

User Guide

PlateSpin Forge® 3.3

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Novell.

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About This Guide

This guide provides information about using PlateSpin Forge.

- ♦ [Chapter 1, “Product Overview,” on page 9](#)
- ♦ [Chapter 3, “Appliance Setup and Maintenance,” on page 31](#)
- ♦ [Chapter 4, “Up and Running,” on page 49](#)
- ♦ [Chapter 5, “Workload Protection,” on page 59](#)
- ♦ [Chapter 6, “Essentials of Workload Protection,” on page 73](#)
- ♦ [Chapter 7, “Auxiliary Tools for Working with Physical Machines,” on page 89](#)
- ♦ [Chapter 8, “Troubleshooting,” on page 95](#)
- ♦ [“Glossary” on page 105](#)

Audience

This guide is intended for IT staff, such as data center administrators and operators, who use PlateSpin Forge in their ongoing workload protection projects.

Feedback

We want to hear your comments and suggestions about this manual and the other documentation included with this product. Please use the User Comments feature at the bottom of each page of the online documentation, or submit your comments through the [Novell Documentation Feedback site \(http://www.novell.com/documentation/feedback.html\)](http://www.novell.com/documentation/feedback.html).

Additional Documentation

This guide is part of the PlateSpin Forge documentation set.

For a complete list of publications supporting this release, visit the [PlateSpin Forge 3 Online Documentation Web Site \(http://www.novell.com/documentation/platespin_forge_3\)](http://www.novell.com/documentation/platespin_forge_3).

Documentation Updates

The most recent version of this guide can be found at [PlateSpin Protect 10 Online Documentation Web Site \(http://www.novell.com/documentation/platespin_protect_10\)](http://www.novell.com/documentation/platespin_protect_10).

Additional Resources

We encourage you to use the following additional resources on the Web:

- ♦ [Novell User Forum \(http://forums.novell.com\)](http://forums.novell.com): A Web-based community with a variety of discussion topics.
- ♦ [Novell Knowledgebase \(http://www.novell.com/support\)](http://www.novell.com/support): A collection of in-depth technical articles.

Technical Support

- ♦ Telephone (North America): +1-877-528-3774 (1 87 PlateSpin)
- ♦ Telephone (global): +1-416-203-4799
- ♦ E-mail: support@platespin.com

You can also request support through the online [Service Request Web page \(http://support.novell.com/contact/getsupport.html\)](http://support.novell.com/contact/getsupport.html).

1 Product Overview

- ♦ [Section 1.1, “About PlateSpin Forge,” on page 9](#)
- ♦ [Section 1.2, “Supported Configurations,” on page 9](#)
- ♦ [Section 1.3, “Security and Privacy,” on page 11](#)
- ♦ [Section 1.4, “Performance,” on page 11](#)

1.1 About PlateSpin Forge

PlateSpin Forge is a consolidated recovery hardware appliance that protects physical and virtual workloads (operating systems, middleware, and data) by using embedded virtualization technology. If there is a production server outage or disaster, workloads can be rapidly powered on within the PlateSpin Forge recovery environment and continue to run as normal until the production environment is restored.

PlateSpin Forge enables you to:

- ♦ Quickly recover workloads upon failure
- ♦ Simultaneously protect multiple workloads (10 to 25, depending on the model)
- ♦ Test the failover workload without interfering with your production environment
- ♦ Fail back failover workloads to either their original or to completely new infrastructures, physical or virtual
- ♦ Take advantage of existing external storage solutions, such as SANs

With internal, prepackaged storage, Forge has a total storage capacity of 3.5 terabytes, although the capacity is almost unlimited when external storage configurations are used by adding iSCSI or Fibre Channel cards.

1.2 Supported Configurations

- ♦ [Section 1.2.1, “Supported Windows Workloads,” on page 9](#)
- ♦ [Section 1.2.2, “Supported Linux Workloads,” on page 10](#)

1.2.1 Supported Windows Workloads

PlateSpin Forge supports most Windows-based workloads.

Both file- and block-level replications are supported, with certain restrictions. See [Section 6.3, “Transfer Methods,” on page 74](#).

Table 1-1 Supported Windows Workloads

Operating System	Remarks
Windows 7	Professional, Enterprise, and Ultimate editions only
Windows Server 2008 R2	Including domain controller (DC) systems and Small Business Server (SBS) editions
Windows Server 2008	Including domain controller (DC) systems and Small Business Server (SBS) editions
Windows Vista	Business, Enterprise, and Ultimate editions; SP1 and later
Windows Server 2003 R2	Including domain controller (DC) systems and Small Business Server (SBS) editions
Windows Server 2003	Including domain controller (DC) systems and Small Business Server (SBS) editions
Windows XP Professional	
Windows Server 2000	Requires Service Pack 4 with Update Rollup 1.
Windows clusters	See "Protecting Windows Clusters" on page 84 for specific cluster configurations supported.

Supported international versions: French, German, Japanese, Chinese Traditional, and Chinese Simplified

1.2.2 Supported Linux Workloads

PlateSpin Forge supports a number of Linux distributions.

Replication is done at the block level, for which your PlateSpin software requires a `blkwatch` module compiled for a particular Linux distribution being protected.

Some of the supported Linux versions require that you compile the PlateSpin `blkwatch` module for your specific kernel. Those workloads are called out explicitly.

Table 1-2 Supported Linux Workloads

Operating System	Remarks
Red Hat Enterprise Linux (RHEL) 4.0, 5.0-5.5, 6.0-6.2	
RHEL 5.6-5.8, 6.3	You must compile the PlateSpin <code>blkwatch</code> module before inventorying these workloads. See KB Article 7005873 (http://www.novell.com/support/viewContent.do?externalId=7005873) .
SUSE Linux Enterprise Server (SLES) 9, 10, 11 (up to SP1)	
Open Enterprise Server 2, SP2 and SP3	

Operating System	Remarks
Oracle Enterprise Linux (OEL)	<ul style="list-style-type: none"> Same level of support as that for workloads running RHEL. Workloads using the Unbreakable Enterprise Kernel are not supported.

Supported international versions (Linux): All international versions of these Linux systems are supported.

Supported Linux file systems: EXT2, EXT3, EXT4, REISERFS, and NSS (OES 2 workloads).

NOTE: Encrypted volumes of workloads on the source are decrypted in the failover VM.

1.3 Security and Privacy

PlateSpin Forge provides several features to help you safeguard your data and increase security.

- [Section 1.3.1, “Security of Workload Data in Transmission,” on page 11](#)
- [Section 1.3.2, “Security of Credentials,” on page 11](#)
- [Section 1.3.3, “User Authorization and Authentication,” on page 11](#)

1.3.1 Security of Workload Data in Transmission

To make the transfer of your workload data more secure, you can configure the workload protection to encrypt the data. When encryption is enabled, data replicated over the network is encrypted by using AES (Advanced Encryption Standard).

You can enable or disable encryption individually for each workload. See [“Workload Protection Details” on page 62](#).

1.3.2 Security of Credentials

Credentials that you use to access various systems (such as workloads and failback targets) are stored in the PlateSpin Forge database and are therefore covered by the same security safeguards that you have in place for your Forge VM.

In addition, credentials are included within diagnostics, which are accessible to accredited users. You should ensure that workload protection projects are handled by authorized staff.

1.3.3 User Authorization and Authentication

PlateSpin Forge provides a comprehensive and secure user authorization and authentication mechanism based on user roles, and controls application access and operations that users can perform. See [Section 2.2, “Setting Up User Authorization and Authentication,” on page 16](#).

1.4 Performance

- [Section 1.4.1, “About Product Performance Characteristics,” on page 12](#)
- [Section 1.4.2, “Data Compression,” on page 12](#)

- ♦ [Section 1.4.3, “Bandwidth Throttling,” on page 12](#)
- ♦ [Section 1.4.4, “RPO, RTO, and TTO Specifications,” on page 13](#)

1.4.1 About Product Performance Characteristics

The performance characteristics of your PlateSpin Forge product depend on a number of factors, including:

- ♦ Hardware and software profiles of your source workloads
- ♦ The specifics of your network bandwidth, configuration, and conditions
- ♦ The number of protected workloads
- ♦ The number of volumes under protection
- ♦ The size of volumes under protection
- ♦ File density (number of files per unit of capacity) on your source workloads’ volumes
- ♦ Source I/O levels (how busy your workloads are)
- ♦ The number of concurrent replications
- ♦ Whether data encryption is enabled or disabled
- ♦ Whether data compression is enabled or disabled

For large-scale workload protection plans, you should perform a test protection of a typical workload, run some replications, and use the result as a benchmark, fine-tuning your metrics regularly throughout the project.

1.4.2 Data Compression

If necessary, PlateSpin Forge can compress the workload data before transferring it over the network. This enables you to reduce the overall amount of data transferred during replications.

Compression ratios depend on the type of files on a source workload’s volumes, and might vary from approximately 0.9 (100MB of data compressed to 90 MB) to approximately 0.5 (100MB compressed to 50MB).

NOTE: Data compression utilizes the source workload’s processor power.

Data Compression can be configured individually for each workload or in a Protection Tier. See [“Protection Tiers” on page 75](#).

1.4.3 Bandwidth Throttling

PlateSpin Forge enables you to control the amount of network bandwidth consumed by direct source-to-target communication over the course of workload protection; you can specify a throughput rate for each protection schedule. This provides a way to prevent replication traffic from congesting your production network and reduces the overall load of your PlateSpin Forge Server.

Bandwidth throttling can be configured individual for each workload or in a Protection Tier. See [“Protection Tiers” on page 75](#).

1.4.4 RPO, RTO, and TTO Specifications

- ♦ **Recovery Point Objective (RPO):** Describes the acceptable amount of data loss measured in time. The RPO is determined by the time between incremental replications of a protected workload and is affected by current utilization levels of PlateSpin Forge, the rate and scope of changes on the workload, your network speed, and the chosen replication schedule.
- ♦ **Recovery Time Objective (RTO):** Describes the time required for a failover operation (bringing a failover workload online to temporarily replace a protected production workload).
The RTO for failing a workload over to its virtual replica is affected by the time it takes to configure and execute the failover operation (10 to 45 minutes). See [“Failover” on page 66](#).
- ♦ **Test Time Objective (TTO):** Describes the time required for testing disaster recovery with some confidence of service restoration.

Use the *Test Failover* feature to run through different scenarios and generate benchmark data. See [“Using the Test Failover Feature” on page 67](#).

Among factors that have an impact on RPO, RTO, and TTO is the number of required concurrent failover operations; a single failed-over workload has more memory and CPU resources available to it than multiple failed-over workloads, which share the resources of their underlying infrastructure.

You should determine average failover times for workloads in your environment by doing test failovers at various times, then use them as benchmark data in your overall data recovery plans. See [“Generating Workload and Workload Protection Reports” on page 57](#).

2 Application Configuration

- ♦ [Section 2.1, “Product Licensing,” on page 15](#)
- ♦ [Section 2.2, “Setting Up User Authorization and Authentication,” on page 16](#)
- ♦ [Section 2.3, “Access and Communication Requirements across your Protection Network,” on page 21](#)
- ♦ [Section 2.4, “Configuring PlateSpin Forge Default Options,” on page 25](#)

2.1 Product Licensing

This section provides information about activating your PlateSpin Forge software.

- ♦ [Section 2.1.1, “Obtaining a License Activation Code,” on page 15](#)
- ♦ [Section 2.1.2, “Online License Activation,” on page 15](#)
- ♦ [Section 2.1.3, “Offline License Activation,” on page 16](#)

2.1.1 Obtaining a License Activation Code

For product licensing, you must have a license activation code. If you do not have a license activation code, request one through the [Novell Customer Center Web site \(http://www.novell.com/customercenter/\)](http://www.novell.com/customercenter/). A license activation code will be e-mailed to you.

The first time you log into PlateSpin Forge, the browser is automatically redirected to the License Activation page. You have two options for activating your product license: [Online License Activation](#) or [Offline License Activation](#).

2.1.2 Online License Activation

For online activation, PlateSpin Forge must have Internet access.

NOTE: HTTP proxies might cause failures during online activation. Offline activation is recommended for users in environments that use HTTP proxy.

- 1 In the PlateSpin Forge Web Interface, click *Settings > Licenses > Add License*. The License Activation page is displayed.

- 2 Select *Online Activation*, specify the e-mail address that you provided when placing your order and the activation code you received, then click *Activate*.

The system obtains the required license over the Internet and activates the product.

2.1.3 Offline License Activation

For offline activation, you obtain a license key over the Internet by using a machine that has Internet access.

NOTE: To obtain a license key, you must have a Novell account. If you are an existing PlateSpin customer and you don't have a Novell account, you must first create one. Use your existing PlateSpin username (a valid e-mail address registered with PlateSpin) as input for your Novell account username.

- 1 Click *Settings > License*, then click *Add license*. The License Activation page is displayed.
- 2 Select *Offline Activation* and copy the hardware ID shown.
- 3 Use a Web browser on a computer that has internet access to navigate to the [PlateSpin Product Activation Web Site \(http://www.platespin.com/productactivation/ActivateOrder.aspx\)](http://www.platespin.com/productactivation/ActivateOrder.aspx). Log in with your Novell username.
- 4 Enter in the appropriate fields:
 - ♦ the activation code that you received
 - ♦ the e-mail address that you provided when placing your order
 - ♦ the hardware ID that you copied in [Step 2](#)
- 5 Click *Activate*.

The system generates a license key file and prompts you to save it.

- 6 Save the generated license key file, transfer it to the product host that does not have internet connectivity, and use it to activate the product.

2.2 Setting Up User Authorization and Authentication

- ♦ [Section 2.2.1, "About PlateSpin Forge User Authorization and Authentication," on page 17](#)
- ♦ [Section 2.2.2, "Managing PlateSpin Forge Access and Permissions," on page 18](#)
- ♦ [Section 2.2.3, "Managing PlateSpin Forge Security Groups and Workload Permissions," on page 20](#)

2.2.1 About PlateSpin Forge User Authorization and Authentication

The user authorization and authentication mechanism of PlateSpin Forge is based on user roles, and controls application access and operations that users can perform. The mechanism is based on Integrated Windows Authentication (IWA) and its interaction with Internet Information Services (IIS).

The role-based access mechanism enables you to implement user authorization and authentication in several ways:

- ♦ Restricting application access to specific users
- ♦ Allowing only specific operations to specific users
- ♦ Granting each user access to specific workloads for performing operations defined by the assigned role

Every PlateSpin Forge instance has the following set of operating system-level user groups that define related functional roles:

- ♦ **Workload Protection Administrators:** Have unlimited access to all features and functions of the application. A local administrator is implicitly part of this group.
- ♦ **Workload Protection Power Users:** Have access to most features and functions of the application, with some limitations such as restrictions in the capability to modify system settings related to licensing and security.
- ♦ **Workload Protection Operators:** Have access to a limited subset of system features and functions, sufficient to maintain day-to-day operation.

When a user attempts to connect to PlateSpin Forge, the credentials provided through the browser are validated by IIS. If the user is not a member of one of the Workload Protection roles, connection is refused.

Table 2-1 Workload Protection Roles and Permission Details

Workload Protection Role Details	Administrators	Power Users	Operators
Add Workload	Allowed	Allowed	Denied
Remove Workload	Allowed	Allowed	Denied
Configure Protection	Allowed	Allowed	Denied
Prepare Replication	Allowed	Allowed	Denied
Run (Full) Replication	Allowed	Allowed	Allowed
Run Incremental	Allowed	Allowed	Allowed
Pause/Resume Schedule	Allowed	Allowed	Allowed
Test Failover	Allowed	Allowed	Allowed
Failover	Allowed	Allowed	Allowed
Cancel Failover	Allowed	Allowed	Allowed
Abort	Allowed	Allowed	Allowed
Dismiss (Task)	Allowed	Allowed	Allowed
Settings (All)	Allowed	Denied	Denied

Workload Protection Role Details	Administrators	Power Users	Operators
Run Reports/Diagnostics	Allowed	Allowed	Allowed
Failback	Allowed	Denied	Denied
Reprotect	Allowed	Allowed	Denied

In addition, PlateSpin Forge software provides a mechanism based on *security groups* that define which users should have access to which workloads in the PlateSpin Forge workload inventory.

Setting up a proper role-based access to PlateSpin Forge involves two tasks:

1. Adding users to the required user groups detailed in [Table 2-1](#) (see your Windows documentation).
2. Creating application-level security groups that associate these users with specified workloads (see [“Managing PlateSpin Forge Security Groups and Workload Permissions” on page 20](#)).

2.2.2 Managing PlateSpin Forge Access and Permissions

- ♦ [“Accessing the PlateSpin Forge Server Administration Interface” on page 18](#)
- ♦ [“Adding PlateSpin Forge Users” on page 19](#)
- ♦ [“Assigning a Workload Protection Role to a PlateSpin Forge User” on page 19](#)
- ♦ [“Changing the PlateSpin Forge Administrator Password” on page 20](#)

Accessing the PlateSpin Forge Server Administration Interface

To access the Web User Interface for Microsoft Windows Server administration:

- 1 Open a Web browser and go to `https://IP_address:8098`
Replace *IP_address* with the IP address of the Forge VM.

Your browser connects to the server and displays the default Welcome page.

Figure 2-1 Web User Interface for Microsoft Windows Server Administration



Adding PlateSpin Forge Users

Use the procedure in this section to add a new PlateSpin Forge user.

If you want to grant specific role permissions to an existing user on the Forge VM, see [“Assigning a Workload Protection Role to a PlateSpin Forge User” on page 19](#).

- 1 Access your Forge VM’s Server Administration Web User Interface.
See [“Accessing the PlateSpin Forge Server Administration Interface” on page 18](#).
- 2 Click *Users > Local Users*.
The Local Users on Server page opens.
- 3 Under *Tasks*, click *New*, then type a username, a password, and other optional information.
- 4 Click *OK*.
The Local Users on Server page reloads.

You can now assign a workload protection role to the newly created user. See [“Assigning a Workload Protection Role to a PlateSpin Forge User” on page 19](#).

Assigning a Workload Protection Role to a PlateSpin Forge User

Before assigning a role to a user, determine the collection of permissions that best suits that user. See [Table 2-1, “Workload Protection Roles and Permission Details,” on page 17](#).

- 1 Access your Forge VM’s Server Administration Web User Interface. See [“Accessing the PlateSpin Forge Server Administration Interface” on page 18](#).
- 2 Click *Users > Local Groups*.
The Local Groups on Server page opens.
- 3 In the list of groups, select the required workload protection group, then click *Properties* under *Tasks*.
The corresponding group property page opens.

- 4 Click *Members*, select the required user from the list, and then click *Add*.
The selected user is added to the *Members* list.
- 5 Click *OK*.

You can now add this user to a PlateSpin Forge security group and associate a specified collection of workloads. See [“Managing PlateSpin Forge Security Groups and Workload Permissions” on page 20](#).

Changing the PlateSpin Forge Administrator Password

To change the password of the Forge VM’s Administrator account:

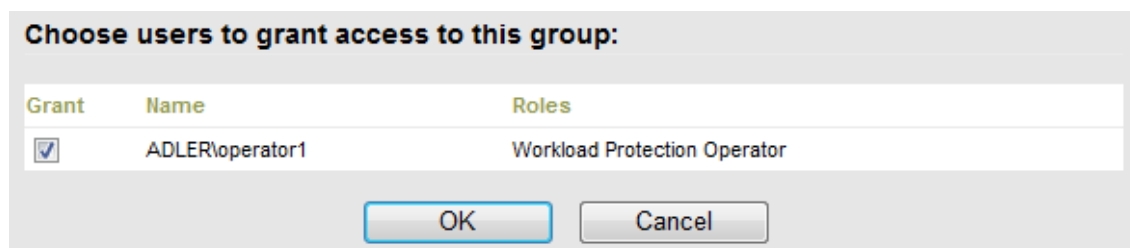
- 1 Access your Forge VM’s Server Administration Web User Interface. See [“Accessing the PlateSpin Forge Server Administration Interface” on page 18](#).
- 2 Click *Set Administrator Password*, type the new password, confirm it, then click *OK*.

2.2.3 Managing PlateSpin Forge Security Groups and Workload Permissions

PlateSpin Forge provides a granular application-level access mechanism that allows specific users to carry out specific workload protection tasks on specified workloads. This is accomplished by setting up *security groups*.

- 1 Assign a PlateSpin Forge user a Workload Protection Role whose permissions best suit that role in your organization. See [“Assigning a Workload Protection Role to a PlateSpin Forge User” on page 19](#).
- 2 Access PlateSpin Forge as an administrator by using the PlateSpin Forge Web Interface, then click *Settings > Permissions*.
The Security Groups page opens:
- 3 Click *Create Security Group*.
- 4 In the *Security Group Name* field, type a name for your security group.
- 5 Click *Add Users* and select the required users for this security group.

If you want to add a PlateSpin Forge user that was recently added to the Forge VM, it might not be immediately available in the user interface. In this case, first click *Refresh User Accounts*.



Grant	Name	Roles
<input checked="" type="checkbox"/>	ADLER\operator1	Workload Protection Operator

OK Cancel

- 6 Click *Add Workloads* and select the required workloads:

Choose workloads to include in this group:

Include	Workload Name	Security Group
<input checked="" type="checkbox"/>	WIN7-PC	BCM Operators
<input type="checkbox"/>	10.99.161.227	[Unassigned]
<input type="checkbox"/>	AE-W2K3-1	[Unassigned]
<input checked="" type="checkbox"/>	AE-W2K3-3	[Unassigned]
<input checked="" type="checkbox"/>	AE-W2K3-4	[Unassigned]
<input type="checkbox"/>	AE-W2K3-4Y	[Unassigned]
<input type="checkbox"/>	AE-W2K3-5	[Unassigned]
<input type="checkbox"/>	DI-w2k3Dyntar	[Unassigned]

OK Cancel

Only users in this security group will have access to the selected workloads.

7 Click *Create*.

The page reloads and displays the your new group in the list of security groups.

To edit a security group, click its name in the list of security groups.

2.3 Access and Communication Requirements across your Protection Network

- [Section 2.3.1, “Access and Communication Requirements for Workloads,” on page 21](#)
- [Section 2.3.2, “Protection Across Public and Private Networks Through NAT,” on page 23](#)
- [Section 2.3.3, “Optimizing Data Transfer over WAN Connections,” on page 23](#)
- [Section 2.3.4, “Overriding the Default bash Shell for Executing Commands on Linux Workloads,” on page 24](#)
- [Section 2.3.5, “Configuring the Application to Function Across NAT,” on page 24](#)

2.3.1 Access and Communication Requirements for Workloads

The following software, network, and firewall requirements are for workloads that you intend to protect by using PlateSpin Forge.

Table 2-2 Access and Communication Requirements for Workloads

Workload Type	Prerequisites	Required Ports
All workloads	Ping (ICMP echo request and response) capability.	

Workload Type	Prerequisites	Required Ports
All Windows workloads	Microsoft .NET Framework version 2.0 or 3.5 SP1	
Windows 7; Windows Server 2008; Windows Vista	<ul style="list-style-type: none"> ♦ Built-in <code>Administrator</code> or domain administrator account credentials (membership only in the local Administrators group is insufficient). On Vista, the account must be enabled (it is disabled by default). ♦ The Windows Firewall configured to allow <i>File and Printer Sharing</i>. Use one of these options: <ul style="list-style-type: none"> ♦ Option 1, using Windows Firewall: Use the basic <i>Windows Firewall Control Panel</i> item (<code>firewall.cpl</code>) and select <i>File and printer Sharing</i> in the list of exceptions. - OR - ♦ Option 2, using Firewall with Advanced Security: Use the <i>Windows Firewall with Advanced Security</i> utility (<code>wf.msc</code>) with the following <i>Inbound Rules</i> enabled and set to <code>Allow</code>: <ul style="list-style-type: none"> ♦ <i>File and Printer Sharing (Echo Request - ICMPv4In)</i> ♦ <i>File and Printer Sharing (Echo Request - ICMPv6In)</i> ♦ <i>File and Printer Sharing (NB-Datagram-In)</i> ♦ <i>File and Printer Sharing (NB-Name-In)</i> ♦ <i>File and Printer Sharing (NB-Session-In)</i> ♦ <i>File and Printer Sharing (SMB-In)</i> ♦ <i>File and Printer Sharing (Spooler Service - RPC)</i> ♦ <i>File and Printer Sharing (Spooler Service - RPC-EPMAP)</i> 	<p>TCP 3725</p> <p>NetBIOS 137 - 139</p> <p>SMB (TCP 139, 445 and UDP 137, 138)</p> <p>TCP 135/ 445</p>
Windows Server 2000; Windows XP	<ul style="list-style-type: none"> ♦ Windows Management Instrumentation (WMI) installed <p>WMI (RPC/DCOM) can use TCP ports 135 and 445 as well as random or dynamically assigned ports above 1024. If problems occur when adding the workload, consider temporarily placing the workload in a DMZ or temporarily opening the firewalled ports while adding the workload to PlateSpin Forge.</p> <p>For additional information, such as guidance in limiting the port range for DCOM and RPC, see the following Microsoft technical articles.</p> <ul style="list-style-type: none"> ♦ Using DCOM with Firewalls (http://msdn.microsoft.com/en-us/library/ms809327.aspx) ♦ Configuring RPC dynamic port allocation to work with firewalls (http://support.microsoft.com/default.aspx?scid=kb;en-us;154596) ♦ Configuring DCOM to work over a NAT-based firewall (http://support.microsoft.com/kb/248809) 	<p>TCP 3725</p> <p>NetBIOS 137 - 139</p> <p>SMB (TCP 139, 445 and UDP 137, 138)</p> <p>TCP 135/ 445</p>
All Linux workloads	Secure Shell (SSH) server	TCP 22, 3725

2.3.2 Protection Across Public and Private Networks Through NAT

In some cases, a source, a target, or PlateSpin Forge itself, might be located in an internal (private) network behind a network address translator (NAT) device, unable to communicate with its counterpart during protection.

