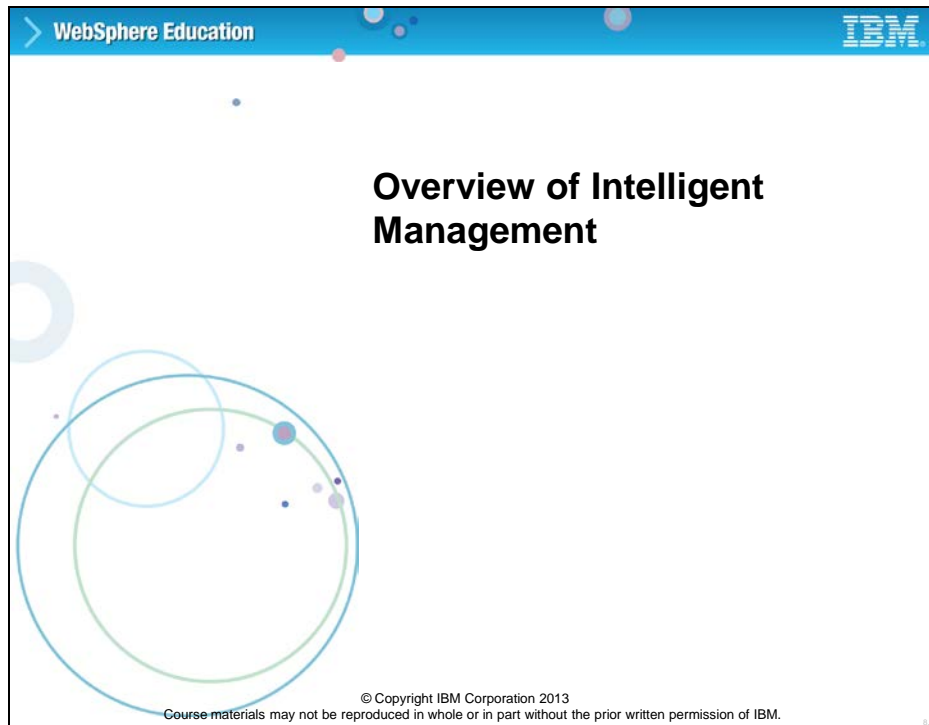
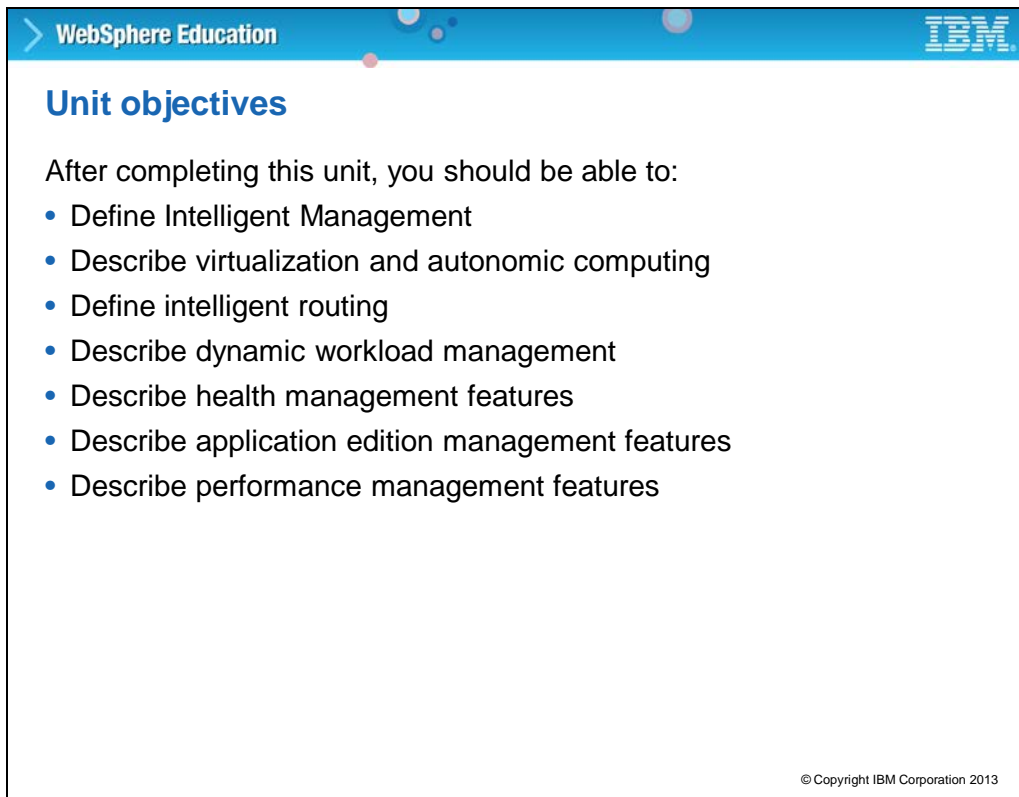


Slide 1



Overview of Intelligent Management. This unit introduces the concepts of the Intelligent Management feature of WebSphere Application Server.

Slide 2

The slide features a blue header bar with a white right-pointing arrow, the text 'WebSphere Education', and the IBM logo. The main content area is white with a blue title 'Unit objectives'. Below the title, it states 'After completing this unit, you should be able to:' followed by a bulleted list of seven objectives. The footer contains the copyright notice '© Copyright IBM Corporation 2013'.

> WebSphere Education IBM

## Unit objectives

After completing this unit, you should be able to:

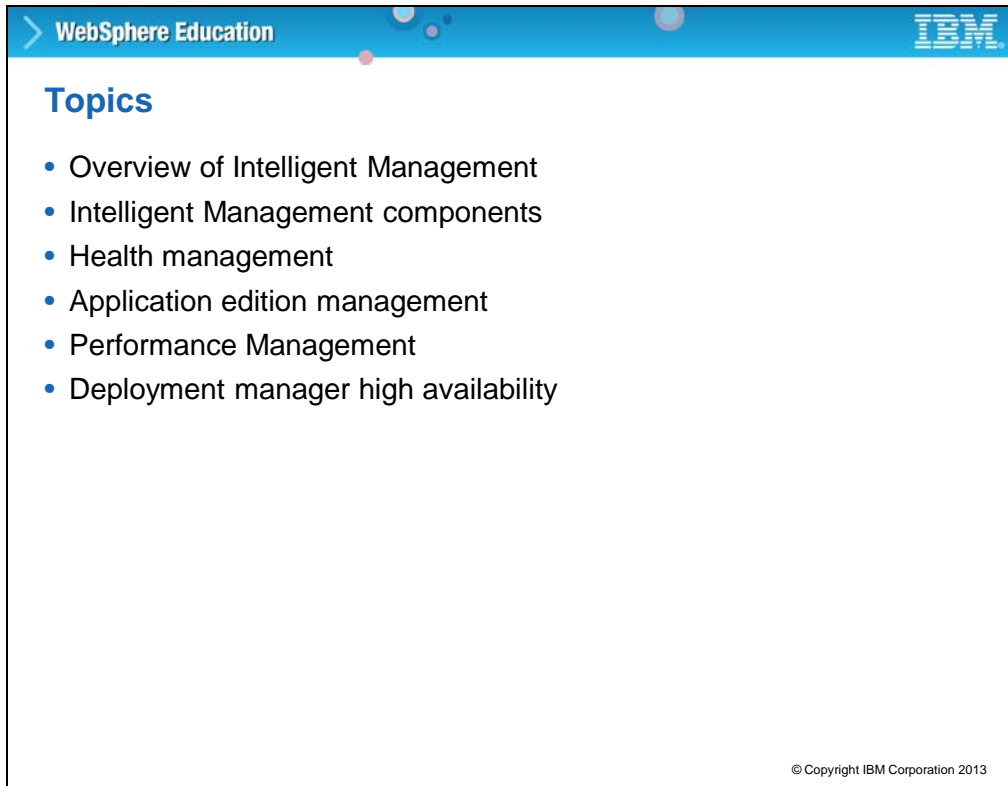
- Define Intelligent Management
- Describe virtualization and autonomic computing
- Define intelligent routing
- Describe dynamic workload management
- Describe health management features
- Describe application edition management features
- Describe performance management features

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After completing this unit, you should be able to:

- Define Intelligent Management
- Describe virtualization and autonomic computing
- Define intelligent routing
- Describe dynamic workload management
- Describe health management features
- Describe application edition management features
- Describe Performance Management features

Slide 3



The slide features a blue header bar with a white right-pointing arrow, the text "WebSphere Education", and the IBM logo. The main content area is white and contains the title "Topics" in blue, followed by a bulleted list of six items. The footer of the slide is white and contains a small copyright notice.

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## Topics

- Overview of Intelligent Management
- Intelligent Management components
- Health management
- Application edition management
- Performance Management
- Deployment manager high availability

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This unit is divided into six topics.

Slide 4

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## Overview of Intelligent Management

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Topic: Overview of Intelligent Management. In this topic, you get an overview of Intelligent Management.

—

Slide 5

WebSphere Education


## Intelligent Management

- Intelligent management provides application server virtualization, resource management, and advanced operations
- Used to enhance operations efficiency by
  - Managing available resources to meet the demands of high-volume transactional workloads
  - Managing large scale, continuously available application server environments
- Provides application infrastructure virtualization
  - Separates applications from the physical infrastructure on which they are hosted
  - Requests are intelligently routed to respond to the most critical applications and users
- Dynamic operations allow an application environment to scale as required by virtualizing WebSphere resources

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Intelligent Management provides a virtualized infrastructure that redefines the traditional concepts of Java Platform, Enterprise Edition (Java EE) resources and applications, and their relationships with one another. This application infrastructure virtualization facilitates the ability of the product to automate operations in an optimal manner, increasing the quality of service. By introducing an automated operating environment with workload management, you can reduce total cost of ownership by completing more work by using less hardware.

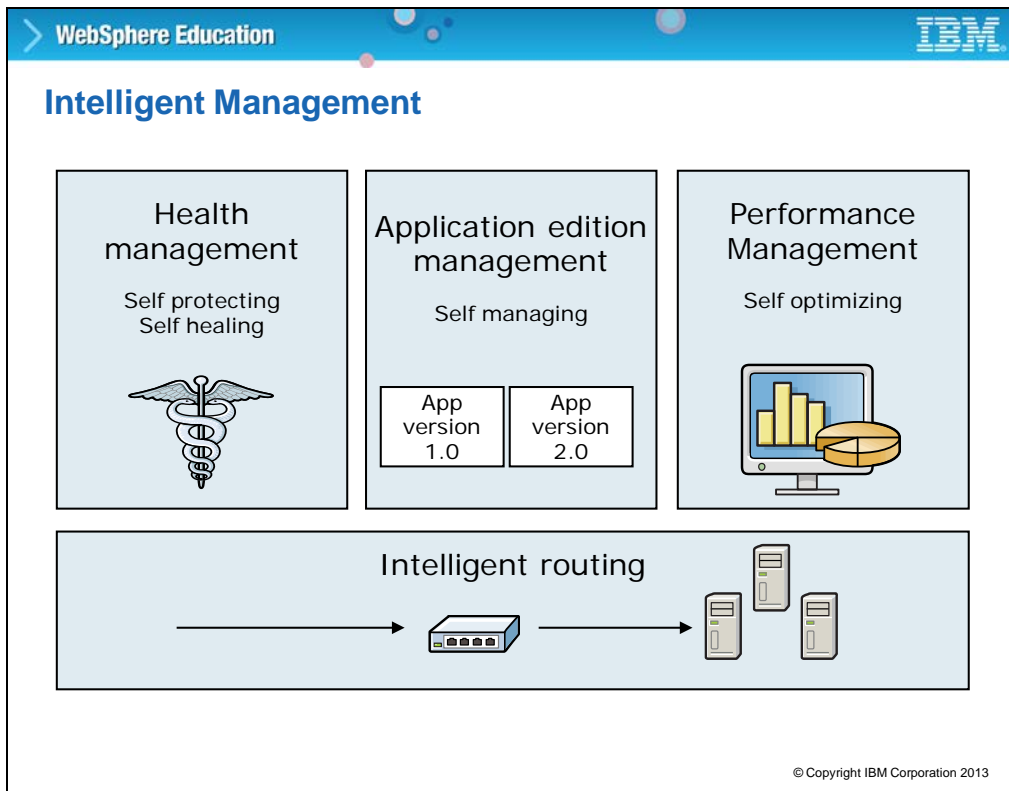
Intelligent Management capabilities are available with WebSphere Application Server Network Deployment V8.5. It provides a virtualized infrastructure that redefines the traditional concepts of Java EE resources and applications and their relationships with one another.

The dynamic operations environment consists of autonomic managers whose purpose is to maximize utilization by using defined business goals. Dynamic operations allow an application environment to scale as required by the virtualization of WebSphere resources and the use of a goals-directed infrastructure. Therefore, you can increase the speed at which your environment adapts to the business requirements. Using the dynamic operations features of WebSphere Application Server, you can change the way a typical WebSphere environment is configured to one that has the following features:

- Improves the utilization of available resources such as processor and memory
- Classifies and monitors the workload

- Provides a business-centric view of the workload and how it functions
- Responds in real time to changes in the workload mix (without human intervention if so wanted), by using business guidelines that the organization specified

## Slide 6



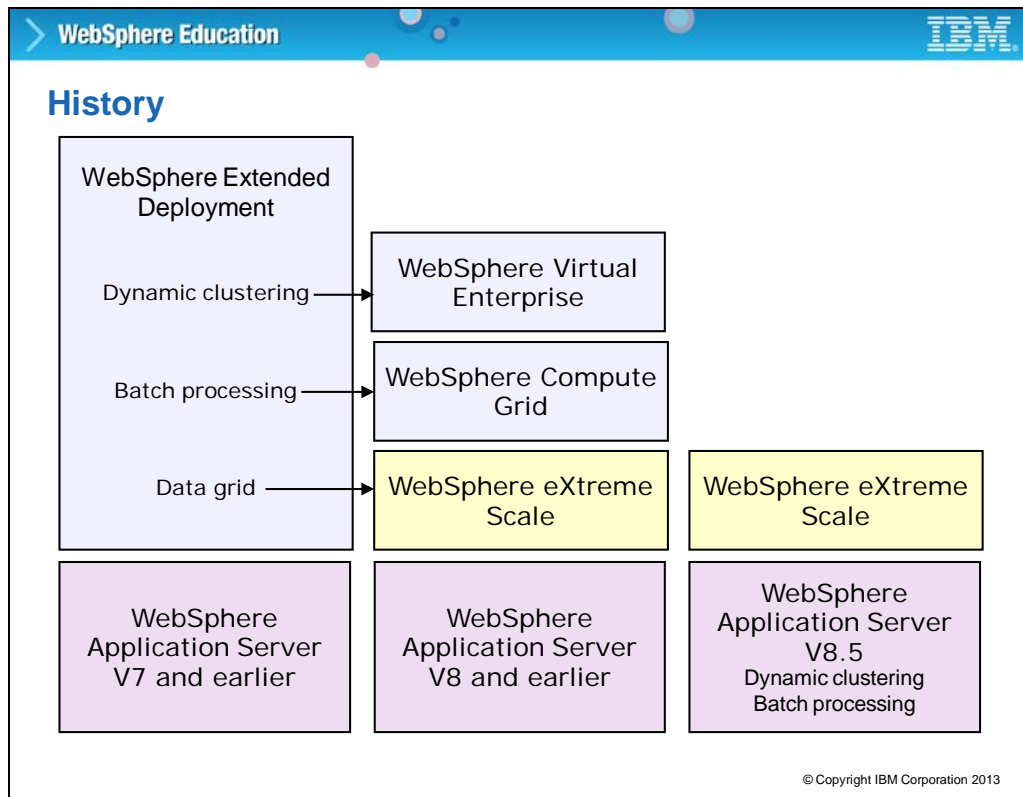
The Intelligent Management features extend the quality of service that the middleware environment provides. Configurable operational policies govern the performance and health of your applications.

