



IBM Software Group

IBM® WebSphere® Extended Deployment V6.1

WebSphere® Virtual Enterprise

Formerly Operations Optimization

Overview



@business on demand.

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This presentation will give an overview of WebSphere Virtual Enterprise version 6.1

This module was originally recorded for WebSphere Extended Deployment Operations Optimization, which is now called WebSphere Virtual Enterprise. Though the module uses the previous names, the technical material covered is still accurate.

Agenda

- Introduction to WebSphere Extended Deployment
- Dynamic operations
- Advanced administration features



This presentation will briefly introduce WebSphere Extended Deployment Operations Optimization, and describe what is meant by dynamic operations and how WebSphere Extended Deployment leverages this capability. The presentation will then provide a high level overview of the numerous advanced administration enhancements that are part of the operations optimization package.

Section

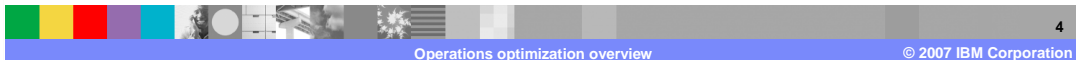
Introduction



This section will introduce the WebSphere Extended Deployment operations optimization package.

Operations optimization

- Extends your existing middleware systems
 - ▶ Quality of service
 - ▶ Performance
 - ▶ Resiliency
 - ▶ Manageability
- Works with a variety of middleware systems



WebSphere Extended Deployment operations optimization is a set of extensions for your existing middleware systems focused around quality of service, performance, resiliency, and manageability. It includes dynamic operations features which enable a virtualized, dynamic environment for goal-oriented workload management, to take better advantage of hardware resources in a distributed environment. This package also provides several advanced features for enhanced administration. These features include, the ability to manage and seamlessly roll out multiple editions of an application, advanced visualization tools to help you better understand what is happening in your environment, and health monitoring agents that can automatically take action when certain software conditions are detected.

Each of these topics will be discussed briefly in this presentation, and covered in more detail in other presentations.

Two ways to install

- As an 'add-on' product for WebSphere Application Server Network Deployment
 - ▶ Requires WebSphere Application Server V6.1
 - ▶ Fundamentally alters WebSphere Network Deployment operations
- WebSphere Extended Deployment middleware agent
 - ▶ Used to manage servers that are not running WebSphere Extended Deployment.
 - ▶ Supports a variety of other middleware servers
 - ▶ Does not require WebSphere Application Server



The WebSphere Extended Deployment installer allows you to choose one of two installation types.

When installed as an extension to WebSphere Application Server Network Deployment version 6.1, it enables you to create WebSphere Extended Deployment resources like nodes, application servers, and dynamic clusters. This extends the WebSphere administration console to ease management of large cells.

The second installation option installs a Java™-based middleware agent to a system that does not have WebSphere Network Deployment previously installed. The middleware agent allows WebSphere Extended Deployment to monitor and control other middleware servers that were created outside of WebSphere Extended Deployment.

Section

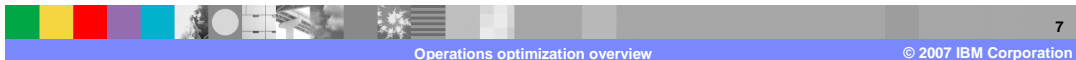
Dynamic operations



This section will describe the dynamic operations features of WebSphere Extended Deployment.

Dynamic operations overview

- Dynamic workload management
 - ▶ Virtualized
 - ▶ Goal-oriented
 - ▶ Policy-based
- More consistent quality of service for critical applications
- More efficient utilization of hardware resources



WebSphere Extended Deployment provides a virtualized environment that allows hardware resources to be shared and allocated dynamically based on performance goals that you have defined for your enterprise applications. This capability can help you provide a more consistent quality of service for your critical applications in times of excessive load, and more efficiently utilize the hardware resources that you already have. The following example will highlight the benefits of a dynamic, virtualized WebSphere Extended Deployment environment.

