

AutoPilot® M6 Plug-in for WebSphere Application Server (JMX)

Installation and User's Guide

Version 6.0.2

For use with AutoPilot 6.0 and WebSphere 7.0 or higher

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INSTALLATION AND USER'S GUIDE

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Chapter 1: Introduction

Welcome to the AutoPilot M6 for WebSphere Application Server (WAS) JMX Installation and User's Guide. This guide explains how to update and perform new installations. It is designed to work with AutoPilot M6, its components and other plug-ins, and run simultaneously without interference or performance degradation. AutoPilot M6 for WebSphere Application Server JMX will hereinafter be identified as AP M6 for WAS JMX and further abbreviated as WAS JMX.

1.1 How This Guide is Organized

- [Chapter 1:](#)** Identifies users and history of this document. System requirements are also outlined. All other system and platform information is listed in the *AutoPilot M6 Installation and User's Guides*.
- [Chapter 2:](#)** Contains a brief description of WAS along with listings of features and facts published.
- [Chapter 3:](#)** Provides instructions for new installations of WAS JMX.
- [Chapter 4:](#)** Provides instructions for using the WAS JMX.
- [Chapter 5:](#)** Provides an overview of the fact folders used by the WAS JMX
- [Appendix A:](#)** Provides a detailed list of all reference information required for the installation of AutoPilot.
- [Appendix B:](#)** Contains conventions used in AutoPilot and documents typographical conventions.
- [Glossary:](#)** Contains a listing of unique and common acronyms and words and their definitions.

1.2 History of This Document

Table 1-1. Document History

Release Date:	Document Number	For AutoPilot Version	Summary
March 2008	M6/WS-JMX 600.001	AP M6 Version 600.001	Initial document release.
September 2008	M6/WS-JMX 600.002	AP M6 Version 600.001 and higher	Expert property changes.
March 2011	M6/WS-JMX 600.003	AP M6 Version 600.001 and higher	Errata
January 2015	M6/WS-JMX 600.004	AP M6 Version 600.001 and higher	Errata
June 2022	M6/WS-JMX 600.004.1		Changed title to <i>AutoPilot® M6 Plug-in for WebSphere Application Server (JMX) Installation and User's Guide</i>

1.2.1 User Feedback

Nastel encourages all Users and Administrators of AutoPilot to submit comments, suggestions, corrections and recommendations for improvement for all AutoPilot documentation. Please send your comments via e-mail to support@nastel.com. You will receive a written response, along with status of any proposed change, update, or correction.

1.3 Related Documents

The complete listing of related and referenced documents is listed in [Appendix A](#) of this guide.

1.4 Release Notes

See INSTALL.TXT and README.TXT files on installation media and should be accessible on wherever AutoPilot M6 is installed. (For example: [C:\AutoPilotM6]\documents). README.TXT is also available on the Nastel Resource Center.

1.5 Intended Audience

This Guide is intended for use by installers and administrators of Nastel's AutoPilot M6 and AutoPilot M6 for WebSphere MQ. There are three user groups defined for the purpose of installation and use.

- **Installer:** The installer should be familiar with Java Run Time Environment 1.6.x (JRE 1.6.x) or higher (included in AutoPilot M6 for Windows, Solaris, AIX, HP-UX and Linux). Procedures for installing software on the target platform such as Windows and/or UNIX. Basic understanding of TCP/IP.
- **Administrator:** The administrator should have a working knowledge Java Run Time Environment 1.6.x (JRE 1.6.x) or higher, middleware, TCP/IP, and system management. Installation procedures for the platform where AutoPilot is installed (for example, Windows, NT, UNIX, etc.)
- **User:** Requires local operating system operations knowledge and basic knowledge of AutoPilot M6.

1.6 System Requirements

This section defines system and platform prerequisite support requirements for WAS JMX.

1.6.1 Platforms

WAS JMX is compatible with the following platforms:

- Windows 2008-2012
- Unix
- Linux (including zLinux).

WAS JMX is capable of monitoring application servers running on other platforms as long as a compatible set of client libraries and compatible Java runtime are available.

1.6.2 WebSphere Application Servers

WAS JMX is compatible with the following versions of WebSphere:

- WAS V7 or higher

1.6.3 Other Requirements

WAS JMX requires the following conditions:

- a. CEP server installation is on same machine with WAS server:
 - AutoPilot CEP server is running on the same machine as the WebSphere server and no other application servers or plug-ins are installed on this node.
 - Installer may need administrative privileges for the target platform.
- b. CEP Server installation and WAS server is on different machines:
 - AP JMX expert requires the following IBM libraries from WAS server installation directory:
 - etc, lib, plugins, profiles properties, runtime
 - java

1.7 Terms and Abbreviations

A list of Terms and Abbreviations used in this document is located in the [Glossary](#).

1.8 Technical Support

If you need additional technical support, you can contact Nastel Technologies by telephone or by e-mail. To contact Nastel technical support by telephone, call **(800) 963-9822 ext. 1**, if you are calling from outside the United States dial **001-631-761-9190**. To contact Nastel technical support by e-mail, send a message to support@nastel.com. To access the Nastel automated support system (user id and password required), go to <http://support.nastel.com/>. Contact your local AutoPilot Administrator for further information.

1.9 Conventions

Refer to [Appendix B](#) for conventions used in this guide.

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Chapter 2: About WebSphere Application Server (JMX)

2.1 Introduction

WAS JMX is designed to enable AutoPilot M6 to monitor and manage *eBusiness* applications for continuous operations in addition to its standard features. It connects to WAS, gathers, and publishes WAS MBean attributes exposed via JMX interface as AutoPilot facts. It also allows users to change WAS MBean attributes and perform MBean operations.

2.1.1 WAS JMX Features

By integrating with AutoPilot, WAS JMX provides the following management features:

- Monitors and controls status of WebSphere services and processes
- Automatic fault recovery
- Creates custom monitoring
- Collects historical data for subsequent analysis/capacity planning
- Organizes management information into views, customized for specific users
- Gathers and publishes WAS MBean attributes exposed via JMX interface as AutoPilot facts. It also allows users to change WAS MBean attributes and perform MBean operations.

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Chapter 3: Installation

3.1 Installation Preparation

This section contains general information related to preparing for and installing the installation of AutoPilot M6 for WAS JMX software.

