# Managing Change Across Complex WebSphere Enterprise Environments

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## Objective

- Environment provision
- Introduce change into environments
- Consistent process for code deployments
- Comparison between environments
- Comparing and environment overtime
- Who, what, when?
- Self contained “super archive” that contains all code, scripts and configuration to provision an entire environment
- Efficiencies through self-service
- Speeding up the software development life-cycle
- Start to view middleware components more as commodities

## Scope of seminar

- Version Control System
  - Development area
  - Release area
- Common approach to versioning
- Build Process
- Build Package (input to deployment process)
- Environment Provisioning and Deployment Process

## Version Control – Development area

- Development area contains all the source code
- Developers and administration team have access to source
- Application build.xml reside here

## Sample Development area

Salesapp_dev\

\applicationEARs

\database

\source

## Version Control – Release Area

- Release area contains all the scripts and properties files used for deployment.
- Only administration team have edit access. Developers can view content.
- Shared resources are symlinks (in ClearCase / svn) or IVY Repository if using ANT or in POM.xml if Maven2

## Sample Release area

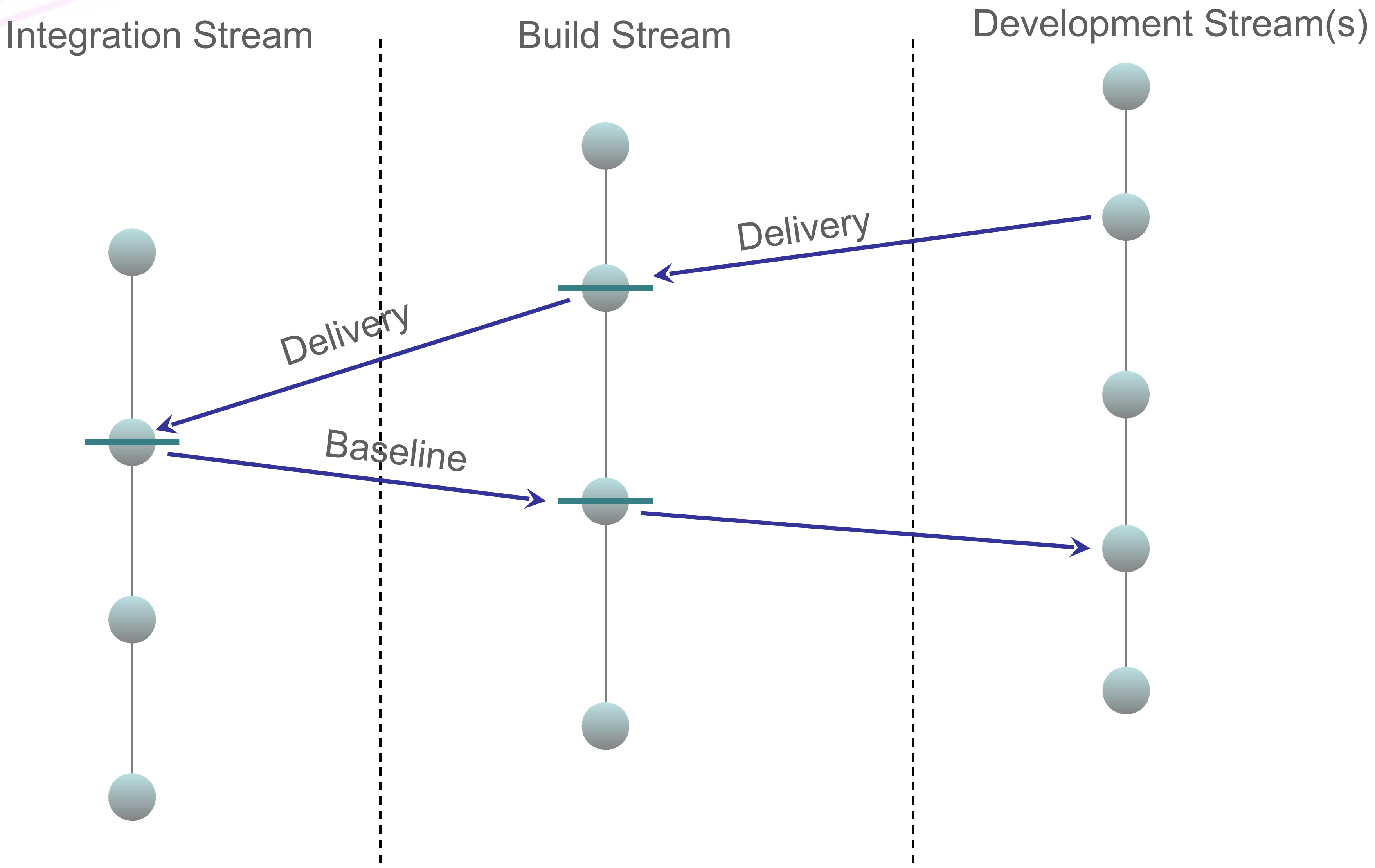
Saleapp_release

- \j2ee
- \html
- \mq
- \scripts
- \clients

## How does the VCS relate to the build process?

- Build process is inextricably linked to standards in place in version control system
- Developer work on the team stream(s)
- Developer delivers to the build stream
- Build initially on build stream. Successful builds are delivered to the integration stream
- Re-built on integration stream
- Ensures only successful builds are done on the integration stream
- Build package is the output from Integration Stream
- Integration stream is baselined
- Baseline is then recommended

# Sample Development Area



## Build Process #1

Generic build framework of re-usable components to perform all common tasks:

- buildJar
- buildWar
- buildEjb
- buildPortlet
- buildBusinessProcess
- buildEar

## Build Process #2

- Application teams create and application specific build.xml file that calls generic build targets
- Example xml
  - buildJar
  - buildJar
  - buildWar
  - buildEar

# Build a JAR file

```
<target name="doCustomerBSJava_Project" depends="init,
    generateFoundationJXS" description="Builds all the java code">
        <ant antfile="${GENERICBUILD}" target=“buildJar">
                <property name="project" value="${project}"/>
                <property name="classpath" value="${classpath}"/>
                <property name="component" value="CustomerBS"/>
