

## Best Practices for Installing and Configuring IBM WebSphere Network Deployment Before Running SAS Deployment Wizard

This document addresses the best practices to use in preparing IBM WebSphere Application Server Network Deployment before running SAS Deployment Wizard to install and configure SAS Web applications.

SAS Deployment Wizard provides two choices for configuring WebSphere Application Server: manual and automatic. As a result, this document indicates when a recommendation is appropriate for each of these choices. When not explicitly indicated, the recommendation applies to both.

### Considerations for Configuring WebSphere Application Server

1. Be sure to check all software and hardware requirements for WebSphere Application Server based on your operating system:
2.
  - [System Requirements for WebSphere Application Server V7.0](#)
  - [Hardware and software requirements for WebSphere Application Server V7.0](#)
3. Select only those links in the IBM documentation that apply to the operating system. For WebSphere Application Server 7.0 installation, follow the documented IBM recommendations at these links:
  - The AIX section can be found at: [Preparing AIX systems for installation](#)
  - The Linux section can be found at: [Preparing Linux systems for installation](#)
  - The Solaris section can be found at: [Preparing Solaris systems for installation](#)
  - The Windows section can be found at: [Preparing Windows systems for installation](#)
  - The z/OS section can be found at: [Preparing z/OS systems for installation](#)
4. To avoid WebSphere Application Server port and name conflicts when you run SAS Deployment Wizard, it is preferable that the WebSphere Application Server installation that SAS Deployment Wizard uses have no other WebSphere Application Server profiles in it at the time that you run SAS Deployment Wizard and that no other WebSphere Application Server installations exist on the machine. See the next item to learn how to handle an exception to this best practice.
5. If you have separate SAS Web environments, such as one for a development configuration level, one for testing, and one for production, SAS recommends creating a WebSphere cell for each SAS Web environment. However, if the additional cells are on a single machine, you must manually configure WebSphere for all cells other than the first. You must manually configure subsequent SAS Web environments because you are given full control of port selections to avoid port conflicts. When SAS Deployment Wizard uses automatic configuration to install the first SAS

Web environment and to configure the first cell, it selects default port numbers. However, during manual configuration, you have an opportunity to specify alternative port numbers for additional SAS Web environments.

If you know that you will need to add multiple WebSphere Application Server cells to a single machine, SAS recommends that you use SAS Deployment Wizard to create the first WebSphere environment. Once SAS Deployment Wizard configures this environment, the default port numbers become unavailable for any other use. For subsequent SAS Web environments, manually configure WebSphere Application Server using the IBM Profile Management Tool for Windows or Linux systems, or use the WebSphere Application Server `manageprofiles` command to construct the `dmgr` and `appserver` node profiles. You can then choose unique port numbers knowing that the default port numbers are unavailable. More information about ports and manual configuration is available in this document.

7. For Windows operating environments, install with a user account that has Administrative authority. Review the [IBM Preparing Windows Systems](#) for installation web page for any other requirements for this user. For UNIX systems, as IBM recommends, install WebSphere Application Server using the root user account. If you are unable to use the root user account, IBM has documented limitations for non-root installers in article "[Non-root installation](#)" for WebSphere Application Server V7.0. Similarly, SAS provides the article "[Running SAS Deployment Wizard on UNIX with WebSphere and a Nonroot User Account](#)."
8. Install the product using the appropriate installation program for your operating environment. For example, for 32-bit Windows operating environments, `launchpad.bat` is typically used. However, because not all UNIX operating environments are supported by an equivalent `launchpad` script, use the installation executable found in the `WebSphere Application Server` directory on the install media or in an extracted installation archive (TAR file).
9. On the Installation Directory page of the WebSphere Application Server installation location, select the installation directory name carefully when the WebSphere Application Server installation program presents that opportunity.
  - The default location for Windows operating environments is the `Program Files` directory. Select the location that is appropriate for your installation.
  - For UNIX operating environments, be aware of these considerations for the WebSphere Application Server installation directory name:
    - The default location (`/usr` or `/opt`) is typically a file system anchored by the root volume group. Disk space limitations imposed by your installation for this root volume group might make the default installation location inappropriate. Select the installation file system with disk space in mind. See the [Hardware and software requirements for V7.0](#) for the specific disk space requirements.
    - Do not use spaces in names of the directories for WebSphere Application Server installation. Spaces in filenames and directories for UNIX operating environments are considered unconventional. In addition, spaces in directory names on UNIX operating environments complicate alteration of deployed SAS Web applications, if that becomes necessary.
10. During WebSphere Application Server installation, the WebSphere Application Server installation wizard may display a page containing a check box that you can use to enable

WebSphere Application Server Administrative Security. This check box is selected by default and enables WebSphere Application Server Administrative Security.