3.1.1 Installation Materials

Installation can be performed by download through the Nastel Resource Center or by installation media. The media installation can be automatically initiated, then continued using the installation wizard, or manually installed. The installation media contains all required AutoPilot components for Java 2 platforms.

3.1.1.1 Technical Documents

Prior to installation, review all text files and installation procedures provided on the Nastel Resource Center. It is recommended that all installation related materials are printed to allow the installer to review prior to installation, and better follow the detailed instructions within.

3.1.2 Licensing Information

A copy of the standard Licensing Agreement is imbedded in the installation software. The formal licensing agreement has been furnished in the purchase agreement package.

3.2 Installation

This section provides instructions for installing WAS JMX on the compatible platforms. Review all installation related materials prior to commencing installation procedures. Reviewing materials will allow installers to pre-determine installation options and familiarize themselves with associated requirements.

3.2.1 Before Installing WAS JMX

This procedure outlines the typical procedures for installing M6 for WAS JMX for all supported platforms.

1. WAS 7.0 or higher
2. AutoPilot CEP server is running on the same machine as WAS.
3. AutoPilot CEP server is running on the different machine, i.e. Nastel Domain server.
 - JMX expert requires the following IBM libraries from WAS server installation directory:
 - o etc, lib, plugins, profiles properties, runtime
 - o java
 - Create a directory; for example in `[AUTOPILOT_HOME]\was_lib`.
 - Copy this libraries etc, lib, plugins, profiles properties, runtime, java into `[AUTOPILOT_HOME]\was_lib`
 - in `ssl.client.props` property file change path in `user.root=[AUTOPILOT_HOME]\was_lib` to reflect path of copied WAS libraries.


NOTE:

This `[AUTOPILOT_HOME]\was_lib` becomes a path to WAS installation directory.

3.2.2 Installing WAS JMX Expert from the Nastel Resource Center

1. Download WAS JMX from the Nastel Resource Center.
2. Save your work and logoff AutoPilot and WAS.

	NOTE:	There are no specific logoff procedures required to exit AutoPilot Console.
---	--------------	---

3. Stop the Nodes and/or Domain Servers that will be updated as specified in the *AutoPilot M6 User's Guide*.
3. Copy AP_JMX_WAS-xxx.pkg into the `[AUTOPILOT_HOME]\updates` directory. (xxx is current version number of WAS JMX).
4. At the command prompt run:
`[AUTOPILOT_HOME]\bin\pkgman ..\updates\ AP_JMX_WAS-xxx.pkg`
5. Enter the path of WAS. For example: **C:\Program Files\WebSphere\AppServer**
6. Verify installation: `[AUTOPILOT_HOME]\bin\pkgman -libinfo`. The details of the library are listed.

	NOTE:	Ensure there are no errors posted at the bottom of the screen.
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Chapter 4: Using WebSphere Application Server

4.1 Experts

All experts are agents knowledgeable about the subject they are assigned to monitor. Experts are mobile and act as connectors to other AutoPilot and optional plug-in experts. Experts are contained in target managed resources (nodes) and collect system's status information, which are analyzed by assigned policies, then filtered by AutoPilot managers to be viewed in a Business View Viewer. Experts publish facts. Facts in AutoPilot are basic true statements about current run-time values, indicating an object's state in a managed resource. WAS JMX Experts maintain the same strengths and qualities as all AutoPilot Experts. Refer to *AutoPilot M6 User's Guide* for additional information on expert deployment and configuration.

4.1.1 Deploying WAS JMX Experts

1. Click  **Deployment Tool** to display *Directory Viewer*.



Figure 4-1. Deployment Tool and Networked Nodes

2. Right click desired node to display *Node Menu*. Click **Deploy Expert**.
3. Click WebSphere > WebSphere JMX Monitor.

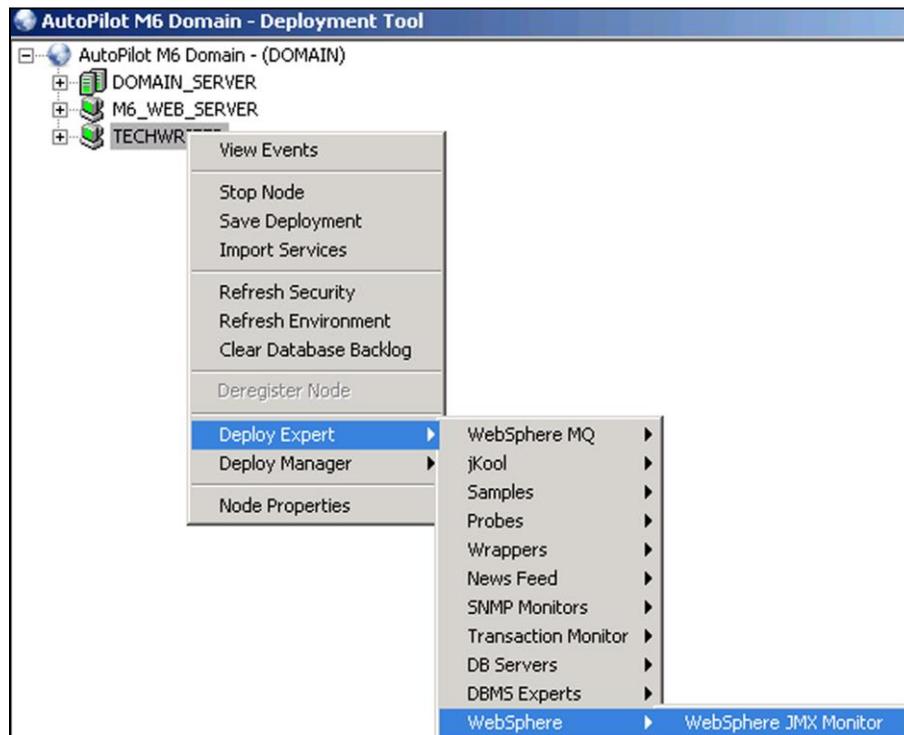


Figure 4-2. Deploying WebSphere Experts

4. Review the WAS JMX Expert configuration in the screens displayed. Refer to WAS JMX Expert configuration instructions for further detail.
5. Click **Apply**. The WAS JMX Expert will be deployed only on node selected in step 2 above.