                <property name="sourceDir" value="$
    {dir.java.src}/CustomerBS/src"/>
                <property name="workingDir" value="${workingDir}"/>
                <property name="workingDir.lib" value="$
    {workingDir}/lib/${project.staging}/lib"/>
        </ant>
    </target>
```

# Build a WAR file

```
<target name="buildWar_ProjectPortal" depends="init" description="Build
    Project Portal War file">
        <ant antfile="${GENERICBUILD}" target="buildWar">
                <property name="war.name" value="ProjectPortalWeb.war"/>
                <property name="component" value="ProjectPortalWeb"/>
                <property name="sourceDir" value="$
    {dir.web.src}/ProjectPortalWeb/src"/>
                <property name="include" value="**/*"/>
                <property name="sourceDir.meta" value="$
    {dir.web.src}/ProjectPortalWeb/WebContent"/>
                <property name="project" value="${project}"/>
                <property name="classpath" value="${classpath}:$
    {classpathWAR}"/>
                <property name="workingDir" value="${workingDir}"/>
        </ant>
    </target>
```

# Build an EAR file

```
<ant antfile="${GENERICBUILD}" target=“buildEar">
			<property name="sourceDir" value="${dir.ear.src}/${application.name}" />
			<property name="sourceDir.jx" value="${dir.ear.src}/${application.name}" />
			<property name="include" value="" />
			<property name="excludeJars" value="" />
			<property name="sourceDir.meta" value="${dir.ear.src}/${application.name}/META-INF" />
			<property name="workingDir.meta" value="${workingDir.dist}/META-INF" />
			<property name="project" value="${project}" />
			<property name="component" value="projectapplication" />
			<property name="classpath" value="${classpath}" />
			<property name="workingDir" value="${workingDir}" />
</ant>
```

## Build Process – benefits #1

- Can change the implementation of Generic Build and ALL application teams start using this without having to make any changes
- Can add additional components to Generic Build process that are immediately available to all application teams
  - E.g.: Recently added Agitar for code coverage.
- Enforce standard use of libraries: log4j, jms, oracle, etc.

## Build Process – benefits #2

- Application teams can still implement custom build components if required
- Output of the build process is a the deployment “Build Package”
- Optionally developers can own the build process and abide by a contract to provide Build Package in a specific format

## Versioning

- Baseline / label in version control system should be the only version required
- Standard approach
  - MAJOR.MINOR.BUILD
  - e.g. 03.02.001
- Common approach to versioning allows you think your version control system , deployment and runtime infrastructure

## Versioning

Version used as an identifier in:

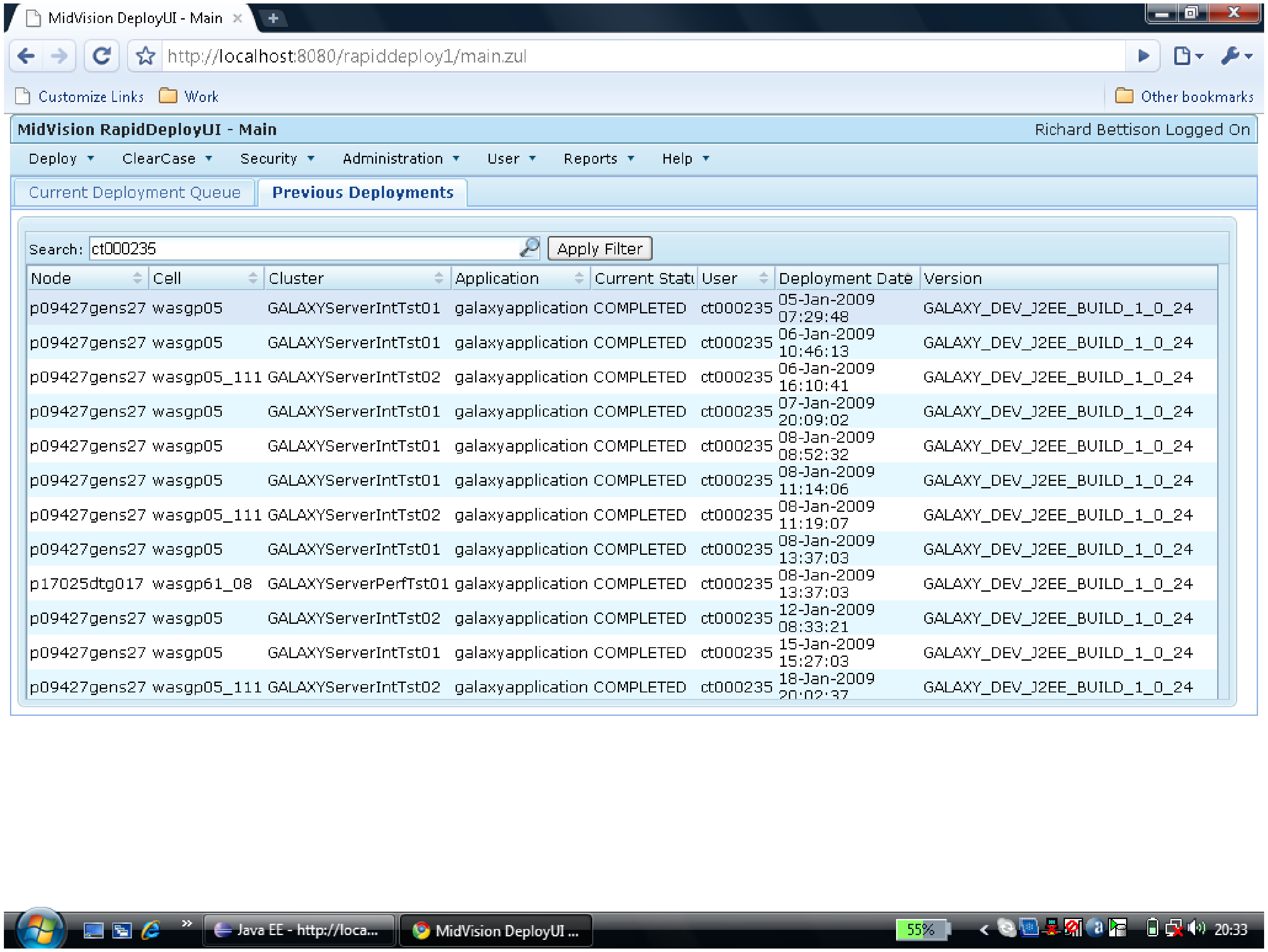
- Version Control System
- MANIFEST.MF
- Build package (super archive containing code and deployment scripts / properties)
- Deployment tool
- Use of J2EE standard tags in MANIFEST (Application-Version) the version is displayed in SystemOut

## Audit

Typically audit is carried out backwards – starting at runtime environment

- Check version of deployed code in SystemOut
- Check deployment audit logs to see who / when deployment happened
- May also want to code has been promoted through the environments correctly
- Finally, may also want to perform some analysis on version control system i.e. what is the difference between this version of code and a previous one

