WebSphere Education

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WebSphere Education

Welcome to:

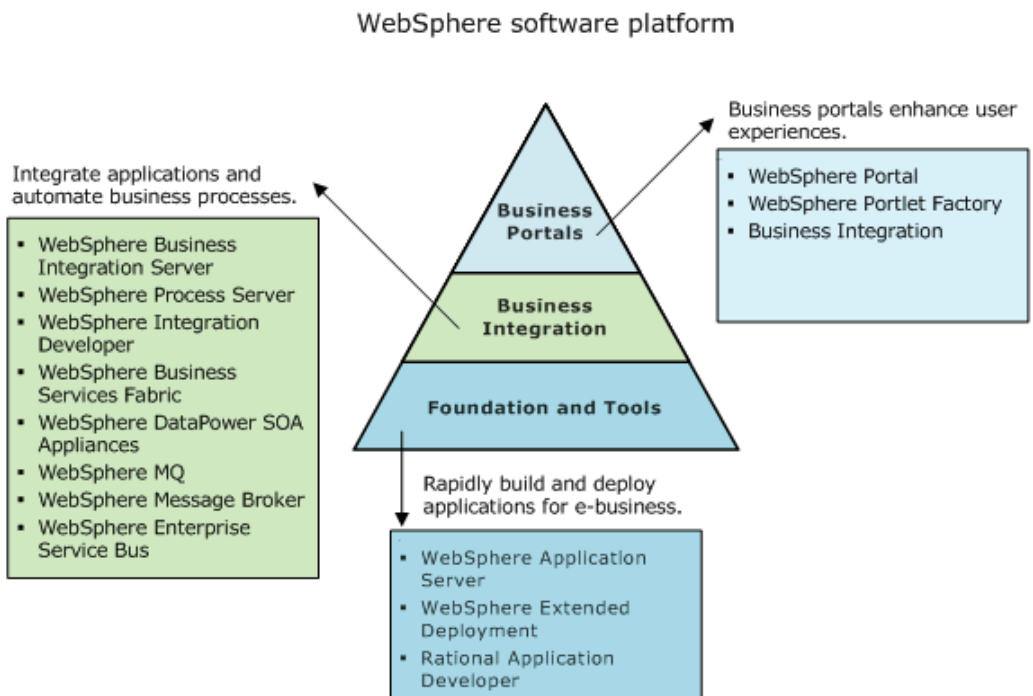
WA370 / VA370
IBM WebSphere Application Server V7 Administration on Windows
ERC 1.0
Course introduction

WebSphere Education

WebSphere product family overview

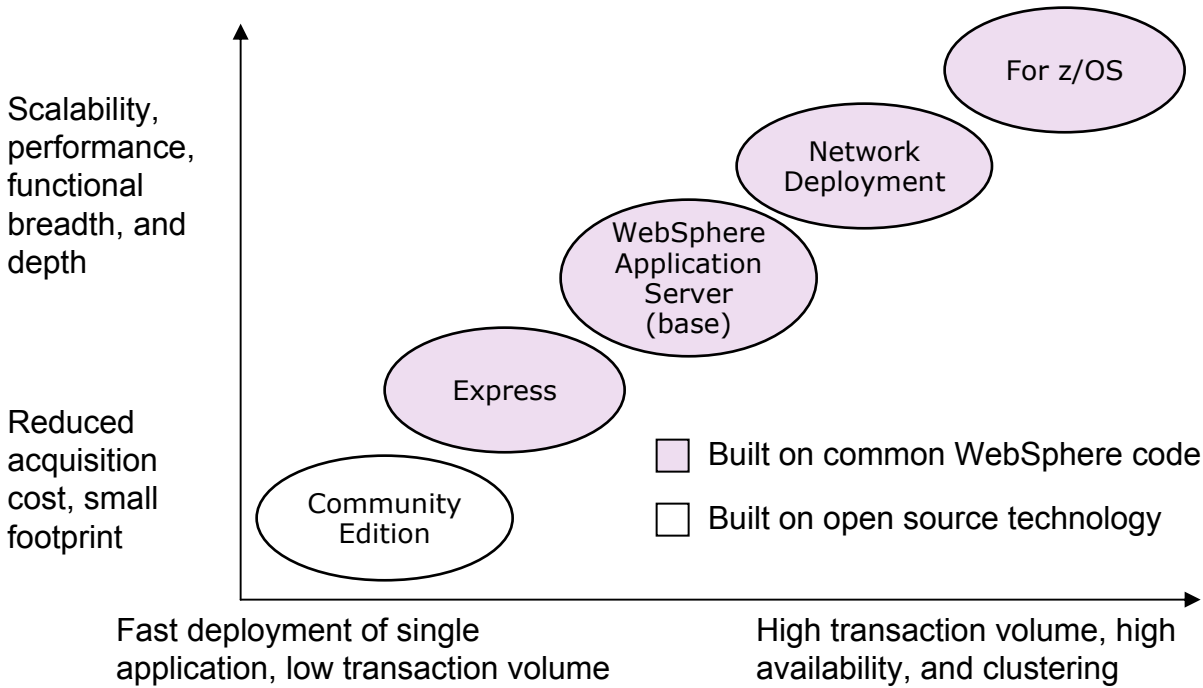
1

WebSphere software platform

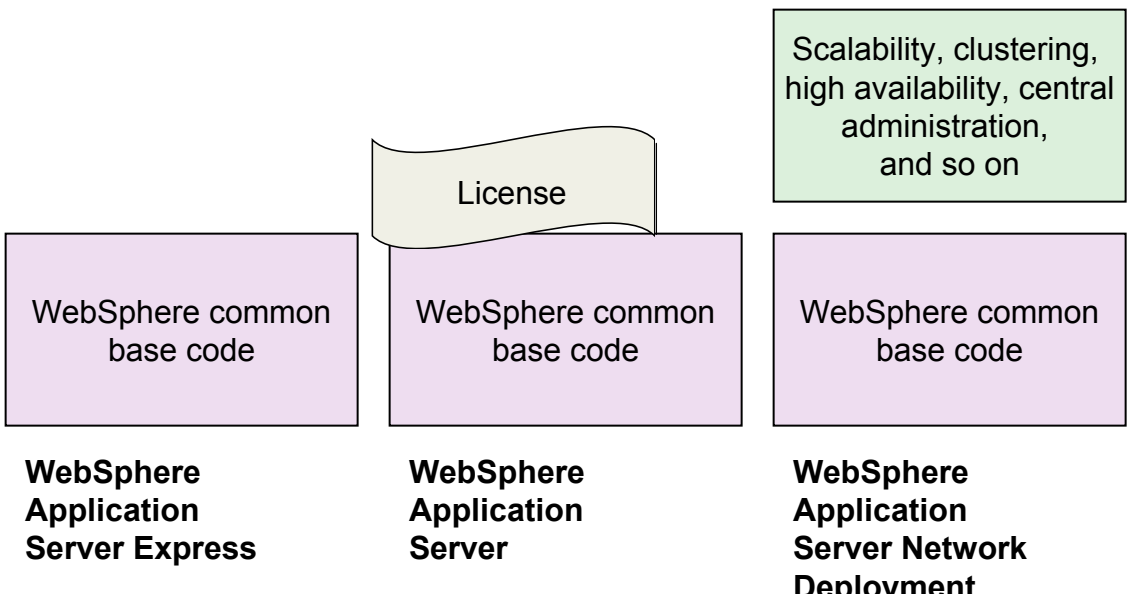


WebSphere Application Server family

- Multiple deployment options; multiple business models

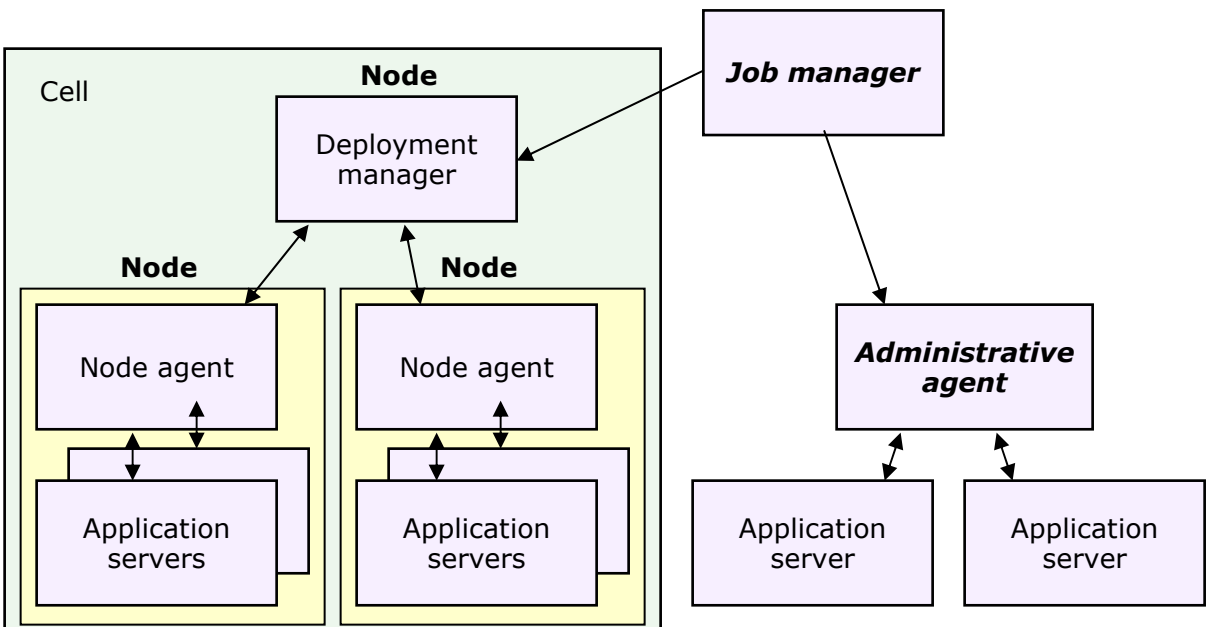


WebSphere Application Server V7 packaging



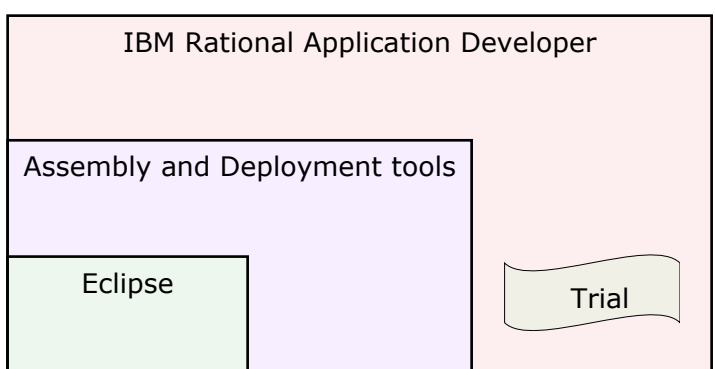
Flexible management

- 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

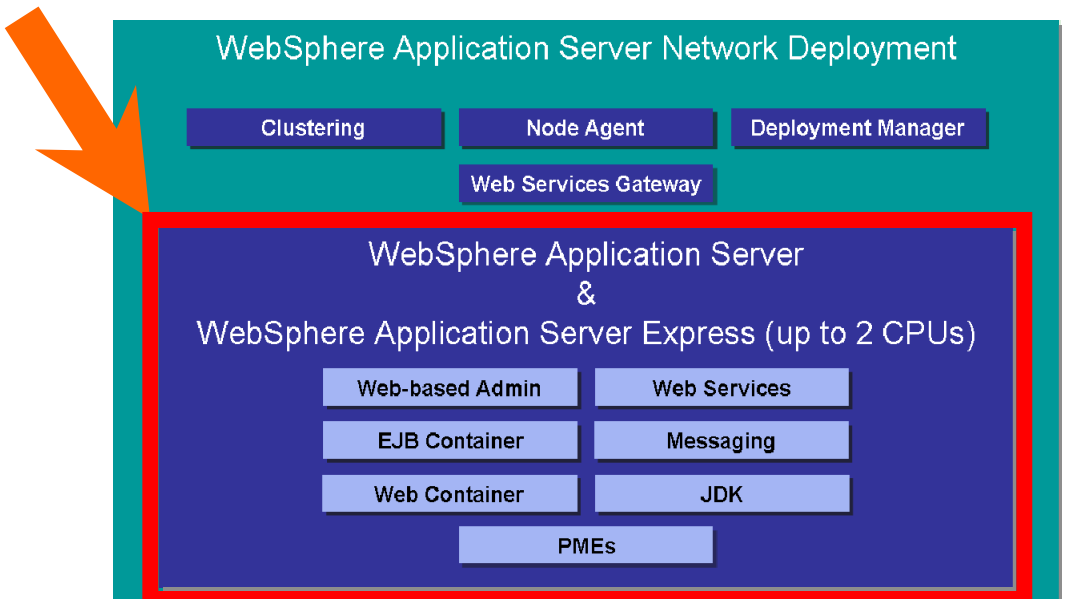
1. What is the main difference between the Express and base WebSphere Application Server editions?
   - The Express edition license only covers two CPUs. The license for the base edition covers unlimited CPUs.
2. Which WebSphere Application Server edition do you need if you want to deploy a single application 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

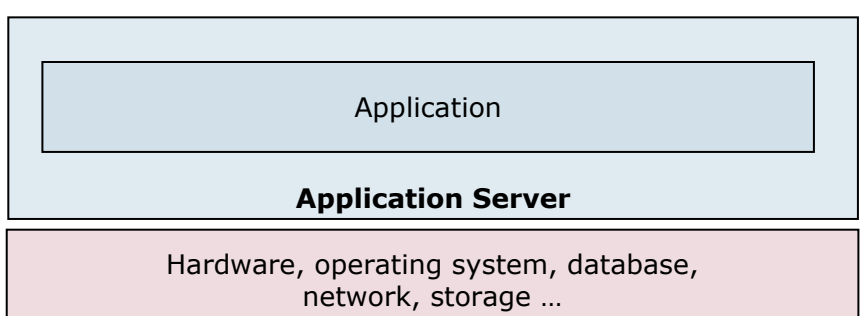
2

Version 7 packaging

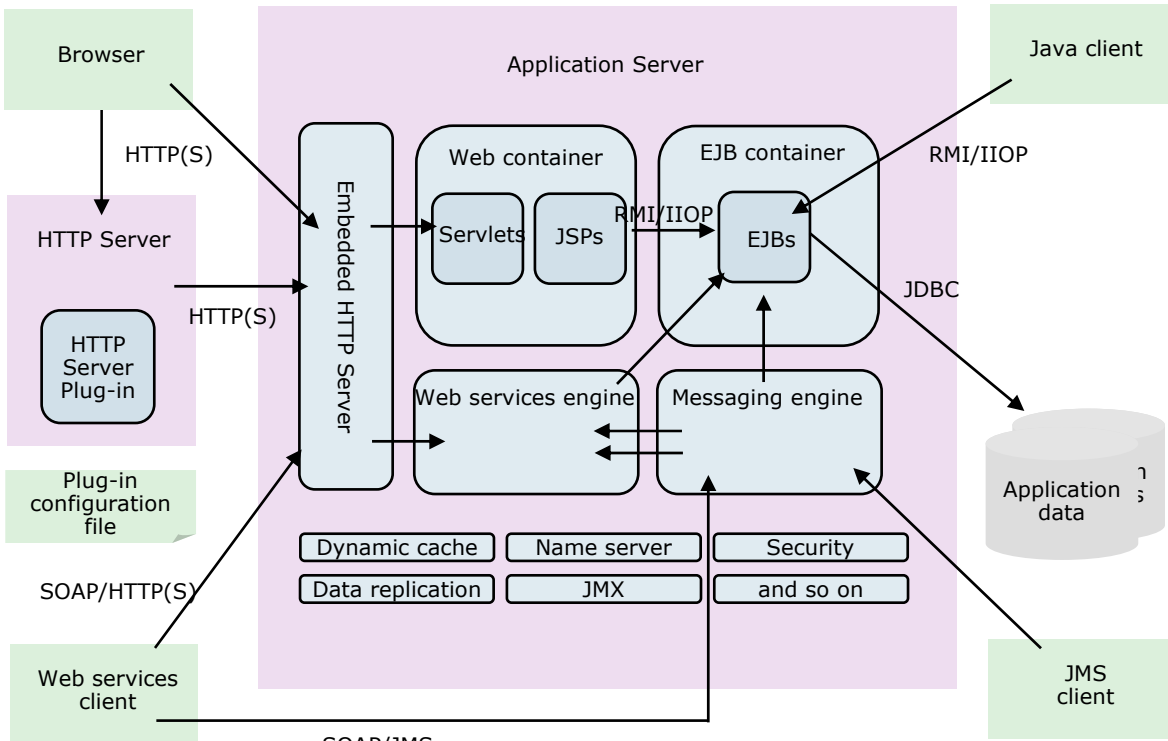


WebSphere Application Server basics

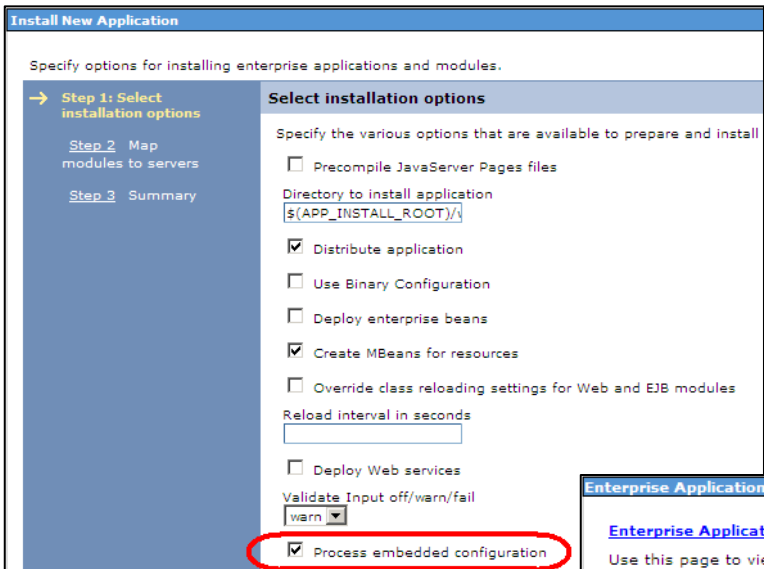
- WebSphere Application Server
  - Is a platform on which Java-based business applications run
  - Is an implementation of the Java Enterprise Edition (JEE) specification
  - Provides services (database connectivity, threading, workload management, and so forth) that can be used by the business applications



WebSphere architecture runtime (10 of 10)

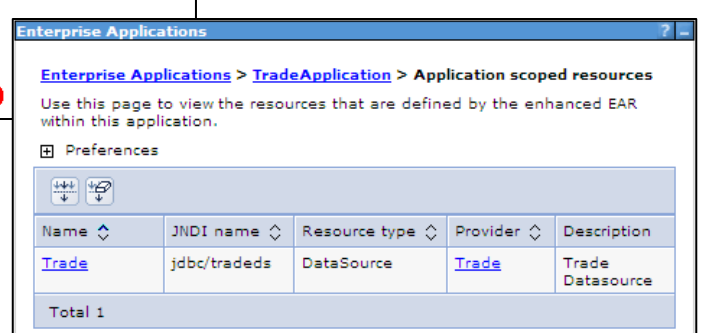


Removing enhancements



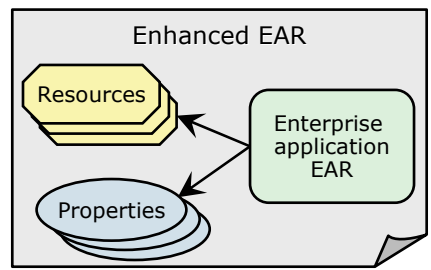
- Resources can be ignored.
  - Remove enhancements from EAR before deploying (preferred)
  - Uncheck **Process embedded configurations**
    - Will only be prechecked if there are enhancements

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



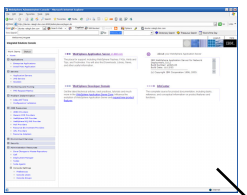
Enhanced EAR

- 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

Application Server

Embedded HTTP Server

Web container

Servlets

JSPs

Admin application

EJB container

EJBs

Admin service

Admin MBeans

Web services engine

Messaging engine

XML configuration files

Dynamic cache

Name server

Security

Data replication

JMX

and so forth

SOAP/HTTP

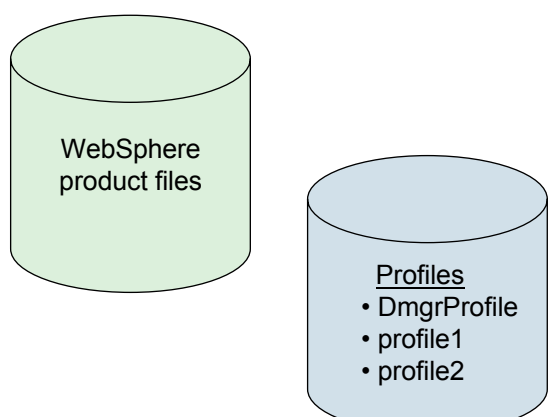
C:\> wsadmin

RMI/IIOP

wsadmin command-line client

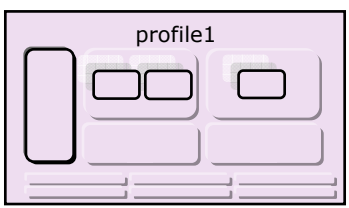
WebSphere profiles overview

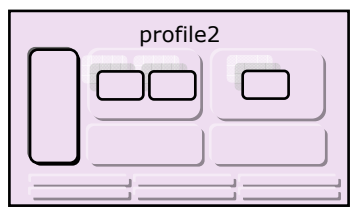
- Profiles are sets of files that represent a WebSphere Application Server configuration.
- WebSphere Application Server files are split into two categories:
  - Product files
    - Set of shared read-only static files or product binaries shared by any instances of the WebSphere Application Server product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

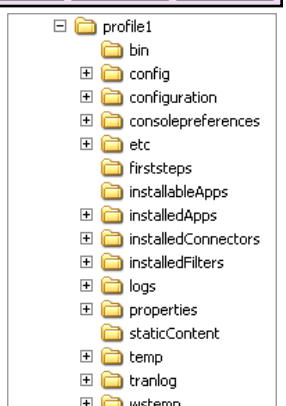


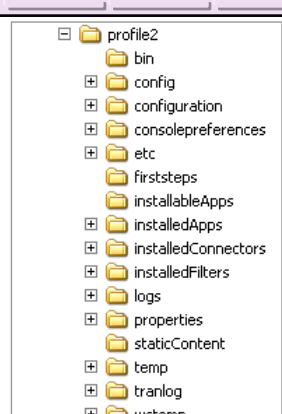
WebSphere profiles benefits

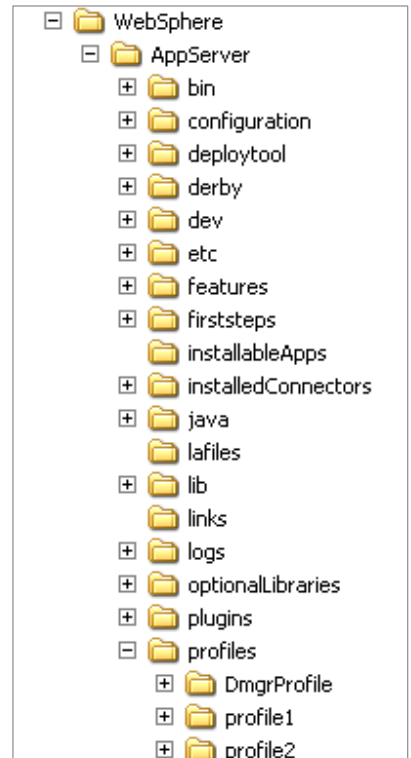
- Benefits of profiles:
  - Each profile uses the same product files.
  - Simpler than multiple WebSphere installations.
    - Less disk space
    - Simplifies application of product updates











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

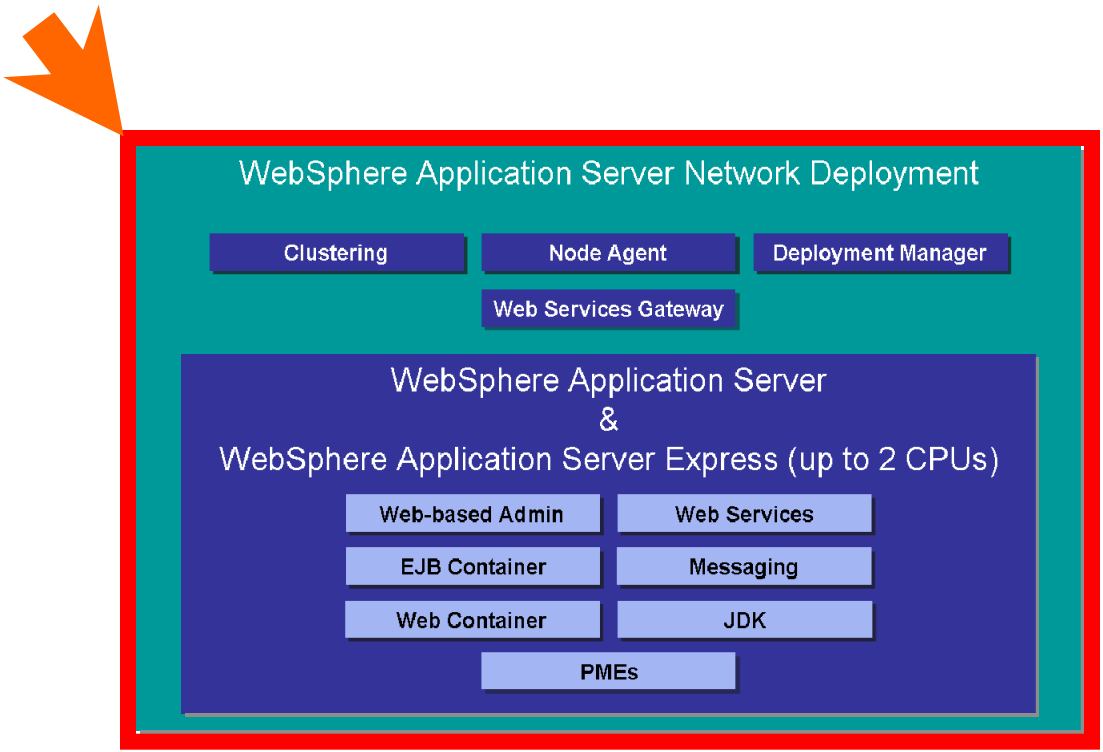
3. Which of the following are components contained within the application server’s JVM?
   B. Embedded HTTP Server

WebSphere Education

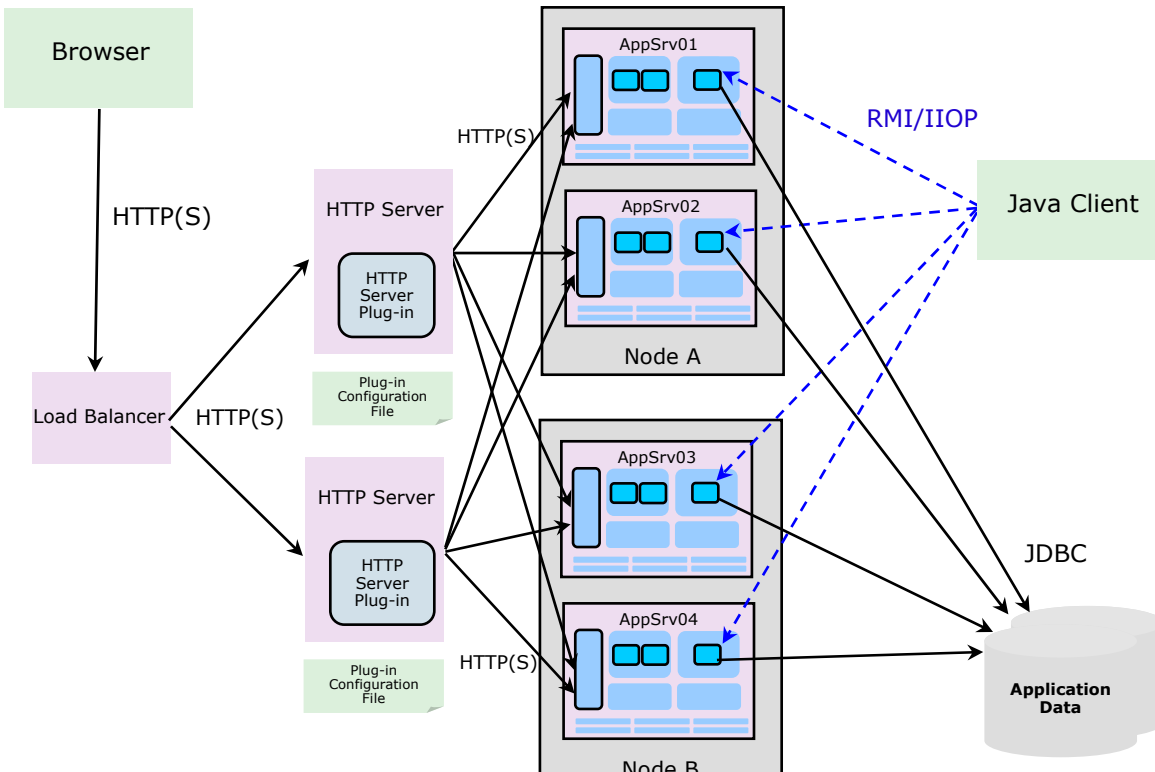
WebSphere Application Server architecture — federated

3

Version 7 packaging

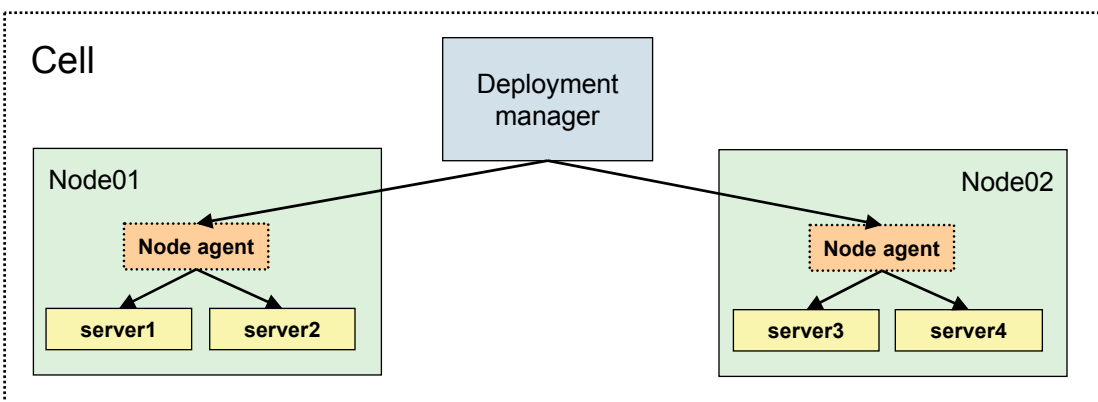


Network deployment runtime flow



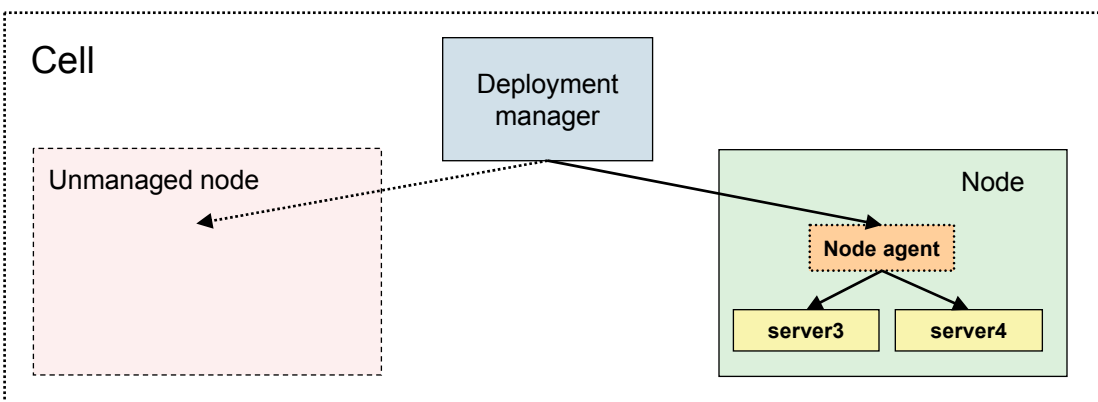
Network deployment concepts

- 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

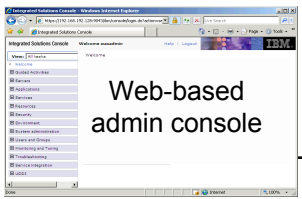


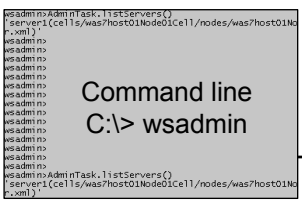
Managed versus unmanaged nodes

- 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



Network deployment administration flow





HTTP(S)

SOAP

Deployment manager

Admin Application

Web container

Admin Services

Node agent

Admin Service

Cell config

Node01 config

server1 config

server2 config

server1

server2

EAR file

Node01

MASTER

Cell config

Node01 config

server1 config

server2 config

Node02 config

server3 config

server4 config

EAR file

Node agent

Admin Service

Cell config

Node02 config

server3 config

server4 config

server3

server4

EAR file

Node02

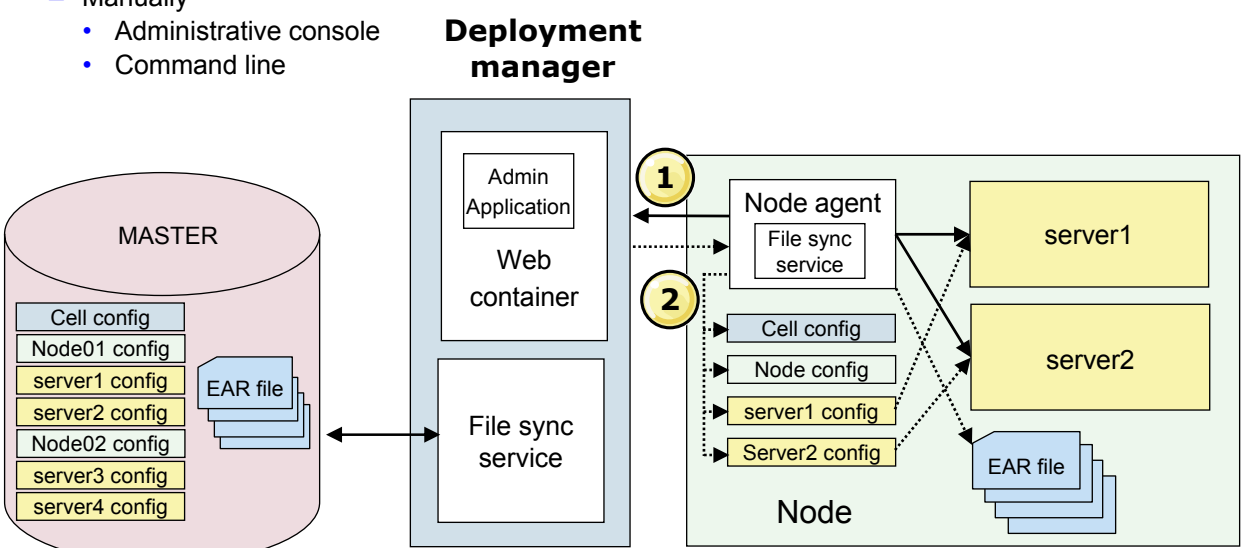
Commands

Configuration

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

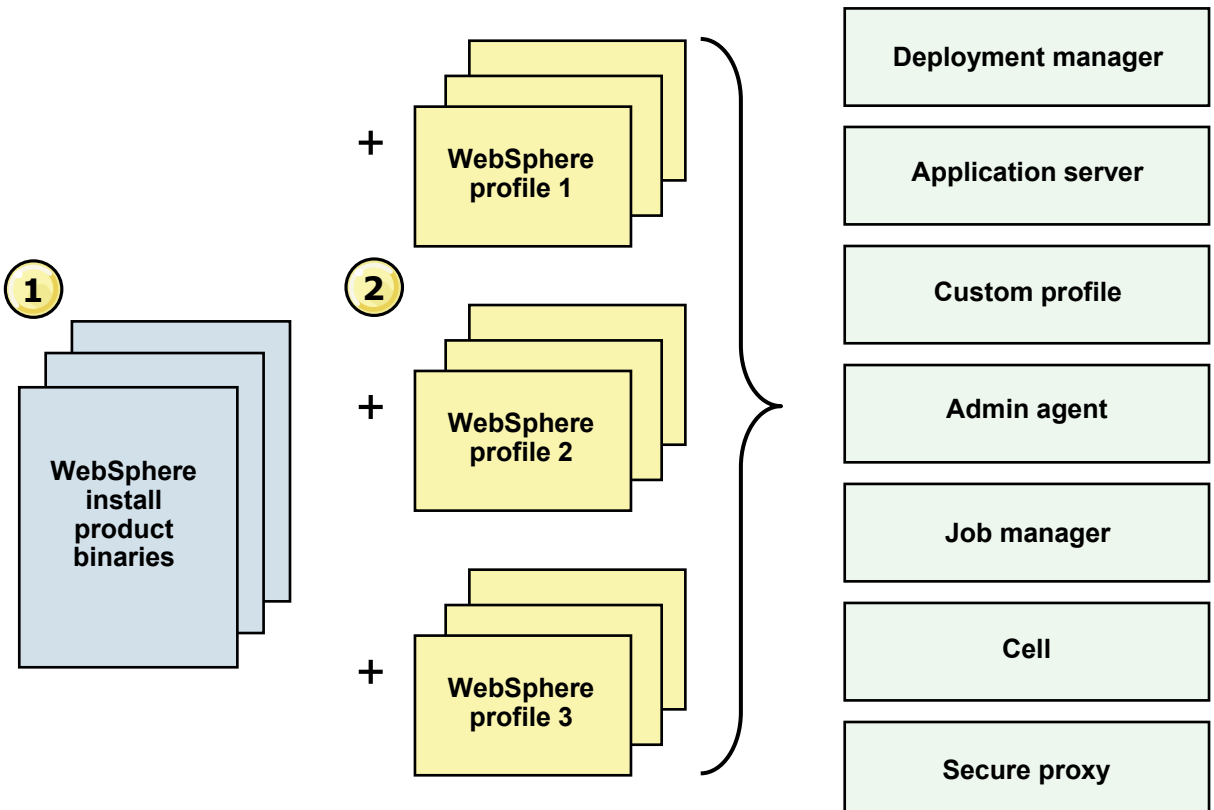
- For the latest specifics on versions and patch levels, check:
  - `http://www.ibm.com/software/webservers/appserv/doc/latest/prereq.html`

