

The Importance of Choosing the Right Workload Migration Tools

Table of Contents:	2	How to Do More with Less in Your Data Center
	2	Six Steps to a Successful Migration
	2 . . .	Step 1: Inventory Workloads
	3 . . .	Step 2: Assess (Planning and Analysis)
	5 . . .	Step 3: Pre-migration
	6 . . .	Step 4: Migration
	7 . . .	Step 5: Post-migration
	9 . . .	Step 6: Testing and Troubleshooting
	9	The Right Tools for Data Center Transformation



How to Do More with Less in Your Data Center

IT decision-makers should be wary of too-good-to-be-true product offers that lack automation capabilities and that, in terms of total cost of ownership, are far more expensive than PlateSpin products even if, at least initially, they are free.

¹ "U.S. Data Centers: The Calm Before the Storm," Gartner Report, Sept. 25, 2007

It's a fact of life today that IT management is getting squeezed. Data center budgets are decreasing or at best staying the same even as infrastructure demands increase. In an effort to help data center managers do more with less, Gartner recently issued a list of seven recommendations for cutting data center costs. Those recommendations include:

- *Rationalizing all hardware to determine the machines that are being used effectively and those that are not—a proper inventory and assessment process, in other words.*
- *Consolidating data center sites to minimize redundant IT assets and support requirements.*
- *Virtualization of hardware to improve operational efficiency, minimize expenditures for new hardware and reduce energy costs.*¹

Of course these are sound recommendations. But IT decisionmakers haven't been waiting for pronouncements from Gartner or anyone else. They are implementing new data center strategies—or overhauling the ones they already have in place. This means migrating to higher-performance, energy-efficient servers; consolidating physical servers by leveraging virtualization technology, blade infrastructure or both to save on physical space and operational costs; and relocating and consolidating data centers in order to take advantage of cost savings from centralization and regional economics.

However, one of the biggest cost centers in the data center that is often overlooked is inefficient use of talent. If IT personnel are manually completing migration-related tasks such as virtualization and server consolidation—tasks that could be automated—then they are wasting valuable company time and money.

Instead of running up labor costs in efforts to capture greater operational efficiencies, a more practical course of action is to equip data center personnel with better tools. This paper takes a brief look at workload planning and migration tools, and differentiates PlateSpin® products as the category leaders and best values overall. We believe that this latter point—best values overall—is especially important in light of the fact that many competitive products are initially offered as free versions that can be upgraded later. So they seem like a tremendous value up front but can be lacking key functionality down the road, even when fully upgraded.

Decision-makers considering these freeware products should therefore consider the "high cost of free." It is our contention that PlateSpin products are the most cost-effective—even more cost-effective than free—and that they automate the processes of planning, migration and management better than any other products. IT decision-makers should be wary of too-good-to-be-true product offers that lack automation capabilities and that, in terms of total cost of ownership, are far more expensive than PlateSpin products even if, at least initially, they are free. The merits of PlateSpin Recon and PlateSpin Migrate are highlighted in the following overview of the migration process.

Six Steps to a Successful Migration

Step 1: Inventory Workloads

Best Practice:

- *List all servers, workloads and applications, as well as who owns what.*

This first step in any successful migration is proper planning. Its requirements are straightforward:

- *Inventory what needs to be migrated*
- *Determine who owns workloads and servers*
- *Establish what (if any) additional resources may be needed*

Once this information has been gathered, you can filter out some portion of the server pool due to location, application owners, unsupported OSES and any other criteria that indicate unsuitability for migration.

PlateSpin Recon Inventory Edition makes inventorying workloads and resources a simple task by identifying all the hardware and application services running in the data center. As for determining who owns what and gaining their approval for the migration, PlateSpin Recon can expedite the process by labeling every server and associating each one with a department, owner and application. This enables data center personnel to bundle scheduling announcements and requests rather than sending out 10 or 20 separate requests to the same user.