# Example Audit



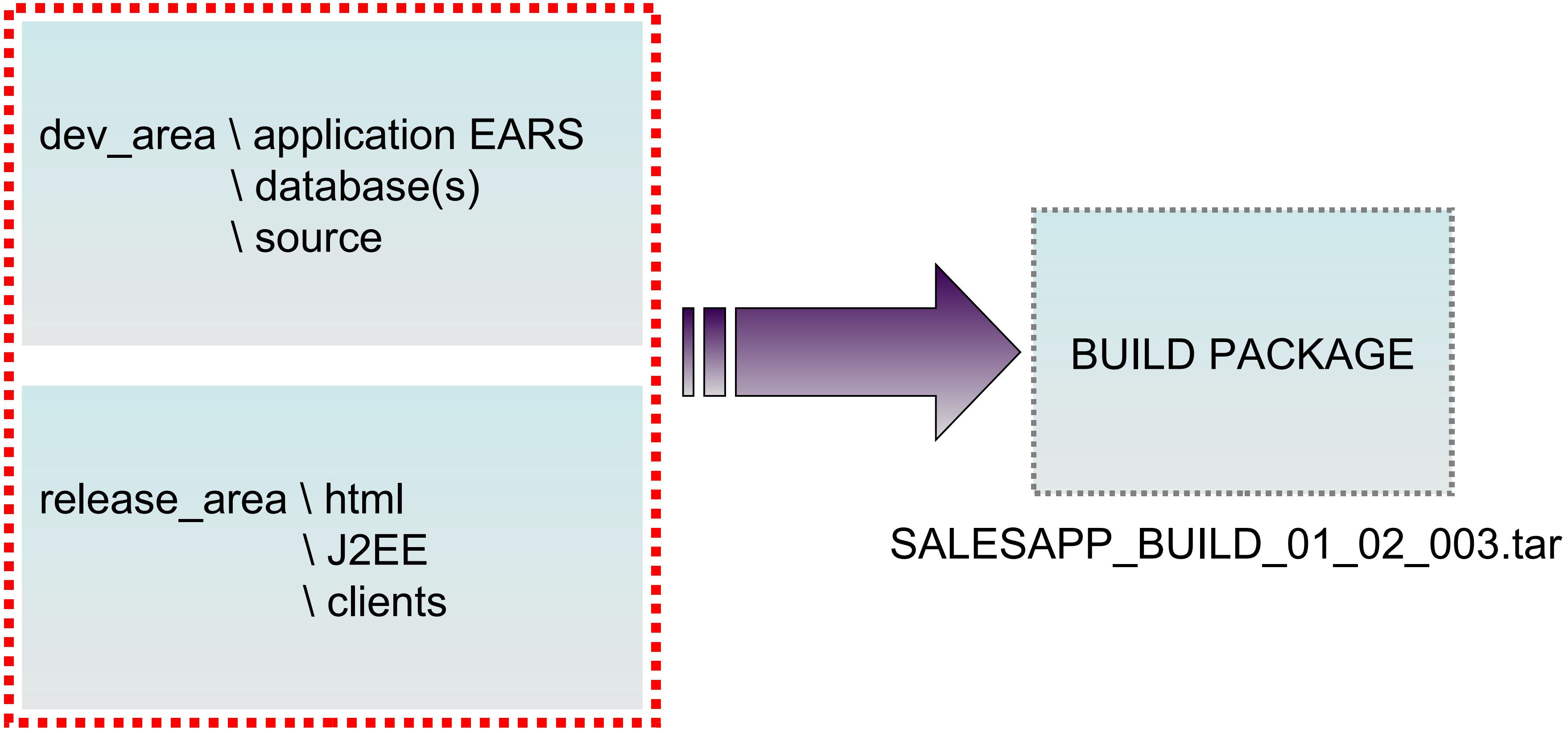
Search: ct000235

| Node | Cell | Cluster | Application | Current Statu | User | Deployment Date | Version |
|---|---|---|---|---|---|---|---|
| p09427gens27 | wasgp05 | GALAXYServerIntTst01 | galaxyapplication | COMPLETED | ct000235 | 05-Jan-2009 07:29:48 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p09427gens27 | wasgp05 | GALAXYServerIntTst01 | galaxyapplication | COMPLETED | ct000235 | 06-Jan-2009 10:46:13 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p09427gens27 | wasgp05_111 | GALAXYServerIntTst02 | galaxyapplication | COMPLETED | ct000235 | 06-Jan-2009 16:10:41 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p09427gens27 | wasgp05 | GALAXYServerIntTst01 | galaxyapplication | COMPLETED | ct000235 | 07-Jan-2009 20:09:02 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p09427gens27 | wasgp05 | GALAXYServerIntTst01 | galaxyapplication | COMPLETED | ct000235 | 08-Jan-2009 08:52:32 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p09427gens27 | wasgp05 | GALAXYServerIntTst01 | galaxyapplication | COMPLETED | ct000235 | 08-Jan-2009 11:14:06 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p09427gens27 | wasgp05_111 | GALAXYServerIntTst02 | galaxyapplication | COMPLETED | ct000235 | 08-Jan-2009 11:19:07 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p09427gens27 | wasgp05 | GALAXYServerIntTst01 | galaxyapplication | COMPLETED | ct000235 | 08-Jan-2009 13:37:03 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p17025dtg017 | wasgp61_08 | GALAXYServerPerfTst01 | galaxyapplication | COMPLETED | ct000235 | 08-Jan-2009 13:37:03 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p09427gens27 | wasgp05 | GALAXYServerIntTst02 | galaxyapplication | COMPLETED | ct000235 | 12-Jan-2009 08:33:21 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p09427gens27 | wasgp05 | GALAXYServerIntTst01 | galaxyapplication | COMPLETED | ct000235 | 15-Jan-2009 15:27:03 | GALAXY_DEV_J2EE_BUILD_1_0_24 |
| p09427gens27 | wasgp05_111 | GALAXYServerIntTst02 | galaxyapplication | COMPLETED | ct000235 | 18-Jan-2009 20:02:37 | GALAXY_DEV_J2EE_BUILD_1_0_24 |