4.1.2 Configuring WAS JMX Experts

	NOTE:	The names of experts can only be used once in an AutoPilot network.
---	--------------	---

This paragraph provides detailed instructions and information for configuring the WAS JMX Expert. WAS JMX is supplied with a typical Expert, the set-up and configuration of this supplied Expert will be addressed.

Other Software/Platform specific and standard experts are addressed in supporting documentation for that software/platform plug-in and the AutoPilot User's Guide. Only the WAS JMX Expert is discussed in this Guide.

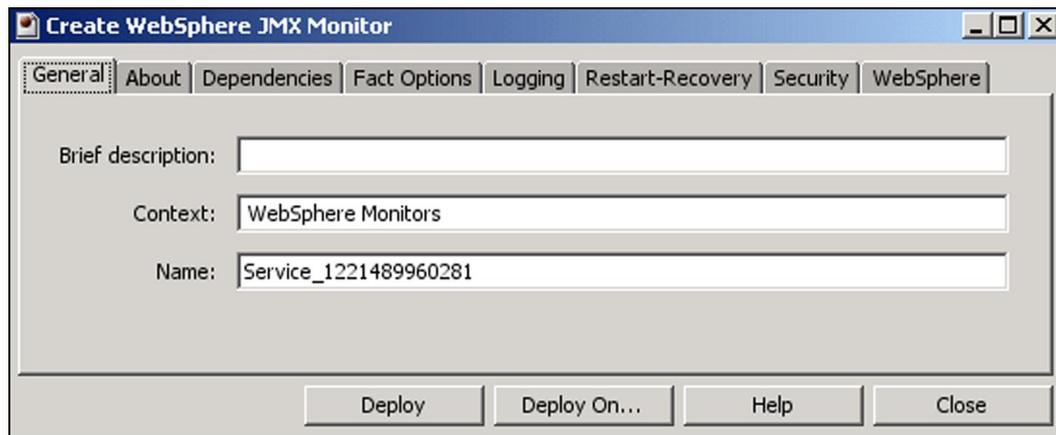


Figure 4-3. Configuring Experts

This Expert consists of eight screens of user-definable configuration data. The following procedure explains the entries for each category of the WAS JMX Expert.

1. **General:** This screen is common to all Experts. Review (if updating existing Expert) or configure data elements as follows:

Element	Description
Brief description	Short description of the service. This name will appear in brackets (example: [Process Monitor]) on screen with listed Node.
Context	User defined category that will be registered in the Domain Server. Context is displayed as folder icon under each CEP server. The default name is WebSphere Monitors.
Name	Name that uniquely identifies the service in the Domain Server. Enter or modify the Service Name as required, or in accordance with local guidelines. Variations of names are used when deploying services on multiple Nodes. No spaces or blanks are allowed in Service Name formats. The default name is “Service_”, plus a 12 digit random number (example: Service_123456789012).

The screenshot shows a dialog box titled "Create WebSphere JMX Monitor" with a "General" tab selected. The dialog contains three input fields: "Brief description:" (empty), "Context:" (containing "WebSphere Monitors"), and "Name:" (containing "Service_1221489960281"). At the bottom, there are four buttons: "Deploy", "Deploy On...", "Help", and "Close".

Figure 4-4. WAS JMX Expert General Configuration

2. **About:** This screen is common to all Experts and cannot be changed.

Table 4-2. WAS JMX Expert Properties: About	
Element	Description
Package Title	Implementation title of source package.
Package vendor	Name of implementation vendor.
Package version	Package version as assigned by the vendor.

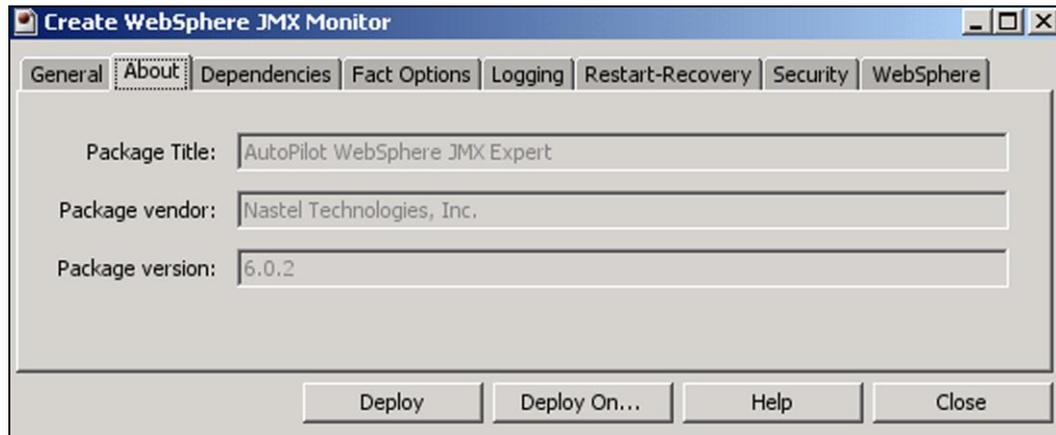


Figure 4-5. WAS JMX Expert About Configuration

3. **Dependencies:** (Reserved) Leave blank unless required. Dependencies are comma delimited lists of services within a CEP server. The lists must be available to the specified service prior to loading. The sequence of service loading is determined n\by the list.

Table 4-3. WAS JMX Expert Properties: Dependencies	
Element	Description
Platform dependencies	Comma separated list of operating system platforms this expert is dependant on.
Service dependencies	Comma separated list of services this expert is dependant on.

