



WebSphere Education



# Liu Yunchen

0531-88391698 [lyunc@sdu.edu.cn](mailto:lyunc@sdu.edu.cn)

*School of Computer Science & Technology*

## Shandong University





WebSphere Education



Welcome to:

**WA370 / VA370**

# **IBM WebSphere Application Server V7 Administration on Windows**

**ERC 1.0**

**Course introduction**





WebSphere Education



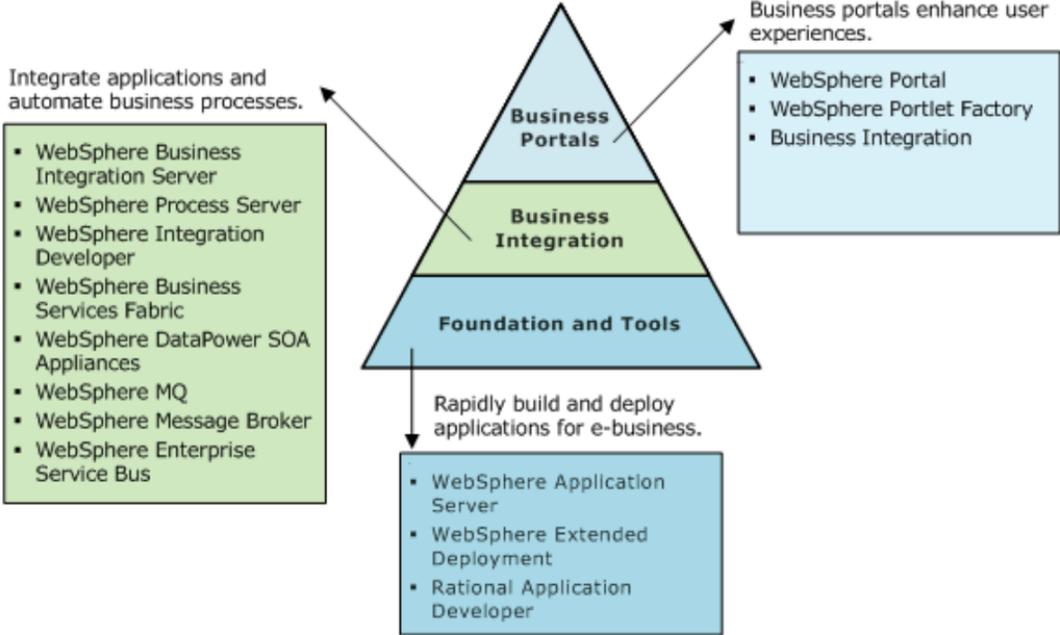
# WebSphere product family overview

# 1



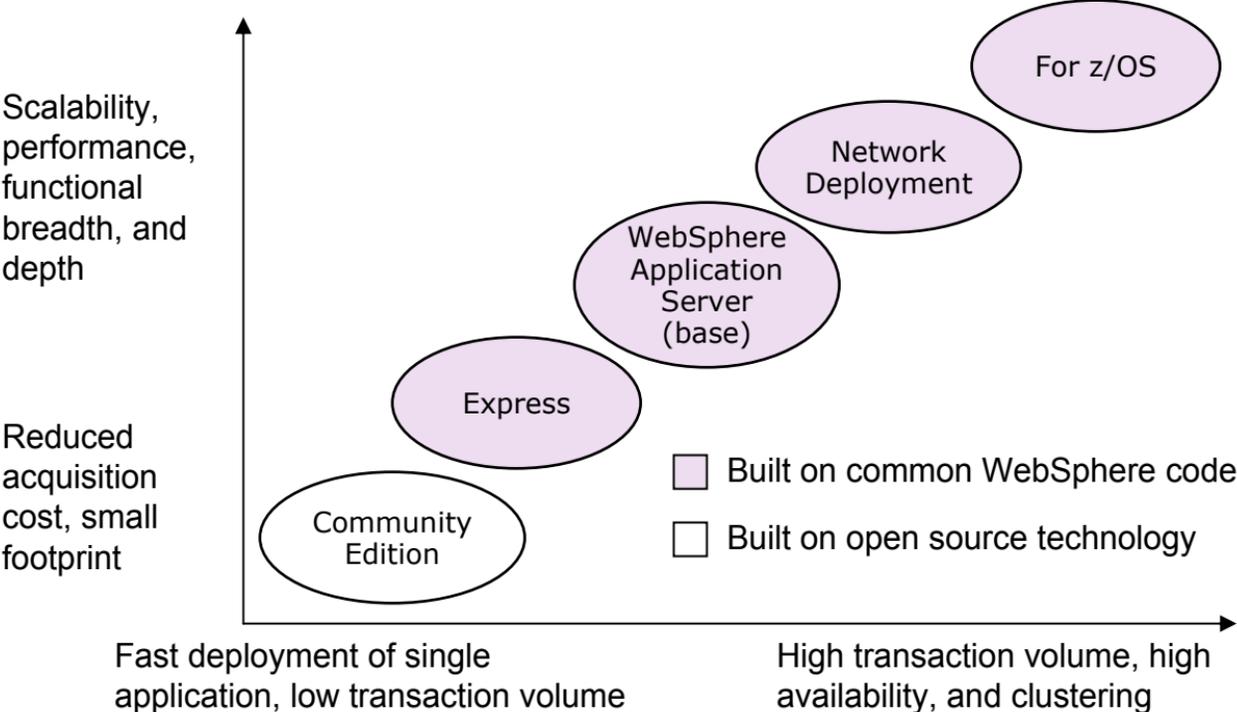
# WebSphere software platform

WebSphere software platform



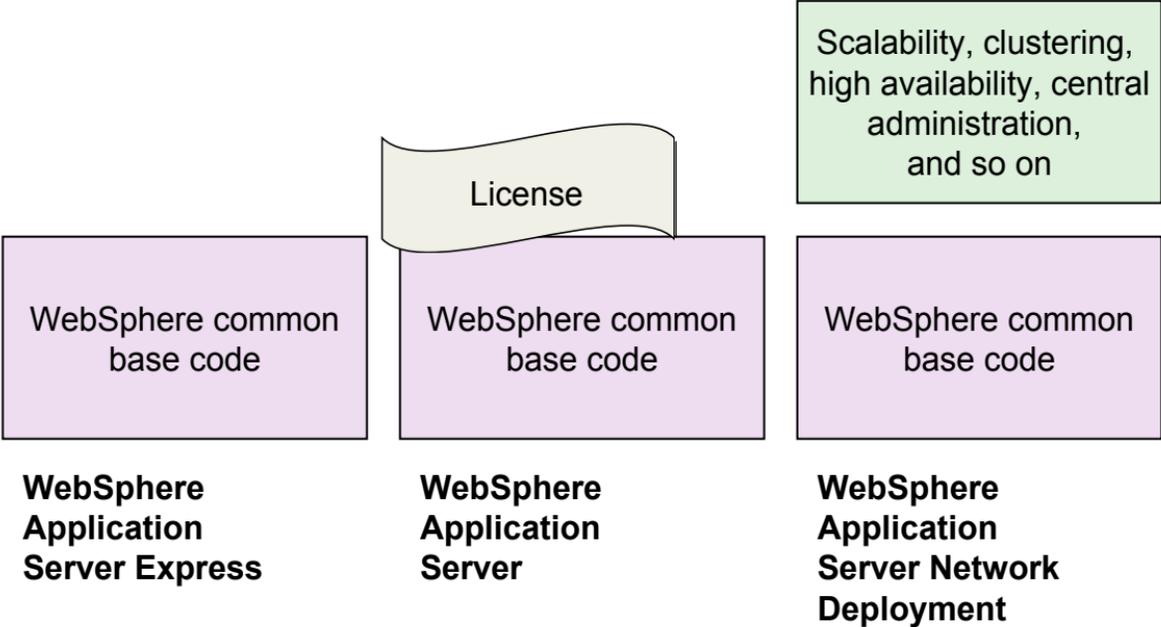
# WebSphere Application Server family

- Multiple deployment options; multiple business models



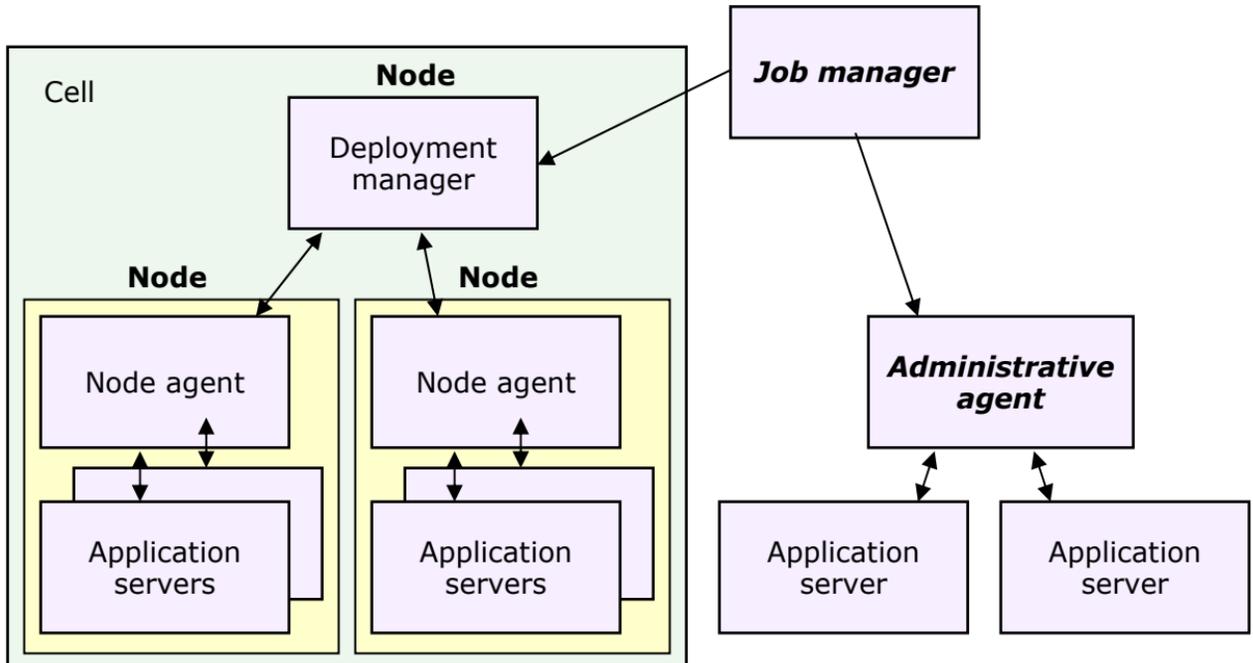
# WebSphere Application Server V7 packaging

---



# Flexible management

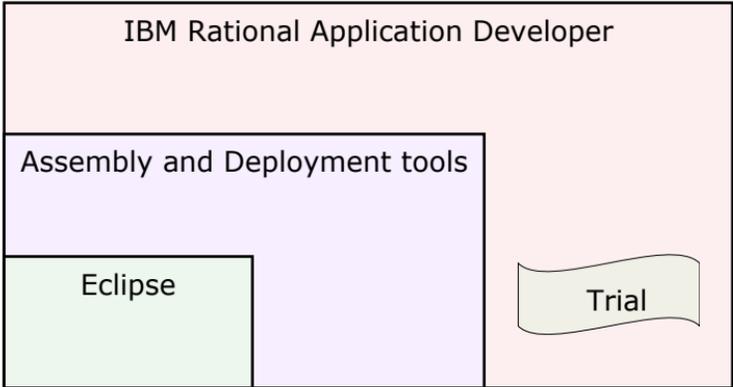
- Does not replace traditional cell model
- Coordinate management actions among multiple deployment managers
- Asynchronously administer multiple unfederated application servers



# Assembly and development tools

---

- IBM Rational Application Developer for WebSphere Software product provides supported assembly and deployment tools
  - The license for assembly and deployment capabilities does not expire
  - The license for development and other capabilities is available on a limited Trial basis



# Checkpoint

---

1. What is the main difference between the Express and base WebSphere Application Server editions?
2. Which WebSphere Application Server edition do you need if you want to deploy a single application with low transaction volume?
3. True/False: Flexible management replaces the old cell administration model.
4. True/False: You cannot use the assembly tools within Rational Application Developer with the trial license.

# Checkpoint solutions

---

1. What is the main difference between the Express and base WebSphere Application Server editions?
  - The Express edition license only covers two CPUs. The license for the base edition covers unlimited CPUs.
2. Which WebSphere Application Server edition do you need if you want to deploy a single application with low transaction volume?
  - Any edition will allow you to deploy a single application with low transaction volume.
3. True/False: Flexible management replaces the old cell administration model.
  - False
4. True/False: You cannot use the assembly tools within Rational Application Developer with the trial license.
  - False



WebSphere Education



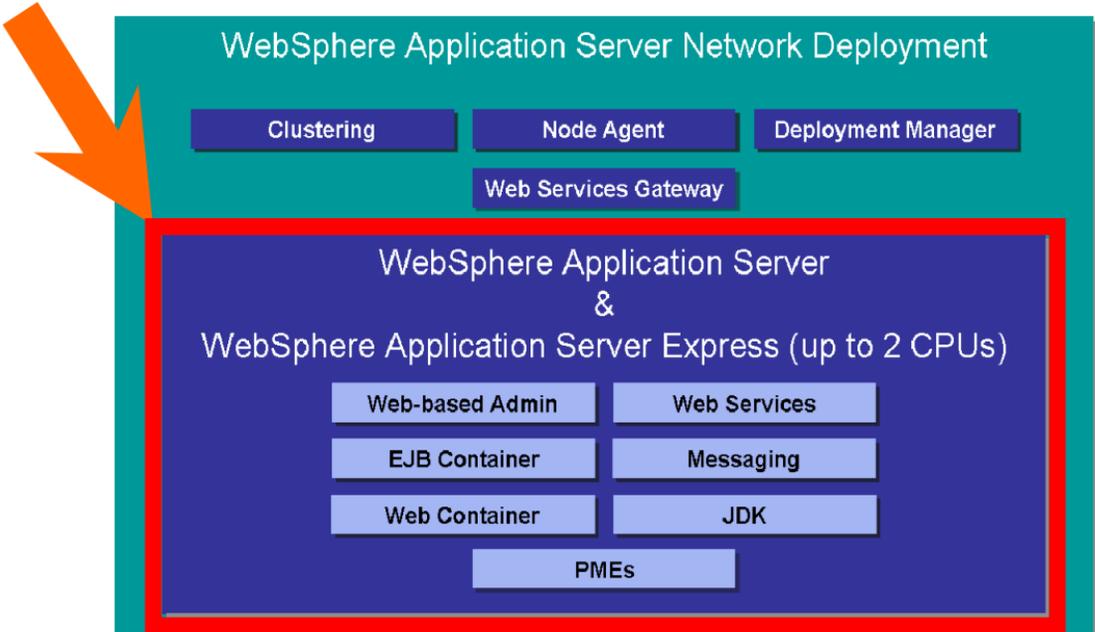
# WebSphere Application Server architecture — standalone

# 2



# Version 7 packaging

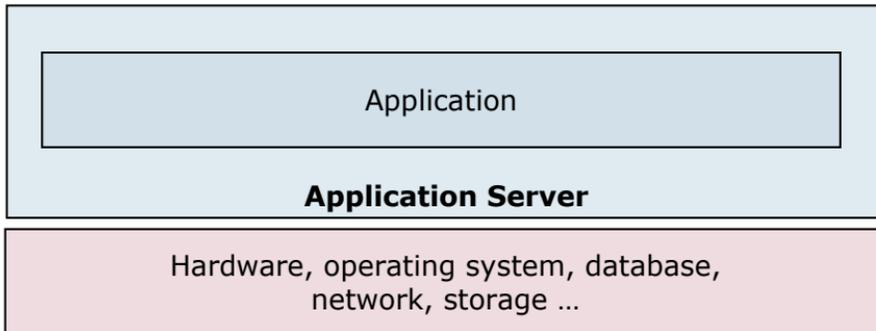
---



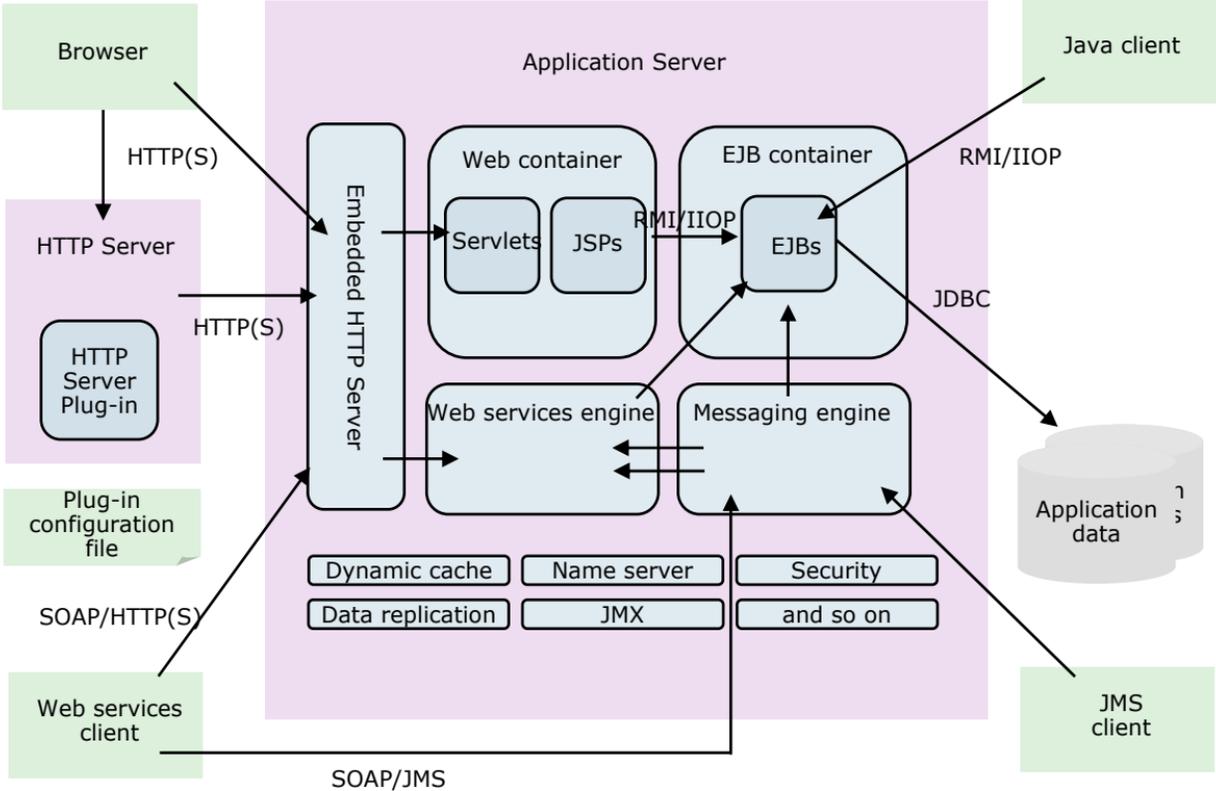
# WebSphere Application Server basics

---

- WebSphere Application Server
  - Is a platform on which Java-based business applications run
  - Is an implementation of the Java Enterprise Edition (JEE) specification
  - Provides services (database connectivity, threading, workload management, and so forth) that can be used by the business applications



# WebSphere architecture runtime (10 of 10)



# Removing enhancements

Install New Application

Specify options for installing enterprise applications and modules.

→ Step 1: Select installation options

Step 2 Map modules to servers

Step 3 Summary

### Select installation options

Specify the various options that are available to prepare and install

- Precompile JavaServer Pages files
- Directory to install application  
`${APP_INSTALL_ROOT}/\`
- Distribute application
- Use Binary Configuration
- Deploy enterprise beans
- Create MBeans for resources
- Override class reloading settings for Web and EJB modules

Reload interval in seconds

- Deploy Web services

Validate Input off/warn/fail  
warn

Process embedded configuration

- Resources can be viewed, but not through the normal screens.
  - Click **Application scoped resources** under the enterprise application

- Resources can be ignored.
  - Remove enhancements from EAR before deploying (preferred)
  - Uncheck **Process embedded configurations**
    - Will only be prechecked if there are enhancements

Enterprise Applications

[Enterprise Applications](#) > [TradeApplication](#) > Application scoped resources

Use this page to view the resources that are defined by the enhanced EAR within this application.

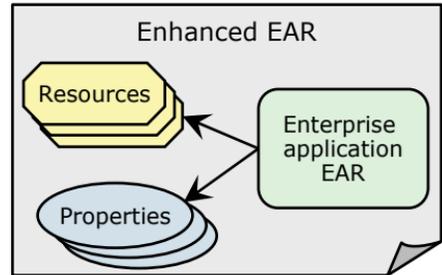
Preferences

Name	JNDI name	Resource type	Provider	Description
<a href="#">Trade</a>	jdbc/tradeds	DataSource	<a href="#">Trade</a>	Trade Datasource

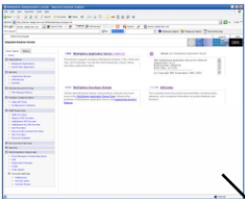
Total 1

# Enhanced EAR

- Enterprise archive containing Java EE artifacts plus resource information needed to install on WebSphere Application Server
  - JDBC resources (datasources)
  - Class loader
  - JAAS authentication aliases
  - Shared libraries
  - Virtual host information
- Benefits: improved productivity
  - Application resources and properties come with the application
  - Application install process creates the necessary resources within the server or cluster
  - Moving application from one server to another also moves the resources
- Support integrated with the IBM Rational Development and Assembly and Deployment tools
  - Found on Deployment page of application deployment descriptor
- **Warning:** Can possibly cause problems if unintended application scoped resources are used in production
  - Enhancements can be removed or ignored during application installation.

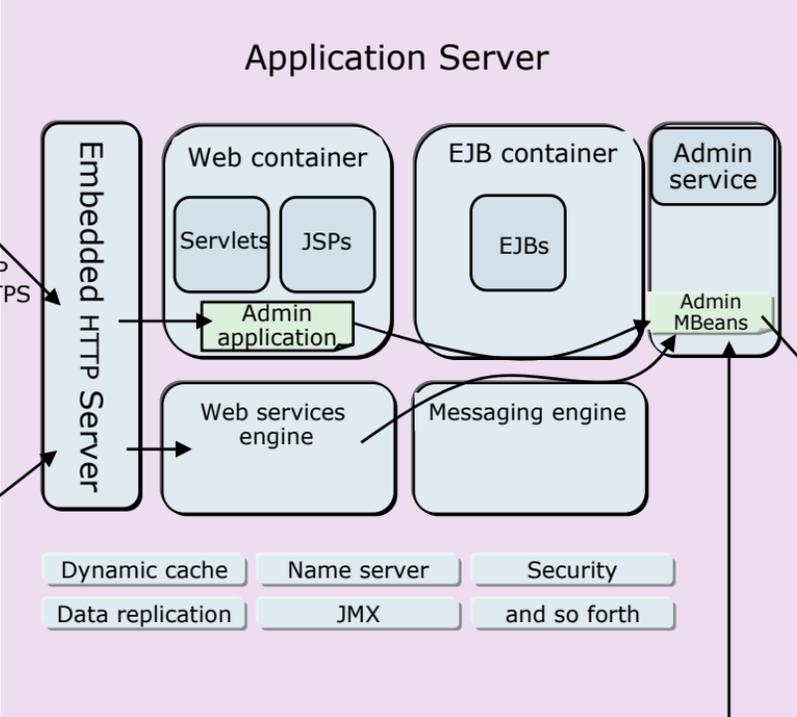


# WebSphere architecture administration (4 of 4)



Web-based administrative console

HTTP or HTTPS



XML configuration files

SOAP/HTTP

```
C:\> wsadmin
```

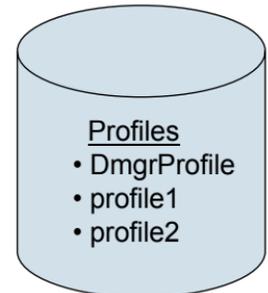
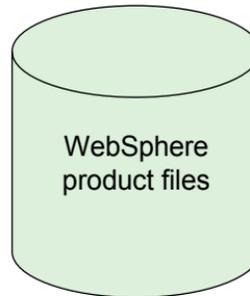
wsadmin command-line client

RMI/IIOP

# WebSphere profiles overview

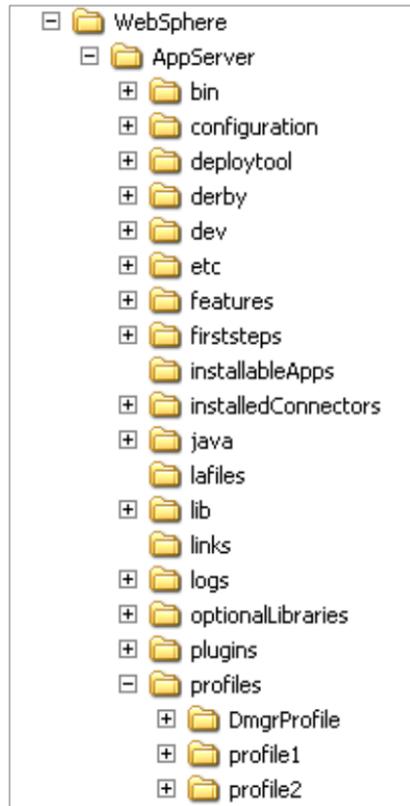
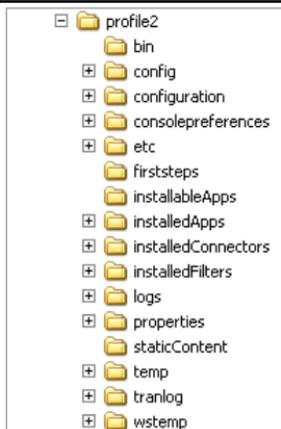
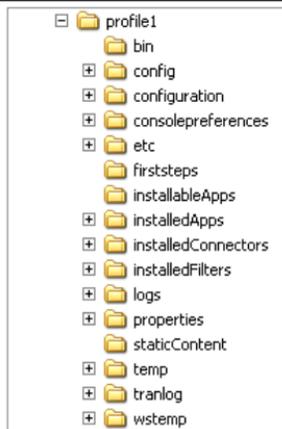
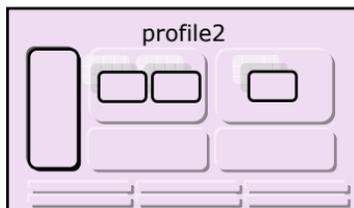
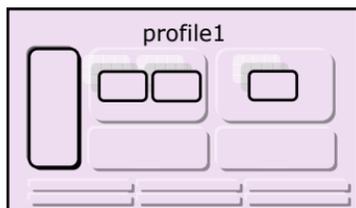
---

- Profiles are sets of files that represent a WebSphere Application Server configuration.
- WebSphere Application Server files are split into two categories:
  - Product files
    - Set of shared read-only static files or product binaries shared by any instances of the WebSphere Application Server product
  - Configuration files (profiles)
    - Set of user-customizable data files
    - Files include: WebSphere configuration, installed applications, resource adapters, properties, log files, and so forth



# WebSphere profiles benefits

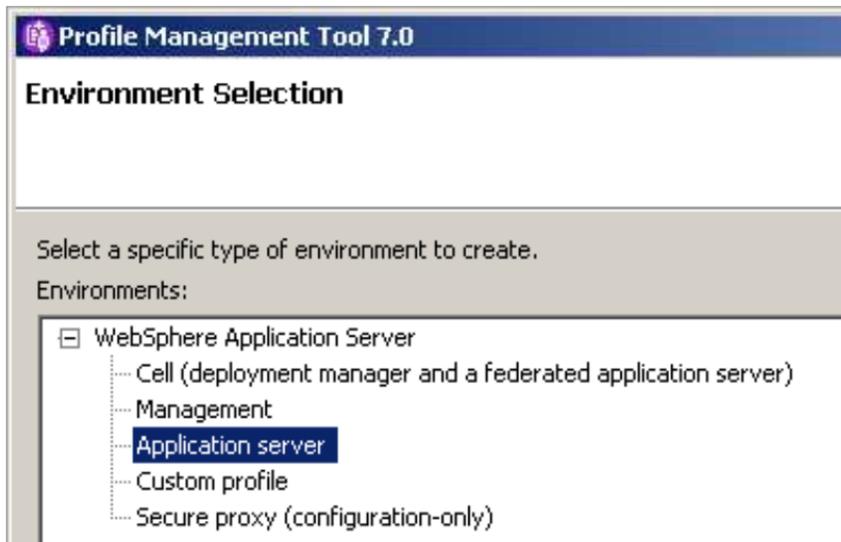
- Benefits of profiles:
  - Each profile uses the same product files.
  - Simpler than multiple WebSphere installations.
    - Less disk space
    - Simplifies application of product updates



# Profile types

---

- Cell
  - Deployment manager with a federated application server
- Management
  - Administrative agent
  - Deployment manager
  - Job manager
- Application server
  - Stand-alone
- Custom profile
  - Federated node  
(no application server)
- Secure proxy



# Checkpoint

---

1. Which of the following provides an environment for running servlets?
  - A. Client module
  - B. Web container
  - C. EJB module
  
2. Which type of JDBC driver is considered a “thick” driver?
  - A. Type 2
  - B. Type 3
  - C. Type 4
  
3. Which of the following are components contained within the application server’s JVM?
  - A. HTTP Server plug-in
  - B. Embedded HTTP Server
  - C. DB2 database

# Checkpoint solutions

---

1. Which of the following provides an environment for running servlets?
  - B. Web container
2. Which type of JDBC driver is considered a “thick” driver?
  - A. Type 2
3. Which of the following are components contained within the application server’s JVM?
  - B. Embedded HTTP Server



WebSphere Education



# WebSphere Application Server architecture — federated

# 3



# Version 7 packaging

---



## WebSphere Application Server Network Deployment

Clustering

Node Agent

Deployment Manager

Web Services Gateway

## WebSphere Application Server & WebSphere Application Server Express (up to 2 CPUs)

Web-based Admin

Web Services

EJB Container

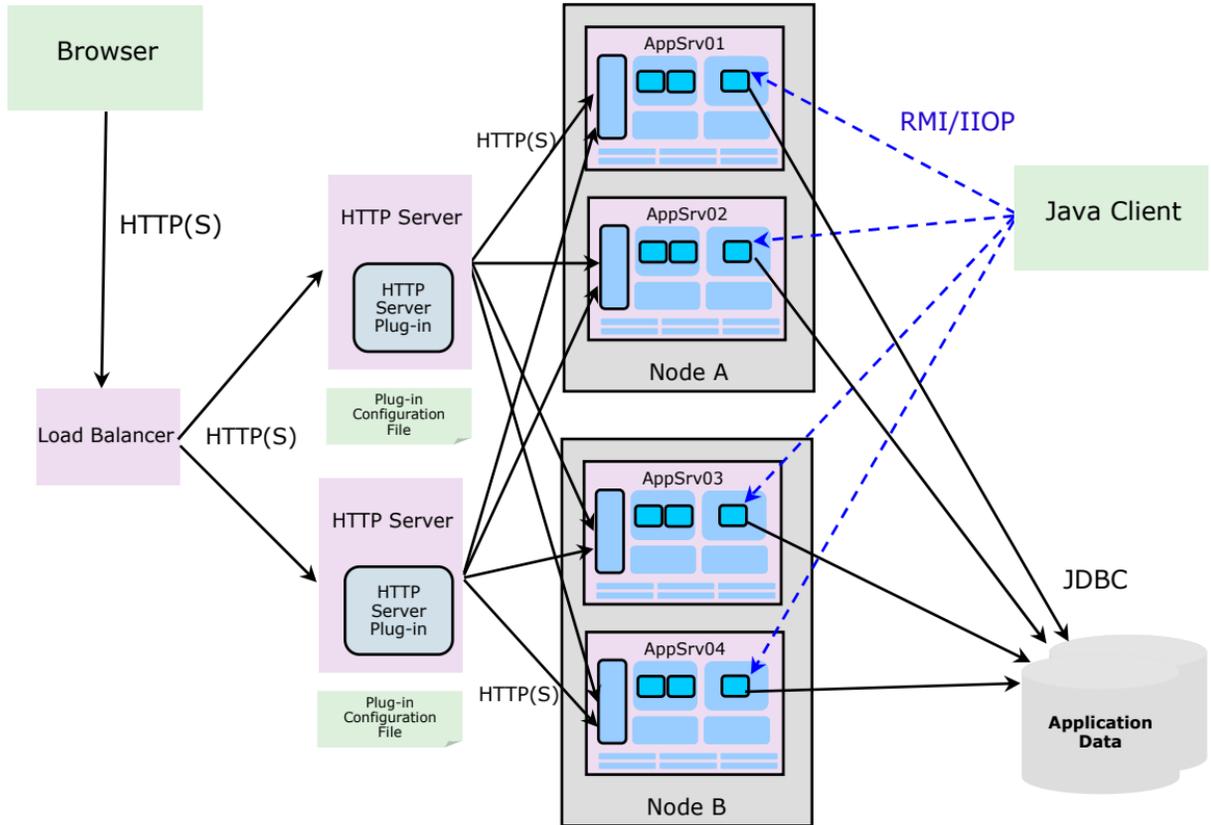
Messaging

Web Container

JDK

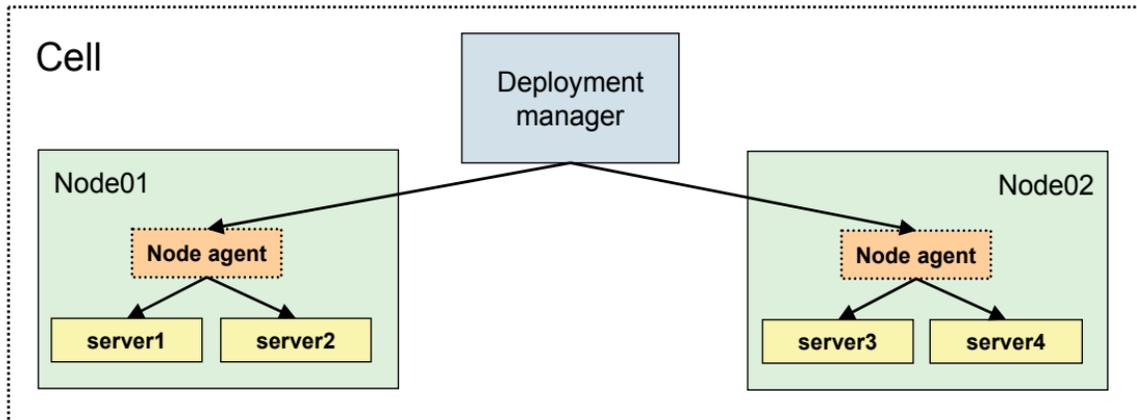
PMEs

# Network deployment runtime flow



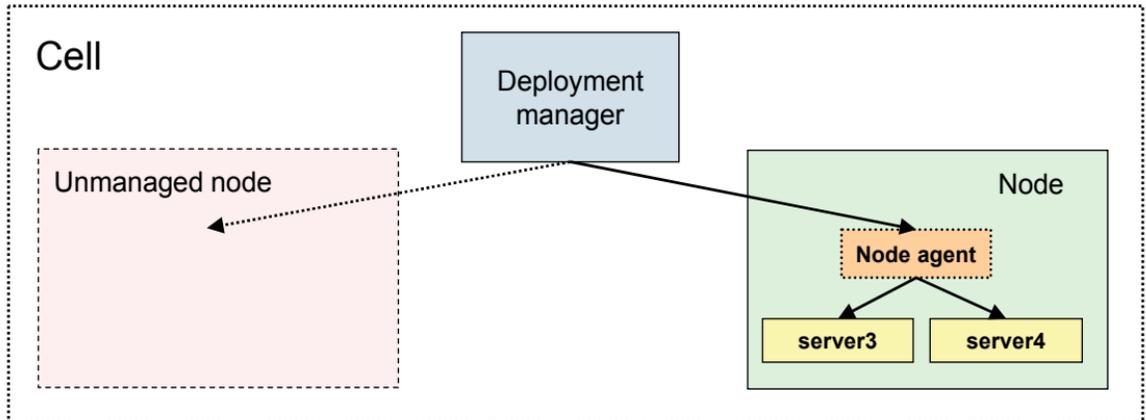
# Network deployment concepts

- A **deployment manager** (DMgr) process manages the node agents
  - Holds the configuration repository for the entire management domain, called a cell
  - Within a cell, the administrative console runs inside the DMgr
- A **node** is a logical grouping of application servers
  - Each node is managed by a single **node agent** process
  - Multiple nodes can exist on a single machine through the use of profiles



# Managed versus unmanaged nodes

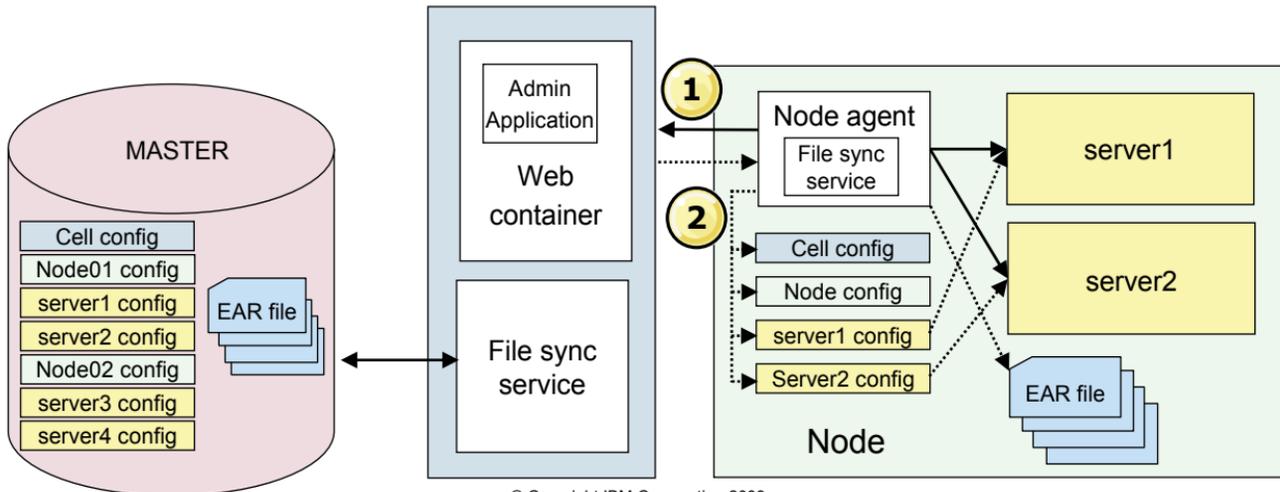
- A managed node is a node that contains a node agent
- An unmanaged node is a node in the cell without a node agent
  - Enables the rest of the environment to be aware of the node
    - Useful for defining HTTP servers as part of the topology
    - Enables creation of different plug-in configurations for different HTTP servers





# File synchronization

- Deployment manager contains the master configuration
- Node agents synchronize their files with the master copy
  - Automatically
    - At start up
    - Periodically
  - Manually
    - Administrative console
    - Command line
- During synchronization
  1. Node agent asks for changes to master configuration
  2. New or updated files are copied to the node



# WebSphere Network Deployment profiles

---

- Benefits of profiles in network deployment:
  - Think of profiles as representing a node
    - Can install multiple profiles on a single machine
  - All profiles use the same product files
    - **Application server** profile (stand-alone)
      - Equivalent to Base or Express application server
      - Has a node name and a cell name property, and corresponding directories
      - Cell directory is overwritten upon federation
    - **Deployment manager** profile
      - Creates a deployment manager
    - **Custom** profile (managed)
      - Creates a managed node which, by default, is federated into a cell
      - Creates a node agent, but no application servers
    - **Cell** profile
      - Creates both a deployment manager and a federated node
    - Others

# High availability overview

---

- High availability (HA) manager is used to eliminate single points of failure.
- High availability manager is responsible for running key services on available servers rather than on a dedicated one (such as the DMgr).
- Can take advantage of fault-tolerant storage technologies such as Network Attached Storage (NAS).
- Hot standby and peer failover for critical singleton services.
  - WLM routing, PMI aggregation, JMS messaging, transaction manager, and so forth.
  - Failed singleton starts up on an already-running JVM.
  - Planned failover takes < 1 second.

