Exam notes for Exam 70-232 Implementing and Maintaining Highly Available Web Solutions with Microsoft Windows 2000 Server Technologies and Microsoft Application Center 2000

Abstract:

This Study Guide will help you to begin studying for the newly developed .NET architecture Microsoft exam for Application Center 2000. This guide will help to aim your studies, make you aware of what is expected on the test and provide many resources for you to study from and get more information with.

Exam Information:

Note: Exam 70-232 is available in its beta version September 28–October 7, 2001. While it is in its beta version, this exam is numbered 71-232.

When you pass this exam, you achieve Microsoft Certified Professional status. You also earn elective credit toward Microsoft Certified Systems Engineer certification.

Candidates for this exam work in Windows 2000 Web server environments that use Application Center 2000. They have a minimum of one year's experience administering and monitoring highly available Web environments that have the following characteristics:

- 2-100+ Web servers
- Multi-tiered deployment environments including staging, version control, and rollback
- N-tiered application architecture including a logical Web tier and business logic tier based on COM+ components
- Internet security, such as firewalls, secure protocols, and proxy servers
- Server technologies that include Internet Information Services (IIS), Network Load Balancing (NLB), Windows 2000 Performance tool, and COM+

For most Microsoft exams experience is not necessary but it will greatly improve your odds of passing this exam as well as helping you use the technology out in the field, which is really the most important part.

Links:

You can't miss this link! Microsoft has incorporated video seminars into their web site to include the entire .NET platform. What is nice about this video series is that it really helps you begin down the path of study by giving you a really solid background on the product. It basically explains how to leverage it and all the details in an overview fashion. Please visit and watch the seminar:

Application Center 2000 Product Overview Online Seminar
Discover how Application Center 2000 can help you manage and deploy high-availability Web applications built on the Microsoft Windows 2000 operating system.

Other Good Links:

TECHNET on APP2K

http://www.microsoft.com/windows2000/default.asp

The Windows 2000 Web site provides the most up-to-date information about Windows 2000 and other server products, such as Application Center.

http://www.microsoft.com/applicationcenter/

The Application Center Web site

http://www.microsoft.com/windows2000/library/howitworks/management/wmioverview.asp

This site provides an overview of WMI

http://www.microsoft.com/windows2000/library/howitworks/iis/iis5techoverview.asp

The site provides a technical overview of IIS 5.0

http://www.microsoft.com/sql

This Web site provides the most current information about the SQL Server 2000 product line

Read the Application Center 2000 Product Overview
Get a high-level overview of Application Center 2000 and learn how it facilitates application management, software scaling, and mission-critical availability

Take the Application Center 2000 Product Tour
See how Application Center uses clusters to ease deployment and administration of Web applications

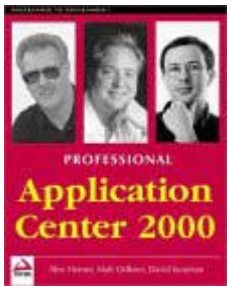
Get the Application Center 2000 Product Guide
Read this guide to get an understanding of the product design goals for Application Center 2000

Download the Application Center 2000 Trial Software
Download the 120-day evaluation edition of Application Center 2000 and see for yourself how it can help you improve Web site performance, guarantee uptime, and simplify management

Publications:

Microsoft Resource Kit is always full of useful material and this is just as good as the rest. Use this to augment your experience with this product.

These are currently the best publications you can get at this time.



Professional Application Center 2000 is a detailed look at the product and another good source of information

Objectives:

This certification exam measures your ability to implement, administer, and troubleshoot information systems that incorporate Microsoft Application Center 2000. Before taking the exam, you should be proficient in the job skills listed below:

Installing and Deploying Application Center 2000

- Plan the deployment of Application Center 2000 in n-tier environments. Considerations include database access, COM+ components, Web environments, and staging environments.
- Plan the deployment of Application Center 2000 in a load-balanced environment. Considerations include client state and application state.
- Install Application Center 2000. Installation types include interactive and unattended.
- Troubleshoot problems that occur during installation.

