

IBM WebSphere Application Server Migration: Benefits, Planning and Best Practices

Including WebSphere v9.0



October 18, 2016

Please Note:

- IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion.
- Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.
- The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract.
- The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.
- Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

Migration Overview

Migration overview

Migration planning roadmap

Application Migration options

Configuration Migration options

Summary

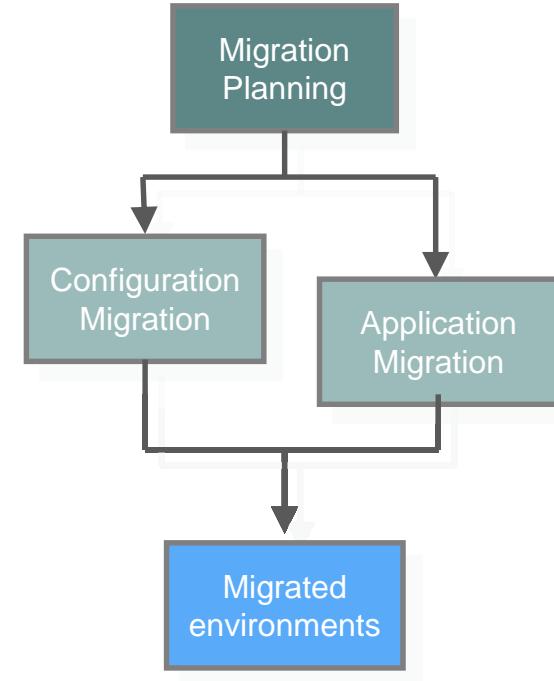
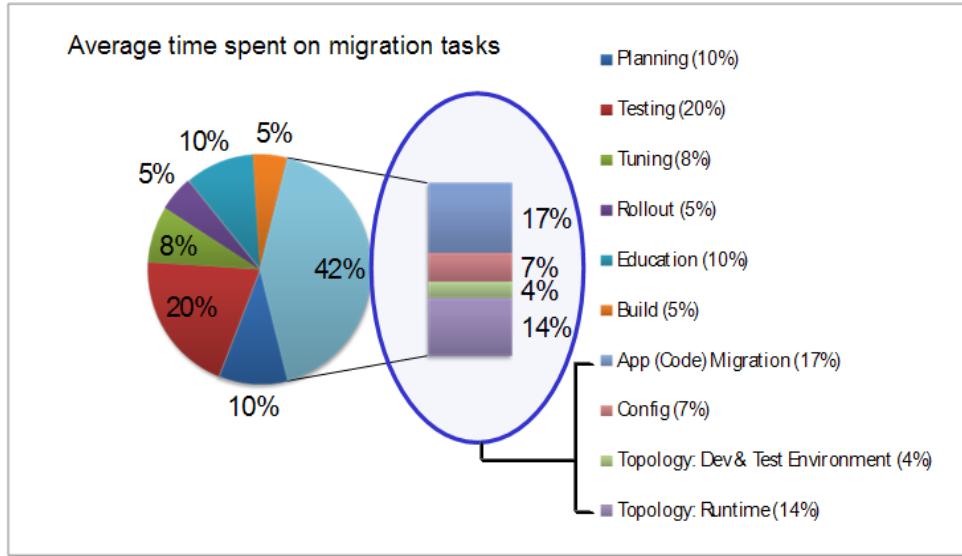
References



Introduction

- This presentation is intended to educate and assist in performing WebSphere Application Server version to version migrations as well as information on moving to Liberty
- It contains overall planning guidelines as well as migration concerns for your awareness
- It does not prescribe one migration path
 - Varies with customer policies
 - Varies with versions involved
 - Varies with customer procedures
- Use this information as a guide to build your own plan
- Get assistance if needed

Migration Overview

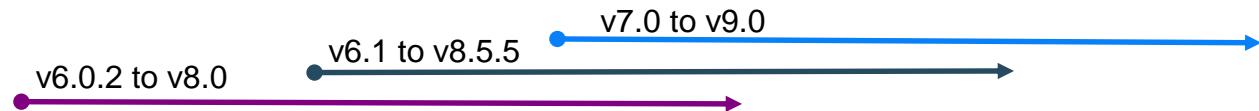


- The whole migration process involves a variety of steps
- Application changes and testing is 37%
- Migrating configuration is 25%
- What if you could make this easier?

Migration impacts overview

Migration impact is gated by two overarching factors

1. The versions involved in the customer Migration scenario
 - Moving from v7.0 to v9.0 is different than moving from v6.0.2 to v9.0
2. The amount of change introduced in and between these versions
 - Moving from v7.0 to v9.0 involves changes introduced by v8.0, v8.5 and v9.0.
 - Moving from v6.1 to v9.0 involves changes introduced by v7.0, v8.0, v8.5 and v9.0 and would require a double migration, since the migration tools only support n-3.



	v6.0.2	v6.1	v7.0	v8.0	v8.5	V9.0
Configuration	Port assignment	Security	None	None	Port assignments	Core group wire protocol
Application	JSP and Servlet	Java SE	Some	Minimal	None*	Java EE 7 Java SE 8

None means no required code changes with default of JRE6 when using traditional WAS runtime WebSphere v9.0*

Externals Summary

	v5.x (EOS)	v6.0.2 (EOS)	v6.1 (EOS)	v7.0 EOS announced	v8.0 EOS announced	v8.5	V8.5.5	Liberty CD	V9.0
IDE	WSAD 5.1- RAD v7.0	RAD v6.0- RAD v8.0	RAD v7.0- RAD v8.0	RAD v7.5- RAD v9.1 WDT for WAS V7	RAD v8.0- RAD v9.1 WDT for WAS V8	RAD v8.5- RAD v9.1 WDT for WAS V8.5	RAD v8.5.5- RAD v9.5 WDT for WAS 8.5	RAD v8.5.5- RAD v9.5 WDT for WAS	RAD V9.6 Beta WDT for WAS
Code	J2EE 1.3 JRE 1.3 (v5.0) JRE 1.4 (v5.1)	J2EE 1.4 JRE 1.4	J2EE 1.4 JRE 5	JEE 5 JRE 6	JEE 6 JRE 6	JEE 6 JRE 6, 7 Liberty	JEE 6/ JEE 7 JRE 6, 7, 8 Liberty Liberty Core	JEE 6/ JEE 7 JRE 6, 7, 8	JEE 7 JRE 8
Deploy	EAR	EAR Config in EAR	EAR Config in EAR	EAR/BLA Config in EAR EBA(FeP)	EAR/BLA Config in EAR EBA	EAR/BLA Config in EAR EBA Liberty	EAR/BLA Config in EAR EBA Liberty	EAR WAR EBA	EAR/BLA Config in EAR EBA

Notes:

Rational Application Developer (RAD) – The latest version that supports your server version is recommended.

WebSphere Development Tools (WDT) – Available on the latest 2 Eclipse levels. The latest available is recommended.

Choosing the “right” version

Question: “Which WebSphere Application Server version should I migrate to?”

- We used to talk about which is the best version. Now consider which is the best platform.
 - Liberty
 - Traditional WebSphere Application Server: either V8.5 for JEE 6, v9.0 for JEE 7
 - On-premises / cloud
- Recent end of service announcements need consideration
- End of Service dates
 - WebSphere Application Server
 - v5.1 was September 2008 | v6.0.2 was September 2010 | v6.1 was September 2013
 - WebSphere Application Server v6.1 end of extended support is September 2016
 - WebSphere Application Server v7.0 is April 2018
 - WebSphere Application Server v8.0 is April 2018
 - Java SE 6 on Liberty is September 2017
 - Java SE 6 on traditional WebSphere is April 2018
- Characteristics of your targeted platform
 - Do you want the simplest possible migration
 - Stability in lifecycle
 - JEE/JDK levels relative to targeted version
 - Need new WebSphere Application Server features?
 - Version requirements of vendor or IBM stack products
 - Version your Enterprise has committed towards
 - Want to move to light-weight Liberty runtime with flexible configuration
 - Want to re-tool for container portability (Docker)
 - Want to move to hosted cloud to reduce CAPEX

Support policies

- At least 12 months notice prior to an IBM branded product release's EOS date and the availability of support extensions for an extra charge set by IBM
 - Endeavor to coordinate EOS dates on 30 April or 30 September
- Enhanced '5+3' support statement as of March 2007
 - Five years for standard, three for extended support.
 - Updated April 2008 to include selected products within the Information Management, IBM Lotus, IBM Rational, IBM Tivoli and WebSphere...
 - <http://www-1.ibm.com/support/docview.wss?uid=swg21256700>
- Latest as of 2011
 - One of our new initiatives will be to support, on a going-forward basis for select IBM branded products that have not previously announced an EOS date, not only the 'current' version of the product, but also up to two previous versions, in an effort to limit disruptive technology transitions.

In this context, a 'version' is a major functional enhancement level. While not every IBM software product will be subject to this initiative, initial focus is to support key products from all of our software brands, and expand products over time

- <http://www.ibm.com/software/support/lifecycle/lc-policy.html>

Best practices, offers, incentives

- **PVU Waiver offer:** IBM will now grant customers no charge, temporary use Software Subscription & Support (S&S) rights to continue using their current licenses in production while also using up to 2x those license entitlements for migration to a later WAS Version.
- **Migration Assist:** is available for customers on Support and Maintenance. Customers can call Support with migration questions
- **ISSW Assessments:** are available to assist customers with their migration planning and execution activities
- **IBM Software Accelerated Value Program:** provides expertise in custom version to version migrations.
- **Website Knowledge Center**

What is Liberty?

- Lightweight, flexible Java EE runtime within the WebSphere Application Server (WAS) product set
- Comes with every edition of WAS....
 - WebSphere App Server (“Base”)
 - WebSphere App Server Network Deployment (“ND”)
 - WebSphere App Server z/OS
-including its own, low-end edition
 - WebSphere App Server Liberty Core
- Liberty consists of a kernel and a set of pluggable features
 - each product editions has a different set of features

Product Terminology

What you buy

Product/Edition/License

WebSphere Application Server Liberty Core

What you install

Runtime / features

WAS Liberty
Java EE Web profile

WebSphere Application Server

WAS Liberty
Java EE

WAS traditional
Java EE

and

WebSphere Application Server Network Deployment (& z/OS)

WAS Liberty
Java EE + Advanced Management

WAS traditional
Java EE + Advanced Management

and

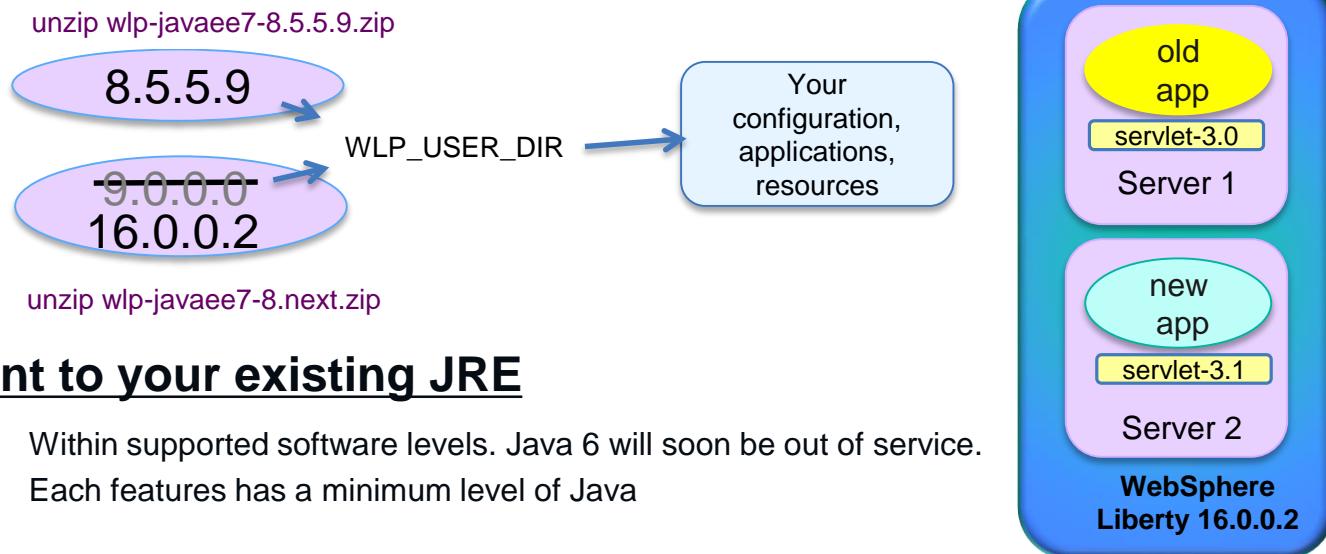
Why are customers choosing Liberty?

- “We want to reduce costs, simplify, and become cloud ready”
- Development efficiencies
- Flexible license options
 - even with collective management
- Rapid provisioning
 - small disk size
 - zip packages
 - remove the Ops team from the app update flow
- Lower running costs
 - dynamic config
 - zero migration
 - self-tuning thread pools
 - Lower running costs
- **Liberty is free to use on Developers machines**

Eliminate Future Migration Costs

New Liberty features, and config, augment rather than replace old ones

Zero migration for unchanged apps on WAS Liberty, regardless of Java EE version

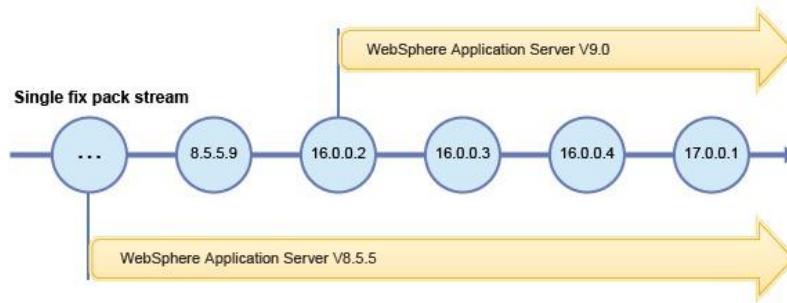


Point to your existing JRE

Within supported software levels. Java 6 will soon be out of service.
Each feature has a minimum level of Java

What's With the 16.0.0.2?

Liberty Continuous Delivery



WAS V9 introduces a new 9.0.0.0 service stream for traditional WAS fixpacks.

WAS Liberty follows a continuous delivery model with a single service stream – it makes no sense to persist with a major version for Liberty fixpacks in a ‘versionless’ single delivery stream.

To properly reflect this we are changing Liberty fixpack numbering to:

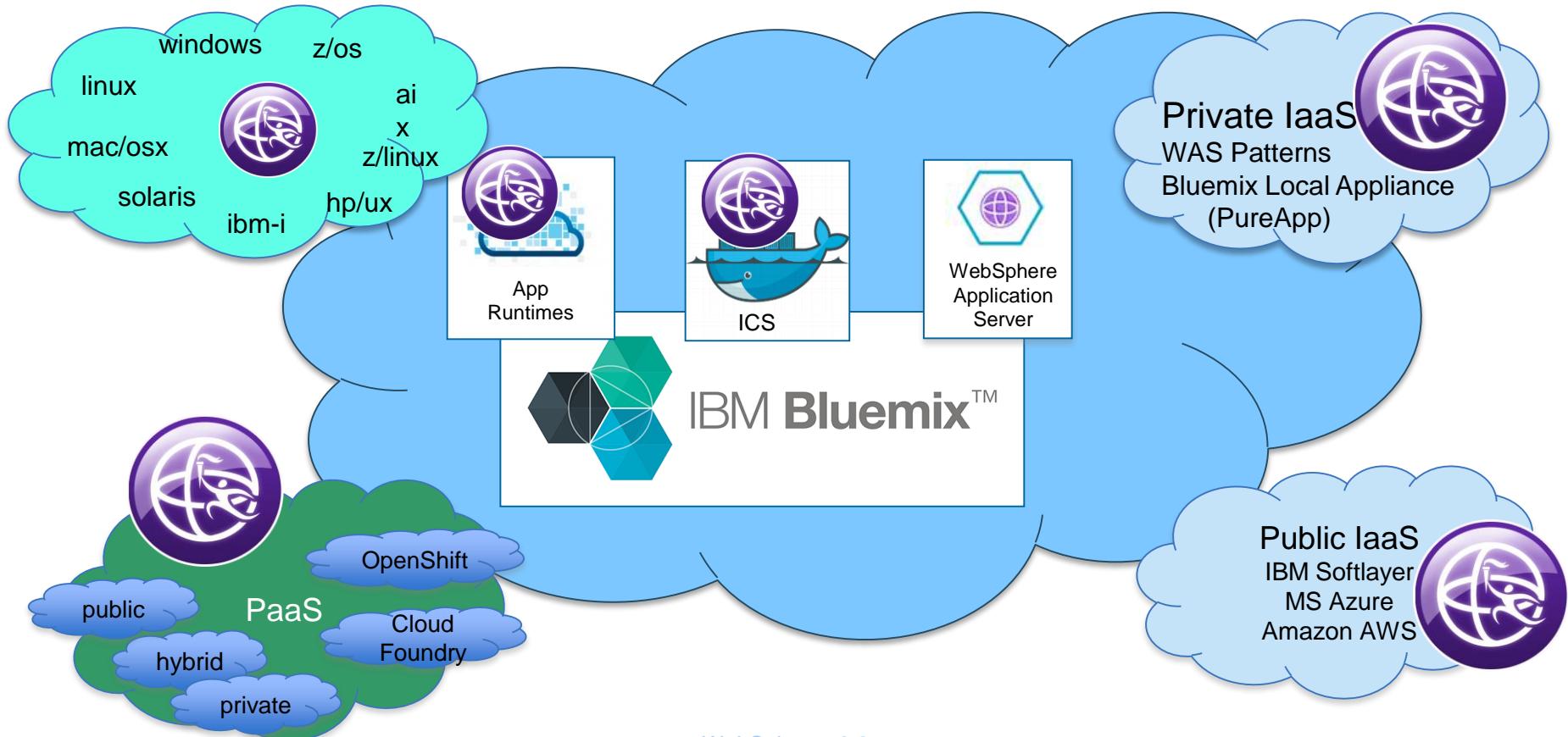
Y.R.M.F: year.release.modlevel.fixpack

eg 16.0.0.4 would be the fourth fix pack in 2016

The next fixpack after 8.5.5.9 is the second fixpack of 2016 and is numbered 16.0.0.2.

Its just a number - **there is no migration required at all** to the first V9 release of Liberty: 16.0.0.2.

Where can I run Liberty?

