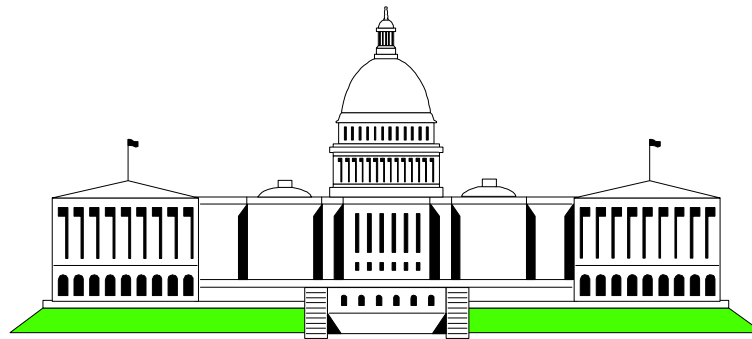


WebSphere Network Deployment 5.1 On Linux for zSeries

WebSphere software



Washington System Center

Acknowledgments

The material in this presentation was taken in part from the WebSphere Tutorials.

- Facts, features, fit
- Cells, nodes, node agents and clusters
- Installing the product
- Federation
- High Availability and failover

ND Features above base

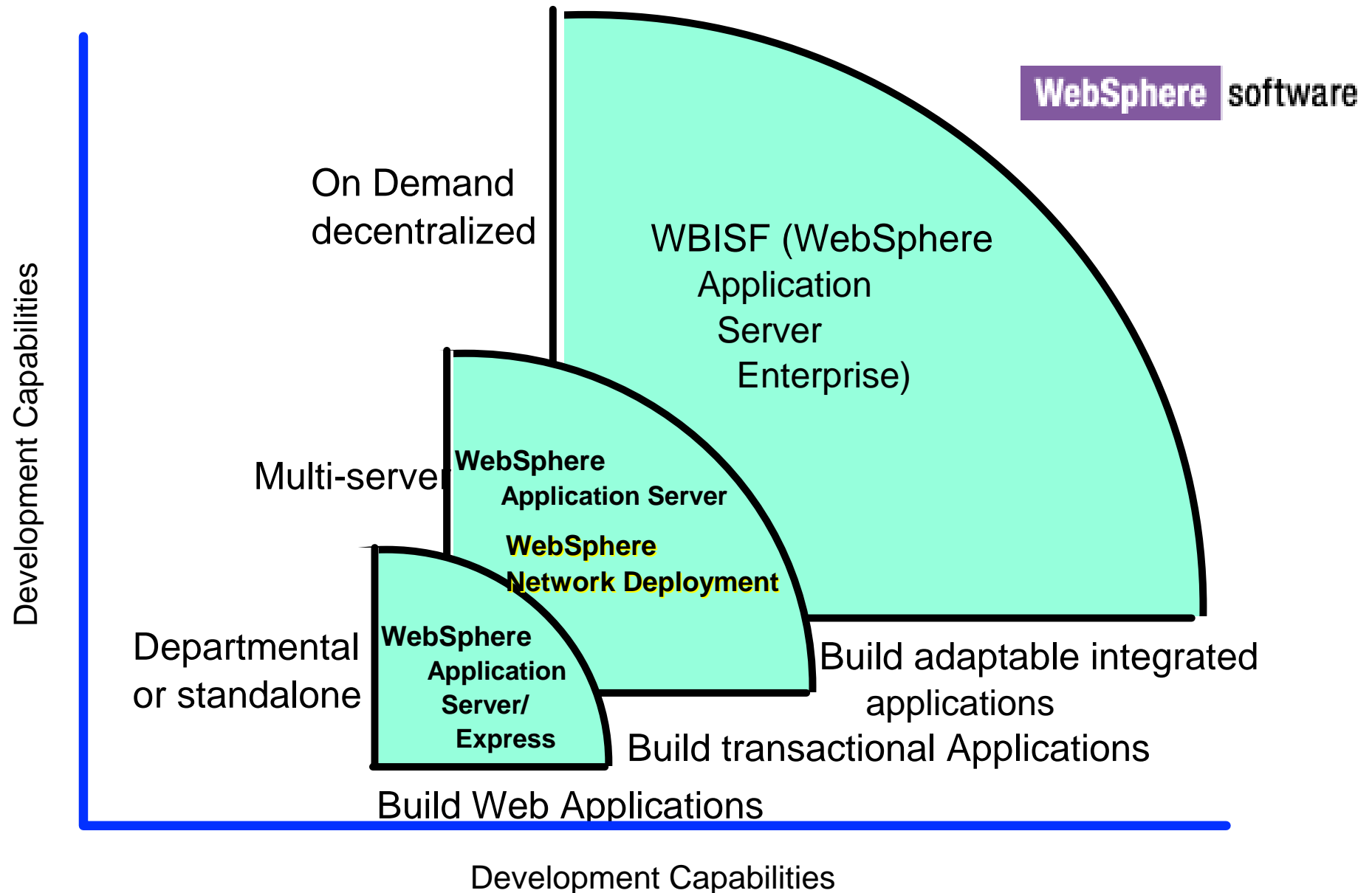
- Web Services support
 - Industry-leading
 - Advanced Web services features
 - ▶ UDDI Registry Acts as a repository that allows storage of business units that describe basic Web services
 - Web Services Gateway Enables Web services invocation by users from outside the firewall with the benefit of robust security protection
- Enhanced Problem resolution capabilities
 - Provides first failure data capture to report and analyze problems as they occur
- High availability and Enhanced workload management
 - Dynamic caching, performance management tools and Edge Server Component
 - ▶ Cluster support
 - ▶ Failure bypass
 - ▶ Intelligent workload distribution across a cluster
 - ▶ Centralized security

- Designed for highly available, high volume environments
 - Includes sophisticated load balancing, caching and centralized security capabilities based on WebSphere Edge Server.
 - ▶ Load-balancing component provides a scalable solution for distributing and routing HTTP, servlet, and Enterprise JavaBean™ (EJB) requests.
 - ◆ Distribute workload across multiple servers through sophisticated load balancing and clustering capabilities
 - ◆ Enables isolation of application servers to avoid single points of failure
 - ▶ Custom advisors can be used to load-balance requests based on unique application and platform criteria.
 - ▶ Consultants. To extend the load balancing capabilities beyond purely a WebSphere Application Server environment, consultant code can be used to optimize server performance within a Cisco or Nortel infrastructure.

- Enhanced Caching (dynamic). edge-of-network caching capability
 - Improves response time by offloading back-end servers and peering links.
 - ▶ JSPs etc.
 - Caching proxy provides the following plug-in support:
 - ▶ Tivoli Access Manager plug-in
 - ◆ A plug-in that allows users to exploit an LDAP-based repository for storing user authentication and authorization information.
 - Allows centralized security
 - WAS ND and Tivoli Access manager more tightly integrated
 - ◆ An authentication/authorization plug-in that allows independent software vendors (ISVs) to exploit third party authentication/authorization mechanisms such as RADIUS or SecurID tokens.
- Edge Side Includes (ESI) support.
 - Markup language
 - Dynamic web page assembly

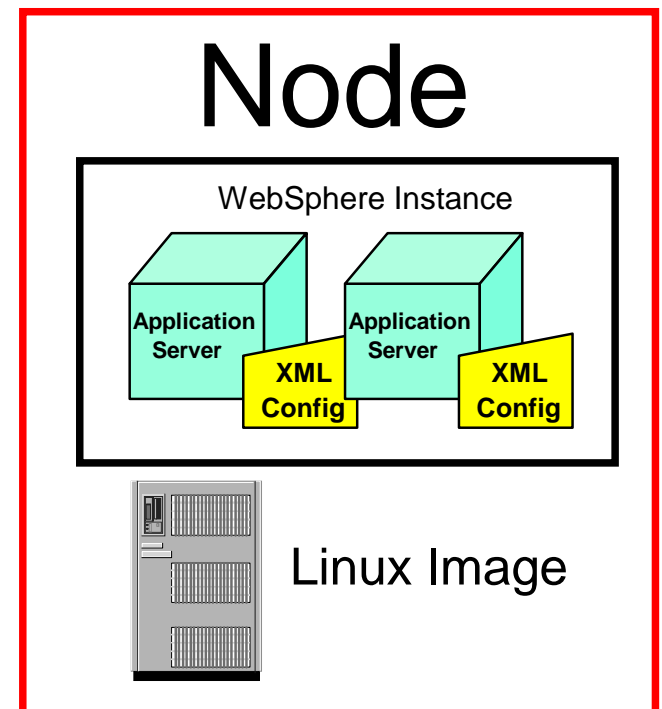
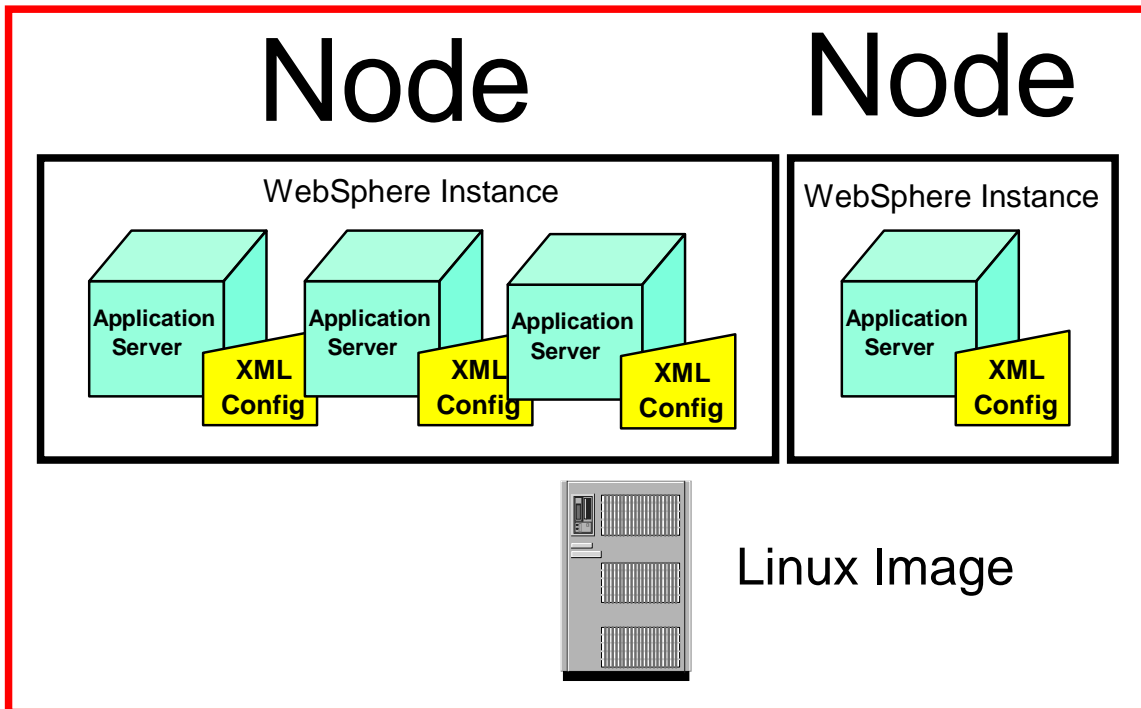
The big picture

● Where does WebSphere Network Deployment fit in?