# Checkpoint

---

1. A process that handles communications with the resources within the node is \_\_\_\_\_.
2. During what process does the node agent check for changes to the master configuration?
3. What is a configuration that enables a host machine to resemble multiple host machines?
4. What defines the runtime environment for either the deployment manager or the application server?

# Checkpoint solutions

---

1. A process that handles communications with the resources within the node is the \_\_\_\_\_.
  - Node agent
2. During what process does the node agent check for changes to the master configuration?
  - File synchronization
3. What is a configuration that enables a host machine to resemble multiple host machines?
  - Virtual host
4. What defines the runtime environment for either the deployment manager or the application server?
  - Profiles



WebSphere Education



# WebSphere Application Server installation

# 4



# Software requirements — operating systems

---

- Supported operating systems include:
  - Windows
  - AIX
  - Sun Solaris
  - HP-UX
  - Linux/Intel, Linux/PowerPC, Linux for zSeries
  - IBM i
  - IBM z/OS
  
- For the latest specifics on versions and patch levels, check:
  - <http://www.ibm.com/software/webservers/appserv/doc/latest/prereq.html>

# Software requirements — Web servers

---

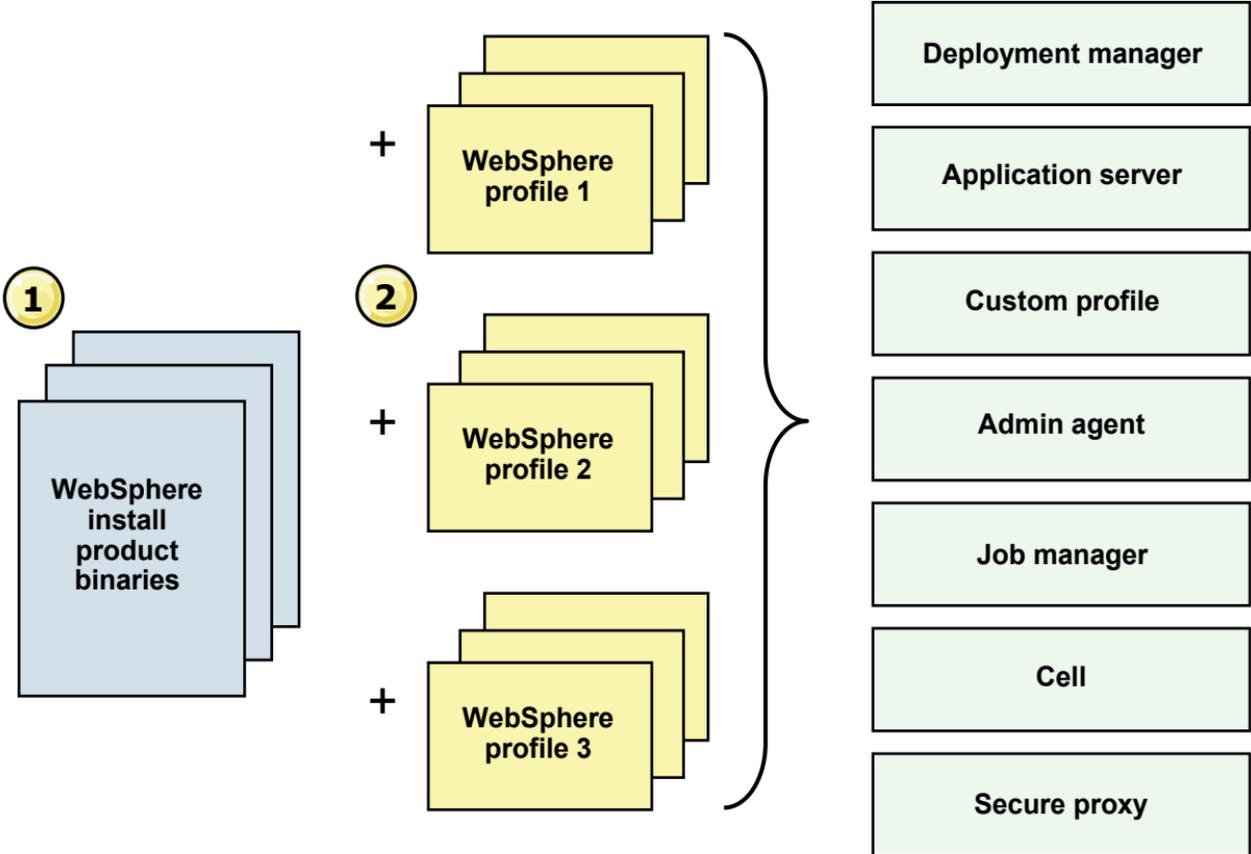
- Supported Web servers include:
  - Apache
  - IBM HTTP Server
  - Internet Information Server
  - Sun Java System Web Server
  - Lotus Domino
- For the latest specifics on versions and patch levels, check:
  - <http://www.ibm.com/software/webservers/appserv/doc/latest/prereq.html>

# Software requirements — database

---

- Supported database servers include:
  - IBM DB2
  - Cloudscape Derby
  - Oracle
  - Sybase
  - Microsoft SQL
  - Informix
  - IMS
  - WebSphere Information Integrator
- For the latest specifics on versions and patch levels, check:
  - <http://www.ibm.com/software/webservers/appserv/doc/latest/prereq.html>

# Installation overview



# Pre-installation tasks

---



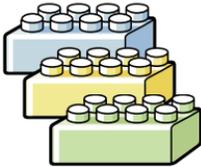
## Read the documentation

- WebSphere Information Center platform-specific tips for installing and migrating
- Install readme



## Installation media

- CD-ROM media
- Downloaded media



## Confirm hardware and software

- Obtain necessary products and maintenance
- Check WebSphere Web site for any maintenance



## TCP/IP networking

- Host name of node should be in DNS or local hosts file
- Host name of node should remain fixed
- DHCP not supported



## User ID

- Create and verify userid for starting services
- Verify userid for disk read/write access



## File systems and memory

- Enough space is available
- Enough memory is available

# Launchpad

The screenshot shows the WebSphere Application Server Network Deployment Launchpad. It features a navigation menu on the left and a main content area on the right. Three red callout boxes with yellow circles containing numbers 1, 2, and 3 highlight specific elements: 1. A red box around the top right header area containing the text 'Launchpad.exe from install CD'. 2. A red box around the left navigation menu, which lists various installation options. 3. A red box around a paragraph in the main content area that provides a recommendation to view installation diagrams and visit the WebSphere Information Center.

**1** Launchpad.exe from install CD

**2**

- Welcome
- WebSphere Application Server Installation
- IBM HTTP Server Installation
- Web Server plug-ins Installation
- WebSphere DMZ Secure Proxy Server Installation
- Application Clients Installation
- IBM Update Installer for WebSphere Software Installation
- IBM WebSphere Installation Factory
- IBM Edge Components
- IBM Support Assistant
- IBM Tivoli Composite Application Manager for WebSphere Application Server
- Exit

**3**

## Welcome to WebSphere Application Server Network Deployment

IBM WebSphere Application Server Network Deployment, Version 7.0 is an integrated platform that contains an Application Server, Web development tools, a Web server, and additional supporting software and documentation. This launchpad may serve as a single point of reference for installing your Application Server environment.

We recommend viewing the [installation diagrams](#) for illustrations of common application server environments. For full documentation visit the on-line [WebSphere Information Center](#).

**To begin**, select an entry from the list below to initialize a product installation wizard. Alternatively, select a product on the navigation list to left to read descriptions of the products, and browse help documentation and support links before starting an installation wizard.

- WebSphere Application Server Network Deployment
  - [Launch the installation wizard for WebSphere Application Server Network Deployment.](#)
- IBM HTTP Server
  - [Launch the installation wizard for IBM HTTP Server.](#)

# Installation — launching the installation wizard

The screenshot shows the WebSphere Application Server Network Deployment installation wizard launchpad. The window title is "WebSphere Application Server Network Deployment". The top navigation bar includes the WebSphere logo, the text "WebSphere. software", and the IBM logo. A "Language selection" dropdown menu is set to "English".

**Welcome**

WebSphere Application Server Installation

IBM HTTP Server Installation

Web Server plug-ins Installation

WebSphere DMZ Secure Proxy Server Installation

Application Clients Installation

IBM Update Installer for WebSphere Software Installation

IBM WebSphere Installation Factory

IBM Edge Components

IBM Support Assistant

IBM Tivoli Composite Application Manager for WebSphere Application Server

Exit

**Welcome to WebSphere Application Server Network Deployment**

IBM WebSphere Application Server Network Deployment, Version 7.0 is an integrated platform that contains an Application Server, Web development tools, a Web server, and additional supporting software and documentation. This launchpad may serve as a single point of reference for installing your Application Server environment.

We recommend viewing the [installation diagrams](#) for illustrations of common application server environments. For full documentation visit the on-line [WebSphere Information Center](#).

To **begin**, select an entry from the list below to initialize a product installation wizard. Alternatively, select a product on the navigation list to left to read descriptions of the products, and browse help documentation and support links before starting an installation wizard.

→ **WebSphere Application Server Network Deployment**  
Launch the installation wizard for WebSphere Application Server Network Deployment.

→ IBM HTTP Server  
Launch the installation wizard for IBM HTTP Server.

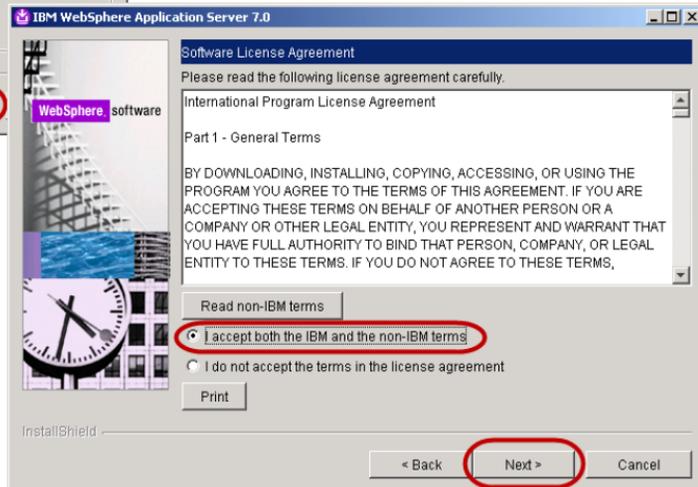
A red box highlights the "WebSphere Application Server Network Deployment" option, and a yellow circle with the number "1" is placed next to the "Exit" option in the left navigation pane.

# Installation — welcome and license agreement

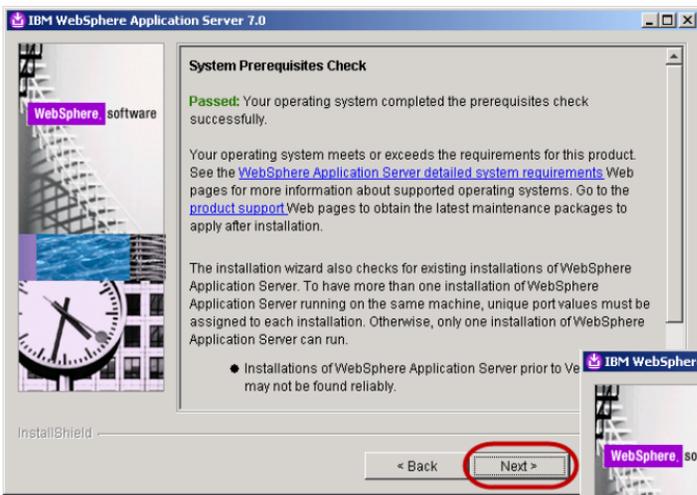


- 2 Welcome window includes information about documentation and support sites

- 3 License agreement window
- Read or print the license agreement
  - Accept the license agreement



# Installation — prerequisites and sample applications

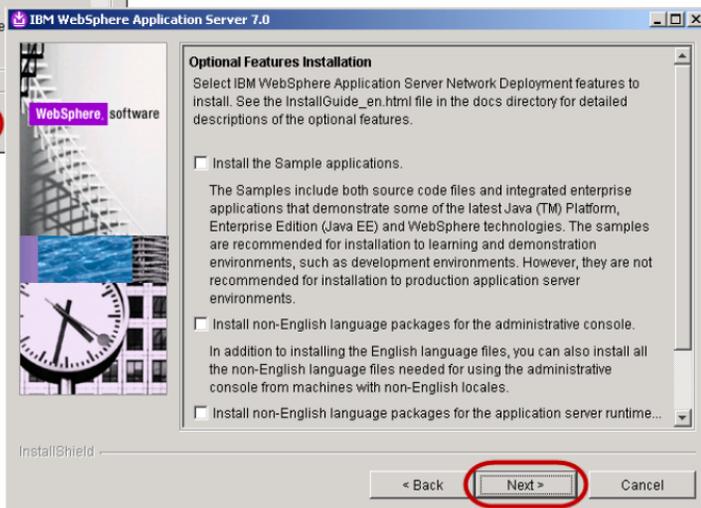


## 4 System prerequisites check

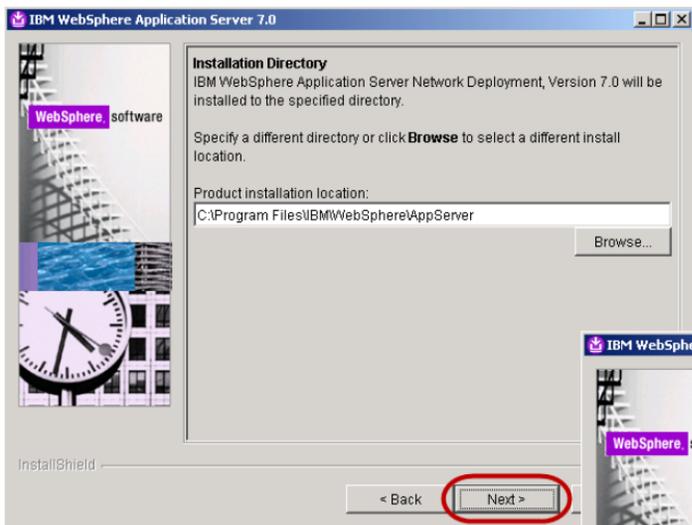
- Passed should be the status
- Links provided to review the required system prerequisites
- Checks for existing installations of WebSphere Application Server

## 5 Optional features installation

- Sample applications
- Non-English language packages for the administrative console
- Non-English language packages for the application server runtime environment



# Installation — install directory and environments

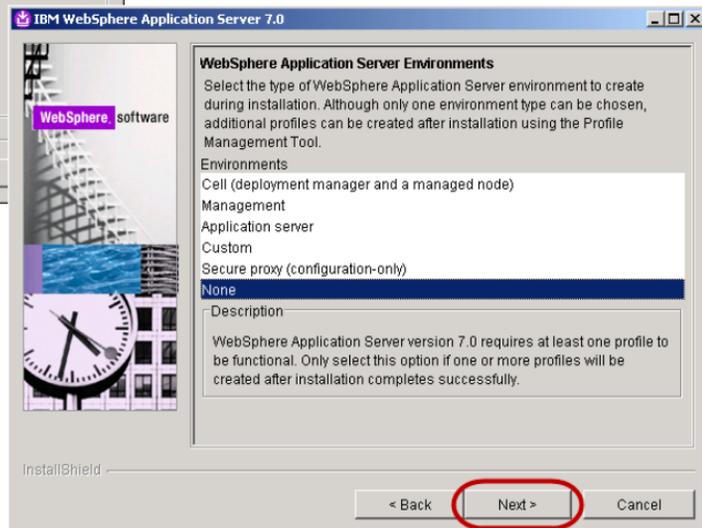


## 6 Installation directory

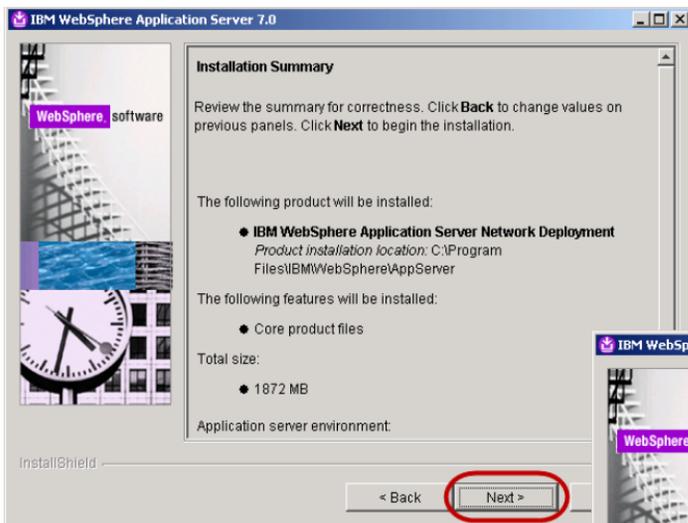
- Specify the directory location for the product installation

## 7 Environments

- Only one environment can be chosen
- If you specify none, you must create one when the installation is complete
- Profile Management Tool will be used to create profiles after installation



# Installation — summary and results

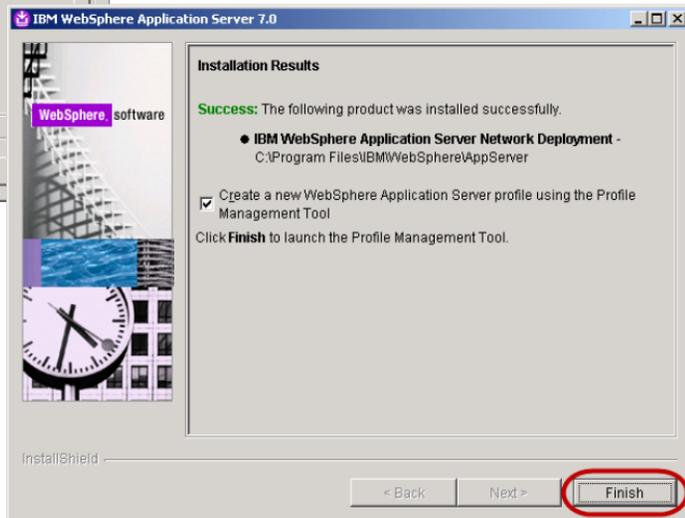


## 8 Installation summary

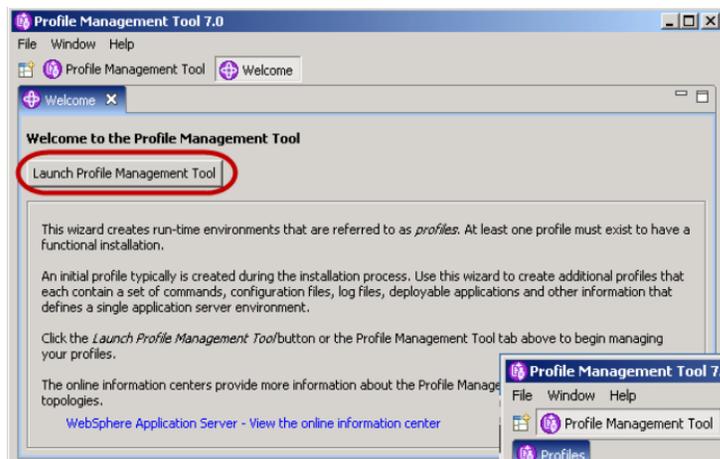
- The summary information is based on the selections you made previously
- Review the summary for correctness

## 9 Installation results

- Review the results
- If a profile was not created during installation, check the option to create one using the Profile Management Tool



# Profile Management Tool — launch and create

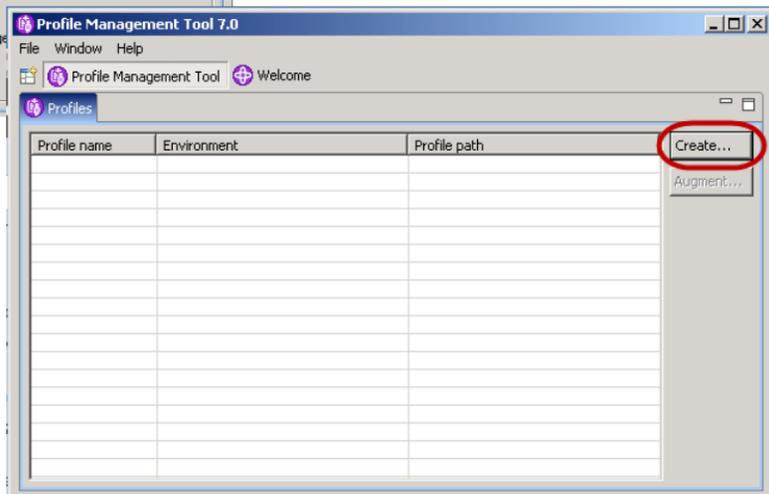


**1** Launch the Profile Management Tool

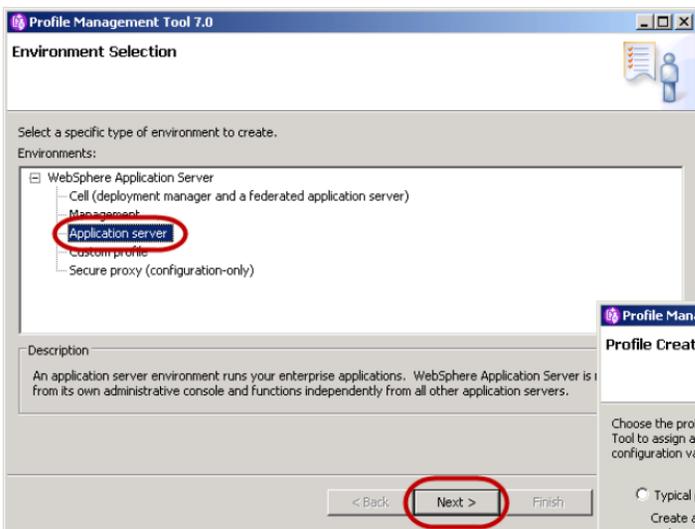
- Following installation, the Profile Management Tool welcome window appears.
- Click Launch Profile Management Tool to manage profiles

**2** Create a profile

- Profile list is initially empty
- Click Create



# Profile Management Tool — environment and options

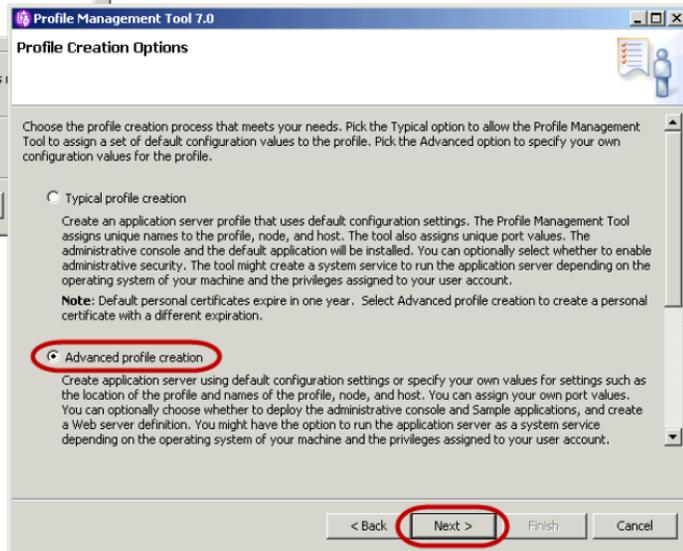


## 3 Environment selection

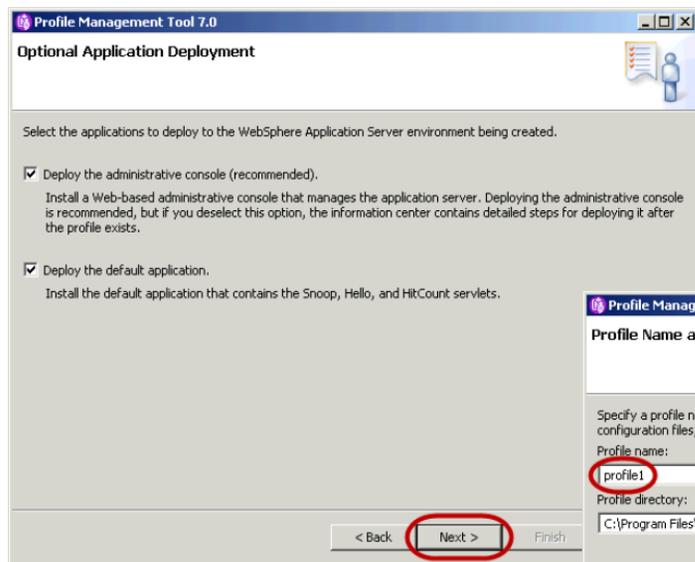
- A profile is associated with an environment type

## 4 Profile creation options

- Typical profile creation uses default configuration settings.
- Advanced profile creation allows you to accept default settings or specify your own.



# Profile Management Tool — options, name, and location



**Profile Management Tool 7.0**

### Optional Application Deployment

Select the applications to deploy to the WebSphere Application Server environment being created.

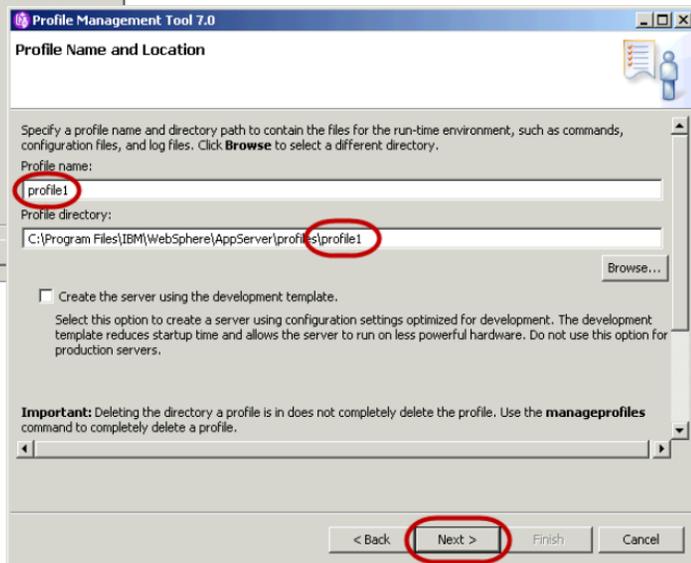
- Deploy the administrative console (recommended).  
Install a Web-based administrative console that manages the application server. Deploying the administrative console is recommended, but if you deselect this option, the information center contains detailed steps for deploying it after the profile exists.
- Deploy the default application.  
Install the default application that contains the Snoop, Hello, and HitCount servlets.

< Back **Next >** Finish

## 5 Application deployment options

- Administration console
- Default application

## 6 Profile name and location



**Profile Management Tool 7.0**

### Profile Name and Location

Specify a profile name and directory path to contain the files for the run-time environment, such as commands, configuration files, and log files. Click **Browse** to select a different directory.

Profile name:

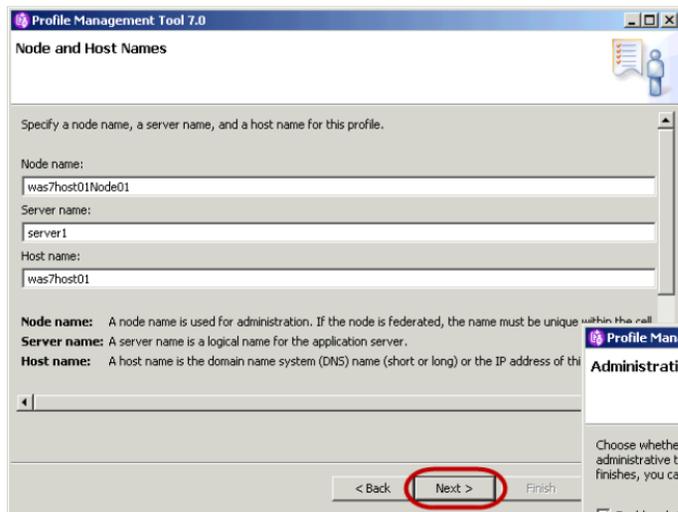
Profile directory:  
 Browse...

Create the server using the development template.  
Select this option to create a server using configuration settings optimized for development. The development template reduces startup time and allows the server to run on less powerful hardware. Do not use this option for production servers.

**Important:** Deleting the directory a profile is in does not completely delete the profile. Use the **manageprofiles** command to completely delete a profile.

< Back **Next >** Finish Cancel

# Profile Management Tool — names and security



Profile Management Tool 7.0

### Node and Host Names

Specify a node name, a server name, and a host name for this profile.

Node name:  
was7host01Node01

Server name:  
server1

Host name:  
was7host01

**Node name:** A node name is used for administration. If the node is federated, the name must be unique within the cell.

**Server name:** A server name is a logical name for the application server.

**Host name:** A host name is the domain name system (DNS) name (short or long) or the IP address of the

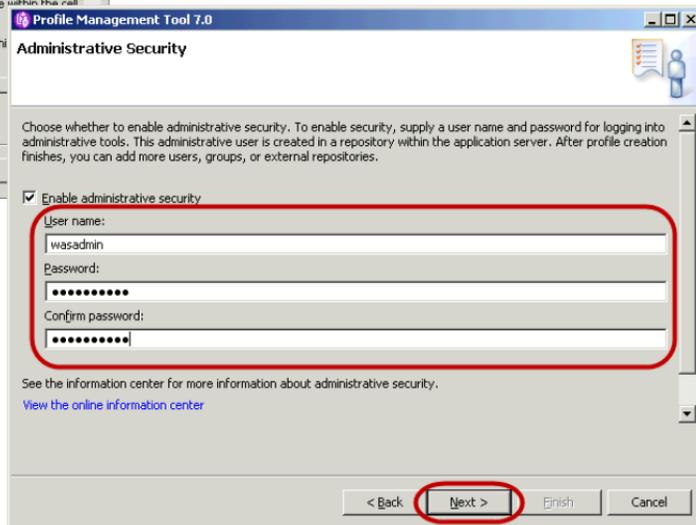
< Back **Next >** Finish

## 7 Profiles node and host names

- Node name
- Server name
- Host name

## 8 Specify administrative security

- User name and password
- More users can be added after the profile is created



Profile Management Tool 7.0

### Administrative Security

Choose whether to enable administrative security. To enable security, supply a user name and password for logging into administrative tools. This administrative user is created in a repository within the application server. After profile creation finishes, you can add more users, groups, or external repositories.

Enable administrative security

User name:  
wasadmin

Password:  
.....

Confirm password:  
.....

See the information center for more information about administrative security.  
[View the online information center](#)

< Back **Next >** Finish Cancel

# Profile Management Tool — security certificate (1 of 2)

Profile Management Tool 7.0

Security Certificate (Part 1)

Choose whether to create a default personal certificate and root signing certificate, or import them from keystores. To create new certificates, proceed to Part 2 and provide the certificate information. To import existing certificates from keystores, locate the certificates then proceed to Part 2 and verify the certificate information.

Create a new default personal certificate.  
 Import an existing default personal certificate.

Default personal certificate

Path:

Password:

Keystore type:

Keystore alias:

Create a new root signing certificate.  
 Import an existing root signing certificate.

Root signing certificate

Path:

Password:

Keystore type:

Keystore alias:

< Back **Next >** Finish Cancel

9

## Security certificate (part 1)

- Create or import a default personal certificate
- Create or import a root signing certificate

# Profile Management Tool — security certificate (2 of 2)

10

## Security certificate (part 2)

Profile Management Tool 7.0

Security Certificate (Part 2)

Modify the certificate information to create new certificates during profile creation. If you are importing existing certificates from keystores, use the information to verify whether the selected certificates contain the appropriate information. If the selected certificates do not, click **Back** to import different certificates.

Default personal certificate (a personal certificate for this profile, public and private key):

Issued to distinguished name:

Issued by distinguished name:

Expiration period in years:

Root signing certificate (personal certificate for signing other certificates, public and private key):

Expiration period in years:

Default keystore password:

Confirm the default keystore password:

# Profile Management Tool — ports and Windows service

**Profile Management Tool 7.0**  
Port Values Assignment

The values in the following fields define the ports for the application server and do not conflict with other profiles in this installation. Another installation of WebSphere Application Server or other programs might use the same ports. To avoid run-time port conflicts, verify that each port value is unique.

Default Port Values | Recommended Port Values

Administrative console port (Default 9060):	9060
Administrative console secure port (Default 9043):	9043
HTTP transport port (Default 9080):	9080
HTTPS transport port (Default 9443):	9443
Bootstrap port (Default 2809):	2809
SJP port (Default 5060):	5060
SJP secure port (Default 5061):	5061
SOAP connector port (Default 8880):	8880
Administrative interprocess communication port (Default 9633)(X):	9633
SAS SSL ServerAuth port (Default 9401):	9401

< Back | **Next >** | Finish

**11** Review port value assignments

**Profile Management Tool 7.0**  
Windows Service Definition

Choose whether to use a Windows service to run WebSphere Application Server. Windows services can start and stop WebSphere Application Server, and configure startup and recovery actions.

**Run the application server process as a Windows service.**

Log on as a local system account.  
 Log on as a specified user account.

