

# The Basics of Operations Management

One of the key criteria for selecting and deploying enterprise systems is the ability to effectively manage their operations. By ensuring that critical business systems are healthy, responsive, and running as expected, information technology managers and executives are able to lower the total cost of ownership for their systems and place more emphasis on the development and deployment of new capabilities. In most organizations, this is the major focal point to help drive efficiency. In this chapter, we cover the following topics:

- ☐ Systems management on the Microsoft platform
- ☐ Model-based operations management
- ☐ Dynamic Systems Initiative

With the emphasis on Microsoft's management technologies over the past few years, new releases of SMS and MOM, and the evolution of the Microsoft Update platform, there is a greater need for IT to understand how these products can work together to provide a comprehensive systems management solution that enables software deployment, systems monitoring for alerts and exceptions, and access to the data that can help IT to prevent problems in the future. Those who use the systems management tools from Microsoft benefit from having Microsoft's knowledge of its own tools baked into the products, which makes it easier to manage their Windows desktop and server environments and provides the capability to work in a heterogeneous setting.

The goal for this chapter is to provide a basic overview of operations management and describe the problem domain and then focus on the components of the Microsoft platform now and in the future that will enable system administrators and IT to effectively manage their technology operations. By examining the current management tools and understanding Microsoft's Dynamic Systems Initiative, you can better formulate your strategies for deploying management solutions on the Microsoft platform.

# Systems Management on the Microsoft Platform

IT organizations deploy systems management and monitoring technologies in an effort to reduce costs associated with the complexity and effort of deploying and managing large numbers of workstations, servers, and server-based applications in their enterprise environment. Achieving this goal depends on the technology being used to provide scalability to accommodate large environments and to provide an efficient architecture. However, when comparing monitoring and management technologies, the most critical factor to consider is the availability of the operational assistance they offer to the operators and administrators that rely upon these tools. These administrators want to ensure that their systems are highly available and functional for their customers.

Monitoring technologies are only as valuable as the quality of the best-practices they provide. Traditionally monitoring, management, and deployment technologies have been toolsets that depend on customization by IT or consultants to determine appropriate components that should be deployed and how to best configure them to monitor the availability and performance of the customer's specific application or service. Because of this, few organizations have realized the potential value of these technologies. In addition, monitoring tools that are not granular enough in detail can fall short in helping administrators to solve problems once they are identified.

The core management solutions on the Microsoft platform include products such as Systems Management Server (SMS), Microsoft Operations Manager (MOM), and the Microsoft Update solution. Through the use of SMS for software deployment, MOM for management alerts and notifications, and Microsoft Update to provide easy access to updated patches for products such as Microsoft Windows, Microsoft Office, and many others, an enterprise systems administrator has a baseline to enable secure and well-managed systems. MOM provides the foundation for operations management while SMS enables more sophisticated configuration and release management scenarios. Together, these tools can effectively support the full lifecycle for systems management.

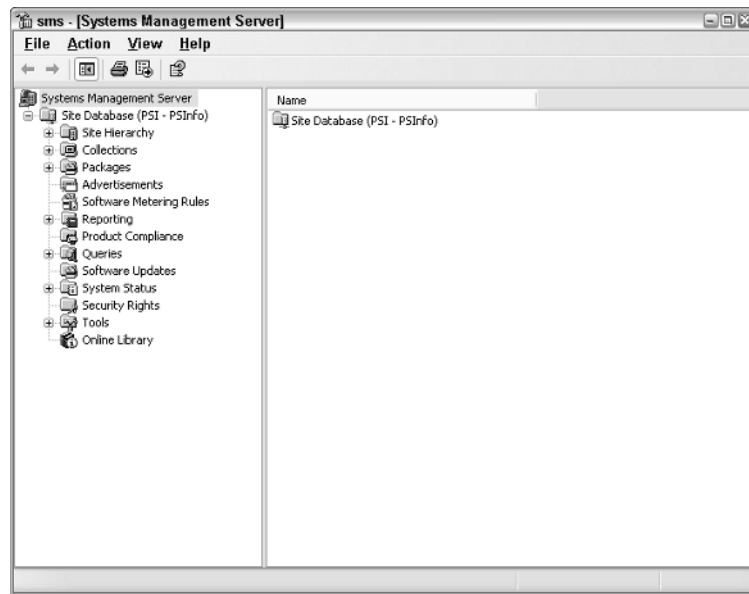
For many years, IT administrators have been successfully using Microsoft SMS to manage Windows-based desktops and servers within their organizations. As the number of Windows PCs deployed within these organizations has grown dramatically, SMS has helped IT administrators contain the cost of managing such heavily distributed systems, keeping the overall cost of ownership low while allowing the number of deployed PCs and applications to grow.