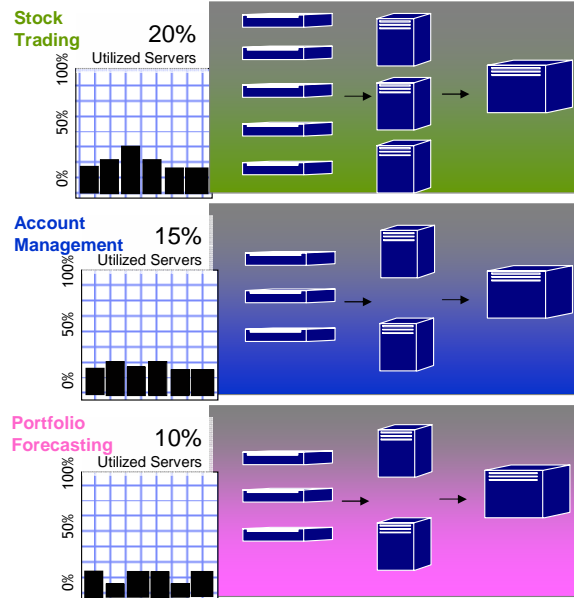
Example: Typical distributed environment

Environment

- ▶ Multiple business critical applications
- ▶ Hundreds of application servers

Challenges

- ▶ Underutilized servers
- ▶ Inability to share resources across clusters
- ▶ Inconsistent quality of service
- ▶ Human-intensive monitoring and management environment



An example of a typical environment without WebSphere Extended Deployment is shown here with three applications; stock trading, account management, and portfolio forecasting. A real environment would likely be an order of magnitude larger than this example, in terms of both applications and hardware. Most of the servers are underutilized because they have all been provisioned for peak load. You get inconsistent qualities of service in this scenario, because if one application gets more load than it can handle, it cannot take advantage of other resources that may be sitting idle.

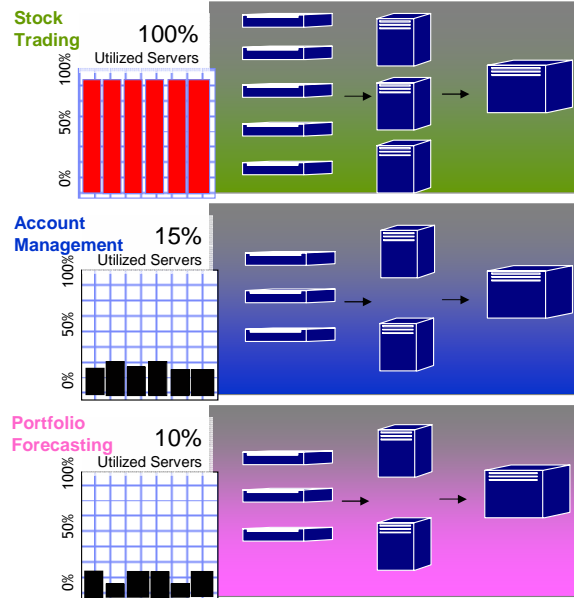
Example: Typical distributed environment

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- ▶ Human-intensive monitoring and management environment



As you can see in this example, each of the three applications has its own cluster, running at low utilization. If for some reason a large amount of traffic hits the stock trading application, its cluster could become 100% utilized. At this point the application's performance will begin to degrade, despite the fact that you have other resources sitting underutilized.

Example: Dynamic operations environment

- **Virtualized**
 - ▶ Pooled resources
 - ▶ Virtualized applications
- **Goals based**
 - ▶ Operational policies are attached to applications to reflect operational goals and importance of application
 - ▶ Autonomic managers monitor environment for maximum utilization using business goals
- **Results**
 - ▶ Reduce total cost of ownership (doing more with same or less)
 - ▶ Increase stability and repeatability of environment