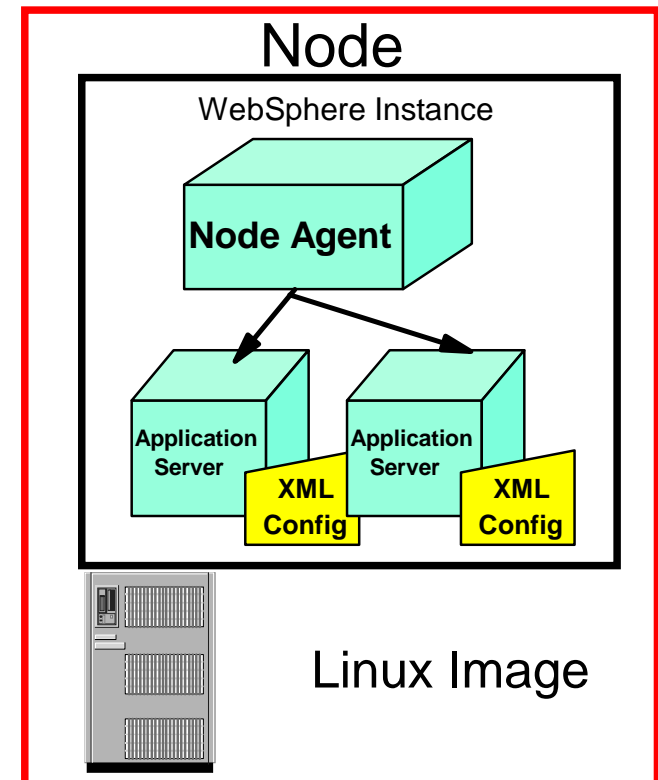
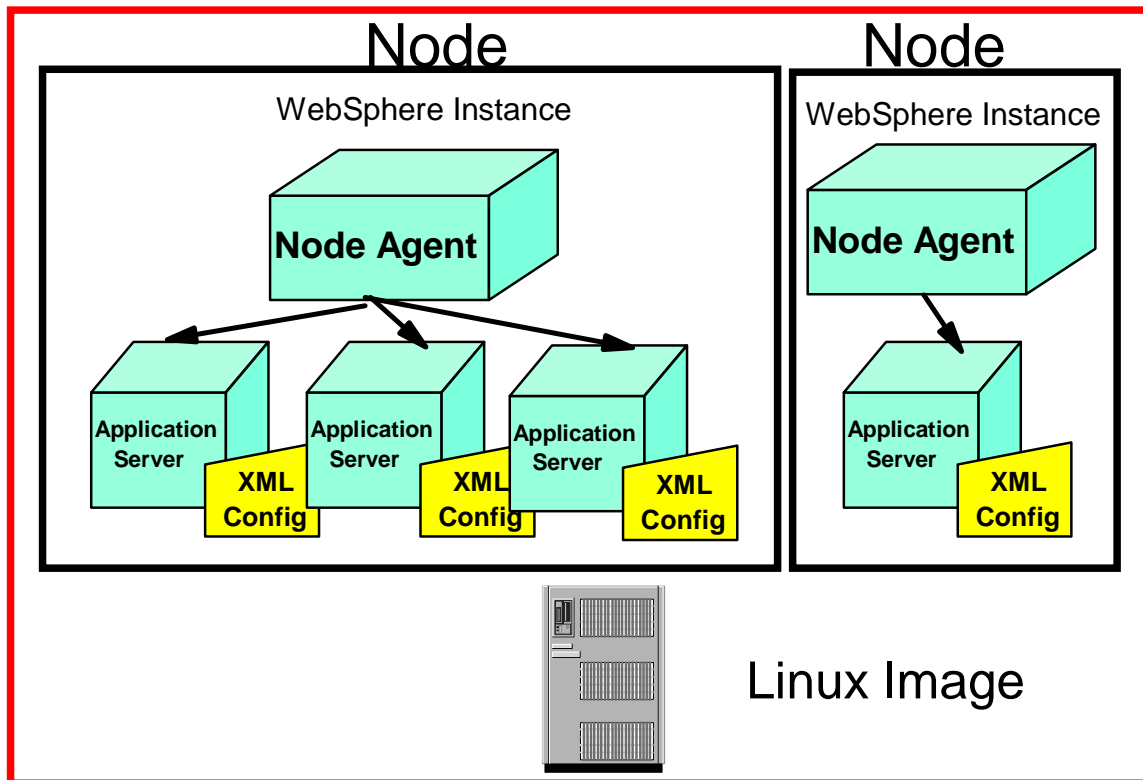
Concepts - Nodes

- A node
 - A logical grouping of the managed servers on a physical machine.
 - Usually corresponds to a physical computer system with a distinct IP host address, but multiple nodes may exist at the same IP address.
 - ▶ Node names are usually identical to the host name for the computer, but don't need to be.
 - Names must be unique



Concepts - Node Agents

- A node agent manages all WebSphere Application Servers on a node.
 - Represents the node in the management cell.
 - Can not exist without WebSphere ND
 - One node agent for each node
 - May be managed from the console session or command line
 - ▶ Must be restarted from command line if agent is down



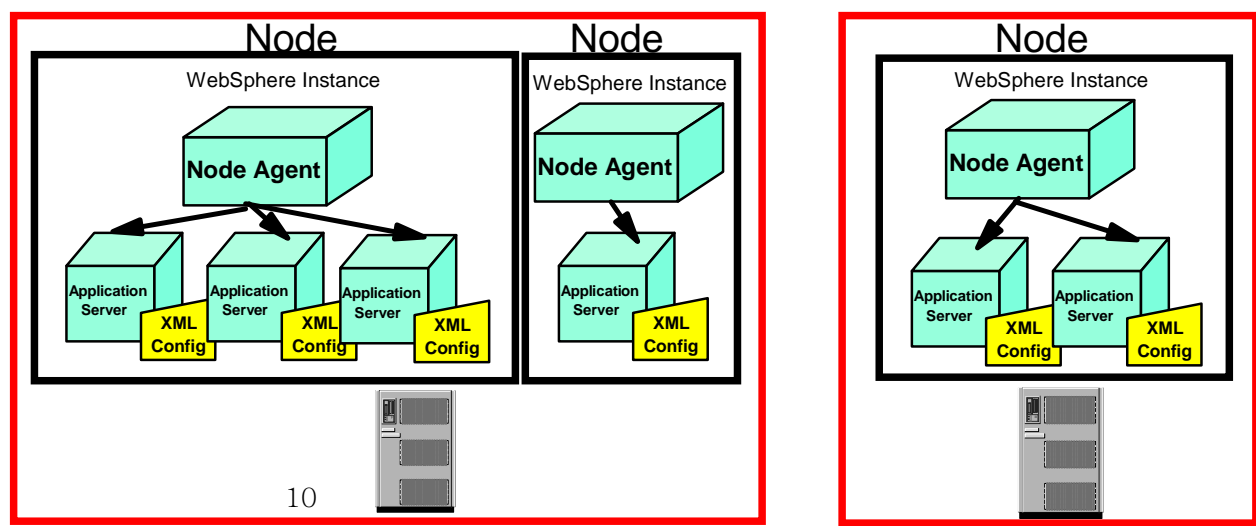
● A cell

WebSphere software

● A configuration concept

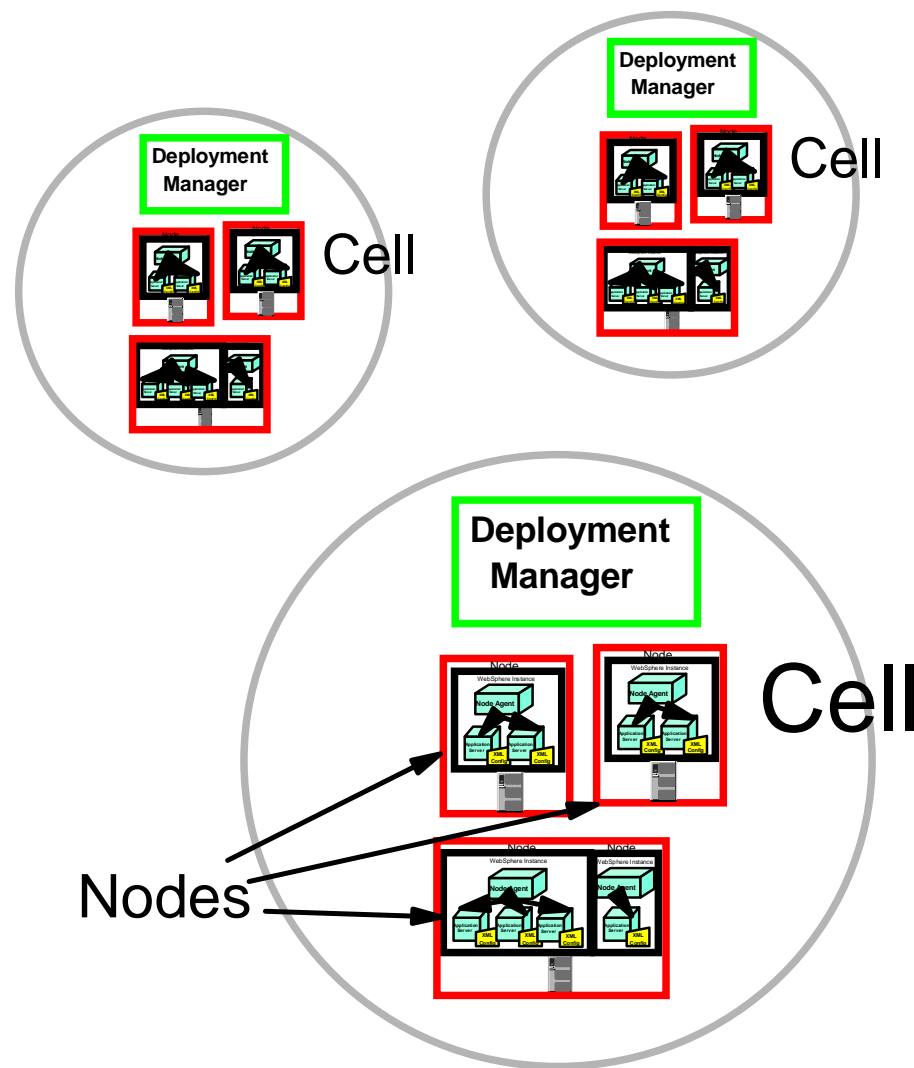
- ▶ Consists of arbitrary, logical groupings of one or more nodes in a WebSphere Application Server distributed network.
- A way for administrators to logically associate nodes with one another.
- Administrators define the nodes that make up a cell according to whatever criteria makes sense in their organizational environments.
- Administrative configuration data is stored in XML files
- A cell retains master configuration files for each server in each node in the cell.
- Each node and server also have their own local configuration files.