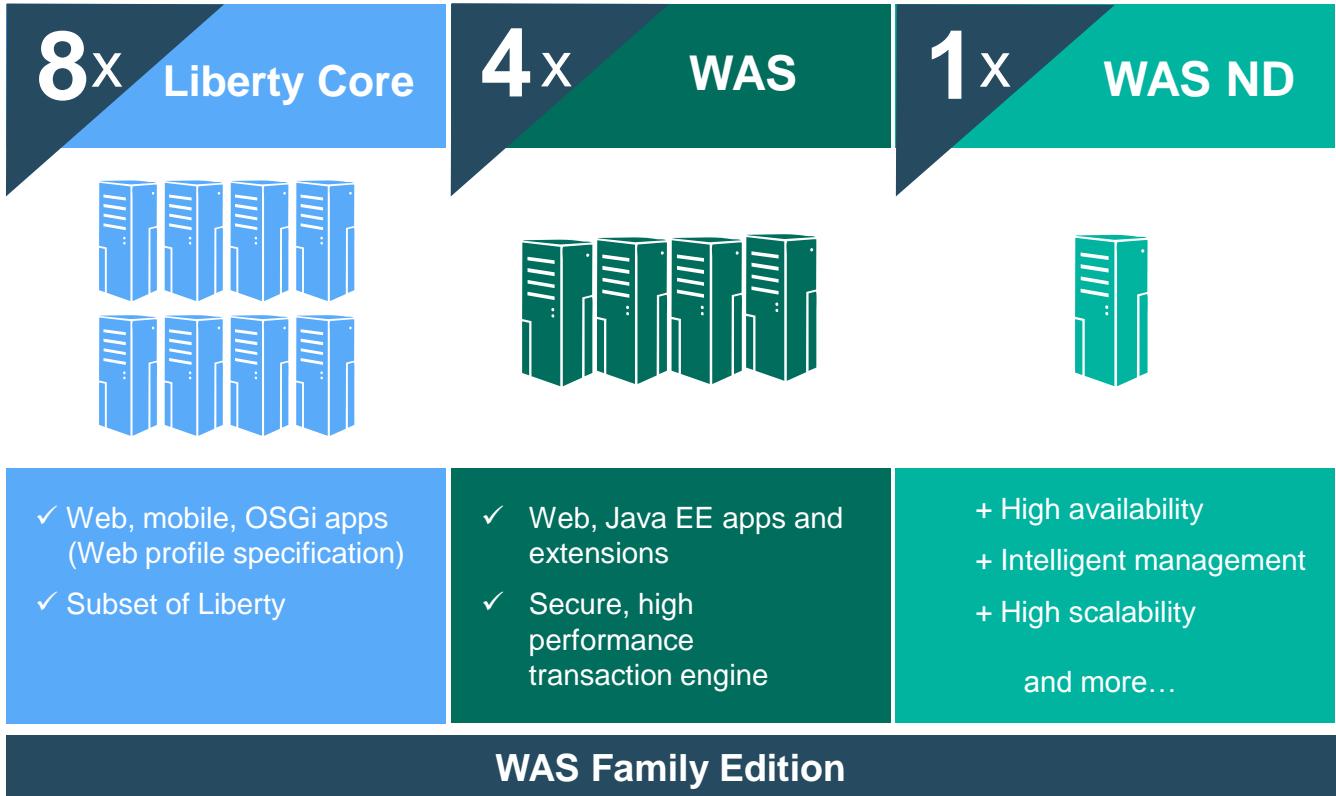


WebSphere Application Server Family Edition

1 PVU of Family Edition entitles:
1 PVU ND *or*
4 PVUs Base *or*
8 PVUs Liberty Core

OR mix & match

AND can redeploy new mix over time



Migration Planning Roadmap

Migration overview

Migration planning roadmap

Application Migration options

Configuration Migration options

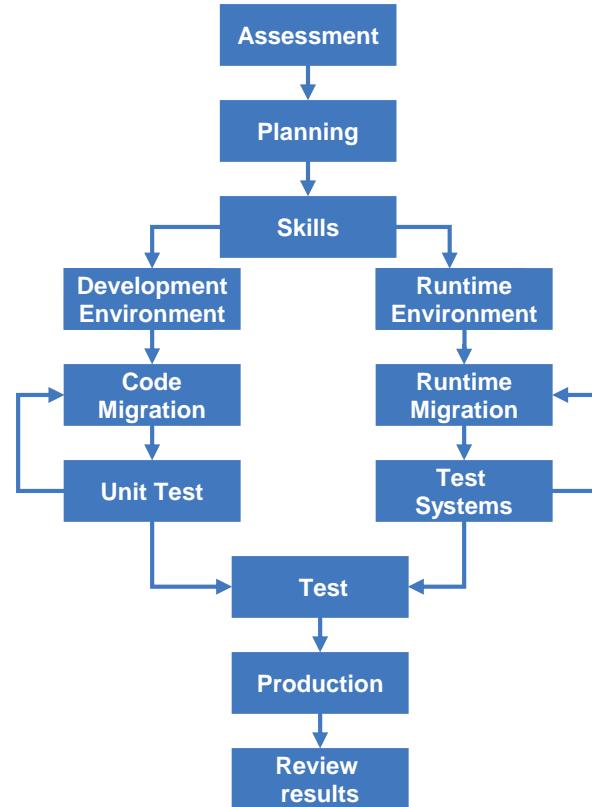
Summary

References



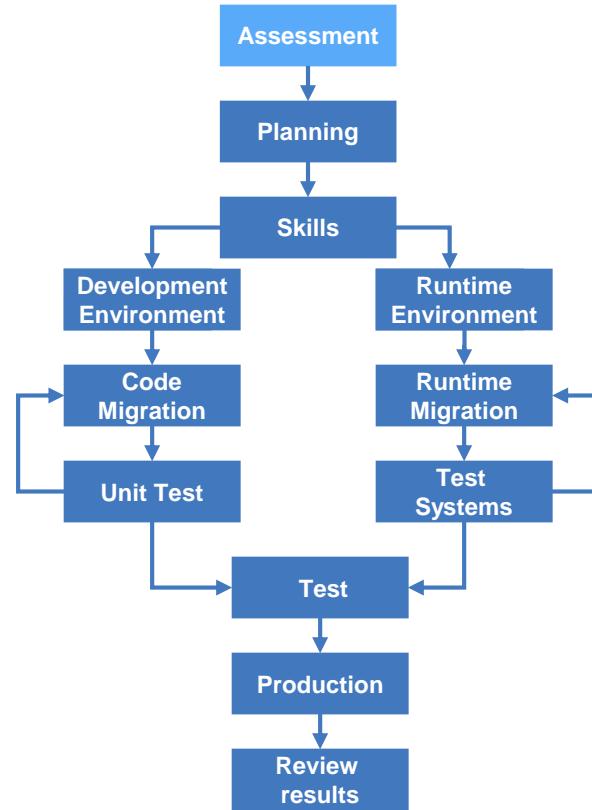
Migration Plan Roadmap

- Assessment
- Planning
- Skills
- Development Environment
- Application Code Migration
- Runtime Environment Migration
- Test
- Production
- Review the results



Assessment

- Gather the stakeholders
 - Communications with clients, peers, and leadership
 - Consider a core Migration team for larger scale
- Identify education requirements
 - Developer, Administrator...
- Hardware requirements
 - Possible Upgrades, 64 bit versus 32 bit
- Topology assessment
 - Downtime tolerance, Failover support
- Application architecture
 - Tightened JEE specifications
 - Dependencies between apps
 - API removal, JRE changes
- Review Testing practices
 - Standard practices and automation
- Vendor apps and WebSphere products
 - J2EE/JDK/WebSphere version requirements



Planning - Questionnaires

- Runtime Environment

- Overall Infrastructure questions
- Hardware and Software prereqs
- HTTP Server, Network Edge
- Availability requirements
- Rollout plans
- Administration
- Security
- Test Practices and tools

- Development Environment

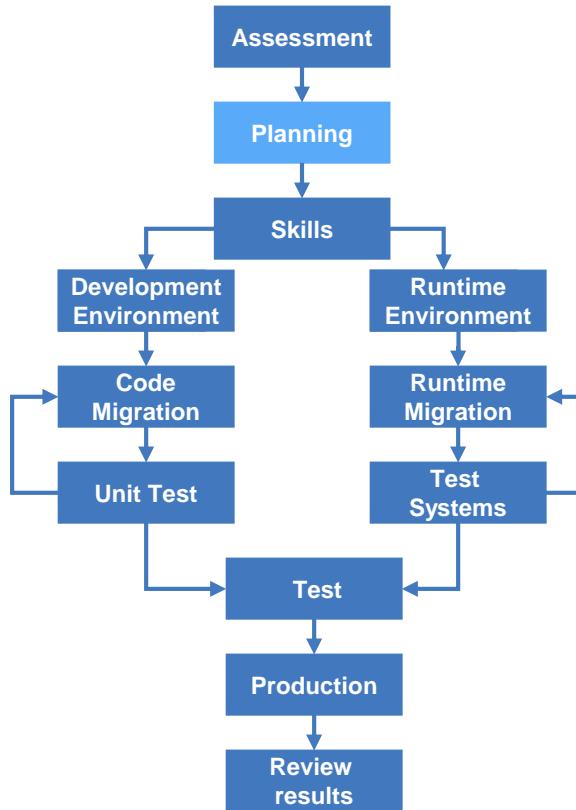
- Workstations and IDEs
- Test configurations
- Software development skills
- Development methodology
- Build, Packaging Tooling and Process

- V7 Release to Release Migration Guide

<http://www.redbooks.ibm.com/redpieces/abstracts/redp4635.html>

- Many Detailed Questions: WAS 8.5 WebSphere Migration Guide (Appendix A)

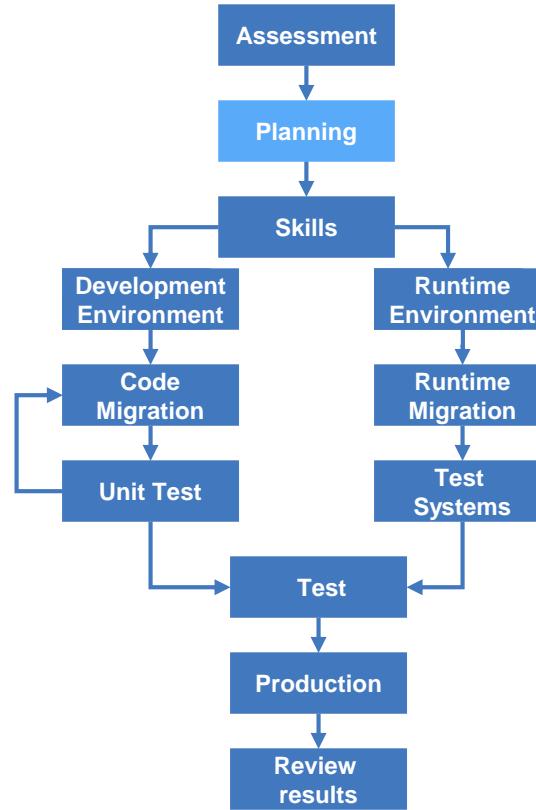
<http://www.redbooks.ibm.com/redpieces/abstracts/sg248048.html>



Planning

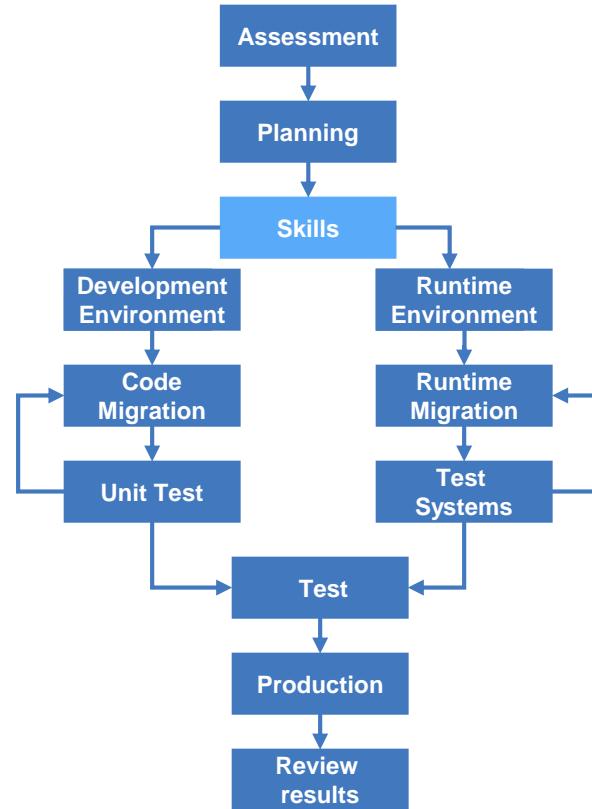
Build a plan based on assessment

- Hardware and license requirements
- Prerequisite and requisite software
 - Check with “Clarity” website
- Education
 - IBM Education Assistant, IBM Education, ...
- Account for many applications and multiple development teams?
 - Identify early adopters
 - Identify Pilot projects
 - Migration as an initiative or project?
- Application rollout strategies
 - “Stealth”, “Train”, Voluntary, Continuous...
- Consider timeline factors
 - Availability, maintenance windows, lockdowns
- Plan for High Availability
 - Mixed version clusters requires dual app compatibility
- Create an execution timeline
- Include a rollback plan



Skills

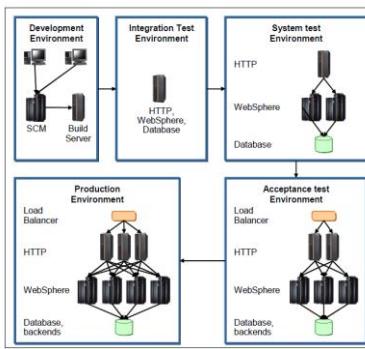
- Plan for education
 - New development tooling
 - Enhancements in WebSphere administration model
 - Changes in the latest WebSphere version
 - New standards



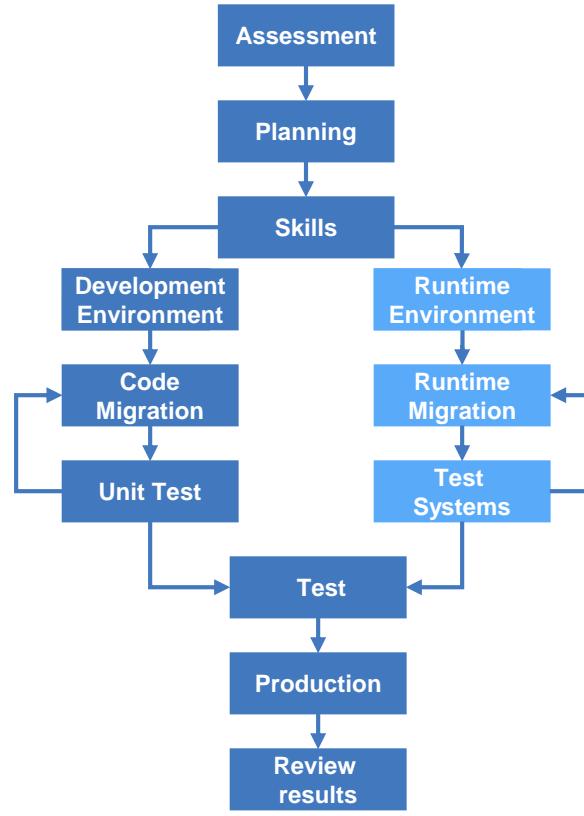
Runtime Environment

- Most likely will need to support parallel development
- Migrate test systems iteratively

- Integration
- System test
- Performance
- Pre-Production
- Production

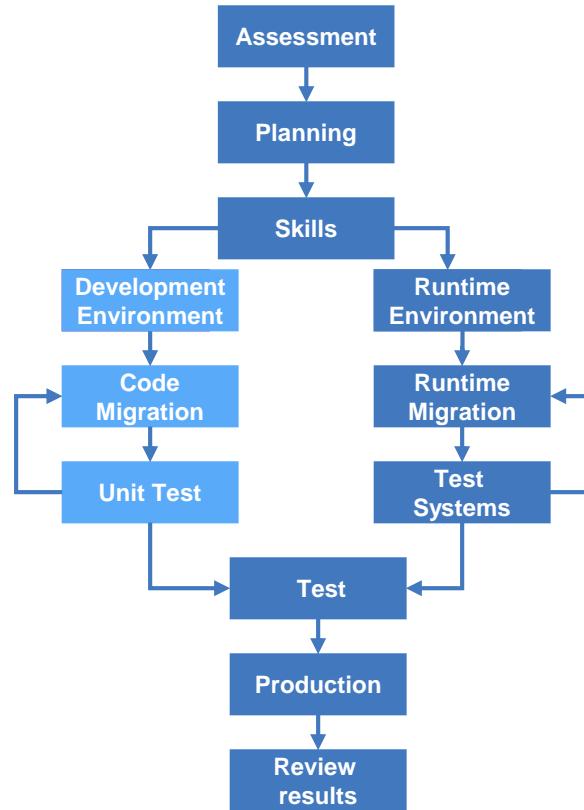


- Use the same migration process throughout if possible
 - Or at least before you do production migration...



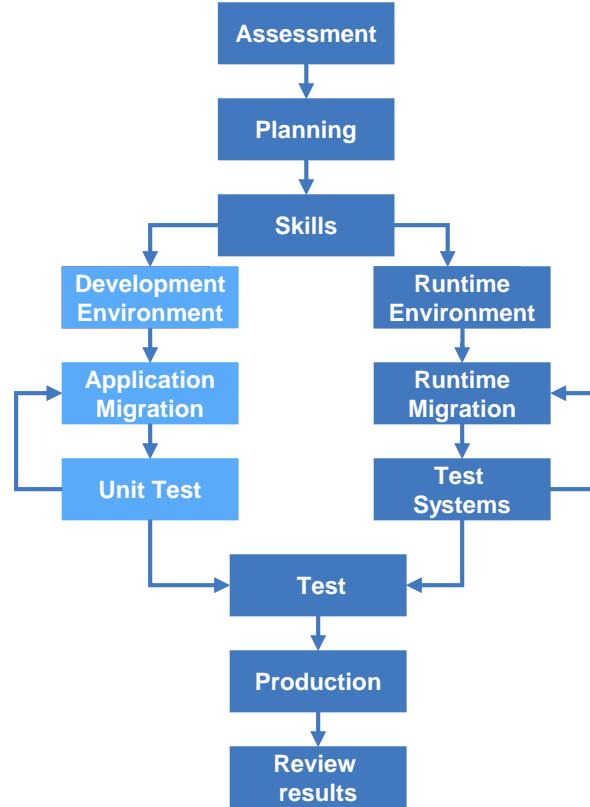
Development Environment

- Upgrades needed for IDEs
 - Progress iteratively, expand outward
 - Can migrate the WAS configuration using WAS configuration migration tools
- Assume good but not complete application compatibility
 - Assess apps, based on known issues
 - If no changes required, perform standard regression



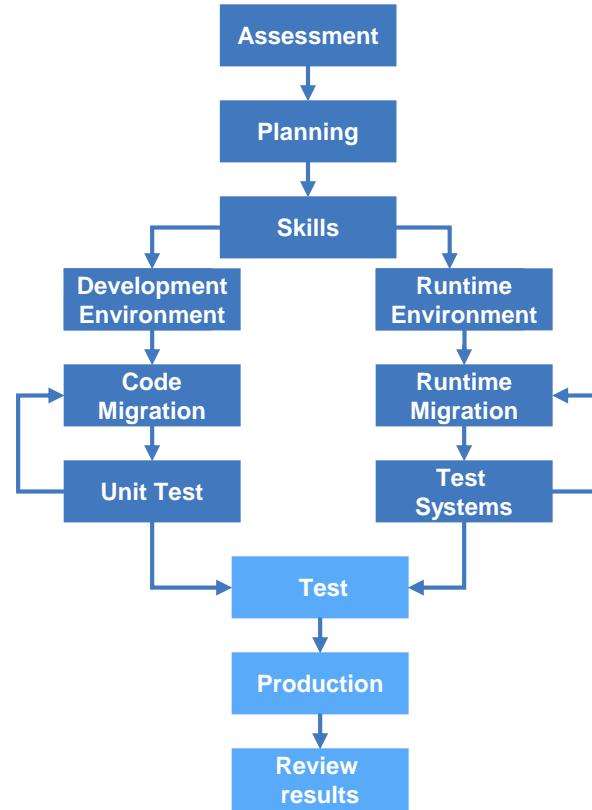
Application Migration (Iterative)

- Minimize change
 - Only make changes required to support version migration
 - Reduces complexity of planning, diagnosis and debug
 - Keep it Simple
 - Require application code to be dual-compatible to support mixed version clusters
 - Test to the depth of test environment that fits your comfort level
- Then Optimize and Enhance
 - Java EE Spec migration
 - New programming models
 - Application upgrades
 - Deprecations
- Iterate following your standard practices



Test/Production/Review

- Run your standard test processes
 - Progress applications normally through the test environments
- Ensure Performance is measured
 - Differences exist between versions
 - JDK changes may have occurred
- Have a rollback plan for production
 - Practice on another system earlier in the cycle
- Review the results of the Migration
 - Update the plan for next time



Application Migration options

Migration overview

Migration planning roadmap

Application Migration options

Configuration Migration options

Summary

References



An Overview of WebSphere Migration Tools

A set of tools that help you:



- Migrate between versions of WebSphere Application Server
- Migrate from traditional WebSphere to Liberty
- Move your applications to cloud platforms
- Migrate from third-party application servers to WebSphere

Migration discovery and planning	Binary analysis	Source analysis	Configuration migration
			
<p>WebSphere Migration Strategy Tool – online tool that helps you</p> <ul style="list-style-type: none">• Learn the options for migration including Liberty, on-premises, Docker, and cloud options <p>WebSphere Migration Discovery Tool - on-line tool that helps you</p> <ul style="list-style-type: none">• Estimate the effort required to migrate your application to WebSphere Application Server from third-party application servers• Select the IBM cloud platform suited to host your application and estimate migration to that platform.	<p>Command-line binary scanner that provides</p> <ul style="list-style-type: none">• High level evaluation report showing the Java EE technologies your application uses• Inventory report that provides detail of the files and packages and Java EE artifacts in your application.• Detailed analysis for migration between versions of traditional WebSphere, Liberty, and Liberty Core• Cloud migration for instant runtimes differences• Cloud connectivity analysis	<p>WAMT - Eclipse plugins that scans application source to provide</p> <ul style="list-style-type: none">• High level evaluation report• A line-by-line analysis of code changes required• Detailed analysis from third-party applications servers• Detailed analysis for migration between versions of traditional WebSphere, Liberty, and Liberty Core• Cloud migration for instant runtimes differences• Cloud connectivity analysis	<p>WASPreUpgrade and WASPostUpgrade commands to move WebSphere traditional configuration between profiles.</p> <p>WCMT – Eclipse plugin that helps migrate server configuration</p> <ul style="list-style-type: none">• From third-party application servers to WebSphere Application Server.• Between versions of WebSphere Application Server including traditional WebSphere to Liberty <p>UrbanCode to move configuration.</p>

How do I use the application migration tools?

