



Leveraging Rational and Cloud Technologies To Integrate Development, Test and Production Environments

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Agenda

- DevOps and Continuous Delivery
- IBM cloud solutions with Virtual System Patterns
- DevOps Tools and UrbanCode

Business innovation is increasingly being delivered via software

Rapid pace of change and the digitization of business drives the need for agility

Software drives
almost **80%**
of the automotive industry's
functional innovation

An F-35 contains
5.6 million
lines of code

Technology is the
#1 force impacting
business today



Robotic surgical systems have the
computational capacity
of **7 laptops**

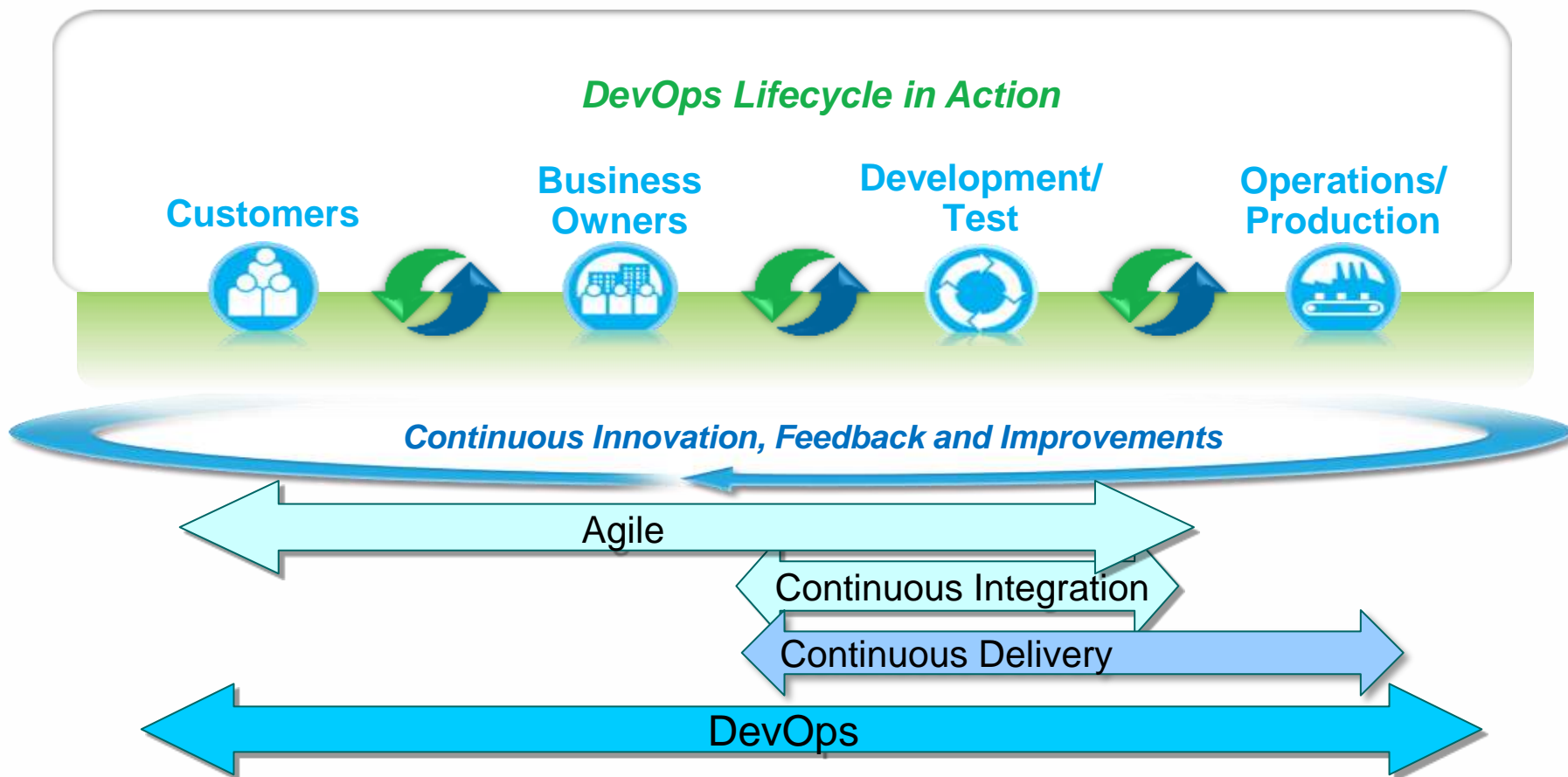
By the year 2020 in the U.S.,
90% of financial
transactions will be
cashless

Customer experience
increasingly drives **business**
needs

DevOps: A blueprint for continuous delivery of software innovation

dev-ops *noun* \ˈdev-äps\
Enterprise capability for continuous software delivery that enables clients to seize market opportunities and reduce time to customer feedback.

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Challenge in Continues Delivery

- Differences in environments can lead to problems
 - Hand-off is time consuming.
 - Development components don't run in the test environment
 - Quality assured solutions don't run in the production environment
- Keeping all three environments identical is very difficult
- Agile development rapid releases compound the difficulties
- Result: Errors, Delays, Extra Cost

Cloud technologies can help address these challenges

Continuous Delivery for Cloud

- Virtualization
 - Flexible and scalable
 - Delivery instructions defined as code.
- Automation
 - Fast and reliable delivery without human errors
- Standardization
 - Repeatable and reliable process
 - Reuse of artifacts for delivery