However, the environment in which Windows-based PCs are deployed is constantly changing as new technologies are adopted and as PCs are used in increasingly complex configurations. The most recent release of SMS, Systems Management Server 2003, is designed to track and support these changing trends in PC usage and provide support for emerging usage scenarios and technologies. SMS 2003 provides solutions for a number of key issues faced by IT administrators managing Windows-based PC environments today. SMS 2003 addresses the following key problem areas:

- ❑ Managing computers and users that roam around the network, often connecting over poor bandwidth links or from different geographic locations on a regular basis
- ❑ Tracking the deployment and usage of software assets in the organization, and using this to plan licensing and software acquisition across the company

- ❑ Monitoring the patch state of all deployed Windows PCs and applications in the enterprise, and removing vulnerabilities proactively in a closed loop process with real-time patch deployment status
- ❑ Offering managers and users access to the management data aggregated by SMS, including live configuration and operations reports
- ❑ Managing Windows PCs securely, but with a minimum of administrative overhead, while fending off the ever-increasing number of external security threats

The core features of SMS, including software deployment, inventory tracking, and remote troubleshooting are supported in SMS 2003. The SMS administration console is shown in Figure 1-1.



**Figure 1-1**

In addition, support has been added for the increasing number of mobile users in organizations today. This support simplifies management of Windows-based PCs and users who commonly roam to different physical locations, reducing the IT cost of managing such users and machines and providing seamless one-to-many solutions for desktop, laptop, and server users. Because of increased need to maintain the security of all deployed software in an enterprise, SMS 2003 also adds support for Security Patch Management of deployed Windows systems. This allows administrators to easily monitor the patch state of all systems within their enterprise through a set of powerful web reports. These reports are used to identify any vulnerability in the network, at which point the system can then be used to download and deploy the latest patches from Microsoft's web site to those machines that require them. Additional scenarios and enhancements will be supported in SP2 of SMS, which is scheduled for release in 2006.

# Chapter 1

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Because many organizations are deploying Windows Server 2003 Active Directory service within their networks, SMS 2003 is able to take advantage of this technology, further simplifying the process of managing clients and users. Many Active Directory features map directly to SMS targeting concepts, allowing IT administrators to target software and inventory tasks using Active Directory constructs and containers. In summary, SMS provides a strong set of features to enable software deployment and the management of clients and users.

When it comes to systems monitoring and alerting functions, the core component of that solution is Microsoft Operations Manager. MOM 2005 differs from traditional monitoring technology and assists customers in reducing the cost of management through the use of management packs. These management packs for an application combine the insight of the application developers, a knowledge base for organizational learning and common knowledge surrounding the product along with best practices for operations.

The difference between MOM management packs and similar management technology lies both in the identities of the management pack developers and the methodology used for their development. First, MOM 2005 management packs provide built-in, product-specific operational intelligence, encapsulating knowledge from the individual Microsoft product teams developing the applications, Microsoft Consulting Services, and Microsoft's product support organizations. All of this knowledge is made available out of the box for consumption by the product users. Second, the Design for Operations methodology is used to first analyze and then design the management of Windows applications and services.

