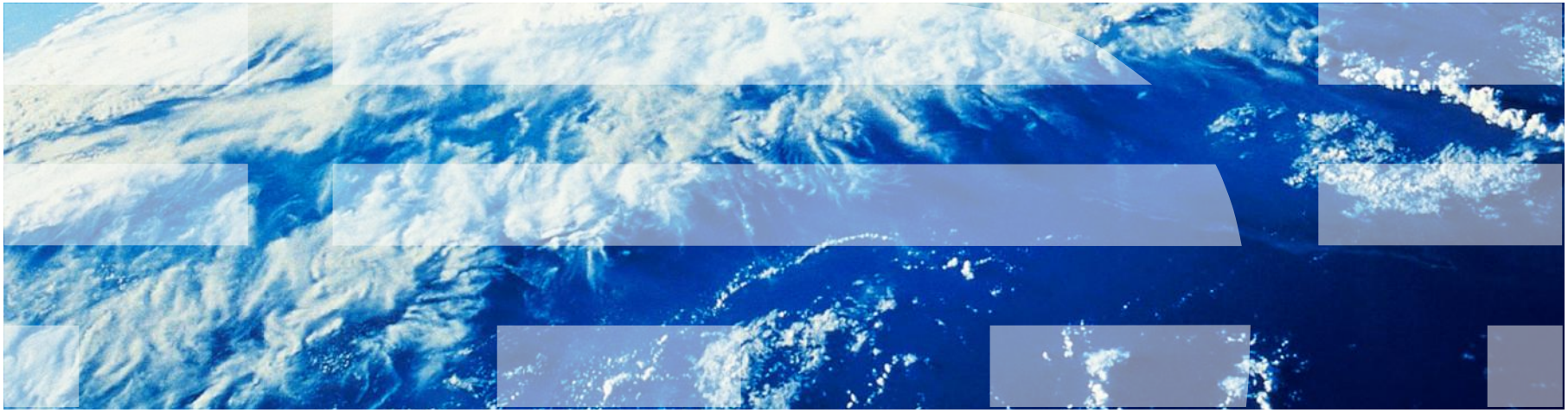
Jonathan Marshall (marshalj@uk.ibm.com) @jmarshall1 - WebSphere Client Technical Professional

Moving WebSphere towards the cloud



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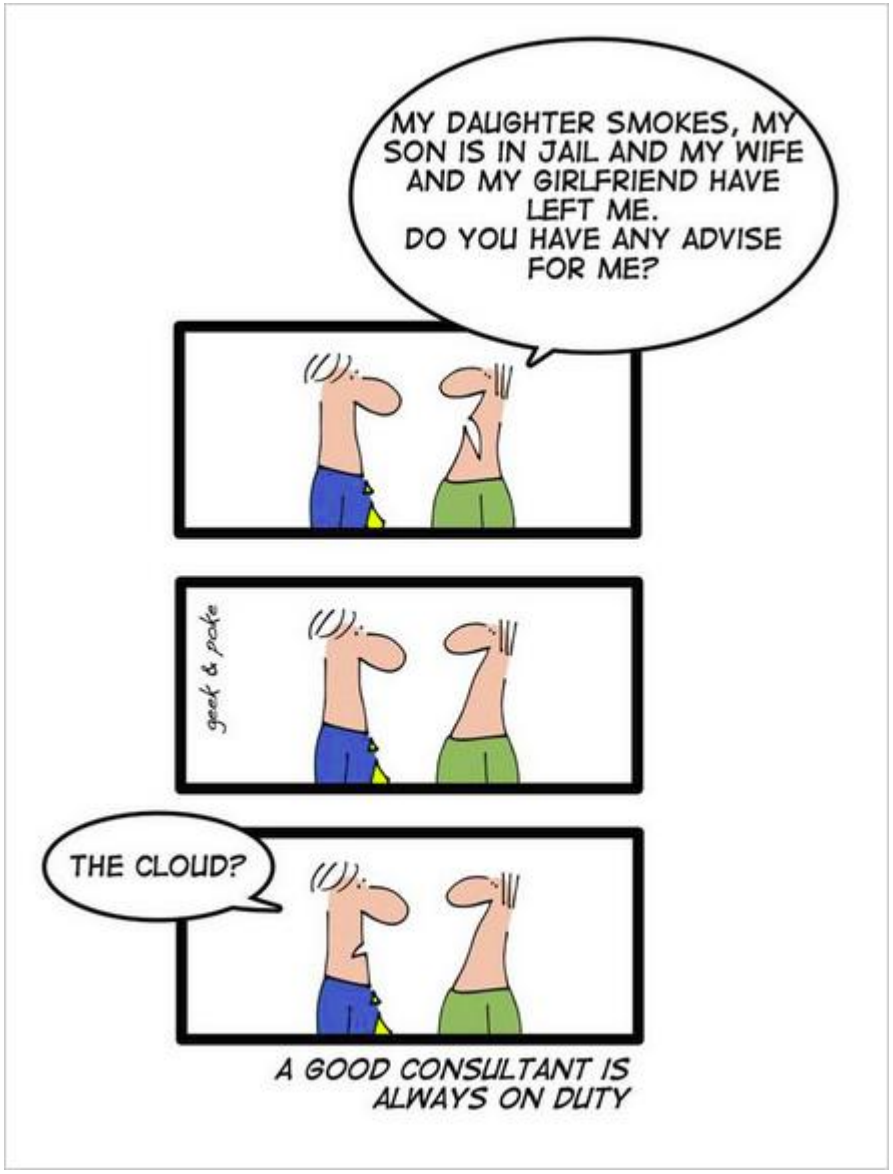
What do we mean by cloud?



Comic by Geek and Poke

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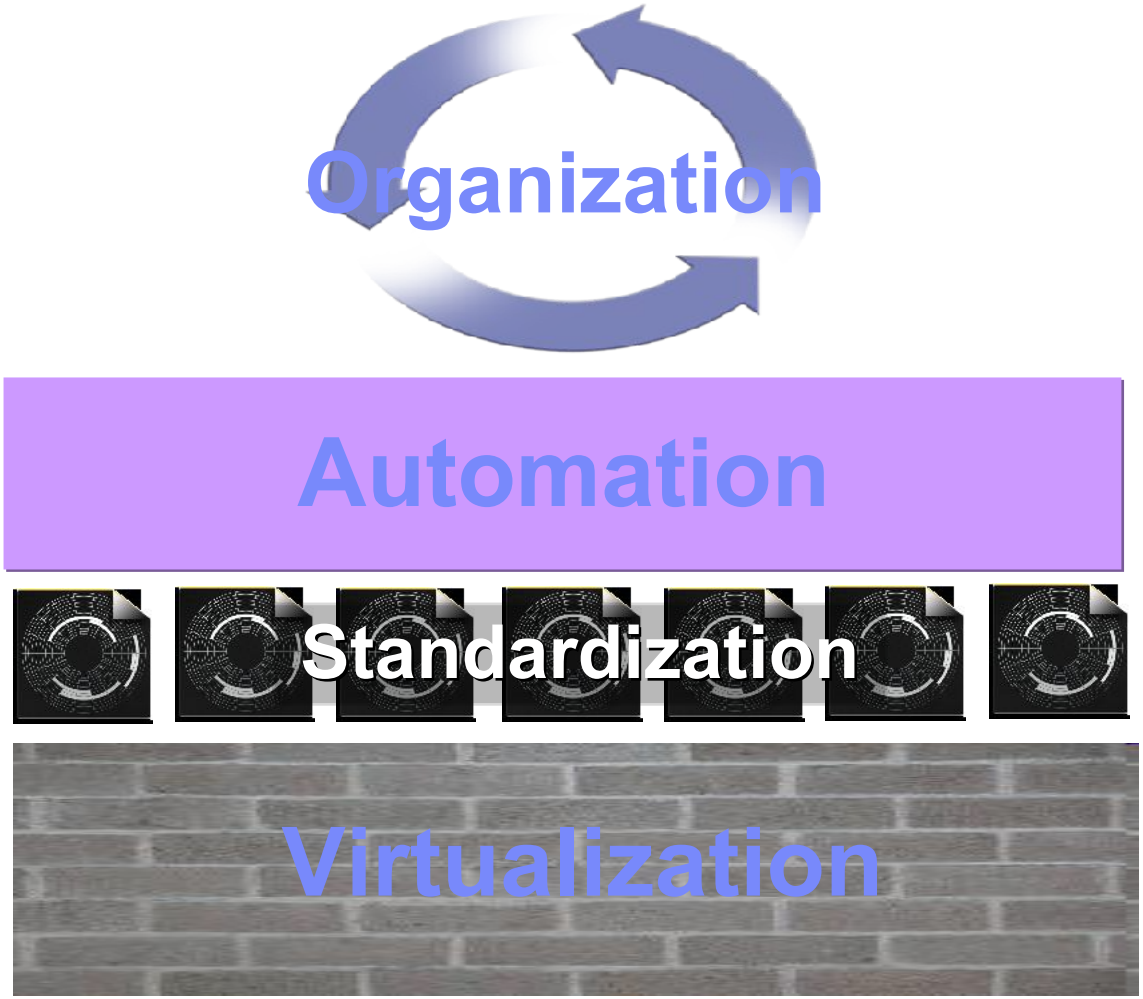
What do we mean by cloud?



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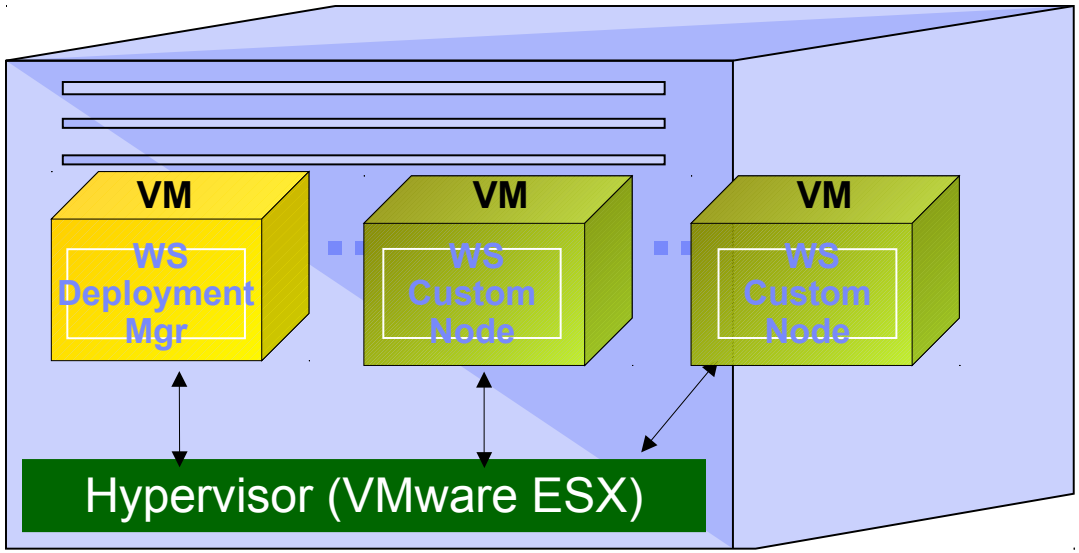
VIRTUALISATION

Allows you to run more than one logical machine on one physical machine; benefits being …

1. **Increased resource utilization**
2. **Increased agility**: (start/stop and copy/modify of different configs quicker)
3. **Isolation**
4. **Portability**



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STANDARDIZATION: Virtualized Middleware can be deployed as different constructs

Developing reusable, standardized constructs

- Script Packages
  Configuration
  Applications

- Patterns of Deployment (topologies)
  Standalone vs Clustered

- Virtual Images
  “Ready to go” Zero install

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AUTOMATION

These processes are executed serially for each new app environment:

Approvals	Procurement	HW Install	OS Install	MW Install	App Install/Config

2-4 month lead time

Factor out repetitive tasks

Approvals	Procurement	HW Install

Done once at cloud creation/expansion time

OS Install	MW Install	App Install/Config

Done once at image/pattern creation/customization time

Click "Deploy" and wait

Done for each environment request

Down to Hours or Minutes

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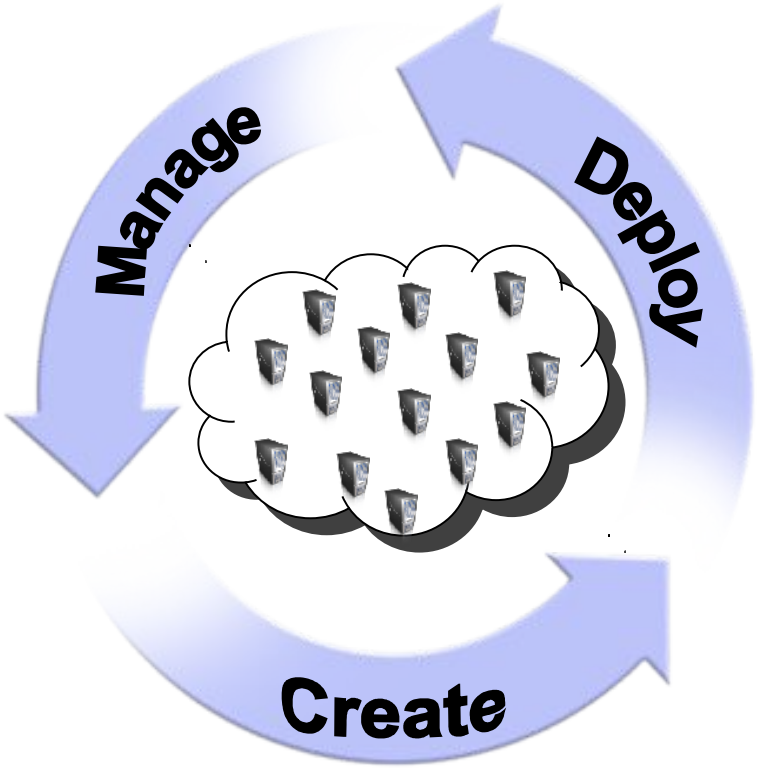
ORGANIZATION

- Pattern Building
  - Create custom virtual images
  - Create custom patterns
- Self-provisioning
  - Provide custom deployment information
  - Use and then return capacity to pool
- Virtual system management
  - Monitor resource usage
  - Start, stop, and remove virtual systems
  - Create snapshots of virtual systems
  - Apply fixes and service level upgrades



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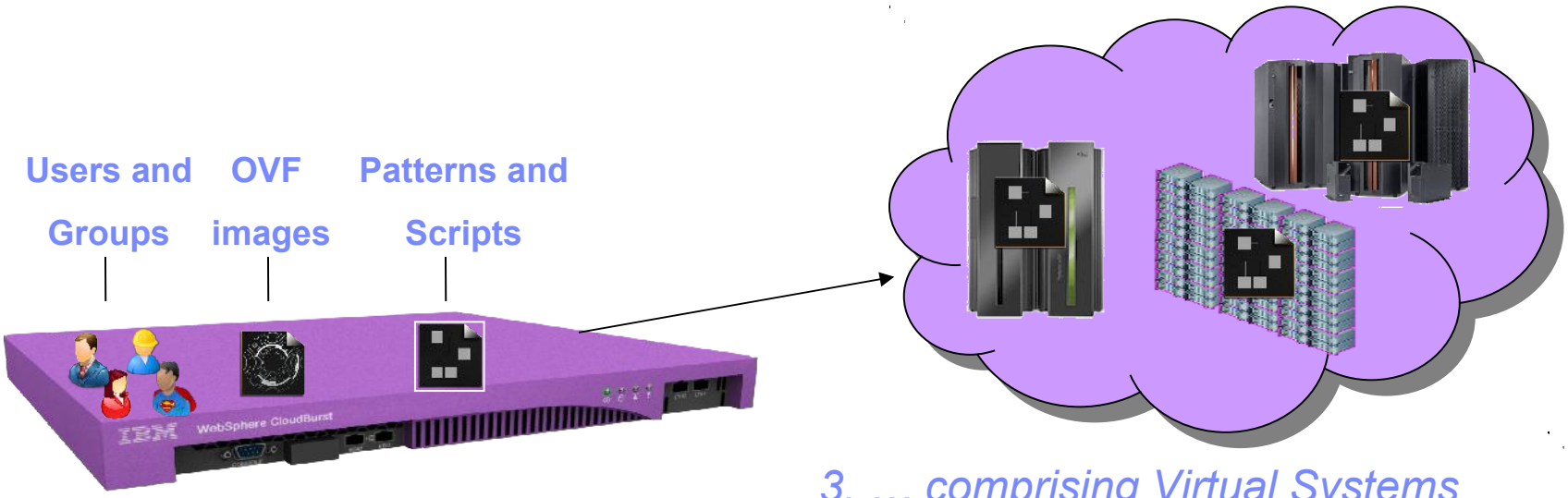
IBM Workload Deployer with Hypervisor Edition Images

1. An appliance from IBM…

2. …that manages your on-premise cloud…



3. … comprising Virtual Systems

Web 2.0 UI, CLI, and REST APIs

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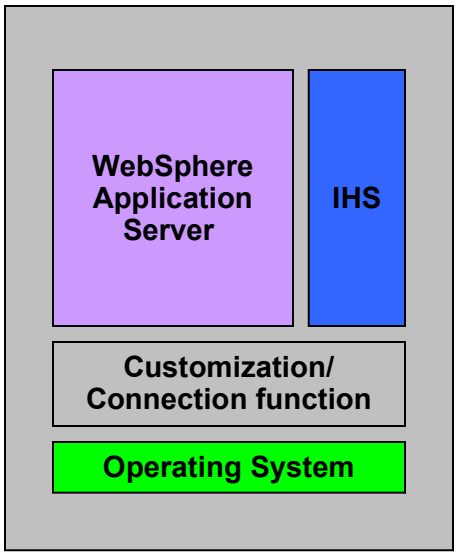
IBM Hypervisor Edition Products

The building blocks for the virtual systems

- Shipped ready to run on a hypervisor (VMware ESX, PowerVM, z/VM)
- Open Virtualization Format standard base packaging
- No installation required (just run)
- Maintenance, support, and fixes through IBM for entire image



