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SIMPLIFY MIGRATION OF LEGACY SERVERS TO VIRTUAL MACHINES WITH PLATESPIN MIGRATE

Virtualizing existing workloads offers an excellent way to consolidate underutilized legacy hardware, helping to increase flexibility and reduce costs without compromising performance. PlateSpin® Migrate for Dell can help simplify and accelerate physical-to-virtual migrations onto powerful 11th-generation Dell™ PowerEdge™ servers.

Virtualization has become a mainstream component of enterprise data centers, helping provide consolidation savings, workload migration capabilities, reduced deployment times, and a variety of other benefits. A majority of these benefits are forward-looking: they tend to focus on newly deployed environments, not on legacy server installations. However, because data center ecosystems are increasingly optimized for virtualization, IT teams often seek to virtualize existing installations as well as new deployments. Consequently, migration tools have emerged as a key method of moving legacy OS images from physical servers to virtual machines (VMs).

To help ease the migration of legacy hardware to powerful virtualized environments, Dell now offers PlateSpin Migrate workload portability software from Novell as part of its factory software options. A five-pack license for the physical-to-virtual (P2V) migration capability can be purchased during the configuration of most Dell PowerEdge servers and delivered as part of the server documentation. Administrators can then download the software directly from the PlateSpin Web site. Dell offers support for this software as well as Dell ProSupport services at additional cost.

To successfully perform P2V migrations, however, administrators must next turn to planning and execution, including identifying appropriate candidate servers

with consideration for the OS version, specific workload type, and acceptable downtime. This article focuses on migrating an example environment of common legacy servers to virtualized 11th-generation Dell PowerEdge blade servers, outlines factors that administrators should take into account when planning a migration, and recommends best practices for preparing and carrying out the migration.

UNDERSTANDING THE PLATESPIN MIGRATION PROCESS

PlateSpin Migrate is part of the PlateSpin Portability Suite, which uses a client/server model. The client software can be installed on the server host or on a separate Microsoft® Windows® OS-based workstation. The server component requires a Microsoft Windows 2000 Server or Microsoft Windows Server® 2003 OS-based host.

P2V migrations with PlateSpin Migrate use one of two methods: Take Control or Live Transfer. The Take Control method takes the source workload offline during the transfer, while the Live Transfer method is designed to minimize workload downtime. Before performing a Take Control migration, the PlateSpin Portability Suite server temporarily modifies the boot files on the source server so that it can restart into a pre-execution environment. Servers running a Windows OS reboot into a Windows Preinstallation Environment (WinPE), while those running a Linux® OS reboot into a RAM disk. After

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rebooting into this environment, the source server's original boot files are restored and network communication with the PlateSpin Portability Suite server is initiated. When the PlateSpin Portability Suite server receives communication from the target hypervisor, the source server's files begin copying to the target VM. The PlateSpin Portability Suite server communicates with the target VMware® ESX host and automatically creates the corresponding source workload. PlateSpin Migrate allows administrators to reconfigure target VM components such as processor, memory, storage, and so on. PlateSpin Migrate also contains a database to help ensure that the appropriate drivers for the target hypervisor are injected into the OS image during the migration. After the migration is complete, the source server may be configured to shut down, while the target VM remains online. Linux-based servers must be migrated using the Take Control method.

PlateSpin Migrate can perform file-based Live Transfer migrations on most Windows workloads. With this method, the PlateSpin Portability Suite server installs a controller on the source server. After network communication is established between the source server, target VM, and PlateSpin Portability Suite server, the controller begins transferring the source server's files to the target VM. When the first transfer pass is complete, the controller checks the source server for modified or recently added files and resends the remaining data. When migrating Microsoft Exchange or Microsoft SQL Server® workloads, the appropriate services are stopped for the final file transfer. After the transfer is complete, the source server shuts down and the target VM remains online. Administrators can fine-tune network and file transfer settings if they have a high-latency network between the source and target.¹