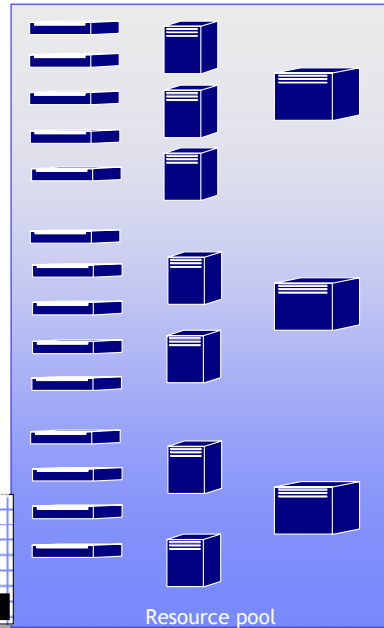
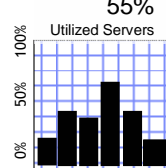
Stock
Trading

Customer
Support

Account
Management

Risk
Management

Portfolio
Forecasting



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Operations optimization overview

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What WebSphere Extended Deployment does instead, is provide a virtualized environment. The key concept is dynamic clusters (which are similar to regular 'clusters' but can dynamically grow and shrink), to which your applications will be deployed. You then define policies that dictate performance goals that will govern the management of workload for that application. WebSphere Extended Deployment will manage work against that goal, and as you see in this example, resources are dynamically allocated within the resource pool as work comes into the system to balance resources and maintain acceptable performance. You may even find that you can afford to deploy more applications onto the same amount of hardware, since it is now utilized in a more efficient manner.

Key features

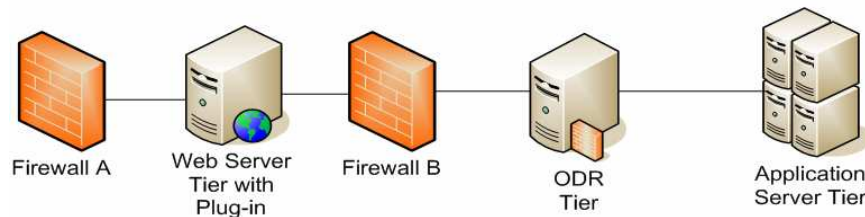
- On-demand router
 - ▶ New process built as a set of filters to the proxy server
 - ▶ Provides routing of HTTP traffic into a collection of cells
 - ▶ Provides three key on-demand features:
 - Flow control and queuing
 - Prioritization
 - Dynamic workload management
- Dynamic application placement
 - ▶ Autonomic placement of instances of application servers on nodes
 - ▶ Starts and stops preconfigured server instances to meet defined performance goals



WebSphere Extended Deployment includes a new process, the on-demand router. This is an enhanced version of the proxy server included in WebSphere Application Server version 6.1. The on-demand router is an intelligent HTTP proxy that acts as the entry point for traffic coming into a WebSphere Extended Deployment cell, performing request prioritization, flow control, and dynamic workload management.

Another key feature is known as dynamic application placement, which uses dynamically sized server clusters to increase or decrease the number of servers on which a particular application is running to help meet your performance goals. Each node within a dynamic cluster has an instance of an application server running that cluster's applications that can be started and stopped dynamically as traffic for that application increases or decreases.

Common topology



- Typical topology has multiple on-demand routers for scalability and availability
- On-demand router
 - ▶ Generates the plugin-cfg.xml file for Web server plug-ins
 - ▶ Dynamically learns configuration of backend cells
 - ▶ Can be connected to multiple cells simultaneously
 - ▶ Supports routing to any HTTP endpoint
 - ▶ Can be placed in front of the Web server tier, for example

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Operations optimization overview

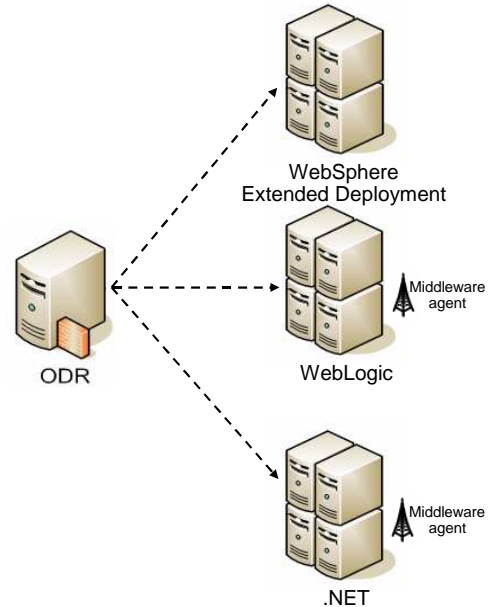
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The most common topology places the on-demand router (or more commonly multiple on-demand routers) inside the private network between the Web server and the application servers. This leaves the Web server to continue serving static content, but the plug-in running on the Web server is now configured to route traffic to the on-demand router, rather than to the application servers. The on-demand router is constantly updated with the location of dynamic cluster instances within the cell (or cells), and routes traffic accordingly.