Creating, Configuring, Managing, and Troubleshooting Clusters

- Create and configure Web clusters, including staging clusters.
- Create and configure COM+ clusters. Considerations include Component Load Balancing (CLB), COM+ routing cluster, and COM+ application cluster
- Configure and implement CLB within an n-tier architecture
- Configure COM+ components for CLB
- Manage cluster members. Considerations include adding, replacing, restarting, and removing cluster members.
- Troubleshoot problems that occur during cluster operations. Considerations include accounts, background services, event logging, and event exclusion

Configuring and Troubleshooting IP Load Balancing

- Configure and troubleshoot the NLB network environment. Considerations include network adapters, IP addresses, switches, hubs, and traffic segmentation.
- Configure NLB operational parameters. Parameters include weight, affinity, port rules, priority, registry entries, and IP addresses for cluster networks and private networks.
- Configure IIS bindings to support load-balancing solutions.
- Configure Active Server Pages (ASP) sessions and request forwarding to provide load balancing of stateful applications.
- Configure Application Center 2000 to allow third-party load balancing solutions

Deploying and Synchronizing N-Tier Applications

- Configure Application Center 2000 to deploy COM+ components.
- Configure authentication and authorization.
- Migrate COM components to COM+ applications.
- Deploy server certificates for SSL connections.
- Troubleshoot problems that occur with Application Center 2000 during application deployment and synchronization.
- Create, modify, and delete Application Center 2000 applications.
- Configure and manage Application Center 2000 application images.
- Manage application resources. Resources include Web applications, files, registry settings, and COM+ components.
- Configure synchronization of applications within a cluster. Considerations include components and frequency.
- Deploy applications.
- Deploy content from a staging server.
- Implement a version control system by using Application Center 2000

Monitoring and Managing Operations

- Configure performance monitoring for clusters.
- Create and configure data collectors and thresholds by using Health Monitor. Considerations include data groups, sync and non-sync monitors, actions, and custom actions.
- Configure Application Center 2000 to automate the management of tiers and clusters

Application Center 2000 Exam notes

Application Center 2000 Overview

Microsoft Application Center 2000 is the deployment and management tool for high-availability Web applications built on the Microsoft Windows 2000 operating system. Application Center 2000 makes managing groups of servers as simple as managing a single computer.

Enable Web applications built on Windows 2000 to achieve on-demand scalability and mission-critical availability through software scaling, while reducing operational complexity and costs.

Application Center 2000 Benefits

- Reduce Application Management Complexity:
  - Manage all elements of each application as a single entity, including content, components and configuration settings (IIS, COM+, Registry, Security, etc.)
- Manage Many Servers As One Unit:
  - Configure and manage applications on separate servers as if they were one system; easily apply changes across the server cluster
- Streamline Application Deployment:
  - Simplify the migration of applications through the development lifecycle and the deployment of updates across the cluster
- Application Load Balancing:
  - Centralize the configuration of Network Load Balancing and Component Load Balancing
- On-Demand Scalability:
  - Expand or reduce application capacity easily using off-the-shelf PC hardware
- Simplified Cluster Operations:
  - Automate the complex processes of creating a new cluster, adding new servers and removing servers from the cluster
- Fault Tolerance:
  - Withstand software and hardware failures at any point in the system without disrupting application service
- Performance and Health Monitoring:
  - View performance and event log data for individual machines or clusters-all from a single console
- Automated Event Detection and Response:
  - Configure responses to system failures, allowing the system to proactively fix problems before the user is affected.

