



End-to-End Service Monitoring with Microsoft® System Center Operations Manager 2007

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Executive Summary

End-to-end service monitoring is a new feature of System Center Operations Manager 2007. IT organizations have changed the focus of their offerings in the last couple of years, traditionally IT ran servers which provided storage or application access. Today IT offerings have grown to more sophisticated service offerings, many of which involve several servers or applications working together in a distributed manner. IT Services made up of distributed applications with many working components linked together by networks and software on many different physical or virtual systems make up the bulk of critical systems within an organization these days. In System Center Operations Manager 2007, Microsoft is providing a new level of visibility into the operations and efficiency of enterprise IT services. This paper outlines the service monitoring capabilities of Operations Manager 2007.

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Introduction

These days IT departments are under intense pressure—pressure from users who want more productivity and business groups who want to see more value. Pressure also comes from regulators demanding compliance, technology advances, and competitors. IT departments must manage these pressures to keep their businesses running while lowering costs. The bulk of many IT budgets are spent “treading water,” simply maintaining the current systems and services. Only a small fraction of an IT budget is spent on new technologies and services to move the business ahead. The cost of hardware and software is tracking downward, but the cost of managing and operating these assets is increasing. By gaining the upper hand in monitoring and managing their IT services, such as desktop, messaging, or line-of-business applications, IT departments can do more with fewer resources, manage the complexity of their environment, and achieve the agility necessary to be successful.

IT services can be defined as a group of processes and technology that work together to produce a common outcome. For example, a Web browser, Web site, network, and database work together to process sales transactions. This grouping is an IT service; any interruption in the chain and the sales transaction is not processed. IT administrators need to manage their systems in the context of a service to be efficient. If a single database server crashes, one application or many applications that rely on the database server may be taken out. Knowing the relationship of the service components is important to aid in assessing impact and determining the most appropriate troubleshooting steps.

Microsoft System Center Operations Manager 2007 launches Microsoft’s solution for end-to-end service monitoring of IT services. Microsoft is no stranger to service management. Products such as Systems Management Server (SMS) have been used for years to manage components of IT services such as clients, servers, and networks. Operations Manager 2007 introduces event and performance monitoring of end-to-end services to the capabilities of the Microsoft System Center family of management solutions. Operations Manager 2007 is a solution that can be leveraged as part of a broader Microsoft Operating Framework (MOF) or ITIL service management solution. For more information on MOF, go to <http://www.microsoft.com/mof>

System Center Operations Manager 2007

System Center Operations Manager is a software solution to meet the need for end-to-end service monitoring in the enterprise IT environment. System Center Operations Manager provides an easy-to-use set of tools to monitor thousands of significant events and service performance monitors across hundreds of operating systems and applications to provide a single view of the health of an organization’s IT environment. This view of a service’s health is key to rapid, agile responses to events that may impact the normal running of business and ultimately cost an enterprise money.

System Center Operations Manager 2007 is the third version of Microsoft’s award-winning monitoring solution. Operations Manager 2007 builds on the success of its predecessors by adding key features and functionality that customers and the market have been demanding. Microsoft listened to users of the first two versions of Operations Manager to find out what they liked, and what they didn’t like. Customers said they wanted to monitor more than just individual servers, they wanted it to be easier to find computers and applications that need to be monitored, and they wanted more detailed troubleshooting and best practice knowledge. The market for management solutions also played a role in the design of Operations Manager 2007. More enterprises are implementing Service Level Management, and more companies are finding a need to monitor their ever-expanding network of Microsoft Windows-based systems.

To answer this need, Microsoft enhanced the already capable Operations Manager solution by designing Operations Manager 2007 around these three pillars:

- End-to-end service monitoring
- Best-of-breed manager of Windows
- Increased efficiency and control

Within these pillars, Microsoft has leveraged the best of existing technologies, such as Windows and Microsoft SQL Server, and embraced new technologies, such as the System Definition Model (SDM) and Windows PowerShell scripting engine. System Center Operations Manager 2007 has answered the IT service management needs of both customers and the market.