Step 2: Assess (Planning and Analysis)

Best Practices:

- *Track resource utilization of all workloads over a minimum of 30 days to deliver best-possible virtual machine density and consolidation ratios*
- *Record utilization based on usage peaks or averages spanning 24-hour periods instead of single peak points.*
- *Eliminate waste and inefficiency by discovering allocated but unused storage, disk, CPU and network resources within your existing virtualization environment.*
- *Be sure your assessment plan takes into account different CPU architectures.*
- *Compare different consolidation scenarios such as scale-up vs. scale-out, model with different server makes and models and identify cost savings from power and cooling.*

Step 2 is all about the carpenter's adage, "Measure twice, cut once." In other words, proper planning and analysis are the keys to minimizing the risks, costs and aggravation associated with any project—especially one as critical as changes to data center infrastructure. Workload migration projects can be much more complex than many people imagine, and only thorough and intelligent planning up front can identify potential pitfalls and define a clear path to success. Planning at this level necessitates tracking resource utilization of all workloads you might be considering.

PlateSpin Recon Enterprise tracks and records workload resource utilization continually over time (we recommend tracking workload resource utilization for at least 30 days, with peaks or averages recorded in 24-hour periods), to deliver best-possible virtual machine density and consolidation ratios on specified hardware, while preventing performance-crippling resource contention. This is accomplished by matching the utilization peaks of some workloads with the utilization valleys in others. PlateSpin Recon Enterprise can also find unused resources even when the virtualization platform shows 100 percent allocation. PlateSpin Recon resource reclamation reports identify gaps between resource allocation and actual utilization. Minimizing these gaps maximizes the virtual resource capacity of the existing infrastructure, extending useful service life and postponing new hardware purchases. PlateSpin Recon Enterprise analyzes the four critical dimensions of workload—CPU, disk, memory, and network—over time, and even across thousands of servers simultaneously. Thus, it provides consolidation plans that maximize utilization while minimizing resource contention.

PlateSpin Recon Enterprise is a sophisticated workload analysis, planning and management solution that provides new levels of intelligence, visual analysis, and forecasting for server consolidation initiatives, as well as ongoing virtual capacity management.

PlateSpin Migrate is a powerful workload portability solution that automates the movement of server workloads over the network between physical servers, virtual hosts and image archives. PlateSpin Migrate remotely decouples workloads from the underlying server hardware and streams them to and from physical or virtual hosts—all from a single point of control.

PlateSpin Recon saves time by letting you export your chosen consolidation plan directly into PlateSpin Migrate, so you can seamlessly transition projects from analysis to implementation.

PlateSpin Recon

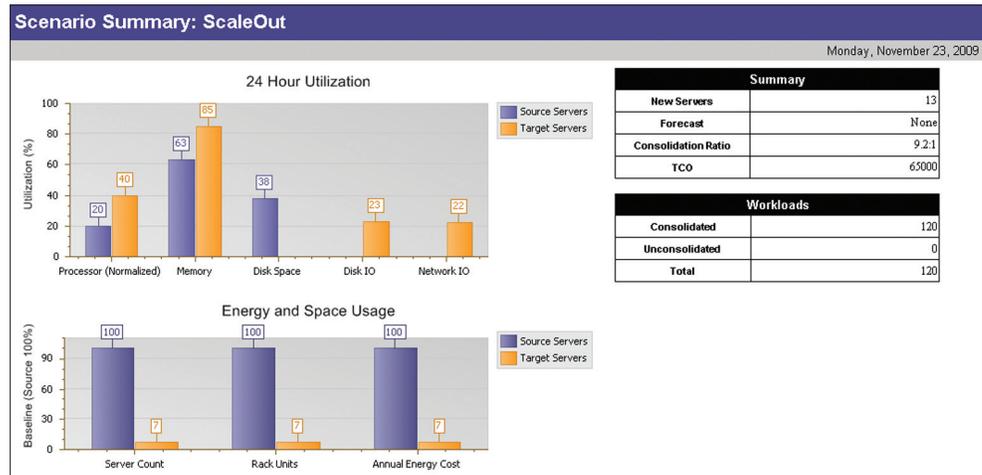


Figure 1. PlateSpin Recon provides advanced scenario modeling, trending, forecasting and planning capabilities to determine optimal combinations of hardware and virtual hosts—taking the guesswork out of migrations.