Application Center 2000 Features:

- Aggregated Performance Data
  - Analyze performance data for any server in the cluster, or for the entire cluster as a single aggregated source.
- Application Staging & Deployment
  - Automates the deployment of applications (content, components, & configuration data) from one server to another
  - For example, deploy from development to test, staging, and production environments
- Automatic Application Synchronization
  - Keep your application content, components and configuration settings consistent across all the machines in the cluster
- Cluster Wizard
  - Automates the process of creating, configuring, and managing Web and COM+ clusters
- Component Load Balancing
  - Distribute your COM+ component execution load across multiple servers
- Health Monitor
  - Set pre-configured thresholds to monitor system performance
- Integration with FrontPage and DAV
  - Seamlessly publish content updates using FrontPage or Distributed Authoring and Versioning to a cluster of servers
- Integrated Management Console
  - Make configuration changes and view performance and event log data for one or all machines, all from a single console

- Integration with Microsoft Web Platform
  - Scale and manage Windows 2000 applications built with Visual Studio, Commerce Server 2000, BizTalk Server 2000, Host Integration Server 2000, SQL Server 2000, and Internet Security and Acceleration Server 2000
- Integration with Network Load Balancing
  - Automatic configuration and control over Windows 2000 Network Load Balancing (NLB)
- Integration with 3rd Party Management Tools
  - Integrate Application Center 2000 with your existing 3rd party server and enterprise management tools
- Intelligent Application Monitoring
  - Automatically respond to pre-configured system events to pre-empt application failure, reducing administrative menial tasks and freeing you up for more important tasks
- Intelligent Event Log
  - Query event data from one or more machines to quickly diagnose problems with applications or servers, thanks to smart, distributed event logging facilities
- Local or HTML Based Administration
  - Perform all your administrative tasks locally, using a standard application, or remotely via HTML
- No Single Point of Failure
  - Achieve advanced fault tolerance
  - Application Center creates a system that can withstand software and hardware failures at any point in the system without disrupting application service
- Request Forwarding
  - Augments client affinity load balancing solutions to allow ASP session objects to be used, even behind rotating client-side proxies
- Rolling Upgrades
  - Upgrade production applications without service interruptions
- Simplified Routine Cluster Operations
  - Wizards simplify and automate the complex processes of creating and managing web and component clusters
- Single Application Image
  - Manage your applications as a single high-level definition that encompasses all of its content, components, and configuration settings
- Third-Party Load Balancing Compatibility
  - Manage applications running in clusters which use 3rd party hardware load balancing solutions
- Windows Management Instrumentation (WMI) Support
  - Consumes and emits WMI events, allowing easier integration with other applications and system management tools that support WMI

Application Center 2000 Requirements

- System Requirements
- Computer/Processor PC with a Pentium 133 MHz or higher processor
- Memory 256 MB of RAM (128 MB minimum; 4 GB maximum)
- Hard Disk 100 MB of available hard-disk space
- Drive CD-ROM drive
- Two Network Interface Cards (1 NIC supported); if using Windows 2000 Network Load Balancing, two NICs are required
- Display VGA or higher-resolution monitor
- Operating System Microsoft Windows 2000 Server or Windows 2000 Advanced Server
- Peripherals Microsoft Mouse or compatible pointing device
- Miscellaneous The following feature must be installed as part of Windows 2000 installation:
- Microsoft Internet Information Services 5.0

What is Application Center and where does it fit into .NET?

Application Center is a tool for creating, deploying, and managing Web- and component-based applications. Typically, these are line-of-business applications that require a high level of availability and need to provide acceptable response time.

The servers hosting these applications are expected to handle traffic that is characterized by high volumes, exponential growth curves, and load fluctuations.

This software-based solution is designed to provide the capital cost advantages of the scale-out model, while at the same time providing reduced operations costs. Reduce operating costs should bring the organization more profit from the cut back in overhead.

