SHARE in Boston

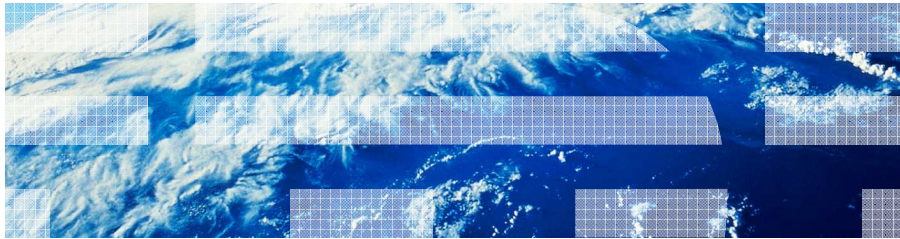# Manage WebSphere environment in your cloud via the new IBM WebSphere CloudBurst Appliance

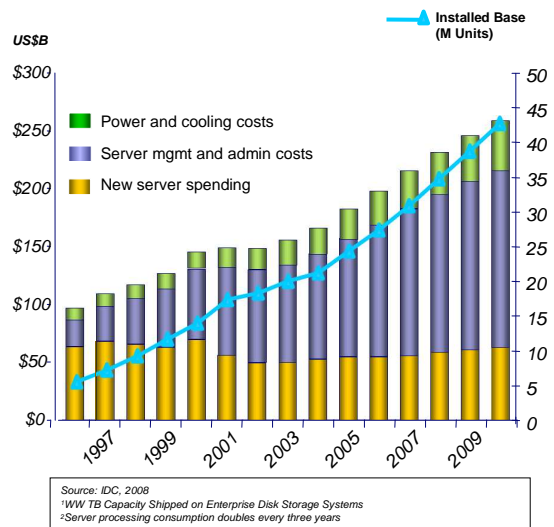**Rajeev Gandhi**

IBM

Aug 5. 2010

Agenda

- Background
- WebSphere CloudBurst Appliance – overview and components
- Virtual images and supported hardware
- WebSphere CloudBurst - life cycle
- Security, Users and Groups
- WebSphere Process Server Hypervisor Edition
- Appliance Management and Data Center Integration
- Demonstration
- Other enhancements
  - Virtual system snapshot and restore
  - Extending virtual images
  - Applying maintenance
  - Securely backup and restore
  - Multi-image patterns
  - SNMP management
  - Dynamic virtual machine operations
  - Licensing
- Automate Pattern customization with Rational Automation Framework for WebSphere
- Summary

1

Section

Background

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[1]
- Server processing capacity doubling every three years[2]
- 10G Ethernet ports tripling over the next five years

Installed Base (M Units)

US$B

- Power and cooling costs
- Server mgmt and admin costs
- New server spending

1997 1999 2001 2003 2005 2007 2009

Source: IDC, 2008
[1]WW TB Capacity Shipped on Enterprise Disk Storage Systems
*[2]Server processing consumption doubles every three years*

2

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
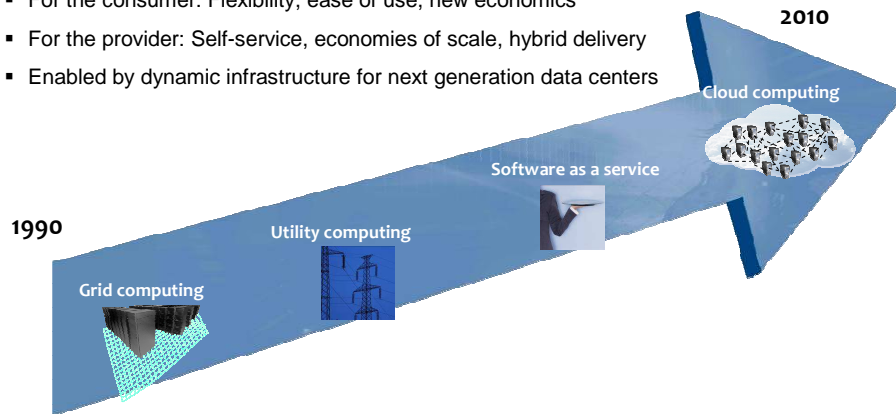
2010

Cloud computing

Software as a service

1990

Utility computing

Grid computing

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
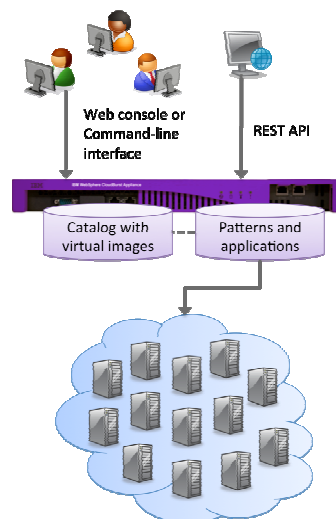
Section

WebSphere CloudBurst
Overview and components

SHARE in Boston: IBM WebSphere CloudBurst Appliance © 2010 IBM Corporation

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## WebSphere CloudBurst is…

- **An appliance from IBM…**
  - Includes:
    - Hardware with built-in security and trust authority
    - WebSphere CloudBurst function
    - WebSphere middleware images
    - WebSphere middleware patterns

- **…that manages your on-premise cloud…**
  - Bring your own enterprise cloud:
    - Hypervisors
    - Storage
    - Network

- **… comprising of WebSphere Middleware Server virtual systems**
  - Customize and extend images and patterns for your applications
  - Dispense and run in the cloud
  - Life cycle management and optimization

Web console or Command-line interface

REST API

Catalog with virtual images

Patterns and applications

SHARE in Boston: IBM WebSphere CloudBurst Appliance © 2010 IBM Corporation

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Components of a WebSphere cloud

- Virtual images provide core components for building virtual systems
  - **WebSphere Application Server Hypervisor Edition**
  - **WebSphere Process Server Hypervisor Edition**
  - **DB2 Hypervisor Edition**
  - …

- **WebSphere CloudBurst Appliance** hosts virtual images in its catalog and dispenses them to your private cloud