## Build Package

- So far we have focused on standard java / j2ee modules
- Build Package is a superset of multiple j2ee modules along with ALL the scripts and properties that allow you to provision, configure and deploy to specific target environments
- Build Package is the output from an application build.xml plus the contents of the release area
- The combined package is base-lined, zipped or tarred (depending on target) to provide a self-contained archive that will provision an entire runtime environment (clusters, web server, virtualhosts, datasource, QCF, Queue destination, QMGR’s, Queues, Topics, etc.) and installs code

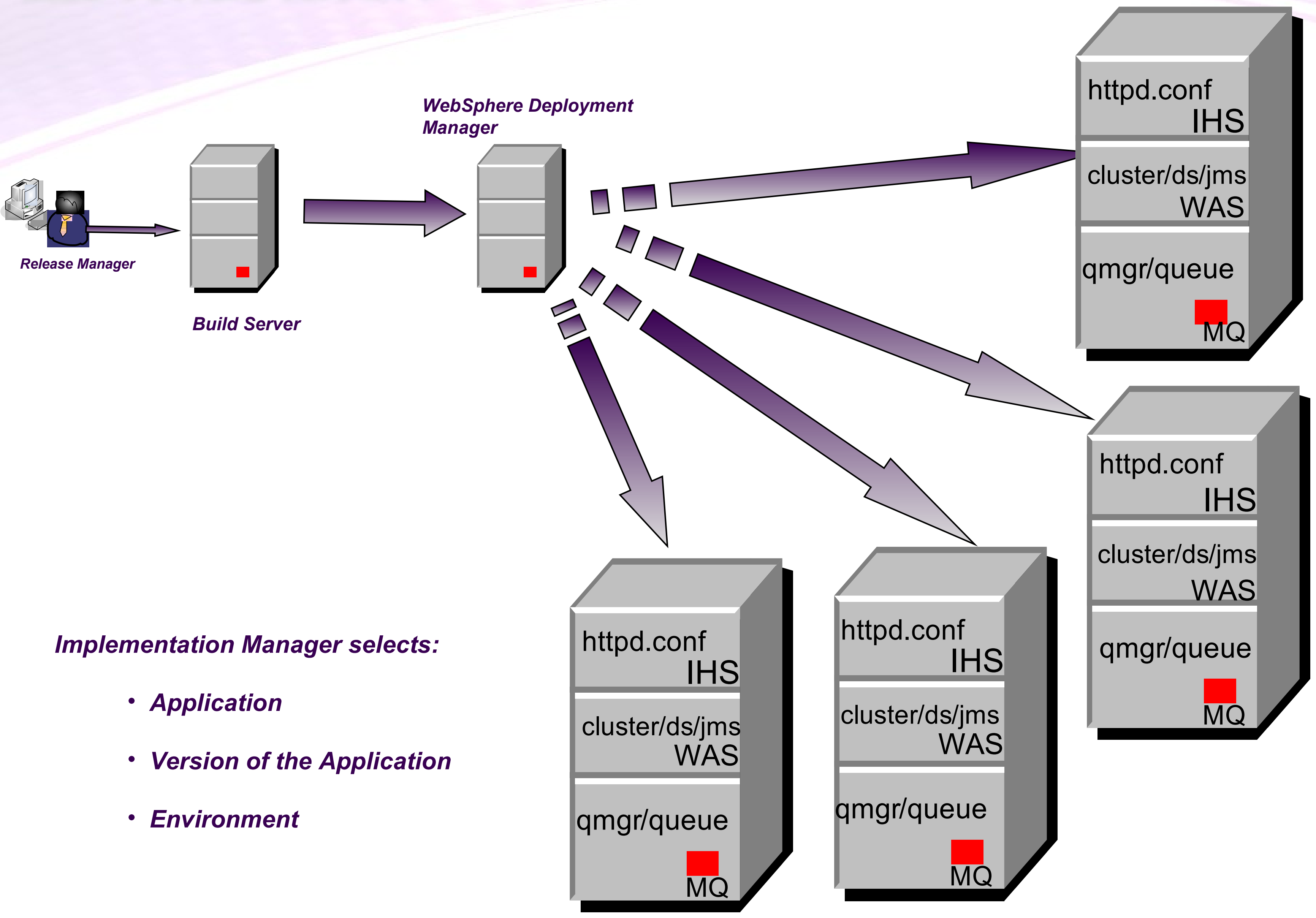
## Creating the Build Package



Baseline File: SALESAPP_BUILD_01_02_003

## Deployment Process

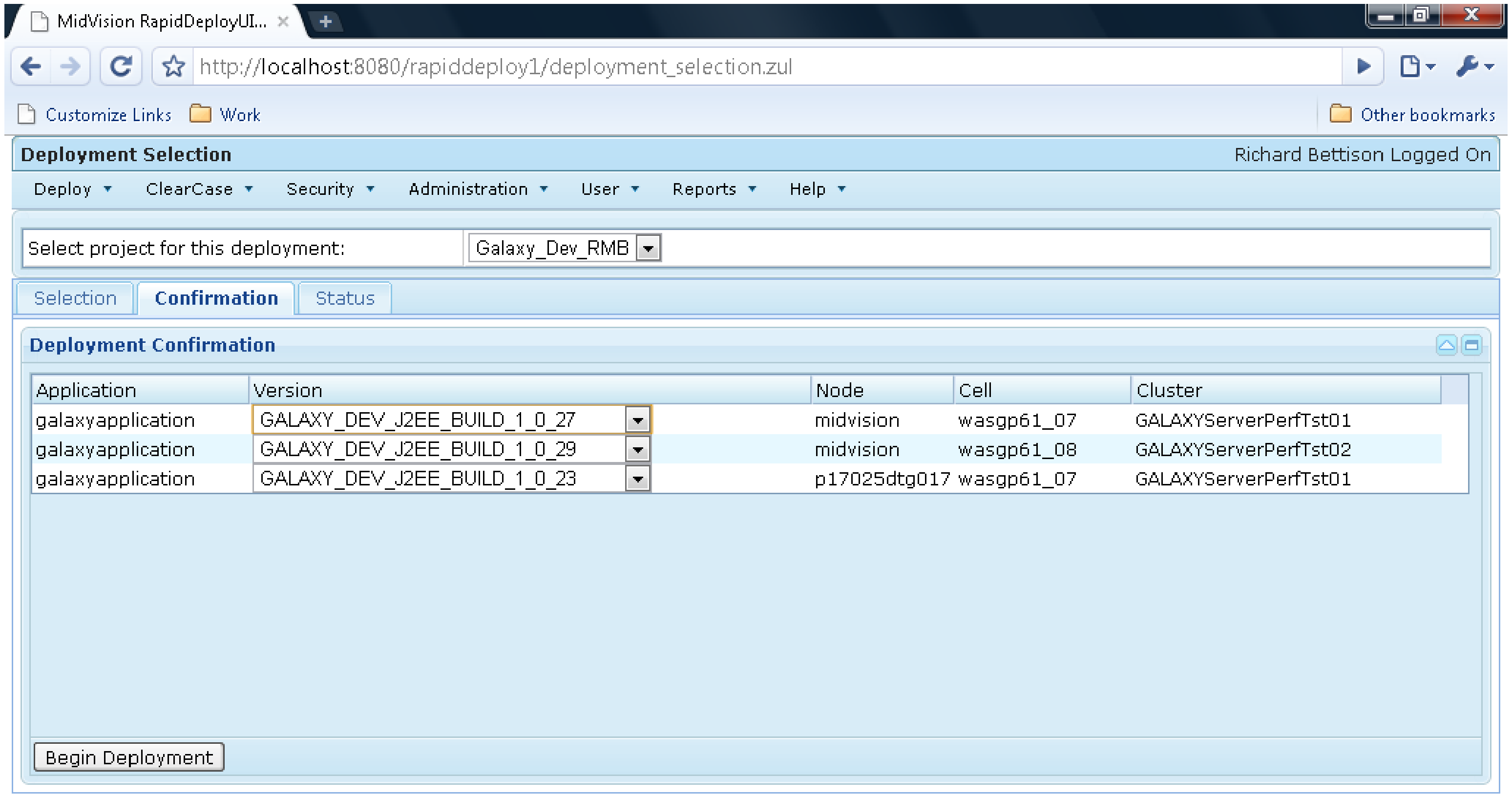
- The input to the deployment process is the build package
- Self-contained archive that can be deployed to any target environment. Only pre-requisite is a binary install of target runtime (DM, nodeagents, MQ, IHS, etc.)
- Build Package is pushed to local DM, unpacked and installed using the scripts, utilities and properties contained in the Build Package (no scripts are required locally)