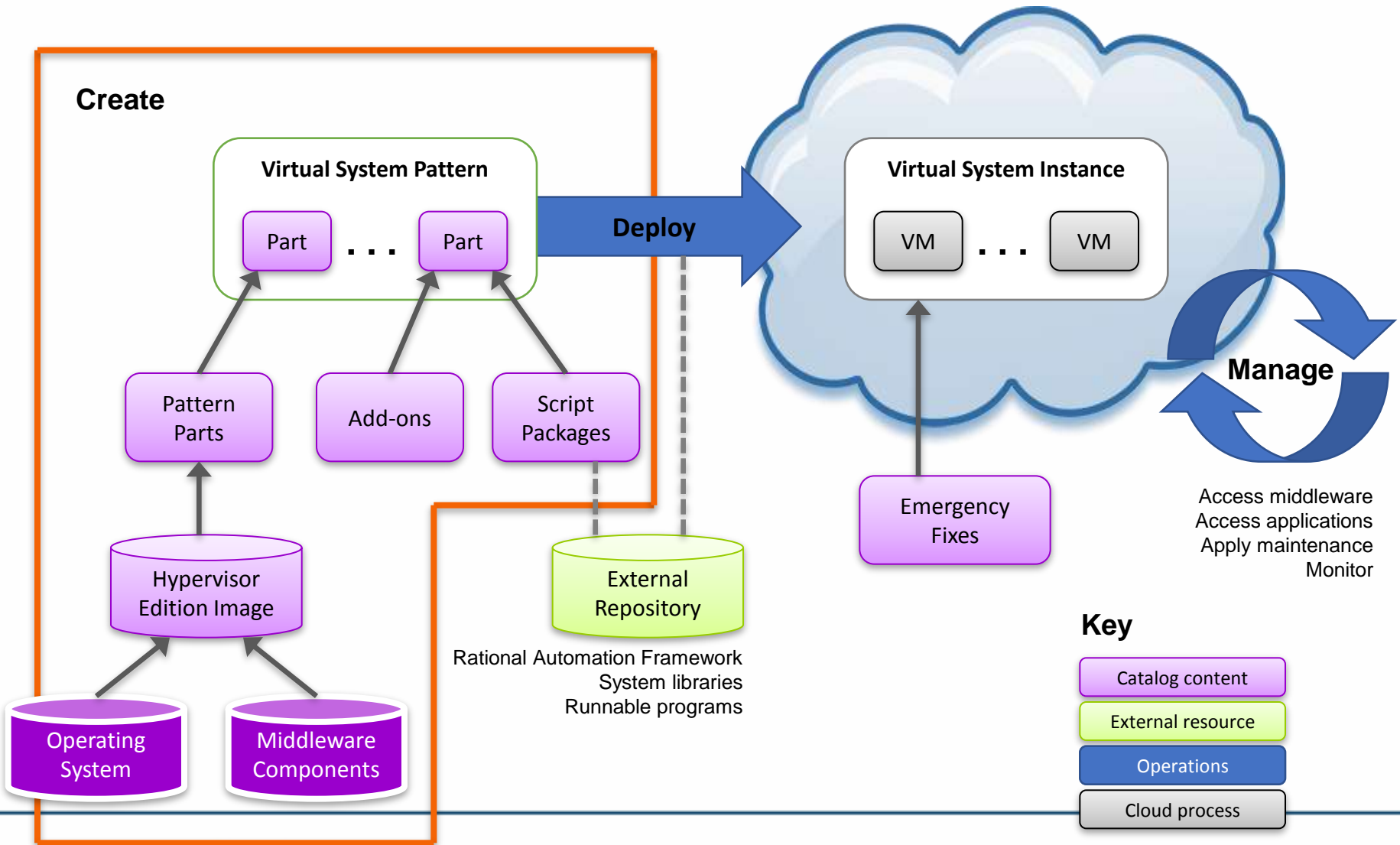
Agenda

- DevOps and Continuous Delivery
- IBM cloud solutions with Virtual System Patterns.
- DevOps tool chain and UrbanCode

Cloud hosts

- A [Cloud Host](#) is a public or private cloud capable of deploying virtual machines into a virtualized server environment
- Automatic deployment of virtual machines utilizes [images, patterns, and scripts](#) to create a pre-configured and reproducible running system of one or more virtual machines
- The virtual machines are a fully configured stack with virtualized processors, memory, and storage, operating system, middleware, and application code
- We have been exploiting technology [Virtual Systems Patterns](#) .

Anatomy of a virtual system

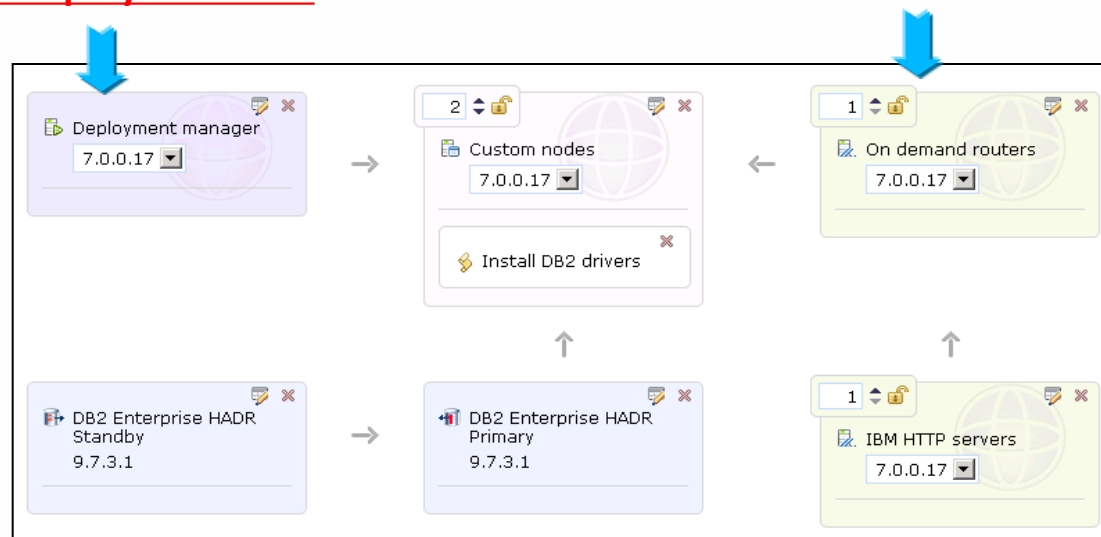


Virtual System Pattern

- A virtual system pattern represents system and middleware topology and automation required to build and wire that topology
- For example: WebSphere Application Server Cluster pattern containing Deployment Manager, one or more Custom Nodes, IBM Http Server and configuration scripts for installing applications to the topology