Software requirements — database

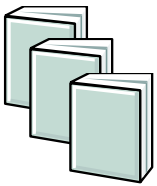
- Supported database servers include:
  - IBM DB2
  - Cloudscape Derby
  - Oracle
  - Sybase
  - Microsoft SQL
  - Informix
  - IMS
  - WebSphere Information Integrator

- For the latest specifics on versions and patch levels, check:
  - `http://www.ibm.com/software/webservers/appserv/doc/latest/prereq.html`

Installation overview

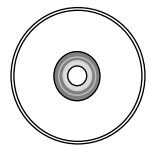


Pre-installation tasks



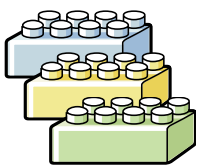
Read the documentation

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



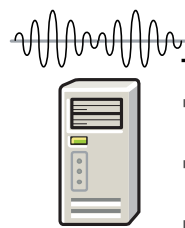
Installation media

- CD-ROM media
- Downloaded media



Confirm hardware and software

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

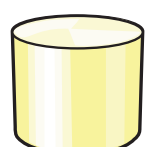


TCP/IP networking

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

User ID

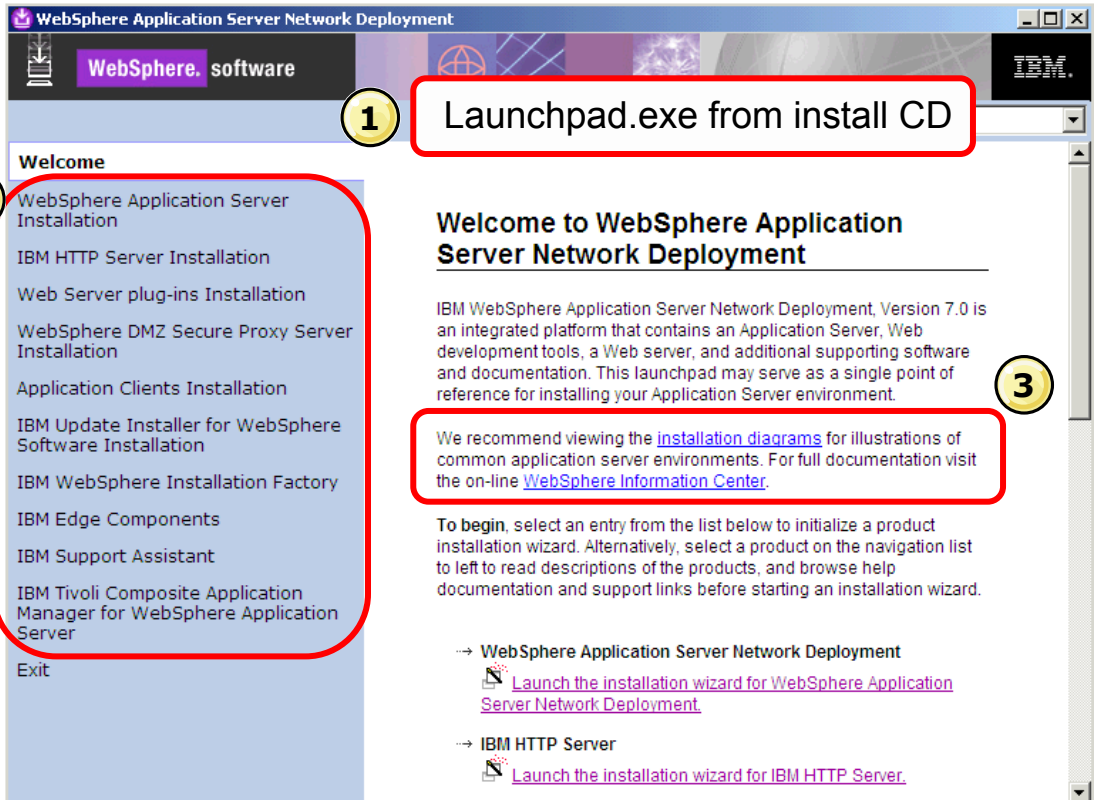
- Create and verify userid for starting services
- Verify userid for disk read/write access



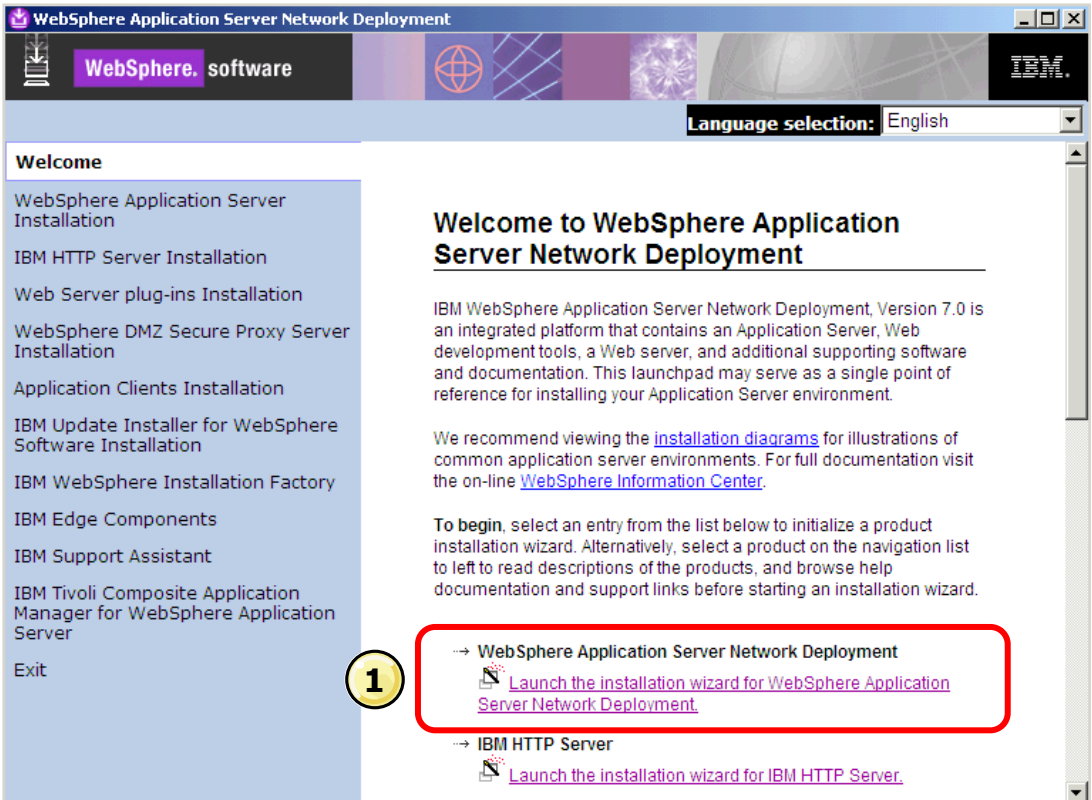
File systems and memory

- Enough space is available
- Enough memory is available

Launchpad

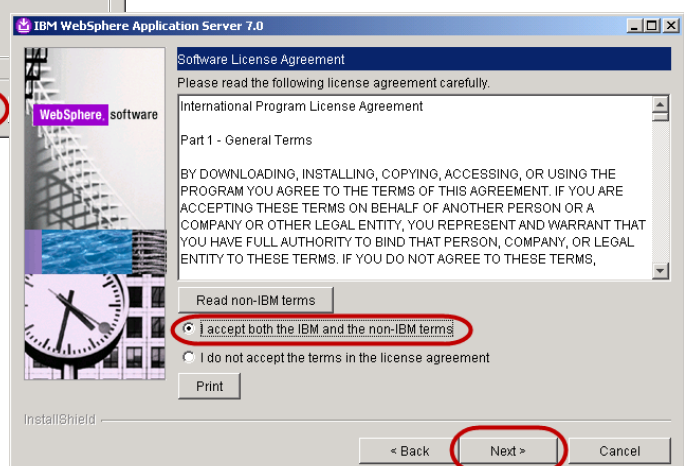


Installation — launching the installation wizard



Installation — welcome and license agreement

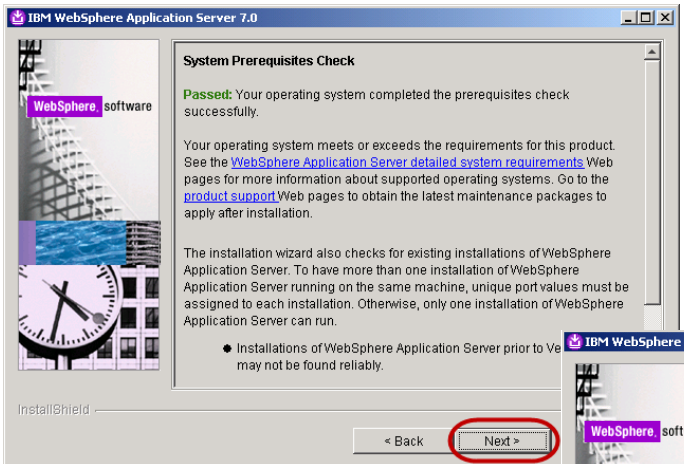
2 Welcome window includes information about documentation and support sites



3 License agreement window

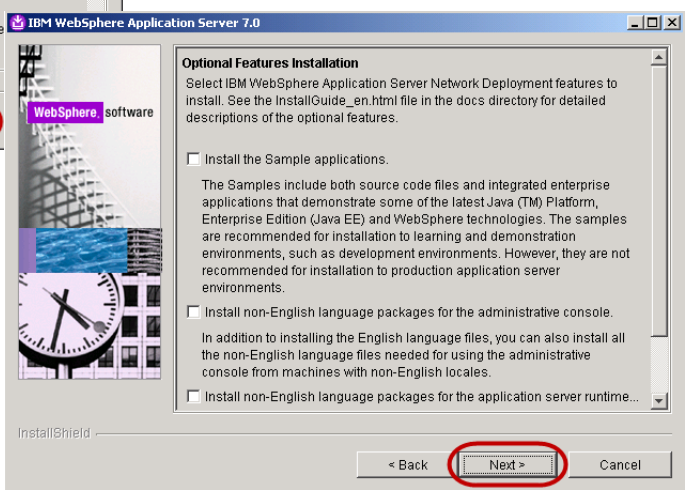
- Read or print the license agreement
- Accept the license agreement

Installation — prerequisites and sample applications



4 System prerequisites check

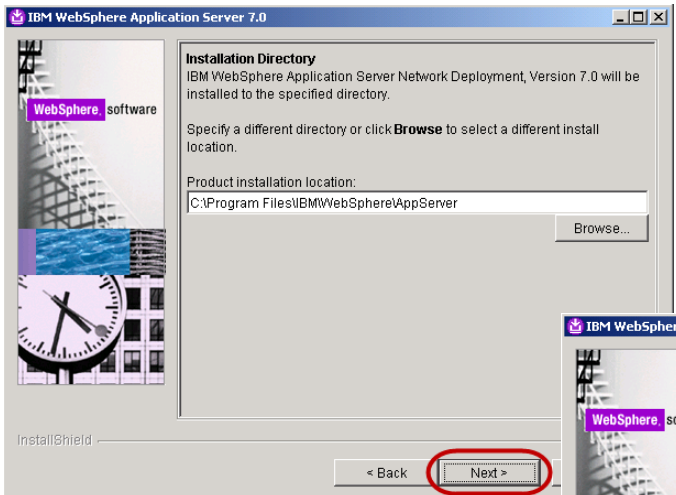
- Passed should be the status
- Links provided to review the required system prerequisites
- Checks for existing installations of WebSphere Application Server



5 Optional features installation

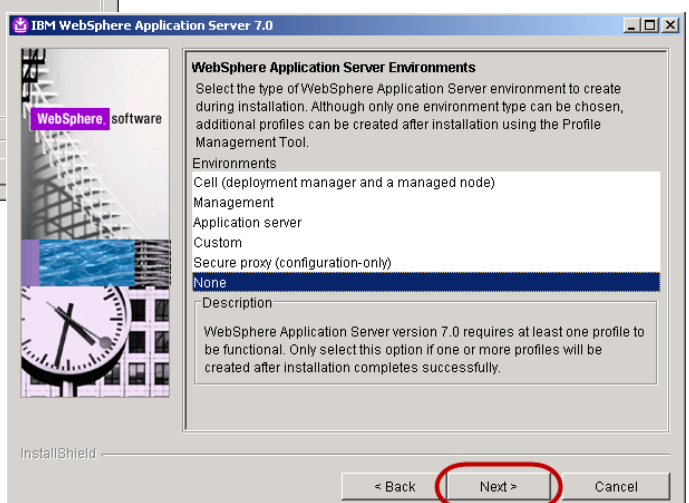
- Sample applications
- Non-English language packages for the administrative console
- Non-English language packages for the application server runtime environment

Installation — install directory and environments



6 Installation directory

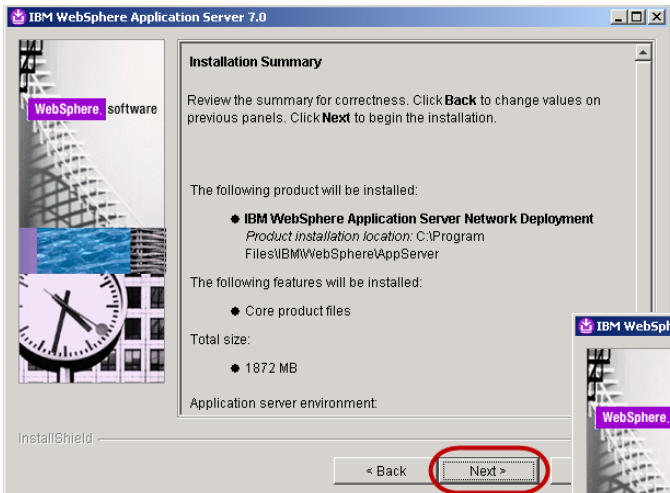
- Specify the directory location for the product installation



7 Environments

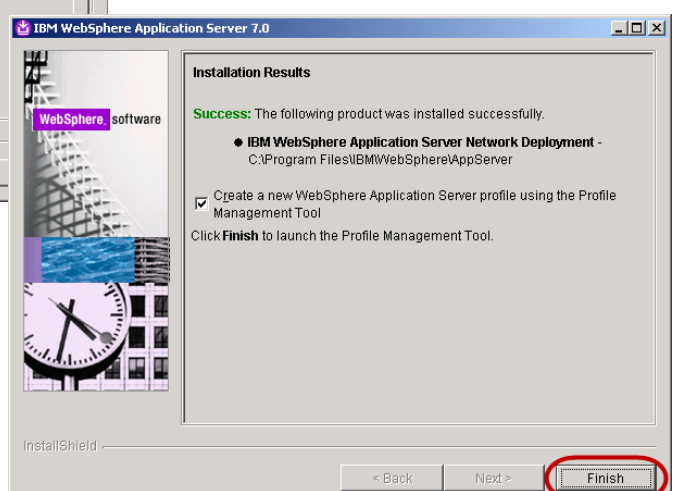
- Only one environment can be chosen
- If you specify none, you must create one when the installation is complete
- Profile Management Tool will be used to create profiles after installation

Installation — summary and results



8 Installation summary

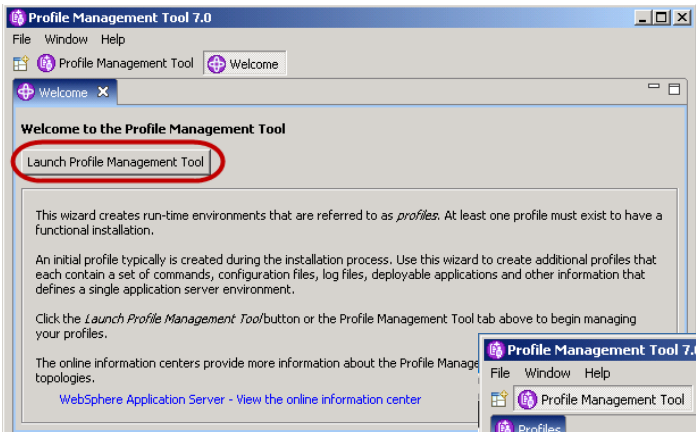
- The summary information is based on the selections you made previously
- Review the summary for correctness



9 Installation results

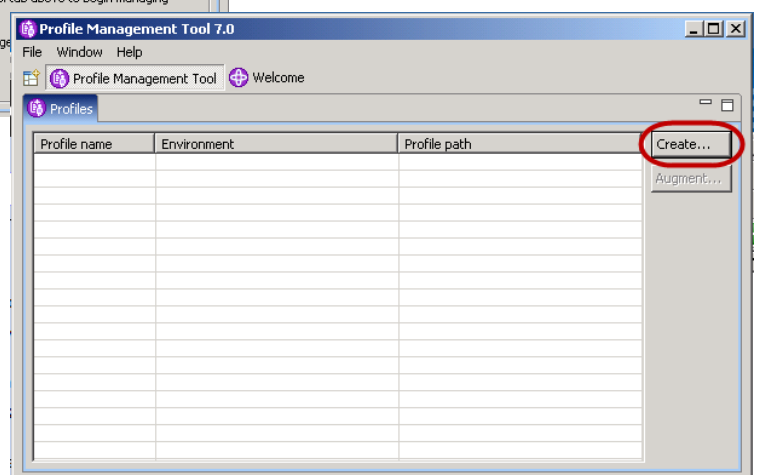
- Review the results
- If a profile was not created during installation, check the option to create one using the Profile Management Tool

Profile Management Tool — launch and create



1 Launch the Profile Management Tool

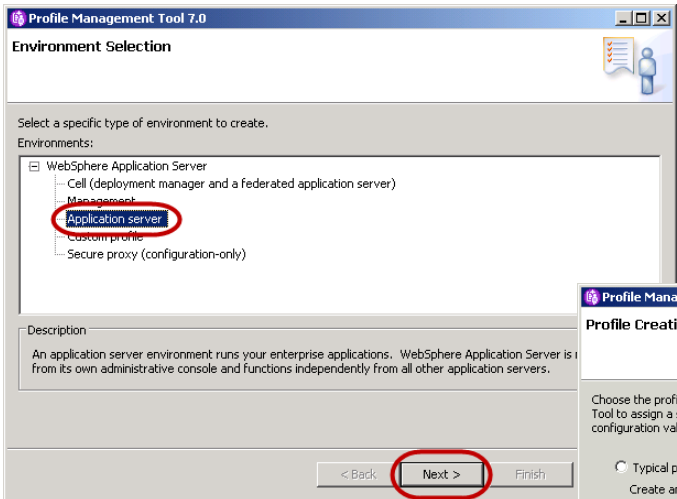
- Following installation, the Profile Management Tool welcome window appears.
- Click Launch Profile Management Tool to manage profiles



2 Create a profile

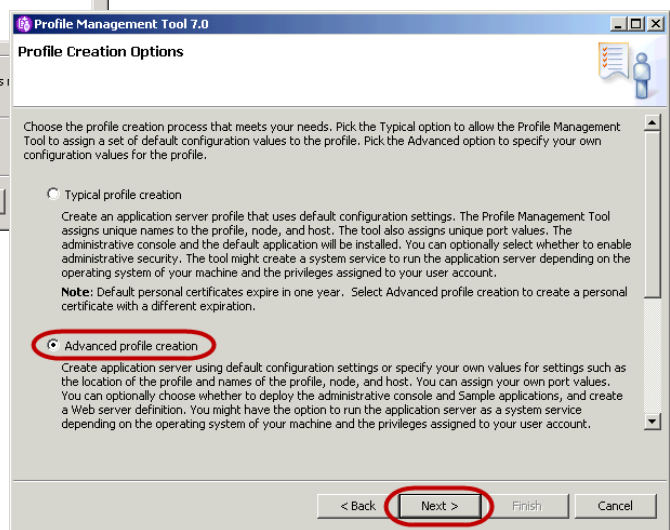
- Profile list is initially empty
- Click Create

Profile Management Tool — environment and options



3 Environment selection

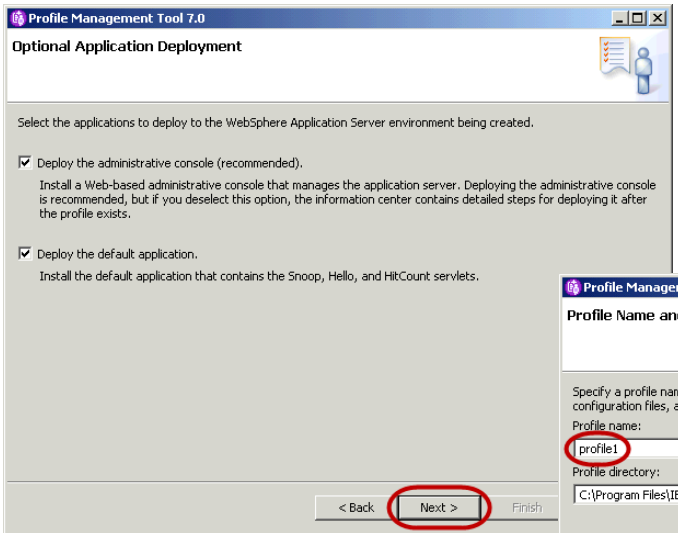
- A profile is associated with an environment type



4 Profile creation options

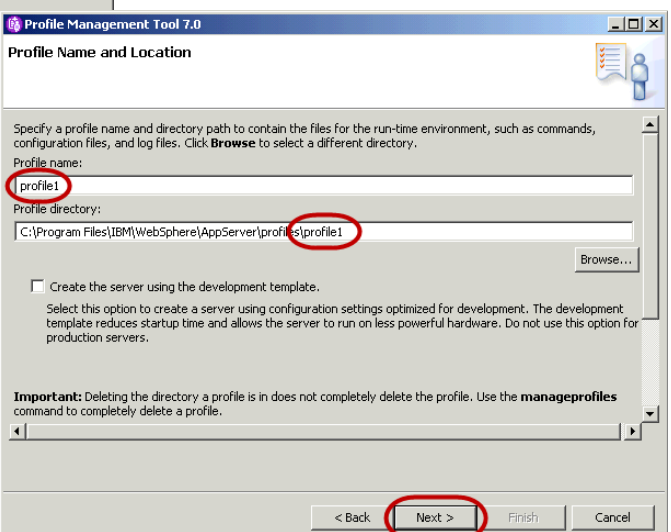
- Typical profile creation uses default configuration settings.
- Advanced profile creation allows you to accept default settings or specify your own.

Profile Management Tool — options, name, and location



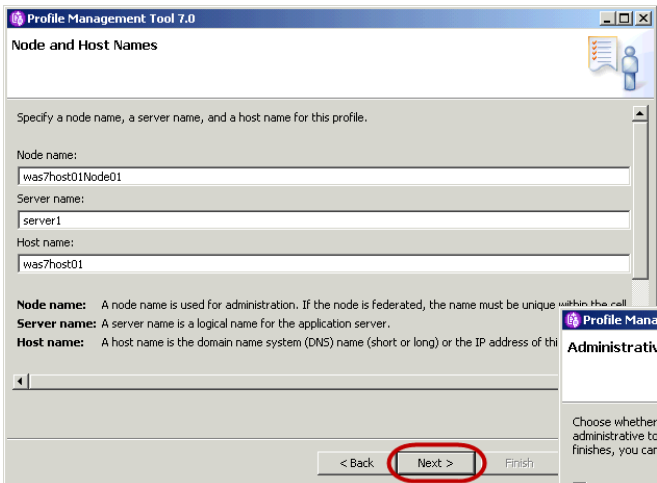
5 Application deployment options

- Administration console
- Default application



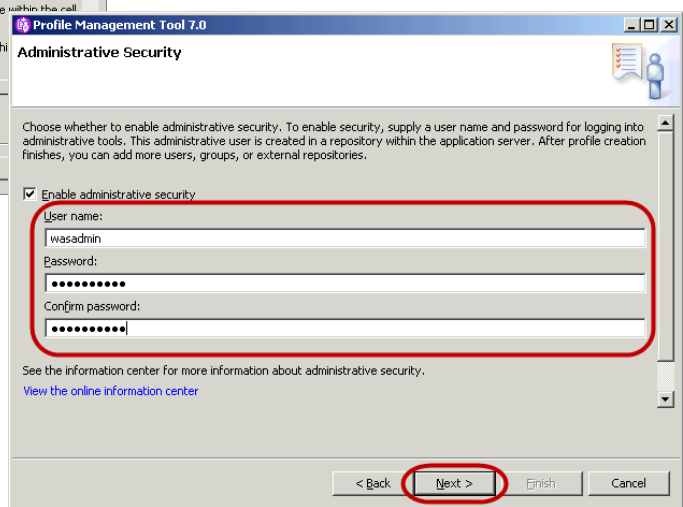
6 Profile name and location

Profile Management Tool — names and security



7 Profiles node and host names

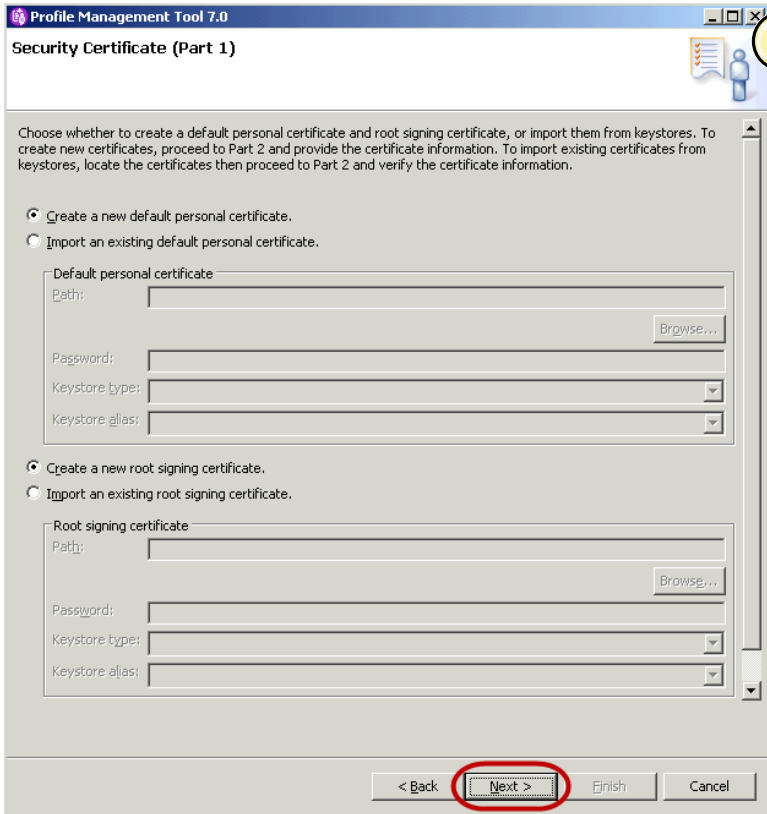
- Node name
- Server name
- Host name



8 Specify administrative security

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

Profile Management Tool — security certificate (1 of 2)



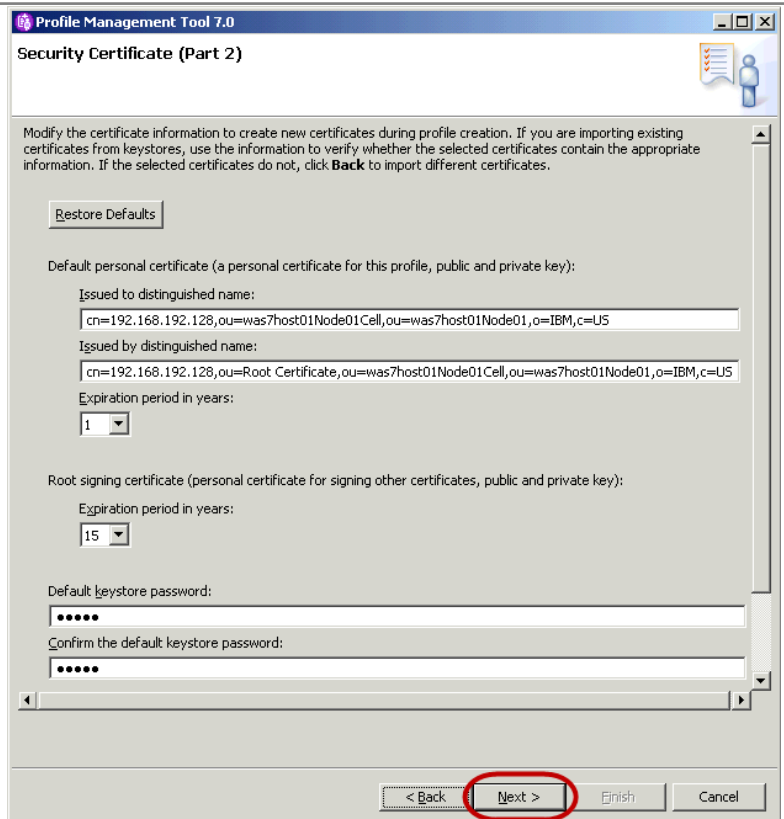
9

Security certificate (part 1)

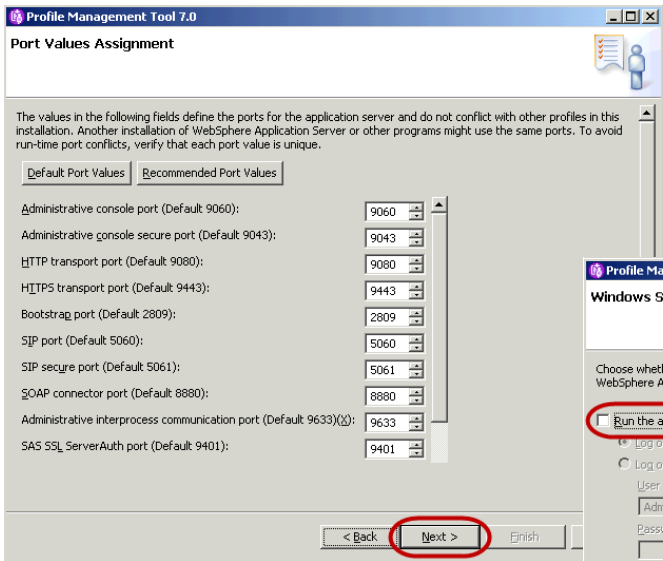
- Create or import a default personal certificate
- Create or import a root signing certificate

Profile Management Tool — security certificate (2 of 2)

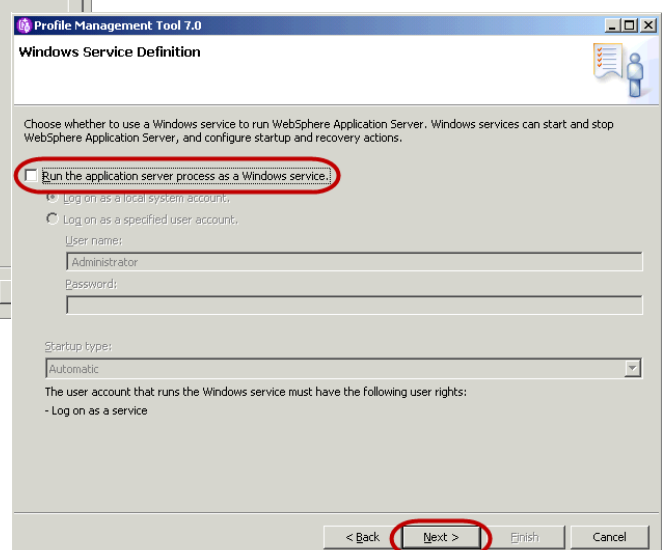
10 Security certificate (part 2)



Profile Management Tool — ports and Windows service

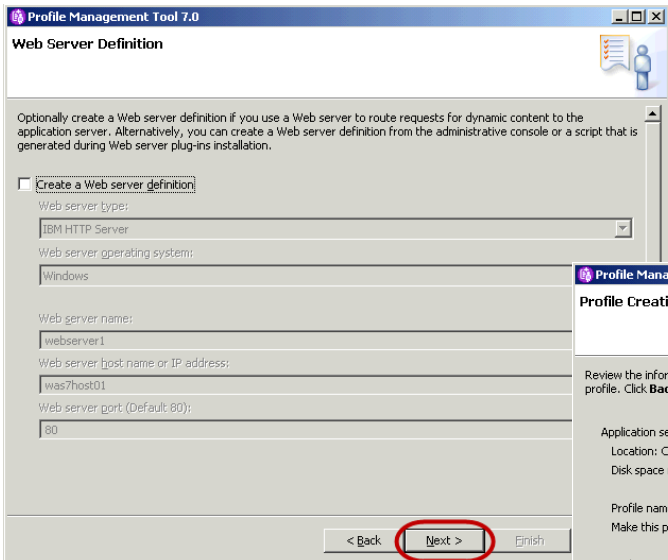


11 Review port value assignments

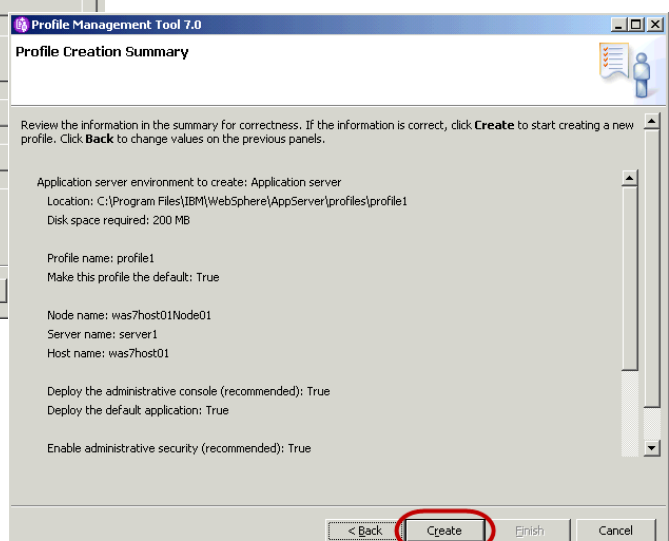


12 Specify Windows service option

Profile Management Tool — Web server and summary



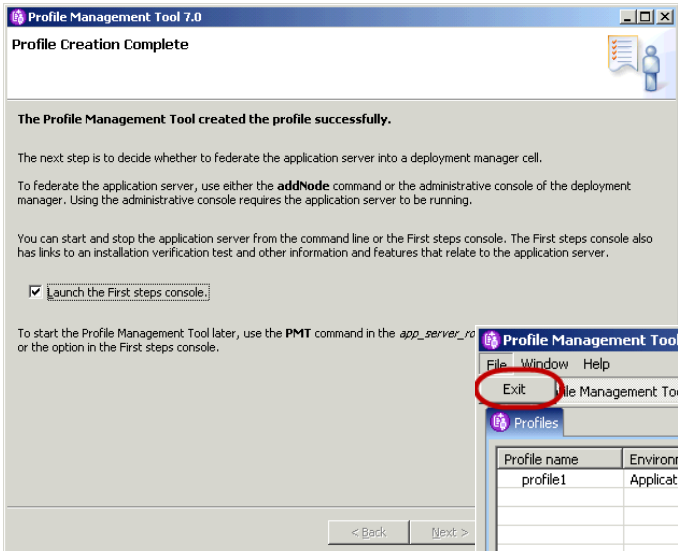
13 Optionally create a Web server definition



14 Profile creation summary

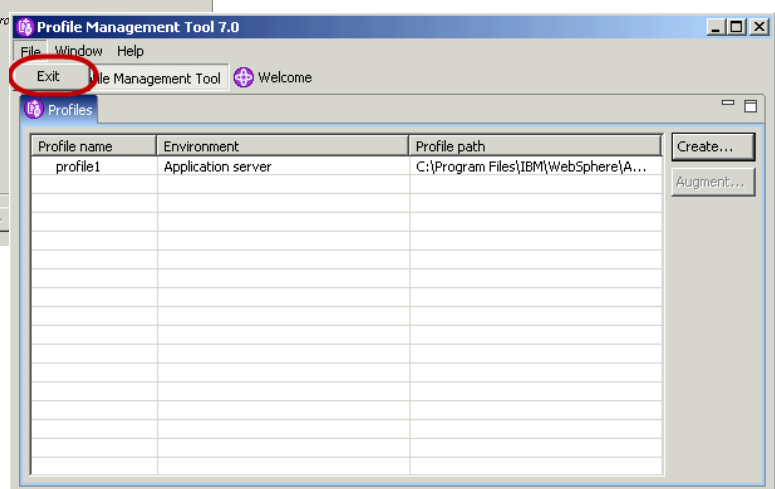
- The summary information is based on the selections you made previously
- Review the summary for correctness