Cell



Deployment Manager

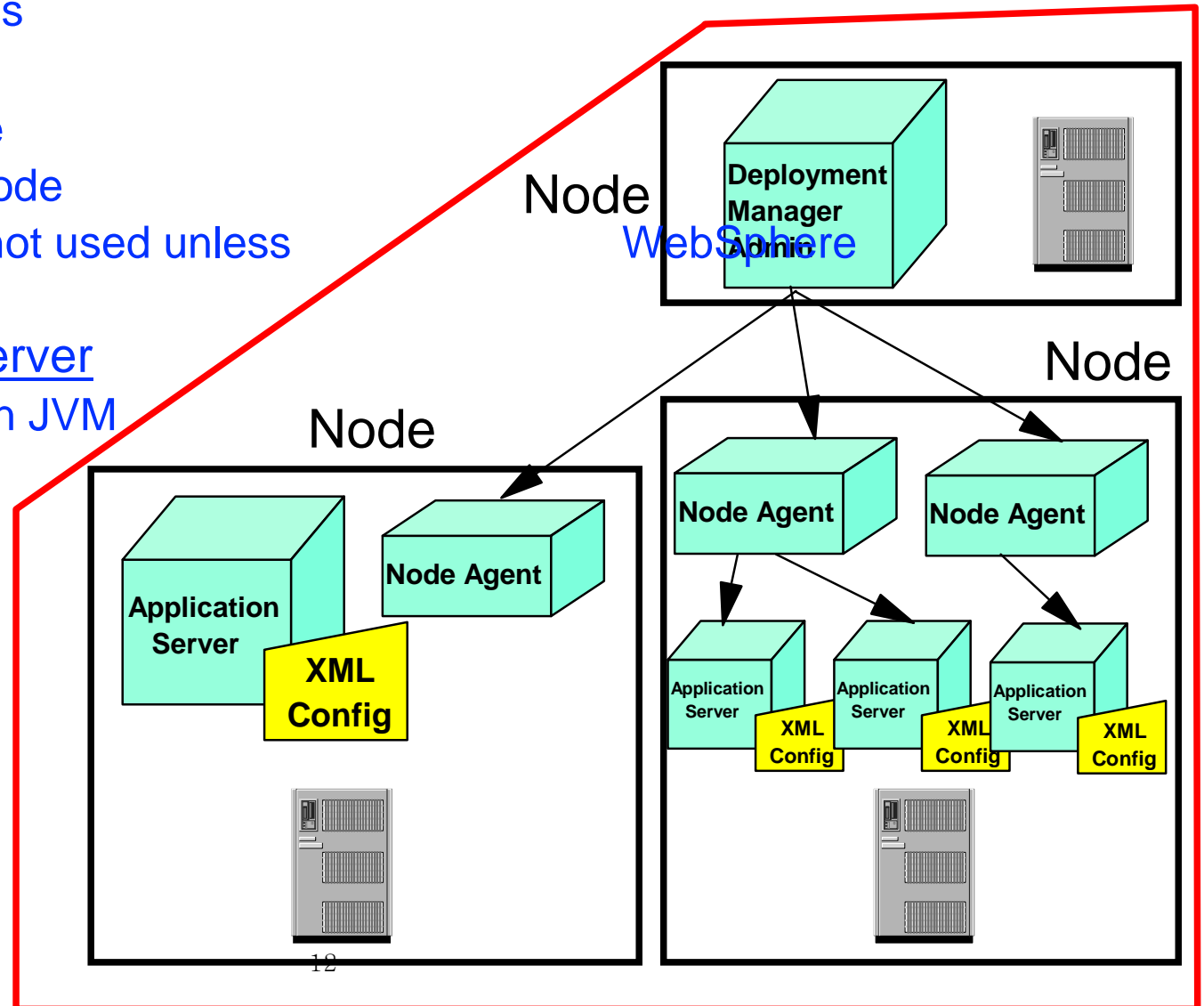
- Administrative agents that provide a centralized management view for a cell and all nodes in that cell.
- Hosts the administrative console.
 - ▶ Provides a single, central point of administrative control for all elements of the entire WebSphere Application Server distributed cell.
 - ▶ Provides management of clusters and the management of workload balancing of application servers across one or several nodes.



WebSphere ND V5 Model - bringing it all together

- Cell (Domain in previous releases)
 - Network of nodes with logical view for administration
- Deployment Manager
 - Manages multiple nodes
- Node Agent
 - Resides on single node
 - Manages Servers on node
 - Comes with base, but not used unless ND is used
- Managed Process or Server
 - Each server having own JVM
 - ▶ Application Servers
 - ▶ JMS Server
 - ▶ Generic Servers

Cell

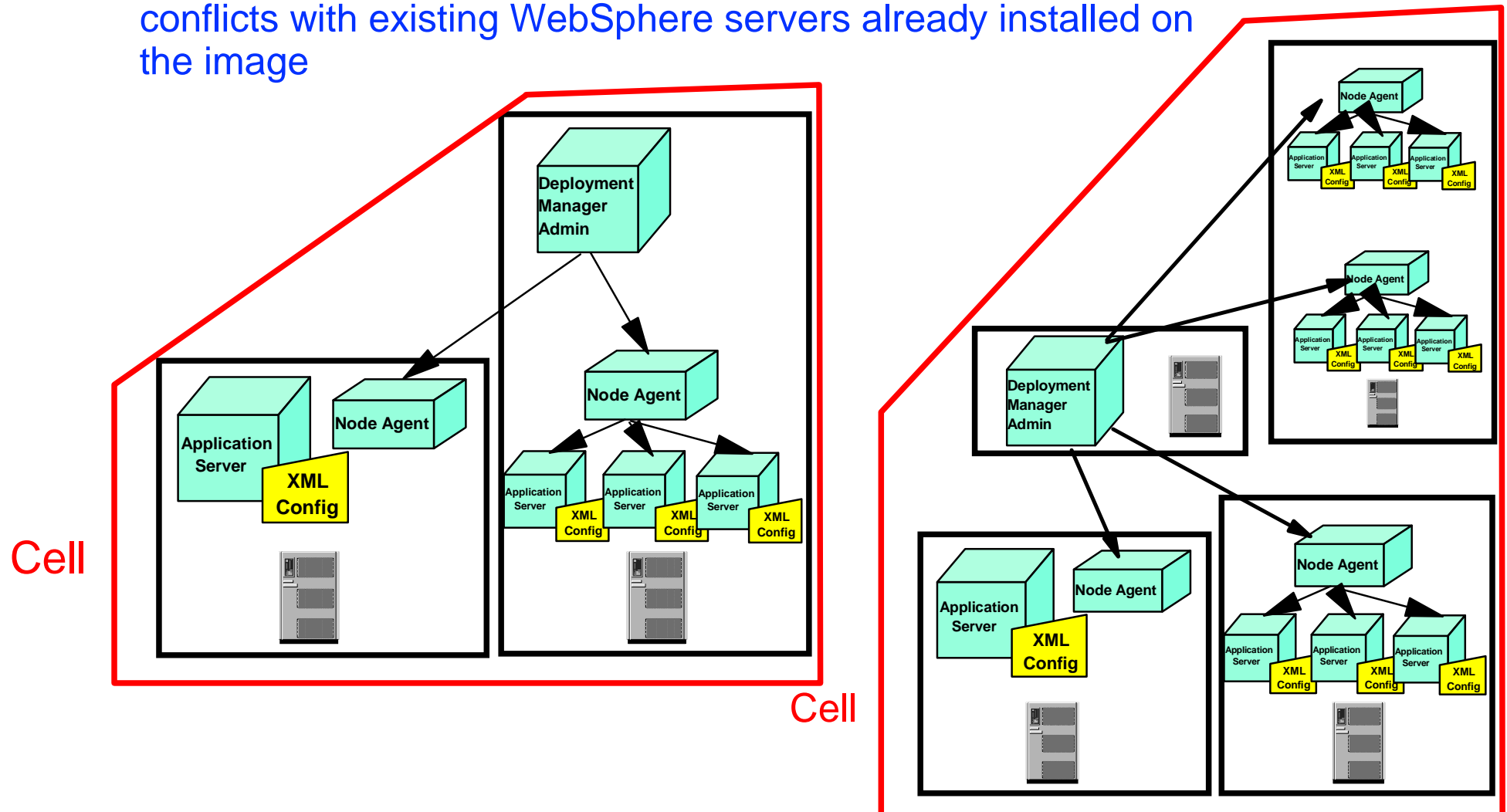


Different models



Advanced
Technical Support

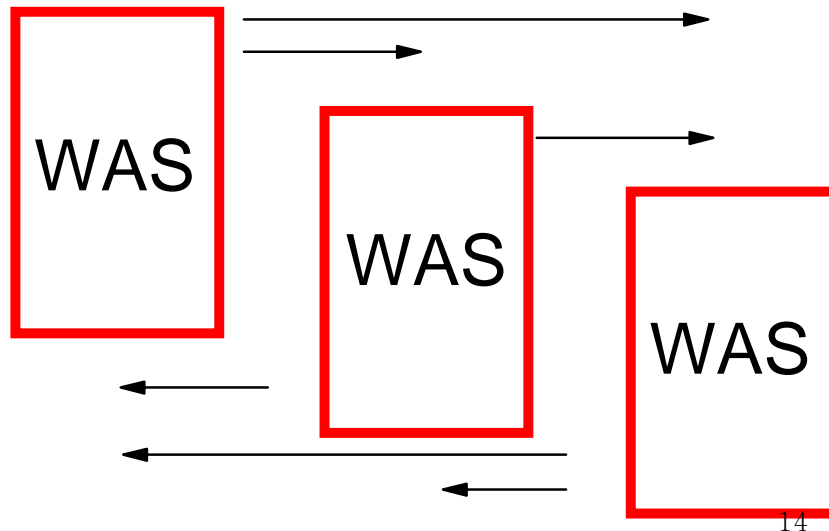
- WebSphere Network Deployment may be standalone on an image or may coexist with a single or multiple base WebSphere Application Servers
 - The coexistence will involve using alternate ports to avoid conflicts with existing WebSphere servers already installed on the image



The goal is high availability

High availability (HA)

- Definition - An application or service that is provided in a near-continuous fashion.
 - A solution must include the concepts of
 - ▶ **Process availability**
 - ▶ **Data availability**



- A process is considered available when there is a server available to service a request. WebSphere implements process availability as follows:
 - Clusters. The ability to service any given request is supported by a number of similar processes.
 - Failover. When a process becomes unavailable, requests are directed away from the unavailable process and toward the other, available, processes in the cluster.
 - When there are no available processes to service a request, a programming model exists that allows clients to perform recovery, if possible, and to resubmit requests, if necessary. This path may lead to loss of data and to the system being down for some time, depending on the nature and seriousness of the failure.

- Occurs when data is preserved across process failures and is available for processes that continue to be available. Data availability requires:
 - Failover to redundant copies of data, when the primary source of data for a process is no longer available
 - Procedures for recovery of data, when the catastrophic errors occur in system (e.g. fire)

Data
Data
Data
Data
Data

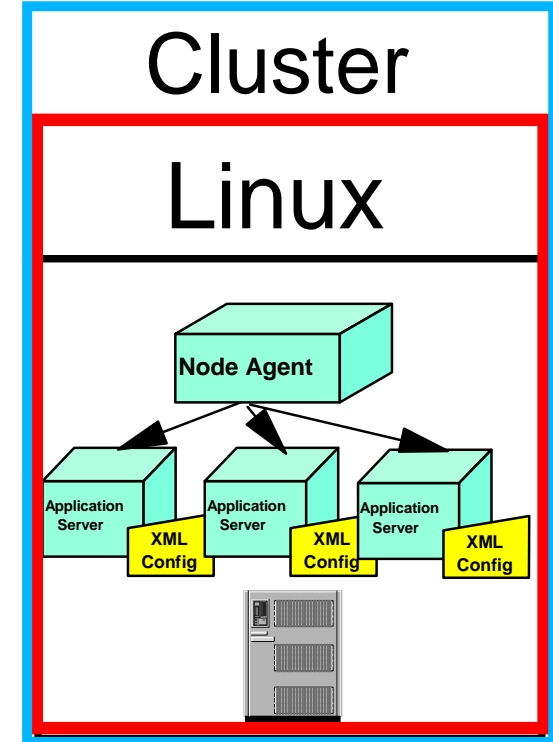
WebSphere software

Clusters - what are they in detail?