Intelligent routing improves business results by ensuring that priority is given to business critical applications. Requests to applications are prioritized and routed based on rules that are defined. You can use health management to monitor conditions automatically and take corrective actions when the conditions are observed. You can monitor the status of application servers, sense problem areas, and then respond to these problem areas before an outage occurs.

You can use application edition management to roll out new versions of applications without experiencing downtime for a maintenance window. You can use this feature to manage interruption-free production application deployments.

Performance Management provides a self-optimizing middleware infrastructure. You can use dynamic clusters to scale up and out the number of running cluster members automatically as needed to meet response time goals for users.

Slide 7



The biggest news under the theme of application resiliency is the integration of the features from WebSphere Virtual Enterprise into WebSphere Application Server Network Deployment V8.5. This merge allows for a single WebSphere Application Server Network Deployment installation to deliver the traditional Network Deployment functions, and WebSphere Virtual Enterprise functions. The former WebSphere Virtual Enterprise functions now in Network Deployment V8.5, are characterized as Intelligent Management features and encompass intelligent routing, application edition management, dynamic clustering, and health management.



Slide 8

WebSphere Education

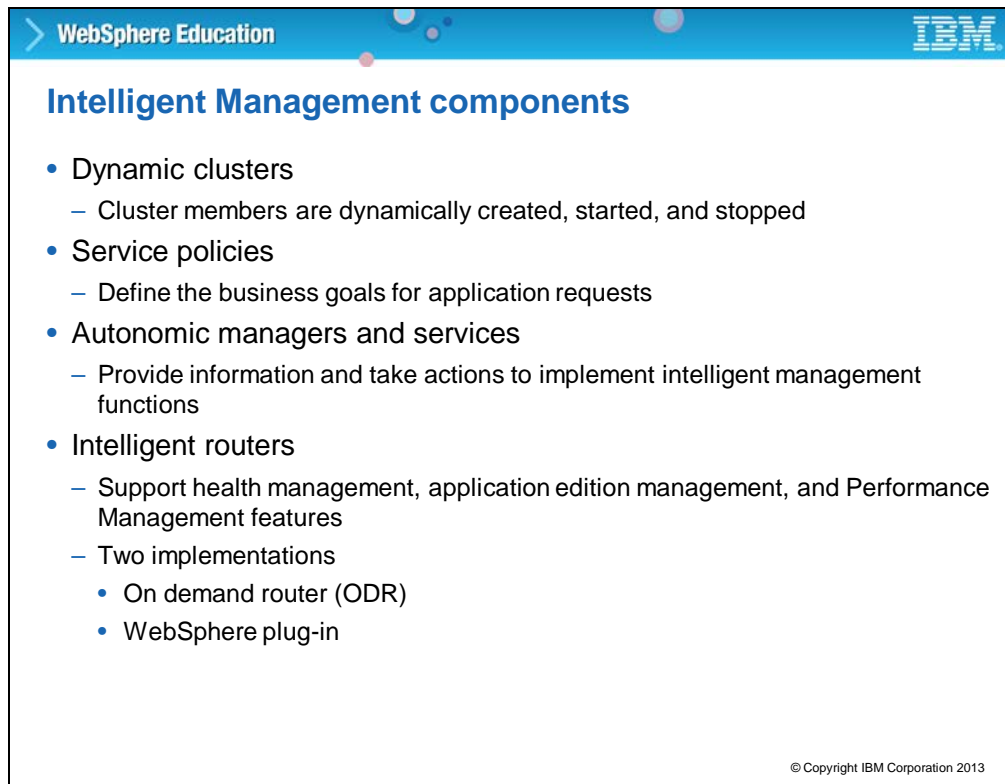
IBM

## Intelligent Management components

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Topic: Intelligent Management components. In this topic, you learn about the components that work together to provide Intelligent Management functions.

Slide 9



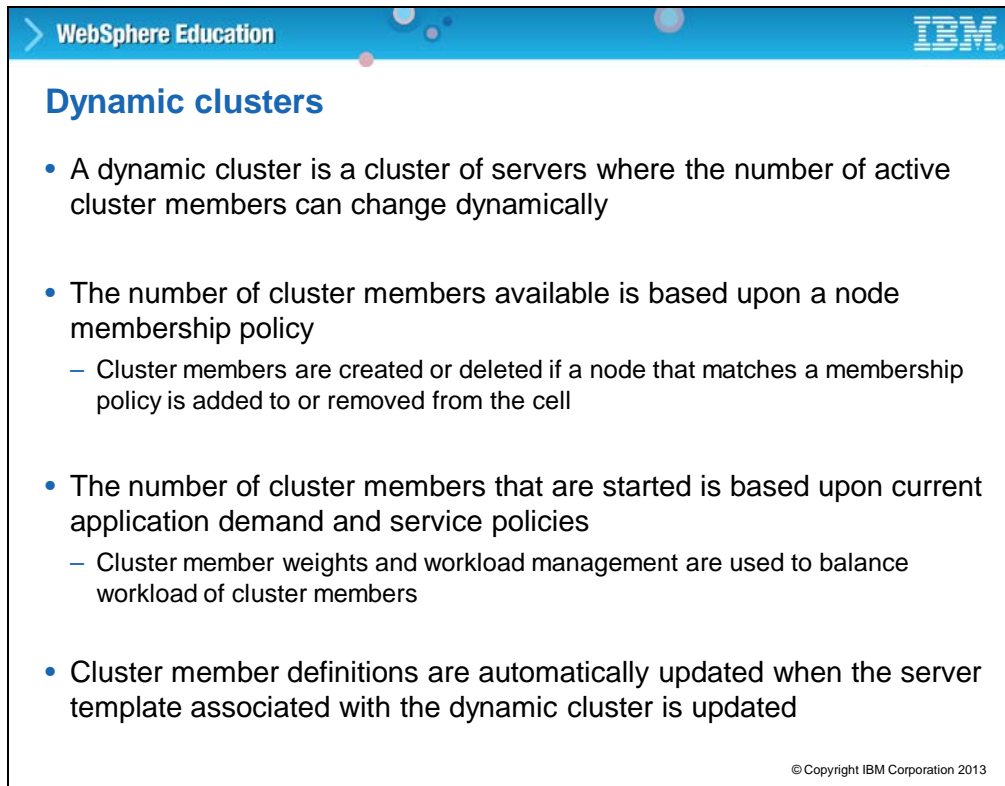
The slide is titled "Intelligent Management components" and is part of a "WebSphere Education" presentation, as indicated by the header. The IBM logo is in the top right corner. The content is organized into a bulleted list with sub-points.

- **Dynamic clusters**
  - Cluster members are dynamically created, started, and stopped
- **Service policies**
  - Define the business goals for application requests
- **Autonomic managers and services**
  - Provide information and take actions to implement intelligent management functions
- **Intelligent routers**
  - Support health management, application edition management, and Performance Management features
  - Two implementations
    - On demand router (ODR)
    - WebSphere plug-in

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Components that Intelligent Management uses include dynamic clusters, service policies, autonomic managers and services, and intelligent routers. These components are described more fully in the next few slides.

Slide 10



The slide is titled "Dynamic clusters" and is part of a "WebSphere Education" presentation, as indicated by the header. It features a blue header bar with the "WebSphere Education" text and the IBM logo. The main content is a bulleted list describing the characteristics of dynamic clusters. The list includes: a definition of a dynamic cluster as a server cluster where the number of active members can change; the number of members based on a node membership policy, with a sub-point about creating or deleting members; the number of members based on current application demand and service policies, with a sub-point about balancing workload; and automatic updates to member definitions when the server template is updated. A small copyright notice "© Copyright IBM Corporation 2013" is located at the bottom right of the slide.

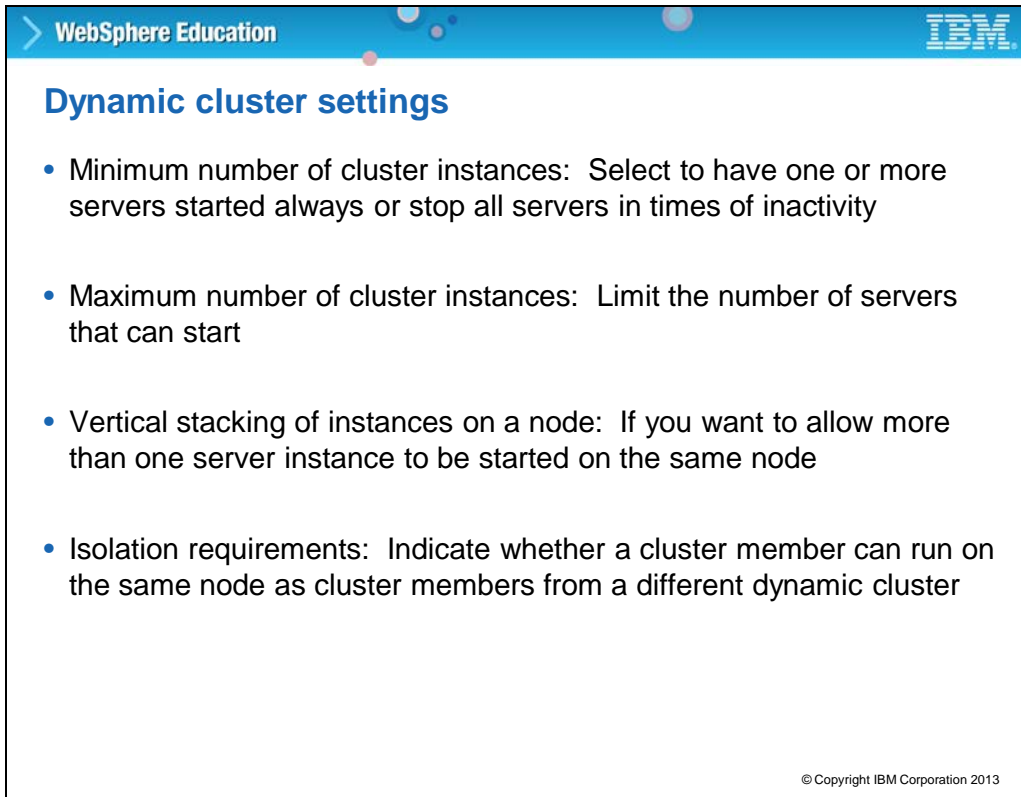
- A dynamic cluster is a cluster of servers where the number of active cluster members can change dynamically
- The number of cluster members available is based upon a node membership policy
  - Cluster members are created or deleted if a node that matches a membership policy is added to or removed from the cell
- The number of cluster members that are started is based upon current application demand and service policies
  - Cluster member weights and workload management are used to balance workload of cluster members
- Cluster member definitions are automatically updated when the server template associated with the dynamic cluster is updated

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A dynamic cluster is a server cluster that enables application server virtualization. Members of a dynamic cluster are automatically created based on a membership policy, which is updated by using a server template, and started and stopped based on current demand, available resources, and service policies.

Dynamic clusters allow the application environment to dynamically expand and contract based on the amount of workload that can be handled at any time.

Slide 11



The slide is titled "Dynamic cluster settings" and is part of a WebSphere Education presentation. It contains four bullet points describing cluster configuration options. The IBM logo is in the top right corner, and a copyright notice is in the bottom right corner.

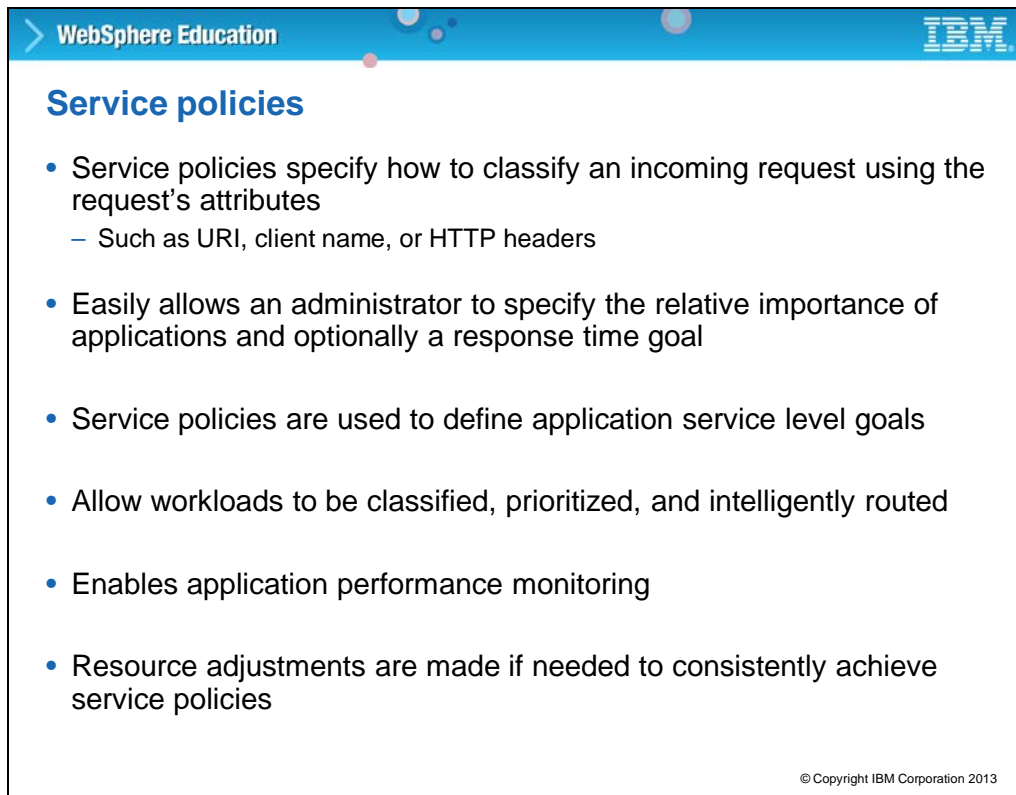
**Dynamic cluster settings**

- Minimum number of cluster instances: Select to have one or more servers started always or stop all servers in times of inactivity
- Maximum number of cluster instances: Limit the number of servers that can start
- Vertical stacking of instances on a node: If you want to allow more than one server instance to be started on the same node
- Isolation requirements: Indicate whether a cluster member can run on the same node as cluster members from a different dynamic cluster

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When you define a dynamic cluster, you can specify the minimum number of cluster members that must be started, and the maximum number of cluster members that can be started. You can specify how any cluster members for the dynamic cluster can exist on a single node. You can also specify which cluster members from other dynamic clusters can start on the same node with these cluster members.