CREATING AN EXAMPLE MIGRATION ENVIRONMENT

A typical characteristic of physical server sprawl is the presence of multiple

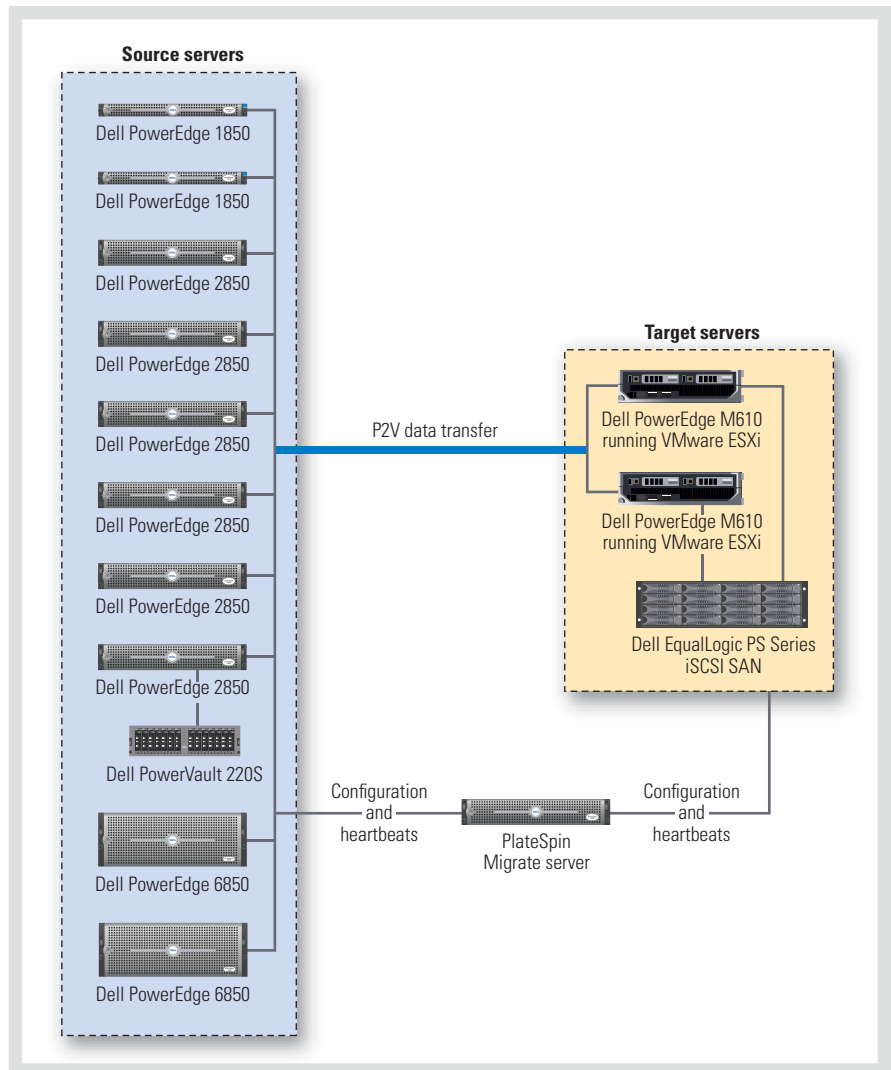


Figure 1. Example migration environment using PlateSpin Migrate for Dell

underutilized servers, each running a single workload. As a case study, in May 2009 Dell engineers and PlateSpin technicians performed an example migration on a set of 10 such legacy servers: 2 Dell PowerEdge 1850 servers, 6 PowerEdge 2850 servers, and 2 PowerEdge 6850 servers. A Dell PowerVault™ 220S disk array provided additional SCSI storage for one of the PowerEdge 2850 servers, and all servers connected to a low-latency Gigabit Ethernet LAN.

The goal of the case study was to use PlateSpin Migrate for Dell to migrate and consolidate the legacy hardware workloads to a target environment consisting of a

PowerEdge M1000e modular blade enclosure with two 11th-generation PowerEdge M610 blade servers running an embedded VMware ESXi 3.5 hypervisor. A Dell EqualLogic™ PS Series Internet SCSI (iSCSI) storage area network (SAN) array—in this case an EqualLogic PS5000XV array—provided shared storage.

Figure 1 illustrates the example migration environment; Figure 2 shows the OS, function, transfer method, amount of data transferred, and migration time for each source server. In this environment, the PlateSpin Migrate server established the initial configuration and monitored

¹For more information, see the "Fine-Tuning Data Transfer Performance" section of the PlateSpin Portability Suite user guide, available at www.platespin.com/downloads/dellp2v.