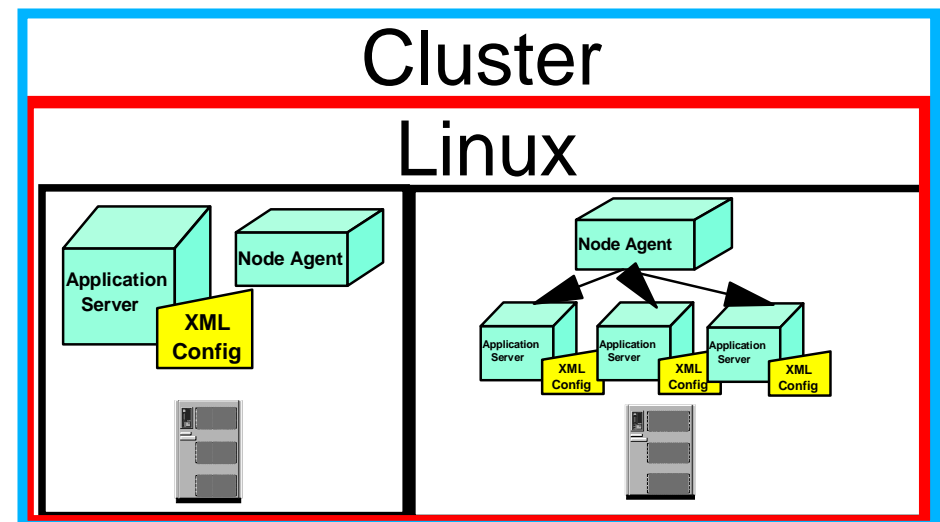
- A cluster is a collection of servers working together as a single system to ensure that mission-critical applications and resources remain available to clients.
 - Can be visualized as consisting of several logical components:
 - ▶ Application servers (processes or “clones”) that service requests
 - ▶ Administrative servers (processes) that administer the application servers
 - ▶ Data repositories (databases or native operating system files) that store information used by the Application and Administrative servers process failures and is available for processes that continue to be available.

● Vertical

- Refers to the practice of defining multiple clones of an application server on the same physical machine
- May be on a single application server, which is implemented by a single JVM process and cannot always fully utilize the CPU power of a large machine and drive CPU load up to 100%.
- Or may include more than one instance of a WebSphere Application Server on the same image to provide a straightforward mechanism to create multiple JVM processes, that together can fully utilize all the processing power available as well as providing process level failover.



OR

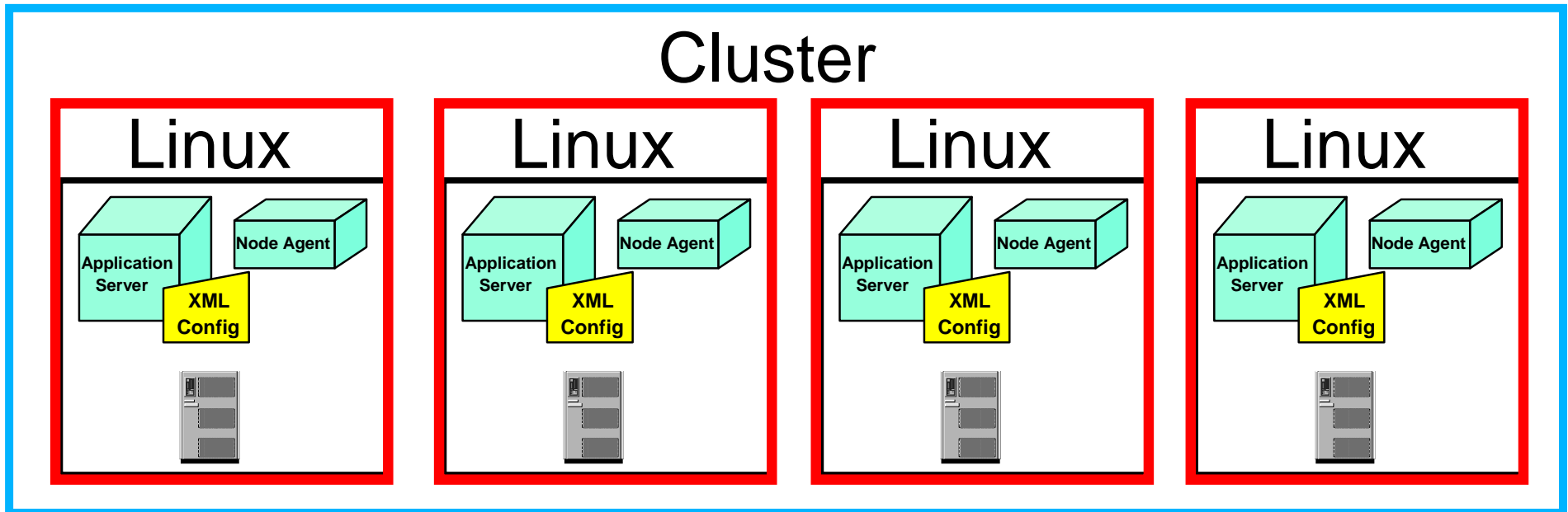


Clusters types continued

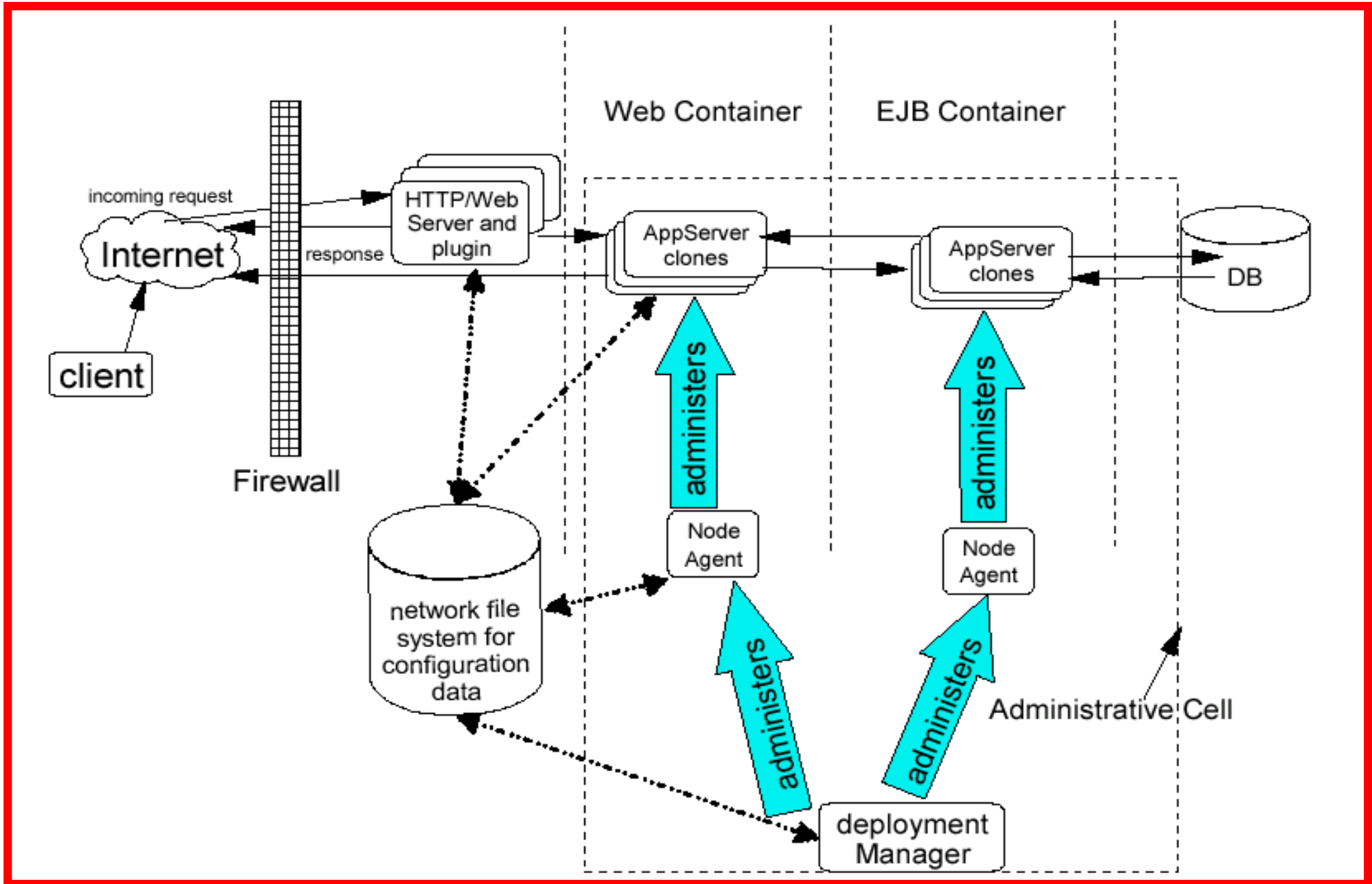
● Horizontal

- Refers to the more traditional practice of defining clones of an application server on multiple physical machines, thereby allowing a single WebSphere application to span several machines while presenting a single system image.
- Horizontal cloning can provide both increased throughput and failover redundancy.

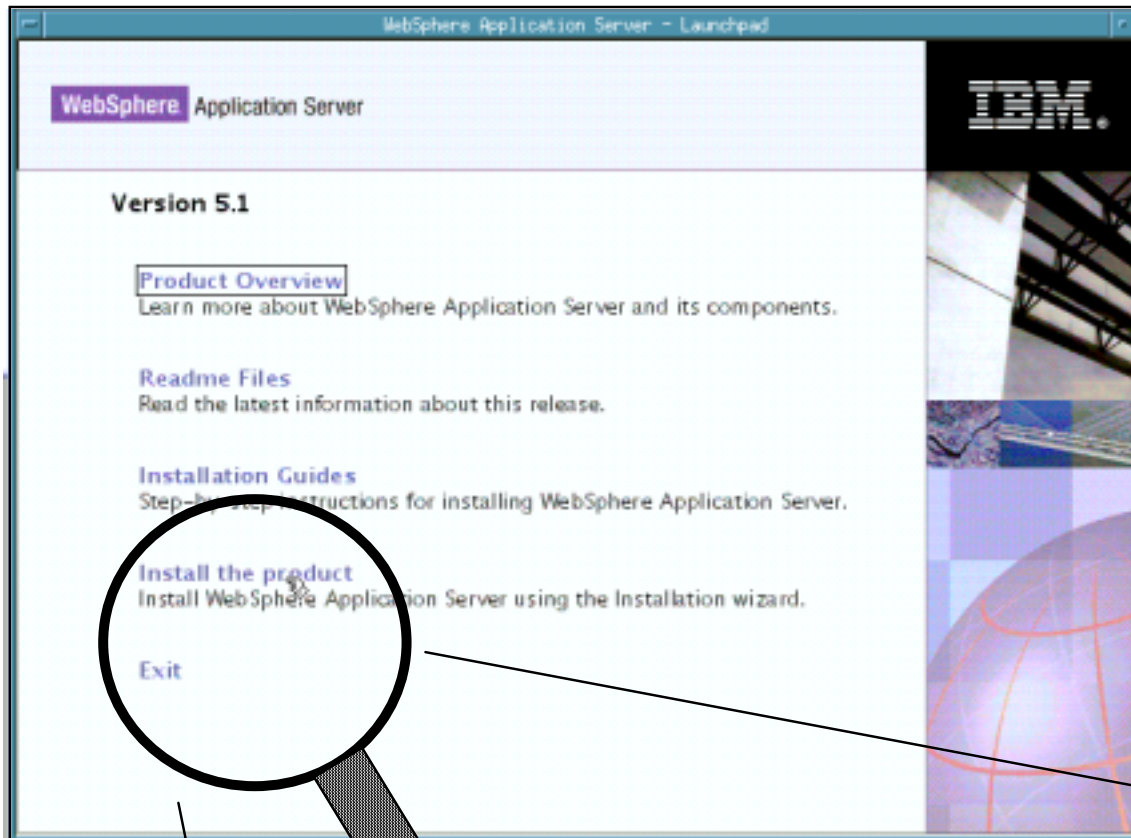
Cluster



Clusters - the big picture



- WebSphere Network Deployment installs in the same manner as the base WebSphere Application Server.