- **Private cloud** – set of Hypervisor servers (like ESX Server) hosting virtual systems managed by WebSphere CloudBurst, and set of IP addresses to be used by virtual systems
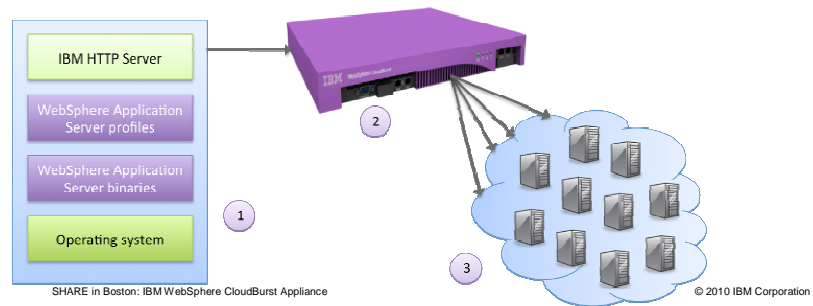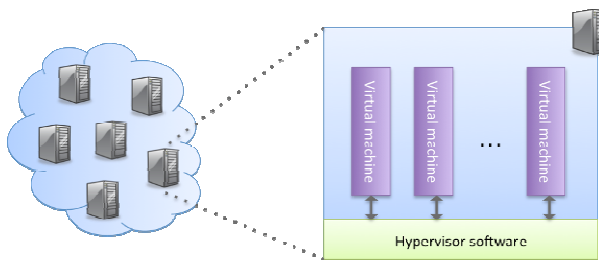

WebSphere Application Server Hypervisor Edition

- 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 – Suse Linux or RedHat Linux
  - 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

5
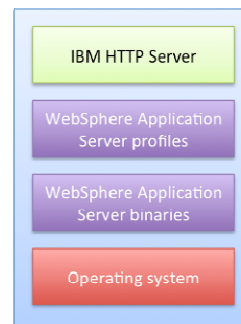
Hypervisor and Cloud resources

- 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
  - **Cloud group:** a group of related hypervisors, used as a target for deployment

---

Supported Middleware Hypervisor editions - Virtual Images

- WebSphere Application Server V6.1 and V7.0
  - All V6.1 Feature Packs - EJB 3.0, Web Services and Web 2.0 Feature packs
  - All V7.0 Feature Packs – SCA, CEA, XML Feature packs
  - IBM HTTP Server
  - IBM HTTP Server Plug-in
  - IBM Update Installer
  - IBM Support Assistant

- IBM WebSphere Application Server Hypervisor Edition Intelligent Management Pack 6.1.1 (for WebSphere Application Server V7.0.0.11)

- WebSphere Process Server V6.2 and V7.0

- DB2 Enterprise 9.7

Not all combinations are supported on all platforms
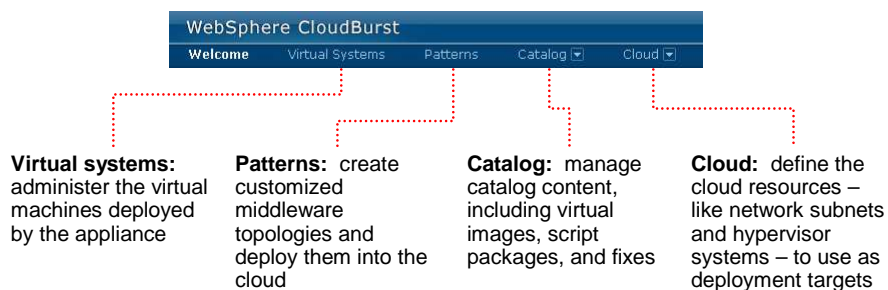**Refer to the Information Center for details including release levels**

Supported Hypervisors and Operating systems

- VMware ESX 3.02, 3.03, 3.5, 4.0 and VMware VirtualCenter
  – RedHat Linux® 5.5 Enterprise server (32-bit)
  – Novell SUSE Linux Enterprise Server 11 (32-bit)

- PowerVM 5 and 6 with IBM Systems Director VMControl
  – AIX® 6.1.3 (64-bit)

- z/VM
  – Novell SUSE Linux Enterprise Server 11 for 390 (64-bit)

**Not all combinations are supported on all platforms
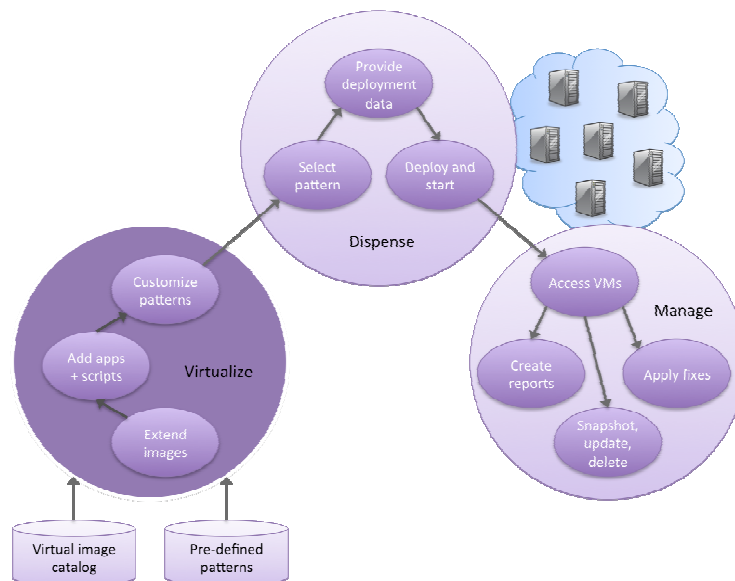Refer to the Information Center for details including release levels**

WebSphere CloudBurst Appliance components

- WebSphere CloudBurst is a physical appliance that is designed to deploy and manage virtualized WebSphere Application Server environments

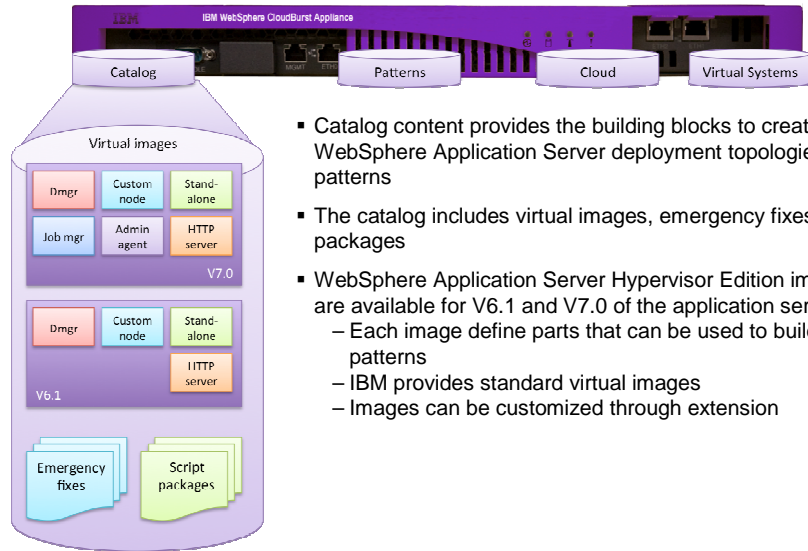- Administrative capabilities of the appliance are available for:

WebSphere CloudBurst

| Welcome | Virtual Systems | Patterns | Catalog ▾ | Cloud ▾ |

Virtual systems: administer the virtual machines deployed by the appliance

Patterns: create customized middleware topologies and deploy them into the cloud

Catalog: manage catalog content, including virtual images, script packages, and fixes

Cloud: define the cloud resources – like network subnets and hypervisor systems – to use as deployment targets

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Section

WebSphere CloudBurst life cycle

WebSphere CloudBurst life cycle – virtualize
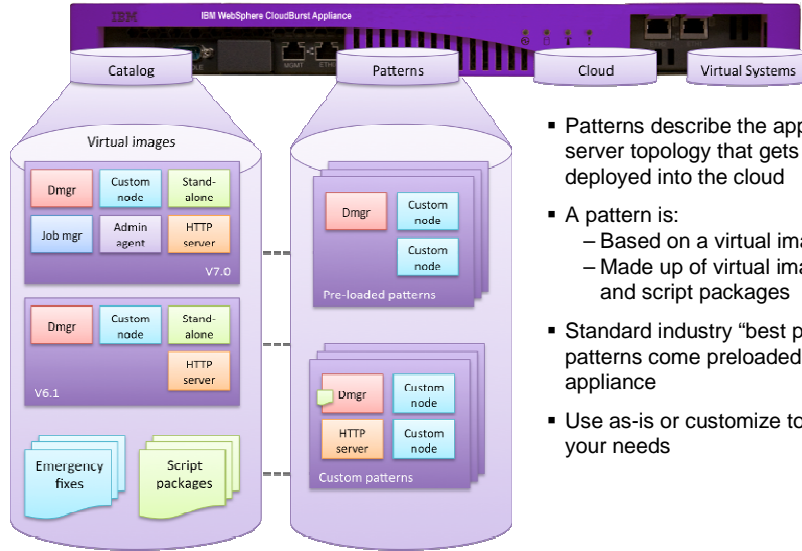
8

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

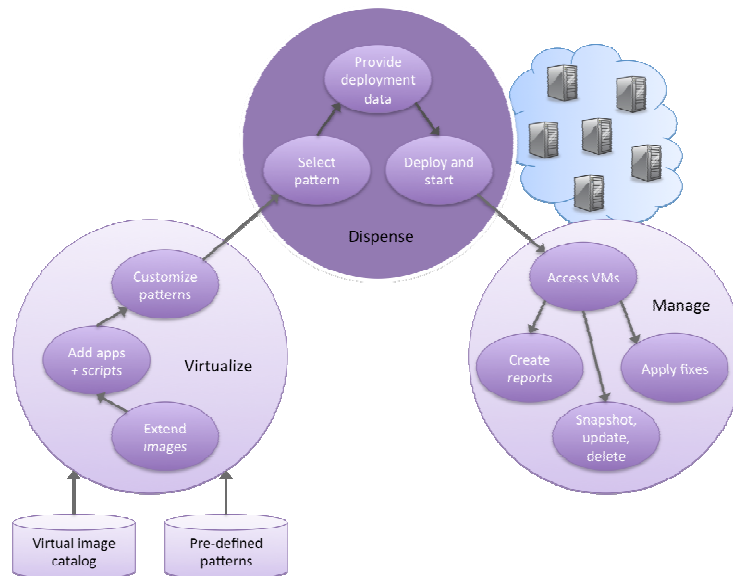## Catalog – emergency fixes and script packages
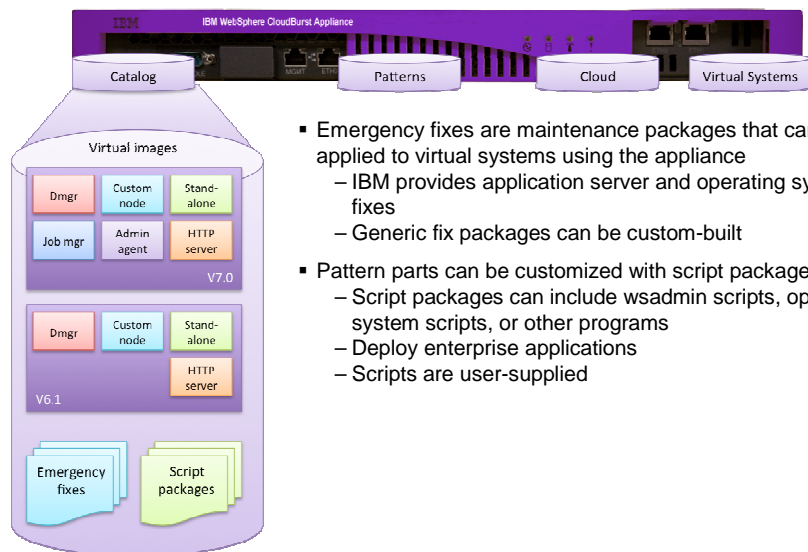
- Emergency fixes are maintenance packages that can be applied to virtual systems using the appliance
  - IBM provides application server and operating system fixes
  - Generic fix packages can be custom-built
- Pattern parts can be customized with script packages
  - Script packages can include wsadmin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

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Patterns

Catalog · Patterns · Cloud · Virtual Systems

Virtual images

V7.0: Dmgr, Custom node, Stand-alone, Job mgr, Admin agent, HTTP server

V6.1: Dmgr, Custom node, Stand-alone, HTTP server

Emergency fixes · Script packages

Pre-loaded patterns: Dmgr, Custom node, Custom node

Custom patterns: Dmgr, Custom node, HTTP server, Custom node

- 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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WebSphere CloudBurst life cycle – dispense