What deployer defines

What system deploys

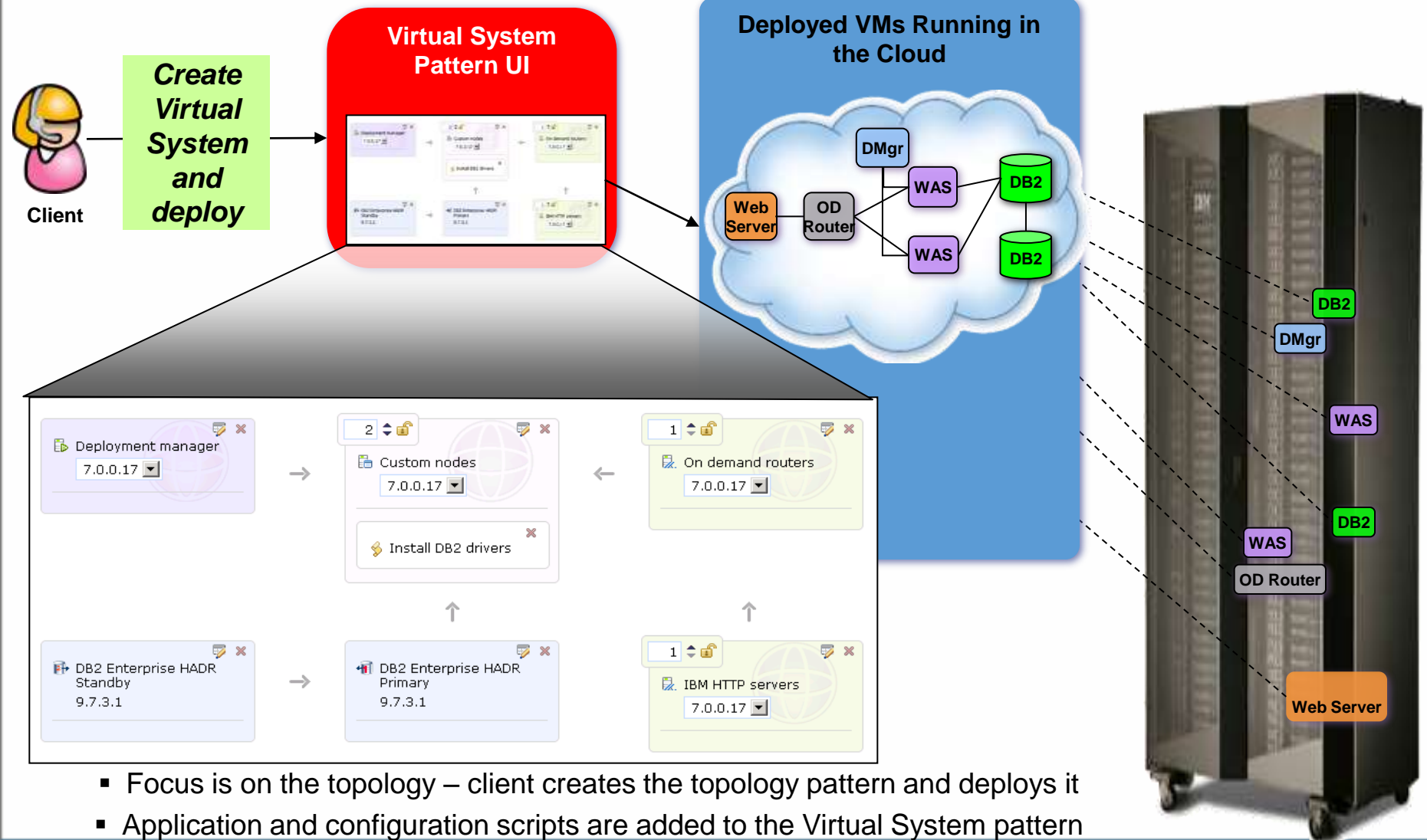


Virtual System Views

Client View

Logical View

Physical View - VMs



IBM offers cloud host solutions that support Virtual System Patterns

- **SmartCloud Orchestrator**

- Fully automates the deployment and lifecycle management of cloud services across resources, workloads and services
- Built on a foundation of open standards – TOSCA, OpenStack, OSLC
- Accelerated deployments with reusable workload patterns with [Virtual System Patterns](#).
- Includes capability of SmartCloud Provisioning.

- **PureApplication System**

- Hardware, software, and a management appliance in a pre-built rack
- PureApplication Manager can deploy [Virtual System Patterns](#) to it's own Intel and Power servers

- **SmartCloud Provisioning**

- Can deploy [Virtual Systems Patterns](#) to Intel, Power, and zLinux hosting platforms

- **IBM Workload Deployer**

- A hardware appliance that can deploy [Virtual System Patterns](#) to Intel, Power, and zLinux hosting platforms

Examples of pre-built IBM software patterns

Web and SOA Applications

- IBM **WebSphere Application Server** Hypervisor Edition for RHEL *
- IBM **Web Application Pattern** *
- IBM Web Experience Patterns for **WebSphere Portal Server** for Red Hat Enterprise Linux
- IBM Web Experience Patterns for **Web Content Manager** for Red Hat Enterprise Linux
- IBM **SOA Policy** Pattern
- IBM **SOA Policy Gateway** Pattern for Red Hat

Connecting Your World

- IBM **Connections** Hypervisor Edition
- IBM **WebSphere Message Broker** Hypervisor Edition for Red Hat Enterprise Linux Server
- **WebSphere MQ** Hypervisor Edition V7.5 for Red Hat Enterprise Linux
- IBM **Messaging Extension** for Web Application Pattern
- IBM **WebSphere Transformation Extender** with Launcher Hypervisor Edition
- IBM PureApplication System virtual application for **SAP CRM**

Data and Transactions

- IBM **DB2** Enterprise Server Edition *
- IBM **Transactional Database** Pattern *
- IBM **Data Mart** Pattern *
- IBM **Informix** Hypervisor Edition

Business Intelligence and Analytics

- IBM Business Intelligence Pattern (**Cognos**)
- IBM **InfoSphere Information Server** for production
- IBM **InfoSphere Information Server** for non production environments

Processes and Decisions

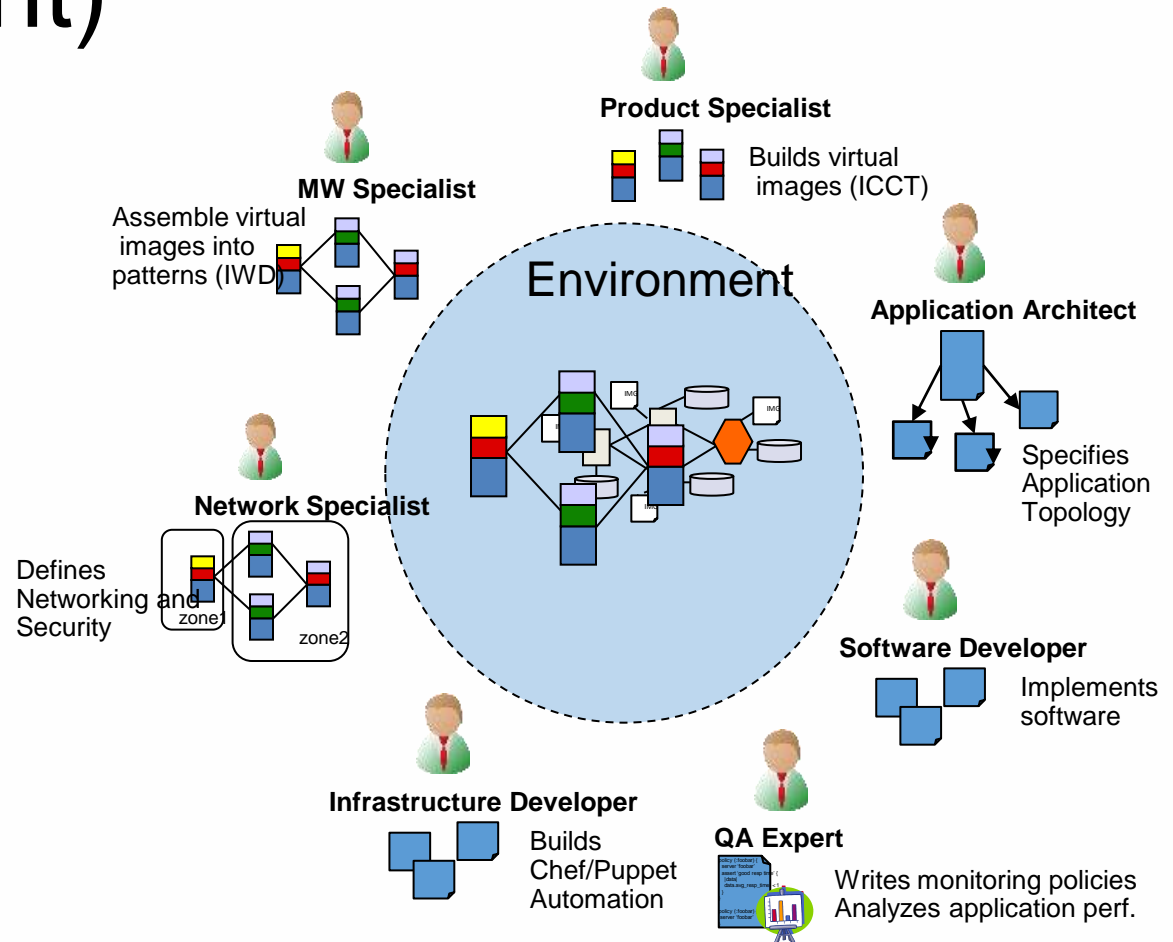
- IBM **BPM** Pattern (Process Center Hypervisor Edition on RHEL)
- IBM **BPM** Pattern (Process Server Hypervisor Edition on RHEL)
- IBM **Operational Decision Manager** Pattern (Decision Center Hypervisor Edition on RHEL)
- IBM **Operational Decision Manager** Pattern (Decision Server Hypervisor Edition on RHEL)