In addition to these cost benefits, Application Center provides:

Manageability

- Application Center operates via a centralized management console that is minimal and familiar (MMC based)
- This MMC console is used to organize and manage replication, load balancing, and the monitoring of Web and COM+ applications

Scalability

- Application Center can give you scalability that is both linear and flexible
- Additional servers can be added to a cluster as needed to accommodate seasonal peaks and removed (and reallocated within the organization) as the load decreases. This offers high amounts of scalability and flexibility

Reliability

- By eliminating the single point of failure associated with scaling up or hardware-based load balancing
- It also transparently removes a server from operation in the event of a hardware or software failure

Performance Enhancement

- Application Center 2000 offers optimal load balancing algorithms for different types of applications (CLB)
- Application Center provides tools for monitoring system performance and allows the system administrator to adjust load on a server-by-server basis

Design Goals of Application Center 2000

- Provide easy administration of Web and COM+ applications on multiple server groups
- Provide a user interface and administrative console that will be easy to use, browsable, scalable, searchable, and minimal
- Increase the discoverability of most-used settings; bury or eliminate advanced settings
- Provide easy access to related partner configuration tools like Microsoft Internet Information Services (IIS), COM+, and Microsoft Health Monitor

Application Center Feature Summary

- Cluster services
    - Common tasks for administering the cluster configuration (for example, creating a cluster or adding a member) are easy to execute by using wizards or the graphical user interface
- Load balancing
    - Application Center supports Network Load balancing (integrated NLB) and Component Load Balancing (CLB)
- Synchronization and deployment
    - System settings, content, and applications are replicated across the cluster, either automatically or on demand
    - Content can be deployed within a cluster or to another cluster
- Monitoring
    - Real-time event, performance, and health monitoring are supported, and historical data is accessible
- Programmatic support
    - Scripting support is available for performing common Application Center management tasks and accessing the event and monitoring data
    - Selected administrative tasks can be completed with a set of command-line tools
- Local and remote administration
    - A cluster can be administered locally or through a secure remote connection
- High availability
    - Requests and transactions are automatically rerouted to another member if a server failure occurs

Cluster Creation with Clustering Wizard

Application Center makes it very easy for you to create a cluster of servers. The New Cluster Wizard steps you through the creation and configuration process. The design goal was to enable a user to create a fully functional cluster as easily and as quickly as possible and this objective was reached by minimizing the amount of user input needed and by requiring a minimal number of user decision points in the creation process.

Here are the Wizard pages:

- Welcome to the New Cluster Wizard
  - Starts the process and explains what the wizard does
- Analyzing Server Configuration
  - The target server is analyzed to see if its configuration is adequate for serving as a cluster controller.
- Cluster Name and Description
  - Used to name the cluster and provide an optional description of the cluster
- Cluster Type
  - Used to identify the primary type of content that will be served on the cluster
  - This determines which load balancing option should be used
- Network Load Balancing (NLB) Setting
  - This page only appears if a current installation of NLB is bound to a network adapter
  - The existing NLB settings can be retained or new ones can be configured.
- Load Balancing
  - Used to identify whether the cluster will use NLB load balancing, other load balancing, or no load balancing
- Load Balancing Options
  - Used to identify the network adaptor that will be used for load balancing.
- Cluster Type
  - Used to identify the types of Web sites that the cluster will service.
- Monitoring Notifications
  - Enables the administrator to set up default and general monitoring services (such as a Simple Mail Transfer Protocol [SMTP] server or an e-mail address for notifications)
- Completing the New Cluster Wizard
  - Triggers completion of the process; notifies the user if cluster creation was successful