Dispense: Provide deployment data, Select pattern, Deploy and start

Virtualize: Customize patterns, Add apps + scripts, Extend images

Manage: Access VMs, Create reports, Apply fixes, Snapshot, update, delete

Virtual image catalog · Pre-defined patterns

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Cloud resources

- Cloud resources exist outside of the appliance
  - Network, hypervisors, storage
  - Cloud components must be configured before using with WebSphere CloudBurst
- Define IP groups, hypervisors, cloud groups in the appliance configuration
- Pattern deployment is targeted to a cloud group
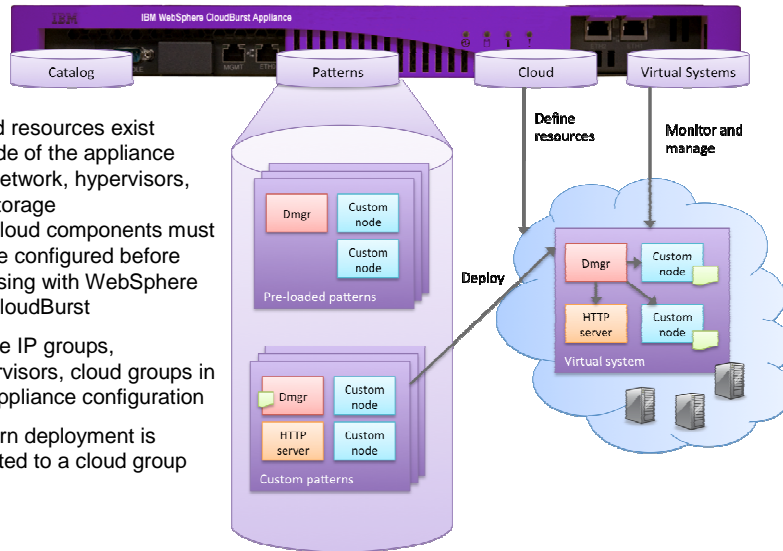
SHARE in Boston: IBM WebSphere CloudBurst Appliance

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Virtual systems

- 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
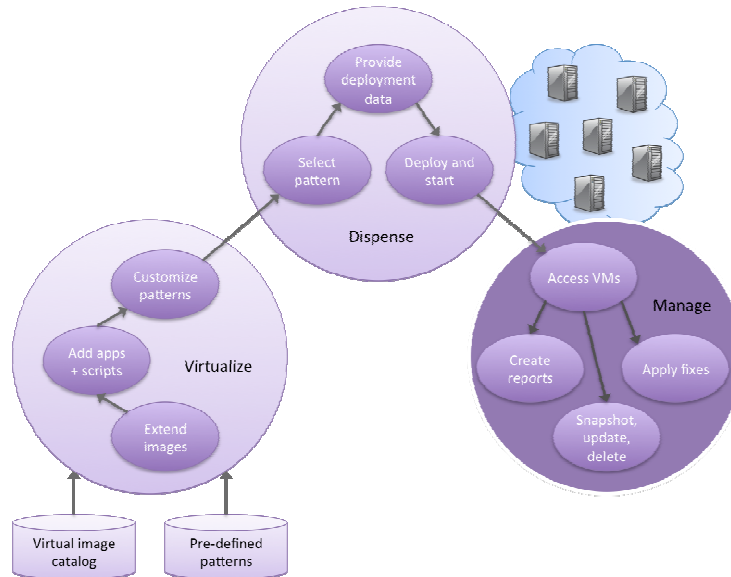 - Fully functioning and configured WebSphere Application Server environment
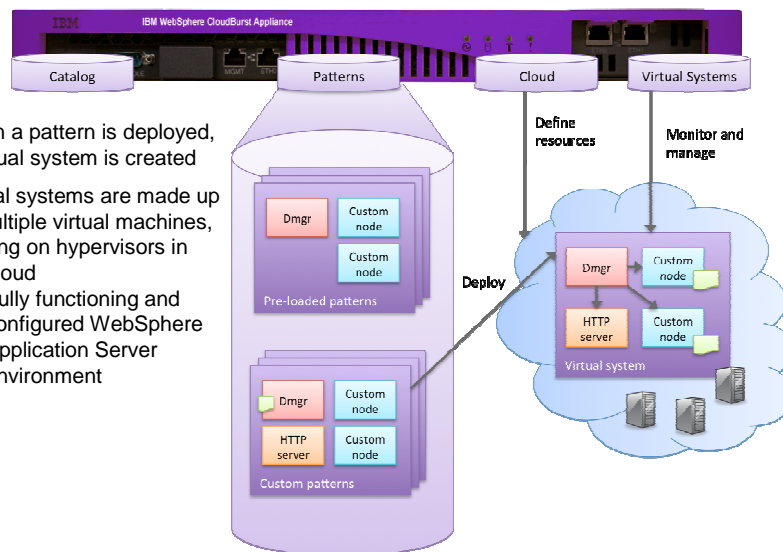
SHARE in Boston: IBM WebSphere CloudBurst Appliance

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WebSphere CloudBurst life cycle – manage

WebSphere Application Server management

- Once deployed, WebSphere Application Server environments are managed and accessed in traditional ways
  – Administrators access the console
  – Clients access applications

- WebSphere CloudBurst provides access points for the deployed environment
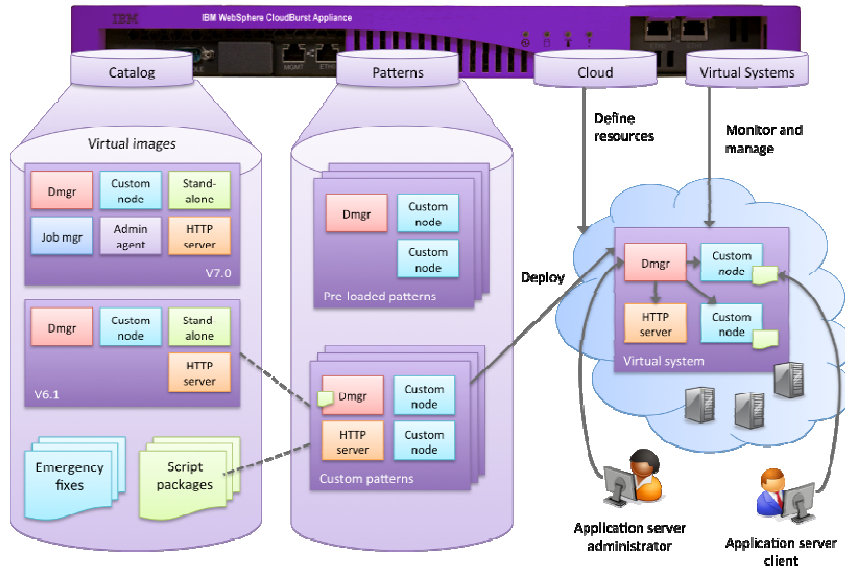 – WebSphere Application Server console
  – VNC
  – SSH
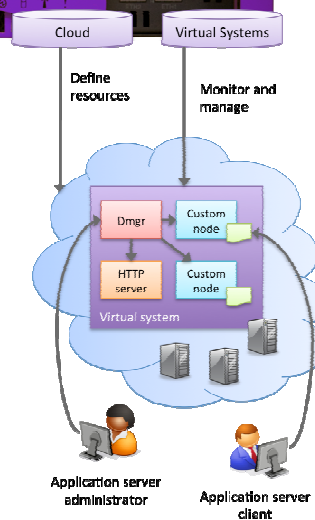
Full deployment model