SAS recommends that you deselect this check box to disable WebSphere Application Server Administrative Security if you plan to run SAS Deployment Wizard and to choose automatic WebSphere Application Server configuration. (You can easily enable WebSphere Application Server Administrative Security after SAS Deployment Wizard completes automatic configuration.) If you enable WebSphere Application Server Administrative Security before you run SAS Deployment Wizard with the automatic configuration choice, it unnecessarily complicates the WebSphere Application Server configuration that SAS Deployment Wizard performs. If you plan to manually configure WebSphere Application Server instead, enabling or disabling WebSphere Application Server Administrative Security during WebSphere Application Server installation is a matter of preference.

11. Among the final pages that the WebSphere Application Server installation wizard displays, a question appears about whether to create an environment for your WebSphere Application Server installation.

If you plan to use SAS Deployment Wizard to automatically configure WebSphere Application Server, SAS recommends that you select None. (Do not create any profiles at this time.) In this case, the WebSphere Application Server installation wizard warns you that WebSphere Application Server will not be operational without definition of an environment. You can safely ignore this warning because the profiles necessary to make WebSphere Application Server operational for SAS Web applications are built during SAS Deployment Wizard automatic WebSphere Application Server configuration.

If you choose to configure WebSphere Application Server manually instead of letting SAS Deployment Wizard configure it automatically, the decision to build an environment has no consequence. For manual WebSphere Application Server configuration to support SAS Web applications, creation of the necessary profiles and servers, and customization of necessary WebSphere Application Server components (such as JMS, JDBC, MailSession, and JAAS Login Modules) is described in the Instructions.html file that SAS Deployment Wizard generates.

12. Check that IBM maintenance software has been applied. The minimum WebSphere Application Server 7.0 required maintenance for SAS is Fix Pack 13. See [Fix list for IBM WebSphere Application Server version 7.0](#).

**Note:** Before applying service to any WebSphere Application Server installation, make sure that all servers, node agents, and dmgrs are stopped. Also, perform a backupConfig operation for each profile that exists.

**Caution:** If you use the Maintenance Download Wizard to download maintenance Fix Packs for WebSphere and you have selected to download more than one maintenance package with it, confirm that you have a .pak file for each package you chose to download. Security settings on your browser may interfere with getting more than one file during a download by the Maintenance Download Wizard.

13. If synchronization of the dmgr and nodeagent fails due to timeouts during auto configuration of WebSphere when running the Software Deployment Wizard, the timeout values can be increased. To increase the timeout value, set either the SOAP timeout (if using the SOAP

protocol) or the RMI timeout (if using the RMI protocol) for the dmgr to nodeagent communications.

## Considerations Before Running SAS Deployment Wizard

1. As mentioned in the previous section, if you choose to let SAS Deployment Wizard configure WebSphere Application Server automatically, then all necessary profiles, servers, and customization of components is completed automatically. The use of profiles enables WebSphere Application Server to isolate runtime files, which may be changed by WebSphere Application Server maintenance, from configuration files, which are not typically affected by WebSphere Application Server maintenance. A profile defines the environment for WebSphere Application Server runtimes. This includes creating these items:
  - A deployment manager profile that is used to contain the dmgr server and manage the SAS application server node.
  - An application server node profile that is used to contain the node agent and SAS application server(s) that host the SAS Web applications. The node is also automatically federated to the dmgr server.
  - Complete definitions for all the resources that the SAS Web applications require. These resources include JDBC, JMS, Service Integration Bus, Mail Server, JAAS Login Modules, and so on.
  - Customization of the servers (in particular the dmgr and application server hosting the SAS Web applications) with respect to customizing the JVM properties and generic JVM options tailored for performance of the SAS Web applications.
2. The steps that are required to manually configure WebSphere Application Server using the WebSphere Integrated Solutions Console (known as the *administrative console*) are described in an `Instructions.html` file that SAS Deployment Wizard generates. Follow these instructions carefully to ensure successful configuration of the WebSphere Application Server environment for SAS Web applications.