Slide 12



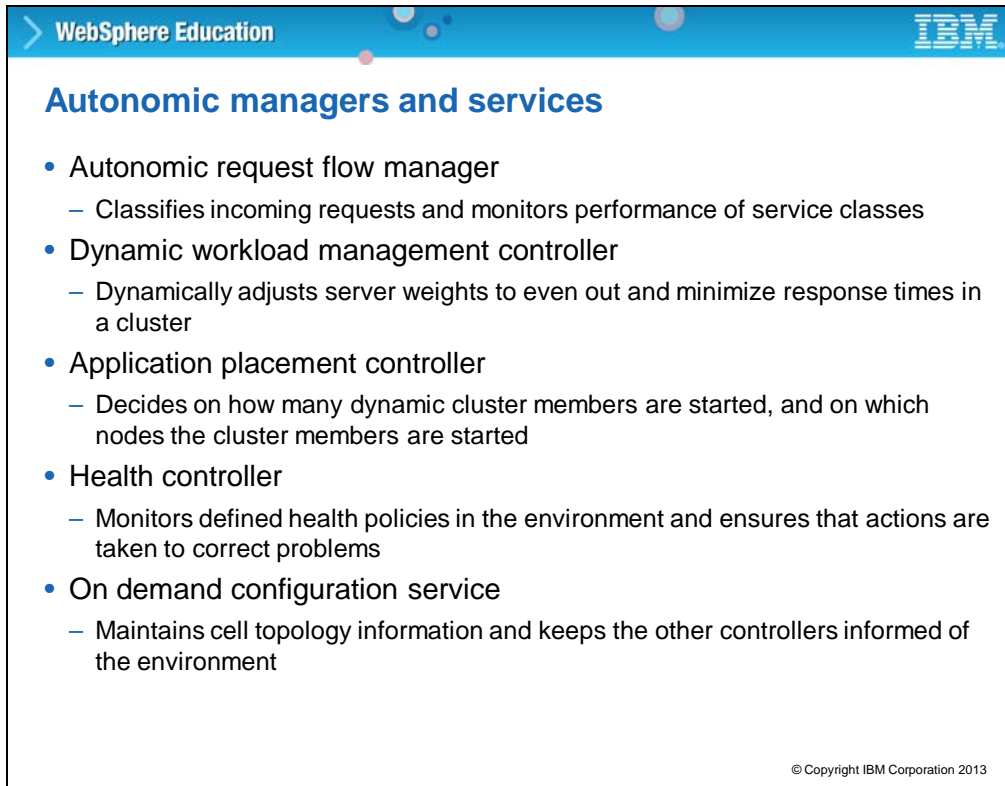
The slide is titled "Service policies" and is part of a "WebSphere Education" presentation. It features a blue header with the "WebSphere Education" text and the IBM logo. The main content is a bulleted list of seven points describing service policies. The slide is framed by a black border, and the IBM logo is in the bottom right corner.

- Service policies specify how to classify an incoming request using the request's attributes
  - Such as URI, client name, or HTTP headers
- Easily allows an administrator to specify the relative importance of applications and optionally a response time goal
- Service policies are used to define application service level goals
- Allow workloads to be classified, prioritized, and intelligently routed
- Enables application performance monitoring
- Resource adjustments are made if needed to consistently achieve service policies

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A service policy is a user-defined categorization that is assigned to potential work as an attribute that the application request flow manager (ARFM) reads. You can use a service policy to classify requests that are based on request attributes. These attributes include the Uniform Resource Identifier (URI), the client name and address, HTTP headers, query parameters, cookies, time of day, and others. By configuring service policies, you apply varying levels of importance to the actual work. You can use multiple service policies to deliver differentiated services to different categories of requests.

## Slide 13



**WebSphere Education** **IBM**

## Autonomic managers and services

- Autonomic request flow manager
  - Classifies incoming requests and monitors performance of service classes
- Dynamic workload management controller
  - Dynamically adjusts server weights to even out and minimize response times in a cluster
- Application placement controller
  - Decides on how many dynamic cluster members are started, and on which nodes the cluster members are started
- Health controller
  - Monitors defined health policies in the environment and ensures that actions are taken to correct problems
- On demand configuration service
  - Maintains cell topology information and keeps the other controllers informed of the environment

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With Intelligent Management, you can introduce autonomic capabilities into your infrastructure at your own pace. Autonomic capabilities are delivered in a set of components that are known as autonomic managers. Autonomic managers monitor performance and health statistics through a series of sensors, and optimize system performance and run traffic shaping.

The autonomic request flow manager manages traffic shaping of incoming requests. The dynamic workload controller dynamically adjusts server weights to even out and minimize response times across the cluster. There is one dynamic workload controller per cluster. The dynamic workload controller maintains a list of active server instances for each dynamic cluster, and assigns each a routing weight according to observed performance trends.

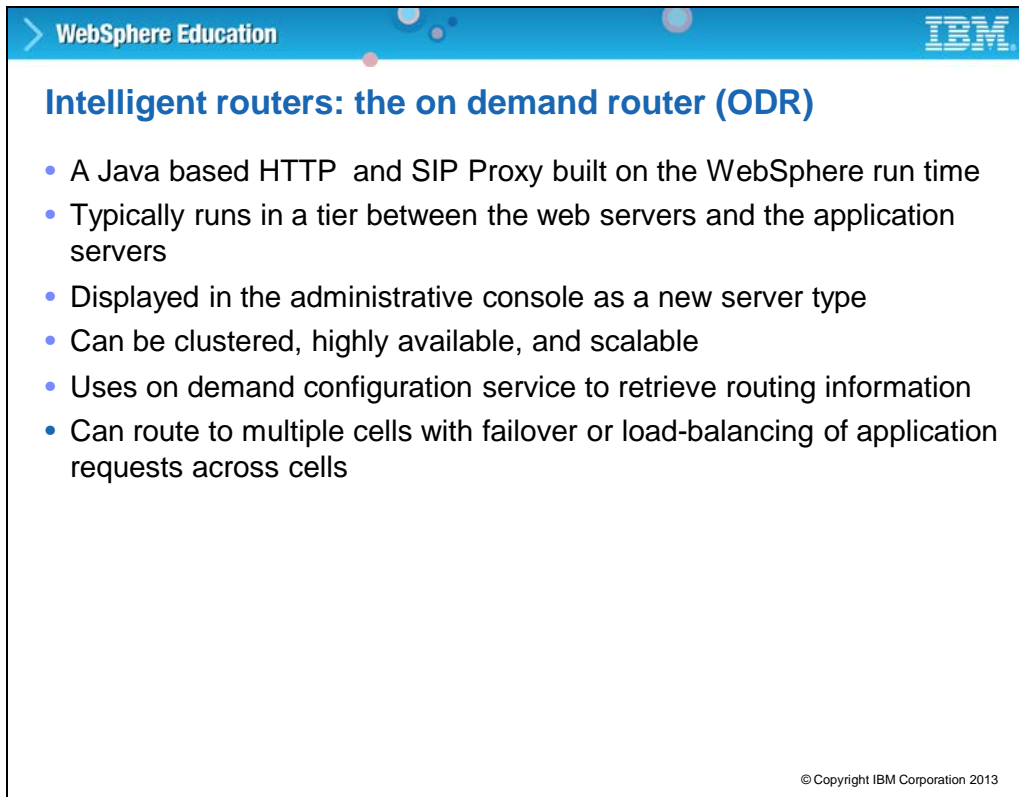
The application placement controller is responsible for the management of the location of an application within a node group. A single application placement controller exists in the cell and is hosted in the deployment manager or in a node agent process. The application placement controller starts and stops application server instances to manage HTTP, SIP, JMS, and IIOP traffic.

The health controller is used for managing health conditions and is covered in the next topic.

The on-demand configuration service maintains cell topology information and keeps the autonomic request flow manager and other controllers aware of the environment. It tracks updates in cell topology and state, including applications that are installed and removed, servers started and stopped, and others. The on-demand configuration service allows the on-demand

router to sense its environment. The on-demand router dynamically configures the routing rules at run time to allow the on-demand router to accurately route traffic to application servers.

Slide 14



The slide is titled "Intelligent routers: the on demand router (ODR)" and is part of a "WebSphere Education" presentation. It features a blue header with the IBM logo. The content is a bulleted list describing the ODR's role and capabilities. A copyright notice for IBM Corporation 2013 is at the bottom right.

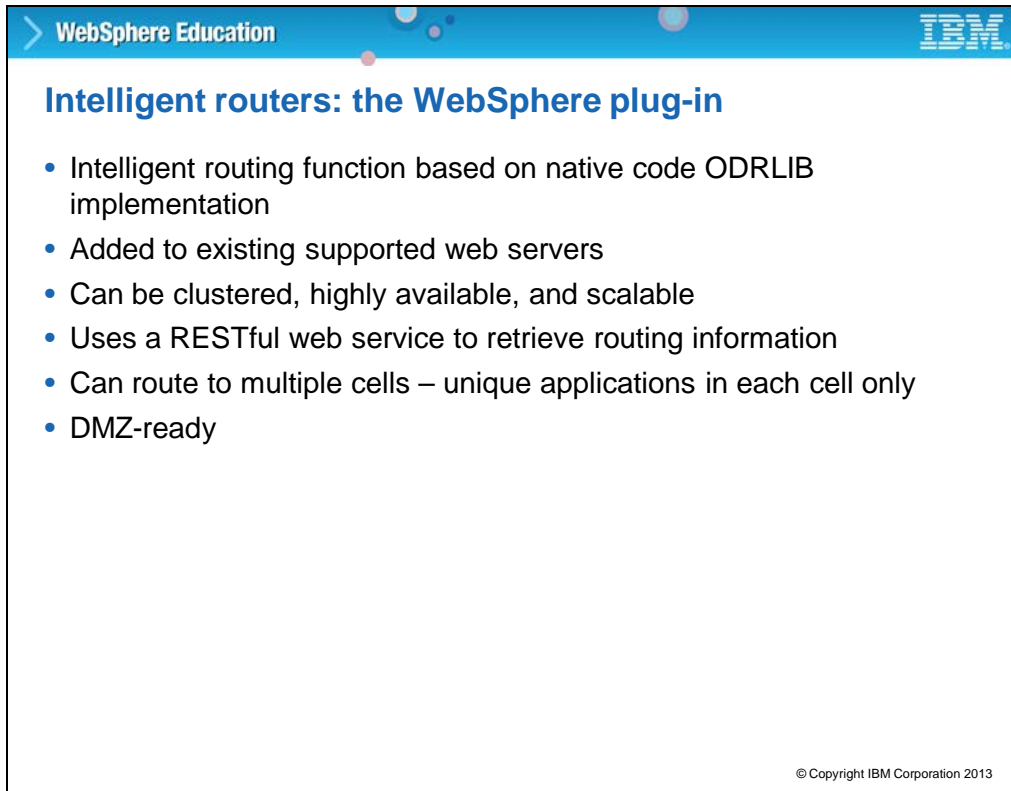
- A Java based HTTP and SIP Proxy built on the WebSphere run time
- Typically runs in a tier between the web servers and the application servers
- Displayed in the administrative console as a new server type
- Can be clustered, highly available, and scalable
- Uses on demand configuration service to retrieve routing information
- Can route to multiple cells with failover or load-balancing of application requests across cells

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The on-demand router is an HTTP and SIP proxy that is part of a WebSphere Application Server cell. It typically sits between the web servers and the application servers. It is one of two types of intelligent routers that the Intelligent Management feature uses to route client requests to application servers. Because the on-demand router is part of the cell, it can use the on-demand configuration service to retrieve the information that is used to route requests. The on-demand router can route requests to multiple cells.



Slide 15



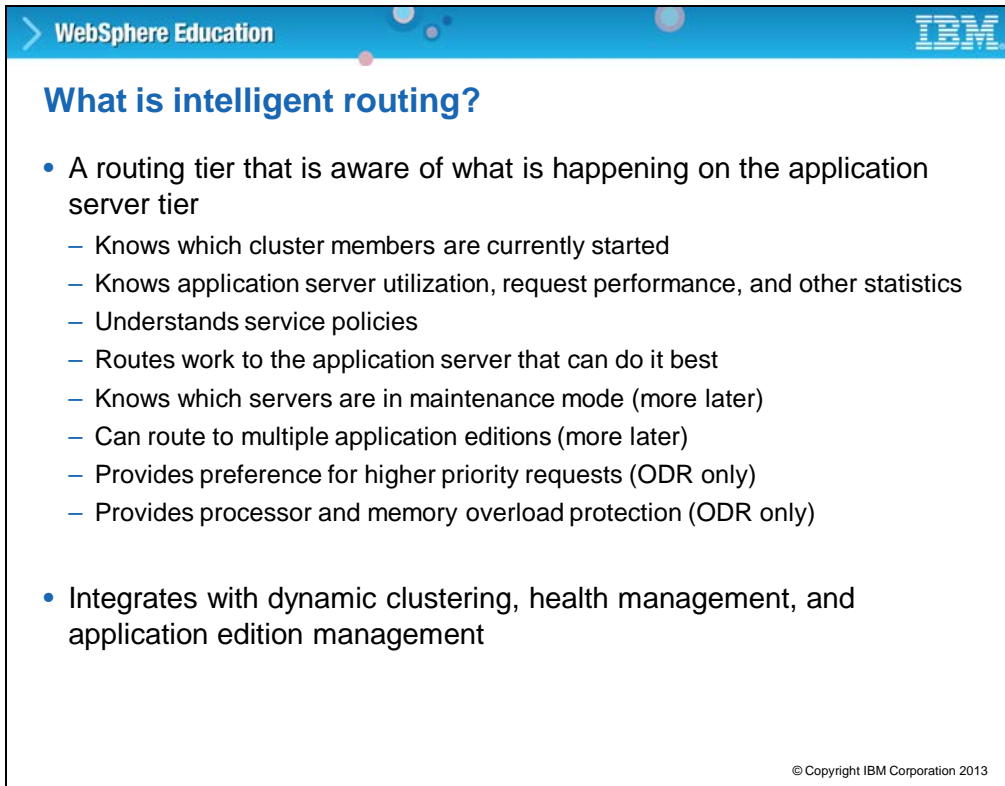
The slide is titled "Intelligent routers: the WebSphere plug-in" and is part of a "WebSphere Education" presentation. It features a blue header with the IBM logo. The main content is a bulleted list of features. The footer contains a copyright notice for IBM Corporation 2013.

- Intelligent routing function based on native code ODRLIB implementation
- Added to existing supported web servers
- Can be clustered, highly available, and scalable
- Uses a RESTful web service to retrieve routing information
- Can route to multiple cells – unique applications in each cell only
- DMZ-ready

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The WebSphere plug-in is the second type of intelligent router that the Intelligent Management feature uses. The plug-in runs in the web server tier, and routes requests directly to application servers. The information that is needed to route requests is retrieved from the cell with a RESTful web service. One advantage of the WebSphere plug-in intelligent router is that it is DMZ-ready. However, the plug-in intelligent router does not provide as much function as the on-demand router.