PlateSpin Forge enables you to address this issue, depending on which of the following hosts is located behind the NAT device:

- ♦ **PlateSpin Forge Server:** In your server's `web.config` configuration file, record the additional IP addresses assigned to that host. See [“Configuring the Application to Function Across NAT” on page 24](#).
- ♦ **Workload:** When you are attempting to add a workload, specify the public (external) IP address of that workload in the discovery parameters.
- ♦ **Failed-over VM:** During failback, you can specify an alternative IP address for the failed-over workload in [Failback Details \(Workload to VM\) \(page 70\)](#).
- ♦ **Failback Target:** During an attempt to register a failback target, when prompted to provide the IP address of the PlateSpin Server, provide either the local address of the Protect Server host or one of its public (external) addresses recorded in the Server's `web.config` configuration file (see “PlateSpin Forge Server” above).

2.3.3 Optimizing Data Transfer over WAN Connections

You can optimize data transfer performance and fine tune it for WAN connections. You do this by modifying configuration parameters that the system reads from `*.config` files on your Forge VM. For the generic procedure, see [“Configuring the Product Behavior through XML Configuration Parameters” on page 29](#).

Use these settings to optimize data transfers across a WAN. These settings are global and affect all replications using the file-based and VSS replications.

- ♦ **Configuration file:** `productinternal.config`
- ♦ **Location:** `Program Files\PlateSpin Forge Server\Web`

NOTE: If these values are modified, replication times on high-speed networks, such as Gigabit Ethernet, might be negatively impacted. Before modifying any of these parameters, consider consulting PlateSpin Support first.

[Table 2-3](#) lists the configuration parameters with the defaults and with the values recommended for optimum operation in a high-latency WAN environment.

Table 2-3 Default and Optimized Configuration Parameters in `productinternal.config`

Parameter	Default Value	Optimized Value
<code>fileTransferThreadcount</code>	2	4 to 6
Controls the number of TCP connections opened for file-based data transfer.		
<code>fileTransferMinCompressionLimit</code>	0 (disabled)	max 65536 (64 KB)
Specifies the packet-level compression threshold in bytes.		

Parameter	Default Value	Optimized Value
fileTransferCompressionThreadsCount	2	N/A
Controls the number of threads used for packet-level data compression. This is ignored if compression is disabled. Because the compression is CPU-bound, this setting might have a performance impact.		
fileTransferSendReceiveBufferSize	0 (8192 bytes)	max 5242880 (5 MB)
TCP/IP window size setting for file transfer connections. It controls the number of bytes sent without TCP acknowledgement, in bytes.		
When the value is set to 0, the default TCP window size is used (8 KB). For custom sizes, specify the size in bytes. Use the following formula to determine the proper value:		
$((\text{LINK_SPEED}(\text{Mbps})/8) * \text{DELAY}(\text{sec})) * 1000 * 1000$		
For example, for a 100 Mbps link with 10 ms latency, the proper buffer size would be:		
$(100/8) * 0.01 * 1000 * 1000 = 125000 \text{ bytes}$		

2.3.4 Overriding the Default bash Shell for Executing Commands on Linux Workloads

By default, the PlateSpin Protect Server uses the `/bin/bash` shell when executing commands on a Linux source workload.

If required, you can override the default shell by modifying the corresponding registry key on the PlateSpin Protect Server.

See KB Article [KB Article 7010676](http://www.novell.com/support/kb/doc.php?id=7010676) (<http://www.novell.com/support/kb/doc.php?id=7010676>).

2.3.5 Configuring the Application to Function Across NAT

To enable the PlateSpin Forge Server to function across NAT-enabled environments, you must record additional IP addresses of your PlateSpin Forge Server in a configuration file that the server reads upon startup.

For information on the update procedure, see [“Configuring the Product Behavior through XML Configuration Parameters” on page 29](#).

- ♦ **Configuration file:** `Web.config`
- ♦ **Location:** `Program Files\PlateSpin Forge Server\Web`
- ♦ **Values:** `<add key="AlternateServerAddresses" value="" />`

Add the additional IP addresses, delimited by a semicolon (;), for example:

```
<add key="AlternateServerAddresses" value="10.99.106.108;10.99.106.109" />
```


2.4 Configuring PlateSpin Forge Default Options

- ♦ [Section 2.4.1, “Setting Up Automatic E-Mail Notifications of Events and Reports,” on page 25](#)
- ♦ [Section 2.4.2, “Language Setup for International Versions of PlateSpin Forge,” on page 28](#)
- ♦ [Section 2.4.3, “Configuring the Product Behavior through XML Configuration Parameters,” on page 29](#)

2.4.1 Setting Up Automatic E-Mail Notifications of Events and Reports

You can configure PlateSpin Forge to automatically send notifications of events and replication reports to specified e-mail addresses. This functionality requires that you first specify a valid SMTP server for PlateSpin Forge to use.

- ♦ [“SMTP Configuration” on page 25](#)
- ♦ [“Setting Up Automatic Event Notifications by E-Mail” on page 26](#)
- ♦ [“Setting Up Automatic Replication Reports by E-Mail” on page 27](#)

SMTP Configuration

Use the PlateSpin Forge Web Interface to configure SMTP (Simple Mail Transfer Protocol) settings for the server used to deliver e-mail notifications of events and replication reports.

Figure 2-2 Simple Mail Transfer Protocol Settings

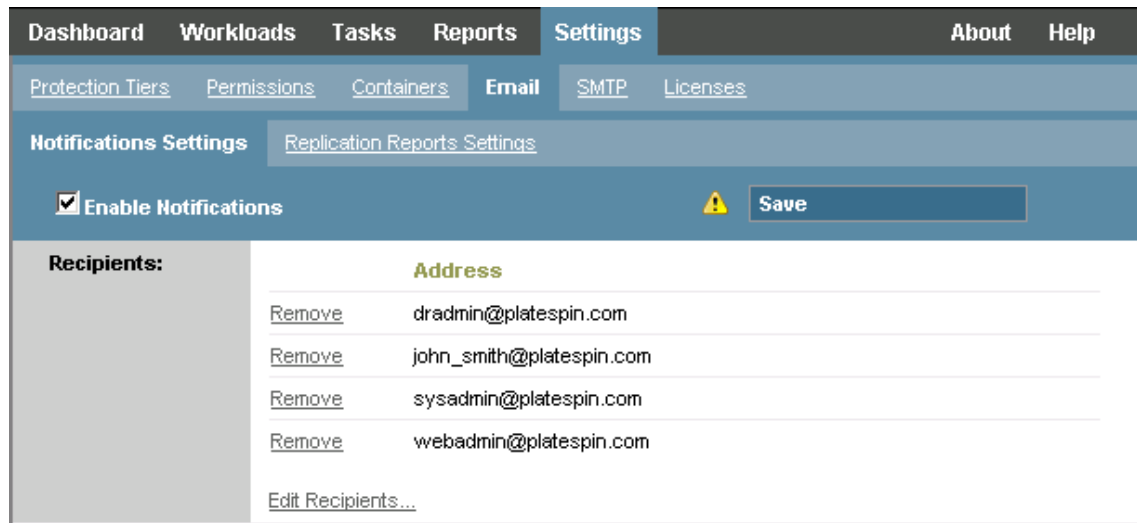
SMTP Settings		Save
SMTP Server Address:	<input type="text"/>	
Port:	<input type="text" value="25"/>	
Reply Address:	<input type="text"/>	
Username:	<input type="text"/>	
Password:	<input type="password"/>	
Confirm:	<input type="password"/>	

To configure SMTP settings:

- 1 In your PlateSpin Forge Web Interface, click *Settings > SMTP*.
- 2 Specify an SMTP server *Address*, a *Port* (the default is 25), and a *Reply Address* for receiving e-mail event and progress notifications.
- 3 Type a *Username* and *Password*, then confirm the password.
- 4 Click *Save*.

Setting Up Automatic Event Notifications by E-Mail

- 1 Set up an SMTP server for PlateSpin Forge to use. See [“SMTP Configuration” on page 25](#).
- 2 In your PlateSpin Forge Web Interface, click *Settings > Email > Notification Settings*.
- 3 Select the *Enable Notifications* option.
- 4 Click *Edit Recipients*, type the required e-mail addresses separated by commas, then click OK.



The screenshot shows the 'Settings' tab in the PlateSpin Forge web interface. Under the 'Email' sub-tab, the 'Notifications Settings' section is active. The 'Enable Notifications' checkbox is checked. A 'Save' button is visible. Below this, a table lists the email recipients with columns for 'Recipients:' and 'Address'. The table contains four entries, each with a 'Remove' link and an email address: dradmin@platespin.com, john_smith@platespin.com, sysadmin@platespin.com, and webadmin@platespin.com. An 'Edit Recipients...' link is at the bottom of the list.

Recipients:	Address
Remove	dradmin@platespin.com
Remove	john_smith@platespin.com
Remove	sysadmin@platespin.com
Remove	webadmin@platespin.com
Edit Recipients...	

- 5 Click *Save*.

To delete listed e-mail addresses, click *Delete* next to the address that you want to remove.

The following events trigger e-mail notifications:

Event	Remarks
Workload Online Detected	Generated when the system detects that a previously offline workload is now online. Applies to workloads whose protection schedule's state is not <i>Paused</i> .
Workload Offline Detected	Generated when the system detects that a previously online workload is now offline. Applies to workloads whose protection schedule's state is not <i>Paused</i> .
Full Replication Successfully Completed	
Full Replication Failed	
Full Replication Missed	Similar to the Incremental Replication Missed event.
Incremental Replication Successfully Completed	
Incremental Replication Failed	

Event	Remarks
Incremental Replication Missed	<p>Generated when any of the following applies:</p> <ul style="list-style-type: none"> ♦ A replication is manually paused while a scheduled incremental replication is due. ♦ The system attempts to carry out a scheduled incremental replication while a manually-triggered replication is underway. ♦ The system determines that the target has insufficient free disk space.
Test Failover Completed	Generated upon manually marking a Test Failover operation a success or a failure.
Prepare Failover Completed	
Prepare Failover Failed	
Failover Completed	
Failover Failed	

Setting Up Automatic Replication Reports by E-Mail

To set up PlateSpin Forge to automatically send out replication reports by e-mail, follow these steps:

- 1 Set up an SMTP server for PlateSpin Forge to use. See [SMTP Configuration \(page 25\)](#).
- 2 In your PlateSpin Forge Web Interface, click *Settings > Email > Replication Reports Settings*.
- 3 Select the *Enable Replication Reports* option.
- 4 In the *Report Recurrence* section, click *Configure* and specify the required recurrence pattern for the reports.
- 5 In the *Recipients* section, click *Edit Recipients*, type the required e-mail addresses separated by commas, then click *OK*.

The screenshot shows the 'Settings' page in the PlateSpin Forge web interface. The 'Email' tab is selected, and the 'Replication Reports Settings' sub-tab is active. The 'Enable Replication Reports' checkbox is checked. The 'Report Recurrence' is set to 'Every day at 12:00 AM'. The 'Recipients' section lists three email addresses: 'admin@platespin.com', 'john_smith@platespin.com', and 'operator@platespin.com'. The 'Protect Access URL' is set to 'http://localhost:80'.

Section	Value
Enable Replication Reports	<input checked="" type="checkbox"/>
Report Recurrence	Every day at 12:00 AM
Recipients	admin@platespin.com john_smith@platespin.com operator@platespin.com
Protect Access URL	http://localhost:80

- 6 (Optional) In the *Protect Access URL* section, specify a non-default URL for your PlateSpin Forge Server (for example, when your Forge VM has more than one NIC or if it is located behind a NAT server). This URL affects the title of the report and the functionality of accessing relevant content on the server through hyperlinks within e-mailed reports.
- 7 Click *Save*.

For information on other types of reports that you can generate and view on demand, see [“Generating Workload and Workload Protection Reports” on page 57](#).

2.4.2 Language Setup for International Versions of PlateSpin Forge

PlateSpin Forge provides National Language Support (NLS) for Chinese Simplified, Chinese Traditional, French, German, and Japanese.

To use the PlateSpin Forge Web Interface and integrated help in one of these languages, the corresponding language must be added in your Web browser and moved to the top of the order of preference:

- 1 Access the Languages setting in your Web browser:
 - ♦ **Internet Explorer:** Click *Tools > Internet Options > General tab > Languages*.
 - ♦ **Firefox:** Click *Tools > Options > Content tab > Languages*.
- 2 Add the required language and move it up the top of the list.
- 3 Save the settings, then start the client application by connecting to your PlateSpin Forge Server. See [“Launching the PlateSpin Forge Web Interface” on page 49](#).

NOTE: (For users of Chinese Traditional and Chinese Simplified versions) Attempting to connect to the PlateSpin Forge Server with a browser that does not have a specific version of Chinese added might result in Web server errors. For correct operation, use your browser’s configuration settings to add a specific Chinese language (for example, Chinese [zh-cn] or Chinese [zh-tw]). Do not use the culture-neutral Chinese [zh] language.

The language of a small portion of system messages generated by the PlateSpin Forge Server depends on the operating system interface language selected in your Forge VM:

- 1 Access your Forge VM.
See [Section 3.4.1, “Accessing and Working with the Forge Management VM in the Appliance Host,” on page 38](#).
- 2 Start the Regional and Language Options applet (click *Start > Run*, type `intl.cpl`, and press Enter), then click the *Languages* (Windows Server 2003) or *Keyboards and Languages* (Windows Server 2008) tab, as applicable.
- 3 If it is not already installed, install the required language pack. You might need access to your OS installation media.
- 4 Select the required language as the interface language of the operating system. When you are prompted, log out or restart the system.

2.4.3 Configuring the Product Behavior through XML Configuration Parameters

Some aspects of your PlateSpin Forge Server's behavior are controlled by configuration parameters that are read from *.config files on your Forge VM.

Under normal circumstances you should not need to modify these settings unless you are advised to do so by PlateSpin Support. This section provides a number of common use cases along with information on the required procedure.

Use the following procedure for changing and applying any *.config parameters:

- 1 On your Forge VM, go to the indicated directory.
- 2 Use a text editor to open the *.config file.
- 3 Locate the required parameter in the *.config file and change its value, which is enclosed in quotation marks (""). Do not remove the quotation marks. Use acceptable values indicated in this section or as advised by PlateSpin Support.
- 4 Save and close the *.config file.
- 5 Restart the PlateSpin Forge Server. See ["Restarting the PlateSpin Forge Server to Apply System Changes" on page 29](#).

Restarting the PlateSpin Forge Server to Apply System Changes

- 1 Go to the PlateSpin Forge Server's bin\RestartPlateSpinServer subdirectory.
See [Section 3.4.1, "Accessing and Working with the Forge Management VM in the Appliance Host," on page 38](#).
- 2 Double-click the RestartPlateSpinServer.exe executable.
A command prompt window opens, requesting confirmation.
- 3 Confirm by typing Y and pressing Enter.

3 Appliance Setup and Maintenance

This section provides information about appliance setup and maintenance tasks that you might need to complete on a regular basis.

- ♦ [Section 3.1, “Setting up Appliance Networking,” on page 31](#)
- ♦ [Section 3.2, “Relocating PlateSpin Forge and Reassigning Its IP Addresses,” on page 32](#)
- ♦ [Section 3.3, “Using External Storage Solutions with PlateSpin Forge,” on page 36](#)
- ♦ [Section 3.4, “PlateSpin Forge Appliance Maintenance,” on page 38](#)
- ♦ [Section 3.5, “Upgrading PlateSpin Forge,” on page 42](#)
- ♦ [Section 3.6, “Resetting Forge to Factory Defaults,” on page 44](#)

3.1 Setting up Appliance Networking

This section provides information about customizing the networking settings of your appliance host.

- ♦ [Section 3.1.1, “Setting up Appliance Host Networking,” on page 31](#)

3.1.1 Setting up Appliance Host Networking

Your PlateSpin Forge appliance has six physical network interfaces configured for external access:

- ♦ **External Test Network:** To isolate network traffic when testing a failover workload with the Test Failover feature.
- ♦ **Internal Test Network:** For testing a failover workload in complete isolation from the production network.
- ♦ **Replication Network:** To provide the system with networking designated for ongoing traffic between your production workload and its replica in the Management VM.
- ♦ **Production Network:** For real-life business continuity networking when performing a failover or a fallback.
- ♦ **Management Network:** The Forge Management VM network.
- ♦ **Appliance Host Network:** Hypervisor management network. This network is unavailable for selection in the PlateSpin Forge Web Client.

By default, PlateSpin Forge ships with all 6 physical network interfaces mapped to one vSwitch in the hypervisor. You can customize the mapping to better suit your environment. For example, you can protect a workload that has two NICs, one of which is used for production connectivity, and the other strictly for replications. For additional information, see [KB Article 7921062 \(http://www.novell.com/support/viewContent.do?externalId=7921062\)](http://www.novell.com/support/viewContent.do?externalId=7921062).

In addition, to further fine-tune the control of your network traffic, consider assigning a different VLAN ID to each of these individual port groups. This ensures that your production network is not interfered with by traffic from workload protection and recovery operations. See [KB Article 21057](http://www.novell.com/support/viewContent.do?externalId=7921057) (<http://www.novell.com/support/viewContent.do?externalId=7921057>).

3.2 Relocating PlateSpin Forge and Reassigning Its IP Addresses

Relocating your PlateSpin Forge appliance involves changing the IP addresses of its components to reflect the new environment. These are the IP addresses you specified during the initial setup of the appliance (see your *Forge Getting Started Guide*).

The procedure varies depending on the *appliance version* (1 or 2). For information on how to determine the appliance version of your unit, see “*Determining your Unit’s Appliance Version*” in your *Forge Getting Started Guide*.

- ♦ [Section 3.2.1, “Forge Relocation Procedure for Appliance Version 2,” on page 32](#)
- ♦ [Section 3.2.2, “Forge Relocation Procedure for Appliance Version 1,” on page 36](#)

3.2.1 Forge Relocation Procedure for Appliance Version 2

Before starting the relocation procedure:

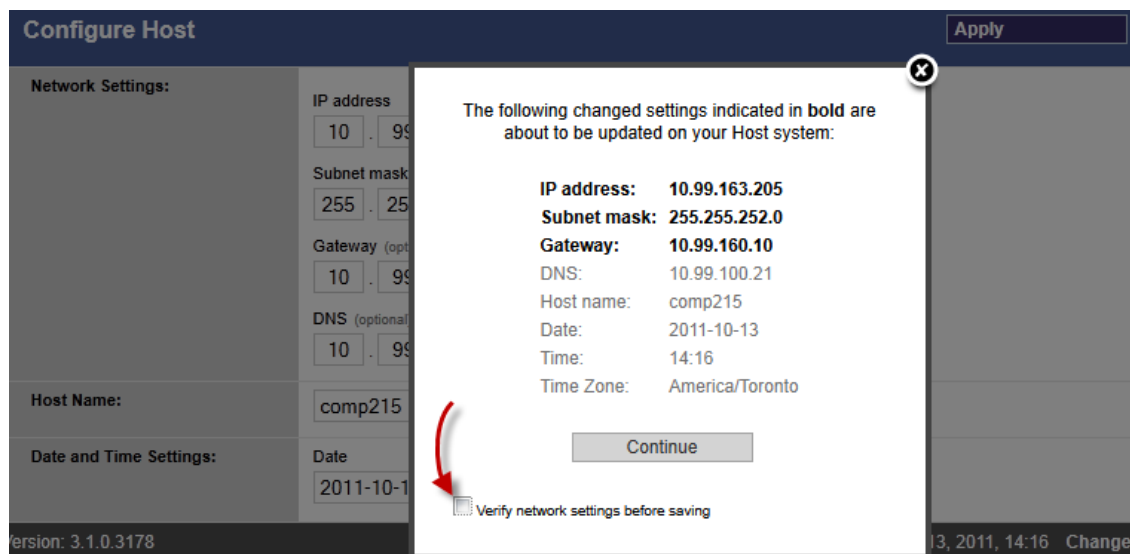
- 1 Pause all replication schedules, ensuring that at least one incremental has run for each workload:
 - 1a In your PlateSpin Forge Web Client, select all workloads, click *Pause*, then click *Execute*.
 - 1b Ensure that the status *Paused* is displayed for all the workloads.

The specifics of the relocation process vary depending on whether the new IP address of the appliance at the target site is known (scenario 1) or unknown (scenario 2).

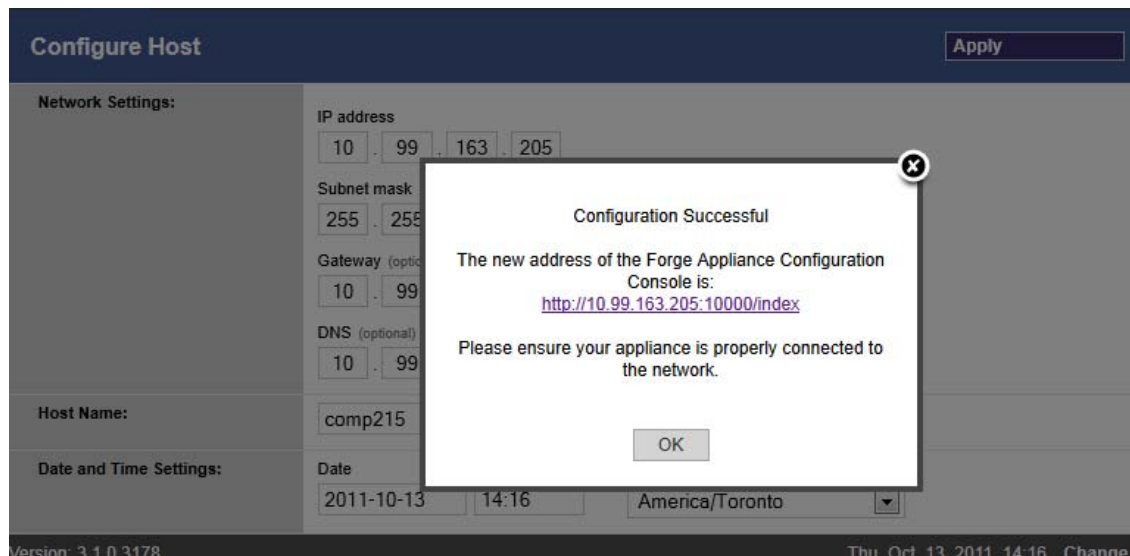
- ♦ [“Scenario 1 - Relocating Forge \(New IP Address Known\)” on page 32](#)
- ♦ [“Scenario 2 - Relocating Forge \(New IP Address Unknown\)” on page 34](#)

Scenario 1 - Relocating Forge (New IP Address Known)

- 1 Pause all replications. See [Step 1a](#) and [Step 1b](#) above.
- 2 Launch the Forge Appliance Configuration Console (ACC): open a browser and go to `http://<Forge_IP_address>:10000`.
- 3 Log in using the `forgeuser` account and click *Configure Host*.
- 4 Enter the new network parameters and click *Apply*.
- 5 In the confirmation popup window, ensure that the new settings are correct, deselect the *Verify network settings before saving*, then click *Continue*.



- 6 Wait for the configuration process to complete and for the browser window to display the Configuration Successful popup window.



NOTE: The link in the popup window for the new ACC address will not work until you now physically disconnect your appliance and connect it to the new subnet.