Let's walk through using the migration tools to gain insights of your applications and details on your migration concerns.

Migration strategy and discovery



Binary analysis

```
<javax/servlet/http/HttpServletRe
N   EXT I-9 L9 P-T-119 Ym_0+J+
L _+*E 0 1 ... ,14 . B S|-1J1 i , w
E z+2+I8*, B1s , is 01 (l *+g 0 *
:0+10* , 2+;+- is 9+I 10 (l 10;
:J S , B , is 1+i !! x (l 10;J S w|
I+H* ; l , H1z , " A -;H1H III B#
0* m+•B| , B , B+!#
L , H1z , " A -;H1H III B# 14;J
L + L Y , L Y !1a #1a 516 , L1 (10
L + Z , - , L + Z , S1 + Z , Z , Z , Z
```

Source Migration

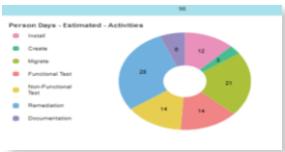
```
1  import com.ibm.websphere.samples.pbs.GIVEN_ALL
2  /**
3   * Servlet to handle customer account actions.
4   */
5  @WebServlet("/servlet/AccountServlet")
6  public class AccountServlet extends HttpServlet
7  {
8      ...
9      ...
10     private static final long serialVersionUID=1L
11     ...
12     public static final String ACTION_ACCOUNT
13     public static final String ACTION_ACCOUNTUPD
14     public static final String ACTION_LOGIN
15     public static final String ACTION_REGISTER
16     public static final String ACTION_SETLOGGING
17 }
```

Config Migration

```
2=<server description="new server">
3
4    <!-- Enable features -->
5    <featureManager>
6        <feature> servlet-3.1</feature>
7        <feature> jsp-2.3</feature>
8        <feature> ejb-3.2</feature>
9    </featureManager>
10
11    <!-- To access this server from a remote client -->
12    <httpEndpoint id="defaultHttpEndpoint"
13        httpPort="9080" />
14
```

Step 1: Strategy planning and sizing tools

Migration discovery and planning



Binary analysis

```
javax/servlet/http/HttpServletRe
New EVIG: I-E L-E P, T-IIG Ym D-Jx
L-*E E-A ... ,I< .0S|-H|`^`n`R
E:Z+ID*` B|? ,Ig O^ (L-*E E-A ...
:0+I@^?n :+-, Is q+I I@^ (L I@:
:z-S |p, Is l+i H ^ (L I@:jS w+0
L|^A^` L|l|z^` A-:IIIE I|Ig S
L^+ m+|D F-|z|?`|L|z^` A-:IIIE I|Ig S
L|z^` A-:IIIE I|Ig S
```

Source Migration

```
1 import com.ibm.commerce.beans.pricing.PriceListM
2
3 /**
4  * A servlet to handle customer account actions.
5  */
6 @WebServlet("CustomerAccountServlet")
7 public class AccountServlet extends HttpServlet
8 {
9     /**
10      * private static final long serialVersionUID
11      */
12     // ...
13
14     public static final String ACTION_ACCOUNT
15     public static final String ACTION_ACCOUNTUPD
16     public static final String ACTION_REGISTER
17     public static final String ACTION_SETLOGGING
18 }
```

Config Migration

```
2<server description="new server">
3
4    <!-- Enable features -->
5    <featureManager>
6        <feature>javavlet-3.1</feature>
7        <feature>jsp-2.3</feature>
8        <feature>jb-3.2</feature>
9    </featureManager>
10
11    <!-- To access this server from a r
12    <httpEndpoint id="defaultHttpEndpoint"
13        httpPort="8080">
```

WebSphere Migration Strategy Tool:

<http://whichwas.mybluemix.net>

Evaluate options for your WebSphere applications

WebSphere Application Server Migration Discovery Tool

<http://ibm.biz/MigrationDiscovery>

Size your effort and learn about WebSphere cloud migration

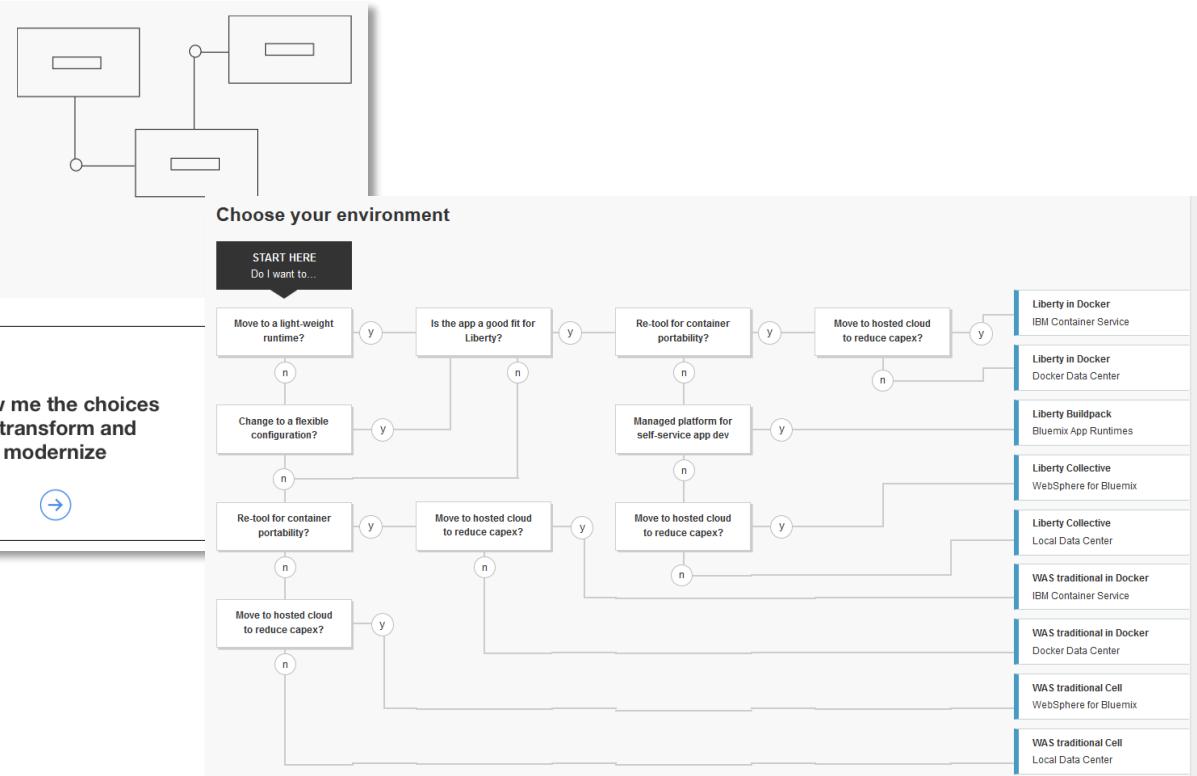
WebSphere v9.0

WebSphere Migration Strategy Tool

<http://whichwas.mybluemix.net>

WebSphere Migration Strategy

As you consider the future of your WebSphere applications, how will you innovate to support **social, mobile, analytics, and cloud technologies** to better serve your customers?



Migration Discovery - Gather Installation/Application/Test Info

WebSphere Application Server

Migration Discovery Tool

The purpose of this questionnaire is to gather basic information on your current JEE applications, JEE installations, and testing stages so we can better estimate the effort required to migrate them to WebSphere. These questions help us to identify all of the artifacts the need to be migrated, the degree to which those migrations can be automated, and the overall effort for doing the migration.

It is expected that you will be able to respond to most of the questions based on your knowledge of your environment. Some of the metrics may require a limited amount of research. If you find that a question is not appropriate to your environment, please skip that question and move onto the next.

All answers will be kept confidential by IBM.

[IBM Online Privacy Statement Highlights](#)

Discovery progress (2 of 4)

Installation Questions

Please answer these questions in the context of the Application Server installations that you want to migrate. This should include all Application Server installations that are required by application development teams, testing teams, and production. For example, if you are migrating from JBoss then count all of your JBoss configurations, or if you are migrating from WebLogic then count all of your WebLogic domains.

How many installations are you going to migrate?
Classify them as low, medium, or high complexity.

Low 1

This is a local installation. This means that it is running on the same host. Other components such as databases, file systems, testing, or production where horizontal scaling is required.

Medium 1

This is a distributed installation. This means that it is running on multiple hosts, but there is no horizontal scaling.

High 1

This is a fully clustered installation. This means that it can be horizontally and vertically clustered. This requires high availability and redundancy.

Discovery progress (1 of 4)

37%

Cloud Questions

Please select the Cloud Platform you will be migrating to. Use the "HELP ME" section if you need assistance with selecting a Platform. Click the "Compare" button to see side-by-side detailed comparisons of up to 3 Cloud Platforms.

HELP ME choose a Cloud platform

Tell us what you are looking for:

Cloud Deployment Model

- Public - Off-Premise
- Dedicated - Off-Premise
- Local - On-Premise
- Undecided

Cloud Management Model

- Customer Managed
- Pattern Managed
- Platform Managed
- Undecided

Cloud Migration Strategy

- Cloud Native Application
- Traditional Tiered Application
- Undecided

Discovery progress (3 of 4)

Application Questions

Please answer these questions for all deployable archives that are to be migrated. Note that for the purposes of this questionnaire a deployable archive is any WEB Archive, EJB-JAR, Application Client JAR, or Resource Adaptor Archive that you deploy separately or as part of an Enterprise Application Archive (EAR) to the application server.

How many WARs and EJB JARs are you going to migrate?

Classify them as low, medium, or high complexity.

Low Complexity:

WAR 1 App Client JAR 0

Medium Complexity:

WAR 1 EJB JAR 1 RAR 0

High Complexity:

WAR 0 EJB JAR 0

Total number of WAR: 2 Total number of EJB JAR: 1 Total number of App Client JAR: 0 Total number of RAR: 0

[Previous: Installation Questions](#) [Next: Testing Questions](#)

Discovery progress (4 of 4)

100%

Testing Questions

Please answer these questions based on your own historical data for testing the Java EE Applications that are to be migrated. Include the time to prepare the test, execute the tests and report the results. Do not include the time to resolve the defects.

Use IBM historical data (uncheck if you will be providing testing effort information)

[Previous](#) [Submit](#)

Summary and Estimate Details

Information provided

7 Applications	3 Runtime Environments	14 Functional Test (days) IBM Provided	14 Non-Functional Test (days) IBM Provided
----------------	------------------------	--	--

Summary of information provided

	Low Complexity	Medium Complexity	High Complexity
Applications	2	3	2
Runtimes	1	1	1

	Duration (days)
Functional testing	14 (IBM Provided)
Non-Functional testing	14 (IBM Provided)

Applications



Runtimes



[Next Estimate Details](#)

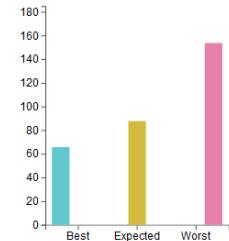
Discovery "Rough Order of Magnitude" Estimates

Estimated values: 88 person days (rounded to nearest day)
Estimated range: 66 - 154 person days (rounded to nearest day)
Degree of accuracy: From -25% to +75%

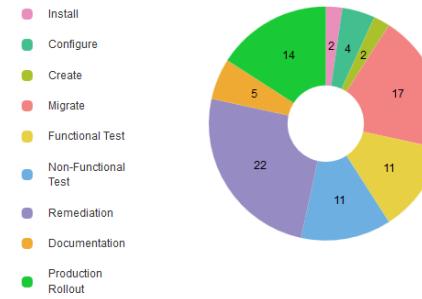
Migration Activity

Migration Activity	Total Effort in person days (rounded up to the next full day)
Install Runtimes	2
Configure Runtimes	4
Create Java EE Resources in WAS	2
Migrate and Smoke Test Applications	17
Functional Test Applications	11
Non-Functional Test Applications	11
Remediation During Testing	22
Documentation During Migration	5
Production Rollout	14
Total	88

Person Days - Estimated Values(Range)

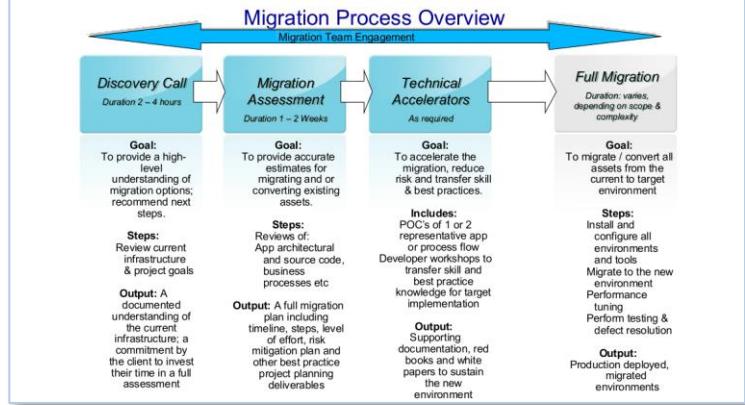


Person Days - Estimated - Activities



Resources, process, and summary

Migration Methodology Overview



Timeline

An estimated timeline can provide an overview of the project duration in weeks, the number of required resources in each role, and the migration activities that can be used to build a migration plan.

Project timelines cannot be determined using a generic approach. Dependencies like resource availability and technical skills must be taken into consideration for planning accuracy.

Contact an IBM Migration Specialist to request a free migration consultation. If you wish to be reached over the phone, provide your number and a convenient time for one of our specialists to give you a call.

Prerequisites

For a smooth and successful migration to WebSphere, ensure the following preparation are completed before any migration development is initiated.

- ✓ Identified key stakeholders and technical point of contacts.
- ✓ Developed resource level project plans for the migration effort
- ✓ Provisioned target hardware for running the migrated application
- ✓ Established access to all required systems with proper user permissions
- ✓ Allocated office space and workstation with proper internet and intranet access
- ✓ Provided access to baselined source code and deployed archives built from that source code
- ✓ Prepared functional and non-functional testing cases to validate migrated application

Scope

Runtime environment installation and configuration

- Installation and configuration of 3 cells (1 - low, 1 - medium, and 1 - high complexity)
- Deployment of 7 applications and their associated resources to development stages

Application migration and testing

- Includes migration of 7 applications (2-low, 3-medium, and 2-high complexity)
- Includes functional testing and load testing; does not include writing test scripts
- Includes defect resolution and performance tuning

Production Rollout Assistance

- Includes production planning and rollout

Miscellaneous

- Does not include Project Management
 - Depends on number of iterations, resources, etc.
- Does not include Project Duration
 - This also depends on number of iterations, resources, etc.

Assumptions

Estimates are based on three factors:

- **Combined effort hours.** A migration can be performed solely by the customer, solely by IBM, or jointly by a collaboration. Our experience is that collaboration works best as IBM has specialists with deep migrations knowledge and the customer has resources with deep application knowledge. For that reason, this ROM estimate provides effort hours for IBM and the customer working jointly by a collaboration. Contact an IBM Migration Specialist for a breakdown between IBM and customer effort hours, or for an estimate where the migration is performed solely by customer or solely by IBM.
- **IBM's classification scheme and historical data.** That is the estimate is based on IBM's historical data on how long it takes to migrate environments and applications of varying complexity levels (e.g., low, medium, and high complexity)
- **Answers to the Discovery Questionnaire.** That is, the estimate is based on the number and complexity of the environments and the applications as specified in the discovery questionnaire.

The following assumptions are made:

- Environment and application migration related tasks will have enough resources to run in parallel
- Testing related tasks will overlap slightly with the environment and application migration related tasks
 - That is, as soon as the environments and applications are ready the testing can commence
- Functional & non-functional test effort estimates is based on 1 resource at 100% allocation for the duration of the tests.

Next Steps

Expert Migration Assistance

Make use of our WWWCMF experts located across the globe to jump start and accelerate your upcoming migration.

The WWWCMF can offer qualified customers the following **Free of charge!**

- Detailed Migration Cost Estimate
- Proof of Concept Migration



Speak with your IBM Sales representative about engaging the Wide WebSphere Competitive Migration Team



Contact the World Wide WebSphere Competitive Migration Team directly

[Click here to find out more about WWWCMF and what we do.](#)

Self-Help Migration Resources (English only)

- Migrations, why pay more?
- Blog: WhyWebSphere.com
- WebSphere vs. WebLogic License and Support Cost Calculator
- Redbook - WebSphere Application Server V8.5. Migration Guide
- Redbook - WebSphere Application Server V7. Competitive Migration Guide
- IBM WebSphere Application Server Migration Toolkit
 - Demo Video
 - Webcast Replay
 - Forum
- Learn about the Tomcat Config Migration Tech Preview
- Upcoming & replay of WebSphere Support Technical Exchange webcasts
- Links to WebSphere forums & community for the latest in WebSphere technology
- Global WebSphere Community
- My Notifications subscription for critical IBM software support updates
- WebSphere Application Server family
- IBM Middleware Technical Journal for Developers
- Using Spring and Hibernate with WebSphere Application Server

Step 2: Application assessment using the binary scanner

Migration Toolkit for Application Binaries

https://developer.ibm.com/wasdev/downloads/#asset/tools-Migration_Toolkit_for_Application_Binaries



Binary analysis

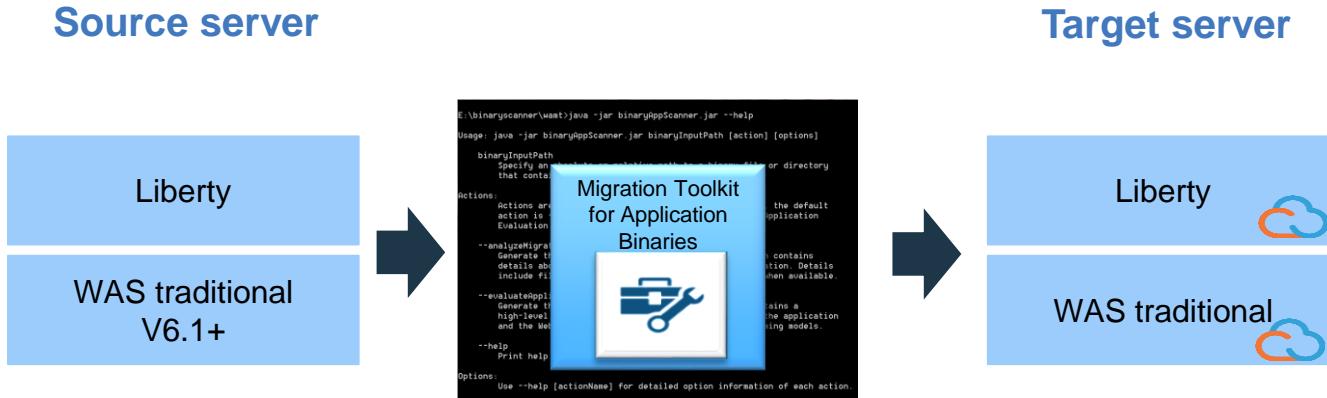
Source Migration

Config Migration

- Evaluates the binaries – EAR, WAR, JAR, class files, etc.
 - Command line convenience
 - HTML, Text, or JSON output

Analyze application binaries

Migration assistance with command-line convenience and no source code needed.