User name:  
Administrator

Password:  
[Redacted]

Startup type:  
Automatic

The user account that runs the Windows service must have the following user rights:  
- Log on as a service

< Back | **Next >** | Finish | Cancel

**12** Specify Windows service option

# Profile Management Tool — Web server and summary

Profile Management Tool 7.0

### Web Server Definition

Optionally create a Web server definition if you use a Web server to route requests for dynamic content to the application server. Alternatively, you can create a Web server definition from the administrative console or a script that is generated during Web server plug-ins installation.

Create a Web server definition

Web server type:  
IBM HTTP Server

Web server operating system:  
Windows

Web server name:  
webserv1

Web server host name or IP address:  
was7host01

Web server port (Default: 80):  
80

< Back **Next >** Finish

**13** Optionally create a Web server definition

## **14** Profile creation summary

- The summary information is based on the selections you made previously
- Review the summary for correctness

Profile Management Tool 7.0

### Profile Creation Summary

Review the information in the summary for correctness. If the information is correct, click **Create** to start creating a new profile. Click **Back** to change values on the previous panels.

Application server environment to create: Application server  
Location: C:\Program Files\IBM\WebSphere\AppServer\profiles\profile1  
Disk space required: 200 MB

Profile name: profile1  
Make this profile the default: True

Node name: was7host01Node01  
Server name: server1  
Host name: was7host01

Deploy the administrative console (recommended): True  
Deploy the default application: True

Enable administrative security (recommended): True

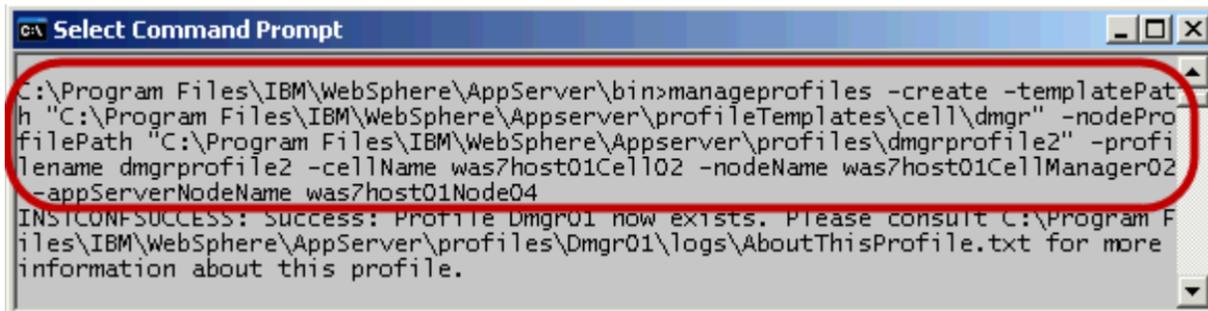
< Back **Create** Finish Cancel



# Profile creation — command-line tool

- The manageprofiles command line tool allows you to create, list, alter or delete profiles.

Manageprofiles -<mode> -<argument> <argument parameter>



The screenshot shows a Windows Command Prompt window titled "C:\ Select Command Prompt". The command entered is: `C:\Program Files\IBM\WebSphere\AppServer\bin>manageprofiles -create -templatePath "C:\Program Files\IBM\WebSphere\Appserver\profileTemplates\cell\dmgr" -nodeProfilePath "C:\Program Files\IBM\WebSphere\Appserver\profiles\dmgrprofile2" -profileName dmgrprofile2 -cellName was7host01Cell02 -nodeName was7host01CellManager02 -appServerNodeName was7host01Node04`. The command and its output are circled in red. The output is: `INSTCONFSUCCESS: Success: Profile Dmgr01 now exists. Please consult C:\Program Files\IBM\WebSphere\AppServer\profiles\Dmgr01\logs\AboutThisProfile.txt for more information about this profile.`

# First steps

WebSphere Application Server - First steps - profile1

WebSphere Application Server

IBM

## First steps

- Installation verification**  
Confirm that your server is installed and that it can start properly.
- Start the server**  
Start the server and its applications.
- Administrative console**  
Install and administer applications.
- Profile management tool**  
Work with profiles.
- Information center for WebSphere Application Server**  
Learn more about WebSphere Application Server.
- Migration wizard**  
Migrate WebSphere Application Server 5.1, 6.0 or 6.1 to version 7.0.  
Migrate WebSphere Application Server Feature Pack for Web Services to version 7.0.
- Exit**

Starts automatically after installation

# Installation verification

The image shows a screenshot of the WebSphere Application Server installation wizard. The main window is titled "WebSphere Application Server - First steps - profile 1". It features a navigation pane on the left with a yellow circle containing the number "1" next to the "Installation verification" step. The main content area shows the "Installation verification" step with the instruction: "Confirm that your server is installed and that it can start properly." Below this, there is a "Start the server" section with the instruction: "Start the server and its applications." An inset window titled "First steps output - Installation verification" displays a log of system messages. A red oval highlights the final two lines of the log: "VTL0070I: The installation Verification Tool verification succeeded." and "VTL0080I: The installation verification is complete." A yellow circle containing the number "2" is placed next to the second highlighted line. The log also shows several error messages from MBeanHelper and WSVR0626W from ThreadPools, but these are not highlighted.

**1** Installation verification

Confirm that your server is installed and that it can start properly.

**Start the server**

Start the server and its applications.

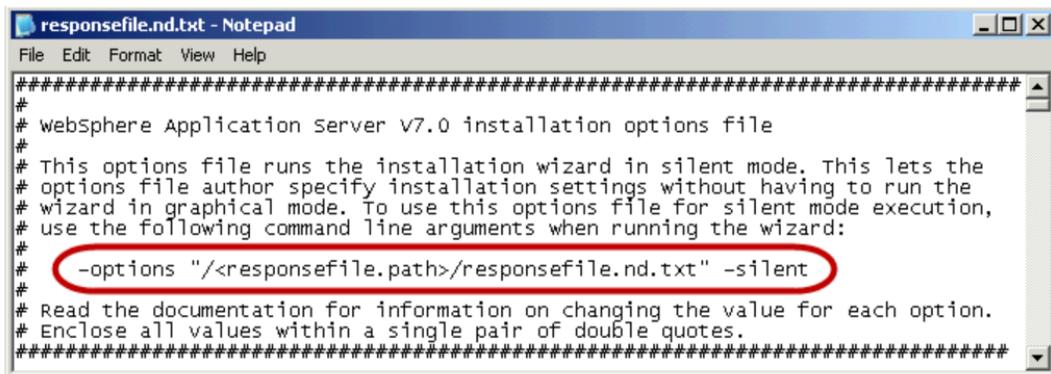
**First steps output - Installation verification**

```
[1/8/09 16:09:18:421 EST] 0000001c MBeanHelper E Could not invoke an operation on object: WebSphere:name=Plugin
[1/8/09 16:09:26:937 EST] 00000017 MBeanHelper E Could not invoke an operation on object: WebSphere:name=WebSe
[1/8/09 16:10:11:343 EST] 00000027 MBeanHelper E Could not invoke an operation on object: WebSphere:name=WebSe
[1/8/09 16:39:44:625 EST] 00000000 WSKeyStore W CWPJK0041W: One or more key stores are using the default passw
[1/8/09 16:39:50:265 EST] 00000000 ThreadPoolMgr W WSVR0626W: The ThreadPool setting on the ObjectRequestBroke
[1/8/09 16:48:33:593 EST] 00000015 webcontainer E com.ibm.ws.webcontainer.WebContainer handleRequest SRVE0255
[1/8/09 16:49:51:750 EST] 00000017 webcontainer E com.ibm.ws.webcontainer.WebContainer handleRequest SRVE0255
[1/8/09 14:28:43:453 EST] 00000000 WSKeyStore W CWPJK0041W: One or more key stores are using the default passw
[1/8/09 14:28:48:140 EST] 00000000 ThreadPoolMgr W WSVR0626W: The ThreadPool setting on the ObjectRequestBroke
[1/8/09 15:24:21:109 EST] 00000017 webcontainer E com.ibm.ws.webcontainer.WebContainer handleRequest SRVE0255
[1/8/09 15:24:21:109 EST] 00000017 webcontainer E com.ibm.ws.webcontainer.WebContainer handleRequest SRVE0255
[1/13/09 11:05:21:390 EST] 00000000 WSKeyStore W CWPJK0041W: One or more key stores are using the default pass
[1/13/09 11:05:25:265 EST] 00000000 ThreadPoolMgr W WSVR0626W: The ThreadPool setting on the ObjectRequestBroke
VTI0040I: 48 errors/warnings are detected in the C:\Program Files\IBM\WebSphere\AppServer\profiles\profile1\logs\server
VTL0070I: The installation Verification Tool verification succeeded.
VTL0080I: The installation verification is complete.
```

**2**

# Silent installation

- Sample response files are provided
  - For Express installation: `responsefile.express.txt`
  - For Base installation: `responsefile.base.txt`
  - For Network Deployment installation: `responsefile.nd.txt`



```
#####
#
# websphere Application server v7.0 installation options file
#
# This options file runs the installation wizard in silent mode. This lets the
# options file author specify installation settings without having to run the
# wizard in graphical mode. To use this options file for silent mode execution,
# use the following command line arguments when running the wizard:
#
# -options "<responsefile.path>/responsefile.nd.txt" -silent
#
# Read the documentation for information on changing the value for each option.
# Enclose all values within a single pair of double quotes.
#####
```

- Issue the install command to use the custom response file:
  - `install.exe -options`  
`"/<responsefile.path>/myresponsefile.txt" -silent`

# Uninstall

---

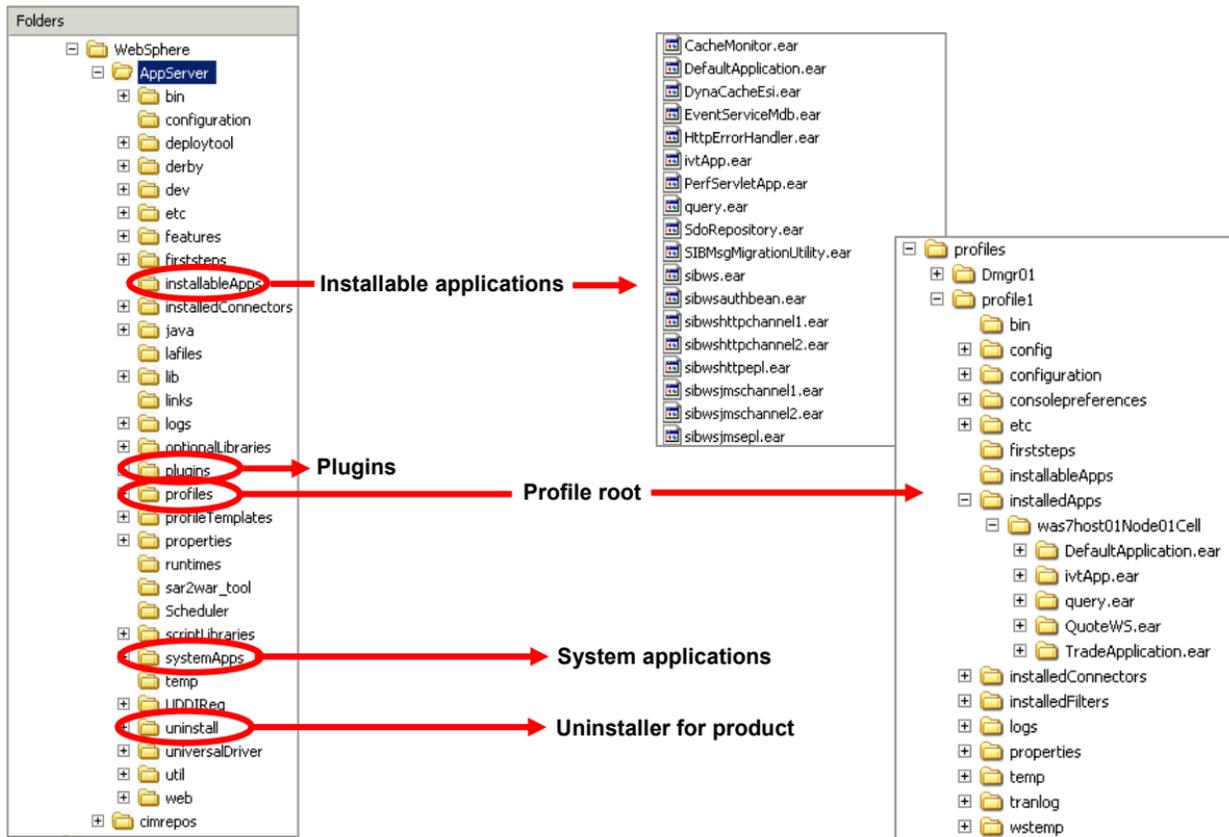
- Dependent on the InstallShield MultiPlatform (ISMP) uninstaller
- Located under the `uninstall` WebSphere directory
  - Command: `uninstall.exe` (Windows)



```
C:\Program Files\IBM\WebSphere\AppServer\uninstall>uninstall.exe
```

- Always use the uninstaller to remove WebSphere components
  - Do not use Add/Remove program to uninstall WebSphere
- Cannot custom uninstall parts of WebSphere installation
  - All the components are removed
  - Logs and properties files are not removed
- Silent uninstallation is supported
  - `uninstall.exe -silent` (Windows)

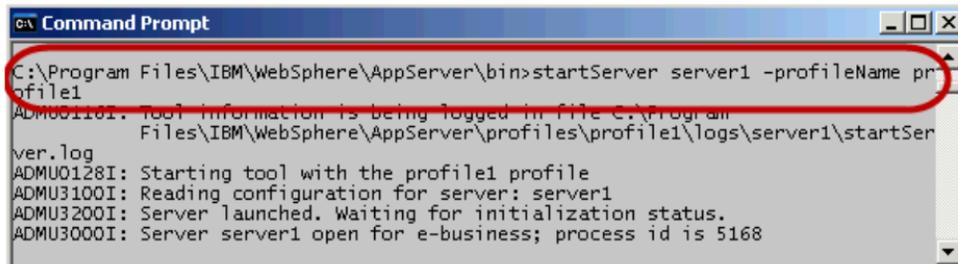
# Directory structure





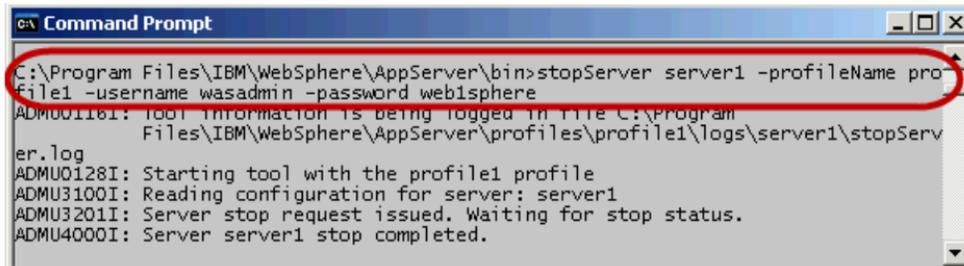
# Common command line tools

- **startServer** — starts a server



```
Command Prompt
C:\Program Files\IBM\WebSphere\AppServer\bin>startServer server1 -profileName profile1
ADMU00110I: Tool information is being logged in file C:\Program Files\IBM\WebSphere\AppServer\profiles\profile1\logs\server1\startServer.log
ADMU0128I: Starting tool with the profile1 profile
ADMU3100I: Reading configuration for server: server1
ADMU3200I: Server launched. Waiting for initialization status.
ADMU3000I: Server server1 open for e-business; process id is 5168
```

- **stopServer** — stops a server



```
Command Prompt
C:\Program Files\IBM\WebSphere\AppServer\bin>stopServer server1 -profileName profile1 -username wasadmin -password webSphere
ADMU00116I: Tool information is being logged in file C:\Program Files\IBM\WebSphere\AppServer\profiles\profile1\logs\server1\stopServer.log
ADMU0128I: Starting tool with the profile1 profile
ADMU3100I: Reading configuration for server: server1
ADMU3201I: Server stop request issued. Waiting for stop status.
ADMU4000I: Server server1 stop completed.
```

- **serverStatus** — displays server status
- **versionInfo** — displays installed product versions

# Server commands

---

- WebSphere commands are profile aware
  - There is a `-profileName` option on many WebSphere V7 commands  
`<was_root>\bin\startServer server1 -profileName profile1`
  - Or issue the commands from the appropriate profile directory  
`<profile_root>\profile1\bin\startServer server1`
- If no profile is specified, the default profile is assumed
  - There can be only one default profile
- Examples:
  - `startServer server1 -profileName profile1`
  - `startManager -profileName DmgrProfile`
  - `stopServer server1` (assumes the default profile)

# IBM HTTP Server — launching installation wizard

The screenshot shows the WebSphere Application Server Network Deployment installation wizard. The window title is "WebSphere Application Server Network Deployment". The top navigation bar includes the WebSphere logo, the text "WebSphere. software", and a language selection dropdown set to "English".

**Welcome**

- WebSphere Application Server Installation
- IBM HTTP Server Installation
- Web Server plug-ins Installation
- WebSphere DMZ Secure Proxy Server Installation
- Application Clients Installation
- IBM Update Installer for WebSphere Software Installation
- IBM WebSphere Installation Factory
- IBM Edge Components
- IBM Support Assistant
- IBM Tivoli Composite Application Manager for WebSphere Application Server
- Exit

## Welcome to WebSphere Application Server Network Deployment

IBM WebSphere Application Server Network Deployment, Version 7.0 is an integrated platform that contains an Application Server, Web development tools, a Web server, and additional supporting software and documentation. This launchpad may serve as a single point of reference for installing your Application Server environment.

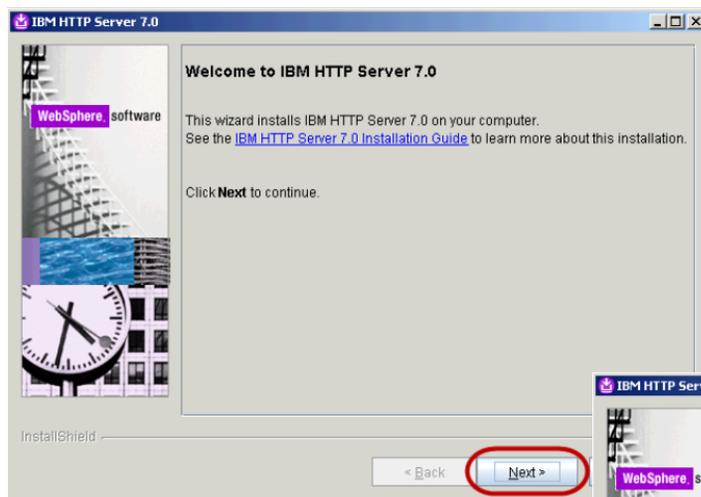
We recommend viewing the [installation diagrams](#) for illustrations of common application server environments. For full documentation visit the on-line [WebSphere Information Center](#).

To **begin**, select an entry from the list below to initialize a product installation wizard. Alternatively, select a product on the navigation list to left to read descriptions of the products, and browse help documentation and support links before starting an installation wizard.

- WebSphere Application Server Network Deployment  
[Launch the installation wizard for WebSphere Application Server Network Deployment.](#)
- IBM HTTP Server  
[Launch the installation wizard for IBM HTTP Server.](#)

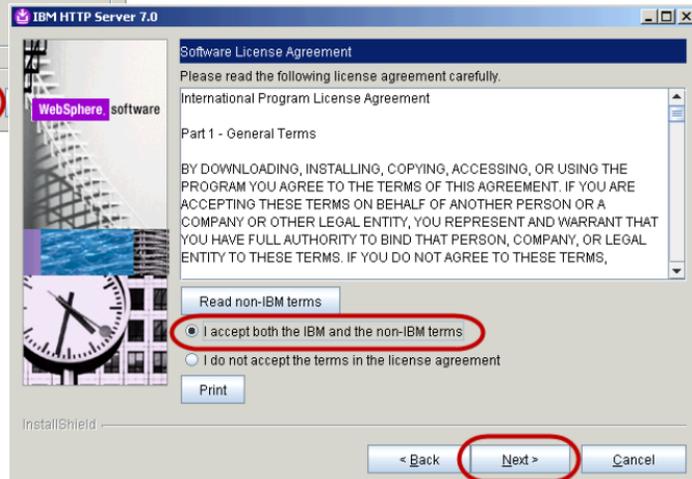
A red box highlights the "IBM HTTP Server" option and its associated link. A yellow circle with the number "1" is positioned to the left of this option.

# IBM HTTP Server — welcome and license agreement

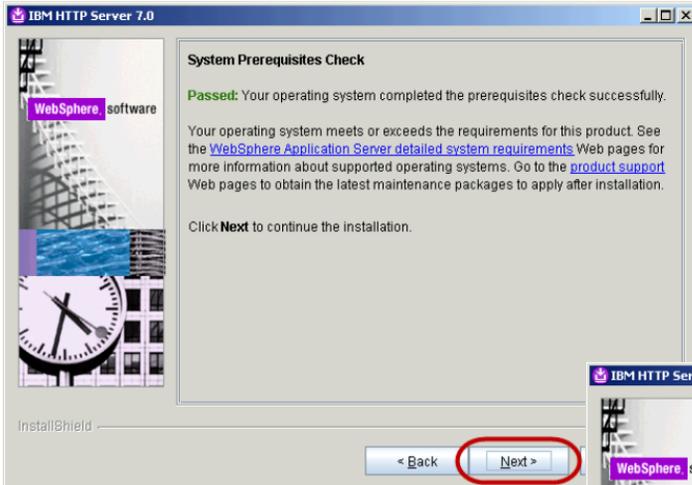


- 2 Welcome window includes a link for installation documentation

- 3 License agreement window
- Read or print the license agreement
  - Accept the license agreement



# IBM HTTP Server — prerequisites and install location

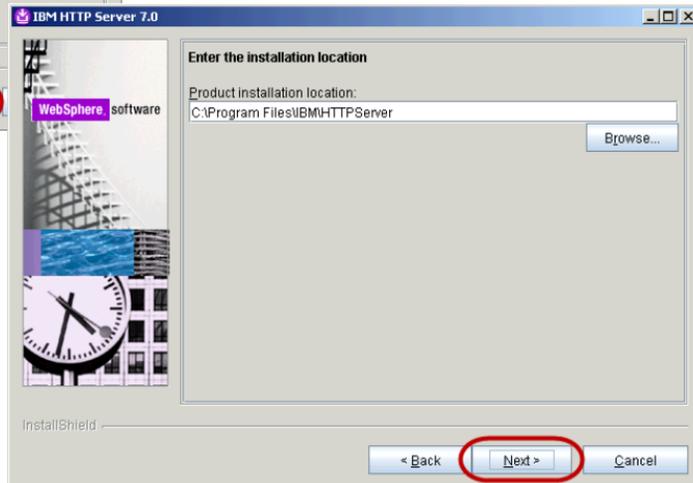


## 4 System prerequisites check

- Passed should be the status
- Links provided to review the required system prerequisites

## 5 Installation directory

- Specify the directory location for the product installation



# IBM HTTP Server — port values and service definition

**Port Values Assignment**

IBM HTTP Server communicates using the port numbers listed below. If these ports are already in use by IBM HTTP Server or another application, then change the port numbers from their default values.

HTTP Port:

HTTP Administration Port:

< Back **Next >**

## 6 Port values

- Verify the assigned port values

## 7 Windows service definition

- Specify if the IBM HTTP Server and IBM HTTP Administration Server run as Windows services

**Windows Service Definition**

Choose whether to use a Windows service to run IBM HTTP Server and IBM HTTP Administration Server. Optionally the IBM HTTP Server and IBM HTTP Administration Server can be started from the command line. Configure the startup type to have the Windows services start manually or automatically when rebooting the system.

Run IBM HTTP Server as a Windows Service

Run IBM HTTP Administration as a Windows Service

Log on as a local system account

Log on as a specified user account

User name:

Password:

Startup type:

The user account that runs the Windows service must have the following user rights:

- Act as part of the operating system
- Log on as a service

< Back **Next >** Cancel

# IBM HTTP Server — authentication and plug-in



IBM HTTP Server 7.0

WebSphere software

### HTTP Administration Server Authentication

Create a user ID and password to authenticate to the IBM HTTP Server administration server using the WebSphere Application Server administrative console. The newly-created user ID and password is encrypted and stored in the conf/admin.passwd file. You can create additional user IDs after the installation by using the htpasswd utility.

Create a user ID for IBM HTTP Server administration server authentication.

User ID:  
ihsadmin

Password:  
\*\*\*\*\*

Confirm Password:  
\*\*\*\*\*

InstallShield

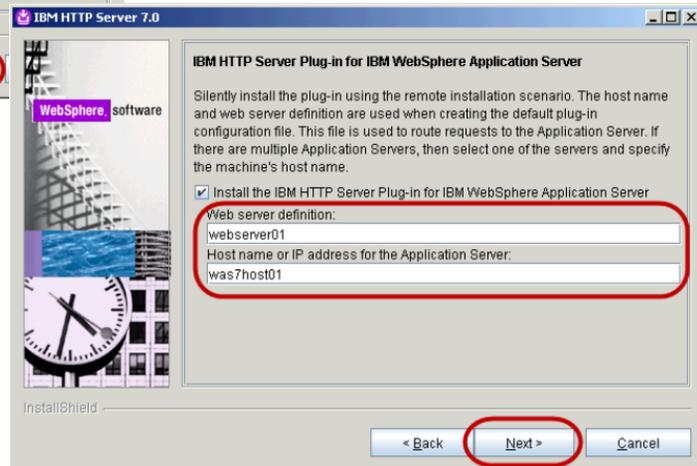
< Back Next >

## 8 Authentication

- Provide a user ID and password for authentication

## 9 Web Server definition

- Provide a Web Server definition
- Provide a host name for the application server



IBM HTTP Server 7.0

WebSphere software

### IBM HTTP Server Plug-in for IBM WebSphere Application Server

Silently install the plug-in using the remote installation scenario. The host name and web server definition are used when creating the default plug-in configuration file. This file is used to route requests to the Application Server. If there are multiple Application Servers, then select one of the servers and specify the machine's host name.

Install the IBM HTTP Server Plug-in for IBM WebSphere Application Server

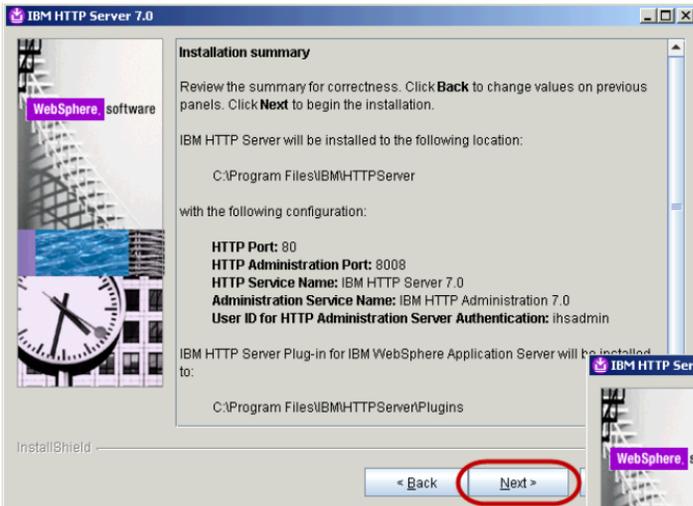
Web server definition:  
webserv01

Host name or IP address for the Application Server:  
was7host01

InstallShield

< Back Next > Cancel

# IBM HTTP Server — summary and results

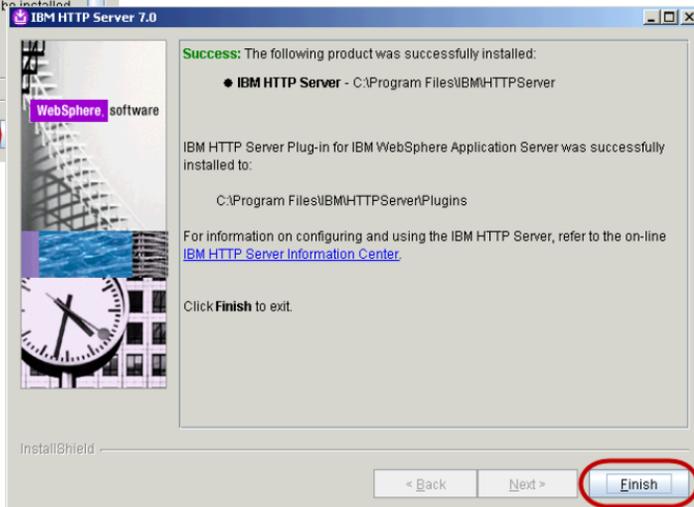


## 10 Installation summary

- The summary information is based on the selections you made on each panel
- Review the summary for correctness

## 11 Installation results

- Review the results



# Checkpoint solutions

---

1. What are the types of profiles that can be configured?
  - For the application server, an application server profile. For Network Deployment, you may also configure deployment manager, custom, and cell profiles.
2. Which log file is used to verify the installation was successful?
  - Examine the log file `<was_root>\logs\install\log.txt`
3. What is IVT, and how can it be accessed?
  - IVT is an installation verification tool that will scan log files to look for errors that may have occurred during installation. It can be launched from the command line or from the First steps console of each profile.



WebSphere Education

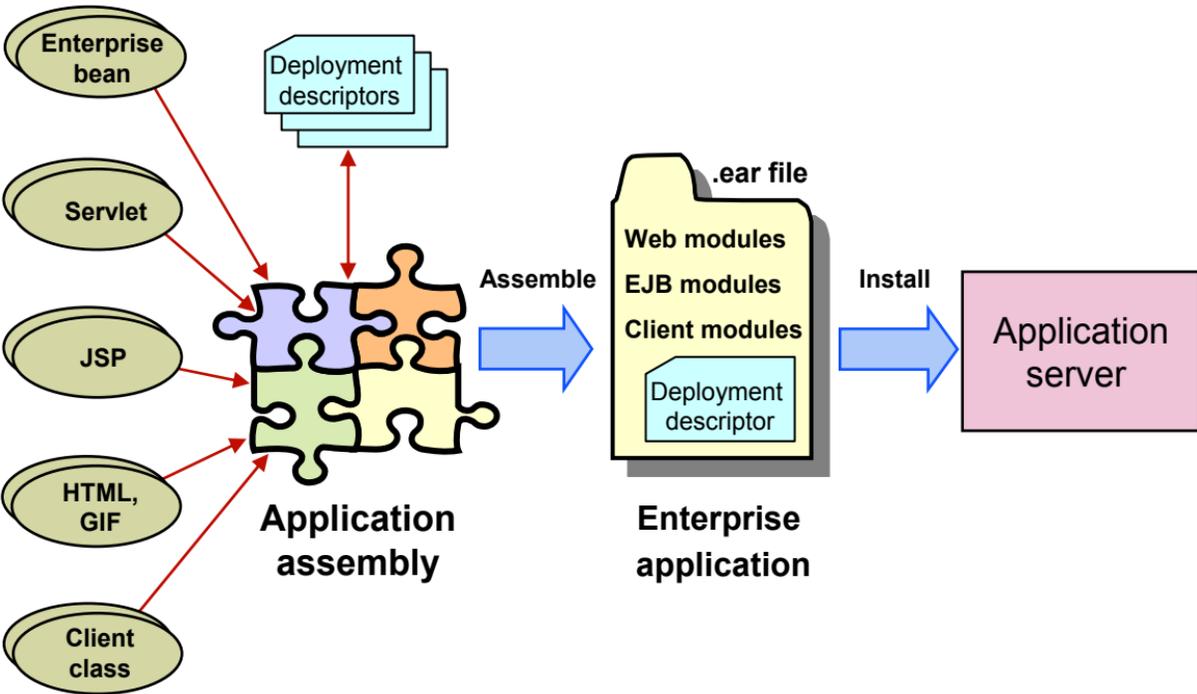


# Application assembly

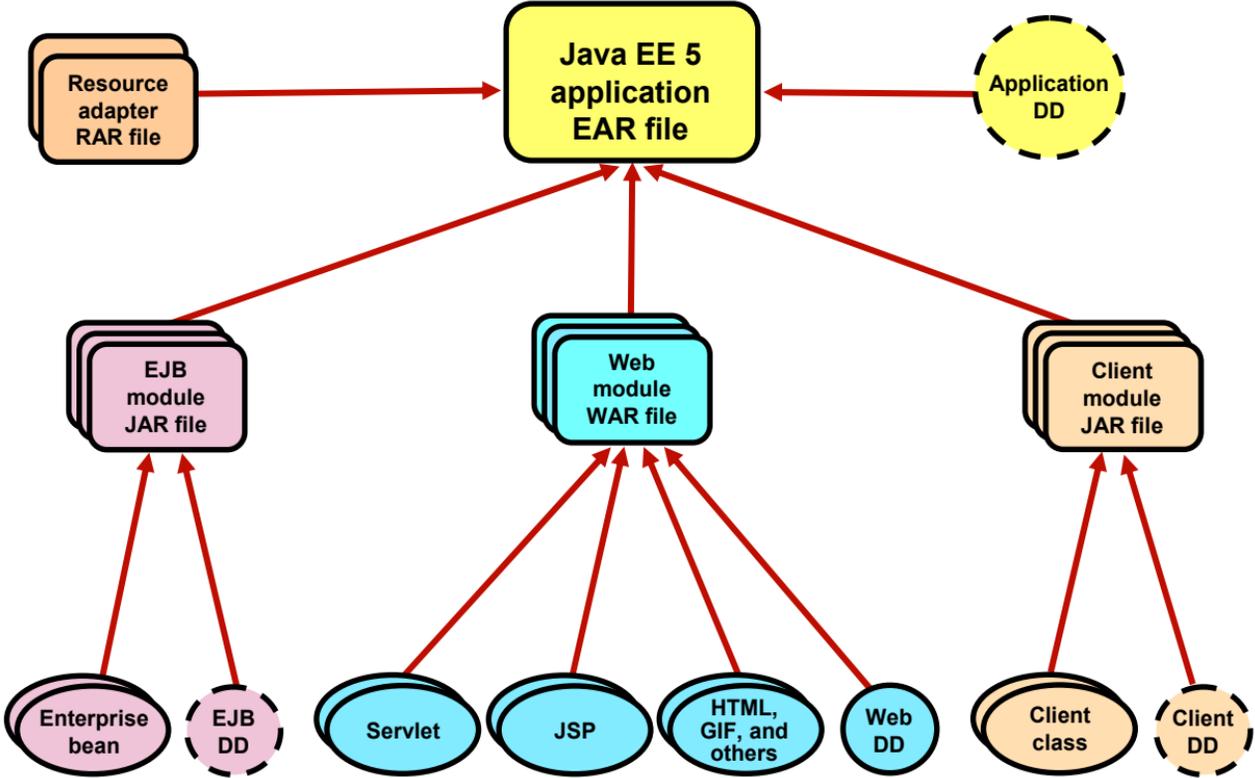
# 5



# Overview of application assembly and installation

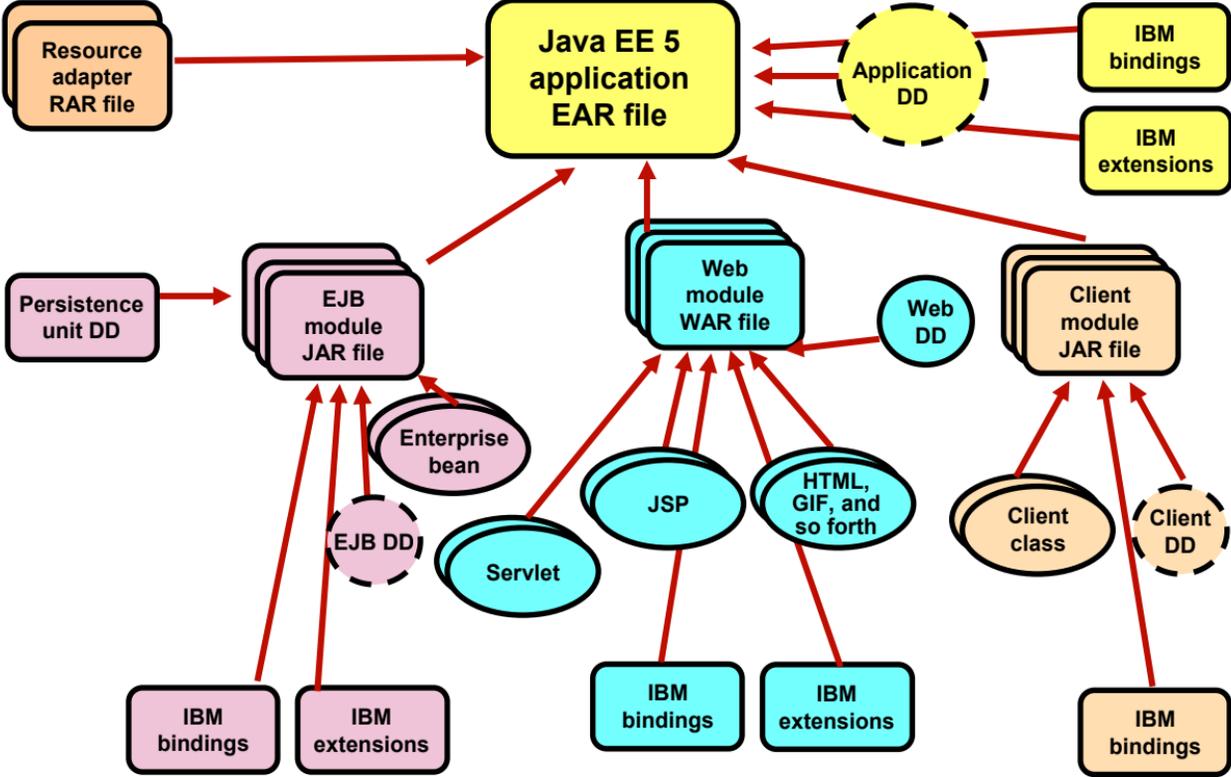


# Java EE 5 packaging



DD = deployment descriptor

# WebSphere: Application packaging



DD = Deployment Descriptor

# Assembly and deploy toolkit functionality

---

- Things you can do with the assembly and deploy toolkit:
  - Create and configure Java EE enterprise applications (EAR files):
    - Build from scratch
    - Java EE modules
  - Generate and modify deployment descriptor information
  - Generate and modify binding information attributes
  - Generate and modify the IBM extension attributes
  - Deploy applications to a remote server
  - Perform remote debugging and profiling sessions
    - IBM Agent Controller needs to be installed for remote profiling
  - Create, debug, and run Jython scripts
  - Import command assistance logs from the console into Jython scripts
  - View, analyze, and correlate log files