- 7 Shut down the appliance:
 - 7a Shut down the Forge Management VM. See [“Starting and Shutting Down the Forge Management VM”](#) on page 40.
 - 7b Shut down the Appliance Host:
 - 7b1 At the Forge Console, switch to the ESX Server console by pressing Alt-F2.
 - 7b2 Log in as the superuser (user root with the associated password).
 - 7b3 Type the following command and press Enter:


```
shutdown -h now
```
 - 7c Power the appliance down.

- 8 Disconnect your appliance, move it to the new site, attach it to the new subnet, and power it on. The new IP address should now be valid.
- 9 Launch the ACC and log in using the `forgeuser` account, click *Configure Forge VM*, specify the required parameters, then click *Apply*.
- 10 Verify that the settings are correct, click *Continue*, and wait for the process to complete.

NOTE: If you configured the Forge VM to use DHCP, do the following after the relocation:

1. Determine the Forge VM's new IP address (use the VMware client program to access the Forge VM and look it up in the VM's Windows interface. See ["Launching the VMware Client and Accessing the Forge Management VM" on page 39](#)).

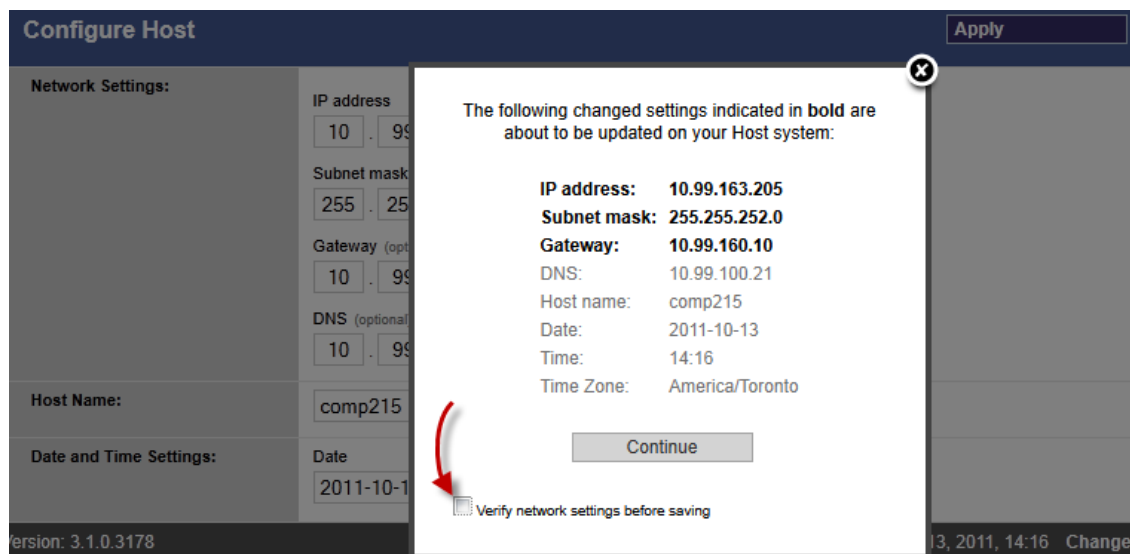
2. Use the new IP address to launch the PlateSpin Forge Web Interface and refresh the container (click *Settings > Containers > then click ↻*).

- 11 Resume the paused replications.

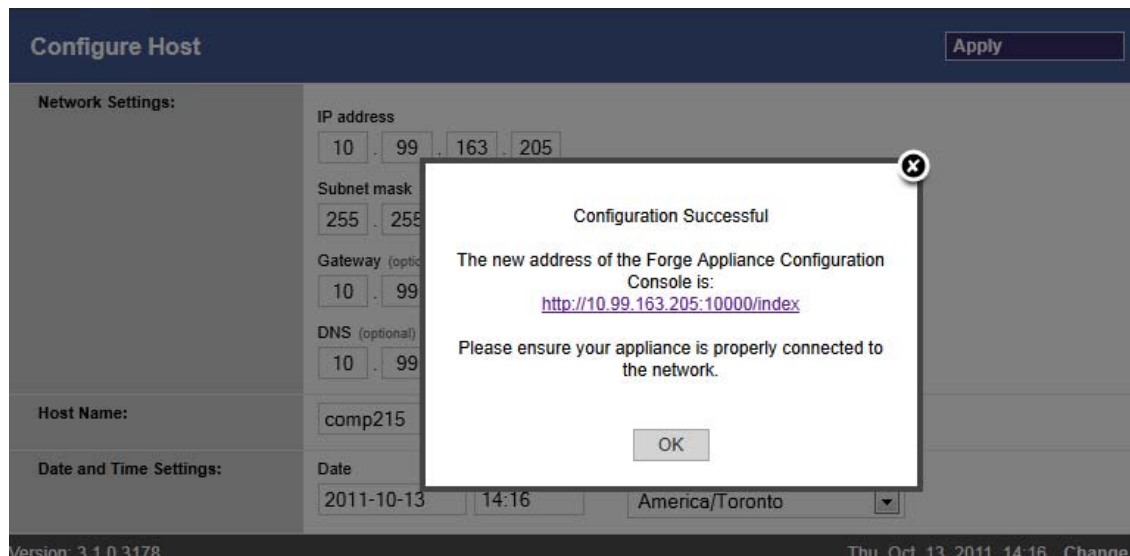
Scenario 2 - Relocating Forge (New IP Address Unknown)

- 1 Pause all replications. See [Step 1 on page 32](#).
- 2 Shut down the appliance:
 - 2a Shut down the Forge Management VM. See ["Starting and Shutting Down the Forge Management VM" on page 40](#).
 - 2b Shut down the Appliance Host:
 - 2b1 At the Forge Console, switch to the ESX Server console by pressing Alt-F2.
 - 2b2 Log in as the superuser (user `root` with the associated password).
 - 2b3 Type the following command and press Enter:

```
shutdown -h now
```
 - 2c Power the appliance off.
- 3 Disconnect your appliance, move it, attach to the new network, then power it on.
- 4 Set up a computer (notebook computer recommended) so that it is able to communicate with Forge at its current IP address (the IP address at the old site), then connect it to the appliance. See [Appliance v2 Configuration Procedure Using the Forge ACC \(http://www.novell.com/documentation/platespin_forge_3/getstart/data/bk2otgs.html#bwkc1x9\)](http://www.novell.com/documentation/platespin_forge_3/getstart/data/bk2otgs.html#bwkc1x9) in your *Getting Started Guide*.
- 5 Launch the Forge Appliance Configuration Console (ACC): open a browser and go to `http://<Forge_IP_address>:10000`.
- 6 Log in using the `forgeuser` account and click *Configure Host*.
- 7 Enter the new network parameters and click *Apply*.
- 8 In the confirmation popup window, ensure that the new settings are correct, deselect the *Verify network settings before saving*, then click *Continue*.



- 9 Wait for the configuration process to complete and for the browser window to display the Configuration Successful popup window.



NOTE: The link in the popup window for the new ACC address will not work until you now physically disconnect your appliance and connect it to the new subnet.

- 10 Disconnect the computer from the appliance and connect the appliance to the new subnet.
The new IP address should now be valid.
- 11 Launch the ACC and log in using the `forgeuser` account, click *Configure Forge VM*, specify the required parameters, then click *Apply*.
- 12 Verify that the settings are correct, click *Continue*, and wait for the process to complete.

NOTE: If you configured the Forge VM to use DHCP, do the following after the relocation:

1. Determine the Forge VM's new IP address (use the VMware client program to access the Forge VM and look it up in the VM's Windows interface. See ["Launching the VMware Client and Accessing the Forge Management VM"](#) on page 39).

2. Use the new IP address to launch the PlateSpin Forge Web Interface and refresh the container (click *Settings > Containers > then click* ).

13 Resume the paused replications.

3.2.2 Forge Relocation Procedure for Appliance Version 1

- 1 Pause all replication schedules, ensuring that at least one incremental has run for each workload:
 - 1a In your PlateSpin Forge Web Client, select all workloads, click *Pause*, then click *Execute*.
 - 1b Ensure that the status *Paused* is displayed for all the workloads.
- 2 Shut down the Forge Management VM. See [“Starting and Shutting Down the Forge Management VM” on page 40](#).
- 3 Shut down the Appliance Host:
 - 3a At the Forge Console, switch to the ESX Server console by pressing Alt-F2 (to switch back to the Forge Console, press Alt-F1).
 - 3b Log in as the superuser (`root` and the associated password).
 - 3c Type the following command and press Enter:

```
shutdown -h now
```
 - 3d Power the appliance off.
- 4 Move the appliance to the new location, set up the hardware, make the required cable connections, then power the appliance on.
- 5 Update the appliance network configuration:
 - 5a At the Forge console, log in as the superuser (`root` and the associated password).
 - 5b Update the *IP address*, *Netmask*, and *Gateway IP address* settings for the appliance host as required. You can use DHCP, but only if a static IP lease is enabled. For multiple appliance environments, assign unique hostnames to the appliances to avoid hostname conflicts.
 - 5c Update the *IP address*, *Netmask*, *Gateway IP address* and domain affiliation settings for the Forge Management VM as required.
 - 5d Select *OK*, review the updates, then select *OK* again.
- 6 Update the network settings for the paused replications; in your PlateSpin Forge Web Client, do the following for each paused workload:
 - 6a Access the Replication Settings section in the paused workload’s protection details.
 - 6b Update the *Replication Network* value to reflect the network change.
 - 6c Save the settings.
- 7 Resume replications: in your PlateSpin Forge Web Client, select all workloads, click *Resume Schedule*, then click *Execute*.

3.3 Using External Storage Solutions with PlateSpin Forge

The following sections contain information to help you with the setup and configuration of external storage for PlateSpin Forge.

- ♦ [Section 3.3.1, “Using Forge with SAN Storage,” on page 37](#)
- ♦ [Section 3.3.2, “Adding a SAN LUN to Forge,” on page 38](#)

3.3.1 Using Forge with SAN Storage

PlateSpin Forge supports existing external storage solutions, such as Storage Area Network (SAN) implementations. Both Fibre Channel and iSCSI solutions are supported. SAN support for Fibre Channel and iSCSI HBAs allows a Forge appliance to be connected to a SAN array. You can then use SAN-array LUNs (Logical Units) to store workload data. Using Forge with a SAN improves flexibility, efficiency, and reliability.

Each SAN product has its own nuances and differences that do not migrate from one hardware manufacturer to the next. This is especially true when considering how these products connect and interact with the Forge Management VM. As such, specific configuration steps for each possible environment and context are beyond the scope of this guide.

The best place to find this type of information is from your hardware vendor or your SAN product sales representative. Many hardware vendors have support guides available describing these tasks in detail. You can find a wealth of information at the following sites:

The [VMware Documentation Web site](http://www.vmware.com/support/pubs/) (<http://www.vmware.com/support/pubs/>).

- The *Fibre Channel SAN Configuration Guide* discusses the use of ESX Server with Fibre Channel storage area networks.
- The *iSCSI SAN Configuration Guide* discusses the use of ESX Server with iSCSI storage area networks.
- The *VMware I/O Compatibility Guide* lists the currently approved HBAs, HBA drivers, and driver versions.
- The *VMware Storage/SAN Compatibility Guide* lists currently approved storage arrays.
- The *VMware Release Notes* give information about known issues and workarounds.
- The *VMware Knowledge Bases* have information on common issues and workarounds.

The following vendors provide storage products that have all been tested by VMware:


- 3PAR (<http://www.3par.com>)
- Bull (<http://www.bull.com>) (FC only)
- Compellent (<http://www.compellent.com>)
- Dell (<http://www.dell.com>)
- EMC (<http://www.emc.com>)
- EqualLogic (<http://www.equallogic.com>) (iSCSI only)
- Fujitsu (<http://www.fujitsu.com>) and Fujitsu Siemens (<http://www.fujitsu-siemens.com>)
- HP (<http://www.hp.com>)
- Hitachi (<http://www.hitachi.com>) and Hitachi Data Systems (<http://www.hds.com>) (FC only)
- IBM (<http://www.ibm.com>)
- NEC (<http://www.nec.com>) (FC only)
- Network Appliance (NetApp) (<http://www.netapp.com>)
- Nihon Unisys (<http://www.unisys.com>) (FC only)
- Pillar Data (<http://www.pillardata.com>) (FC only)
- Sun Microsystems (<http://www.sun.com>)
- Xiotech (<http://www.xitech.com>) (FC only)

You can also learn more about iSCSI by visiting the Storage Networking Industry Association Web site at http://www.snia.org/tech_activities/ip_storage/iscsi/.

3.3.2 Adding a SAN LUN to Forge

PlateSpin Forge supports the use of Storage Area Network (SAN) storage, but before Forge can access an existing SAN, a SAN Logical Unit (LUN) needs to be added to Forge's ESX.

- 1 Set up and configure your SAN system.
- 2 Access the appliance host (see [“Downloading the VMware Client Program” on page 39](#)).
- 3 In the VMware client interface, click the root (top-level) node in the Inventory panel, then click the *Configuration* tab.
- 4 Click the *Add Storage* hyperlink in the upper right.
- 5 In the Add Storage Wizard, click *Next* until you are prompted to specify datastore information.
- 6 Specify a datastore name and click *Next* in the subsequent wizard pages. When the wizard finishes, click *Finish*.
- 7 Click *Storage* under *Hardware* to see the Forge datastores. The newly added SAN LUN should appear in the window.
- 8 Quit the VMware client program.

In the PlateSpin Forge Web Client, the new datastore doesn't appear until the next replication runs and the Application Host is refreshed. You can force a refresh by selecting *Settings > Containers* and clicking  near the appliance hostname.

3.4 PlateSpin Forge Appliance Maintenance

Topics in this section provide information about tasks that deal with PlateSpin Forge appliance maintenance.

- ♦ [Section 3.4.1, “Accessing and Working with the Forge Management VM in the Appliance Host,” on page 38](#)

3.4.1 Accessing and Working with the Forge Management VM in the Appliance Host

Occasionally you might need to access the Forge Management VM and perform maintenance tasks as described here or when you are advised to do so by PlateSpin Support.

Use the VMware client software to access the Forge Management VM, including its OS interface and VM settings.

NOTE: The VMware client software differs between ESX version 3.5 (Forge appliance version 1 systems) and ESX version 4.1 (Forge appliance version 2 systems).

- ♦ ESX 3.5 requires the VMware Virtual Infrastructure Client (VIC)
- ♦ ESX 4.1 requires the VMware vSphere Client

For convenience and ease of reference, these programs are sometimes referred to as *VMware Client*. In addition, the terms *Virtual Infrastructure Client (VIC)* and *vSphere Client* might be used interchangeably.

-
- ♦ [“Downloading the VMware Client Program” on page 39](#)
 - ♦ [“Launching the VMware Client and Accessing the Forge Management VM” on page 39](#)

- ♦ “Starting and Shutting Down the Forge Management VM” on page 40
- ♦ “Managing Forge Snapshots on the Appliance Host” on page 41
- ♦ “Manually Importing VMs into the Appliance Host’s Datastore” on page 41
- ♦ “Guidelines for Applying Security Updates to the PlateSpin Forge Management VM” on page 42

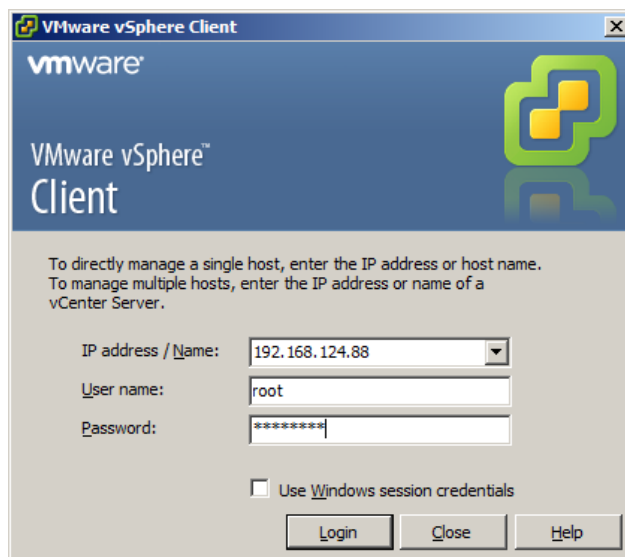
Downloading the VMware Client Program

Download the client software from the appliance host and install it on a Windows workstation external to PlateSpin Forge.

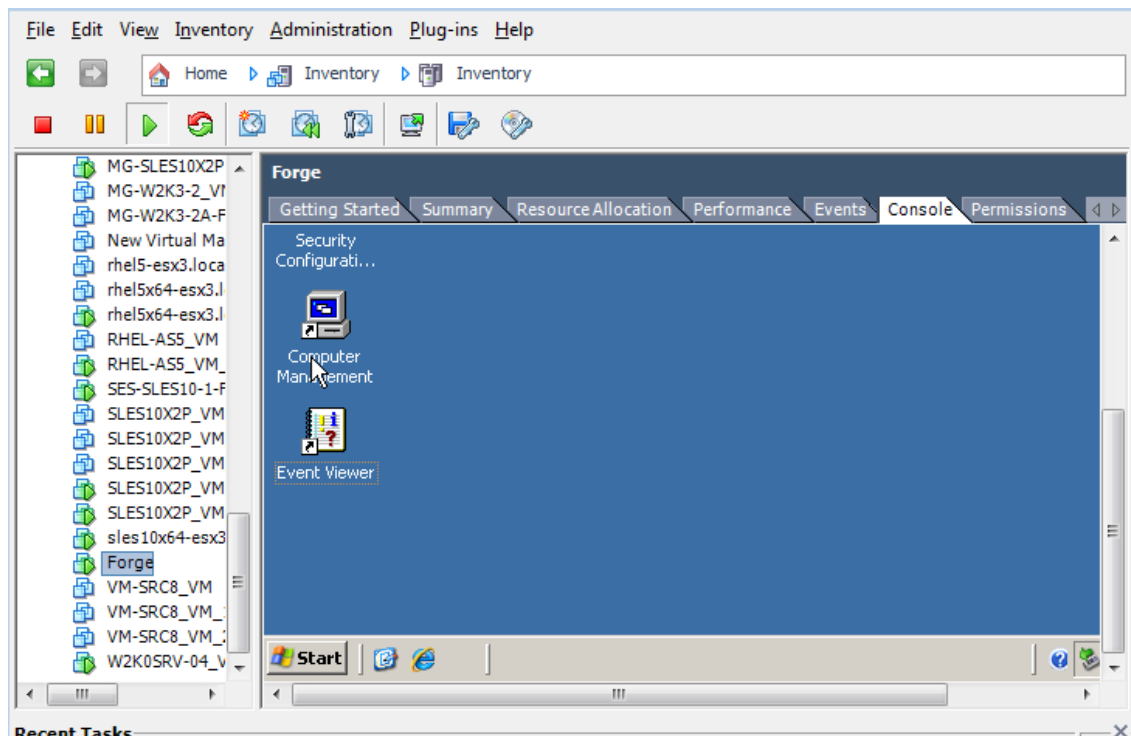
- 1 Download the client software:
 - ♦ (Conditional: for Forge appliance version 2 with VMware ESX 4.1) Download the [VMware vSphere Client](http://vsphereclient.vmware.com/vsphereclient/3/4/5/0/4/3/VMware-viclient-all-4.1.0-345043.exe) program (<http://vsphereclient.vmware.com/vsphereclient/3/4/5/0/4/3/VMware-viclient-all-4.1.0-345043.exe>).
 - OR
 - ♦ (Conditional: for Forge appliance version 1 with VMware ESX 3.5) Open a Web browser and go to the home page of the appliance host (VMware ESX), using the appliance host’s IP address. Ignore the warning related to the security certificate. On the VMware ESX Server’s Welcome page, click the *Download Virtual Infrastructure Client* hyperlink, and download the installation program.
- 2 Launch the downloaded installation program and follow the instructions to install the software.

Launching the VMware Client and Accessing the Forge Management VM

- 1 Clicking *Start > Programs > VMWare > VMware vSphere | Virtual InfrastructureClient*.
The VMware client login window is displayed.



- 2 Specify your administrator-level credentials and log in, ignoring any certificate warnings.
The VMware client program opens.



- 3 In the inventory panel at the left, locate and select the *PlateSpin Forge Management* VM item. At the top of the right panel, click the *Console* tab.

The Client's console area displays the Forge Management VM's Windows interface.

Use the console to work with the Management VM the same way as you would work with Windows on a physical machine.

To unlock the Management VM, click inside the console and press Ctrl+Alt+Insert.

To release the cursor for working outside the VMware client program, press Ctrl+Alt.

Starting and Shutting Down the Forge Management VM

Occasionally you might need to shut down and then restart the Forge Management VM, such as when you relocate the appliance.

- 1 Use the VMware Client to access the Forge Management VM host. See ["Downloading the VMware Client Program" on page 39](#).
- 2 Use the standard Windows procedure to shut down the VM (*Start > Shut Down*).

To restart the Management VM:

- 1 In the inventory panel at the left, right-click the *PlateSpin Forge Management VM* item and select *Power on*.

Managing Forge Snapshots on the Appliance Host

Occasionally you might need to take a point-in-time snapshot of your management VM, such as when you upgrade Forge software or when carry out troubleshooting tasks. You might also need to remove snapshots (recovery points) to free storage space.

- 1 Use the VMware Client to access the appliance host. See [“Downloading the VMware Client Program” on page 39](#).
- 2 In the inventory panel at the left, right-click the *PlateSpin Forge Management VM* item and select *Snapshot > Take Snapshot*.
- 3 Type a name and a description for the snapshot, then click OK.

To revert the management VM to a previous state:


- 1 In the inventory panel at the left, right-click the *PlateSpin Forge Management VM* item and select *Snapshot > Snapshot Manager*.
- 2 In the tree representation of the VM states, select a snapshot, then click *Go to*.

To remove snapshots that represent recovery points:

- 1 In the inventory panel at the left, right-click the *PlateSpin Forge Management VM* item and select *Snapshot > Snapshot Manager*.
- 2 In the tree representation of the VM states, select a snapshot, then click *Remove*.

Manually Importing VMs into the Appliance Host's Datastore

Use this procedure to manually import a VM into the appliance host's datastore. You might want to consider this option when you want your failover workload to be created differentially (see [“Initial Replication Method \(Full and Incremental\)” on page 77](#)).

- 1 At the production site, create a VM (ESX 3.5 and later) from your production workload (for example, by using PlateSpin Migrate) and copy the VM files from the ESX host's datastore to portable media, such as a portable hard drive or a USB flash drive. Use the Datastore Browser of the client software to browse and locate the files.
- 2 At the disaster recovery site, attach the media to a workstation that has network access to Forge and has the VMware client program installed. See [“Downloading the VMware Client Program” on page 39](#).
- 3 Use the VMware Client's Datastore Browser to access the Forge datastore (*Storage1*) and upload the VM files from the temporary media. Use the uploaded VM to register it with the appliance host (right-click > *Add to Inventory*).
- 4 Refresh the PlateSpin Forge inventory (in the PlateSpin Forge Web Client, click *Settings > Containers*, then click  adjacent to the appliance host).

Guidelines for Applying Security Updates to the PlateSpin Forge Management VM

This section provides general guidelines for applying security patches to the Forge Management VM.

- 1 During a maintenance window, access the Forge Management VM by using the VMware VMware client program. See [“Downloading the VMware Client Program” on page 39](#).
- 2 From within the Forge Management VM’s Windows interface, check for security updates from Microsoft.
- 3 Use the PlateSpin Forge Web Client to put PlateSpin Forge into maintenance mode by pausing all replication schedules and ensuring that any incomplete replications are complete.
- 4 Take a snapshot of the Forge Management VM. See [“Managing Forge Snapshots on the Appliance Host” on page 41](#).
- 5 Download and install the required security patches. When the installation finishes, reboot the Forge Management VM.
- 6 Use the PlateSpin Forge Web Client to resume replications paused in [Step 3](#) and verify that replications are working properly.
- 7 Remove the snapshot of the Forge Management VM that you took in [Step 4](#). See [“Managing Forge Snapshots on the Appliance Host” on page 41](#).

3.5 Upgrading PlateSpin Forge

You can upgrade your Forge software from versions 2.5, 3.0, and 3.0.2.

The rest of this section provides information about upgrading your PlateSpin Forge appliance.

- ♦ [Section 3.5.1, “Before Starting the Upgrade,” on page 42](#)
- ♦ [Section 3.5.2, “Summary of Upgrade Tasks,” on page 42](#)
- ♦ [Section 3.5.3, “Forge Upgrade Procedure,” on page 43](#)

3.5.1 Before Starting the Upgrade

Before starting the upgrade, make sure that you have the following prerequisites:

- ♦ The Forge setup installation executable.
- ♦ IP addresses and appropriate credentials for:
 - ♦ The Forge appliance (used for the Forge Web Client Interface and the Forge Management VM)
 - ♦ The Forge Appliance Host (VMware ESX server)
- ♦ The VMware client program. See [“Downloading the VMware Client Program” on page 39](#).