Other topology options are also possible, including placing the On Demand Router tier in the de-militarized zone, where it could be used in front of, or instead of the Web server tier.

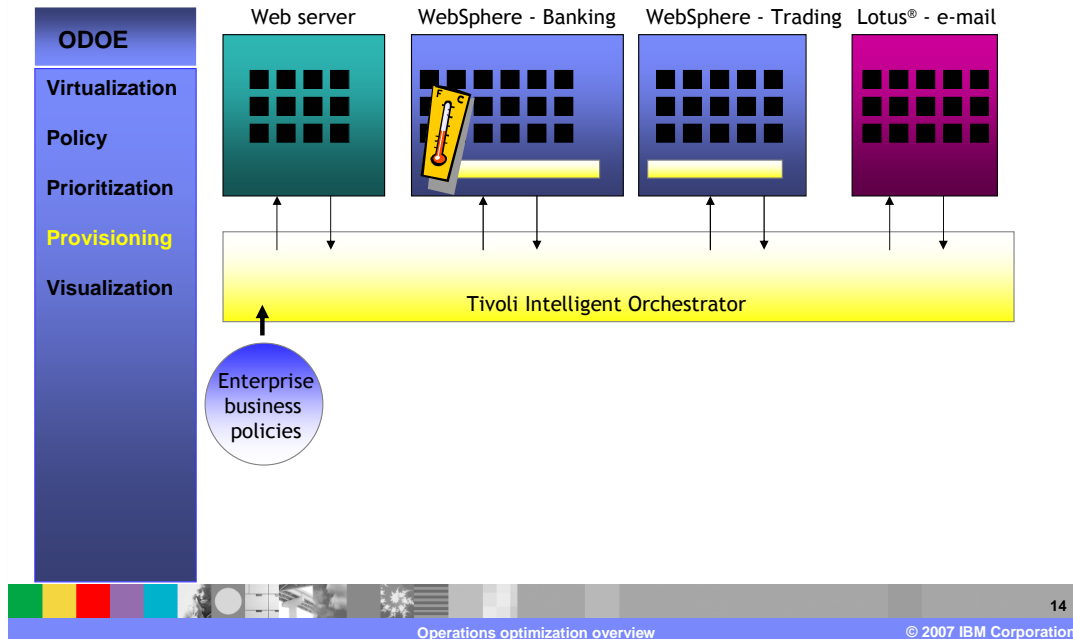
Integration with other middleware servers

- Full operations optimization support for non WebSphere Extended Deployment servers
 - ▶ Any HTTP endpoint, including WebSphere Community Edition, Tomcat, or .NET
- Complete Extended Deployment dynamic operations capabilities
 - ▶ Health management and monitoring
 - ▶ Application placement for resource control
- Provided through WebSphere Extended Deployment Middleware agent for operations optimization
 - ▶ Capabilities similar to WebSphere node agent



WebSphere Extended Deployment Operations Optimization version 6.1 extends dynamic operations capabilities beyond the traditional WebSphere administrative domain; allowing other middleware server types to be integrated into a WebSphere Extended Deployment environment. The on-demand router can route traffic to any HTTP endpoint. This means that you can use it as a front end to applications running on other vendor's servers, including Tomcat, or .NET; or other versions of WebSphere such as WebSphere Application Server Community Edition. This provides you with all of the benefits of the on-demand router's request prioritization and flow control features. WebSphere Extended Deployment Version 6.1 additionally provides full dynamic operations support for these other middleware servers, including dynamic application placement through the middleware agent for operations optimization.