In addition, PlateSpin Recon accounts for the performance characteristics of different CPU architectures. For example, unlike some free competitors, it doesn't rely solely on processor clock speed. Instead, the PlateSpin Recon Capacity Planning Module recognizes the performance differences between a 3.0 GHz quad-core Intel* Xeon* processor and a 3.0 GHz dual-core AMD* Opteron*, thus increasing the accuracy of consolidation plans.

PlateSpin Recon even compares and contrasts potential power and cooling cost savings and ROI derived from various consolidation scenarios. Custom fields allow power and cooling requirements for major hardware platforms to be inputted and maintained in a central database, enabling organizations to analyze and cost-justify green computing initiatives.

In fact, PlateSpin Recon Enterprise Edition enables you to create multiple custom scenarios with user-defined target server specifications, including server templates or existing virtual machine servers, to create

an optimal consolidation plan. It can even help you improve the performance of your workloads by identifying hidden configuration errors in virtual machines.

Once the inventory is complete, PlateSpin Recon saves time by letting you export your chosen consolidation plan directly into PlateSpin Migrate, so you can seamlessly transition projects from analysis to implementation. Then, when the planning stage is complete, you simply right-click and choose the "Implement with Platespin Migrate" command in PlateSpin Recon. Recon then exports all of the upfront planning and placement information, and everything is pre-populated in the PlateSpin Migrate product.

And with PlateSpin Recon Enterprise Edition, you can periodically re-assess and re-optimize virtual infrastructure, reclaim and redeploy underused resources, and even forecast future requirements.

Other workload migration solutions aren't anywhere near as comprehensive. VMware* Capacity Planner, for instance, is a one-time planning tool that simply records the busiest hour of the week and average utilization. It requires manual adjustments to be made to account for single and multi-core processors. And, lacking CPU normalization capabilities, VMware Capacity Planner and other solutions tend to underestimate the true processing abilities of many modern CPUs, resulting in lower-than-anticipated utilization on the new virtual hosts.

Planning capabilities and platform support aren't issues with PlateSpin Recon. It supports the industry's broadest range of virtualization platforms, making it the best solution for heterogeneous data centers. PlateSpin customers can standardize on a single tool, whether looking to virtualize using VMware, Hyper-V* or Xen* hypervisors, and with Windows* or Linux* operating systems. PlateSpin Recon even supports Solaris* virtualization.

Another planning issue for many enterprise customers today is that VMware Capacity Planner stores and analyzes infrastructure data offsite, at a VMware facility. Organizations that want to control their own planning process are out of luck, as are organizations with privacy concerns or those that require high-security operations.

In sharp contrast, PlateSpin products are made for purchase by enterprises. They are deployed and run in thousands of data centers by data center personnel. All data collected by PlateSpin Recon stays within the servers that customers have installed at their own sites. A key reason why PlateSpin Recon Enterprise is used by one of the departments within the U.S. Government is that the organization isn't interested in uploading its data to third-party organizations.

Step 3: Pre-migration

Best Practices:

- *Configure migration jobs for automated, unattended running.*
- *Schedule jobs to run during set downtime windows or when utilization is lowest.*
- *Take advantage of various options to configure (enable/disable) services on the target.*

The more you can do in this phase, the less time you spend in front of a console after the process is complete. PlateSpin Migrate not only automates the migration process, it logs and updates the user on progress and allows for scheduling jobs to fit the environment— with or without staff being present. So you can schedule workload migrations to run automatically in the middle of the night or on weekends. If a glitch occurs, disruptions are minimized and the event is recorded so that remedial action can be taken later. And with PlateSpin solutions, production system disruptions are extremely rare because all testing and validation is done in the initial replication while the production system is still up and running. All you need to do is schedule a window of a few minutes to do the final synchronization and cutover. In this way PlateSpin Migrate minimizes or eliminates the prolonged outages typically associated with the migration process.