	OS	Function	Transfer method	Data transferred	Migration time (hours:minutes)*
PowerEdge 1850	Microsoft Windows 2000 Server	Domain controller and DNS server	Take Control	2.89 GB	0:28
PowerEdge 1850	Microsoft Windows 2000 Server	Print server	Live Transfer	2.82 GB	0:27
PowerEdge 2850	Red Hat Enterprise Linux 3	Apache Web server	Take Control	10.02 GB	0:33
PowerEdge 2850	Red Hat Enterprise Linux 3	Apache Web server	Take Control	10.02 GB	0:35
PowerEdge 2850	Microsoft Windows 2000 Server	Common Internet File System (CIFS) file server	Live Transfer	2.77 GB	0:20
PowerEdge 2850	Microsoft Windows 2000 Server	Proxy server	Live Transfer	2.77 GB	0:22
PowerEdge 2850	Microsoft Windows Server 2003 Web Edition	FTP server on Windows Internet Information Services (IIS)	Live Transfer	3.32 GB	0:19
PowerEdge 2850	Microsoft Windows Server 2003 Standard Edition	Microsoft Exchange server with 180 GB database	Live Transfer	185.16 GB	6:23
PowerEdge 6850	Microsoft Windows Server 2003 Enterprise Edition	Microsoft SQL Server database server with 10 GB database	Live Transfer	14.16 GB	0:46
PowerEdge 6580	Microsoft Windows Server 2003 Enterprise Edition	Microsoft SQL Server database server with 50 GB database	Live Transfer	55.69 GB	1:44

*Migration times are rounded to the nearest minute.

Figure 2. Source servers, data transfer, and migration times during the example migration

heartbeats from the source and target servers, with the payload data transfer communicated directly from source to target. PlateSpin Migrate limits administrators to 25 simultaneous conversions and 5 conversions per target hypervisor host. For this case study, to help maximize network bandwidth for each migration, the migration team performed only one migration per destination hypervisor at a time.²

FOLLOWING RECOMMENDED BEST PRACTICES

Following best practices before, during, and after the conversion process can help ensure a successful migration.

Verify compatibility. Before performing a P2V migration, administrators should use the PlateSpin Analyzer program (part of the PlateSpin Portability Suite) to validate each source workload. This program checks devices on Windows-based source

servers for compatibility and flags applications and services that may require special attention during the migration process. The Workload Service Control allows administrators to specify services that should be shut down during the migration, which may include Microsoft Exchange and Dell OpenManage™ software.

Verify licensing and credentials. Administrators should ensure that the PlateSpin Portability Suite has a sufficient number of licenses and the correct type of licenses to perform all the P2V migrations. The PlateSpin Portability Suite must have appropriate authentication credentials for each source server, and all servers must have certain network services running, such as Windows Management Instrumentation (WMI) for Windows-based servers and sshd for Linux servers. Both the source and target servers require administrator or root credentials.

Maintain the source server for critical workloads. When administrators use the Live Transfer approach to help minimize downtime, but must test the target VM before it begins running the production workload, they can use the PlateSpin Server Sync™ feature to keep the source workload active after the migration. After they have completed testing on the VM, they can then initiate one final file transfer pass, after which the VM begins running the production workload.

Understand the needs of specific workloads. Domain controllers can be transferred using the Take Control or Live Transfer method; using the Live Transfer method, however, requires following specific PlateSpin best practices.³ In the example migration environment, the migration team used the Take Control method to migrate the PowerEdge 1850 domain controller and Domain Name System (DNS) server.

² Both PowerEdge 1850 servers were configured with two Intel® Xeon® "Nocona" processors at 3.6 GHz, 3 GB of RAM, one 10,000 rpm, 147 GB hard drive, and two Intel PRO/1000 MT LAN on Motherboards (LOMs); the four PowerEdge 2850 servers running Red Hat Enterprise Linux or Windows 2000 Server were configured with two Intel Xeon "Nocona" processors at 3.4 GHz, 3.5 GB of RAM, one 10,000 rpm, 300 GB hard drive, and two Intel PRO/1000 MT LOMs; the PowerEdge 2850 server running Windows Server 2003 Web Edition was configured with two Intel Xeon "Nocona" processors at 3.6 GHz, 4 GB of RAM, one 10,000 rpm, 300 GB hard drive, and two Intel PRO/1000 MT LOMs; the PowerEdge 2850 server running Windows Server 2003 Standard Edition was configured with two Intel Xeon "Nocona" processors at 3.6 GHz, 4 GB of RAM, one 10,000 rpm, 146 GB hard drive, one 15,000 rpm, 73 GB hard drive, and two Intel PRO/1000 MT LOMs; both PowerEdge 6850 servers were configured with four dual-core Intel Xeon 7140M processors at 3.4 GHz, 16 GB of RAM, one 10,000 rpm, 34 GB hard drive, one 15,000 rpm, 34 GB hard drive, and two Broadcom BCM5704 LOMs; and the PowerVault 220S array was configured with twelve 10,000 rpm, 73 GB hard drives. The two PowerEdge M610 blade servers were configured with two quad-core Intel Xeon E5502 processors at 1.86 GHz, 12 GB of RAM, no hard drives, and two Broadcom BCM5709 LOMs, and the EqualLogic PS5000XV array was configured with sixteen 15,000 rpm, 450 GB hard drives.