**Note:** Manual WebSphere Application Server configuration assumes a high level of skill in using the administrative console and good familiarity with customizing and configuring WebSphere Application Server. Refer to the “SAS Configuration Scripting Tools” chapter in the *SAS Intelligence Platform: Middle-Tier Administration Guide* if you want to use the scripting tool as an alternative to performing a manual configuration.
3. When SAS Deployment Wizard automatically configures WebSphere Application Server, it builds two profiles:
  - `SASDmgr01` – this is the default dmgr profile name. You can alter the name in SAS Deployment Wizard.
  - `SAS<host-name>01Node` – this is default node agent and application server profile name. You can alter the name in SAS Deployment Wizard.

The profile names you choose are used to create default names for these related WebSphere management objects:

- SASDmgr01Cell – this is the default cell name containing the objects to manage the SAS Web applications. This name is derived from the dmgr profile name.
  - SASDmgr01Node – this is the default node name containing the dmgr server. This name is derived from the dmgr profile name.
  - SAS<host-name>01Node – this is the default node name containing the node agent and the application server used by SAS. This name is derived from the application server profile name.
  - SASServer1 (and possibly SASServer2,...,SASServer11) – this is the default application server name for the application server that hosts the SAS Web applications. You can alter the name in SAS Deployment Wizard.
4. The automatic WebSphere Application Server configuration that SAS Deployment Wizard performs creates profiles with the names that are identified in the previous list. If a profile with the same name already exists, SAS Deployment Wizard reuses the profile. When SAS Deployment Wizard reuses a profile, it creates or updates the settings for the components related to SAS Web applications—such as JDBC, JMS, Mail Server, and JVM options. By reusing profiles, you can reuse any profiles that SAS Deployment Wizard created on a previous run if you need to add components on a subsequent SAS Deployment Wizard run.
  5. If you deliberately want to reuse profiles that you created during a previous SAS Deployment Wizard automatic WebSphere Application Server configuration, be sure the corresponding cell and node names that are derived from your selected profile names are unique and also exist. For example, if you let the dmgr profile default to SASDmgr01, the derived cell name is SASDmgr01Cell and the derived node name for the dmgr profile is SASDmgr01Node. If you want to reuse an existing SASDmgr01 profile, then the associated cell and node entities with names of SASDmgr01Cell and SASDmgr01Node must also exist. If these associated cell and node entities with these names do not exist, unpredictable results can occur.
  6. Before running SAS Deployment Wizard and choosing automatic WebSphere Application Server configuration, be sure that all application servers, node agents, and dmgr servers are stopped in all profiles. This is particularly important if they are components of profiles that SAS Deployment Wizard might reuse.
  7. For automatic WebSphere Application Server configuration in SAS Deployment Wizard, most ports are selected by WebSphere; however, certain dmgr, nodeagent, and appserver ports can be overridden by the SAS Deployment Wizard user. (See table in point 8 below). IBM documents the default ports that are typically selected for WebSphere Application Server V7.0 in [“Port number settings in WebSphere Application Server versions.”](#)

8. For automatic WebSphere Application Server configuration, SAS Deployment Wizard lets you alter some WebSphere Application Server server ports. The following table identifies ports that you can configure. SAS Deployment Wizard overlays port numbers with either the default values in this list or with port numbers that you provide in SAS Deployment Wizard. (See [http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp?topic=/com.ibm.websphere.migration.nd.doc/info/ae/ae/rmig\\_portnumber.html](http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp?topic=/com.ibm.websphere.migration.nd.doc/info/ae/ae/rmig_portnumber.html) for the default WebSphere port number assignments).

Name Used in SAS Deployment Wizard	Name Used in WebSphere Application Server	SAS Deployment Wizard Default Value and Description (alterable in the SAS Deployment Wizard)
dmgr HTTP Port	WC_adminhost	9060
dmgr HTTPS Port	WC_adminhost_secure	9043
dmgr RMI port	BOOTSTRAP_ADDRESS	9809
SASServer1 HTTP Port	WC_defaulthost	9080  Default ports when you request multiple servers in SAS Deployment Wizard: 9081 = SASServer2 9082 = SASServer3 9083 = SASServer4
SASServer1 HTTPS Port	WC_defaulthost_secure	9044  Default ports when you request multiple servers in SAS Deployment Wizard: 9045 = SASServer2 9046 = SASServer3 9047 = SASServer4
SASServer1 RMI Port	BOOTSTRAP_ADDRESS	9811  Default RMI ports when you request multiple servers in SAS Deployment Wizard: 9812 = SASServer2 9813 = SASServer3 9814 = SASServer4

Because there are so many port numbers for Websphere, only a few are exposed in the Software Deployment Wizard screens. The ports for SOAP or RMI and HTTP and HTTPS that appear on the Software Deployment Wizard screens are assigned an initial default value by the Software Deployment Wizard code. The following table documents these ports.