The Design for Operations methodology of managing applications is a sharp contrast to the typical way application management has been developed in the past. As opposed to a subject matter expert driving the approach to managing a system, Design for Operations requires developers of Microsoft applications and third-party applications or services to adopt an inside-out approach based on their personal knowledge of the application or services. Instead of simply monitoring processes or services to see if they're running and then generating an alert to a console, Design for Operations requires that an application or service be analyzed and broken down into a framework that will describe the application from a management perspective. This methodology uses three models as the basis for implementing management for a service or application: the Health Model, the Task Model, and the State Model. The models are meant to provide a prescriptive mechanism for ensuring that management is built for every service and application and that the management is aligned with the needs of the administrator who will be running the service. This design point is a requirement of the Windows Server Systems Core Engineering Criteria, which are used to determine whether a Microsoft product can be shipped under the banner of Windows Server System.

The Health Model defines what it means for a system to be healthy or unhealthy, and the model defines how a system transitions in and out of those states. Information on a system's health is necessary for the maintenance and diagnosis of the system. The contents of the Health Model become the basis for system events and instrumentation on which monitoring and automated recovery is built. All too often, system information is supplied in a developer-centric way that does not give the administrator operational

visibility of the applications. The Health Model seeks to guide both what kinds of information should be provided and how the system or the administrator should respond to the information. If a management technology is monitoring an application or service without a deep understanding of Health Modeling, IT operators will be required to invest time and resources analyzing the relevance of an alert to the operations of their organization.

The Task Model is used by developers to enumerate the activities that are performed in managing the system. These may be maintenance tasks performed on a routine basis, such as system backup; for event-driven tasks, such as adding a user; or for diagnostic tasks performed to correct system failures. Defining these tasks guides the development of administration tools and interfaces, and it becomes the basis for automation. Used in conjunction with the Health Model, the Task Model can drive self-correcting systems with the appropriate instrumentation. Task Models are utilized by management pack developers in the creation of product or service-specific management Rules and Administrator Tasks. Management packs also leverage the Task Model to understand which error situations can be corrected on the managed system by using self-correcting rules and which will require human intervention. Likewise, Task Models are leveraged to provide IT administrators with preconfigured, remotely launched tasks from a MOM Operator Console that will assist in either error diagnosis or correction. Without the concept of a Task Model, most monitoring applications rely on the IT organization or consultants to write complex scripts and rules to determine how to resolve error situations locally or determine the correct diagnostic procedures or tools needed to remedy a problem remotely.

State Modeling will be increasingly leveraged by future Windows platforms and applications to provide administrators with a comprehensive means of managing both the availability and configuration of systems and applications. State Modeling catalogs the state and settings associated with an application and define the scope and type for each. State may be associated with the computer or the user, it may be temporary or permanent, and it might be user data or operational parameters. Having a strict association of every state entity with a scope and category allows the administrator flexibility in deployment and provides a powerful tool for control. It means an administrator can separately store user data, migrate a user easily from one computer to another, and replicate computer configuration across a data center.

In an early adoption of State Modeling, MOM 2005 management packs provide administrators Health and State information from new views within the MOM Operator Console. In addition to alert views found in other management applications, the State Monitoring view provides MOM operators with a quick overview of server health. Each computer shown in the state monitoring view receives a rating in critical categories. The rated categories include memory and operating system as well as specific application categories, such as Active Directory, SQL Server, and Exchange Server. The operator can expand a particular category to view server status displayed in subcategories, as shown in Figure 1-2.