WebSphere Application Server Hypervisor Edition

WebSphere Process Server Hypervisor Edition

WebSphere Business Monitor Hypervisor Edition

WebSphere Message Broker Hypervisor Edition

WebSphere Portal Hypervisor Edition

DB2 Enterprise Edition

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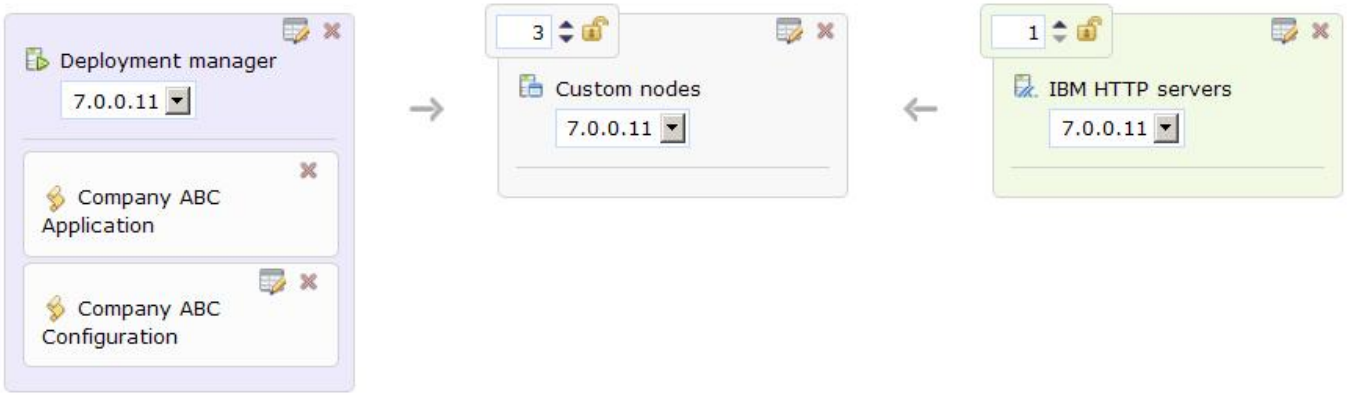
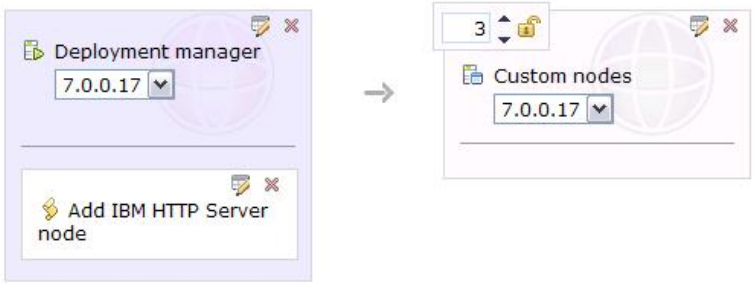
Pattern examples



OR



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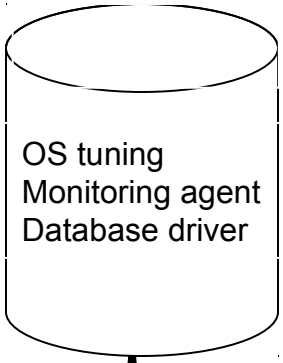
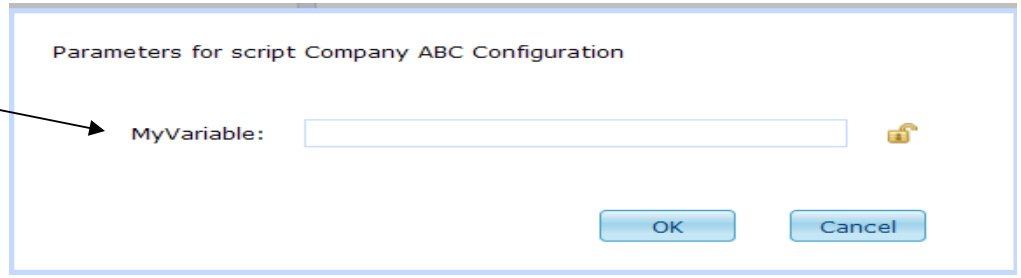
Opportunities for customization

1. Within the Image Extend/Capture)



2. Within the pattern

But doesn't this break our *standardisation* criteria?



3. With script packages and parameters

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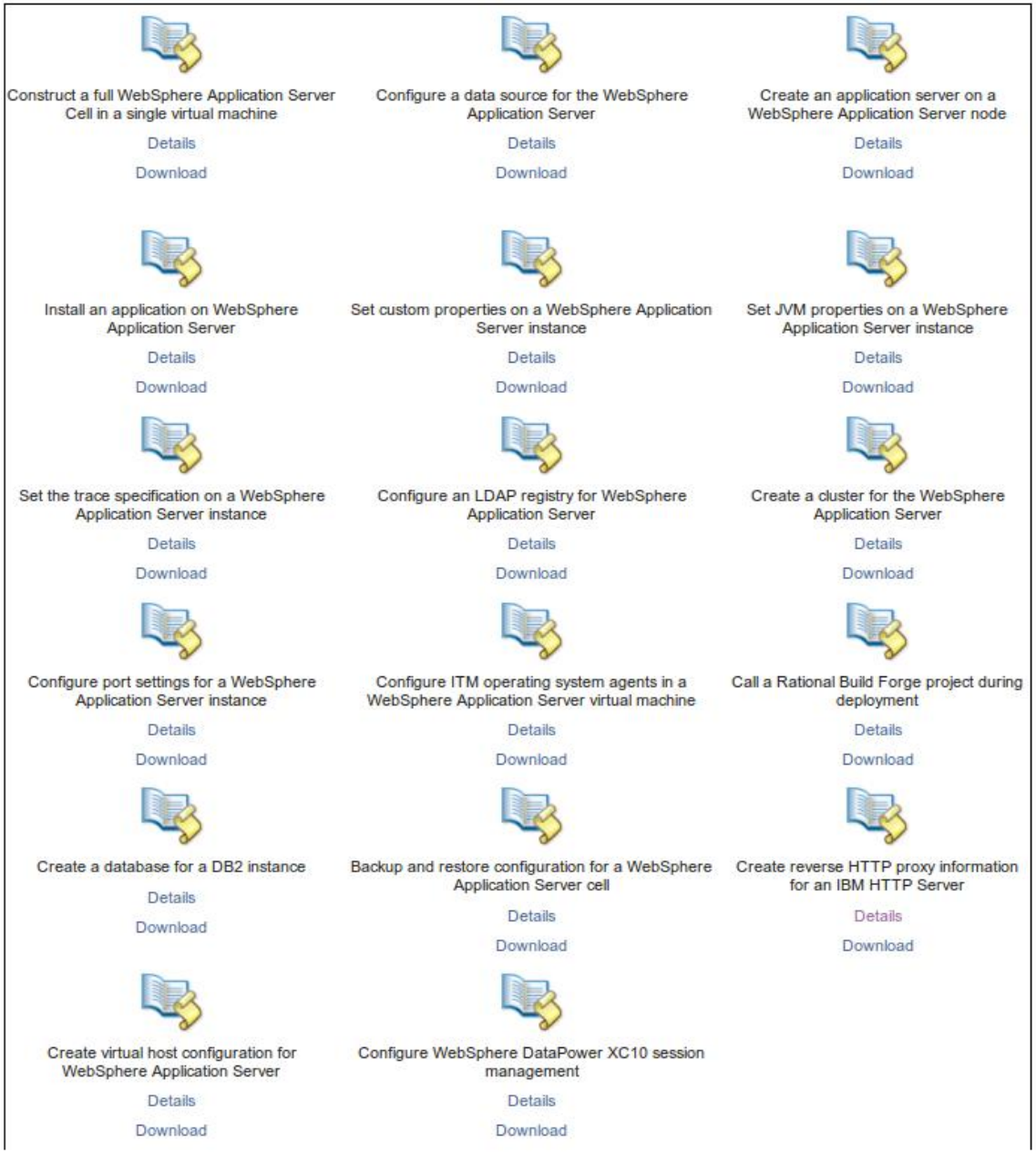
Script Packages



Available from
http://bit.ly/wcaSamplesGallery

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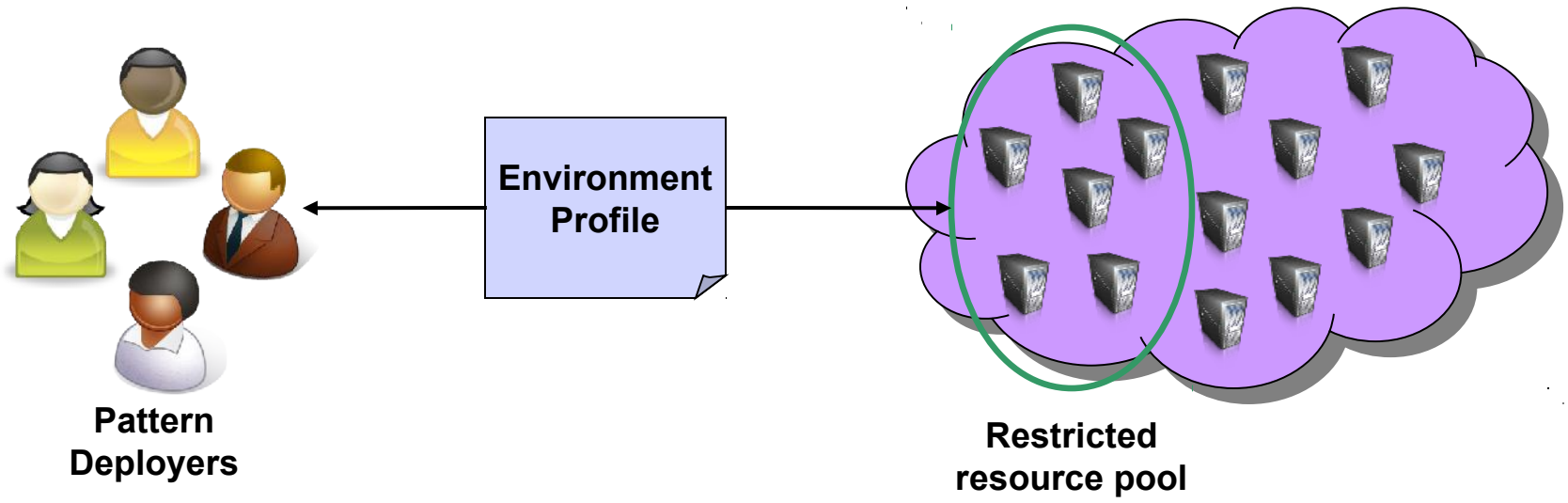
Environment Profiles

Specify a set of capabilities and parameters to a group of users

- Assign IPs, cloud group mappings, virtual machine names
- Set limits on cloud resource consumption (CPU, memory, storage)
- Provide data storage mapping rules for virtual machines



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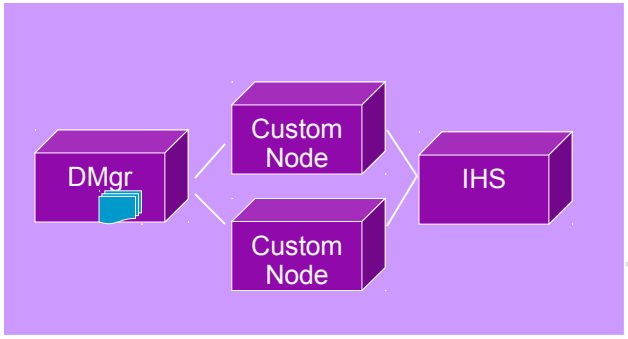
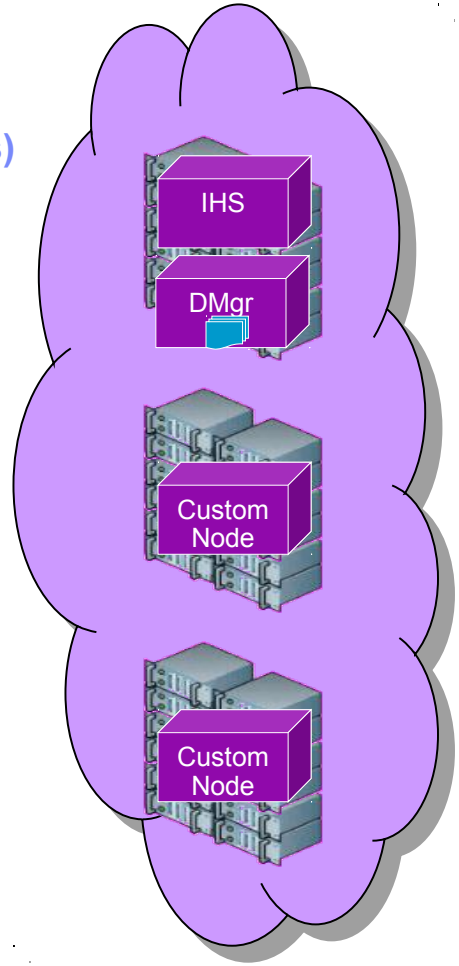
From Pattern to Virtual System

1. Choose hypervisor(s)
2. Create virtual machines
3. Inject IP addresses
4. Start VMs and software
5. Run scripts



Pattern

Placement of Virtual Images



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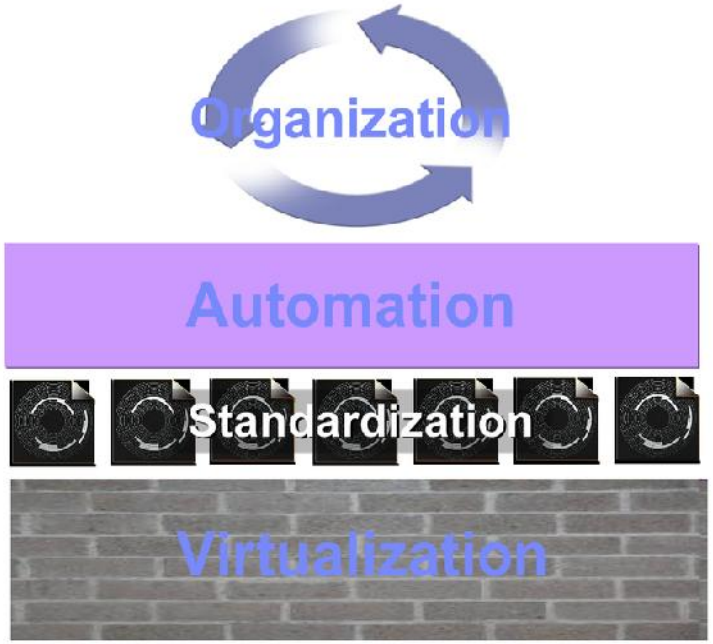
Reduced deployment from 3 months to 3 hours

Dramatically reduced effort (cost) to obtain an environment

Creates new business opportunity

Improved quality of deliverables

Decommissioning of environments might actually happen!



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Aren't we missing a buzzword?

Elasticity

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What does elasticity mean?

- Capacity on demand (and shrink when not needed)
- Self-healing
- Seamless growth/stretching
- Commercial implications (pay as you go)

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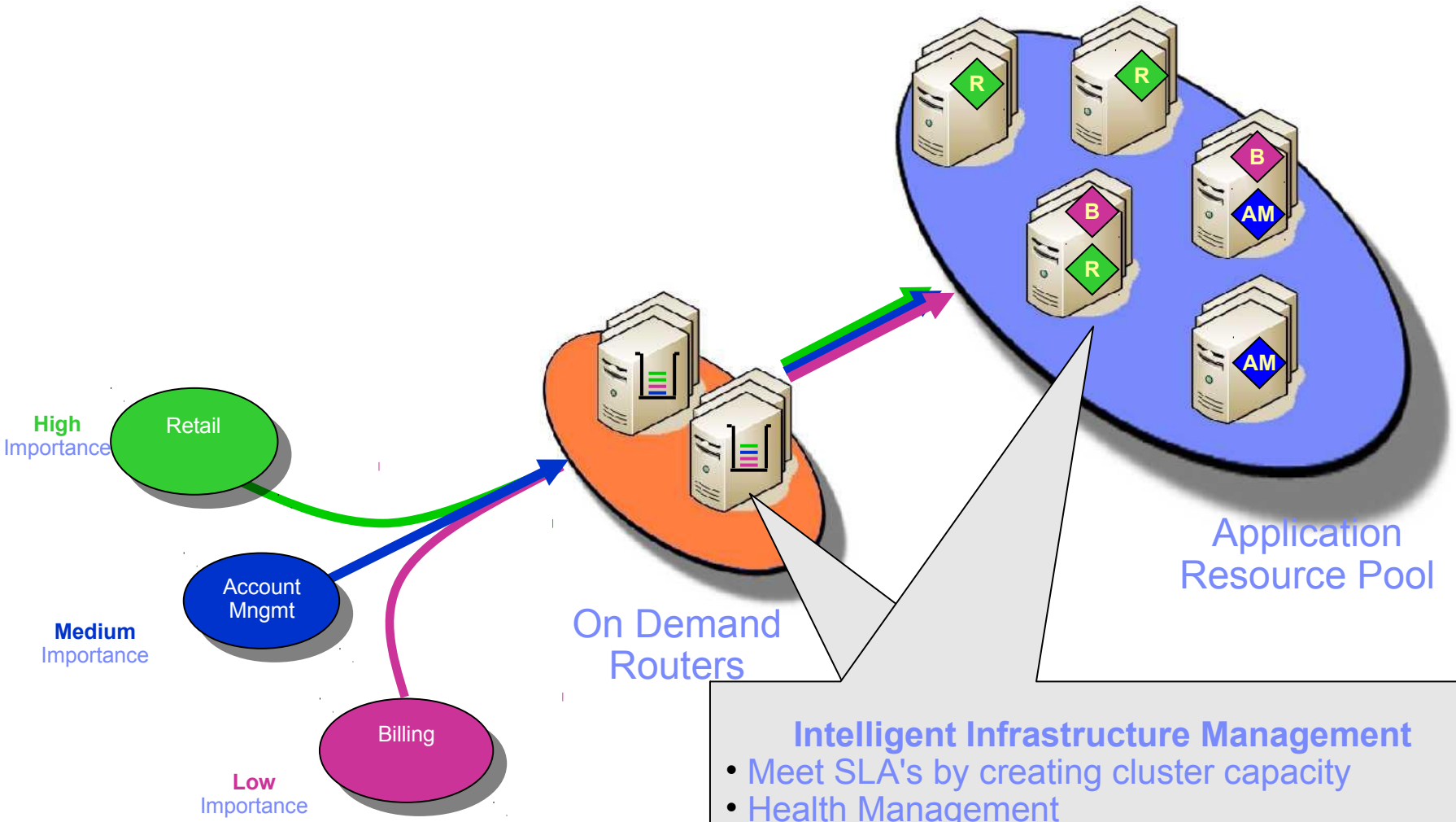
Remember WebSphere Virtual Enterprise?