- Java EE 1.4, 5 or 6
- Java SE 5, 6 or 7

- Java EE 6 or 7
- Java SE 7 or 8
- On premises, instant runtime, WAS on Cloud, Docker

Binary Scanner - Evaluate the best-fit platform

- Use the Application Evaluation Report during your initial assessment and planning.
- Report shows the Java EE technologies your application uses. Help determine the right platform by answering questions like:

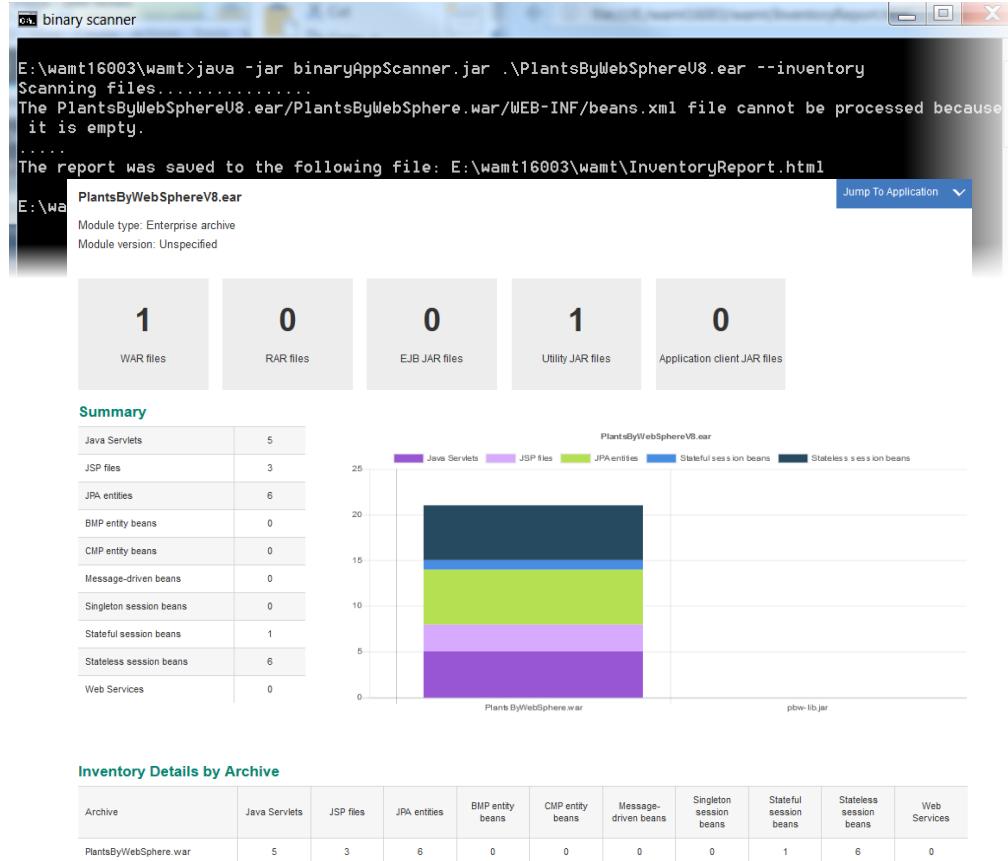
- Does my application use deprecated Java EE technologies?
- Will my application run on Liberty for Java on Bluemix?
- Should I continue using traditional WebSphere?

Application Evaluation Report								
Your application uses technologies provided by these IBM platforms:								
WebSphere Application Server V9.0								
	Liberty for Java on IBM Bluemix	Liberty Core	Liberty	WebSphere traditional	Network Deployment Liberty	Network Deployment traditional	Liberty for z/OS	WebSphere traditional for z/OS
WEB SERVICES TECHNOLOGIES								
Java API for XML-based RPC (JAX-RPC)				✓		✓		✓
WEB APPLICATION TECHNOLOGIES								
Java Servlet	✓	✓	✓	✓	✓	✓	✓	✓
JavaServer Pages / Expression Language (JSP/EL)	✓	✓	✓	✓	✓	✓	✓	✓
ENTERPRISE APPLICATION TECHNOLOGIES								
Enterprise JavaBeans (EJB) 2.x and 1.x	✓		✓	✓	✓	✓	✓	✓
Enterprise JavaBeans (EJB) Lite subset	✓	✓	✓	✓	✓	✓	✓	✓
Remote Enterprise JavaBeans (EJB)			✓	✓	✓	✓	✓	✓
Java Persistence (JPA)	✓	✓	✓	✓	✓	✓	✓	✓
Common Annotations for the Java Platform	✓	✓	✓	✓	✓	✓	✓	✓
JavaMail	✓	✓	✓	✓	✓	✓	✓	✓
JAVA EE-RELATED SPECIFICATIONS IN JAVA SE								
Java Database Connectivity (JDBC)	✓	✓	✓	✓	✓	✓	✓	✓
This report was generated on 5/9/16 9:32 AM for the following modules: /apps/PlantsByWebSphereV7.ear								

Binary Scanner – Inventory to estimate and understand

Ideal for

- Understanding the application
- Input to the WebSphere Migration Discovery tool
- Estimation and sizing



Analysis with the binary scanner for a quick deep report

Ideal for

- Early evaluation and planning
- Developers not using an Eclipse-based IDE
- Access to the detail help on migration issues

The screenshot shows two windows side-by-side. The top window is a Command Prompt showing the execution of a Java command to analyze an EAR file. The bottom window is a detailed migration analysis report.

Command Prompt Output:

```
E:\wamt>java -jar binaryAppScanner.jar .\PlantsByWebSphereV8.ear --analyzeMigrationDetails --sourceAppServer=was80 --targetAppServer=liberty
Scanning files .....
The ./PlantsByWebSphereV8.ear/PlantsByWebSphere.war/WEB-INF/beans.xml file cannot be processed because it is empty.
.....
The report was saved to the following file: E:\wamt\AnalysisReport.html
E:\wamt>
```

Detailed Migration Analysis Report Summary:

6/22/16 12:23 PM
E:\wamt\PlantsByWebSphereV8.ear

6	Rules flagged
6	Files affected
7	Total results

Source options:
--sourceAppServer=was80 --sourceJava=ibm6

Target options:
--targetAppServer=liberty --targetJava=ibm8 --targetJavaEE=ee7

Detailed Results by Rule:

- Behavior change in rounding in NumberFormat and DecimalFormat format methods (2)
[Show rule help](#) | [Show results](#)
- CDI scans for implicit beans when there is no beans.xml file (1)
[Show rule help](#) | [Show results](#)
- Check for a behavior change on the sendRedirect method (1)
[Show rule help](#) | [Show results](#)

Evaluate target cloud options quickly

The command line tool also generates a summary of cloud connectivity considerations.

```
java -jar binaryScanner.jar ./PlantsByWebSphereV8.ear --analyzeMigrationDetails  
--sourceAppServer=was80 --targetAppServer=liberty --targetCloud=bluemix
```

Detailed Migration Analysis Report

6/22/16 11:13 PM
E:\want\PlantsByWebSphereV8.ear

Jump To Rule ▾

11 Rules flagged	8 Files affected	12 Total results	Source options --sourceAppServer=was80 --sourceJava=ibm6	Target options --targetAppServer=liberty --targetJava=ibm8 --targetJavaEE=ee7 --targetCloud=bluemix
----------------------------	----------------------------	----------------------------	--	---

Connectivity Rules Summary

This table summarizes the flagged connectivity rules for each Java archive. Select the links in the column header to view all detailed results for that rule. Select the number links within this table to view the detailed results for that specific Java archive.

	Databases	Enterprise information systems (EIS)	Java EE security	Java Message Service (JMS)	JavaMail server	Message-Driven Beans (MDB)	Remote EJB lookups	Remote EJB providers	Remote web services	Third-party security	Vendor specific messaging
- PlantsByWebSphereV8.ear	1		1		1						
PlantsByWebSphereV8.ear											
PlantsByWebSphere.war	1		1		1						

Detailed Results by Rule

Behavior change in rounding in NumberFormat and DecimalFormat format methods (2)

Expand all | Collapse all

Show rule help | Show results

Learn about the issues

Rule help and the results are presented together so that you can learn quantify the migration effort.

The screenshot shows the 'Detailed Results by Rule' interface. At the top, there's a title bar with 'Behavior change in rounding in NumberFormat and DecimalFormat format methods (2)'. Below it are buttons for 'Expand all', 'Collapse all', 'Close rule help', and 'Close results'. The main area is divided into two sections: 'Rule Help' and 'Results'.

Rule Help:

Java 8 introduces a behavior change in the rounding behavior of decimal numbers using the `format` method on the `java.text.NumberFormat` and the `java.text.DecimalFormat` classes when the value is very close to a tie, sitting exactly at the rounding position specified in the formatting pattern. The change affects numbers with a binary numeric representation that is not exact.

For example, the closest binary approximation of 0.015 that a computer can reach is 0.01499999999999994448848768742172978816416595458984375. If you round that number to two digits, in Java 8 the answer is .01 because .00499999... is less than .005. In previous versions of Java, the answer is 0.02.

This rule flags calls to the `NumberFormat` and `DecimalFormat` `format` methods when they are called with a `double` primitive or a `java.lang.Double` object as the first parameter. The following example shows the use of the `format` methods.

```
public static void main(String[] args) {  
    java.text.NumberFormat nf = java.text.NumberFormat.getInstance();  
    nf.setMaximumFractionDigits(3);  
    double aDouble;  
    String myStr;  
  
    aDouble = 0.8055d;  
    myStr = nf.format(aDouble);  
    System.out.println("format(" + aDouble + ") returns \"" + myStr + "\", Expecting \"0.805\".");  
}
```

Results:

FILE NAME	REFERENCE DETAILS	MATCH CRITERIA	LINE NUMBER
./PlantsByWebSphereV8.ear/PlantsByWebSphere.war			
WEB-INF/classes/com/ibm/websphere/samples/pbw/war/ShoppingBean.class	Method getShippingCostString Method getTotalCostString	java.text.NumberFormat.format(double) java.text.NumberFormat.format(double)	155 175

Scans the included JAR files, but you can control the report content with the `--includePackages` and `--excludePackages` options.

WebSphere v9.0

Step 3: Make application changes

- WebSphere Application Server Migration Toolkit
 - https://developer.ibm.com/wasdev/downloads/#asset/tools-WebSphere_Application_Server_Migration_Toolkit

Migration discovery



Binary analysis

```
javavm/servlet/http/HttpServletRC
Nw EYIG I-S P T-LIG Ym D+j+
...+*g 0 x ... +,k - B|+LJ+` Nq R
mz+Ib* E|g, Iy O` (l *+g 0 ` ...
:0+I0` 2n -+f-, is q+i I0` ( I0:
:js -jB is l+i || * (l :jS m) 0
:|q` i l H12x` n A -:H1M I119 9
:0 -m}*|@F l -fZf|f
:|fZf|f -A :TfF E I+f g m - Iqz-4
:|fZf|f -A :TfF E I+f g m - Iqz-4
```

Source Migration

```
1 import com.ibm.websphere.samples.poc.AccountServlet
2 /**
3  * Servlet to handle customer account actions.
4  */
5 @WebServlet("/servlet/AccountServlet")
6 public class AccountServlet extends HttpServlet
7 {
8     ...
9     private static final long serialVersionUID
10    ...
11    public static final String ACTION_ACCOUNT
12    public static final String ACTION_ACCOUNTUPD
13    public static final String ACTION_LOGOUT
14    public static final String ACTION_REGISTER
15    public static final String ACTION_SETLOGGING
```

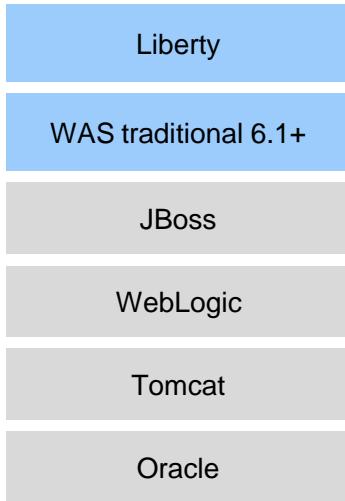
Config Migration

```
1 <server description="new server">
2   ...
3   <!-- Enable features -->
4   <featureManager>
5     <feature>HttpServlet-3.1</feature>
6     <feature>jsp-2.3</feature>
7     <feature>ejb-3.2</feature>
8   </featureManager>
9
10  <!-- To access this server from a client -->
11  <httpEndpoint id="defaultHttpEndpoint"
12    httpPort="8080"/>
```

- Evaluates Java, JSP, XML, and other files
- Eclipse IDE

Analyze application source code in Eclipse

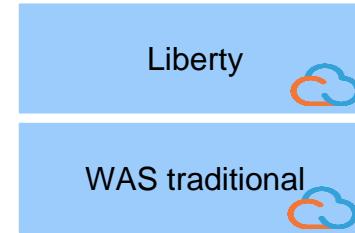
Source server



- Java EE 1.4, 5 or 6
- Java SE 1.4, 5, 6 or 7



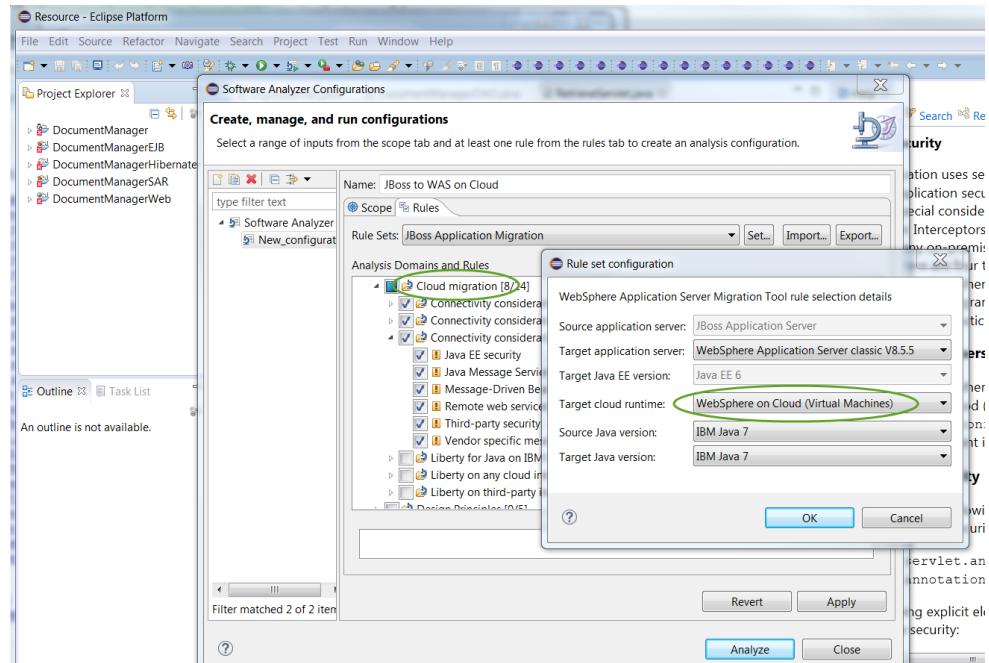
Target server



- Java EE 6 or 7
- Java SE 7 or 8
- On premises,
instant runtime,
WAS on Cloud,
Docker

See the details on how to update the source

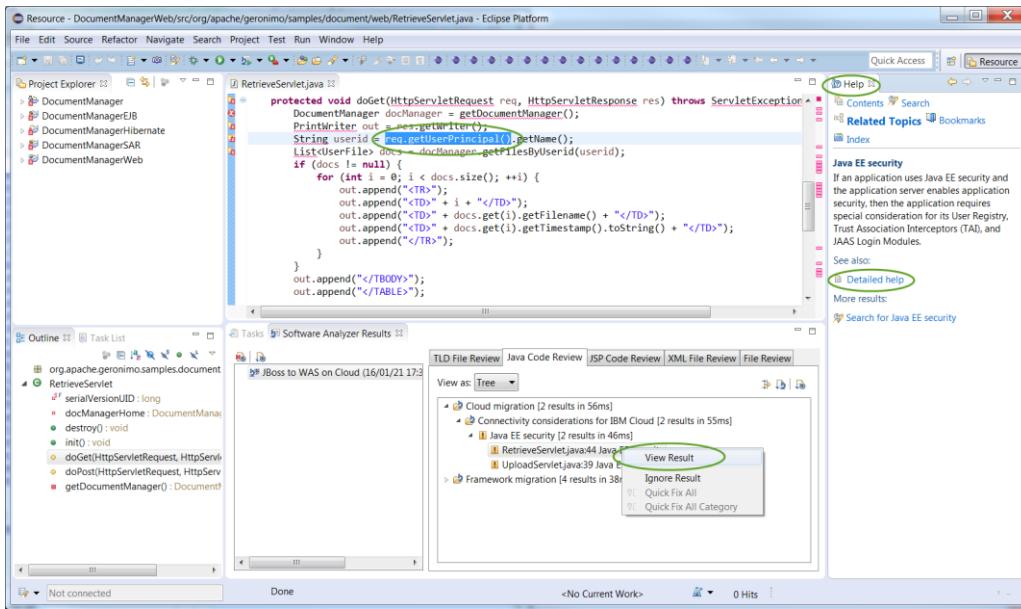
- Configure analysis rules appropriate for your source and target application server and cloud platform.
- Choose your Java SE source and target
- Choose your Java EE source and target



Jump to the source code

After running analysis...

- Open the code from the analysis result
- Each issue has detailed help for guidance for issue mitigation.
- If possible, a quick fix is provided.



Learn about the issues

- Detailed information and advice is provided
- Code quick fixes where possible
- Pointers to the knowledge center and external resources

The screenshot shows a web browser window displaying a Java EE security document. The title bar includes standard icons for Help, Back, Forward, and Stop. Below the title bar, there are links for Contents, Search, Related Topics, Bookmarks, and Index. The main content area is titled "Java EE security". It contains a paragraph explaining that if an application uses security and the application server enables application security, it requires special consideration for User Registry, Trust Association Interceptors (TAI), and JAAS Login Modules, as well as any on-premise security server. It also mentions four types of application security: authenticating users, declarative security, Java EE programmatic security, and vendor provided programmatic security. Below this, there are sections for "Authenticating users" and "Declarative security", each with its own detailed description and code examples.

If an application uses security and the application server enables application security, then the application requires special consideration for its User Registry, Trust Association Interceptors (TAI), and JAAS Login Modules, as well as any on-premise security server that may be needed. There are four types of application security that will get flagged - authenticating users, declarative security, Java EE programmatic security, and vendor provided programmatic security.

Authenticating users

Applications that authenticate users specify a standard authentication method (BASIC, FORM, CLIENT-CERT) by using the `<login-config>` element and its `<auth-method>` sub-element in the WEB-INF/web.xml file.

Declarative security

In Java code, the following explicit annotations indicate use of declarative security:

- `javax.servlet.annotation.ServletSecurity`
- `javax.annotation.security.RolesAllowed`

The following explicit elements also indicate use of declarative security:

- `<method-permission>` in the ejb-jar.xml file
- `<security-constraint>` in the WEB-INF/web.xml file

What can detailed analysis detect?