End-to-End Service Monitoring

End-to-end service monitoring is the process of monitoring the many technology components of the service as a holistic entity. The service, which is a collection of applications, servers, and other managed objects, is modeled into a high-level object called a *distributed application*. Distributed applications, like all objects that are monitored with Operations Manager, has a health state and therefore, can be viewed with the Health Explorer, and can have reports and views run against them. Distributed applications are treated the same as any other managed object.

Services in Operations Manager are made up of several components: models, management packs, and templates. At the core of all services is the model. Models in Operations Manager are based on standard XML schema for describing services, which is known as the System Definition Model (SDM). The model is stored in a management pack and is therefore extensible and customizable. In this way, it is similar to any Operations Manager management pack. Service models in Operations Manager are made up of one or more sub-components. Components are containers that can hold objects such as servers or applications. Components are linked together by relationships, which provide the structure to the distributed application model and tell the model how health should be rolled up. To determine the health of component objects, Operations Manager leverages the models and management knowledge in object management packs. For example, if the service uses SQL Server as a component, then Operations Manager will rely on the SQL Server management pack as part of the service model for SQL Server health. Some management packs can build a basic service model as part of their discovery. This is helpful for services such as Exchange messaging, which has many components that make up the overall service. These automatic service models can be modified and extended as needed. Operations Manager 2007 provides a graphical tool called the Distributed Application Designer for building or modifying service models. In addition to the designer, Operations Manager includes several types of templates to make adding monitoring easier. Templates in Operations Manager 2007 are similar to templates in Microsoft Word. You normally would not start writing a report in a New Document in Word. Instead, you choose a template that has the right formatting and customize it based on your needs. Similarly, Operations Manager provides templates for typical distributed applications, objects such as Windows Services, and common IT actions such as collecting performance counters. Operations Manager 2007 templates include the following:

- Distributed application templates
- Management pack templates (e.g., Windows Service)
- Rules templates (e.g., performance counter collection)
- Monitor templates (e.g., event-driven state monitors)

The Distributed Application Designer and templates make creating service models for Operations Manager 2007 monitored systems very simple.

As part of this paper, we will use a simple ASP.NET application called .NET PetShop to demonstrate how a service model is created with Operations Manager 2007. PetShop uses Internet Information Server (IIS), ASP.NET, and SQL Server 2005 as the components that make up the service, as shown in Figure 1. Internet Explorer 7.0 is used as a client of the service and will be leveraged to provide user perspective into the service.



Figure 1 .NET PetShop Service Components

Modeling End-to-End Services

To begin monitoring IT services within an organization, the service must first be modeled. This means that all of the sub-components which make up the service need to be identified and the relationships determined. This can often be the most difficult part of service monitoring.

Any object that Operations Manager can discover or manage can be included in a distributed application model. This means that using third-party management packs for non-Microsoft technologies would allow for a service to contain heterogeneous components. As a result, services that are only partially Microsoft-based also benefit from the enhanced monitoring of Operations Manager 2007.

For the PetShop service, three main components need to be included on the model: the database, the Web site, and the Web browser, for user perspective. These components make up the PetShop service. The specific PetShop Web site is referenced, not the Web server, and likewise the PetShop database is referenced, not the SQL Server. The underlying servers, IIS and SQL, are important for the overall monitoring, and the service health will roll up the server health to determine the state of the service. These servers may host more than just the PetShop service components and the health of a different Web site or database, which does not impact the PetShop service, is not required in the model. In traditional monitoring systems, you would group together the computers that host these applications and objects. In many cases in which you are consolidating or virtualizing applications, if another application hosted on the same physical system produces alerts, PetShop administrators would also be alerted because their application happens to be hosted on the same computer.

Modeling and monitoring specific objects that are actually part of your distributed application will not only reduce the overall alert noise but also alert you to exactly which object is having problems.

Operations Manager 2007 discovery allows management packs like those for IIS and SQL Server to determine the individual databases and Web sites being hosted by the server and monitor them individually.

After you have determined the components that make up the service, you need to start modeling the service in Operations Manager 2007. To do this, use the Distributed Application Designer.