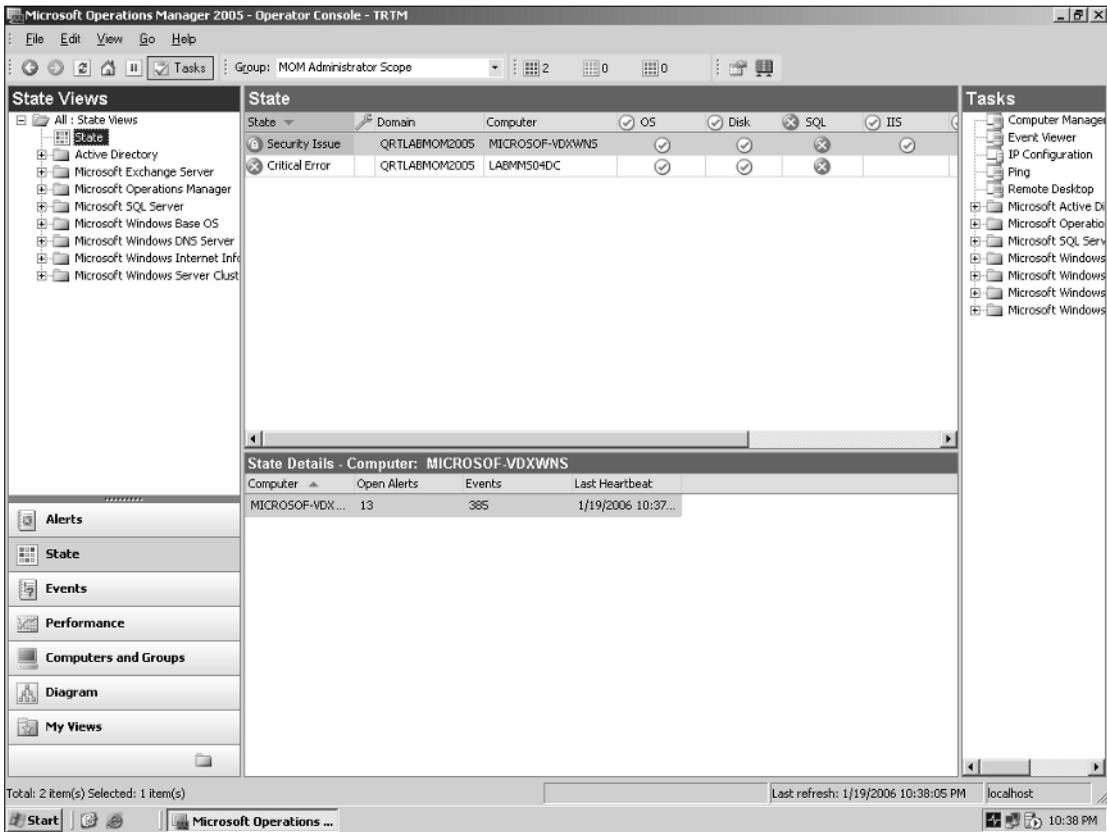


Figure 1-2

MOM 2005 provides users with a variety of topological views that show the automatic discovery of nodes and relationships. With topological views, IT administrators can view node status, navigate to other views, and launch context-sensitive actions. This can reduce resolution time for complex problems from hours to minutes, significantly reducing cost and improving service levels. For example, when something happens to an application such as Active Directory, it turns red on the diagram. By double-clicking on the red application, a more detailed diagram opens showing one or more trouble spots in red. The operator can continue drilling down in detail until he or she uncovers the cause. The MOM console tasks and prescriptive guidance are then available to help resolve the issue. Diagram views are shown in Figure 1-3.