- WebSphere Version Migration
 - Identify issues in applications moving to newer versions of WebSphere
 - Migrate applications from v6.1, v7.0, v8.0, v8.5.5 (source scanner goes back farther)
 - Migrate applications to v8.5.5, v9.0
 - Liberty
 - Identify programming models not available in Liberty
 - Behavior changes between WebSphere traditional and Liberty
 - Java EE 7 differences
 - Java SE differences
- Cloud Migration
 - Optimize your application for Bluemix and Liberty PaaS
 - Instant runtimes, Docker, and WAS on Cloud targets
 - Connectivity considerations
- Third-party application servers (Eclipse tool only)
 - Migrate applications from Oracle (WebLogic & Oracle AS), JBoss or Tomcat to Liberty and traditional WebSphere

What's new in the migration tools for traditional WebSphere V9

Detects the use of deprecated features

- Enterprise JavaBeans (EJB) entity beans
- Java API for XML-based RPC (JAX-RPC)
- Java API for XML Registries (JAXR)
- Java EE Application Deployment
- The CommonJ Timer and Work Manager APIs
- The WebSphere Asynchronous Beans API

What's new in the migration tools for traditional WebSphere V9

Detects the use of removed features

- Apache HTTP client API
- CDI OpenWebBeans API
- CEA system application
- Common Event Infrastructure API
- JSF SunRI engine
- SCA programming models

What's new in the migration tools for Java EE 7

- Java EE compatibility
 - Newer Java EE versions intend to support older Java EE versions
 - Java EE supports incremental upgrade
 - Modules within an application can be earlier versions
 - In some cases breaking clarifications exist
 - The migration tools help with Java EE version differences but not Java EE exploitation

What's new in the migration tools for Java EE 7

- Changing the underlying Java EE implementation affects behavior
 - Java EE 7 has some new providers in WAS Liberty
 - JPA 2.1 – EclipseLink (was OpenJPA)
 - JAX-RS 2.0 – CXF (was Apache Wink)
 - CDI 1.2 – Weld implementation (was OpenWebBeans)
 - The toolkit also provides assistance for Java EE 7 differences in:
 - Expression Language (EL)
 - JMS
 - Servlet

What's new in the migration tools for Java SE

- WebSphere V9 runs on Java SE 8
- Java Runtime compatibility (JRE)
 - JREs focus on binary compatibility and are normally very good
 - However new APIs and behavior changes can cause migration work
 - [Interface changes](#)
 - [Exception differences](#)
 - [Null](#)
 - Source scanner helps migrate from Java 1.4 up to Java 8
 - Binary scanner helps migrate from Java 5 to Java 8

How do I migrate configuration?

- WebSphere Version to Version Migration
 - WASPreUpgrade / WASPostUpgrade
- Traditional WebSphere to Liberty or third-party app servers
 - WebSphere Configuration Migration Tool
 - https://developer.ibm.com/wasdev/downloads/#asset/tools-WebSphere_Configuration_Migration_Tool

Migration discovery



Binary analysis

```
javaj/servlet/http/HttpServletRe  
N> EYIG: I-& L& P, T-114 Ym O+J  
L- *%< 1 ... +,I<- [S|-+J|*` n` R  
e:z+I*` B|q, Ia 0` (L-*%< 0` ...  
:o+I*` B|q, Ia 0` (L-*%< 0` ...  
:j-B|p, 3B -+I, B` x (I I0-:S o{0  
[A|q, B|p, 3B -+I, B` x (I I0-:S o{0  
[0` x m-+I|p, F-+I, B` x A -+I|p, I+H R  
[I|Z|s, A -+I|p, I+H R  
[I|Z|s, A -+I|p, I+H R  
[I|Z|s, A -+I|p, I+H R
```

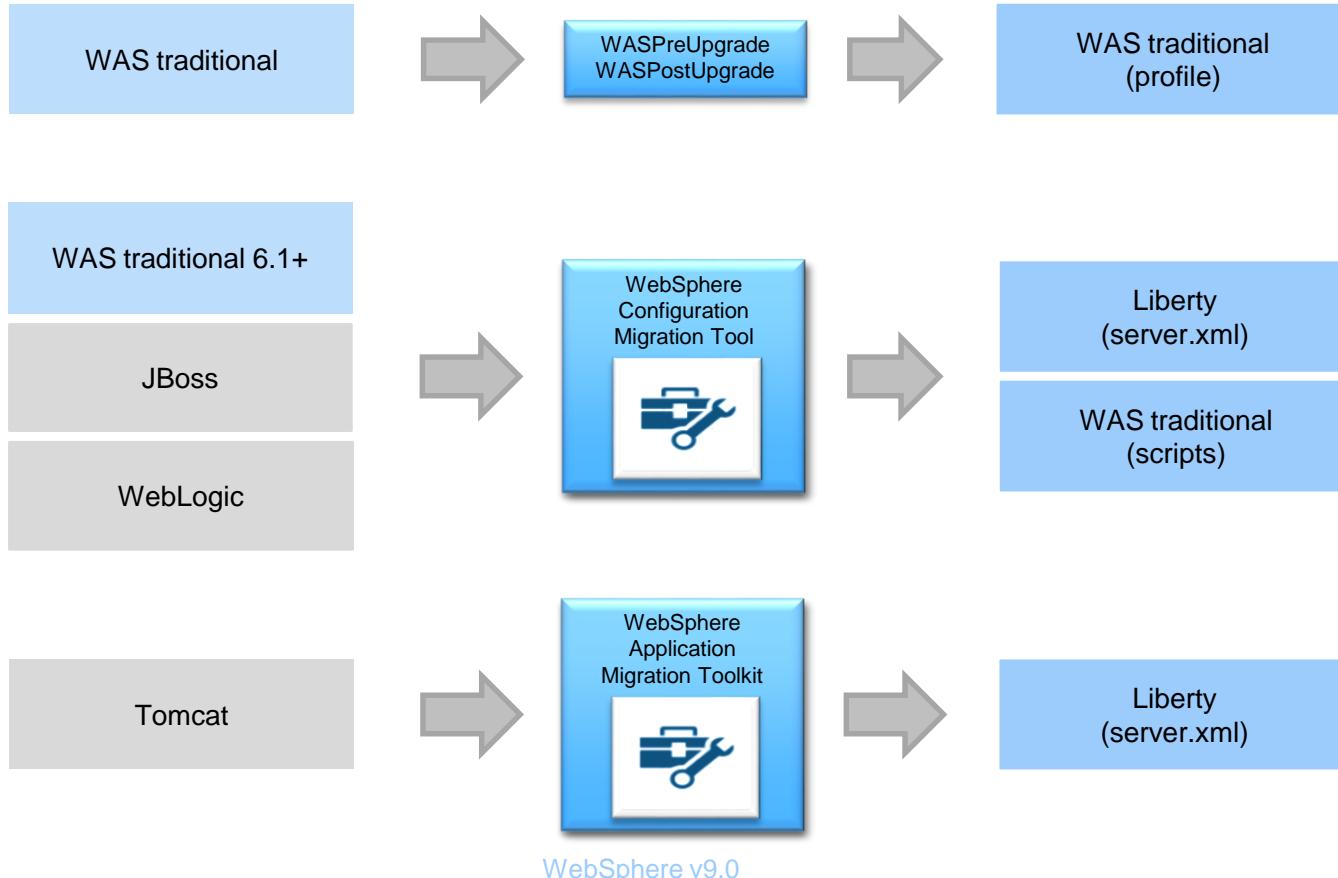
Source Migration

```
1 import com.ibm.websphere.samples.jee.v9.sample  
2 // Account servlet to handle customer account actions.  
3 //  
4 public class AccountServlet extends HttpServlet  
5 {  
6     private static final long serialVersionUID = 1L;  
7     // Set the session timeout to 30 minutes.  
8     public static final String ACTION_ACCOUNT = "ACTION_ACCOUNT";  
9     public static final String ACTION_LOGOUT = "ACTION_LOGOUT";  
10    public static final String ACTION_REGISTER = "ACTION_REGISTER";  
11    public static final String ACTION_SetLogging = "ACTION_SetLogging";  
12 }  
13 // To access this server from a browser, enter:  
14 // http://localhost:9080/account
```

Config Migration

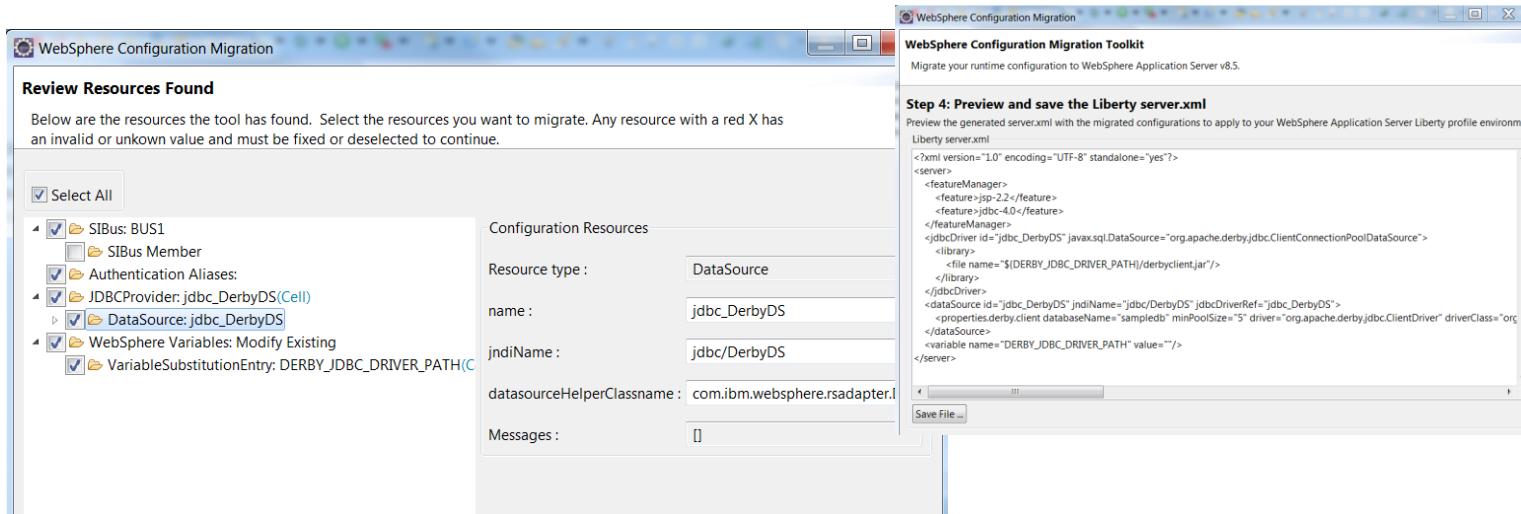
```
2<server description="new server">  
3     <!-- Enable features -->  
4     <featureManager>  
5         <feature> servlet-3.1</feature>  
6         <feature> jsp-2.3</feature>  
7         <feature> ejb-3.2</feature>  
8     </featureManager>  
9     <!-- To access this server from a browser, enter:  
10        <httpEndpoint id="defaultHttpEndpoint"  
11            httpPort="9080" />
```

Analyze configuration



WCMT in Eclipse

- Lists resources, allows edit of properties
- Preview and save liberty server.xml content
- Creates Jython scripts for traditional WebSphere
- Input for traditional WebSphere is config properties file
 - `wsadmin -lang python -c "AdminTask.extractConfigProperties(['-propertiesFileName my.props'])"`



What can you migrate to Liberty using WCMT?

- JDBC providers
- Data sources
- JMS destination
- JMS topic
- JMS queue
- JMS connection
- JMS topic connection factory
- Foreign JMS connection factory
- Activation specification
- Queue activation specification
- Topic activation specification
- MQ topic
- MQ queue
- MQ activation specification
- MQ connection factory
- MQ queue connection factory
- JCA authentication alias
- Service integration bus
- Global security
- LDAP user registry
- WebSphere variables

Tomcat migration

Tomcat Configuration Migration Tool

Included with WAMT

- Migrates common Tomcat configuration elements to Liberty profile
- Simplifies developer experience – Integrated experience in Eclipse for both app and configuration migration to Liberty
- Uses WDT for server definitions and deploy

Configuration Migration Options

Migration overview

Migration planning roadmap

Application Migration options

Configuration Migration options

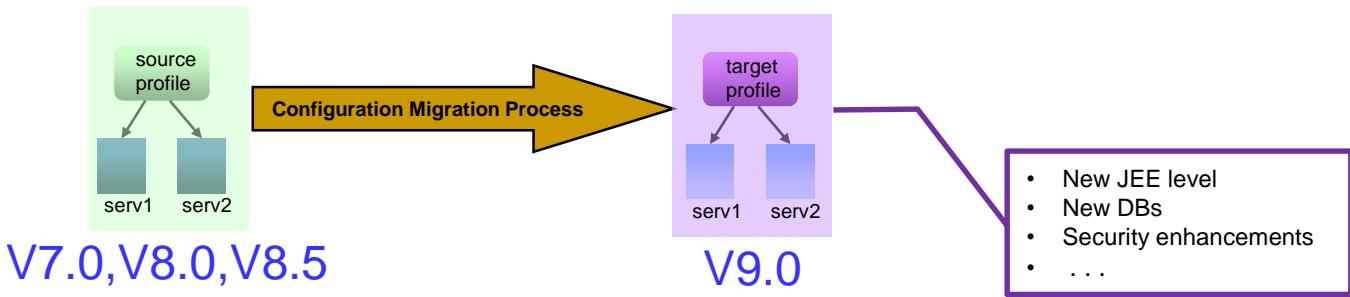
Summary

References



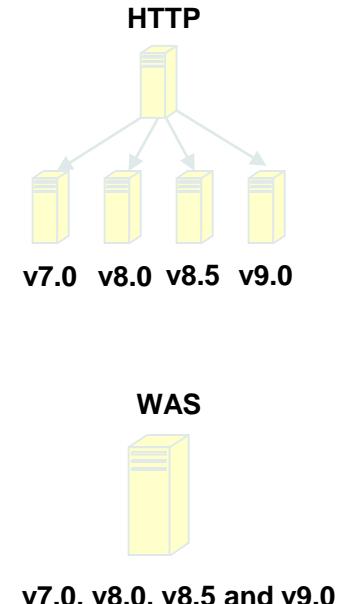
WebSphere Configuration Migration Goals

- Configuration migration process includes tools, procedures, and information to reconstruct or migrate the current WebSphere Application Server configuration from one release to the next.
 - *Configuration* includes topology information, server-specific customizations, and applications with any known associated data. (security, ports, variables, shared libraries, databases, clusters, ...)
- Configuration migration allows users to maintain a stable environment, while providing a path to access the latest technologies delivered in the new release of the WebSphere Application Server. Migration merges the old configuration data into the new configuration data, taking into account any release to release changes where the data needs to be replaced, merged or purged. Goal is to have:
 - the newly migrated servers behave as close as possible to old servers.
 - the applications continue to function at the same JEE level.



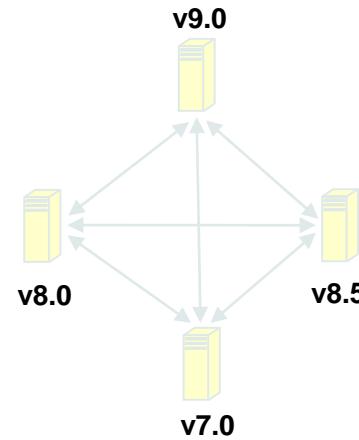
Coexistence configuration for migration

- Cross version plug-in support
 - Higher level Web Server plug-in can work to multiple WebSphere versions
 - The URI for a machine must be unique in the routing rules for the plug-in
 - Support for n-3 (v7.0, v8.0 and v8.5 for v9.0)
- Coexistence
 - Different versions of WAS: same machine, same LPAR, same time
 - Requires port conflict resolution
 - Support for n-3 (v7.0,v8.0,v8.5 and v9.0)



Interoperability

- Different versions of WebSphere can communicate
- Support for applications that are Secure, Transactional, EJB and WLM-able
- Support for n-3
(v7.0, v8.0, v8.5 and v9.0)

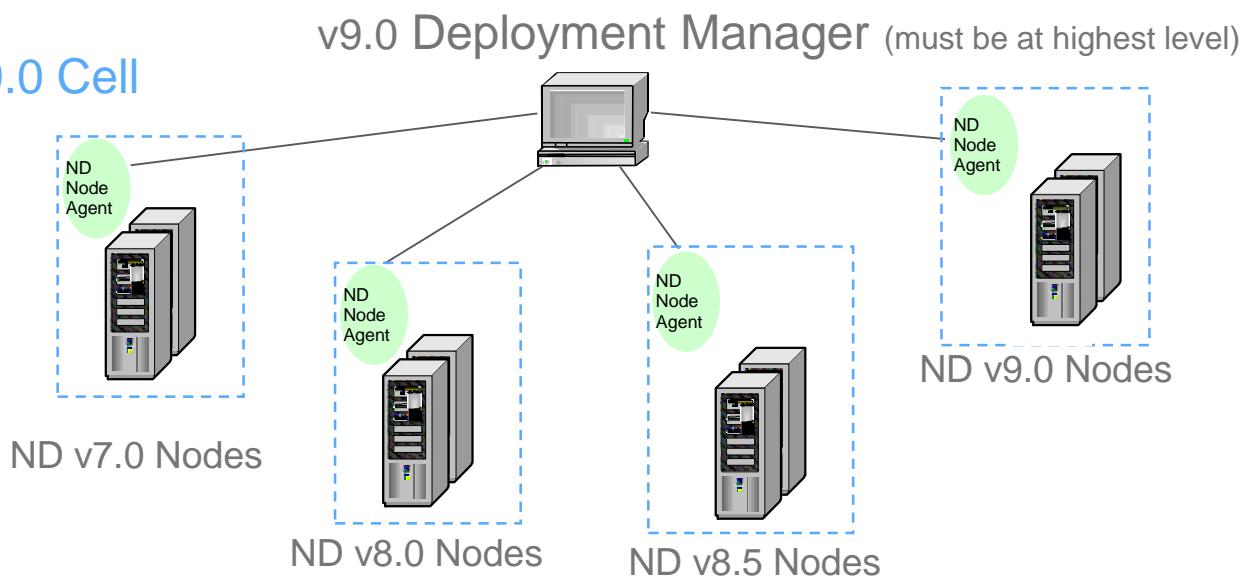


Mixed version cell support

Support for existing infrastructure in new deployments

Business Value: Adopt newer infrastructure as your plans require, saving time and money

WAS Network Deployment v9.0 Cell



v9.0 Cell can contain v7.0, v8.0, v8.5 and v9.0 nodes: for continued operation as well as staging of upgrades.
Note – Precompile options are not available for application deploy to back level nodes

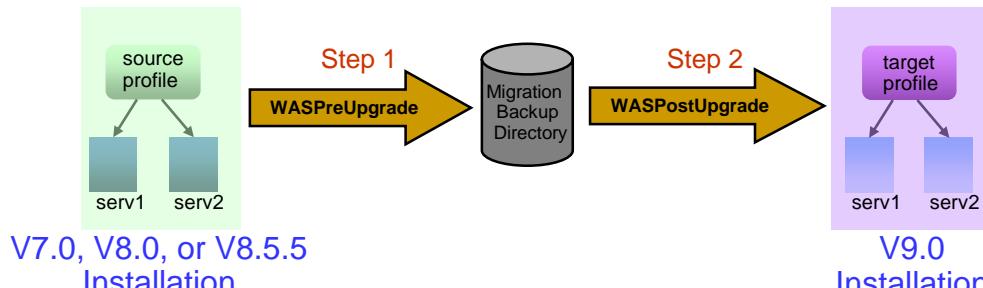
Administration

- WebSphere traditional
 - Administration model consistent since V6
 - Stable config model, some new added each release
 - Consistent operations model, some new in V7
 - Same app deploy capability, some validation improvements
 - Scripting model consistent since V6
 - Stable scripting strategy starting v5.0
 - Small number of changes in some later versions
 - Jython v2.1 upgraded to v2.7 and set as default for wsadmin command in WebSphere V9.0
 - As of V9, JACL has moved to being deprecated
 - Migration tooling consistent and enhanced each release
- Liberty
 - Simplified configuration model and application deploy
 - Differences in admin model (JMX, Admin Center, Collectives)

WebSphere Configuration Migration Overview

- Configuration migration tools handle one profile/node at a time.
 - Profiles in a deployment cell or in a flexible management topology must be migrated in a predefined order.
 - It is a two step process
 - Configuration data from source profile is captured into a migration backup directory. ([WASPreUpgrade](#))
 - Source data is merged into the new target profile. ([WASPostUpgrade](#))
- Various strategies and options are available for running a migration, depending on the topology of the installation.
 - Scenarios are outlined in the WebSphere Application Server Knowledge Center and white papers.