Application Virtualisation



* Illustrative values based on reduction of application server estate

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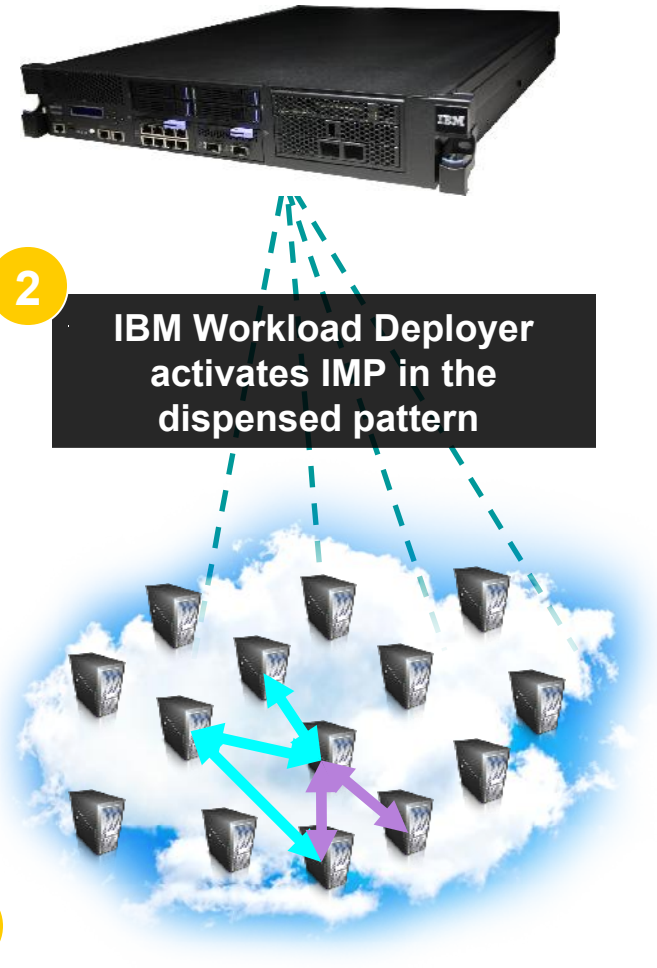
Enable a self-optimizing private cloud with Intelligent Management Pack

1

Use the pattern editor to select the policy-based management options

- ☑ **Define dynamic clusters**
  - ☑ Create dynamic clusters
    - Creates dynamic clusters across all custom nodes.
  - ☑ Enable elasticity mode
    - Enables the feature that allows virtual enterprise to add a member to the dynamic cluster if additional processing is required to handle the requests by provisioning a virtual machine dynamically
- ☑ **Enable overload protection**
  - ☐ Memory overload protection
  - ☐ CPU overload protection
- ☑ **Configure standard health policies**
  - ☐ Excessive heap usage
  - ☐ Memory leak
  - ☐ Maximum server age
  - ☐ E-mail notification list
- ☑ **Configure on demand router-dependent health policies**
  - ☐ Maximum requests served
  - ☐ Excessive number of timed out requests
  - ☐ Excessive average response time
  - ☐ Storm drain detection



Policy-based management self-optimizes your private cloud

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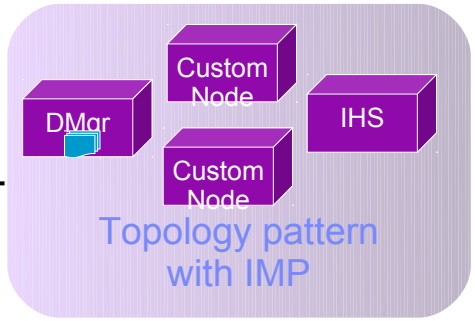
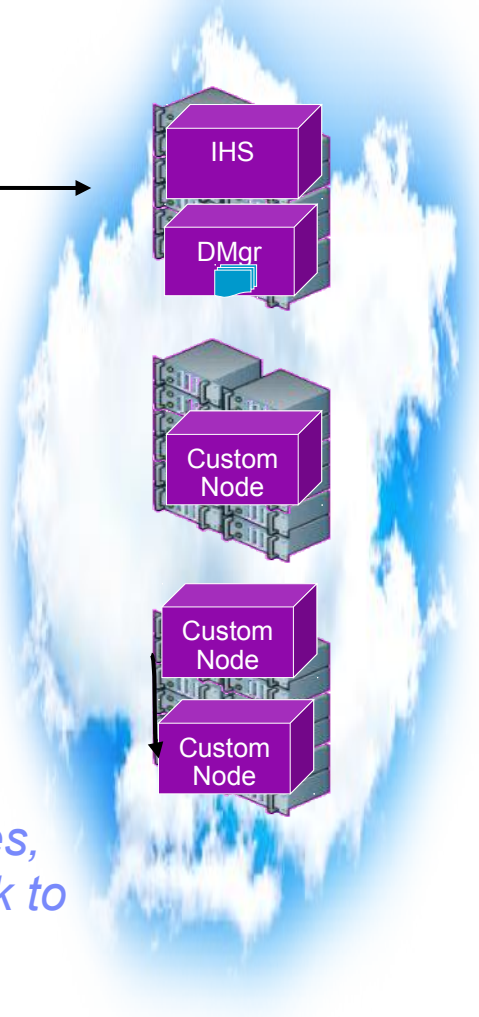
New integration capabilities



IWD initiates deployment to cloud



To meet service-level policies, WVE autonomically calls back to IWD for additional nodes

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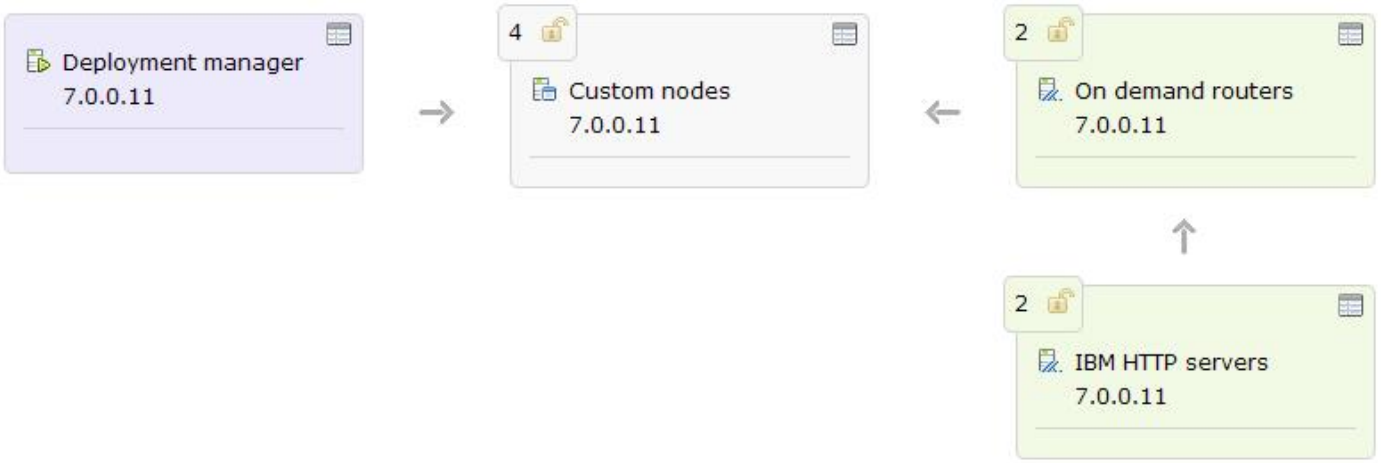
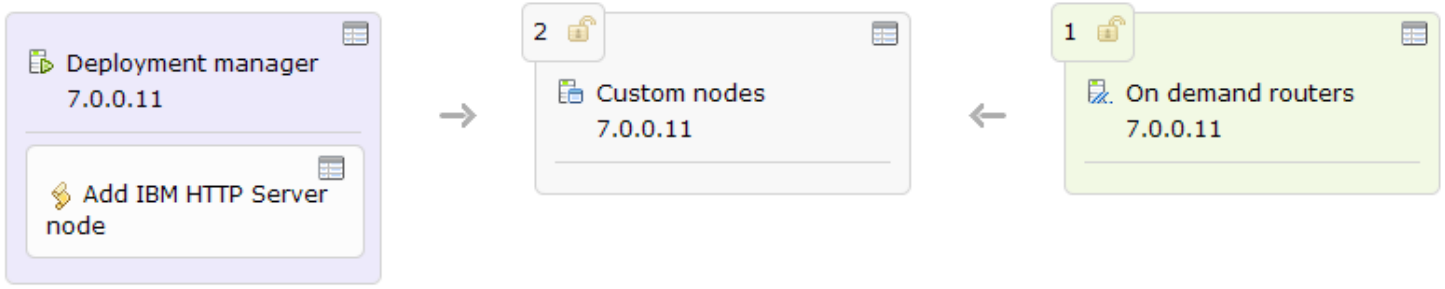
Pre-built topology patterns in IBM Workload Deployer

WebSphere advanced cluster



WebSphere advanced cluster (development)



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Customized patterns with the Intelligent Management Pack

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Cloud with runtime elasticity

IBM Workload Deployer

Cloud-based application middleware deployments

Deploy time

Run time

WebSphere Virtual Enterprise

Incoming

Traffic

Policy-based request routing, health monitoring, application editioning

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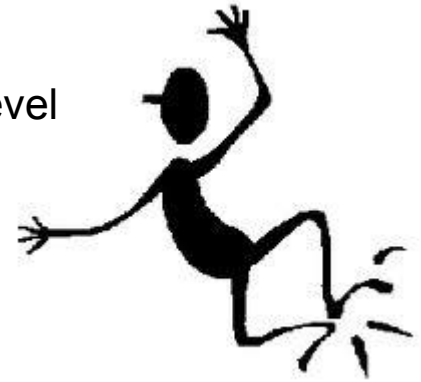
So that's private cloud then is it? Or is it?

Why do we need to worry about...

- WebSphere version and patch levels
- Datasource configurations
- Cluster sizing
- Session failover
- Plugin configurations and routing

What do we really need to care about

- An application platform of a given Java EE prereq level
- Some sort of data resource
- May be constrain it to a defined user population
- Make it run fast enough and resilient
- Deliver it quickly! (it's cloud after all)



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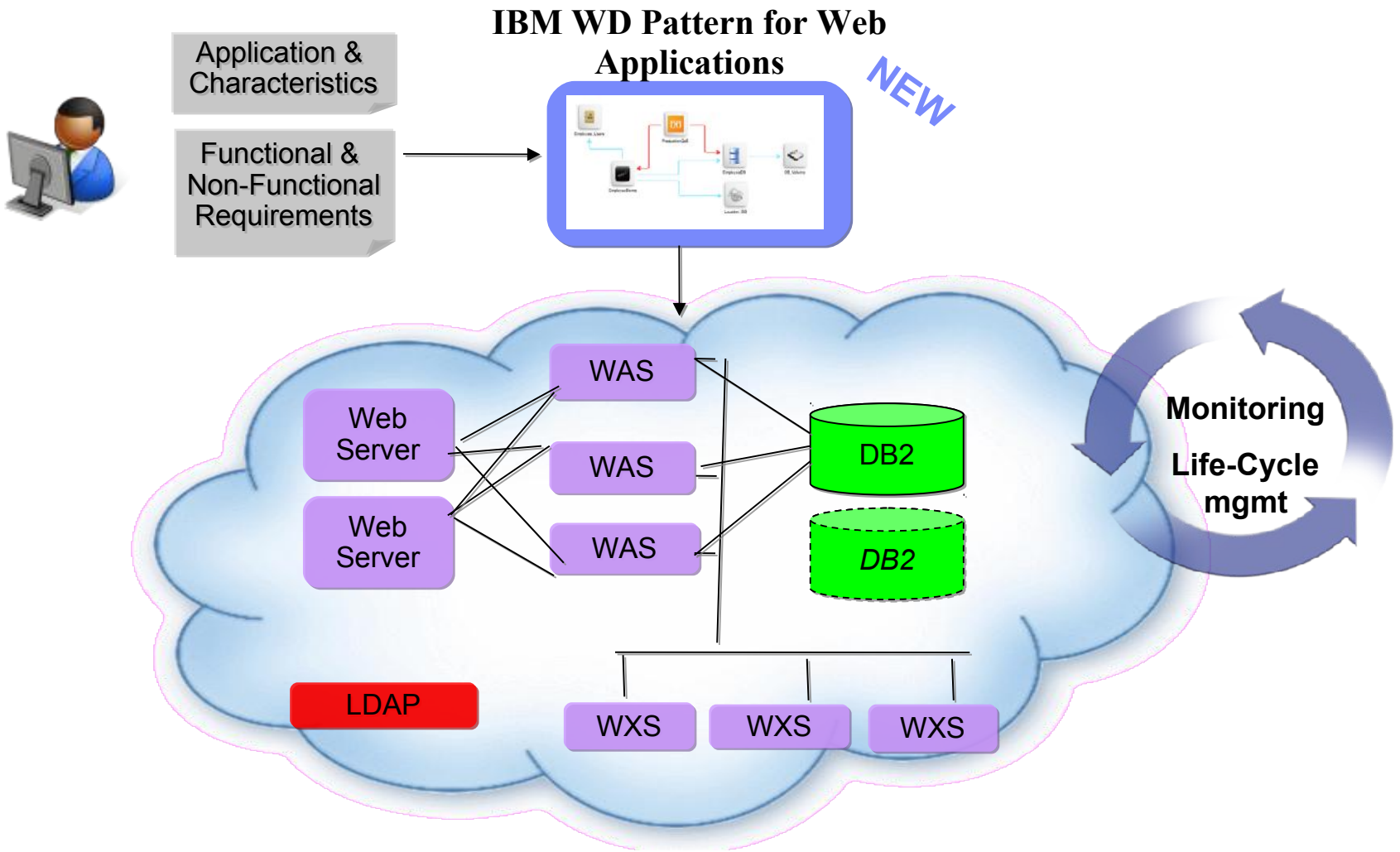
Introducing Virtual Application Patterns
(as opposed to Virtual System Patterns)



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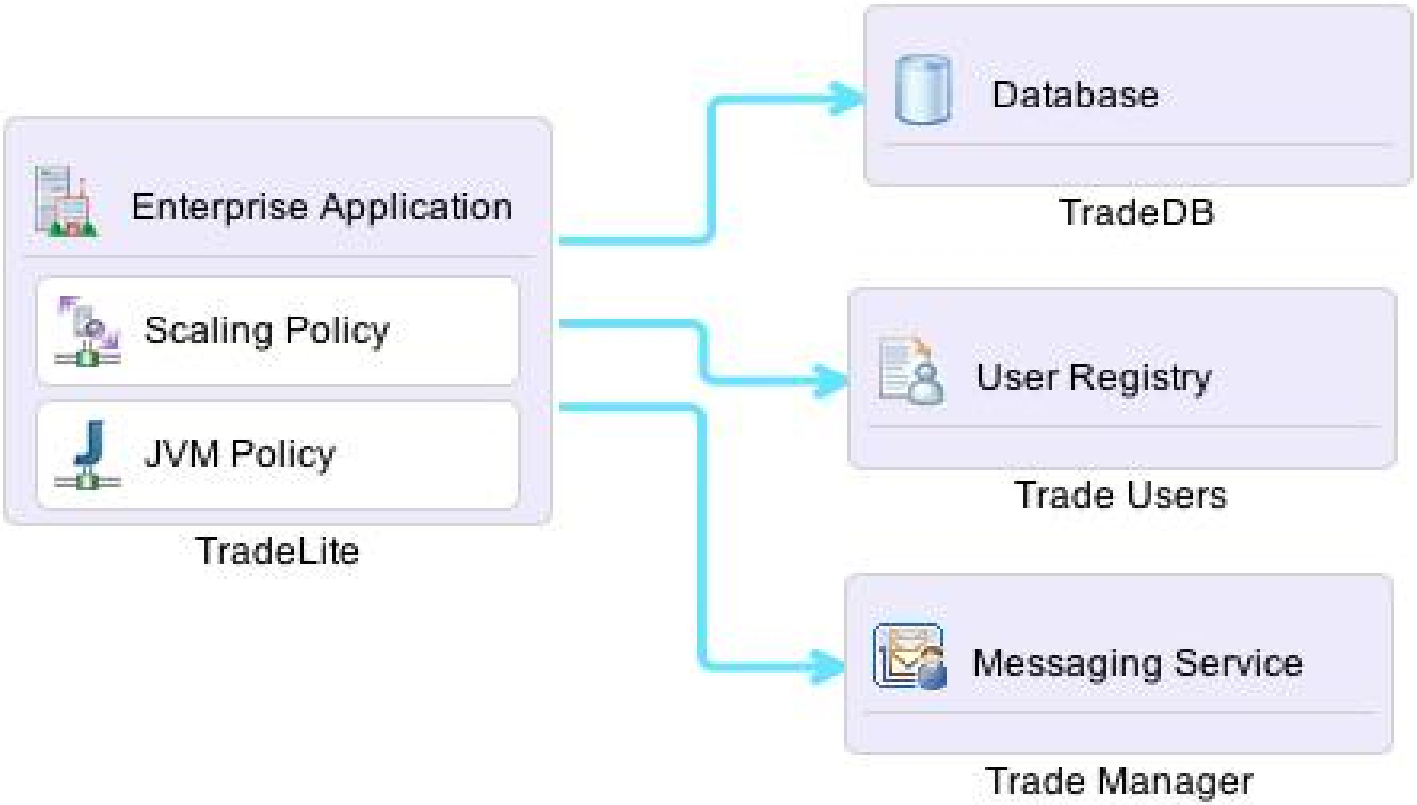
Introducing Virtual Application Patterns
(as opposed to Virtual System Patterns)

Ah, that's better!