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Section

Security, Users and Groups

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Users and Groups - overview

- A user account allows an individual to access the IBM WebSphere CloudBurst Appliance

- The users feature of WebSphere CloudBurst allows you to define individual users in order to create new accounts

- The user groups feature of WebSphere CloudBurst allows you to group user accounts into logical sets

- Users and user groups are provided so that you can manage the permissions set for each individual for the IBM WebSphere CloudBurst Appliance

- User and Groups can be stored in the Appliance or can use a LDAP Server
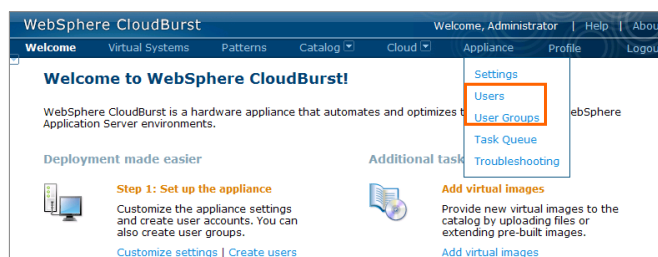
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User level operations

- The user panel under **Appliance > Users**
  - Displays user status icons and detailed user information
  - Can be used to create, modify and remove users

- User permissions can be specified from this page if the user is not a member of a user group

- If LDAP authentication is enabled, the user's password can not be set from the appliance
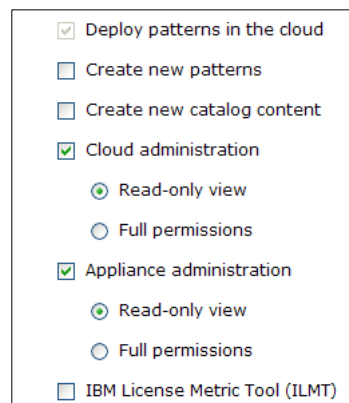
14

Group level operations

- Group-level permissions
  – Set permissions for all
    group members at once
- Included user status icons on
  the group details page
  – Under **Appliance > User
    Groups > group_name**

Description:	non-admin users
Created on:	Jun 18, 2010 11:54:04 AM
Updated on:	Jun 18, 2010 11:54:04 AM
Group members:	(none)
	Add more...
Permissions:	☑ Deploy patterns in the cloud
	☐ Create new patterns
	☑ Create new catalog content
	☐ Cloud administration
	⦿ Read-only view
	○ Full permissions
	☐ Appliance administration
	⦿ Read-only view
	○ Full permissions
	☐ IBM License Metric Tool (ILMT)

Appliance security
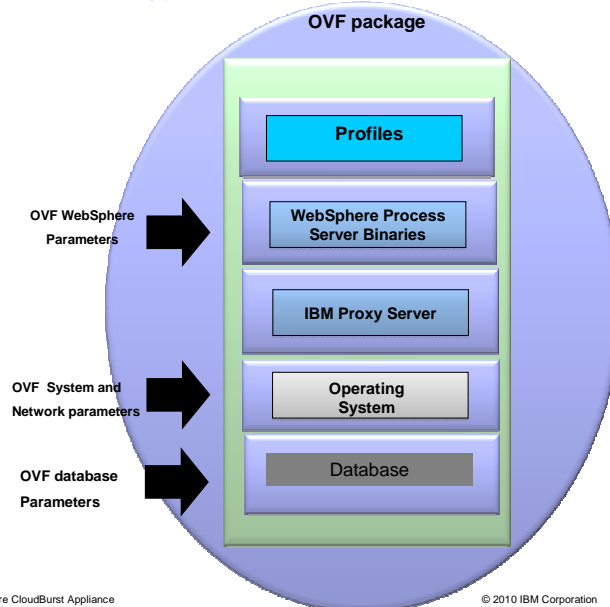
- Contents of flash drive and hard disks are encrypted using
  key unique to the appliance

- Sensitive data such as passwords and encryption keys stored
  on internal flash drive inside tamper proof case

- Appliance provides no way for user to upload executable
  scripts or code outside of the script package mechanism

- System backup is encrypted

- Appliance contains no command shell

Section

WebSphere Process Server Hypervisor Edition

IBM WebSphere Process Server Hypervisor Edition

OVF package

- Preinstalled, configured, and tuned
- Open Virtualization Format standard packaging
- WebSphere Process Server V6.2 and V7.0
- Available as a stand-alone image, or with WebSphere CloudBurst

OVF WebSphere Parameters →

OVF System and Network parameters →

OVF database Parameters →

Profiles

WebSphere Process Server Binaries

IBM Proxy Server

Operating System

Database

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Using WebSphere Process Server and WebSphere CloudBurst

- WebSphere Process Server virtual image included with WebSphere CloudBurst 2.0
- Create WebSphere Process Server pattern
- Edit WebSphere Process Server pattern
- Specify deployment parameters
- Deploy WebSphere Process Server to virtual system
- Access WebSphere Process Server virtual system parts in their virtual machines


WPS HVE - Patterns

- WebSphere Process Server comes preconfigured with three patterns
  – Single Server for WebSphere Process Server
  – Simulated Scalable Environment for WebSphere Process Server
  – Scalable Environment for WebSphere Process Server

- Use pattern parts to create custom patterns
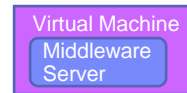
Patterns – Single server

- Uses the stand alone server part
- Deployed to one virtual machine

DB2 Server
Process Server
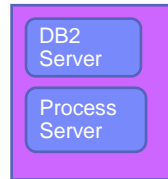
Stand Alone Profile

Single Java Virtual Machine (JVM)