Slide 16



The slide is titled "What is intelligent routing?" and is part of a WebSphere Education presentation. It features a blue header with the "WebSphere Education" text and the IBM logo. The main content is a bulleted list describing the capabilities of intelligent routing. The list includes: a routing tier aware of application server tier events (knowing cluster members, utilization, and statistics), understanding service policies, routing to the best application server, handling maintenance mode, routing to multiple editions, and providing ODR (On-Demand Router) specific features like priority and overload protection. It also mentions integration with dynamic clustering, health management, and application edition management. A small copyright notice "© Copyright IBM Corporation 2013" is at the bottom right of the slide.

- A routing tier that is aware of what is happening on the application server tier
  - Knows which cluster members are currently started
  - Knows application server utilization, request performance, and other statistics
  - Understands service policies
  - Routes work to the application server that can do it best
  - Knows which servers are in maintenance mode (more later)
  - Can route to multiple application editions (more later)
  - Provides preference for higher priority requests (ODR only)
  - Provides processor and memory overload protection (ODR only)
- Integrates with dynamic clustering, health management, and application edition management

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With intelligent routing, the router is aware of what is happening in the application server tier. As dynamic cluster members are started and stopped, the intelligent router is informed so that the router knows what servers are available. The intelligent routers use performance characteristics of the application servers to make decisions. Service policy information is used along with performance information to route requests most effectively.

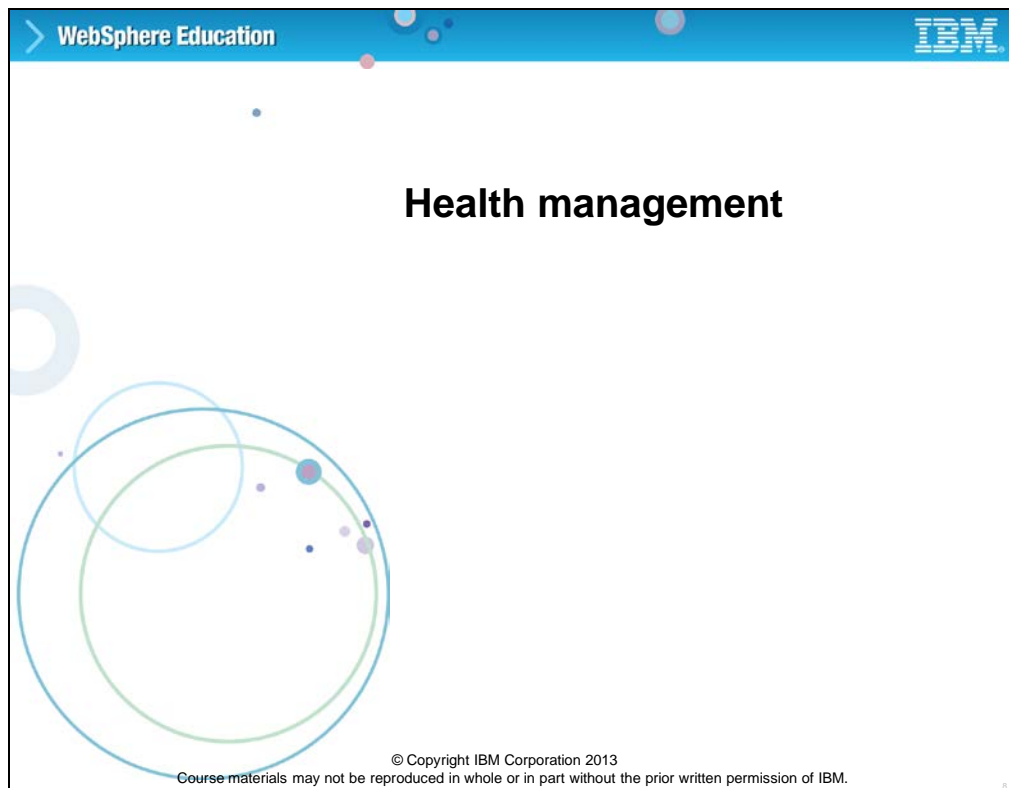
Intelligent routers understand when a server or node is in maintenance mode, and route only appropriate requests to those endpoints. Maintenance mode is presented more fully in the health management topic.

Intelligent routers can route to more than one edition of an application at the same time; or can route correctly when rolling out from one edition to another. Edition management is presented in more detail later in this unit.

The ODR intelligent router can prioritize requests so that lower priority requests are held back, allowing higher priority requests to use more application server resources. The ODR can also queue requests to prevent application server overload.



Intelligent routers work with autonomic managers, dynamic clusters, the health management system, and the application edition management system to route requests to the most appropriate resources.

Slide 17



Topic: Health management. In this topic, you learn about the health management feature.

Slide 18

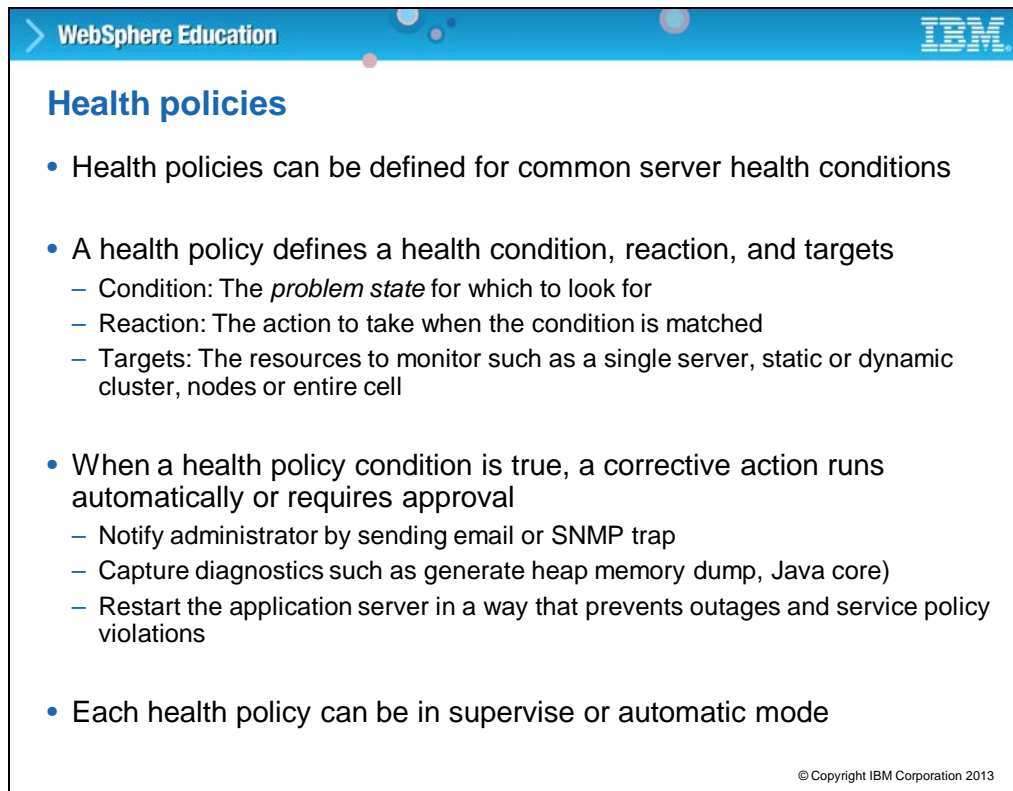
## What is health management?

- A WebSphere environment can be monitored for various software health conditions
  - Age, work completed, memory usage, response time, and others
  - Excessive timeouts, storm drain detection
- Servers can have a custom sequence of steps that are run as a corrective or preventive action
  - Policy-driven autonomic system
- Health policies define monitored health conditions
- Customized health conditions and health actions can be defined

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Intelligent Management provides a health management feature to monitor the status of your application servers, and sense and respond to problem areas before an outage occurs. You can manage the health of your application that is serving the environment with a policy-driven approach that enables specific actions to occur when monitored criteria are met. For example, when memory usage exceeds a percentage of the heap size for a specified time, health actions can run to correct the situation.

## Slide 19



The slide is titled "Health policies" and is part of a "WebSphere Education" presentation, as indicated by the header. It contains a bulleted list of information about health policies in WebSphere. The list includes: health policies for common server health conditions; a definition of a health policy (condition, reaction, targets) with sub-points for condition, reaction, and targets; automatic or approval-based corrective actions with sub-points for notification, diagnostics capture, and restarts; and the ability to be in supervise or automatic mode. The IBM logo is in the top right corner, and a copyright notice for IBM Corporation 2013 is at the bottom right.

- Health policies can be defined for common server health conditions
- A health policy defines a health condition, reaction, and targets
  - Condition: The *problem state* for which to look for
  - Reaction: The action to take when the condition is matched
  - Targets: The resources to monitor such as a single server, static or dynamic cluster, nodes or entire cell
- When a health policy condition is true, a corrective action runs automatically or requires approval
  - Notify administrator by sending email or SNMP trap
  - Capture diagnostics such as generate heap memory dump, Java core)
  - Restart the application server in a way that prevents outages and service policy violations
- Each health policy can be in supervise or automatic mode

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WebSphere can monitor servers for common health problems and take corrective action. Various health conditions can be defined by using health policies. When a health policies violation is detected, an action plan can be put into effect automatically. The plan can include to notify administrators (including by email), capture diagnostics information (Java thread or heap dump), or restart the server.

Application server restarts are intelligent and done in a way to prevent outage and service policy violations. WebSphere provides the “first line of defense” for poor application health by mitigating common health problems and routing around unhealthy servers. ITCAM for WebSphere extends WebSphere health management by adding in-depth application problem determination capabilities. ITCAM gives support teams the diagnostics tools they use find out at a granular level what went wrong and how to fix it fast. ITCAM provisions Rational and Eclipse developer and test tools with performance data captured in production, eliminating the need to attempt problem recreation. ITCAM integrates with the broader Tivoli Automation portfolio that enables customers to cost-effectively manage their IT infrastructure.

Slide 20

**WebSphere Education** IBM

## Viewing health conditions

**View:** All tasks

- Welcome
- Guided Activities
- Servers
- Applications
- Jobs
- Services
- Resources
- Runtime Operations
- Security
- Operational policies**
  - Service policies
  - Service policy topology
  - Health Policies**
  - Custom Action
  - Autonomic Managem...
- Environment

Cell=was95hostCell01, Profile=dmgr

**Health Policies**

A health policy defines runtime behaviors to monitor and take corrective actions when these behaviors are determined to be present.

**Preferences**

New... Delete

Select	Name	Reaction mode	Description
<input type="checkbox"/>	<a href="#">GarbageCollection</a>	Automatic	
<input type="checkbox"/>	<a href="#">Memory usage</a>	Supervise	
Total 2			

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You can view existing and create new health policies by using the administrative console. Navigate to **Operational policies > Health Policies** to view any defined policies.

Slide 21

**WebSphere Education** **IBM**

## Predefined health conditions

Create a new health policy. Define the general properties, including the health condition, and the servers, clusters, and dynamic clusters to be monitored.

→ **Step 1: Define health policy general properties**

Step 2: Define health policy health condition properties

Step 3: Specify members to be monitored

Step 4: Confirm health policy creation

### Define health policy general properties

**Name**

**Description**

**Health condition**

☒ **Predefined health condition**

Age-based condition

Age-based condition  
 Excessive request timeout condition  
 Excessive response time condition  
 Memory condition: excessive memory usage  
 Memory condition: memory leak  
 Storm drain condition  
 Workload condition  
 Garbage collection percentage condition

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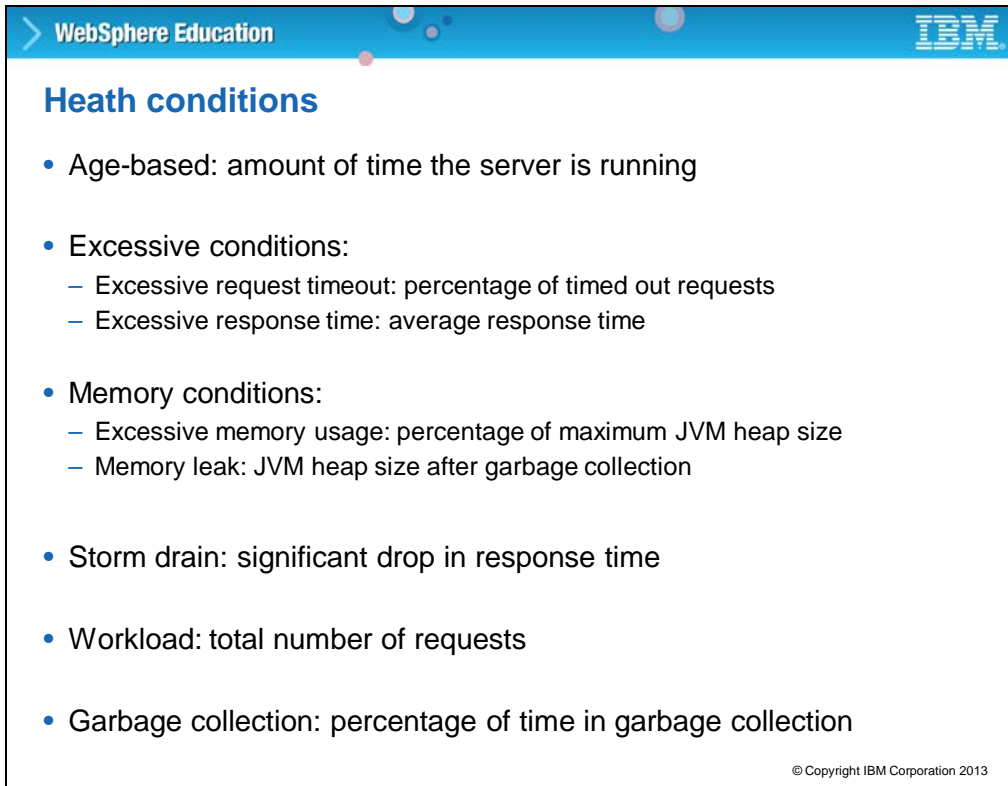
Health conditions define the variables that you want to monitor in your environment. Several categories of health policy conditions exist. You can choose from the list of predefined health conditions when you create a health policy

23

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Slide 22



The slide is titled "Heath conditions" (note the typo in the original image). It features a blue header with "WebSphere Education" and the IBM logo. The content is a bulleted list of health conditions. At the bottom right, there is a small copyright notice: "© Copyright IBM Corporation 2013".

- Age-based: amount of time the server is running
- Excessive conditions:
  - Excessive request timeout: percentage of timed out requests
  - Excessive response time: average response time
- Memory conditions:
  - Excessive memory usage: percentage of maximum JVM heap size
  - Memory leak: JVM heap size after garbage collection
- Storm drain: significant drop in response time
- Workload: total number of requests
- Garbage collection: percentage of time in garbage collection


This slide introduces the pre-defined health conditions. Excessive garbage collection triggers when the Java virtual machine (JVM) spends more than a configured percentage of time when running garbage collections.

Storm drain detects situations where requests are shifted toward a faulty cluster member that advertises low response times. This condition is triggered when there is a significant drop in the average response time. This drop must be measured at the on-demand router, for a member of the cluster that is coupled with an increase in the dynamic weights for the cluster member.