3.5.2 Summary of Upgrade Tasks

To upgrade your Forge appliance, you need to perform the following tasks in order:

1. Ensure that no replications are currently running or are scheduled to run during the upgrade.
2. Save the current state of the management VM by taking a snapshot.

3. Update the Forge Management VM with the latest Microsoft .NET Framework software and any security patches.
4. Copy and run the required setup executable locally within the Forge Management VM.
5. Verify proper operation of the appliance after the upgrade.

3.5.3 Forge Upgrade Procedure

This phase involves pausing all scheduled replications of protected workloads and waiting for running replications to complete.

- 1 Use the PlateSpin Forge Web Client to pause all scheduled replications. Wait for any replications that are underway to complete. Ensure that the replication status of protected workloads is *idle* in the Replication Status column.
See [“Launching the PlateSpin Forge Web Interface” on page 49](#).
- 2 Power off the Forge Management VM. See [“Starting and Shutting Down the Forge Management VM” on page 40](#).
- 3 Back up the Forge Management VM by creating a snapshot. See [“Managing Forge Snapshots on the Appliance Host” on page 41](#).
- 4 For Forge 1.x appliances, disable Independent mode for VM Hard Disk 2:
 - 4a In the Inventory panel at the left, right-click the Forge Management VM and select *Edit Settings*.
The Virtual Machine Properties window is displayed.
 - 4b On the *Hardware* tab, click *Hard Disk 2*.
 - 4c At the right, deselect the *Independent* check box.
- 5 Power on the Forge Management VM, access it with the VMware client program, and do the following:
 - 5a Install the latest Microsoft .NET Framework software. Forge 3 requires [Microsoft .NET Framework 3.5, SP1](http://www.microsoft.com/downloads/details.aspx?FamilyId=AB99342F-5D1A-413D-8319-81DA479AB0D7) (<http://www.microsoft.com/downloads/details.aspx?FamilyId=AB99342F-5D1A-413D-8319-81DA479AB0D7>).
 - 5b Update Windows, applying any available security updates.
 - 5c Reboot the Forge Management VM.
- 6 Run the Forge setup installation executable within the Forge Management VM and follow the on-screen instructions.

NOTE: In some situations, the installation program might fail to automatically re-import data that it exports during the upgrade process. If this happens, use the `PlateSpin.ImportExport.exe` utility to recover this data from your server host's `\Documents and Settings\<user_profile>\Application Data\PlateSpin` directory. See [KB Article 7921084](http://www.novell.com/support/viewContent.do?externalId=7921084) (<http://www.novell.com/support/viewContent.do?externalId=7921084>).

- 7 Use the PlateSpin Forge Web Client to resume all paused replications.
- 8 Use the VMware client program to remove the snapshot created in [Step 3](#).

IMPORTANT: Drivers that were uploaded to the PlateSpin Forge driver database for failback are not preserved. Any such drivers need to be uploaded again after the upgrade.

3.6 Resetting Forge to Factory Defaults

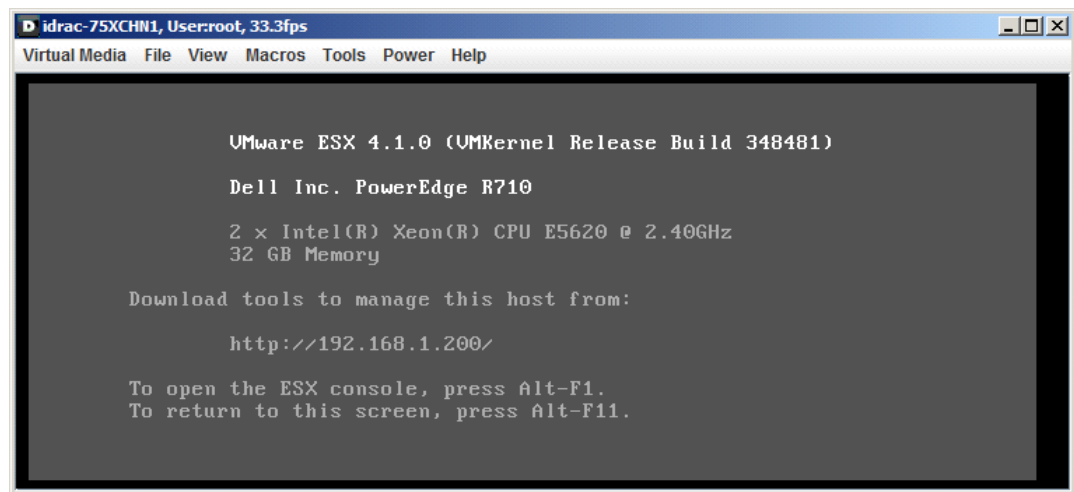
This section provides information on resetting your Forge 3.1, Appliance Version 2 unit to its factory default state.

Depending on your Forge model, this process might take 20 to 45 minutes or longer.

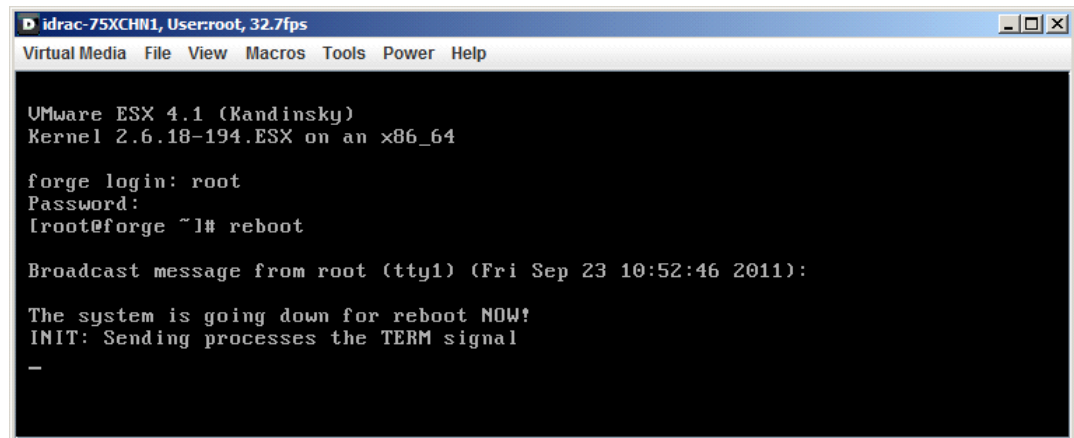
- 1 Disconnect all external/remote/shared storage systems from Forge (iSCSI, FiberChannel, NFS).
- 2 Disconnect all network cables from Forge.

WARNING: If you are performing a factory reset on multiple Forge appliances connected to the same physical switch, skipping this step might cause IP address conflicts and result in failure.

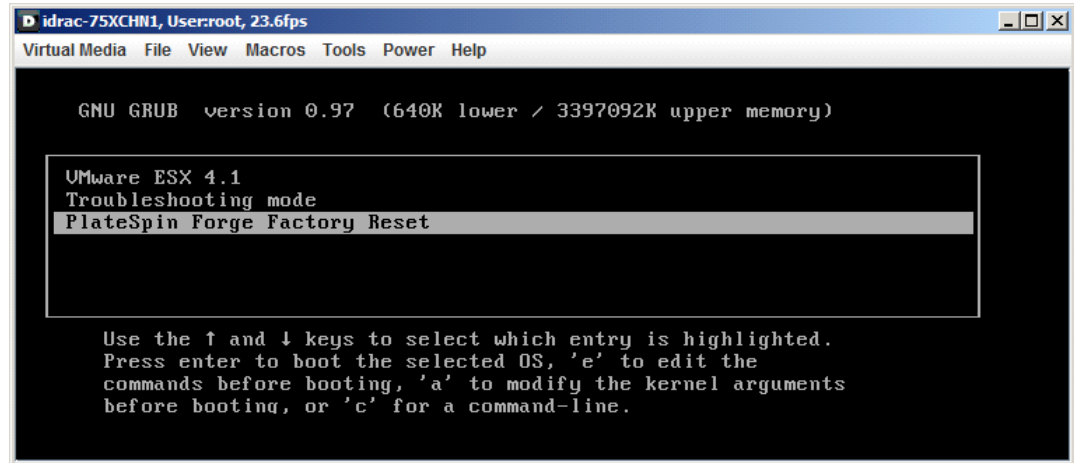
- 3 Reboot the appliance host:
 - 3a Log in to the hypervisor (VMware ESX) either directly or by using DRAC.
 - 3b Press Alt-F1 to open the ESX console.



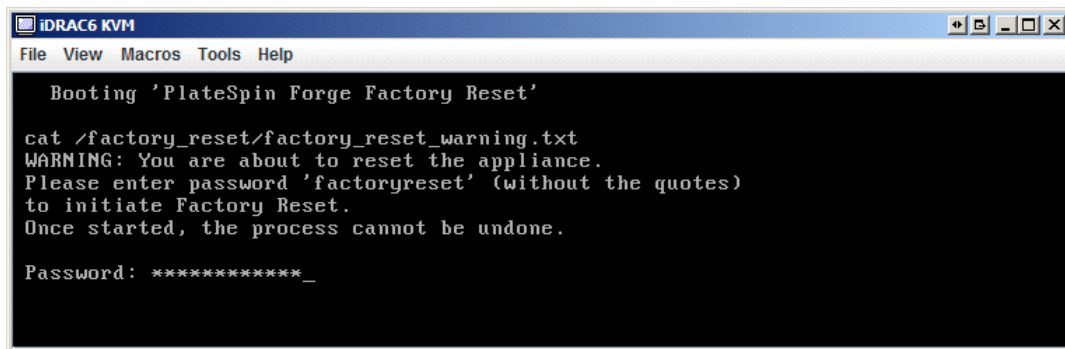
- 3c Log in with your administrator-level credentials.
- 3d Type reboot and press Enter:



3e Wait until the reboot process is complete and the GRUB menu is displayed:



- 4 Select the *PlateSpin Forge Factory Reset* option and press Enter. Make sure that you do this before the default configuration is automatically applied. (about 25 seconds).
- 5 Follow the on-screen instructions, type the reset password (`factoryreset`) when prompted, and press Enter.

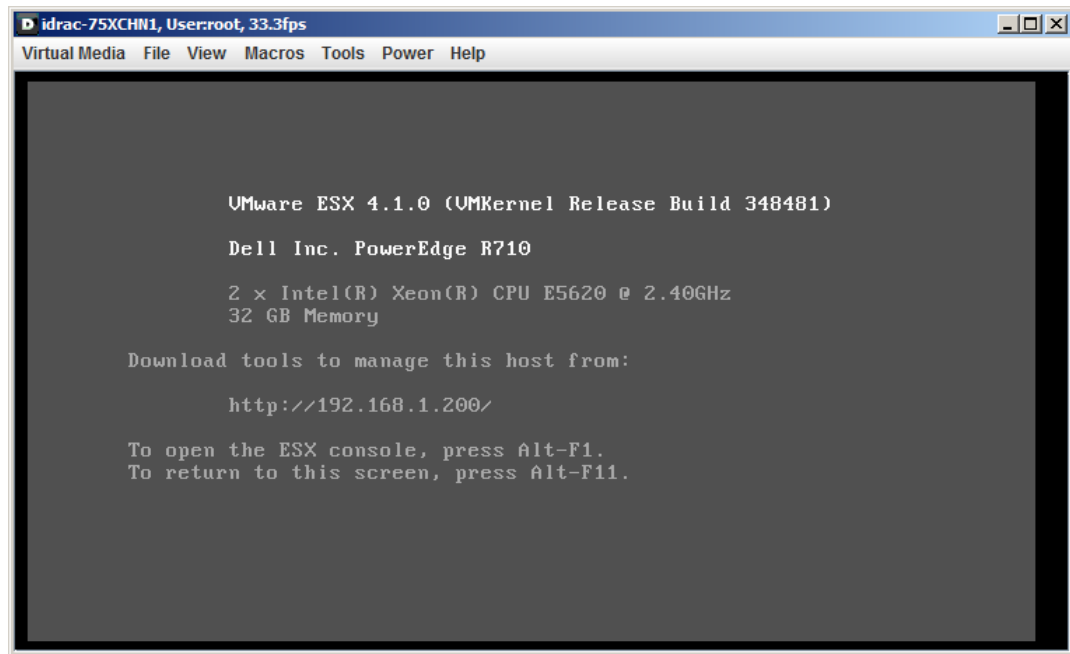


The system starts the reset process.

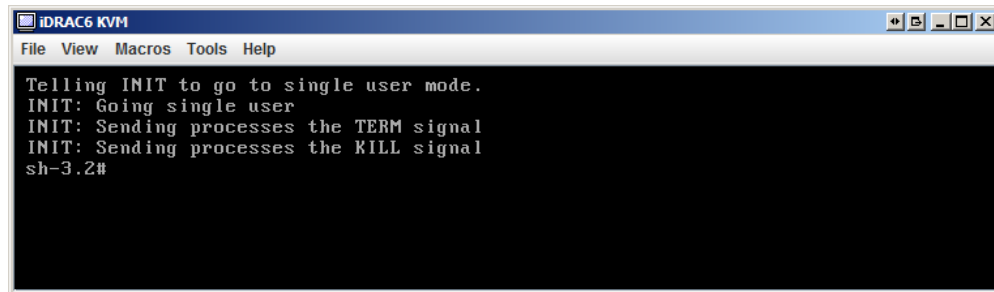
- 6 Wait for the Factory Reset process to complete.

NOTE: During the Factory Reset process, the appliance will reboot twice. Allow the appliance to boot by itself using the default boot configuration (VMware ESX 4.1). Don't select the *PlateSpin Forge Factory Reset* option a second time.

If the reset process is successful, the command prompt window should look similar to the one below:



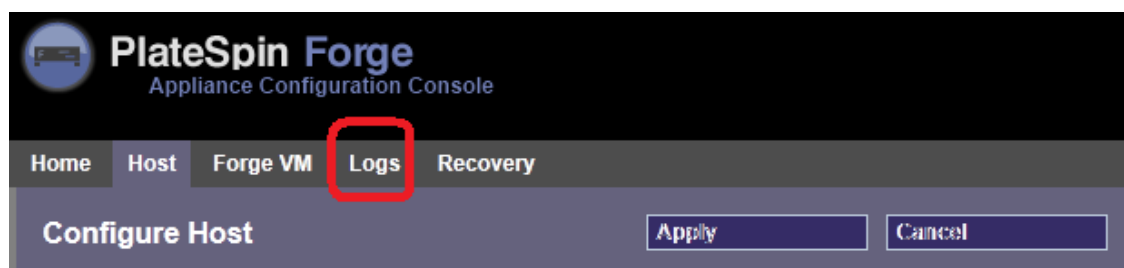
If the reset process is unsuccessful, the screen might look like the following:



In case of failure:

- ♦ Call PlateSpin Support and be prepared to provide the log files. Log files required for troubleshooting the reset process are:
 - ♦ /var/log/forge/forge-recovery.log
 - ♦ /var/log/forge/INSTALL_LOG.log
 - ♦ /var/log/weasel.log

The contents of these log files should also be available through the Forge Appliance Configuration Console (ACC) interface.



- ♦ Consider rebuilding Forge using a Field Rebuild Kit that you can obtain from PlateSpin Support.

4 Up and Running

This section provides information about the essential features of PlateSpin Forge and its interface.

- ♦ [Section 4.1, “Launching the PlateSpin Forge Web Interface,” on page 49](#)
- ♦ [Section 4.2, “Elements of the PlateSpin Forge Web Interface,” on page 50](#)
- ♦ [Section 4.3, “Workloads and Workload Commands,” on page 52](#)
- ♦ [Section 4.4, “Managing Multiple Instances of PlateSpin Protect and PlateSpin Forge,” on page 54](#)
- ♦ [Section 4.5, “Generating Workload and Workload Protection Reports,” on page 57](#)

4.1 Launching the PlateSpin Forge Web Interface

Most of your interaction with PlateSpin Forge takes place through the browser-based PlateSpin Forge Web Interface.

The supported browsers are:

- ♦ Microsoft Internet Explorer 7 and later
- ♦ Mozilla Firefox (on Windows) 3.6 and later

JavaScript (Active Scripting) must be enabled in your browser:

- ♦ **Internet Explorer:** Click *Tools > Internet Options > Security > Internet zone > Custom level*, then select the *Enable* option for the Active Scripting feature.
- ♦ **Firefox:** Click *Tools > Options > Content*, then select the *Enable JavaScript* option.

To use the PlateSpin Forge Web Interface and integrated help in one of the supported languages, see [Section 2.4.2, “Language Setup for International Versions of PlateSpin Forge,” on page 28](#).

To launch the PlateSpin Forge Web Interface:

- 1 Open a Web browser and go to:

`http://<hostname | IP_address>/Forge`

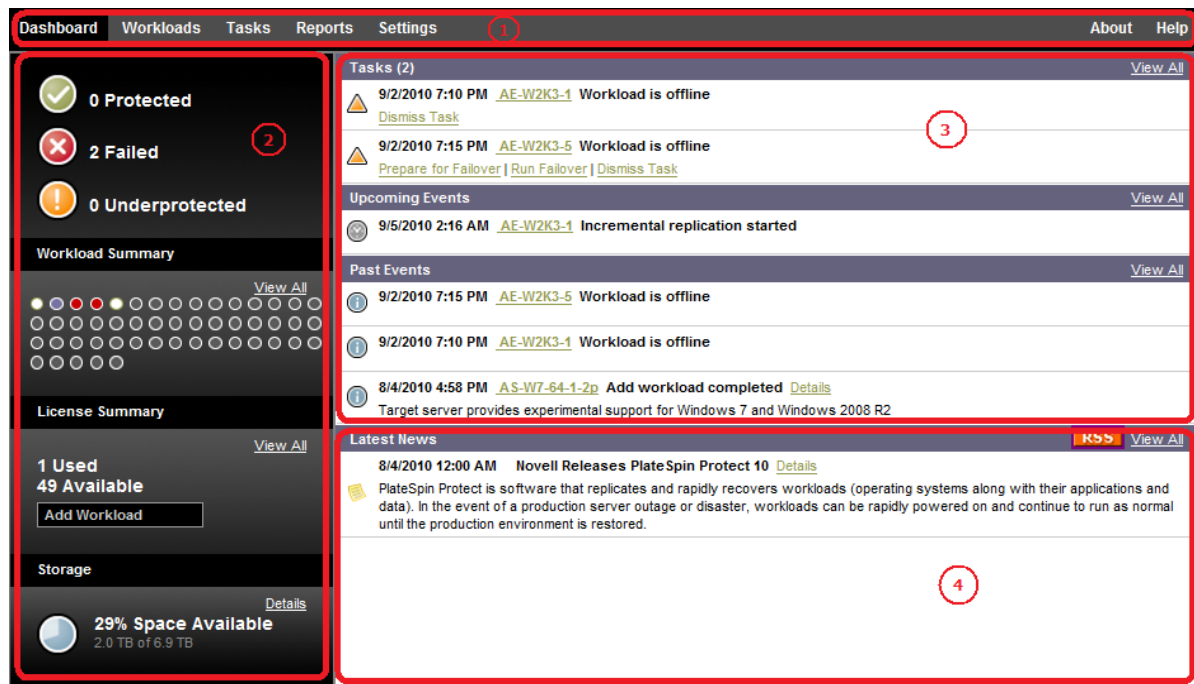
Replace `<hostname | IP_address>` with the hostname or the IP address of your Forge VM.

If SSL is enabled, use `https` in the URL.

4.2 Elements of the PlateSpin Forge Web Interface

The default interface of the PlateSpin Forge Web Interface is the Dashboard page, which contains elements for navigating to different functional areas of the interface and carrying out workload protection and recovery operations.

Figure 4-1 The Default Dashboard Page of the PlateSpin Forge Web Interface



The Dashboard page consists of the following elements:

1. **Navigation bar:** Found on most pages of the PlateSpin Forge Web Interface.
2. **Visual Summary panel:** Provides a high-level view of the overall state of the PlateSpin Forge workload inventory,
3. **Tasks and Events panel:** Provides information about events and tasks requiring user attention.
4. **Latest News panel:** Provides information on product and related updates through RSS. To subscribe to the PlateSpin Forge news feed, click RSS.

The following topics provide more details:

- ♦ [Section 4.2.1, "Navigation Bar," on page 51](#)
- ♦ [Section 4.2.2, "Visual Summary Panel," on page 51](#)
- ♦ [Section 4.2.3, "Tasks and Events Panel," on page 52](#)

4.2.1 Navigation Bar

The Navigation bar provides the following links:

- ♦ **Dashboard:** Displays the default Dashboard page.
- ♦ **Workloads:** Displays the Workloads page. See [“Workloads and Workload Commands” on page 52](#).
- ♦ **Tasks:** Displays the Tasks page, which lists items requiring user intervention.
- ♦ **Reports:** Displays the Reports page. See [“Generating Workload and Workload Protection Reports” on page 57](#).
- ♦ **Settings:** Displays the Settings page, which provides access to the following configuration options:
 - ♦ **Protection Tiers:** See [“Protection Tiers” on page 75](#).
 - ♦ **Permissions:** See [“Setting Up User Authorization and Authentication” on page 16](#).
 - ♦ **Email/SMTP:** See [“Setting Up Automatic E-Mail Notifications of Events and Reports” on page 25](#).
 - ♦ **Licenses/License Designations:** See [“Product Licensing” on page 15](#).

4.2.2 Visual Summary Panel

The Visual Summary panel provides a high-level view of all licensed workloads and the amount of available storage.

Inventoried workloads are represented by three categories:

- ♦ **Protected:** Indicates the number of workloads under active protection.
- ♦ **Failed:** Indicates the number of protected workloads that the system has rendered as failed according to that workload’s Protection Tier.
- ♦ **Underprotected:** Indicates the number of protected workloads that require user attention.

The area in the center of the left panel represents a graphical summary of the Workloads page. It uses the following dot icons to represent workloads in different states:

Table 4-1 Dot Icon Workload Representation

● Unprotected	● Underprotected
○ Unprotected – Error	● Failed
● Protected	● Expired
● Unused	

The icons are shown in alphabetical order according to workload name. Mouse over a dot icon to display the workload name, or click the icon to display the corresponding Workload Details page.

Storage provides information about container storage space available to PlateSpin Forge.

4.2.3 Tasks and Events Panel

The Tasks and Events panel shows the most recent Tasks, the most recent Past Events, and the next Upcoming Events.

Events are logged whenever something relevant to the system or to the workload occurs. For example, an event could be the addition of a new protected workload, the replication of a workload starting or failing, or the detection of the failure of a protected workload. Some events generate automatic notifications by e-mail if SMTP is configured. See [“Setting Up Automatic E-Mail Notifications of Events and Reports”](#) on page 25.

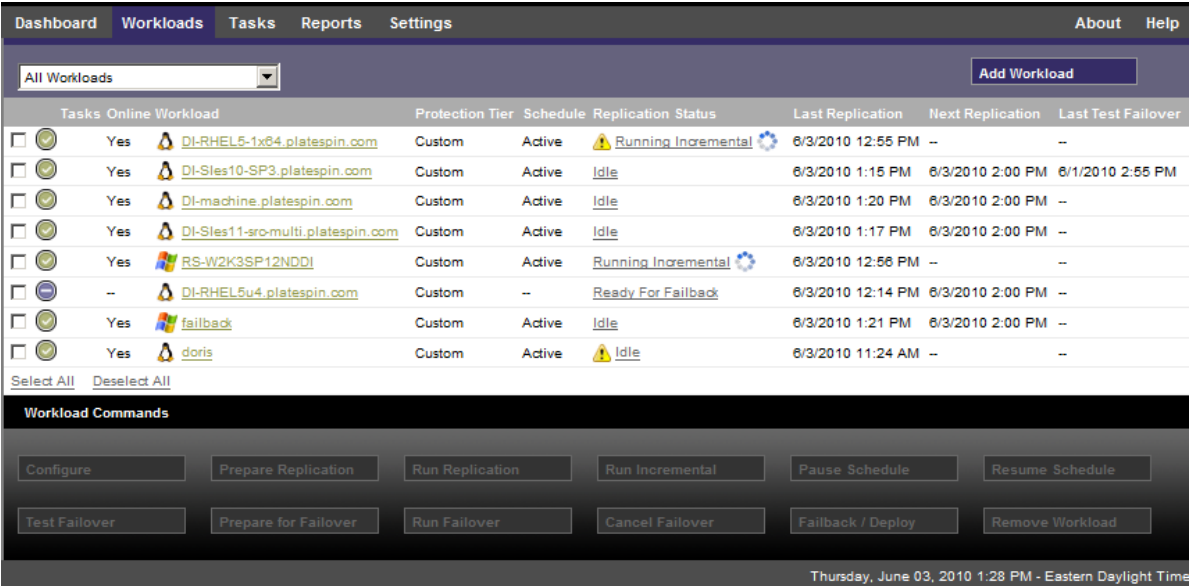
Tasks are special commands that are tied to events that require user intervention. For example, upon completion of a Test Failover command, the system generates an event associated with two tasks: Mark Test as Success and Mark Test as Failure. Clicking either task results in the Test Failover operation being canceled and a corresponding event being written in the history. Another example is the FullReplicationFailed event, which is shown coupled with a StartFull task. You can view a complete list of current tasks on the *Tasks* tab.

