WebSphere Application Server
What's New?

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IBM

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# WebSphere Application Server on z/OS

<table>
<thead>
<tr>
<th>Session</th>
<th>Day</th>
<th>Time</th>
<th>Room</th>
<th>Title</th>
<th>Speaker</th>
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<tr>
<td>11377</td>
<td>Monday</td>
<td>11:00</td>
<td>Grand Ballroom Salon B</td>
<td>What Can I Do With the SMF 120s?</td>
<td>David Follis</td>
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<td>11371</td>
<td>Monday</td>
<td>3:00</td>
<td>Orange County Salon 2/3</td>
<td>Administrator Hands On Lab</td>
<td>David Follis / Michael Stephen / Ken Irwin</td>
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<td>11378</td>
<td>Tuesday</td>
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<td>Grand Ballroom Salon B</td>
<td>Spelunking the Admin Console</td>
<td>John Hutchinson</td>
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<td>Being the Back-Up Administrator</td>
<td>Mike Loos</td>
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<td>Grand Ballroom Salon B</td>
<td>Liberty Profile -- Rumors Dispelled</td>
<td>David Follis</td>
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<td>11370</td>
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<td>Grand Ballroom Salon B</td>
<td>Potpourri</td>
<td>Anybody</td>
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<td>11376</td>
<td>Friday</td>
<td>8:00</td>
<td>Platinum Ballrom Salon 10</td>
<td>zWAS – In Real Life</td>
<td>David Follis / Rod Feak</td>
</tr>
</tbody>
</table>
WAS – What's New?

• Level 2 Update
• Liberty
• Compute Grid
• Virtual Enterprise
  • Dynamic Clustering & Intelligent Routing
  • Health Management
  • Application Edition Management
• Other
  • Java 7 SDK
  • IBM Mobile Foundation
## Versions, Dates and Service Levels..oh my

<table>
<thead>
<tr>
<th>Version</th>
<th>GA</th>
<th>End of Marketing</th>
<th>End of Support</th>
</tr>
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<tr>
<td>Version 7</td>
<td>9/26/2008</td>
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<td></td>
</tr>
<tr>
<td>Version 8</td>
<td>6/17/2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 8.5</td>
<td>6/15/2012</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- If delivered by Stack Product, EOS is that of Stack Product
- V8 (and beyond) iFixes for ALL Platforms
- [http://www.ibm.com/software/support/lifecycle/index_a_z.html](http://www.ibm.com/software/support/lifecycle/index_a_z.html)
# WebSphere V8.5 Pre-Reqs

**Liberty Profile**

- **Z/OS Pre-REQs:**

<table>
<thead>
<tr>
<th>Program Number</th>
<th>Product Name and Minimum VRM/Service Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>5694-A01</td>
<td>z/OS V01.11.00 or later</td>
</tr>
<tr>
<td>5694-A01</td>
<td>PTF UA51978 (z/OS V01.11.00) Required for IHS V8.5 with SSL</td>
</tr>
<tr>
<td>5694-A01</td>
<td>APAR OA38745 for Distributed Mapping Identity function</td>
</tr>
<tr>
<td>5694-A01</td>
<td>APAR OA37620 (Metal-C) for Liberty Profile</td>
</tr>
<tr>
<td>5694-A01</td>
<td>APAR OA39035 (Metal-C) for Liberty Profile</td>
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<td>5694-A01</td>
<td>APAR OA39236 (Metal-C) for Liberty Profile</td>
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<td>5694-A01</td>
<td>APAR OA39528 (RRS) for Liberty Profile</td>
</tr>
<tr>
<td>5635-DB2</td>
<td>APAR PM59162 (DB2) for Liberty Profile</td>
</tr>
</tbody>
</table>
USS Info APAR II14684

- Severe Performance degradation with z/OS UNIX Apps
  - WebSphere App Server z/OS
  - Performance issues during server startup or heavy load
  - Significantly higher usage of GCP's for zAAP/zIIP eligible work
    - Slow HFS / zFS access
    - CML Lock contention
  - occurs with OEM security support of FSACCESS
    - even if not explicitly have the FSACCESS class profile defined
- TSS fixes: TR44615, TR48511
- ACF2 fix: TR44615
FITS No More

- The FITS requirement process (for WAS anyway) is gone
- Now you can participate directly via the Request For Enhancements (RFE) process on DeveloperWorks:
- Search
- Submit
- Comment/Discuss
- VOTE!
**WOLA - History of Functional Updates**