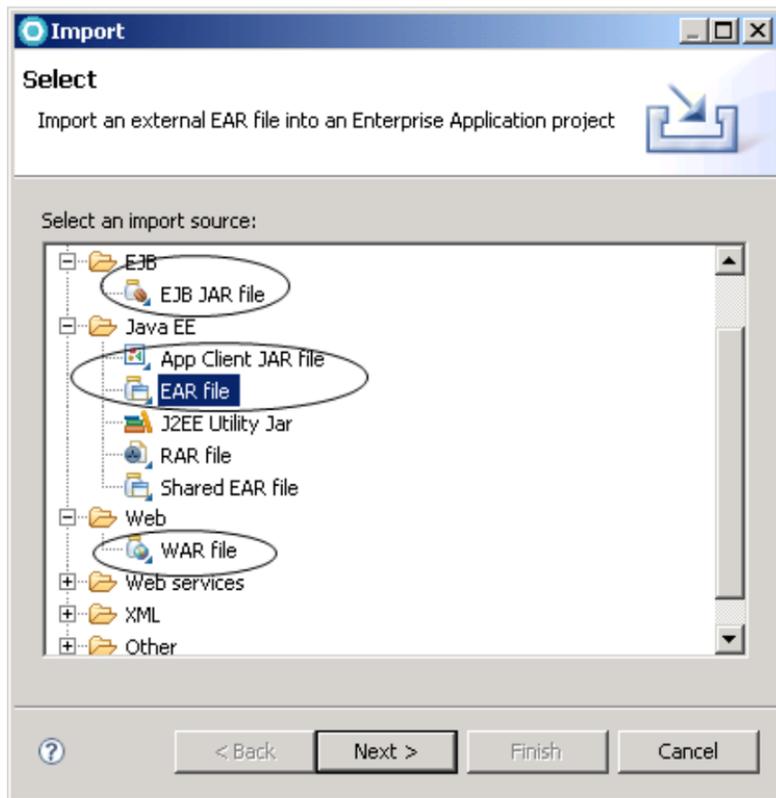
# Assembling an enterprise application

---

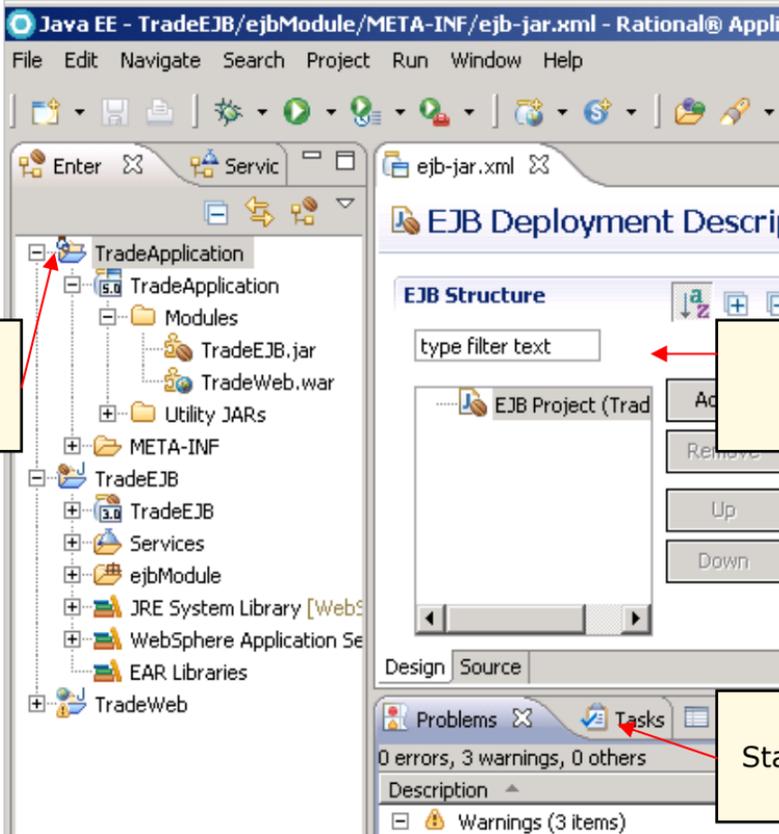
- When working with a workspace handed over by development, no assembly is required (already done automatically by the tool).
  - Configure modules
  - Export an EAR file
- Project Interchange files can be imported into a new or existing workspace.
- When assembling individual modules:
  - Create a new workspace (first time)
  - Import modules into the workspace
  - Assign modules to an enterprise application
  - Configure the module's deployment descriptors
  - Configure the Java EE module dependencies
  - Export the EAR file
- After assembly:
  - Optional test within the tool

# Import modules

- Wizard driven
  - Import modules
    - EAR files
    - EJB JAR
    - Application client JAR
    - Web module WAR
  - Imported into a new or existing enterprise application



# Java EE perspective

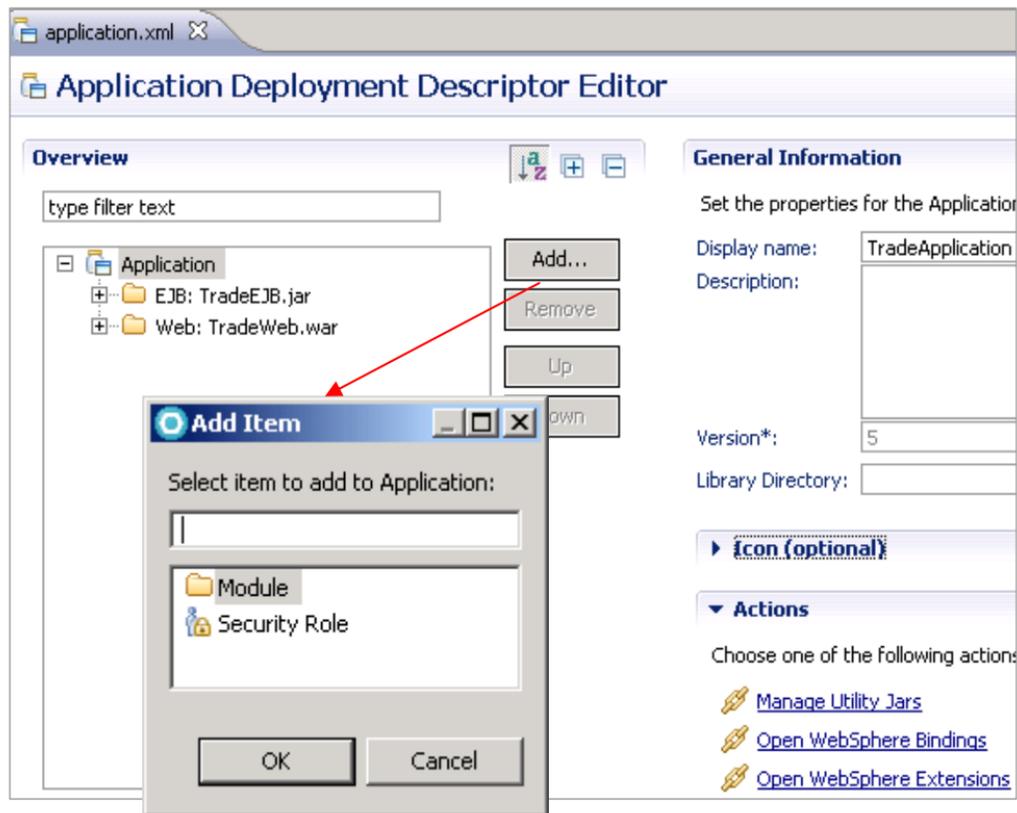


Project view  
(Enterprise  
Explorer)

Editor

Stacked views

# Application deployment descriptor (1 of 2)



# Application deployment descriptor (2 of 2)

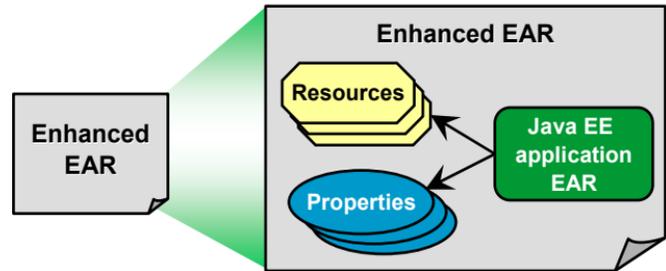
---

- Simplest of deployment descriptors
- The editor can be used to:
  - Edit the application's display name and description
  - Add and remove modules
    - Web
    - EJB
    - Application client
    - Resource adapter (connector)
  - Work with security roles of the application

# Packaging enterprise applications for deployment

- You can deploy Java compliant **EAR** and **WAR** files.
- An **enhanced EAR** includes Java EE artifacts plus resource information needed to install on the WebSphere Application Server V7:

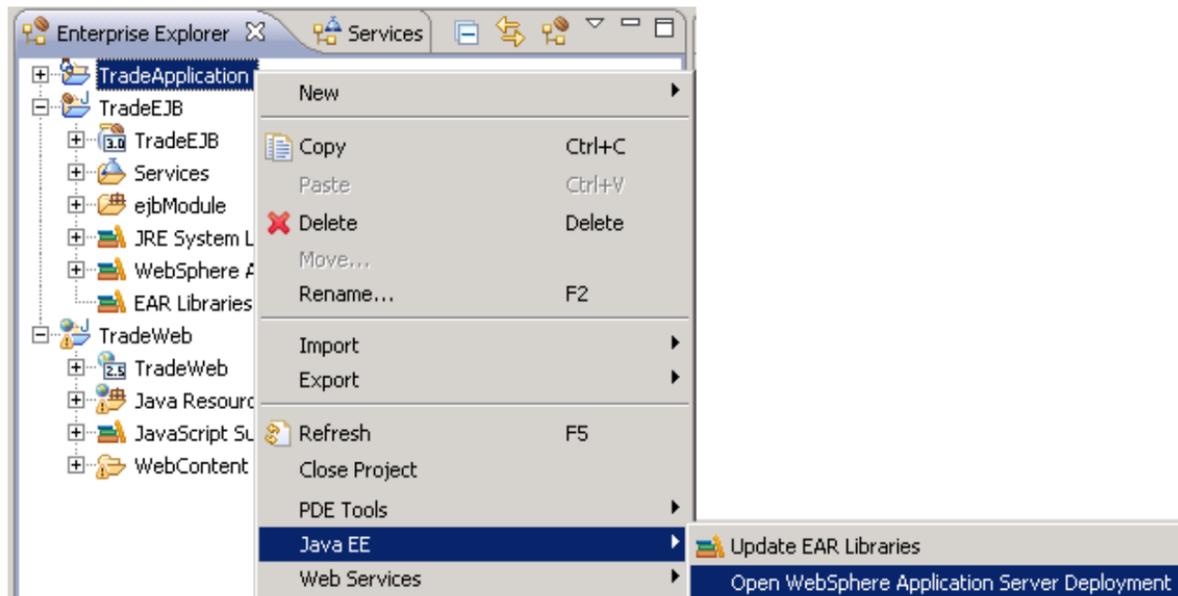
- JDBC resources (data sources)
- Class loader
- JAAS authentication aliases
- Shared libraries
- Virtual host information



- Benefits in improved productivity:
  - Application resources and properties come with the application.
  - The application installation process creates the necessary resources within the server or cluster.
  - Moving an application from one server to another also moves the resources.
- WebSphere extensions supported by:
  - Assembly and deploy tooling

# Application scope resources (1 of 2)

- Define resources to be included in the enhanced EAR file.



# Application scope resources (2 of 2)

WebSphere Application Server Deployment

## WebSphere Deployment

**Data Sources**  
Allows the installed applications to access data from databases.

JDBC provider list:

Name	Implementation Class Name
Trade	com.ibm.db2.jcc.DB2XADataSource

Data source defined in the JDBC provider selected above:

Name	JNDI Name
Trade	jdbc/tradeds

Resource properties defined in the data source selected above:

Name	Value
databaseName	TRADE
driverType	4
serverName	rhhost

# Dealing with enhanced EAR files at deploy time

- To ignore application scoped resources at installation time:

### Install New Application

Specify options for installing enterprise applications and modules.

→ **Step 1: Select installation options**

[Step 2](#) Map modules to servers

[Step 3](#) Provide JSP reloading options for Web modules

[Step 4](#) Map shared libraries

[Step 5](#) Map shared library relationships

[Step 6](#) Provide JNDI names for beans

[Step 7](#) Bind EJB Business

[Step 8](#) Map EJB references to beans

[Step 9](#) Map virtual hosts for Web modules

[Step 10](#) Map context roots for Web modules

#### Select installation options

Specify the various options that are available to prepare and install the application.

Precompile JavaServer Pages files

Directory to install application

Distribute application

Use Binary Configuration

Deploy enterprise beans

Application name

Create MBeans for resources

Override class reloading settings for Web and EJB modules

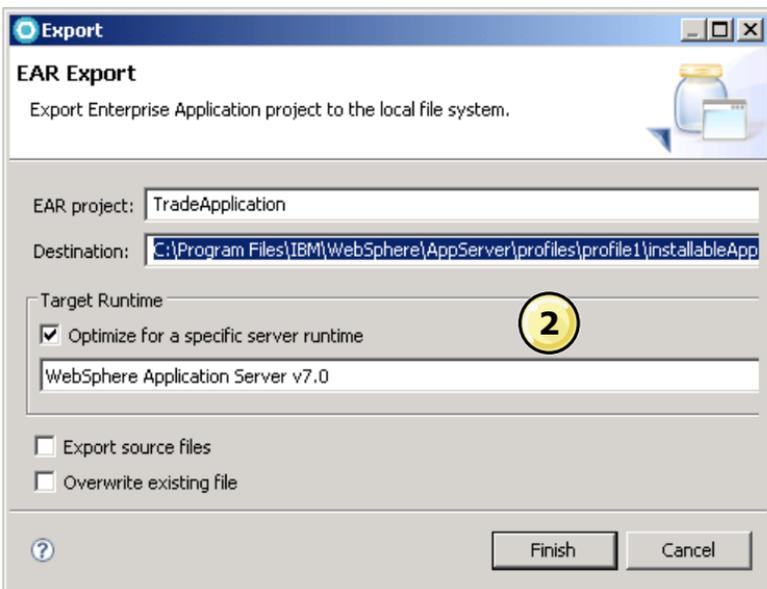
Reload interval in seconds

Deploy Web services

Validate Input off/warn/fail

Process embedded configuration

# Generating an EAR file for deployment



- Assemble application modules.
- Resolve Java EE dependencies.
- Save all changes.
- Export the EAR file.
- If source is available, it can optionally be included in the EAR file.
- The exported file is ready to be deployed.

# Checkpoint solution

---

1. The result of packaging an enterprise application is \_\_\_\_\_.
  - An EAR file
2. True or false: Java EE 5 reduces or eliminates the need to deal with Java EE deployment descriptors in many cases.
  - True
    - “Annotations reduce or eliminate the need to deal with Java EE deployment descriptors in many cases.” — Java EE 5 specification
    - Caveat: If you do not specify the deployment descriptors, the product assumes certain default names.
3. True or false: Enhanced enterprise applications are the recommended way to deploy applications in a production environment.
  - False. Enhanced EAR files help the developer to test the application.



WebSphere Education



# WebSphere Application Server administrative console

# 6



# Administrative console

Integrated Solutions Console - Windows Internet Explorer

https://192.168.192.128:9043/ibm/console/login.do?action=se Live Search

Integrated Solutions Console

Integrated Solutions Console Welcome wasadmin Help | Logout IBM

View: All tasks

- Welcome
- Guided Activities
- Servers
- Applications
- Services
- Resources
- Security
- Environment
- System administration
- Users and Groups
- Monitoring and Tuning
- Troubleshooting
- Service integration
- UDDI

Welcome

Welcome

Integrated Solutions Console provides a common administrative console for multiple products. The table lists the product suites that can be administered through this installation. Select a product suite to view more information.

Suite Name	Version
<a href="#">WebSphere Application Server</a>	7.0.0.0

About this Integrated Solutions Console

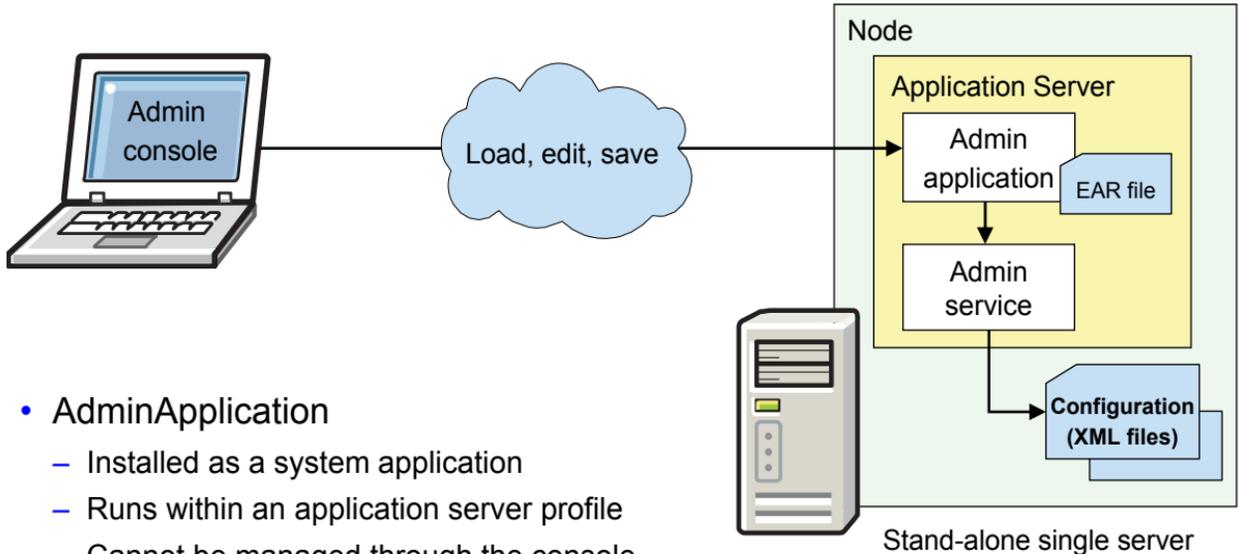
Integrated Solutions Console, 7.0.0.0  
Build Number: r0835.03  
Build Date: 8/31/08

-----  
LICENSED MATERIALS PROPERTY OF  
IBM  
5724-J08, 5724-I63, 5724-H88, 5724-  
H89, 5655-N02, 5733-W70 (C)

- Web browser-based tool managing WebSphere Application Server
- Supports a full range of product administrative activities

Done Internet 100%

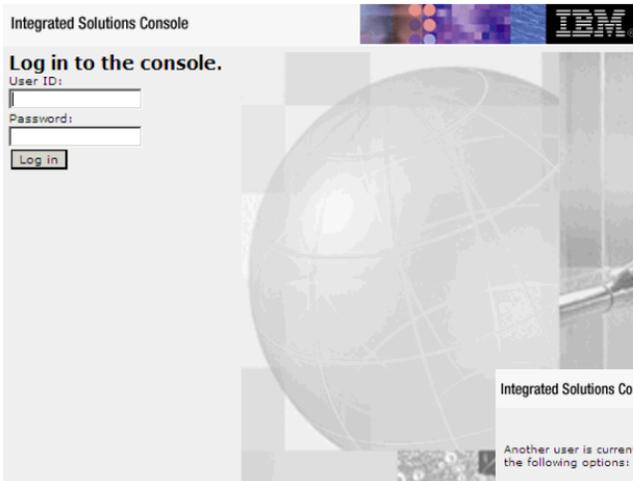
# Starting the administrative console



- AdminApplication
  - Installed as a system application
  - Runs within an application server profile
  - Cannot be managed through the console
  - Not listed as an installed application
  - Protected by WebSphere Security
- Accessed through <http://localhost:9060/ibm/console>
  - 9060 is the default port



# Console login



Integrated Solutions Console

**Log in to the console.**

User ID:

Password:

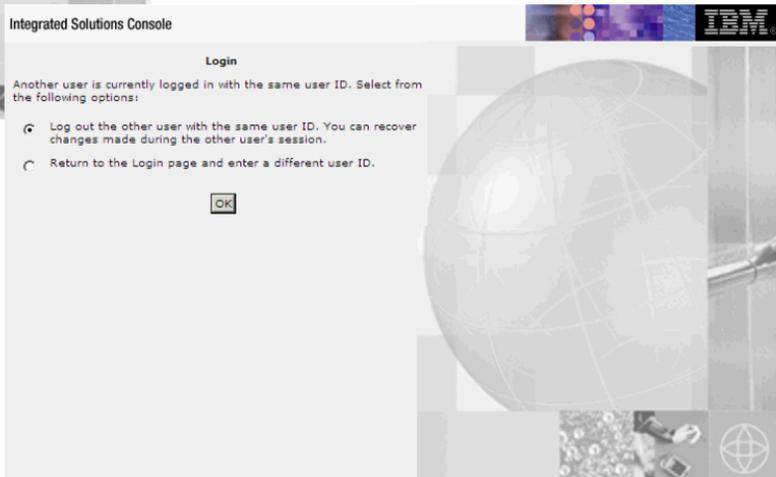
Log in

**1** Log in to the console

- User ID
- Password

**2** User ID conflict

- Appears when another user logged in with the same user ID



Integrated Solutions Console

**Login**

Another user is currently logged in with the same user ID. Select from the following options:

Log out the other user with the same user ID. You can recover changes made during the other user's session.

Return to the Login page and enter a different user ID.

OK

# Recovering prior changes



The screenshot shows a dialog box titled "Recover prior changes" from the "Integrated Solutions Console". The dialog contains the following text: "Your prior session timed out before the changes could be published to the master configuration. Would you like to recover the changes made in the prior session or work with the master configuration?". There are two radio button options: "Work with the master configuration" (unselected) and "Recover changes made in prior session" (selected). Below the second option is a checkbox labeled "View items with changes" which is also selected. An "OK" button is located at the bottom left of the dialog. The IBM logo is visible in the top right corner of the console header.

- You can recover prior changes if your prior session times out.
- Two options are available:
  - Work with the default administrative configuration
  - Work with the administrative configuration from the prior session

# Administrative console panels

**Application servers**

Application servers

Use this page to view a list of the application servers in your environment and the status of each of these servers. You can also use this page to change the status of a specific application server.

☰ Preferences

Name	Node	Host Name	Version
You can administer the following resources:			
<a href="#">server1</a>	was7host01Node01	was7host01	N...
Total 1			

1 Collection pages

2 Detail pages

3 Wizard pages

- JDBC wizard is an example

**Application servers**

[Application servers](#) > [server1](#)

Use this page to configure an application server. An application server is a server that provides services required to run enterprise applications.

Runtime Configuration

**General Properties**

Name:

Node name:

Run in development mode

Parallel start

Start components as needed

Access to internal server classes:

**Server-specific Application Settings**

ClassLoader policy:

Class loading mode:

**Container Settings**

- [Session management](#)
- SIP Container Settings
- Web Container Settings
- Portlet Container Settings
- EJB Container Settings
- Container Services
- Business Process Services

**Applications**

- [Installed applications](#)

**Server messaging**

- [Messaging engines](#)

Apply OK Reset Cancel

# Administrative console areas

Integrated Solutions Console

Welcome wasadmin

1

Banner

Help | Logout



View: All tasks

Cell=was7host01Node01Cell, Profile=profile1

Close page

Virtual Hosts

Help

Messages

⚠ Changes have been made to your local configuration. You can:

- [Save](#) directly to the master configuration.
- [Review](#) changes discarding.

⚠ The server may need to be restarted for these changes to take effect.

4

Message area

Field help

For field help information, select a field label or list marker when the help cursor is displayed.

Page help

[More information about this page](#)

Command Assistance

[View administrative scripting command for last action](#)

5

Help

2

Navigation tree

- Welcome
- ⊕ Guided Activities
- ⊕ Servers
- ⊕ Applications
- ⊕ Services
- ⊕ Resources
- ⊕ Security
- ⊕ Environment
  - Virtual hosts
  - Update global Web server plug-in configuration
  - WebSphere variables
  - Shared libraries
  - Replication domains
- ⊕ Naming
- ⊕ System administration
- ⊕ Users and Groups
- ⊕ Monitoring and Tuning
- ⊕ Troubleshooting
- ⊕ Service integration
- ⊕ UDDI

[Virtual Hosts](#) > [admin\\_host](#) > Host Aliases

Use this page to edit, create, or delete a domain name system (DNS) alias by which the virtual host is known.

⊕ Preferences

New Delete



3

Work area

Select	Host Name	Port
<input type="checkbox"/>	*	9060
<input type="checkbox"/>	*	9043
Total 2		

You can administer the following resources:

Select	Host Name	Port
<input type="checkbox"/>	*	9060
<input type="checkbox"/>	*	9043

Total 2

# Administrative console help

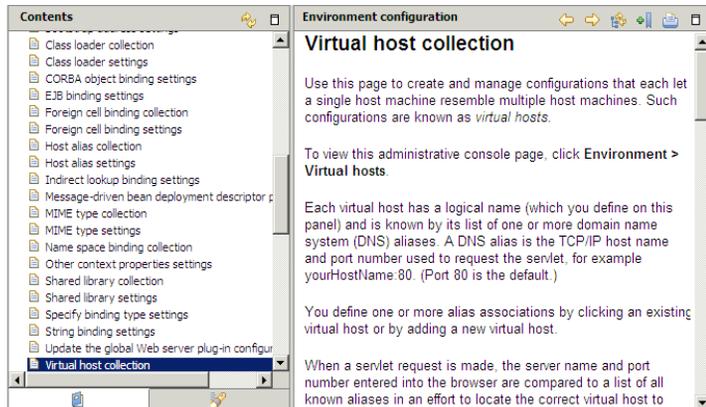
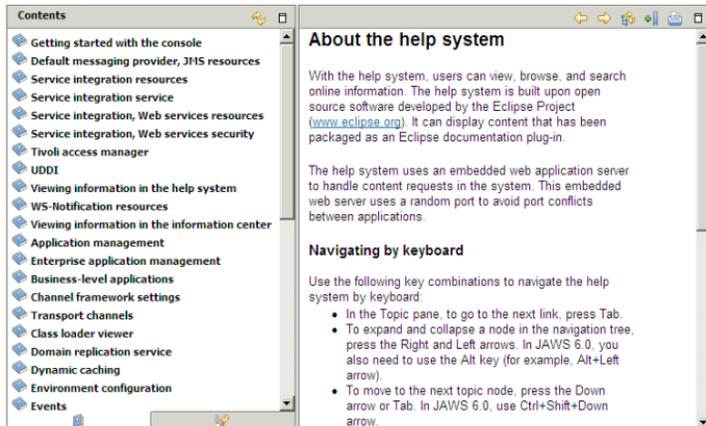
## 1 Console help

- Click **Help** from console banner
- Select from list of references



## 2 Page help

- Click **More information about this page** from help workspace



# Administrative console preferences, filters, and scope

- Some administrative console pages include fields to customize how much data is shown
- Select options in the following fields:
  - Preferences
  - Filter
  - Scope

2 Select resources

The screenshot shows the 'Enterprise Applications' administrative console. At the top, there is a section for 'Enterprise Applications' with a description: 'Use this page to manage installed applications. A single application can be deployed onto multiple servers.' Below this is a 'Preferences' section, which is circled in red and labeled with a yellow box '1 Set preferences'. This section includes a 'Maximum rows' input field set to '20', a 'Retain filter criteria' checkbox, and a 'Show items at the following authorization group level:' dropdown menu set to 'All Roles'. There are 'Apply' and 'Reset' buttons. Below the preferences is a toolbar with buttons for 'Start', 'Stop', 'Install', 'Uninstall', 'Update', 'Rollout Update', 'Remove File', 'Export', and 'Export DDL'. Below the toolbar is a table with columns 'Select', 'Name', and 'Application Status'. The table is circled in red and labeled with a yellow box '2 Select resources'. Below the table is a filter section, also circled in red and labeled with a yellow box '3 Set filters'. The filter section includes a 'Filter' dropdown menu set to 'Name', a 'Search terms:' input field with an asterisk, and a 'Go' button. Below the filter section is a table with the heading 'You can administer the following resources:'. The table has three rows, each with a checkbox, a resource name, and a green arrow icon. The resources are 'DefaultApplication', 'ivtApp', and 'query'. At the bottom of the table, it says 'Total 3'.

# Guided activities

The screenshot displays the IBM Integrated Solutions Console interface. At the top, it says "Integrated Solutions Console" and "Welcome wasadmin". There are links for "Help" and "Logout". On the left is a navigation tree with categories like "Welcome", "Guided Activities", "Servers", "Applications", "Services", "Resources", "Security", "Environment", "System administration", "Users and Groups", "Monitoring and Tuning", "Troubleshooting", "Service integration", and "UDDI". The "Guided Activities" section is highlighted with a red oval, and within it, "Connecting to a database" is selected. The main content area is titled "Connecting to a database" and includes an "Introduction" section with text explaining the activity's purpose. Below the introduction are "Start" and "Help" buttons. A list of steps follows: "Configure credentials for secure database access", "Configure a JDBC provider", "Configure WebSphere variables", "Configure a data source", "Save and synchronize configuration", and "Test database connection". To the right of the text is a diagram showing three application servers connected to a central server, which is in turn connected to four database instances.

View: All tasks

- Welcome
- Guided Activities**
  - Connecting to a database
  - Routing requests through a WebSphere application server to an application server
- Servers
- Applications
- Services
- Resources
- Security
- Environment
- System administration
- Users and Groups
- Monitoring and Tuning
- Troubleshooting
- Service integration
- UDDI

## Connecting to a database

### Introduction

This guided activity leads you through a set of steps to configure database access for an application. It is assumed that the database software is installed and configured. After completing these steps, your application will be able to access the data from a database.

To continue, click **Start**.

[Start](#) [Help](#)

- Configure credentials for secure database access
- Configure a JDBC provider
- Configure WebSphere variables
- Configure a data source
- Save and synchronize configuration
- Test database connection

## Assumptions

It is assumed that you are installing an application that needs to securely access data from a relational database. For more information on this task, see the following sources in the information center:

- [Configuring a JDBC provider and data source](#)
- [Deploying data access applications](#)
- [Learn about data access resources](#)

- Structured steps through common administrative tasks
- Otherwise have to know exactly what pages to use and where to find them within the console

# My tasks

Integrated Solutions Console    Welcome wasadmin

View: My tasks

There are no tasks currently selected as 'My tasks'

[Add tasks](#)

**1** Select My tasks from the navigation view selection list

**2** Select tasks to add to My tasks list

**3** Tasks will display in My tasks list

View: My tasks

[Edit 'My tasks'](#)

- [WebSphere application servers](#)
- [Web servers](#)
- [New Application](#)
- [WebSphere enterprise applications](#)

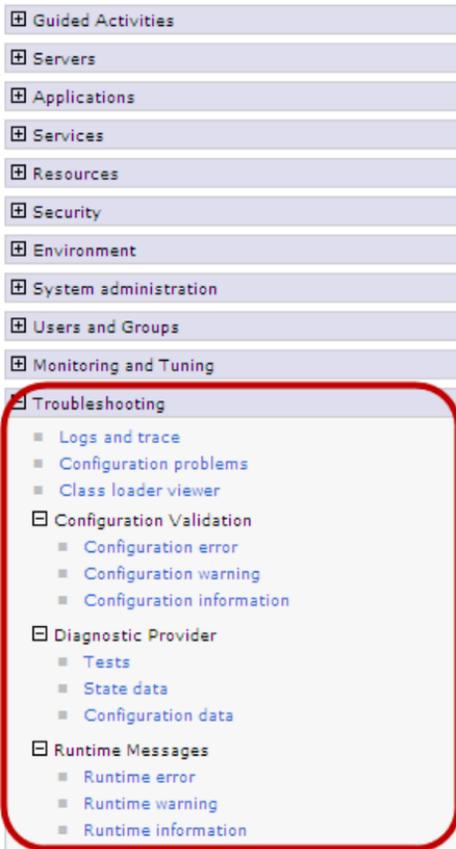
My Tasks

My Tasks

Select the tasks you wish to add to the 'My tasks' list.

- Welcome
- Guided Activities
  - Servers
    - Server Types
      - WebSphere application servers
      - WebSphere MQ servers
      - Web servers
- Applications
  - New Application
  - Application Types
    - WebSphere enterprise applications
    - Business-level applications
    - Assets

# Troubleshooting information



- Configure log and trace settings
- Identify and view configuration problems
- View where modules reside within a topology of enterprise applications
- Configuration validation  
View problems that exist in the present configuration
- Diagnostic provider  
Review the startup configuration, current configuration, and current state of a diagnostic domain
- Runtime messages  
Review runtime error, warnings and information messages

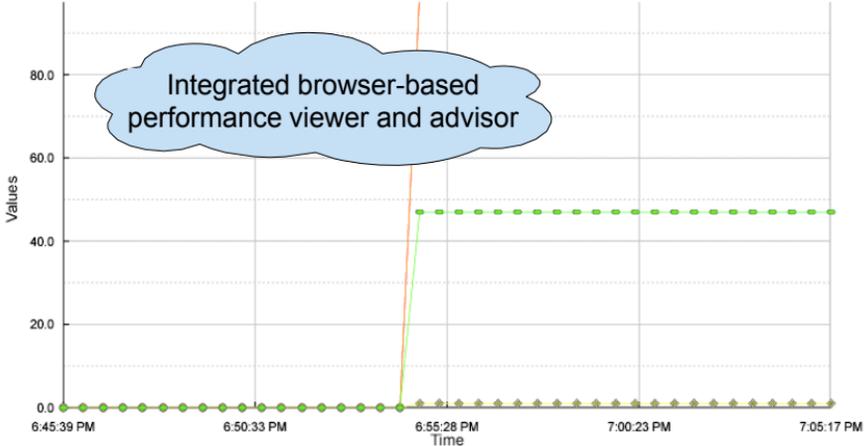
# Tivoli Performance Viewer

**Tivoli Performance Viewer** > server1

Use this page to view and refresh performance data for the selected server, change user and log settings, and view summary reports and information on specific performance modules.

Refresh View Module(s)

- server1
  - Advisor
  - Settings
  - Summary Reports
  - Performance Modules
    - ExtensionRegistryStats.name
    - Security Authentication
    - Security Authorization
    - SipContainerModule
    - Dynamic Caching
    - JDBC Connection Pools
    - HAManager
    - JVM Runtime
    - Object Pool
    - ORB
    - Servlet Session Manager
    - System Data
    - Thread Pools
    - Transaction Manager
  - Web Applications
    - DefaultApplication#Default
      - Servlets
        - filetransferSecured#filetran
        - ibmasyncrsp#ibmasyncrsp
        - isclite#ISCAAdminPortlet.wa
        - isclite#WIMPortlet.war
        - isclite#adminredirector.wa
        - isclite#iehs.war
        - isclite#isclite.war



Reset To Zero Clear Buffer View Table Show Legend

Select	Marker	Name	Value	Scale	Update	Scaled Value
<b>Snoop Servlet</b>						
<input checked="" type="checkbox"/>		RequestCount ?	1.0	1.0E20		1.0E20
<input checked="" type="checkbox"/>		ServiceTime ?	47.0	1.0E20		4.7000002E21
<b>Servlets</b>						
<input checked="" type="checkbox"/>		RequestCount ?	1.0	1.0		1.0
<input checked="" type="checkbox"/>		ServiceTime ?	47.0	1.0		47.0

# Checkpoint

---

1. The AdminApp application can be configured using the administrative console.
  - A. True
  - B. False
  
2. Configurable console settings, including session timeout, can be set through the Console Preferences page of the system administration task.
  - A. True
  - B. False

# Checkpoint solutions

---

1. The AdminApp application can be configured using the administrative console.  
B. False
2. Configurable console settings, including session timeout, can be set through the Console Preferences page of the system administration task.  
B. False. The session timeout is set using a script.