³ For more information, visit support.platespin.com/kb2/article.aspx?id=20501 (login required).

The PowerEdge 2850 Web servers in the example migration environment are running Apache on the Red Hat® Enterprise Linux 3 OS. Because this is a Linux OS, PlateSpin Migrate supports only the Take Control method. Before beginning the migration, administrators should ensure that the file systems to be copied are ext2, ext3, and/or ReiserFS; other file systems are currently unsupported.

For the PowerEdge 2850 Exchange server, administrators would typically use the file-based Live Transfer feature, which supports Windows Server 2003 Standard Edition. They would need to disable Exchange services during the migration, and should ensure that the original settings are restored to the target VM after the conversion is complete by selecting the appropriate check box.

Similarly, administrators would also typically use the file-based Live Transfer feature for the PowerEdge 6850 SQL Server workloads, because Live Transfer supports Windows Server 2003 Enterprise Edition. While the database files are copied from the source server to the target VM, the database service must be stopped; in the Transfer Services window, they should ensure that the SQL Server service is detected and scheduled to be stopped, and that the appropriate check box indicates that database files will be copied. If the database files are extremely large, resulting in an unacceptable level of downtime for the database service, administrators should consider purchasing a license for PlateSpin Protect so that they can perform a block-based Live Transfer migration. Purchasing a license for PlateSpin Protect Enterprise would also enable them to use Microsoft Volume Shadow Copy Service (VSS) to allow Exchange and SQL Server services to continue running during the migration; after the files have been copied, file blocks that have changed since the migration began are then copied at the end without requiring downtime. In this case study, the database files were

copied with the OS files by PlateSpin Migrate using Live Transfer.


Choose an appropriate mode. In general, the advanced mode is preferable to the wizard mode because it offers additional options, such as installing VMware Tools in the VM and running custom scripts after the migration. Using advanced mode can help administrators avoid the need to manually perform redundant tasks and accelerate migrations, and allows them to save or schedule a job for execution at a later time.

Disable any unnecessary services. Administrators should typically disable any service that is not to be used in the target environment, such as legacy versions of Dell OpenManage services.⁴

Ensure that the target environment is appropriately sized. During the planning stages of a migration, administrators should ensure that the target virtualized environment has sufficient capacity to meet the workload requirements. For small numbers of servers such as those in the example case study environment, all VMs may be able to run in a one- or two-node virtualized pool. For larger environments, administrators should typically use additional tools such as PlateSpin Recon to help them appropriately size the final configuration.

PlateSpin Recon provides planning and analysis capabilities for large migration environments, collecting hardware, software, and services inventory in addition to workload and utilization information. By assessing the current requirements of the physical environment, it can make detailed sizing recommendations for the target virtualized environment, including specific information for the server models used in the configuration. Dell works closely with PlateSpin to help ensure that the software includes the latest information on Dell servers. In addition, the Dell Global Infrastructure Consulting Services team offers Virtualization Readiness Assessments using PlateSpin Recon to provide a comprehensive, customized analysis of an existing data center configuration.

SIMPLIFYING THE MOVE TO VIRTUALIZATION

PlateSpin Migrate for Dell provides an efficient process for migrating legacy hardware to powerful virtualized environments, one that helps avoid the need for administrators to plan for days of server migrations and incur costly downtimes. In the example case study, most migrations completed in less than an hour, and even the most complex migration completed within a single workday. By offering PlateSpin Migrate software with 11th-generation Dell PowerEdge servers as well as support and services to help with planning and implementation, Dell provides a comprehensive, simplified way to carry out these migrations in enterprise data centers. 

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⁴For more information, see the "Best Practices (X2P)" section of the PlateSpin Portability Suite user guide, available at www.platespin.com/downloads/dellp2v.