IBM WebSphere Application Server Migration Toolkit

Release 16.0.0.3
Agenda

- Overview of WebSphere Application Server Migration Toolkit (WAMT)
- Why analyze?
  - Binary Scanner
  - Liberty
- Version to version migration
- Competitive migration
- Configuration migration
- Installation
- Resources
Static code analysis

- Obviously finding defects early in the development cycle is a cost savings
- Static analysis tools can augment an existing development process
- What if a tool could identify changes needed to migrate applications?
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.

\[
\begin{array}{|c|c|c|c|c|c|c|}
\hline
\text{Version} & v6.0.2 & v6.1 & v7.0 & v8.0 & v8.5 & V9.0 \\
\hline
\text{Configuration} & \text{Port assignment} & \text{Security} & \text{None} & \text{None} & \text{Port assignments} & \text{Core group wire protocol} \\
\hline
\text{Application} & \text{JSP and Servlet} & \text{Java SE} & \text{Some} & \text{Minimal} & \text{None*} & \text{Java EE 7} \\
& & & & & & \text{Java SE 8} \\
\hline
\end{array}
\]

*None* means no required code changes with default of JRE6 when using traditional WAS runtime
## Externals Summary

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

**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.
### 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

<table>
<thead>
<tr>
<th>Migration discovery and planning</th>
<th>Binary analysis</th>
<th>Source analysis</th>
<th>Configuration migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>WebSphere Migration Strategy Tool – online tool that helps you</td>
<td>Command-line binary scanner that provides</td>
<td>WAMT - Eclipse plugins that scans application source to provide</td>
<td>WASPreUpgrade and WASPostUpgrade commands to move WebSphere traditional configuration between profiles.</td>
</tr>
<tr>
<td>• Learn the options for migration including Liberty, on-premises, Docker, and cloud options</td>
<td>• High level evaluation report showing the Java EE technologies your application uses</td>
<td>• High level evaluation report</td>
<td></td>
</tr>
<tr>
<td>WebSphere Migration Discovery Tool – on-line tool that helps you</td>
<td>• Inventory report that provides detail of the files and packages and Java EE artifacts in your application.</td>
<td>• A line-by-line analysis of code changes required</td>
<td></td>
</tr>
<tr>
<td>• Estimate the effort required to migrate your application to WebSphere Application Server from third-party application servers</td>
<td>• Detailed analysis for migration between versions of traditional WebSphere, Liberty, and Liberty Core</td>
<td>• Detailed analysis from third-party applications servers</td>
<td></td>
</tr>
<tr>
<td>• Select the IBM cloud platform suited to host your application and estimate migration to that platform.</td>
<td>• Cloud migration for instant runtimes differences</td>
<td>• Detailed analysis for migration between versions of traditional WebSphere, Liberty, and Liberty Core</td>
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<tr>
<td></td>
<td>• Cloud connectivity analysis</td>
<td>• Cloud migration for instant runtimes differences</td>
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<tr>
<td></td>
<td></td>
<td>• Cloud connectivity analysis</td>
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</tr>
<tr>
<td>WASMT – Eclipse plugin that helps migrate server configuration</td>
<td></td>
<td>WASMT</td>
<td>UrbanCode to move configuration.</td>
</tr>
</tbody>
</table>
Where do I get the migration tools?

http://wasdev.net – go to the Download tab and filter on “migration”.

IBM WebSphere Liberty Repository

Your results for migration (4 results)

- **Migration Toolkit for Application Binaries**
  - Released: 24 June 2016
  - Asset Type: Tool
  - The Migration Toolkit for Application Binaries provides a command line tool that quickly evaluates application binaries for rapid deployment on newer versions of WebSphere Application Server traditional or Liberty.

- **WebSphere Configuration Migration Tool**
  - Released: 30 June 2016
  - Asset Type: Tool
  - The WebSphere Configuration Migration Tool is an Eclipse plugin that helps migrate your existing Server configuration from WebLogic, JBoss or traditional WebSphere V7.0+ to Liberty and traditional WebSphere Application Server V8.5.5+.