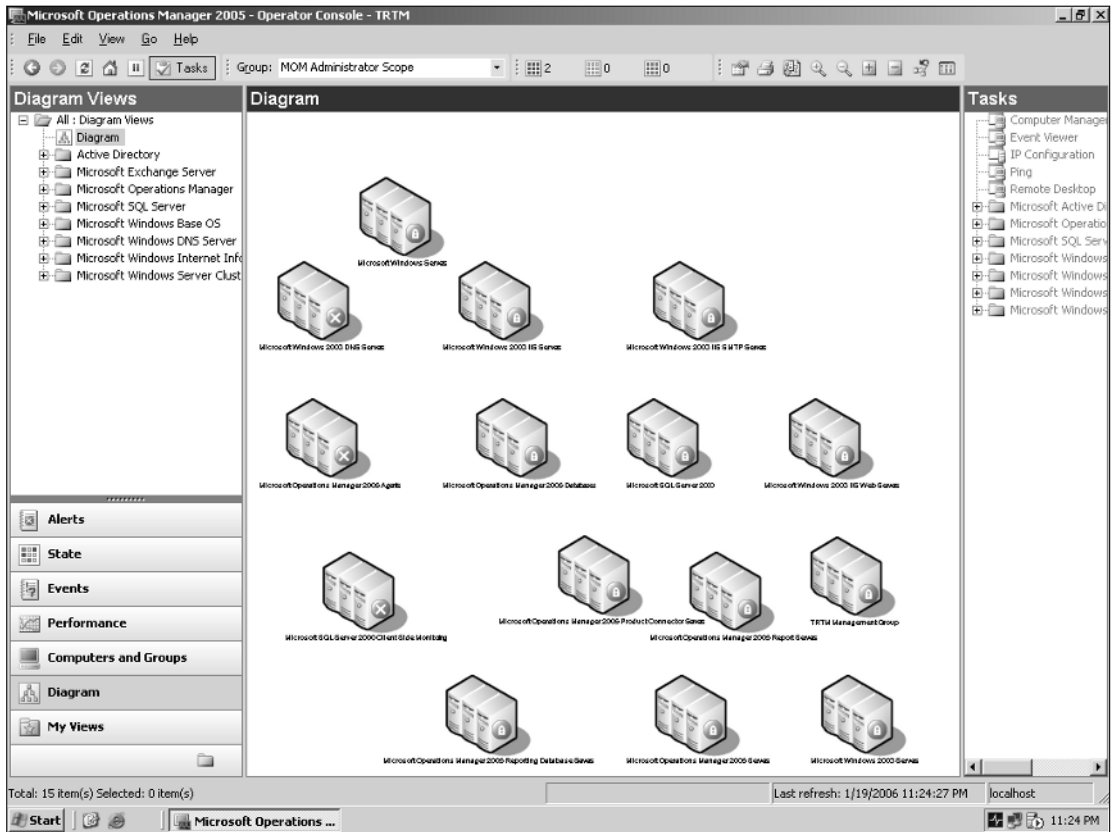


Figure 1-3

## Moving Toward the Future: Dynamic Systems Initiative

Knowledge is a key component for systems management. This includes knowledge of the deployed systems, knowledge of the environment in which they operate, knowledge of a designer's intent for those systems, and knowledge of IT policies. Specifically, knowledge may include the following:

- ☐ Developer constraints on settings of a component, including constraints on related systems that the component is hosted on or communicates with
- ☐ IT policy that further constrains settings or deployments
- ☐ Installation directives that describe how a system is to be installed

# Chapter 1

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- ❑ Health models that describe system states and the events or behavioral symptoms that indicate state transitions
- ❑ Monitoring rules, ranging from polling frequency to event filtering and forwarding to diagnostic or corrective action in response to problems
- ❑ Schemas for instrumentation, settings, events, and actions
- ❑ Service-level agreements that define performance and availability
- ❑ Transaction flows and costs of processing steps for performance analysis
- ❑ Reports

As IT organizations have become more geographically dispersed and individual roles more specialized, IT professionals tend to operate in silos focused on their area of specialization. This makes it increasingly difficult to communicate relevant system knowledge across the IT lifecycle. As a result, organizations find it very difficult to collaborate across roles, promote continuous improvement of a system's design and operation, and conduct typical management tasks such as deployment, updating, and patching.

The silos that form across IT organizations interact with an application or system at some point during its lifecycle. However, each silo possesses its own pocket of system-relevant knowledge that does not get communicated effectively to the rest of the organization.