In the Tasks and Events panel on the dashboard, each category shows a maximum of three entries. To see all tasks or to see past and upcoming events, click *View All* in the appropriate section.

4.3 Workloads and Workload Commands

The Workloads page displays a table with a row for each inventoried workload. Click a workload name to display a Workload Details page for viewing or editing configurations relevant to the workload and its state.

Figure 4-2 *The Workloads Page*



Tasks	Online Workload	Protection Tier	Schedule	Replication Status	Last Replication	Next Replication	Last Test Failover
<input type="checkbox"/>	Yes DI-RHEL5-1x64.platespin.com	Custom	Active	Running Incremental	6/3/2010 12:55 PM	--	--
<input type="checkbox"/>	Yes DI-Sles10-SP3.platespin.com	Custom	Active	Idle	6/3/2010 1:15 PM	6/3/2010 2:00 PM	6/1/2010 2:55 PM
<input type="checkbox"/>	Yes DI-machine.platespin.com	Custom	Active	Idle	6/3/2010 1:20 PM	6/3/2010 2:00 PM	--
<input type="checkbox"/>	Yes DI-Sles11-sro-multi.platespin.com	Custom	Active	Idle	6/3/2010 1:17 PM	6/3/2010 2:00 PM	--
<input type="checkbox"/>	Yes RS-W2K3SP12NDDI	Custom	Active	Running Incremental	6/3/2010 12:56 PM	--	--
<input type="checkbox"/>	-- DI-RHEL5u4.platespin.com	Custom	--	Ready For Failback	6/3/2010 12:14 PM	6/3/2010 2:00 PM	--
<input type="checkbox"/>	Yes failback	Custom	Active	Idle	6/3/2010 1:21 PM	6/3/2010 2:00 PM	--
<input type="checkbox"/>	Yes doris	Custom	Active	Idle	6/3/2010 11:24 AM	--	--

Select All Deselect All

Workload Commands

Configure Prepare Replication Run Replication Run Incremental Pause Schedule Resume Schedule

Test Failover Prepare for Failover Run Failover Cancel Failover Failback / Deploy Remove Workload

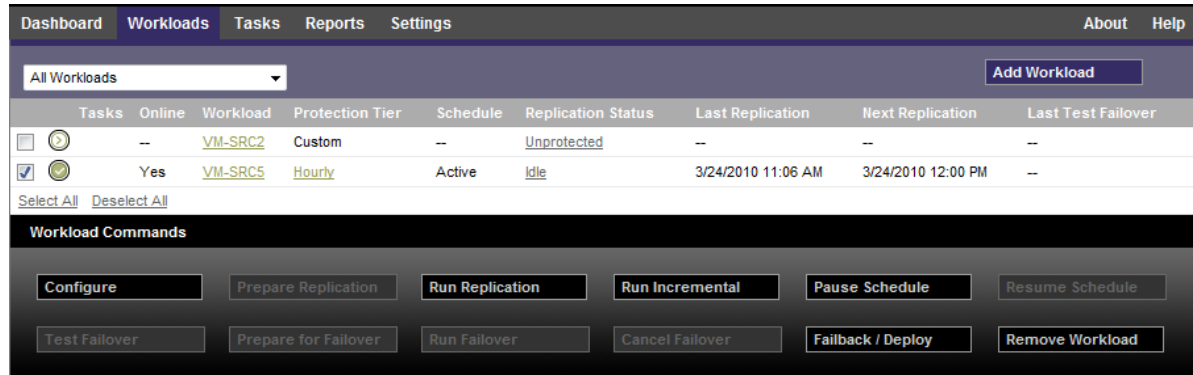
Thursday, June 03, 2010 1:28 PM - Eastern Daylight Time

NOTE: All time stamps reflect the time zone of the Forge VM. This might be different from the time zone of the protected workload or the time zone of the host on which you are running the PlateSpin Forge Web Interface. A display of the server date and time appears at the bottom right of the client window.

4.3.1 Workload Protection and Recovery Commands

Commands reflect the workflow of workload protection and recovery. To perform a command for a workload, select the corresponding check box at the left. Applicable commands depend on the current state of a workload.

Figure 4-3 Workload Commands



The following table summarizes workload commands along with their functional descriptions.

Table 4-2 Workload Protection and Recovery Commands

Workload Command	Description
<i>Configure</i>	Starts the workload protection configuration with parameters applicable to an inventoried workload.
<i>Prepare Replication</i>	Installs required data transfer software on the source and creates a failover workload (a virtual machine) on the target container in preparation for workload replication.
<i>Run Replication</i>	Starts replicating the workload according to specified parameters (full replication).
<i>Run Incremental</i>	Performs an incremental transfer of changed data from the source to the target outside the workload protection schedule.
<i>Pause Schedule</i>	Suspends the protection; all scheduled replications are skipped until the schedule is resumed.
<i>Resume Schedule</i>	Resumes the protection according to saved protection settings.
<i>Test Failover</i>	Boots and configures the failover workload in an isolated environment within the container for testing purposes.
<i>Prepare for Failover</i>	Boots the failover workload in preparation for a failover operation.
<i>Run Failover</i>	Boots and configures the failover workload, which takes over the business services of a failed workload.
<i>Cancel Failover</i>	Aborts the failover process.
<i>Failback</i>	Following a failover operation, fails the failover workload back to its original infrastructure or to a new infrastructure (virtual or physical).
<i>Remove Workload</i>	Removes a workload from the inventory.

4.4 Managing Multiple Instances of PlateSpin Protect and PlateSpin Forge

PlateSpin Forge includes a Web-based client application, the PlateSpin Forge Management Console, that provides centralized access to multiple instances of PlateSpin Protect and PlateSpin Forge.

In a data center with more than one instance of PlateSpin Forge, you can designate one of the instances as the manager and run the management console from there. Other instances are added under the Manager, providing a single point of control and interaction.

- ♦ [Section 4.4.1, “Using the PlateSpin Forge Management Console,” on page 54](#)
- ♦ [Section 4.4.2, “About PlateSpin Forge Management Console Cards,” on page 54](#)
- ♦ [Section 4.4.3, “Adding Instances of PlateSpin Protect and PlateSpin Forge to the Management Console,” on page 55](#)
- ♦ [Section 4.4.4, “Managing Cards on the Management Console,” on page 56](#)

4.4.1 Using the PlateSpin Forge Management Console

- 1 Open a Web browser on a machine that has access to your PlateSpin Forge instances and navigate to the following URL:

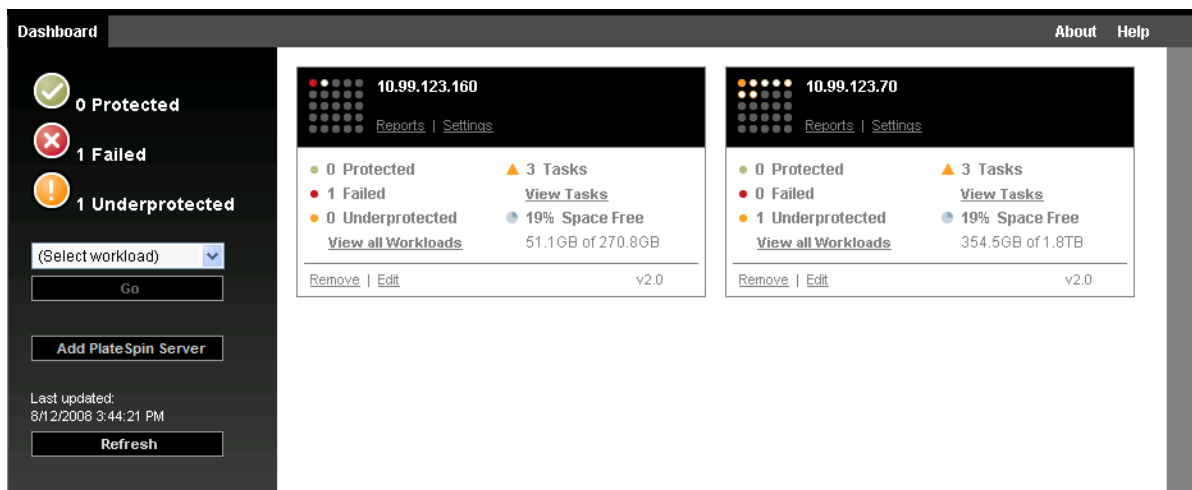
`http://<IP_address | hostname>/console`

Replace `<IP_address | hostname>` with either the IP address or the hostname of the Forge VM that is designated as the Manager.

- 2 Log in with your username and password.

The console’s default Dashboard page is displayed.

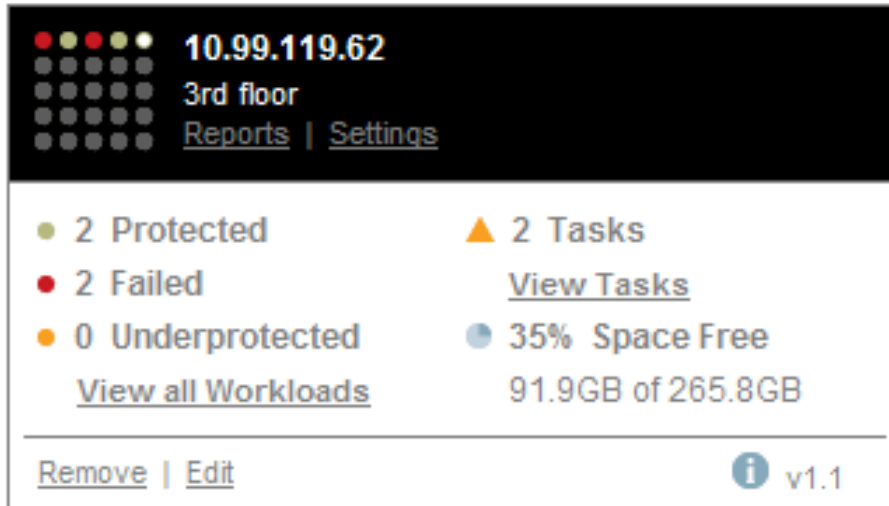
Figure 4-4 The Management Console’s Default Dashboard Page



4.4.2 About PlateSpin Forge Management Console Cards

Individual instances of PlateSpin Protect and PlateSpin Forge, when added to the Management Console, are represented by cards.

Figure 4-5 PlateSpin Forge Instance Card



A card displays basic information about the specific instance of PlateSpin Protect or PlateSpin Forge, such as:

- ♦ IP address/hostname
- ♦ Location
- ♦ Version number
- ♦ Workload count
- ♦ Workload status
- ♦ Storage capacity
- ♦ Remaining free space

Hyperlinks on each card allow you to navigate to that particular instance's Workloads, Reports, Settings, and Tasks pages. There are also hyperlinks that allow you to edit a card's configuration or remove a card from the display.

4.4.3 Adding Instances of PlateSpin Protect and PlateSpin Forge to the Management Console

Adding a PlateSpin Protect or Forge instance to the Management Console results in a new card on the Management Console's dashboard.

NOTE: When you log in to the Management Console running on an instance of PlateSpin Protect or PlateSpin Forge, that instance is not automatically added to the console. It must be manually added.

To add a PlateSpin Protect or Forge instance to the console:

- 1 On the console's main dashboard, click *Add PlateSpin Server*.
The *Add/Edit* page is displayed.
- 2 Specify the URL of the PlateSpin Protect Server host or Forge VM. Use HTTPS if SSL is enabled.
- 3 (Optional) Enable the *Use Management Console Credentials* check box to use the same credentials as those used by the console. When it is selected, the console automatically populates the *Domain \ Username* field.

- 4 In the *Domain\Username* field, type a domain name and a username valid for the instance of PlateSpin Protect or PlateSpin Forge that you are adding. In the *Password* field, type the corresponding password.
- 5 (Optional) Specify a descriptive or identifying *Display Name* (15 characters max), a *Location* (20 characters max), and any *Notes* you might require (400 characters max).
- 6 Click *Add/Save*.

A new card is added to the dashboard.

4.4.4 Managing Cards on the Management Console

You can modify the details of a card on the Management Console.

- 1 Click the *Edit* hyperlink on the card that you want to edit.
The console's *Add/Edit* page is displayed.
- 2 Make any desired changes, then click *Add/Save*.
The updated console dashboard is displayed.

To remove a card from the Management Console:

- 1 Click the *Remove* hyperlink on the card you want to remove.
A confirmation prompt is displayed.
- 2 Click *OK*.
The individual card is removed from the dashboard.

4.5 Generating Workload and Workload Protection Reports

PlateSpin Forge enables you to generate reports that provide analytical insight into your workload protection schedules over time.

The following report types are supported:

- ♦ **Workload Protection:** Reports replication events for all workloads over a selectable time window.
- ♦ **Replication History:** Reports replication type, size, time, and transfer speed per selectable workload over a selectable time window.
- ♦ **Replication Window:** Reports the dynamics of full and incremental replications that can be summarized by *Average*, *Most Recent*, *Sum*, and *Peak* perspectives.
- ♦ **Current Protection Status:** Reports *Target RPO*, *Actual RPO*, *Actual TTO*, *Actual RTO*, *Last Test Failover*, *Last Replication*, and *Test Age* statistics.
- ♦ **Events:** Reports system events for all workloads over a selectable time window.
- ♦ **Scheduled Events:** Reports only upcoming workload protection events.

Figure 4-6 Options for a Replication History Report

The screenshot shows the 'Reports' tab in the PlateSpin Forge web interface. The 'Replication History' report is selected. The interface includes a navigation bar with 'Dashboard', 'Workloads', 'Tasks', 'Reports', 'Settings', 'About', and 'Help'. Below the navigation bar, there is a header for 'Replication History' with a sub-header 'What are the replication events relevant to my workload?'. The main content area contains a form with a 'Custom' dropdown menu, a date range from '4/4/2011 12:00:00 AM' to '4/18/2011 4:15:41 PM', a 'Workload' dropdown menu set to 'SES-2K8-1', and a checkbox for 'All Replication Events' with a link to 'Diagnostics View'. Below the form is a table with the following data:

Date	Replication Event	Total Time	Transfer Time	Transfer Size	Transfer Speed
4/17/2011 4:01 AM	Incremental replication did not run as scheduled because the workload was busy	--	--	.0 MB	0.00 Mbps
4/17/2011 4:00 AM	Incremental replication did not run as scheduled because the workload was busy	--	--	.0 MB	0.00 Mbps
4/10/2011 4:01 AM	Incremental replication did not run as scheduled because the workload was busy	--	--	.0 MB	0.00 Mbps
4/10/2011 4:00 AM	Incremental replication did not run as scheduled because the workload was busy	--	--	.0 MB	0.00 Mbps

At the bottom of the table, there are links for 'Printable View' and 'Export To Xml'. The footer of the interface shows the date and time: 'Monday, April 18, 2011 4:15 PM - Eastern Daylight Time'.

To generate a report:

- 1 In your PlateSpin Forge Web Interface, click *Reports*.
A list of the report types is displayed.
- 2 Click the name of the required report type.

5 Workload Protection

PlateSpin Forge creates a replica of your production workload and regularly updates that replica based on a schedule that you define.

The replica, or the *failover workload*, is a virtual machine in the VM container of PlateSpin Forge that takes over the business function of your production workload in case of a disruption at the production site.

- ♦ [Section 5.1, “Basic Workflow for Workload Protection and Recovery,” on page 59](#)
- ♦ [Section 5.2, “Adding a Workload for Protection,” on page 60](#)
- ♦ [Section 5.3, “Configuring Protection Details and Preparing the Replication,” on page 62](#)
- ♦ [Section 5.4, “Starting the Workload Protection,” on page 64](#)
- ♦ [Section 5.5, “Aborting Commands,” on page 65](#)
- ♦ [Section 5.6, “Failover,” on page 66](#)
- ♦ [Section 5.7, “Failback,” on page 68](#)
- ♦ [Section 5.8, “Reprotecting a Workload,” on page 72](#)

5.1 Basic Workflow for Workload Protection and Recovery

PlateSpin Forge defines the following workflow for workload protection and recovery:

1 Preparatory step:

1a Make sure that PlateSpin Forge supports your workload.

See [“Supported Configurations” on page 9](#).

1b Make sure that your workloads meet access and network prerequisites.

See [“Access and Communication Requirements across your Protection Network” on page 21](#).

1c (Linux only)

- ♦ (Conditional) If you plan to protect a supported Linux workload that has a non-standard, customized, or newer kernel, rebuild the PlateSpin `blkwatch` module, which is required for block-level data replication.

See [KB Article 7005873 \(http://www.novell.com/support/viewContent.do?externalId=7005873\)](http://www.novell.com/support/viewContent.do?externalId=7005873).

- ♦ (Recommended) Prepare LVM snapshots for block-level data transfer. Ensure that each volume group has sufficient free space for LVM snapshots (at least 10 % of the sum of all partitions).

See [KB Article 7005872 \(http://www.novell.com/support/viewContent.do?externalId=7005872\)](http://www.novell.com/support/viewContent.do?externalId=7005872).

- ♦ (Optional) Determine and prepare any custom scripts that you want to execute on your source workload upon each replication.
See [“Using Freeze and Thaw Scripts for Every Replication \(Linux\)”](#) on page 78.
- 2 Add a workload.
See [“Adding a Workload for Protection”](#) on page 60.
- 3 Configure protection details and prepare the replication.
See [“Configuring Protection Details and Preparing the Replication”](#) on page 62.
- 4 Start the workload protection schedule.
See [“Starting the Workload Protection”](#) on page 64.
- 5 (Optional) Manually run an incremental.
- 6 (Optional) Test the failover functionality.
See [Using the Test Failover Feature](#).
- 7 Perform a failover.
See [“Failover”](#) on page 66.
- 8 Perform a failback.
See [“Failback”](#) on page 68.
- 9 (Optional) Reprotect a workload after failback.

Except for Steps 1, 8, and 9, these are represented by workload commands on the Workloads page. See [“Workloads and Workload Commands”](#) on page 52.

A *Reprotect* command becomes available following a successful Failback operation.

5.2 Adding a Workload for Protection

- 1 Follow the required preparatory steps.
See [Step 1](#) in [“Basic Workflow for Workload Protection and Recovery”](#) on page 59.
- 2 On the Dashboard or Workloads page, click *Add Workload*.
The PlateSpin Forge Web Interface displays the Add Workload page.

Dashboard
Workloads
Tasks
Reports
Settings
About
Help

Add Workload

ADD WORKLOAD
CONFIGURE PROTECTION
PREPARE REPLICATION
RUN REPLICATION

Workload Settings

Hostname or IP: 10.99.123.170

Workload Type:
☐ Windows
☒ Linux

Credentials:
User Name: root
Password:
Test Credentials

Security Group: All Workloads

Replication Settings

Initial Replication Method:
☒ Full Replication
☐ Incremental Replication

Protection Target: comp213 (VMware ESXi Server 4.1.0.260247)

Name	Description	CPU	Memory	Free Space	Last Refresh
comp129	VMware ESX Server 4.0.0.261974	8 x Intel(R) Xeon(R) CPU X5355 @ 2.66GHz	15.6 GB	--	48 Day(s) ago Remove
comp213	VMware ESXi Server 4.1.0.260247	16 x Intel(R) Xeon(R) CPU E5530 @ 2.40GHz	32.0 GB	1.9 TB	0 Hour(s) ago Remove

Add Container

Workload Commands

Add Workload
Add and New

3 Specify the required workload details:


- Workload Settings:** Specify your workload's hostname or IP address, the operating system, administrator-level credentials, and a security group to assign the workload to. See [“Managing PlateSpin Forge Security Groups and Workload Permissions”](#) on page 20.

Use the required credential format. See [“Guidelines for Workload Credentials”](#) on page 74.

To make sure that PlateSpin Forge can access the workload, click *Test Credentials*.

- Replication Settings:** Select the required replication settings. See [“Initial Replication Method \(Full and Incremental\)”](#) on page 77.

4 Click *Add Workload*.

PlateSpin Forge reloads the Workloads page and displays a process indicator for the workload being added . Wait for the process to complete. Upon completion, a *Workload Added* event is shown on the Dashboard.

5.3 Configuring Protection Details and Preparing the Replication

Protection details control the workload protection and recovery settings and behavior over the entire life cycle of a workload under protection. At each phase of the protection and recovery workflow (see [“Basic Workflow for Workload Protection and Recovery” on page 59](#)), relevant settings are read from the protection details.

To configure your workload’s protection details:

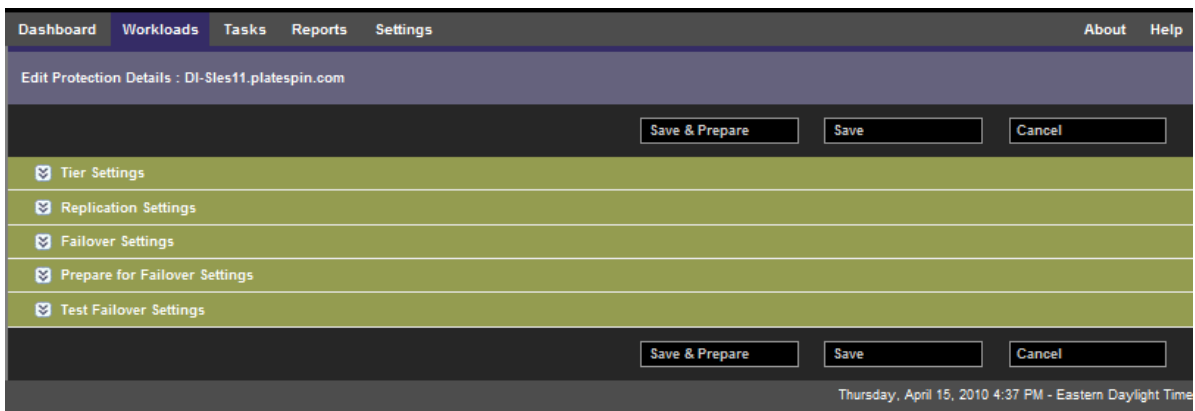
- 1 Add a workload. See [“Adding a Workload for Protection” on page 60](#).
- 2 On the Workloads page, select the required workload and click *Configure*.
The PlateSpin Forge Web Interface displays the workload’s Protection Details page.
- 3 Configure the protection details in each set of settings as dictated by your business continuity needs. See [“Workload Protection Details” on page 62](#).
- 4 Correct any validation errors, if displayed by the PlateSpin Forge Web Interface.
- 5 Click *Save*.

Alternately, click *Save & Prepare*. This saves the settings and simultaneously executes the *Prepare Replication* command (installing data transfer drivers on the source workload if necessary and creating the initial VM replica of your workload).

Wait for the process to complete. Upon completion, a *Workload configuration completed* event is shown on the Dashboard.

5.3.1 Workload Protection Details

Workload protection details are represented by five sets of parameters:



You can expand or collapse each parameter set by clicking the ☒ icon at the left.