Server	Protocol	Default Port Assignment
Dmgr	SOAP	8879
	RMI	9809
	HTTP	9060
	HTTPS	9043
Nodeagent	SOAP	8878
	RMI	2810
SASServer1 (single or multiple)	HTTP	9080
	HTTPS	9443
	SOAP	8880
	RMI	9811
	ADMIN_HTTP	9061
	ADMIN_HTTPS	9044
SASServer2	HTTP	9081
	HTTPS	9444
	SOAP	8881
	RMI	9812
	ADMIN_HTTP	9062
	ADMIN_HTTPS	9045
SASServer3	HTTP	9082
	HTTPS	9445
	SOAP	8882
	RMI	9813
	ADMIN_HTTP	9063

	ADMIN_HTTPS	9046
SASServer4	HTTP	9083
	HTTPS	9446
	SOAP	8883
	RMI	9814
	ADMIN_HTTP	9064
	ADMIN_HTTPS	9047
SASServer5	HTTP	9084
	HTTPS	9447
	SOAP	8884
	RMI	9815
	ADMIN_HTTP	9065
	ADMIN_HTTPS	9048
SASServer6	HTTP	9085
	HTTPS	9448
	SOAP	8885
	RMI	9816
	ADMIN_HTTP	9066
	ADMIN_HTTPS	9049
SASServer7	HTTP	9086
	HTTPS	9449
	SOAP	8886
	RMI	9817
	ADMIN_HTTP	9067
	ADMIN_HTTPS	9050
SASServer8	HTTP	9087
	HTTPS	9450



	SOAP	8887
	RMI	9818
	ADMIN_HTTP	9068
	ADMIN_HTTPS	9051
SASServer9	HTTP	9088
	HTTPS	9451
	SOAP	8888
	RMI	9819
	ADMIN_HTTP	9069
	ADMIN_HTTPS	9052
SASServer10	HTTP	9089
	HTTPS	9452
	SOAP	8889
	RMI	9820
	ADMIN_HTTP	9070
	ADMIN_HTTPS	9053
SASServer11	HTTP	9091
	HTTPS	9453
	SOAP	8890
	RMI	9821
	ADMIN_HTTP	9071
	ADMIN_HTTPS	9054

9. Other than the ports in the previous table, you cannot alter named WebSphere Application Server ports using SAS Deployment Wizard. You must use the administrative console or manually edit the appropriate `serverindex.xml` file for the server to alter other ports.
10. If you plan to use nondefault ports and manually configure WebSphere Application Server, the recommended best practice is to create the necessary profiles before you run SAS Deployment Wizard. By doing this, you determine the complete list of the ports that the profiles use. When you run SAS Deployment Wizard, you are required to identify the five ports that are identified in Item 8 in this list. With this information and port usage in `Instructions.html`, you can determine

which port numbers are used and which ports are available. Because you have already created your own profiles, you can ignore steps about creating profiles in Instructions.html. Also be aware that the cell name, dmgr node name, application server name, and node name in the Instructions.html all follow SAS naming conventions. (See Item 3 in this list.) It is unlikely that the profiles that you create in your WebSphere Application Server environment will match these names and follow this convention. As a result, when you read Instructions.html, you must perform simple substitution of your cell, node, and server names for the corresponding names identified in Instructions.html.

11. Remember that the Instructions.html documentation that SAS Deployment Wizard generates explains all configuration steps. If you choose an automatic configuration, it describes the steps that SAS Deployment Wizard takes. If you choose manual configuration, it describes the steps that you must take to configure WebSphere Application Server for use with SAS Web applications.