Software models can be used to capture system-relevant knowledge and facilitate the communication and collaboration around this knowledge that is required to improve the efficiency of the entire IT development, deployment, and support lifecycle. A software model provides a level of abstraction for administrators similar to what a blueprint provides to an architect or a prototype provides to a product designer. But for a dynamic and distributed software environment, a static model or blueprint is insufficient. The model must be a living organism and should evolve throughout the life of a system. Having the right tools for systems management can help to keep these models current and enable users to have dynamic views of the system model based on an underlying operational system.

When a system is developed, basic rules and configurations are defined. As the system is deployed, the details of its configuration, environmental constraints, and requirements are added. As operational best practices are developed or enhanced, they can be incorporated into the model as well, providing a feedback loop between the operations staff and the model. In the end, the model becomes a live, dynamic blueprint that captures knowledge about a complete distributed system in terms of its structure, behavior, and characteristics. The following benefits can be gained as a result of these models:

- ❑ The system model captures the entire system's composition in terms of all interrelated software and hardware components.
- ❑ The system model captures knowledge as prescriptive configurations and best practices, allowing the effects of changes to the system to be tested before the changes are implemented.
- ❑ Tools that take advantage of the system model can capture and track the configuration state so that administrators do not need to maintain it in their heads. The software maintains the desired state so that humans do not need to.



- ❑ Administrators do not need to operate directly on real-world systems but rather can model changes before committing to them. In this way, “what if” scenarios can be tried without impact to a business.
- ❑ The system model becomes the point of coordination and consistency across administrators who have separate but interdependent responsibilities.

The modeling system becomes the integrated platform for design and development tools that enable the authoring of system models. It also becomes the platform for operational management and policy-driven tools used for capacity planning, deployment, configuration update, inventory control, and so on.

In Microsoft’s initial implementation of the Dynamic Systems Initiative, the System Definition Model (SDM) is a foundational component of dynamic systems. SDM is a model that is used to create definitions of distributed systems. In this context, a distributed system is a set of related software and hardware resources working together to accomplish a common function. Multi-tier applications, Web Services, Internet web sites supporting e-commerce, and enterprise data centers are examples of systems. Using SDM, businesses can create a live blueprint of their systems. This blueprint can be created and manipulated with various software tools and is used to define system elements and capture data pertinent to development, deployment, and operations so that the data becomes relevant across the entire IT lifecycle.

Today, an SDM can be defined using tools available with Visual Studio 2005. Going forward, SDM will be the basis for design of system models, used to deploy systems based on the model defined and will be kept up-to-date by an SDM service that dynamically modifies the SDM to reflect the current state of operations. While the SDM will be incorporated into the Microsoft management solutions, third parties will also be able to develop solutions based on the SDM to extend the capabilities of these models and the tools that consume or produce them.

Several key capabilities of IT organizations and IT systems become possible when software models are used to capture all relevant system knowledge. Through the DSI efforts and SDM, Microsoft aims to enable innovation in its products and from its partners in four areas: Design for Operations, System-Level Management, Policy-Driven Operations, and Hardware Abstraction.

## ***Design for Operations***

When creating mission-critical software, software architects often find themselves communicating with their counterparts who specify data center and infrastructure architecture. In the process of delivering a solution, an application’s logical design is often found to be at odds with the actual capabilities of the deployment environment. Typically, this communication breakdown results in lost productivity as developers and operations managers reconcile an application’s capabilities with a data center’s realities.

With new model-based development tools, such as Visual Studio Team System, these differences are mitigated by offering a logical infrastructure designer that will enable operations managers to specify their deployment environment and architects to verify that their application will work within the specified deployment constraints. These tools use software models to capture the knowledge of a designer’s intent, knowledge of an operational environment, and knowledge of IT governing policies to ensure IT systems are designed with operations and manageability in mind from the start. The models described can be built using Visual Studio 2005 and then consumed by Microsoft management tools and any other third-party tools that are built to consume the models, which are based on an open specification.