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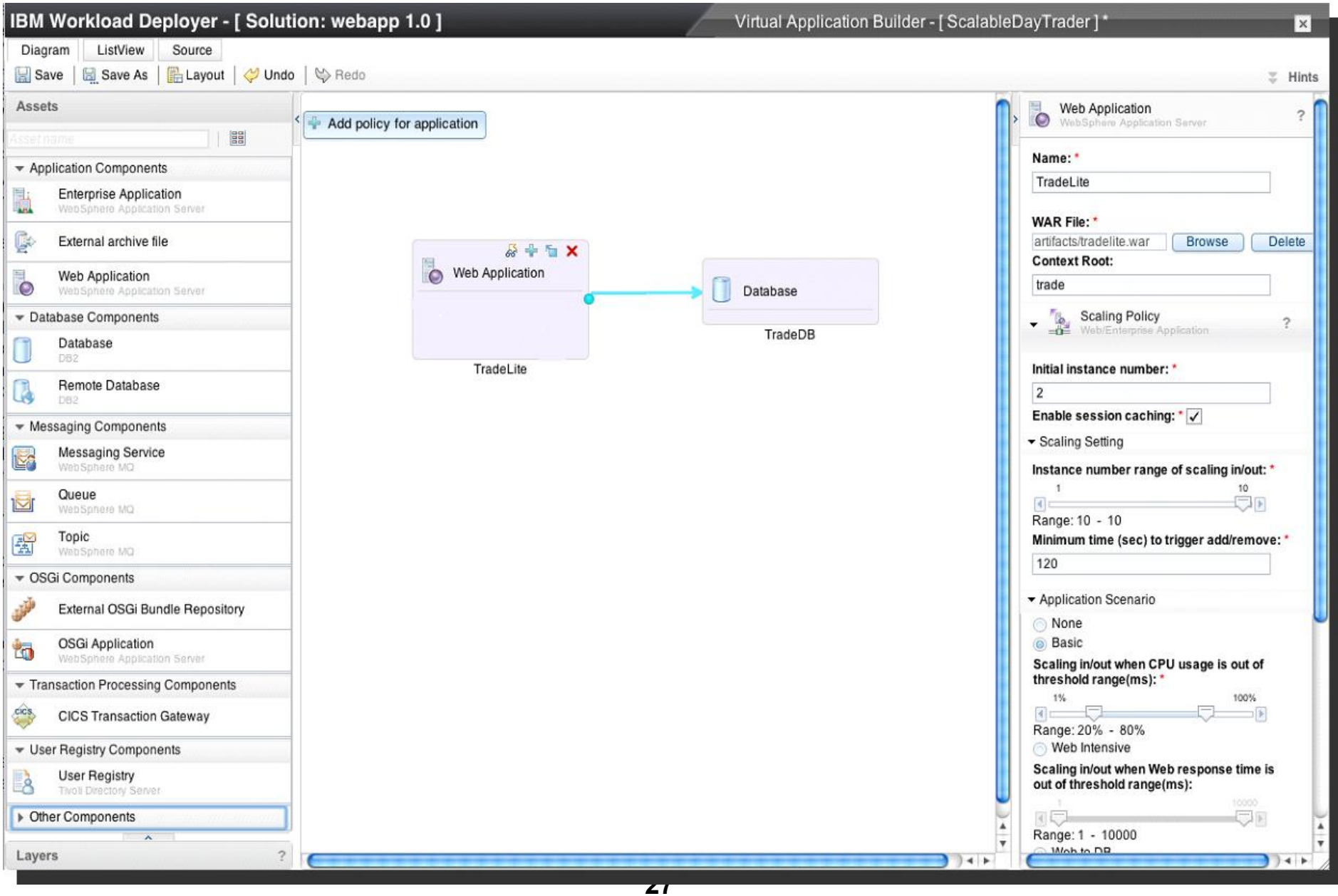
Simplified model in the Cloud Application Builder



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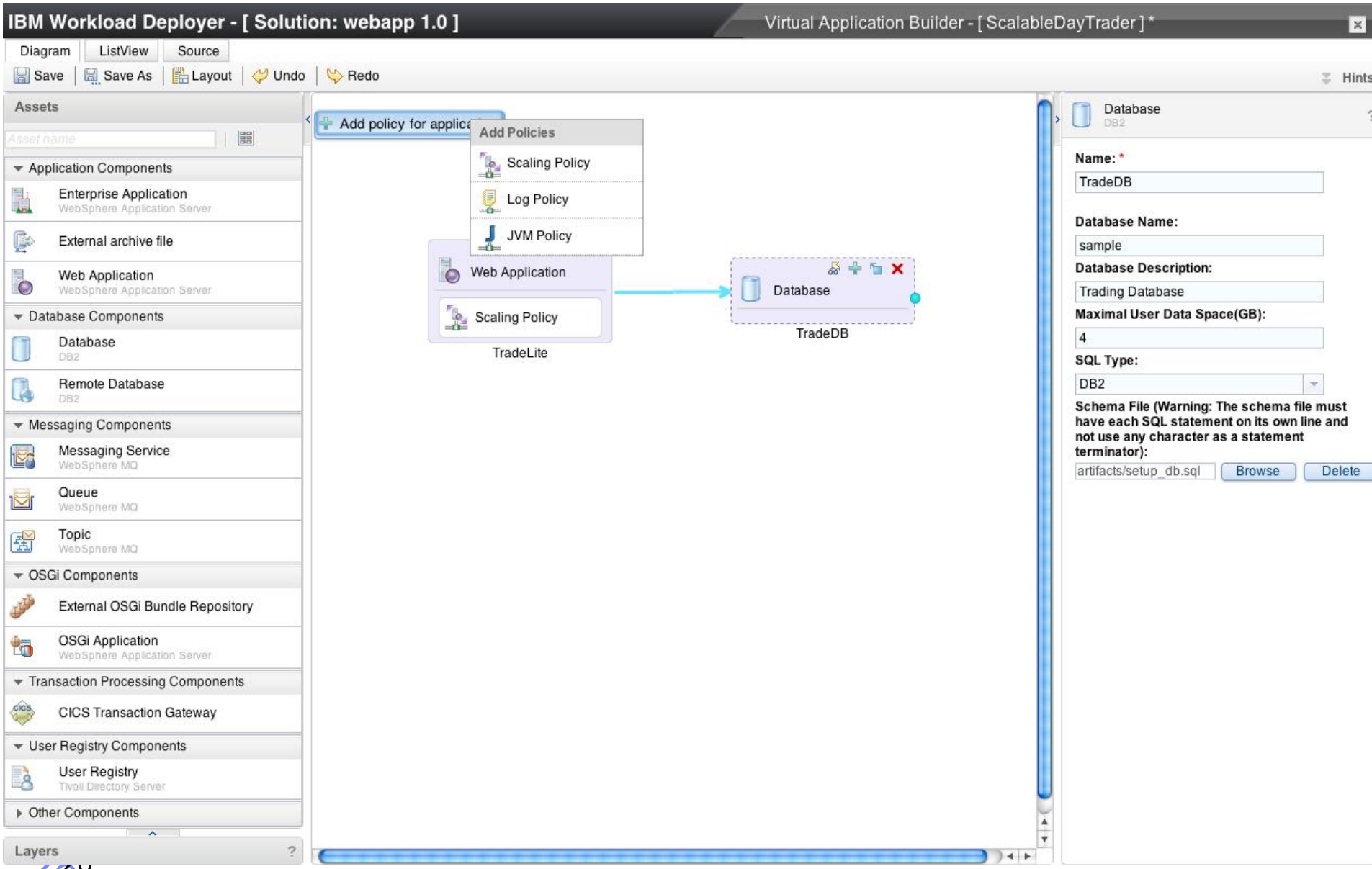
IBM Workload Deployer - [Solution: webapp 1.0]
Virtual Application Builder - [ScalableDayTrader] *
Diagram
ListView
Source
Save
Save As
Layout
Undo
Redo
Hints
Assets
Application Components
Enterprise Application
WebSphere Application Server
External archive file
Web Application
WebSphere Application Server
Database Components
Database
DB2
Remote Database
DB2
Messaging Components
Messaging Service
WebSphere MQ
Queue
WebSphere MQ
Topic
WebSphere MQ
OSGi Components
External OSGi Bundle Repository
OSGi Application
WebSphere Application Server
Transaction Processing Components
CICS Transaction Gateway
User Registry Components
User Registry
Tivoli Directory Server
Other Components
Layers
Add policy for applica
Add Policies
Scaling Policy
Log Policy
JVM Policy
Web Application
Scaling Policy
TradeLite
Database
TradeDB
Database
DB2
Name: *
TradeDB
Database Name:
sample
Database Description:
Trading Database
Maximal User Data Space(GB):
4
SQL Type:
DB2
Schema File (Warning: The schema file must have each SQL statement on its own line and not use any character as a statement terminator):
artifacts/setup_db.sql
Browse
Delete

Web App and Database Patterns

- Designed to support common online web application and database workloads
- Pattern for Web Applications consists of application support based on
  - WebSphere Application Server,
  - Tivoli Directory
  - WebSphere eXtreme Scale
  - Connectors to remote systems
    - MQ, DB2, DB2/z, CICS, IMS, 3rd party DB (Oracle), Tivoli Directory
- All Patterns support
  - Integrated monitoring and logging extensions
  - Failure recovery and HA/Auto-Scaling*
  - Sold as an integrated offerings
- *But you don't get a WebSphere admin console URL!*

*Supported for Some Components

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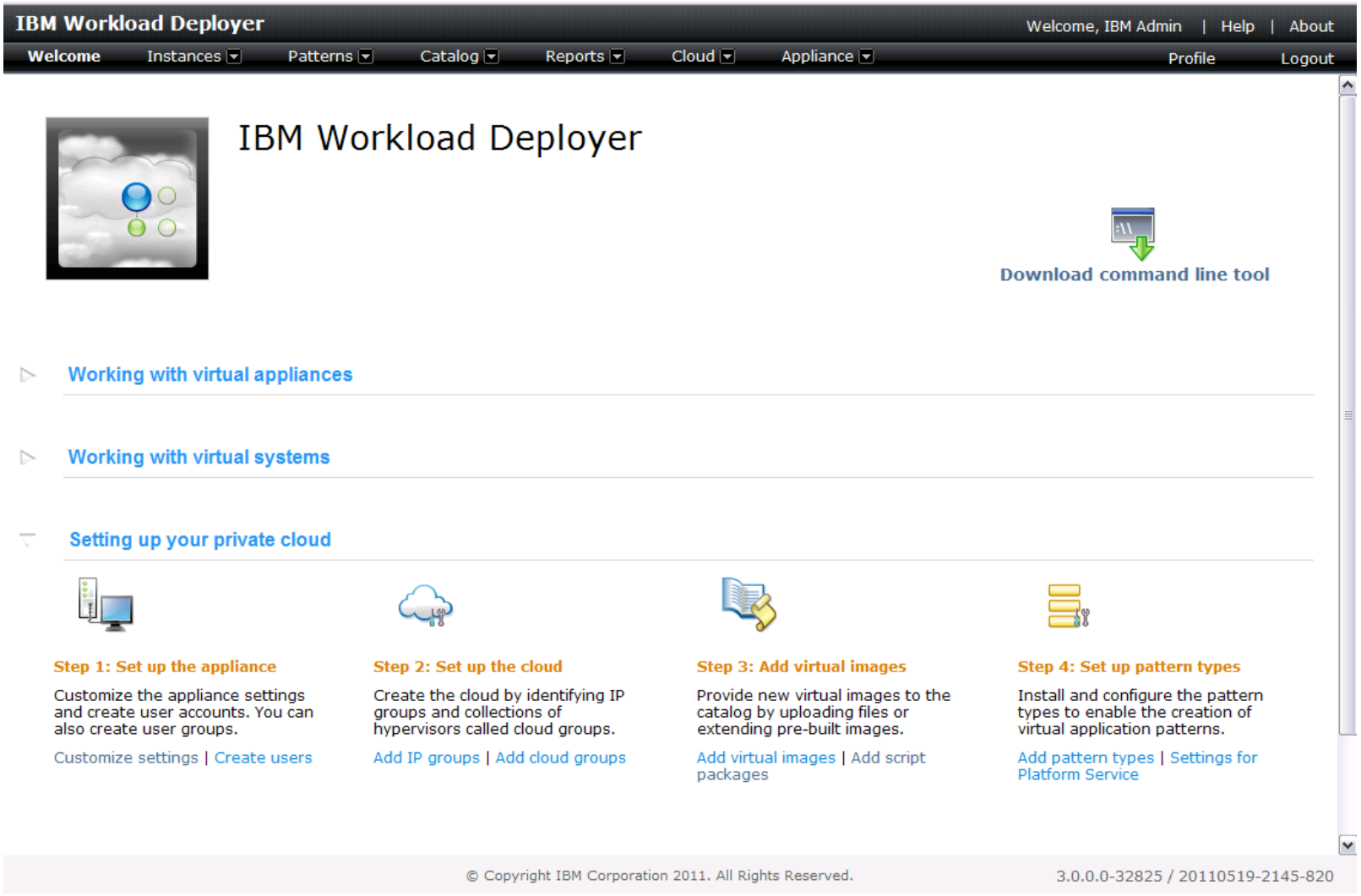
IBM Workload Deployer



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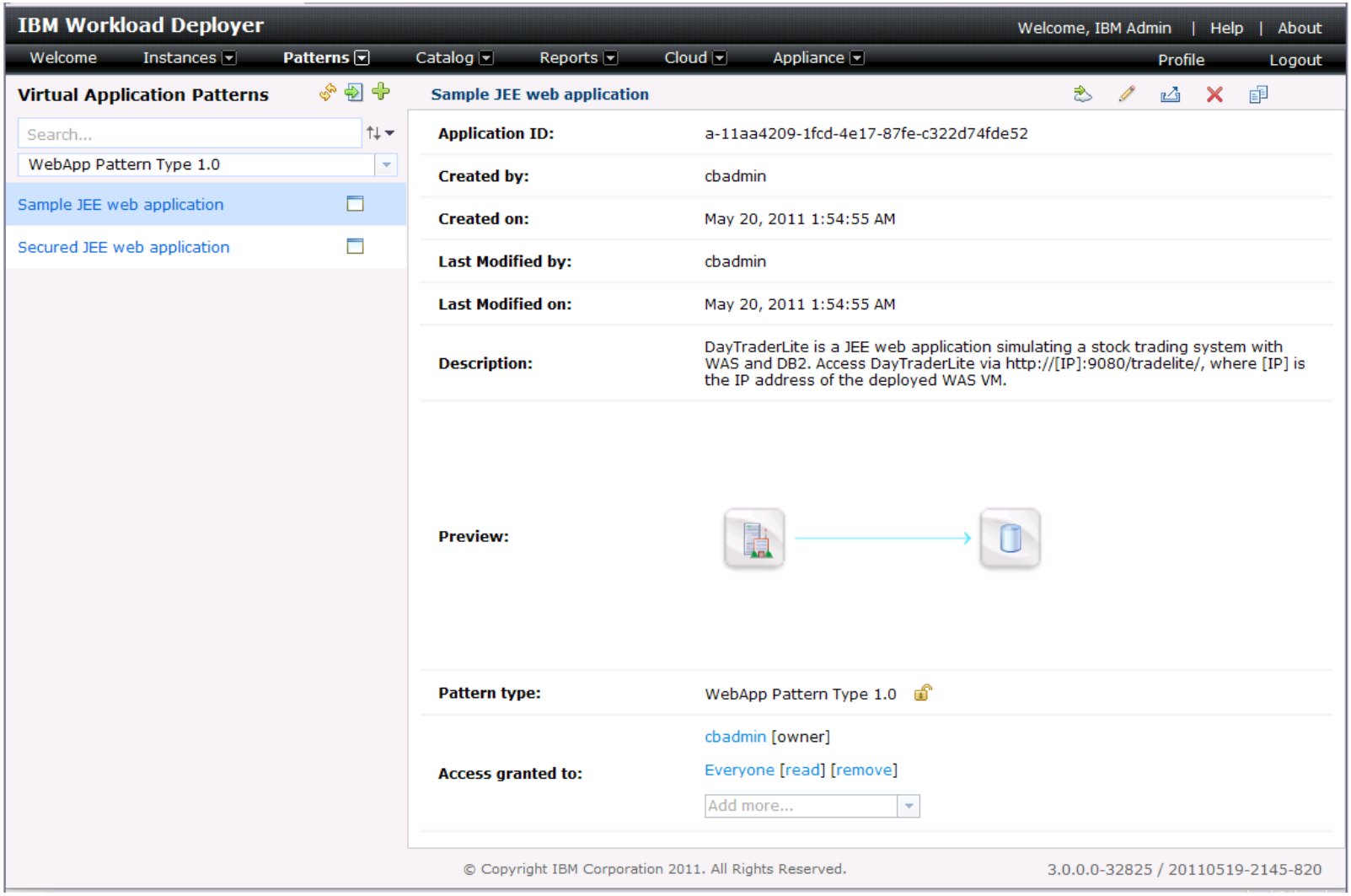
Cloud Applications