WebSphere Education

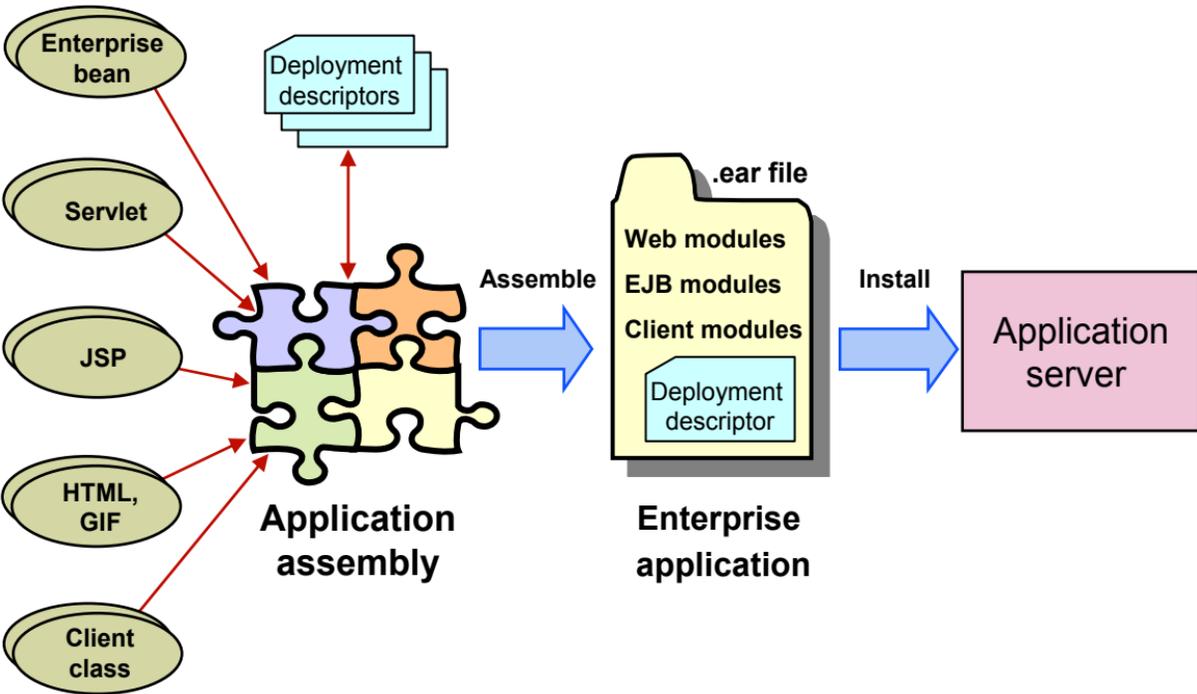


# Application assembly

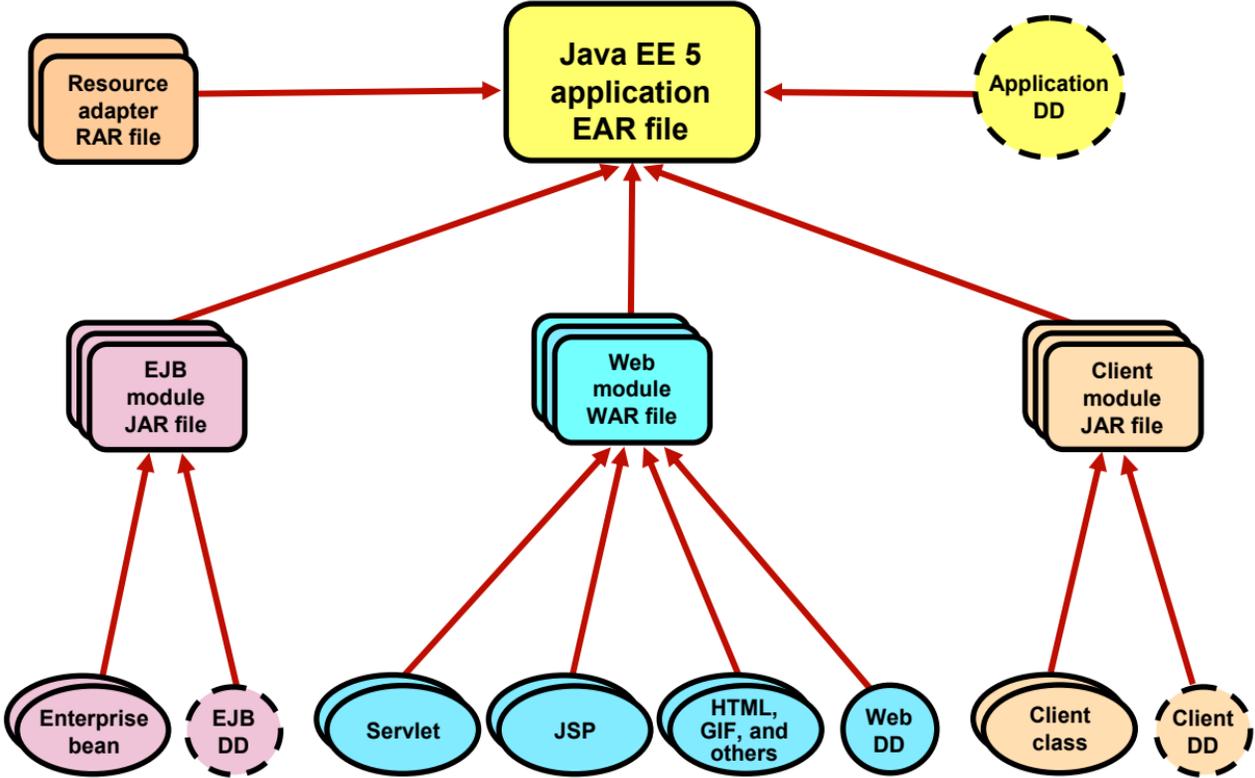
# 7



# Overview of application assembly and installation

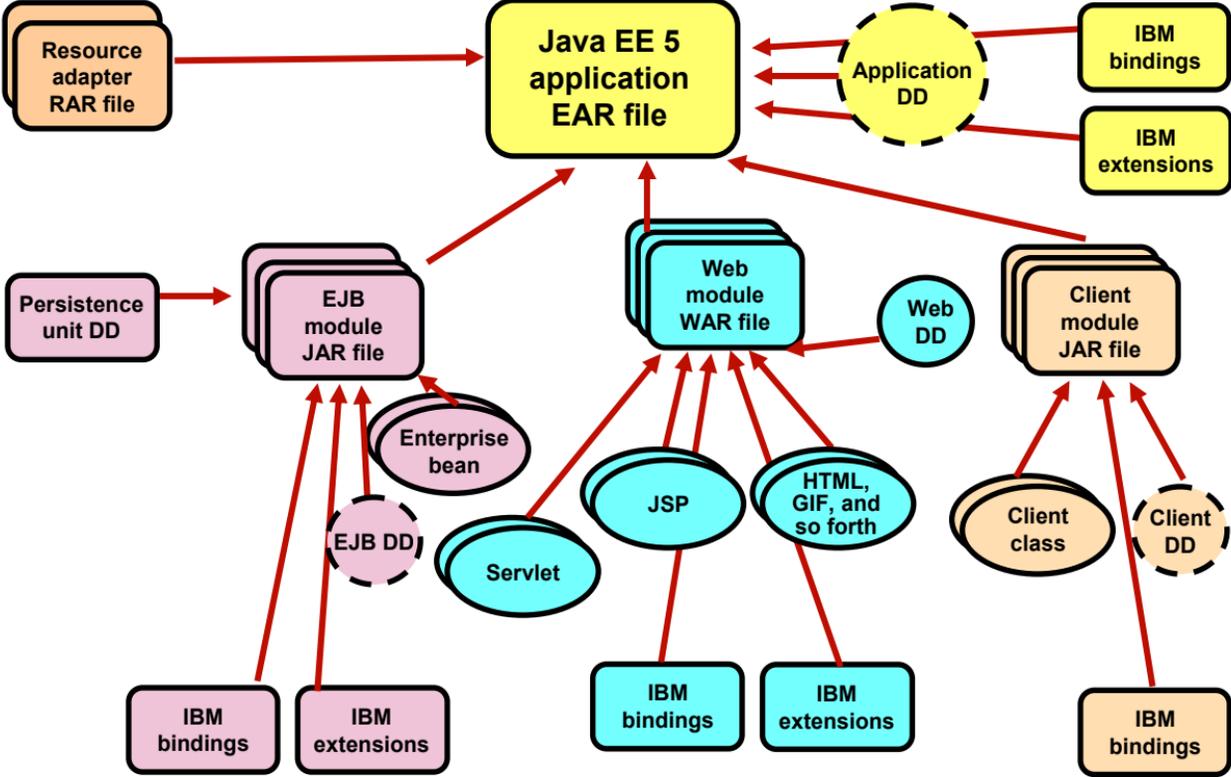


# Java EE 5 packaging



DD = deployment descriptor

# WebSphere: Application packaging



DD = Deployment Descriptor

# Assembly and deploy toolkit functionality

---

- Things you can do with the assembly and deploy toolkit:
  - Create and configure Java EE enterprise applications (EAR files):
    - Build from scratch
    - Java EE modules
  - Generate and modify deployment descriptor information
  - Generate and modify binding information attributes
  - Generate and modify the IBM extension attributes
  - Deploy applications to a remote server
  - Perform remote debugging and profiling sessions
    - IBM Agent Controller needs to be installed for remote profiling
  - Create, debug, and run Jython scripts
  - Import command assistance logs from the console into Jython scripts
  - View, analyze, and correlate log files

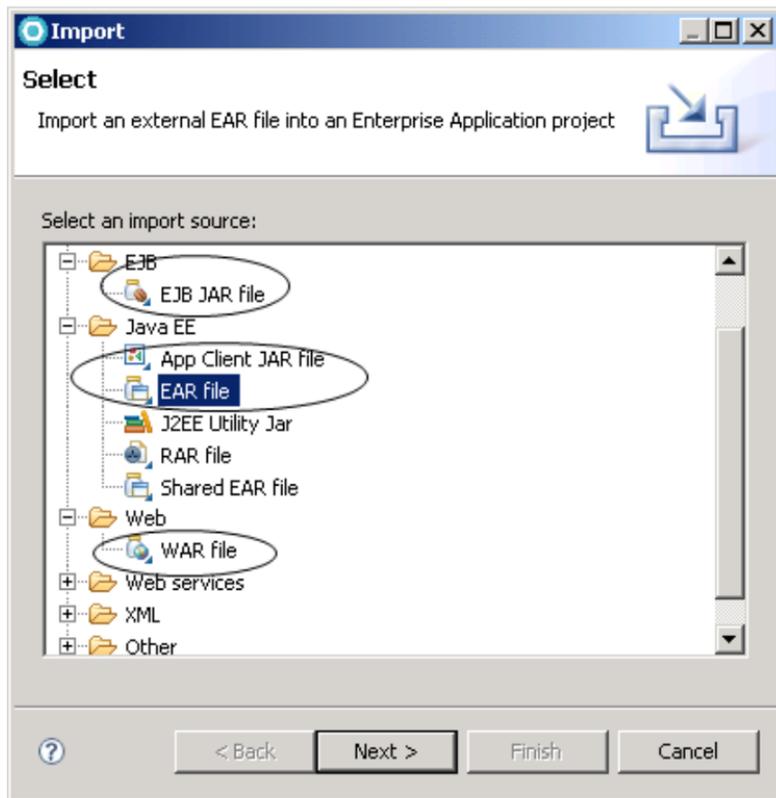
# Assembling an enterprise application

---

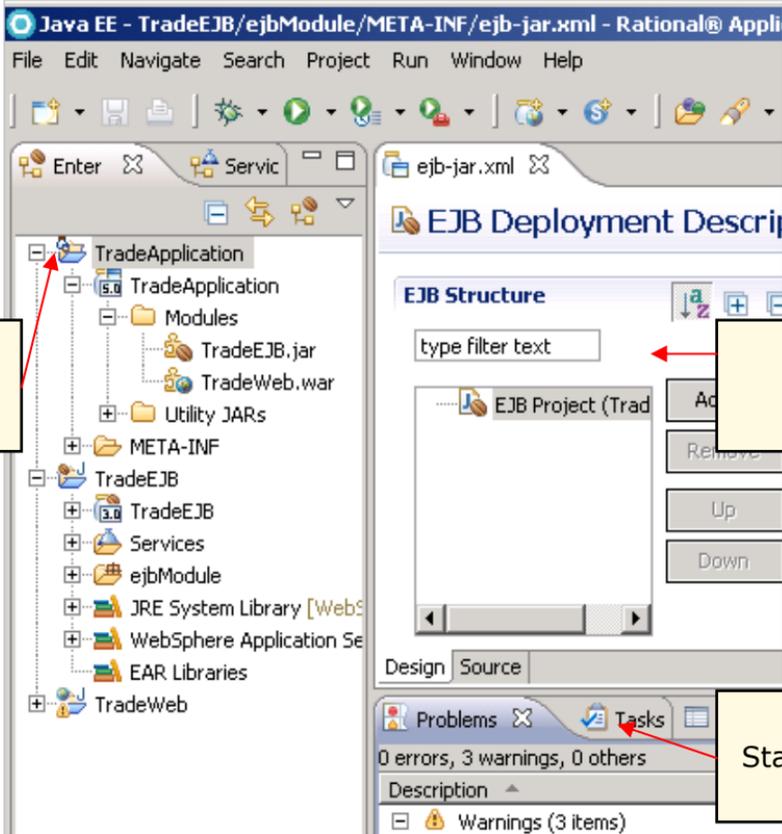
- When working with a workspace handed over by development, no assembly is required (already done automatically by the tool).
  - Configure modules
  - Export an EAR file
- Project Interchange files can be imported into a new or existing workspace.
- When assembling individual modules:
  - Create a new workspace (first time)
  - Import modules into the workspace
  - Assign modules to an enterprise application
  - Configure the module's deployment descriptors
  - Configure the Java EE module dependencies
  - Export the EAR file
- After assembly:
  - Optional test within the tool

# Import modules

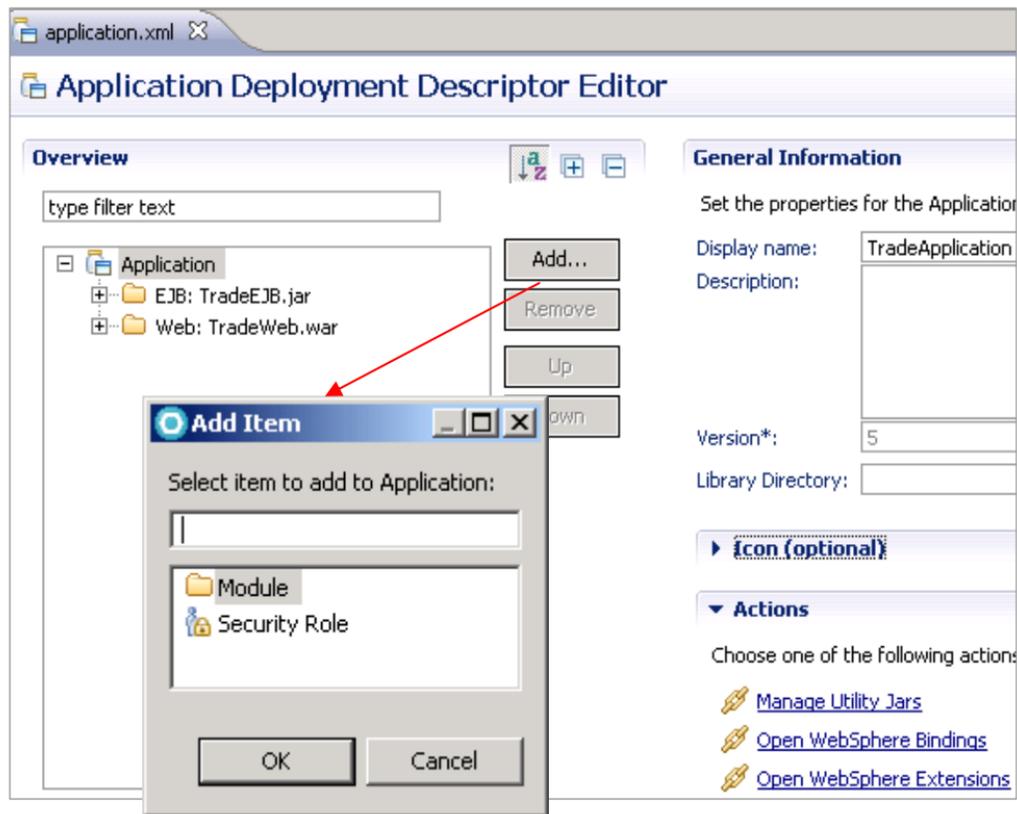
- Wizard driven
  - Import modules
    - EAR files
    - EJB JAR
    - Application client JAR
    - Web module WAR
  - Imported into a new or existing enterprise application



# Java EE perspective



# Application deployment descriptor (1 of 2)



# Application deployment descriptor (2 of 2)

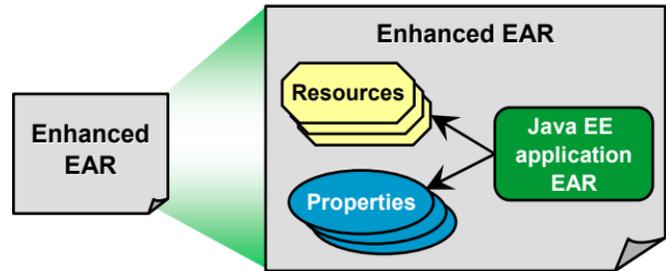
---

- Simplest of deployment descriptors
- The editor can be used to:
  - Edit the application's display name and description
  - Add and remove modules
    - Web
    - EJB
    - Application client
    - Resource adapter (connector)
  - Work with security roles of the application

# Packaging enterprise applications for deployment

- You can deploy Java compliant **EAR** and **WAR** files.
- An **enhanced EAR** includes Java EE artifacts plus resource information needed to install on the WebSphere Application Server V7:

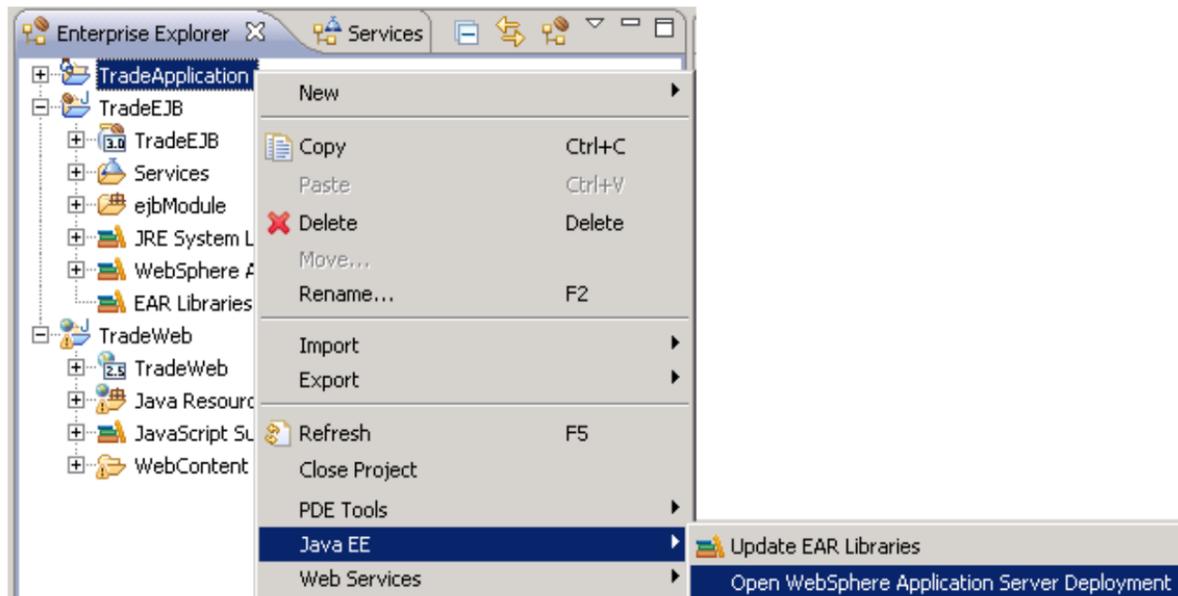
- JDBC resources (data sources)
- Class loader
- JAAS authentication aliases
- Shared libraries
- Virtual host information



- Benefits in improved productivity:
  - Application resources and properties come with the application.
  - The application installation process creates the necessary resources within the server or cluster.
  - Moving an application from one server to another also moves the resources.
- WebSphere extensions supported by:
  - Assembly and deploy tooling

# Application scope resources (1 of 2)

- Define resources to be included in the enhanced EAR file.



# Application scope resources (2 of 2)

WebSphere Application Server Deployment

## WebSphere Deployment

**Data Sources**  
Allows the installed applications to access data from databases.

JDBC provider list:

Name	Implementation Class Name
Trade	com.ibm.db2.jcc.DB2XADataSource

Data source defined in the JDBC provider selected above:

Name	JNDI Name
Trade	jdbc/tradeds

Resource properties defined in the data source selected above:

Name	Value
databaseName	TRADE
driverType	4
serverName	rhhost

# Dealing with enhanced EAR files at deploy time

- To ignore application scoped resources at installation time:

### Install New Application

Specify options for installing enterprise applications and modules.

→ **Step 1: Select installation options**

[Step 2](#) Map modules to servers

[Step 3](#) Provide JSP reloading options for Web modules

[Step 4](#) Map shared libraries

[Step 5](#) Map shared library relationships

[Step 6](#) Provide JNDI names for beans

[Step 7](#) Bind EJB Business

[Step 8](#) Map EJB references to beans

[Step 9](#) Map virtual hosts for Web modules

[Step 10](#) Map context roots for Web modules

#### Select installation options

Specify the various options that are available to prepare and install the application.

Precompile JavaServer Pages files

Directory to install application

Distribute application

Use Binary Configuration

Deploy enterprise beans

Application name

Create MBeans for resources

Override class reloading settings for Web and EJB modules

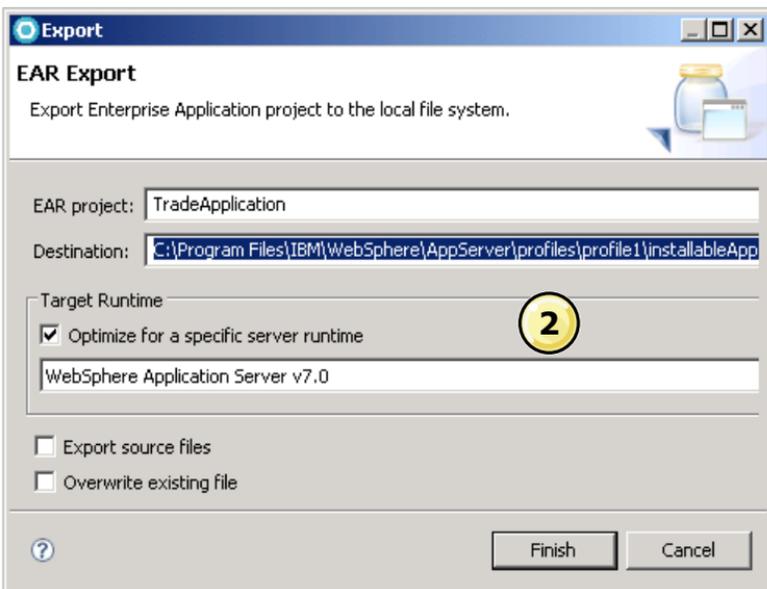
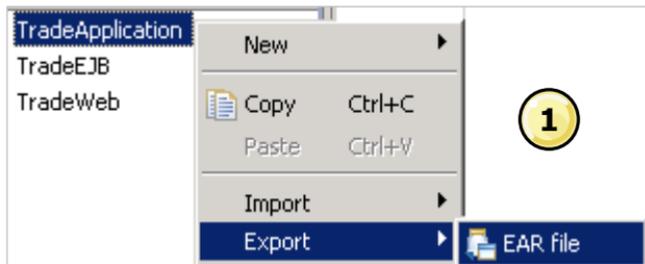
Reload interval in seconds

Deploy Web services

Validate Input off/warn/fail

Process embedded configuration

# Generating an EAR file for deployment



- Assemble application modules.
- Resolve Java EE dependencies.
- Save all changes.
- Export the EAR file.
- If source is available, it can optionally be included in the EAR file.
- The exported file is ready to be deployed.

# Checkpoint

---

1. The result of packaging an enterprise application is \_\_\_\_\_ .
2. True or false: Java EE 5 reduces or eliminates the need to deal with Java EE deployment descriptors in many cases.
3. True or false: Enhanced enterprise applications are the recommended way to deploy applications in a production environment.

# Checkpoint solution

---

1. The result of packaging an enterprise application is \_\_\_\_\_.
  - An EAR file
2. True or false: Java EE 5 reduces or eliminates the need to deal with Java EE deployment descriptors in many cases.
  - True
    - “Annotations reduce or eliminate the need to deal with Java EE deployment descriptors in many cases.” — Java EE 5 specification
    - Caveat: If you do not specify the deployment descriptors, the product assumes certain default names.
3. True or false: Enhanced enterprise applications are the recommended way to deploy applications in a production environment.
  - False. Enhanced EAR files help the developer to test the application.



WebSphere Education

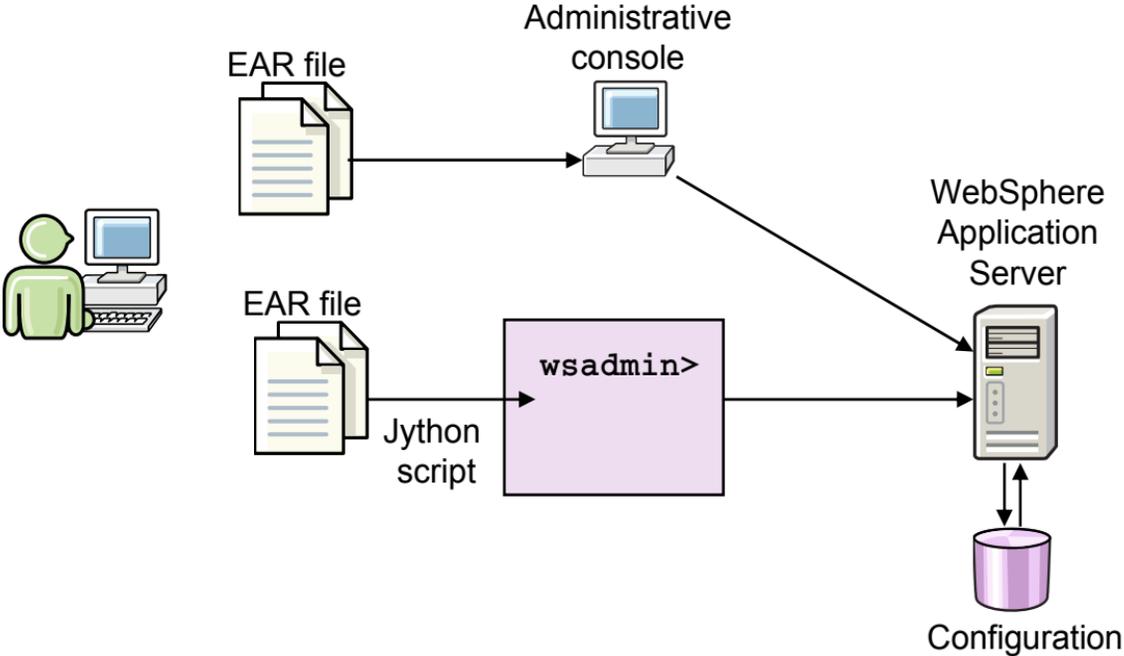


# Application installation

# 8



# Installing enterprise applications



# Installation tasks

---

- Configure the application environment as required
  - Variables, virtual hosts, class path, security, and so forth
- Configure application resources
  - JDBC provider, data sources, JMS resources, or SIBus, if applicable
- Install application
- Manage static content
  - Files served by Web server, not in EAR file
  - Leave static content in EAR file

# Make application files available to server

---

- The default directory assigned to hold the EAR file before it is installed is:  
`<profile_root>\<profile>\installableApps`
- Most often, the application file you receive is an enterprise archive (.ear) file.

# Installing a new application

- Select Applications →  
New Application →  
New Enterprise  
Application

**New Application**

This page provides links to create new applications of different types.

[Install a New Application](#)

-  [New Enterprise Application](#)
-  [New Business Level Application](#)
-  [New Asset](#)

**Preparing for the application installation**

Specify the EAR, WAR, JAR, or SAR module to upload and install.

**Path to the new application**

Local file system

Full path

Remote file system

Full path

**Preparing for the application installation**

**How do you want to install the application?**

Fast Path - Prompt only when additional information is required.

Detailed - Show all installation options and parameters.

Choose to generate default bindings and mappings

# Example of fast path installation

Step 2 Map modules to servers — this page specifies which server or cluster that the application will run on.

**Install New Application**

Specify options for installing enterprise applications and modules.

→ **Step 1: Select installation options**

Step 2: Map modules to servers

Step 3: Summary

### Select installation options

Specify the various options that are available to prepare and install your application.

Precompile JavaServer Pages files

Directory to install application

Distribute application

Use Binary Configuration

Deploy enterprise beans

Application name

Create MBeans for resources

Override class reloading settings for Web and EJB modules

Reload interval in seconds

Deploy Web services

Validate Input off/warn/fail

Process embedded configuration

#### File Permission

Allow all files to be read but not written to  
Allow executables to execute  
Allow HTML and image files to be read by everyone

# Example of detailed installation

Specify options for installing enterprise applications and modules.

→ **Step 1: Select installation options**

Step 2 Map modules to servers

Step 3 Provide JSP reloading options for Web modules

Step 4 Map shared libraries

Step 5 Map shared library relationships

Step 6 Provide JNDI names for beans

Step 7 Bind EJB Business

Step 8 Map EJB references to beans

Step 9 Map virtual hosts for Web modules

Step 10 Map context roots for Web modules

Step 11 Map environment entries for Web modules

Step 12 Map security roles to users or groups

Step 13 Metadata for modules

Step 14 Summary

### Select installation options

Specify the various options that are available to prepare and install the application.

Precompile JavaServer Pages files

Directory to install application

Distribute application

Use Binary Configuration

Deploy enterprise beans

Application name

Create MBeans for resources

Override class reloading settings for Web and EJB modules

Reload interval in seconds

Deploy Web services

Validate Input off/warn/fail

Process embedded configuration

**File Permission**

Allow all files to be read but not written to  
Allow executables to execute  
Allow HTML and image files to be read by everyone

Application Build ID

Allow dispatching includes to remote resources

Allow servicing includes from remote resources

Business level application name

Asynchronous Request Dispatch Type

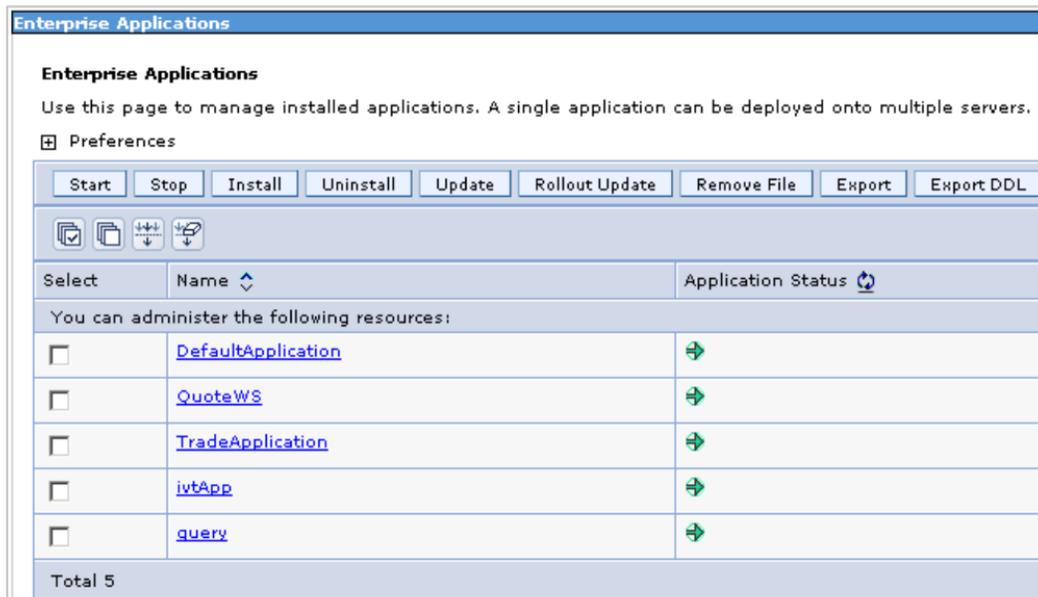
Allow EJB reference targets to resolve automatically

Summary  
step



# Starting an application

- After the application is installed you can select the application and: start, stop, install, uninstall, update, rollout update, remove file, export, or export DDL.
- Go to **Applications** → **Application types** → **WebSphere enterprise applications**.



**Enterprise Applications**

Use this page to manage installed applications. A single application can be deployed onto multiple servers.

[-] Preferences

Start Stop Install Uninstall Update Rollout Update Remove File Export Export DDL

Select	Name	Application Status
You can administer the following resources:		
<input type="checkbox"/>	<a href="#">DefaultApplication</a>	
<input type="checkbox"/>	<a href="#">QuoteWS</a>	
<input type="checkbox"/>	<a href="#">TradeApplication</a>	
<input type="checkbox"/>	<a href="#">ivtApp</a>	
<input type="checkbox"/>	<a href="#">query</a>	

Total 5

# Application update

Enterprise Applications

**Preparing for the application update**

Specify the EAR, WAR, JAR, or SAR module to upload and install.

Application to be updated:

Application update options

Replace the entire application  
Upload an enterprise archive (\*.ear) to replace the entire installed application.

Specify the path to the replacement ear file.

Local file system  
Full path

Remote file system  
Full path

Replace or add a single module  
If the path to the new module matches an existing path to a module in the installed application, the new module replaces the existing module. If the path to the module does not exist in the installed application, the new module is added to the application.

Replace or add a single file  
If the path to the new file matches an existing path to a file in the installed application, the new file replaces the existing file. If the path to the file does not exist in the installed application, the new file is added to the application.

Replace, add, or delete multiple files  
Use a compressed file format such as .zip or .gzip. The compressed file is unzipped into the installed application directory. If the uploaded files exist in the application with the same paths and file names, the uploaded files replace the existing files. If the uploaded files do not exist, the files are added to the application. You can remove existing files from the installed application by specifying metadata in the compressed file.

You can update the full application, a single module, a single file, or part of the application.

# Application startup behavior and auto start

---

- Startup behavior of an application
  - The values set affect how quickly an application starts and what occurs when an application starts.
  - Click **Applications** → **Application Types** → **WebSphere enterprise applications** → *application\_name* → **Startup behavior** in the console navigation tree to configure startup behavior settings.
- Automatic starting of an application
  - By default, an installed application starts automatically when the server on which the application resides starts.
  - Click **Applications** → **Application Types** → **WebSphere enterprise applications** → *application\_name* → **Target specific application status** to configure auto startup.

# Checkpoint

---

1. True/False: You can update a single module or part of an application in the console.
2. True/False: The default startup behavior for an application is to automatically start when the server starts.
3. What is the default directory for storing EAR files before they are installed?

# Checkpoint solutions

---

1. True/False: You can update a single module or part of an application.
  - True
2. True/False: The default startup behavior for an application is to automatically start when the server starts.
  - True
3. What is the default directory for storing EAR files before they are installed?
  - `<profile_root>\<profile>\installableApps`



WebSphere Education



# Problem determination

# 9



# Overview of problem determination (1 of 3)

---

Problem determination (troubleshooting) is a systematic approach to solving a problem. There are two approaches:

1. Analysis approach
  - Collect and analyze diagnostic data (possibly through several iterations) until root cause is found.
2. Isolation approach
  - Reproduce the problem, analyze results, remove variables (possibly through several iterations) until root cause is found.