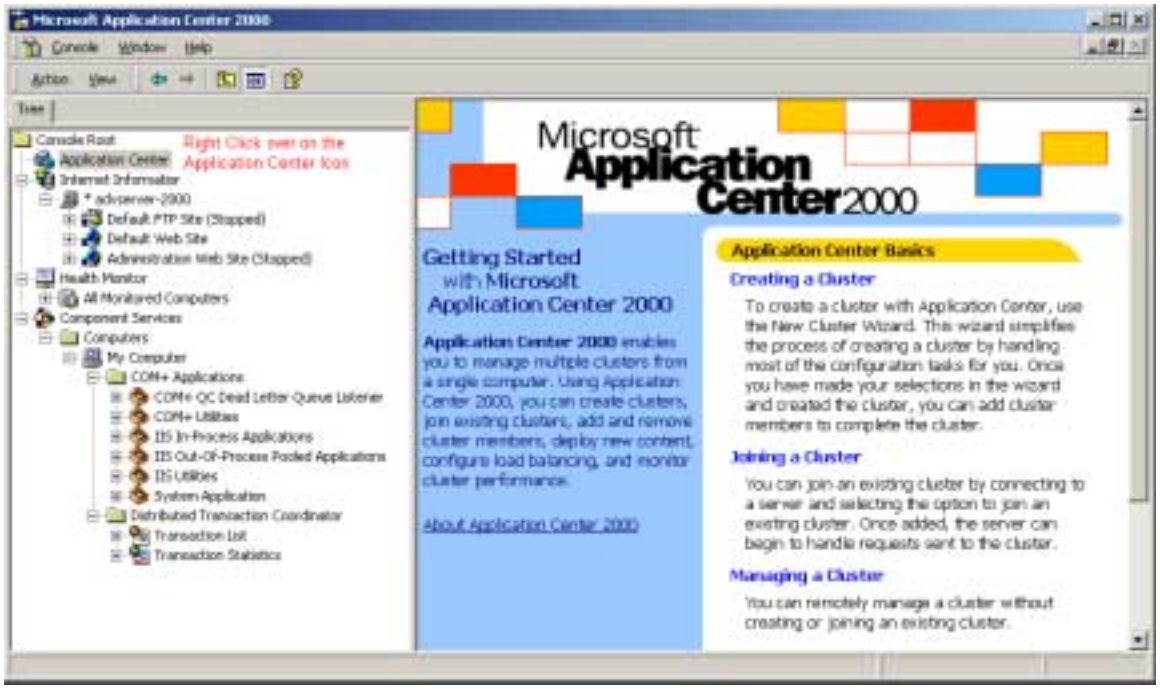
Once the cluster is created successfully and you close the wizard, the console tree of the MMC displays a cluster hierarchy. You now have a cluster that consists of one member—the cluster controller. From this point, you can scale out the cluster by adding additional members. For our purposes, administrative tasks are those that deal with the composition of a cluster and the current state of its members. These tasks include activities such as adding a server to a cluster or taking a member offline

Cluster Administrative Tasks and Wizards

- Add Server to Cluster
  - The task of adding a server to a cluster is accomplished by using a wizard. See the next section, "The Add Cluster Member Wizard."
- Remove Server from Cluster
  - Removes the specified server from a cluster.
- Restart a Server
  - Restart a server, if required (for example, if you have installed new components).
- Change the Cluster Controller
  - Promote a cluster member to controller (for example, if the current controller has failed so that a new controller is required).

- Disband Cluster
  - Completely disband the cluster and leave the remaining server as a standalone server
- The Add Cluster Member Wizard
  - One of the early administrative tasks is adding a server to a cluster after the cluster has been created
  - Once again—in keeping with the ease-of-use design goal—a wizard is available for this task
  - The Add Cluster Member Wizard is launched from the cluster pop-up menu in the MMC console

The Cluster Wizard is part of the Application Center MMC:



Adding Cluster Member Wizard Pages

- Welcome to the Add Cluster Member Wizard
  - Starts the process, explains what the wizard does, and provides these warnings:
    - Server content will be overwritten when the member is synchronized with the controller
    - Two network adapters are required for Network Load Balancing
- Name and Credentials
  - Used to specify the server to add, either by browsing or by entering the server name or IP address The current user must have, or be able to provide credentials for, a user account with administrative privileges in order to continue

- Controller Name
  - Used to identify the controller for the cluster to which the server will be added
  - This is done either by browsing or by entering the controller name/IP address
  - In order to continue, the current user must have, or be able to, provide credentials for an account with administrative privileges
  - This page is not shown when running the wizard from a cluster where the controller is assumed to be the current controller
- Analyzing Server Configuration
  - The specified server configuration is analyzed to ensure that it is configured adequately and is eligible to be added