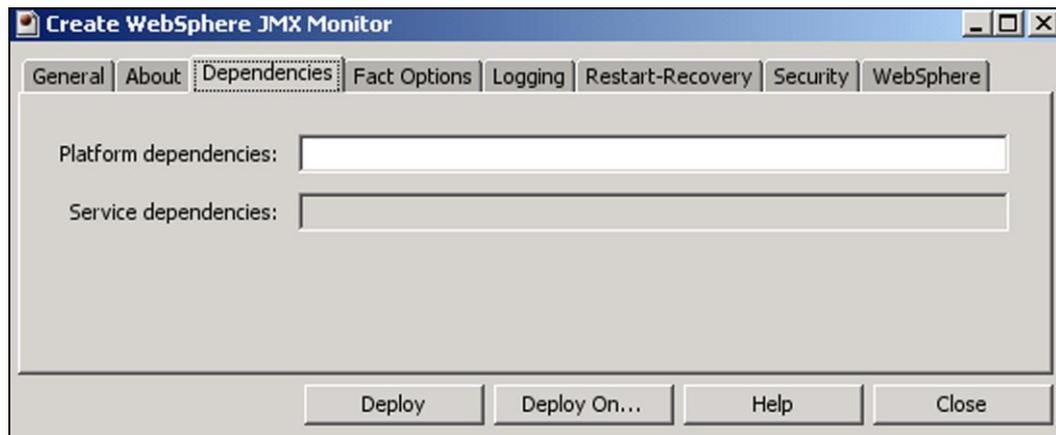


Figure 4-6. WAS JMX Expert Dependencies Configuration

4. **Fact Options:** This screen is common to all Experts. Review (if updating existing Expert) or configure data elements as follows:

Table 4-4. WAS JMX Expert Properties: Fact Options	
Element	Description
Exclude Fact Filters	Comma separated list of fact paths to exclude during publishing
Expire facts(ms)	Automatically expires facts that have not been updated in the specified time (ms).
Fact History Size	Automatically maintains specified number of samples for each published fact in memory.
Fact History Time(ms)	Automatically maintains fact history not exceeding specified time in ms.
Include Fact Filters	Comma-separated list of fact paths to include during publishing.

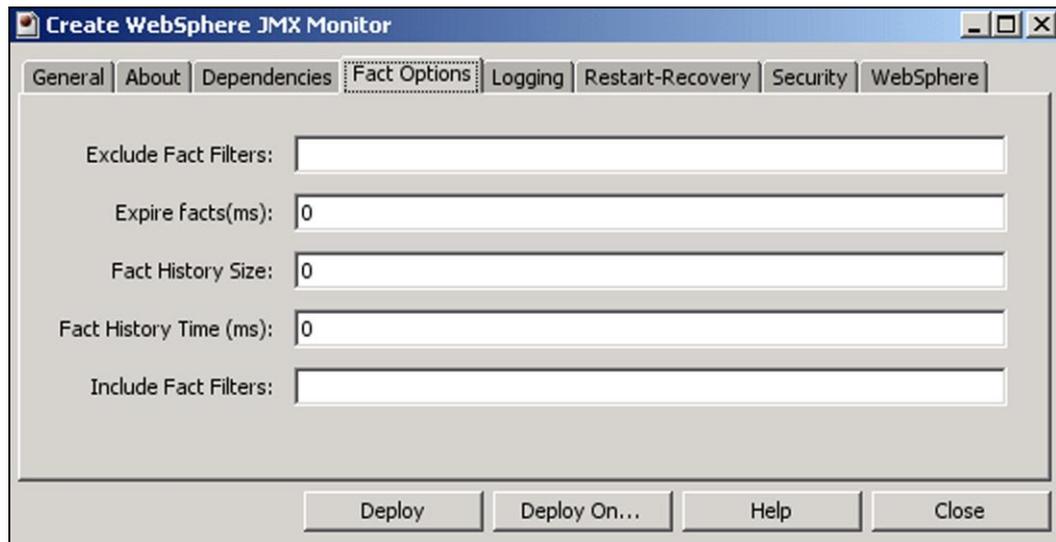


Figure 4-7. WAS JMX Expert Fact Options Configuration

5. **Logging:** This screen is common to all Experts. Review (if updating existing Expert) or configure data elements as follows:

Table 4-5. WAS JMX Expert Properties: Logging	
Element	Description
Audit	Enable/Disable service audit trace. Default is disabled.
Log name	Log name associated with the service. The default name is Services, but may be changed as required. (Example: Task_Progress_Process_Log).
Log service activity	Enable/Disable service activity trace. Default is disabled.
Log size (bytes)	Log size in bytes. Real log size is the maximum value of the server.log.size and logsize. Default is 200,000 bytes.
Record Facts	Enable/Disable fact recording for this service. CEP server records all facts produced by this service into an .fct file which can be played back using the apfact utility. Recording occurs only when CEP server is started with <code>-logfacts</code> option or the environmental variable property <code>server.service.fact.logging=true</code> is defined in global.properties or node.properties. Default is enabled.

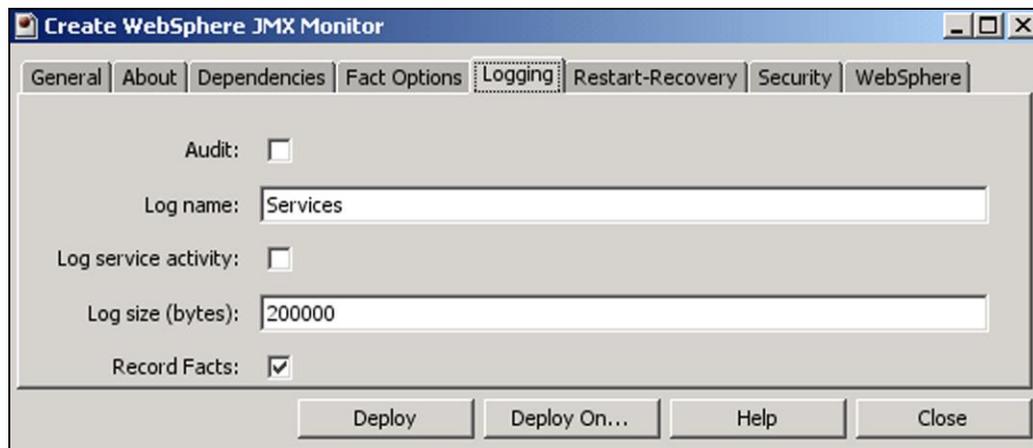


Figure 4-8. WAS JMX Expert Logging Configuration

6. **Restart-Recovery:** This screen is common to all Experts. Review (if updating existing Expert) or configure data elements as follows:

Table 4-6. WAS JMX Expert Properties: Restart-Recovery	
Element	Description
Automatic start	Enable/disable automatic start. Default is enabled.
Save in registry	Persistent services are saved in Registry .xml file. Default is enabled.
Synchronous Control	Enable/Disable synchronous service initiation. Default is enabled.