The following are the details of the five parameter sets:

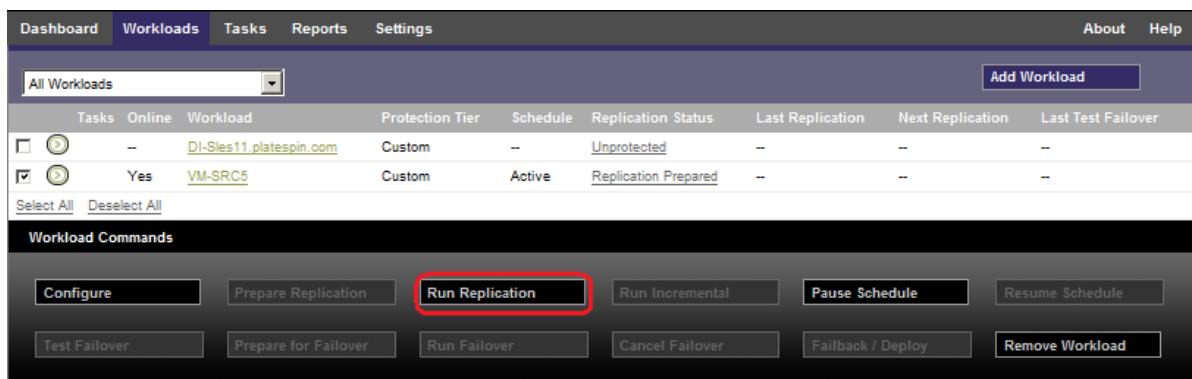
Table 5-1 Workload Protection Details

Parameter Set (Settings)	Details
Tier	Indicates the Protection Tier that the current protection uses. See “Protection Tiers” on page 75 .
Replication	<p>Transfer Encryption: To enable encryption, select the <i>Encrypt Data Transfer</i> option. See “Security and Privacy” on page 11.</p> <p>Transfer Method: (Windows) Enables you to select a data transfer mechanism and security through encryption. See “Transfer Methods” on page 74.</p> <p>Source Credentials: Required for accessing the workload. See “Guidelines for Workload Credentials” on page 74.</p> <p>Number of CPUs: Enables you to specify the required number of vCPUs assigned to the failover workload (applicable only when the selected method of initial replication is <i>Full</i>).</p> <p>Replication Network: Enables you to separate replication traffic based on virtual networks defined on your appliance host. See “Networking” on page 81.</p> <p>Configuration File Datastore: Enables you to select a datastore associated with your appliance host for storing VM configuration files. See “Recovery Points” on page 76.</p> <p>Protected Volumes: Use these options to select volumes for protection and to assign their replicas to specific datastores on your appliance host.</p> <p>Thin Disk option: Enables the thin-provisioned virtual disk feature, whereby a virtual disk appears to the VM to have a set size, but only consumes the amount of disk space that is actually required by data on that disk.</p> <p>Services/Daemons to Stop During Replication: Enables you to select Windows services or Linux Daemons that are automatically stopped during the replication. See “Service and Daemon Control” on page 78.</p>
Failover	<p>VM Memory: Enables you to specify the amount of memory allocated to the failover workload.</p> <p>Hostname and Domain/Workgroup affiliation: Use these options to control the identity and domain/workgroup affiliation of the failover workload when it is live. For domain affiliation, domain administrator credentials are required.</p> <p>Network Connections: Use these options to control the LAN settings of the failover workload. See “Networking” on page 81.</p> <p>Service/Daemon States to Change: Enables you to control the startup state of specific application services (Windows) or daemons (Linux). See “Service and Daemon Control” on page 78.</p>
Prepare for Failover	Enables you to control the temporary network settings of the failover workload during the optional Prepare for Failover operation. See “Networking” on page 81 .

Parameter Set (Settings)	Details
Test Failover	<p>VM Memory: Enables you to assign the required RAM to the temporary workload.</p> <p>Hostname: Enables you to assign a hostname to the temporary workload.</p> <p>Domain/Workgroup: Enables you to affiliate the temporary workload with a domain or a workgroup. For domain affiliation, domain administrator credentials are required.</p> <p>Network Connections: Controls the LAN settings of the temporary workload. See “Networking” on page 81.</p> <p>Service/Daemon States to Change: Enables you to control the startup state of specific application services (Windows) or daemons (Linux). See “Service and Daemon Control” on page 78.</p>

5.4 Starting the Workload Protection

Workload protection is started by the *Run Replication* command:



You can execute the Run Replication command after:

- ♦ Adding a workload.
- ♦ Configuring the workload’s protection details.
- ♦ Preparing the initial replication.

When you are ready to proceed:

- 1 On the Workloads page, select the required workload, then click *Run Replication*.
- 2 Click *Execute*.

PlateSpin Forge starts the execution and displays a process indicator for the *Copy data* step .

NOTE: After a workload has been protected:

- ♦ Changing the size of a volume that is under block-level protection invalidates the protection. The appropriate procedure is to 1. remove the workload from protection, 2. resize the volumes as required. 3. re-establish the protection by re-adding the workload, configuring its protection details, and starting replications.
- ♦ Any significant modification of the protected workload requires that the protection be re-established. Examples include adding volumes or network cards to the workload under protection.

5.5 Aborting Commands

You can abort a command after executing it and while it is underway, on the Command Details page of that particular command.

To access the Command Details page of any command that is underway:

- 1 Go to the Workloads page.
- 2 Locate the required workload and click the link representing the command currently executing on that workload.

<input type="checkbox"/>		No		CL-2K8R2-VM1	Custom	Active		Idle	3/5/2012 12:23 AM	4/11/2012 12:00 AM	--
<input type="checkbox"/>		Yes		DI-Sles11x64-Src	every 4 hours	Active		Failover Prepared	3/29/2012 8:13 AM	4/9/2012 12:00 PM	3/23/2012 3:32 PM
<input type="checkbox"/>		--		ma-cl-slessp2_site	every 4 hours	--		Live	3/15/2012 2:49 PM	--	3/9/2012 2:44 PM
<input type="checkbox"/>		Yes		VISTACLIENT	Custom	Active		Running Incremental	3/28/2012 10:21 AM	4/9/2012 12:00 PM	3/23/2012 5:14 PM
<input type="checkbox"/>		--		CL-VISTASP1-SRC	every 4 hours	--		Live	2/22/2012 2:55 PM	--	--
<input type="checkbox"/>		Yes		CL-XPX64-SRC	Custom	Active		Idle	4/9/2012 10:17 AM	4/9/2012 12:00 PM	3/23/2012 5:15 PM

The PlateSpin Forge Web Interface displays the appropriate Command Details page:

Protection Details

Command Details

VISTACLIENT

Running Incremental

Status: Running

Duration: 3d 21h 31m 37s

Step: Copy data (2%)

Setting Up Controller (1%)

Last Full Replication: 2/17/2012 3:53 PM

Last Incremental Replication: 3/28/2012 10:21 AM

Last Test Failover: 3/23/2012 5:14 PM

Schedule: Active

Replication History: View

Tasks: --

Command Summary

Events:

Event	Details	User	Date
Incremental replication started		DEV-MORTAZAA/PlateSpin	4/5/2012 2:00 PM

Status:

Running

Controller installation has not finished in a timely fashion. A controller has already been installed on 10.99.123.164.

Start Time:

4/5/2012 2:00 PM

Duration:

3d 21h 31m 37s

Steps:

Step	Status	Start Time	End Time	Duration	Diagnostics
Revert to snapshot	Completed	4/5/2012 2:00 PM	4/5/2012 2:01 PM	1m 7s	--
Copy data	Running (2%)	4/5/2012 2:01 PM	--	3d 21h 30m 30s	--

Diagnostics: [Generate](#)

Workload Commands

Abort

Configure

Pause Schedule

- 3 Click *Abort*.

5.6 Failover

A *Failover* results in the business function of a failed workload being taken over by a failover workload within a PlateSpin Forge VM container.

- ♦ [Section 5.6.1, “Detecting Offline Workloads,” on page 66](#)
- ♦ [Section 5.6.2, “Performing a Failover,” on page 67](#)
- ♦ [Section 5.6.3, “Using the Test Failover Feature,” on page 67](#)

5.6.1 Detecting Offline Workloads

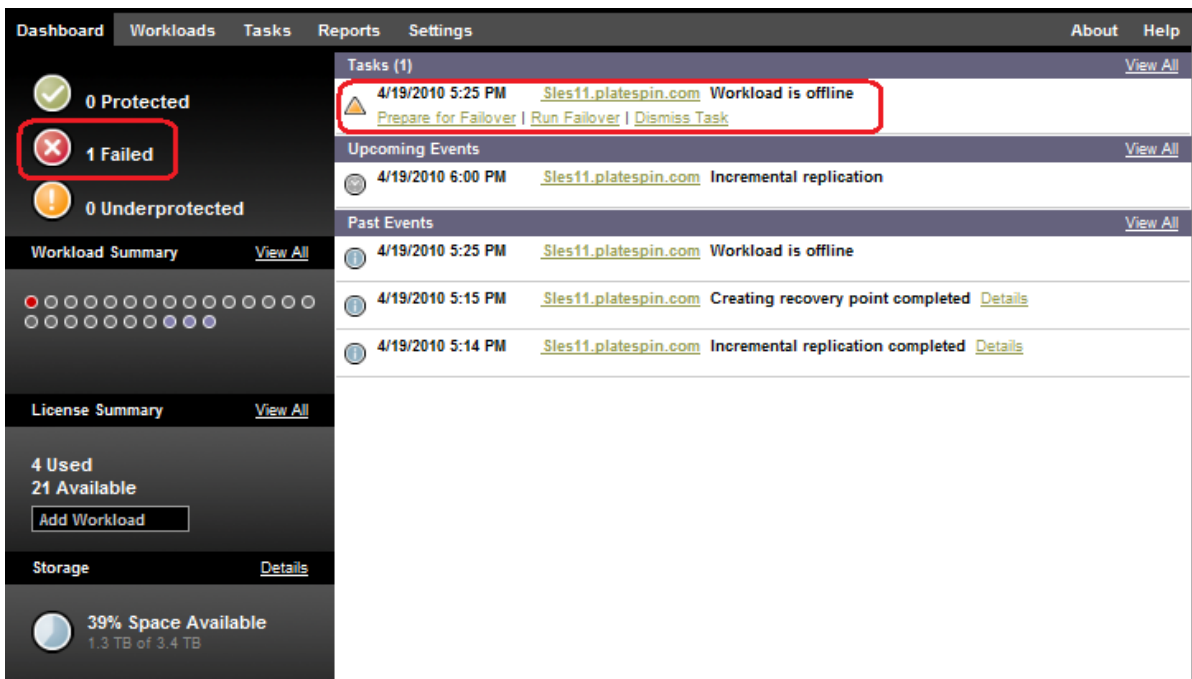
PlateSpin Forge constantly monitors your protected workloads. If an attempt to monitor a workload fails for a predefined number of times, PlateSpin Forge generates a *Workload is offline* event. Criteria that determine and log a workload failure are part of a workload protection’s Tier settings (see the [Tier](#) row in [“Workload Protection Details” on page 62](#)).

If notifications are configured along with SMTP settings, PlateSpin Forge simultaneously sends a notification e-mail to the specified recipients. See [“Setting Up Automatic E-Mail Notifications of Events and Reports” on page 25](#).

If a workload failure is detected while the status of the replication is *Idle*, you can proceed to the *Run Failover* command. If a workload fails while an incremental is underway, the job stalls. In this case, abort the command (see [“Aborting Commands” on page 65](#)), and then proceed to the *Run Failover* command. See [“Performing a Failover” on page 67](#).

The following figure shows the PlateSpin Forge Web Interface’s Dashboard page upon detecting a workload failure. Note the applicable tasks in the Tasks and Events pane:

Figure 5-1 The Dashboard Page upon Workload Failure Detection (‘Workload Offline’)



5.6.2 Performing a Failover

Failover settings, including the failover workload's network identity and LAN settings, are saved together with the workload's protection details at configuration time. See the [Failover](#) row in "Workload Protection Details" on page 62.

You can use the following methods to perform a failover:

- ♦ Select the required workload on the Workloads page and click *Run Failover*.
- ♦ Click the corresponding command hyperlink of the *Workload is offline* event in the Tasks and Events pane. See [Figure 5-1](#).
- ♦ Run a *Prepare for Failover* command to boot the failover VM ahead of time. You still have the option to cancel the failover (useful in staged failovers).

Use one of these methods to start the failover process and select a recovery point to apply to the failover workload (see "Recovery Points" on page 76). Click *Execute* and monitor the progress. Upon completion, the replication status of the workload should indicate *Live*.

For testing the failover workload or testing the failover process as part of a planned disaster recovery exercise, see "Using the Test Failover Feature" on page 67.

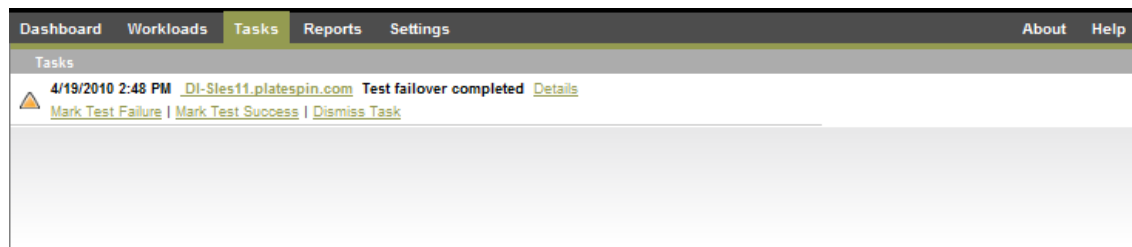
5.6.3 Using the Test Failover Feature

PlateSpin Forge provides you with the capability to test the failover functionality and the integrity of the failover workload. This is done by using the *Test Failover* command, which boots the failover workload in a restricted network environment for testing.

When you execute the command, PlateSpin Forge applies the Test Failover Settings, as saved in the workload protection details, to the failover workload (see the [Test Failover](#) row in "Workload Protection Details" on page 62).

- 1 Define an appropriate time window for testing and make sure that there are no replications underway. The replication status of the workload must be *Idle*.
- 2 On the Workloads page, select the required workload, click *Test Failover*, select a recovery point (see "Recovery Points" on page 76), and then click *Execute*.

Upon completion, PlateSpin Forge generates a corresponding event and a task with a set of applicable commands:



- 3 Verify the integrity and business functionality of the failover workload. Use the VMware vSphere Client to access the failover workload in the appliance host.
See "Downloading the VMware Client Program" on page 39.

- 4 Mark the test as a *failure* or a *success*. Use the corresponding commands in the task (*Mark Test Failure*, *Mark Test Success*). The selected action is saved in the history of events associated with the workload and is retrievable by reports. *Dismiss Task* discards the task and the event.

Upon completion of the *Mark Test Failure* or *Mark Test Success* tasks, PlateSpin Forge discards temporary settings that were applied to the failover workload, and the protection returns to its pre-test state.

5.7 Failback

A Failback operation is the next logical step after a failover; it transfers the failover workload to its original infrastructure or, if necessary, a new one.

Supported failback methods depend on the target infrastructure type and the degree of automation of the failback process:

- ♦ **Automated Failback to a Virtual Machine:** Supported for VMware ESX platforms and VMware DRS Clusters.
- ♦ **Semi-Automated Failback to a Physical Machine:** Supported for all physical machines.
- ♦ **Semi-Automated Failback to a Virtual Machine:** Supported for Xen on SLES and Microsoft Hyper-V platforms.

The following topics provide more information:

- ♦ [Section 5.7.1, “Automated Failback to a VM Platform,” on page 68](#)
- ♦ [Section 5.7.2, “Semi-Automated Failback to a Physical Machine,” on page 71](#)
- ♦ [Section 5.7.3, “Semi-Automated Failback to a Virtual Machine,” on page 72](#)

5.7.1 Automated Failback to a VM Platform

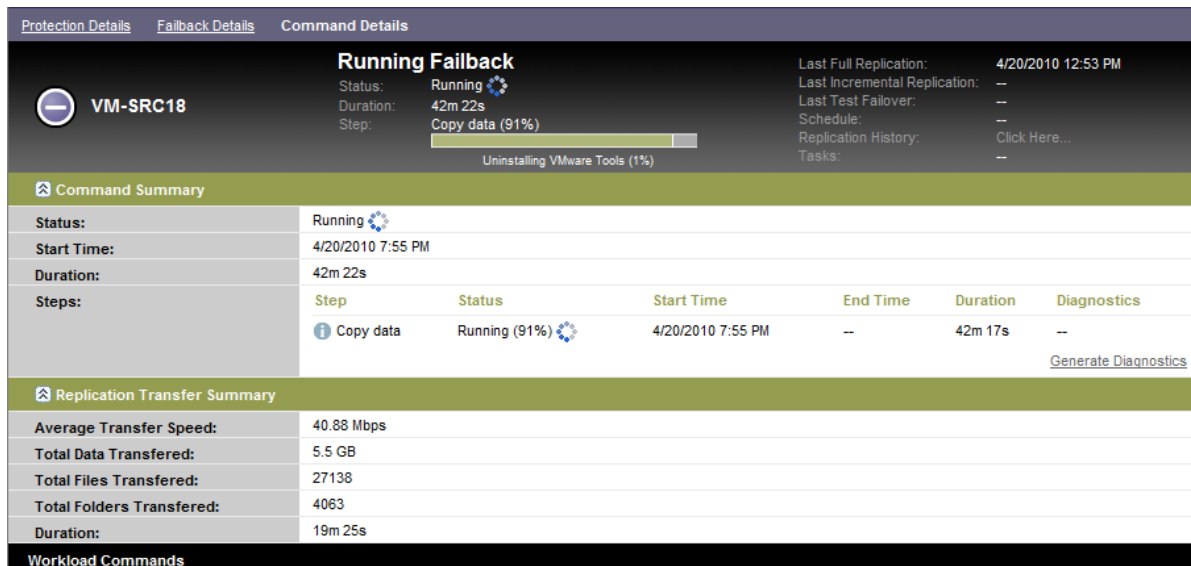
The following containers are supported as automated failback targets:

Target	Notes
VMware DRS Cluster in vSphere 5.1	<ul style="list-style-type: none">♦ The DRS configuration must be either Partially Automated or Fully Automated (it must not be set to Manual)♦ As a VM Container, the DRS Cluster must consist of ESXi 5.1 servers only, and can be managed by vCenter 5.1 only.
VMware DRS Cluster in vSphere 5.0	<ul style="list-style-type: none">♦ The DRS configuration must be either Partially Automated or Fully Automated (it must not be set to Manual)♦ As a VM Container, the DRS Cluster must consist of ESXi 5.0 servers only, and can be managed by vCenter 5.0 only.
VMware DRS Cluster in vSphere 4.1	<ul style="list-style-type: none">♦ The DRS configuration must be either Partially Automated or Fully Automated (it must not be set to Manual)♦ As a VM Container, the Cluster, as a container, can use a combination of ESX 4.1 and ESXi 4.1 servers, and can be managed by vCenter 4.1 only
VMware ESXi 4.1, 5.0, 5.1	ESXi versions must have a paid license; protection is unsupported with these systems if they are operating with a free license.
VMware ESX 4.1	

Use these steps to do an automated failback of a failover workload to a target VMware container.

- 1 Following a failover, select the workload on the Workloads page and click *Failback*.
- 2 Specify the following sets of parameters:
 - ♦ **Workload Settings:** Specify the failover workload's hostname or IP address and provide administrator-level credentials. Use the required credential format (see ["Guidelines for Workload Credentials" on page 74](#)).
 - ♦ **Failback Target Settings:** Specify the following parameters:
 - ♦ **Replication Method:** Select the scope of data replication. If you select *Incremental*, you must prepare a target. See ["Initial Replication Method \(Full and Incremental\)" on page 77](#).
 - ♦ **Target Type:** Select *Virtual Target*. If you don't yet have a failback container, click *Add Container* and inventory a supported VM host using administrator-level credentials.
- 3 Click *Save and Prepare* and monitor the progress on the Command Details screen.
Upon successful completion, PlateSpin Forge loads the Ready for Failback screen, prompting you to specify the details of the failback operation.
- 4 Configure the failback details. See ["Failback Details \(Workload to VM\)" on page 70](#).
- 5 Click *Save and Failback* and monitor the progress on the Command Details page. See [Figure 5-2](#).
PlateSpin Forge executes the command. If you selected *Reprotect after Failback* in the Post-Failback parameter set, a *Reprotect* command is shown in the PlateSpin Forge Web Interface.

Figure 5-2 Failback Command Details



Failback Details (Workload to VM)

Failback details are represented by three sets of parameters that you configure when you are performing a workload failback operation to a virtual machine.

Table 5-2 Failback Details (VM)

Parameter Set (Settings)	Details
Failback	<p>Transfer Method: Enables you to select a data transfer mechanism and security through encryption. See “Transfer Methods” on page 74.</p> <p>Failback Network: Enables you to direct failback traffic over a dedicated network based on virtual networks defined on your appliance host. See “Networking” on page 81.</p> <p>VM Datastore: Enables you to select a datastore associated with your failback container for the target workload.</p> <p>Volumes to Copy: Enables you to select the volumes for re-creating on the target and assigning to a specific datastore.</p> <p>Services/Daemons to stop: Enables you to select Windows services or Linux daemons that are automatically stopped during the failback. See “Service and Daemon Control” on page 78.</p> <p>Alternative Address for Source: Accepts input of an additional IP address for the failed-over VM if applicable. See “Protection Across Public and Private Networks Through NAT” on page 23.</p>
Workload	<p>Number of CPUs: Enables you to specify the required number of vCPUs assigned to the target workload.</p> <p>VM Memory: Enables you to assign the required RAM to the target workload .</p> <p>Hostname, Domain/Workgroup: Use these options to control the identity and domain/workgroup affiliation of the target workload. For domain affiliation, domain administrator credentials are required.</p> <p>Network Connections: Use these options to specify the network mapping of the target workload based on the virtual networks of the underlying VM container.</p> <p>Service States to Change: Enables you to control the startup state of specific application services (Windows) or daemons (Linux). See “Service and Daemon Control” on page 78.</p>
Post-Failback	<p>Reprotect Workload: Use this option if you plan to re-create the protection contract for the target workload after deployment. This maintains a continuous event history for the workload and auto-assigns/designates a workload license.</p> <ul style="list-style-type: none">♦ Reprotect after Failback: Select this option if you intend to re-create a protection contract for the target workload. When the failback is complete, a <i>Reprotect</i> command will be available in the PlateSpin Forge Web Interface for the failed-back workload.♦ No reprotect: Select this option if you don’t intend to re-create a protection contract for the target workload. To protect the failed-back workload upon completion, you will have to re-inventory that workload and reconfigure its protection details.

5.7.2 Semi-Automated Failback to a Physical Machine

Use these steps to fail a workload back to a physical machine after a failover. The physical machine might be either the original infrastructure or a new one.

- 1 Register the required physical machine with your PlateSpin Forge Server. See [“Registering Physical Machines with PlateSpin Forge for Failback”](#) on page 81.
- 2 (Optional: Windows platforms) Run the PS Analyzer tool to determine whether any drivers are missing. See [“Analyzing Device Drivers with PlateSpin Analyzer \(Windows\)”](#) on page 89.
- 3 If the PS Analyzer reports missing or incompatible drivers, upload the required drivers to the PlateSpin Forge device driver database. See [“Managing Device Drivers”](#) on page 90.
- 4 Following a failover, select the workload on the Workloads page and click *Failback*.
- 5 Specify the following sets of parameters:
 - ♦ **Workload Settings:** Specify the failover workload’s hostname or IP address and provide administrator-level credentials. Use the required credential format (see [“Guidelines for Workload Credentials”](#) on page 74).
 - ♦ **Failback Target Settings:** Specify the following parameters:
 - ♦ **Replication Method:** Select the scope of data replication. See [“Initial Replication Method \(Full and Incremental\)”](#) on page 77.
 - ♦ **Target Type:** Select the *Physical Target* option and then select the physical machine you registered in [Step 1](#).

PREPARE FAILBACK CONFIGURE FAILBACK RUN FAILBACK

Workload Settings

Hostname or IP: MA--Rhel5u3

Credentials:

User Name: root

Password: [Masked]

[Test Credentials](#)

Failback Target Settings

Replication Method: ☒ Full Replication ☐ Incremental Replication

Target type: ☐ Virtual Targets ☒ Physical Targets

Failback Target: [Selection required below] ❌

No physical targets available.

Note: To add a physical target, boot up and register the physical server with PlateSpin Failback ISO Image. To download, visit the [PlateSpin Resource Centre](#).

Workload Commands

[Save and Prepare](#)

- 6 Click *Save and Prepare* and monitor the progress on the Command Details screen.
Upon successful completion, PlateSpin Forge loads the Ready for Failback screen, prompting you to specify the details of the failback operation.
- 7 Configure the failback details, then click *Save and Failback*.
Monitor the progress on the Command Details screen.

5.7.3 Semi-Automated Failback to a Virtual Machine

This failback type follows a process similar to the [Semi-Automated Failback to a Physical Machine](#) for a VM target other than a natively-supported VMware container. During this process, you direct the system to regard a VM target as a physical machine.

A semi-automated failback to a VM is supported for the following target VM platforms:

- ♦ Xen on SLES 10 SP2
- ♦ Microsoft Hyper-V Server 2008 (*not* R2)

NOTE: You can also do a semi-automated failback to a container, for which there is fully-automated failback support (VMware ESX and DRS Cluster targets).

5.8 Reprotecting a Workload

A *Reprotect* operation, the next logical step after a *Failback*, completes the workload protection lifecycle and starts it anew. Following a successful Failback operation, a *Reprotect* command becomes available in the PlateSpin Forge Web Interface interface, and the system applies the same protection details as those indicated during the initial configuration of the protection contract.