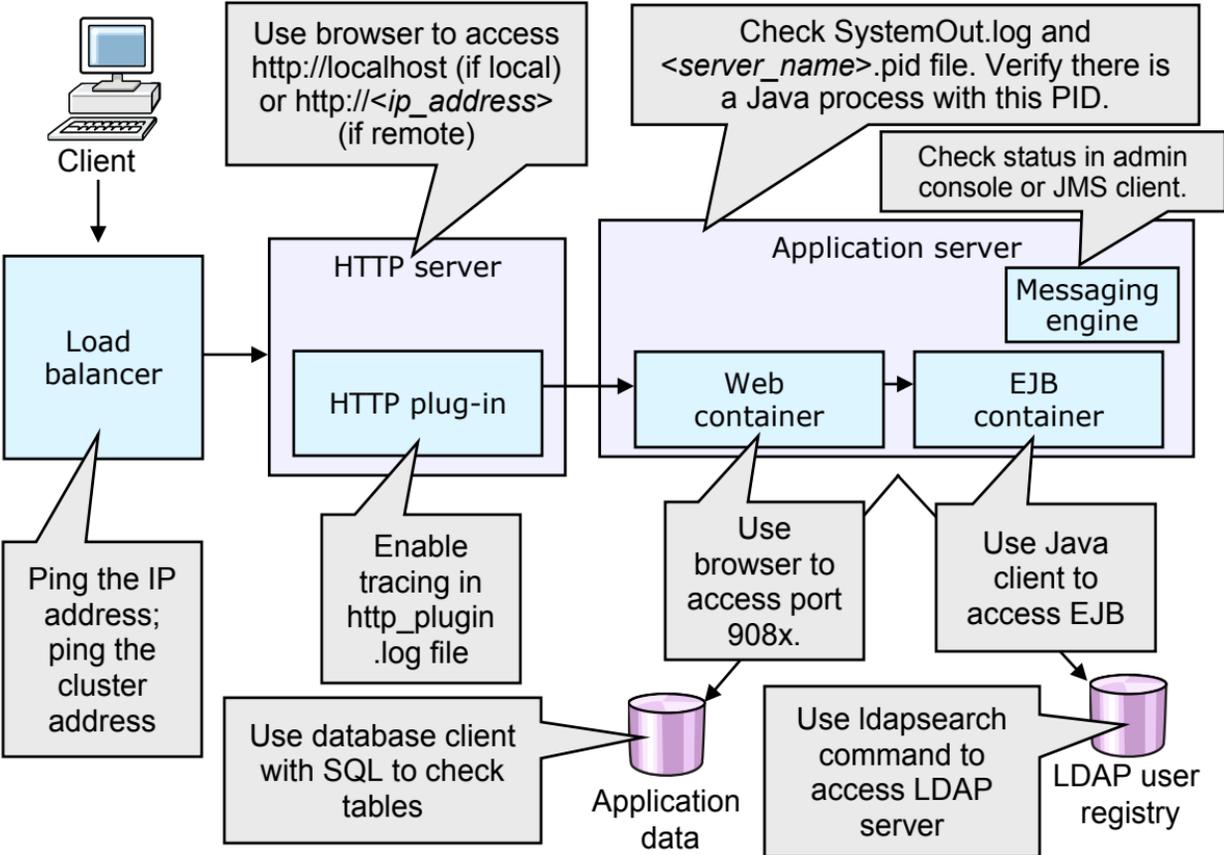
# Categorize and describe the problem

---

Categorize and describe the problem based on diagnostic data:

- What are the symptoms of the problem?
- Where does the problem occur?
- When does the problem occur?
- Does the problem occur after a recent configuration change?
- Can the problem be reproduced?

# Are all components in application flow accessible?



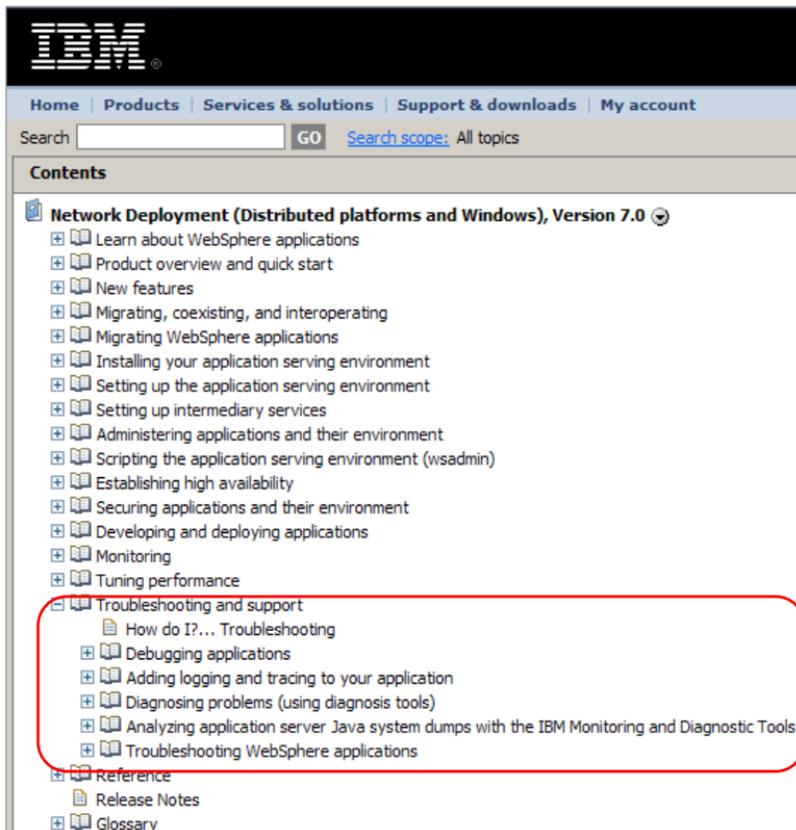
# Resources for performing a problem investigation

---

Resources to help investigate your problem:

- Product support pages
- WebSphere support page
- Information Center
- IBM Support Assistant

# Information center: Troubleshooting and searching



IBM

Home | Products | Services & solutions | Support & downloads | My account

Search  GO [Search scope:](#) All topics

**Contents**

- Network Deployment (Distributed platforms and Windows), Version 7.0
  - Learn about WebSphere applications
  - Product overview and quick start
  - New features
  - Migrating, coexisting, and interoperating
  - Migrating WebSphere applications
  - Installing your application serving environment
  - Setting up the application serving environment
  - Setting up intermediary services
  - Administering applications and their environment
  - Scripting the application serving environment (wsadmin)
  - Establishing high availability
  - Securing applications and their environment
  - Developing and deploying applications
  - Monitoring
  - Tuning performance
  - Troubleshooting and support**
    - How do I?... Troubleshooting
    - Debugging applications
    - Adding logging and tracing to your application
    - Diagnosing problems (using diagnosis tools)
    - Analyzing application server Java system dumps with the IBM Monitoring and Diagnostic Tools
    - Troubleshooting WebSphere applications
  - Reference
    - Release Notes
  - Glossary

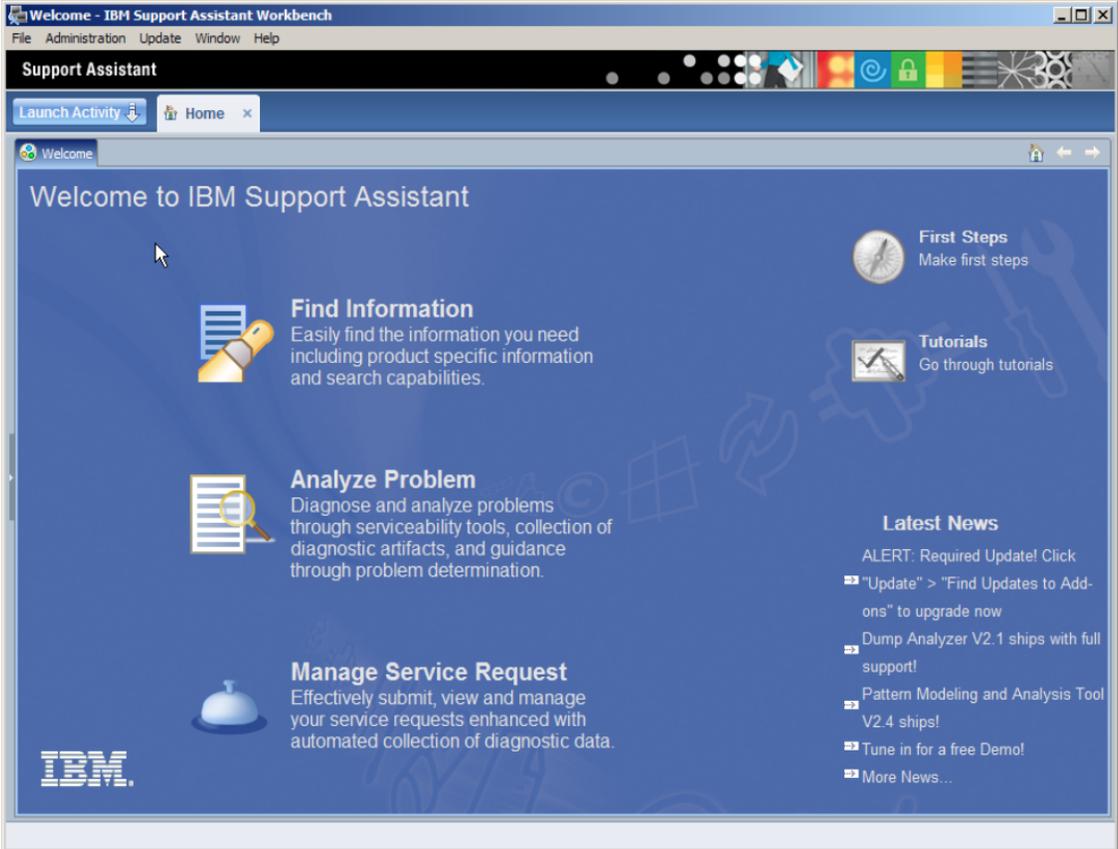
- The information center is a good resource for troubleshooting.
- Specific problem areas are documented and a search facility is provided.

# What is the IBM Support Assistant?

---

- The IBM Support Assistant workbench (ISA) is a free, stand-alone application that is installed on any workstation. It can also be enhanced by installing plug-in modules for the IBM products you use.
  - The ISA workbench is supported on Windows and Linux
  - The ISA Agent manager and Assistant agent need to be configured to support other platforms such as AIX and Solaris
- Benefits of ISA include:
  - Saves time searching product, support, and educational resources.
  - Assists in opening a problem management report (PMR)
  - Allows for easy location and installation of useful product support tools using a support tool framework.
  - Easily downloaded from  
<http://www.ibm.com/software/support/isa/>

# IBM Support Assistant workbench home page



# Examining server log files

---

- Log files are an initial source of diagnostic data
- WebSphere provides several useful logs including
  - JVM logs
  - HTTP plug-in logs
  - Console runtime messages

# WebSphere Application Server logs

---

- **JVM logs:** created by redirecting the System.out and System.err streams of the JVM to independent log files.
  - One set of JVM logs for each application server and all of its applications located by default in the following directory:  
`<profile_root>/<profile_name>/logs/<server_name>`
  - SystemOut.log and SystemErr.log
- **Process logs:** contain two output streams (stdout and stderr) that are accessible to native code running in the process.
  - One set for each application server
  - native\_stderr.log and native\_stdout.log
- **IBM service log:** contains both the WebSphere Application Server messages that are written to the System.out stream and some special messages that contain extended service information
  - One per profile (node)
  - activity.log

# Server log files: Types and locations

---

- Application server log file destinations and names for are configurable. The default location is:  
`<was_root>\profiles\<profile_name>\logs\<server_name>`
- Application server log files:
  - **SystemOut.log** and **SystemErr.log**
  - **startServer.log** and **stopServer.log**
  - **trace.log**
  - **native\_stdout.log** and **native\_stderr.log**
- Web server plug-in log file:
  - **http\_plugin.log**
    - Location: `<plugin_root>\logs\<webserver_name>`

# How to view logs

---

- JVM logs:
  - Click **Troubleshooting > Logs and Trace** in the administrative console navigation tree and view in the console.
  - Navigate to the `<profile_root>\<profile_name>\logs\<server_name>` directory on the machine where logs are stored, and open `SystemOut.log` or `SystemErr.log` in a text editor.
- Process logs:
  - Navigate to the `<profile_root>\<profile_name>\logs\<server_name>` directory on the machine where logs are stored, and open `native_stdout.log` or `native_stderr.log` in a text editor.
- IBM service log:
  - Located at `<profile_root>\<profile_name>\logs\activity.log`
  - Use Log Analyzer in IBM Support Assistant to view.

# Viewing runtime messages in the console (1 of 2)

- Runtime events are grouped by severity: error, warning, information
- To view select:  
**Troubleshooting** →  
**Runtime Messages** →
  - Runtime Error
  - Runtime Warning
  - Runtime Information
- Runtime events are disabled by default
- Select **Info** to enable all runtime events

**Runtime Events**

Runtime Events

Use this page to view runtime events that propagate from the server.

**i** Runtime Events have been disabled by default ("None"). To enable a event level please select from the list. "Error" would enable only Error runtime events. "Warning" would enable both Error and Warning runtime events. Info would enable all runtime events.

None

None

Error

Warning

Info

Preferences

Refresh Reload

Timestamp	Message Originator	Message
None		
Total 0		

# Viewing runtime messages in the console (2 of 2)

- Runtime events details include:
  - Message code and text
  - Brief explanation of the event
  - Action for the user to perform
  - What server component issued the message
  - Timestamp
  - Thread ID
  - Node name
  - Server name

### Runtime Events

[Runtime Events](#) > **Message Details**

Use this page to view runtime events that propagate from the server.

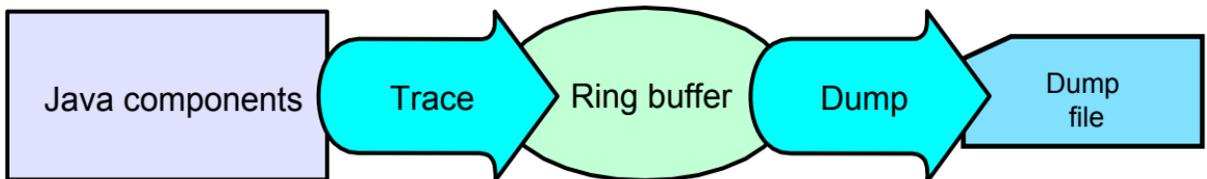
#### General Properties

Message	SRVE0255E: A WebGroup/Virtual Host to handle /snoop has not been defined.
Message type	Runtime error
Explanation	Could not find a web group (web module) or virtual host to handle the request. This is an application error.
User action	Be sure the web group and virtual host is defined and deployed.
Message Originator	com.ibm.ws.webcontainer
Source object type	RasLoggingService
Timestamp	Dec 14, 2008 8:42:13 PM EST
Thread Id	35
Node name	was70host01Node01
Server name	server1

# Using diagnostic tracing

---

- Tracing can be started
  - While server is running using Runtime Diagnostic Trace
  - When server is started using Configuration Diagnostic Trace
- Trace output can be directed to:
  - File (default)
  - Memory ring buffer — dumped after trace stops
- Tracing has a significant impact on performance
  - Enable temporarily for problem determination
  - Trace to file is slower than trace to memory ring buffer Runtime tab



# Enable and configure tracing

- Troubleshooting →  
Logs and Trace →  
<server\_name> →  
Diagnostic Trace
- Configure Trace Output
  - None
  - Memory buffer
  - File (default)
- Configure Trace Output Format
  - Basic (recommended by IBM support)
  - Advanced
- **Note:** Configure Log Detail Level to get trace output

The screenshot shows the IBM Configuration console with the 'Runtime' tab selected. The 'General Properties' section is expanded to show 'Trace Output' settings. The 'File' radio button is selected, and the 'File Name' field contains the path '\$(SERVER\_LOG\_ROOT)/trace.log'. Other settings include a Maximum Buffer Size of 8 thousand entries, a Maximum File Size of 20 MB, and a Maximum Number of Historical Files of 5. The 'Trace Output Format' is set to 'Basic (Compatible)'. At the bottom, there are buttons for 'Apply', 'OK', 'Reset', and 'Cancel'.

Configuration **Runtime**

**General Properties**

**Trace Output**

None

Memory Buffer

\* Maximum Buffer Size  
8 thousand entries

File

\* Maximum File Size  
20 MB

\* Maximum Number of Historical Files  
5

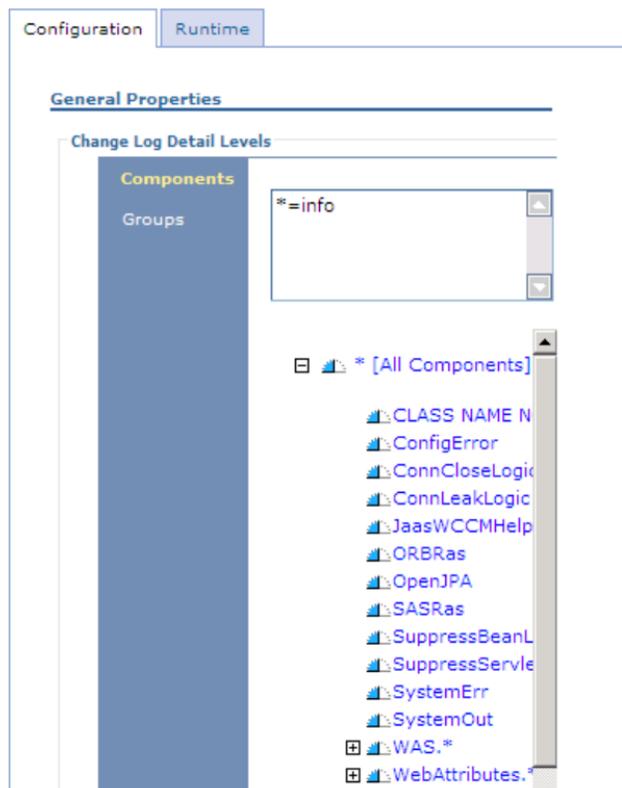
\* File Name  
\$(SERVER\_LOG\_ROOT)/trace.log

**Trace Output Format**  
Basic (Compatible) ▼

Apply OK Reset Cancel

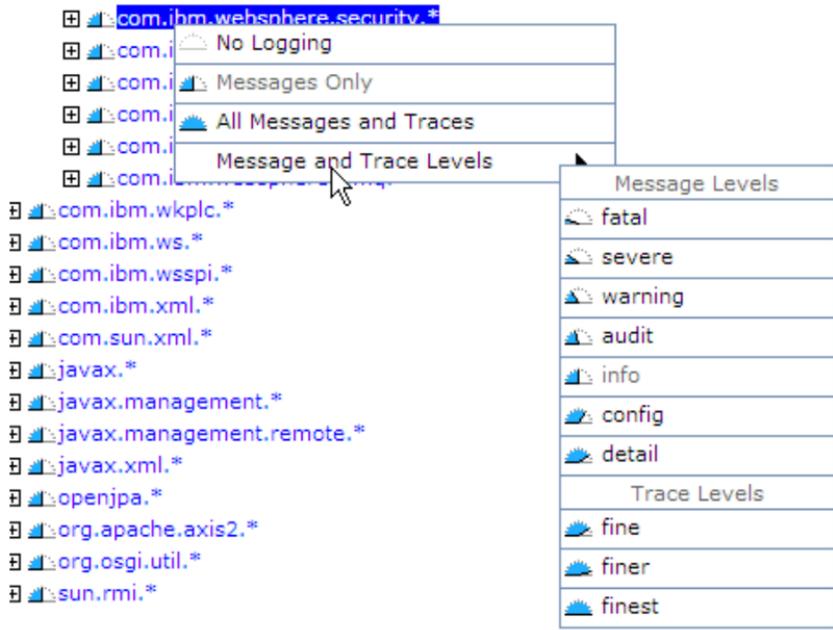
# Setting the log detail level (1 of 2)

- Logging and Tracing →  
<server> →  
Change Log Detail Level
- Log detail level affects tracing *and* regular logging
  - Setting levels below **info** reduces the amount of data in logs
  - `*=off` disables logging altogether
- Trace levels (**fine**, **finer**, **finest**) do not appear in the trace file unless logging is enabled
- Log string can be typed in or set using the graphical menu
- Default is `*=info`
- User-created applications can be instrumented too, and be included in the trace output



# Setting the log detail level (2 of 2)

- Select component
- Select one of
  - No logging
  - Messages only
  - Messages and Traces
- Or select **Message and Trace Levels** and select **Trace level**



# Trace output content and format

---

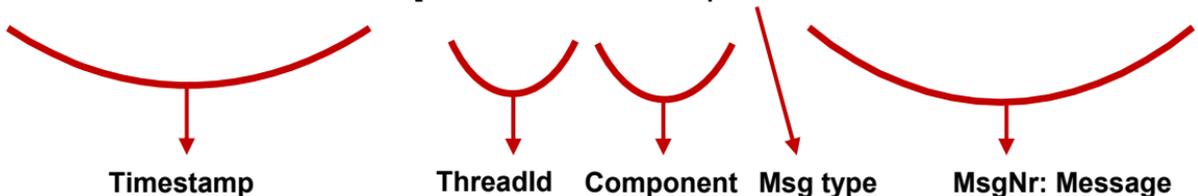
- Trace output allows administrators to examine processes in the application server and diagnose various issues.
- Two formats can be configured
  - Basic (recommended by IBM Support)
  - Advanced
- Trace events displayed in basic format use the following format:
  - `<timestamp><threadId><shortName><eventType> [className] [methodName]<textmessage> [parameter 1] [parameter 2]`
- Possible values of `eventType` include:
  - `>` a trace entry of type method entry.
  - `<` a trace entry of type method exit.
  - `3` a trace entry of type finest, debug or dump.

# Reading a log or trace file (1 of 2)

- Log and trace file format:

Msg Type	Description
1,2,3	Trace info: fine, finer, finest
A	Audit
W	Warning
Z	Type was not recognized
E	Error
D	Detail
C	Configuration
F	Fatal (exits process)
I	Information
O	Program output
R	Program output (sys.err)

[06/30/08 9:51:15:081 GMT] 3c07adad PMImpl A PMON0001A:PMI enabled



# Installation problems

---

- The process of installing WebSphere Application Server automatically creates numerous log files.
- Most installation problems can be solved by
  - Locating the relevant log files created during installation
  - Interpreting the log file messages

# Installation log locations

---

- Log files for installation and uninstallation for all packages can be found under the `<install_root>\logs\` directory
- If the logs directory can not be accessed during installation, the logs are saved under `<user_home>\<productID>logs`
- If there is a JDK related problem and you cannot find any logs, look under `<OS temp directory>\niflogs`
  - `/tmp/niflogs` on UNIX and `%TEMP%\niflogs` on Windows

# Installation exit codes

---

- All V7.0 installers, including IHS and plug-in installers use a common logging strategy, including exit codes.
- Exit codes are not set on Windows platforms due to an Install Shield limitation.
  - Consult **log.txt** for information on success or failure
    - INSTCONFSUCCESS (exit code 0 ) implies successful install and profile creation.
    - INSTCONFFAILED (exit code 1) implies a failed install.
    - INSTCONFPARTIALSUCCESS (exit code 2) usually implies a successful install, but some configuration action failed.

# Problem determination tools

---

- In the overall process of problem determination diagnostic data must be collected or generated and the data must be analyzed.
- Various tools are available to help you collect and analyze diagnostic data for solving problems related to
  - JVM
  - Server and application configuration
  - Performance
  - Namespace issues

# Problem determination tool availability

---

- Some tools are integrated into the WebSphere administrative console.
  - Tivoli Performance Viewer, Configuration validation, Classloader viewer, and so on.
- Some tools are separate programs shipped with WebSphere Application Server itself, or ship as separate products in their own right.
  - dumpNameSpace, RAD, and so on.
- IBM Support Assistant (ISA):
  - Serves as a central point from which many tools can be found and even executed directly inside ISA.

# Problem determination tools (1 of 2)

---

- IBM Guided Troubleshooter
  - Provides step-by-step guidance to perform various problem determination tasks
- Collectors
  - Facilitate gathering the log files and other artifacts needed for analysis of a problem, and sending them to IBM Support
- Tivoli Performance Viewer and Performance Advisor
  - Captures and analyzes statistical performance data from a running WebSphere Application Server system
- Configuration validation
  - Checks for errors in a WebSphere Application Server configuration
- Log Analyzer
  - Analyzes and correlates logs from multiple servers

# Problem determination tools (2 of 2)

---

- **ClassLoader Viewer**
  - Diagnoses problems related to loading of classes in applications
- **Memory Dump Diagnostic Tool for Java (MDD4J)**
  - Analyzes heap dumps to diagnose out-of-memory conditions and leaks
- **Pattern Modeling and Analysis Tool for Java Garbage Collector (PMAT)**
  - Analyzes a JVM verboseGC log to diagnose out-of-memory conditions
- **Thread Analyzer**
  - Analyzes a JVM thread dump to diagnose hangs, bottlenecks, and so forth
- **DumpNameSpace**
  - Dumps the contents of the JNDI namespace to diagnose application configuration and startup problems
  
- **And more**

# Using the Log Analyzer

---

- Log Analyzer can be downloaded as a tool add-on in the ISA Workbench
- Log Analyzer enables you to analyze log files using either of the following methods:
  - The user can perform a manual analysis
  - The Log Analyzer perform an automatic symptom analysis
- Log Analyzer also enables you to correlate information in a log file from a single application or in multiple log files generated by different applications.

# Log Analyzer — Log View

The screenshot displays the IBM Log Analyzer interface. The main window is titled "Log View - IBM WebSphere Application Server (WAS) activity log activity.log". The filter is set to "Show warning and error log records". The log records table shows the following data:

Creation Time	Severity	Message Text	Priority	Situ...
Dec 11, 2008 4:59:08.546000 PM	30	DCSV8104W: DCS Stack DefaultCor...	0	Repc
Dec 11, 2008 4:18:46.125000 PM	50	Failed to obtain Node Synch Status: ...	0	Repc
Dec 11, 2008 4:18:46.015000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 4:18:37.562000 PM	50	Failed to obtain Node Synch Status: ...	0	Repc
Dec 11, 2008 4:18:37.546000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 4:18:33.234000 PM	50	Failed to obtain Node Synch Status: ...	0	Repc
Dec 11, 2008 4:18:33.203000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 4:18:31.421000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 4:18:30.468000 PM	50	Failed to obtain Node Synch Status: ...	0	Repc
Dec 11, 2008 4:18:30.437000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 4:18:06.843000 PM	50	Failed to obtain Node Synch Status: ...	0	Repc
Dec 11, 2008 4:18:06.812000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 4:18:04.437000 PM	50	Failed to obtain Node Synch Status: ...	0	Repc
Dec 11, 2008 4:18:03.937000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 3:06:32.171000 PM	30	SECJ0371W: Validation of the LTPA ...	0	Repc
Dec 11, 2008 3:06:31.828000 PM	30	SECJ0371W: Validation of the LTPA ...	0	Repc

The interface includes a "Log Navigator" on the left with a tree view showing "Logs", "Symptom Catalogs", and "Correlations". The "Properties" pane at the bottom shows "Symptom Analysis Results View" for a record on Dec 12, 2008. The "Symptom Analysis Results View" pane contains a table with the following data:

Creation time	Symptom
Dec 11, 2008 ...	ADMND0022E

The "Recommendations and actions" pane shows a list of recommendations, including "Recommendation No appropriate permission is associated with".

Numbered callouts (1, 2, 3, 4) highlight specific UI elements: 1 points to the Log Navigator, 2 points to a log record, 3 points to the Symptom Analysis Results View table, and 4 points to the Recommendations and actions pane.

# Log Analyzer — context menu

Log View - IBM WebSphere Application Server (WAS) activity log activity.log

(Filter: Show warning and error log records)

Log Records (Page 1 of 1 Filter matched 25 of 797 records)

Creation Time	Severity	Message Text	Priority	Situ.
Dec 11, 2008 4:18:31.421000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 4:18:30.468000 PM	50	Failed to obtain Node Synch Status: ...	0	Repc
Dec 11, 2008 4:18:30.437000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 4:18:06.843000 PM	50	Failed to obtain Node Synch Status: ...	0	Repc
Dec 11, 2008 4:18:06.812000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 4:18:04.437000 PM	50	Failed to obtain Node Synch Status: ...	0	Repc
Dec 11, 2008 4:18:03.937000 PM	50	Could not invoke an operation on ob...	0	Repc
Dec 11, 2008 3:06:32.171000 PM	30			
Dec 11, 2008 3:06:31.828000 PM	30			
Dec 11, 2008 3:00:55.015000 PM	30			
Dec 11, 2008 2:59:43.062000 PM	30			
Dec 11, 2008 11:53:03.359000 AM	50			
Dec 11, 2008 11:53:03.062000 AM	50			
Dec 11, 2008 11:32:08.500000 AM	30			
Dec 11, 2008 11:32:00.140000 AM	30			

Context Menu:

- Analyze Selection
- Analyze All
- Analyze Settings...
- Properties
- Copy to Clipboard
- New Symptom Definition...
- Refresh Views
- Choose Columns...
- Sort Columns...
- Search Message Text in IBM Support Assistant
- Search Message ID in IBM Support Assistant
- Correlation by Time
- Correlation by Time, Application ID, Host Name and Database Name
- Correlation by PMI Request Metrics
- Correlation by Time, URL and Application ID
- Correlation by Time and URL
- Correlation by Time and Application ID

Event Details:

Message Text — SECJ0371W: Va  
current Date: T

Creation Time

Properties Symptom Analysis Results View

Additional Data Attributes

Correlation Data Attributes

Situation

Message Information

Source Component

Reporting Component

Right-click any event to bring up the context menu. From the menu you can choose to analyze a single event or all events.

# Dumping the JNDI namespace

---

- DumpNameSpace utility shows JNDI directory content
- Useful to ensure correct association of named objects:
  - JDBC resources
  - EJBs
  - JMS resources
  - Other resources
- Syntax and some of the options:

```
<was_root>\bin\dumpNameSpace  
  [-host bootstrap_host_name (defaults to localhost)]  
  [-port bootstrap_port_number (defaults to 2809)]  
  [-startAt subcontext/in/the/tree]
```

- Output can be redirected to a file and inspected



# Checkpoint

---

1. What are the two approaches for problem determination?
2. What are the two types of JVM log files, and what data do they contain?
3. What are the three levels of diagnostic trace detail?
4. What are the three major features of the IBM Support Assistant that are accessible from the Welcome screen?
5. What are some JVM-related problems that a server can experience?

# Checkpoint solutions

---

1. What are the two approaches for problem determination?
  - Analysis and isolation
2. What are the two types of JVM log files, and what data do they contain?
  - **SystemOut.log** contains messages from different server components. Mostly informational, these messages log events that occur during the lifetime of a server's JVM. **SystemErr.log** contains any exceptions and stack traces thrown by server components.
3. What are the three levels of diagnostic trace detail?
  - Fine, finer, and finest
4. What are the three major features of the IBM Support Assistant that are accessible from the Welcome screen?
  - Find Information, Analyze Problem, and Manage Service Request.
5. What are some JVM-related problems that a server can experience?
  - Hung threads, OutOfMemory conditions, connect leaks



WebSphere Education



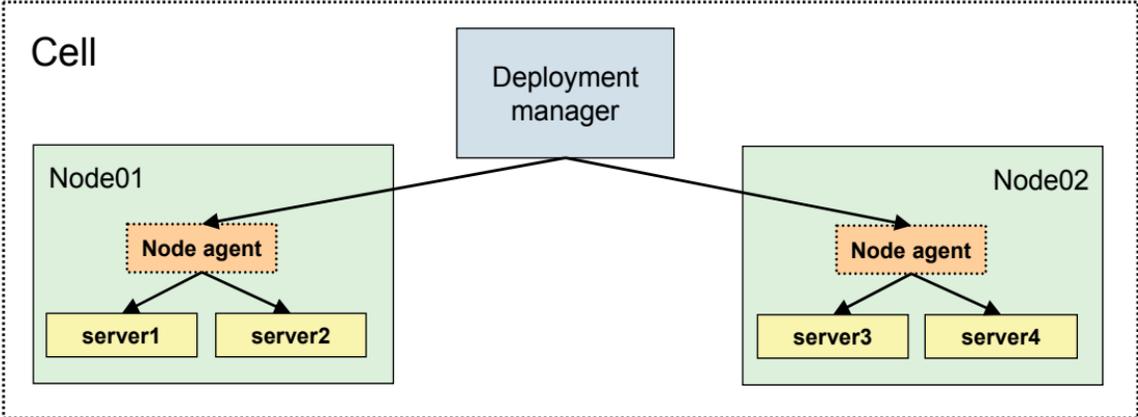
## Federating a cell

# 10



# WebSphere cells

- A WebSphere cell defines an administrative domain.
  - Available in WebSphere Application Server Network Deployment.
  - A deployment manager provides centralized administration for entire cell.
  - A cell is created as a profile.
  - Nodes run application components in application servers.



# WebSphere Application Server process types

---

- **Application server**

- Provides the functions that are required to support and host user applications.
- Runs on only one node, but one node can support many application servers.

- **Node agent**

- Created and installed when a node is federated into a cell.
- Works with the deployment manager to perform administrative activities on the node.

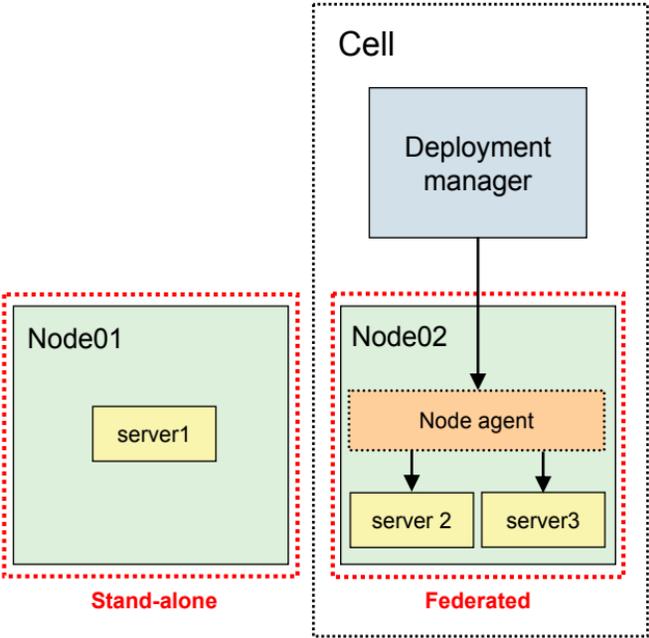
- **Deployment manager**

- Administers multiple application servers from one centralized manager.
- Works with the node agents on each node to manage all the servers in a distributed topology.
- Application server nodes are federated with the deployment manager before they can be managed by the deployment manager.



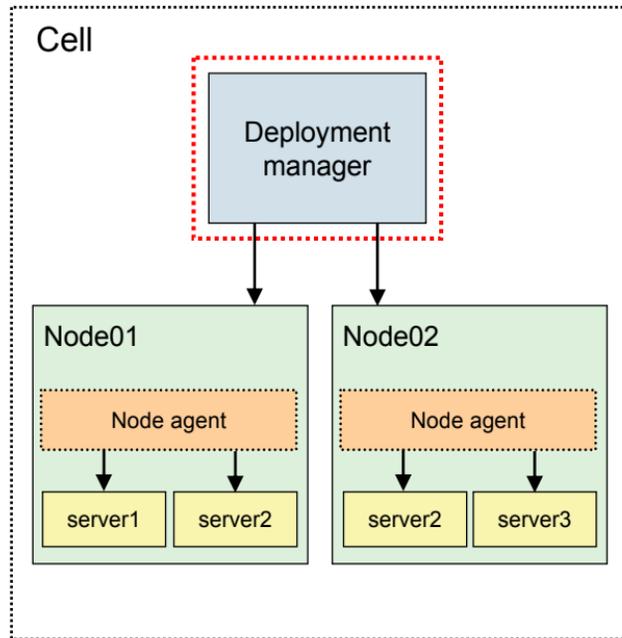
# Application server profile

- Application server profiles provide a base installation.
- Application servers in the network deployment product can run as:
  - Managed nodes in a cell.
  - Stand-alone application servers.
- Multiple application server profiles can be created on a single computer.
- Each application server profile can be federated into a cell.
- Multiple base profiles on a single computer can be federated:
  - Into the same cell.
  - Into different cells.
  - Remain stand-alone.