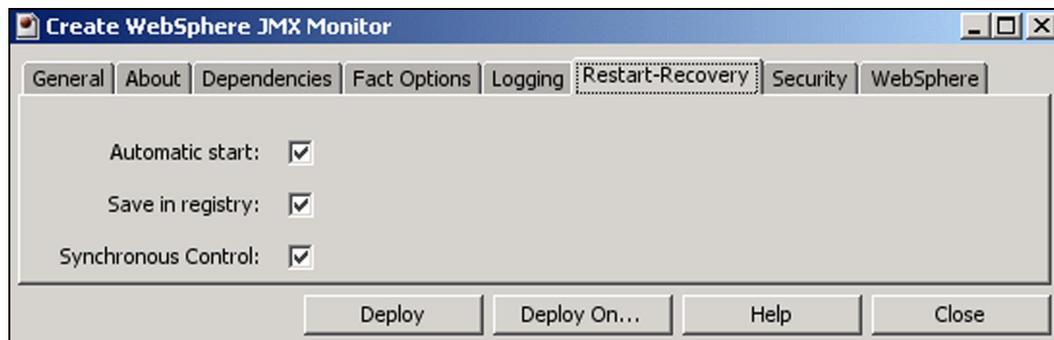


Figure 4-9. WAS JMX Expert Restart-Recovery Configuration

7. **Security:** This screen is common to all Experts. Review (if updating existing Expert) or configure data elements as follows:

Table 4-7. WAS JMX Expert Properties: Security		
Property	Description	
Inherit permissions from owner	Enable/disable inherit permission from owner's permission masks. Default is enabled.	
Owner	User that owns the object. To change ownership, click Change button.	
Permissions	Permissions for users in the same group and users in other groups. Enable/disable as required.	
	Group:	Other:
Read	Group members may read/view attributes of an object.	Other users may read/view attributes of an object.
Change	Group members may change the attributes of an object.	Other users may change the attributes of an object.
Delete	Group members may delete the object.	Other users may delete the object.
Control	Group members may execute control actions such as start, stop, and disable.	Other users may execute control actions such as start, stop, and disable.
Execute	Group members may execute operational commands on the object.	Other users may execute operational commands on the object.

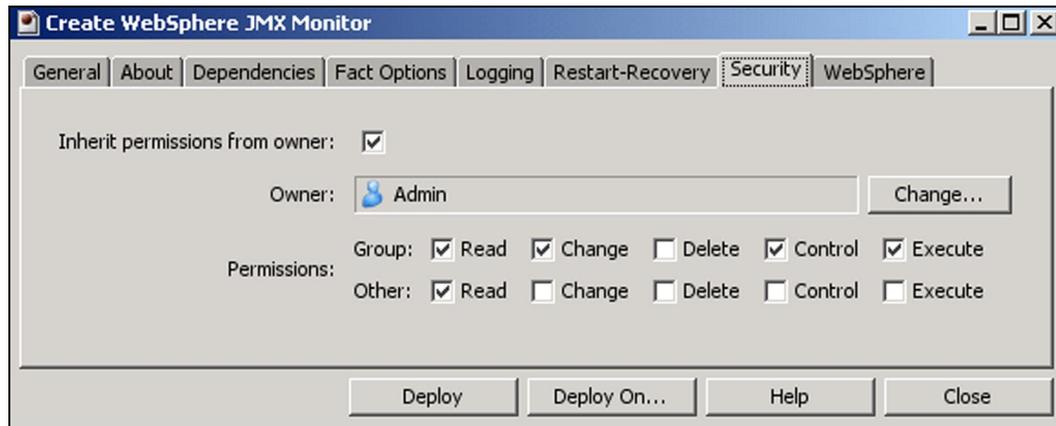


Figure 4-10. WAS JMX Expert Security Configuration

8. **WebSphere:** Review (if updating existing Expert) or configure data elements. See Figure 4-11 for **remote** (CEP server and WAS server on separate machines) or Figure 4-12 for **local** (same machine as WAS server) as follows:

Table 4-8. WAS JMX Expert Properties: WebSphere	
Element	Description
Agent connector type	Type of connector to use. (SOAP or RMI)
Connector host name	Host name of computer running JMX agent and connector. Default is localhost.
Connector port	TCP/IP port number of the connector on the JMX agent. Use the default value of 8880 unless otherwise instructed by a WebSphere administrator.
MBean filter	Show MBeans whose names only match this filter.
Sample time threshold (sec.)	MBean sample time threshold in seconds. Triggers reconnect once crossed.
Sampling interval (sec.)	Sampling frequency in seconds. Default is 300 seconds.
SAS configuration URL	URL to the SAS configuration file.
Short name keys	Comma-separated keys for shortening MBean names.
SOAP configuration URL	URL to the SOAP configuration file.
SSL configuration URL	URL to the SSL configuration file.
WAS password	WAS password.
WAS security enabled	Used for local configuration.
WAS user name	Used for local configuration.