NOTE: The *Reprotect* command becomes available only if you selected the *Reprotect* option in the Failback details. See [“Failback” on page 68](#).

The rest of the workflow covering the protection lifecycle is the same as that in normal workload protection operations; you can repeat it as many times as required.

6 Essentials of Workload Protection

This section provides information about the different functional areas of a workload protection contract.

- ♦ [Section 6.1, “Workload License Consumption,” on page 73](#)
- ♦ [Section 6.2, “Guidelines for Workload Credentials,” on page 74](#)
- ♦ [Section 6.3, “Transfer Methods,” on page 74](#)
- ♦ [Section 6.4, “Protection Tiers,” on page 75](#)
- ♦ [Section 6.5, “Recovery Points,” on page 76](#)
- ♦ [Section 6.6, “Initial Replication Method \(Full and Incremental\),” on page 77](#)
- ♦ [Section 6.7, “Service and Daemon Control,” on page 78](#)
- ♦ [Section 6.8, “Using Freeze and Thaw Scripts for Every Replication \(Linux\),” on page 78](#)
- ♦ [Section 6.9, “Volumes,” on page 79](#)
- ♦ [Section 6.10, “Networking,” on page 81](#)
- ♦ [Section 6.11, “Registering Physical Machines with PlateSpin Forge for Failback,” on page 81](#)
- ♦ [Section 6.12, “Advanced Workload Protection Topics,” on page 83](#)

6.1 Workload License Consumption

Your PlateSpin Forge product license entitles you to a specific number of workloads for protection through workload licensing. Every time you add a workload for protection, the system consumes a single workload license from your license pool. You can recover a consumed license, if you remove a workload, up to a maximum of five times.

For information about product licensing and license activation, see [“Product Licensing” on page 15](#).

6.2 Guidelines for Workload Credentials

PlateSpin Forge must have administrator-level access to workloads. Throughout the workload protection and recovery workflow, PlateSpin Forge prompts you to specify credentials that must be provided in a specific format.

Table 6-1 Workload Credentials

To Discover	Credentials	Remarks
All Windows workloads	Local or domain administrator credentials.	For the username, use this format: <ul style="list-style-type: none">♦ For domain member machines: <i>authority\principal</i>♦ For workgroup member machines: <i>hostname\principal</i>
Windows Clusters	Domain administrator credentials	
All Linux workloads	Root-level username and password	Non-root accounts must be properly configured to use <code>sudo</code> . See KB Article 7920711 (http://www.novell.com/support/viewContent.do?externalId=7920711).
VMware ESX 4.1, ESXi 5.0	ESX account with administrator role.	If ESX is configured for Windows domain authentication, you can also use your Windows domain credentials.

6.3 Transfer Methods

A transfer method describes the way data is replicated from a source workload to a target. PlateSpin Forge provides different data transfer capabilities, which depend on the protected workload's operating system:

- ♦ **Block-level:** Data is replicated at a volume's block level. For this transfer method, PlateSpin Forge uses a driver to monitor changes on the source workload.
 - ♦ **Windows systems:** For Windows systems, PlateSpin Forge uses a block-based component and leverages the Microsoft Volume Snapshot Service (VSS) with applications and services that support VSS. The automatic installation of the block-based component requires a reboot of the source workload. No reboot is required when you are protecting Windows

clusters with block-level data transfer. When you are configuring workload protection details, you can select the timing of the component's installation. Similarly, when removing a workload, uninstallation of the block-based component requires a reboot.

- ♦ **Linux systems:** For block-level transfer of Linux systems, PlateSpin Forge uses a block-level data transfer component and leverages LVM snapshots if available (this is the default and recommended option). See [KB Article 7005872](http://www.novell.com/support/viewContent.do?externalId=7005872) (<http://www.novell.com/support/viewContent.do?externalId=7005872>).

The Linux block-based component included in your PlateSpin Forge distribution is precompiled for the standard, non-debug kernels of the supported Linux distributions. If you have a non-standard, customized, or newer kernel, you can rebuild the block-based component for your specific kernel. See [KB Article 7005873](http://www.novell.com/support/viewContent.do?externalId=7005873) (<http://www.novell.com/support/viewContent.do?externalId=7005873>).

Deployment or removal of the component is transparent, has no continuity impact, and requires no intervention and no reboot.

- ♦ **File-level:** Data is replicated on a file-by-file basis (Windows only). Supported with or without VSS, but using VSS is highly recommended.

NOTE: Not all workloads support VSS, and in some cases supported transfer methods are determined by a Service Pack level. For further information, see [KB Article 7005870](http://www.novell.com/support/viewContent.do?externalId=7005870).

To make the transfer of workload data more secure, PlateSpin Forge enables you to encrypt data replication. When encryption is enabled, over-the-network data transfer from the source to the target is encrypted by using AES (Advanced Encryption Standard) or 3DES if FIPS-compliant encryption is enabled.

NOTE: Data encryption has a performance impact and might significantly slow down the data transfer.

6.4 Protection Tiers

A Protection Tier is a customizable collection of workload protection parameters that define the following:

- ♦ The frequency and recurrence pattern of replications
- ♦ Whether to encrypt data transmission
- ♦ Whether and how to apply data compression
- ♦ Whether to throttle available bandwidth to a specified throughput rate during data transfer
- ♦ Criteria for the system to consider a workload as offline (failed)

A Protection Tier is an integral part of every workload protection contract. During the configuration stage of a workload protection contract, you can select one of several built-in Protection Tiers and customize its attributes as required by that specific protection contract.

You can also create custom Protection Tiers in advance:

- 1 In your PlateSpin Forge Web Interface, click *Settings > Protection Tiers > Create Protection Tier*.
- 2 Specify the parameters for the new Protection Tier:

Name	Type the name you want to use for the tier.
------	---

Incremental Recurrence	Specify the frequency of incremental replications and the incremental recurrence pattern. You can type directly in the <i>Start of recurrence</i> field, or click the calendar icon to select a date. Select <i>None</i> as the Recurrence Pattern to never use incremental replication.
Full Recurrence	Specify the frequency of full replications and the full recurrence pattern.
Blackout Window	<p>Use these settings to force a replication blackout (for suspending scheduled replications during peak utilization hours or to prevent conflicts between VSS-aware software and the PlateSpin VSS block-level data transfer component).</p> <p>To specify a blackout window, click <i>Edit</i>, then select a blackout recurrence pattern (daily, weekly, etc.), and the blackout period's start and end times.</p> <p>NOTE: The blackout start and end times are based on the system clock on your PlateSpin Forge Server.</p>
Compression Level	<p>These settings control whether and how workload data is compressed before transmission. See “Data Compression” on page 12.</p> <p>Select one of the available options. <i>Fast</i> consumes the least CPU resources on the source but yields a lower compression ratio, <i>Maximum</i> consumes the most, but yields a higher compression ratio. <i>Optimal</i>, the middle ground, is the recommended option.</p>
Bandwidth Throttling	<p>These settings control bandwidth throttling. See “Bandwidth Throttling” on page 12.</p> <p>To throttle replications to a specified rate, specify the required throughput value in Mbps and indicate the time pattern.</p>
Recovery Points to Keep	Specify the number of recovery points to keep for workloads that use this Protection Tier. See “Recovery Points” on page 76 .
Workload Failure	Specify the number of workload detection attempts before it is considered failed.
Workload Detection	Specify the time interval (in seconds) between workload detection attempts.

6.5 Recovery Points

A recovery point is a point-in-time snapshot of a workload. It allows a replicated workload to be restored to a specific state.

Each protected workload has at least one recovery point and may have a maximum of 32 recovery points.

WARNING: Recovery points that accumulate over time might cause your PlateSpin Forge storage to run out of space.

To remove recovery points from your appliance, see [“Managing Forge Snapshots on the Appliance Host” on page 41](#).

6.6 Initial Replication Method (Full and Incremental)

In workload protection and failback operations, the Initial Replication parameter determines the scope of data transferred from a source to a target.

- ♦ **Full:** A full volume transfer takes place from a production workload to its replica (the failover workload), or from a failover workload to its original virtual or physical infrastructure.
- ♦ **Incremental:** Only differences are transferred from a source to its target, provided that they have similar operating system and volume profiles.
 - ♦ During protection: The production workload is compared with an existing VM in the appliance host. The existing VM might be one of the following:
 - ♦ A previously-protected workload's recovery VM (when a *Remove Workload* command's *Delete VM* option is deselected).
 - ♦ A VM that is manually imported into the appliance host, such as a workload VM physically moved on portable media from the production site to a remote recovery site.
See [“Manually Importing VMs into the Appliance Host’s Datastore” on page 41](#).
 - ♦ During failback to a virtual machine: The failover workload is compared with an existing VM in a failback container.
 - ♦ During failback to a physical machine: The failover workload is compared with a workload on the target physical machine, if the physical machine is registered with PlateSpin Forge (see [“Semi-Automated Failback to a Physical Machine” on page 71](#)).

During workload protection and failback to a VM host, selecting *Incremental* as the initial replication method requires that you browse, locate, and prepare the target VM for synchronization with the selected operation’s source.

- 1 Proceed with the required workload command, such as *Add Workload* or *Failback*.
- 2 For the *Initial Replication Method* option, select *Incremental Replication*.
- 3 Click *Prepare Workload*.

The PlateSpin Forge Web Interface displays the Prepare for Incremental Replication page.

Prepare for Incremental Replication

Prepare Cancel

Container: comp212 (VMware ESX Server 4.0.0.175625)

Name	Description	CPU	Memory	Free Space	Last Refresh
comp212	VMware ESX Server 4.0.0.175625	16 x Intel(R) Xeon(R) CPU E5630 @ 2.40GHz	31.5 GB	1.9 TB	2 Day(s) ago

Virtual Machine: 1SLES10-P1.site_VM (SuSE Linux)

Inventory Network: VM Network

☒ DHCP ☐ Static

- 4 Select the required container, the virtual machine, and the inventory network to use for communicating with the VM.
- 5 Click *Prepare*.

Wait for the process to complete and for the user interface to return to the original command, then select the prepared workload.

NOTE: (Block-level data replications only) An initial incremental replication takes significantly longer than subsequent replications. This is because the system must compare the volumes on the source and the target block by block. Subsequent replications rely on changes detected by the block-based component while it is monitoring a running workload.

6.7 Service and Daemon Control

PlateSpin Forge enables you to control services and daemons:

- ♦ **Source service/daemon control:** During data transfer, you can automatically stop Windows services or Linux daemons that are running on your source workload. This ensures that the workload is replicated in a more consistent state than if you leave them running.

For example, for Windows workloads, consider stopping antivirus software services or services of third-party VSS-aware backup software.

For additional control of Linux sources during replication, consider the capability to run custom scripts on your Linux workloads during each replication. See [“Using Freeze and Thaw Scripts for Every Replication \(Linux\)” on page 78](#).

- ♦ **Target startup state/run level control:** You can select the startup state (Windows) or the run level (Linux) of services/daemons on the failover VM. When you perform a Failover or Test Failover operation, you can specify which services or daemons you want to be running or stopped when the failover workload has gone live.

Common services that you might want to assign a disabled startup state are vendor-specific services that are tied to their underlying physical infrastructure and are not required in a virtual machine.

6.8 Using Freeze and Thaw Scripts for Every Replication (Linux)

For Linux systems, PlateSpin Forge provides you with the capability to automatically execute custom scripts, `freeze` and `thaw`, that complement the automatic daemon control feature. `freeze` is executed at the beginning of a replication, and `thaw` is executed at the end of a replication.

Consider using this capability to complement the automated daemon control feature provided through the user interface (see [“Source service/daemon control:” on page 78](#)). For example, you might want to use this feature to temporarily freeze certain daemons instead of shutting them down during replications.

To implement the feature, use the following procedure before setting up your Linux workload protection:

- 1 Create the following files:

- ♦ `platespin.freeze.sh`: A shell script to execute at the beginning of the replication
- ♦ `platespin.thaw.sh`: A shell script to execute at the end of the replication
- ♦ `platespin.conf`: A text file defining any required arguments, along with a timeout value.

The required syntax for the contents of the `platespin.conf` file is:

```
[ServiceControl]

FreezeArguments=<arguments>

ThawArguments=<arguments>

TimeOut=<timeout>
```

Replace *<arguments>* with the required command arguments, separated by a space, and *<timeout>* with a timeout value in seconds. If a value is not specified, the default timeout is used (60 seconds).

- 2 Save the scripts, along with the `.conf` file, on your Linux source workload, in the following directory:

```
/etc/platespin
```

6.9 Volumes

Upon adding a workload for protection, PlateSpin Forge inventories your source workload's storage media and automatically sets up options in the PlateSpin Forge Web Interface for you to specify the volumes you require for protection.

PlateSpin Forge supports several types of storage, including Windows dynamic disks, LVM (version 2 only), RAID, and SAN.

For Linux workloads, PlateSpin Forge provides the following additional features:

- ♦ Non-volume storage, such as a swap partition that is associated with the source workload, is recreated in the failover workload.
- ♦ The layout of volume groups and logical volumes is preserved so that you can re-create it during failback.
- ♦ (OES 2 workloads) EVMS layouts of source workloads are preserved and re-created in the appliance host. NSS pools are copied from the source to the recovery VM.

The following figures show the Replication Settings parameter set for a Linux workload with multiple volumes and two logical volumes in a volume group.

Figure 6-1 Volumes, Logical Volumes, and Volume Groups of a Protected Linux Workload

Tier Settings				
Replication Settings				
Encrypt Data Transfer:	No			
Source Credentials:	root			
Number of CPUs:	1			
Replication Network:	DHCP - VM Network			
Recovery Point Datastore:	Storage2 (669.7 GB free)			
Protected Volumes:	Include	Name	Total Size	Datastore
	<input checked="" type="checkbox"/>	/usr	2.9 GB	Storage2
	<input checked="" type="checkbox"/>	/boot	2.0 GB	Storage2
	<input checked="" type="checkbox"/>	/new2 (EXT3)	151.9 MB	Storage2
Protected Logical Volumes:	Include	Name	Total Size	Volume Group
	<input checked="" type="checkbox"/>	/LogicalVolume1 (EXT3)	484.2 MB	group
	<input checked="" type="checkbox"/>	/LogicalVolume2 (EXT3)	193.7 MB	group
Volume Groups:	Include	Name	Total Size	Datastore
	<input checked="" type="checkbox"/>	group	1016.0 MB	Storage2
Non-volume Storage:	--			
Daemons to Stop During Replication:	--			
Failover Settings				
Prepare for Failover Settings				
Test Failover Settings				
Recovery Points				
Workload Details				

The following figure shows volume protection options of an OES 2 workload with options indicating that the EVMS layout should be preserved and re-created for the failover workload:

Figure 6-2 Replication Settings, Volume-Related Options (OES 2 Workload)

Protected Logical Volumes:	Include	Name	Used Space	Free Space	Volume Group / EVMS Volume	
	<input checked="" type="checkbox"/>	/ (REISERFS)	2.2 GB	2.2 GB	system	
	<input checked="" type="checkbox"/>	/boot (EXT2)	13.0 MB	55.3 MB	/dev/evms/sda1	
	<input checked="" type="checkbox"/>	/opt/novell/nss/mnt/pools/NEWPOOL (NSSFS)	23.3 MB	999.6 MB	NEWPOOL	
Non-volume Storage:	Include	Partition	Is Swap	Total Size	Datastore / Volume Group	
	<input checked="" type="checkbox"/>	/dev/system/swap	Yes	1.48 GB	system	
Volume Groups:	Include	Name	Total Size	Datastore	Thin Disk	
	<input checked="" type="checkbox"/>	system	5.9 GB	dev-comp124:storage	<input type="checkbox"/>	
EVMS Volumes:	Include	Name	Datastore	Total Size	Datastore	Thin Disk
	<input checked="" type="checkbox"/>	/dev/evms/sda1		70.6 MB	dev-comp124:storage	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	NEWPOOL		1023.0 MB	dev-comp124:storage	<input type="checkbox"/>
Daemons to Stop During Replication:	Add Daemons					

6.10 Networking

PlateSpin Forge enables you to control your failover workload's network identity and LAN settings to prevent replication traffic from interfering with your main LAN or WAN traffic.

You can specify distinct networking settings in your workload protection details for use at different stages of the workload protection and recovery workflow:

- ♦ **Replication:** ([Replication](#) parameter set) For separating regular replication traffic from your production traffic.
- ♦ **Failover:** ([Failover](#) parameter set) For the failover workload to become part of your production network when it goes live.
- ♦ **Prepare for Failover:** ([Prepare for Failover](#) network parameter) For network settings during the optional Prepare for Failover stage.
- ♦ **Test Failover:** ([Test Failover](#) parameter set) For network settings to apply to the failover workload during a Test Failover stage.

6.11 Registering Physical Machines with PlateSpin Forge for Failback

If the required target infrastructure for a failback operation is a physical machine, you must register it with PlateSpin Forge.

The registration of a physical machine is carried out by booting the target physical machine with the appropriate PlateSpin boot ISO image.

To use a boot ISO image, download it from the [PlateSpin Forge area of Novell Downloads \(http://download.novell.com\)](http://download.novell.com) by doing a search with the following parameters:

- ♦ *Product or Technology:* PlateSpin Forge
- ♦ *Select Version:* PlateSpin Forge 3.3
- ♦ *Date Range:* All Dates

Use the image appropriate to your target machine:

Table 6-2 Boot ISO Images for Target Physical Machines

Filename	Remarks
WindowsFailback.iso	Windows
WindowsFailback-WinPE3.iso	For use with hardware not supported by WindowsFailback.zip
LinuxFailback.iso	Linux systems
WindowsFailback-Cisco.iso	Windows systems on Cisco hardware
WindowsFailback-Dell.iso	Windows systems on Dell hardware
WindowsFailback-Fujitsu.iso	Windows systems on Fujitsu hardware

After downloading the required file, unzip and save the extracted ISO file.

- ♦ [Section 6.11.1, “Registering Target Physical Machines,” on page 82](#)

6.11.1 Registering Target Physical Machines

1 Burn the appropriate image on a CD or save it to media from which your target can boot.

2 Ensure that the network switch port connected to the target is set to *Auto Full Duplex*.

Because the Windows version of the boot CD image supports only *Auto Negotiate Full Duplex*, this ensures that there are no conflicts in the duplex settings.

3 Use the boot CD to boot the target physical machine, then wait for the command prompt window to open.

(Windows only) Wait for the *REGISTERMACHINE* and *Recovery Console* command boxes to open. Use the *REGISTERMACHINE* command box. For information on the *Recovery Console* utility, see [“Using the Recovery Tool Command Line Utility \(Windows\)” on page 82](#).

4 (Linux only) For 64-bit systems, at the initial boot prompt, type the following:

- ♦ `ps64` (for systems with up to 512 MB RAM)
- ♦ `ps64_512m` (for systems with more than 512 MB RAM)

5 Press Enter.

6 When you are prompted, enter the hostname or the IP address of your Forge VM.

7 Provide your administrator-level credentials for the Forge VM, specifying an authority. For the user account, use this format:

domain\username or *hostname\username*

Available network cards are detected and displayed by their MAC addresses.

8 If DHCP is available on the NIC to be used, press Enter to continue. If DHCP is not available, select the required NIC to configure with a static IP address.

9 Enter a hostname for the physical machine or press the Enter key to accept the default values.

10 When prompted to indicate whether to use HTTPS, enter `Y` if you have enabled SSL, and `N` if you have not.

After a few minutes, the physical machine should be available in the failback settings of the PlateSpin Forge Web Interface.

Using the Recovery Tool Command Line Utility (Windows)

The Recovery Console command line utility enables you to dynamically inject Windows device drivers into the target physical machine without restarting the entire physical target registration process.

The utility is loaded in a secondary command box upon the initial attempt to boot from the Windows boot image (see [Step 3 on page 82](#)).

To use the Recovery Tool, enter its command name, *RECOVERYTOOL*, followed by an applicable parameter, in the Recovery Console window.



```
Recovery Console
AM      643,072  SPRING.CORE.DLL
PM      143,360  SPRING.THREADING.DLL
PM      275,456  VIRTUALDISKS.DLL
File(s) 12,075,414 bytes
Dir(s)   0 bytes free
platespin\utility>RECOVERYTOOL /L
```

You can use:

- ♦ /L to list any driver services installed on the target OS
- ♦ /J to inject drivers into the target OS

You can specify whether the drivers are to be downloaded from the PlateSpin Forge Server or from a local path. If you intend to use a local path, you should group multiple drivers for the same device together. If you want to download drivers from the PlateSpin Forge Server, the utility prompts you to specify which driver you want to use (if there is more than one).

Injecting Drivers into a PlateSpin Boot Image (Linux)

You can use a custom utility to package and inject additional Linux device drivers into the PlateSpin boot image before burning it on a CD:

- 1 Obtain or compile the required *.ko driver files.

IMPORTANT: Make sure the drivers are valid for the kernel included with the ISO file (for x86 systems: 2.6.32.54-0.3-pae, for x64 systems: 2.6.32.54-0.3-default) and are appropriate for the target architecture. See also [KB Article 7005990](#).

- 2 Mount the image in any Linux machine (root credentials required). Use the following command syntax:

```
mount -o loop <path-to-ISO> <mount_point>
```

- 3 Copy the rebuildiso.sh script, located in the /tools subdirectory of the mounted ISO file, into a temporary working directory. When you have finished, unmount the ISO file (execute the command `umount <mount_point>`).

- 4 Create another working directory for the required driver files and save them in that directory.

- 5 In the directory where you saved the rebuildiso.sh script, run the following command as root:

```
./rebuildiso.sh -i <ISO_file> -d <driver_dir> -m i586|x86_64
```

On completion, the ISO file is updated with the additional drivers.

6.12 Advanced Workload Protection Topics

- ♦ [Section 6.12.1, “Protecting Windows Clusters,” on page 84](#)
- ♦ [Section 6.12.2, “Linux Failback to a Paravirtualized VM on Xen on SLES,” on page 84](#)
- ♦ [Section 6.12.3, “Using Workload Protection Features through the PlateSpin Forge Web Services API,” on page 87](#)

6.12.1 Protecting Windows Clusters

PlateSpin Forge supports the protection of a Microsoft Windows cluster's business services. The supported clustering technologies are:

- ♦ Windows 2003 Server-based Windows Cluster Server (*Single-Quorum Device Cluster* model)
- ♦ Windows 2008 Server-based Microsoft Failover Cluster (*Node and Disk Majority* and *No Majority: Disk Only* models)

Protection of a cluster is achieved through incremental replications of changes on the active node streamed to a virtual single-node cluster, which you can use while troubleshooting the source infrastructure.

The scope of support for cluster migrations in the current release is subject to the following conditions:

- ♦ When you perform an *Add Workload* operation, you must identify the active node—the node that currently owns the quorum resource of the cluster—identified by the cluster's IP address (*virtual IP address*). Specifying the IP address of an individual node results in that node being inventoried as a regular, cluster-unaware Windows workload.
- ♦ A cluster's quorum resource must be collocated with the cluster's resource group (service) being protected.

If a node failover occurs between incremental replications of a protected cluster, PlateSpin Forge generates a protection event. If the new active node's profile is similar to the failed active node, the protection schedule continues; otherwise, the command fails. The profiles of cluster nodes are considered similar if:

- ♦ They have the same number of volumes
- ♦ Each volume is exactly the same size on each node
- ♦ They have an identical number of network connections

To protect a Windows cluster, follow the normal workload protection workflow (see [“Basic Workflow for Workload Protection and Recovery” on page 59](#)).

On failback, PlateSpin Forge provides validation that helps you ensure that shared volume layouts are preserved on the target. Make sure you map the volumes correctly.

6.12.2 Linux Failback to a Paravirtualized VM on Xen on SLES

You can do a failback to a paravirtualized VM on Xen on SLES (version 10 only). This is done indirectly, through a two-stage process. The paravirtualized VM needs to be transformed into a fully virtualized VM first and later transformed back. A utility (`xmpsadministrator-`), included in your PlateSpin boot ISO image, is used to transform the VM.

The procedure varies slightly, depending on whether the target is a new or an existing paravirtualized VM.