- **Development/Test**
  - Test code on distributed development machine and have WOLA call "proxied" to z/OS where WAS z/OS server and backend data systems are located
  - Support for inbound calls for EJB that resides in another WAS server from that connected to with WOLA registration

- **Work Distribution**
  - Ability to round-robin between multiple external address spaces registered into server with the same register name

- **Monitoring**
  - New SMF 120.10 record for outbound WOLA calls
  - Correlator tokens for WAS to CICS TS 4.2 requests

**8.0.0.0**
- **Install** -- integrated, olaInstall.sh no longer needed
- **Usage** - IMS multi-segment/large message (>32K) support
- **Availability** -- Failover to alternate connection factory JNDI and failback
- **Monitoring** -- better visibility to WOLA inbound workload in SMF 120.9

**7.0.0.12**
- **Usage** -- Two-phase commit support WAS $\rightarrow$ CICS 4.1
- **Usage** -- IMS support

**7.0.0.4**
- Original release of the WebSphere Optimized Local Adapters function

**8.0.0.1**
- 2-Phase Commit Support for IMS->WAS (RRS=YES)

**8.0.0.4**
BPM: WOLA Adapter Tools Support

WOLA used Enterprise Meta Data Wizard generates WOLA Adapter Import and the supporting artifacts: Interface, BOs.

WOLA EMD Wizard transforms a Cobol Copy Book to a BO.
WAS – What's New?

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• **Liberty**
• Compute Grid
• Virtual Enterprise
  • Dynamic Clustering & Intelligent Routing
  • Health Management
  • Application Edition Management
• Other
  • Java 7 SDK
    • IBM Mobile Foundation
WebSphere Application Server
Over 14 years of Leadership & trusted delivery

- WAS V6.1 Feature Packs
- WAS V7 Feature Packs (XML, CEA, SCA)
- WAS V7 & V6.1 Feature Packs
- WAS V7 Feature Packs
- WAS V8 Alpha, Beta
- WAS V8 Beta, GA
- WAS V8.5 Alpha, Beta
- WAS V8.5 Lightweight Liberty profile
- WAS V8.5 Beta 2 (including lightweight Liberty profile)
- Migration Toolkit Refresh
- WAS Tooling Bundles
- Intelligent Management
- Java SE 7
- WAS HV Refresh
- Migration Toolkit Refresh
- WAS HV
- WAS EC2 AMI
- WAS V7 & V6.1 Feature Packs
- WAS V6.1 Feature Packs
- J2EE 1.4
- JEE 6
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012

Complete your sessions evaluation online at SHARE.org/AnaheimEval
Where did WAS 8.5 come from?

WebSphere Application Server on z/OS

- XD = Extended Deployment
  - a.k.a. Compute Grid (CG)
- OO = Operations Optimization
  - Virtual Enterprise (part of XD 6.1)
- BatchFP = Modern Batch FP
  - Subset of XD (CG)
  - Included in WAS V8
- WAS 8.5 includes CG, XD, VE, plus:
  - Liberty Profile
  - Java 7 SDK
  - XCT (Cross-Comp. Trace)
  - ISA (IBM Support Asst.)
What is the Liberty profile?

A lightweight, dynamic, composable runtime

Lightweight
- Server install is only about 55 MB
- Extremely fast server starts – typically well under 5 seconds

Dynamic
- Available features are user selected and can change at runtime
- Restarts are not required for server configuration changes

Composable
- Features are implemented as loosely coupled components with lazily resolved optional and mandatory dependencies
- The availability of features and components determines what Liberty can do and what’s available to applications
What is the Liberty profile?  

An easy to configure runtime environment

• Simple, extensible, and sparse configuration model
  – Configuration can live in a single XML document
  – Configuration is by exception
    • Defaults are provided by contributing feature
    • Only modifications to the defaults are required

• Flexible configuration structure
  – Include mechanism allows for shared configuration elements
  – Variable indirection mechanism allows for customization when distributed across multiple JVMs
  – Easily managed by version control systems if desired
What is the Liberty profile?