Distributed Application Designer

Operations Manager 2007 provides a tool called the Distributed Application Designer to graphically build or modify Operations Manager service models. The Distributed Application Designer allows authors to quickly combine monitored objects into services and start monitoring them end to end.

The designer is launched from the authoring section of the Operations Manager console and allows service authors to build a service using one of many prebuilt distributed application templates or to start from scratch.

Distributed application templates include the following:

- Line of Business Web Application
- Messaging
- Microsoft® Windows SharePoint Services Farm
- Microsoft® Office SharePoint Farm
- Terminal Service Farm

If none of the above templates fits your services needs, then you can start with a blank template, much like the New Document template in Microsoft Word, and add the components and relationships you need for your service. Like documents created in Microsoft Word, modified templates can be saved as a new template for future use.

The PetShop service uses the Line of Business Web Application template, which provides components for Web sites and databases by default. Using the designer, a user-perspective component can be added to the model. This user perspective or synthetic transaction can contain a recorded Web browser session to simulate a client using a Web browser to conduct a transaction. Recorded Web browser sessions are captured using the Web Application management pack template. (Synthetic transactions are discussed later in the Management Pack Templates section of this paper.) Hardware elements can be added to represent the physical servers that the components run on to add a deep level of monitoring for the PetShop service.

Operations Manager 2007 models allow you to enforce constraints on the type of objects that a component can contain. This allows you to restrict database objects from being dropped into a Web Application component that may be Internet-facing. These constraints can be used to represent real-world security and business policies.

The Distributed Application Designer will automatically save the components, objects, and model to a management pack. While it generates the model, it will also generate default views, such as a Diagram view, which displays the relationship of service components visually, as shown in Figure 2, and an Alert view, which filters the alerts to only those coming from service components.

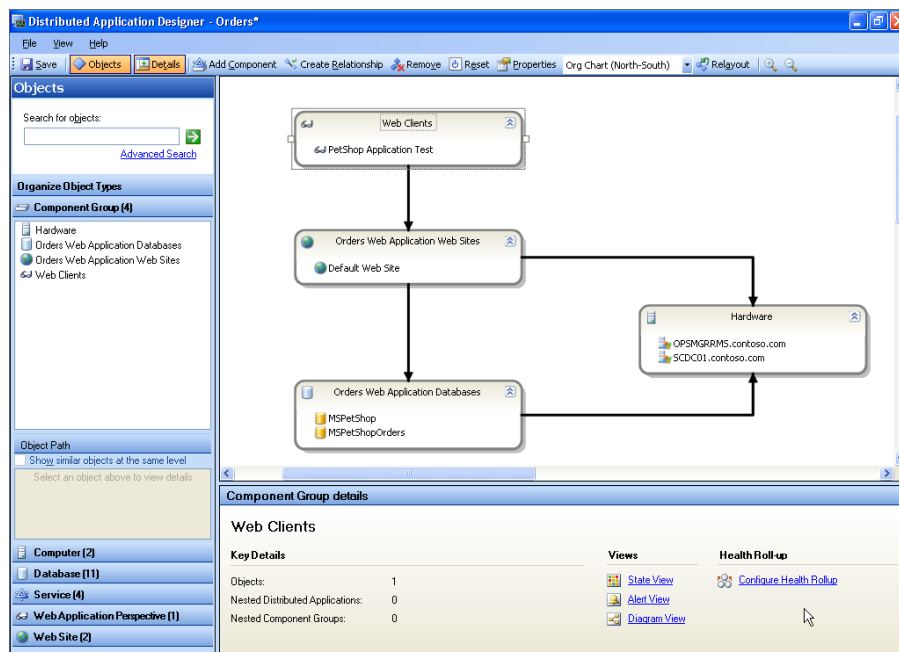


Figure 2 - Distributed Application Designer

Service modeling is an iterative process, and the first step will be to model the top-level components and start monitoring this simple service. Over the service's life cycle, it will evolve and change, and these changes will need to be reflected in the model. Operations Manager 2007 Distributed Application Designer is a full designer, not just a wizard, which allows models to be revisited and changed as needed.