Concepts in SmartCloud Continues Delivery (SCD) of 2012

- First Generation of Continues Delivery offering for cloud.
- Leverages Virtual System Patterns
- Introduced SDE with Weaver technology for complex and flexible deployment
- Leverages Rational tools and IBM Cloud Host tools
 - RTC and RAM
 - SCP
- Also leverages open source tools
 - Chef, cucumber

SDE (Software Defined Environment)

- Cloud enables complete description and use of
 - application
 - middleware
 - infrastructure
- Provisioning and using them is complex task
 - Various roles of experts need to collaborate
- Opportunities for standardization, modularization and reuse.



Weaver

- SDE framework developed by IBM Research.
- DSL (Domain Specific Language) based on Ruby
 - Application
 - Infrastructure (system and middleware)
 - Environment
- Promote reuse with modules
- Reduces errors with validation.

Environment, Application and Infrastructure



- *Environment = {applications} + infrastructure*
- Each application runs in Environment on Infrastructure.
- Each section is organized as a module for reusability.

Example: Topology for JKE Banking *Application*

```
• topology (:jke) {
•   name "JKE"
•   version "2.0.0"
•   description "JKE Banking Web/DB Application"
•
•   node (:app_server) {
•     name "JKE Banking Web application server"
•     description "Describes all components hosted on your web application server"
•
•     component (:web_app) {
•       name "JKE Web Application"
•       description "Web frontend in Dojo plus a bunch of REST resource"
•
•       requires :product => "WebSphere Application Server Community Edition", :version => "6.0.0"
•       requires :product => /Java/i, :version => /(6|7).*/
•
•       # Configurable properties for the application component
•       property :context_root => '/jke', :validators => [ not_empty ]
•       property :deploy_directory => "/opt/#{asset_id}-#{asset_version}"
•       property :asset_id => "JKE_app", :validators => [ not_empty ]
•       property :asset_version => "2.0.3.I20120729-1116", :validators => [ not_empty ]
•       property :war_file => 'http://ram.ibm.com:13080/ram/artifact/#{asset_id}/#{asset_version}',
•         :validators => [ valid_url ]
•     }
•
•   node (:db_server) {
•     name "JKE Banking Database server"
•     description "Describes all components in your DB server"
•     # component details omitted for brevity
•     . . .
•   }
• }
```

■ Components of application

- Application node
 - Uses AP server
- DB node

■ Validation logic

Example: **Topology** for *Infrastructure*

```
•import "virtual_images.weaver"

•topology (:qa_infrastructure) {
•  name "QA Infrastructure for JKE Banking"
•
•  # Represents the Tomcat node
•  node (:tomcat_vm) {
•    name "Tomcat Server"
•    # Declare the usage of role "tomcat_mysql_image" from the imported topology
•    use pure_app_images.tomcat_mysql_image

•
•    property :cpu => 4
•    property :memory => 4096, :description => "Memory in MB"
•  }
•
•  # Represents the MySQL node
•  node (:mysql_vm) {
•    name "MySQL Server"
•    # Declare the usage of role "tomcat_mysql_image" and alias it to 'img'
•    use pure_app_images.tomcat_mysql_image => img
•
•    property :cpu => 4
•    property :memory => 8192, :description => "Memory in MB"
•  }
•}
```

■ Components of infrastructure

- AP server
 - Tomcat
 - # of CPU
 - Memory size
- DB node
 - MySQL
 - CPU,
 - memory,...