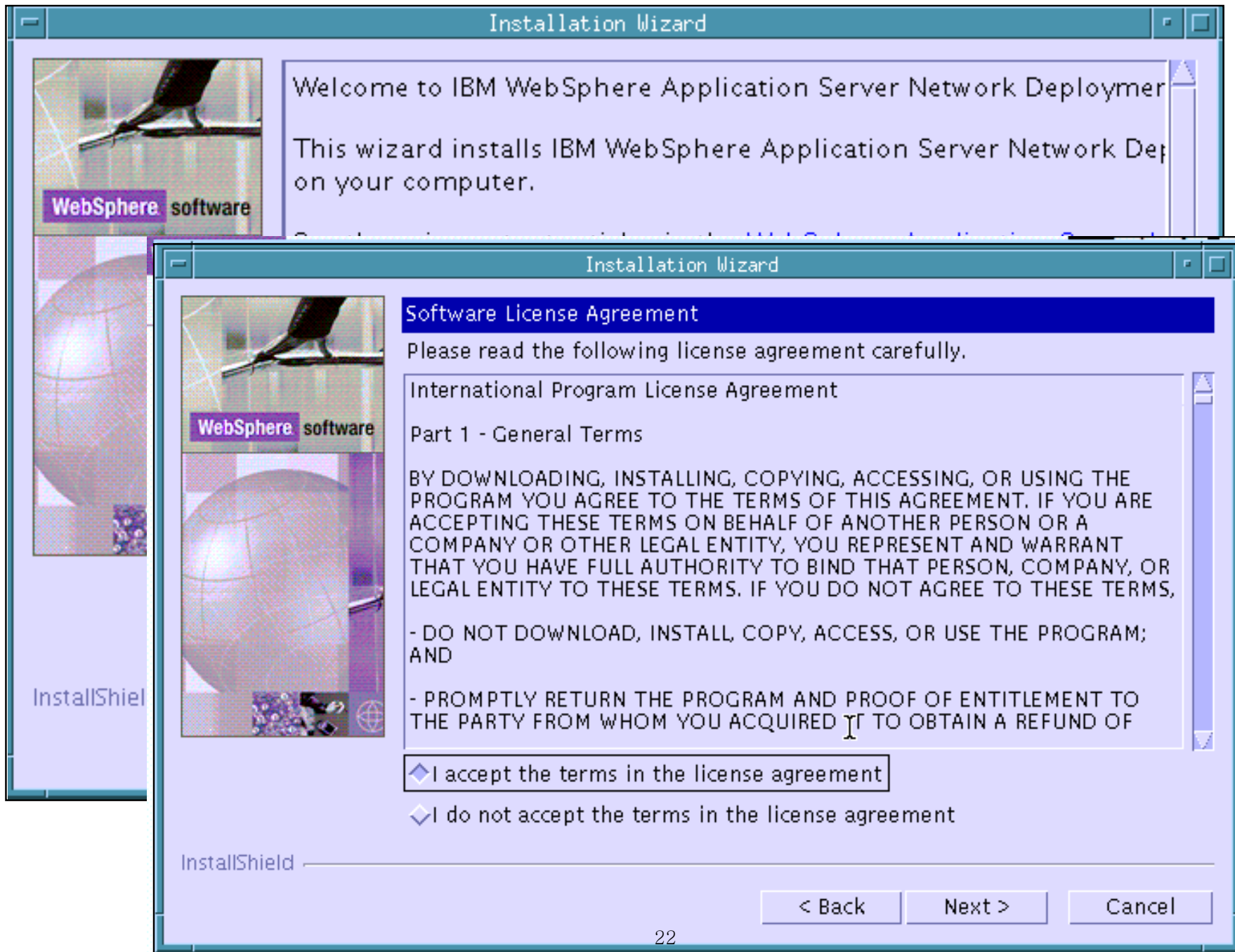


Xterm

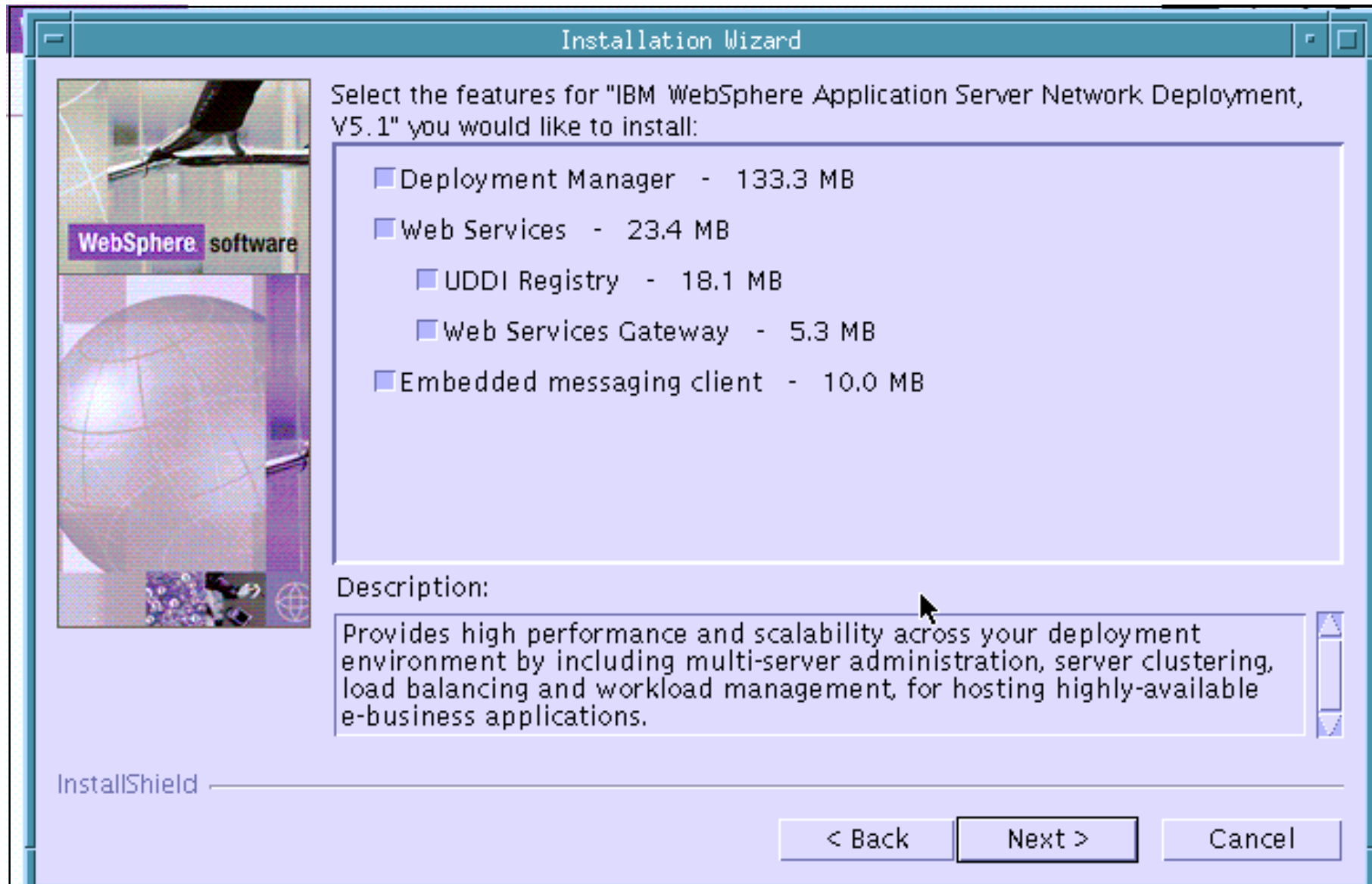
```
>launchpad.sh
```

Install the product
Install WebSphere Application Server using the Installation wizard.