A transportable runtime for your applications

Use “server package” to generate an archive that contains a tested, self-contained, pre-configured server instance that includes your application

- Enables an application-centric deployment model that allows for easy scale-out
- Light-touch admin builds on the ND job manager infrastructure to manage Liberty server instances

A runtime environment with fidelity to full WAS

- Liberty is WebSphere
- Applications that are developed and tested on Liberty will run on the full profile
Liberty and traditional profile capabilities

There are functional differences between traditional WAS and the Liberty profile – Liberty provides a useful subset of traditional WAS

Liberty Profile

- Bean validation
- Blueprint
- Java API for RESTful Web Services
- Java Database Connectivity (JDBC)
- Java Naming and Directory Interface (JNDI)
- Java Persistence API (JPA)
- Java Server Faces (JSF)
- Java Server Pages (JSP)
- JMX
- Monitoring
- OSGi JPA
- Remote connector
- Secure Sockets Layer (SSL)
- Security
- Servlet
- Session Persistence
- Transaction
- Web application bundle (WAB)
- z/OS Security (SAF)
- z/OS Transactions (RRS)
- z/OS Workload Management

Traditional WAS Profile

- Everything Liberty has…

- Enterprise Java Beans (EJBs)
- Messaging (JMS)
- Web Services
- Service Component Arch (SCA)
- Java Connector Architecture (JCA)
- Clustering
- WebSphere Optimized Local Adapters
- Administrative Console
- WSADMIN scripting
- Multi-JVM Server Model

And much more …

Complete your sessions evaluation online at SHARE.org/AnaheimEval
Why Liberty on z/OS?

**Performance: Startup time – 3.2 seconds!**

- Liberty – 64bit IBM Java 6.0.1, 64/64MB min/max heap, 60MB shared class cache, TradeLite installed
- Traditional – 64bit IBM Java 6.0.1, 1SR,128/256MB min/max CR heap, 256/512MB min/max SR heap, 75MB CR shared class cache, 75MB SR shared class cache, no applications installed

![Server Startup – Elapsed](chart1)

![Server Startup – CPU](chart2)
WAS – What's New?

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- Liberty
- **Compute Grid**
- Virtual Enterprise
  - Dynamic Clustering & Intelligent Routing
  - Health Management
  - Application Edition Management
- Other
  - Java 7 SDK
  - IBM Mobile Foundation
WAS ND V8.5: Resiliency enhancements – WebSphere Virtual Enterprise & WebSphere Batch

Before

- Install WebSphere Virtual Enterprise
- Install WebSphere Compute Grid
- Install WAS V8 or earlier

After

Install WAS ND V8.5

Batch processing

Health Management

Application Edition Management

Dynamic Clustering

Intelligent Routing
Compute Grid Included in WAS 8.5

- **“Modern Batch”:** Job Scheduler & Endpoint Server
  - Function Equivalent to WebSphere XD Compute Grid V8

- Concurrent execution of batch & OLTP work
- Container managed checkpoint and restart
- Integrate with JES schedulers
- Utility to package batch app'ns
- Parallel Batch Job processing
- COBOL and CICS Support
- Many SPI & programming model improvements.
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Virtual Enterprise (VE) Included in WAS 8.5
“Intelligent Management”
- Integration of 4 autonomic features:

**Application Edition Management**
- Self-Managing
  - StockTrading 1.0
  - StockTrading 2.0
  - StockTrading 3.0
  - Finance 3.0
  - Finance 4.0

**Health Management**
- Self-Protecting Self-Healing

**Dynamic Clustering**
- Self-Optimizing

---

Intelligent Routing
Application Edition Management

Multiple Editions of an Application in a WebSphere cell

- Interruption-free rollout of application updates
- Ability to “roll back” to a previous application version
- “Validation mode” to verify functionality with subset of users

- **Edition** = “Instance of an J2EE application” (i.e., version)
  - Each edition is numbered (or named) based on build level, or deployment bindings (or both)

- **Group Rollout or Atomic Rollout**

- **Validation Mode or Concurrent Activation Mode**
  - Use Routing Policies & Dynamic Clusters to control traffic to the new editions.
Health Monitoring

• Define Health Policies to take corrective action based on unacceptable behavior:

**Health Conditions**
- **Excessive request timeouts**: % of timed out requests
- **Excessive response time**: average response time
- **Excessive garbage collection**: % of time spent in GCs
- **Excessive memory**: % of maximum JVM heap size
- **Age-based**: amount of time server has been running
- **Memory leak**: JVM heap size after garbage collection
- **Storm drain**: significant drop in response time
- **Workload**: total number of requests
Health Monitoring

• Health Policies
  ➔ Unacceptable behavior
  ➔ Corrective Actions

• Health Conditions
  ➔ Aged-based
  ➔ Workload
  ➔ Timeouts
  ➔ Response time
  ➔ Memory usage
  ➔ Memory Leak
  ➔ Storm Drain