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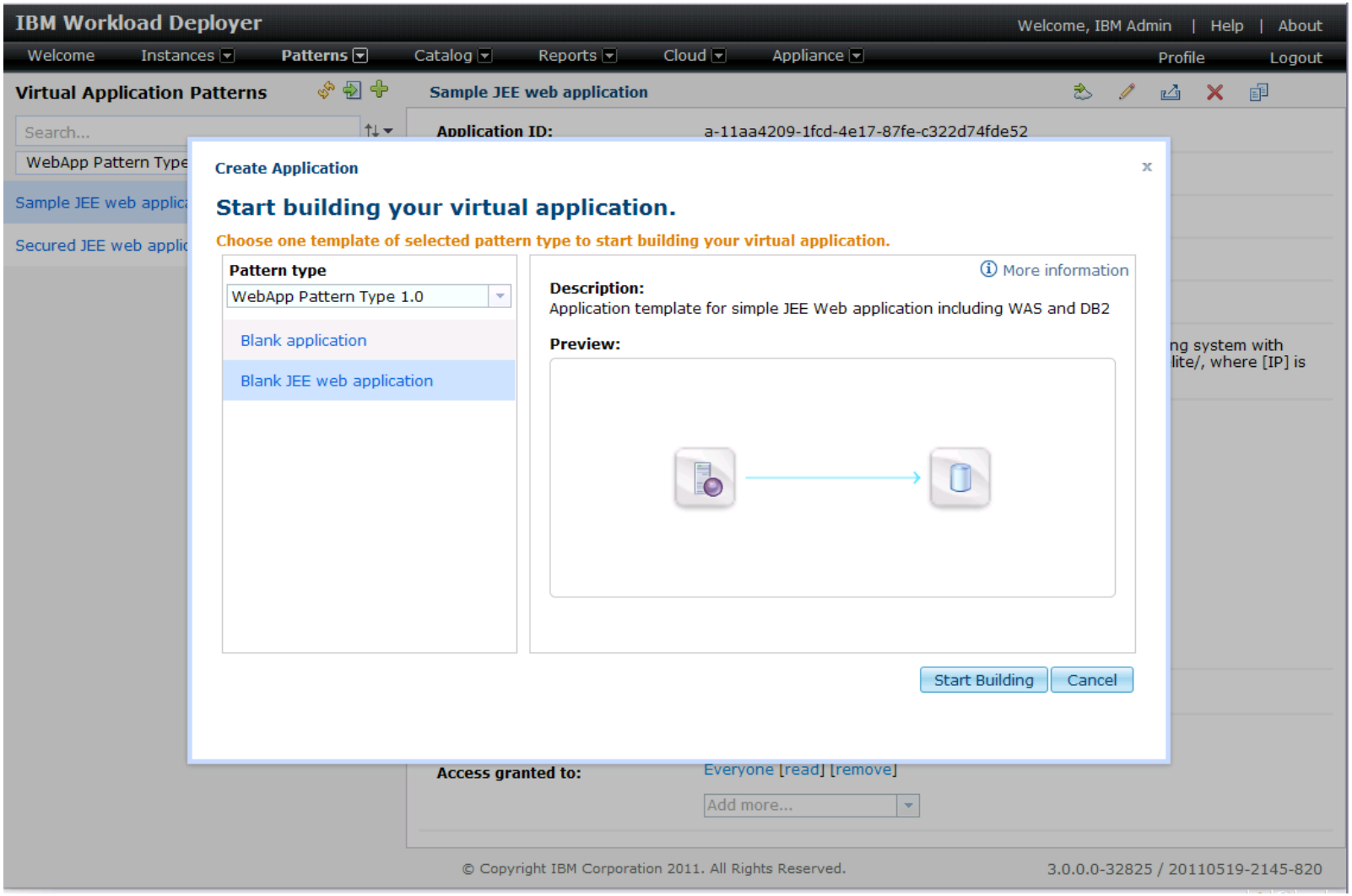
Creating a Cloud Application



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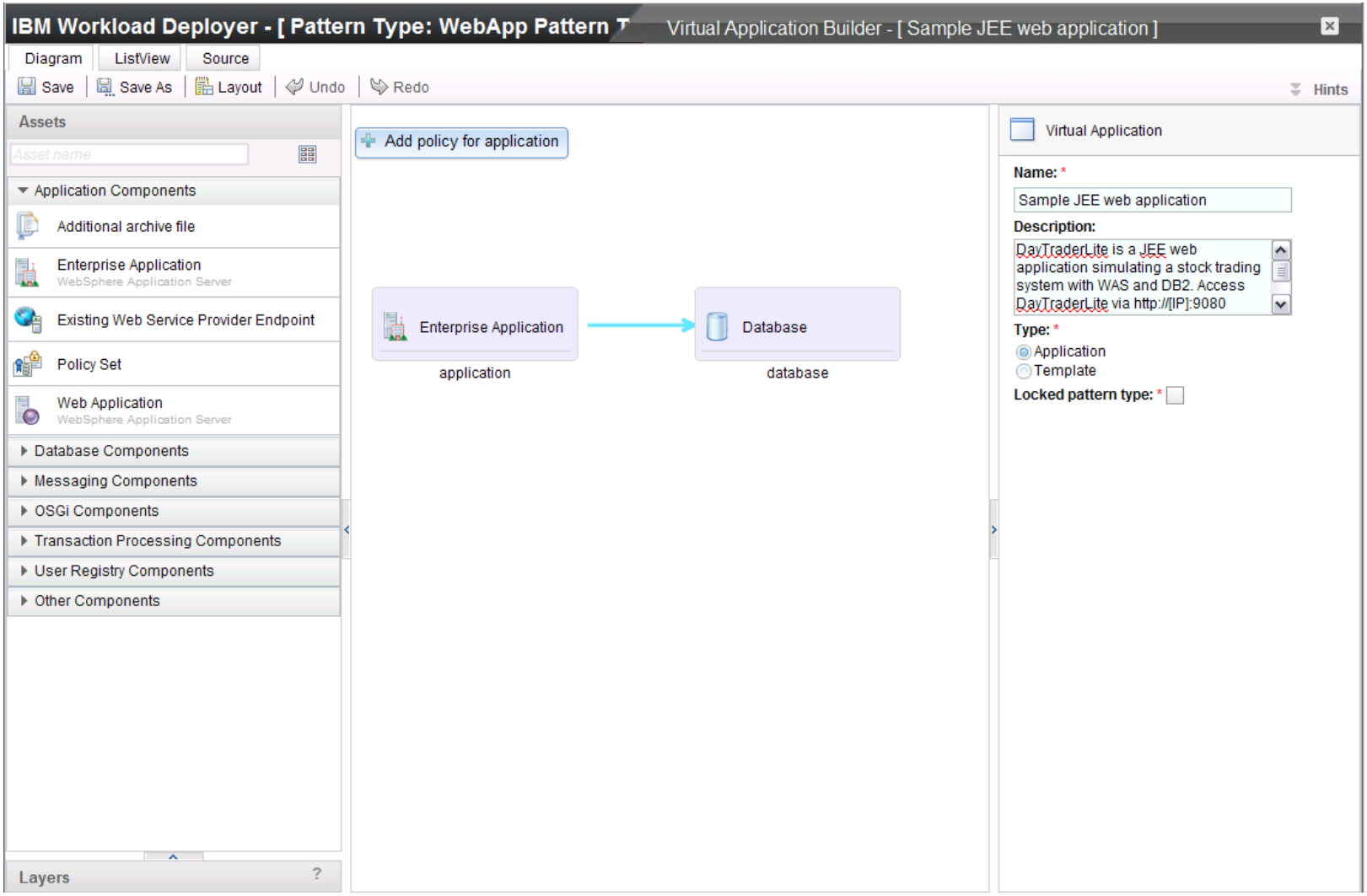
Cloud Application Builder



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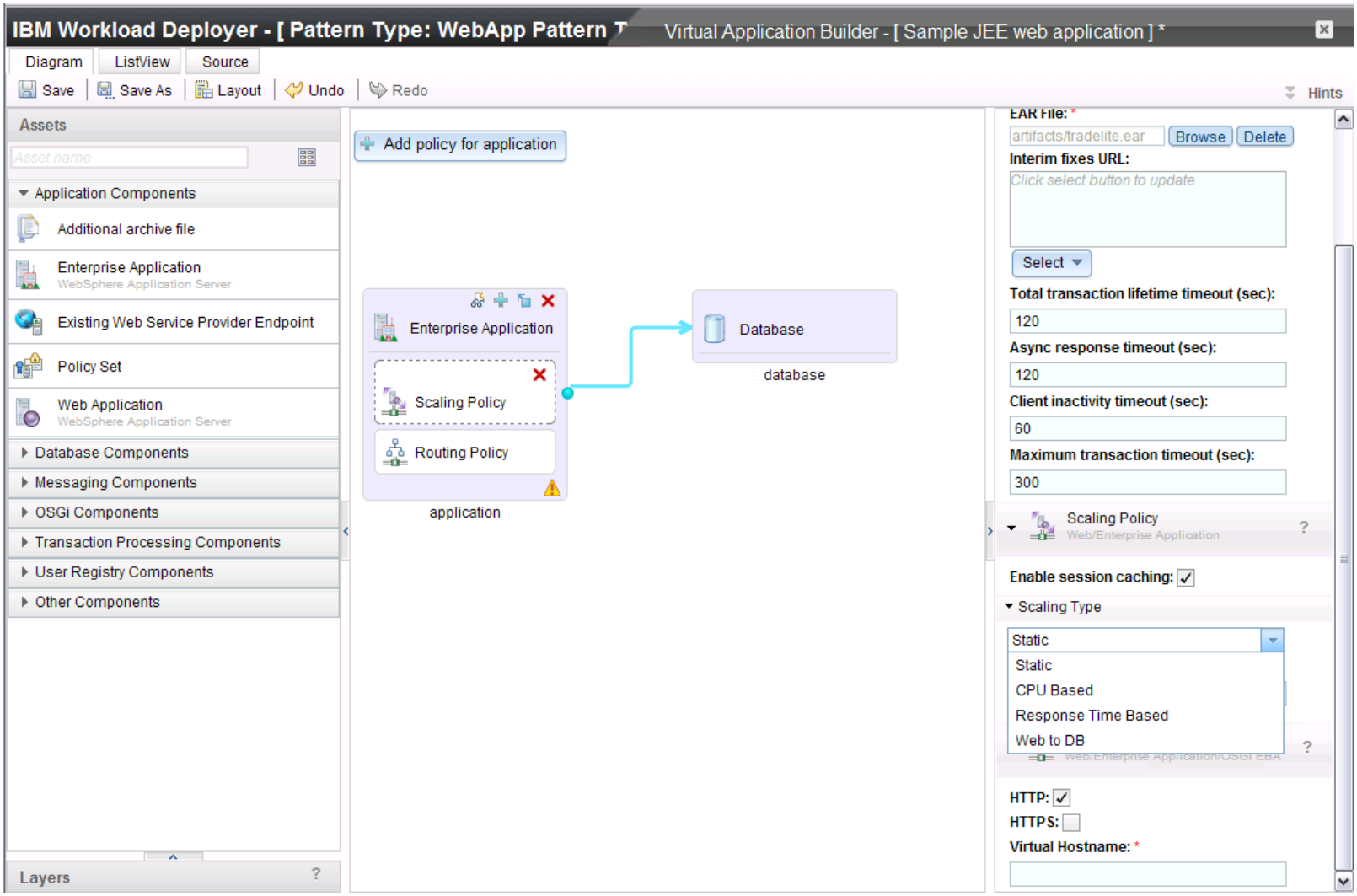
Cloud Application Builder



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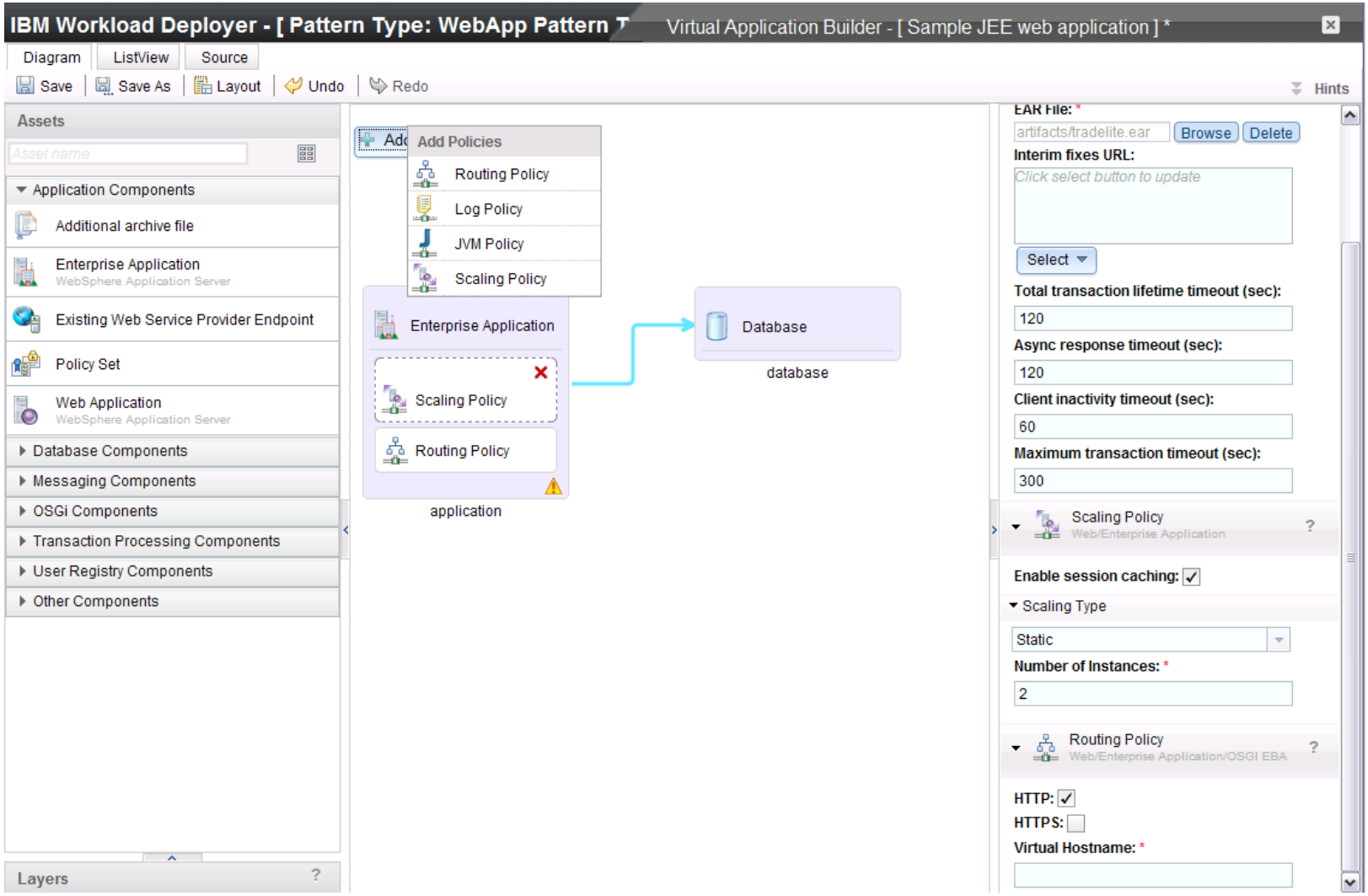
Policies



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Shared Services

Built-in support for shared cloud services

- Lifecycle Management of the Service itself
- Support for programmatic access to service resources
- Automated wiring of workload patterns into service capabilities

Initial Services

- Caching Service - Based on WebSphere eXtreme Scale
  - Used for HTTP Sessions automatically
- Proxy Service
  - Based on secure Java proxy technology
  - Support for dynamic registration of new endpoints

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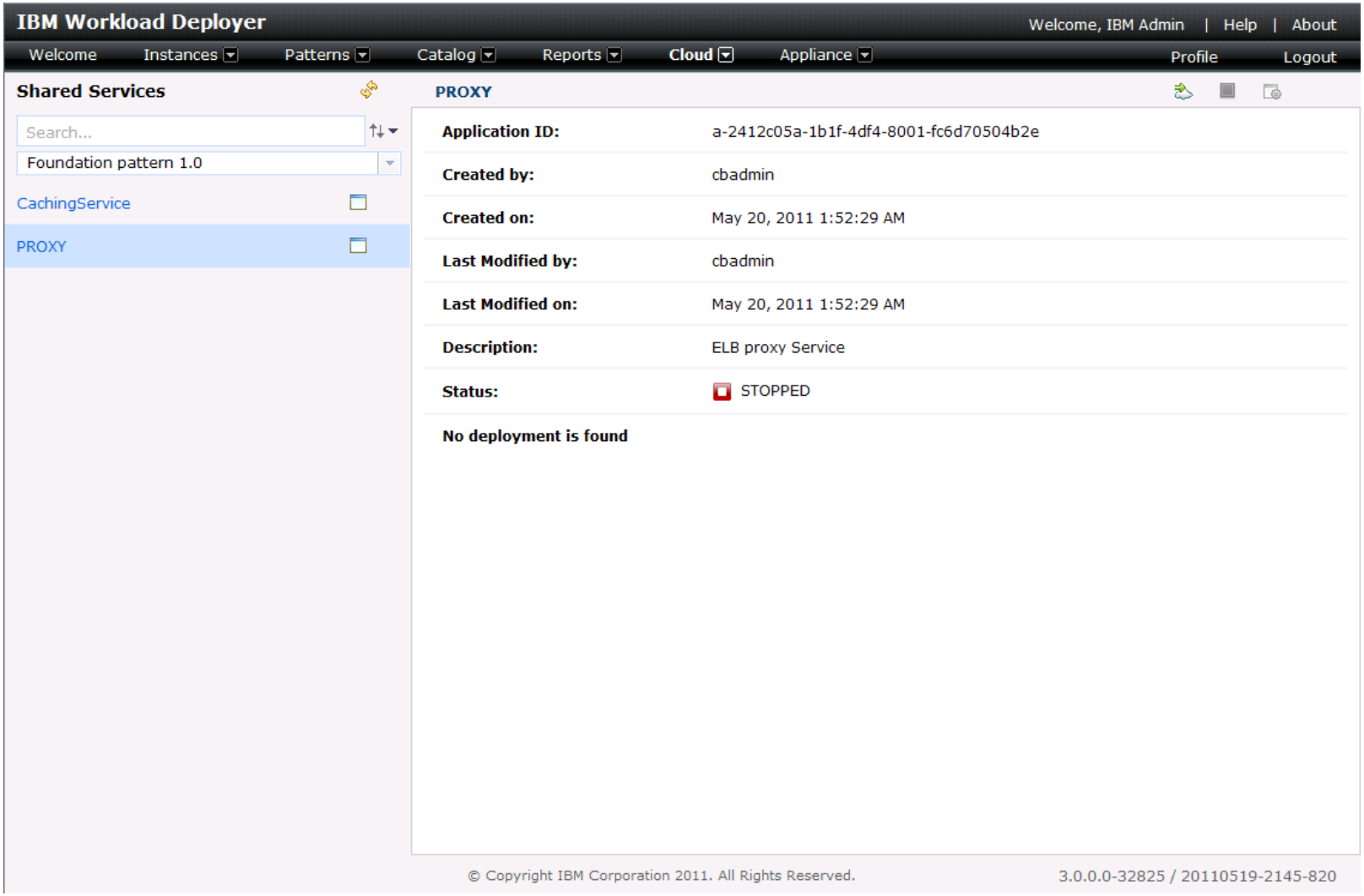
Shared Services