Profile Management Tool — results and exit



15 Profile creation results

- Optionally, launch the First steps console when finished



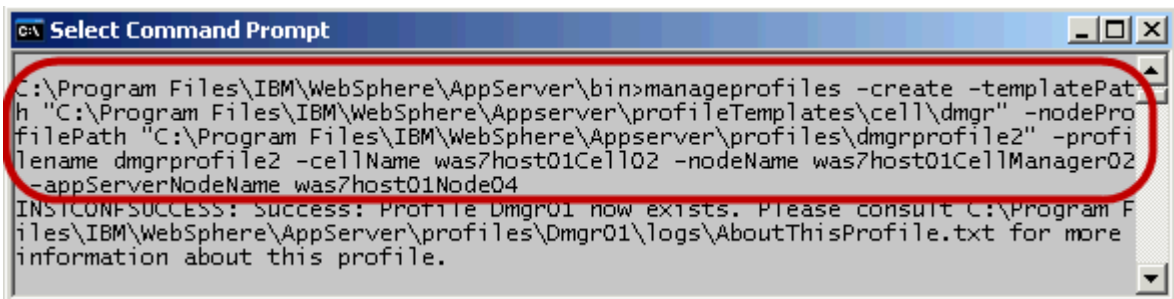
16 Profile list

- Each profile you create will appear in the profile list
- Exit the Profile Management Tool when all your profiles have been created

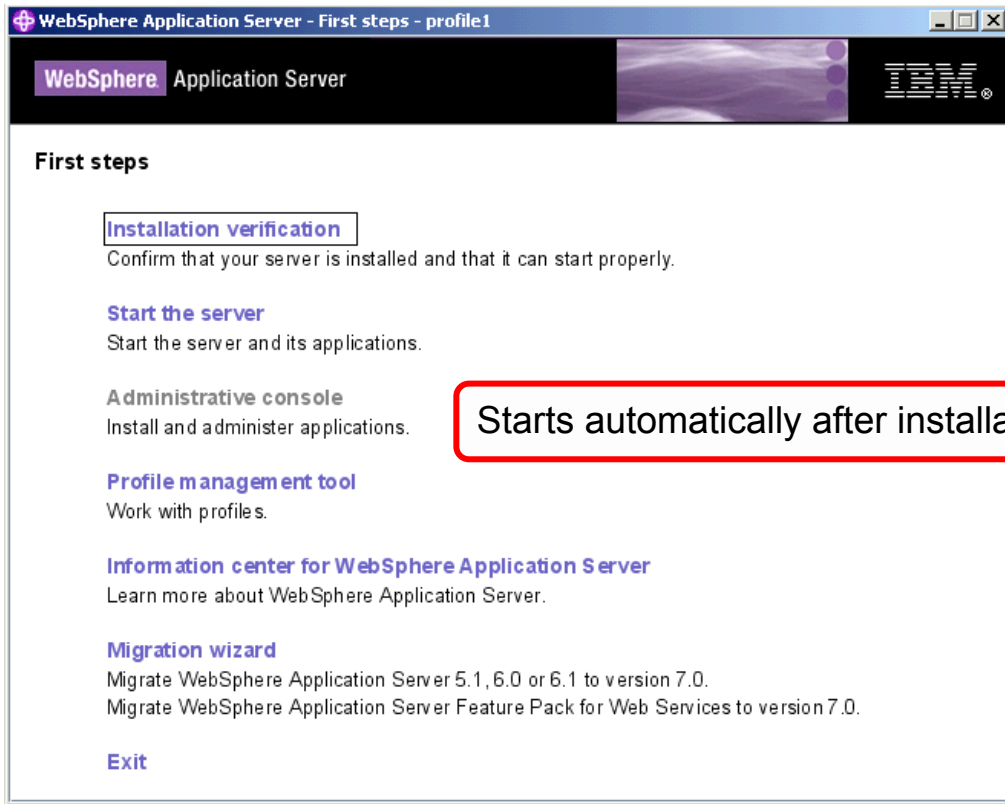
Profile creation — command-line tool

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

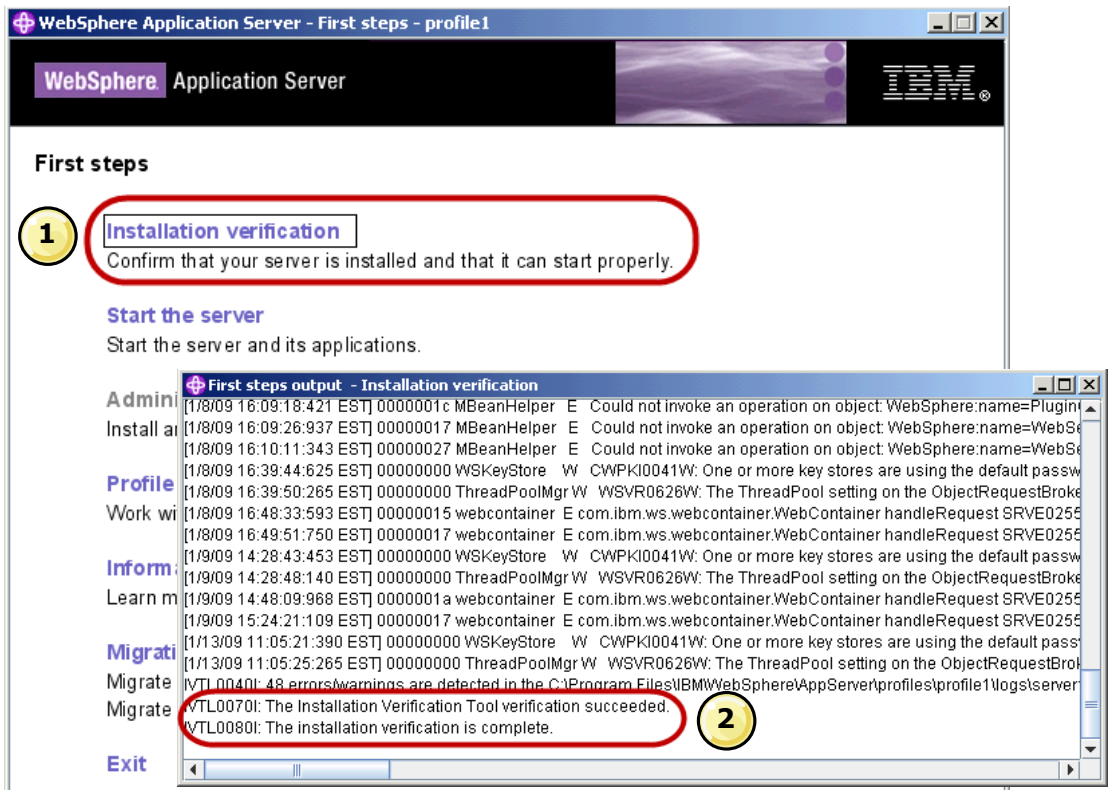
```
Manageprofiles -<mode> -<argument> <argument parameter>
```



First steps

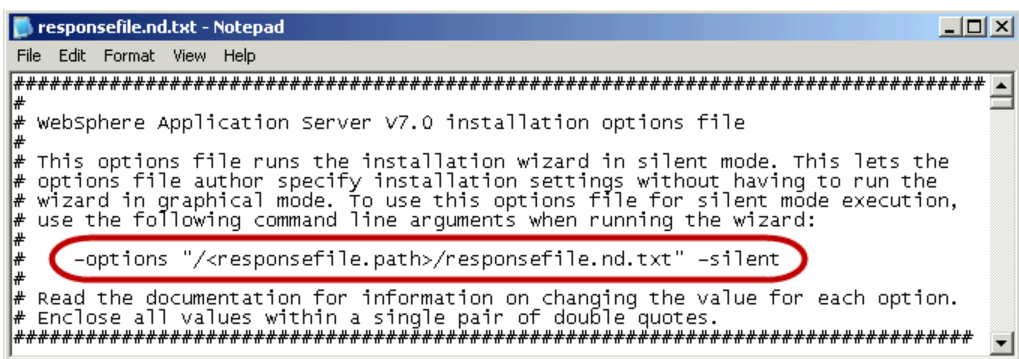


Installation verification



Silent installation

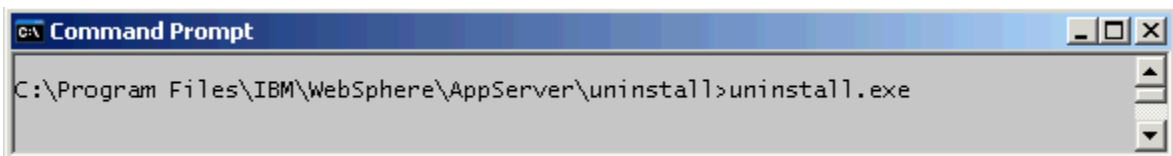
- Sample response files are provided
  - For Express installation: **responsefile.express.txt**
  - For Base installation: **responsefile.base.txt**
  - For Network Deployment installation: **responsefile.nd.txt**



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

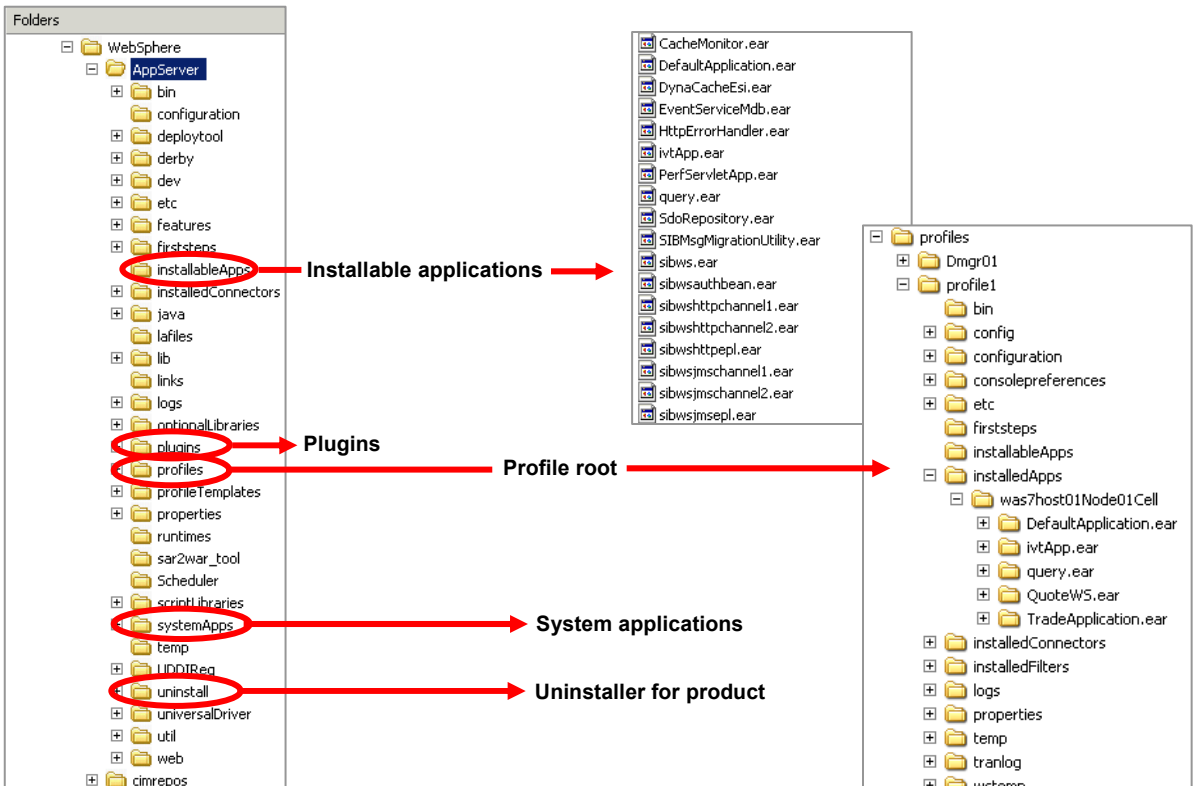
Uninstall

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

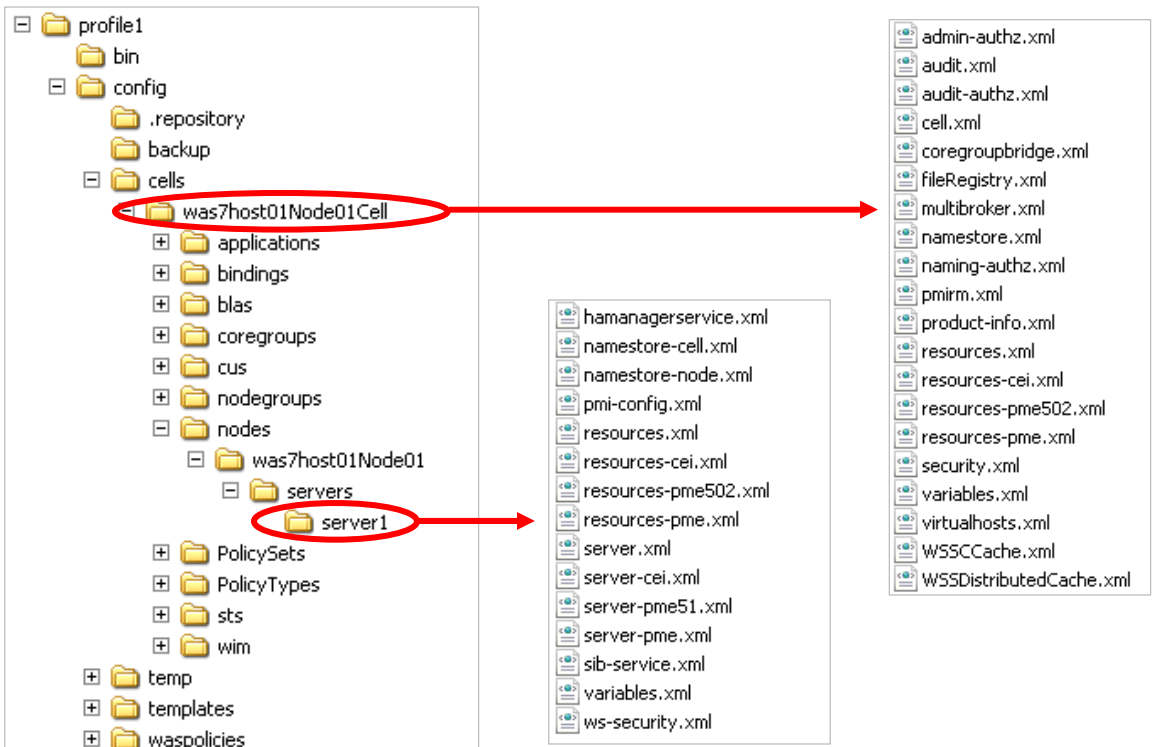


- Always use the uninstaller to remove WebSphere components
  - Do not use Add/Remove program to uninstall WebSphere
- Cannot custom uninstall parts of WebSphere installation
  - All the components are removed
  - Logs and properties files are not removed
- Silent uninstallation is supported
  - `uninstall.exe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

Directory structure

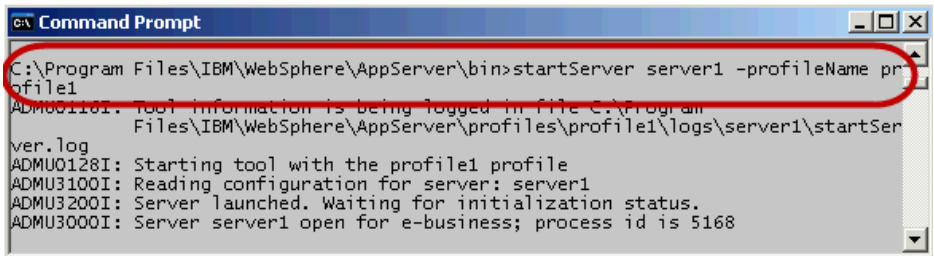


Configuration files

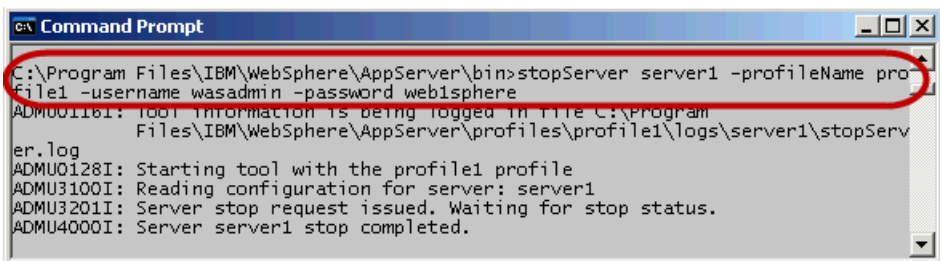


Common command line tools

- `startServer` — starts a server



- `stopServer` — stops a server



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

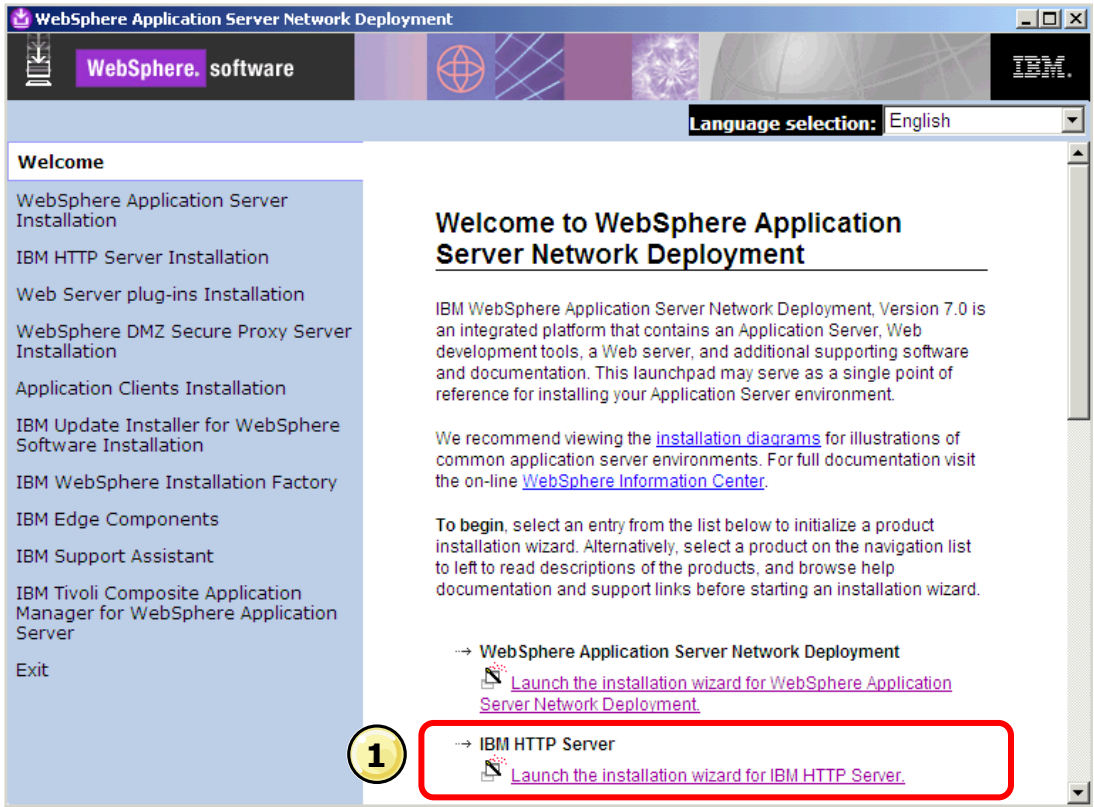
Server commands

- 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`

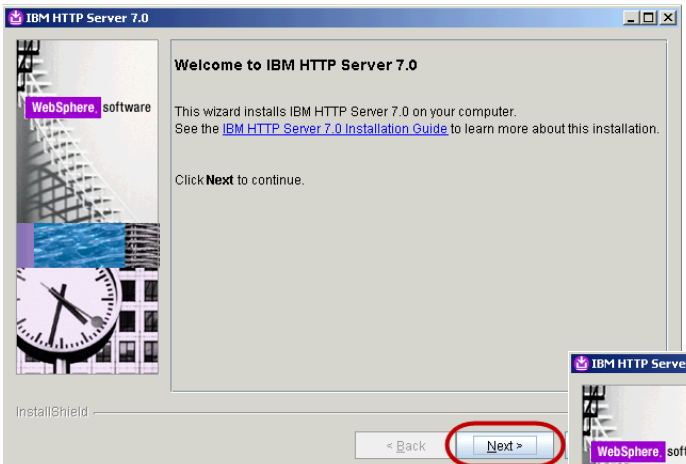
- If no profile is specified, the default profile is assumed
  - There can be only one default profile

- Examples:
  - `startServer server1 -profileName profile1`
  - `startManager -profileName DmgrProfile`
  - `stopServer server1` (assumes the default profile)

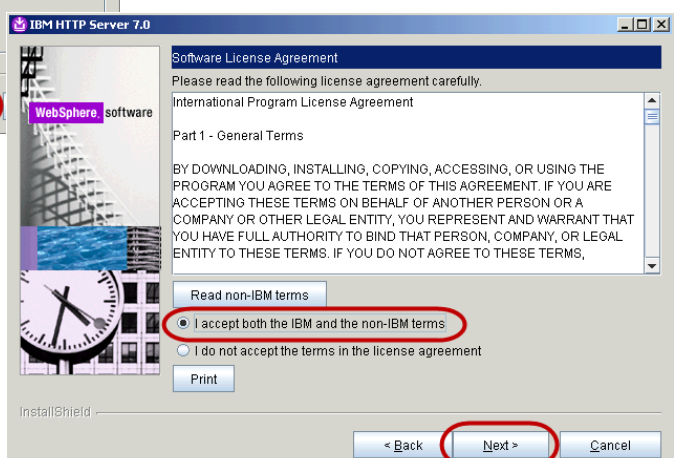
IBM HTTP Server — launching installation wizard



IBM HTTP Server — welcome and license agreement



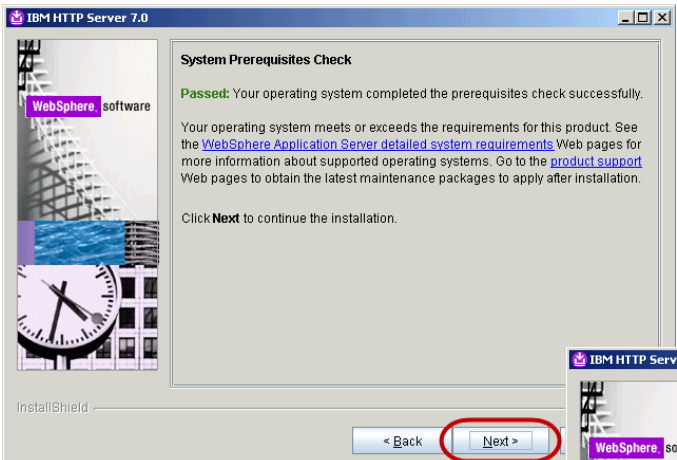
2 Welcome window includes a link for installation documentation



3 License agreement window

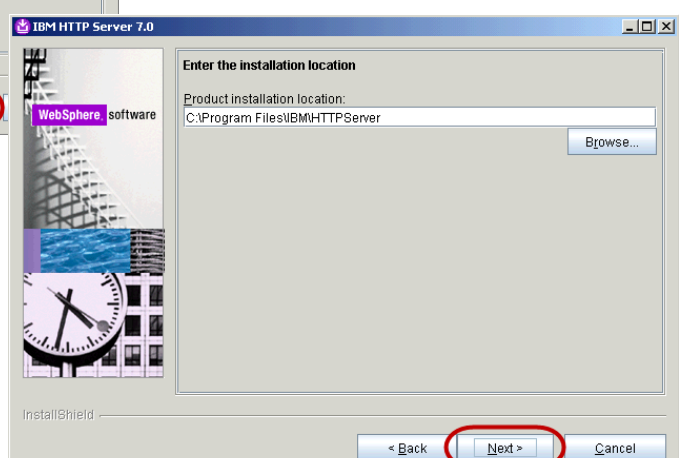
- Read or print the license agreement
- Accept the license agreement

IBM HTTP Server — prerequisites and install location



4 System prerequisites check

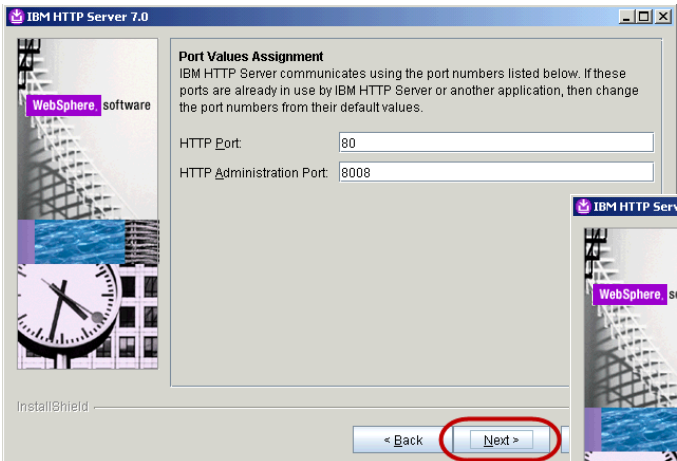
- Passed should be the status
- Links provided to review the required system prerequisites



5 Installation directory

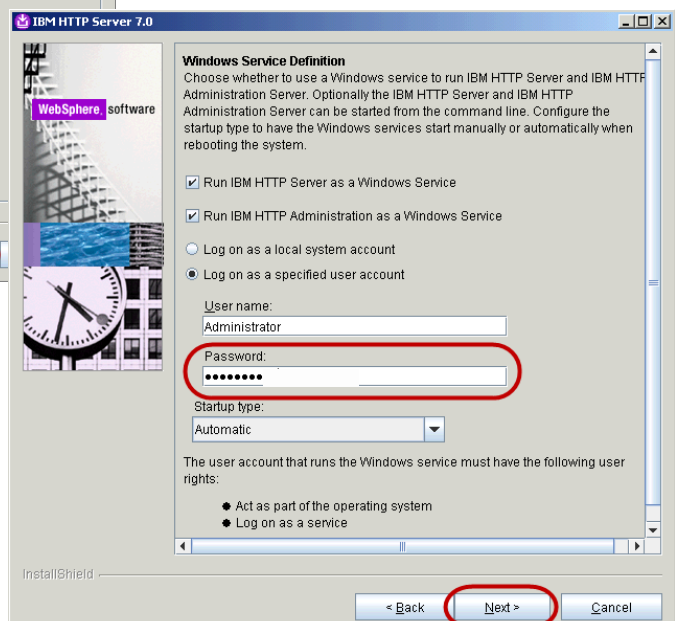
- Specify the directory location for the product installation

IBM HTTP Server — port values and service definition



6 Port values

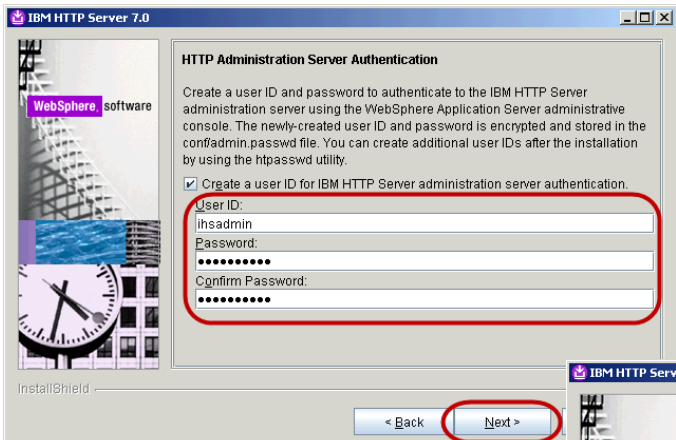
- Verify the assigned port values



7 Windows service definition

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

IBM HTTP Server — authentication and plug-in

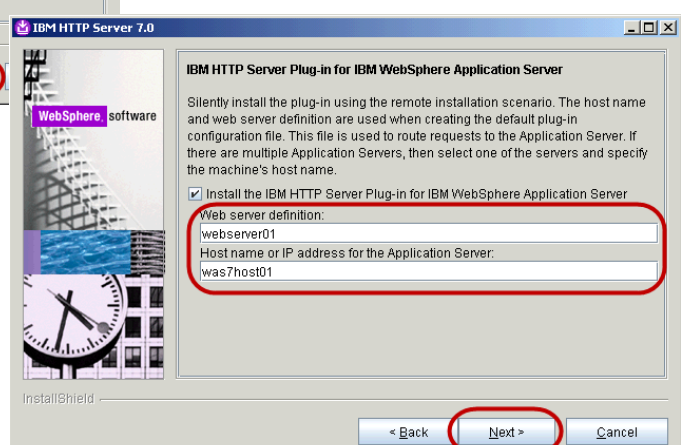


8 Authentication

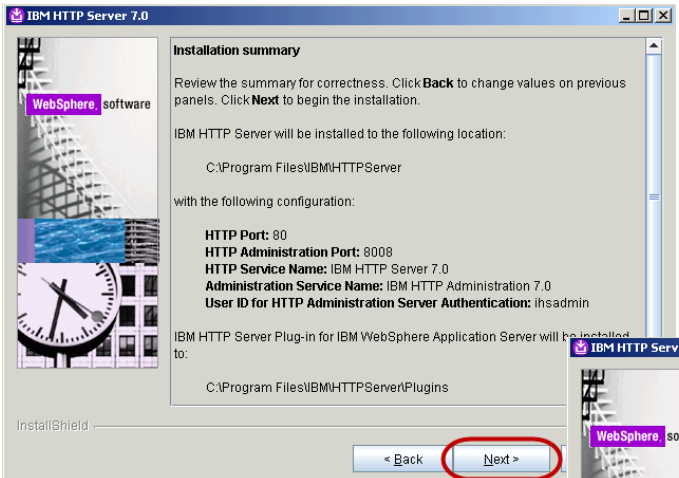
- Provide a user ID and password for authentication

9 Web Server definition

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

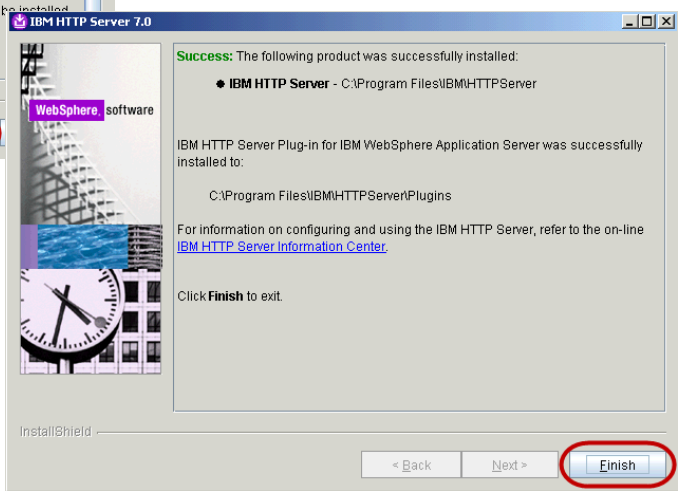


IBM HTTP Server — summary and results



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`

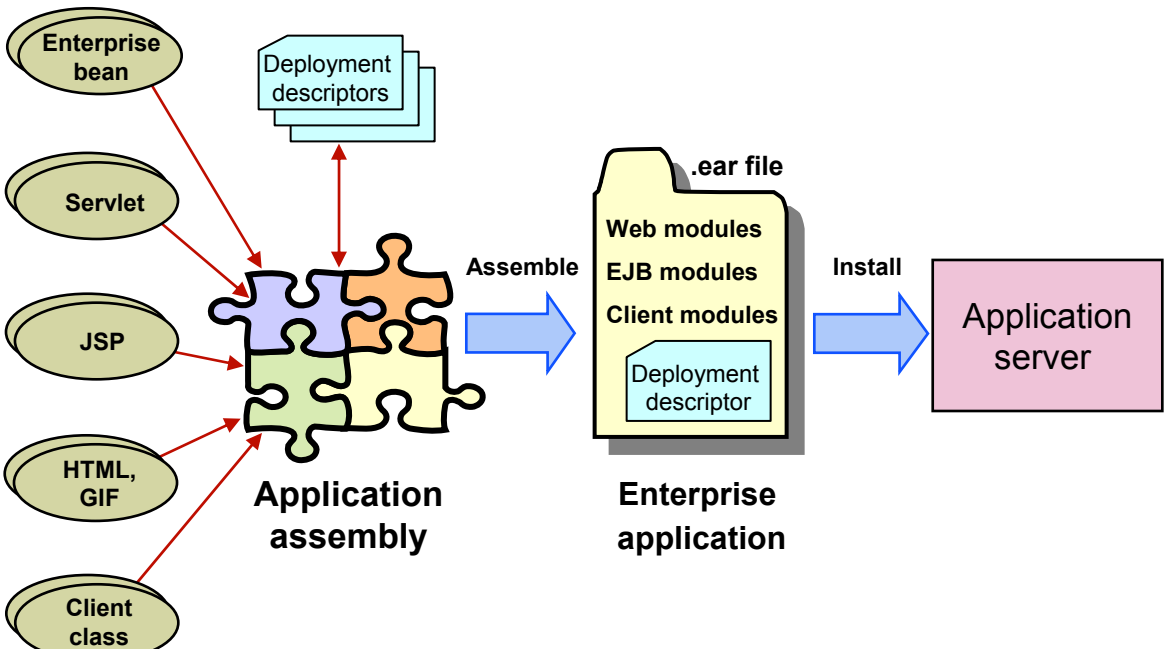
3. What is IVT, and how can it be accessed?
   - IVT is an installation verification tool that will scan log files to look for errors that may have occurred during installation. It can be launched from the command line or from the First steps console of each profile.