• Target Elements
  ➔ Servers
  ➔ Clusters
  ➔ Cluster members
  ➔ Cell

• Reactions
  ➔ Server Restart
  ➔ Dump Threads
  ➔ Dump JVM Heap
  ➔ Put Server in maint. mode

• Reaction Modes
  ➔ Automatic
  ➔ Supervised
On-demand Router Solution
On-Demand Routers & Dynamic Operations

- ODRs and Dynamic Clusters are redundant with z.OS WLM and Dynamic Servant address spaces ....
  - May Increase Complexity and Overhead....
- Sysplex Distributor with HTTP plugins, or Proxy servers can balance your work across multiple Servers, and WLM-managed Servants for changes in demand....
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• Other
  • Java 7 SDK
  • IBM Mobile Foundation
Selectable Java SDK Level

IBM Java SDK V7 Improvements:

- Language enhancements
- GC policies: 'Balanced' targets short & consistent pause times on large heaps
- File I/O – Asynch I/O, Ext. attributes
- Shared Cache
- Diagnostics

Java 6 or Java 7 Selectable by Node or by Server (31 or 64 bit)

- Used for servers, or command-line tools

Configure for your topology using:

- The manageSDK command-line utility
- The ISC
- wsadmin AdminTask commands
Java 7 SDK is installed in the WAS 8.5 HFS

- The IBM WebSphere SDK Java Technology Edition Version 7.0 offering has its own Package in the WAS V8.5 Repository
- Sample IM Install Job:
  /Service/InstallationManager/bin/eclipse/tools/imcl
  install com.ibm.websphere.IBMJAVA.v70
  -installationDirectory /Service/usr/lpp/zWebSphere/V8R5
  -sharedResourcesDirectory /Service/InstallationManager/sharedResources

- Sample Java HFS Directory Structures:
  /wasv85config/xxcell/xxnodey/AppServer/java* → wasInstall/java*
  /wasv85config/xxcell/xxdmnode/DeploymentManager/java* → wasInstall/java*

  wasInstall -> /Service/usr/lpp/zWebSphere/V8R5

  /usr/lpp/zWebSphere/V8R5/java
  /usr/lpp/zWebSphere/V8R5/java64
  /usr/lpp/zWebSphere/V8R5/java_1.7_31
  /usr/lpp/zWebSphere/V8R5/java_1.7_64
Java Level Selectable by Server, Node, etc.

Using the ISC (Admin Console):

- Servers > server_name > Java SDKs.
- System administration > Deployment manager > Java SDKs.
- System administration > Nodes > node_name > Java SDKs.
- System administration > Administrative agent > Java SDKs.
- System administration > Job manager > Java SDKs.

![Image of Java SDKs selection](image-url)
Java Level Selectable by Server, Node, etc.

- Using `wsadmin.sh` script with `AdminTask` commands:
  - `getNodeDefaultSDK`
  - `getSDKVersion`
  - `getServerSDK`
  - `getUnusedSDKsOnNode`
  - `setNodeDefaultSDK`
  - `setServerSDK`
managesdk.sh examples

Cd /wasv85config/qccell/qcnodec/AppServer/bin

List the Available SDK levels for a Node:
-> ./managesdk.sh -listAvailable

List the SDK level for Servers:
-> ./managesdk.sh -listEnabledProfileAll

Enable an SDK level for a Node:
-> ./managesdk.sh -enableProfileAll -sdkname 1.6_64

Display the SDK level for a Node:
-> ./managesdk.sh -getNewProfileDefault

Set the SDK level for Commands run from the app_server_root/bin directory:
-> ./managesdk.sh -setCommandDefault -sdkname 1.7_64

CWSDK1021I: The command default SDK name is now set to 1.7_64.
CWSDK1001I: Successfully performed the requested managesdk task.
Selecting 31-bit or 64-bit JVM
- Independent of the Java 6/7 level

- ISC to select 31-bit or 64-bit JVM for a particular Server:
XCT log viewer

Output your logs using advanced format so that you can see the request ID information in the logs.  