- Remote versus local
- Standard versus clone



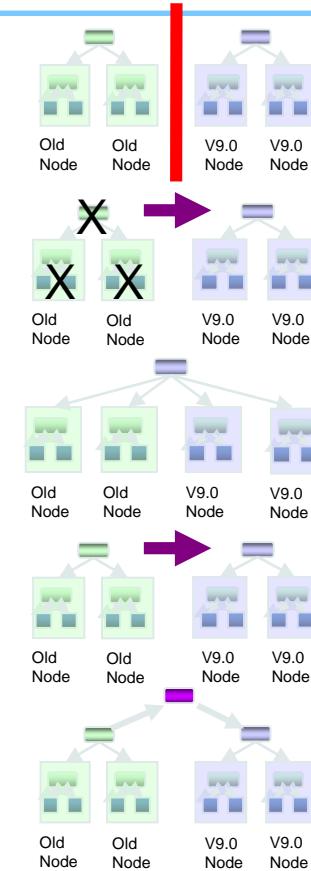
Migration Tools for Administrators

WebSphere Application Server configuration migration tools

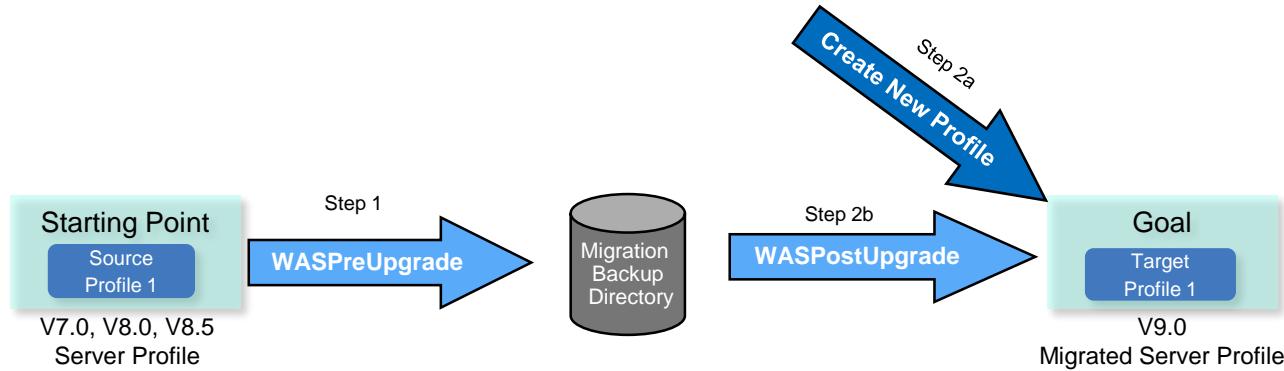
- Configuration Migration Tool (CMT) for distributed
 - Move existing configurations between versions on same machine
- z/OS Migration Management Tool (zMMT) – for z/OS
 - Creates jobs to perform the migration (WCT product)
- Command line tools for configuration migration
 - For distributed and iSeries (WASPreUpgrade, WASPostUpgrade)
 - Local and cross-platform version migration support (createRemoteMigrJar)
 - Delayed application deployment (WASMigrationAppInstaller)

Five Strategies for Migrating Network Deployment

1. Manual Side by Side (**Scripted**)
 - Create a new cell and populate with tools or manually
 - No runtime migration tools
2. In Place - Copy and replace the cell (**Standard**)
 - Recreates the **exact** existing configuration in new cell
 - The old dMgr and nodes are disabled when migrated.
3. In Place - Copy and replace the DMgr (**Hybrid**)
 - Recreates the **exact** existing configuration in new cell
 - Add new nodes and move incrementally
4. In Place - Copy and coexist (**Clone – new for v9**)
 - Recreates the **exact** existing configuration in new cell
 - All ports in the new cell will be changes.
 - New cell can coexist with the old cell.
5. Side by Side - Fine Grained (**Fine Grained**)
 - Create a new cell and incrementally copy configuration
 - Uses an intermediate profile, runtime migration and wsadmin tools

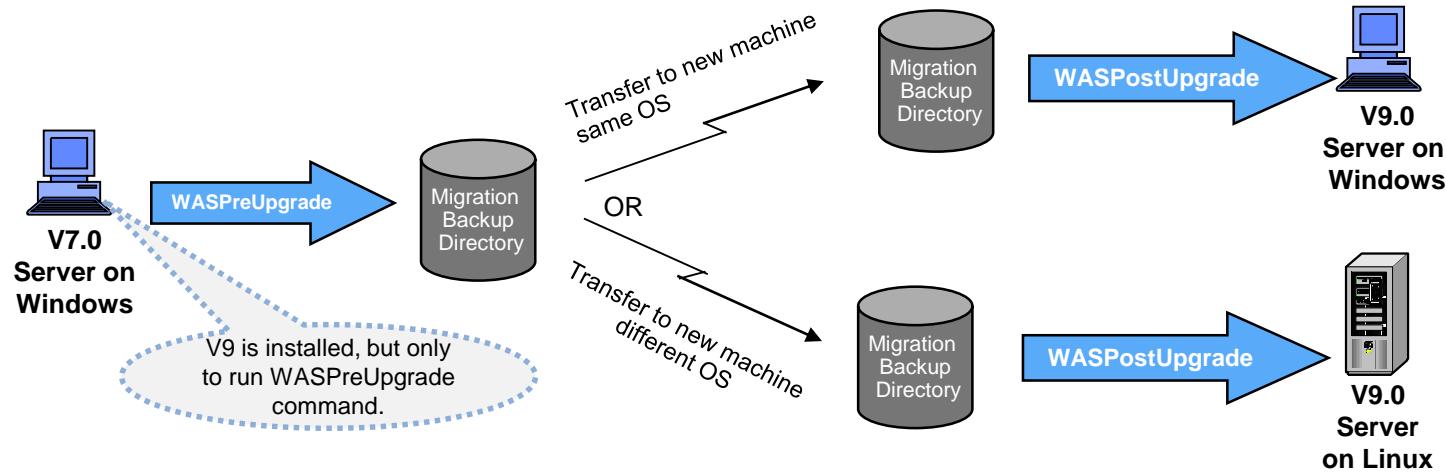


Migration Tooling – Standard Local Migration



- Migrate on the same platform, same machine
 - Both the old and new versions of WebSphere coexist.
 - However, for cell migrations the old nodes will be disabled.
- Use either the command-line tools or the migration wizard

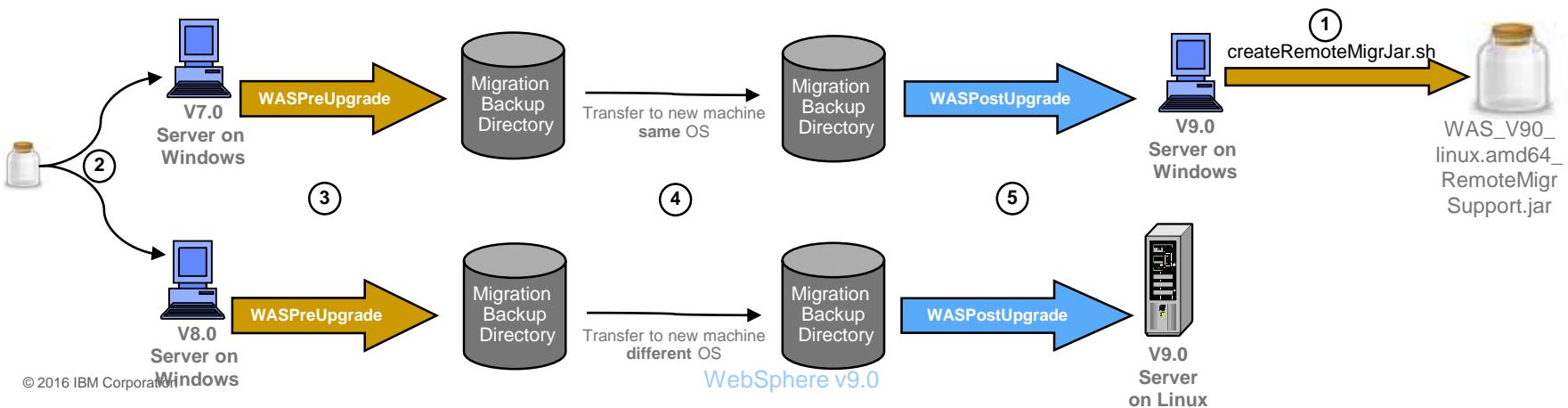
Migration Tooling – Remote Migration (1)



- Migrate to a different distributed platform (Linux x86 to Windows)
- Migrate to new hardware on same OS (Linux x86 to Linux x86)
- WASPreUpgrade's “–machineChange true” option only available for command line
- The example above requires WebSphere V9.0 be installed on the V7.0 machine.

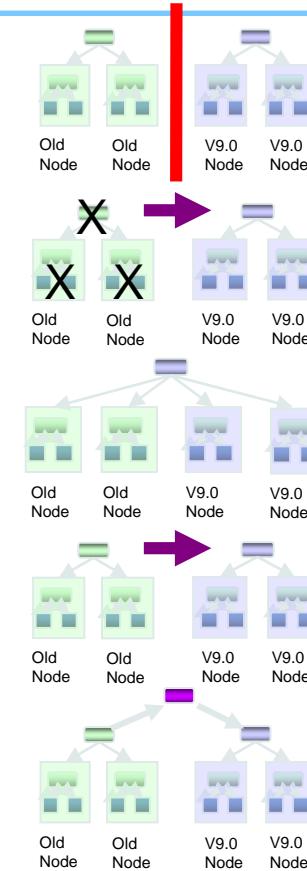
Migration Tooling – Remote Migration (2)

- The `createRemoteMigrJar` tool
 - Designed to help with remote migrations to new hardware.
 - No need to install latest WebSphere release on old hardware.
 - The tool packages the latest WASPreUpgrade command. (**Note: This package is OS specific!!**)
 - Send package to old hardware of same OS.
 - Run WASPreUpgrade to create migration backup directory.
 - Zip up and send migration backup directory to the new machine and finish the migration.
 - Also designed to help with mass remote migrations.
 - Create once and use on all source machines matching OS.

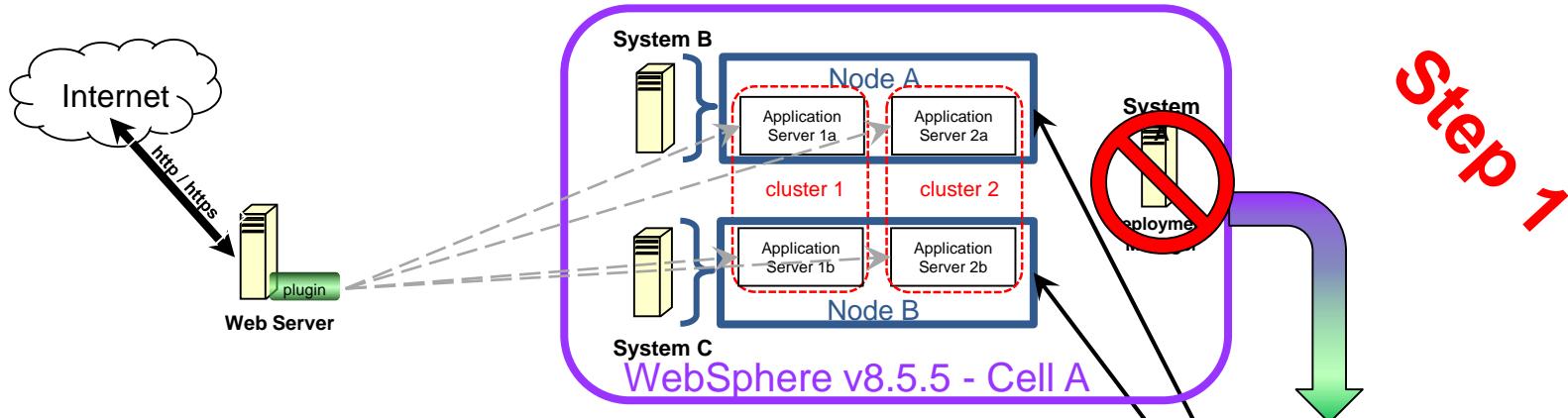


Five Strategies for Migrating Network Deployment

1. Manual Side by Side (**Scripted**)
 - Create a new cell and populate with tools or manually
 - No runtime migration tools
2. In Place - Copy and replace the cell (**Standard**)
 - Recreates the **exact** existing configuration in new cell
 - The old dMgr and nodes are disabled when migrated.
3. In Place - Copy and replace the DMgr (**Hybrid**)
 - Recreates the **exact** existing configuration in new cell
 - Add new nodes and move incrementally
4. In Place - Copy and coexist (**Clone – new for v9**)
 - Recreates the **exact** existing configuration in new cell
 - All ports in the new cell will be changes.
 - New cell can coexist with the old cell.
5. Side by Side - Fine Grained (**Fine Grained**)
 - Create a new cell and incrementally copy configuration
 - Uses an intermediate profile, runtime migration and wsadmin tools



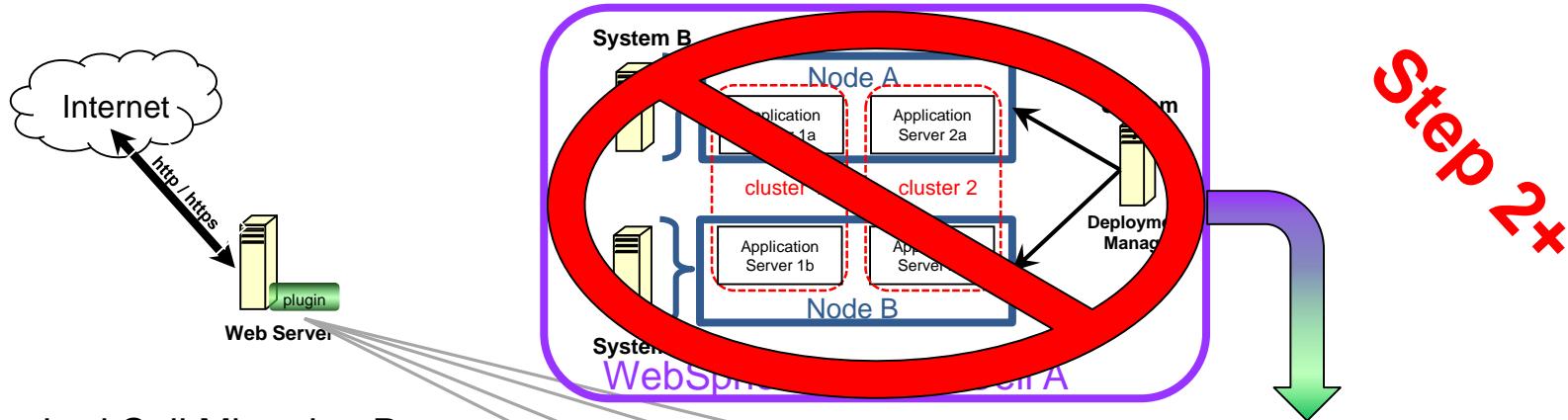
Standard Migration Strategy (In Place - Copy and replace the cell)



Standard Cell Migration Process

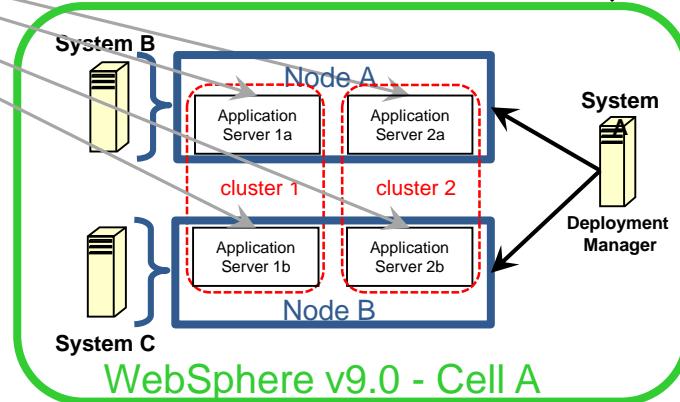
1. Migrate dmgr.
 - a) Disables old dmgr
 - b) Old nodes managed by new dmgr.
 - c) Old nodes contains new v9.0 data.
(syncNode)

Standard Migration Strategy (In Place - Copy and replace the cell)

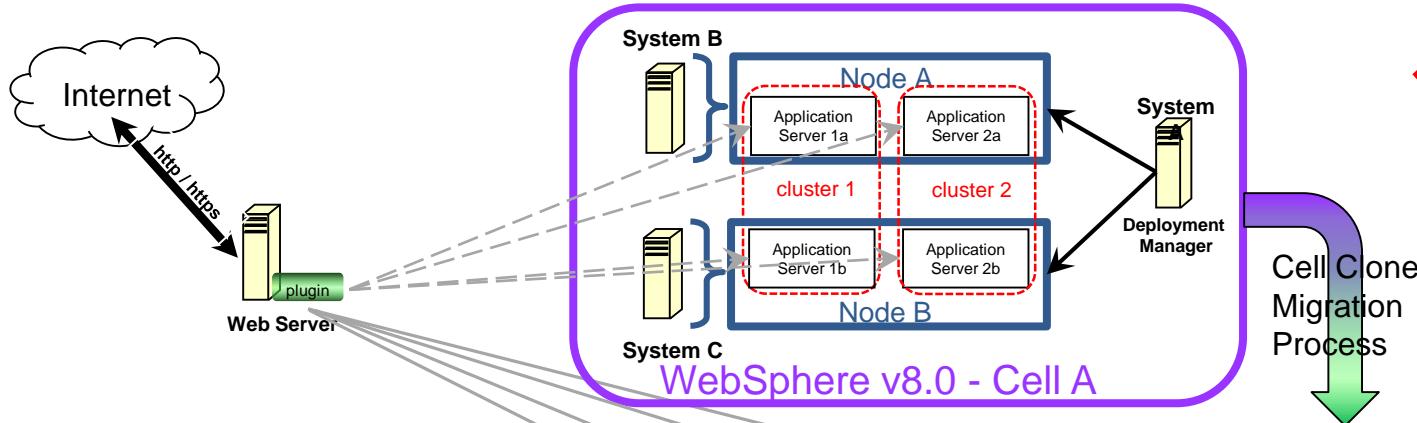


Standard Cell Migration Process

1. Migrate dmgr.
2. Migrate node A and disable old node.
3. Migrate node B and disable old node.
4. V8.5.5 cell becomes obsolete.
5. V9.0 keeps all the same names for:
cell, nodes, clusters and servers.
6. V9.0 cell is started, tuned and tested.
7. V8.5.5 recovery become difficult.

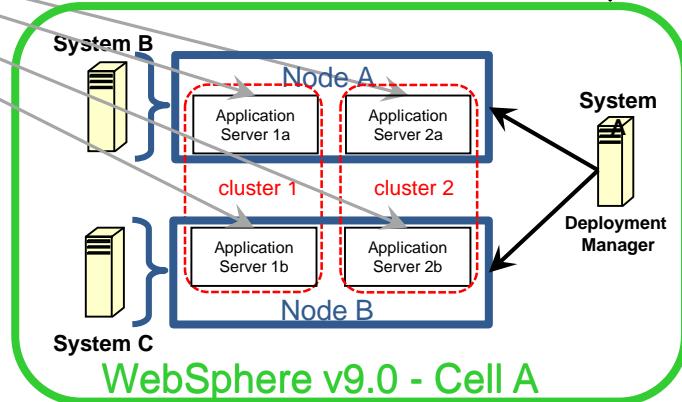


Clone Migration Strategy (In Place - Copy and coexist)



Cell Clone Migration Process

1. Migrate dmgr.
2. Migrate node A.
3. Migrate node B.
4. Once cloned cells are managed independently.
5. V8.0 cell remains functional and running.
6. V9.0 keeps all the same names for:
cell, nodes, clusters and servers.
7. V9.0 cell is started, tuned and tested.
8. Web Server switched from V8.0 to V9.0 cell when ready.
9. V8.0 can be stopped, but kept for recovery.



New for V9

Advantages of using the Clone Migration Strategy

- Practice and throw away. Flesh out the issues.
- No scheduling of weekend or weeknight outages in order to migrate.
- Zero down time for old release.
- Concurrent functional environments at both the old and new release levels.
- Verify and test newly migrated cell before bringing it online.
- Quick fall back strategy to old release.
- Reduce cost in planning and carrying out a migration.

Clone Migrations – other notes

- Does not support a mixed cell environment.
 - If Dmgr is cloned then all nodes in the cell must also be cloned!
 - A node may not be cloned unless its DMgr is cloned!
- All endpoint ports in new cell are completely independent of old cell.
- Supports the remote migration option. (-machineChange true)
- Currently not supported on iSeries or zOS.
- Supports all profile types except:
Job Manager and Managed App Servers.
- For a federated node migration, the host and SOAP
or RMI port of the new deployment manager must be provided.