As for VMware's offering, VMware Converter automation varies greatly by environment. Certain configurations are far more manual than automatic. And in every case, data center staff has to be present during the entire migration from start to finish. In addition, Converter offers limited configurable options compared to PlateSpin Migrate, and requires sysprep.

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PlateSpin Migrate's Server Sync functionality allows customers to test replicated workloads in their new environment, then synchronize only the changes before going live.

These shortcomings can often double the migration time. And it's not just the longer migration time to consider. Staff could be working at other tasks while an unattended migration runs automatically instead of manning a console and manually configuring options. PlateSpin Migrate not only automates the migration process (including post-migration configuration), but also allows job scheduling.

Vizioncore's definition of automation varies significantly by platform. It can sometimes require manual tasks such as attaching the disks to the virtual machines and manually performing all configuration tasks.

Step 4: Migration

Best Practices:

- *Test workloads in the new location before going live*
- *Staged migrations are an effective option for migrations over slow WANs*

When consolidating servers, relocating a data center or undertaking any type of workload relocation, you want to avoid unexpected results. That's exactly what PlateSpin Migrate's Server Sync is designed to help you do. Server Sync lets you perform an initial transfer to the target site or host, test the workload in the new location while continuing to run the source and then perform a final sync before cutting over the workload. Server Sync functionality allows customers to test replicated workloads in their new environment, then synchronize only the changes before going live. vConverter customers must either perform a second full migration while the source server is offline, or omit testing altogether.

PlateSpin Migrate also supports concurrent migrations—up to 40 of them—which can dramatically shorten the project timeline as well as time to value.

PlateSpin Server Sync

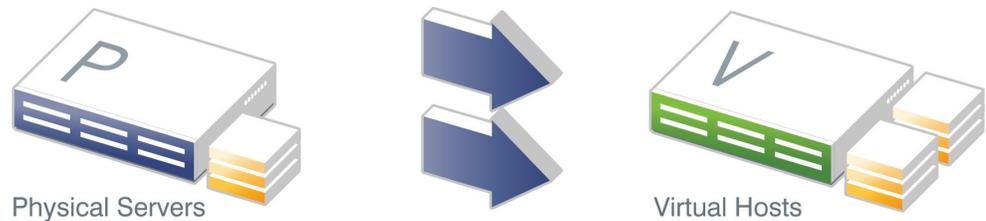


Figure 2. PlateSpin Server Sync is the foundation technology for testing and migrating live workloads across local and remote sites with no downtime.

As for concurrent migrations and competitors' products, VMware Converter and other free products perform well on individual migrations, but performance degrades significantly as the migration count increases, especially to the same host.

Some competitors make impressive-sounding claims about having the fastest migration tools on the market. However, their claims rely on unrealistic, artificially-constructed migration scenarios, the likes of which are nowhere to be found in real-world production environments. For instance, one competitor's product benchmark requires that:

- *the source workload must be a base Windows installation with no applications or data*
- *the target host can only be an idle ESX 3.0.2 server*
- *migration must only be performed over an otherwise unused Gigabit Ethernet network*
- *no customization on the target is allowed*

PlateSpin Migrate is designed to provide superior performance over real-life networks.

As for migrations of several servers over WANs—a realistic scenario in many organizations—staged migrations are ideal. They let you copy a workload to an image, physically ship the image to the required destination, copy it to the new location (physical or virtual), and then synchronize changes over the network. This is often the fastest option.

PlateSpin Migrate is especially useful for performing staged migrations over LANs or WANs, or to remote locations with limited bandwidth. In fact, PlateSpin Migrate was developed specifically to deliver faster file transfers over high-latency networks of varying quality. In the event of a network disruption, PlateSpin Migrate automatically resumes from the point of interruption when service is restored.