For example:

```
<profile_root>/bin-> ./logViewer.sh
Using <profile_root>/logs/cbsr03a as repository directory.
```

<table>
<thead>
<tr>
<th>Instance ID</th>
<th>Start Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1337030555018</td>
<td>05/14/12 17:22:35.018</td>
</tr>
<tr>
<td>1337030555018/0000018400000006-CBSR03AS_STC06101</td>
<td>05/14/12 17:22:48.460</td>
</tr>
<tr>
<td>1337789556138</td>
<td>05/23/12 12:12:36.138</td>
</tr>
<tr>
<td>1337789556138/000001B400000001-CBSR03AS_STC06163</td>
<td>05/23/12 12:12:49.857</td>
</tr>
</tbody>
</table>

```
logViewer.sh ./logViewer.sh -minLevel WARNING -format advanced -instance 
1337789556138/000001B4000000001-CBSR03AS_STC06163
Using /wasv85config/cbcell/cbnodea/AppServer/profiles/default/logs/cbsr03a 
as repository directory.
```

```
   source=com.ibm.ws.ssl.config.WSKeyStore class= method= org=IBM 
   prod=WebSphere component=Application Server thread=[main] 
   CWPKI0041W: One or more key stores are using the default password.
```
Configuration Repository Checkpoints for Auditing and Recovery

- The Repository Service is consolidated from WVE.
- Provides “full” and “delta” checkpoints of the master configuration repository.
- Simplifies restoration to a previous configuration state.
  - Full checkpoint created manually
  - Delta checkpoints, when enabled, are created automatically in checkpoint repository on every configuration-save.
- New Security Audit event - ADMIN_REPOSITORY_SAVED refers to corresponding delta checkpoint records.
  - Delta checkpoint can be exported to review configuration changes when needed.
ISA (IBM Support Assistant) Data Collector

- Automatically Collect Data for Problem Analysis and Send to IBM Support. Very simple to use:
  - Invoke from `<profile_root>/bin/isadc.sh`
  - Prompts for Options (if not specified):
    - Location of zip file to be created
    - Transfer to IBM (HTTPS, FTP) or to some other host.
    - PMR Number
    - License (“I agree”)
  - Produces a zip file and FTPs to IBM (or specified host):
    ```
    /u/hutch-> jar -tvf 12345.678.000.cbcell-cbnodea-WAS-ISADC.zip
    24700 Wed May 23 11:10:44 EDT 2012 autopdzip/autopd/log/Trace_Viewer.xml
    39422 Wed May 23 11:10:44 EDT 2012 autopdzip/autopd/log/Viewer_Translations.js
    1515 Wed May 23 11:11:28 EDT 2012 autopdzip/autopd/log/isadc-error0.log
    97158 Wed May 23 11:11:28 EDT 2012 autopdzip/autopd/log/isadc-trace0.xml
    5008 Wed May 23 11:10:44 EDT 2012 autopdzip/autopd/log/isadc-trace1.xml
    210119 Wed May 23 11:12:16 EDT 2012 RAS_Collect_Tool/Debug/config/Output.txt
    2992 Wed May 23 11:11:10 EDT 2012 RAS_Collect_Tool/autopd-collection-environment-v2.xml
    2245826 Wed May 23 11:12:16 EDT 2012 RAS_Collect_Tool/collector.jar
    ```
ISA Data Collector Sample use

• Create a response file that contains the answers to all the questions for a certain run through the data collector:

```
profile_root/bin/isadc.sh -record response_filename
```

• Use the following command to provide the response file when starting the tool:

```
profile_root/bin/isadc.sh -silent response_filename
```
WebSphere Sample Applications

Samples no longer packaged with the WebSphere product.

- Download samples from “Samples, V 8.5” info. center.

On the Downloads tab, click the Download Sample link for the samples that you want.

- Download compressed file, or individual sample files, to a directory on your workstation.
  - Many sample compressed files have an /installableApps directory that contains deployable prebuilt archives.
  - Other directories contain sample-specific source archives, scripts, and instructions for building deployable archives.

- They are also available for WAS V.8, but not so complete:
  http://www14.software.ibm.com/webapp/wsbroker/redirect?version=matt&product=was-nd-mp&topic/welcome_samples
WebSphere Sample Applications


- Network Deployment (IBM i), Version 8.5
  - Samples, Version 8.5
    - ActivitySession service sample
    - Applet client sample
    - Communications Enabled Applications samples
    - Contexts and Dependency Injection samples
    - Internationalization service sample
    - Java Batch ILC sample
    - Java Batch Mailer sample
    - Java Batch Overdraft sample
    - Java Batch postingv2 sample
    - Java Batch simpleCI sample
    - Java Batch IVT sample
    - JavaServer Faces 2.0 samples
    - JAX-WS web services samples
    - JTA extensions sample
    - OSGi blabber sample
    - OSGi blog sample
    - Service Component Architecture samples
    - Servlet 3.0 samples
    - Web 2.0 and Mobile Toolkit samples
    - Web Services Business Activity sample
    - XML samples
    - Site Map

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EJBDeploy - “optional feature”

• With WAS V. 8 (& 8.5), EJBDeploy tool is an optional feature.
  • It was installed automatically with WAS V. 7 and earlier.
  • Without this feature, applications with pre-EJB 3.0 modules, such as the Java Batch sample applications will not be correctly deployed.