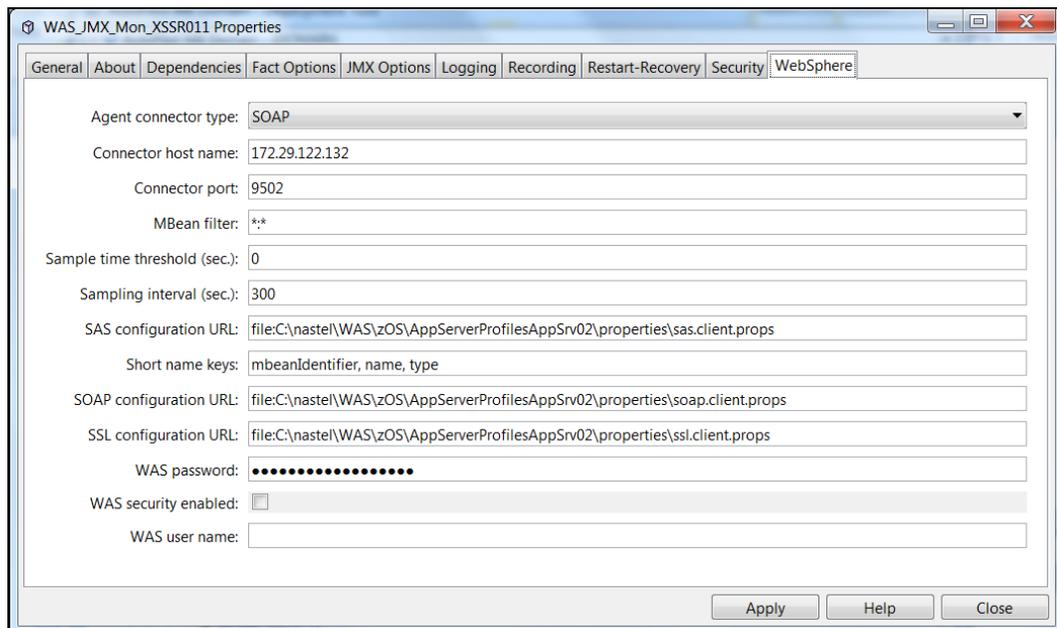


Figure 4-11. WAS JMX Expert WebSphere Remote Configuration

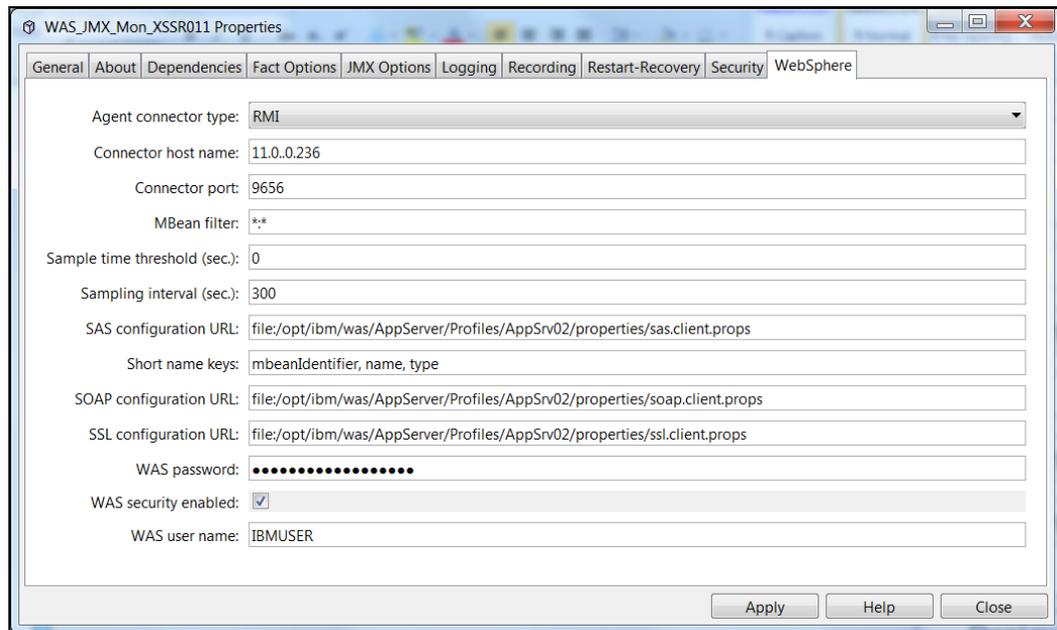


Figure 4-12. WAS JMX Expert WebSphere Local Configuration

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Chapter 5: WebSphere Application Server JMX Configuration Metrics

This section describes the WebSphere JMX metrics collected by WAS JMX expert. They are published as facts and are available under each expert. Once published, these facts can be included in one or more business views for validation, automation, notifications, logging and alerts.

The WAS JMX expert publishes these facts to indicate its status:

- **keep_connection** – Values can be “true” or “false.” True means keep JMS connection open between samples; false means to close/reopen for each sample. The control value is set from the JMX sensor properties JMX Options tab.
- **last_sample_time_ms** – The number of milliseconds spent in the most recent sampling cycle.
- **notifications** – Values can be “true” or “false.” True means subscribe to JMX notifications for all sampled MBeans. The control value is set from the JMX sensor properties JMX Options tab.
- **sample_count** – The total number of sampling cycles performed.
- **sample_time_overflow_count** – The number of times the sampling time for an MBean crossed the sample time threshold.
- **sampling** – Values can be “true” or “false.” Sampling values are true during initial sensor connection and facts publishing. The value is false when sampling completes.
- **status** – The status of the WAS JMX expert as described in the following table.

Fact Value	Description
Started	Expert is currently started.
Stopped	Expert is currently stopped.
Connecting	Expert is currently connecting to the WebSphere Application Server.
Connected	Expert is currently connected to the WebSphere Application Server.
Failed	Expert is currently in a failed state.
Working	Expert is currently getting information from the WebSphere Application Server.
Disconnected	Expert is currently disconnected from the WebSphere Application Server.

The expert gets all other facts from the WAS server. The names of these facts may vary with the version of the WAS server, the web applications installed, or the particular configuration of the WAS server.

5.1 Facts Published By WAS JMX Expert

The WAS JMX Expert publishes facts for each WAS MBean. The WAS MBeans are organized into JMX domains. Typically a WAS server has these JMX domains:

- JMImplementation
- WebSphere.