- **WebSphere Application Server Migration Toolkit**
  - Released: 24 June 2016
  - Asset Type: Tool
  - The migration toolkit provides Eclipse-based tools for WebSphere migration scenarios including Cloud migration, WebSphere version to version migration including WAS Liberty, and migration from third-party application servers.
Migration toolkit simplified install

- **Eclipse source migration tools - one download**
  - Combines Competitive, version to version, Liberty, and cloud tools

- **Source and configuration migration tools – one online update site**
  - Or install it all from Eclipse Marketplace
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.
Step 1: Strategy planning and sizing tools

Migration discovery and planning

Binary analysis

Source Migration

Config Migration

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 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?

http://whichwas.mybluemix.net
Summary and Estimate Details

Discovery "Rough Order of Magnitude" Estimates

Estimated values: 88 person days (rounded to nearest day)
Estimated range: (44 - 104 person days) (rounded to nearest day)
Degree of accuracy: From -25% to +75%

<table>
<thead>
<tr>
<th>Migration Activity</th>
<th>Total effort in person days (rounded up to the next full day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install Routines</td>
<td>2</td>
</tr>
<tr>
<td>Configure Routines</td>
<td>4</td>
</tr>
<tr>
<td>Create Java EE Resources in WKS</td>
<td>2</td>
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<tr>
<td>Migrate and Smoke Test Applications</td>
<td>17</td>
</tr>
<tr>
<td>Functional Test Applications</td>
<td>11</td>
</tr>
<tr>
<td>Non-Functional Test Applications</td>
<td>11</td>
</tr>
<tr>
<td>Remediation During Testing</td>
<td>22</td>
</tr>
<tr>
<td>Documentation During Migration</td>
<td>5</td>
</tr>
<tr>
<td>Production Rollout</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>88</strong></td>
</tr>
</tbody>
</table>

Person Days - EstimatedValues(Range)

Person Days - Estimated Activities

- Install
- Configure
- Create
- Migrate
- Functional Test
- Non-Functional Test
- Remediation
- Documentation
- Production Rollout

Revision Date 09/2016
Resources, process, and summary

Migration Methodology Overview

Scope

Runtime environment installation and configuration
- Installation and configuration of IBM z/OS, z/VM, and z/Linux for IBM z/OS
- Installation of 7 applications and their associated resources to development stages

Application migration and testing
- Includes migration of 7 applications (z/OS, z/Linux, and z/VM)
- Includes functional and non-functional testing

Production Rollout Assistance
- Includes production planning and rollout

Assumptions

Estimates are based on three factors:
- Estimates for migration and integration
- IBM Z/OS migration process
- IBM Z/OS application migration process

The following assumptions are made:
- Development and application migration related tasks will have enough resources to run in parallel
- Testing related tasks will progress diligently with the environment and application migration related tasks
- Assumptions are based on the number of locations and resources, etc.

Next Steps

Expert Migration Assistance

Self-Help Migration Resources (English only)

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Resources, process, and summary

Migration Methodology Overview

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Runtime environment installation and configuration
- Installation and configuration of 7 z/OS, z/VM, and z/Linux
- Deployment of 7 applications and their associated resources to development stages

Application migration and testing
- Includes migration of 7 applications (z/OS, z/Linux, and z/VM)
- Includes functional and non-functional testing

Production Rollout Assistance
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Estimates are based on three factors:
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Next Steps

Expert Migration Assistance

Self-Help Migration Resources (English only)

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Step 2: Application assessment using the Migration Toolkit for Application Binaries

Migration Toolkit for Application Binaries


- Migration discovery
- 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.