WebSphere Education

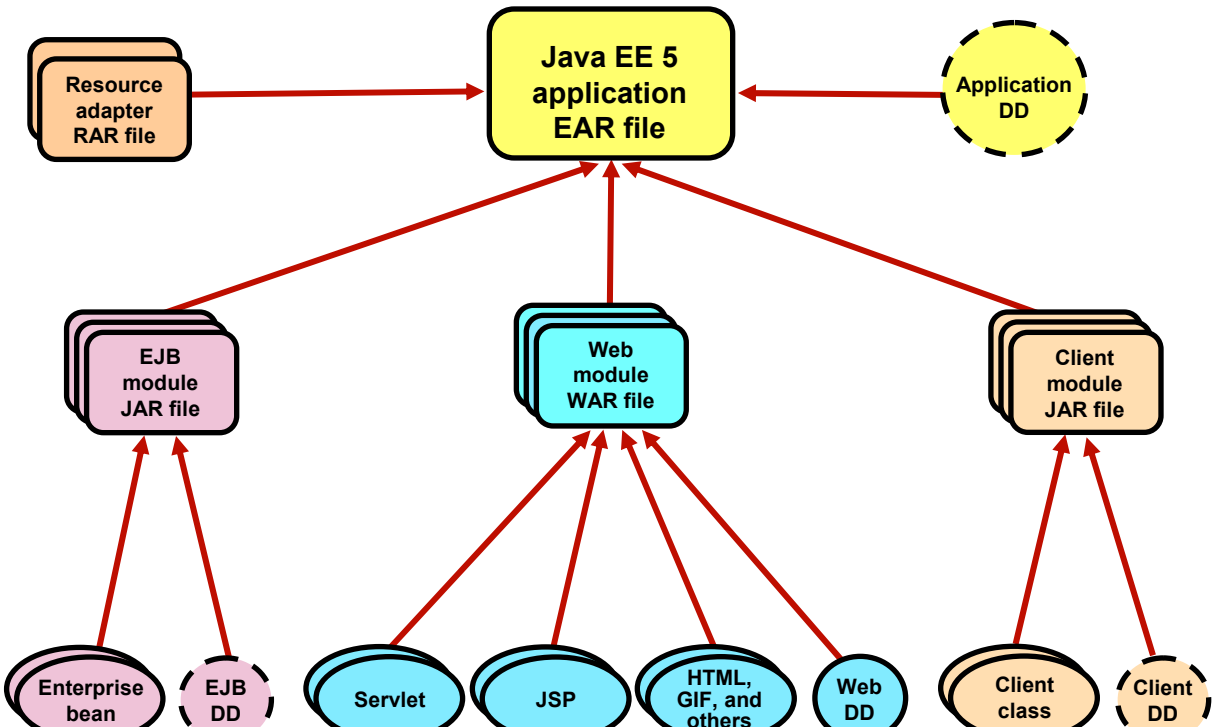
Application assembly

5

Overview of application assembly and installation

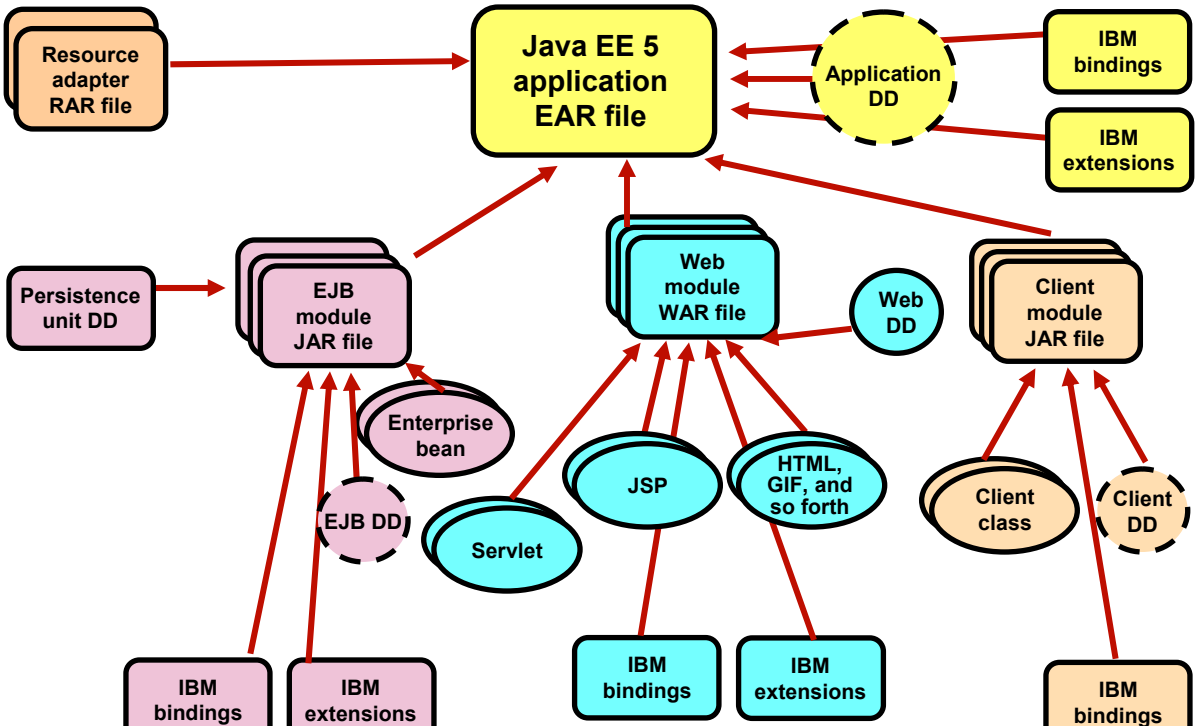


Java EE 5 packaging



DD = deployment descriptor

WebSphere: Application packaging



DD = Deployment Descriptor

Assembly and deploy toolkit functionality

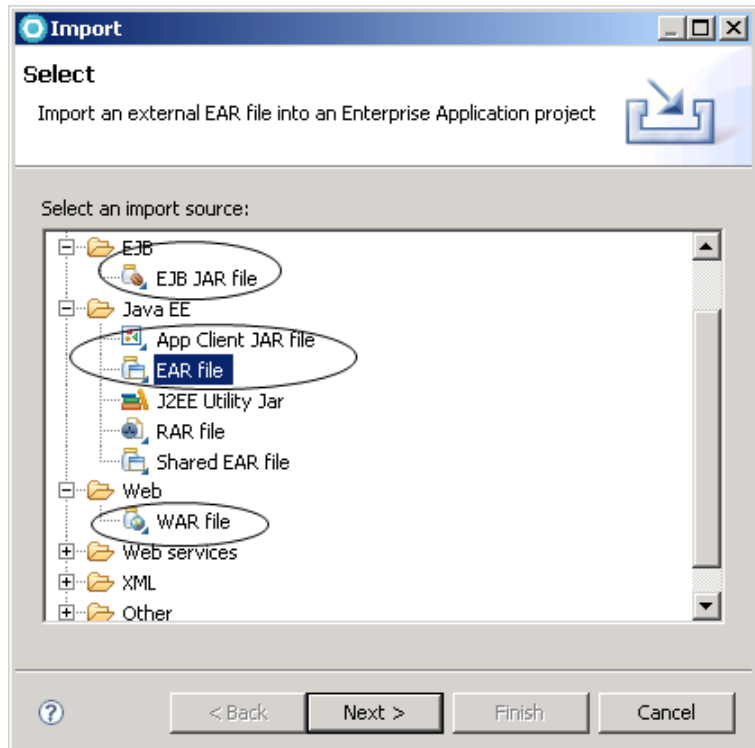
- Things you can do with the assembly and deploy toolkit:
  - Create and configure Java EE enterprise applications (EAR files):
    - Build from scratch
    - Java EE modules
  - Generate and modify deployment descriptor information
  - Generate and modify binding information attributes
  - Generate 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

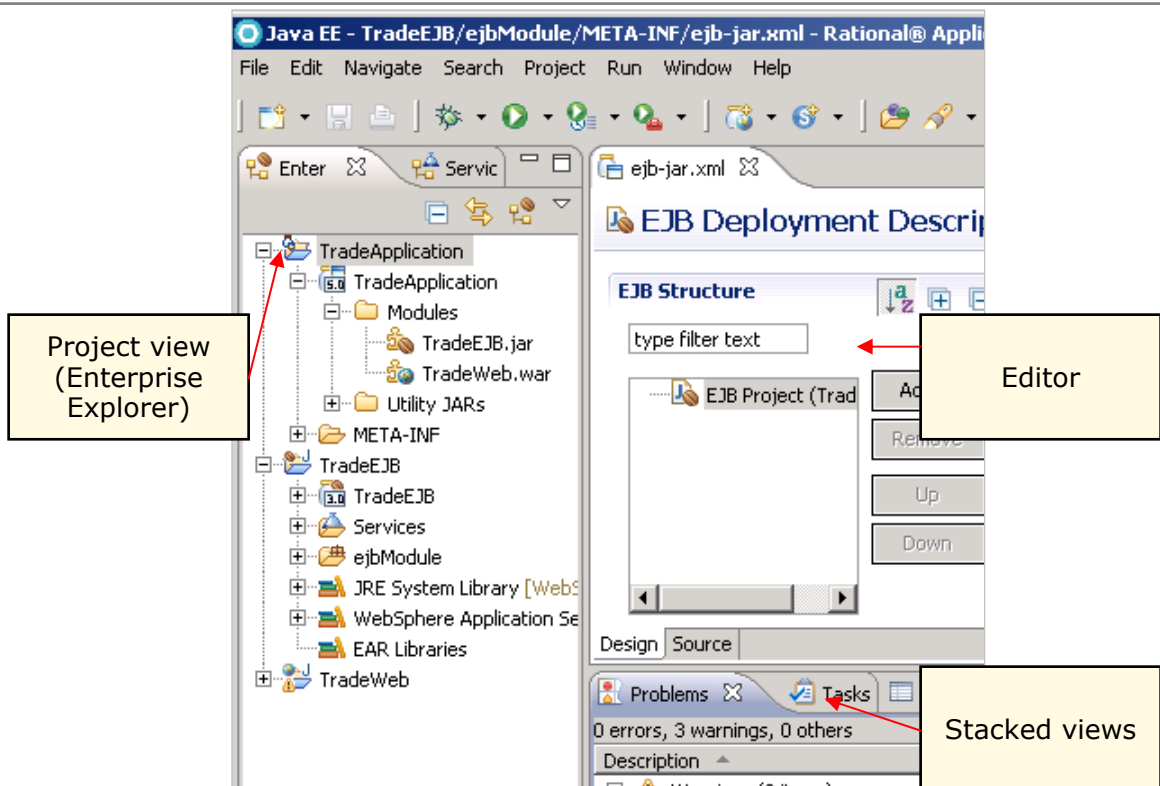
- When working with a workspace handed over by development, no assembly is required (already done automatically by the tool).
  - Configure modules
  - Export an EAR file
- Project Interchange files can be imported into a new or existing workspace.
- When assembling individual modules:
  - Create a new 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

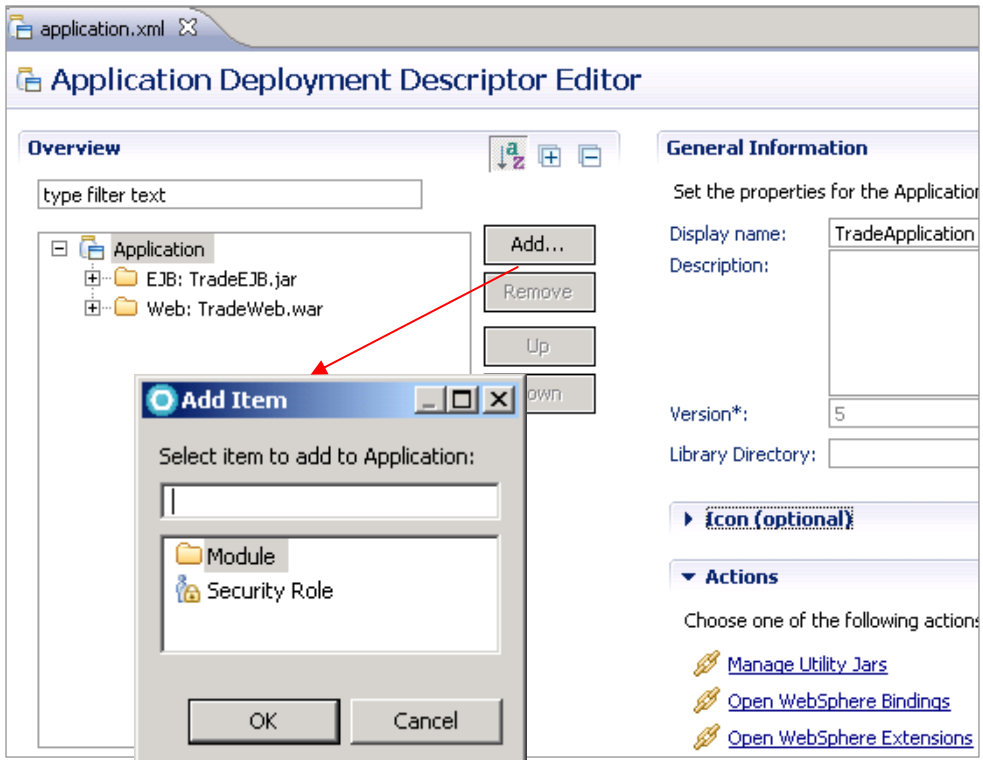
- Wizard driven
  - Import modules
    - EAR files
    - EJB JAR
    - Application client JAR
    - Web module WAR
  - Imported into a new or existing enterprise application



Java EE perspective



Application deployment descriptor (1 of 2)



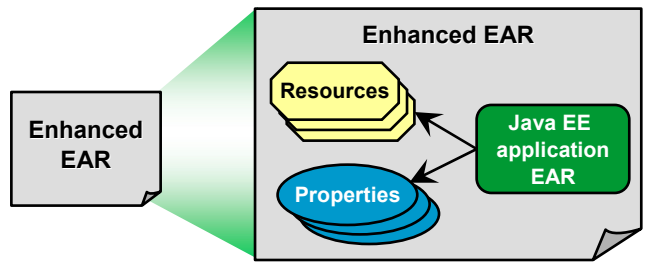
Application deployment descriptor (2 of 2)

- 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

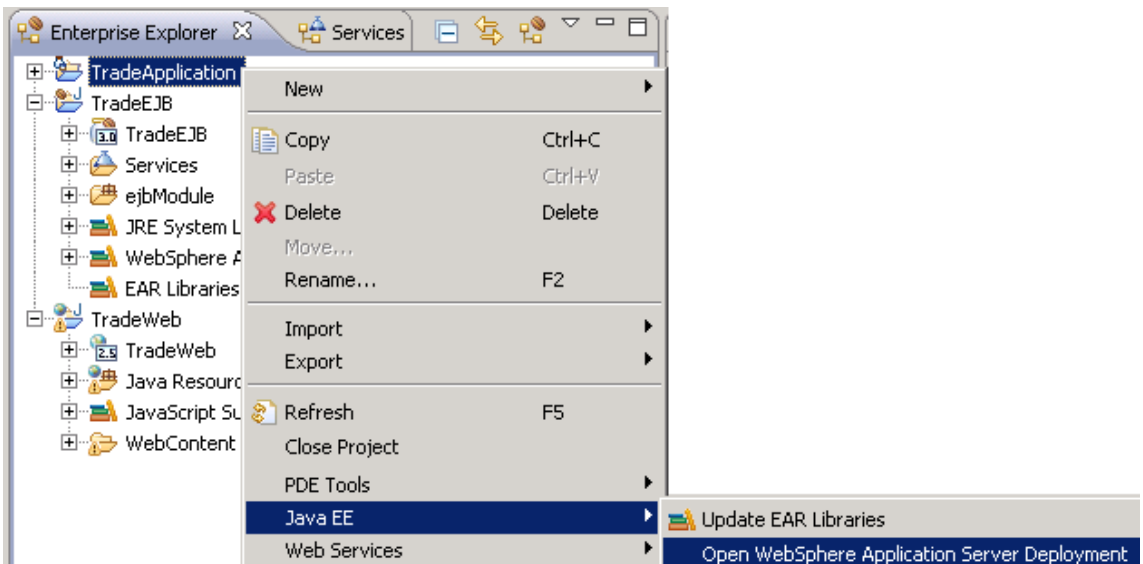
- You can deploy Java compliant **EAR** and **WAR** files.
- An **enhanced EAR** includes Java EE artifacts plus resource information needed to install on the WebSphere Application Server V7:
  - JDBC resources (data sources)
  - Class loader
  - JAAS authentication aliases
  - Shared libraries
  - Virtual host information



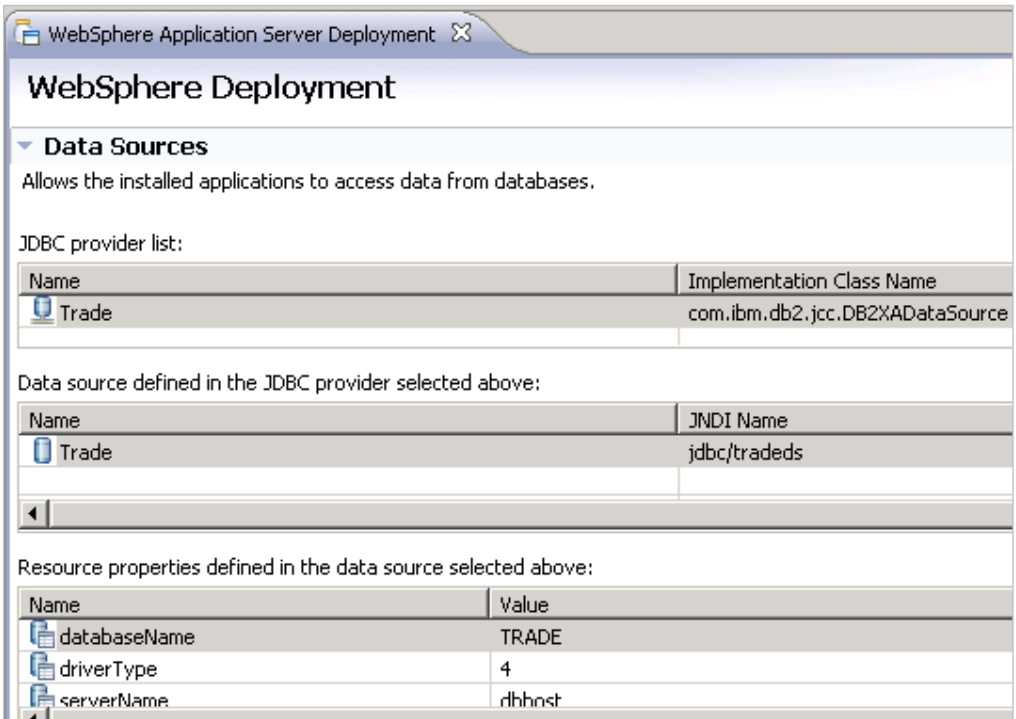
- Benefits in improved productivity:
  - Application resources and properties come with the application.
  - The application installation process creates the necessary resources within the server or cluster.
  - Moving an application from one server to another also moves the resources.
- WebSphere extensions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

Application scope resources (1 of 2)

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

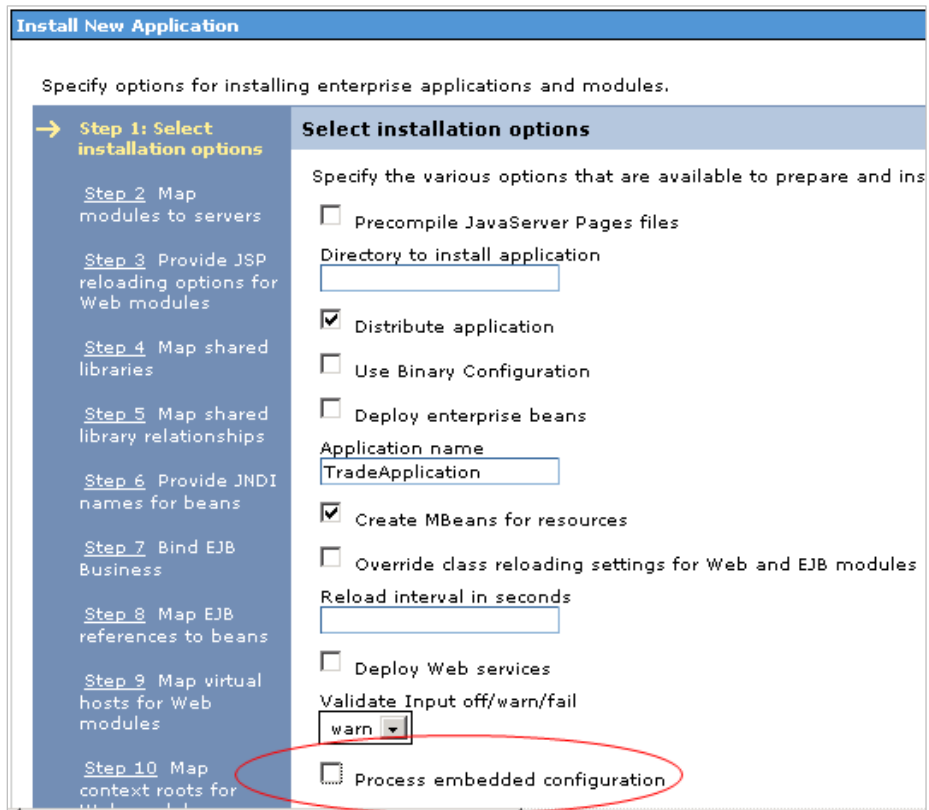


Application scope resources (2 of 2)

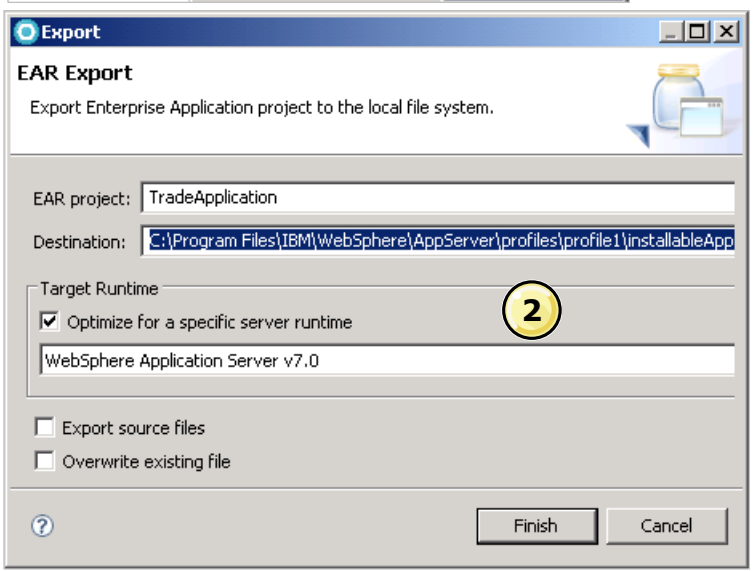


Dealing with enhanced EAR files at deploy time

- To ignore application scoped resources at installation time:



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

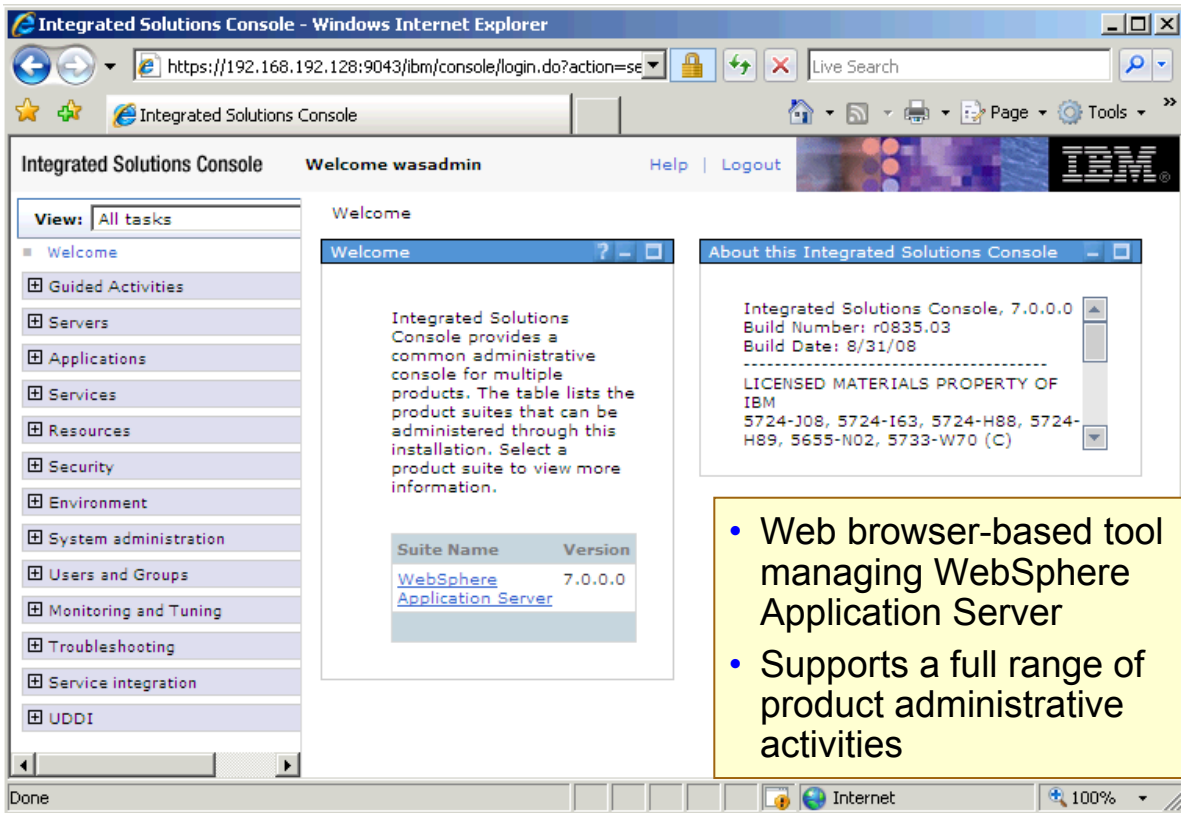
1. The result of packaging an enterprise application is ____.
   - An EAR file
2. True or false: Java EE 5 reduces or eliminates the need to deal with Java EE deployment descriptors in many cases.
   - True
     "Annotations reduce or eliminate the need to deal with Java EE deployment descriptors in 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

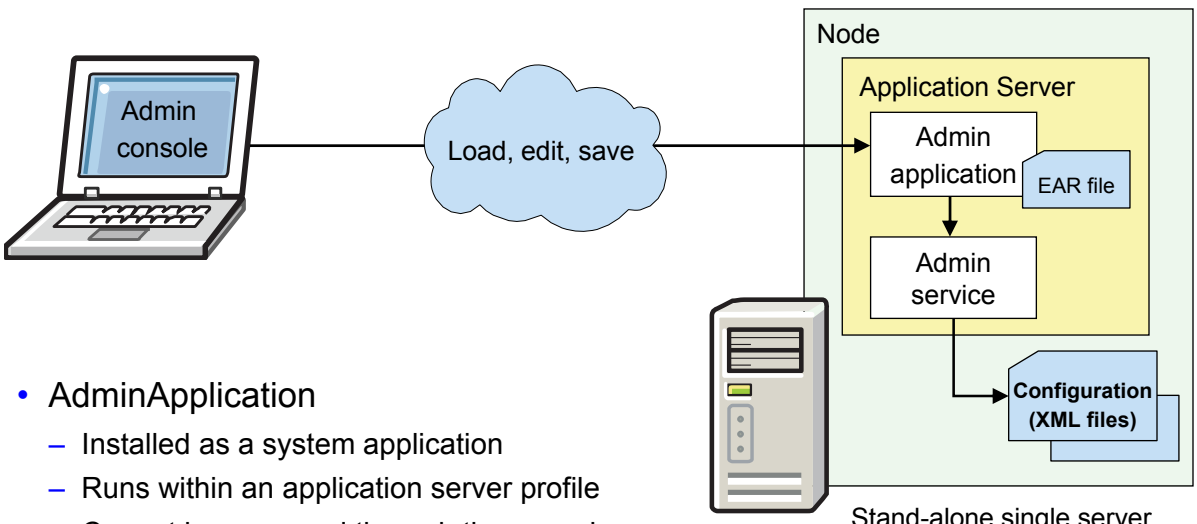
6

Administrative console



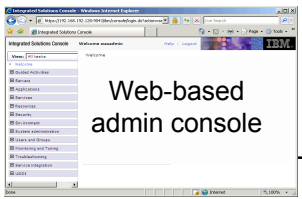
- Web browser-based tool managing WebSphere Application Server
- Supports a full range of product administrative activities

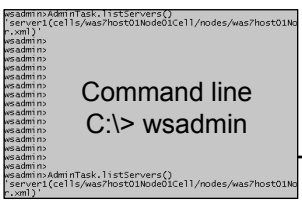
Starting the administrative console



- 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

Administrative console in a cell topology





HTTP or
HTTPS

SOAP

Deployment
manager

Admin
application

Web
container

Admin
services

MASTER

Cell config
Node01 config
server1 config
server2 config
Node02 config
server3 config
server4 config

EAR file

Node agent
Admin
service

Cell config
Node01 config
server1 config
server2 config

server1
server2

EAR file

Node01

Node agent
Admin
service

Cell config
Node02 config
server3 config
server4 config

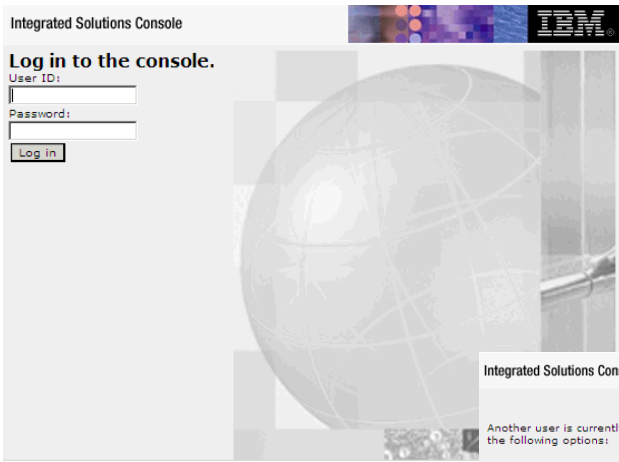
server3
server4

EAR file

Node02

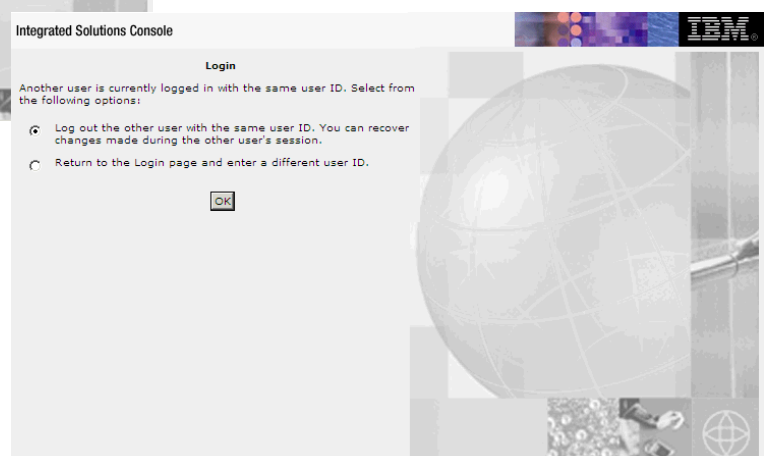
Commands
Configuration

Console login



1 Log in to the console

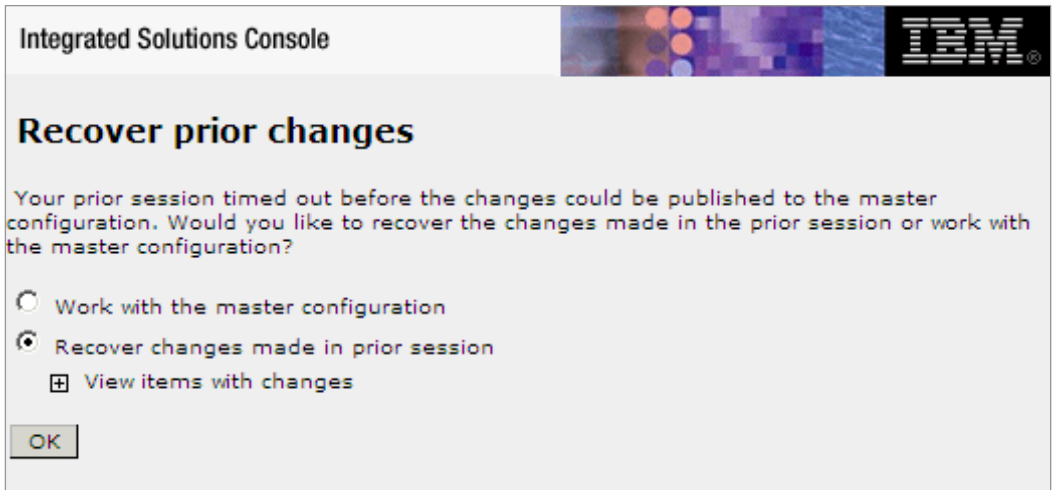
- User ID
- Password



2 User ID conflict

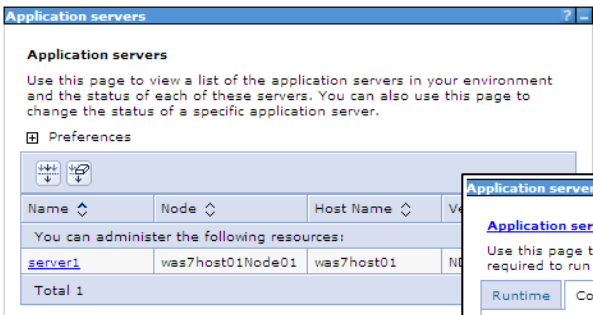
- Appears when another user logged in with the same user ID

Recovering prior changes



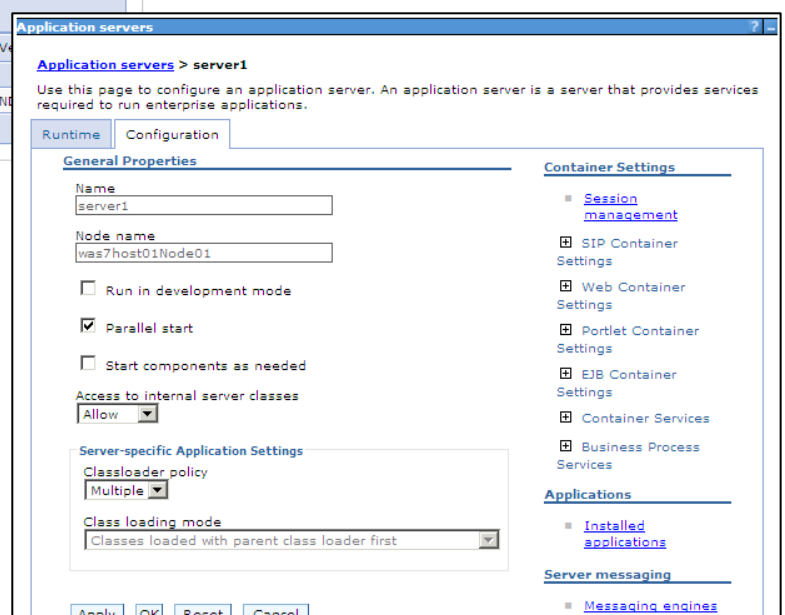
- You can recover prior changes if your prior session times out.
- Two options are available:
  - Work with the default administrative configuration
  - Work with the administrative configuration from the prior session

Administrative console panels



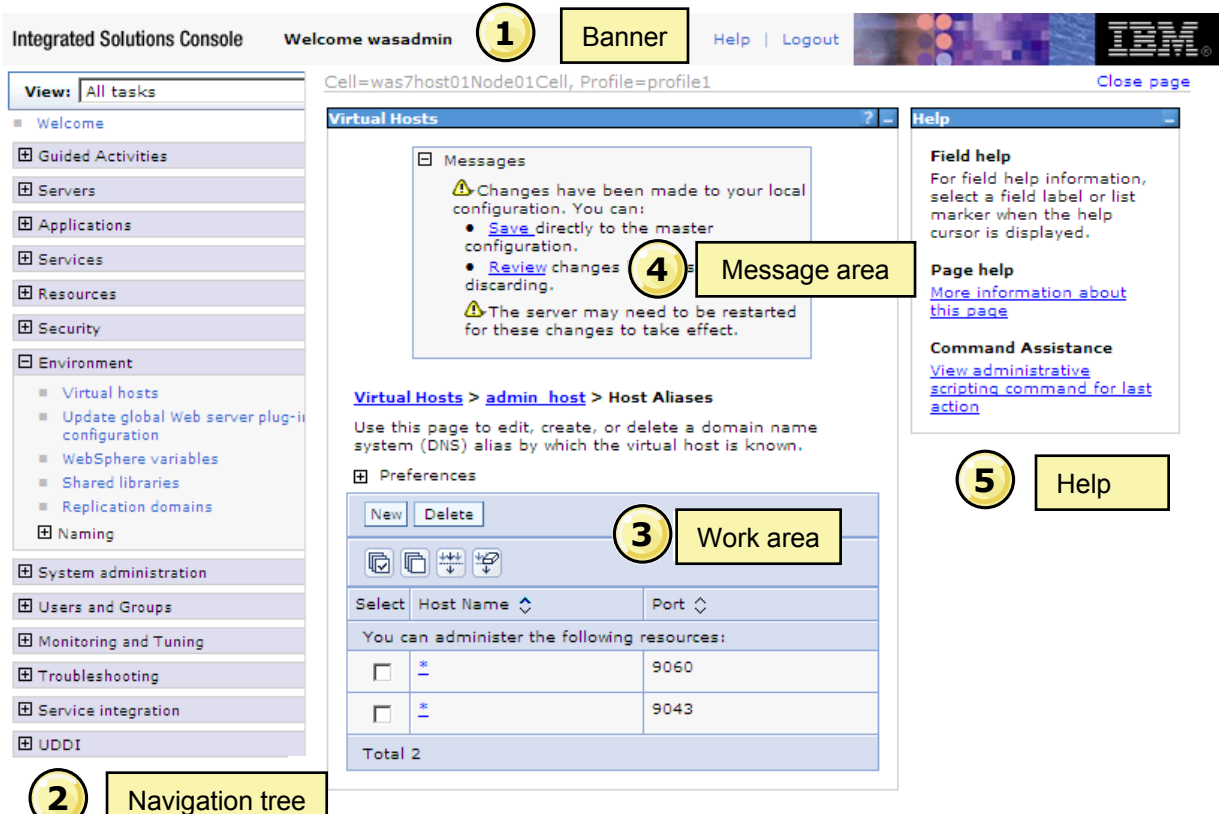
1 Collection pages

2 Detail pages



3 Wizard pages
- JDBC wizard is an example

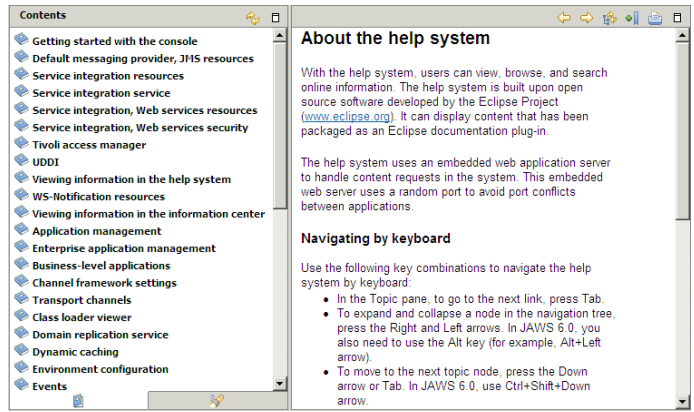
Administrative console areas



Administrative console help

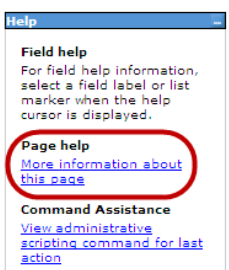
1 Console help

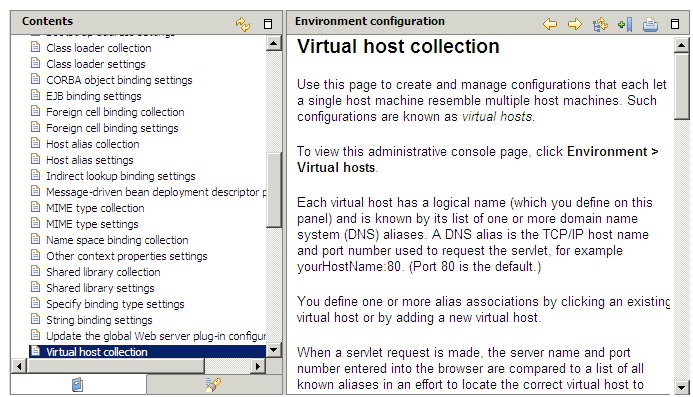
- Click **Help** from console banner
- Select from list of references



2 Page help

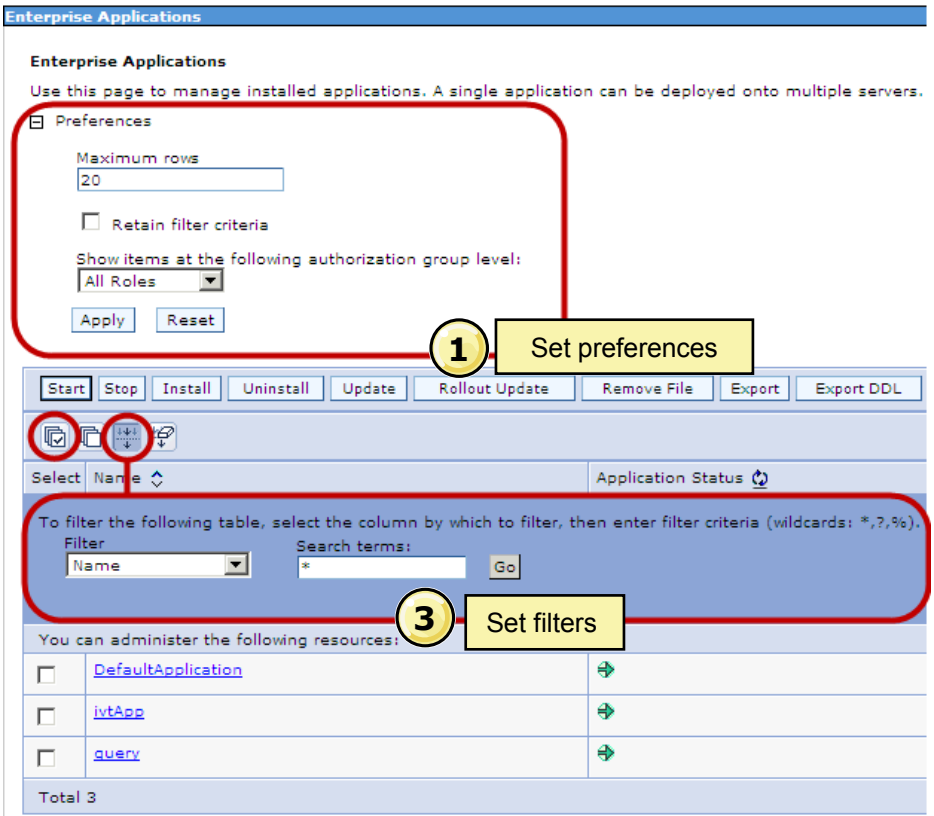
- Click **More information about this page** from help workspace