Free solutions typically expect pristine network conditions, and may abort migrations during network interruptions, which can cost your team hours or days when you are forced to start over. With vConverter, for example, minor disruptions can require manual re-submission of entire jobs. As for VMware's solution, Converter is designed for LAN migrations only; performance is poor over WANs and high-latency networks, or networks with high utilization.

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Step 5: Post-migration

Best Practices:

- *Use scripts to automate post-migration events to further decrease manual intervention and involvement.*
- *Stay flexible by retaining the ability to move workloads from anywhere to anywhere.*

Let's say that, after the migration is concluded, you want to add a virus scan utility. PlateSpin Migrate lets you write a script to include this post-migration step in some or all of your migration jobs.

This level of user customization of post-migration processes ensures initial time savings as well as ongoing savings by automating time-consuming, repeatable processes as part of the migration job. Scripting post-migration events before the migration enables those events to take place automatically, so IT administrators don't need to be present after the migration.

The only way to confirm a project's success is through post-migration validation. Validation testing and the ability to go back and take an iterative and ongoing approach to data center transformation can assure the success of the initial project, while actually delivering on the promise of ongoing optimization and management.

PlateSpin Migrate makes it easy to test and validate that the migration was a success. You can configure PlateSpin Migrate to automatically generate a post-migration report that you can e-mail to all stakeholders

You can configure PlateSpin Migrate to automatically generate a post-migration report that you can e-mail to all stakeholders announcing the completion of the migration and showing performance gains and the end result: workload profiles consolidated and simplified.

The best way to minimize risk and verify the success of the project is to combine comprehensive planning with thorough testing both before and after migrations.

PlateSpin and Novell are helping organizations worldwide build more flexible, interoperable and cost-effective data center environments. The combination of PlateSpin and Novell products offers customers a powerful data center management platform with solutions for Linux, UNIX* and Windows across physical and virtual environments. The global reach of the combined companies allows us to offer enterprises a full range of integrated solutions to make their IT work as one.

announcing the completion of the migration and showing performance gains and the end result: workload profiles consolidated and simplified. Detailed logs and reports can also verify compliance with federal laws or trade group policies. In fact, PlateSpin Migrate has extensive job logging, audit trails and detailed diagnostics. Errors and warnings

provide information needed to identify, isolate and resolve issues quickly. On the other hand, VMware Converter error messages are rudimentary and incomplete.

In addition, PlateSpin Migrate's workload licensing and complete X2X functionality let users move workloads between physical servers, virtual hosts and image archives as needed, where needed, when needed. Other products are single-purpose tools designed to move workloads from a physical source to a virtual host. They are dedicated P2V tools that treat the virtual host as the final destination.