Key

Virtual Machine
Middleware Server

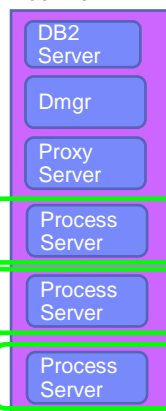## Patterns – Simulated Scalable Environment

- Uses the full function control node part
- Deployed to one virtual machine

DB2 Server
Dmgr
Proxy Server
Process Server
Process Server
Process Server

Remote messaging, remote support Process Server deployment pattern

Single Virtual Machine (VM)

App Target Cluster

Support Cluster

Messaging Cluster

Key

Virtual Machine
Middleware Server

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Patterns – Scalable Environment

- Uses the deployment manager, proxy server, database, full function control node and two basic function node parts
- deployed to 5 virtual machines
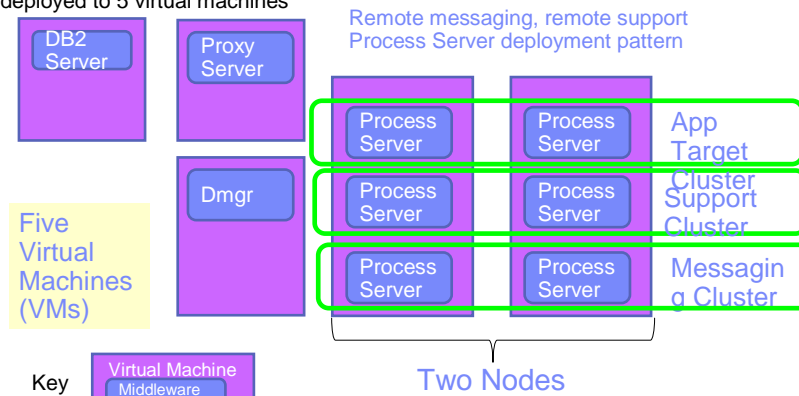
Remote messaging, remote support
Process Server deployment pattern

DB2 Server

Proxy Server
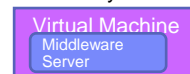
Dmgr

Five Virtual Machines (VMs)

Process Server	Process Server	App Target
Process Server	Process Server	Cluster Support Cluster
Process Server	Process Server	Messaging Cluster

Two Nodes

Key — Virtual Machine / Middleware Server

Section

Appliance Management and Data Center Integration

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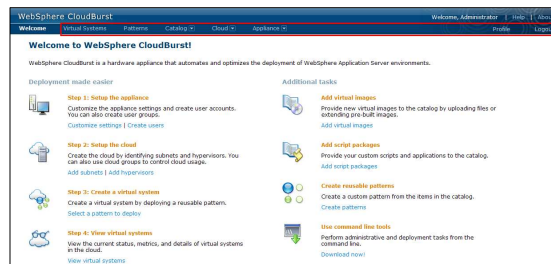## CloudBurst appliance management

- Administrative Web console
- Command Line Interface
- REST APIs to access the appliance

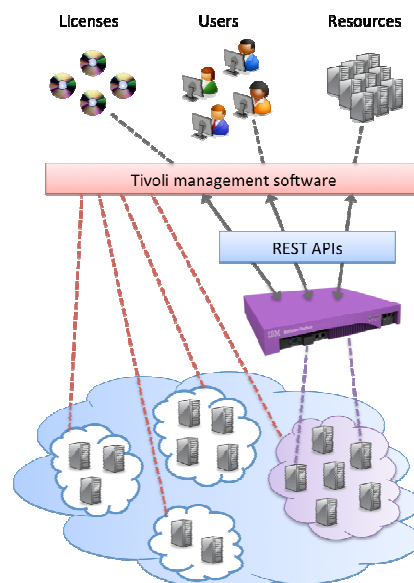## Data center integration

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

Section

Virtual system snapshot and restore

SHARE in Boston: IBM WebSphere CloudBurst Appliance © 2010 IBM Corporation

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Virtual System Snapshot and Restore

- CloudBurst provides mechanism to snapshot and restore all the virtual images within a Virtual system
  – Useful to take snapshot of working system that can be restored later, if needed

- On Snapshot
  – CloudBurst calls out to the hypervisor to initiate a snapshot create command
  – Snapshot is created for all virtual images in a given Virtual system
  – Snapshot is stored on the hypervisors where the virtual images are located, and not on CloudBurst – Can have only 1 snapshot at any given time

- On Restore
  – CloudBurst calls out to the hypervisor to initiate a snapshot restore command
  – Virtual system must be restarted after restore

WebSphere CloudBurst — Welcome, Administrator | Help | About

Welcome | **Virtual Systems** | Patterns | Catalog | Cloud | Appliance | Profile | Logout

Virtual Systems

Search...

My Cloned Lab Virtual System

My Cloned Lab Virtual System

Created on: Apr 16, 2009 9:47:35 PM
From pattern: My Cloned Lab Pattern
Current status: The virtual system has been deployed and is ready to use
Updated on: Apr 16, 2009 11:46:36 PM
Access granted to: Administrator [owner]
Add more...

Snapshot: Create | Restore

Take a snapshot of the virtual system

Restore from previous snapshot

History

Virtual machines

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IBM

Section

Extending Virtual Image

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IBM

Extend and capture process

- You can extend image to add maintenance files, add other products, etc.

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22
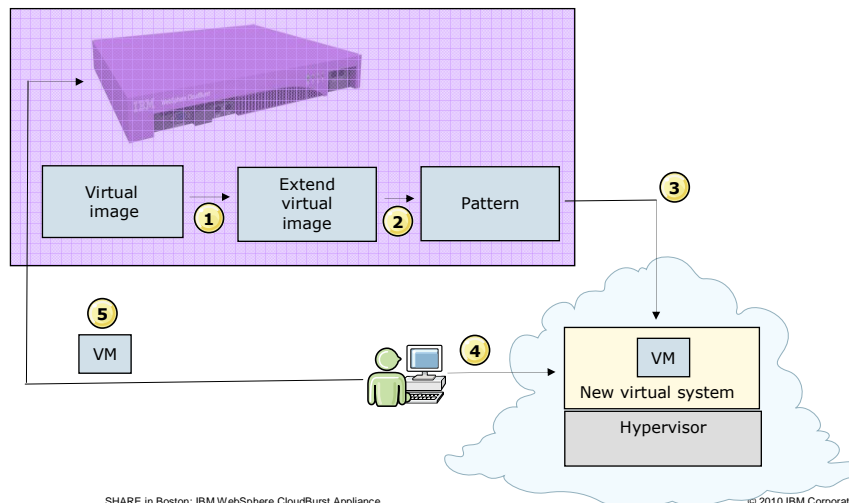
Section