Integration with Tivoli® Intelligent Orchestrator



WebSphere Extended Deployment also provides hooks for integrating with Tivoli Intelligent Orchestrator, allowing it to participate in larger-scale macro provisioning with servers of disparate types. For example, if a WebSphere Extended Deployment node group is fully utilized, Tivoli Intelligent Orchestrator could take some servers from an underutilized Lotus Domino® environment and apply the appropriate WebSphere Extended Deployment software and configuration; then add the servers to the node group in question, therefore helping to handle the excess load.

Section

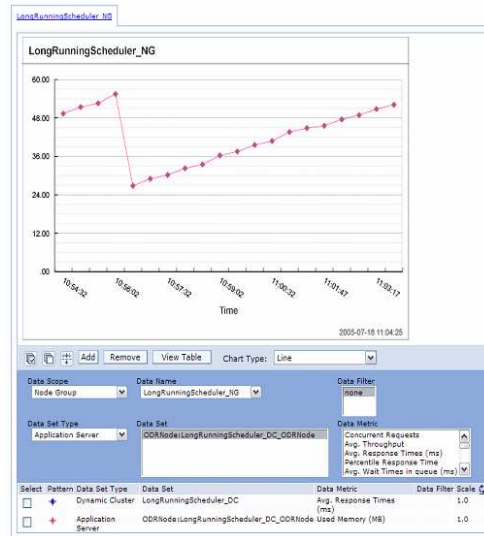
Advanced administration features



WebSphere Extended Deployment operations optimization includes many advanced features that make life easier for the administrators of a WebSphere environment. This section will provide a high level overview of these features.

Runtime visualization

- Custom charting of performance and goal data
- Data can be logged for reference or chargeback
- System health summary panels



With the new complexities of dynamic operations, the need arises for tools that extend monitoring and manageability capabilities. The visualization components of WebSphere Extended Deployment enhance the administrative console to provide live data on the performance and health characteristics of the entire cell.

Real-time reporting shows you alerts indicating anomalies with the runtime environment. You can view the status of the cell based on on-demand routers, core groups, autonomic managers, and nodes. You also have the ability to build and save customized reports for dynamic viewing. These reports can display charts representing numerous statistics about components of your cell, from an application's average response time to the processor utilization of an individual server.

Application edition management

- WebSphere Extended Deployment supports managing multiple editions of an application in a WebSphere cell
 - ▶ Interruption-free rollout of application updates
 - ▶ Ability to “roll back” to a previous application version
 - ▶ “Validation mode” to verify functionality using a subset of users
 - ▶ Routing policies can be used to define which particular requests are handled by which application edition
- An *edition* is a distinct instance of a J2EE application (similar to *version*)
 - ▶ May be a distinct build version, or the same build with different deployment bindings



WebSphere Extended Deployment allows you to deploy and manage multiple editions of the same application within a cell. You can use the Edition Control Center to manage the rollout of new editions to some or all of your servers without service interruption. You also have the ability to roll back to previous editions if you find a problem with the new edition after deployment. Validation mode deploys the new edition to a clone of the deployment cluster where the previous edition is deployed. This allows you to verify the functionality of the new edition in your production environment. If you have multiple editions of an application deployed concurrently, you can create routing policies that dictate which edition should serve each incoming request. For example, all requests from users in a certain group, or from a certain IP address range, might be served by a different edition than all other users, for testing purposes.

Health monitoring

- A WebSphere Extended Deployment environment can be monitored for various software health conditions
 - ▶ Age, work performed, memory usage, response time
 - ▶ Stuck requests, storm drain detection
- Health conditions and reactions are defined by health policies
 - ▶ Servers can be restarted as a corrective or preventive action
 - ▶ Java heap can be dumped for memory problems



Health monitoring is another useful administration feature. WebSphere Extended Deployment allows you to configure 'health policies', which define software conditions that may indicate a problem including excessive memory usage, stuck requests and uptime. and automatically take a user-defined action if those conditions are matched. For example, if your application has a known bug that causes degraded performance after a week of uptime, you could choose to automatically restart the server weekly. Similarly, you could also choose to generate a dump of the Java heap every time memory consumption exceeded a certain level, and restart the server as well. Note that heap dumps can only be generated automatically on platforms that utilize the IBM Java Runtime Environment.