■ Validation logic

Example: Topology for *Environment*

```
•import "qa_infrastructure.weaver" # Topology for Infrastructure
•import "jke_app.weaver"         # Topology for Application
•
•topology (:qa_environment) {
•  name "Integration Testing Environment"
•  description "JKE App on two node IWD pattern"

•  use :qa_infrastructure
•  use :jke
•
•  # Realize application nodes onto pattern nodes
•  realizes jke.app_server => qa_infrastructure.tomcat_server
•  realizes jke.db_server => qa_infrastructure.mysql_server

•  # Environment specific properties
•  property :build_tag => "TODO", :description => "Build id from build system"

•  # Set properties for the infrastructure node (excerpt)
•  qa_infrastructure.name = "JKEBanking_#{build_tag}"

•  qa_infrastructure.was_server.cpu = 4
•  qa_infrastructure.was_server.memory = 4096

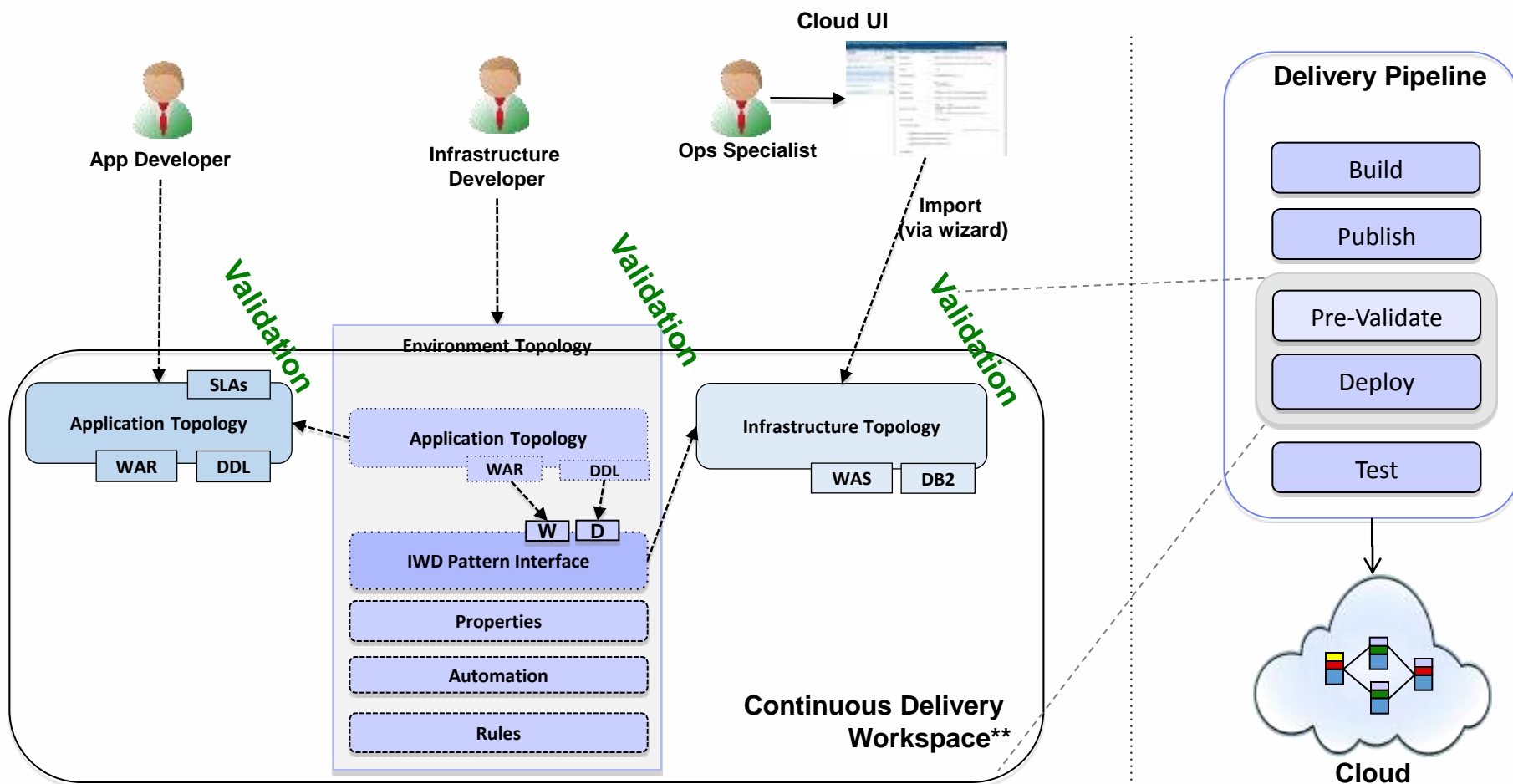
•  qa_infrastructure.db_server.cpu = 4
•  qa_infrastructure.db_server.memory = 4096

•  # Override other values in any of the application or pattern topology (if needed)
•  jke.app_server.web_app.context_root = "/"
•}
```

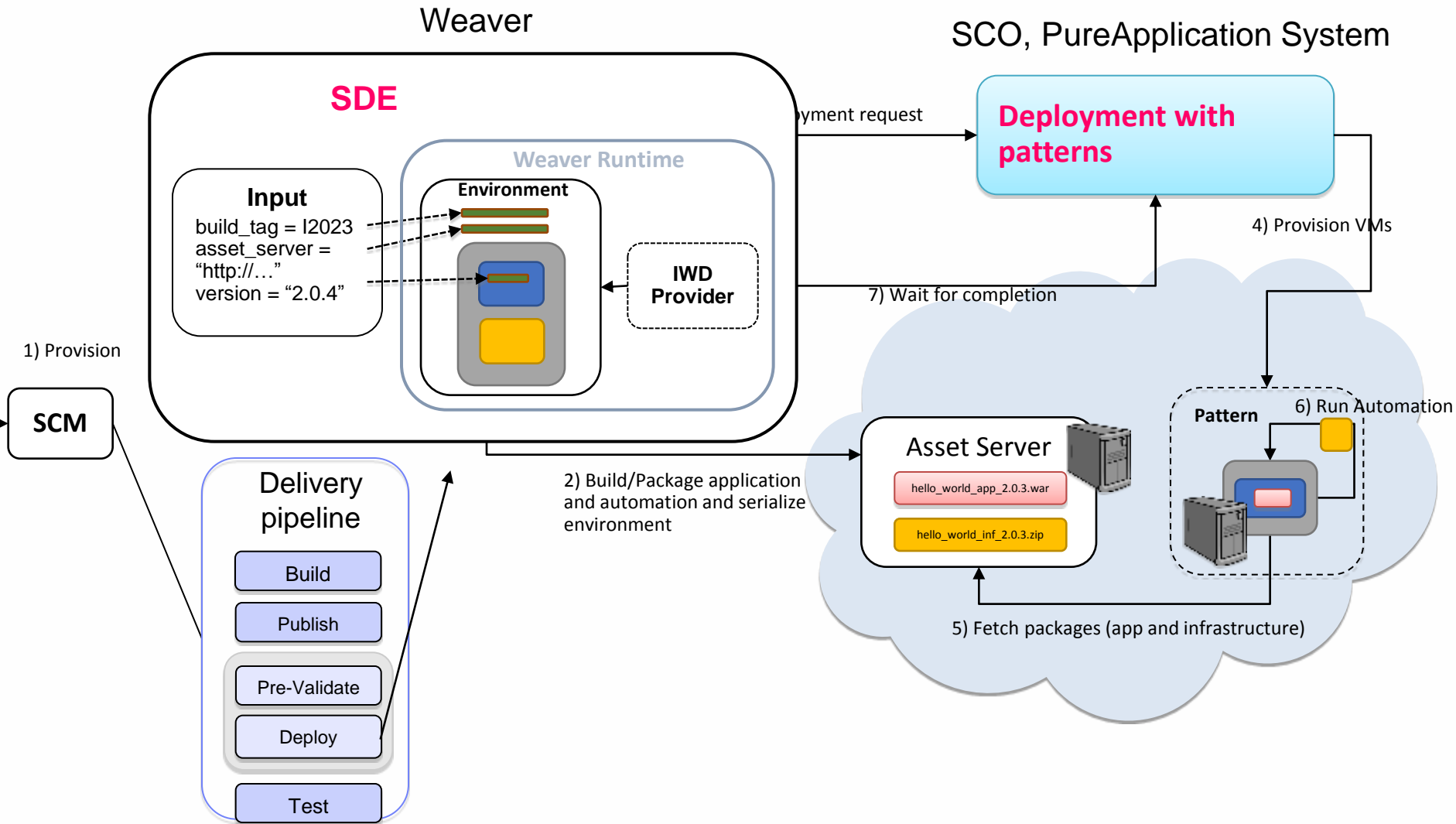
- Component of environment
 - Link to application Topology
 - Link to infrastructure Topology
- Validation logic
- Link to Chef script for application deployment.
- Deployment parameters