Source server

- Liberty
- WAS traditional V6.1+
  - Java EE 1.4, 5 or 6
  - Java SE 5, 6 or 7

Target server

- Liberty
- WAS traditional
  - Java EE 6 or 7
  - Java SE 7 or 8
  - On premises, instant runtime, WAS on Cloud, Docker
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?
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
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
```
Learn about the issues

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

Scans the included JAR files, but you can control the report content with the --includePackages and --excludePackages options.
Step 3: Make application changes

- **WebSphere Application Server Migration Toolkit**

**Migration discovery**

**Binary analysis**

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

**Source Migration**

**Config Migration**
Analyze application source code in Eclipse

Source server

- Liberty
- WAS traditional 6.1+
- JBoss
- WebLogic
- Tomcat
- Oracle

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

Target server

- Liberty
- WAS traditional

- 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
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
Analyze configuration

1. WAS traditional
2. WAS traditional 6.1+
   - JBoss
   - WebLogic
3. WASPreUpgrade WASPostUpgrade
4. WAS traditional (profile)
   - Liberty (server.xml)
5. Liberty (server.xml)
6. WebSphere Application Migration Toolkit
7. WebLogic (scripts)
8. Tomcat
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 jython -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
When moving to WebSphere Application Server on Cloud, use your existing tools of choice

- Existing scripts
- backupConfig/restoreConfig
- WASPreUpgrade/WASPPostUpgrade
IBM UrbanCode Deploy for Continuous Delivery of WAS applications to Hybrid Cloud … including Bluemix

- Design processes to assist you in installing WebSphere
- Easily apply full or partial WebSphere configurations to new or existing instances
- Stand up full WebSphere instances, with configuration, and applications

- Configurations stored as code so that configurations can be compared
- Capture configuration of WebSphere instances and version them for later use
- Easily migrate from older to newer versions of WAS in a fraction of the time with UCD automation

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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

- **8x Liberty Core**
  - Web, mobile, OSGi apps (Web profile specification)
  - Subset of Liberty

- **4x WAS**
  - Web, Java EE apps and extensions
  - Secure, high performance transaction engine

- **1x WAS ND**
  - + High availability
  - + Intelligent management
  - + High scalability
  - and more...

WAS Family Edition
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 features has a minimum level of Java
Installation and support

- Installs into Luna, Mars, Neon, or Rational Application Developer V9+
- Runs on Eclipse supported OS’s – Windows®, Linux® and Mac®
- Installs from Eclipse Marketplace, repository URL, downloaded zip from the WASdev repository
- Compatible with WebSphere Application Server Developer Tools (WDT) for Eclipse
- Support is included for customers with current Passport Advantage support for WebSphere Application Server
- Free public developerWorks forum. Report comments and questions.
- Globalization support for these languages:
  - German
  - Spanish
  - French
  - Japanese
  - Brazilian Portuguese
  - Korean
  - Simplified and traditional Chinese
Summary

- Fast results with the binary scanner
- Source code integration and quick fixes with the Eclipse tool
- Migrate WebSphere applications from older releases to WebSphere Application Server v8.0 through v9.0
- Migrate From Oracle (WebLogic & Oracle AS), JBoss or Apache Tomcat to WebSphere
- Prepare to move to Liberty
- Evaluate cloud platforms
- Ease the migration process and speed time to value with this free toolkit

*Now easier then ever before to migrate your applications to traditional WebSphere, Liberty, and the cloud*
Migration Case Studies

- WAS version migration for developers
- Migrate from other Application Servers
  - Apache Tomcat
  - JBoss
  - Oracle AS
  - WebLogic
- More Migration strategy and planning
- Detailed Questionnaires in Appendix A

http://www.redbooks.ibm.com/abstracts/sg248048.html
Resources

- Migration – Main Page on WASDev

- WebSphere Application Migration Toolkit – Main Page on developerWorks

- WASdev repository for toolkit downloads

- The product documentation (in PDF format)

- WebSphere Application Migration Toolkit Forum

- Migrating from Apache Tomcat developerWorks article

- WebSphere Application Migration Toolkit Demo Video

- Webcast replay: Simplifying Migrations with the WebSphere Application Server Migration Toolkit (focus on Version to Version Migration)
Resources...