- Cluster Member Options
  - Used to specify a network adapter to use in an NLB cluster
- Completing the Add Cluster Member Wizard
  - Triggers completion of the process; notifies the user whether the server was added to the cluster successfully

Application Center provides several alternatives for implementing load balancing on a cluster. In addition to the controller configuration, the type of application that will be hosted on the cluster will determine which of the following load balancing options you should select:

- Integrated NLB
- CLB
- No load balancing

Integrated NLB

- With this option, load balancing is actually carried out by the NLB that's part of Microsoft Windows 2000 Advanced Server
- Application Center only provides an interface that's integrated with NLB
- Note NLB is a distributed IP-level load-balancing solution that works by having cluster members see the packets sent to the virtual IP (VIP) addresses associated with a cluster
- Which member actually processes a particular packet depends on the load-balancing rules that are in effect
- The Application Center user interface serves to make load-balancing configuration for a cluster easier by removing much of the configuration detail and, through the use of a wizard, by reducing the number of user decision points
- The wizard also conducts hardware and software diagnostics to ensure that a minimal workable platform is available to support load balancing (for example, it checks for the correct number of network adapters and IP addresses)
- The main element of the NLB configuration for your cluster is selecting an appropriate load-balancing algorithm for the cluster
- This algorithm, or affinity, is based on the source of the bulk of the incoming client requests
- Application Center integrated NLB uses three types of affinity settings to identify the algorithm that will be used

Load Balancing Affinity Settings

- *None*
  - Multiple requests from the same client can access any cluster member
  - The IP address and port number identifies the client
- *Single*
  - Multiple requests from the same client must access the same cluster member
  - This is the default setting for intranet clients
  - The IP address identifies the client
- *Class C*
  - Multiple requests from the same TCP/IP Class C address range must access the same cluster member
  - This is the default setting for Internet clients because it provides optimum support for "sticky sessions"
    - "Sticky sessions" are sessions in which a client request establishes a server-side state that is used in subsequent requests during the same session

After you've created a cluster, you can use the MMC console to change the affinity setting for a cluster that's using integrated NLB.

Setting individual server weights:

- Another load balancing configuration option that's provided by Application Center is the ability to adjust individual server weights in response to performance data or to accommodate different classes of members
- You can do this by opening a dialog box, from the pop-up menu for a cluster member

Going Offline:

- You now can take any server offline
- The “Set Offline” option removes a server from the load-balancing loop
- This is usually done in situations where you've deployed a new application and you want to test it before adding it to the cluster
- After testing is finished you can push the content to the controller for replication, and then put the server back online
- The “Set Offline” option is also used for a removing server that is experiencing problems

Component Load Balancing (CLB)

CLB is an Application Center service. The decision to use CLB should be based on a thorough analysis of your application requirements before hosting components on back-end servers. There is an inherent system overhead associated with client requests that traverse the network as well as in the process of selecting a server to satisfy the client request

Some scenarios where CLB should be considered are as follows:

- Security is a major concern and you want to segregate COM objects behind an additional firewall
- COM objects are relatively "heavy weight" and the fastest server has to be found on which to run them
- Applications are partitioned into n-tiers, either for development or design reasons.
    - **Note:** If you're using NLB for your front-end servers and want to route component requests to a back-end COM+ server, the Application Center user interface easily lets you specify a target

- Scaling is important—a single cluster can use multiple COM+ clusters to service component requests
    - **Note:** For applications that use a limited number of, or "light weight," components, instantiating COM objects locally on a front-end Web server may provide the best performance

No Load Balancing Needed

There may be situations in which you do not need, or do not want to have, load balancing enabled; for example, it is not necessary for application testing and staging or controller redundancy:

- *Application Testing and Staging*
  - You can create a cluster for testing and staging that consists of a single server or a small number of members
  - In this scenario, load balancing isn't really necessary
- *Controller Redundancy*
  - In environments where a cluster is quite small, say two or three servers, you may want to have a completely redundant member on standby to serve as a backup controller
  - You would keep its content synchronized to the active controller, but you wouldn't have it responding to client requests