*Implementation Manager selects:*

- *Application*
- *Version of the Application*
- *Environment*

# Example deployment tool


MidVision RapidDeployUI...

http://localhost:8080/rapiddeploy1/deployment_selection.zul

Customize Links   Work   Other bookmarks

**Deployment Selection**   Richard Bettison Logged On

Select project for this deployment: Galaxy_Dev_RMB

**Deployment Confirmation**

| Application | Version | Node | Cell | Cluster |
|---|---|---|---|---|
| galaxyapplication | GALAXY_DEV_J2EE_BUILD_1_0_27 | midvision | wasgp61_07 | GALAXYServerPerfTst01 |
| galaxyapplication | GALAXY_DEV_J2EE_BUILD_1_0_29 | midvision | wasgp61_08 | GALAXYServerPerfTst02 |
| galaxyapplication | GALAXY_DEV_J2EE_BUILD_1_0_23 | p17025dtg017 | wasgp61_07 | GALAXYServerPerfTst01 |

## Deploy Process is Application Centric

- Application central point for all configuration (clusters, datasource, qcf’s, QMGR’s, Queues, Web Servers, etc.)
- Each application has a single or group of properties file for each technology it installs
- Binary runtimes need to be installed. ALL other configuration is encapsulated in Build Package
- Need to cater for share components, such as MQ, cell scope resources i.e.URL Providers, etc.

# Deploy Process

Install is split into three parts:

- Pre-install
  - Set flag file on web server to bring service offline
  - After application has quiesced stop middleware components
- Install
  - Load reference data
  - Configure WebSphere Application Server and install EAR
  - Deploy HTTP configuration and static content
  - Deployment MQ config. – QMGR, Queues, Topics, etc.
- Post install
  - Start middleware components
  - Running post-install unit tests
  - Remove LB flags on web server

## Deploy Process - Properties files

deplomentNodeHost.CellName.ClusterName.Application.**py**

deplomentNodeHost.CellName.ClusterName.Application.**mq**

deplomentNodeHost.CellName.ClusterName.Application.**props**

deplomentNodeHost.CellName.ClusterName.Application.**ibmihs**

deplomentNodeHost.CellName.ClusterName.Application.**WebServer1.webconf**

deplomentNodeHost.CellName.ClusterName.Application.**WebServer2.webconf**

deplomentNodeHost.CellName.ClusterName.Application.**clients** (J2EE Client)

deplomentNodeHost.CellName.ClusterName.Application.**dtd**

deplomentNodeHost.CellName.ClusterName.Application.**cdm**

## Deploy Process – properties sample #1

```
---------------------------------------------------
# General Variables
#---------------------------------------------------
appName                                            = “SalesApplication"
appVersion                                         = "1"
envIndentifier                                     = SysInt01
portIndentifier                                    = 190

#---------------------------------------------------
# Application Server Related Variables
#---------------------------------------------------
serverName                                         = “SalesCluster“ + envIndentifier
serverNode                                         = “PrimaryAppServerNode"
cookieName                                         = "JSESSIONID"
threadPoolMinSize                                  = 10
threadPoolMaxSize                                  = 50
minJVMHeapSize                                     = 512
maxJVMHeapSize                                     = 1024

# Note: This need to match the node name given during installation of Deployment Manager.
sslTransportSettingNodeName   = nodeName
# Can be removed at a later point of time. Is not used  at this moment #

# The state of the cluster or appserver after a restart of WebSphere
nodeRestartState                                   = "running"
sleepForInstallDuration                            = 600
restartServerAfterInstall                          = "true"
forceSleepForInstall                               = "false“

# Logging related settings
maxLogFileCount                                    = 5
logRolloverSize                           = 2
```

## Deploy Process – properties sample #2

```
# Server security settings
asSecurityEnabled                              = "false"
asSecurityAppEnabled                           = "false"

# Transaction settings
asTransactionLifetimeTimeout                   = 5
asTransactionClientInactivityTimeout           = 5

WC_defaulthost_port                            = 10190
WC_defaulthost_secure_port                     = 11190
BOOTSTRAP_ADDRESS_port                         = 12190
SOAP_CONNECTOR_ADDRESS_port                    = 13190
SIB_ENDPOINT_ADDRESS_port                      = 14190
SIB_ENDPOINT_SECURE_ADDRESS_port               = 15190
SIB_MQ_ENDPOINT_ADDRESS_port                   = 16190
SIB_MQ_ENDPOINT_SECURE_ADDRESS_port            = 17190
SIP_DEFAULTHOST_port                           = 18190
SIP_DEFAULTHOST_SECURE_port                    = 19190

#-------------------------------------------------
httpServerNosecureTransportPortNo              = 80
httpsCSSSprayerSecureTransportPort             = 443
```