Runtime Migration Strategies

- Each of the five strategies have pros and cons
- The new v9 clone option provides the greatest flexibility.
- Pick the strategy that is right for you.
- Get all the technical details:
 - Charts in reference section
 - Knowledge Center:
<http://www14.software.ibm.com/webapp/wsbroker/redirect?version=cord&product=was-nd-mp&topic=welc6topmigrating>
 - Knowledge Collection:
<http://www-01.ibm.com/support/docview.wss?rs=180&uid=swg27008724#>
 - Learn at your pace: Get the Recorded Webcast
http://public.dhe.ibm.com/software/websphere/techexchange/2012_08_17_0013_WebSphere_Application_Server_M.mov

Application Deployment

- Applications are deployed “as-is” to the new release
- WASPostUpgrade -includeApps
 - true – generate the install scripts and run them
 - false – do not bring any applications forward
 - script – generate the install scripts to be run manually later
 - gives greatest flexibility for moving application forward.
 - use the [WASMigrationAppInstaller](#) tool to deploy apps to the migrated servers.

WASMigrationAppInstaller Tool

- WASMigrationAppInstaller tool is new for V9 and replaces the *install_all_apps.jy* script formerly created by WASPostUpgrade tool.
- Now you can pick and choose which applications to bring forward.
 - The WASPostUpgrade “-includeApps script” option generates an install script for each application but will not deploy them. (*<migr_backup_dir>/install_<appName>.ear.jy*)
 - Next use the WASMigrationAppInstaller tool to select which application you wish to deploy into the new target environment.
 - Various options: install just one, a set, or all applications in the directory.
 - Looks for *install_<appName>.ear.jy* files.
 - The tools is reentrant, allows for concurrent installs, provides retries at different JEE levels and handles ‘editioned’ applications.

Application Deployment Issues

- “I deployed it before on my v7 Deployment Manager (dmgr), now my v8.5 dmgr tells me that the v7 nodes won’t support that level of the application! The application did not change -- What happened?”
 - NEW for V9.0 ➔ automatic retry of application install at the old JEE level, if application fails to deploy at the JEE 7 level.
- “Finally, I was able to deploy the application, but now it is behaving differently. Why?”
- Answer, in both situations is usually annotations introduced at the new JEE level.
 - These annotations were not recognized by the old deployment tool nor by the old server runtime environment. They were basically ignored.
 - They may have been introduced by third-party jar files.
- For a more in depth explanation of these issues see the following white paper.
<http://www-01.ibm.com/support/docview.wss?uid=swg27008724&aid=13>

Other V9 Enhancements

- Better control of ports during migration:
 - Removed –replacePorts and –portBlock parameters
 - Replaced with –setPorts and –resolvePortConflicts
 - `-setPorts <useOld | generateNew | #####>`
 - `-resolvePortConflicts <incrementCurrent | #####>`
 - zMMT allows for port assignments
- Better Logging and Trace
 - Reduced size
 - Log and trace file for commands invoked by migration (`startServer`, `stopServer`, `syncNode`, ...)
 - `AboutThisMigratedProfile.txt`
- Intelligent Management feature
- Batch Processing feature
- Migration Properties file

Migration of WVE and CG Stack Products

- WebSphere Compute Grid and WebSphere Virtual Enterprise
 - Prior to v8.5.5, they were installed as stack products with separate migration tools.
 - In release v8.5.5, they were integrated as features of the WebSphere Application Server product.
 - Batch
 - Intelligent Management
 - Prior to v9.0, both the WVE and CG stack products required multiple steps to migrate.
 - First run the WAS migration process
 - Next run the stack product's migration process.
 - Now for v9.0, use only the WAS migration tools to migrate WCG and WVE!
 - CG and WVE stack product migration commands are obsolete when migrating to WAS v9.0. Use WASPreUpgrade and WASPostUpgrade to migrate from:
 - WAS v7.0 or v8.0 with the WVE and/or CG stack products installed to WAS v9.0 seamlessly.
 - WAS v8.5.5 with integrated Batch and IM features to WAS v9.0.

Migration Properties File

- Provides many advantages to the migration process including:
 - A quick reference to the WASPreUpgrade and WASPostUpgrade migration options.
 - A guide to help you define your migration strategy.
 - Reduce the number of command line parameters you have to remember and type.
 - Make your migration process repeatable.
 - Provides for better customer support and communication.
 - Provides control for debugging certain aspects of the migration process.
 - Provides control for debugging other tools called during the migration process.
 - Provides a quick way to inject system properties into the migration process.
- A template migration.properties is located in the \${WAS_INSTALL_ROOT}/properties directory.
 - Copy to new location and tailor to your migration needs.
- Use with the WASPreUpgrade and WASPostUpgrade commands:
 - Example: WASPreUpgrade C:\migrBU C:\v8install –oldProfile dmgr **–properties <prof_file>**

Problem Determination

- Migration can be very memory and file intensive depending on the topology.
Some general system problems are:
 - OOM
 - File Handles
 - Disk Space
- Other problems may include changes to the old WebSphere install and/or profile data.
 - Check that the userid has proper permissions.
 - Connectivity – network, certificates exchanged, ...
 - Check for unexpected symlinks under the WebSphere installation and profile directories.
 - Hand edited xml and property files with invalid formats can cause problems.
 - Check for changes to the profile's setupCmdLine script.
 - Check the profileRegistry.xml file for valid profiles.
 - Verify each profile has a valid entry in the properties/fsdb directory.

Problem Determination (cont.)

- Other problems can be determined by looking at the trace log.
 - Generally these are config data problems that are not understood or handled properly.
 - Gather the appropriate information and engage L3 if needed.
 - Security and signer prompts can also cause delays and issues.
- Sometimes migration will complete successfully but the server or applications will not start.
 - Gather the appropriate trace data for these situations.
 - If it can be isolated to certain config data, then also gather the migration data.
 - Generally support will need the migration backup directory and the migrated profile.

Problem Determination (cont.)

- More Helpful Hints

- Become familiar with the tools and what they do. Run it, throw it away, start again.
- Migrate only one profile at a time when using the WASPreUpgrade and WASPostUpgrade commands.
- Migrate to a clean migration backup directory.
- Migrate into a clean target profile. Do not use the same profile already migrated into before.
- Separate the application installs from the WASPostUpgrade migration step by using the –includeApps script parameter.
- In a complex topology always perform backups of all cell profiles prior to migrating it - save as a recovery point.
- After migrating a profile, ensure that the topology is fully functional before moving to the next profile.
- Use the migration wizards to help guide you through your migrations.
- Use the –setPorts ##### to assign all new ports to the migrated profile.
- Use the –resolvePortConflicts ##### option to identify new or conflicting ports.
- Use the -requestTimeout option to increase the connection timeout to the Deployment Manager.
- Use the -javaoption option to specify the java maximum and minimum heap sizes.
- The exchangeSignerPrompt is automatically performed during WASPostUpgrade if needed.
 - See the `ssl.enableSignerExchangePrompt` property in the `$PROFILE_HOME/properties/ssl.client.props` file.

Summary

Migration overview

Migration planning roadmap

Application Migration options

Configuration Migration options

Summary

References



Summary

- Migration needs to be a pragmatic, well designed and repeatable process
- WebSphere Application Server migration is becoming easier!
 - More tools
 - More techniques
 - Minimizing Application changes

Enablement: IBM Migration Knowledge collection

- This information and more is available online!
- General planning with detailed notes and WebSphere AppServer version specific information
- Updated with timely information
- Google: “websphere application server migration”

Knowledge Collection: Why Migrate?

Be the first to ask a question Chat with our new IBM Support Agent Tool (Beta)

Product documentation

Abstract

Wondering why you should migrate your apps to a newer version of WebSphere? Here are resources to help you understand the associated benefits and the value of migrating.

Content

Why Migrate?	Migration Planning and Resources	Migration Offers and Support	9.0.x	8.5.x	8.0.x, 7.0.x and 6.1x	z/OS	Additional Resources
--------------	----------------------------------	------------------------------	-------	-------	-----------------------	------	----------------------

Why upgrade to WebSphere Application Server Version 9.0
Learn more about the key reasons for upgrading to WAS version 9.0.

 Migration - Why Upgrade to WAS v9.pdf

[WebSphere Application Server V9 Update: On Premise and in the cloud](#)
For a more in-depth understanding about the technical capabilities of WebSphere Application Server V9 -- Watch this video.

<http://www.ibm.com/support/docview.wss?uid=swg27008728>

Questions ?



References



Reference Information

- Migration Information
- Planning
- Migrating from competitors application servers
- Moving to the cloud
- Training
- Configuration
- Development
- Operations
- 5 Runtime migration strategies
- Differences between versions
- Application planning example

Migration information

- IBM Migration Assist from WebSphere Level 2 Support Team
 - http://www-01.ibm.com/support/docview.wss?uid=swg21570083&acss=was_sp#5
- IBM WebSphere Migration Services
 - <http://www.ibm.com/developerworks/websphere/services/findbykeyword.html?q1=gwap005>
- IBM Software Accelerated Value program
 - <http://www-01.ibm.com/software/support/acceleratedvalue/index.html>
- WAS Migration Toolkit overview:
 - <http://www.ibm.com/developerworks/websphere/downloads/migtoolkit/>
- WAS 8.5 WebSphere Migration Guide
 - <http://www.redbooks.ibm.com/redpieces/abstracts/sg248048.html>
- Talk with your IBM representative !

References - Planning

- Supported hardware and software information
 - http://www.ibm.com/software/webservers/appserv/was/network/requirements/?S_CMP=rnav
 - <http://publib.boulder.ibm.com/infocenter/prodguid/v1r0/clarity/index.html>
- IBM Support Policies
 - <http://www-1.ibm.com/support/docview.wss?uid=swg21256700>
 - <http://www-01.ibm.com/software/support/lifecycle/lc-policy.html>
 - <http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?subtype=ca&infotype=an&appname=iSource&supplier=877&letternum=ENUSZP13-0568>
- Installation Manager and Managing Repositories
 - http://www.ibm.com/developerworks/websphere/library/techarticles/1201_seelemann/1201_seelemann.html
 - <http://www.ibm.com/support/docview.wss?uid=swg27023967&aid=1>
 - http://www.ibm.com/developerworks/websphere/techjournal/1301_seelemann/1301_seelemann.html?ca=drs-
- The Ideal WebSphere Development Environment
 - http://www.ibm.com/developerworks/websphere/techjournal/0312_beaton/beaton.html
- Web Server plug-in technotes and Merge tool
 - <http://www-1.ibm.com/support/docview.wss?uid=swg21160581>
 - <http://www-01.ibm.com/support/docview.wss?uid=swg21139573>
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=phil&product=was-base-dist&topic=twsv_configsimplelb

References - Planning

- WebSphere supported Specification levels and pointers to JEE specifications
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=phil&product=was-nd-mp&topic=rovr_specs
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=cord&product=was-nd-mp&topic=rovr_specs_javaee7
- WebSphere App Server API Deprecations, removals and stabilizations
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=cord&product=was-nd-mp&topic=rmi_deprecationlist
- Changes in Default behavior
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=cord&product=was-nd-mp&topic=rmi_defaultvalue
- WebSphere Application Server V8.5 Concepts, Planning, and Design Guide
 - <http://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/sg248022.html?Open>
- Migrating WebSphere Compute Grid or Feature Pack for Modern Batch
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=phil&product=was-nd-zos&topic=container_computegrid_migrating_cg
- Webcast replay: WebSphere Application Server V61 for z/OS Exit Plan
 - <http://www.ibm.com/support/docview.wss?uid=swg27035994&myns=swgws&mynp=OCSS7K4U&mync=E>
- IBM Media Center – WAS and Liberty Channel
 - <https://mediacenter.ibm.com/channel/t/33964822>

References – Planning for Liberty

- WAS classic or WAS Liberty: how to choose?
 - <https://developer.ibm.com/wasdev/docs/was-classic-or-was-liberty-how-to-choose/>
- The WebSphere Contrarian: If liberty means freedom of choice, am I free to choose the Liberty profile?
 - http://www.ibm.com/developerworks/websphere/techjournal/1506_webcon/1506_webcon-trs.html
- Configuring and Deploying Open Source with IBM WebSphere Application Server Liberty Profile
 - <http://www.redbooks.ibm.com/abstracts/sg248194.html?Open>
- IBM WebSphere Application Server V8.5 Administration and Configuration Guide for Liberty Profile
 - <http://www.redbooks.ibm.com/abstracts/sg248170.html?Open>
- WASdev YouTube Channel
 - <https://www.youtube.com/c/wasdevnet>
- WASdev Documentation
 - <https://developer.ibm.com/wasdev/docs/>

Migrating from a Competitive Application Server?

- Certain migrations could include free services available
 - Migration Assessment Report
 - Workshops
 - Proof of Concept
- Contact your IBM rep

IBM WebSphere Application Server

Why Pay More And Get Less?

The business case for the value, robustness, scalability, and enterprise grade attributes of WebSphere is compelling.

Consider The Facts:

With IBM WebSphere, you can improve your overall total cost of ownership taking into account licenses and support, performance, availability and usability, administrative and development tools.

- With IBM WebSphere, you only pay for software on the server cores you use.
- You can realize savings of 57% on first year licensing and support, compared to Oracle WebLogic.
- Since 2010 over 400 Oracle WebLogic clients have chosen IBM WebSphere.
- Hands-on analysis of capabilities reveal that over 5 years, JBoss is 49% more expensive than WebSphere.
- WebSphere beats Tomcat hands down on features that are important to any sized business.

Get Started Now:

- I would like an IBM migration expert to give me, at no charge, a high level estimate of to what it will take to migrate (requires 2-3 hours.)
- I would like an IBM migration expert to come on-site for a free deep evaluation of my environment and applications and provide a full migration assessment report at no charge.
- I am interested in a Proof of Concept (PoC) where an IBM migration expert comes on-site to migrate 1 or 2 of my applications to WAS on our test environment using their proven methodology and automation tools - all at no charge.
- I would like several of my company's technical personnel or management to attend a free 1, 2, or 3 day Migration Workshop to get an introduction WAS v8.5 and do hands-on labs to learn about the business value and migration process.

If you said YES to any of these options, our migration experts would like to talk to you. They can help you save money now!

Contact your local IBM representative, or send an e-mail to wascm@us.ibm.com.



References – Planning your move from other servers

- Comparing IBM WebSphere and Oracle WebLogic
 - https://www-01.ibm.com/marketing/iwm/iwm/web/signup.do?source=sw-app&S_PKG=ov1115&S_TACT=109KA5IW&dynform=4522&lang=en_US
- IBM WebSphere Application Server V8.5 vs. JBoss Enterprise Application Platform V6
 - https://www-01.ibm.com/marketing/iwm/iwm/web/signup.do?source=sw-app&S_PKG=ov9787&S_TACT=109KA5IW&dynform=4526&lang=en_US
- WebSphere Application Server Migration Discovery Tool
 - <http://ibm.biz/MigrationDiscovery>

References – Planning for the cloud with V9

- Bluemix quick-start demos & guides
 - <http://www.ibm.com/developerworks/learn/cloud/bluemix/quick-start/index.html>
- WebSphere Application Server V9 Update: On Premise and In the Cloud
 - https://mediacenter.ibm.com/media/WebSphere+Application+Server+V9+technical+update/0_ttxciunh
- Why choose when you can have it all with WebSphere V9?
 - <https://www.ibm.com/blogs/systems/choose-can-websphere-v9/>
- Why Liberty is the best Java runtime for the cloud
 - <https://developer.ibm.com/wasdev/docs/liberty-profile-best-java-runtime-cloud/>

References - Training

- WebSphere Training and Technical Enablement
 - <http://www-01.ibm.com/software/websphere/education/>
- IBM Education Assistant
 - <http://www.ibm.com/software/info/education/assistant/>
 - http://www-01.ibm.com/support/knowledgecenter/websphere_iea/com.ibm.iea.was_v8/plugin_coverage.dita
- What's new in WebSphere Application Server V9?
 - <http://www.ibm.com/developerworks/library/mw-1606-alcott-bluemix-trs/index.html>
- What's new in WebSphere Application Server V8.5
 - http://www.ibm.com/developerworks/websphere/techjournal/1206_alcott/1206_alcott.html
- What's new in WebSphere Application Server v8
 - http://www.ibm.com/developerworks/websphere/techjournal/1106_alcott/1106_alcott.html
- What's new in WebSphere Application Server v7
 - http://www.ibm.com/developerworks/websphere/library/techarticles/0809_alcott/0809_alcott.html
- WebSphere Application Server V8.5.5 Technical Overview
 - <http://www.redbooks.ibm.com/redpapers/pdfs/redp4855.pdf>
- WebSphere Application Server: New Features in V8.5.5
 - <http://www.redbooks.ibm.com/redpapers/abstracts/redp4870.html?Open>

References - Training

- Properties based configuration
 - http://www.ibm.com/developerworks/websphere/techjournal/0904_chang/0904_chang.html
 - http://pic.dhe.ibm.com/infocenter/wasinfo/v8r5/index.jsp?topic=/com.ibm.websphere.base.doc/ae/rxml_7propbasedconfig.html
 - <http://www.ibm.com/support/docview.wss?uid=swg27039420>
- System administration in WebSphere Application Server V8.5, Part 1: An overview of new administrative features and enhancements
 - http://www.ibm.com/developerworks/websphere/techjournal/1206_cheng/1206_cheng.html
- System administration in WebSphere Application Server V8.5, Part 2: Using the Centralized Installation Manager
 - http://www.ibm.com/developerworks/websphere/techjournal/1206_wong/1206_wong.html
- System administration in WebSphere Application Server V8.5, Part 3: High Performance Extensible Logging (HPEL)
 - http://www.ibm.com/developerworks/websphere/techjournal/1208_bourne/1208_bourne.html
- System administration in WebSphere Application Server V8.5, Part 4: Using pluggable SDK 7 to enable WebSphere Application Server for Java7
 - http://www.ibm.com/developerworks/websphere/techjournal/1209_hall/1209_hall.html

References - Configuration Migration

- IBM Techdocs Whitepapers on WAS Migration case studies, including other IBM products
 - <http://www-03.ibm.com/support/techdocs/atスマート.nsf/WebIndex/WP101455>
- Migrating to Version 7.0 - zOS
 - <http://www-03.ibm.com/support/techdocs/atスマート.nsf/WebIndex/WP101329>
- WAS z/OS Migration Performance Study
 - <http://www.ibm.com/support/techdocs/atスマート.nsf/WebIndex/WP101589>
- Case study: Tuning WebSphere Application Server V7 and V8 for performance
 - http://www.ibm.com/developerworks/websphere/techjournal/0909_blythe/0909_blythe.html
- WebSphere Application Server V7 Migration Guide
 - <http://www.redbooks.ibm.com/redpieces/abstracts/redp4635.html>
- WebSphere Application Server V8.5 Migration Guide
 - <http://www.redbooks.ibm.com/abstracts/sg248048.html>
- Changing host names and moving profiles
 - http://www.ibm.com/developerworks/websphere/techjournal/0905_webcon/0905_webcon.html
- Migrating cell configurations to new host machines
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=phil&product=was-nd-dist&topic=t mig_migrate_remote_commandline
- Migration – Application Installation problems
 - <http://www-01.ibm.com/support/docview.wss?uid=swg27008724&aid=13>

References - Development

- Rational Application Developer Performance Tips
 - <https://www.ibm.com/developerworks/community/files/basic/anonymous/api/library/a82c60c3-d3d9-4444-9f9f-63678cf12c17/document/b31c01f7-c08f-47c1-a492-1da2602520b4/media>
 - <https://www.ibm.com/developerworks/community/wikis/form/anonymous/api/wiki/2fad2df2-9c68-4aa3-abba-01e910211998/page/9615e26f-77b4-45d0-a8aa-bfeb64af1f20/attachment/884d71f7-8c24-4f43-af40-829b0f850b01/media/radtipsv754.pdf>
- WDT and WAS Application Server for Development
 - WASdev.net
 - <http://www.ibm.com/developerworks/downloads/ws/wasdevelopers/>
- JDK Compatibility
 - JDK 8 - <http://www.oracle.com/technetwork/java/javase/8-compatibility-guide-2156366.html>
 - JDK 7 - <http://www.oracle.com/technetwork/java/javase/compatibility-417013.html>
 - JDK 6 - <http://www.oracle.com/technetwork/java/javase/compatibility-137541.html>
- J2EE class loading
 - www.ibm.com/developerworks/websphere/library/techarticles/0112_deboer/deboer.html
- Migration from Apache SOAP to web services
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=cord&product=was-base-dist&topic=twbs_migratewbs
- JavaServer Pages specific Web container custom properties
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=cord&product=was-nd-mp&topic=rweb_jsp_custom_props
- JMS Listener to Message Driven Bean migration
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=cord&product=was-nd-mp&topic=tmj_adm32