SDE Development View

Runtime View



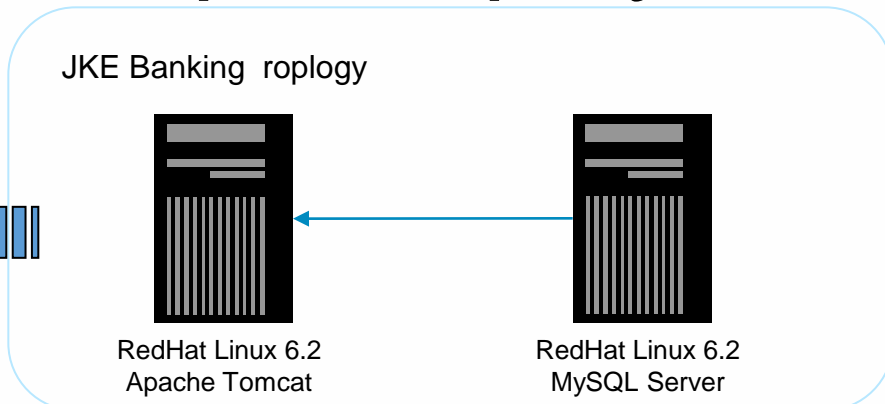
Deployment flow with SCD



Comparison of sample deployment

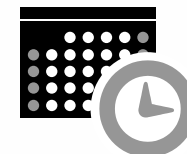


Manual Deployment



Activities	time
Build validation and library registration	30 min.
Provisioning two Linux machines	2 hours
Installing Apache Tomcat and application war files	1.5 hour
Installing MySQL server and setting up DB.	1.5 hour
Setting up a connection between the application and DB.	30 min.
Smoke test and validation	30 min.
total	6.5 hours

Deployment with SCD

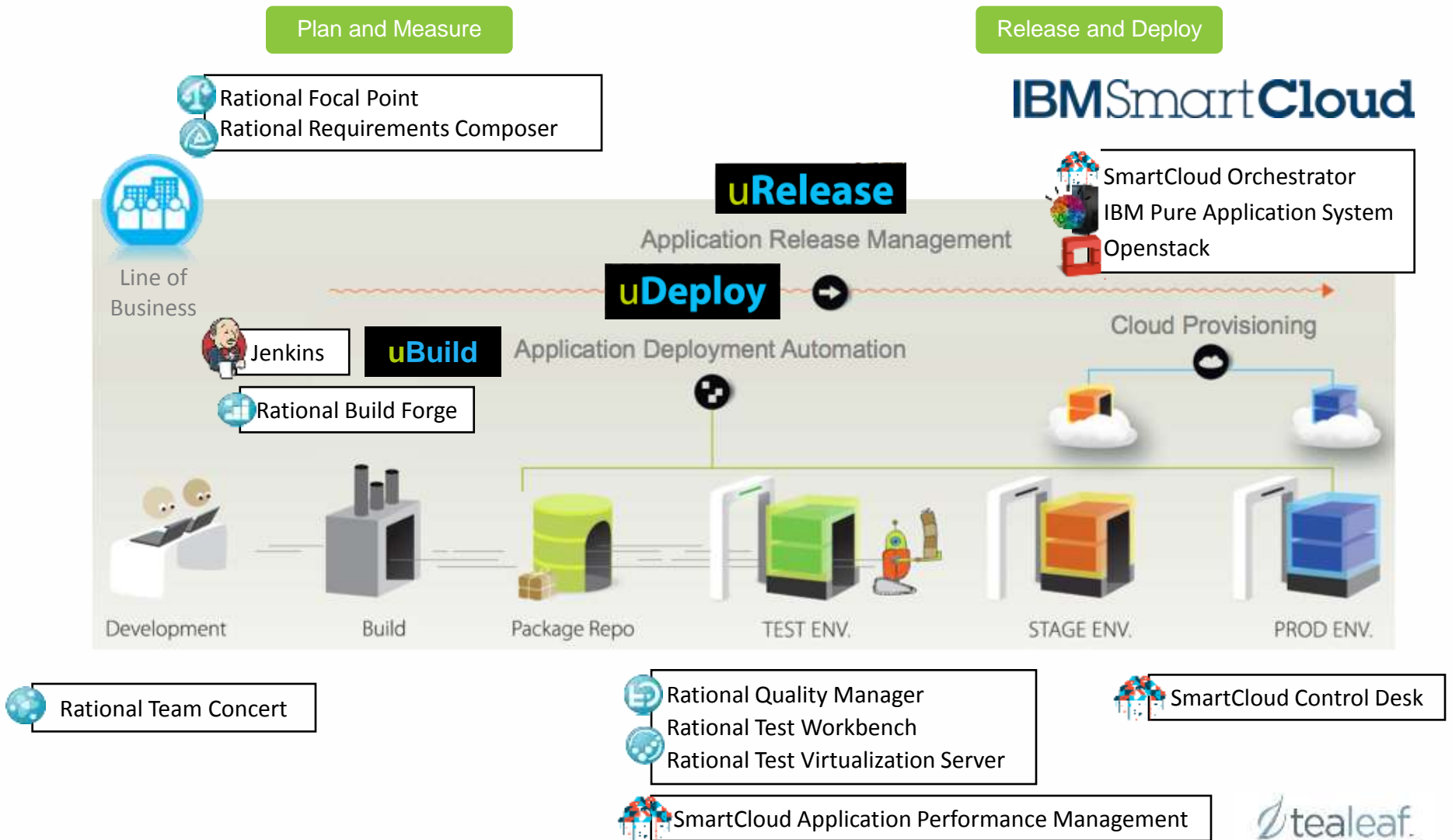


activities	time
Executing automatic deployment	50 min.
total	50 min

Agenda

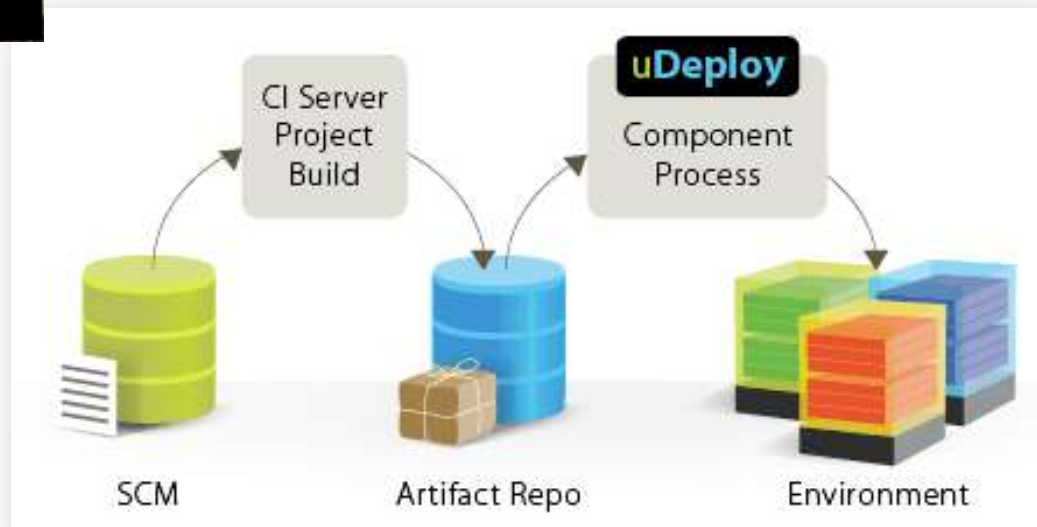
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DevOps Tool Chain