Workload triggers when the members that are associated with this policy serve a user-defined number of requests. You can use the workload condition on all server types.



## Slide 23

WebSphere Education 

## Creating health conditions

Step 1: Define health policy general properties

→ **Step 2: Define health policy health condition properties**

Step 3: Specify members to be monitored

Step 4: Confirm health policy creation

### Define health policy health condition properties

The memory condition: excessive memory usage will look for excessive memory utilization for each server that is a member of the policy. It detects general memory consumption by detecting if a JVM's heap size has grown over a configured percentage of the maximum heap size for a configured period of time.

#### Health condition properties

★ JVM heap size  %

★ Offending time period  Minutes ▾

#### Health management monitor reaction

Reaction mode Supervise ▾

#### Take the following actions when the health condition breaches

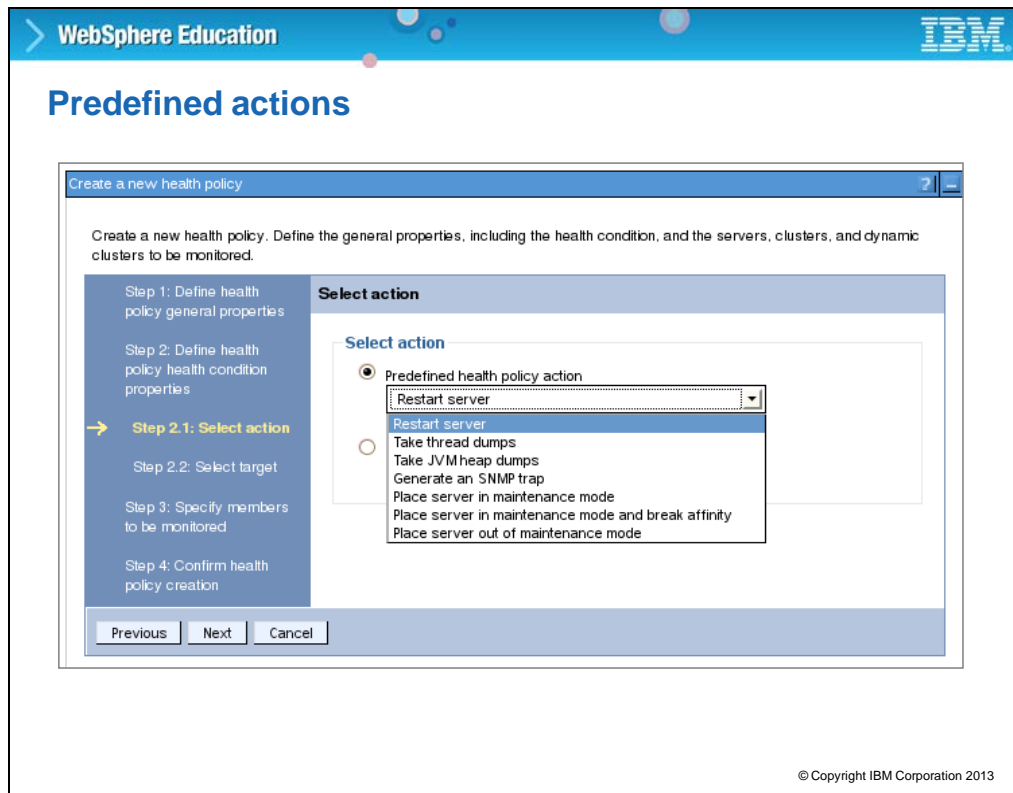
Add Action... Remove Action Move Up Move Down

Select	Step	Action	Target server	Target node
<input type="checkbox"/>	1	Restart server	Sick server	Node hosting sick server

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Actions can be taken automatically, or you can have them occur in supervised mode. Supervised mode requires an operator to confirm the action.

## Slide 24



When a health policy violation is detected, an action plan can be put into effect automatically. Actions that are taken when a monitored condition is detected, are designed to bypass the problem and help in diagnosis. You can select from various predefined actions that are displayed on the screen capture.

## Slide 25

**WebSphere Education**

## Administering actions

Health management monitor reaction

Reaction mode  
Supervise ▼

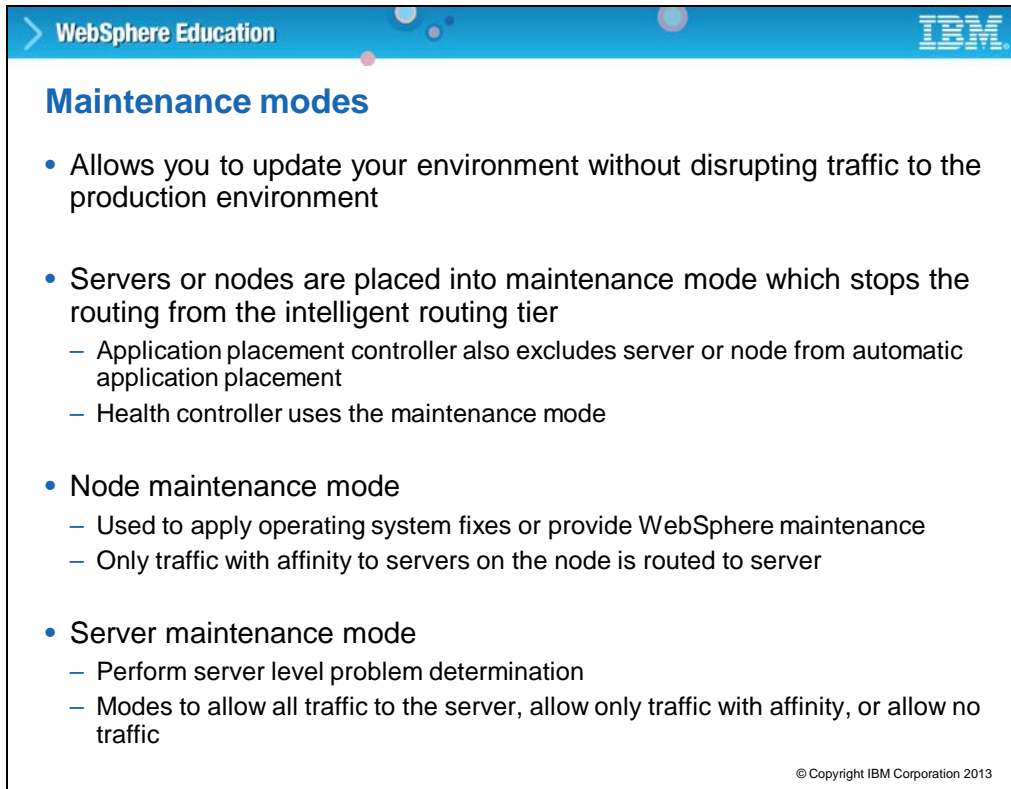
Take the Following Actions When the Health Condition Breaches

Select	Step	Action	Target Server	Target Node
<input type="checkbox"/>	1	Place Server Into Maintenance Mode	Sick Server	Node hosting Sick Server
<input type="checkbox"/>	2	<a href="#">Dump Application State</a>	Sick Server	Node hosting Sick Server
<input type="checkbox"/>	3	Restart Server	Sick Server	Node hosting Sick Server
<input type="checkbox"/>	4	Place Server out of Maintenance Mode	Sick Server	Node hosting Sick Server

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If you chose the **Supervise** reaction mode, then you receive recommendations to improve your health conditions. These recommendations display as runtime tasks that you can accept, deny, or close. To manage runtime tasks, click **System administration > Task management > Runtime tasks** in the administrative console. If you chose the **Automatic** reaction mode, actions to improve the health of your environment occur automatically.

## Slide 26



The slide is titled "Maintenance modes" and is part of a "WebSphere Education" presentation. It contains a bulleted list of features and modes. The IBM logo is in the top right corner, and the copyright notice "© Copyright IBM Corporation 2013" is in the bottom right corner.

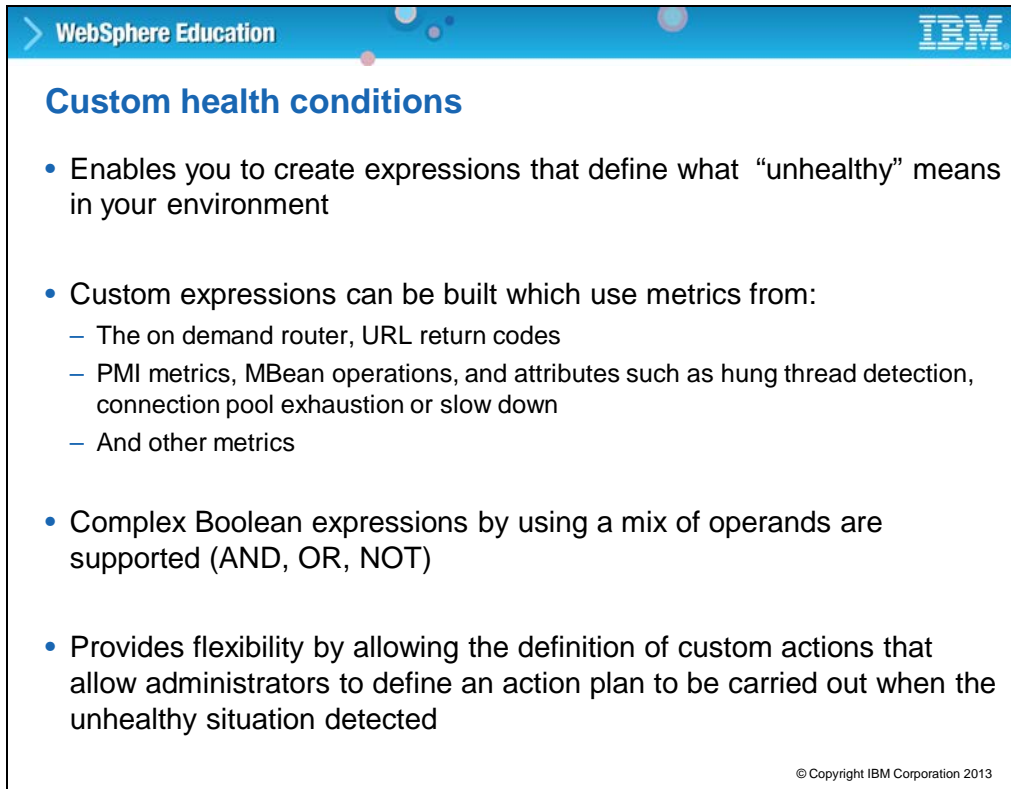
- Allows you to update your environment without disrupting traffic to the production environment
- Servers or nodes are placed into maintenance mode which stops the routing from the intelligent routing tier
  - Application placement controller also excludes server or node from automatic application placement
  - Health controller uses the maintenance mode
- Node maintenance mode
  - Used to apply operating system fixes or provide WebSphere maintenance
  - Only traffic with affinity to servers on the node is routed to server
- Server maintenance mode
  - Perform server level problem determination
  - Modes to allow all traffic to the server, allow only traffic with affinity, or allow no traffic

Periodic product maintenance is important to keep your system environment working correctly, and to avoid trouble from known issues. At some point in time, you might have a problem with a server and must complete diagnostic tests to troubleshoot a specific application server. These situations can lead to the disruption of client requests to servers in your environment. Using the Intelligent Management feature, you can maintain the environment without disrupting traffic to the production environment. You can use it to administratively put a server or node in the cell into maintenance mode.


You can put a node into maintenance mode when you must apply operating system fixes or complete WebSphere maintenance. When a node is in maintenance mode, only traffic with affinity to servers on the node is routed to the server by an intelligent router. A maintenance immediate stop mode can be set that immediately stops the servers on the node.

You can put a server into maintenance mode when you must complete server level problem determination. When an application server is placed into maintenance mode, you can indicate to allow all traffic to the server, allow only traffic with affinity, or allow no traffic during the maintenance period.

Slide 27



The slide is titled "Custom health conditions" and is part of a WebSphere Education presentation. It features a blue header with the "WebSphere Education" logo and the IBM logo. The main content is a bulleted list describing the capabilities of custom health conditions. The list includes: enabling the creation of expressions to define "unhealthy" states; building custom expressions using various metrics like on-demand router, URL return codes, PMI metrics, MBean operations, and attributes such as hung thread detection and connection pool exhaustion; supporting complex Boolean expressions with AND, OR, and NOT operators; and providing flexibility to define custom actions for when an unhealthy situation is detected. A small copyright notice for IBM Corporation 2013 is located at the bottom right of the slide.

> WebSphere Education 

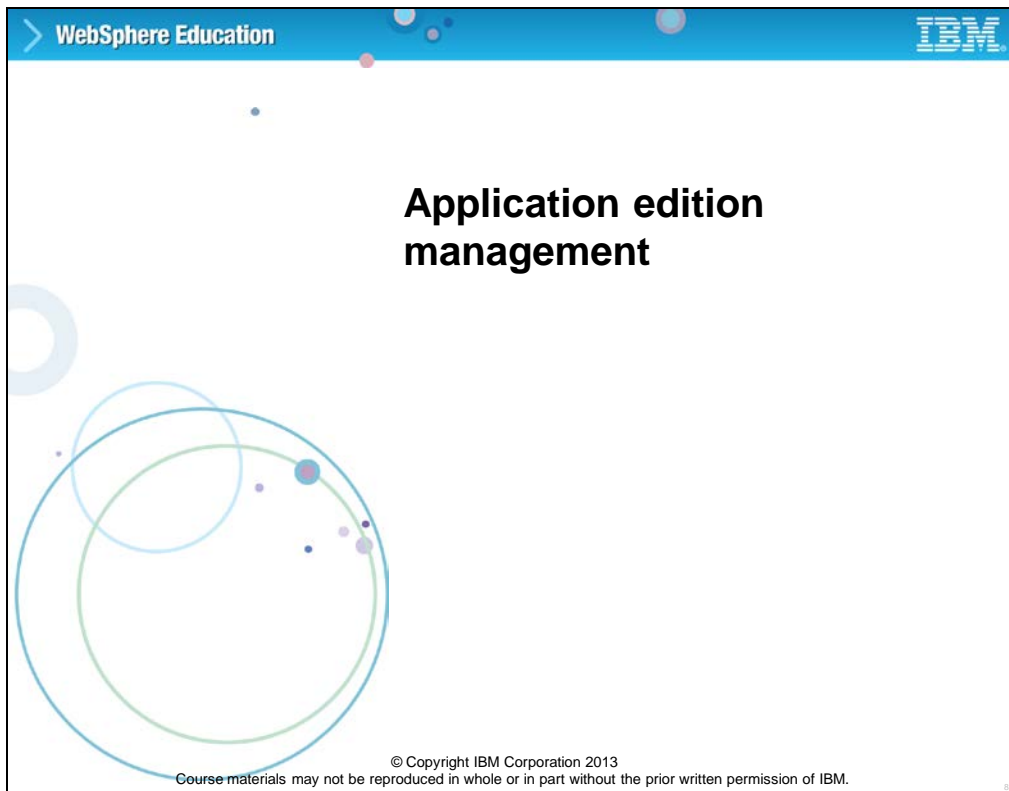
## Custom health conditions

- Enables you to create expressions that define what “unhealthy” means in your environment
- Custom expressions can be built which use metrics from:
  - The on demand router, URL return codes
  - PMI metrics, MBean operations, and attributes such as hung thread detection, connection pool exhaustion or slow down
  - And other metrics
- Complex Boolean expressions by using a mix of operands are supported (AND, OR, NOT)
- Provides flexibility by allowing the definition of custom actions that allow administrators to define an action plan to be carried out when the unhealthy situation detected

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You can define custom conditions for your health policy if the predefined health conditions do not fit your needs. You define custom conditions as a sub expression that is tested against metrics in your environment. When you define a custom condition, consider the cost of collecting the data, analyzing the data, and if needed, enforcing the health policy. This cost can increase depending on the amount of traffic and the number of servers in your network. Analyze the performance of your custom health conditions before you use them in production.