Applying Maintenance and Emergency Fixes to Virtual Image

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Emergency fixes

- Emergency fixes
  - Fixes for Middleware - WebSphere Application Server, WebSphere Process Server …
  - Fixes for virtual system binaries example: OS

- Types of emergency fixes
  - Service packs (provided by IBM)
  - iFixes (provided by IBM)
  - Generic fixes (packaged by end users)

- There are three approaches to apply fixes
  - Redeploy virtual systems with updated images
    - Recommended approach
    - IBM provides updated images in this case
  - Apply fix packs and emergency fixes directly to virtual system
  - Apply fixes directly to virtual systems without WebSphere CloudBurst
    - Not recommended, but possible using existing fix automation tools

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Steps to Apply Maintenance

- Create a new Emergency fix – give a name, upload the file and
- Apply to the Virtual system
- Snapshot is created before fix is applied
- You can rollback the fix by restoring the snapshot
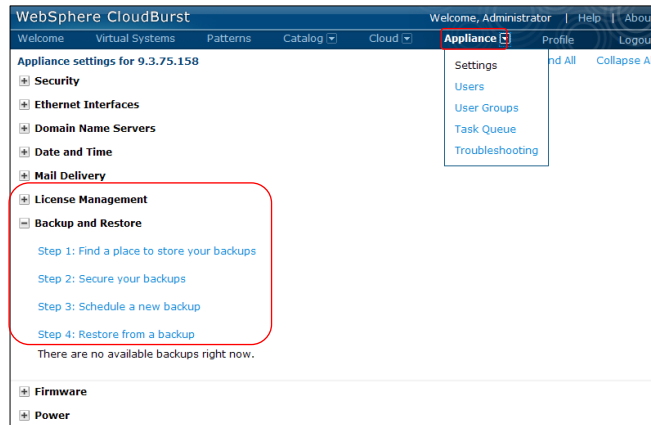- Service history maintained

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Section

Securely Backup and Restore Appliance configuration

Backup and restore

- Backup your appliance to a remote location securely
  - Can use your own certificate or have CloudBurst generate one
- Restore your appliance from a previous backup
- Can schedule backup and/or restore

Section

Intelligent management pack

Intelligent management pack

- Intelligent management pack feature set is similar to WebSphere Virtual Enterprise's feature set

- WebSphere CloudBurst Appliance benefits
  - Easily configurable WebSphere Application Server topologies with advanced functionality
  - Support "best practices" through pre-defined patterns and script packages

- Intelligent management pack benefits
  - JVM mobility through dynamic clusters
  - Apply maintenance with no loss of application service

- All integration features are supported on VMware, PowerVM™ and z/VM platforms

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WebSphere Virtual Enterprise / patterns

- Two enhanced patterns come preloaded on the WebSphere CloudBurst Appliance
  - Simple single cell topology
  - Standard single cell topology

Standard single cell topology

Simple single cell topology
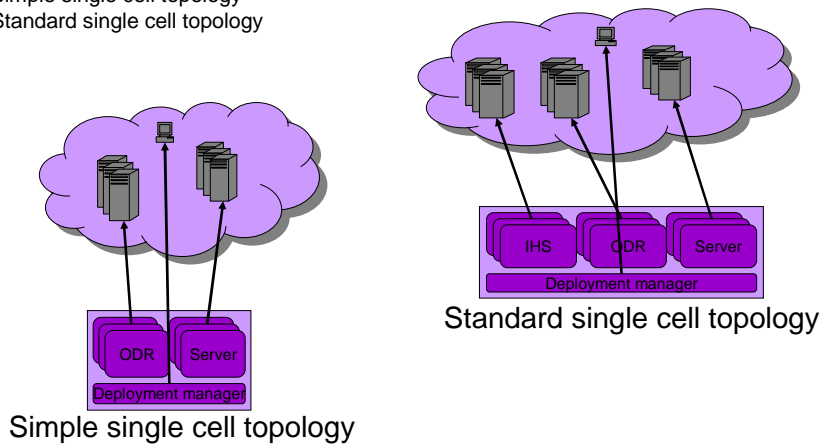
WebSphere Virtual Enterprise / advanced features
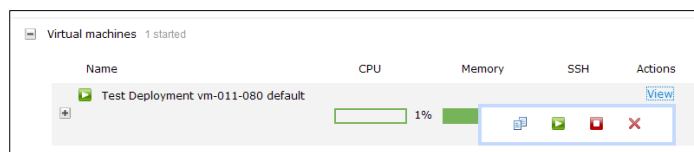
- WebSphere Virtual Enterprise configurable options integrated into the WebSphere CloudBurst Appliance
  – Health management
  – Overload protection
  – Dynamic clustering

Section

Dynamic virtual machine operations

IBM

Dynamic virtual machine operations

- What
  - Ability to add or remove virtual machines after deployment in order to handle varying workload

- Benefits
  - Gives you the flexibility to react to workload
  - Original pattern is preserved
  - No disruption to application availability or running virtual system
  - Can start or stop individual virtual machine

- How
  - Each virtual machine has Clone, Start, Stop and Delete operations
  - Clone adds a virtual machine for increased workload, whereas Delete removes the virtual machine for decreased workload
    - Any applicable script or maintenance packages are run at the time of the operation

Virtual machines 1 started					
Name	CPU	Memory	SSH	Actions	
Test Deployment vm-011-080 default				View	
	1%				

IBM

Section

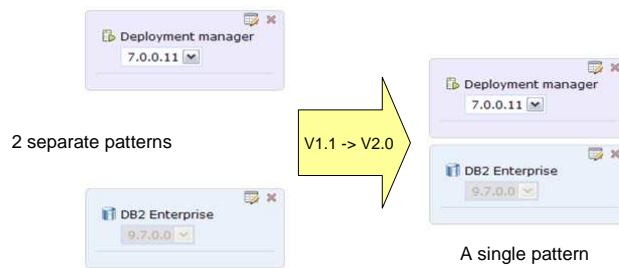# *Multi-image pattern composition*

Multi-image composition

- Allows you to compose a single pattern that spans multiple IBM products and versions
- All virtual image parts making up a pattern must come from the same architecture (ESX, PowerVM or z/VM)