Symptoms:
• (No warning messages at deploy time.)
• Following errors when you launch them:
  • **CNTR0075E**: The user-provided class "..." needed by the EnterpriseBean could not be found or loaded.
  • **WSVR0068E**: Attempt to start EnterpriseBean ...BatchController failed ...

Recovery and work-around actions:
• Add the "ejbdploy" feature after the WebSphere cell is created.
• Deploy applications with pre-EJB 3.0 modules in a WAS cell with the ejbdeploy feature, export the expanded ear file, & deploy it in your WAS cell which may not have ejbdeploy.

For details, see Techdoc TD105993 and the following InfoCenter articles:
WAS V.8: http://www14.software.ibm.com/webapp/wsbroker/redirect?version=matt&product=was-nd-zos&topic=tins_installation_zos_options
WAS V8.5: http://www14.software.ibm.com/webapp/wsbroker/redirect?version=phil&product=was-nd-zos&topic=tins_installation_zos_options
**wasSmpe Directory Changes**
(No separate directory for “Batch”, “WCG” or “XD”)

```
/wasv85config/qccell/qcdmnode
wasInstall -> /Service/usr/lpp/zWebSphere/V8R5
-> ls  wasInstall/
     InstallSamples       installableApps      logs                 systemApps
     Scheduler            installedConnectors  optionalLibraries    tio
     UDDIReg              installedFilters     plugins               tivoli
     bin                  java                 pmi_preprocess.xml    universalDriver
     configuration       java64               preprocess.jar        util
     derby                java_1.7_31          profileTemplates       web
     dev                  java_1.7_64          properties            wlp
     endorsed_apis        lafiles              runtimes             zOS-config
     etc                  lib                  sar2war_tool
     features             links                 scriptLibraries
```

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Heads Up – Linux for System z Likely to be a Popular Platform for Enterprise Mobile

IBM announced the IBM Mobile Foundation Announced April 24, 2012 and Available June 15, 2012

IBM Mobile Foundation V5.0

Product Suite Includes:
• IBM Worklight V5.0
• IBM WebSphere Cast Iron
• IBM Endpoint Manager for Mobile Devices

IBM Worklight V5.0 supported on:

Middleware:
• WebSphere Application Server Network Deployment V7.0 or higher and future releases, modification levels and fix packs
• Apache Tomcat 7.0 and future fix packs

System z operating systems:
• Red Hat Enterprise Linux (RHEL) 5 Update 6 Advanced Platform System z
• Red Hat Enterprise Linux (RHEL) Server 6 System z
• SUSE Linux Enterprise Server (SLES) 11 System z
• SUSE Linux Enterprise Server (SLES) 10 System z
Native, web or hybrid mobile-app development and management

- **IBM Worklight V5.0** helps manage HTML5, hybrid, and native applications using a powerful and flexible mobile IDE. Next-generation mobile middleware, end-to-end security, and integrated management and analytics capabilities are built in.

  ✓ Uses a standards-based technologies and tools, mobile-optimized middleware, a variety of security mechanisms and integrated management and analytics capabilities.

  ✓ Enables the creation of rich, cross-platform apps without the use of code translation, proprietary interpreters or unpopular scripting languages.

Additional education:
http://www.websphereusergroup.org/gwgroupowner/go/gallery/item/1499885?type=video
System z Social Media

- **System z official Twitter handle:**
  - @ibm_system_z

- **Top Facebook pages related to System z:**
  - Systemz Mainframe
  - IBM System z on Campus
  - IBM Mainframe Professionals
  - Millennial Mainframer

- **Top LinkedIn Groups related to System z:**
  - Mainframe Experts Network
  - Mainframe
  - IBM Mainframe
  - System z Advocates
  - Cloud Mainframe Computing

- **Leading Blogs related to System z:**
  - Evangelizing Mainframe (Destination z blog)
  - Mainframe Performance Topics
  - Common Sense
  - Enterprise Class Innovation: System z perspectives
  - Mainframe
  - MainframeZone
  - Smarter Computing Blog
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