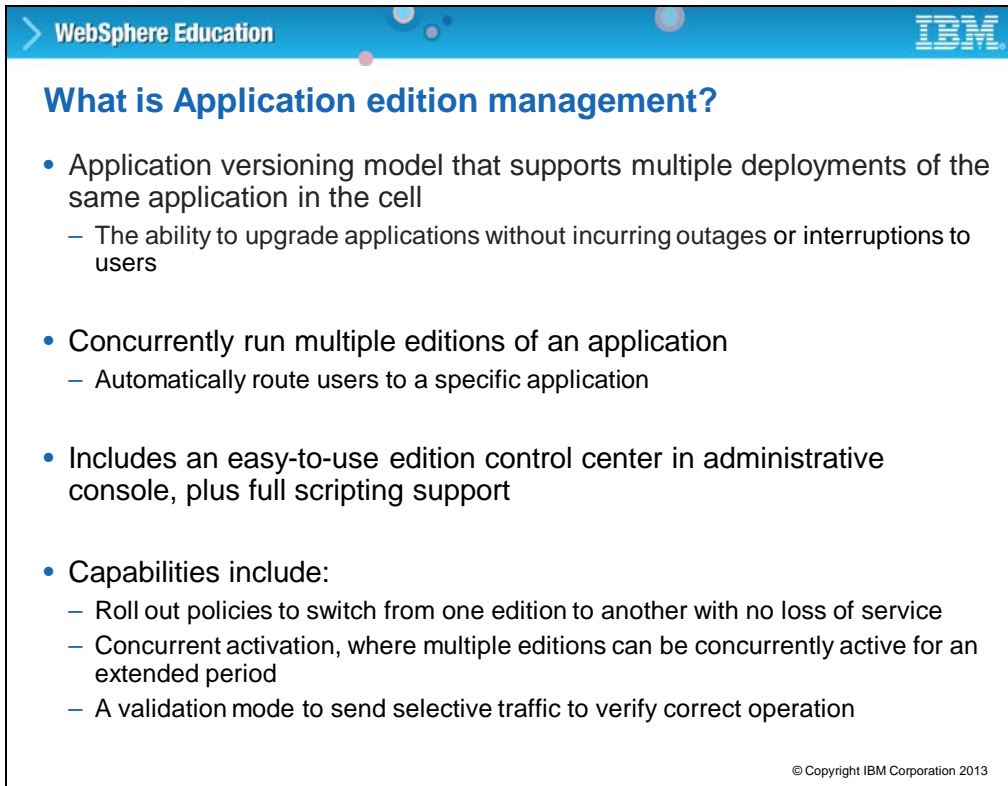
Slide 28



The slide features a blue header bar with the text "WebSphere Education" on the left and the IBM logo on the right. The main title "Application edition management" is centered in a large, bold, black font. Below the title, there is a decorative graphic consisting of several overlapping circles in light blue and green, with small colored dots scattered around them. At the bottom of the slide, there is a small copyright notice: "© Copyright IBM Corporation 2013" and "Course materials may not be reproduced in whole or in part without the prior written permission of IBM."

Topic: Application edition management. In this topic, you learn how to manage various application editions.

Slide 29



The slide is titled "What is Application edition management?" and is part of a WebSphere Education presentation. It features a blue header with the "WebSphere Education" logo and the IBM logo. The content is organized into a bulleted list with sub-points. The list describes application versioning, concurrent editions, an edition control center, and various capabilities like roll-out policies and validation mode. A small copyright notice for IBM Corporation 2013 is at the bottom right of the slide.

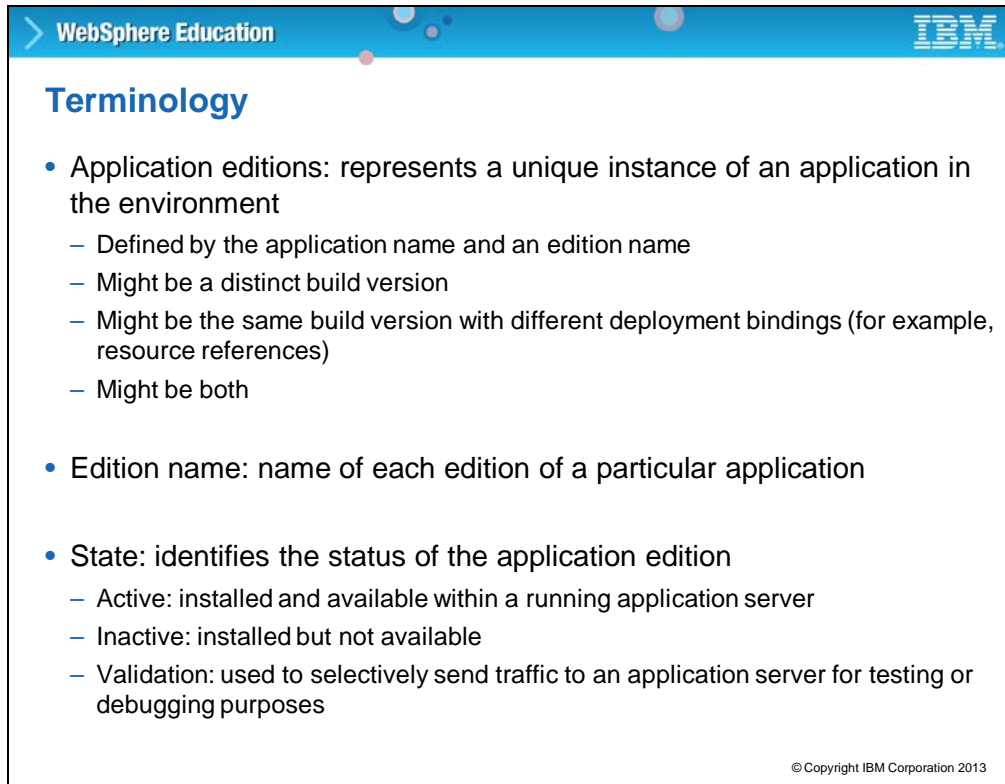
**What is Application edition management?**

- Application versioning model that supports multiple deployments of the same application in the cell
  - The ability to upgrade applications without incurring outages or interruptions to users
- Concurrently run multiple editions of an application
  - Automatically route users to a specific application
- Includes an easy-to-use edition control center in administrative console, plus full scripting support
- Capabilities include:
  - Roll out policies to switch from one edition to another with no loss of service
  - Concurrent activation, where multiple editions can be concurrently active for an extended period
  - A validation mode to send selective traffic to verify correct operation

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Application edition management enables management of interruption-free production application deployments. Using this feature, you can validate a new edition of an application in your production environment without affecting users, and upgrade your applications without incurring user outages. You can also run multiple editions of a single application concurrently, directing different users to different editions, as the ODR maintains not only traditional application state (for example, HTTP session) affinity, but also application version affinity. The ability to queue requests is also employed with the Intelligent Management application edition function. This ability is useful if an “atomic” application update that allows pre-provisioning of a new application version, and an “atomic” update of all users from the old application version to the new application version is wanted.

## Slide 30



The slide is titled "Terminology" and is part of a "WebSphere Education" presentation, as indicated by the header. It contains a bulleted list of three main concepts: Application editions, Edition name, and State. Each concept is further detailed with sub-points. The IBM logo is visible in the top right corner of the slide frame.

- Application editions: represents a unique instance of an application in the environment
  - Defined by the application name and an edition name
  - Might be a distinct build version
  - Might be the same build version with different deployment bindings (for example, resource references)
  - Might be both
- Edition name: name of each edition of a particular application
- State: identifies the status of the application edition
  - Active: installed and available within a running application server
  - Inactive: installed but not available
  - Validation: used to selectively send traffic to an application server for testing or debugging purposes

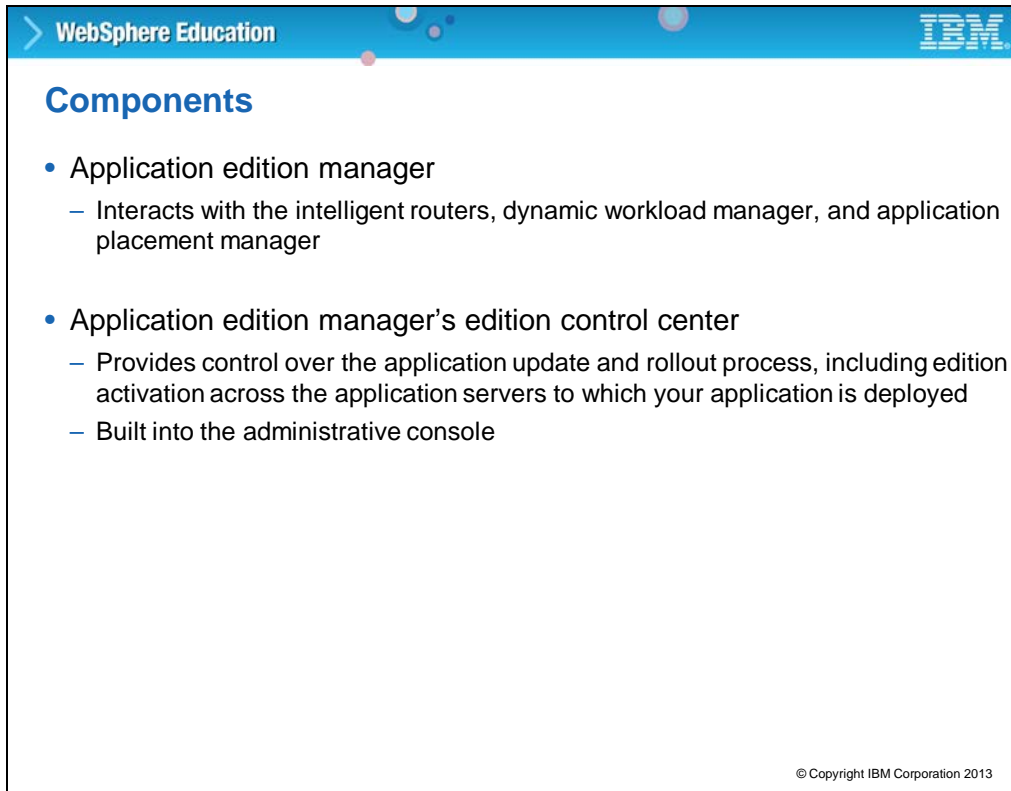
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An application edition represents a unique instance of an application in the environment. An application edition encompasses both application versions and deployment bindings. The combination of an application name and an edition name uniquely identifies an edition of an application.

With application edition manager, you can install multiple editions of the same application. Each edition is identified with an application edition name and description. The edition name is a field in which you can specify a value to uniquely identify one application edition from other editions of the same application. Create a version number scheme for naming editions that is meaningful in your environment. Multiple editions of the same application have the same application name but different edition names. When deploying an application, you can also specify an edition description next to the edition name, which gives you the ability to store more information. The existing application installation and update functions in Network Deployment are destructive. That is, they replace the old instance of the application with a new instance. Installing an application edition is non-destructive. You can install any number of application editions and keep them in the system management repository.



Slide 31



The slide is titled 'WebSphere Education' in the top left corner and features the IBM logo in the top right corner. The main title 'Components' is in a large blue font. Below it, there are two bullet points. The first bullet point is 'Application edition manager' with a sub-bullet 'Interacts with the intelligent routers, dynamic workload manager, and application placement manager'. The second bullet point is 'Application edition manager's edition control center' with two sub-bullets: 'Provides control over the application update and rollout process, including edition activation across the application servers to which your application is deployed' and 'Built into the administrative console'. At the bottom right, there is a small copyright notice: '© Copyright IBM Corporation 2013'.

- Application edition manager
  - Interacts with the intelligent routers, dynamic workload manager, and application placement manager
- Application edition manager's edition control center
  - Provides control over the application update and rollout process, including edition activation across the application servers to which your application is deployed
  - Built into the administrative console

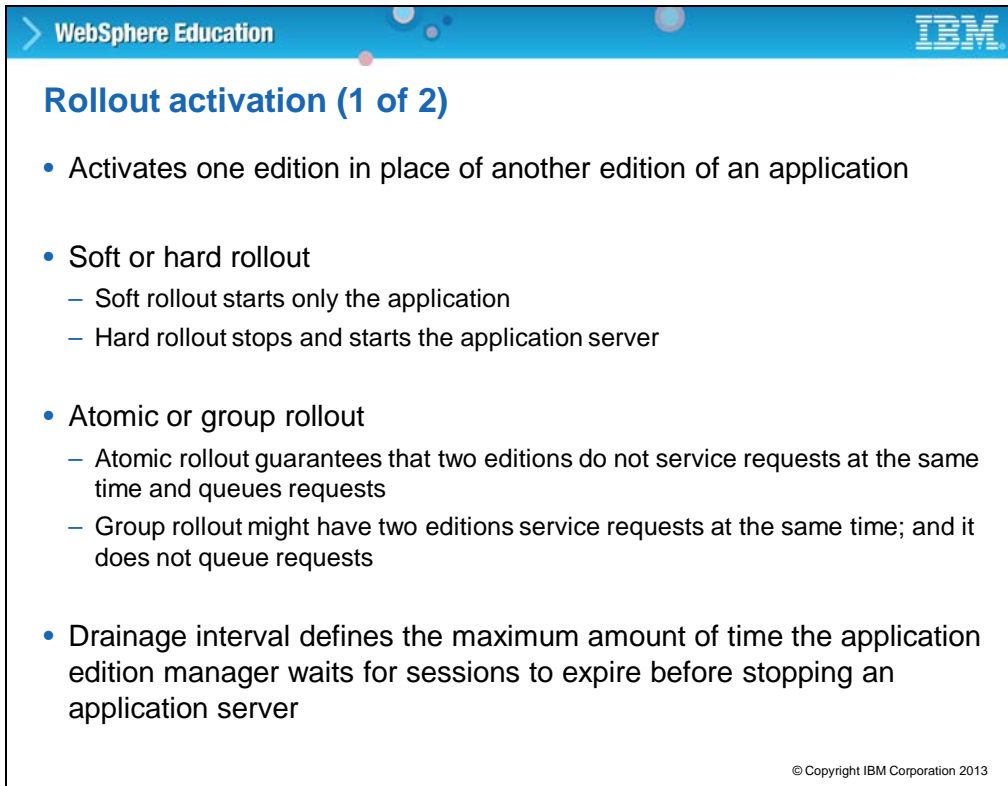
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The application edition manager ensures interruption-free production application deployments. Interruption-free deployment prevents loss of service when you install an application update in your environment.