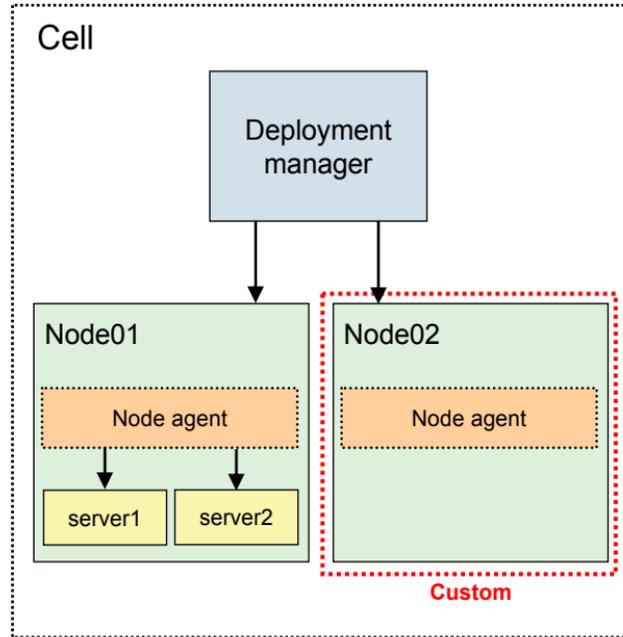
# Deployment manager profile

- Is used to create a deployment manager process (dmgr).
- Can exist on an independent computer.
- Can exist on a computer with other profiles.
- Provides centralized administration of managed application server nodes and custom nodes as a single cell.



# Custom profile

- A custom profile creates a node without an application.
- Automatically federated into a cell during profile creation by default.
- No application servers are created during profile creation.
- Use the deployment manager administrative console to create servers and clusters on the federated node.
- Consider a custom profile as a production-ready shell, ready for customization to contain your servers and applications.



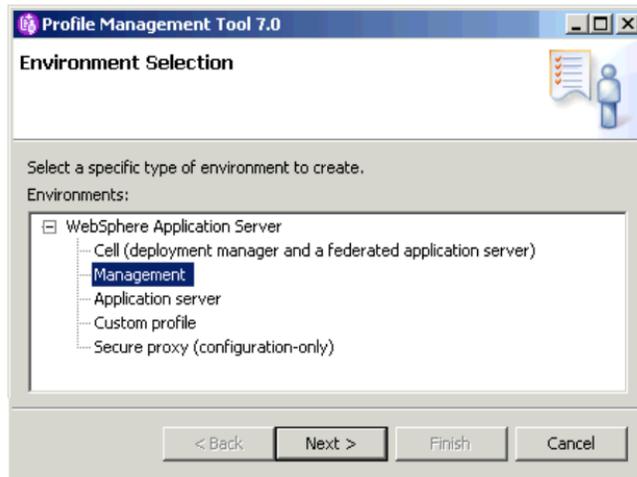
# Creating profiles

## • Profile Management Tool

- Start menu (Windows only)
- Launched from install wizard
- Launch command-line tool `pmt.bat`
  - `<was_root>\bin\ProfileManagement\`
  - Similar command exists for UNIX
  - Wizard in First steps console

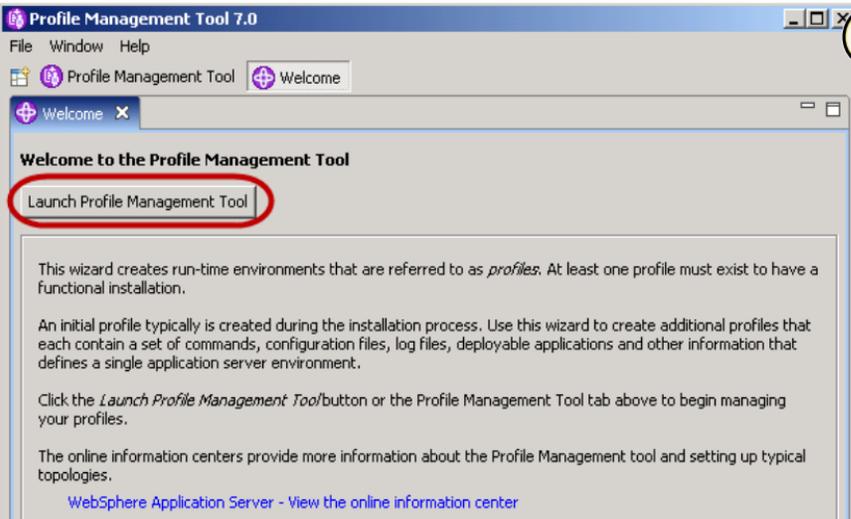
## • manageprofiles

- Command-line tool
- Create profiles in silent mode using `manageprofiles -silent` option
- Other `manageprofiles` options include: `-listProfiles` `-delete`



```
Command Prompt
C:\Program Files\IBM\WebSphere\AppServer\bin>manageprofiles -create -profileName
profile3 -profilePath "C:\Program Files\IBM\WebSphere\AppServer\profiles\profil
e3" -templatePath "C:\Program Files\IBM\WebSphere\AppServer\profileTemplates\def
ault" -nodeName was7host01Node03 -cellName was7host01Cell03 -hostname was7host01
INSTCONFSUCCESS: Success: Profile profile3 now exists. Please consult C:\Program
Files\IBM\WebSphere\AppServer\profiles\profile3\logs\AboutThisProfile.txt for m
ore information about this profile.
```

# Profile Management Tool — launch and create



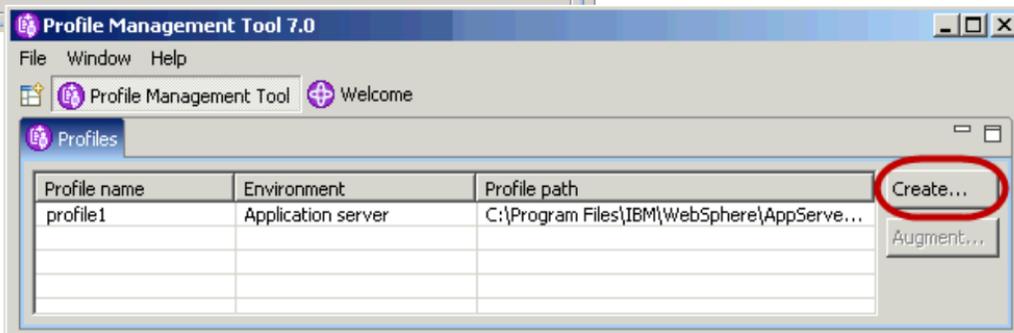
1

Launch the Profile Management Tool

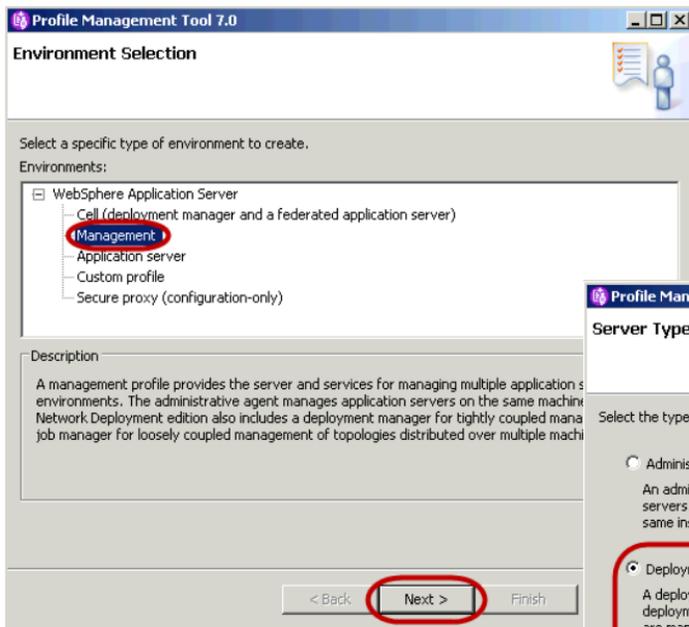
- Started from:
  - WebSphere installation wizard
  - Windows Start menu
  - Command line
- Click **Launch Profile Management Tool** to manage profiles

2  
Create a profile

- Existing profiles shown
- Click **Create**

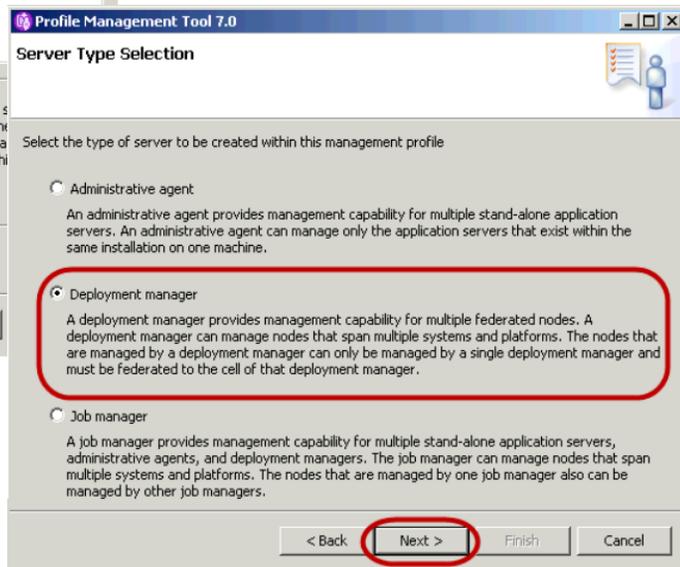


# Profile Management Tool — environment and server type



## 3 Environment selection

- A profile is associated with an environment type
- Following panels vary by environment
- Example will follow creation of a deployment manager



## 4 Server type selection

- Administrative agent
- Deployment manager
- Job manager

# Profile Management Tool — security certificate (2 of 2)

11

## Security certificate (part 2)

Profile Management Tool 7.0

### Security Certificate (Part 2)

Modify the certificate information to create new certificates during profile creation. If you are importing existing certificates from keystores, use the information to verify whether the selected certificates contain the appropriate information. If the selected certificates do not, click **Back** to import different certificates.

[Restore Defaults](#)

Default personal certificate (a personal certificate for this profile, public and private key):

Issued to distinguished name:

Issued by distinguished name:

Expiration period in years:

Root signing certificate (personal certificate for signing other certificates, public and private key):

Expiration period in years:

Default keystore password:

Confirm the default keystore password:

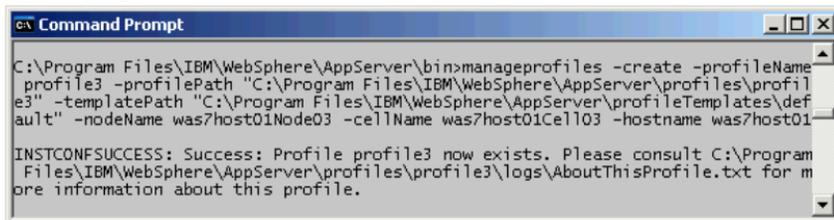
< Back **Next >** Finish Cancel

# Profile creation — command-line tool

The **manageprofiles** script supports a number of functions:

- Create new stand-alone application server profiles.

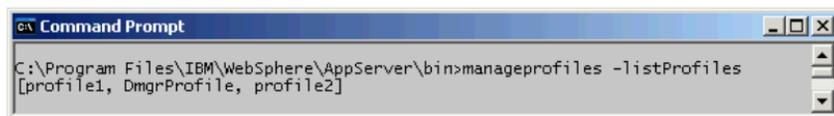
```
manageprofiles -create
```



```
Command Prompt
C:\Program Files\IBM\WebSphere\AppServer\bin>manageprofiles -create -profileName
profile3 -profilePath "C:\Program Files\IBM\WebSphere\AppServer\profiles\profil
e3" -templatePath "C:\Program Files\IBM\WebSphere\AppServer\profileTemplates\def
ault" -nodeName was7host01Node03 -cellName was7host01Cell03 -hostname was7host01
INSTCONFSUCCESS: Success: Profile profile3 now exists. Please consult C:\Program
Files\IBM\WebSphere\AppServer\profiles\profile3\logs\AboutThisProfile.txt for m
ore information about this profile.
```

- List all profiles.

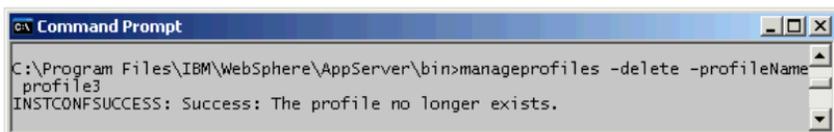
```
manageprofiles -listProfiles
```



```
Command Prompt
C:\Program Files\IBM\WebSphere\AppServer\bin>manageprofiles -listProfiles
[profile1, DmgrProfile, profile2]
```

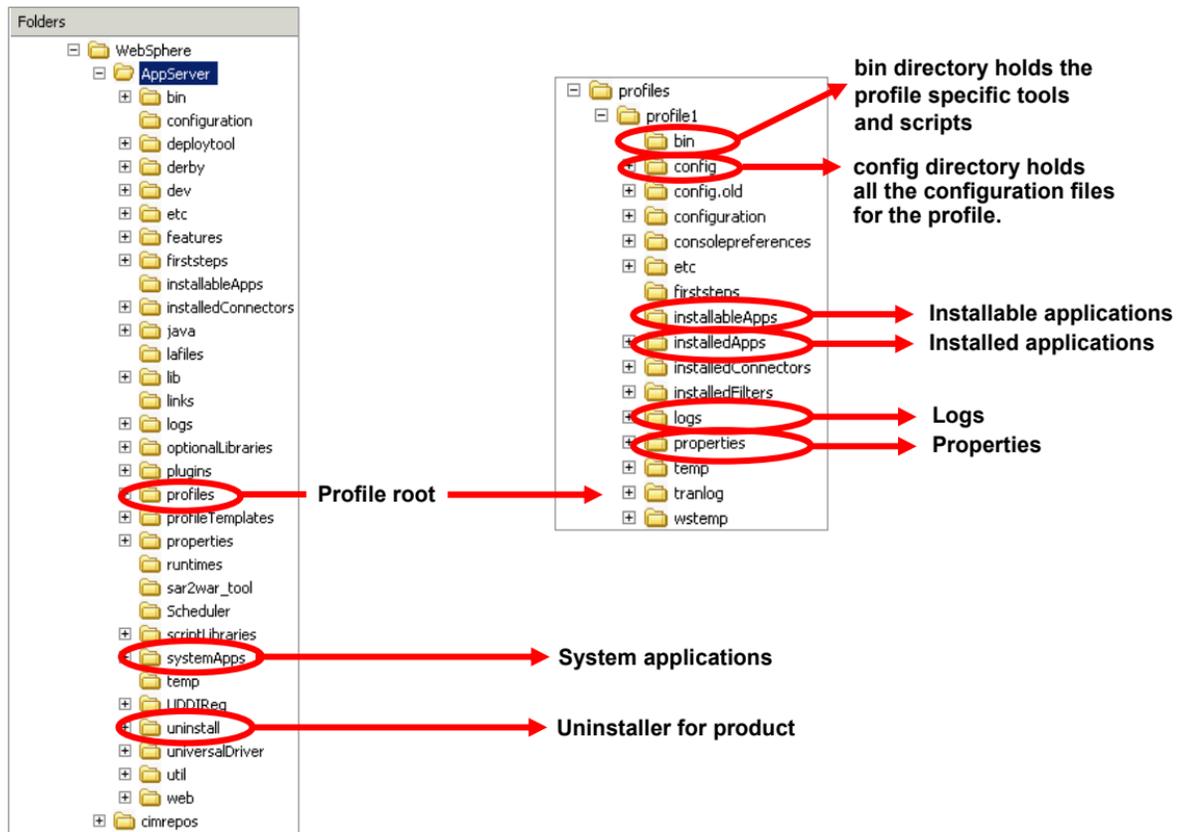
- Delete profiles.

```
manageprofiles -delete -profileName
```



```
Command Prompt
C:\Program Files\IBM\WebSphere\AppServer\bin>manageprofiles -delete -profileName
profile3
INSTCONFSUCCESS: Success: The profile no longer exists.
```

# Directory structure



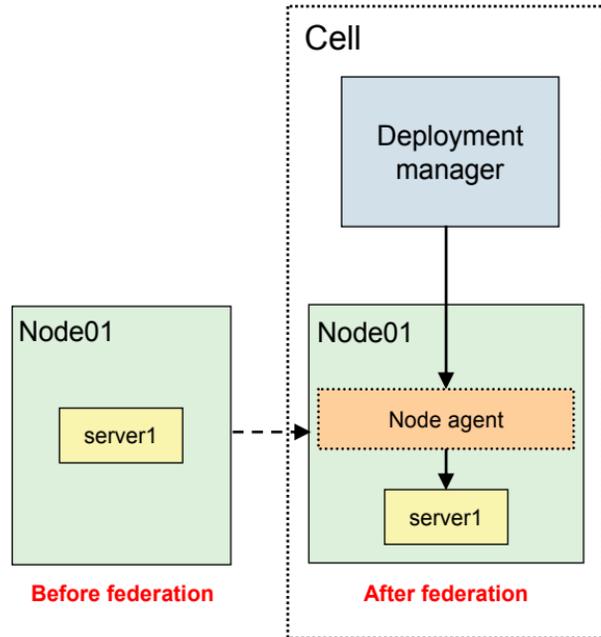
# Server commands review

---

- WebSphere commands are profile aware
  - There is a `-profileName` option on many WebSphere commands.
  - Or issue the commands from the appropriate directory:  
`<profile_root>\<profile_name>\bin`
- If no profile is used, the default profile is assumed.
  - There can only be one default profile.
  - Unless otherwise manually set, the first profile created is the default profile.
- Examples (from `<was_root>\bin`):
  - `startServer server1 -profileName profile1`
  - `startManager -profileName DmgrProfile`
  - `stopServer server1` ← assumes default profile

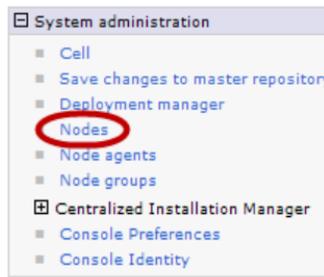
# Adding a node to a cell

- Add a node to a cell using:
  - **Administrative console**, or
  - **addNode** command-line tool
- Adding a node to a cell includes:
  - Creation of a backup of current configuration
  - Connection to the deployment manager
  - Configuration of the node agent
  - Addition of applications of node to cell configuration
- After the node has been added:
  - Use **startNode** to start the node agent
  - Use **syncNode** to synchronize a node



# Adding a node

- Deployment manager administrative console



Buttons: Add Node, Remove Node, Force Delete, Synchronize, Full Resynchronize, Stop

Icons: Refresh, Save, Add, Remove

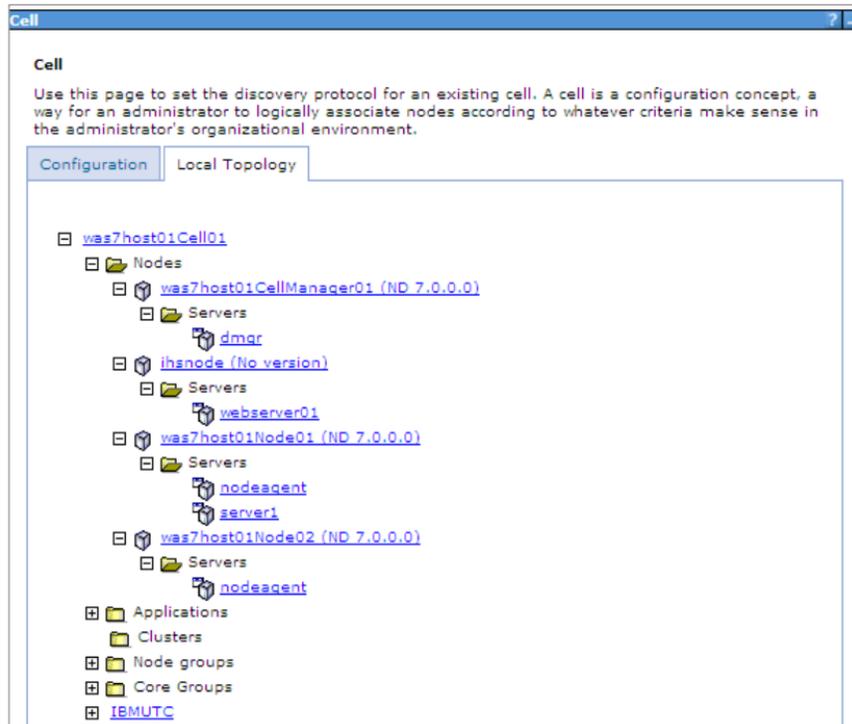
Select	Name	Host Name	Version	Discovery Protocol	Status
You can administer the following resources:					
<input type="checkbox"/>	<a href="#">ihsnode</a>	was7host01	Not applicable	TCP	
	<a href="#">was7host01CellManager01</a>	was7host01	ND 7.0.0.0	TCP	↔
<input type="checkbox"/>	<a href="#">was7host01Node01</a>	was7host01	ND 7.0.0.0	TCP	↔
<input type="checkbox"/>	<a href="#">was7host01Node02</a>	was7host01	ND 7.0.0.0	TCP	?
Total 4					

- Command-line

```
addNode dmgr_host [dmgr_port] [-profileName profilename]  
[-conntype type] [-excludesecuritydomains true | false] [-includeapps]  
[-startingport portnumber] [-portprops qualified_filename]  
[-nodeagentshortname name] [-nodegroupname name]  
[-includebuses] [-registerservice] [-serviceusername name]  
[-servicepassword password] [-coregroupname name] [-noagent]  
[-statusport 1231] [-quiet] [-nowait] [-logfile filename] [-replacelog]  
[-trace] [-username uid] [-password pwd] [-localusername localuid]  
[-localpassword localpwd] [-help]
```

# Cell topology

- Cell topology can be viewed through the administrative console
  - From **System Administration** → **Cell** → **Local Topology**



# Configuring synchronization

- From the node agent detail page click **File synchronization service**

The screenshot shows a web-based configuration interface for the 'File synchronization service'. At the top, a breadcrumb trail reads 'Node agents > nodeagent > File synchronization service', which is circled in red. Below the breadcrumb is a descriptive paragraph: 'Use this page to configure the file synchronization service. The file synchronization service runs in the deployment manager and node agent. It ensures that configuration changes made to the cell repository are propagated to the appropriate node repositories.' The main configuration area is titled 'Configuration' and is divided into two sections: 'General Properties' and 'Additional Properties'. Under 'General Properties', there are four options: 'Enable service at server startup' (checked), 'Synchronization interval' (set to 1 minutes), 'Automatic synchronization' (checked), and 'Startup synchronization' (unchecked). The 'Additional Properties' section contains a link for 'Custom properties'. Below these sections is an 'Exclusions' text area with up and down arrows. At the bottom of the configuration area are four buttons: 'Apply', 'OK', 'Reset', and 'Cancel'.

**Node agents** > **nodeagent** > **File synchronization service**

Use this page to configure the file synchronization service. The file synchronization service runs in the deployment manager and node agent. It ensures that configuration changes made to the cell repository are propagated to the appropriate node repositories.

Configuration

**General Properties**

- Enable service at server startup
- \* Synchronization interval:  minutes
- Automatic synchronization
- Startup synchronization

**Additional Properties**

- [Custom properties](#)

Exclusions

# Remove a node from a cell

- Use `removeNode` command to remove a node from a cell.
  - Restores stand-alone configuration of the node from a backup
  - The `removeNode` command is equivalent to using the Remove Node action
- Use `cleanupNode` command to force the removal of a node from a cell.
  - Used to clean up a node defined in the cell configuration, but no longer exists
  - The `cleanupNode` command is equivalent to using the Force Delete action

**Nodes**

Use this page to manage nodes in the application server environment. A node corresponds to a physical computer system with a distinct IP host address. The following table lists the managed and unmanaged nodes in this cell. The first node is the deployment manager. Add new nodes to the cell and to this list by clicking Add Node.

Preferences

Add Node Remove Node Force Delete Synchronize Full Resynchronize Stop

Select	Name	Host Name	Version	Discovery Protocol	Status
You can administer the following resources:					
<input type="checkbox"/>	<a href="#">ihsnode</a>	was7host01	Not applicable	TCP	
	<a href="#">was7host01CellManager01</a>	was7host01	ND 7.0.0.0	TCP	
<input type="checkbox"/>	<a href="#">was7host01Node01</a>	was7host01	ND 7.0.0.0	TCP	
<input type="checkbox"/>	<a href="#">was7host01Node02</a>	was7host01	ND 7.0.0.0	TCP	

Total 4

# Synchronization

- **Synchronize**

- Uses the normal synchronization optimization algorithm
- Node and cell configuration may still be out of synchronization after operation

- **Full Resynchronize**

- Clears all synchronization optimization settings
- No mismatch between node and cell configuration

**Nodes**

Use this page to manage nodes in the application server environment. A node corresponds to a physical computer system with a distinct IP host address. The following table lists the managed and unmanaged nodes in this cell. The first node is the deployment manager. Add new nodes to the cell and to this list by clicking Add Node.

☒ Preferences

Add Node Remove Node Force Delete **Synchronize** Full Resynchronize Stop

Select	Name	Host Name	Version	Discovery Protocol	Status
You can administer the following resources:					
<input type="checkbox"/>	<a href="#">ihsnode</a>	was7host01	Not applicable	TCP	
	<a href="#">was7host01CellManager01</a>	was7host01	ND 7.0.0.0	TCP	↔
<input type="checkbox"/>	<a href="#">was7host01Node01</a>	was7host01	ND 7.0.0.0	TCP	↔
<input type="checkbox"/>	<a href="#">was7host01Node02</a>	was7host01	ND 7.0.0.0	TCP	↔

Total 4

# Checkpoint

---

1. Which managed processes can be part of a cell?
  - A. Deployment manager
  - B. Node agent
  - C. Load balancer
  - D. Application server
2. Which profiles can be created using the Profile Management Tool?
  - A. Load balancer profile
  - B. Custom profile
  - C. Plug-in profile
  - D. IBM HTTP Server profile
3. All application servers have a corresponding node agent.
  - A. True
  - B. False

# Checkpoint solutions

---

1. Which managed processes can be part of a cell?
  - A. Deployment manager
  - B. Node agent
  - D. Application server
2. Which profiles can be created using the Profile Management Tool?
  - B. Custom profile
3. All application servers have a corresponding node agent.
  - B. False



WebSphere Education



# Workload management

# 1 1

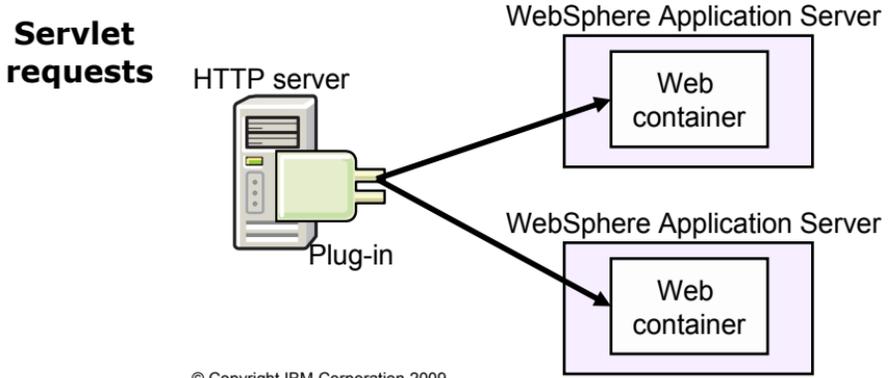
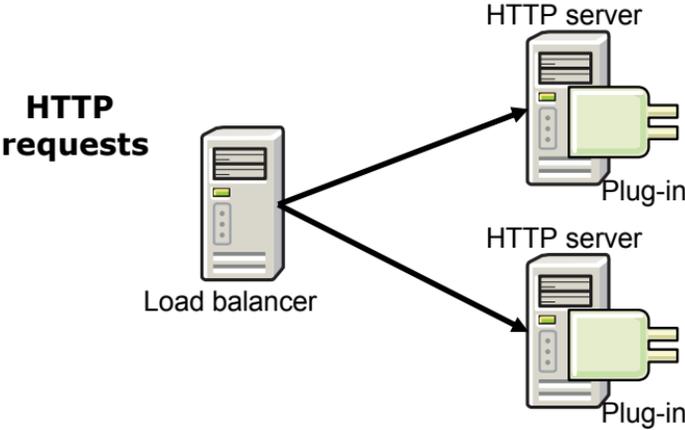


# What is workload management (WLM)?

---

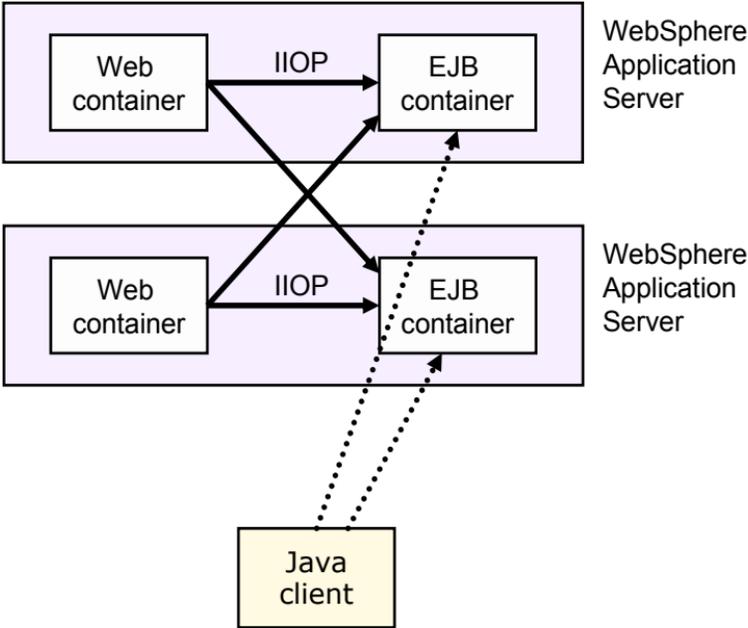
- Sharing requests across multiple application servers
- Configuration options that improve:
  - Performance — improve response time for requests
  - Scalability — grow capacity as the number of users increases
  - Load balancing — allocate workload proportionately among available resources
  - Availability — applications are still available if a server fails

# What can be workload managed? (1 of 2)



# What can be workload managed? (2 of 2)

**EJB requests**



# Clusters

---

**1** Create a cluster by using an existing server (or create a blank cluster)

WebSphere  
Application  
Server

Template

**2** Install applications or make other changes

**3** Create cluster members

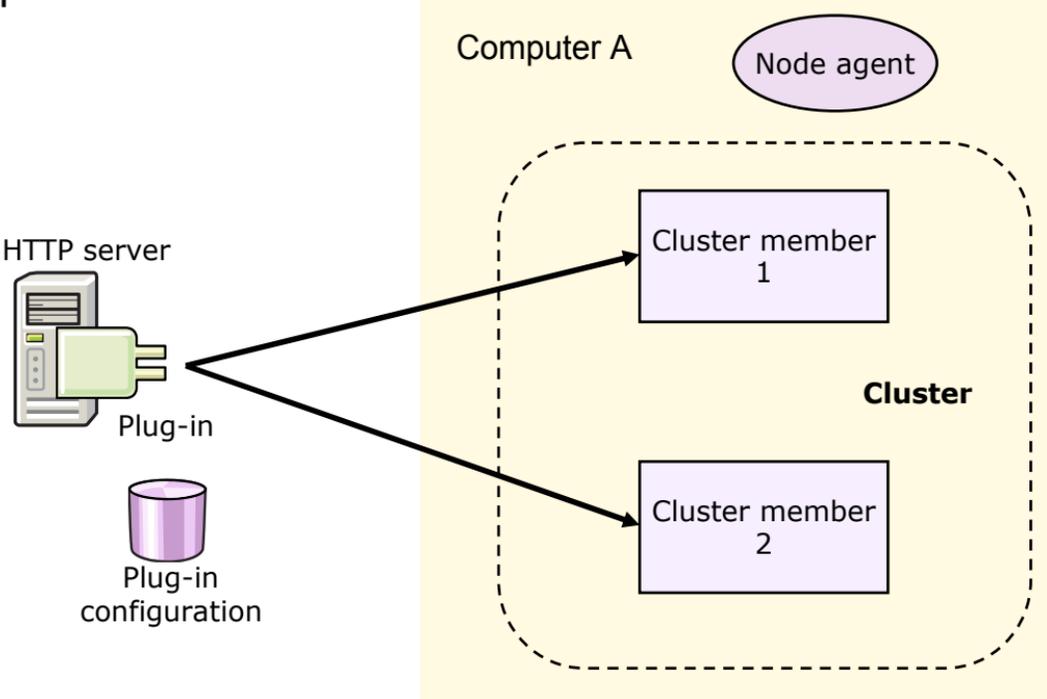
Cluster member  
1

Cluster member  
2

Cluster member  
3

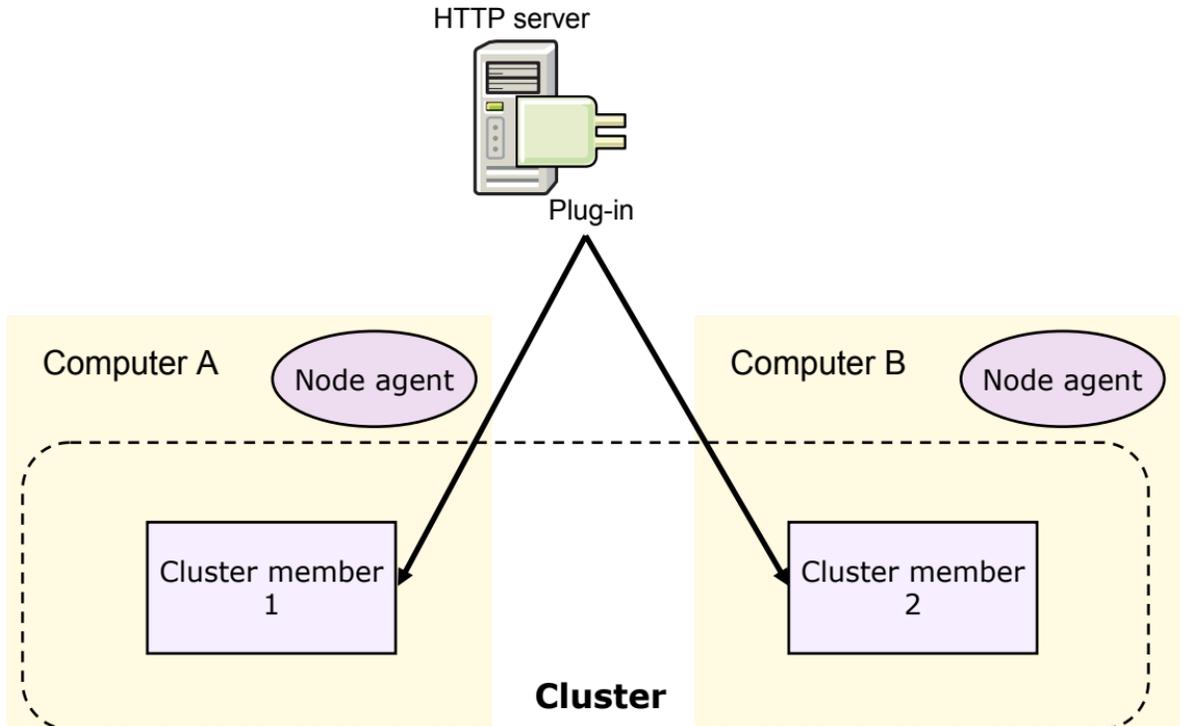
# Configurations — vertical scaling

- May provide better performance with multiple CPUs
- Provides process level failover