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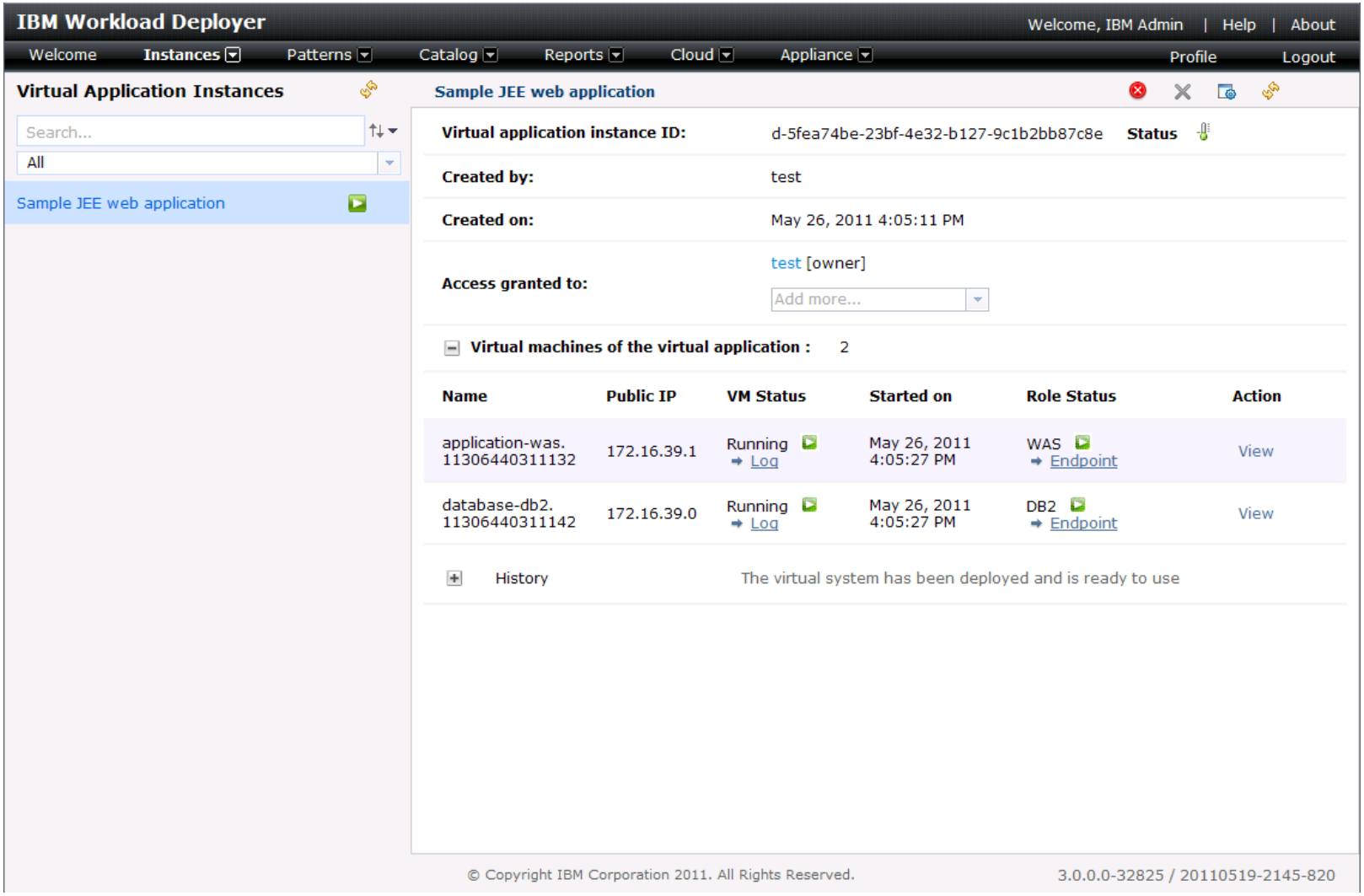
Cloud Dashboard



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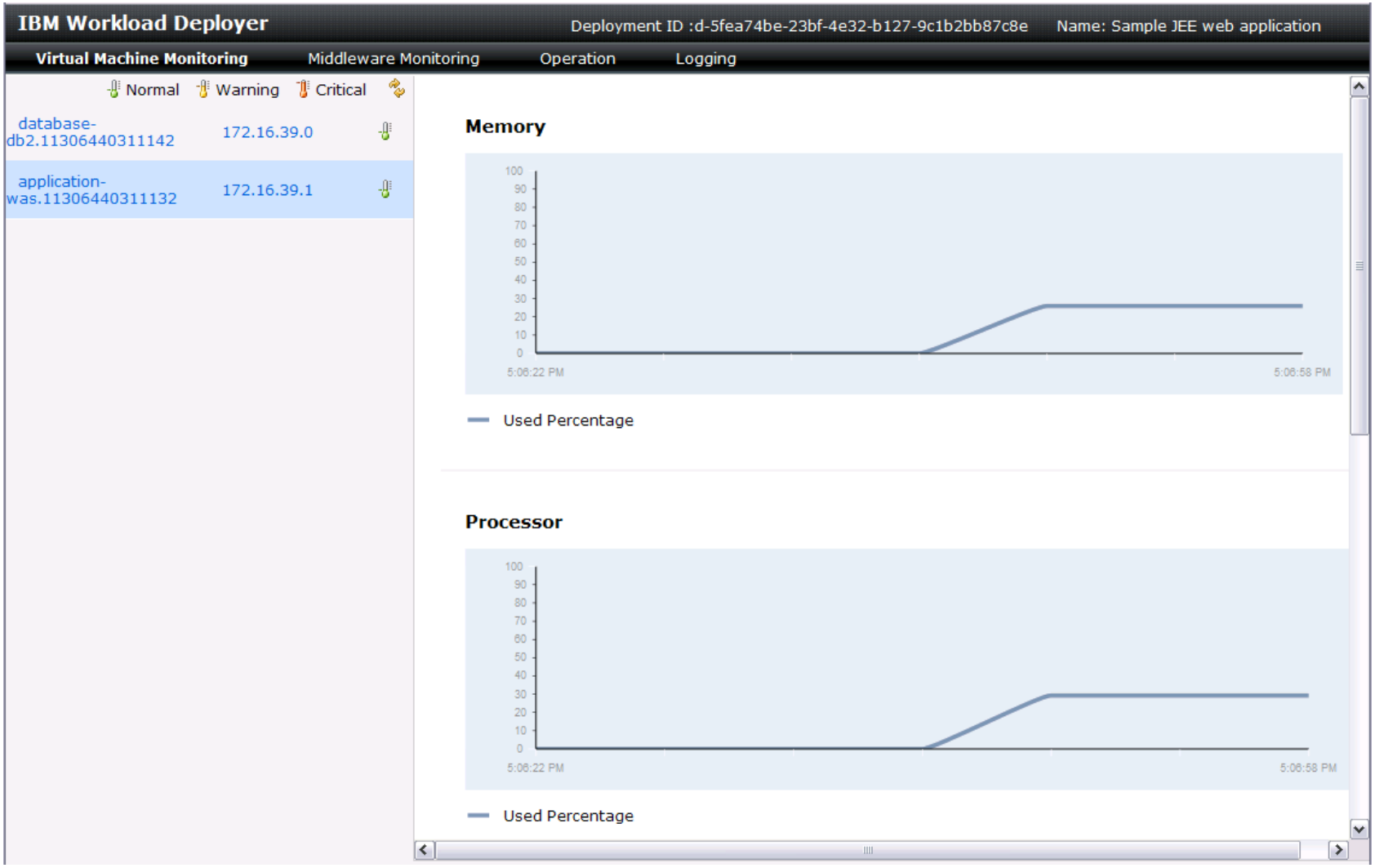
Virtual Application Dashboard



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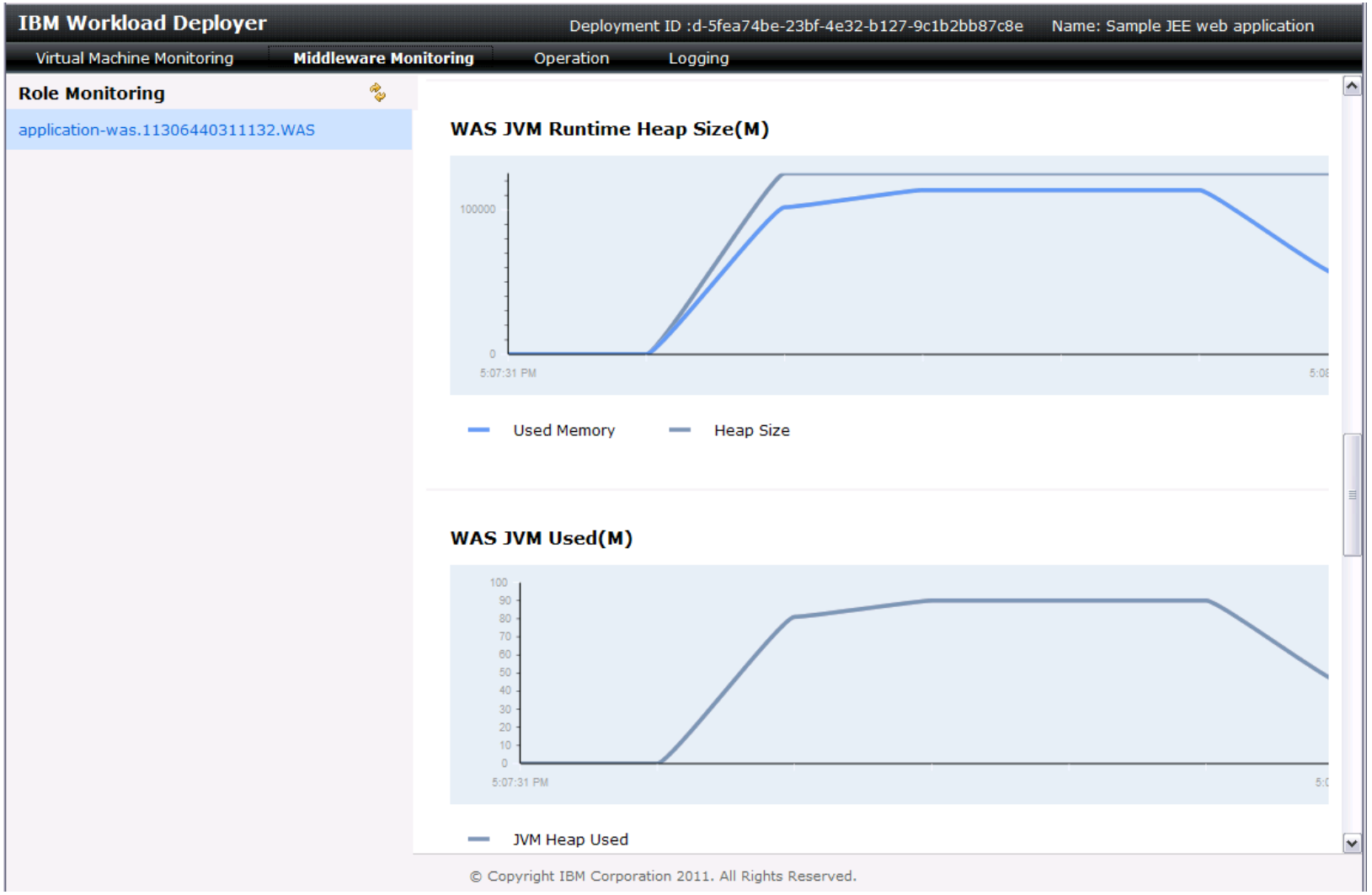
Virtual Application Dashboard



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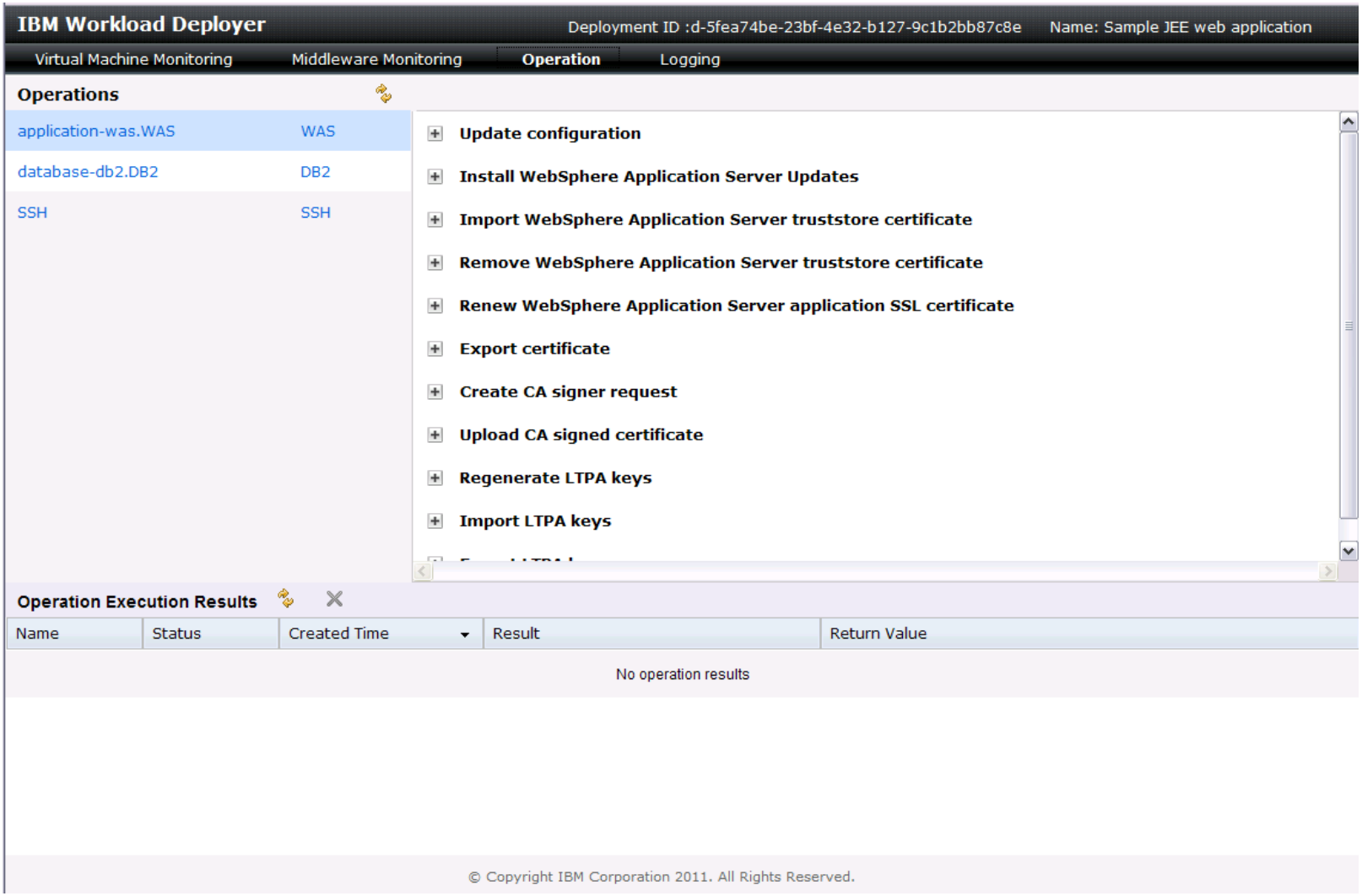
Virtual Application Dashboard



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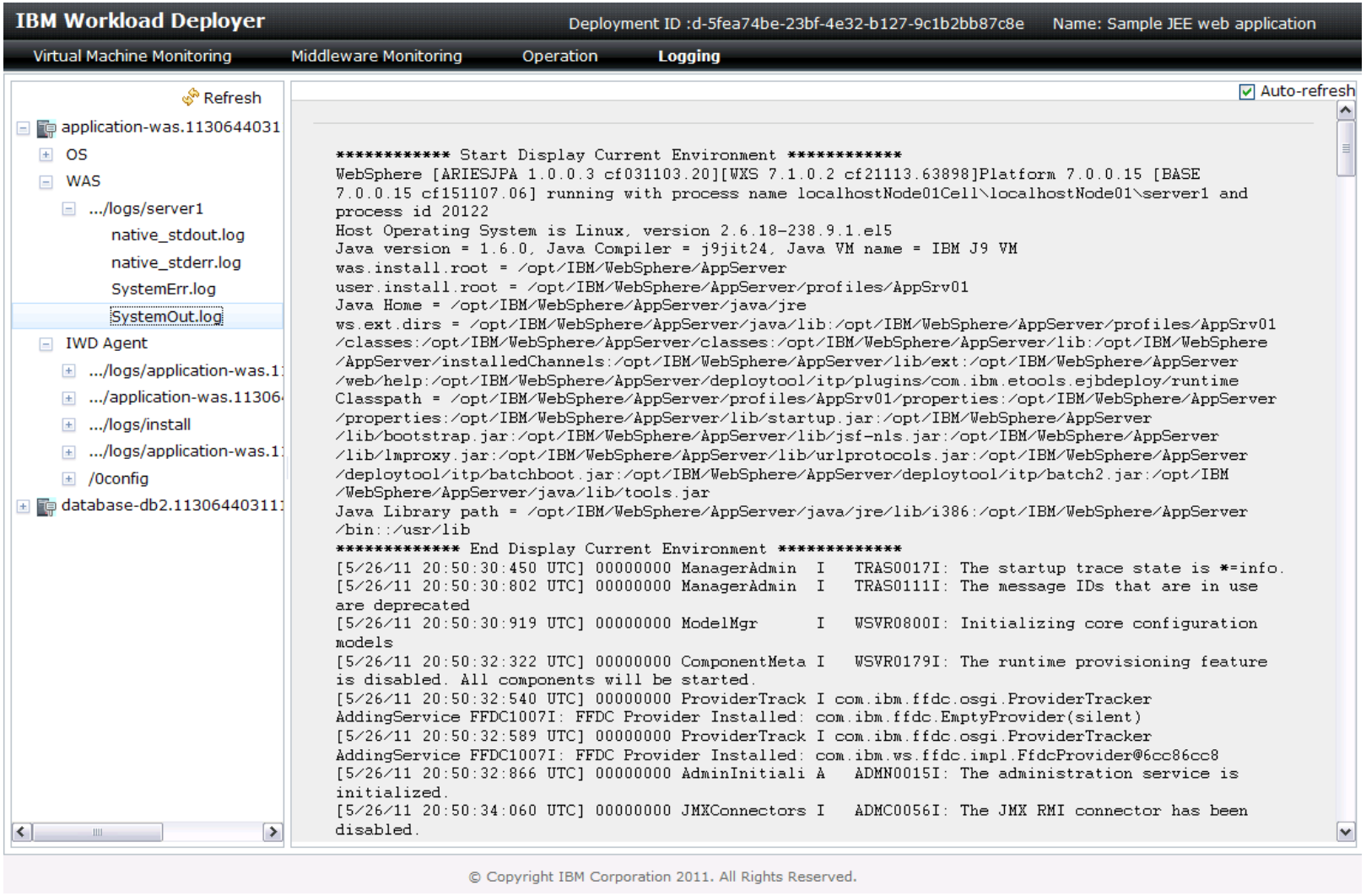
Virtual Application Dashboard