The application edition manager provides an application model for defining versions that supports multiple deployments of the same application in the Intelligent Management cell. Each deployment has a unique edition name. The application edition manager allows you to select the edition to activate on an Intelligent Management cluster so that you can roll out an application update or revert to a previous level.

The application edition manager is fully integrated with Intelligent Management, interacting with the on-demand router (ODR), dynamic workload balancing, and the application placement manager. This integration ensures predictable application behavior when you apply application updates, and a smooth transition from one application edition to another while the system continues to manage your application performance goals. You can access application update processes with the administrative console, including edition activation across the application servers.

Slide 32



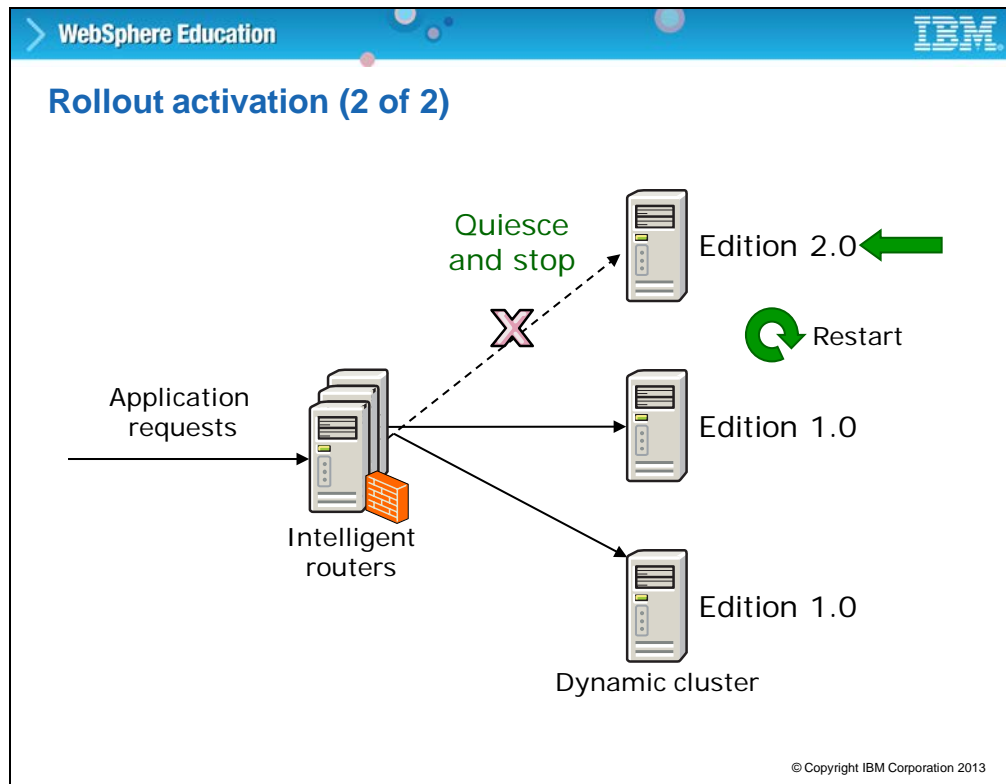
The slide is titled "WebSphere Education" and "IBM". The main title is "Rollout activation (1 of 2)". The content is a bulleted list:

- Activates one edition in place of another edition of an application
- Soft or hard rollout
  - Soft rollout starts only the application
  - Hard rollout stops and starts the application server
- Atomic or group rollout
  - Atomic rollout guarantees that two editions do not service requests at the same time and queues requests
  - Group rollout might have two editions service requests at the same time; and it does not queue requests
- Drainage interval defines the maximum amount of time the application edition manager waits for sessions to expire before stopping an application server

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Rollout activation activates one edition in place of another, ensuring an interruption-free update in the process. Thus, all application requests are serviced during the rollout and none are lost. This process ensures continuous application operation from the perspective of the customers of that application. The application edition manager carefully coordinates the activation of the edition and the routing of requests to the application.

## Slide 33

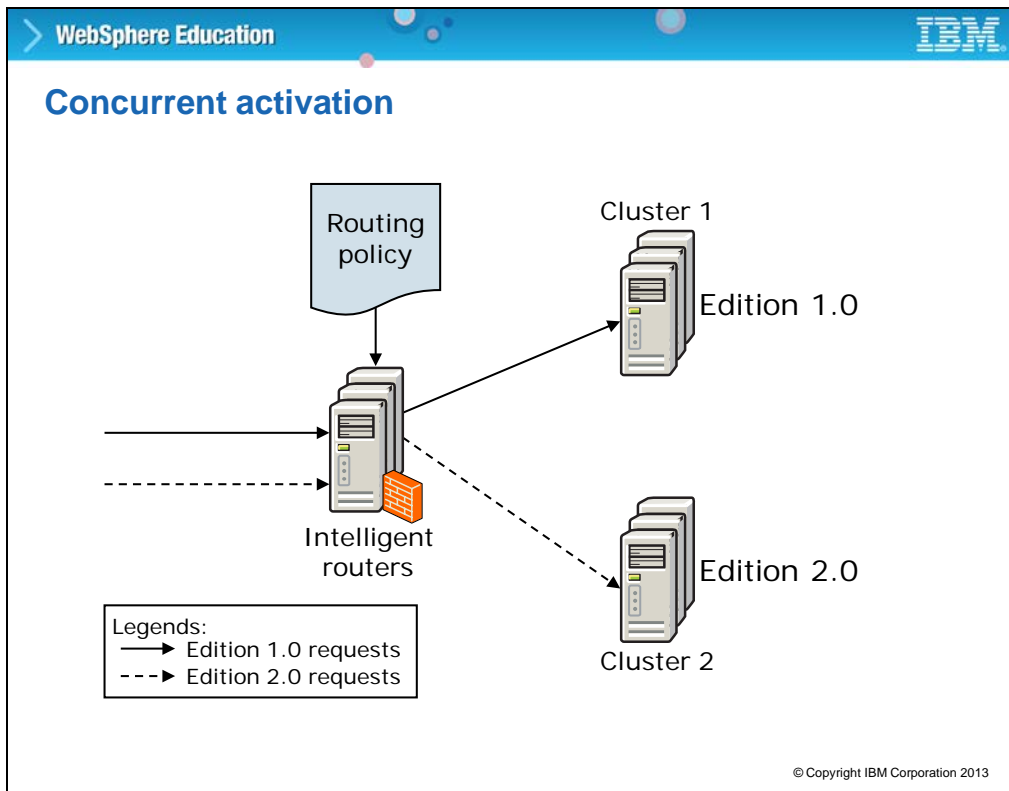


Replacement of one edition with another, in a production environment, requires certain discipline in the evolution of the application. Because edition replacement happens while application users are potentially accessing the previous application edition, the new edition must be compatible with earlier versions. Thus, the new edition cannot add or change any existing application interfaces, including essential behavior. New interfaces can be added. In addition, existing interfaces can be algorithmically corrected and, in some cases, even extended and remain compatible with existing application users.

This slide displays an example of a group rollout scenario. In the diagram, a dynamic cluster is created that consists of three servers. You first must divide the cluster into groups, which tells the application edition manager how many servers to update at the same time. Issuing a rollout to a group, results in the servers in each group that are being upgraded to the new edition at the same time. Each server in the group is quiesced, stopped, and reset.

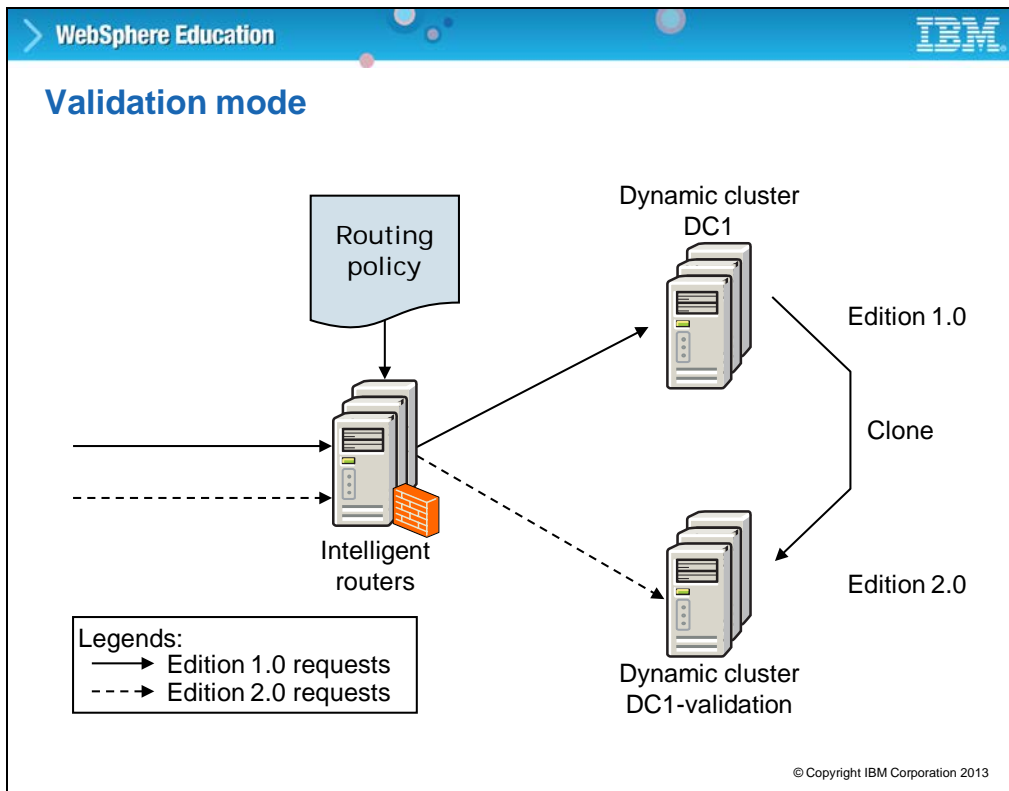
As the rollout is run in the diagram on the slide, one server in the cluster is moved from Edition 1.0 to Edition 2.0. During this time, the server does not receive user requests that are directed from an intelligent router, and the server is stopped. All application requests are sent to the servers that are running Edition 1.0. After a server that is running Edition 2.0 is available, application requests are directed to that server. Any servers that are still running Edition 1.0 do not serve requests until the edition is updated to Edition 2.0.

Slide 34



Concurrent activation enables you to activate the same edition on different servers or clusters. To use multiple editions concurrently, you must distinguish user requests from one another so that the requests are sent to the application server that hosts the appropriate edition. For example, if you introduce a new edition of an application, you might want only a select group of users to test the edition.

Slide 35



Validation activation is a special form of concurrent activation. It activates an edition on a clone of its original deployment target. The clone is created on activation of the edition. After the validation rollout to the original deployment target, the clone is removed automatically. This action allows you to complete final pre-production testing of an application edition in the actual production environment with a selected set of users.

Slide 36

WebSphere Education
IBM

## Edition control center (1 of 2)

Cell=was85hostCell01, Profile=dmgr

Edition Control Center

**Edition Control Center**

The edition control center enables management and operational control over application editions, including interruption free application upgrade. An application edition is a version of an application comprised of distinct versions of modules and/or bindings. This page provides a summary view of each enterprise application, its editions, and their current state. Click on an enterprise application name to manage the individual editions of the selected application.

☐ Preferences

Applications ↕	Type ↕	Editions ↕	Active ↕	Validation ↕
<a href="#">DefaultApplication</a>	Java 2 Platform, Enterprise Edition	1	1	0
<a href="#">PlantsByWebSphere</a>	Java 2 Platform, Enterprise Edition	1	1	0
<a href="#">ivtApp</a>	Java 2 Platform, Enterprise Edition	1	1	0
<a href="#">query</a>	Java 2 Platform, Enterprise Edition	1	1	0
Total 4				

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To validate the results, select **Applications > Edition Control Center > *application\_name***.

## Slide 37

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## Edition control center (2 of 2)

Edition Control Center

Edition Control Center > BeenThere

Manage editions of an application. The deployment targets for each edition were specified during the application install process. After install, an edition is initially in the inactive state. Inactive editions cannot be started. Activating an edition makes it eligible to be started. Validating an edition puts it into a special "validation mode" that configures the edition to run on a clone of its original deployment target. Validation mode requires assignment of a routing policy to the edition to control who may access it. Rolling out an edition performs an interruption-free upgrade of one edition to another on the same deployment target. Rolling out an edition that is in validation mode performs an interruption-free upgrade of the edition on the deployment target from which the validation mode target was cloned. After the rollout, the clone is deleted. Deactivation makes an edition ineligible to be started. Deactivating an edition will cause it to stop. The status column indicates whether an active or validation mode edition is running or stopped.

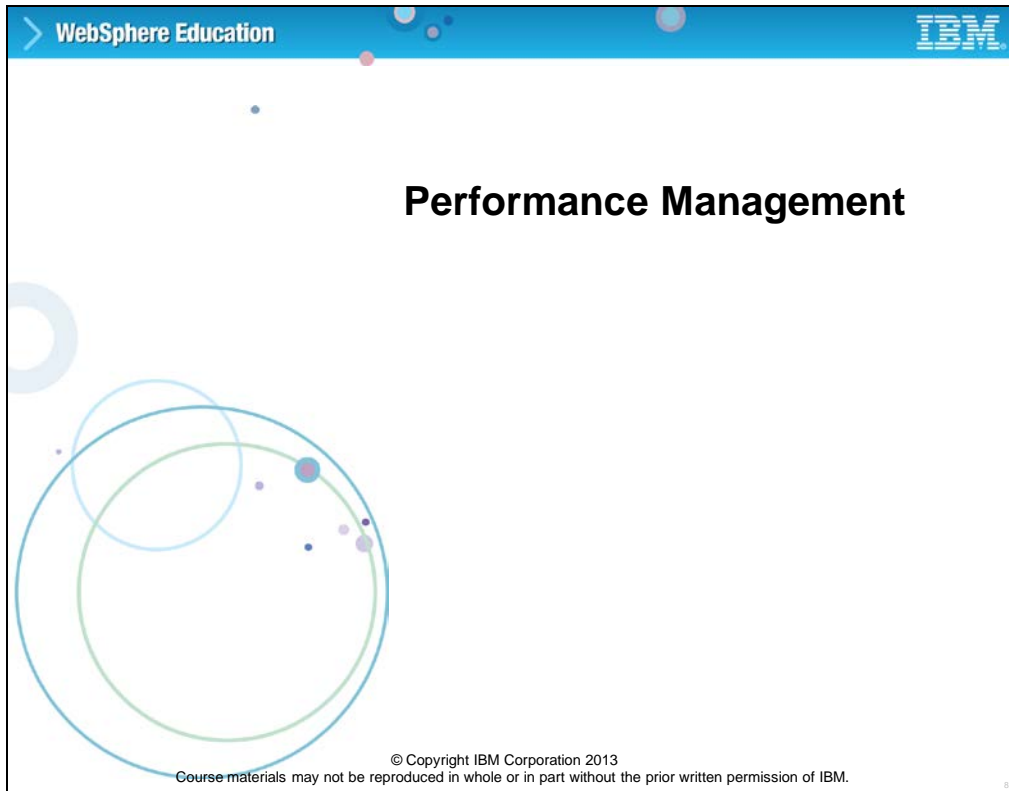
Preferences

Activate Validate Rollout Deactivate

Select	Edition	Description	Target	State	Status
<input type="checkbox"/>	Base	Base Edition	ProductionDC1	Inactive	⊘
<input type="checkbox"/>	1.0	Generation 2 prototype	StaticTestCluster+Server1	Inactive	⊘
<input type="checkbox"/>	2.0	Generation 2	ProductionDC1	Active	➔
<input type="checkbox"/>	3.0	Project "Blue Diamond"	ProductionDC1-Validation	Validation	➔
Total 4					

This slide displays editions for the BeenThere application.