PlateSpin Migrate

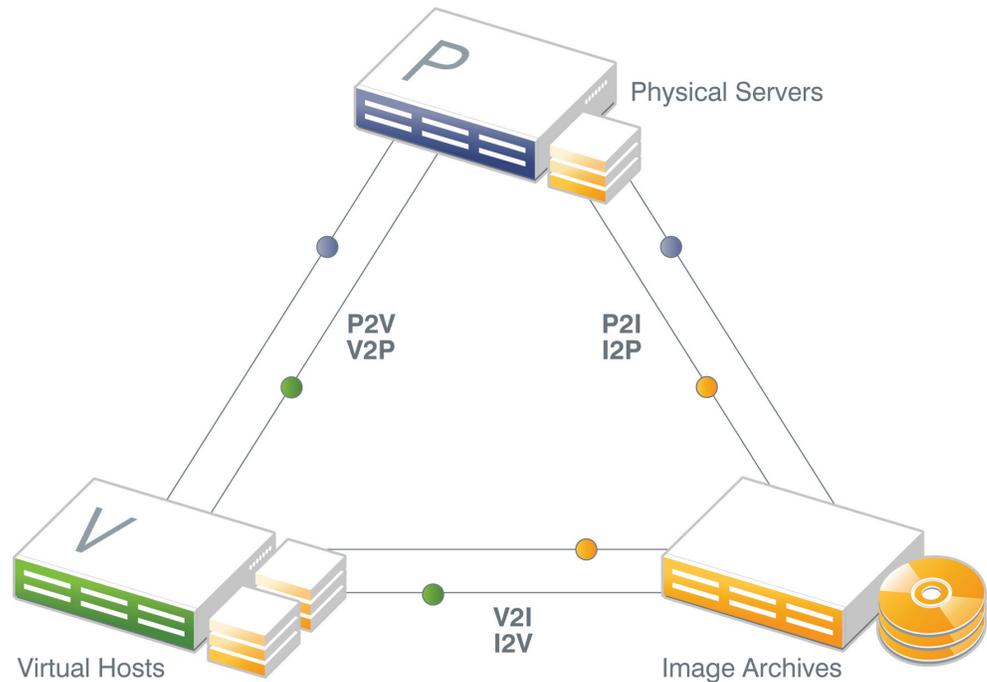


Figure 3. PlateSpin Migrate X2X functionality enables server workload migrations regardless of hardware, operating system or virtual host.

Legend: P2V—Physical-to-Virtual I2P—Image-to-Physical P2I—Physical-to-Image
 V2P—Virtual-to-Physical I2V—Image-to-Virtual V2I—Virtual-to-Image

Step 6: Testing and Troubleshooting

Best Practices:

- *Take a strategic, multi-phase approach to ensure that everything is running correctly at each level of abstraction.*
- *Prepare and run jobs in such a way that they are unlikely to abort in the first place.*

Testing is the part of the workload migration process that most often gets short shrift. Infrastructure projects are expected to move at the speed of business, and that imperative to constantly speed things up can cause decision-makers to limit testing. However, the best way to minimize risk and verify the success of the project is to combine comprehensive planning with thorough testing both before and after migrations. This approach allows data center managers to look at data center transformation from a holistic “big picture” view, lays the groundwork for a one-time transformation and, most importantly, provides the basis for ongoing data center optimization.

Whenever possible, testing should include multiple test stages that focus on the “business-level” components of the data center, which encompass three perspectives:

- *Individual server workload (the operating system, application and data stack residing within the server infrastructure)*
- *Application cluster (most applications are multi-tiered, running across multiple server workloads)*
- *Full data center (dependencies across applications, relied on for business services)*
- *A multi-phase testing approach can ensure that everything is running correctly at each of these layers of abstraction. Testing the individual server workload components through to testing of the applications and entire data center as a whole ensures the highest degree of risk reduction.*

The Right Tools for Data Center Transformation

According to Thomas Bittman, vice president and distinguished analyst at Gartner, there will be a lot of uncertainty in the market in the short-to-medium term as vendors vie for market share and server virtualization technologies take hold in enterprises. His advice? “Be prepared to experiment, but make sure that you are the scientist, not the subject.”²

PlateSpin Recon and PlateSpin Migrate simplify and automate the data center transformation process—with less risk and higher assurance of success than competitive products. In addition, unlike freeware and other one-off solutions, they retain their value to the enterprise by leveraging integrated planning and testing and giving data center managers options that go way beyond legacy “set and forget” approaches—offering the foundation for continuous, on-demand data center resource optimization over the long haul.

Whether you are a VMware, Microsoft, or Xen shop now, you’ll be able to use PlateSpin Migrate and PlateSpin Recon as you explore other virtualization technologies. PlateSpin workload migration products offer broad multiplatform support for streaming workloads between any network hosts. That multiplatform support extends to all of the leading virtualization technologies and hypervisors, as well as multiple operating systems, hardware configurations and imaging technologies.

PlateSpin products provide organizations with mature, proven solutions for testing, migrating and rebalancing workloads across infrastructure boundaries from desktop to data center. They are simply the most mature workload analysis and migration products on the market today.

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² “Virtualization Will Be the Highest-Impact IT Trend Through 2012,” *Virtualization News*, September 2008

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