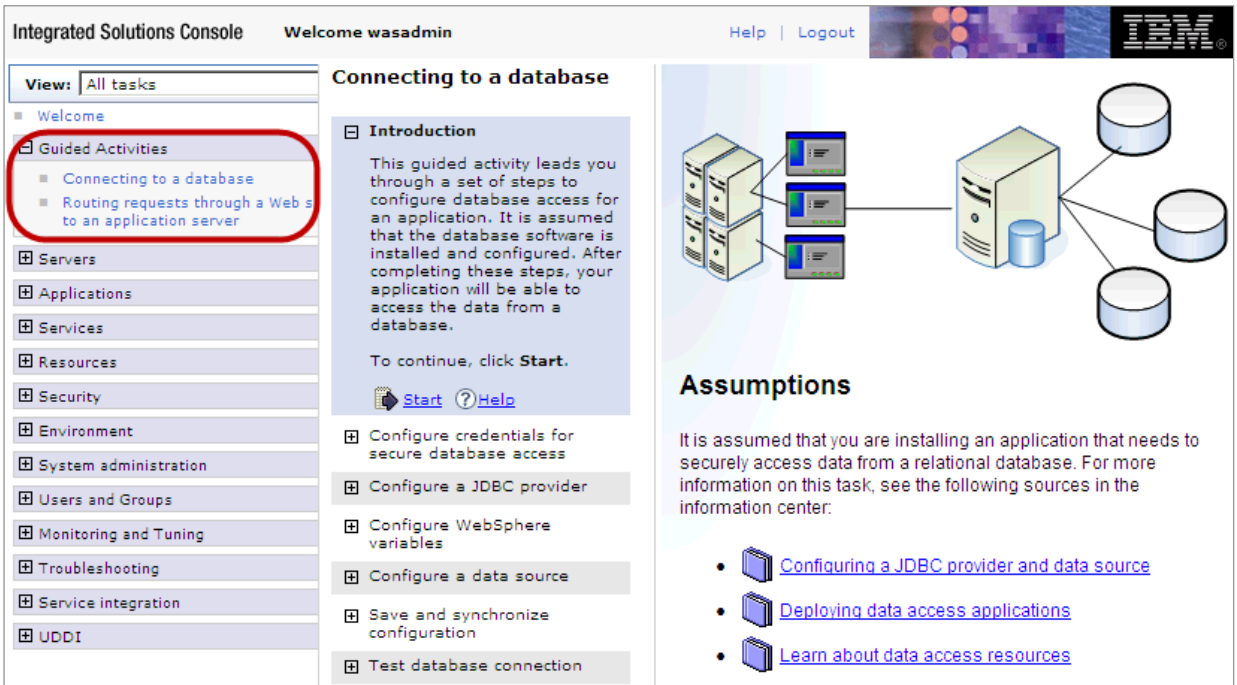
Administrative console preferences, filters, and scope

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



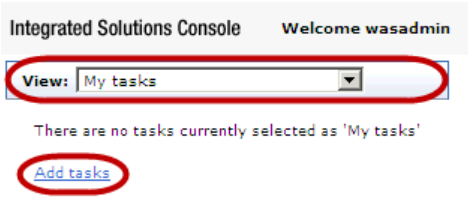
2 Select resources

Guided activities

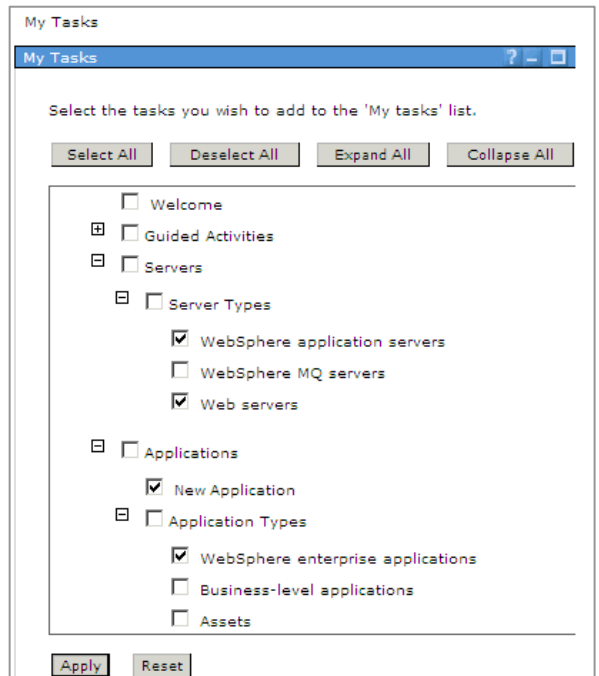


- Structured steps through common administrative tasks
- Otherwise have to know exactly what pages to use and where to find them within the console

My tasks

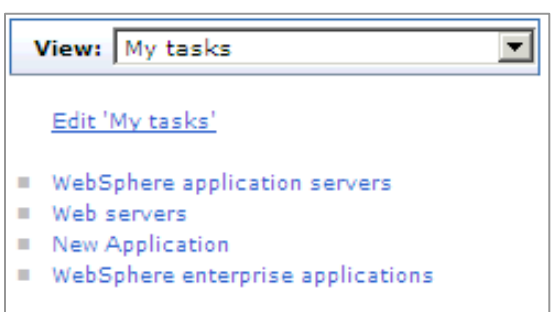


1 Select My tasks from the navigation view selection list

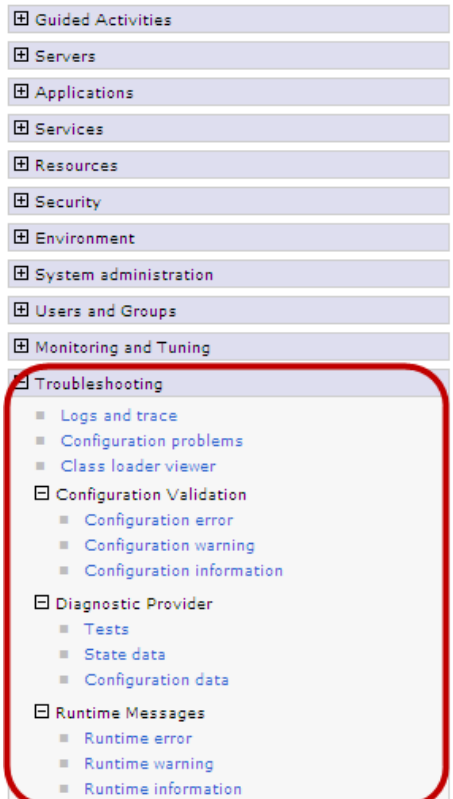


2 Select tasks to add to My tasks list

3 Tasks will display in My tasks list

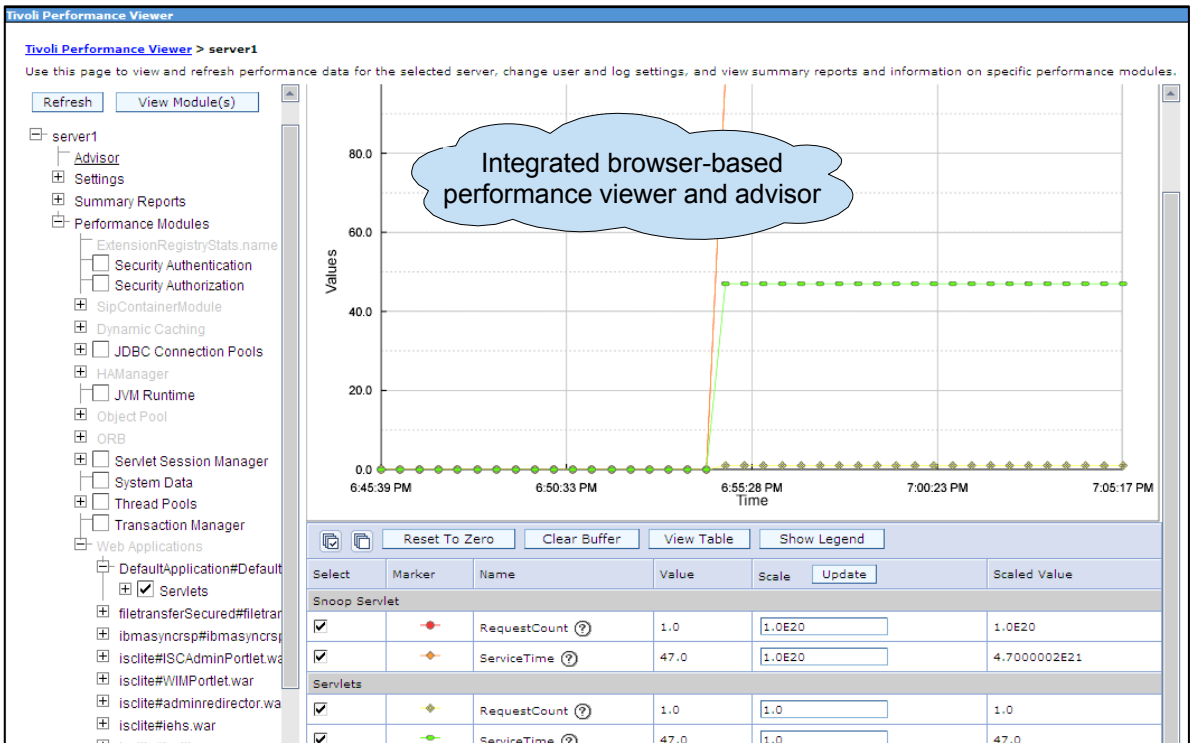


Troubleshooting information



- 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



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.

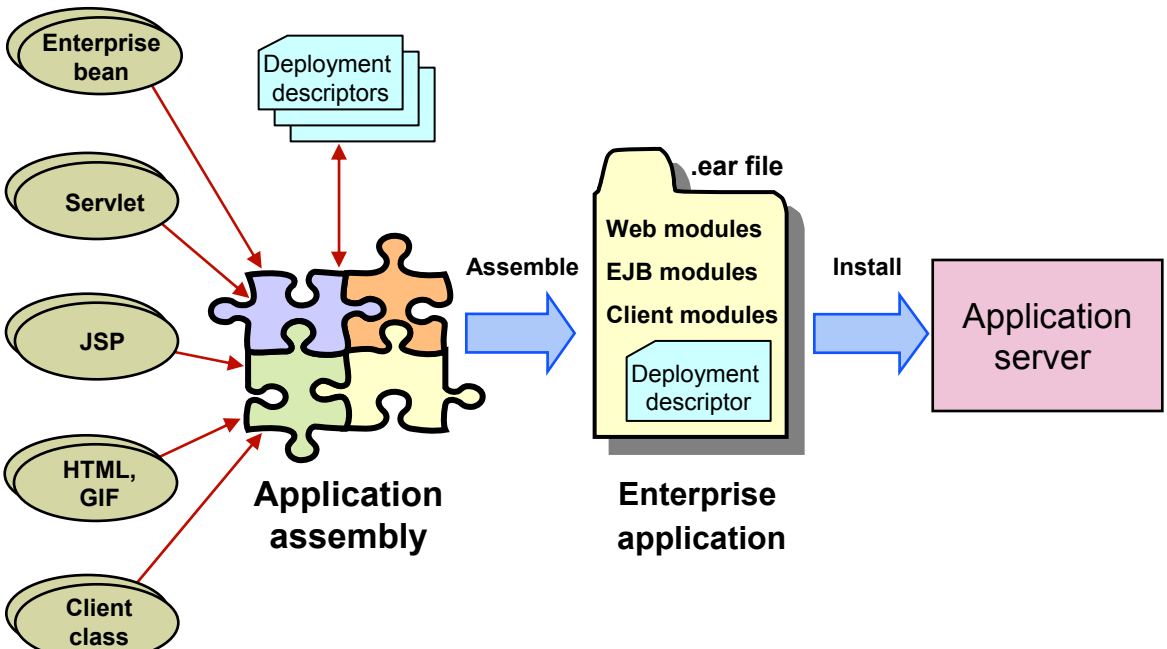
   B. False. The session timeout is set using a script.

WebSphere Education

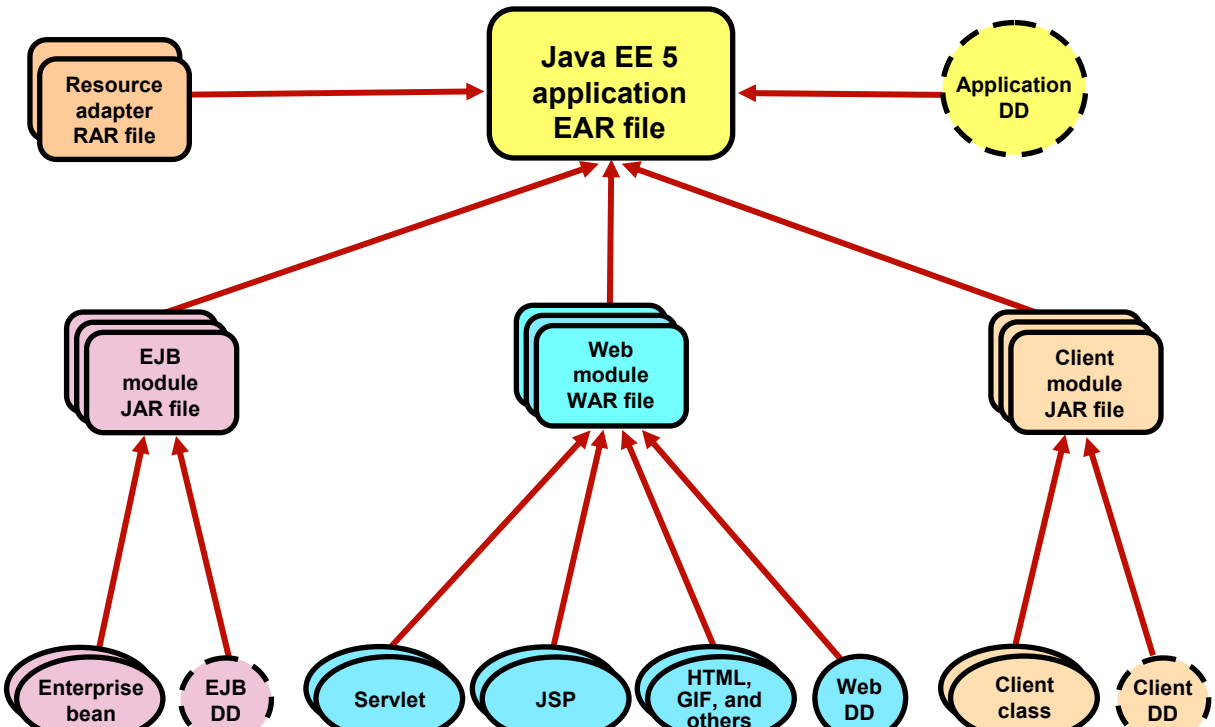
Application assembly

7

Overview of application assembly and installation

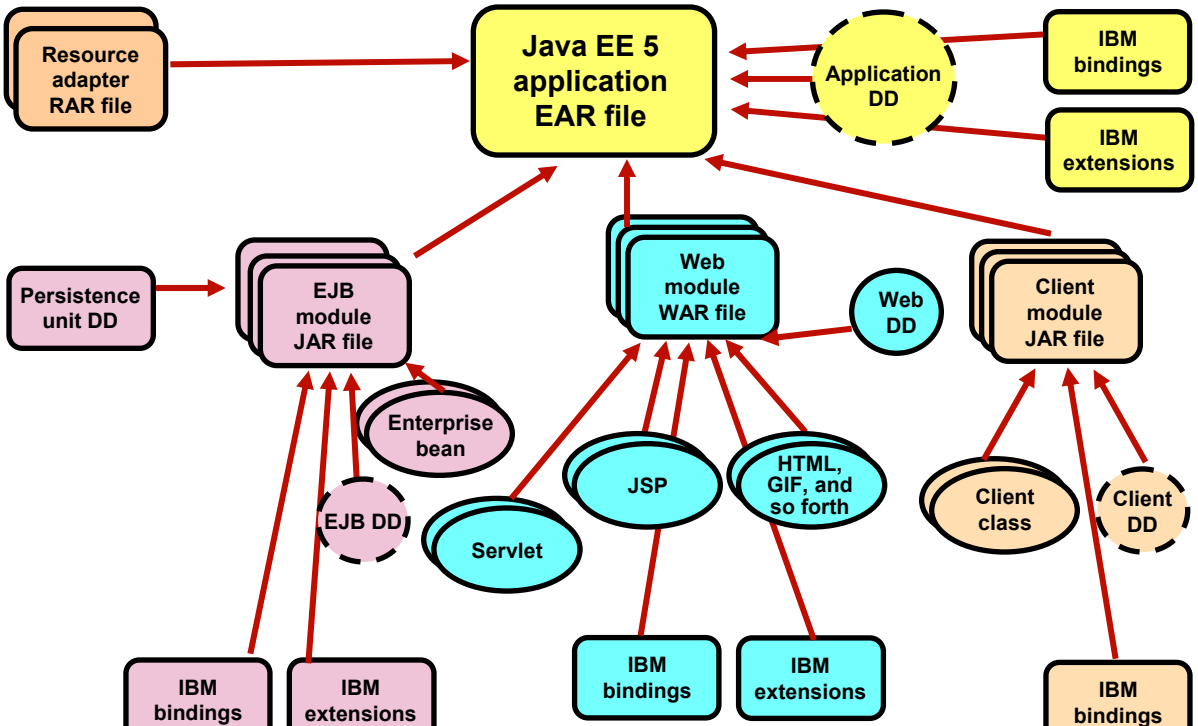


Java EE 5 packaging



DD = deployment descriptor

WebSphere: Application packaging



DD = Deployment Descriptor

Assembly and deploy toolkit functionality

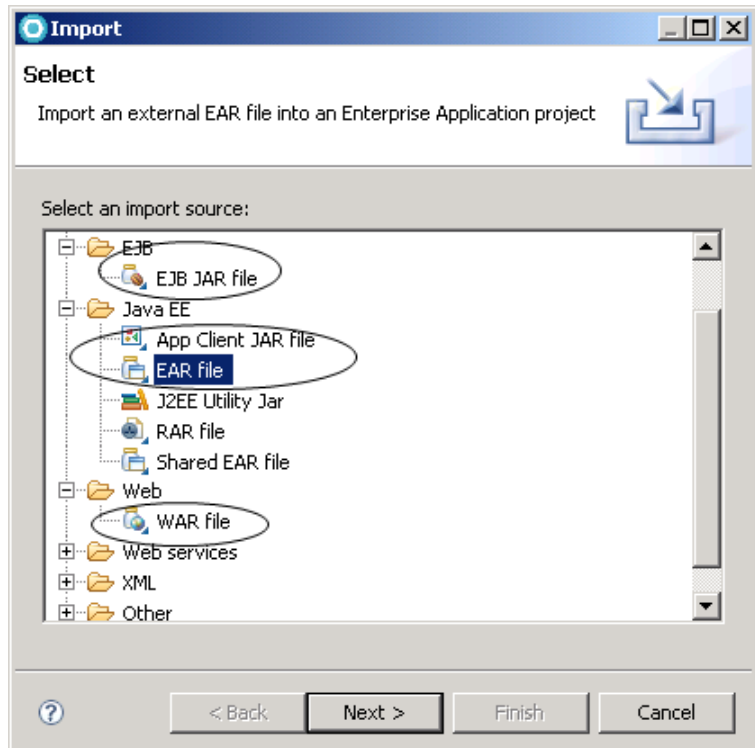
- Things you can do with the assembly and deploy toolkit:
  - Create and configure Java EE enterprise applications (EAR files):
    - Build from scratch
    - Java EE modules
  - Generate and modify deployment descriptor information
  - Generate and modify binding information attributes
  - Generate 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

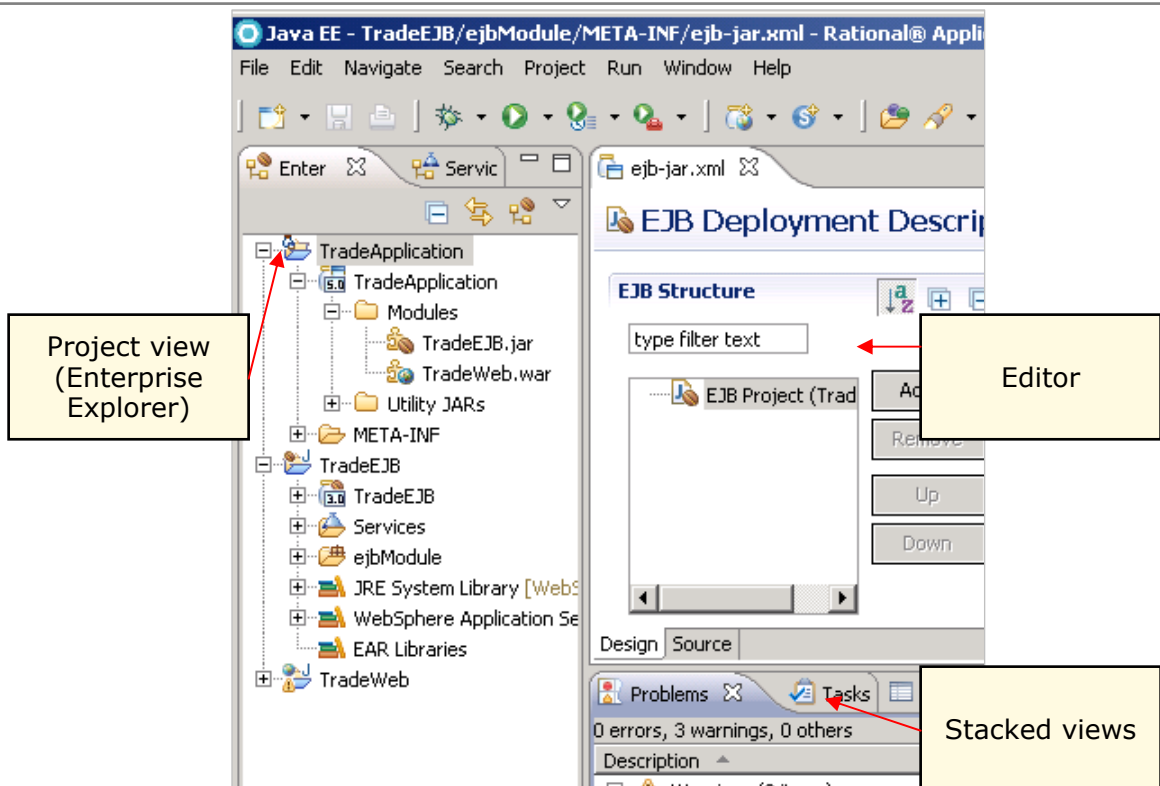
- When working with a workspace handed over by development, no assembly is required (already done automatically by the tool).
  - Configure modules
  - Export an EAR file
- Project Interchange files can be imported into a new or existing workspace.
- When assembling individual modules:
  - Create a new 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

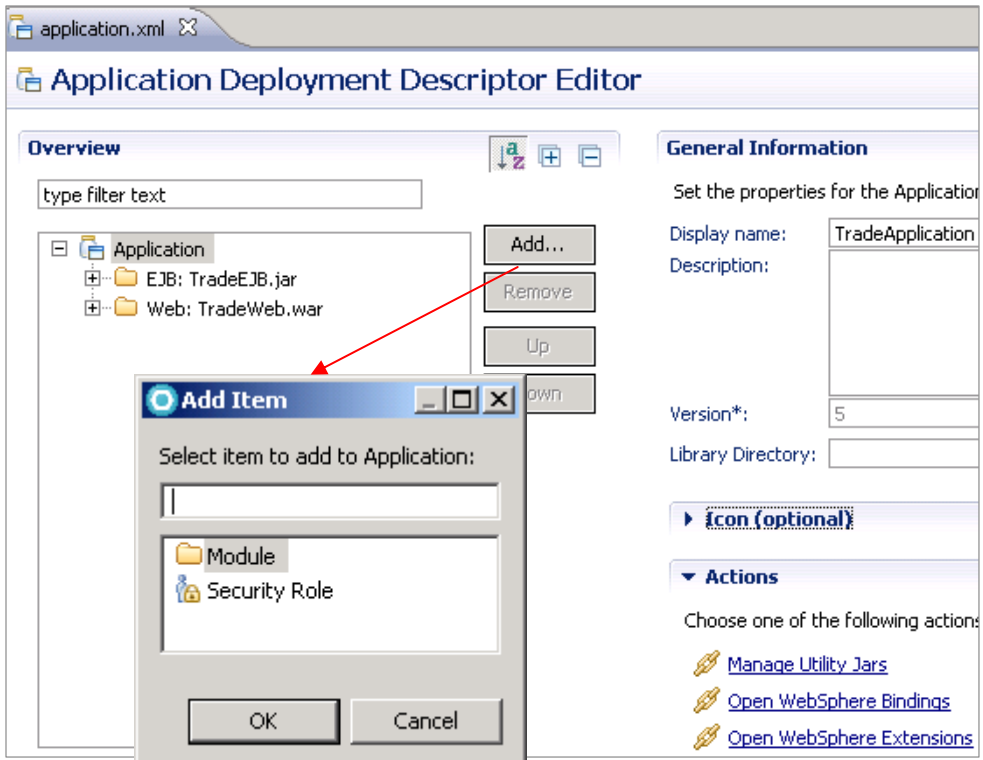
- Wizard driven
  - Import modules
    - EAR files
    - EJB JAR
    - Application client JAR
    - Web module WAR
  - Imported into a new or existing enterprise application



Java EE perspective



Application deployment descriptor (1 of 2)



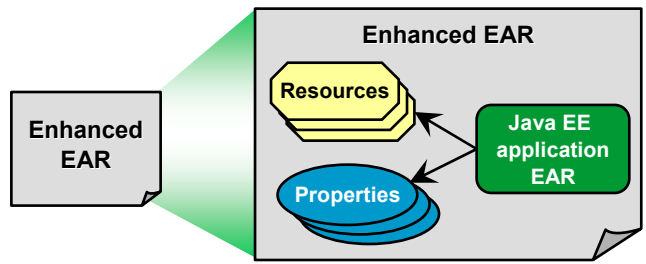
Application deployment descriptor (2 of 2)

- 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

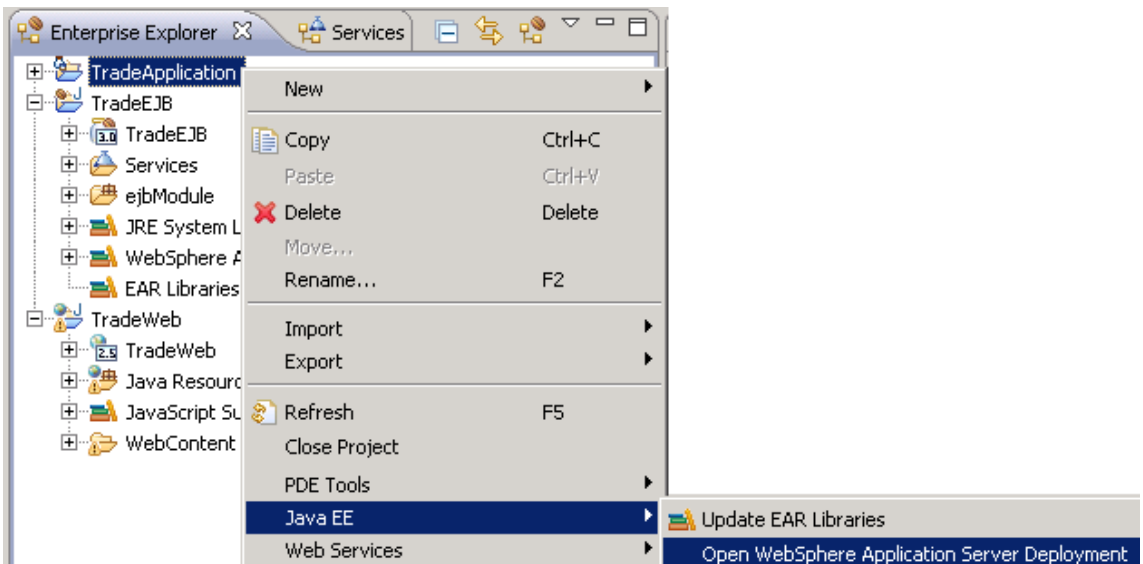
- You can deploy Java compliant **EAR** and **WAR** files.
- An **enhanced EAR** includes Java EE artifacts plus resource information needed to install on the WebSphere Application Server V7:
  - JDBC resources (data sources)
  - Class loader
  - JAAS authentication aliases
  - Shared libraries
  - Virtual host information



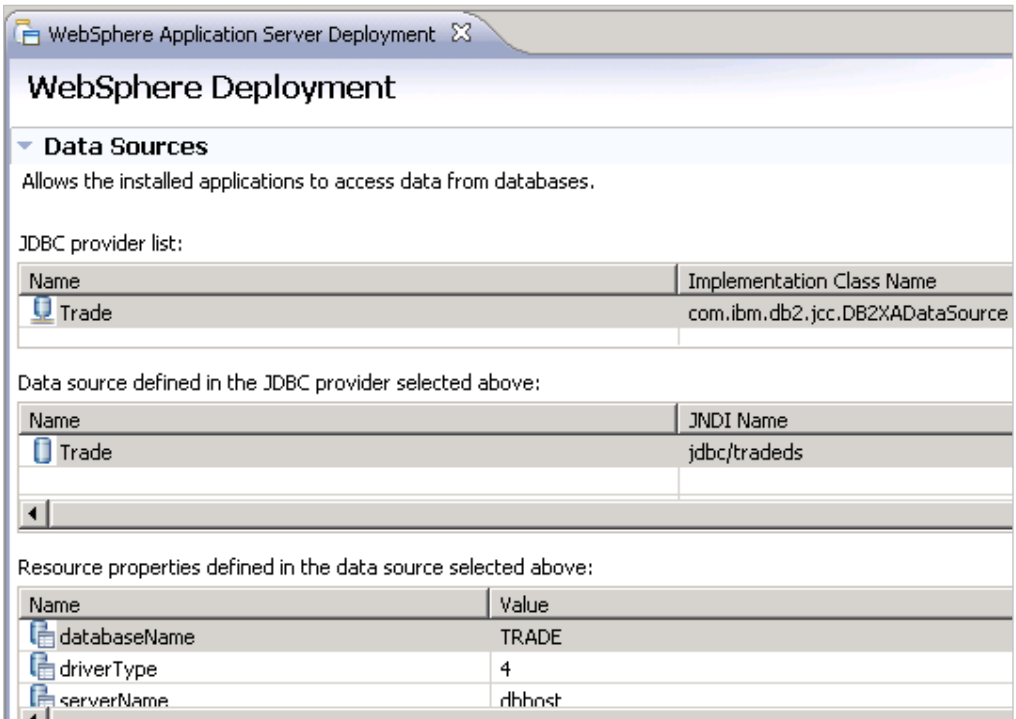
- Benefits in improved productivity:
  - Application resources and properties come with the application.
  - The application installation process creates the necessary resources within the server or cluster.
  - Moving an application from one server to another also moves the resources.
- WebSphere extensions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

Application scope resources (1 of 2)

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

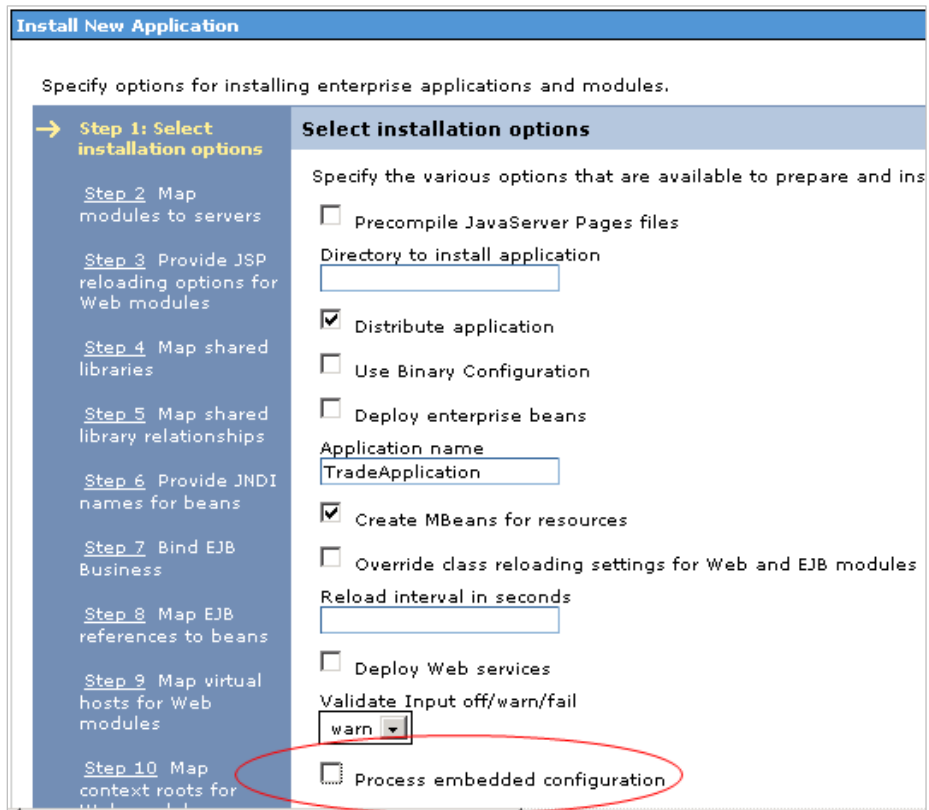


Application scope resources (2 of 2)

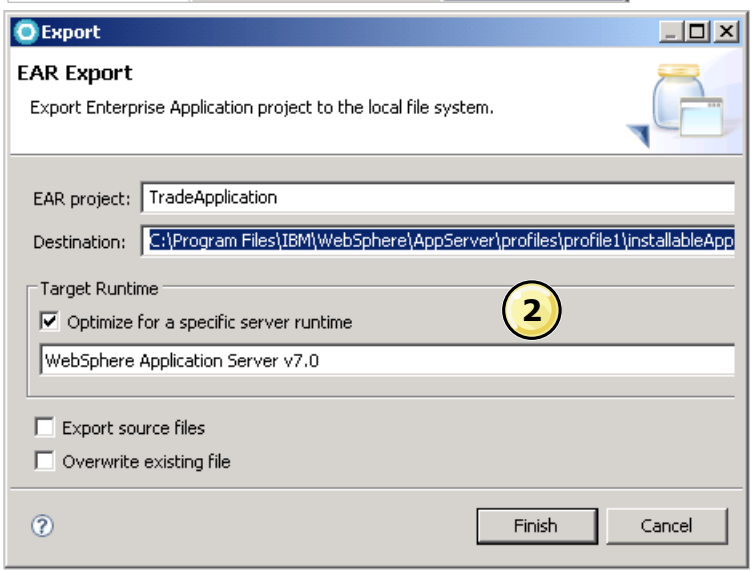


Dealing with enhanced EAR files at deploy time

- To ignore application scoped resources at installation time:



Generating an EAR file for deployment



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- 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.
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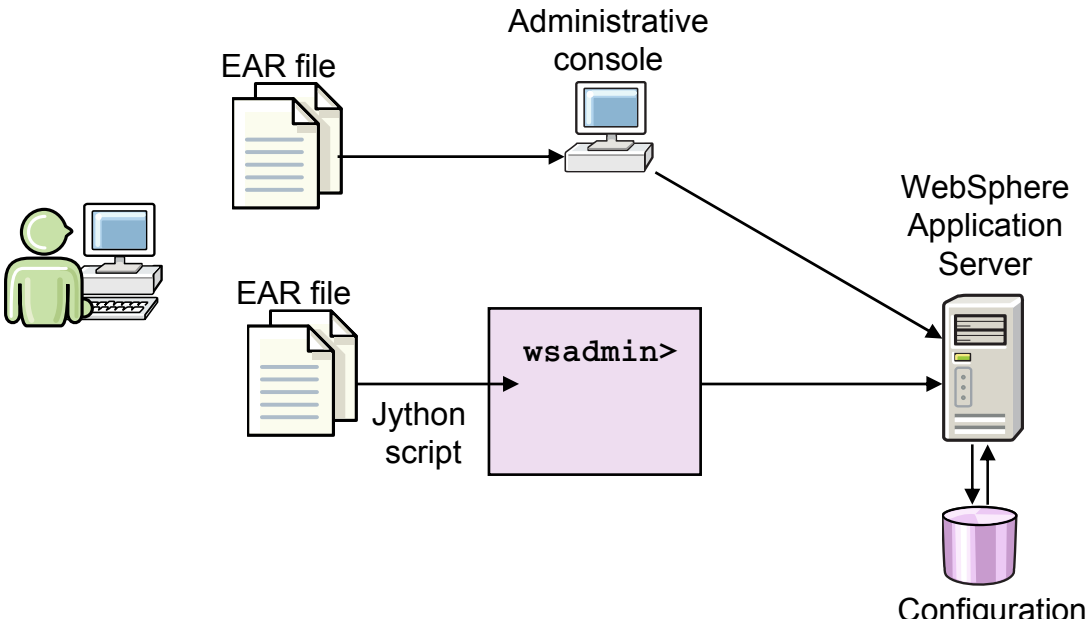
     "Annotations reduce or eliminate the need to deal with Java EE deployment descriptors in many cases." — Java EE 5 specification
     - Caveat: If you do not specify the deployment descriptors, the product assumes certain default names.
3. True or false: Enhanced enterprise applications are the recommended 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

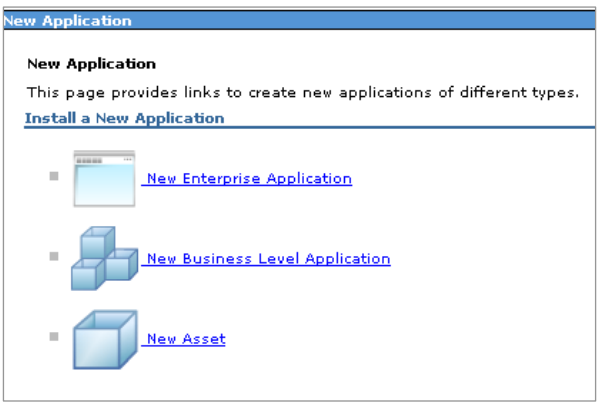
- Configure the application environment as required
  - Variables, virtual hosts, class path, security, and so forth
- Configure application resources
  - JDBC provider, data sources, JMS resources, or SIBus, if applicable
- Install application
- Manage static content
  - Files served by Web server,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

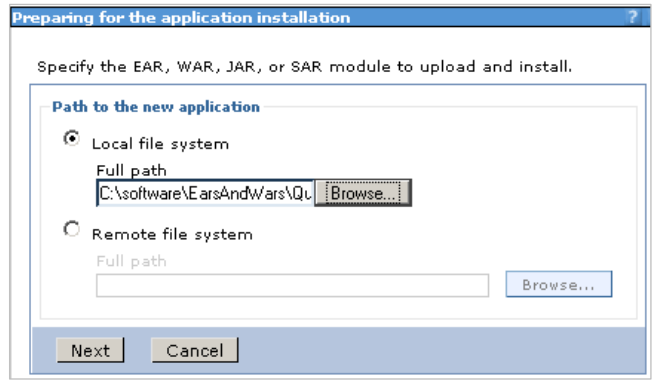
Make application files available to server

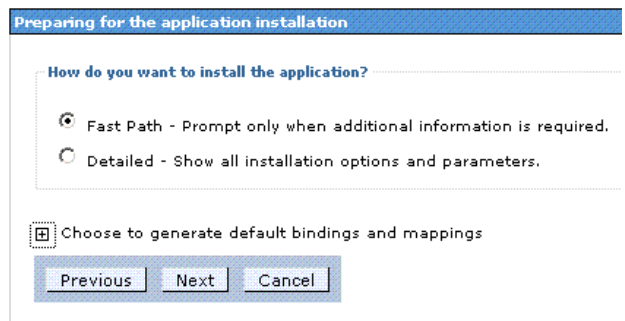
- The default directory assigned to hold the EAR file before it is installed is:
  ***<profile_root>**<profile>*\installableApps**
- Most often, the application file you receive is an enterprise archive (.ear) file.