Synchronization and Deployment

When talking about replication, it's very easy to think only in terms of Web pages and applications. However, this line of thought deals with only one-half of the issue. What about the servers that actually host and deliver the content? Every aspect of a cluster's composition and configuration needs to be synchronized to the cluster controller. Application Center deals with both aspects of the synchronization issue by replicating both controller settings and application settings. Partial or full synchronization of a cluster is achieved by replicating configuration and application settings. A replication engine that uses custom drivers makes the links to the various configuration stores and copies their settings to the target servers. This holistic approach has an added benefit; in the event of a controller failure, you can make **any member** the new cluster controller. You can do this on the fly, with minor configuration changes to the member

Controller Configuration Settings

The controller configuration settings are vital to the existence and ongoing operation of a cluster. The controller is the one that's deemed to have the correct configuration and content at all times and its role is analogous to the domain controller in the Microsoft Windows NT domain model. All other cluster members are synchronized to the controller, and all administrative actions are invoked on the controller

Cluster-related information is stored, such as:

- The cluster name
- Cluster-wide user accounts
- Cluster-wide Passwords
- IP addresses
- Various flags (IE: whether or not NLB is in use)

If integrated NLB is implemented, all the required settings—port rules and client affinity, for example—must also be saved and replicated. Finally, several network settings—such as load-balanced IP addresses bound to the NLB network adapter and default gateway settings—must be saved and replicated as well

Note: Only network settings on the NLB-bound network adapter are replicated

The replication of configuration settings is transparent to the user and done automatically. Most of these settings are copied to all the members, whether they're in the load-balancing loop (online) or not (offline). However, there are some settings that are copied to members that are online only

Applications

An application is defined as a collection of all the required software resources for a Web site or COM+ application. For example, an application can consist of Web site content, COM+ applications, certificates, and registry keys. This approach allows the administrator to think of sites as logical groupings. An application may contain more than one Web site, or no Web sites at all, and still be replicated across a cluster.

Note: Because an Application Center application is a logical framework for handling anything hosted on a server, Web content is treated as an application!

By using the Applications view, you can create an application and identify all the resources that are associated with it. The result is an application definition, which provides the basis for deploying and replicating applications to a member or over the entire cluster

- **Note:** Application Center defines four applications by default:
    - Administration Web Site
    - AllSites
    - Application Center 2000 Administrative Site
    - Default Web Site

The required settings for any published Web site are automatically stored in AllSites, so a custom application definition is not mandatory for Web sites

Application Deployment

Application deployment is handled by the New Deployment Wizard, which enables you to identify target servers—inside or outside the application source cluster—and applications to deploy

New Deployment Wizard Pages

- Welcome to the New Deployment Wizard
    - Starts the process, explains what the wizard does, and warns that resources on the target(s) may be overwritten
- Deployment Target Options
    - Used to determine if the target is within the same cluster or outside the cluster
- Deployment Target Authentication
    - Used to submit valid credentials for the target
- Deployment Targets
    - Used to identify deployment targets
- Deployment Content
    - Used to select either the entire server image or specific applications for deployment
- Deployment Options
    - Used to select deployment options, such as whether or not to replicate all file and directory permissions
- Draining Options
    - Used to specify whether or not to allow default draining time on target or reset target immediately
- Completing the New Deployment Wizard
    - Triggers completion of the process

Additional Application Features

You can use icons on the toolbar in the Applications view to launch additional application-related tasks

- Application Tasks
  - Delete Deletes the selected application.
- Rename
  - Renames the selected application.
- Synchronize
  - Replicates and then synchronizes the selected application across the cluster.
  - Because synchronization through replication is a major aspect of deployment, we'll examine the synchronization feature next.