uDeploy

*Automating deployment of **applications** across dev, test, and production environments*



Application Model of uDeploy



Components

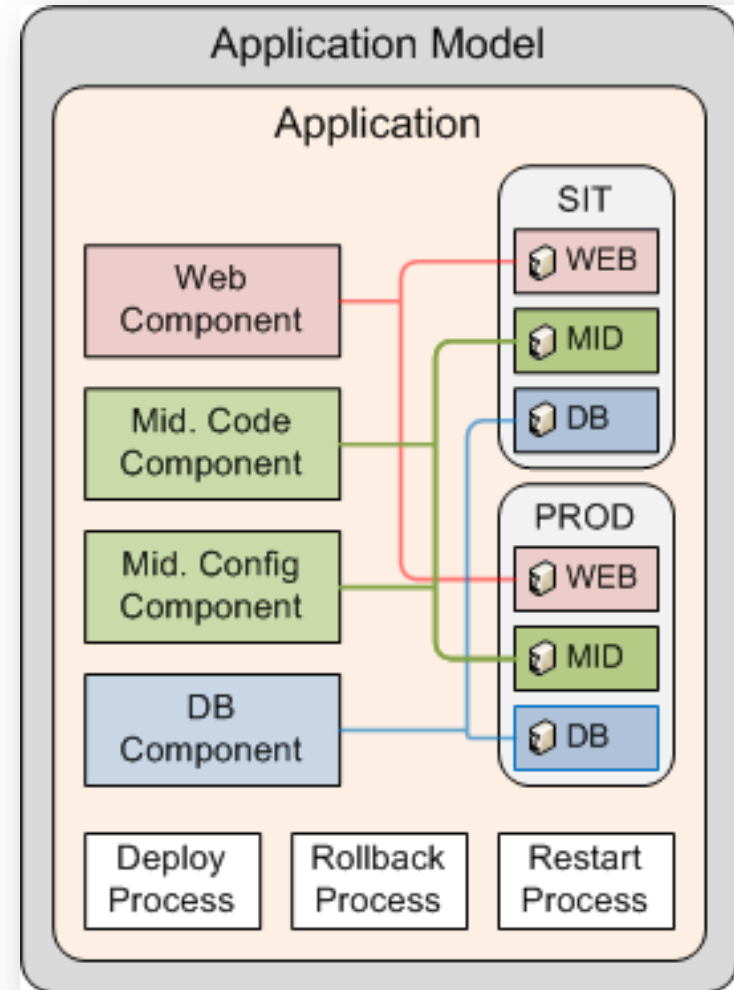
- Tiers or services

Environments

- Target servers
- Servers have roles
- Env. Specific Config

Processes

- Coordinates Component processes



uDeploy configuration settings

uDeploy is ready for lots of config.

This stuff changes across those environments

Variables for this component regardless of environment.

Secure stuff is secure.

You can even replace whole files with templated versions at deploy time.

Store app configuration in your deploy tool where it's safe from junior devs.

uDeploy

Hello admin | Help | Logout

Dashboard Components Applications Configuration Resources Deployment Calendar Work Items Settings

Home > Configuration

Component: PetShop-APP

Properties

Add Property

Name	Value	Description	Actions
appcmd.path	C:\Windows\System32\inetsrv		Edit Delete
code	78ecf0dfadfb6a38ea8f4bf8d8528950867a039c	trigger code for anthill	Edit Delete

10 per page 2 records - Refresh

Add Property

Environment Property Definitions

Define properties here to be given values on each environment the component is used in.

Add Property

Name	Label	Required	Default Value	Description	Actions
web.dir	web.dir	false	C:\Live		Edit Delete
db.server	db.server	true			Edit Delete
db.user	db.user	true			Edit Delete
db.password	db.password	true	****		Edit Delete
web.port	web.port	false			Edit Delete
web.url	web.url	false			Edit Delete

10 per page 6 records - Refresh

Add Property

Configuration Templates

Name	Actions
web.config	View Edit
applicationHost.config	View Edit

10 per page 2 records - Refresh

Create New Configuration Template

Application environment inventory

uDeploy Hello admin | Help | Logout

Home » Applications » PetShop ation Resources Deployment Calendar Work Items Settings

Application: PetShop

Description

The "Petshop" is made of 4 deployable components and is deployed to 3 environments.

Environments **History** Edit Properties Components Snapshots Pro

Environments

Drag environments by their label boxes to order them.

SIT

Actions

Request Process

Compare Copy

Inactivate

Latest Inventory

Component	Version	Snapshot	Properties	Status	Compliance	Actions
PetShop-DB	2279		Version 2	Active	Compliant (1/1)	View Request
Net Framework	4.0	baseline - petshop	Version 1	Active	Compliant (1/1)	View Request
IIS	7.5	baseline - petshop	Version 1	Active	Compliant (1/1)	View Request
PetShop-APP	2306		Version 20			

10 per page 4 records - Refresh

UAT

Actions

Request Process

Compare Copy

Inactivate

Latest Inventory

Component	Version	Snapshot	Properties	Status	Compliance	Actions
PetShop-DB	2279	baseline - petshop	Version 1	Active	Compliant (1/1)	View Request
PetShop-APP	2299	baseline - petshop	Version 11	Active	Compliant (1/1)	View Request
Net Framework	4.0	baseline - petshop	Version 1	Active	Compliant (1/1)	View Request
IIS	7.5	baseline - petshop	Version 1	Active	Compliant (1/1)	View Request

10 per page 4 records - Refresh

Prod

Actions

Request Process

Compare Copy

Inactivate

Latest Inventory

Component	Version	Snapshot	Properties	Status	Compliance	Actions
No components have been installed to this environment. - Refresh						

Show Inactive Environments

Create New Environment Define your own environments

Inventory of correct versions of each component and full app in each environment. SIT has newer stuff.

Compliance
How many of our machines actually have the right version?

The variables used at deploy time are versioned and tracked along with the deployed binaries.