Management Pack Templates

Operations Manager 2007 uses management packs to monitor the components of a distributed application. All of the rules, knowledge, tasks, and reports contained within the management packs are available to support service monitoring.

For services that contain custom applications, the management pack may not exist or may not contain all the necessary monitoring features you require for end-to-end monitoring. If your service relied on a data source for which no management pack was available, the OLE DB management pack template would provide an easy way to ensure its availability to clients.

Many of the objects you want to manage are similar to each other. Operations Manager 2007 includes several management pack templates to assist administrators in easily adding monitoring not covered by the management packs to their service monitoring. Management pack templates contain the monitoring elements that are similar to all objects of that type. This makes it very easy and quick to add monitoring to Operations Manager 2007. Operations Manager 2007 provides management pack templates for monitoring the following:

- ASP.NET Application
- ASP.NET Web Service
- OLE DB Data Source
- TCP Port
- Web Application
- Windows Service

Management pack templates can be useful to extend the end-to-end monitoring of the PetShop service. The PetShop Web site relies on the ability to access the SQL Server databases which house its data. The OLE DB Data Source template can be used to create a monitor which tests access to the specific PetShop databases. This synthetic transaction would report availability of the OLE DB connection and the performance of the connection as well, which is very useful information for an end-to-end view. The PetShop is a Web-based application, so for it to be functioning correctly users need to be able to connect to the Web site and execute transactions across the various pages of the Web site. The Web Application template allows an administrator to record a Web browser session and replay it to test the Web application's availability and performance. Combining this data with monitoring data for the Web server and database server provides visibility into not only the availability of the application but also whether it is performing at an acceptable level.

Monitors created using management pack templates can be added to the distributed application model in a manner similar to any monitor provided by an imported management pack.

Service Reporting

After you have modeled your service and begun monitoring it, you will want to produce reports to show the performance and availability of the service. Operations Manager 2007 provides a robust reporting infrastructure based on SQL Reporting Services. The default reports for performance and availability will work for any service defined with the Distributed Application Designer without modification. Operations Manager 2007 treats distributed applications like any other object it monitors. Simply point the report at the service object and run the report. By default, Operations Manager provides Availability and Performance reports, which can be run against distributed applications. These reports can be run directly from the console, from within alert knowledge, or directly from views, such as the Diagram view. This functionality makes it easy to get up and running with end-to-end service reporting.

Custom Application Monitoring Resources

In many organizations, IT services involve custom applications which are written in-house or by consultants and third parties specifically for the IT service. Monitoring of these applications can be accomplished in the short term by using management pack templates to add monitoring for the Windows Services, the application, or the TCP ports that it uses. For the longer term, organizations should consider having a full management pack created for the application. Management packs allow for knowledge to be captured from the developers and implementers and made available to operations teams responsible for monitoring the custom application.

Operations Manager 2007 includes prescriptive guidance and tools to assist software developers or IT administrator to build custom management packs for their applications. Operations Manager 2007 has a complete Software Developers Kit (SDK), which details the Application Programming Interfaces (APIs) used to access the advance monitoring, diagnostic, and recovery features of Operations Manager 2007. The Operations Manager 2007 Authoring Console makes it easy to generate and write the XML used to define an applications model so that it can be monitored.

In addition to creating a management pack, think about management in the design of custom applications to increase their usability in end-to-end service monitoring scenarios. Creating an Operations Manager 2007 management pack and designing for management should be cornerstones for enterprise application development.

More Information

Operations Manager 2007 provides extensive support documentation for configuring and enabling end-to-end service monitoring with the product help file and online at Microsoft TechNet.

System Center Operations Manager 2007 information is available online at <http://www.microsoft.com/opsmgr>.

For support, newsgroups, blogs, and Knowledge Base articles, visit the Operations Manager Community Page at <http://www.microsoft.com/mom/community>.

Additional information on the Microsoft System Center family and DSI vision is at <http://www.microsoft.com/dsi> and <http://www.microsoft.com/systemcenter>.

Microsoft TechNet <http://www.microsoft.com/technet>.