Installing a new application

- Select **Applications → New Application → New Enterprise Application**

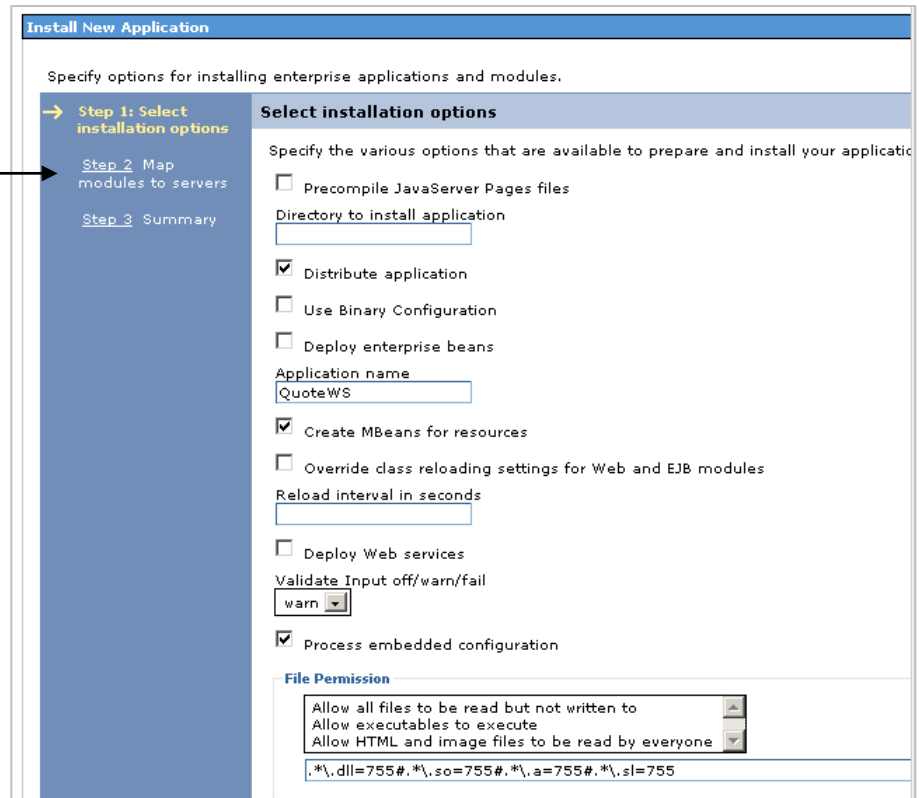




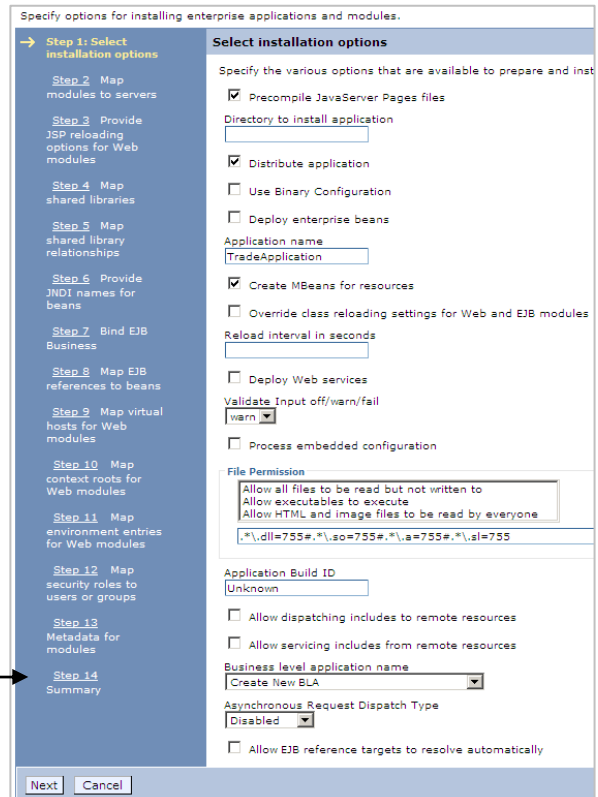


Example of fast path installation

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



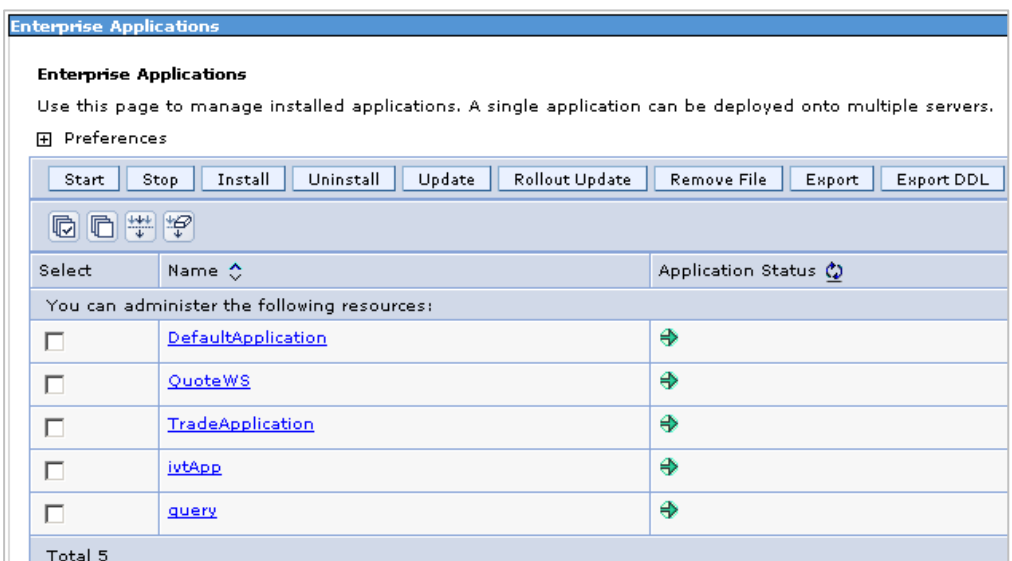
Example of detailed installation



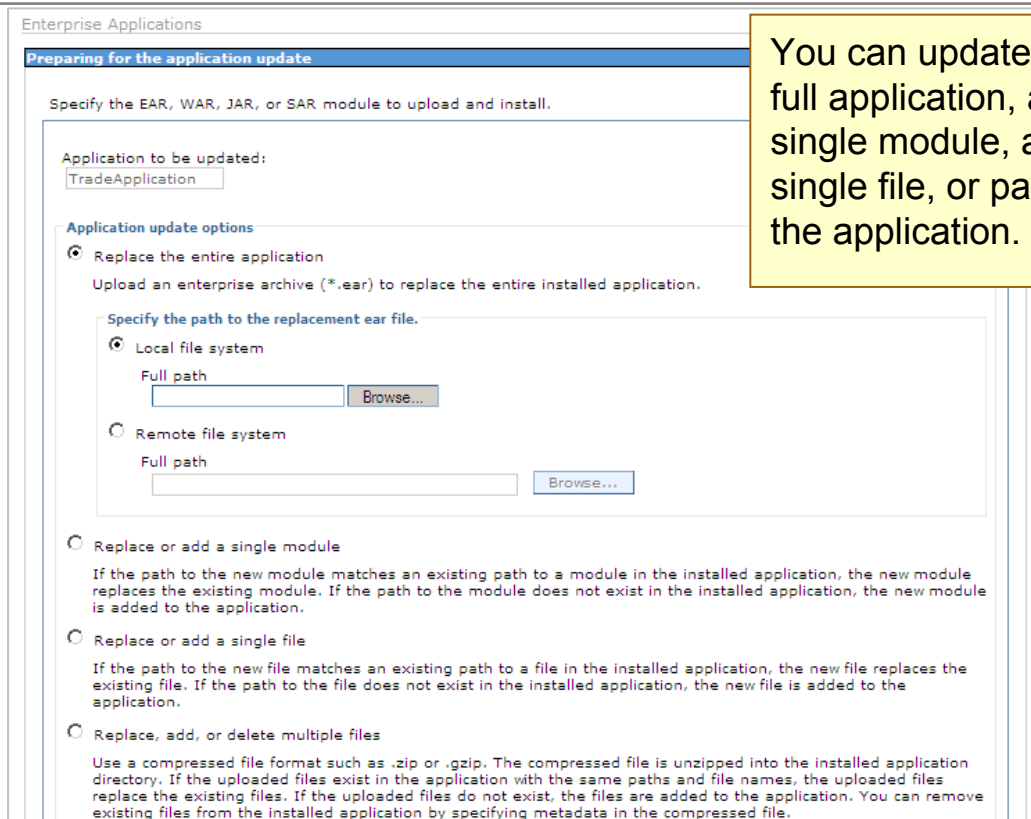
Summary step

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.**



Application update



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.

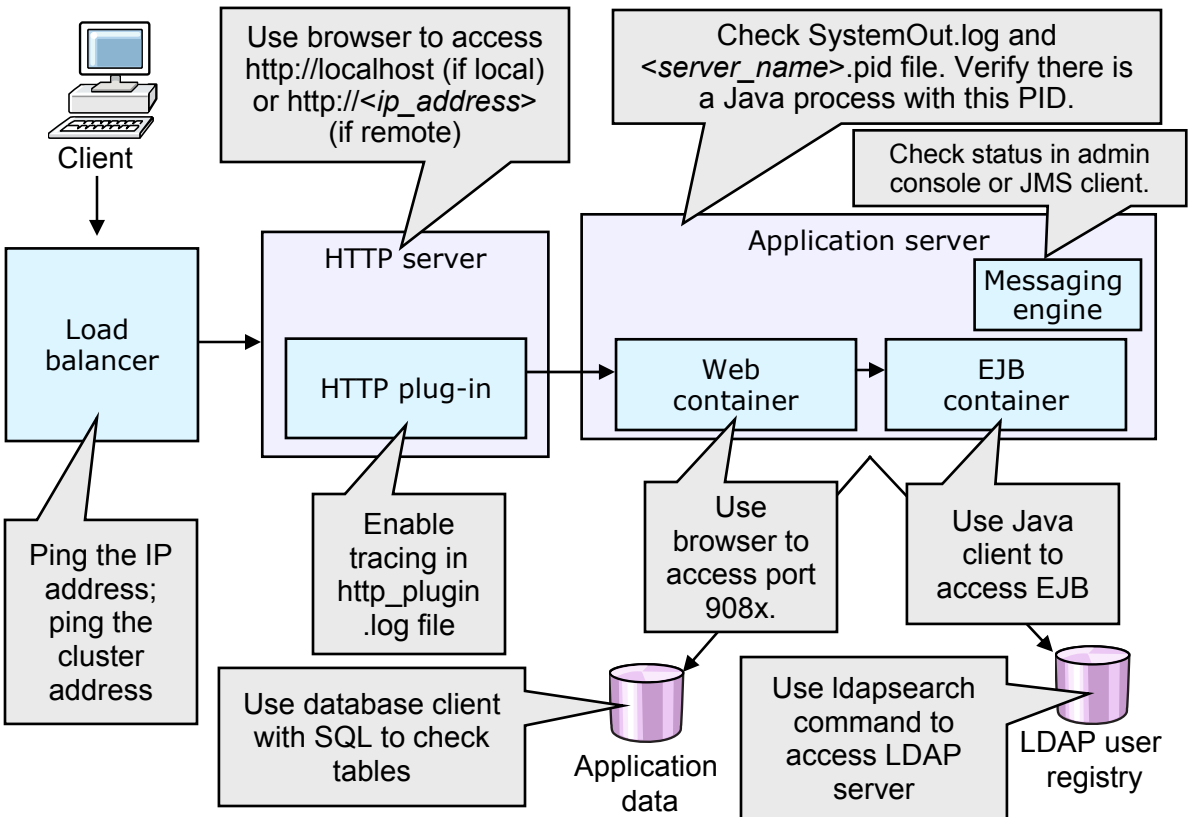
2. Isolation approach
   - Reproduce the problem, analyze results, remove variables (possibly through several iterations) until root cause is found.

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?

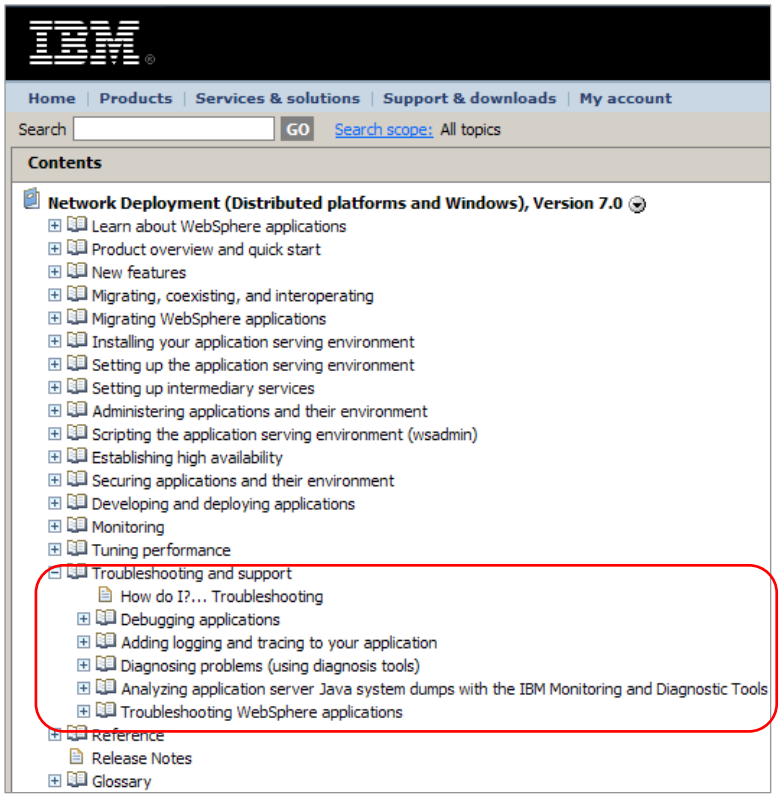


Resources for performing a problem investigation

Resources to help investigate your problem:

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

Information center: Troubleshooting and searching



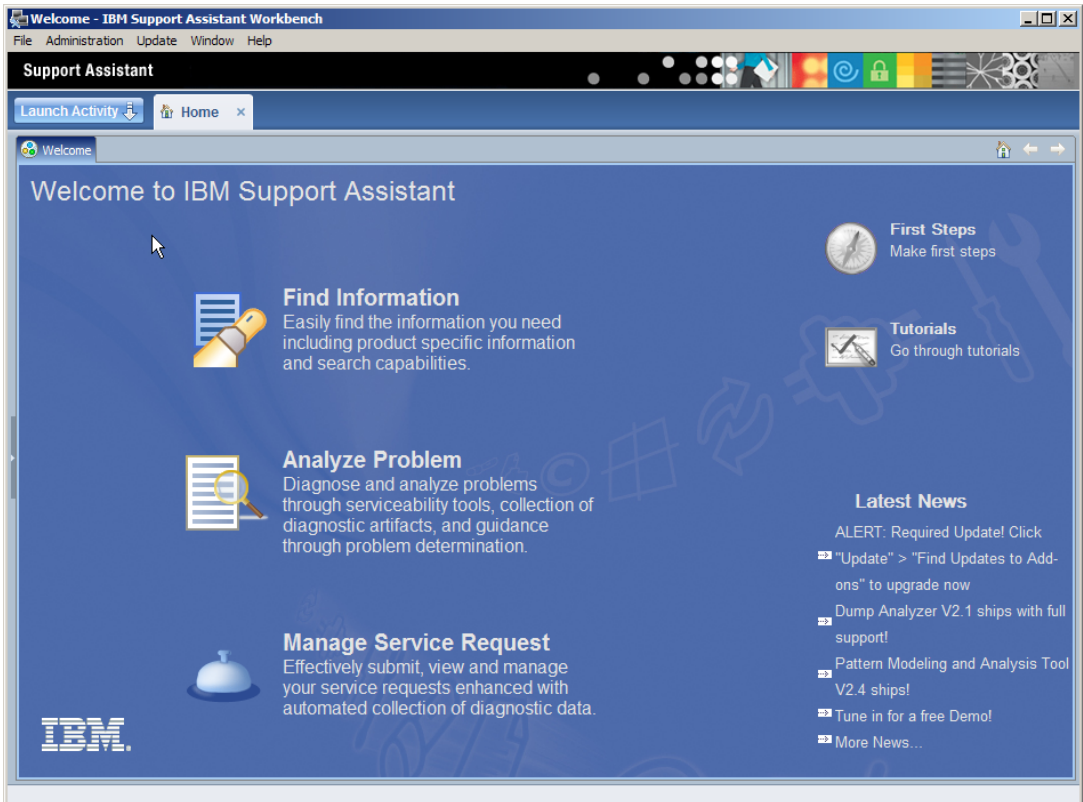
- The information center is a good resource for troubleshooting.
- Specific problem areas are documented and a search facility is provided.

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 stderror) 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.

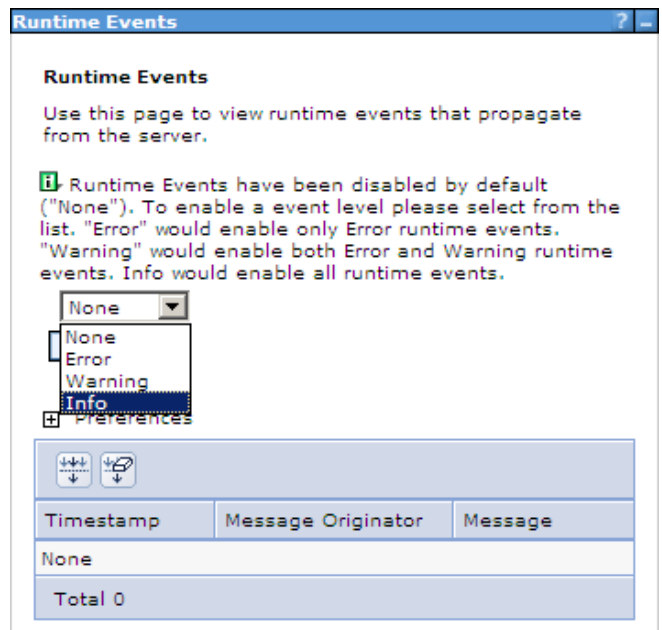
Viewing runtime messages in the console (1 of 2)

- Runtime events are grouped by severity: error, warning, information

- To view select: **Troubleshooting → Runtime Messages →**
  - Runtime Error
  - Runtime Warning
  - Runtime Information

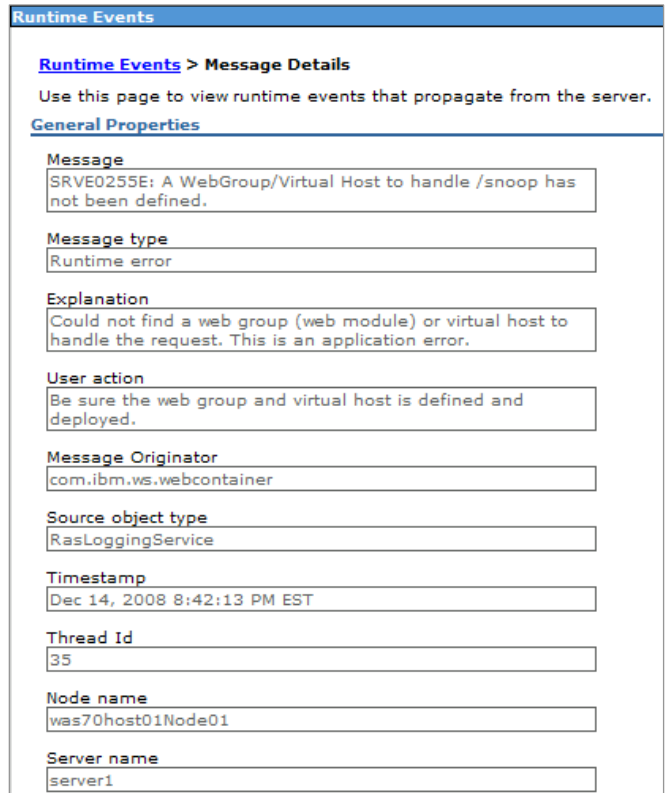
- Runtime events are disabled by default

- Select **Info** to enable all runtime events



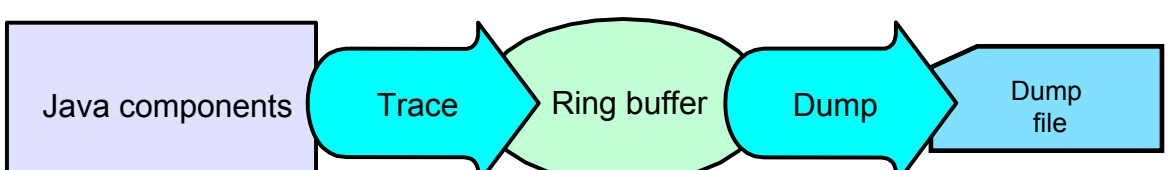
Viewing runtime messages in the console (2 of 2)

- 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



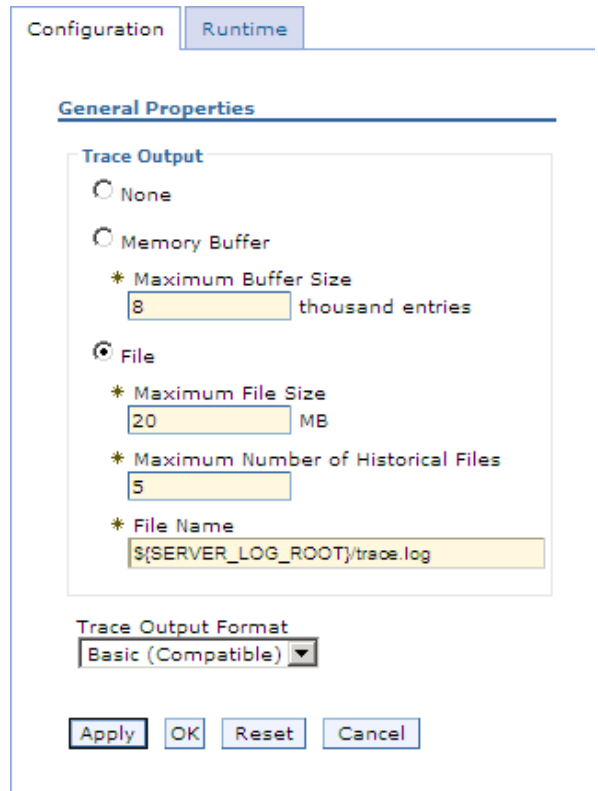
Using diagnostic tracing

- 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



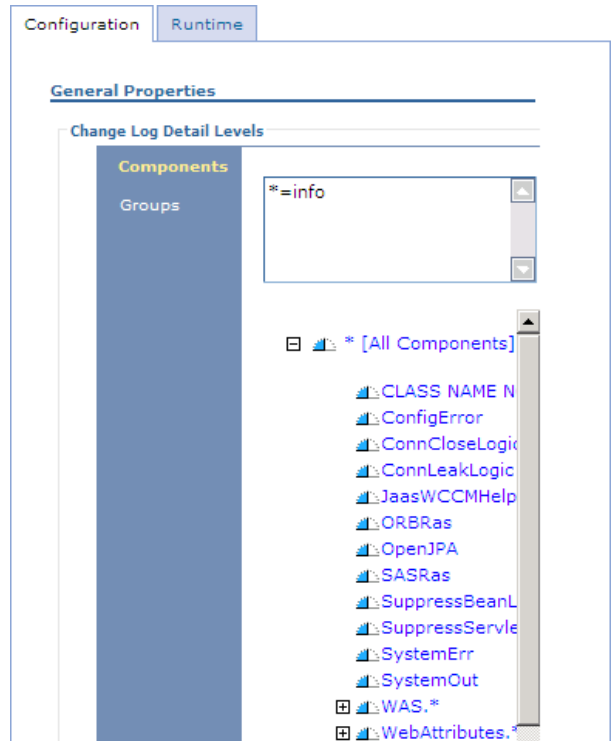
Enable and configure tracing

- **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



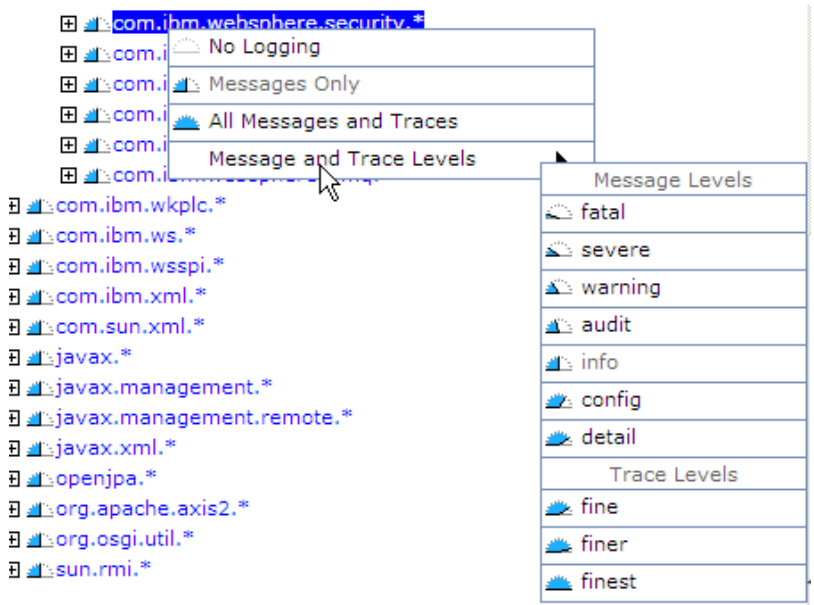
Setting the log detail level (1 of 2)

- **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]`

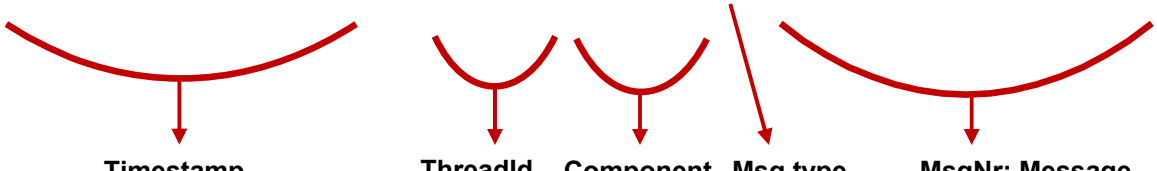
- Possible values of `eventType` include:
  - **>** a trace entry of type method entry.
  - **<** a trace entry of type method exit.
  - **3** a trace entry of type finest, debug or dump.

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 PMIImpl A PMON0001A:PMI enabled



Installation problems

- The process of installing WebSphere Application Server automatically creates numerous log files.

- Most installaltion 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

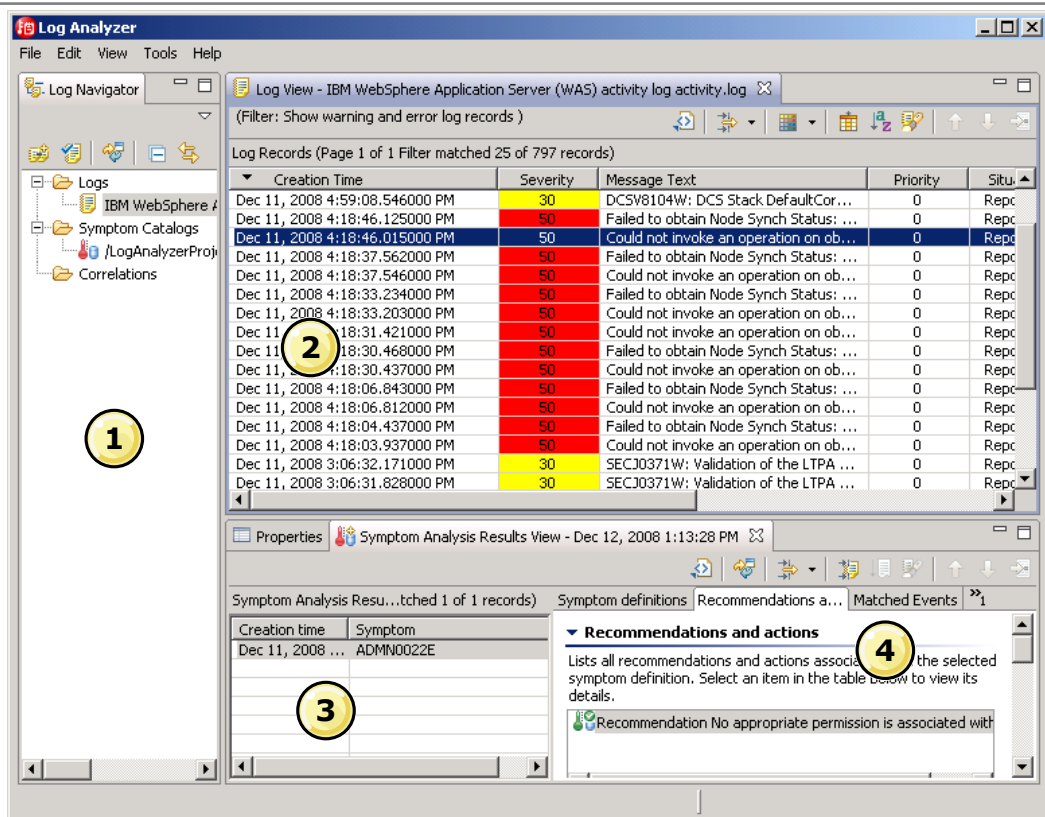
Using the Log Analyzer

- Log Analyzer can be downloaded as a tool add-on in the ISA Workbench

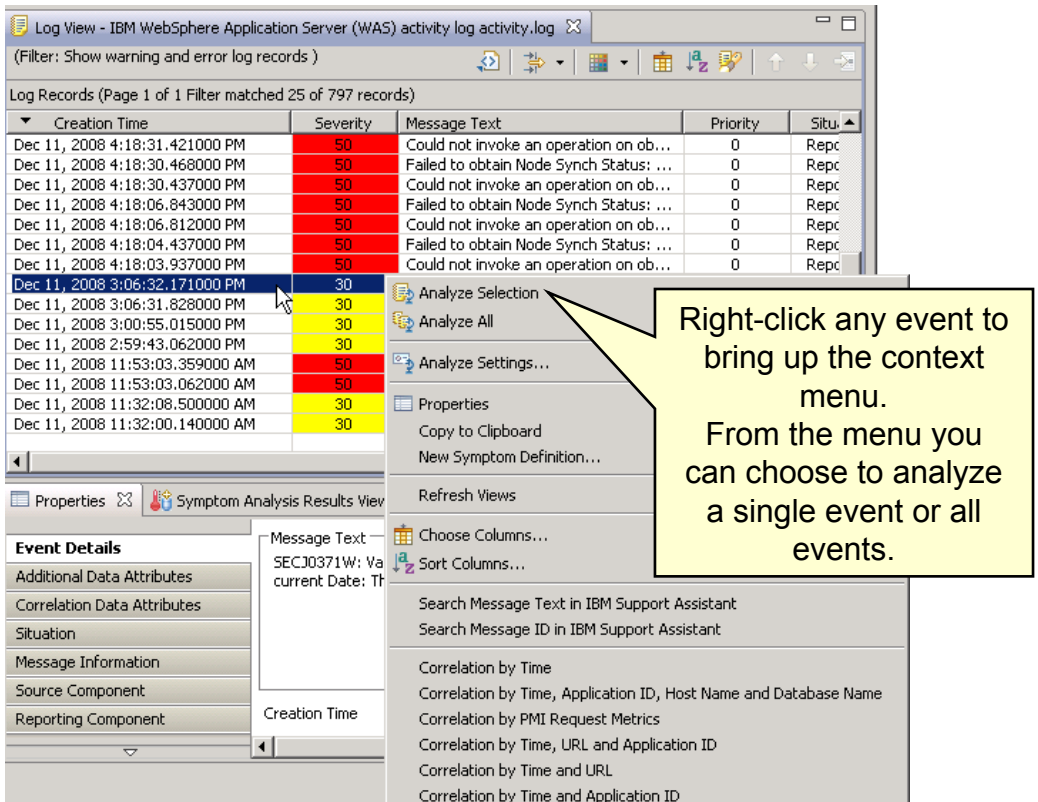
- Log Analyzer enables you to analyze log files using either of the following methods:
  - The user can perform a manual analysis
  - The Log Analyzer perform an automatic symptom analysis

- 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



Log Analyzer — context menu



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

Dumping the JNDI namespace example

- Enter command: **`dumpNameSpace -root server -port 2809`**

```
================================================================================
Name Space Dump
   Context factory: com.ibm.websphere.naming.WsnInitialContextFactory
   Provider URL: corbaloc:iiop:localhost:2809
   Requested root context: server
   Starting context: (top)=was7host01Cell01/nodes/was7host01Node01/servers/server1
   Formatting rules: jndi
   Time of dump: Fri Dec 12 15:04:40 EST 2008
================================================================================


================================================================================
Beginning of Name Space Dump
================================================================================

    1 (top)
    2 (top)/tm                                          javax.naming.Context
    3 (top)/tm/default                                  com.ibm.ws.asynchbeans.timer.TimerManagerImpl
    4 (top)/mail                                        javax.naming.Context
   ...
   15 (top)/jdbc                                        javax.naming.Context
   16 (top)/jdbc/DefaultEJBTimerDataSource              javax.resource.cci.ConnectionFactory
   17 (top)/jdbc/PlantsByWebSphereDataSource            javax.resource.cci.ConnectionFactory
   18 (top)/jdbc/PlantsByWebSphereDataSourceNONJTA      javax.resource.cci.ConnectionFactory
   19 (top)/com.ibm.websphere.ejbcontainer              javax.naming.Context
   20 (top)/com.ibm.websphere.ejbcontainer/PlantsByWebSphere
   20                                                   javax.naming.Context
   ...
   29 (top)/DefaultDatasource                           javax.resource.cci.ConnectionFactory

   30 (top)/UserRegistry                                com.ibm.websphere.security._UserRegistry_Stub
   31 (top)/servername                                  java.lang.String
   32 (top)/eis                                         javax.naming.Context
   33 (top)/eis/jdbc                                    javax.naming.Context
   34 (top)/eis/jdbc/PlantsByWebSphereDataSource_CMP    javax.resource.cci.ConnectionFactory
   35 (top)/eis/DefaultDatasource_CMP                   javax.resource.cci.ConnectionFactory
   36 (top)/Increment                                   com.ibm.defaultapplication.IncrementHome
   37 (top)/jta                                         javax.naming.Context
   38 (top)/jta/usertransaction                         java.lang.Object
   39 (top)/ejb                                         javax.naming.Context
   40 (top)/ejb/PlantsByWebSphere                       javax.naming.Context
   41 (top)/ejb/PlantsByWebSphere/PlantsByWebSphereEJB.jar
```

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

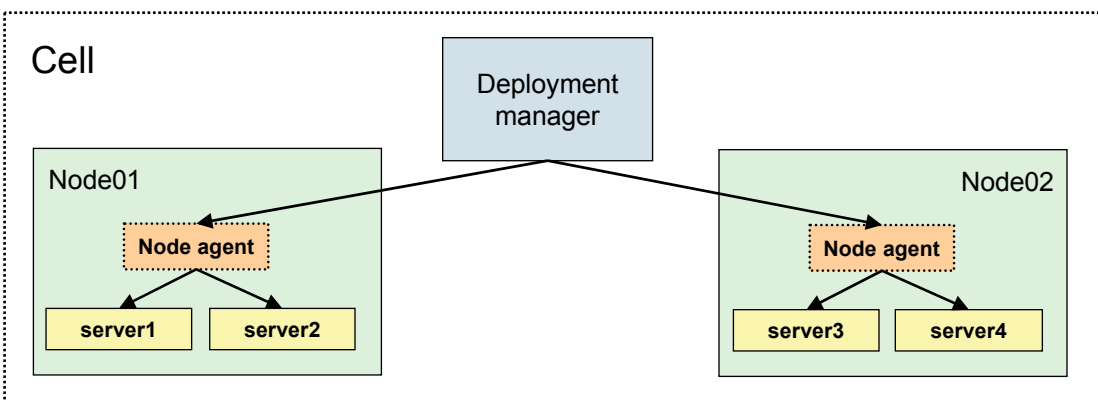
WebSphere Education

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.

