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DSI Power: Hardware and Software that Lower Customer Costs

By Robert L. Scheier
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Because enterprises spend as much as 70 percent of their IT budgets just to maintain existing systems, they demand solutions that are less expensive to manage and more reliable. What's more, they want systems that can be easily ramped up (or down) to meet new and different computing needs. The vendors that are first to market will win, says Thomas Bittman, vice president of research at Gartner Inc. in Stamford, Conn. "They can steal business from OEMs that are not focusing on total cost of ownership, efficiency, consolidation and proven return on investment."

In response, the Dynamic Systems Initiative (DSI) was developed to help OEMs score big by dramatically simplifying and automating how their customers build, deploy and operate highly scalable applications. It does so by unifying hardware, software and service vendors around a new software architecture that enables customers to harness the power of industry-standard hardware. At the Windows Hardware Engineering Conference (WinHEC) in May, Microsoft announced that Fujitsu Ltd., Fujitsu Siemens Computers, IBM Corp., NEC Corp. and Newisys Inc. have joined Dell Computer Corp. and Hewlett-Packard Corp. as hardware vendors in supporting the DSI initiative.

Over the next few years, Microsoft and its hardware and software partners will deliver Dynamic Data Centers (DDCs) where Microsoft software dynamically assigns, provisions and centrally manages computing, storage and network resources and dynamically allocates resources to grow and shrink based on business and workload demands.

XML to the Core

Core to this new architecture is the System Definition Model (SDM), a live XML blueprint that provides a common software contract between development, deployment and operations.

Microsoft's Dynamic Systems Initiative

- ▶ Creates DDCs that lower the cost of applications
- ▶ Gives OEMs and ISVs the ability to provide differentiated hardware and software
- ▶ Includes Automated Deployment Services later this year

When an application is put into production, the operating system will use the SDM repository to automatically provision the application and to dynamically allocate the distributed server, storage and networking resources the application requires. As business needs or workloads change, the operating system will use "resource managers" to automatically grow or shrink the computing, network and storage resources available to the application

based on IT policies as well as service level agreements with user organizations.

The SDM will be created over time as support for it is provided by Microsoft and other software developers through application development tools, operating systems, server applications, management solutions and industry-standard hardware. The first software to support SDM is an add-on to Windows® Server™ 2003 ([More Info](#)) that will ship later this year and make it easier to deploy and redeploy Windows server images.

Future versions of Microsoft® Visual Studio® .NET 2003 ([More Info](#)) will allow developers to capture IT policies in the SDM as well as the operational requirements of an application. These policies "could be as detailed as 'this application needs to run on a dual-processor box with 1 gigabyte of memory,'" says Eric Berg, senior product manager in the Windows Server Group.

By 2005, customers could be using DSI-compliant products to automatically deploy distributed applications; provision the server, storage and networking resources needed for that application; and dynamically increase or decrease resources as business conditions and workloads change. By 2006, Microsoft predicts corporate and third party developers will be writing applications with built-in automation, so that changes in business policies will directly drive changes in applications and resources.

For the first time, says Microsoft's Berg, SDM will give IT managers an integrated view of all the resources and services associated with a specific application. This view will be provided by management consoles built both by Microsoft and independent software vendors.

Where Opportunity Awaits

The first

Components of a Dynamic Data Center

1. **System Definition Model:** An XML-based repository that tracks hardware and operational requirements of applications as well as IT policies for operation
2. **Resource managers:** Dynamically reallocate computer, network and storage resources based on information in the SDM
3. **Providers:** Driver-like software provided by hardware vendors that link their hardware to the resource managers
4. **Hardware:** Includes servers, firewalls, chassis managers and storage arrays built to comply with the DDC specification

SDM-compliant deliverable, scheduled to ship later this year as an add-on to Windows Server 2003, is Automated Deployment Services (ADS). ADS will allow IT managers to quickly and automatically deploy and redeploy anywhere from one to hundreds of Microsoft® Windows® Server™ System images within minutes.