References - Development

- JDK 5/6/7 Tuning
 - <http://www.ibm.com/support/docview.wss?uid=swg27013824>
- Using Spring and Hibernate with WebSphere Application Server
 - http://www.ibm.com/developerworks/websphere/techjournal/0609_alcott/0609_alcott.html
- WebSphere Application Server Migration Toolkit
 - <https://developer.ibm.com/wasdev/downloads/#filter/sortby=relevance;q=toolkit>
 - http://www.ibm.com/developerworks/websphere/downloads/migration_toolkit.html
 - <https://developer.ibm.com/wasdev/docs/migration/>
 - <http://www.ibm.com/support/docview.wss?uid=swg27020784>
- Using other web service engines in WAS
 - http://www.ibm.com/developerworks/websphere/library/techarticles/1001_thaker/1001_thaker.html
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=cord&product=was-nd-mp&topic=twbs_thirdparty
- JSF Migration
 - http://www14.software.ibm.com/webapp/wsbroker/redirect?version=cord&product=was-nd-mp&topic=cweb_jsfmigrate
- Best Practices for Integrating Open Source Software
 - <http://www-01.ibm.com/support/docview.wss?uid=swg21639407>

References – Liberty

- Moving to Liberty
 - http://www.ibm.com/developerworks/websphere/library/techarticles/1404_vines1/1404_vines1.html
 - http://www.ibm.com/developerworks/websphere/library/techarticles/1404_vines2/1404_vines2.html
 - http://www.ibm.com/developerworks/websphere/techjournal/1506_vines/1506_vines-trs.html
 - <https://developer.ibm.com/wasdev/docs/video-moving-applications-cloud-websphere-full-profile/>
 - https://developer.ibm.com/wasdev/downloads/#asset/tools-WebSphere_Configuration_Migration_Tool
 - <http://wasdev.net>

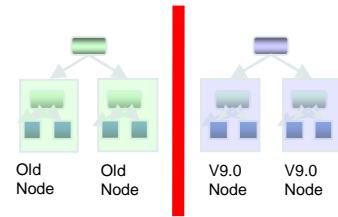
References - Operations

- UrbanCode Deploy
 - <https://developer.ibm.com/urbancode/products/urbancode-deploy/>
 - <https://developer.ibm.com/urbancode/plugin/websphere-application-server-configure/>
- Introducing the Visual Configuration Explorer
 - http://www.ibm.com/developerworks/websphere/techjournal/0710_supauth/0710_supauth.html
 - <http://www.ibm.com/developerworks/forums/forum.jspa?forumID=1139>
- IBM Support Assistant
 - <https://www-01.ibm.com/software/support/isa/>
- Best Practices for Configuring and Managing Large WebSphere Topologies
 - http://www.ibm.com/developerworks/websphere/library/techarticles/0710_largetopologies/0710_largetopologies.html
- wsadmin Primer
 - <http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101014>
- IBM SDK, Java Technology Edition
 - http://www.ibm.com/support/knowledgecenter/SSYKE2_8.0.0/welcome/welcome_javasdk_version.html
 - http://www.ibm.com/support/knowledgecenter/SSYKE2_7.1.0/welcome/welcome_javasdk_version.html
- JACL to Jython conversion assistant
 - <http://www-1.ibm.com/support/docview.wss?rs=180&uid=swg24012144>

Five Runtime Migration Strategies For Network Deployment

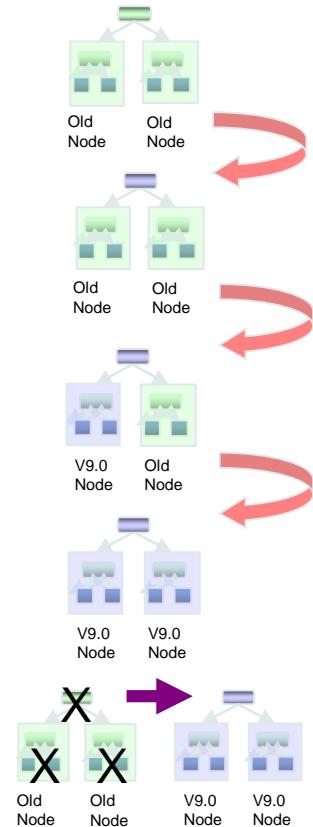
Side by Side

- Ignores the existing configuration
- Create a new cell and populate with administration scripts or manually
- Best results with a comprehensive set of scripts or tools for configuration automation
- Pros
 - No dependencies on tooling
 - Least risk assuming existing scripts are comprehensive
 - Can easily migrate applications singly
- Cons
 - Comprehensive set of scripts and ongoing maintenance of those scripts can be expensive
 - Any required changes to these scripts must be done before migrating
 - Tuning of the old configuration is not carried forward



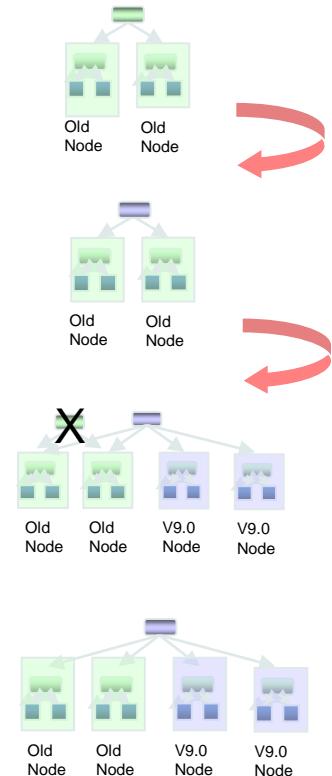
In Place - Copy and replace Cell (Standard)

- Use Runtime migration tools on DMgr
 - Recreates the **exact** existing configuration in the new cell
- Later migrate the existing nodes using the runtime migration tools
 - All applications on a managed node are migrated at the same time
- Pros
 - Does not require comprehensive set of scripts
 - All configuration is moved forward
- Cons
 - Dependency on using the runtime migration tools
 - Requires all applications on a node be ready to migrate at the same time
 - Limited value if you are refactoring your topology
 - Carries default values forward from the old cell



In Place - Copy and replace DMgr

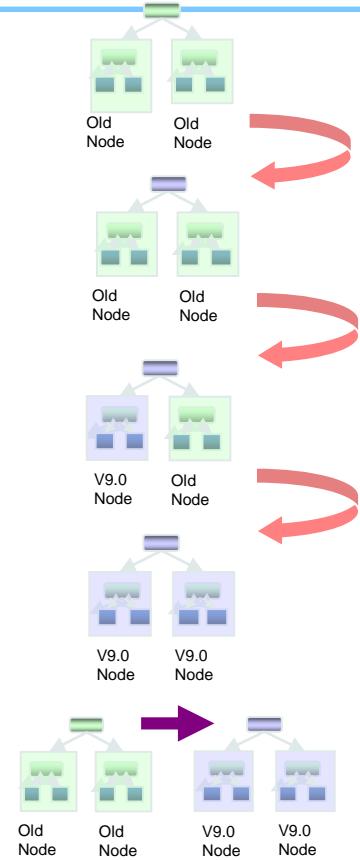
- Use Runtime migration tools on DMgr
 - Recreates the **exact** existing configuration in the new cell
- Add new nodes
 - Applications can be migrated singly when ready
 - Remove old nodes when no longer needed
- Pros
 - Does not require comprehensive set of scripts
 - All configuration is moved forward
 - Cell and cluster level configuration accessible by older nodes
- Cons
 - Dependency on using the runtime migration tools
 - Limited value if you are refactoring your topology
 - Carries default values forward from the old cell



In Place - Copy and coexist (manual clone)

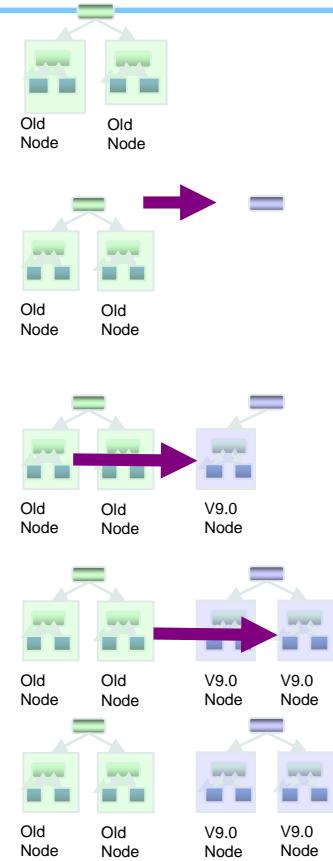
- Same steps as “Copy and replace Cell” except:
 - Use the option of the runtime Migration tools to not disable the old DMgr
 - When migrating the profiles be sure to not use the –setPorts useOld option.
 - Using this option would create port conflicts between the new and old cell.
 - Turn off the old DMgr (the federated nodes should continue to run)
 - Backup all old nodes before migrating them they will be restored later.
 - Start old DMgr, new DMgr and all nodes in the new cell
 - Restore the old nodes from the backups taken earlier.
 - Start up the old nodes.
- See Migration redpiece for example
<http://www.redbooks.ibm.com/redpieces/abstracts/redp4635.html?Open>

*Obsolete
See new clone option*



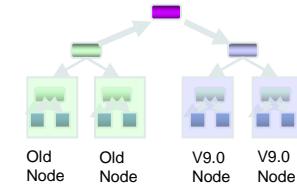
In Place - Copy and coexist (Clone)

- Same steps as “Copy and replace Cell” except:
 - Use the *NEW* –clone option of the runtime migration WASPostUpgrade tool to migrate the Dmgr.
 - No need to stop or disable the old Dmgr – leave it running.
 - Start new DMgr
 - Migrate all the nodes using the –clone option and provide the new Dmgr’s host name and RMI or SOAP port.
 - Migration will resolve all port conflicts.
 - Start each node in the new cell as it is migrated.



Side by Side - Fine Grained

- Uses a combination of tools
 - An intermediate profile
 - The runtime migration tools
 - Properties based configuration tool (PBC)
- Approach
 - Migrate the existing data to an intermediate profile
 - Extract portions of the configuration from that profile
 - Import them into the final DMgr profile using PBC
- See Migration redpiece for example
 - <http://www.redbooks.ibm.com/redpieces/abstracts/redp4635.html?Open>



Overview changes by version

Migration impacts (worst case scenario)

Potential Impact areas	v6.0	v6.1	v7.0	v8.0	v8.5.x	v9.0
Java Runtime (v8.5 has JRE6 and 7)	n/a	6	2	n/a	0/20/19 <small>note</small>	19
JEE - JSP	8	n/a	1	1	0	0
JEE - Servlet	5	n/a	0	2	0	9
JEE - Other	3	n/a	5	7	1	50
WAS Specific	1	6	0	4	0	3
3 rd party packages	2	0	1	0	0	3
Development total	19	12	9	13	0/20/19	64
Administrative script	4	3	2	0	0	1
WAS directory structure	1	1	0	0	0	1
Other administrative	5	2	6	7	0	1
Total administrative	10	6	8	7	0	3
Total potential impact areas	29	18	17	20	0/20/19	67

Note: V8.5 supports Java 6, 7 and 8. Java7 and Java 8 introduces a number of behavior changes. "0" represents Java6 and "20" is for Java7. Not all breaking changes will impact all applications

Migration impacts - Liberty

Potential Impact areas	Java SE	Traditional to Liberty	Liberty Core	Java EE 7
Java Runtime – Java SE 7	16			
Java Runtime – Java SE 8	14			
Third-party APIs		14		
WebSphere API differences		3		
WebSphere API unavailable		55		
JEE – behavior difference		15		
JEE / Java technology – unavailable	13		12	
JEE – CDI				11
JEE – EL				1
JEE – JAX-RS				11
JEE – JMS				2
JEE – JPA				25*
JEE – JSF				1
JEE - Servlet				9
Development total	102		12	60

* JPA 2.0 can be used with other Java EE 7 features.

http://www14.software.ibm.com/webapp/wsbroker/redirect?version=phil&product=was-nd-dist&topic=rwlp_prog_model_jee7behaviors

Changes in v9.0

- Administration changes
 - Default Jython version
 - New default coregroup wiring protocol
 - New java extensions directory - `$WAS_HOME/javaext`
 - Other miscellaneous changes
- Development changes
 - Development tool changes
 - Java SE 8 upgrade
 - Java EE 7 upgrade
 - CDI, JAX-RS, JPA implementation change
 - Servlet, EL, JMS behavior changes
 - API removals
 - API deprecations

Changes in v8.5.5

- WAS traditional
 - No change in product configuration!
 - No need to install in a new directory!
 - No need to migrate configuration!
- Liberty
 - Now Java EE 6 Web Profile Compliant
 - Updating v8.5.0 installed images that have Liberty
 - v8.5.0 image that has just Liberty
 - Must install the new standalone Liberty offering
 - Can then continue using the user data and server configurations currently used by this original install
 - v8.5.0 image that has combined WAS traditional and Liberty
 - User is advised that Liberty will be backed up.
 - To obtain v8.5.5 Liberty and future service, install the standalone offering.
 - Can then continue using the user data and server configurations currently used by this original install.
 - WAS traditional updates as normal.

Changes in v8.5.0

- Administration changes
 - Some new ports defined
 - A number of minor default setting changes
 - [Information provided in the v8.5 InfoCenter](#)
- Development changes
 - Development tool changes
 - Java7 upgrade – Java6 is the default
 - [Breaking changes: \(AWT, Internationalization, IO, JAXP, Language, Networking, Text and Utilities\)](#)
 - JPA (2)
 - [Custom settings are provided to provide compatibility](#)
- Liberty introduced
 - Simplified configuration
 - Programming model subset (webapp focused)

Changes in v8.0

- Administration changes
 - Installation changes
 - Centralized Install Manager
 - Install Factory alternative
 - WebServer Plug-in installation and configuration
 - Java Garbage collection and dump format changes
 - Security default changes
 - Other miscellaneous changes
- Development changes
 - Development tool changes
 - JEE 1.6
 - WebSphere API changes

Changes in v7.0

- Administration changes
 - SessionInitiationProtocol(SIP) Migration Considerations
 - zOS Migration tool
 - Administration script required changes
 - Port usage
 - Security Migration considerations
 - Mixed version considerations
- Development changes
 - Development tool change
 - JRE 6 impacts
 - JEE 5 impacts
 - WebSphere removed features
 - Support for WebServices included in WAS
 - Embedded WebServices implementation and conflicts with existing applications

Changes in v6.1

- Administration changes
 - Migration and Feature Packs
 - zOS Migration tool
 - Administration script required changes
 - Install response file format changes
 - Port usage
 - Profile directory structure
 - New administrative tool IDE
 - Migration tools and v6.1 Security model
- Development changes
 - Development tool change
 - JRE 5 impacts
 - WebSphere changes and removed features

Application planning example

Migration Project

App Owners - Develop a Wave Formula

- **Create Application Rating System**

- Least Complex →→→ to Most Complex
 - Least Critical →→→ to Most Critical

- **Separate Tracks**

- Validated VS. Non-Validated
 - Custom Built VS. Vendor Application

- **Factor in**

- Core Technology Requirements (JSF, EJBs, JSP, Servlets, JAX-WS, Spring, Hibernate, etc...)
 - Dependencies - Applications that Must Migrate together
 - Business Benefit (Application Enhancements Requested)
 - Group into Tier3, Tier2 and Tier1 Type Applications

Migration Project

Expectations

- Many Applications will be easy (little or no changes)
- Some Applications will be difficult (moderate to large amount of changes)
- Some will be in-between

Consider these factors

- Identify Candidates for “Decommissioning” - save yourself some work
- Enhance the Application Features
- Correct Flaws
- Port “As-Is” doing only what is required for migration

Migration Project – Rank Your Applications

“Hypothetical” Ranking – Developing a Formula

Complexity			Mission Critical			Total Score
Low (1)	Medium (3)	High (5)	Low (1)	Medium (5)	High (10)	
1			1			2
	3		1			4
1				5		6
		5	1			6
	3			5		8
		5		5		10
1					10	11
	3				10	13
		5			10	15

Migration Project

	Complexity			Mission Critical			Total Score	JSF Used?	EJB Used?	JSP Used?	Servlet Used?	JAX-WS Used?	Total Score	Overall Score
	Low	Med	High	Low	Med	High								
App A	1			1			2			1	1		2	6
App B		3		1			4	3					3	10
App C	1				5		6		3				3	12
App D		5		1			6			1		3	4	14
App E		3			5		8		3		1	3	7	22
App F		5			5		10	3	3			3	9	28
App G	1					10	11	3		1	1	3	8	27
App H		3				10	13	3	3		1	1	7	27
App I		5			10		15	3	3	1	1	3	11	37

Notices and Disclaimers

Copyright © 2016 by International Business Machines Corporation (IBM). No part of this document may be reproduced or transmitted in any form without written permission from IBM.

U.S. Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM.

Information in these presentations (including information relating to products that have not yet been announced by IBM) has been reviewed for accuracy as of the date of initial publication and could include unintentional technical or typographical errors. IBM shall have no responsibility to update this information. THIS DOCUMENT IS DISTRIBUTED "AS IS" WITHOUT ANY WARRANTY, EITHER EXPRESS OR IMPLIED. IN NO EVENT SHALL IBM BE LIABLE FOR ANY DAMAGE ARISING FROM THE USE OF THIS INFORMATION, INCLUDING BUT NOT LIMITED TO, LOSS OF DATA, BUSINESS INTERRUPTION, LOSS OF PROFIT OR LOSS OF OPPORTUNITY. IBM products and services are warranted according to the terms and conditions of the agreements under which they are provided.

Any statements regarding IBM's future direction, intent or product plans are subject to change or withdrawal without notice.

Performance data contained herein was generally obtained in a controlled, isolated environments. Customer examples are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual performance, cost, savings or other results in other operating environments may vary.

References in this document to IBM products, programs, or services does not imply that IBM intends to make such products, programs or services available in all countries in which IBM operates or does business.

Workshops, sessions and associated materials may have been prepared by independent session speakers, and do not necessarily reflect the views of IBM. All materials and discussions are provided for informational purposes only, and are neither intended to, nor shall constitute legal or other guidance or advice to any individual participant or their specific situation.

It is the customer's responsibility to insure its own compliance with legal requirements and to obtain advice of competent legal counsel as to the identification and interpretation of any relevant laws and regulatory requirements that may affect the customer's business and any actions the customer may need to take to comply with such laws. IBM does not provide legal advice or represent or warrant that its services or products will ensure that the customer is in compliance with any law.

Notices and Disclaimers Con't.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products in connection with this publication and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products. IBM does not warrant the quality of any third-party products, or the ability of any such third-party products to interoperate with IBM's products. IBM EXPRESSLY DISCLAIMS ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The provision of the information contained herein is not intended to, and does not, grant any right or license under any IBM patents, copyrights, trademarks or other intellectual property right.

IBM, the IBM logo, ibm.com, Aspera®, Bluemix, Blueworks Live, CICS, Clearcase, Cognos®, DOORS®, Emitteris®, Enterprise Document Management System™, FASP®, FileNet®, Global Business Services ®, Global Technology Services ®, IBM ExperienceOne™, IBM SmartCloud®, IBM Social Business®, Information on Demand, ILOG, Maximo®, MQIntegrator®, MQSeries®, Netcool®, OMEGAMON, OpenPower, PureAnalytics™, PureApplication®, pureCluster™, PureCoverage®, PureData®, PureExperience®, PureFlex®, pureQuery®, pureScale®, PureSystems®, QRadar®, Rational®, Rhapsody®, Smarter Commerce®, SoDA, SPSS, Sterling Commerce®, StoredIQ, Tealeaf®, Tivoli®, Trusteer®, Unica®, urban{code}®, Watson, WebSphere®, Worklight®, X-Force® and System z® Z/OS, are trademarks of International Business Machines Corporation, registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at: www.ibm.com/legal/copytrade.shtml.

Thank You

Your Feedback is Important!