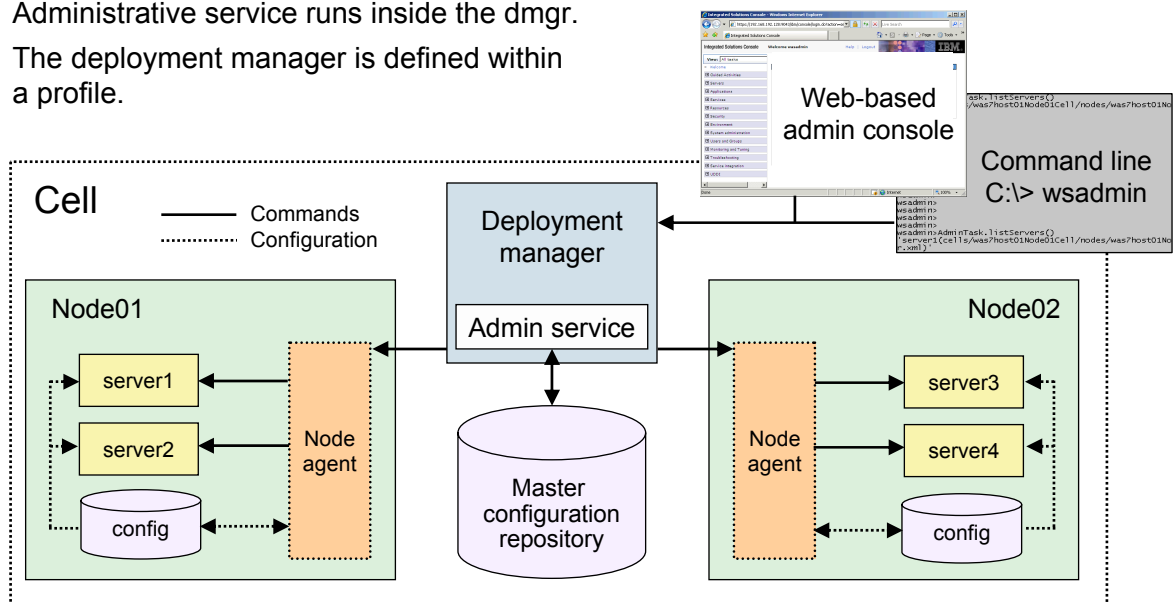


WebSphere Application Server process types

- **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.

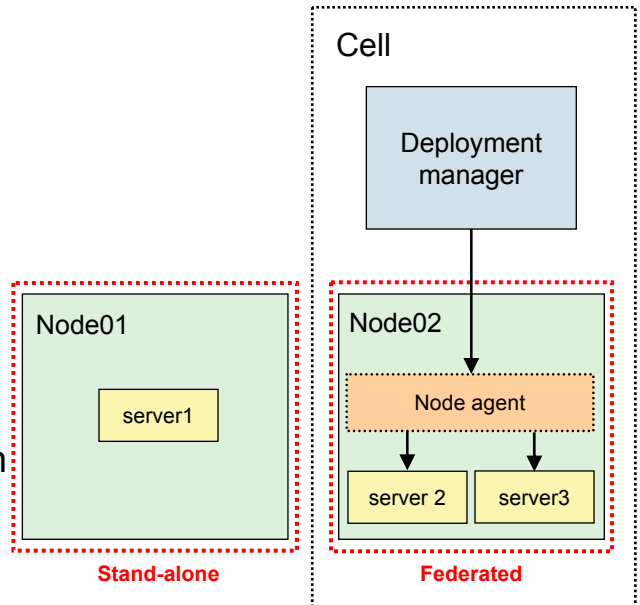
Network deployment concepts

- **Deployment manager (dmgr)**
  - Manages the node agents.
  - Holds the configuration repository for the entire management domain, called a **cell**.
  - Administrative service runs inside the dmgr.
  - The deployment manager is defined within a profile.
- **Node**
  - Logical grouping of servers.
  - Managed by single **node agent** process.
  - Each node is defined within a profile.



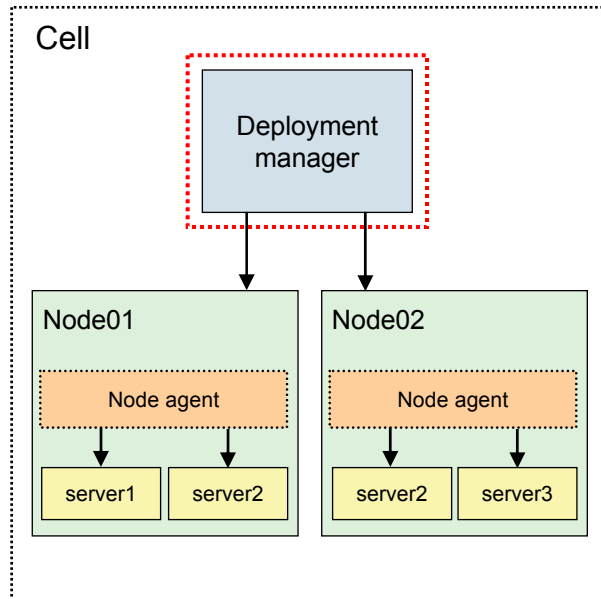
Application server profile

- 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.



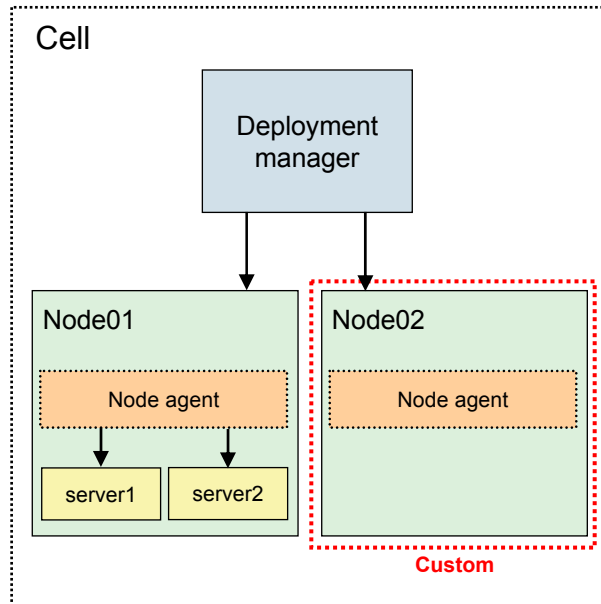
Deployment manager profile

- 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.



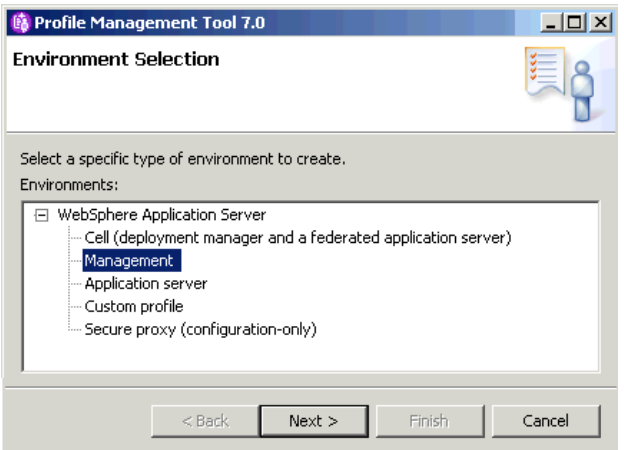
Custom profile

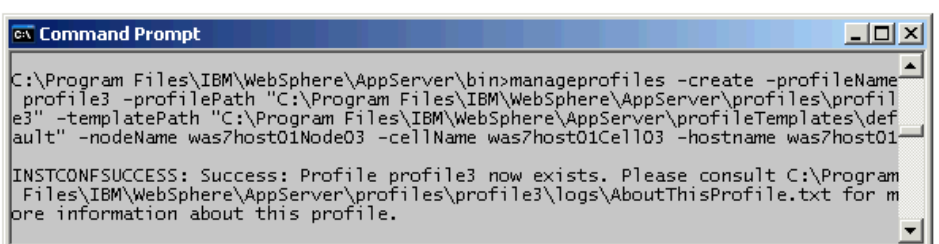
- A custom profile creates a node without an application.
- Automatically federated into a cell during profile creation by default.
- No application servers are created during profile creation.
- Use the deployment manager administrative console to create servers and clusters on the federated node.
-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



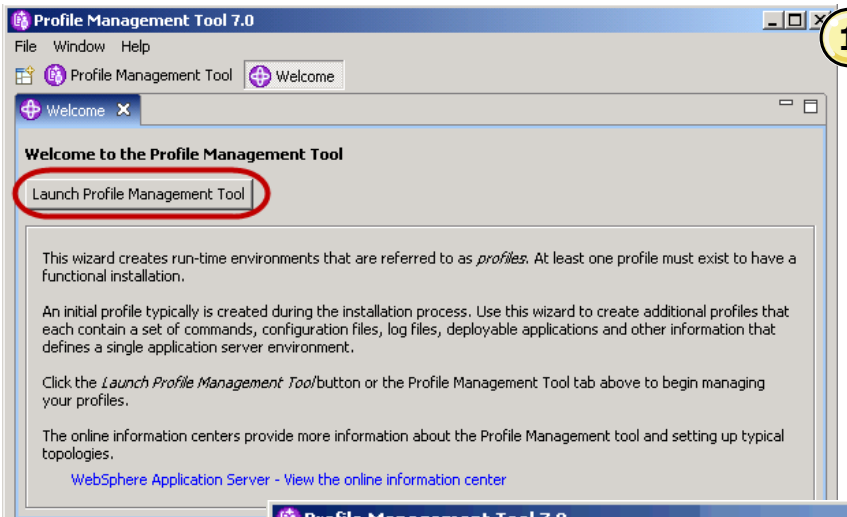
Creating profiles

- **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`





Profile Management Tool — launch and create

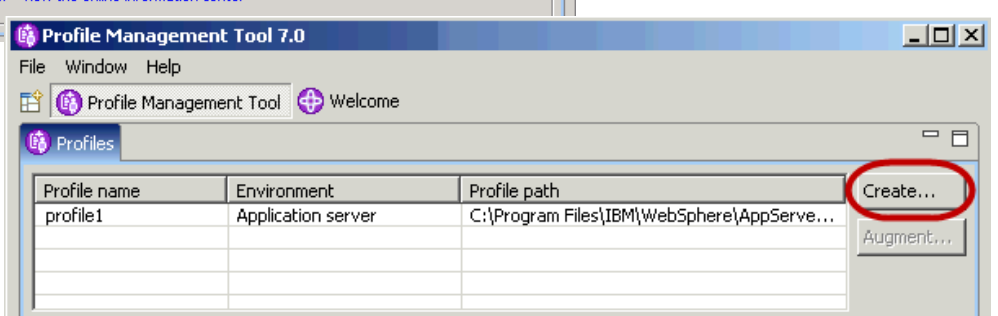


1 Launch the Profile Management Tool

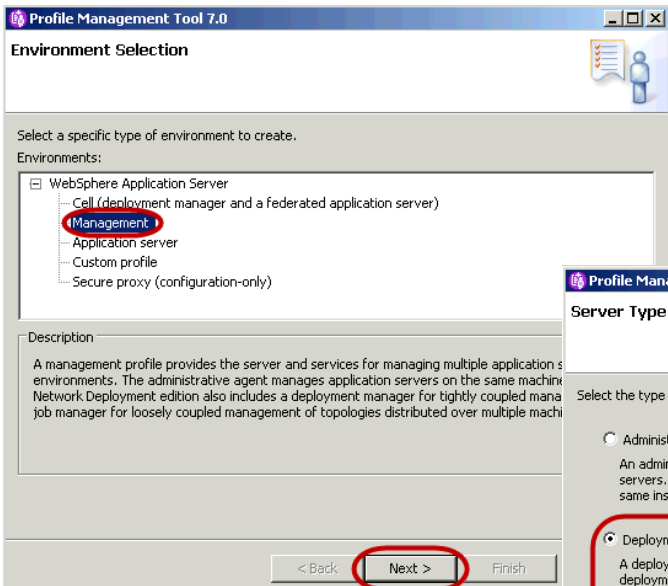
- Started from:
  - WebSphere installation wizard
  - Windows Start menu
  - Command line
- Click **Launch Profile Management Tool** to manage profiles

2 Create a profile

- Existing profiles shown
- Click **Create**

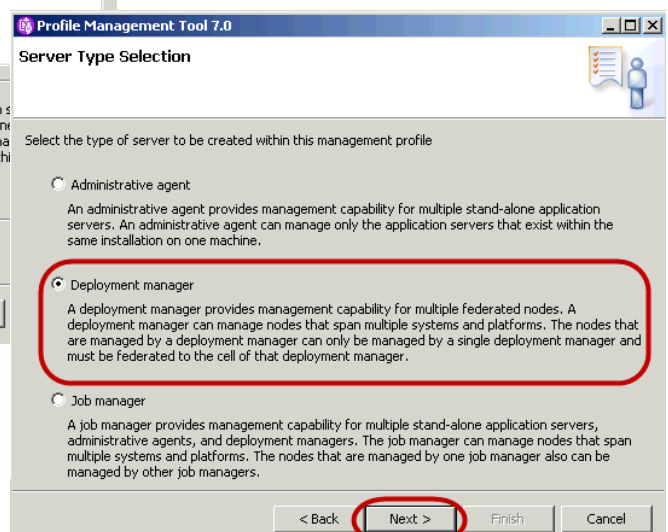


Profile Management Tool — environment and server type



3 Environment selection

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

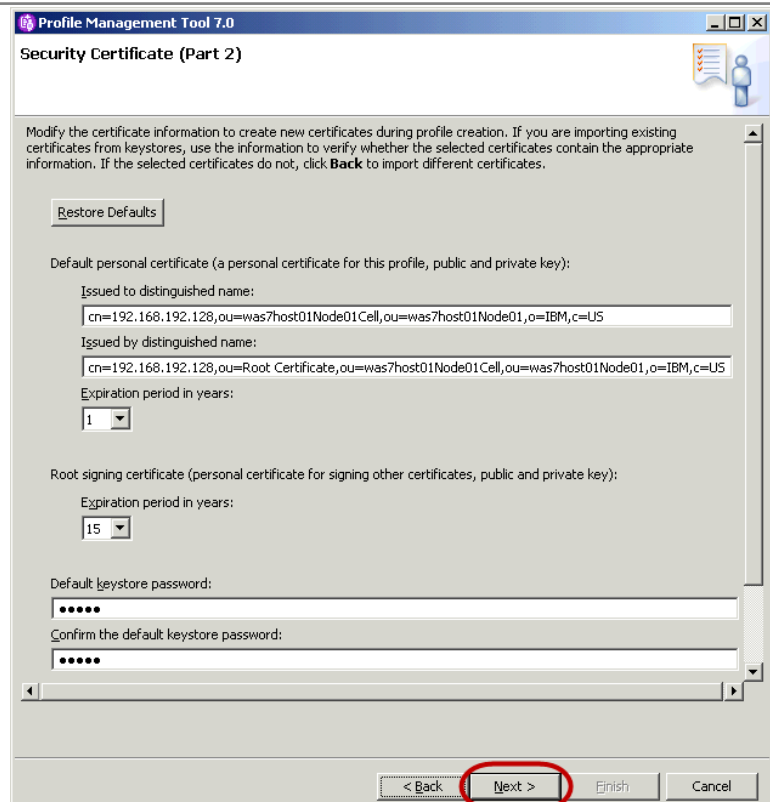


4 Server type selection

- Administrative agent
- Deployment manager
- Job manager

Profile Management Tool — security certificate (2 of 2)

11 Security certificate (part 2)

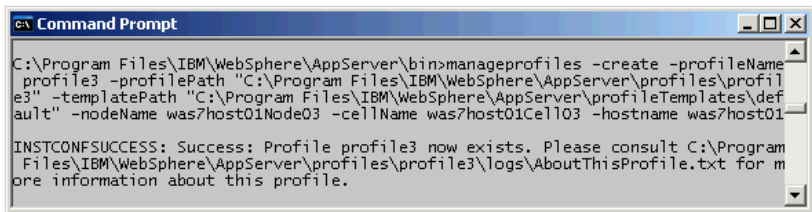


Profile creation — command-line tool

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

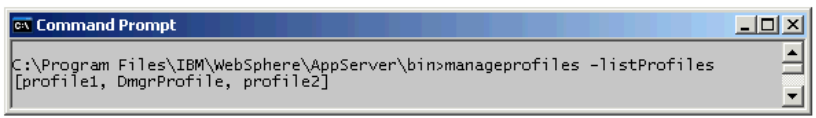
- Create new stand-alone application server profiles.

```
manageprofiles -create
```



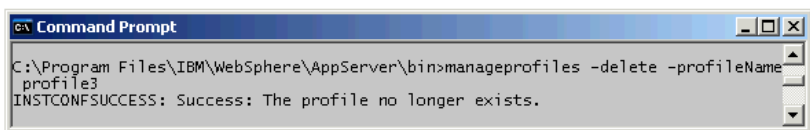
- List all profiles.

```
manageprofiles -listProfiles
```

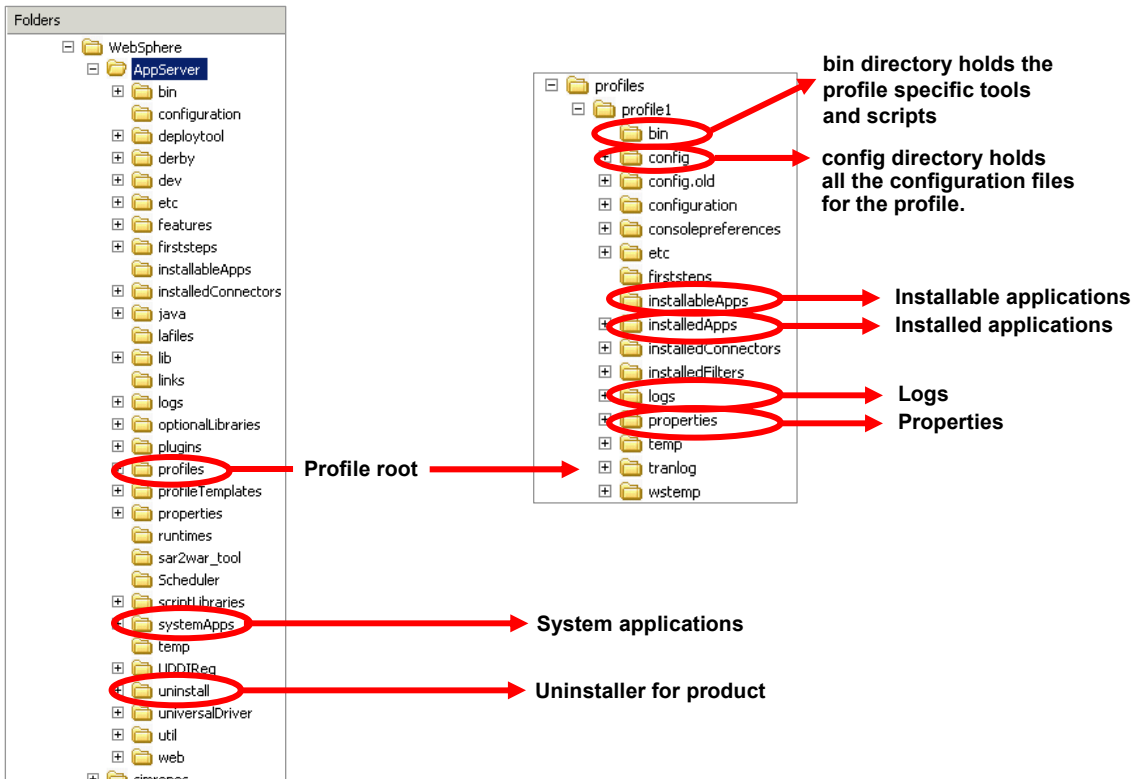


- Delete profiles.

```
manageprofiles -delete -profileName
```



Directory structure



Server commands review

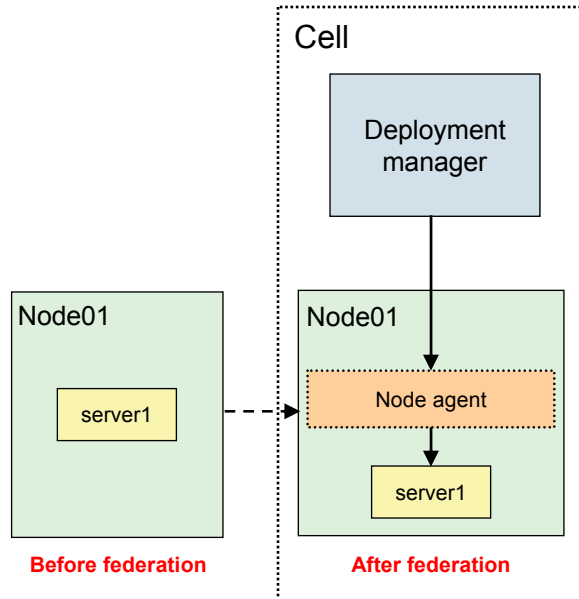
- WebSphere commands are profile aware
  - There is a -profileName option on many WebSphere commands.
  - Or issue the commands from the appropriate directory:
    `<profile_root>\<profile_name>\bin`

- 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

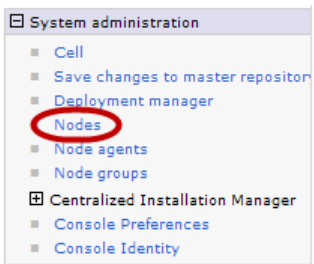
Adding a node to a cell

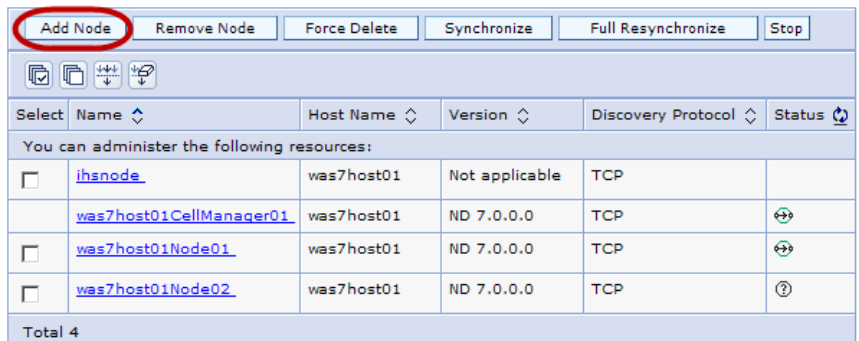
- Add a node to a cell using:
  - **Administrative console,** or
  - **addNode** command-line tool
- Adding a node to a cell includes:
  - Creation of a backup of current configuration
  - Connection to the deployment manager
  - Configuration of the node agent
  - Addition of applications of node to 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



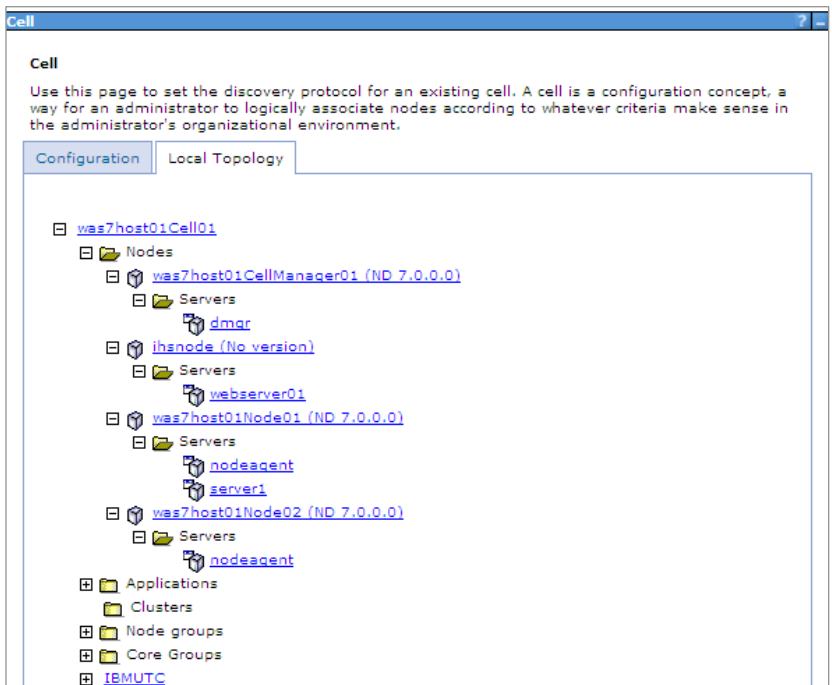


- Command-line

```
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]
```

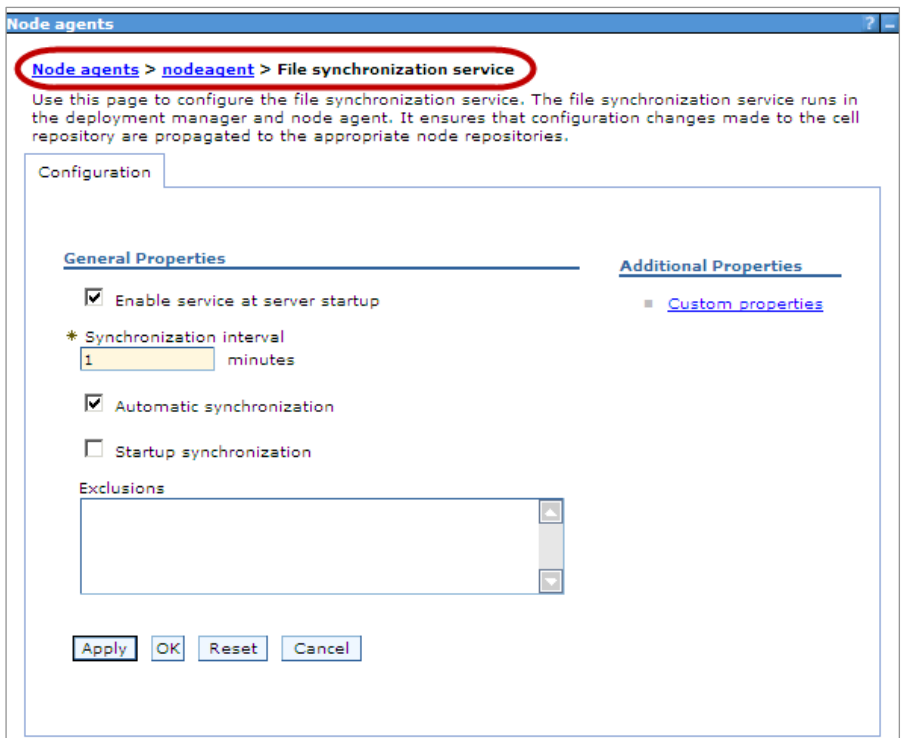
Cell topology

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



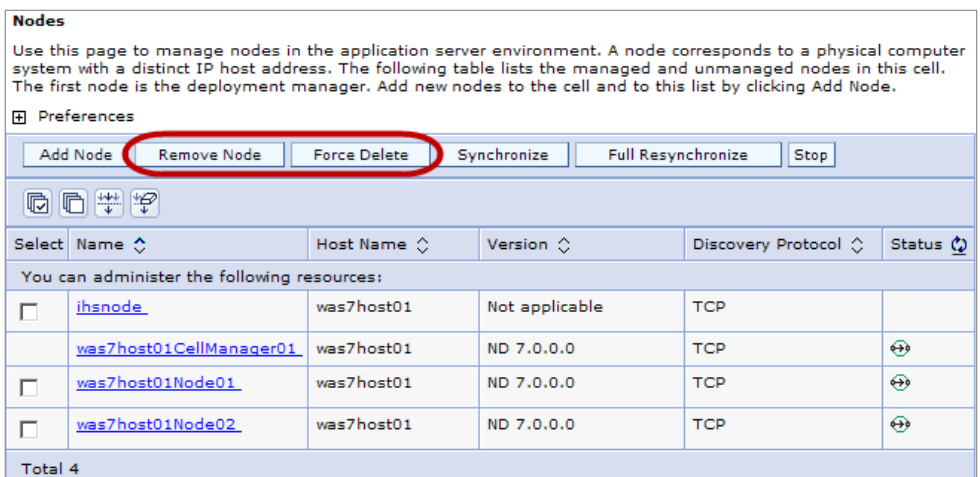
Configuring synchronization

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



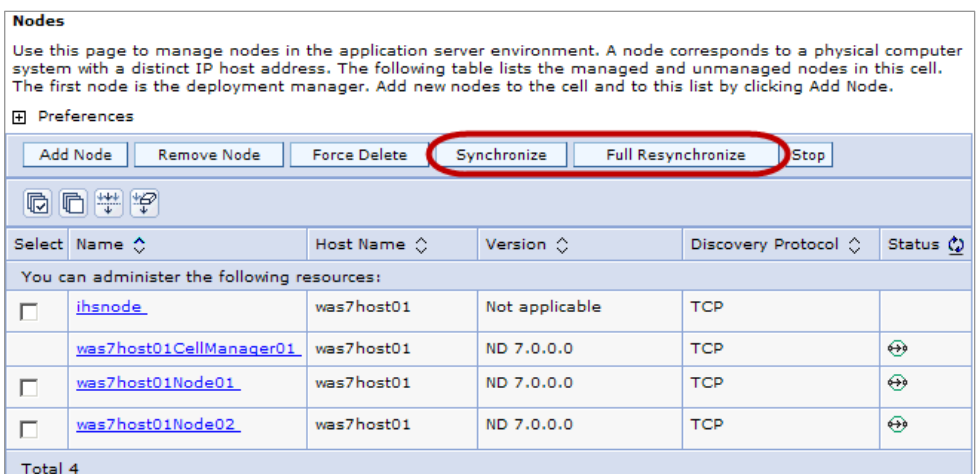
Remove a node from a cell

- 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



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



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

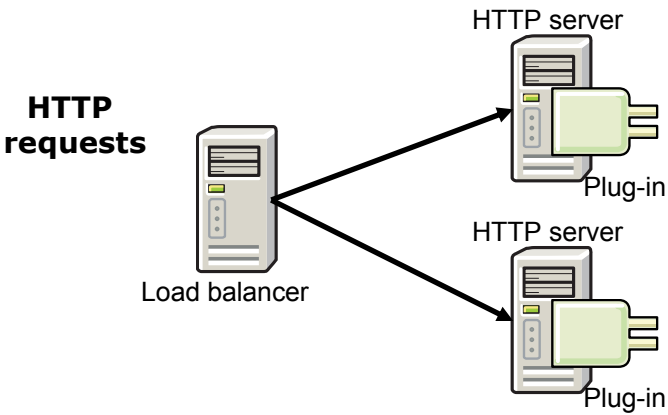
11

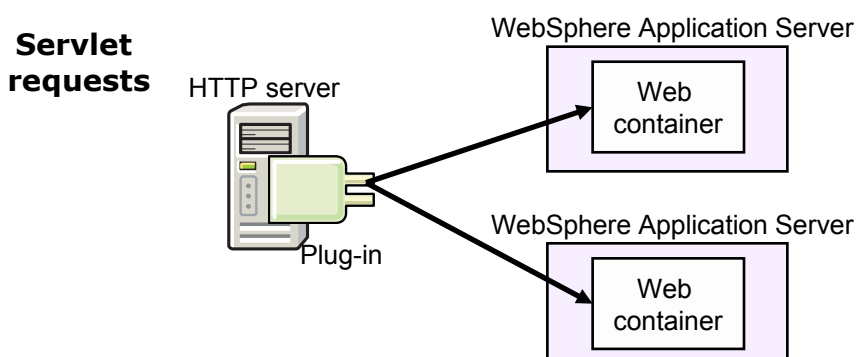
What is workload management (WLM)?