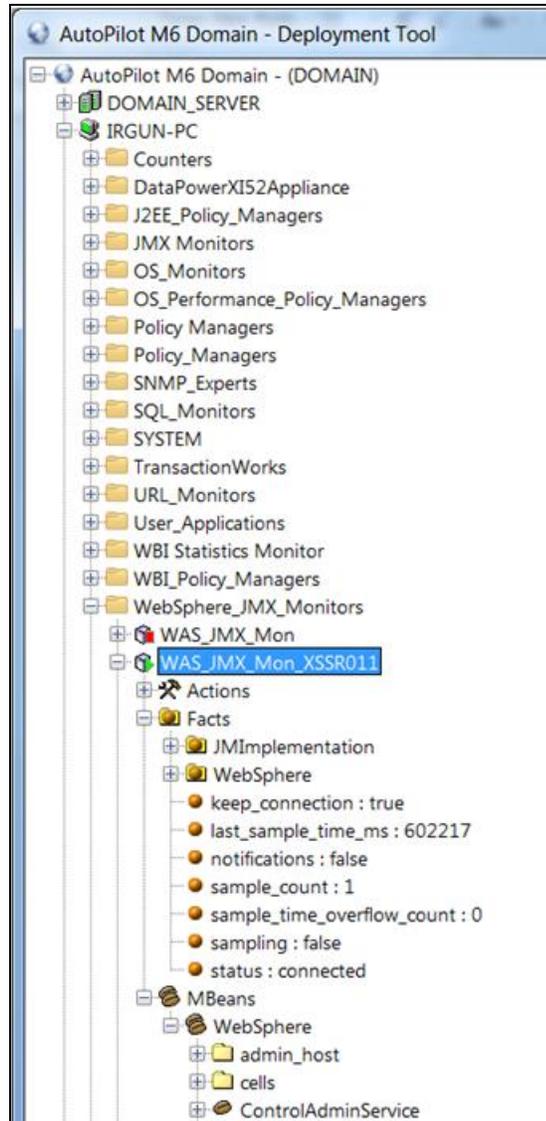


Figure 5-1. WAS JMX Expert Fact Tree

Appendix A: References

A.1 Nastel Documentation

Table A-1. Nastel Documentation	
Document Number (or higher)	Title
M6/INS 600.008	<i>AutoPilot M6 Installation Guide</i>
M6/USR 600.019	<i>AutoPilot M6 Administrator's Guide</i>
M6WMQ/INS 653.003	<i>AutoPilot M6 for WebSphere MQ Installation Guide</i>
M6WMQ/ADM 653.002	<i>AutoPilot M6 for WebSphere MQ Administrator's Guide</i>
M6WMQ/SM 653.001	<i>AutoPilot M6 for WebSphere MQ Security Manager User's Guide</i>
M6/WMQ 600.002	<i>AutoPilot M6 Plug-in for WebSphere MQ</i>
AP/TP 600.001	<i>AutoPilot/Transaction Monitor Probe for WebSphere MQ Installation, Configuration and User Guide</i>
M6/TM-USR 600.001	<i>AutoPilot M6/Transaction Monitor Installation and User Guide</i>

A.2 IBM Documentation

SC33-1872 WebSphere MQ Intercommunications

SC33-1369 WebSphere MQ MQSC Command Reference

SC34-5456 WebSphere MQ Using Java

<http://www-3.ibm.com/software/ts/mqseries/library/manuals/>

<http://www-3.ibm.com/software/ts/mqseries/support/summary/javasupp.html>

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Appendix B: Conventions

B.1 Typographical Conventions

Table B-1. Typographical Conventions	
Convention	Description
<u>Blue/Underlined</u>	Used to identify links to referenced material or websites. Example: support@nastel.com
Bold Print	Used to identify topical headings, glossary entries, and toggle or buttons used in procedural steps. Example: Click EXIT .
<i>Italic Print</i>	Used to place emphasis on a title, menu, screen name, or other categories.
Monospaced Bold	Used to identify keystrokes/data entries, file names, directory name etc.
<i>Monospaced Italic</i>	Used to identify variables in an address location. Example: [C:\ <i>AUTOPILOT_HOME</i>]\documents; where the portion of the address in brackets [] is variable.
Monospaced Text	Used to identify addresses, commands, scripts, etc.
Normal Text	Typically used for general text throughout the document.
Table Text	Table text is generally a smaller size to conserve space. 10, 9, and 8 point type is used in tables throughout the AutoPilot product family of documents.

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Glossary

AutoPilot M6: Nastel Technologies' Enterprise Application Management Platform. AutoPilot M6 monitors and automates the management of eBusiness integration components such as middleware application, application servers and user applications.

AP-WMQ: Nastel Technologies' WebSphere MQ management solution. Re-designated as AutoPilot M6 for WebSphere MQ with release 6.0. Abbreviated as AP/WMQ and AP-WMQ.

BSV: *see* Business View.

Business View (BSV): A collection of rules that define a desired state of an eBusiness environment. Business Views can be tailored to presents information in the form most suited to a given user, as defined by the user.

CEP Server: A container that can host any number of AutoPilot M6 services such as experts, managers, policies, etc. Name changed from managed node to CEP Server in AutoPilot M6, Service Update 6.

Client: Any programming component that uses the AutoPilot M6 infrastructure; for example, the AutoPilot M6 Console.

Console: The console acts as the graphical interface for AutoPilot M6.

Contacts: A subordinate to a given Manager or Expert.

Data Source Name: A logical name that is used by Open Database Connectivity (ODBC) to refer to the drive and other information that is required to access data. The name is use by Internet Information Services (IIS) for a connection to an ODBC data source, (e.g., Microsoft SQL Server database). The ODBC tool in the Control Panel is used to set the DSN. When the ODBC DSN entries are used to store the connection string values externally, you simplify the information that is needed in the connection string. This makes changes to the data source completely transparent to the code itself.

Dependent WebSphere MQ Node: WebSphere MQ nodes that are not directly managed by M6-WMQ. Because dependent nodes do not run an MQ WMQ Agent, they must be managed by proxy.

Deploy: To put to use, to position for use or action.

Domain Server: A specialized CEP server that maintains the directory of CEP servers, experts etc. The domain server is also capable of hosting experts, managers etc.

DSN: *See* Data Source Name.

EVT: Event Log file extension (e.g., *sample.evt*)

Event: An *Event* is something that happens to an object. Events are logged by AutoPilot M6 and are available for use by AutoPilot M6 Policies or the user.

Expert: Services that monitor specific applications such as an applications server, web-server or specific components within the applications (e.g., channels in WebSphere MQ.) Experts generate facts.

Fact: Facts are single pieces of data that have a unique name and value. One or more facts are used to determine the health of the object, application or server.

Graphical User Interface (GUI): A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, with the keyboard. Because the graphical user interface provides standard software routines to handle these elements and report the user's actions (such as a mouse click on a particular icon or at a particular location in text, or a key press); applications call these routines with specific parameters rather than attempting to reproduce them from scratch.

GUI: *See* Graphical User Interface.

Independent WebSphere MQ Node: A WebSphere MQ node that runs a WMQ Agent and which is managed directly by an MQ Workgroup server. Independent nodes can be used as proxy nodes for managing dependent nodes.

IIS: *See* Internet Information Services.

Internet Information Services: Microsoft's brand of Web server software, utilizing HTTP to deliver World Wide Web documents. It incorporates various functions for security, allows CGI programs, and also provides for Gopher and FTP services.

Java: A platform-independent, object-oriented programming language developed and made available by Sun Microsystems.