- Learn about upcoming WebSphere Support Technical Exchange webcasts, and access previously recorded presentations at:

- Discover the latest trends in WebSphere Technology and implementation, participate in technically-focused briefings, webcasts and podcasts at:

- Join the Global WebSphere Community:
  - [http://www.websphereusergroup.org](http://www.websphereusergroup.org)

- View a webcast replay with step-by-step instructions for using the Service Request (SR) tool for submitting problems electronically:
  - [http://www.ibm.com/software/websphere/support/d2w.html](http://www.ibm.com/software/websphere/support/d2w.html)

- Sign up to receive weekly technical My Notifications emails
Resources...

- WebSphere Application Server family

- Move from monolithic to microservices with a robust application platform

- WebSphere Developer Technical Journal

- Using Spring and Hibernate with WebSphere Application Server
References – Liberty profile

- Moving to Liberty profile
  - [http://wasdev.net/](http://wasdev.net/)
### How Can Migration Tools Help on Your Cloud Migration?

Use these tools in combination to help move your applications from third-party application servers and WAS off-cloud to WAS on Cloud.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Liberty on Cloud</th>
<th>Traditional WebSphere on Cloud</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>Configuration Migration</td>
<td>Application Migration</td>
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<tr>
<td>JBoss</td>
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<tr>
<td></td>
<td></td>
<td>Java 2 EE 1.3+ → Liberty 8.5.5</td>
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<td>[3]</td>
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<tr>
<td>Tomcat</td>
<td>6.x+ → Liberty 8.5.5</td>
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<td>Java 2 EE 1.3+ → Liberty 8.5.5</td>
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<td></td>
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<td>Java 2 EE 1.3+ → Liberty 8.5.5</td>
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## WCMT capability

<table>
<thead>
<tr>
<th>Java EE resources</th>
<th>JBoss to Liberty</th>
<th>WebLogic to Liberty</th>
<th>WebSphere V7+ to Liberty</th>
<th>JBoss to traditional WebSphere</th>
<th>WebLogic to traditional WebSphere</th>
<th>WebSphere traditional V7+ to V8.5</th>
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<tbody>
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<td>JVM Properties</td>
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<td>JMS provider</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Foreign JMS provider</td>
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<td>N/A</td>
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<tr>
<td>JMS destination</td>
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<tr>
<td>JMS topic</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>JMS queue</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Activation specification</td>
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<td>Yes</td>
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<td>Yes</td>
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<td>Yes</td>
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<tr>
<td>Queue activation specification</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Topic activation specification</td>
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<td>Yes</td>
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<tr>
<td>JMS connection factory</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>MQ topic</td>
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<td>MQ queue</td>
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<td>MQ Connection Factory</td>
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<td>Foreign JMS Connection Factory</td>
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<tr>
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<td>Yes</td>
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<tr>
<td>JMS queue connection factory</td>
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<tr>
<td>Mail session</td>
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<td>Mail provider</td>
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<tr>
<td>JCA authentication alias</td>
<td>Yes</td>
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<tr>
<td>Service Integration Bus</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Configures global security and an LDAP user registry</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>WebSphere Variables</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
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</tbody>
</table>
The cloud migration tool scans for connectivity considerations when moving to a cloud platform.

<table>
<thead>
<tr>
<th>For applications that use ...</th>