## Cascading properties

wsadmin.sh –f genericWASFunctions.py –profile profileDefaults.py –profile project.py –profile deplomentNodeHost.CellName.ClusterName.Application.py

## Wsadmin Taskinfo function

- Wsadmin function to describe resource mappings in ear file:
- Example: AdminApp.taskInfo(earLocation, "MapResRefToEJB" )
- Abstracted to script to display all mappings
- Jacl format: displayMappings.sh -displayJaclMappings <ear file>
- Jython format: displayMappings.sh – displayJythonMappings <ear file>

# Resource reference mapping 1 – Map EJB references to their resources

Extract from Python properties file showing mapping EJB references to resources via JNDI. |this is also output format from wasadmin.sh –displayJythonMappngs

```
##########################################################################
# Resource 1: Map Resource References to EJB Resources
##########################################################################
#
# Fields:- Module:EJB:URI:Resource Reference:Resource type:Target Resource JNDI Name:Login configuration name:Properties:
#
res1_1 = ["ProjectPortalWeb", "", "ProjectPortalWeb.war,WEB-INF/web.xml", "dmap/UIConfigCache", "com.ibm.websphere.cache.DistributedMap", "cache/ui_config_IBANK_IntTst02", "", ""]
res1_2 = ["ProjectPortalWeb", "", "ProjectPortalWeb.war,WEB-INF/web.xml", "FinancialTransactionProcessingWS", "java.net.URL", "url/FinancialTransactionProcessingWS_IBANK_IntTst02", "", ""]
res1_3 = ["ProjectPortalWeb", "", "ProjectPortalWeb.war,WEB-INF/web.xml", "AccountWS", "java.net.URL", “jdbc/Account_IBANK_IntTst02", "", ""]
…
```

## Resource reference mapping 2 – Define resources

Python properties file extract showing two URL provider definitions.

```
#--------------------------------------------------
# URL Provider 1 and URL Resource Related Variables
#--------------------------------------------------
urlpName_1 = "urlProvider_IBANK_IntTst02"
urlpStreamHandlerClassName_1 = "unused"
urlpProtocol_1 = "unused"
urlpScope_1 = "cell"
urlName_1 = "FinancialTransactionProcessingWS_IBANK_IntTst02"
urlJNDIName_1 = "url/"+urlName_1
urlDestination_1 = "http://10.200.142.55:97/PaymentProcessingServiceSO"

#--------------------------------------------------
# URL Provider 2 and URL Resource Related Variables
#--------------------------------------------------
urlpName_2 = "urlProvider_IBANK_IntTst02"
urlpStreamHandlerClassName_2 = "unused"
urlpProtocol_2 = "unused"
urlpScope_2 = "cell"
urlName_2 = "Account_IBANK_IntTst02"
urlJNDIName_2 = "url/"+urlName_2
urlDestination_2 = "http://10.160.74.63:96/Account"
```

## Environment Comparison / Cloning

- Comparison between environments
- Comparison of the same environment over time
- Provision environments from templates
- Environment cloning:
  - Deployment Manager host and CellName
  - Environment identifier – SysTst01, IntTst01, etc.
  - Ports, ClusterName
  - Backend resources – JDBC, JMS, URL Providers
  - Memory, Pool sizes, Number of AppServers, etc.

## Challenges

- Tools need to be comprehensive i.e. WebShere deployment process needs to cater for ALL your environments requirements
- Up front investment required
- Maintenance can be expensive
- New versions and products need to be incorporated quickly
- Can become reliant on a small number of individuals

## Methodology #1

- Encapsulation of code, scripts / utilities and properties into a single zip or tar
- Can be applied across a broad range of technologies
  - WebSphere using jython
  - MQ using mqsc
  - IBM IHS using shell
  - Portal using jython and XMLAccess
  - WebSphere Datapower using xmi

## Methodology #2

Can be applied to many third party applications

- Chordiant
- BusinessObjects
- Group1 Doc1
- PegaRules

## Bringing it all together

- Weekly rebuilds of test environments
- Code and configuration baselined together
- rollback will revert Code and configuration
- Disaster recovery
- Re-building / migrations
- Environment comparison i.e. dev1 and dev2
- Comparing environments over time

## Bringing it all together

- Code and configuration baselined together
- Environments provisioned if they don’t exist
- Configuration introduced into environments
- Rollback will revert Code and configuration
- Disaster recovery
- Re-building / migrations / cloning
- Environment comparison i.e. dev1 and dev2
- Comparing environments over time
- Weekly rebuilds of test environments
- Full audit of code and configuration changes

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