## Settings for z/OS

The following manual settings are recommended for z/OS customers:

1. On z/OS, the profile names for the deployment manager and application server are always 'default'. When prompted by the SAS Deployment Wizard, do not specify any other value for the profile names.
2. SAS recommends that the following WebSphere Application Server environment variables be specified at the application server scope:  

```
private_bboo_skip_destroyjavaenv=1  
protocol_http_timeout_output_recovery=SESSION
```
3. The Resource Access Control Facility (RACF) OMVS segment for the SAS installer and SAS server user IDs must have CPUTIMEMAX(5000) and ASSIZEMAX(2147483647).
4. The SAS installer and WebSphere Application Server user IDs must be connected using the RACF to one another's groups.
5. WebSphere Application Server must run with `umask=002` in order for the SAS installer and WebSphere Application Server to share group write access.
6. For WebSphere on z/OS, follow the z/OS-specific installation steps listed in the BBODMINS member of the CNTL dataset, which is generated by the zPMT tool or the Interactive System Productivity Facility (ISPF) installation dialog.

## Recommended Manual Settings for z/OS

The following steps are for setting additional z/OS WebSphere specific requirements for installation:

1. The WebSphere system programmer creates the Cell, Node, and Application Server.
2. Ensure that the OMVS segment of the SAS installer and the SAS Server IDs have sufficient ASSIZEMAX and CPUTIMEMAX.

```
ALTUSER <sasinstid> OMVS (ASSIZEMAX (2147483647) CPUTIMEMAX (5000))
ALTUSER <sasservid> OMVS (ASSIZEMAX (2147483647) CPUTIMEMAX (5000))
```

- RACF connects the SAS installer ID group to the WebSphere Application Server ID's group.

```
CONNECT <sasinstid> GROUP (<wasgrpId>) OWNER (SYS1) AUTH (USE)
UACC (NONE)
CONNECT <wassrvId> GROUP (<sasgrpId>) OWNER (SYS1) AUTH (USE)
UACC (NONE)
```

- Program control <hlq>.LIBRARY and <hlq>.LIBE.
- From the WebSphere Admin Console, determine WebSphere Configuration Properties for SDW:

Click **System administration > Deployment manager > Ports:**

WebSphere Port Name	SDW Property Name
WC_adminhost	webappsrv.server.admin.http.port
WC_adminhost_secure	webappsrv.server.admin.https.port
SOAP_CONNECTOR_ADDRESS	webappsrv.server.admin.soap.port
BOOTSTRAP_ADDRESS	webappsrv.server.admin.rmi.port

Click **System administration > Node agents > nodeagent > Ports:**

WebSphere Port Name	SDW Property Name
SOAP_CONNECTOR_ADDRESS	webappsrv.websphere.node.soap.port
BOOTSTRAP_ADDRESS	webappsrv.websphere.node.rmi.port

Click **Servers > WebSphere application servers > server > Ports:**

WebSphere Port Name	SDW Property Name
WC_defaulthost	webappsrv.server.http.port
WC_defaulthost_secure	webappsrv.server.https.port
SOAP_CONNECTOR_ADDRESS	webappsrv.server.soap.port
BOOTSTRAP_ADDRESS	webappsrv.server.rmi.port

- Set these properties in **WebSphere Environment > WebSphere Variables > Scope:** server

```
private_bboo_skip_destroyjavaenv=1
protocol_http_timeout_output_recovery=SESSION
```

7. Use the following default configuration properties in the SDW (run `setup.rexx` with `-debug` to identify):

```
webappsrv.websphere.dmgr.profile.name=default  
webappsrv.websphere.appsrv.profile.name=default  
webappsrv.websphere.appsrv.node.name=SASAppSrv01Node  
webappsrv.server.name=<server short name>
```

## Recommended Reading

These URLs are current as of July 2011.

For WebSphere Application Server V7.0:

IBM Corporation, 2011: "Port number settings in WebSphere Application Server versions." IBM Information Center. Available at

[http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp?topic=/com.ibm.websphere.migration.nd.doc/info/ae/ae/rmig\\_portnumber.html](http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp?topic=/com.ibm.websphere.migration.nd.doc/info/ae/ae/rmig_portnumber.html).

IBM Corporation, 2011: "Non-root installation." IBM Information Center. Available at

[http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp?topic=/com.ibm.websphere.installation.nd.doc/info/ae/ae/cins\\_nonroot.html](http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp?topic=/com.ibm.websphere.installation.nd.doc/info/ae/ae/cins_nonroot.html).

SAS Institute, 2011. Third-Party Software Reference: *Running SAS Deployment Wizard on UNIX with a Nonroot User Account and IBM WebSphere Application Server*. Available at

[http://support.sas.com/resources/thirdpartysupport/v93/appservers/was\\_sdw\\_non\\_root.pdf](http://support.sas.com/resources/thirdpartysupport/v93/appservers/was_sdw_non_root.pdf).

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