2 separate patterns

V1.1 -> V2.0

A single pattern

Section

License tracking and placement

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IBM

License tracking and placement

- Manage virtual image licenses using the WebSphere CloudBurst Appliance to prevent exceeding license allotment
    - Configure the number of licenses per virtual image
    - Configure action to take when license usage has exceeded or is approaching allotment
        - Warn administrator if closing in on allotment
        - Allow deployment if allotment exceeded, but issue notification
        - Deny deployment if allotment exceeded
- Appliance maintains max usage logs which meet IBM license audit requirements
- License reporting can be done in the IBM License Metric Tool (ILMT)
- All license management features in appliance UI have been grouped together

Product	Product ID	Enforcement	Licenses owned (PVUs)	Notify if usage reaches	Licenses in use (PVUs)	Licenses reserved (PVUs)	In the cloud now
IBM WebSphere Application Server Hypervisor Edition	5724-X89	Ignore	0	90.0 %	0	0	0 virtual systems

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IBM

Section

SNMP management

SNMP management

- Manage the WebSphere CloudBurst Appliance using the industry standard Simple Network Management Protocol (SNMP)

- Appliance can be monitored as part of the larger datacenter using products such as:
  - IBM Tivoli® Composite Application Manager (ITCAM)
  - IBM Director
  - HP OpenView
  - Any monitoring client that can consume MIB-II data

Section

Automate CloudBurst Pattern Customization with Rational Automation Framework for WebSphere (RAFW)

Automate Pattern Customization with Rational

Automate for Agility

✓ Automating cloud development reduces time-to-market and delivers higher quality, consistent results

✓ Automate your existing tools and processes, gain rapid ROI, and then fine-tune your cloud development for increased efficiency and savings

Gain Control of WebSphere Environments

✓ Over 500 field-proven automated tasks for configuration and application deployment to Application Server and Portal Server targets

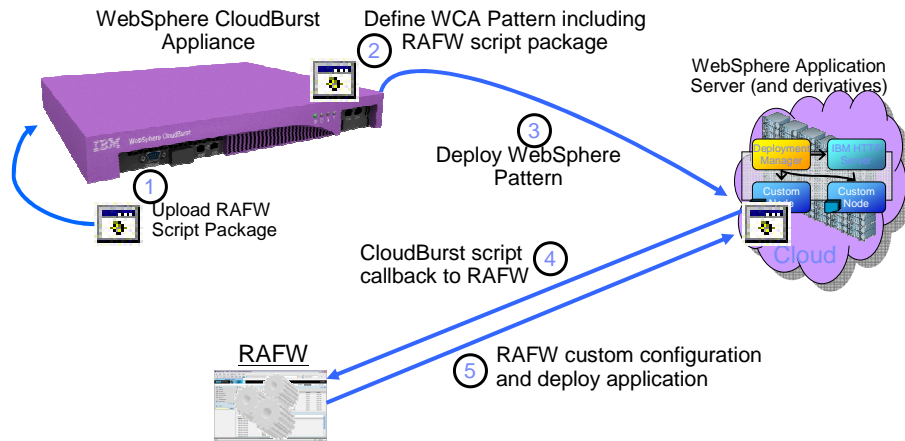Head for the Clouds for Greater Resource Utilization

✓ Ensure efficient and consistent use of WebSphere CloudBurst images for many types of environments, including development, testing, and production scenarios

✓ Rational Automation Framework for WebSphere integration with WebSphere CloudBurst delivers on-demand, easily customized middleware appliances for all purposes

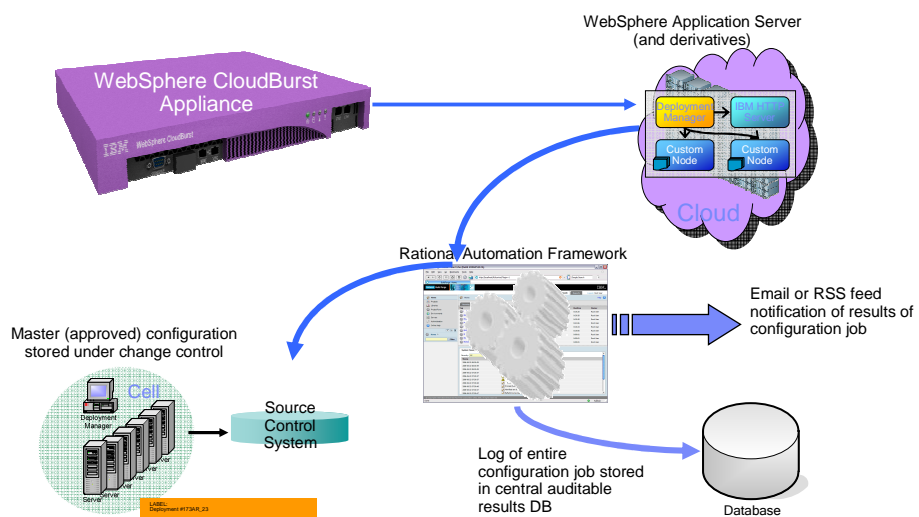Configure WCA Pattern customized by RAFW

RAFW and WebSphere CloudBurst Appliance

WebSphere CloudBurst Appliance

Define WCA Pattern including RAFW script package ②

WebSphere Application Server (and derivatives)

③ Deploy WebSphere Pattern

① Upload RAFW Script Package

CloudBurst script callback to RAFW ④

RAFW

⑤ RAFW custom configuration and deploy application

Note: This scenario can be extended to include additional Rational components including Rational Asset Manager, Rational AppScan, and Rational Software Architect

Use RAFW to capture WCA configuration

WebSphere CloudBurst Appliance

WebSphere Application Server (and derivatives)

Cloud

Rational Automation Framework

Master (approved) configuration stored under change control

Cell

Source Control System

Email or RSS feed notification of results of configuration job

Log of entire configuration job stored in central auditable results DB

Database

33

Section

Summary

IBM

Summary

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

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

Approvals

Operating system installation

HW procurement

License management

Middleware installation

Application installation
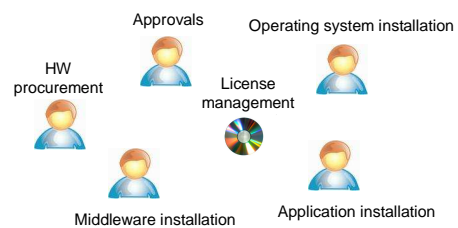
OR

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
- IBM Education Assistant
  - http://publib.boulder.ibm.com/infocenter/ieduasst/v1r1m0/index.jsp

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