Cluster Synchronization

You can replicate a single application to cluster members, or replicate all the applications that are currently hosted on the controller. Site information contained in the AllSites category, or in custom definitions, may include any of the following information, which is replicated when you synchronize a cluster:

- Web Content and Active Server Pages (ASP) applications
- COM+ applications
- Virtual sites (and their associated ISAPI filters) and content
- Global ISAPI filters
- File system directories and files
- Metabase configuration settings
- Exportable CryptoAPI (CAPI) server certificates
- Registry keys
- System DSNs
- Microsoft Windows Management Instrumentation (WMI) settings that Application Center uses

Note: By default, the cluster is synchronized whenever new content is added (only the new content is replicated) or fully synchronized every 60 minutes. The user interface lets you disable this feature completely or change the time frequency for the synchronization schedule

Note: You can exclude specific members from being part of cluster synchronization

As with application deployment, you can explicitly replicate a single application or all of the applications on the controller. This gives you flexibility in staging and deploying new applications, which you may want to test on part of a cluster before deploying the application to all of the members

Application Center Event Sources

- Windows 2000
  - All the events logged by Windows 2000 in its event log
  - Application Center allows you to view these events by severity, source, time frame, and date generated
- Health Monitor
  - Health Monitor logs these events whenever established thresholds are exceeded
- Application Center
  - Various Application Center services, such as load balancing, generate and log events
  - Some error-related events are also logged in the Windows 2000 event log

Event Severities

- Informational
  - Describes the successful operation of an application, driver, or service
  - For example, it informs you when a network driver has loaded successfully
- Warning
  - The event is not of major significance, but may indicate a possible future problem
  - For example, you will receive a warning when disk space is low
- Error
  - Indicates that a significant problem has occurred, such as loss of data or loss of functionality
  - For example, an error will occur if a service has failed to load during startup

Performance

Performance is indicated by a collection of performance counters that indicate the amount of resource consumption. The counters may indicate, for example, that 70 percent of the total hard disk is space is in use, or that there have been 1,897 requests per second for the WWW Service

Application Center uses a set of default counters to give you an overview of both server and cluster performance. These counters cover a broad range of system-related information, from the amount of available memory to the number of ASP page requests serviced per second. You can view these counters either in real time or for a selected time frame

Server performance summary

By presenting these different views, Application Center enables you to assess the current level of performance in the context of past behavior. You have access to enough data to determine whether or not the present performance picture is an anomaly, represents a trend, or is part of a cycle

Health

Application Center creates several default data collectors—with pre-defined thresholds—for use in monitoring server and cluster health. Some of the default collectors are toggled as active, while others are inactive and can be activated at any time

Note: Data collectors are used to collect, receive, and retain specific WMI data

You can also use the *Health Monitor* console to create and configure custom data collectors to expand the scope of the health monitoring features provided by Application Center. The product also supports the use of local monitors and thresholds, in addition to its global monitors

Local and Global Monitors

By default, Application Center creates only global monitors. However, you might want to create local monitor thresholds to meet specific needs. For example, one of your cluster members might have a smaller hard disk than the rest, and the global threshold for disk usage (let's say, 80 percent) might be too high for this member. You can set the local threshold at 70 percent to give yourself more leeway for responding to a disk full situation.

The ability to set local monitors gives you greater flexibility, but keep in mind that it can also increase monitoring complexity.

There are three ways to create local monitors:

- From scratch by using the Health Monitor snap-in
- By copying and modifying existing monitors in the Health Monitor snap-in
- By developing classes with Managed Object Format (.mof) files, and then compiling them for use by WMI

Warning Changing monitors for a specific cluster member will cause that member to be out-of-synch with the rest of the cluster from a monitoring perspective. Unless this change is made correctly, Application Center will overwrite your changes and restore the default settings during the next synchronization cycle

Last Tips:

This exam is based on Windows 2000 server technologies, the .NET platform and Application Center 2000 product and application specifics. Expect a lot of topics to be covered in this exam. Look at the objectives for this exam and make sure you are comfortable with them and are working with them while studying for this exam. Good Luck.