Java Developer's Kit (JDK): A set of software tools developed by Sun Microsystems, Inc., for writing Java applets or applications. The kit, which is distributed free, includes a Java compiler, interpreter, debugger, viewer for applets, and documentation.

JDBC: *See* Java Database Connectivity.

Java Database Connectivity (JDBC): The JDBC API provides universal data access from the Java programming language. Using the JDBC 2.0 API, you can access virtually any data source, from relational databases to spreadsheets and flat files. JDBC technology also provides a common base on which tools and alternate interfaces can be built. The *JDBC Test Tool* that was developed by Merant and Sun Microsystems may be used to test drivers, to demonstrate executing queries and getting results, and to teach programmers about the JDBC API.

Java Server Pages (JSP): JSP technology enables rapid development of web-based applications that are platform independent. Java Server Pages technology separates the user interface from content generation enabling designers to change the overall page layout without altering the underlying dynamic content. Java Server Pages technology is an extension of the Java Servlet technology.

Java Virtual Machine (JVM): The “virtual” operating system that JAVA-written programs run. The JVM is a hardware and operating system-independent abstract computing machine and execution environment. Java programs execute in the JVM where they are protected from malicious programs and have a small compiled footprint.

JDK: *See* Java Developer's Kit.

JRE: JAVA Run-time Environment. The minimum core JAVA required to run JAVA Programs.

JSP: *See* Java Server Pages.

JVM: *See* Java Virtual Machine.

M6 for WMQ: Nistel Technologies' WebSphere MQ management solution. Re-designated as M6 for WMQ with release 6.0, prior releases retain the AP-WMQ or MQControl trademark.

M6 Web: A browser-based interface that provides monitoring and operational control over managed resources and applications.

Management Information Base (MIB): A specification that describes the properties and behavior of a network device. Network managers use MIBs to interact with SNMP-compatible devices. Each MIB is part of a directory structure that specifies where objects are found on the network.

Manager: Managers are the home or container for policies. All business views must reside on managers, and manager must be deployed prior to deploying a business view or policy.

Message Queue Interface: The Message Queue Interface (MQI) is part of IBM's Networking Blueprint. It is a method of program-to-program communication suitable for connecting independent and potentially non-concurrent distributed applications.

MIB: *See* Management Information Base.

MOM: *See* Message-Oriented Middleware.

MQControl: Nastel Technologies' MQSeries management product. Re-designated as AP-WMQ with release 4.0 and M6 for WMQ with release 6.0. Prior releases retain the MQControl trademark.

MQI: *See* Message Queue Interface.

MQSC: *See* WebSphere MQ Commands

MQSeries: IBM's message queuing product. Renamed by IBM as WebSphere MQ.

Naming Service: A common server records "names" of objects and associates them with references, locations and properties.

Managed Node: A container that can host any number of AutoPilot M6 services such as experts, managers, policies, etc. As of AutoPilot M6 Service Update 6, managed node name has changed to CEP Server.

ORB: Object Request Broker.

Orbix: CORBA product distributed by IONA Technologies.

Package Manager: The command line utility that allows users to list, install, uninstall, verify and update AutoPilot M6 installation on any Managed Node.

PCF: *See* Programmable Command Format.

PKGMAN: *See* Package Manager.

Policy/Business Views: Business views are a collection of one or more sensors. Business views are used to visually present the health and status of the different systems as well as automatically issue remedial actions.

Programmable Command Format (PCF): A set of programmable commands that M6-WMQ uses to manage WebSphere MQ. PCF includes data definitions for items such as integers, strings, and lists. The commands can be submitted directly to a queue manager. PCF is comparable to MQSC, except for the fact that MQSC cannot be programmed.

Proxy Management: The indirect management of MQ objects by an intermediate entity. For example, a proxy queue manager might be used to handle another queue manager.

QSG: *See* Queue Sharing Group.

Queue Sharing Group (QSG): In z/OS, a group of queue managers in the same sysplex that can access a single set of object definitions stored in the shared repository, and a single set of shared queues stored in the coupling facility. The shared queue is a type of local queue. The messages on the queue are stored in the coupling facility and can be accessed by one or more queue managers in a queue-sharing group. The definition of the queue is stored in the shared repository.

Sensor: A rule that is used to determine the health of an object or application based on one or more facts. Actions can then be issued, based on health. Sensors are definable in AutoPilot business views by use of the sensor wizard.

Simple Mail Transfer Protocol (SMTP): A TCP/IP protocol for sending messages from one computer to another on a network. This protocol is used on the Internet to route e-mail. *See also* communications protocol, TCP/IP. *Compare* CCITT X series, Post Office Protocol.

Simple Network Management Protocol (SNMP): A de facto standard for managing hardware and software devices on a network. Each device is associated with a Management Information Base (MIB) that describes its properties and behavior.

SMTP: *See* Simple Mail Transfer Protocol.

SNMP: *See* Simple Network Management Protocol.

SNMP Master Agent: An implementation of the SNMP protocol. It includes a definition of the standard MIB. The master agent routes SNMP requests from subagent to subagent.

SNMP Subagent: The implementation of an MIB for a particular device. The MIB describes the device's desired behavior; the SNMP subagent carries it out.

TCP/IP: *See* Transmission Control Protocol/Internet Protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP): A protocol developed by the Department of Defense for communications between computers. It is built into the UNIX system and has become the de facto standard for data transmission over networks, including the Internet.

Virtual Machine: Software that mimics the performance of a hardware device, such as a program that allows applications written for an Intel processor to be run on a Motorola chip. *See* Java Virtual Machine.

WebSphere MQ: IBM's message queuing product. Formally known as MQSeries.

WebSphere MQ Commands: A command-line language used to configure WebSphere MQ.

Websphere_MQ_Manager: A specialized manager capable of hosting one or more MQSeries specific policies, apart from the regular policies.

Workgroup Server: Monitors WebSphere MQ nodes. A workgroup server consists of two agents, M6 managed node and workgroup.

Wireless Application Protocol (WAP): An open global specification that is used by most mobile telephone manufacturers. WAP determines how wireless devices utilize Internet content and other services. WAP enables devices to link diverse systems contents and controls.

WS: *see* Workgroup Server.

z/OS: *see* Z Series Operating System.

Z Series Operating System: IBM architecture for mainframe computers and peripherals. The zSeries family of servers uses the z/Architecture. It is the successor to the S/390 and 9672 family of servers.