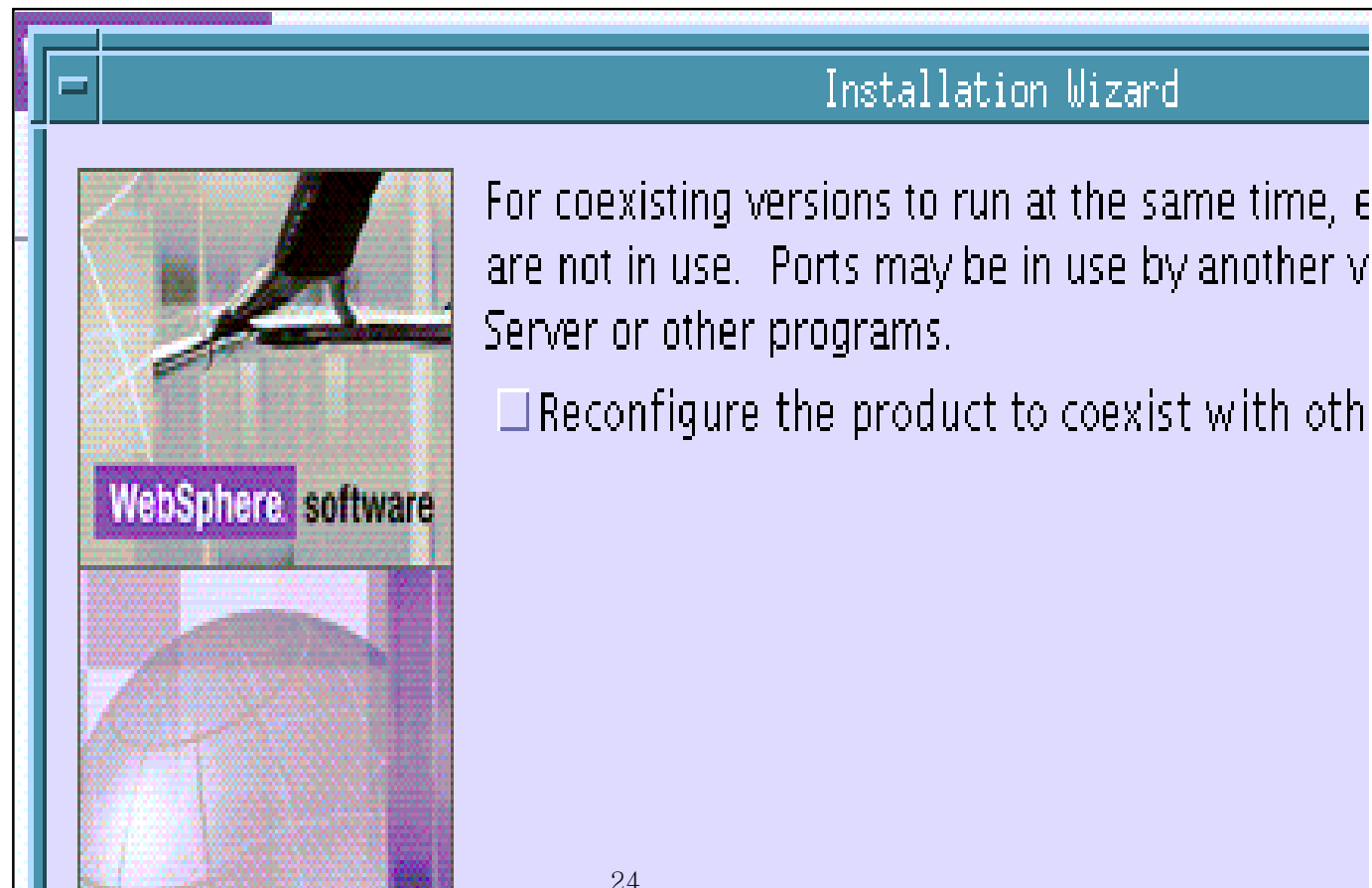
Getting started



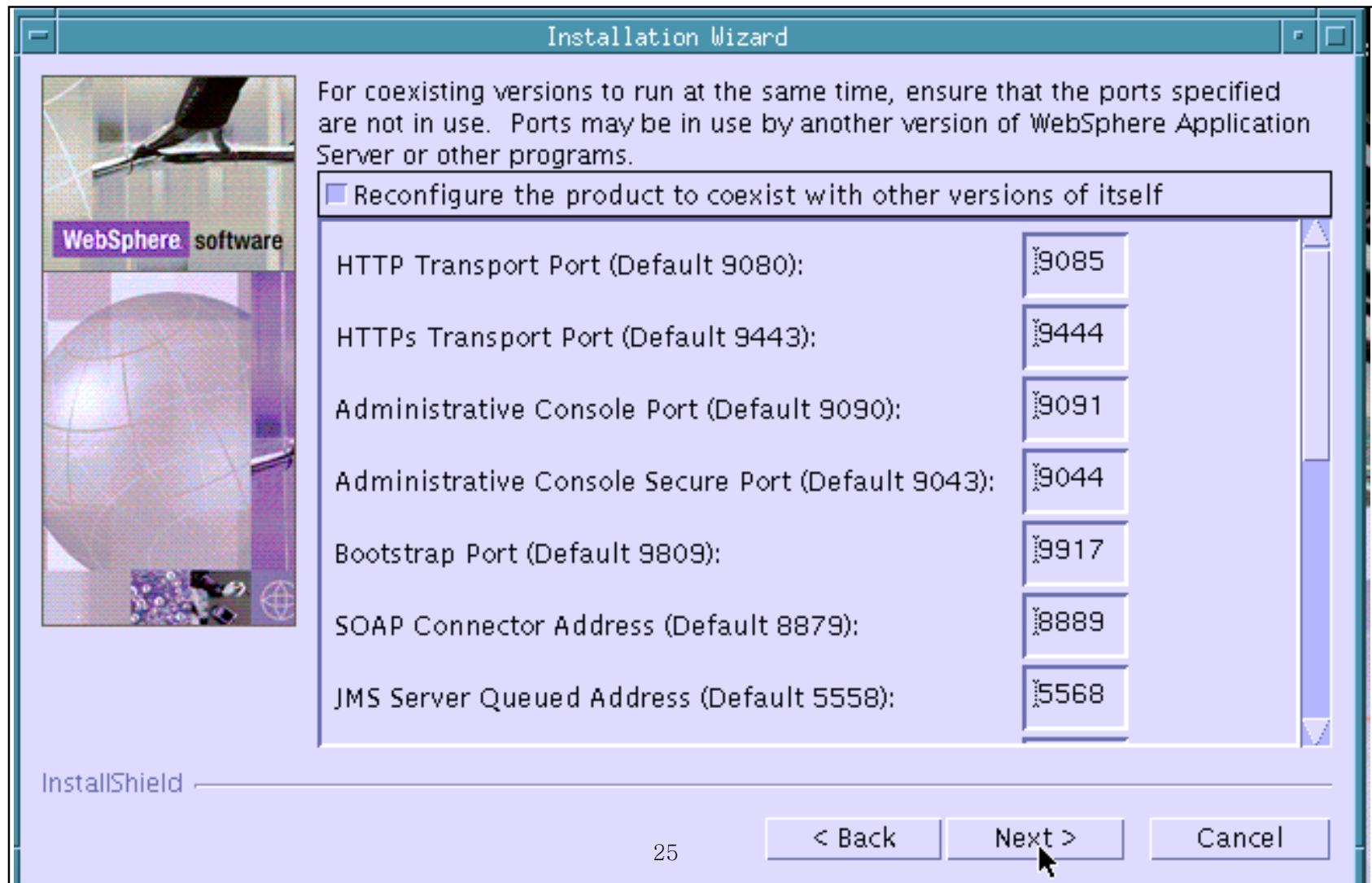
Choose what to install



- May run
 - Standalone
 - With other WAS Application Servers
 - ▶ Coexistence required

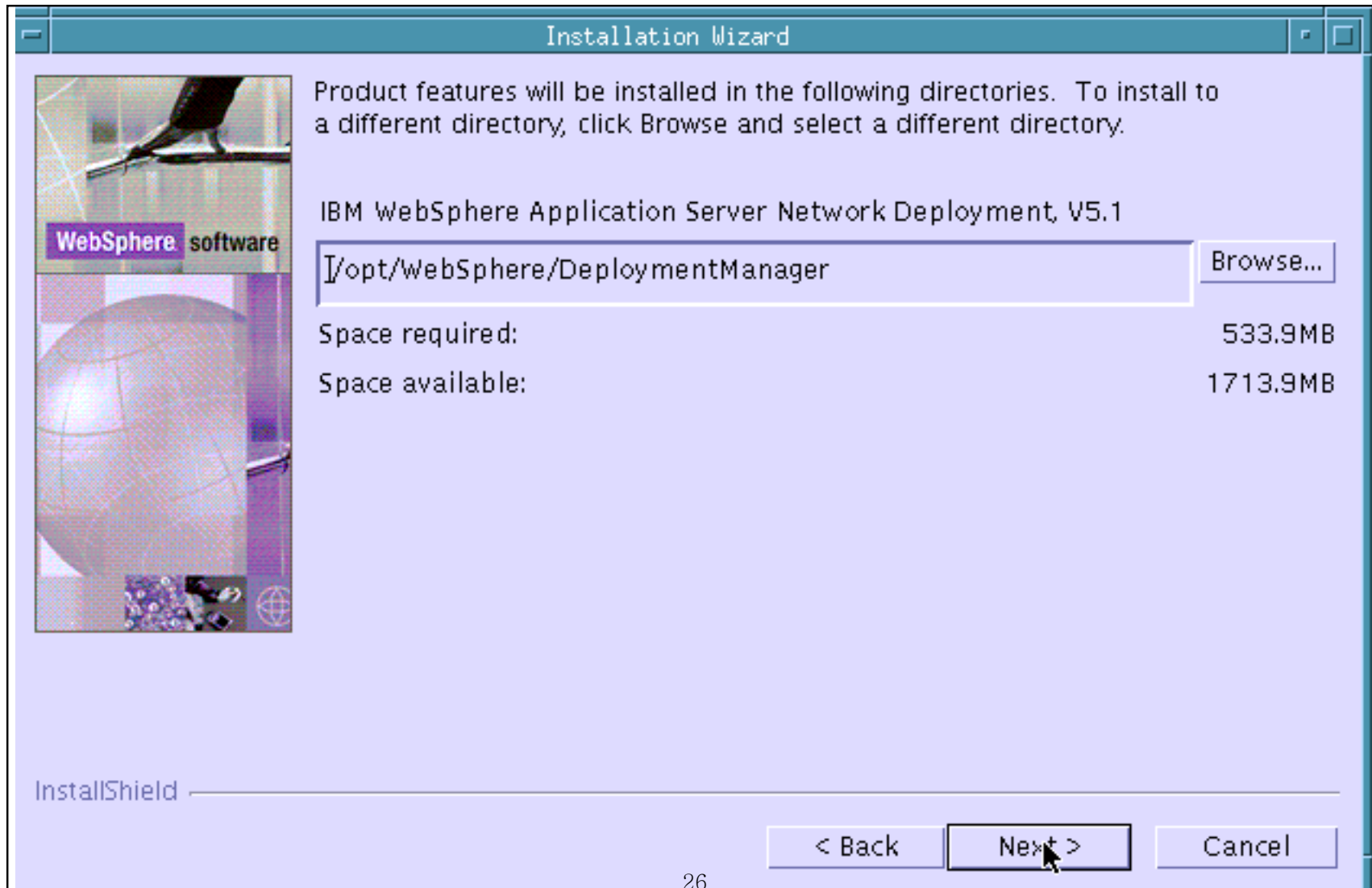


- Must use alternate ports
 - Default ports in use by one or more base servers



Select Source Location

- May use an existing directory as the directory root or any directory of choice



Select Identity Names

- May use suggested defaults or any names of choice

Installation Wizard

Enter a node name, host name, and cell name for this installation. The node name is used for administration, and must be unique within its group of nodes (cell). The hostname is the DNS name or IP address for this computer. The cell name is a logical name for a group of nodes.

WebSphere software

Node Name:
waslab05Manager

Host Name or IP Address:
waslab05.washington.ibm.com

Cell Name:
waslab05Network

InstallShield

< Back Next > Cancel

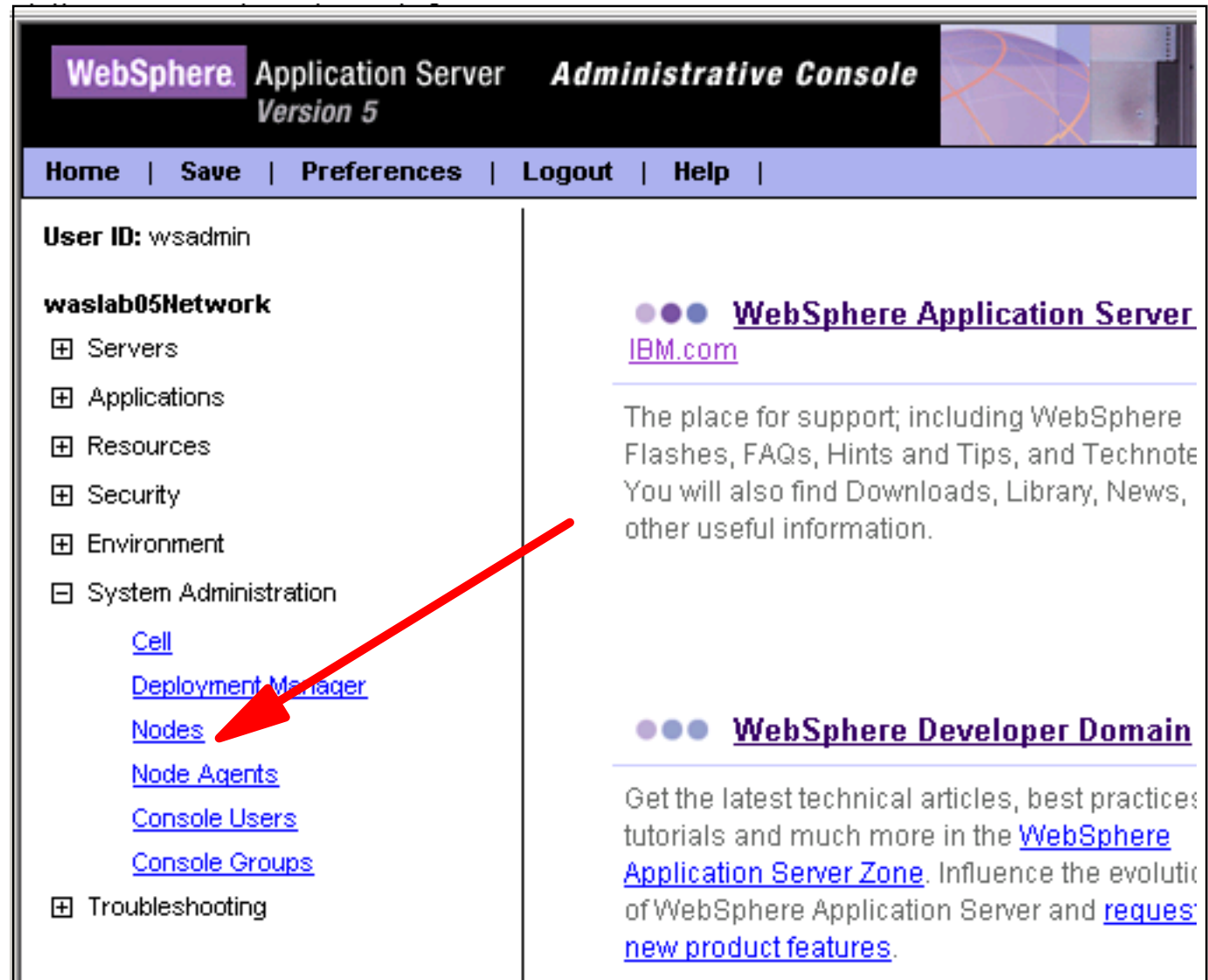
- **Deployment Manager Server**

- May be started and verified from firststeps screen
- May also be started from
 - ▶ `/opt/WebSphere/DeploymentManager/bin startManager.sh`



ip-address/909x/admin

- The console session is brought up using a browser session just as with a base application server. However, the port may vary depending on if other servers exist on the same image.