<th>Consider ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Databases</td>
<td>The connection you need to access the database on-premises or if you want to move any of the data to the cloud.</td>
</tr>
<tr>
<td>Enterprise Information Systems (EIS)</td>
<td>The implications accessing your EIS from the cloud or moving to a different system.</td>
</tr>
<tr>
<td>Java EE Security</td>
<td>The implications for accessing your user registry, Trust Association Interceptors (TAI), and JAAS login modules.</td>
</tr>
<tr>
<td>Third-party Security</td>
<td>Any issues with accessing an on-premises security server.</td>
</tr>
<tr>
<td>Java Message Service (JMS) and Message-drive beans</td>
<td>Configuring Secure Gateway to access the messaging provider.</td>
</tr>
</tbody>
</table>
## Connectivity considerations (cont.)

<table>
<thead>
<tr>
<th>For applications that use …</th>
<th>Consider …</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mail servers</td>
<td>Configuring access the mail server.</td>
</tr>
<tr>
<td>Remote EJB beans</td>
<td>The implications of moving EJB beans to the cloud that provide remote interfaces.</td>
</tr>
<tr>
<td>Remote EJB lookups</td>
<td>The implications of moving EJB beans to the cloud that need to be accessed.</td>
</tr>
<tr>
<td>Remote web services</td>
<td>Accessing or moving any remote web services in the cloud that are not public on the internet.</td>
</tr>
<tr>
<td>Vendor specific messaging</td>
<td>Application updates needed to vendor specific messaging APIs to use the cloud provider URL.</td>
</tr>
</tbody>
</table>
## Get help moving to Liberty for Java on Bluemix Instant Runtimes

<table>
<thead>
<tr>
<th>Instance Runtimes Rule</th>
<th>Flags code where …</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimized Java Runtime Environment</td>
<td>Your application uses Java APIs not in the optimized JRE.</td>
</tr>
<tr>
<td>Avoid creating new process instances</td>
<td>Your application starts processes. This might not be portable to cloud platforms, and it might cause memory issues.</td>
</tr>
<tr>
<td>Avoid writing to the local file system</td>
<td>Your application writes to the file system. Instant runtimes have an ephemeral local file system where data is lost.</td>
</tr>
<tr>
<td>Capture log information</td>
<td>Your application writes to logs. Log files written to the local file system on cloud platforms are not persisted.</td>
</tr>
<tr>
<td>Client certificate authentication is not available</td>
<td>Your application depends on receiving information about a secure request.</td>
</tr>
<tr>
<td>Do not use host names and IP addresses</td>
<td>Your application calls services or peers using host names or IP addresses for services or peers that might be relocated or regenerated.</td>
</tr>
</tbody>
</table>
## Get help moving to Liberty for Java on Bluemix

<table>
<thead>
<tr>
<th>Instance Runtimes Rule</th>
<th>Flags code where ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not use older or non-standard protocols</td>
<td>Your application uses protocols related to EJB 2.0 (IIOP), CICS Transaction Gateway, or IMS Connect because they are not supported in a cloud environment.</td>
</tr>
<tr>
<td>HTTP session persistence</td>
<td>Your application might require HTTP session persistence. If so, it must be configured to store the session data in a database or other data service.</td>
</tr>
<tr>
<td>Listening for inbound connections</td>
<td>Your application is listening to inbound ports. Cloud platforms assign one port to the application for receiving inbound connections. The Liberty server listens on this port. The application cannot receive inbound connections on other ports unless they originate from the same instance of the application.</td>
</tr>
<tr>
<td>Stopping the Liberty server</td>
<td>Your application programmatically stops the server, such as with a <code>System.exit()</code> call. The server will be automatically restarted by the cloud platform.</td>
</tr>
<tr>
<td>Two-phase commit transactions</td>
<td>Your application uses two-phase commit (XA) transactions. They are not enabled on Liberty in cloud platforms.</td>
</tr>
</tbody>
</table>
Get help moving to Containers on Bluemix

When moving to a Docker container

<table>
<thead>
<tr>
<th>IBM Container Rule (Docker)</th>
<th>Flags code where …</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing data inside and between Docker containers</td>
<td>Your application writes to the file system.</td>
</tr>
<tr>
<td></td>
<td>When your Docker image is restarted, data written to the Union File System is lost. Use Docker data volumes or data volume containers for your data.</td>
</tr>
</tbody>
</table>
Migrating from a Competitive Application Server?

Certain migrations could include free services available
- Migration Assessment Report
- Workshops
- Proof of Concept

Contact your IBM rep