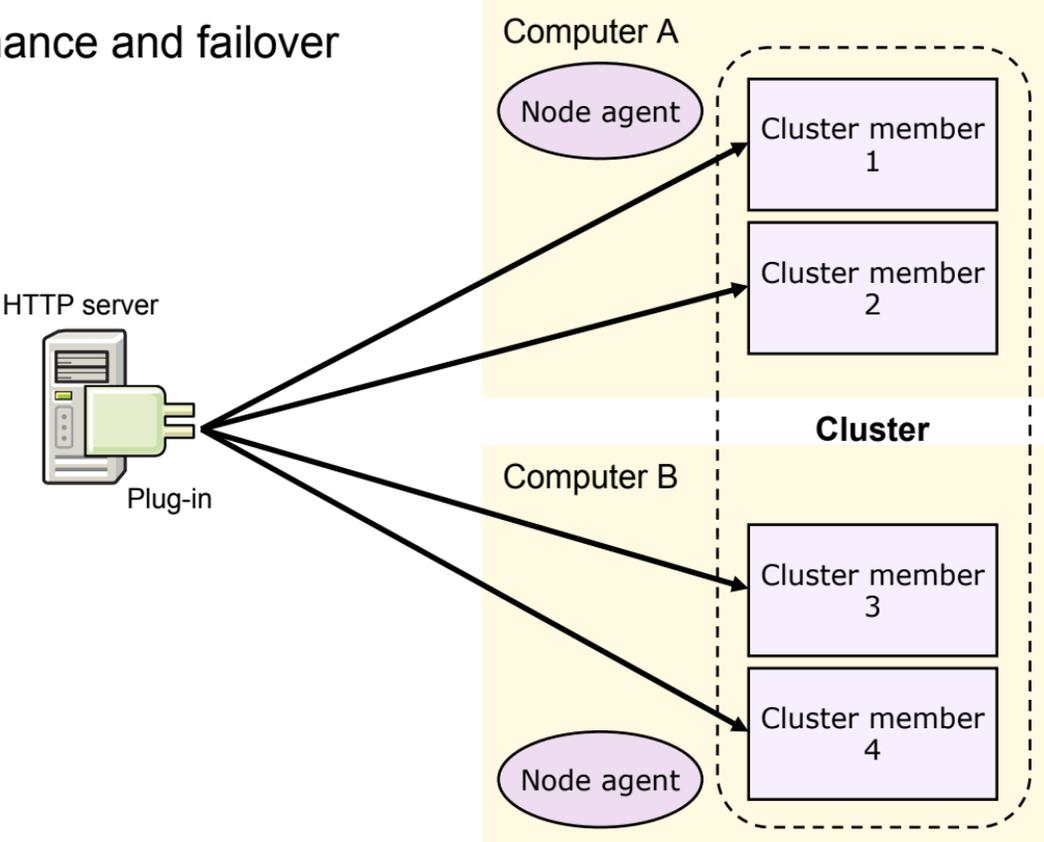
# Configurations — horizontal scaling

- Supports machine failover

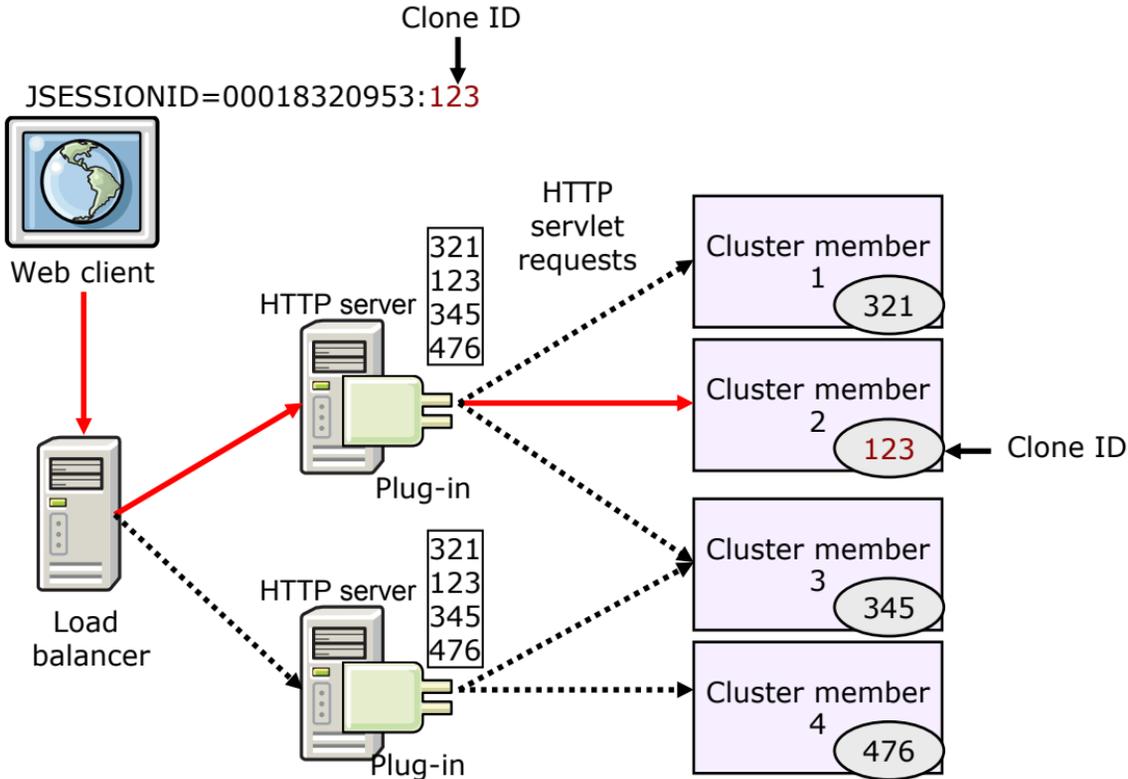


# Configurations — vertical and horizontal scaling

- Performance and failover



# WebSphere session affinity



# Checkpoint questions

---

1. A WebSphere cluster member is what type of process?
  - A. An application server
  - B. A Web server
  - C. An edge server
  - D. A proxy server
2. The creation of a cluster can be based on which of the following?
  - A. An application
  - B. An application server
  - C. An enterprise application
  - D. An application manager
3. Having session affinity means that session information is not lost during failover.
  - A. True
  - B. False

# Checkpoint solutions

---

1. A WebSphere cluster member is what type of process?
  - A. An application server
2. The creation of a cluster can be based on which of the following?
  - B. An application server
3. Having session affinity means that session information is not lost during failover.
  - B. False



WebSphere Education



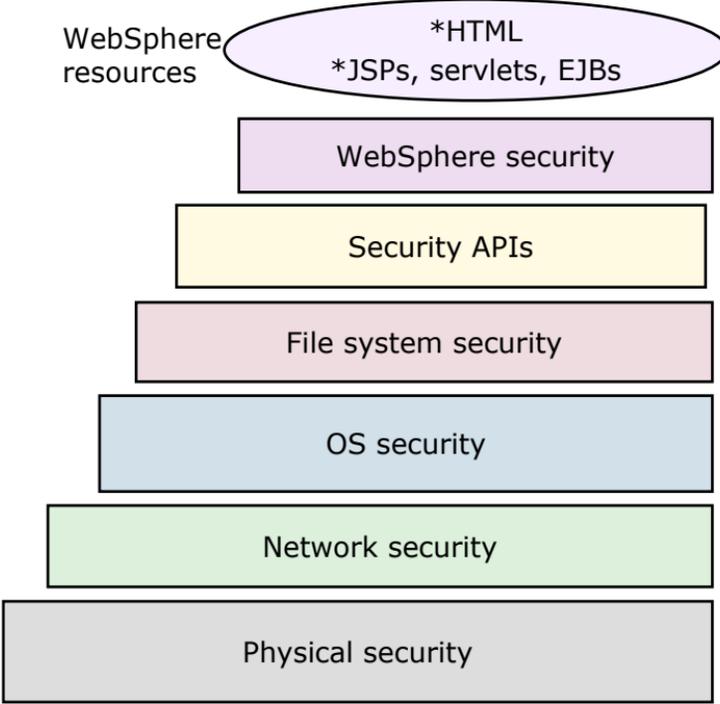
# Security

# 12



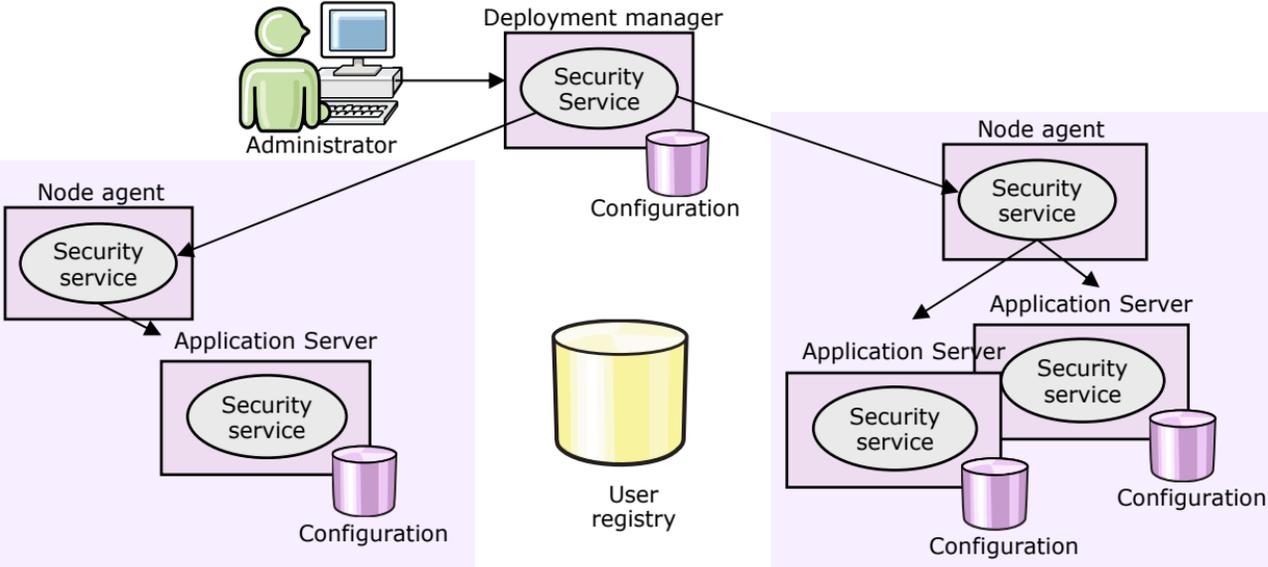
# WebSphere Application Server security overview

- Security can be applied at different levels



# WebSphere security service — big picture

- Security service runs locally in each process (deployment manager, node agent, and application server)
  - Security workload not bottlenecked to a single process
  - Security service failure only affects a single process
- Separation of authentication mechanism and user registry



# Types of security

---

- Administrative security
  - Protects things such as administrative console, wsadmin, scripts
- Application security
  - Protects access to the applications
- Java 2 security
  - Protects the local systems

**Administrative security**

Enable administrative security

- [Administrative user roles](#)
- [Administrative group roles](#)
- [Administrative authentication](#)

**Application security**

Enable application security

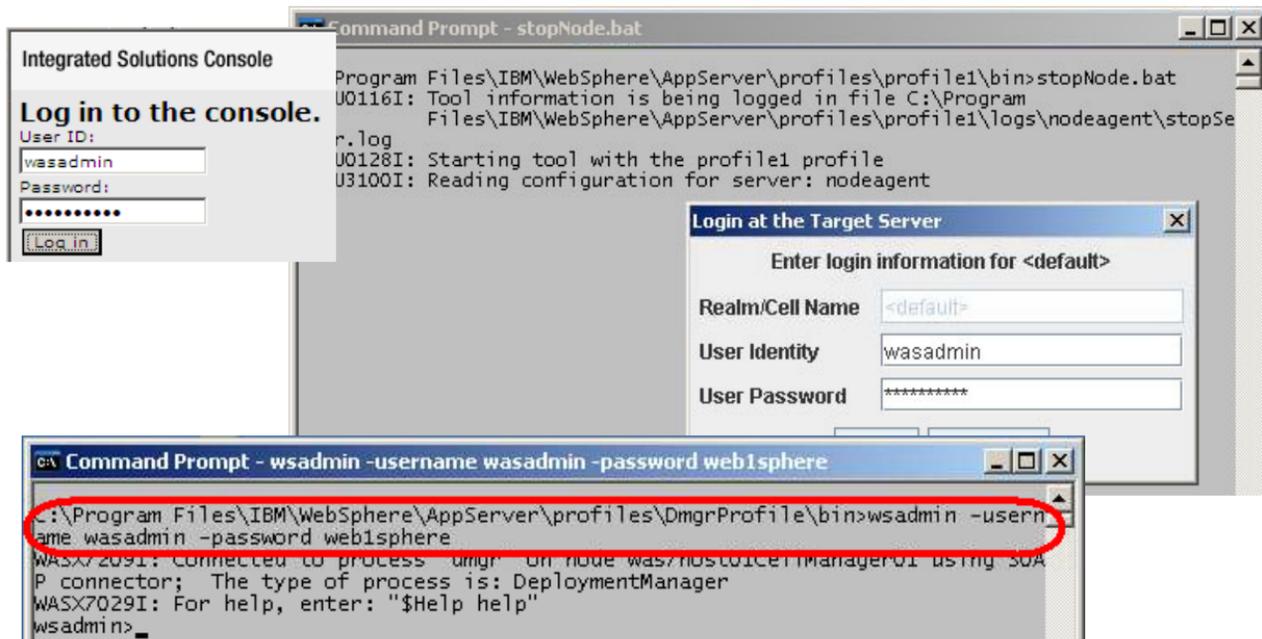
**Java 2 security**

Use Java 2 security to restrict application access to local resources

- Warn if applications are granted custom permissions
- Restrict access to resource authentication data

# Administrative security

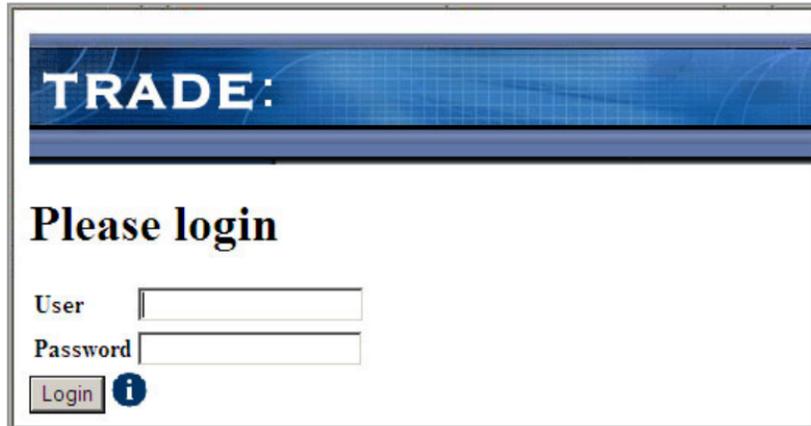
- Protects administrative console, scripts, wsadmin, and others
- Access can be restricted through the use of:
  - Administrative roles
  - Fine-grained access (new as of version 7)



# Application security

---

- Enables security for the applications in your environment
- Provides application isolation and requirements for authenticating application users
  - Security constraints protect servlets
  - Method permissions protect EJBs



**TRADE:**

**Please login**

User

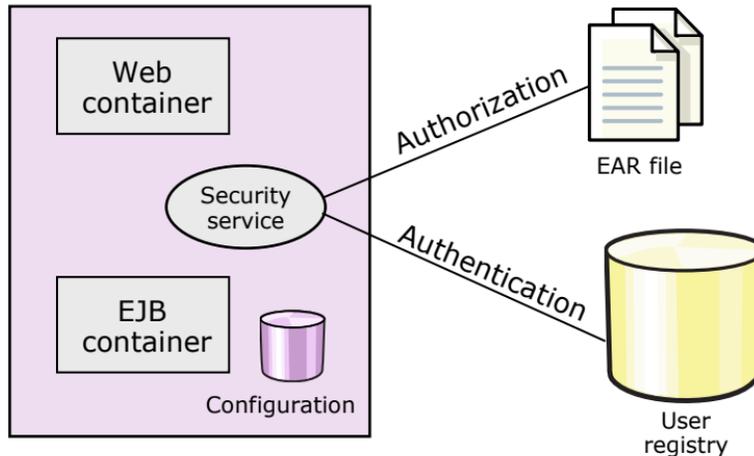
Password

Login 

# Basic steps

---

- In order to implement security, several things are required:
  - Authentication — who are you?
  - Authorization — what are you allowed to do?



# User registry support

---

- Some of the user registries supported by WebSphere Application

## Local OS

NT Domain, NT WorkGroup, Windows
AIX
Solaris
HP-UX
Linux
OS/400

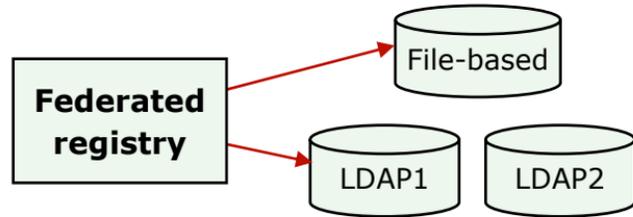
## LDAP

IBM Tivoli Directory Server
IBM SecureWay Directory Server
Sun Java System Directory Server
IBM Lotus Domino
Microsoft Active Directory
Novell eDirectory
Custom (requires addition configuration)

# Federated repositories

---

- The installation wizard and profile management tool have a default of enabling administrative security.
  - The default repository type is a file-based federated repository.
- Federated repositories enables the use of multiple repositories with WebSphere Application Server.
  - Can be:
    - File-based
    - Single LDAP
    - Custom registry
    - Database
    - Multiple LDAPs
    - Sub-tree of an LDAP.
  - Defined and theoretically combined under a single realm.
  - All of the user repositories that are configured under the federated repository functionality are invisible to WebSphere Application Server.
- Federation capabilities provided by the VMM (Virtual Member Manager)



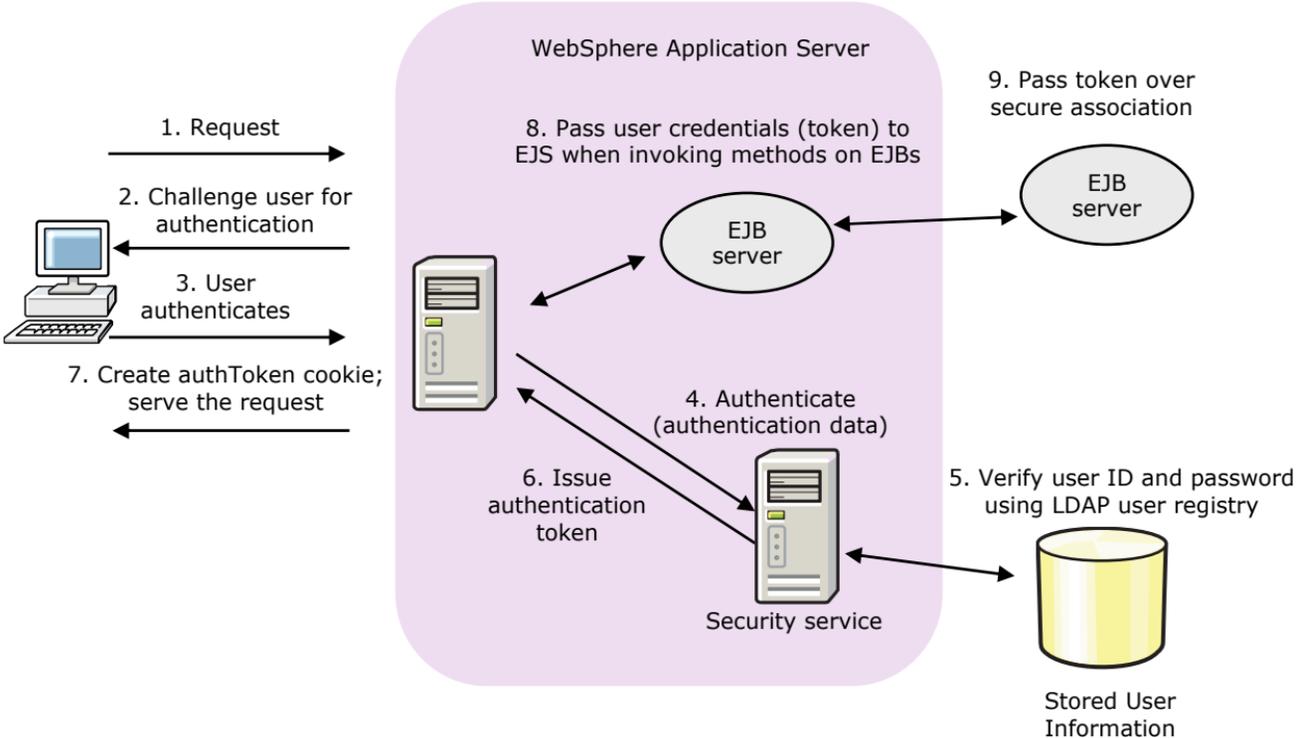
# Custom registry

---

- Allows custom implementation of user registry
- Some possible implementations:
  - Database
  - Flat file
  - OS-based, with additional custom logic
  - Use other, not directly supported, registries
- WebSphere provides:
  - Base types
    - Implementing classes extend the `com.ibm.websphere.security.UserRegistry` class
  - Working sample implementation
    - `com.ibm.websphere.security.FileRegistrySample`

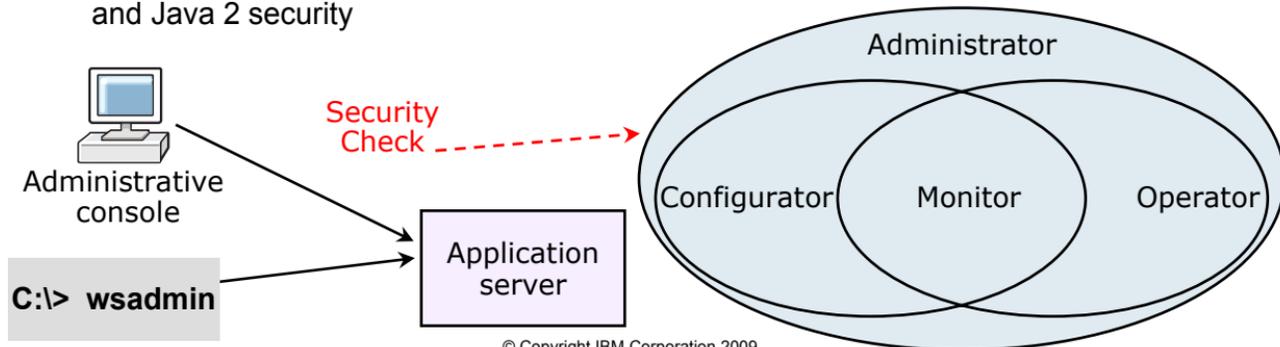
# Authentication mechanism — LTPA

- Allows a user's identity to be passed around the distributed network



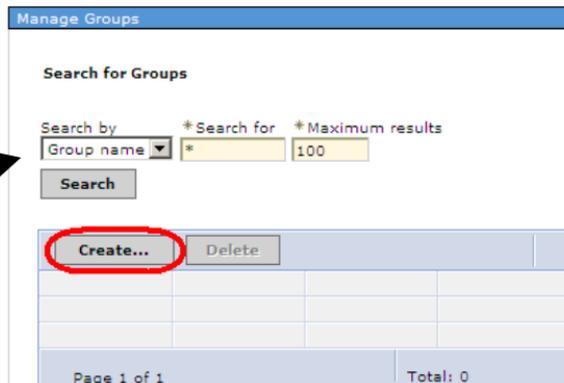
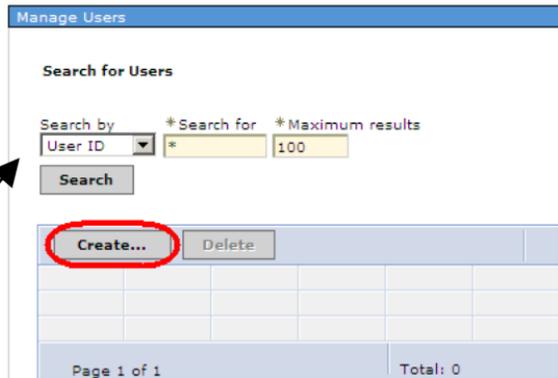
# Console security

- Defines which roles have access to the administrative tools
  - Monitor: Least privileged; allows a user to view the WebSphere configuration and current application server state
  - Configurator: Monitor privilege plus the ability to change the WebSphere configuration.
  - Operator: Monitor privilege plus the ability to change runtime state, such as starting or stopping servers
  - Administrator: Operator, configurator, and iscadmins privilege, plus additional privileges granted solely to the administrator role, such as:
    - Modifying the primary administrative user and password
    - Mapping users and groups to the administrator role
    - Enabling or disabling administrative and Java 2 security



# Console security — creating users and groups

- To set up console security
  - Turn on administrative security
  - **Create console users and groups**
    - Done in which ever user registry is being used



# Console security — mapping users and groups

- To set up console security
  - Turn on administrative security
  - Create console users and groups
  - **Map users and groups to administrative roles**

View: All tasks

- Welcome
- Guided Activities
- Servers
- Applications
- Services
- Resources
- Security
- Environment
- System administration
- Users and Groups
  - **Administrative user roles**
  - **Administrative group roles**
  - Manage Users
  - Manage Groups
- Monitoring and Tuning
- Troubleshooting
- Service integration
- UDDI

**Administrative user roles**

Use this page to add, update roles to users enables them to administer application through wsadmin scripting.

Logout **Add...** Remove

**Administrative group roles**

Use this page to add, update roles to groups enables them through wsadmin scripting.

**Add...** Remove

**Administrative user roles**

**Administrative user roles > User**

Use this page to add, update or to remove administrative roles to users enables them to administer application ser through wsadmin scripting.

\* Role(s)

- Admin Security Manager
- Administrator
- Auditor
- Configurator

Search and Select Users

Decide how many results to display, enter a search string. Select users from the Available list and add them to the Mapped to list. Users already been mapped to a role will not be returned in the Available list.

Search string: \* **Search**

Maximum results to display: 20

Available: [ ] Mapped to role: [ ]

**Administrative group roles**

**Administrative group roles > Group**

Use this page to add, update or to remove administrative roles to groups enables them to administer application through wsadmin scripting.

\* Role(s)

- Admin Security Manager
- Administrator
- Auditor
- Configurator

Select from special subjects

special subjects: **ALL AUTHENTICATED**

Map Groups As Specified Below

Decide how many results to display, enter a search string. Select groups from the Available list and add them to the Mapped to list. Users already been mapped to a role will not be returned in the Available list.

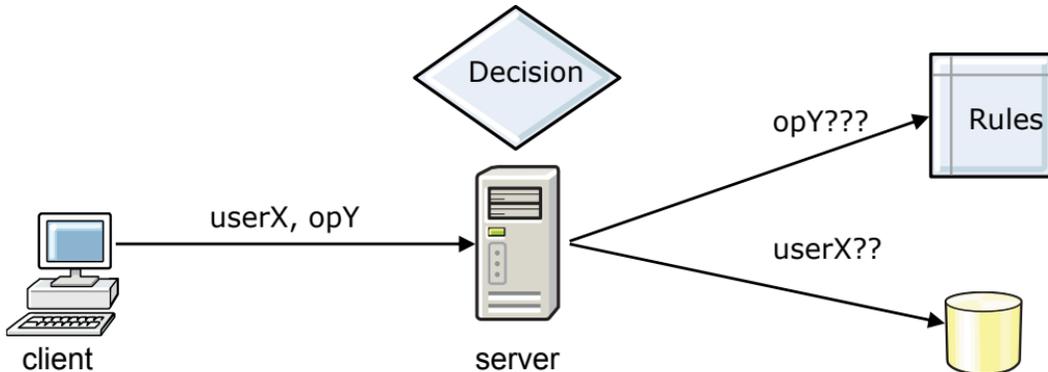
Search string: \* **Search**

Maximum results to display: 20

# Authorization

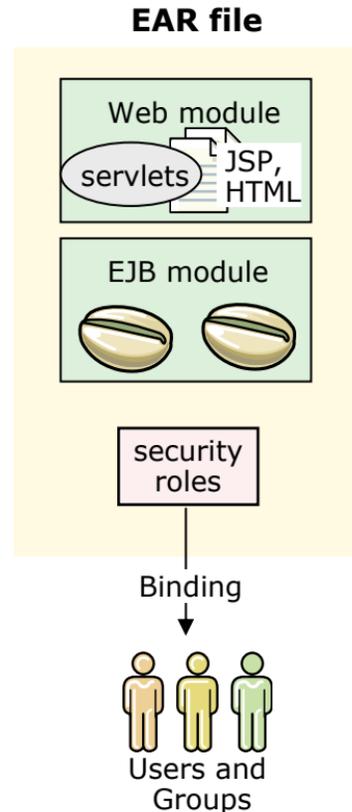
---

- Authorization involves granting trusted principals permission to perform actions on resources (Web pages, servlets, JSPs, and EJBs)
- Control access to resources
  - Security lookup (by server)
    - Determine security privileges for principal
    - Information stored in registry
  - Rule enforcement (by server)
    - Obtain rules from registry
    - Given privileges of principal and rules, determine access

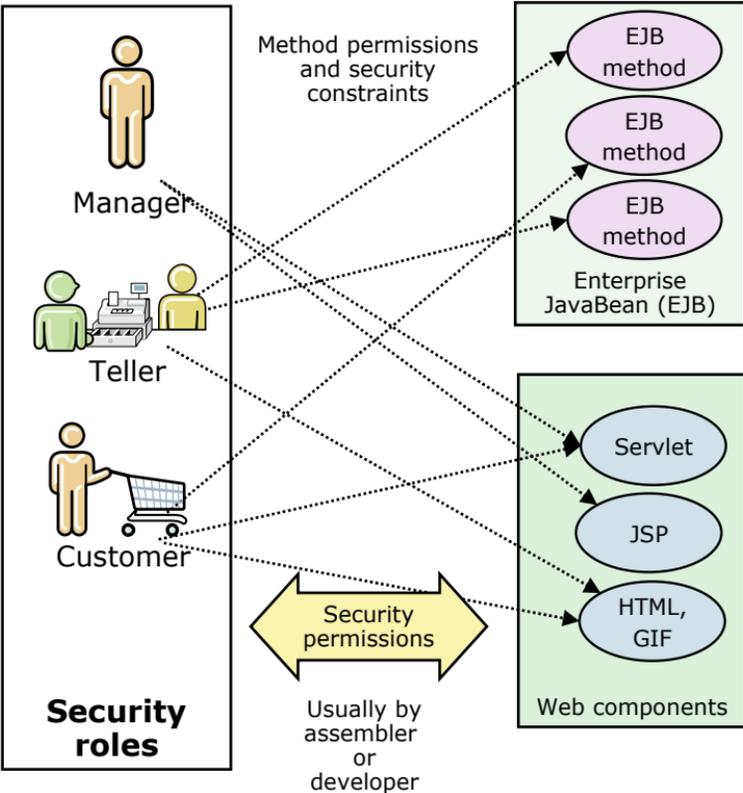


# Security roles — application authorization

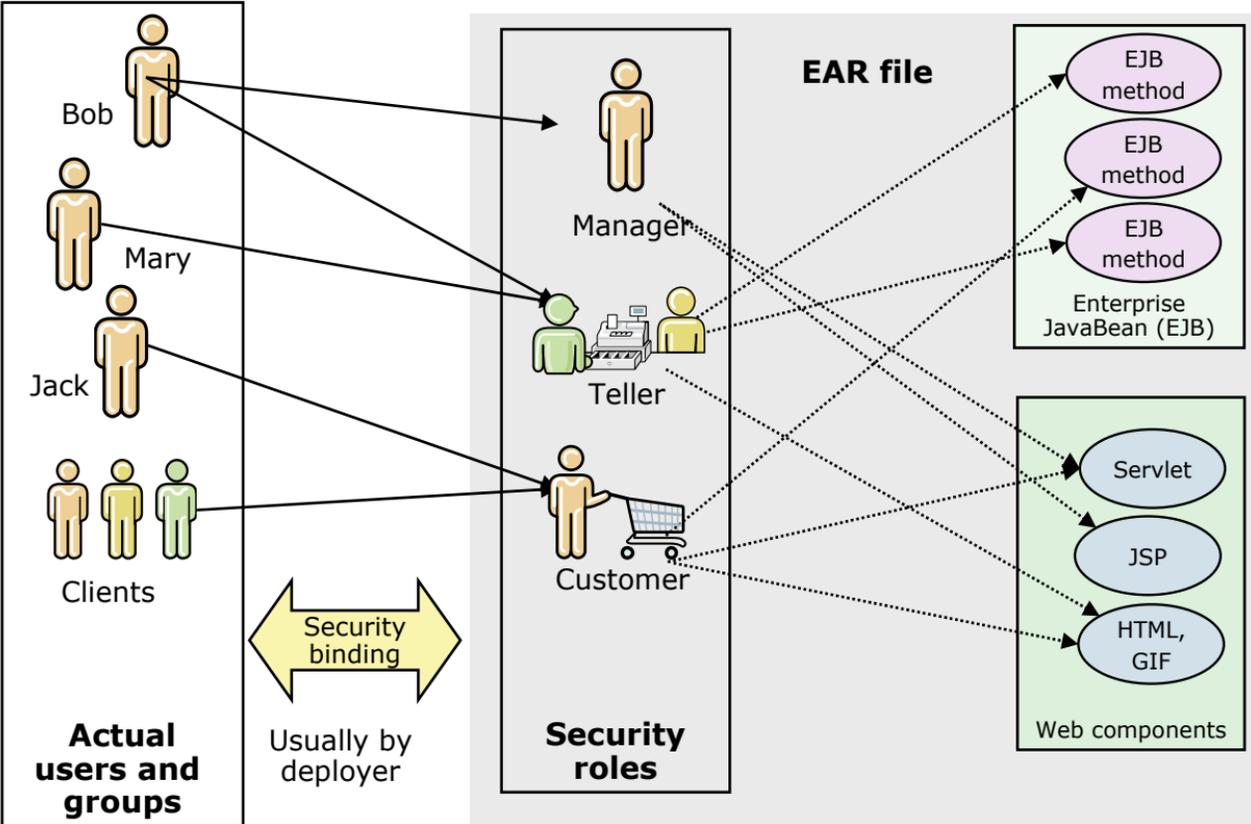
- Authorization is performed using the security roles
  - Specify security at an abstract level without knowledge of actual users and groups
- Security roles are then applied to the Web and EJB application components
  - Web URIs or EJB methods
- Binding of the users and groups to the security roles is usually done at the application installation time
  - Can be done post-installation as well



# Securing application artifacts

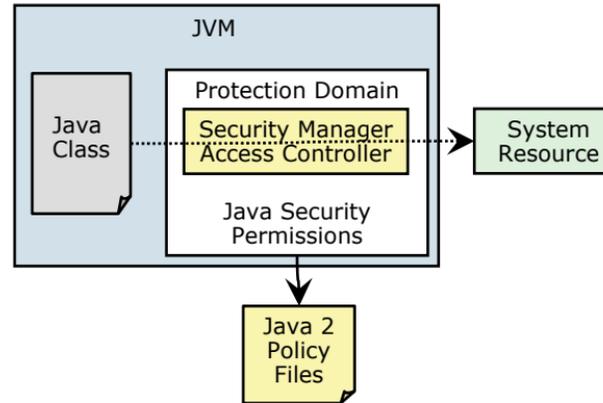


# Securing mapping roles



# Java security overview

- Protects the system from the applications
- Provides an access control mechanism to manage the application's access to system level resources
  - File I/O, network connections (sockets), property files, and so forth
  - Policy-based
- Policies define a set of permissions available from various signers and code locations
  - Stored in policy files
- All Java code runs under a security policy
  - Grants access to certain resources
- Can be turned on or off independently of administrative security



- Java code needs access to certain system resources
- Java code needs to get the permission from Java 2 access control
- Access control looks at the Java 2 policy files to determine if the requesting Java code has the appropriate permission

# Enabling Java 2 security

- Can be enabled and disabled independently of administrative and application security
- Java 2 security provides a policy-based, fine-grain access control mechanism that increases overall system integrity by checking for permissions before allowing access to certain protected system resources

**Global security**

Use this panel to configure administration and the default application security policy. This security configuration policy for all administrative functions and is used as a default security policy for user applications. Security dom override and customize the security policies for user applications.

[Security Configuration Wizard](#)      [Security Configuration Report](#)

**Administrative security**

- Enable administrative security
  - [Administrative user roles](#)
  - [Administrative group roles](#)
  - [Administrative authentication](#)

**Application security**

- Enable application security

**Java 2 security**

- Use Java 2 security to restrict application access to local resources
  - Warn if applications are granted custom permissions
  - Restrict access to resource authentication data

**Authentication**

Authentication mechanisms are

- [LTPA](#)
- Kerberos and LTPA  
(This function is currently **IBM Support site for post updates.**)
  - [Kerberos configuration](#)
  - [Authentication cache settings](#)

- Web and SIP security
- RMI/IIOP security
- Java Authentication and Au

# Checkpoint questions

---

1. Which type of security restricts access to the application?
  - A. Administrative security
  - B. Application security
  - C. Java 2 security
  - D. File system security
2. Which type of security restricts access to the operating system?
  - A. Administrative security
  - B. Application security
  - C. Java 2 security
  - D. File system security
3. Which type of security restricts access to the console?
  - A. Administrative security
  - B. Application security
  - C. Java 2 security
  - D. File system security

# Checkpoint solutions

---

1. Which type of security restricts access to the application?  
B. Application security
2. Which type of security restricts access to the operating system?  
C. Java 2 security
3. Which type of security restricts access to the console?  
A. Administrative security



WebSphere Education



**Thank You**

