
External enterprise service management tools can dedicate a subset of the resources to the appliance, and on demand, either add or remove resources available to the appliance. This is denoted by the blue "enterprise cloud" and the purple "WebSphere cloud" subset given to the appliance to deploy the WebSphere Application Servers virtual images.

## ***Summary***

The next section provides a summary of the presentation.

## Summary

- Life cycle support for
  - Virtualize
  - Dispense
  - Manage
- Delivered as a secure appliance
- Integrates into your enterprise



OR



**Business value:** WebSphere CloudBurst increases efficiency, cost-effectiveness, and usability of WebSphere topologies in a data center by using cloud computing principles

WebSphere CloudBurst lowers cost through higher hardware utilization, less power consumption, and more efficient license management. It provides lower time to value by automating repetitive, time-consuming, manual tasks. It empowers individual application managers, developers, or testers to perform business without lengthy approval processes.

WebSphere CloudBurst ships with environment patterns that codify 10 years of WebSphere Application Server management best practices. Application server environments can be customized and captured once, then dispensed into the cloud at the push of a button. In that way, the appliance increases agility. Rapid setup and teardown of WebSphere Application Server environments means less time spent managing WebSphere environments.

The WebSphere CloudBurst Appliance is ready to integrate into your enterprise, providing high business value through increased efficiency, cost-effectiveness, and usability of application server topologies in a data center by taking advantage of cloud computing principles.

## References

- WebSphere CloudBurst information center
  - <http://publib.boulder.ibm.com/infocenter/wscloudb/v1r1/index.jsp>
- YouTube channel with demonstration videos
  - <http://www.youtube.com/user/WebSphereClouds>

These references can help you learn more about WebSphere CloudBurst.



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