Slide 38

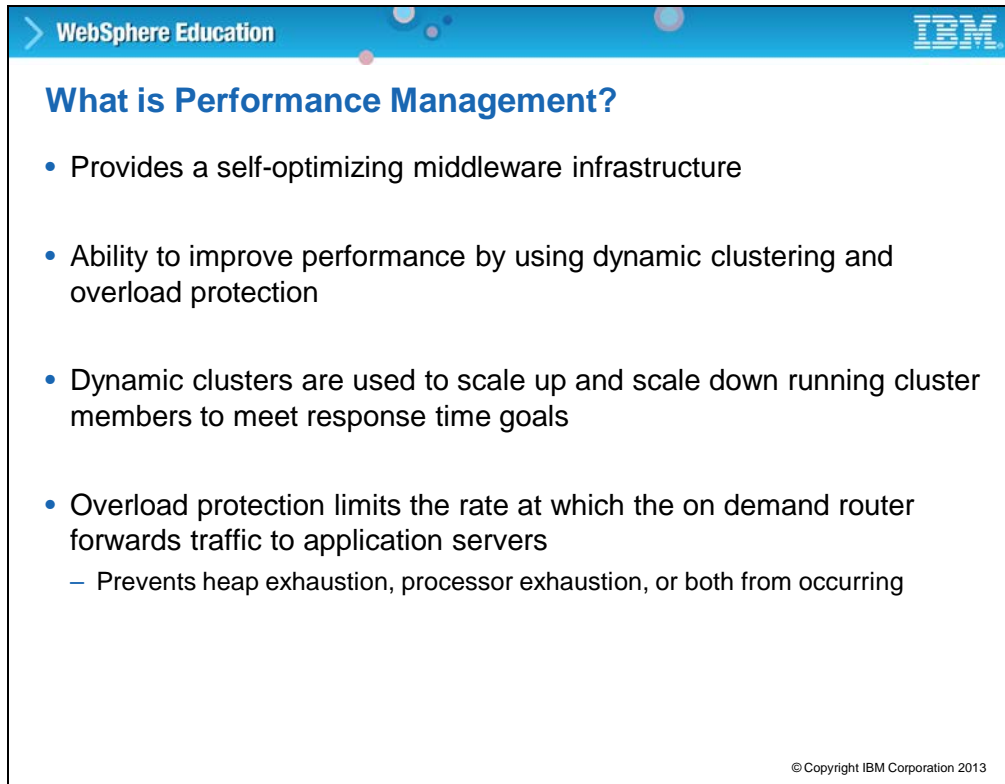


The slide features a blue header bar with the text 'WebSphere Education' on the left and the IBM logo on the right. The main title 'Performance Management' is centered in a large, bold, black font. Below the title, there is a decorative graphic consisting of several overlapping circles in light blue and green, with small colored dots scattered around them. At the bottom of the slide, there is a small copyright notice: '© Copyright IBM Corporation 2013' and 'Course materials may not be reproduced in whole or in part without the prior written permission of IBM.'

Topic: Performance Management. This topic introduces the concept of Performance Management.



Slide 39



The slide is titled "What is Performance Management?" and is part of a WebSphere Education presentation. It features a blue header with the "WebSphere Education" logo and the IBM logo. The content is a bulleted list of four points describing the Performance Management feature. The slide is framed by a black border.

**WebSphere Education** **IBM**

## What is Performance Management?

- Provides a self-optimizing middleware infrastructure
- Ability to improve performance by using dynamic clustering and overload protection
- Dynamic clusters are used to scale up and scale down running cluster members to meet response time goals
- Overload protection limits the rate at which the on demand router forwards traffic to application servers
  - Prevents heap exhaustion, processor exhaustion, or both from occurring

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The Performance Management feature provides dynamic cluster capabilities and overload control. With dynamic clusters, you can automatically scale up and down the number of running cluster members as needed to meet response time goals for your users. You can use overload protection to limit the rate at which the on-demand router forwards traffic to application servers. Doing so helps prevent heap exhaustion, processor exhaustion, or both from occurring.

Slide 40

The slide features a blue header bar with the text 'WebSphere Education' and the IBM logo. The main title 'Deployment manager high availability' is centered in a large, bold, black font. Below the title is a Venn diagram consisting of two overlapping circles, one blue and one green. Inside the intersection of the circles are several small, colored dots (blue, green, purple, and pink). The background of the slide is white with some faint, larger blue and green circles. At the bottom, there is a small copyright notice: '© Copyright IBM Corporation 2013. Course materials may not be reproduced in whole or in part without the prior written permission of IBM.'

Topic: Deployment manager high availability. This topic introduces the concept of a highly available deployment manager.

Slide 41



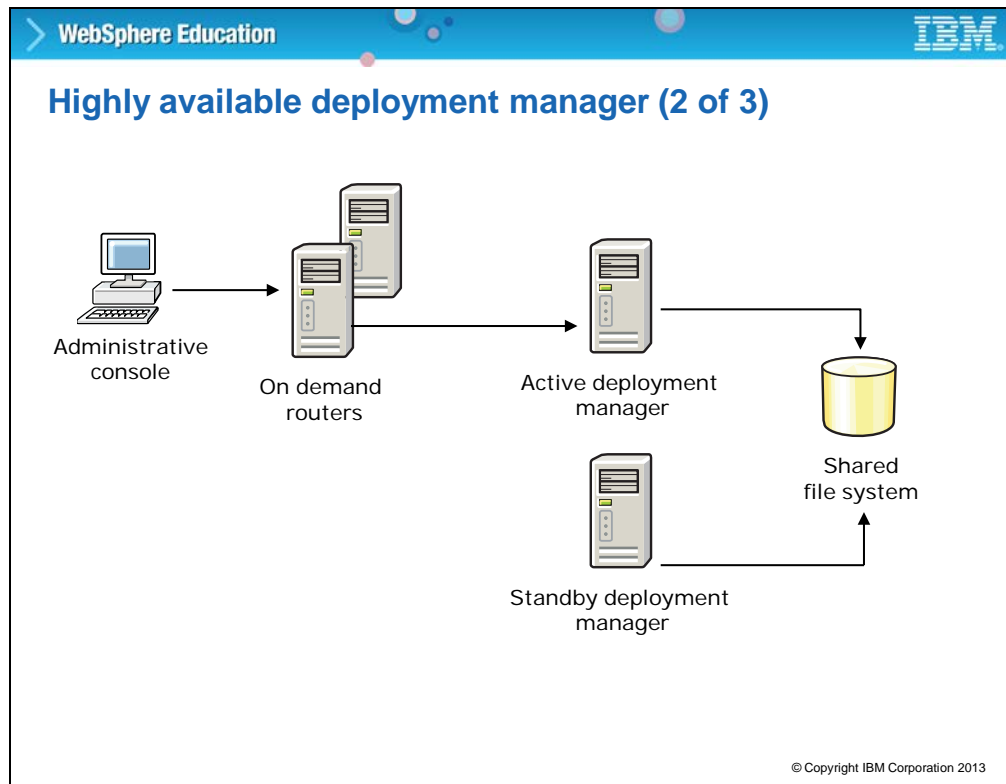
### Highly available deployment manager (1 of 3)

- WebSphere supports running multiple deployment managers for high availability when using the ODR intelligent router
- Multiple deployment managers can be configured
  - Active: the primary deployment manager that hosts the administrative functions
  - Standby: waiting to take over if the active deployment manager fails
- One deployment manager is active, others run in standby mode until a failure is detected
- All deployment managers share master configuration repository and workspaces that are stored in a shared file system that supports fast lock recovery
- The on demand router routes traffic to the active deployment manager

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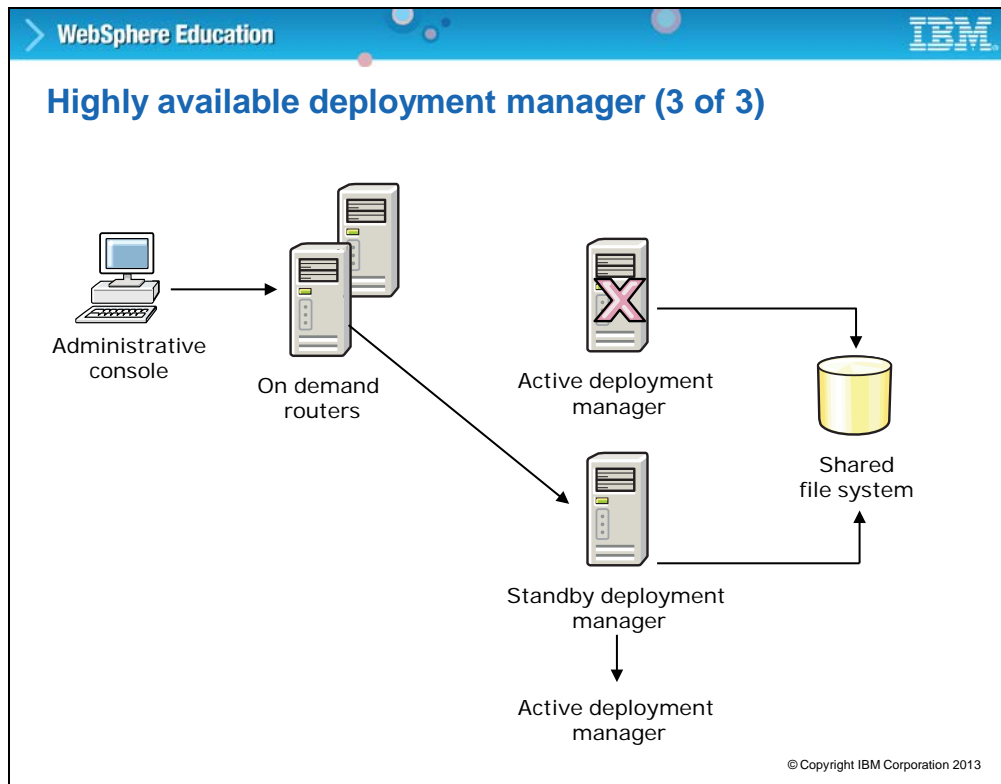
Although it is not required to have deployment manager that is always running, you might require highly available administrative capability, especially in environments that have significant number of new application deployments, updates, and server monitoring. Multiple instances of a deployment manager remove the single point of failure for cell administration; therefore assuring the attainability of the administrative console, wsadmin, and scripting features to manage your environment. WebSphere Application Server provides a mechanism for cloning your existing deployment manager, thus achieving high availability, by employing redundant deployment managers with a hot-standby model and the use of a shared file system.

## Slide 42



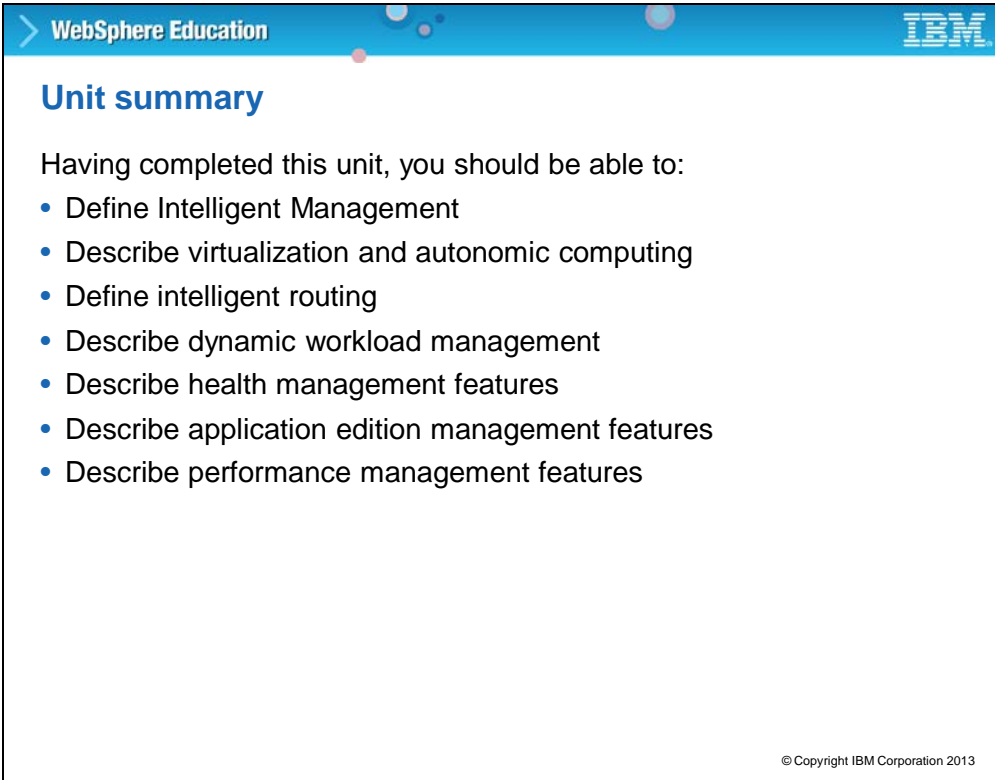
In this paradigm, one of the deployment managers is elected as primary. As primary it is considered an active deployment manager that is hosting the cell-wide endpoints for the administrative functions. Other deployment managers are considered backups and are kept in standby mode and are available to take over the active role in case of failure or termination of the primary manager.

Slide 43



A highly available deployment manager component runs in each deployment manager to control which deployment manager is elected as the active one.

Slide 44

A presentation slide titled 'Unit summary' from the 'WebSphere Education' series. The slide has a blue header bar with the text '> WebSphere Education' on the left and the 'IBM' logo on the right. The main content area is white with a blue title 'Unit summary'. Below the title, it states 'Having completed this unit, you should be able to:' followed by a bulleted list of seven items. At the bottom right of the slide, there is a small copyright notice: '© Copyright IBM Corporation 2013'.

> WebSphere Education

IBM

## Unit summary

Having completed this unit, you should be able to:

- Define Intelligent Management
- Describe virtualization and autonomic computing
- Define intelligent routing
- Describe dynamic workload management
- Describe health management features
- Describe application edition management features
- Describe performance management features

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Having completed this unit, you should be able to:

- Define Intelligent Management
- Describe virtualization and autonomic computing
- Define intelligent routing
- Describe dynamic workload management
- Describe health management features
- Describe application edition management features
- Describe Performance Management features