The screenshot shows the WebSphere Administrative Console interface. The top navigation bar includes links for Home, Save, Preferences, Logout, and Help. The main content area is divided into two columns. The left column displays the user ID 'wsadmin' and a tree view for 'waslab05Network' with expandable sections for Servers, Applications, Resources, Security, Environment, System Administration, and Troubleshooting. Under System Administration, there are links for Cell, Deployment Manager, Nodes, Node Agents, Console Users, and Console Groups. A red arrow points to the 'Nodes' link. The right column features two sections: 'WebSphere Application Server IBM.com' with a support link, and 'WebSphere Developer Domain' with a link to technical articles.

Add Nodes continued

- One node will already be defined as specified during the install process
- Add a node for each base WebSphere on various images

WebSphere Application Server Administrative Console
Version 5

Home | Save | Preferences | Logout | Help

User ID: wsadmin

waslab05Network

- ⊕ Servers
- ⊕ Applications
- ⊕ Resources
- ⊕ Security
- ⊕ Environment
- ⊖ System Administration**
- Cell
- Deployment Manager
- Nodes**
- Node Agents
- Console Users
- Console Groups
- ⊕ Troubleshooting

Nodes

A list of nodes in this cell. You can add new nodes into the cell by clicking on "Add Node" or Application Server instance. ⓘ

Total: 1

- ⊕ Filter
- ⊕ Preferences

Add Node Remove Node Synchronize Full Resynchron

<input type="checkbox"/>	Name ▾	Status ▾ ↻
<input type="checkbox"/>	waslab05Manager	↔

Add Nodes continued

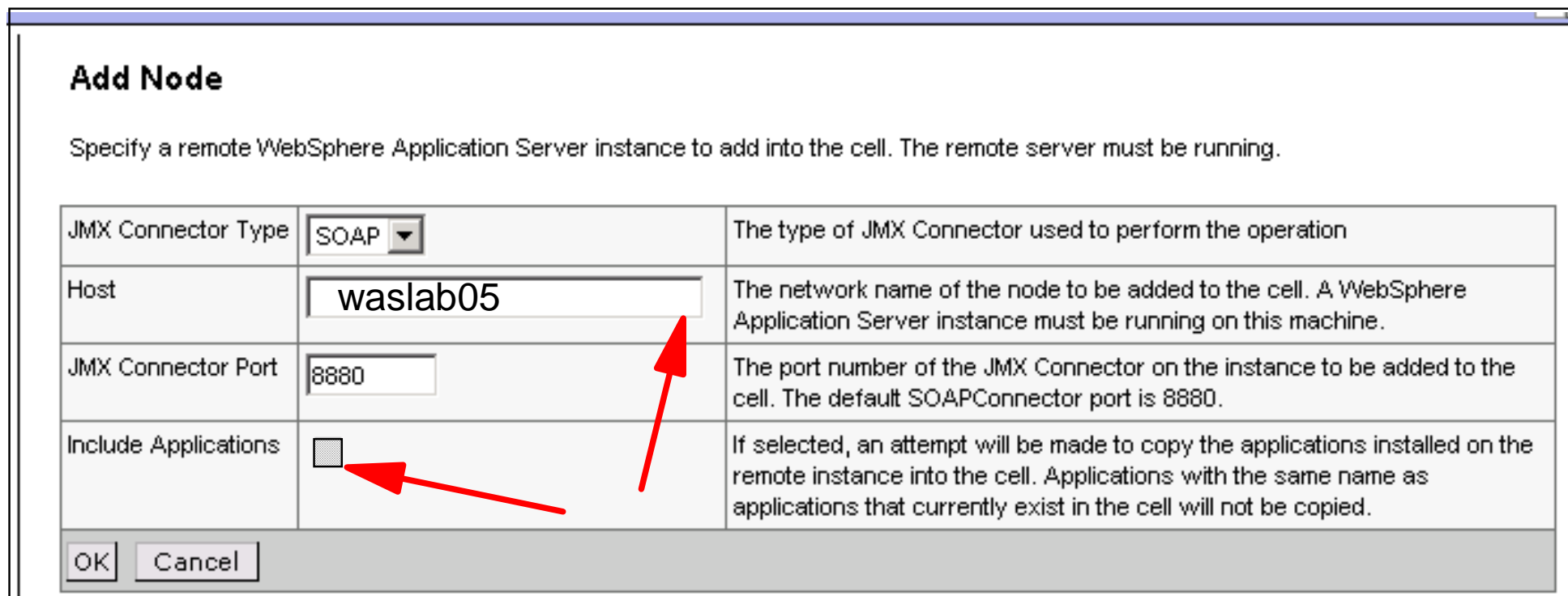
- Provide the hostname
- Include applications is desired

Add Node

Specify a remote WebSphere Application Server instance to add into the cell. The remote server must be running.

JMX Connector Type	SOAP ▾	The type of JMX Connector used to perform the operation
Host	waslab05	The network name of the node to be added to the cell. A WebSphere Application Server instance must be running on this machine.
JMX Connector Port	8880	The port number of the JMX Connector on the instance to be added to the cell. The default SOAPConnector port is 8880.
Include Applications	<input type="checkbox"/>	If selected, an attempt will be made to copy the applications installed on the remote instance into the cell. Applications with the same name as applications that currently exist in the cell will not be copied.

OK Cancel



Add Nodes continued



Advanced
Technical Support

- Messages
- New nodes added

Logout | Help

ADMU0524: WebSphere Embedded Messaging support not installed; Queue Manager not created

ADMU9990:

ADMU0300: Congratulations! Your node waslab05 has been successfully incorporated into the waslab05Network cell.

ADMU9990:

ADMU0306: Be aware:

ADMU0302: Any cell-level documents from the standalone waslab05 configuration have not been migrated to the new cell.

ADMU0307: You might want to:

ADMU0303: Update the configu

ADMU9990:

ADMU0003: Node waslab05 h

The new node will not be availa

[Logout from the WebSphere](#)

[Logout from the WebSphere Administrative Console](#)

Nodes

A list of nodes in this cell. You can add new Application Server instances.

Total: 3

Filter

Preferences

Add Node

Remove Node

Synchronize


Full Resynchronize

Stop


<input type="checkbox"/>	Name	Status
<input type="checkbox"/>	waslab05	
<input type="checkbox"/>	waslab05Manager	
<input type="checkbox"/>	waslab06	

Add Nodes continued - servers

- View of servers after nodes added
- Note that servers were stopped before nodes were added
- Server can then be restarted.

Logout | Help | 





Application Servers

An application server is a server which provides services required to run enterprise applications. 

Total: 2

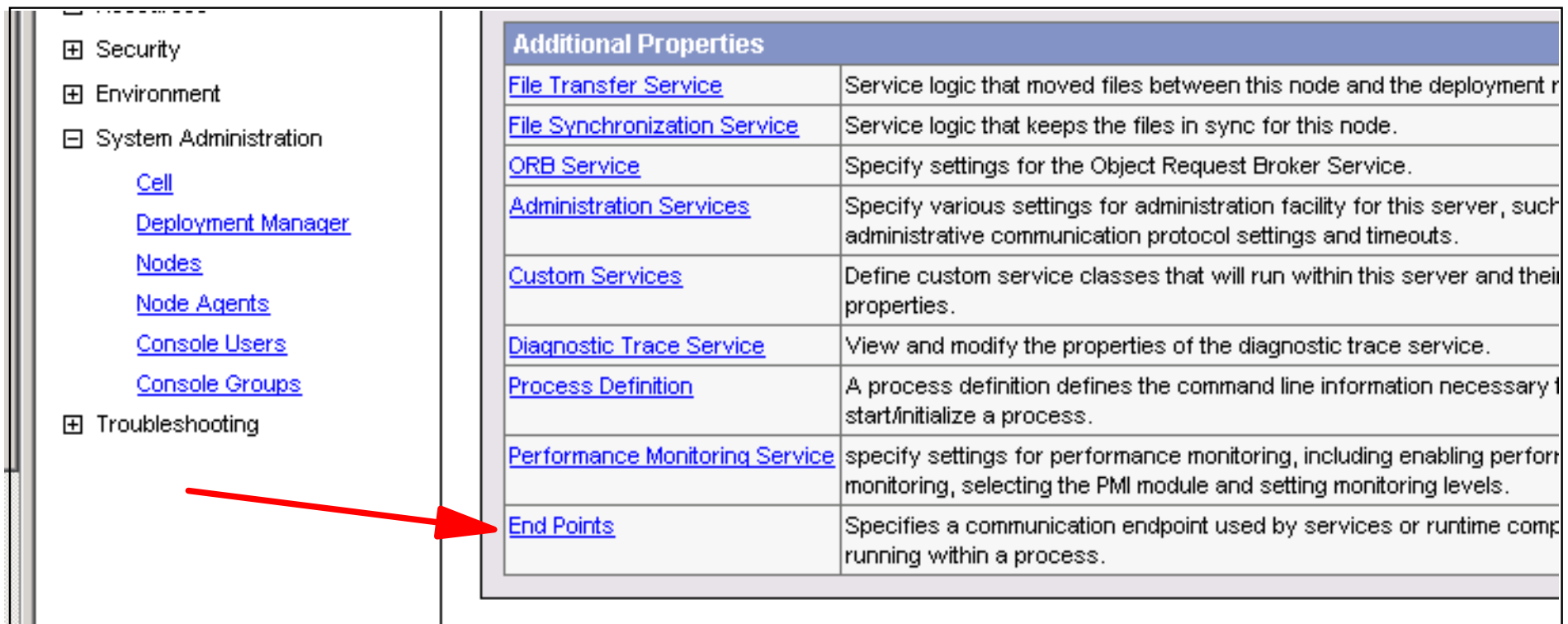
Filter

Preferences

<input type="checkbox"/>	Name 	Node 	Status  
<input type="checkbox"/>	server1	waslab05	✘
<input type="checkbox"/>	server1	waslab06	✘

Add Nodes continued - Ports

- If more than one node exists on a particular IP
 - Must modify ports for nodes using defaults
 - JMS and JMX ports must also be modified if embedded Messaging used



The screenshot displays a web console interface. On the left, a navigation tree is visible with the following items: Security, Environment, System Administration (expanded), Cell, Deployment Manager, Nodes, Node Agents, Console Users, Console Groups, and Troubleshooting. The main content area shows a table titled 'Additional Properties' with the following rows:

Additional Properties	
File Transfer Service	Service logic that moved files between this node and the deployment r
File Synchronization Service	Service logic that keeps the files in sync for this node.
ORB Service	Specify settings for the Object Request Broker Service.
Administration Services	Specify various settings for administration facility for this server, such administrative communication protocol settings and timeouts.
Custom Services	Define custom service classes that will run within this server and their properties.
Diagnostic Trace Service	View and modify the properties of the diagnostic trace service.
Process Definition	A process definition defines the command line information necessary to start/initialize a process.
Performance Monitoring Service	specify settings for performance monitoring, including enabling performance monitoring, selecting the PMI module and setting monitoring levels.
End Points	Specifies a communication endpoint used by services or runtime components running within a process.