Compare one env.'s versions, settings and files to another. Super easy.

Easily see how this got there.



uDeploy process designer

The screenshot displays the uDeploy web interface. At the top, there's a navigation bar with 'Hello admin | Help | Logout' and a menu with 'Dashboard', 'Components', 'Applications', 'Configuration', 'Resources', 'Deployment Calendar', 'Work Items', and 'Settings'. Below this, a breadcrumb trail reads 'Home > Components > JPetStore-APP-Jenkins > Processes > Process: Install'. The main content area is titled 'Process: Install' and shows 'Description Version 19 of 19'. A callout bubble says 'These designs are versioned.' Below the title are tabs for 'Design', 'Edit', 'Properties', and 'Changelog'. On the left, a 'Tools' section contains icons for search, zoom, and other functions. Below that is an 'Add Steps' section with a list of 'Available Plugin Steps' including Manual Task, Add Inventory Status, Remove Inventory Status, Artifacts, BI, Builders, Configuration Management, DB, Deploy, Installers, Integration, Scripting, SQL, and UrbanDeploy. The central part of the screen shows a flowchart of the installation process with steps: 'Stop Application', 'Undeploy Application', 'Erase Scratch Directory', 'Download Artifacts By Label', 'Unwar Shell', 'Replace Tokens', 'Rewar Shell', and 'Deploy Application'. A callout bubble says 'Super easy drag-and-drop configuration. Click the pencil icon to do the detailed config of each step.' Another callout bubble on the right says 'Moving the artifacts/files/stuff for you to deploy is handled for you. No FTP, network file shares or other craziness required.' A third callout bubble on the left says 'Hundreds of built-in steps. (and you can make your own with our open plugin system!)'.

Hundreds of built-in steps. (and you can make your own with our open plugin system!)

Super easy drag-and-drop configuration. Click the pencil icon to do the detailed config of each step.

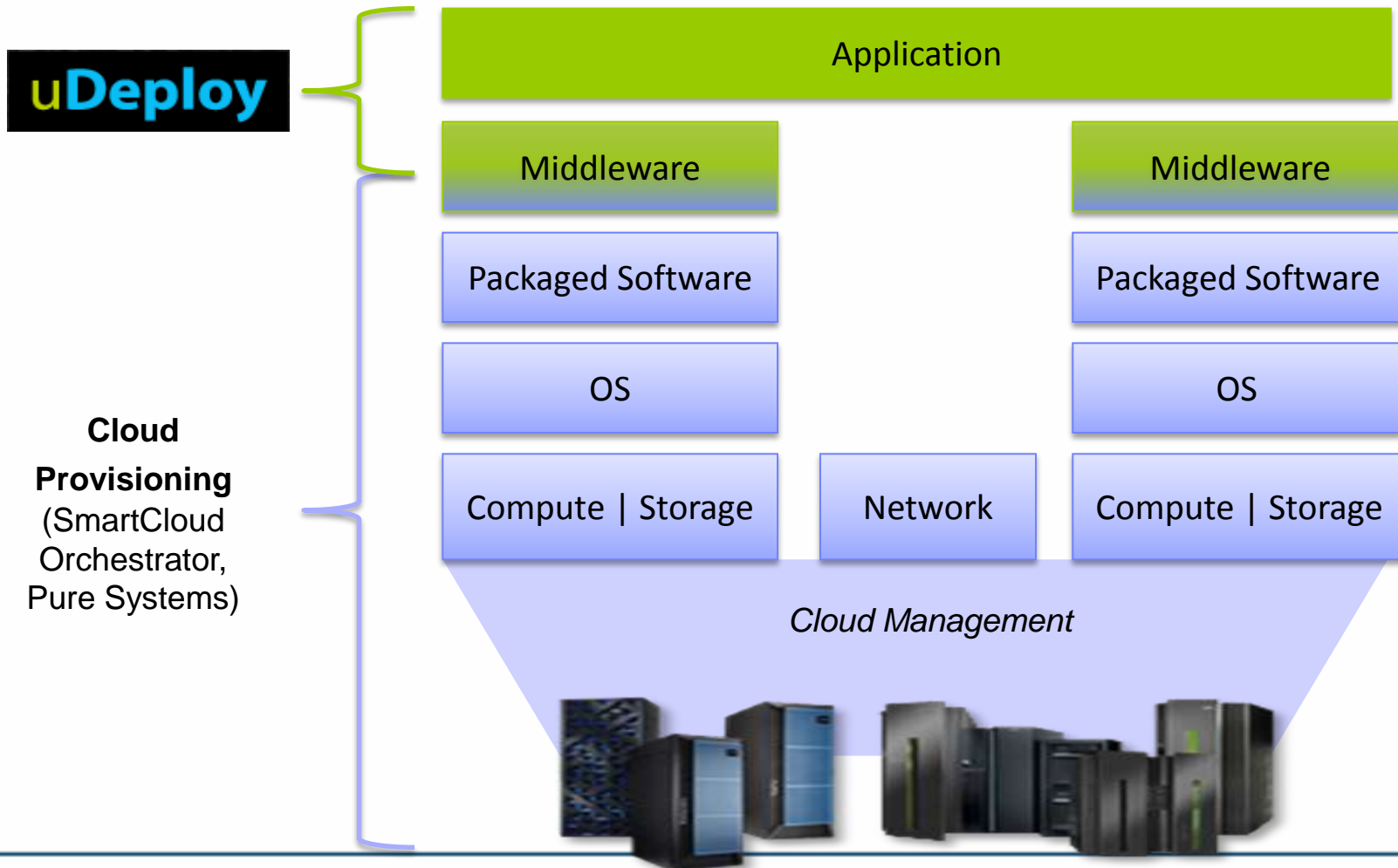
Moving the artifacts/files/stuff for you to deploy is handled for you. No FTP, network file shares or other craziness required.

What's New in UrbanCode uDeploy v6.0

- **Continuous Delivery with Cloud**

- Continuous Testing with Virtualized Services (Green Hat)
- DevOps for Mobile
- Discover and configure WebSphere middleware
- ALM Integration with
 - Rational Asset Manager
 - Rational Quality Manager
 - Rational Build Forge

uDeploy & Cloud Provisioning



Demo

Summary

- To meet the challenge of latest trends (mobile, social, big data and cloud), IBM has defined DevOps as enterprise capability of end to end software delivery with accelerated speed, quality and fast feedback cycle.
- IBM UrbanCode is key solution for continued delivery in our DevOps solutions.
- Its uDeploy V6 supports continues delivery for Cloud with IBM Cloud Host products.
- Technical innovations include
 - Virtual system patterns for repeatable and reusable system deployment.
 - Software Defined Environment with Weaver.
- Rational has adopted continues delivery for our product delivery.
 - CLM has moved from a yearly release to quarterly release of new features.

Questions

Innovate2013
The IBM Technical Summit



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