HP, collaborating closely with Microsoft to develop a conceptual DDC demonstration for this year's WinHEC, developed prototypes of an Authenticated Identity feature for its ProLiant servers to better enhance server boot security. Authenticated Identity identifies computers as either legitimate or rogue during the boot up process. HP also developed prototype SDM-enabled software providers that allow Microsoft's software to provision and manage HP ProLiant Servers, HP ProCurve switches and HP StorageWorks disk arrays.

Providers will be written by the hardware vendors and are roughly comparable to the Windows drivers they have historically created for their products. Microsoft plans to deliver pieces of the device driver kit to help vendors write the providers at the first annual Driver Developer Conference in November and at next year's WinHEC show, says Berg. The providers will let hardware communicate with the hardware, network and storage resource manager software that reallocates resources within the DDC.

Software vendors with system management tools can also use the information provided by SDM to link their tools to wider, more distributed environments. Computer Associates International Inc., for example, has announced plans to integrate ADS with its Unicenter management software to automate the provisioning of Windows servers across the enterprise.

DDCs will be managed by computer, network and storage resource managers. These resource managers link the SDM database that defines the application to the hardware (including servers, network switches and storage arrays) that supports the application.

The computer resource manager detects servers during the initialization of the Preboot eXecution Environment (PXE) and configures them with the proper operating system and settings the application requires. The network resource manager configures switches, load balancers and other network equipment. It also monitors device state and credentials so it can perform tasks such as virtual LAN configuration and load balancing. Finally, the storage resource manager performs block-level allocation of LUNs (logical unit numbers) on storage area networks and allocates file shares on direct-attached storage within servers.

DDC Rules to Play By

While OEMs and systems integrators will customize designs for specific customer needs, there are basic requirements for all DDC-compliant server hardware.

Such hardware must comply with the requirements of the System and Device Requirements for Windows Server 2003 (a Windows logo program). Support of the logo requirements for Windows® 2000 Server ([More Info](#)) is also recommended. Microsoft expects compliant hardware will hit the market by 2005.

Sample Requirements for DSI-compliant Servers

- ▶ Comply with the Windows Logo Program System and Device Requirements
- ▶ Include a baseboard management controller
- ▶ Support Authenticated Identity

Among the additional capabilities recommended are that such servers support Authenticated Identity -- which requires the main system board be enhanced with an isolated cryptographic processor that supports at least 1,024 bit RSA encryption -- as well as an isolated storage area for keys and other attributes used in cryptography. Another recommended feature is the use of a baseboard management controller (BMC) that allows the computer resource manager to remotely control computers, even if the operating system is unresponsive or the computer is turned off.

BMCs used to manage "blade" servers need providers that allow the resource manager to access the chassis and to identify available computer resources within the chassis

regardless of whether the blades are powered up. Such providers will be able to reset any server within the chassis.

A DDC can support direct-attached storage (storage within a server or other computer system, or DAS); storage accessed at the file level through a network protocol such as the Common Internet File System (CIFS); or accessed at the block level through a storage-area network (SAN). Microsoft recommends configuring any SAN within the DDC as a high-availability fabric using Microsoft's multipath I/O infrastructure. This will require the installation of a device-specific module on each computer within the DDC.

"We've taken a complete life cycle-based approach," says Berg. "It's not enough just to make hardware resources easier to manage and deploy. You also need to be able to incorporate the larger architecture to make it easier for the customer to develop, deploy and manage entire applications."

Additional Web Resources

White paper: [Building a Dynamic Data Center](#).

[More information](#) about Automated Deployment Services V1.0, the first implementation of DSI.

[Download](#) the Microsoft Platform Software Development Kit.

[Download](#) the Microsoft Windows Driver Development Kit.

[E-mail](#) Microsoft to ask questions and provide feedback about DDC.

[E-mail](#) Microsoft for more information about the Virtual Disk Service used for SANs within a DDC.

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