A red arrow points from the 'Nodes' link in the navigation tree to the 'End Points' row in the table.

Add Nodes continued - End Points

- Modify each entry to use unique ports

The screenshot shows a configuration dialog box for an End Point Name. The dialog has a 'Configuration' title bar and a 'General Properties' section. The 'General Properties' section contains three rows of configuration data:

General Properties		
End Point Name	BOOTSTRAP_ADDRESS	
Host	* waslab15.washington.ibm.com	The IP address, DNS host name with domain name suffix, or just the DNS host name, used by a client to request a Web application resource (such as a servlet, JSP, or HTML page).
Port	* 2810	The port for which the Web server has been configured to accept client requests. Specify a port value in conjunction with the host name.

At the bottom of the dialog are four buttons: Apply, OK, Reset, and Cancel. A red arrow points from the 'BOOTSTRAP_ADDRESS' entry in the background list to the 'End Point Name' field in the dialog.

Add clusters for high availability

- Select Servers>Clusters
- Select New

The screenshot shows the WebSphere Administrative Console interface. The top navigation bar includes 'Home', 'Save', 'Preferences', 'Logout', and 'Help'. The left sidebar shows the 'User ID: wsadmin' and the 'waslab06Network' tree, with 'Servers' and 'Clusters' highlighted. The main content area is titled 'Server Cluster' and contains a description: 'A server cluster consists of a group of application servers. If one of the member servers fails, requests other members of the cluster.' Below this, there are controls for 'Total: 0', 'Filter', and 'Preferences'. A row of buttons includes 'Start', 'Stop', 'Ripplestart', 'ImmediateStop', 'New', and 'Delete', with 'New' highlighted. At the bottom, there is a table header with columns for 'Name' and 'Status'.

Define the cluster structure

● Choose a cluster name

→ Step 1: Enter Basic Cluster Information

Cluster name:	<input type="text" value="Cluster1"/>	The name of this cluster.
Prefer local:	<input checked="" type="checkbox"/> Prefer local enabled	Enable or disable Node scoped routing optimization.
Internal replication domain:	<input type="checkbox"/> Create Replication Domain for this cluster	If this option is selected, a Replication Domain will be created and the name will be set as the Cluster name
Existing server:	<input type="radio"/> Do not include an existing server in this cluster <input checked="" type="radio"/> Select an existing server to add to this cluster Choose a server from this list: <input type="text" value="waslab06Network/waslab061/server1"/> Weight: <input type="text" value="2"/> <input type="checkbox"/> Create Replication Entry in this Server	Choosing existing Server as a Cluster Member. A list of Servers which are not already a part of existing Clusters is provided. You can specify the weight for this Cluster Member. You can also choose if a Replication Entry needs to be created in this Server for internal replication.

Next

Cancel

Define the cluster structure - Add members



Advanced
Technical Support

→ Step 2: Create New Clustered Servers

Enter information about the new server below, and then use the Apply button to add it to the list of cluster members that will be created for this cluster. Use the Edit button to edit the properties of a server already included in the list. Use the Delete button to remove a server from the list.

Name:	<input type="text"/>	The name of the new cluster member
Select Node:	<input type="text" value="waslab16"/>	The new cluster member will be created on the selected node
Weight:	<input type="text" value="2"/>	Controls the amount of work directed to the application server. If the weight value for the server is greater than the weight values of other servers in the cluster, then the server will receive a larger portion of the servers' workload.
Http Ports	<input checked="" type="checkbox"/> Generate Unique Http Ports	Generates unique port numbers for every http transport that is created on the source server, so that the resulting server that is created will have HTTP Transports which conflict with the original server or other servers defined on the same node.
Replication entry:	<input type="checkbox"/> Create Replication Entry in this Server	If selected, a replication entry will be created for the new cluster member.
Select template:	<input checked="" type="radio"/> Default application server template <input type="radio"/> Existing application server	Cluster members must be created using either a default template or an existing application server as a model. Each member is required to use the same model.
	<input type="text" value="server1"/> <input type="text" value="waslab06Network/waslab16/se"/>	

→ Step 3: Summary

Cluster Name = cluster1

● Typical cell topology

User ID: wsadmin

waslab06Network

[-] Servers

[Application Servers](#)

[JMS Servers](#)

[Clusters](#)

[Cluster Topology](#)

[+] Applications

[+] Resources

[+] Security

[+] Environment

Cell

[-]  [Cluster1](#)

[-]  Nodes

[-]  [waslab061](#)

[-]  Cluster members

 [CLS2](#)

[-]  [waslab06](#)

[-]  Cluster members

 [CLS1](#)

Application to Server Relationships

- Applications are tied to a server, servers, or clusters
- Imported nodes do not duplicate applications
 - Once imported with a node
 - ▶ Applications owned by ND node
 - ▶ Assigned to run on server node they were imported from
- May be updated to run on other or multiple servers or clusters
 - ▶ Map modules to application servers

Specify the application server where you want to install modules contained in your application. Modules can be installed on the same server or dispersed among several servers.

Clusters and Servers:

```
WebSphere:cell=waslab07Network,cluster=cluster1  
WebSphere:cell=waslab07Network,node=waslab07,server=server1  
WebSphere:cell=waslab07Network,node=waslab00,server=server1
```

Apply

<input type="checkbox"/>	Module	URI	Server
<input type="checkbox"/>	Increment Enterprise Java Bean	Increment.jar,META-INF/ejb-jar.xml	WebSphere:cell=waslab07Network,cluster=cluster1
<input type="checkbox"/>	Default Web Application	DefaultWebApplication.war,WEB-INF/web.xml	WebSphere:cell=waslab07Network,cluster=cluster1

OK Cancel

- Ports defined in
 - Environments>Virtual Hosts
 - Usually defined to hostname * (clusters)
 - Shown in WebSphere plug-in for HTTP Server
- Ports increment per server on node starting with port 9080
 - Default ports of 80 and 9080 are not defined after node is federated
 - Plug-in must be regenerated after port change

Total: 6

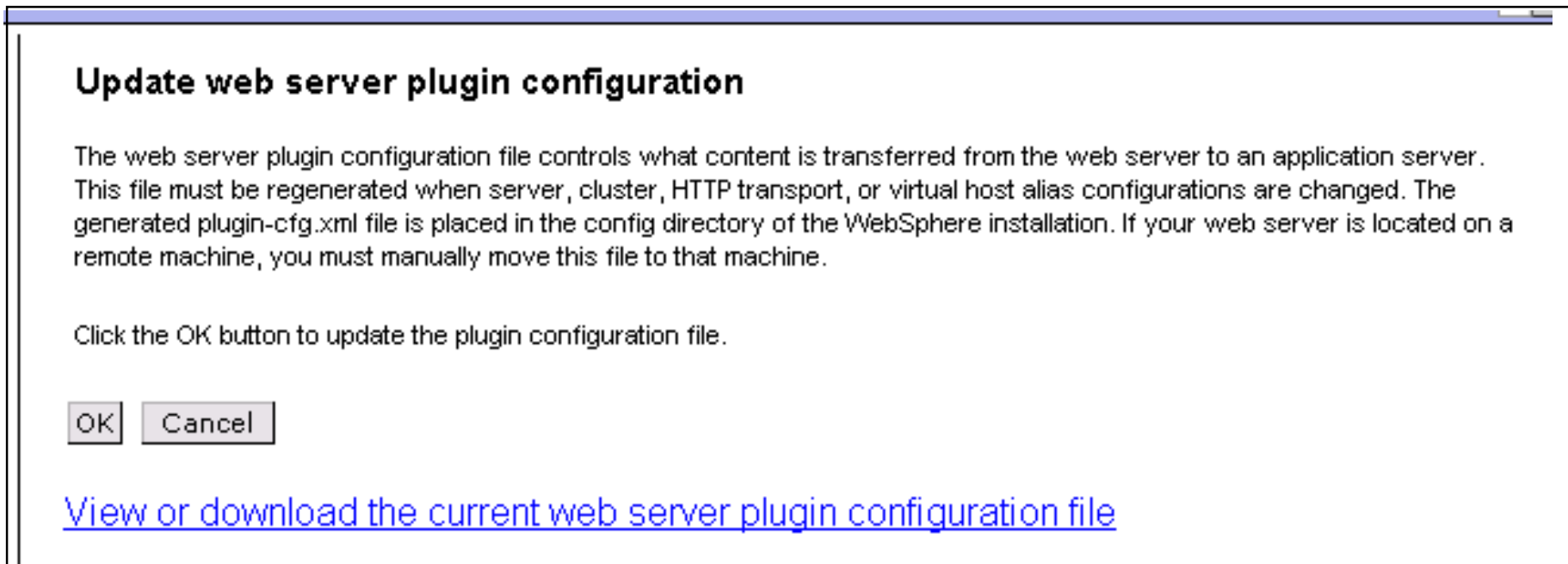
Filter

Preferences

<input type="checkbox"/>	Host Name ▾	Port ▾
<input type="checkbox"/>	* _	9085
<input type="checkbox"/>	* _	81
<input type="checkbox"/>	* _	9444
<input type="checkbox"/>	* _	9080
<input type="checkbox"/>	* _	80
<input type="checkbox"/>	* _	9081

41

- HTTP Server to WebSphere interface
- Written in XML
 - Environments>Update web server plug-in configuration
 - ▶ Generate new plug-in
 - ▶ View plug-in
- After plug-in is regenerated
 - ▶ When ND is used, the plug-in must be manually copied to the appropriate application server directory



- Ports and other info such as cluster names are defined in the plug-in
- Ports must be defined
- HTTP Server and plug-in may be run on single or multiple images in the same cluster

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
- <Config ASDisableNagle="false" AcceptAllContent="false" IISDisableNagle="false"
  IgnoreDNSFailures="false" RefreshInterval="60" ResponseChunkSize="64">
  <Log LogLevel="Error"
    Name="/opt/WebSphere/DeploymentManager/logs/http_plugin.log" />
  <Property Name="ESIEnable" Value="true" />
  <Property Name="ESIMaxCacheSize" Value="1024" />
  <Property Name="ESIInvalidationMonitor" Value="false" />
- <VirtualHostGroup Name="default_host">
  <VirtualHost Name="*:9085" />
  <VirtualHost Name="*:81" />
  <VirtualHost Name="*:9444" />
  <VirtualHost Name="*:9080" />
  <VirtualHost Name="*:80" />
  <VirtualHost Name="*:9081" />
</VirtualHostGroup>
- <ServerCluster CloneSeparatorChange="false" LoadBalance="Round Robin"
  Name="cluster1" PostSizeLimit="-1" RemoveSpecialHeaders="true"
  RetryInterval="60">
- <Server CloneID="vkhluhd" ConnectTimeout="0" ExtendedHandshake="false"
  LoadBalanceWeight="2" MaxConnections="-1" Name="waslab07_clone1"
  WaitForContinue="false">
```

- WebSphere Network Deployment extends the abilities of the WebSphere Application Servers to include centralized administration and robust failover and load balancing capabilities.

References

- [C3214020.pdf](#)
- [WebSphere On-line Documentation](#)
- www.ibm.com/websphere