Repository checkpoints

- Repository checkpoints give you advanced control over the configuration repository
- A full checkpoint is a snapshot of the repository
 - ▶ Restoring to a full checkpoint returns to the configuration state from the time the snapshot was taken
- A delta checkpoint records the most recent change to your configuration
 - ▶ Delta checkpoints can be rolled back individually, in order
 - ▶ Can be created automatically when changes are made



Repository checkpoints make it easier to manage your WebSphere Extended Deployment configuration. A 'full checkpoint' is a snapshot of your entire configuration repository that you can create at any time, and use in the future to restore your configuration back to that state. You can also configure WebSphere Extended Deployment to create 'delta checkpoints' each time you save changes to your configuration repository. Delta checkpoints contain a record of configuration objects that were changed during the last save action, and you can roll back one or more delta checkpoints to undo a series of changes in reverse order.

Standby deployment managers

- WebSphere Extended Deployment supports running multiple deployment managers for high availability
- One deployment manager is active, others run in standby mode until a failure is detected
 - ▶ A single master repository is used, stored on a shared file system
- Administrator accesses the deployment manager through the on-demand router
- On-demand router routes requests to the current 'active' deployment manager



Although it is not required to have a deployment manager running at all times, you may be interested in running more than one deployment manager concurrently if you require highly available administrative capability. WebSphere Extended Deployment supports redundant deployment managers by allowing multiple deployment manager processes to be concurrently active in a cell in an active and standby configuration. All of the deployment managers work from the same master repository, stored on a shared file system. The on-demand router routes requests to the currently active deployment manager and to one of the other deployment managers if the originally active one fails.

Centralized installation manager

- Single install to the deployment manager
 - ▶ Includes all code for all of the scenarios described for all platforms
- “Push” of install from deployment manager to endpoints
 - ▶ Select a set of nodes and push extended deployment to those endpoints
 - ▶ Installs appropriate endpoint code based on type of endpoint
- Agent-less endpoint for install
- Centralization of patch management as well



The centralized installation manager simplifies the tasks of deploying product packages and maintenance to your WebSphere Application Server Extended Deployment Version 6.1 cell. After you first install WebSphere Extended Deployment Operations Optimization to the deployment manager, you can use the centralized installation manager to install WebSphere Extended Deployment components to other nodes in your cell. You can also use the centralized installation manager to install the middleware agent for operations optimization on a node that does not currently have WebSphere installed.

In addition to product installation, the centralized installation manager provides the ability to download WebSphere maintenance. The maintenance includes interim fixes and fix packs, to the deployment manager and to install those maintenance packages to nodes within your cell.

Summary

- WebSphere Extended Deployment 6.1 is an 'add-on' product for WebSphere Application Server that provides many advanced features
- Dynamic operations features create a virtualized, goal-based environment for workload management



In summary, WebSphere Extended Deployment is an extension to WebSphere Application Server that provides several advanced features to improve performance and manageability. The dynamic operations features enable a virtualized, dynamic environment for better utilizing shareable hardware resources based on user-defined performance goals.

Summary

- **Advanced administrative capabilities**
 - ▶ System operations views provides new ways to look at performance data about your environment
 - ▶ Application edition management features enable seamless rollout of multiple editions of an application
 - ▶ Health monitoring can trigger alerts and take action when software health problems are detected
 - ▶ Extended repository service provides ability to create cell configuration checkpoints
 - ▶ High availability deployment manager removes single point of failure for administrative activities
 - ▶ Centralized installation manager allows you to install products and maintenance from the deployment manager
 - ▶ Administration and monitoring for non-WebSphere environments



The advanced administration features provided by WebSphere Extended Deployment include many tools to ease the administrative burden for large systems.

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