- 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

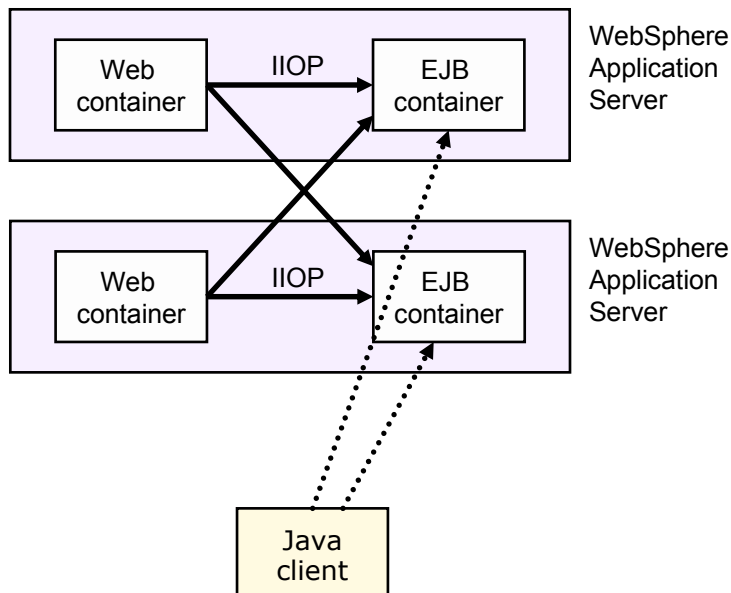
What can be workload managed? (1 of 2)



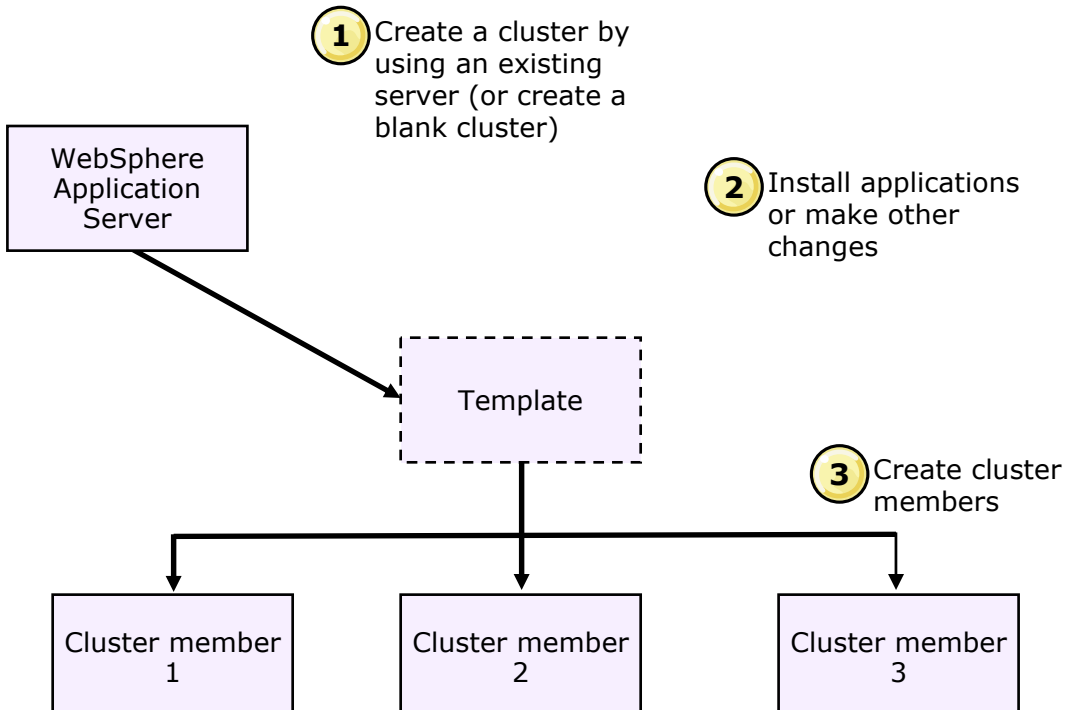


What can be workload managed? (2 of 2)

EJB requests

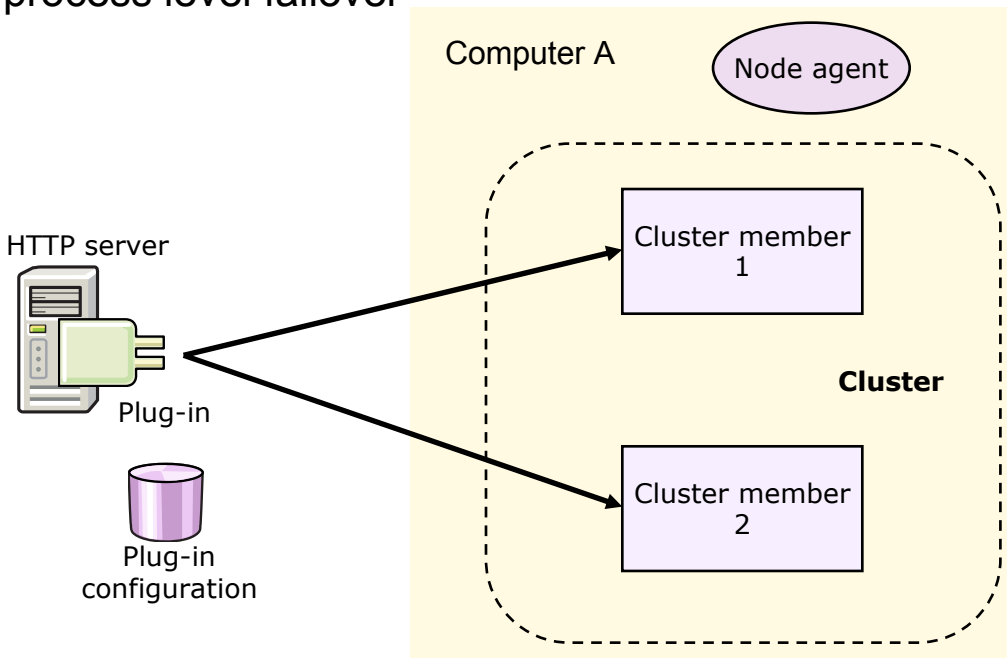


Clusters



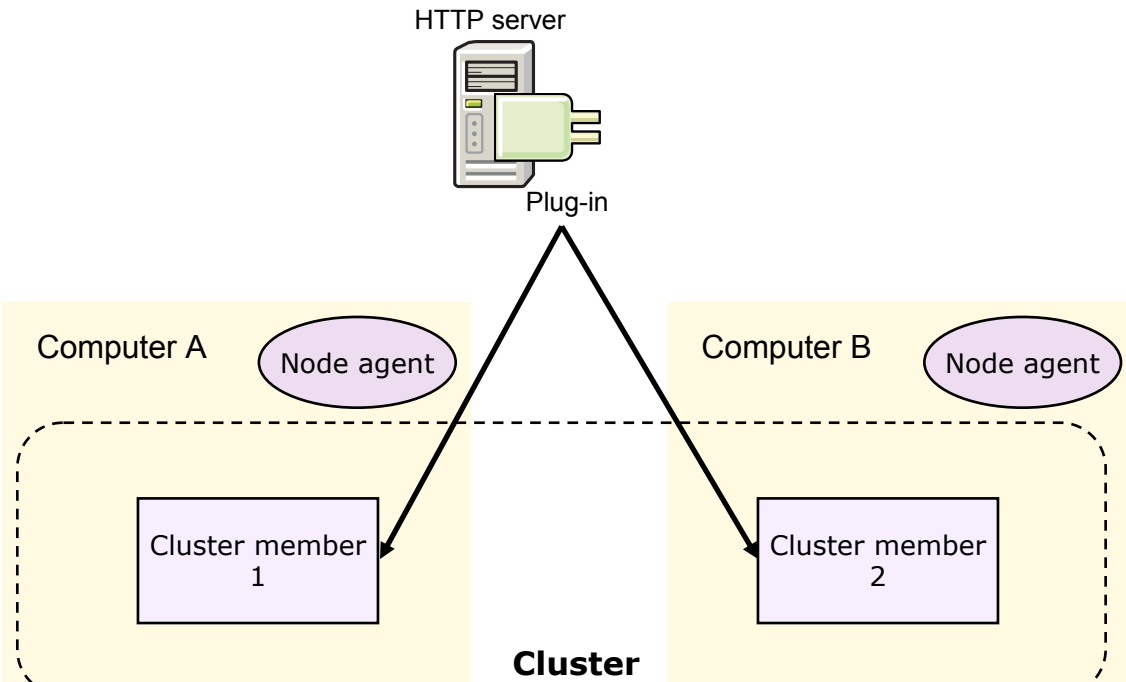
Configurations — vertical scaling

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



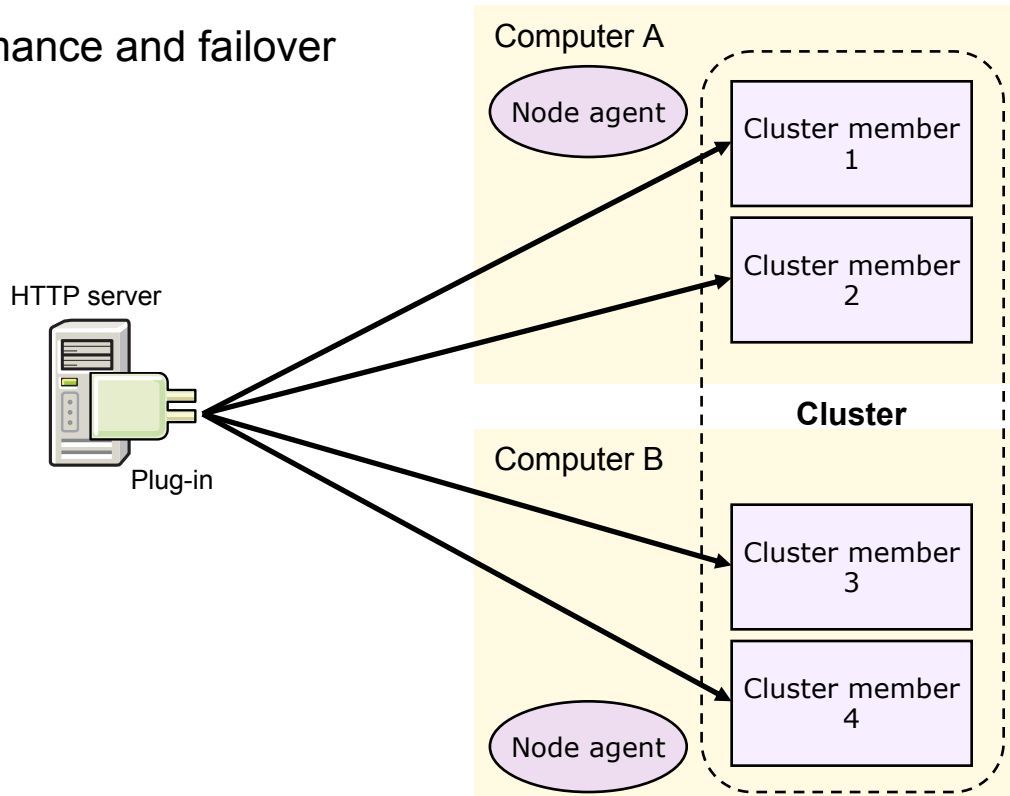
Configurations — horizontal scaling

- Supports machine failover

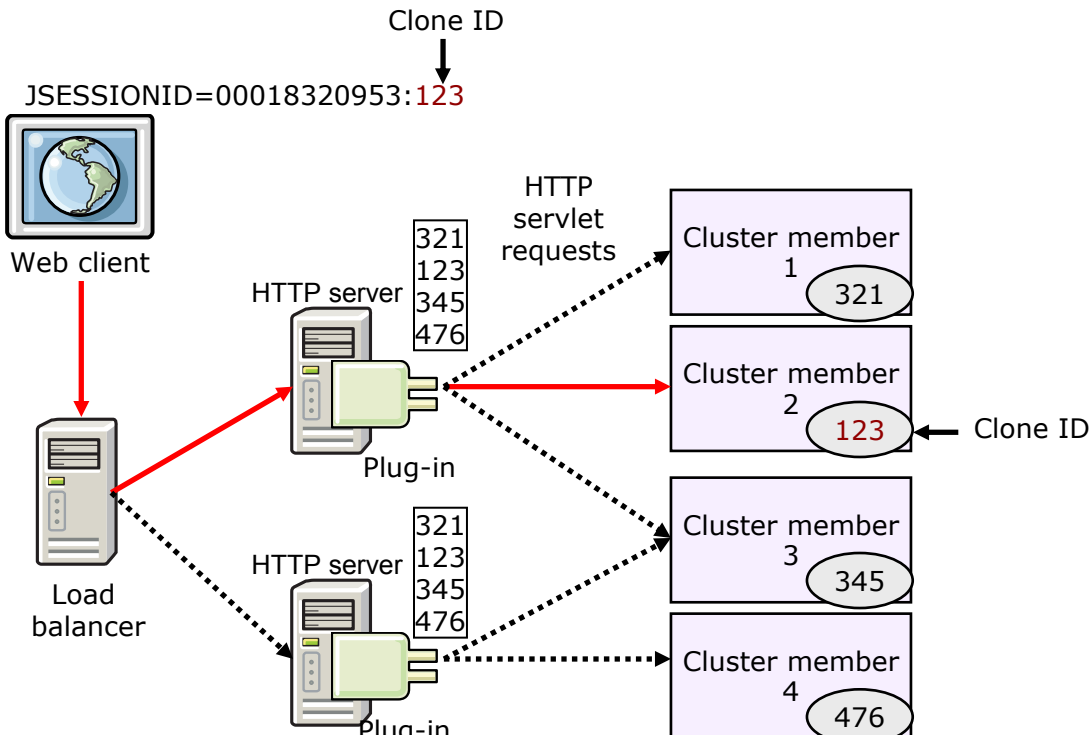


Configurations — vertical and horizontal scaling

- 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

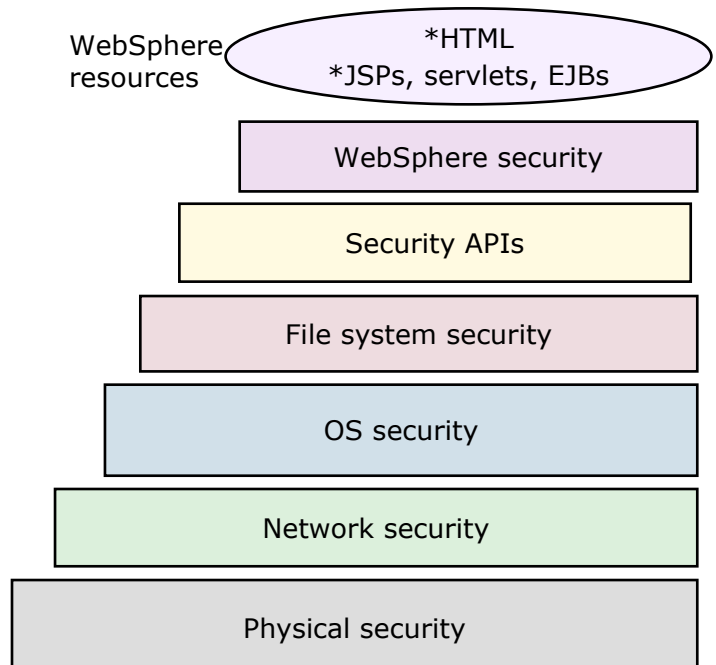
WebSphere Education

Security

12

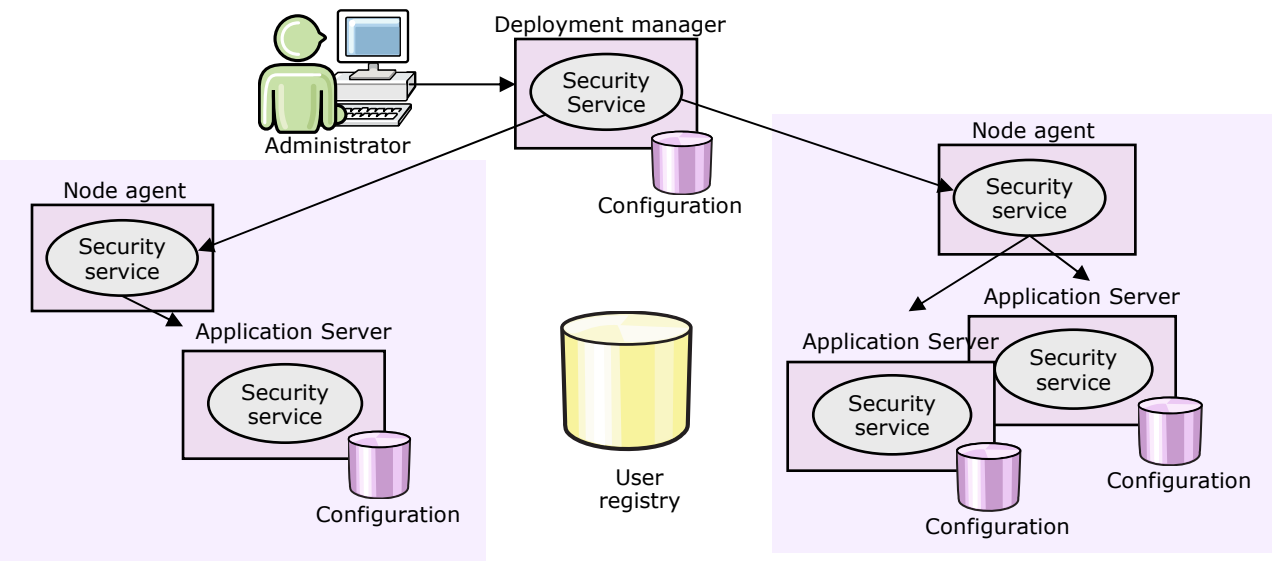
WebSphere Application Server security overview

- Security can be applied at different levels



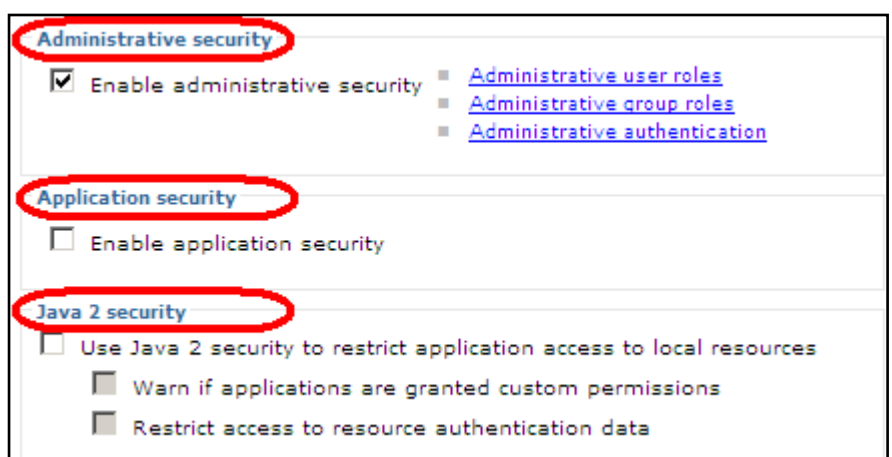
WebSphere security service — big picture

- 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



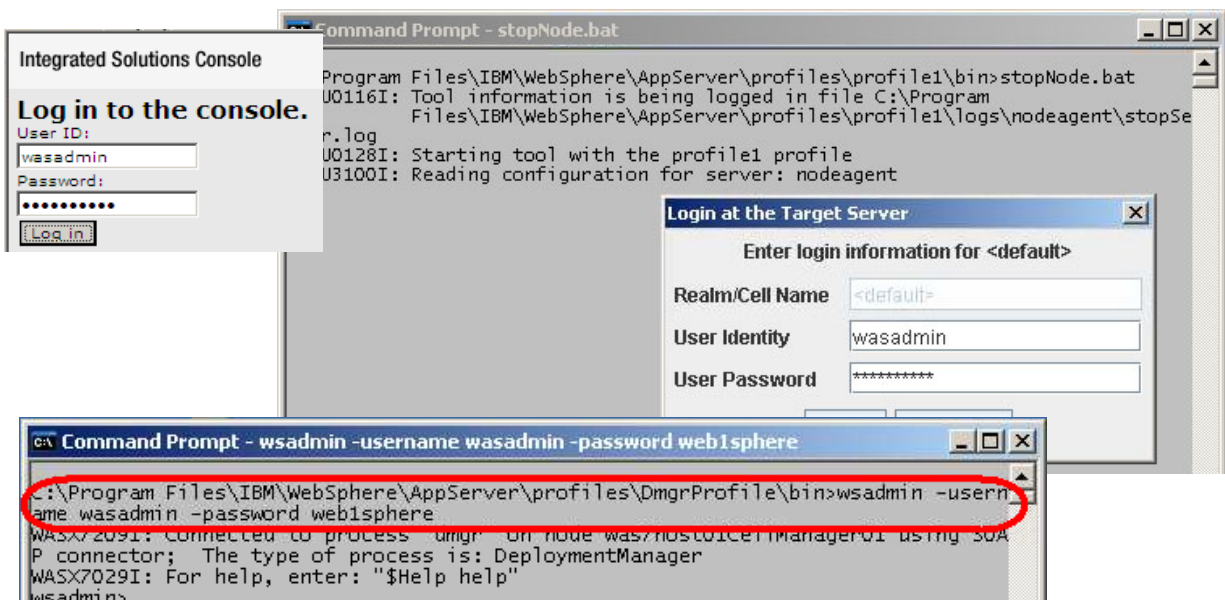
Types of security

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



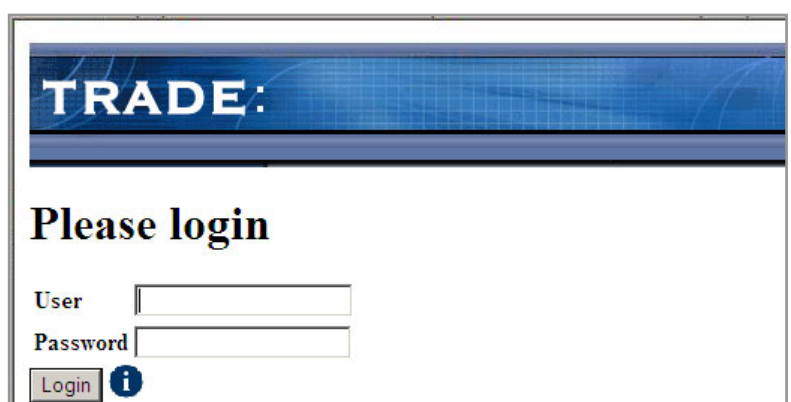
Administrative security

- 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)



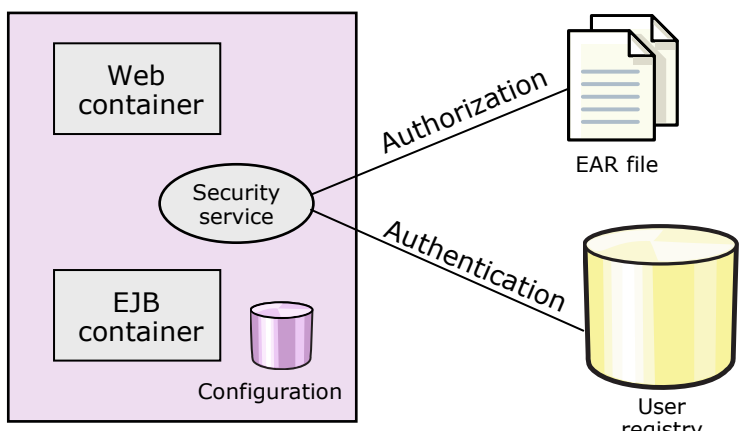
Application security

- 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



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

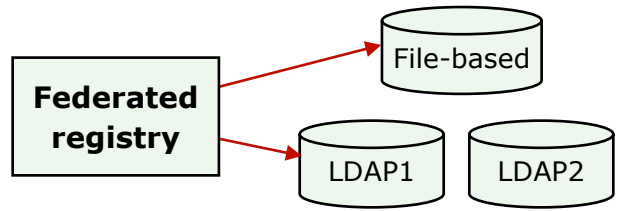
NT Domain, NT WorkGroup, Windows
AIX
Solaris
HP-UX
Linux
OS/400

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.



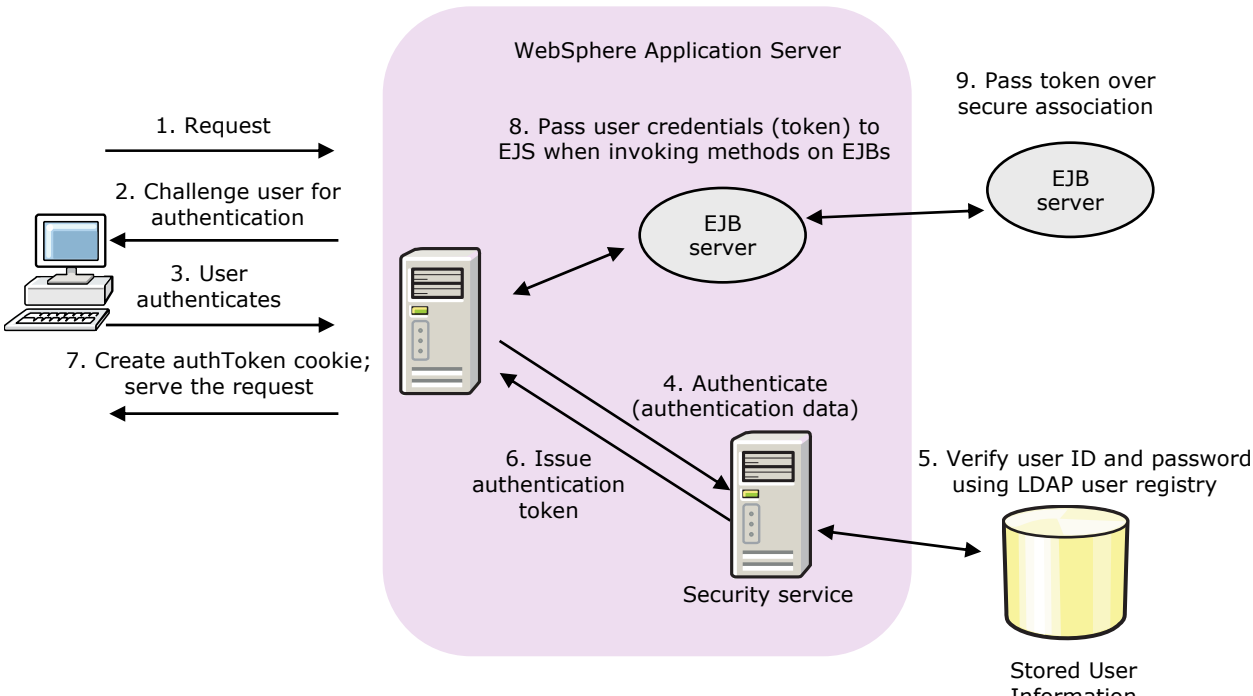
- Federated repositories enables the use of multiple repositories with WebSphere Application Server.
  - Can be:
    - File-based
    - Single LDAP
    - Custom registry
    - Database
    - Multiple LDAPs
    - Sub-tree of an LDAP.
  - Defined and theoretically combined under a single realm.
  - All 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

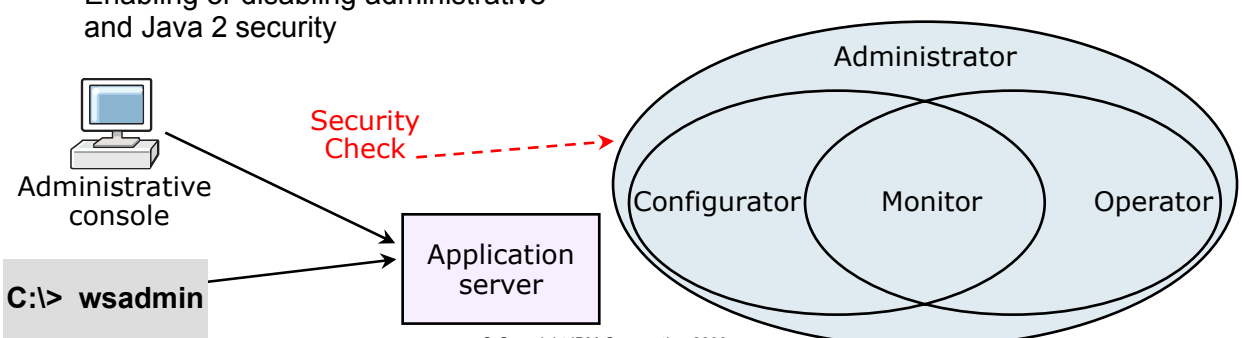
Authentication mechanism — LTPA

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



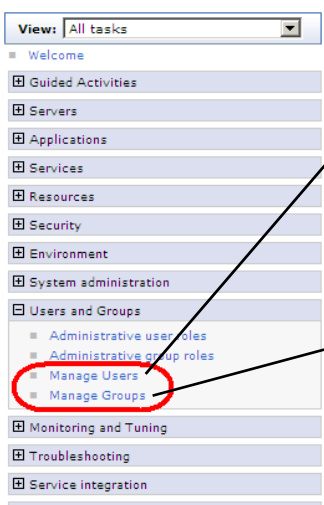
Console security

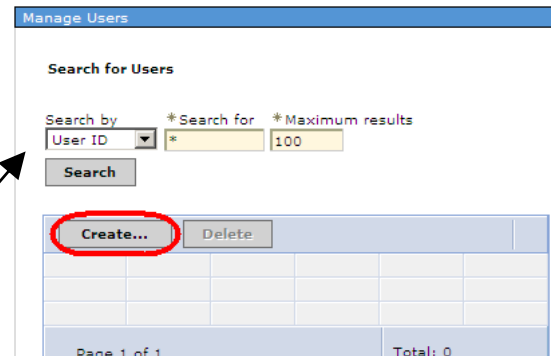
- Defines which roles have access to the administrative tools
  - Monitor: Least privileged; allows a user to view the WebSphere configuration and current application server state
  - Configurator: Monitor privilege plus the ability to change the WebSphere configuration.
  - Operator: Monitor privilege 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

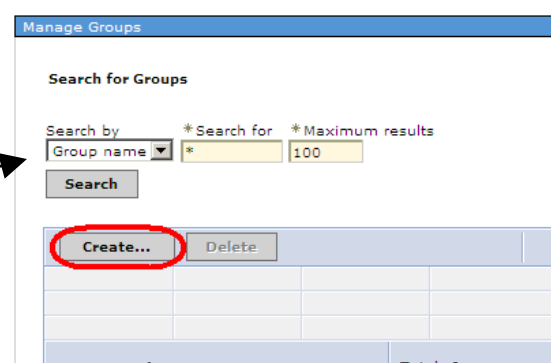


Console security — creating users and groups

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

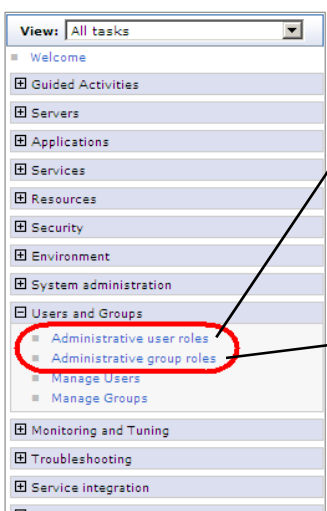


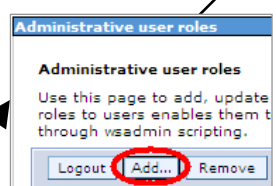


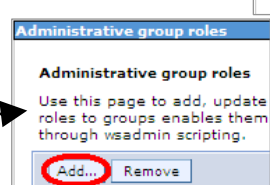


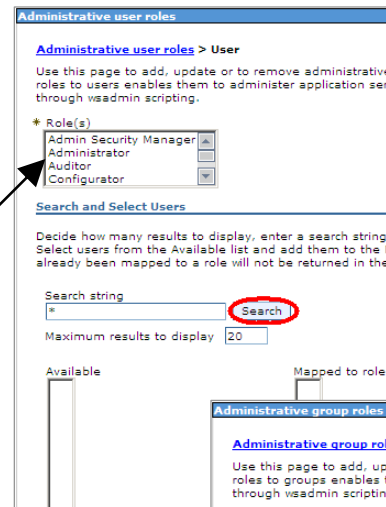
Console security — mapping users and groups

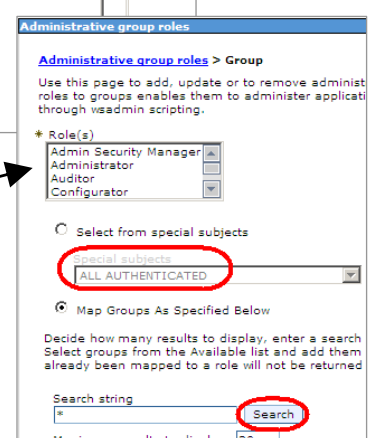
- To set up console security
  - Turn on administrative security
  - Create console users and groups
  - **Map users and groups to administrative roles**





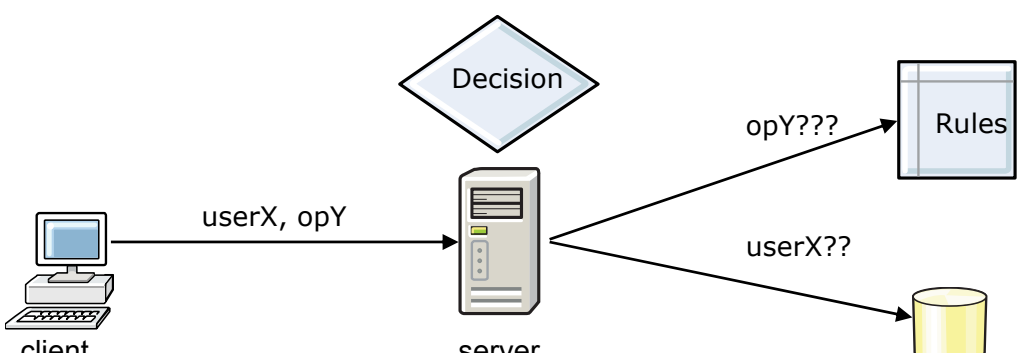






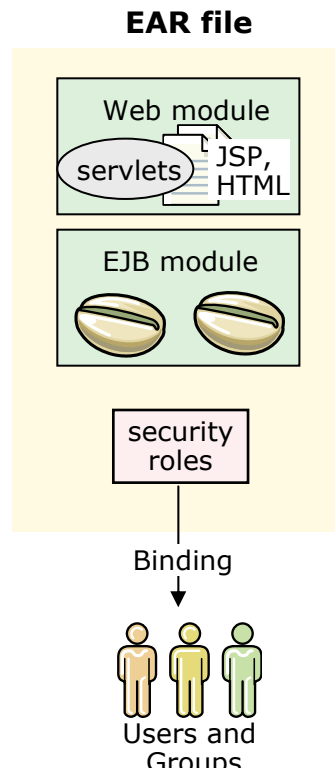
Authorization

- 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

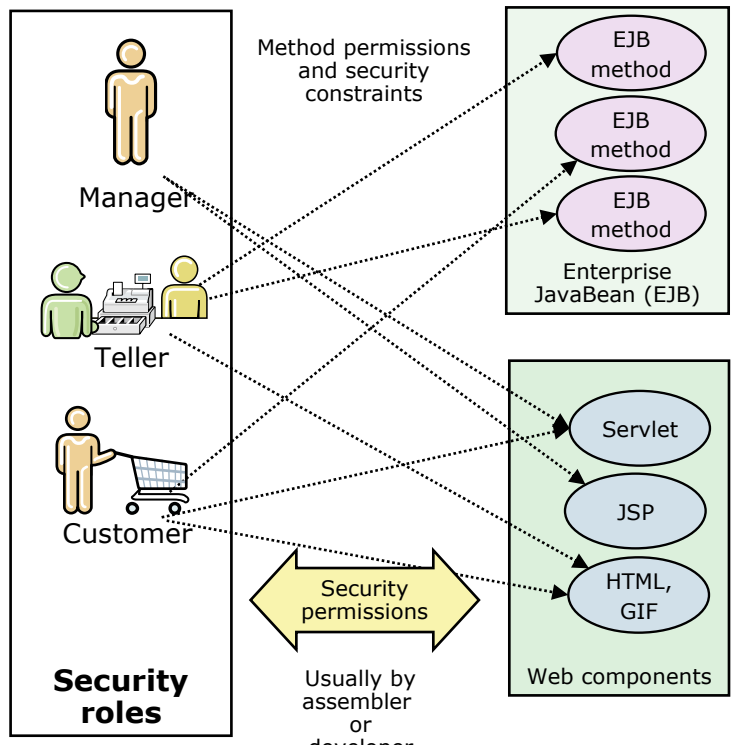


Security roles — application authorization

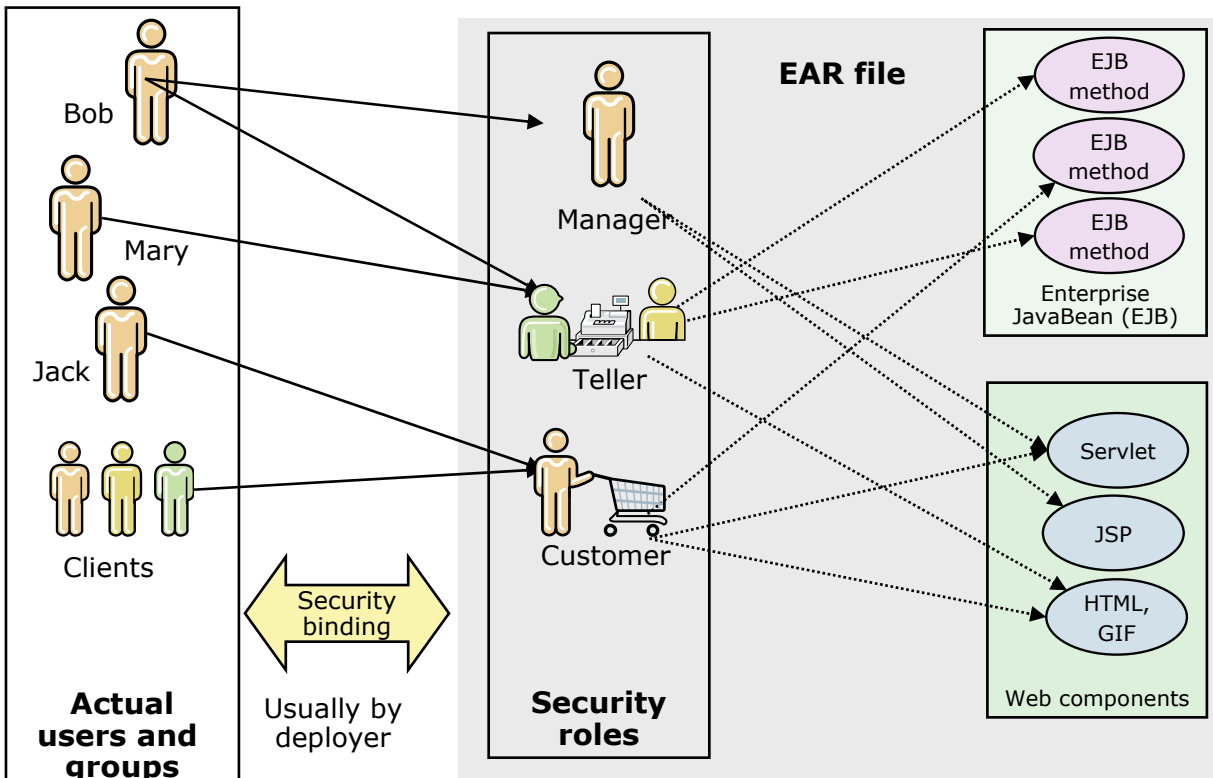
- Authorization is performed using the security roles
  - Specify security at an abstract level without knowledge of actual users and groups
- Security roles are then applied to the Web and EJB application components
  - Web URIs or EJB methods
- Binding of the users and groups to the security roles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



Securing application artifacts

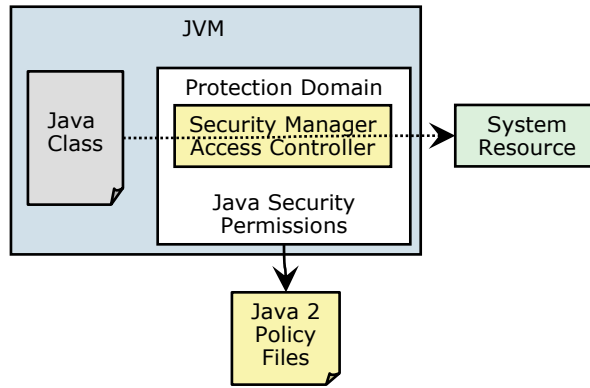


Securing mapping roles



Java security overview

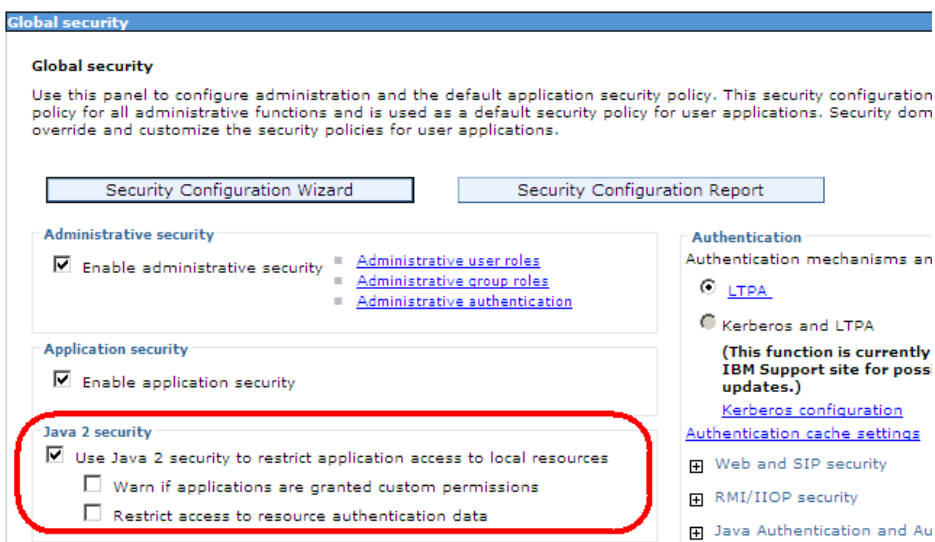
- Protects the system from the applications
- Provides an access control mechanism to manage the application's access to system level resources
  - File I/O, network connections (sockets), property files, and so forth
  - Policy-based
- Policies define a set of permissions available from various signers 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



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

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Thank You