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Summary of Virtual Application Pattern Features

Automated Scaling	Managed environments scale up and down based on observed utilization of compute resources
Failover	Failed virtual machines are replaced with new VMs which are configured with the old VM's identity
Load Balancing	Requests coming into workload pattern environments are load balanced
Security	ACL's for application sharing and management access, LDAP integration for application security
Monitoring	All components of workload pattern environments are monitored by IWD

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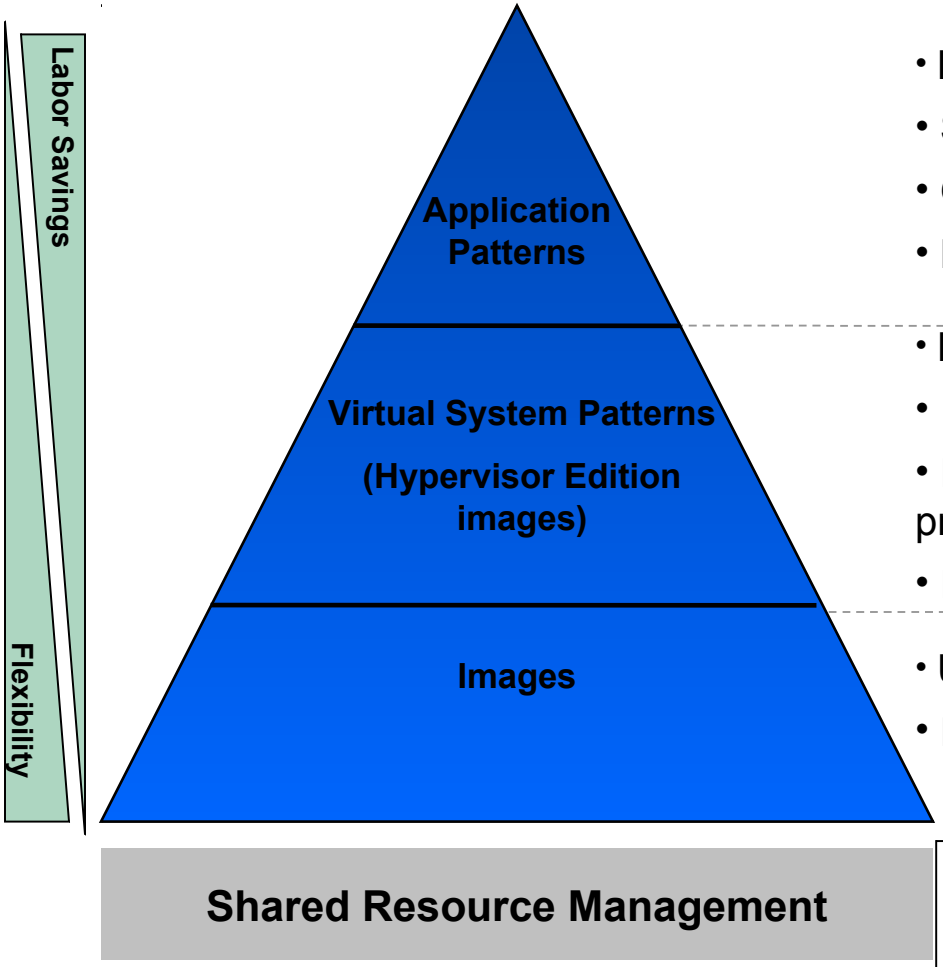
So what's the reality then?



- Full solutions, tailored for a use case
- Subsets of products, delivered as an atomic unit
- Optimized-for-purpose
- Limited ability to customize

- Pre-installed & configured product images
- Full function of the IBM product
- Patterns allow for customization and multi-product deployments,
- High degree of customization and flexibility

- Users build fully customized virtual images
- Maximum flexibility

Shared resource management infrastructure services apply to all workload models:

- User/group permissions management
- License management
- Usage tracking

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So what are the best practices?
Some thoughts...

- Good application design. *No change there then!*
  - Cluster-aware (e.g. serializable sessions)
  - Stick to the Java EE specifications to give portability
  - Rely on Enterprise Java services (don't dip outside the container)

- Resist the urge to “go bespoke”
  - It is always *possible* to do customisation but focus on standardisation as that's where the cost and time benefits really are
  - Do we *really* need that level of control over the topology?

- Understand the organisational implications
  - Benefit from pre-provisioned hardware
  - Cloud crosses team, project and funding boundaries
  - Subtle changes in roles for middleware skills (pattern design)
  - Be prepared for implication of self-provisioning (suitable charge-back)

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Are we ready for public cloud?

- More cost-efficient for short-term usage
- Data sensitivity assurance

Traditional

- WebSphere Application Server
- WebSphere Virtual Enterprise
- WebSphere eXtreme Scale
- Sub-capacity licensing

Private clouds

- IBM Workload Deployer
  - WAS Hypervisor Editions
  - WebApp Workload Pattern
- Intelligent Management Pack
- Sub-capacity licensing

Public Clouds

- WAS on IBM Public Cloud
- WAS Amazon Machine Image
- Pay per SW use or bring your SW
- Bring your license (on IBM Cloud)
- IBM Sandbox

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IBM Workload Deployer v3

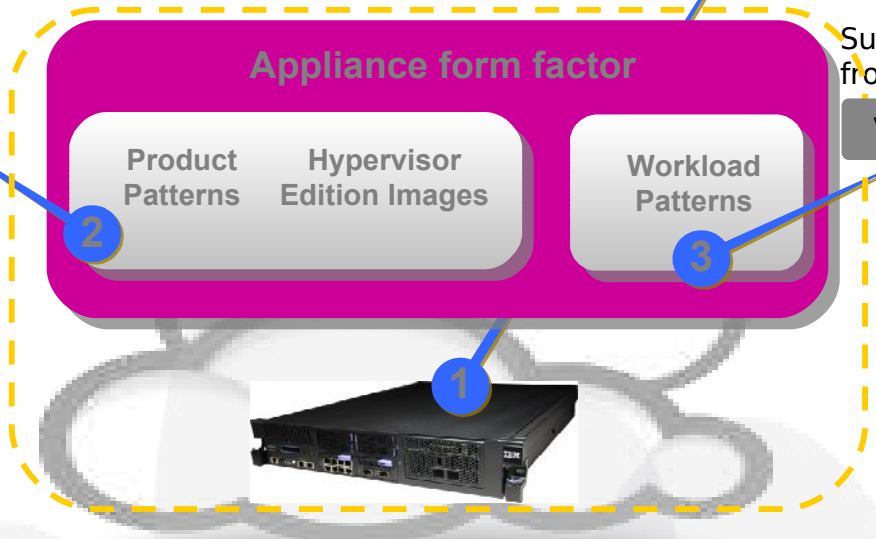
Multiple Deployment Models

Next Generation Appliance
Replaces existing WebSphere CloudBurst Appliance offering

Supports direct migration from previous offering

Virtual System Patterns

Deployment of optimized product configurations (Hypervisor Edition products + base patterns) using IBM best practices. Enables rapid assembly and deployment of custom solutions using pre-configured product patterns with intelligent placement and mobility.



Virtual Application Patterns

Deployment of workload patterns as integrated solutions delivered with integrated management and monitoring. Deployments include full life-cycle management including failure recovery, intelligent placement and elasticity.

x86

System p

System z (z/Linux)

Bring your own hardware

x86

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Any Questions?

http://www.youtube.com/user/WebSphereClouds

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Links

- IBM Education Assistant (http://publib.boulder.ibm.com/infocenter/ieduasst/v1r1m0/index.jsp?topic=/com.ibm.iea.iwd/iwd/IWD30.html)

- IBM Information Center for Workload Deployer (http://publib.boulder.ibm.com/infocenter/worlodep/v3r0m0/index.jsp?topic=%2Fcom.ibm.worlodep.doc%2Fwelcome.html)

- Easy virtual app automation using Workload Deployer: A pattern approach to building cloud applications

https://www.ibm.com/developerworks/cloud/library/cl-workloaddeployer/

- Harness the power of the cloud with IBM Workload Deployer V3

http://www.ibm.com/developerworks/websphere/techjournal/1106_amrhein/1106_amrhein.html

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Links

Customizing with WebSphere CloudBurst (series)

· Customizing with WebSphere CloudBurst, Part 1: Creating highly customized private clouds

http://www.ibm.com/developerworks/websphere/techjournal/0907_amrhein/0907_amrhein.html

· Customizing with WebSphere CloudBurst, Part 2: Using WebSphere CloudBurst to customize a WebSphere middleware environment

http://www.ibm.com/developerworks/websphere/techjournal/0909_amrhein/0909_amrhein.html

· Customizing with WebSphere CloudBurst, Part 3: Using script packages for customizing above and beyond patterns

http://www.ibm.com/developerworks/websphere/techjournal/0911_stelzer/0911_stelzer.html

· Customizing with WebSphere CloudBurst, Part 4: Extending virtual images in WebSphere CloudBurst

http://www.ibm.com/developerworks/websphere/techjournal/0912_amrhein/0912_amrhein.html

· Customizing with WebSphere CloudBurst, Part 5: Maintaining virtualized WebSphere Application Server environments

http://www.ibm.com/developerworks/websphere/techjournal/1001_amrhein/1001_amrhein.html

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Links

Cloud computing for the enterprise (series)

· Cloud computing for the enterprise: Part 1: Capturing the cloud

http://www.ibm.com/developerworks/websphere/techjournal/0904_amrhein/0904_amrhein.html

· Cloud computing for the enterprise: Part 2: WebSphere sMash and DB2 Express-C on the Amazon EC2 public cloud

http://www.ibm.com/developerworks/websphere/techjournal/0905_amrhein/0905_amrhein.html

· Cloud computing for the enterprise: Part 3 Using WebSphere CloudBurst to create private clouds

http://www.ibm.com/developerworks/websphere/techjournal/0906_amrhein/0906_amrhein.html

WebSphere CloudBurst Cloud Management (series)

· Managing your private cloud, Part 1: Introducing the WebSphere CloudBurst Appliance command line interface

http://www.ibm.com/developerworks/websphere/techjournal/0907_burr/0907_burr.html

· Managing your private cloud, Part 2: Using the WebSphere CloudBurst REST API interface

http://www.ibm.com/developerworks/websphere/techjournal/0911_amrhein/0911_amrhein.html

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Additional WebSphere CloudBurst Articles:

· Innovations within reach: What's new in WebSphere CloudBurst V2.0
http://www.ibm.com/developerworks/websphere/techjournal/1007_inreach/1007_inreach.html

· Comment lines by Ruth Willenborg: The "special sauce" inside the WebSphere CloudBurst Appliance
http://www.ibm.com/developerworks/websphere/techjournal/0909_col_willenborg/0909_col_willenborg.html

· Automating the construction of applications and application environments: Exploring the integration of WebSphere CloudBurst and Rational Build Forge
http://www.ibm.com/developerworks/websphere/techjournal/0912_brauneis/0912_brauneis.html

· Innovations within reach: It's fast, highly consumable, deeply knowledgeable, uses patterns – and it's purple
http://www.ibm.com/developerworks/websphere/techjournal/1001_inreach/1001_inreach.html

On-line Demonstrations and Webcasts

· IBM Workload Deployer Demonstrations
https://www14.software.ibm.com/webapp/iwm/web/signup.do?source=sw-app&S_PKG=cloudburst&S_TACT=109HE31W&S_CMP=web_ibm_ws_appinfra_hr_cloudblb

· Webcasts:Deploy and Virtualize: Create high performing application environments
https://www14.software.ibm.com/webapp/iwm/web/signup.do?lang=en_US&source=sw-app&S_PKG=deploy_virtualize_ss&S_TACT=109KA11W&S_CMP=web_ibm_ws_appinfra_bd_wllb

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Links

White Papers

· A Study on Reducing Labor Costs: Through the Use of IBM Workload Deployer

https://www14.software.ibm.com/webapp/iwm/web/signup.do?source=sw-app&S_PKG=cloudblaborcosts&S_TACT=109HE38W&S_CMP=web_ibm_ws_appinfra_bd_wllb

· IDC Analyst White paper: Leveraging Dynamic Application Infrastructure for Effective Private Cloud Computing

https://www14.software.ibm.com/webapp/iwm/web/signup.do?source=sw-app&S_PKG=idcldaipcc&S_TACT=109HE51W&S_CMP=web_ibm_ws_appinfra_bd_wllb

Redbook

· Rapid WebSphere Application Server Provisioning with IBM Workload Deployer

https://www14.software.ibm.com/webapp/iwm/web/signup.do?lang=en_US&source=sw-app&S_PKG=cloudburstred&S_TACT=109HE16W&S_CMP=web_ibm_ws_appinfra_bd_wllb

Blogs

· IBM Workload Deployer: Application-centric cloud platform (Part 1 of 3)

https://www.ibm.com/developerworks/mydeveloperworks/blogs/CLLotusLive/entry/ibm_workload_deployer_application_centric_cloud_platform_part_1_of_320?lang=en

· IBM Workload Deployer: Application-centric cloud platform (Part 2 of 3)

https://www.ibm.com/developerworks/mydeveloperworks/blogs/CLLotusLive/entry/ibm_workload_deployer_application_centric_cloud_platform_part_2_of_3?lang=en

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Links

WebSphere Cloud's YouTube Channel

- WebSphereCloud's YouTube Demonstration videos

http://www.youtube.com/user/WebSphereClouds

WebSphere CloudBurst Sample Gallery

- WebSphere CloudBurst Samples

https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en#/wiki/W6451b814902a_4a31_9589_81f21f330185/page/Samples%20Gallery%20for%20WebSphere%20CloudBurst

IBM Image Construction and Composition Tool

The IBM Image Construction and Composition Tool enables users to construct custom virtual images that they can provision with Tivoli Provisioning Manager and IBM WebSphere CloudBurst Appliance, or use in IBM Smart Business Development and Test on IBM Cloud.

- IBM Image and Construction and Composition Tool

http://www.alphaworks.ibm.com/tech/iicct/download

IBM Workload Plugin Development Kit

The IBM Workload Plugin Development Kit allows you to build custom virtual application patterns, or extend existing patterns with custom components and capabilities, so that IBM Workload Deployer can deploy your custom virtual applications to your cloud.

- IBM Workload Plugin Developer Kit

https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?source=swg-plugindekit

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Backup

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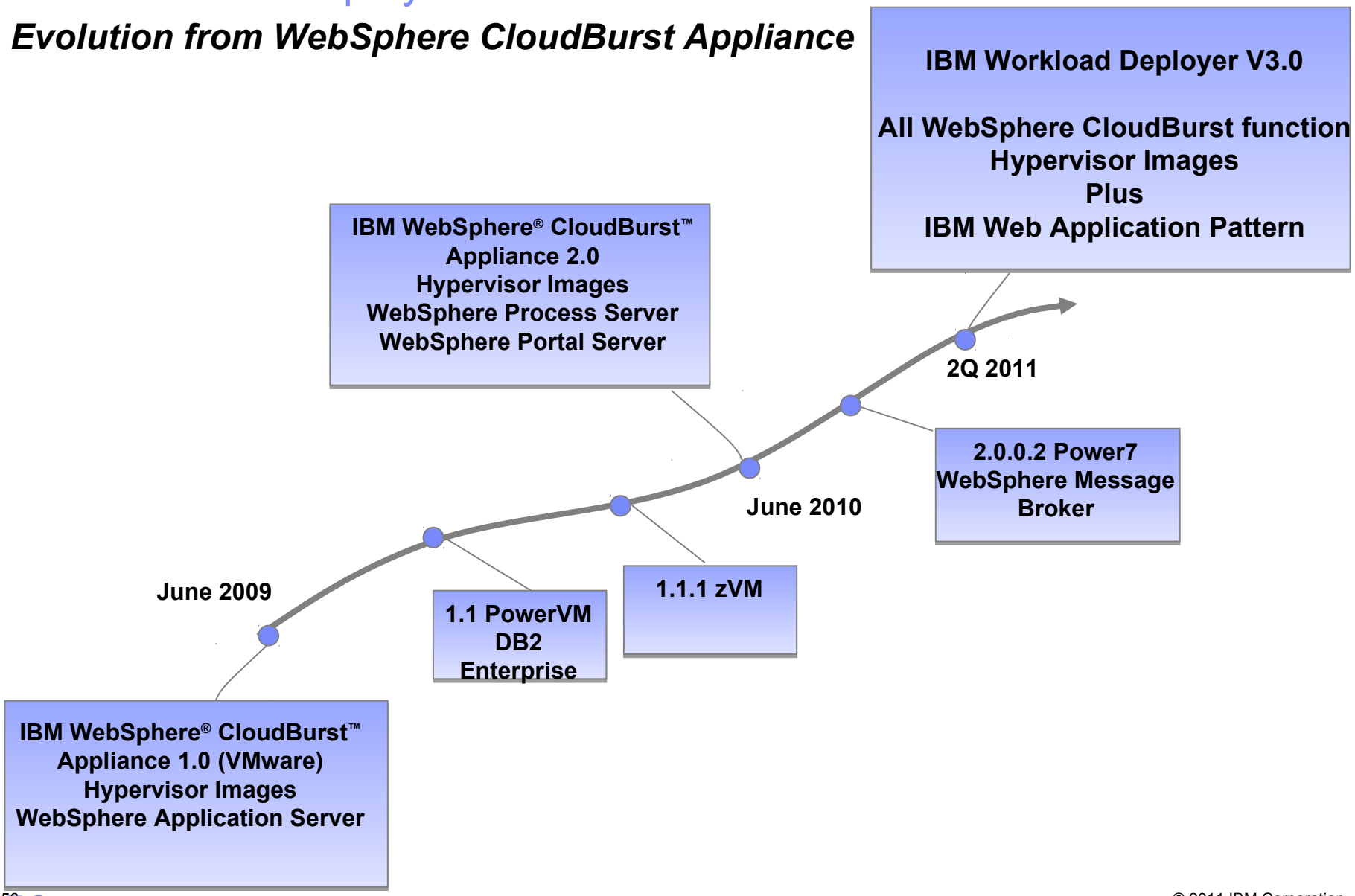
IBM Workload Deployer