### ***System-Level Management***

Models can capture the entire structure of an application, including all the underlying and interrelated software and hardware resources. Management tools, such as future versions of MOM, will use those models to provide a system-level view of the health and performance of that application, enabling administrators to understand the impact of changes or errors in the system and to manage the application more effectively.

This system-wide view will enable future versions of management tools, such as MOM, to perform robust health monitoring and problem solving, as well as end-to-end performance and service-level management.

### ***Policy-Driven Operations***

Models can also capture policies tied to IT and corporate governance, such as Sarbanes-Oxley compliance or basic security standards and operating system versioning. Management tools, such as future versions of Microsoft SMS, will use these models for desired-state management.

By comparing the model of the real-world state with the model of the compliance definition, management tools can make systems compliant before allowing them access to corporate resources.

### ***Hardware Abstraction***

Software models can capture an entire system's composition in terms of all interrelated software and hardware components. As a result, a system will contain a specific description of the hardware requirements of the environment into which it will be deployed.

This knowledge will enable new resource management technologies, such as Microsoft Virtual Server, to interpret these hardware requirements and to be used by management tools to ease the initial provisioning, ongoing change, or removal of hardware from an application based on changing business needs.

## **Management Strategies**

Microsoft's strategy for delivering the Dynamic Systems Initiative is to leverage and extend existing management solutions to take advantage of the model-based approach to systems management. Visual Studio 2005 Team System and MOM 2005 with management packs are great examples of products that deliver on the DSI vision today. With these investments and those planned for the future in products such as SMS and other System Center products, the Dynamic Systems Initiative clearly signals Microsoft's long-term commitment to reducing complexity across the IT lifecycle and making it possible for IT professionals to deliver greater value to their businesses.

Looking toward the future, Microsoft is working to develop products and enable solutions that will unleash the potential of SDM to simplify and automate information technology. Microsoft will both deliver and enable a new breed of application development tools that make it easier for companies to leverage the Design for Operations methodology. Windows and supporting applications and services will evolve to manage distributed resources across a data center, provide users with dynamic system-level views of their environments, and offer new core services targeted at simplifying the deployment

and operations of distributed systems. Windows Server System applications, including SQL Server, Exchange Server, and BizTalk Server, will support SDM to deliver a greater set of management capabilities for IT professionals and their customers. Coupled with Microsoft's commitment to management packs shipping with new software releases, IT administrators will be able to deploy new solutions and have confidence in their ability to be supported in demanding environments much more quickly than before.

## Summary

In this chapter, we covered the following:

- ❑ Systems management on the Microsoft platform
- ❑ Operations, configuration, and release management
- ❑ Dynamic Systems Initiative

By combining health and state with alert information, IT operators no longer have to perform research to understand the organizational impact of alerts. By maintaining awareness of system and service availability, IT staff is better able to identify, address, and resolve IT reliability and performance issues before they become serious problems and negatively affect business applications. Through the use of State Modeling and directly monitoring the event, health, and performance information of Windows Server System, MOM 2005 highlights relevant and important information that can be captured, evaluated, and presented to operators, helping prevent issues from going unseen. Tools such as SMS and Microsoft Update expand the solutions through configuration management capabilities that help administrators to deploy solutions and drive toward desired configuration through automated reporting, software deployment features, and other management capabilities.

Going forward, Microsoft plans to deliver and enable a new category of closed-loop, system-level management solutions that provide new levels of automation in the data center and tie business policies directly to IT systems. By adopting solutions from Microsoft and its partners today, IT professionals can realize reduced costs and gain more time to proactively focus on what is most important to support their organizations. For information technology organizations that are looking to get started with systems management or to become more mature in the approach to managing their systems, products such as MOM 2005, SMS 2003, and Microsoft Update are key components of a well-managed technology environment. In Chapter 2, we take an in-depth look at the features of these products and learn more about how they work together to support systems management.