Evolution from WebSphere CloudBurst Appliance



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The Virtual Application Pattern Approach

- **Awareness and optimizations for specific workloads**
  - Integrated stacks of middleware optimized for particular workloads
- **Consolidating workloads under a simplified management system**
  - Expose radically simplified management model optimized for specific workloads
  - Pattern based deployments for most common workloads
- **Full lifecycle management**
  - Go beyond provisioning to full lifecycle (update, failure recovery, growth, problem determination)
- **Elastic, efficient, multi-tenant and automated management and execution of application workloads**
  - Integrated monitoring, metering, logging, security, caching, etc.
  - Automated policies for resource consumption and balancing
  - Optimized resource utilization of middleware in virtualized environments

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Web App and Database Patterns

- Designed to support common online web application and database workloads

- **Pattern for Web Applications** consists of application support based on
  - WebSphere Application Server,
  - Tivoli Directory
  - WebSphere eXtreme Scale
  - Connectors to remote systems
    - MQ, DB2, DB2/z, CICS, IMS, 3rd party DB (Oracle), Tivoli Directory

- **Pattern for Database** provides support for DB2 in a Database-as-a-Service model

- **Web and Database patterns can be used together**

- **All Patterns support**
  - Integrated monitoring and logging extensions
  - Failure recovery and HA/Auto-Scaling*
  - Sold as an integrate offerings

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*Supported for Some Components

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Current HV Image Portfolio

	RedHat ESX	AIX PowerVM	SUSE zLinux zVM	RedHat zLinux zVM	SUSE Linux (64-bit) ESX	SUSE Linux (32-bit) ESX
Portal						
Portal/ WCM V6.5.1						X
Portal/ WCM V7.0	32-bit					X
Database						
DB2 V9.7		X			X	X
BPM						
WPS V6.2		X	X			X
WPS V7.0	32-bit	X	X			X
WPS V7.5						
Monitor V7.0						X
Monitor V7.5						
ILOG						
Cognos						
Connectivity						
Cast Iron						
WMQ v7.0.1	64-bit					
WMB v7.0	64-bit					
WSRR v7.5						
WTX v8.4						
Application Infrastructure						
WebSphere Application Server v6.1	32-bit	X				X
WebSphere Application Server v7.0	64, 32-bit	X	X	X	X	X
WebSphere Application Server v8.0						
IBM HTTP Server for WAS HV	64, 32-bit	X	X	X	X	X

2010 or earlier | 1H 2011

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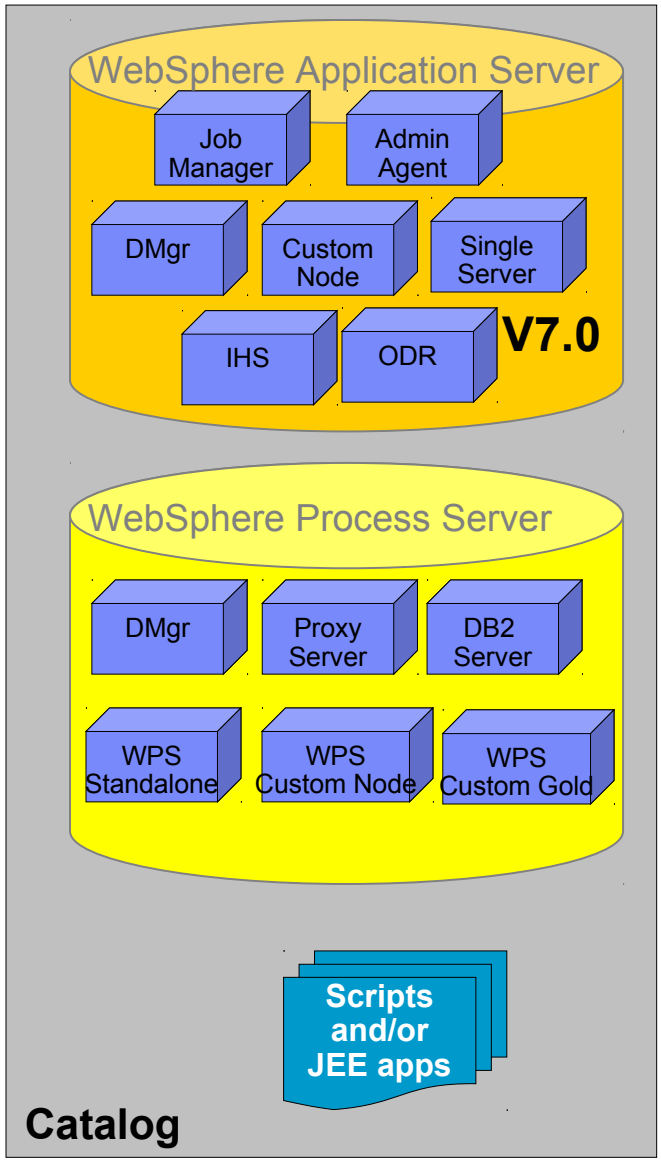
Catalog

IBM provided Virtual Images
- WebSphere Application Server Hypervisor Edition (V6.1, V7.0)
- WebSphere Process Server
- WebSphere Message Broker
- And more

User supplied Script packages
- wsadmin or other scripts
- JEE applications



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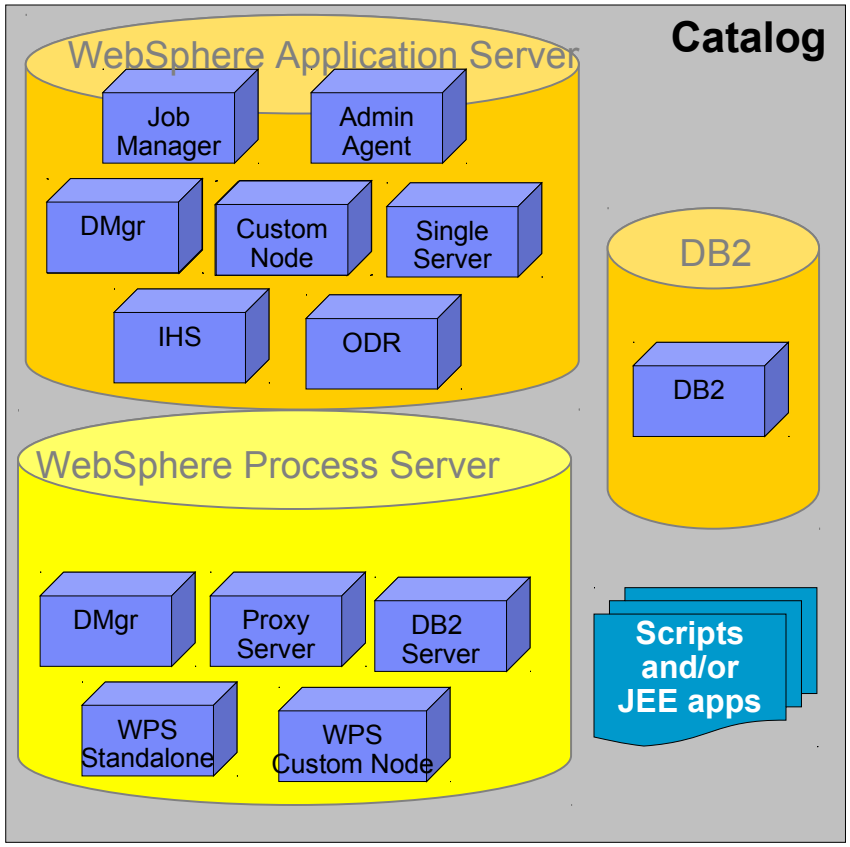
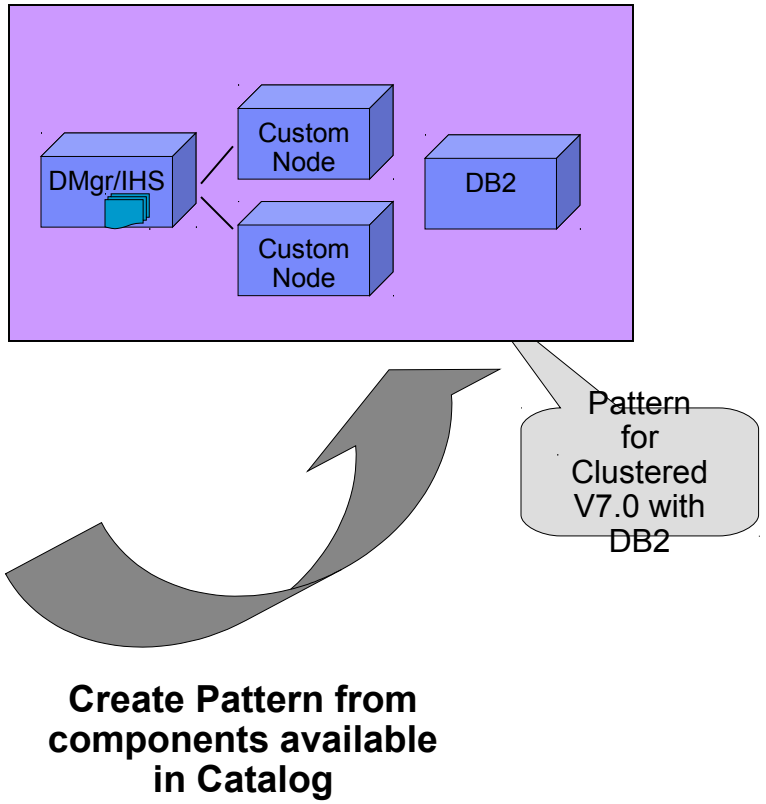
Virtual System Patterns

- Pattern is one or more virtual images and script packages from the catalog to satisfy a certain deployment topology
- Example: Creating pattern of WebSphere V7.0 Clustered topology with DB2





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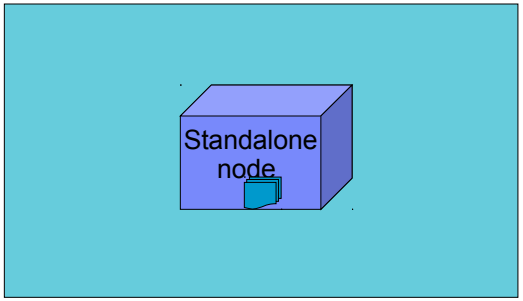
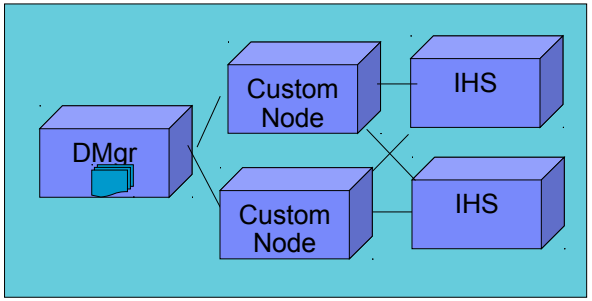
Example Preloaded Patterns

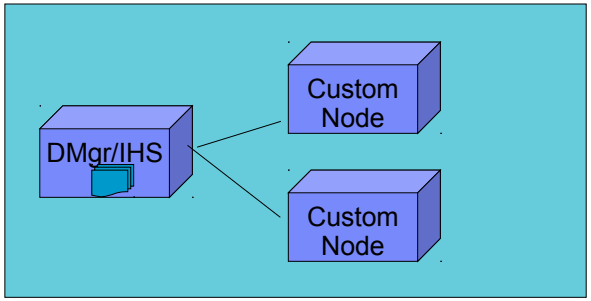
Single Server



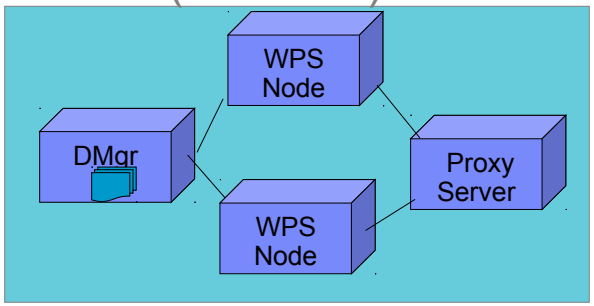
WebSphere cluster



WebSphere cluster (dev)



WebSphere Process Server (Scalable)



Advanced Options for messaging, session persistence, and global security available

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IBM Image Construction and Composition Tool

Now Available on alphaWorks!
http://bit.ly/ICONAlphaWorks

Image Builder

Define image (OS and bundles)

Operating system specialist

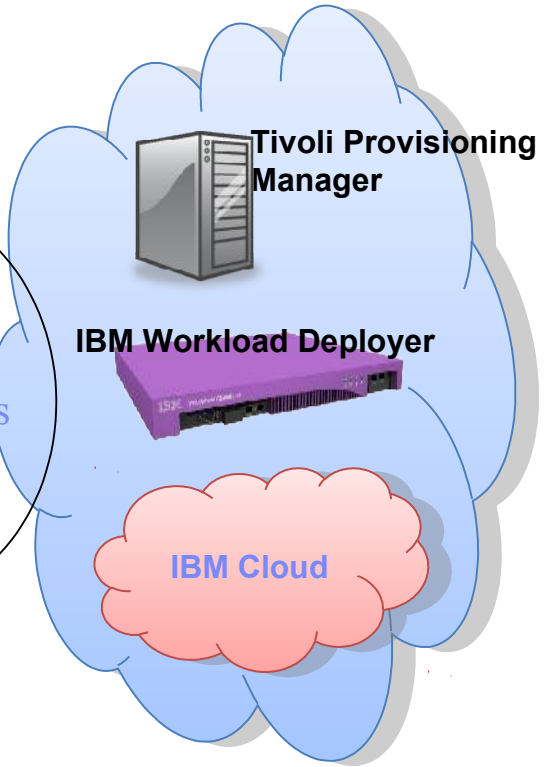
Create base OS

Software specialist

Create bundle

Image Construction Tool

Build images



Bundle Repository

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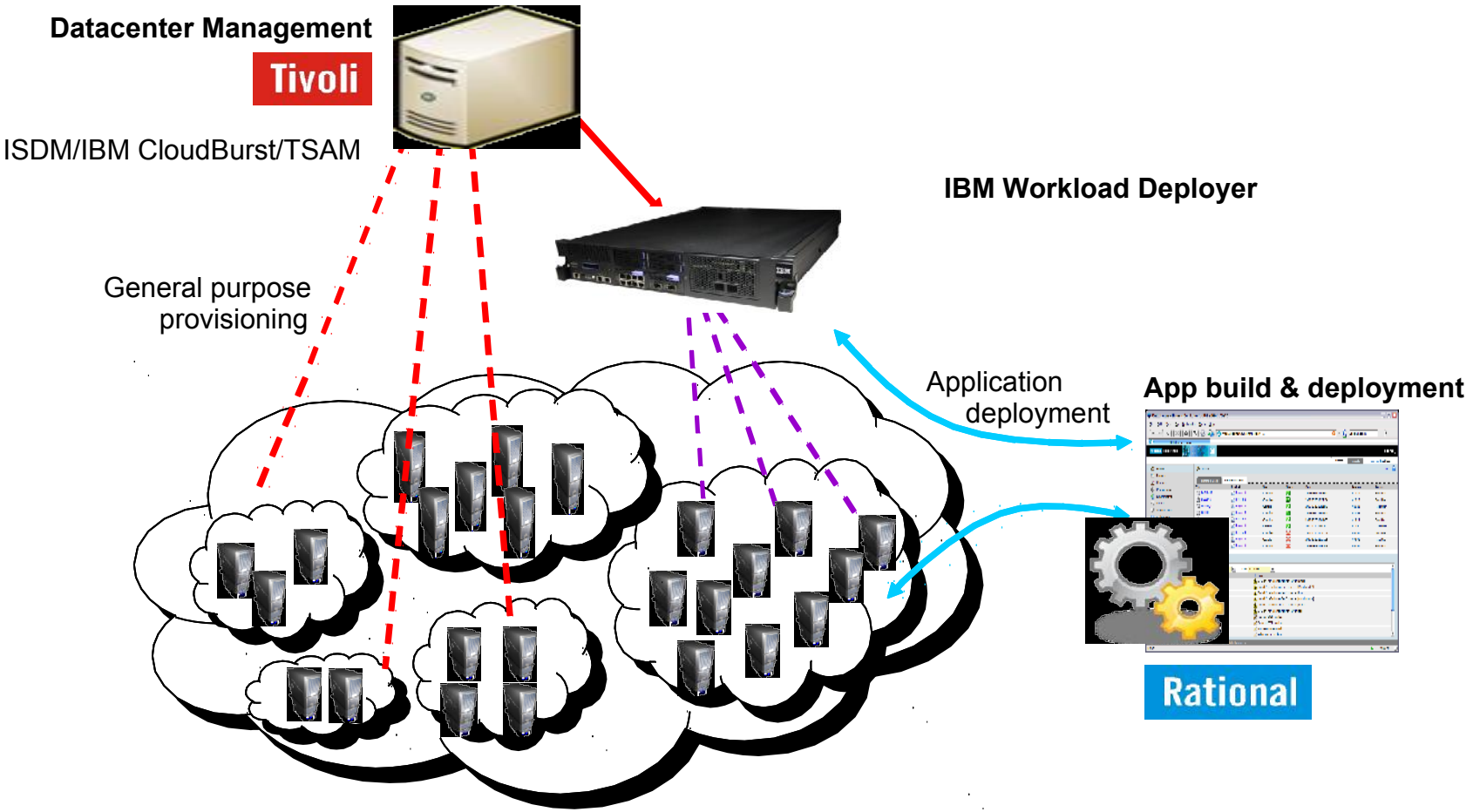
Datacenter Integration



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