- ♦ [“Linux Failback to a New Paravirtualized VM” on page 85](#)
- ♦ [“Linux Failback to an Existing Paravirtualized VM” on page 87](#)

Linux Failback to a New Paravirtualized VM

- 1 Copy the PlateSpin Linux boot ISO to the target Xen on SLES server. See [Table 6-2, “Boot ISO Images for Target Physical Machines,”](#) on page 81.
- 2 Start the Virtual Machine manager and create a fully virtualized VM:
 - 2a Select the *I need to install an operating system* option.
 - 2b Choose a suitable size for the disk image (the disk size should be equal to or bigger than that of the failover VM).
 - 2c Select the boot ISO as the installation source.The VM boots into the PlateSpin OS environment, used in *failback to physical machine* settings.
- 3 Complete the failback procedure. See [“Semi-Automated Failback to a Physical Machine”](#) on page 71.

Upon completion, the VM should be fully functional as a fully virtualized machine.
- 4 Reboot the VM, making sure that it still boots into the PlateSpin OS environment.

```
Welcome to PlateSpin/OS version 9.9.9.9

Available boot options (type the name to boot into):

ps        - PlateSpin Linux for Taking Control (press ENTER to boot into)
ps64      - PlateSpin Linux(x86_64) for Taking Control
ps64_512m - PlateSpin Linux(x86_64) for Taking Control a Virtual Machine
            which has more than 512M memory
next      - Boot from Next Boot Device Set in BIOS (timeout)
debug     - PlateSpin Linux for Trouble Shooting
switch    - PlateSpin Linux for switching kernel to Xen PV

When no key is pressed for 20 seconds, it will boot from the next boot device.

boot: switch_
```

- 5 At the boot : prompt, type switch and press Enter.

This reconfigures the operating system to be bootable as a paravirtualized machine. Upon completion, the output should look similar to the one shown below:

```

about to find other volumes in native off-line OS
kjournal starting. Commit interval 5 seconds
EXT3-fs: mounted filesystem with ordered data mode.
found volume /boot in off-line OS
found other 1 volume(s)
mount all the system volumes
kjournal starting. Commit interval 5 seconds
EXT3 FS on hda1, internal journal
EXT3-fs: mounted filesystem with ordered data mode.
volume /boot has been mounted.
all the system volumes are mounted
Switching to Xen kernel for Para-virt machine....
unmount all the system volumes for clean up.
volume /boot has been unmounted
volume / has been unmounted

#####
Please apply the following data as bootloader_args for
switching Xen fully-virt machine to Para-virt machine:

'--entry=xvda1:/vmlinuz-2.6.16.60-0.54.5-xen,/initrd-2.6.16.60-0.54.5-xen'

#####

[DB]$ _

```

Note the bootloader arguments in the final segment of the output:

Please apply the following data as `bootloader_args` for switching Xen fully-virt machine to Para-virt machine:

```
'--entry=xvda1:/vmlinuz-2.6.16.60-0.54.5-xen, /initrd-2.6.16.60-0.54.5-xen'
```

These are used by the `xmps` utility to set up the location of the kernel and the `initrd` image, from which the paravirtualized machine boots from.

6 Power off the virtual machine:

```
[DB]$ poweroff
```

7 Login to the XEN on SLES server as `root` and mount the PlateSpin Linux boot ISO (the command example assumes that the ISO has been copied under the `/root` directory):

```
# mkdir /mnt/ps # mount -o loop /root/linuxfailback.iso /mnt/ps
```

8 Run the `xmps` utility to create a paravirtualized VM based on the configuration of the fully virtualized VM:

```
# /mnt/ps/tools/xmps --pv --vm_name=SLES10-FV --new_vm_name=SLES10-PV --
bootloader_args="--entry=xvda1:/vmlinuz-2.6.16.60-0.54.5-xen, /initrd-
2.6.16.60-0.54.5-xen"
```

The utility takes as input:

- ♦ The name of the fully virtualized VM on which the configuration of the paravirtualized machine will be based (SLES10-FV)
- ♦ The name of the virtual machine to create (SLES10-PV)
- ♦ The paravirtualized machine's bootloader arguments `--bootloader_args` (shown at [Step 5](#))

If a VM with the same name as the one passed as `new_vm_name` already exists, the `xmps` utility fails.

The newly created paravirtualized VM (SLES10-PV) should now be available in the Virtual Machine Manager, ready to be turned on. The corresponding fully virtualized machine is retired and will fail to boot. This VM can be deleted safely (only the VM configuration will be removed).

- 9 Unmount the PlateSpin Linux boot ISO:

```
# umount /mnt/ps
```

Linux Failback to an Existing Paravirtualized VM

- 1 Copy the PlateSpin Linux boot ISO to the target Xen on SLES server. See [Table 6-2, “Boot ISO Images for Target Physical Machines,” on page 81.](#)

- 2 Log in to the XEN SLES server as root and mount the PlateSpin Linux boot ISO:

```
# mkdir /mnt/ps # mount -o loop /root/linuxfailback.iso /mnt/ps
```

- 3 Run the `xmps` utility to create a fully virtualized VM based on the configuration of the paravirtualized VM (the intended failback target):

```
# /mnt/ps/tools/xmps --fv --vm_name=SLES10-PV --new_vm_name=SLES10-FV --  
bootiso=/root/linuxfailback.iso
```

The utility takes as input:

- ♦ The name of the existing paravirtualized machine (SLES10-PV), which is the intended failback target
- ♦ The name of the temporary fully virtualized machine (SLES10-FV) to be created for the two-stage failback operation
- ♦ The full path of the boot ISO (assuming that the ISO file is located under `/root`: `/root/linuxfailback.iso`)

If a VM with the same name as the one passed as `new_vm_name` already exists, the `xmps` utility fails.

The newly created fully virtualized machine (SLES10-FV) should now be available in the Virtual Machine Manager.

- 4 Turn on the newly created fully virtualized machine (SLES10-FV).

The VM boots into the PlateSpin OS environment, used in *failback to physical machine* settings.

- 5 Complete the failback procedure. See [“Semi-Automated Failback to a Physical Machine” on page 71.](#)

- 6 Reboot the VM, run `switch`, and reconfigure the workload as described in [“Linux Failback to a New Paravirtualized VM” on page 85](#) (from [Step 4](#) to [Step 9](#) only).

6.12.3 Using Workload Protection Features through the PlateSpin Forge Web Services API

You can use workload protection functionality programmatically, through the `protection.webservices` API from within your applications. You can use any programming or scripting language that supports Web services.

```
http://<hostname | IP_address>/protection.webservices
```

Replace `<hostname | IP_address>` with the hostname or the IP address of your Forge VM.

Figure 6-3 The Front Page of the Protection Web Services API



To script common workload protection operations, use the referenced samples written in Python as guidance. A Microsoft Silverlight application, along with its source code, is also provided for reference purposes.

7 Auxiliary Tools for Working with Physical Machines

Your PlateSpin Forge distribution includes tools for use when working with physical machines as failback targets.

- ♦ [Section 7.1, “Analyzing Device Drivers with PlateSpin Analyzer \(Windows\),” on page 89](#)
- ♦ [Section 7.2, “Managing Device Drivers,” on page 90](#)

7.1 Analyzing Device Drivers with PlateSpin Analyzer (Windows)

Before running a workload failback to a physical machine, use the PlateSpin Analyzer to identify potential driver problems and correct them beforehand.

NOTE: PlateSpin Analyzer currently supports only Windows workloads.

- 1 On your Forge VM, start the `Analyzer.Client.exe` program, located in the following directory:
`Program Files\PlateSpin Forge Server\PlateSpin Analyzer`
- 2 Make sure that the network selection is *Default*, then select the required machine in the *All Machines* drop-down list.
- 3 (Optional) To reduce the analysis time, limit the scope of machines to a specific language.
- 4 Click *Analyze*.

Depending on the number of inventoried workloads you select, the analysis might take a few seconds to several minutes.

Analyzed servers are listed in the left pane. Select a server to view test results in the right pane. Test results can be any combination of the following:

Table 7-1 *Status Messages in PlateSpin Analyzer Test Results*

Result	Description
Passed	The machine passed the PlateSpin Analyzer tests.
Warning	One or more tests returned warnings for the machine, indicating potential migration issues. Click the hostname to see the details.
Failed	One or more tests failed for this machine. Click the hostname to see the details and obtain more information.

The *Summary* tab provides a listing of the number of machines analyzed and not checked, as well as those that passed the test, failed the test, or were assigned a warning status.

The *Test Results* tab provides the following information:

Table 7-2 *PlateSpin Analyzer Test Results Tab*

Section	Details
<i>System Test</i>	Validates that the machine fulfills minimum hardware and operating system requirements.
<i>Hardware Support</i>	Checks the workload for hardware compatibility.
<i>Target Hardware Support</i>	Checks hardware compatibility for use as a target physical machine.
<i>Software Test</i>	Checks for applications that must be shut down for Live Transfer, and databases that should be shut down during Live Transfer to guarantee transactional integrity.
<i>Incompatible Application Test</i>	Verifies that applications known to interfere with the migration process are not installed on the system. These applications are stored in the Incompatible Application Database. To add, delete or edit entries in this database, select <i>Incompatible Application</i> from the <i>Tools</i> menu.

The *Properties* tab provides detailed information about a selected machine.

7.2 Managing Device Drivers

PlateSpin Forge ships with a library of device drivers and automatically installs the appropriate ones on target workloads. To determine if the required drivers are available, use the PlateSpin Analyzer utility. See [“Analyzing Device Drivers with PlateSpin Analyzer \(Windows\)” on page 89](#).

If PlateSpin Analyzer encounters missing or incompatible drivers, or if you require specific drivers for a target infrastructure, you might need to add (upload) drivers to the PlateSpin Forge driver database.

- ♦ [Section 7.2.1, “Packaging Device Drivers for Windows Systems,” on page 90](#)
- ♦ [Section 7.2.2, “Packaging Device Drivers for Linux Systems,” on page 91](#)
- ♦ [Section 7.2.3, “Uploading Drivers to the PlateSpin Forge Device Driver Database,” on page 91](#)

7.2.1 Packaging Device Drivers for Windows Systems

To package your Windows device drivers for uploading to the PlateSpin Forge driver database:

- 1 Prepare all interdependent driver files (*.sys, *.inf, *.dll, etc.) for your target infrastructure and device. If you have obtained manufacturer-specific drivers as a .zip archive or an executable, extract them first.
- 2 Save the driver files in separate folders, with one folder per device.

The drivers are now ready for upload. See [“Uploading Drivers to the PlateSpin Forge Device Driver Database” on page 91](#).

NOTE: For problem-free operation of your protection job and the target workload, upload only digitally signed drivers for:

- ♦ All 64-bit Windows systems
 - ♦ 32-bit versions of Windows Vista and Windows Server 2008, and Windows 7 systems
-

7.2.2 Packaging Device Drivers for Linux Systems

To package your Linux device drivers for uploading to the PlateSpin Forge driver database, you can use a custom utility included in your Linux boot ISO image. See [Table 6-2, “Boot ISO Images for Target Physical Machines,” on page 81](#).

- 1 On a Linux workstation, create a directory for your device driver files. All the drivers in the directory must be for the same kernel and architecture.

- 2 Download the boot image and mount it.

For example, assuming that the ISO has been copied under the `/root` directory, issue these commands:

```
# mkdir /mnt/ps # mount -o loop /root/linuxfallback.iso /mnt/ps
```

- 3 From the `/tools` subdirectory of the mounted ISO image, copy the `packageModules.tar.gz` archive into a another working directory and extract it.

For example, with the `.gz` file is inside your current working directory, issue this command:

```
tar -xvzf packageModules.tar.gz
```

- 4 Enter the working directory and execute the following command:

```
./PackageModules.sh -d <path_to_driver_dir> -o <package name>
```

Replace `<path_to_driver_dir>` with the actual path to the directory where you saved you driver files, and `<package name>` with the actual package name, using the following format:

```
Drivename-driverversion-dist-kernelversion-arch.pkg
```

For example, `bnx2x-1.48.107-RHEL4-2.6.9-11.EL-i686.pkg`

The package is now ready for uploading. See [“Uploading Drivers to the PlateSpin Forge Device Driver Database” on page 91](#).

7.2.3 Uploading Drivers to the PlateSpin Forge Device Driver Database

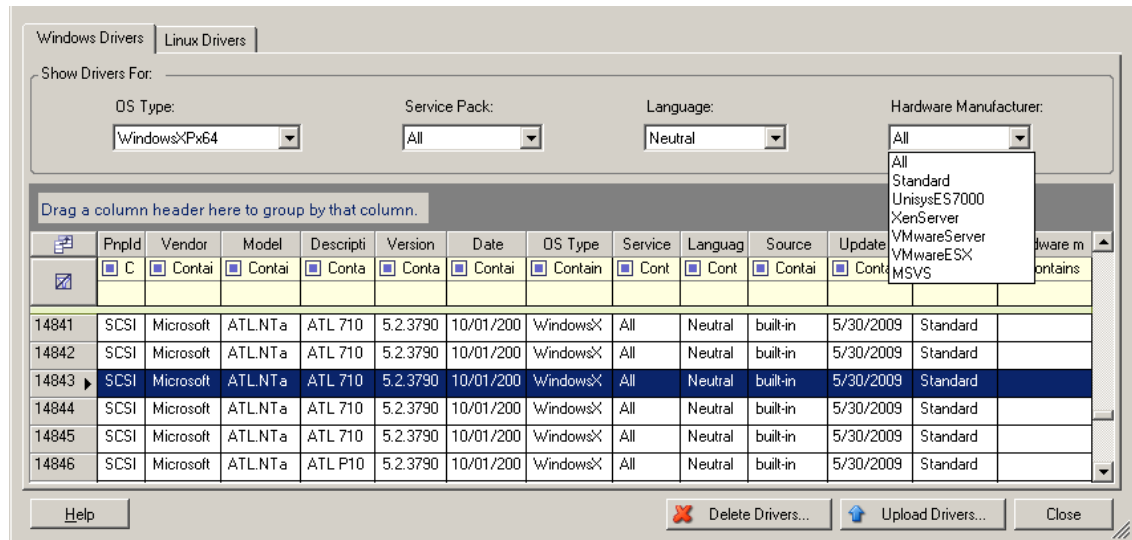
Use the PlateSpin Driver Manager to upload device drivers to the driver database.

NOTE: On upload, PlateSpin Forge does not validate drivers against selected operating system types or their bit specifications; make sure that you only upload drivers that are appropriate for your target infrastructure.

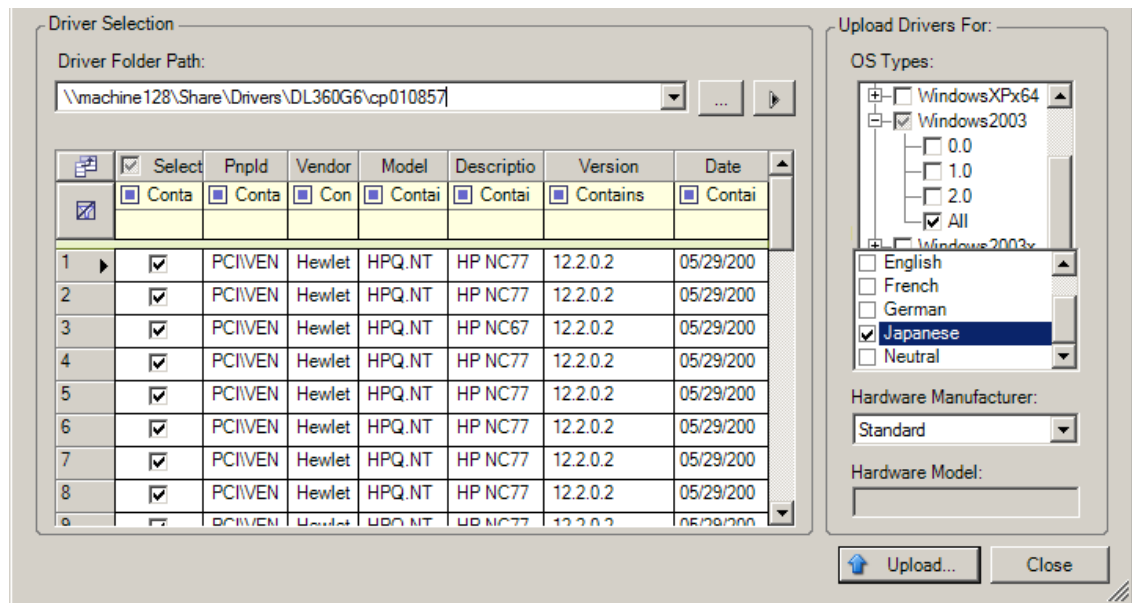
- ♦ [“Device Driver Upload Procedure \(Windows\)” on page 92](#)
- ♦ [“Device Driver Upload Procedure \(Linux\)” on page 93](#)

Device Driver Upload Procedure (Windows)

- 1 Obtain and prepare the required device drivers. See [Packaging Device Drivers for Windows Systems](#).
- 2 On your Forge VM, under Program Files\PlateSpin Forge Server\DriverManager, start the DriverManager.exe program and select the *Windows Drivers* tab.



- 3 Click *Upload Drivers*, browse to the folder that contains the required driver files, and select applicable OS type, language, and hardware manufacturer options.

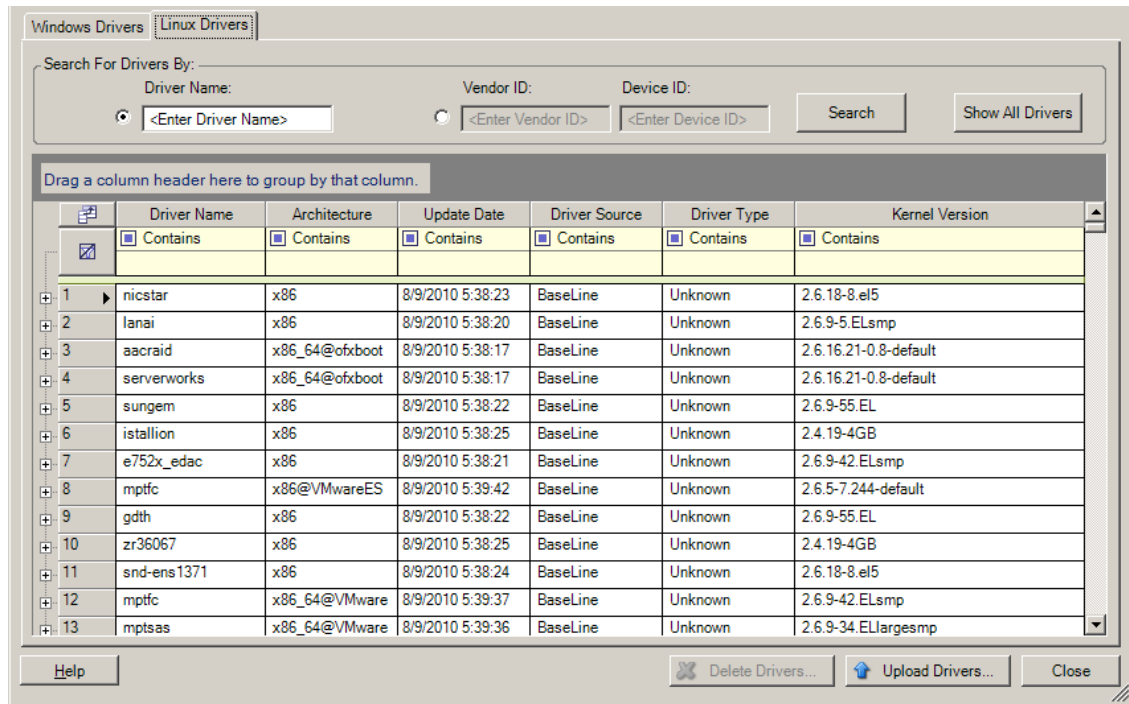


Select *Standard* as the *Hardware Manufacturer* option, unless your drivers are designed specifically for any of the target environments listed.

- 4 Click *Upload* and confirm your selections when prompted.
The system uploads the selected drivers to the driver database.

Device Driver Upload Procedure (Linux)

- 1 Obtain and prepare the required device drivers. See [Packaging Device Drivers for Linux Systems](#).
- 2 Click *Tools > Manage Device Drivers* and select the *Linux Drivers* tab:



- 3 Click *Upload Drivers*, browse to the folder that contains the required driver package (*.pkg), and click *Upload All Drivers*.

The system uploads the selected drivers to the driver database.

8 Troubleshooting

- ♦ [Section 8.1, “Troubleshooting Workload Inventory \(Windows\),” on page 95](#)
- ♦ [Section 8.2, “Troubleshooting Workload Inventory \(Linux\),” on page 99](#)
- ♦ [Section 8.3, “Troubleshooting Problems during the Prepare Replication Command \(Windows\),” on page 99](#)
- ♦ [Section 8.4, “Troubleshooting Workload Replication,” on page 100](#)
- ♦ [Section 8.5, “Generating and Viewing Diagnostic Reports,” on page 101](#)
- ♦ [Section 8.6, “Removing Workloads,” on page 102](#)
- ♦ [Section 8.7, “Post-Protection Workload Cleanup,” on page 102](#)

8.1 Troubleshooting Workload Inventory (Windows)

You might need to troubleshoot the following common problems during the workload inventory.

Problems or Messages	Solutions
The domain in the credentials is invalid or blank	<p>This error occurs when the Credential Format is incorrect.</p> <p>Try the discovery by using a local administrator account with the credential format <code>hostname\LocalAdmin</code></p> <p>Or, try the discovery by using a domain administrator account with the credential format <code>domain\DomainAdmin</code></p>
Unable to connect to Windows server...Access is denied	<p>A non-account was used when trying to add a workload. Use an administrator account or add the user to the administrators group and try again.</p> <p>This message might also indicate WMI connectivity failure. For each of the following possible resolutions, attempt the solution and then perform the “WMI Connectivity Test” on page 96 again. If the test succeeds, try adding the workload again.</p> <ul style="list-style-type: none">♦ “Troubleshooting DCOM Connectivity” on page 97♦ “Troubleshooting RPC Service Connectivity” on page 97
Unable to connect to Windows server...The network path was not found	<p>Network connectivity failure. Perform the tests in “Performing Connectivity Tests” on page 96. If a test fails, ensure that PlateSpin Forge and the workload are on the same network. Reconfigure the network and try again.</p>

Problems or Messages	Solutions
"Discover Server Details {hostname}" Failed Progress: 0% Status: NotStarted	<p>This error can occur for several reasons and each has a unique solution:</p> <ul style="list-style-type: none"> ♦ For environments using a local proxy with authentication, bypass the proxy or add the proper permissions. See KB Article 7920339 (http://www.novell.com/support/viewContent.do?externalId=7920339) for more details. ♦ If local or domain policies restrict required permissions, follow the steps outlined in KB Article 7920862 (http://www.novell.com/support/viewContent.do?externalId=7920862).
<p>Workload Discovery fails with error message</p> <p>Could not find file output.xml</p> <p>or</p> <p>Network path not found</p> <p>or (upon attempting to discover a Windows cluster)</p> <p>Inventory failed to discover. Inventory result returned nothing.</p>	<p>There are several possible reasons for the Could not find file output.xml error:</p> <ul style="list-style-type: none"> ♦ Antivirus software on the source could be interfering with the discovery. Disable the antivirus software to determine whether or not it is the cause of the problem. See "Disabling AntiVirus Software" on page 98. ♦ File and Printer Sharing for Microsoft Networks might not be enabled. Enable it under the Network Interface Card properties. ♦ The Admin\$ shares on the source might not be accessible. Ensure that PlateSpin Forge can access those shares. See "Enabling File/Share Permissions and Access" on page 98. ♦ The Server or the Workstation service might not be running. If this is the case, enable them and set the startup mode to automatic. ♦ The Windows remote registry service is disabled. Start the service and set the startup type to automatic.

8.1.1 Performing Connectivity Tests

- ♦ ["Network Connectivity Test" on page 96](#)
- ♦ ["WMI Connectivity Test" on page 96](#)
- ♦ ["Troubleshooting DCOM Connectivity" on page 97](#)
- ♦ ["Troubleshooting RPC Service Connectivity" on page 97](#)

Network Connectivity Test

Perform this basic network connectivity test to determine whether PlateSpin Forge can communicate with the workload that you are trying to protect.

- 1 Go to your Forge VM.
See ["Downloading the VMware Client Program" on page 39](#).
- 2 Open a command prompt and ping your workload:
`ping workload_ip`

WMI Connectivity Test

- 1 Go to your Forge VM.

See [“Downloading the VMware Client Program” on page 39](#) [“Downloading the VMware Client Program” on page 39](#).

- 2 Click *Start > Run*, type `Wbemtest` and press Enter.
- 3 Click *Connect*.
- 4 In the *Namespace*, type the name of the workload you are trying to discover with `\root\cimv2` appended to it. For example, if the hostname is `win2k`, type:

`\\win2k\root\cimv2`

- 5 Enter the appropriate credentials, using either the `hostname\LocalAdmin` or `domain\DomainAdmin` format.
- 6 Click *Connect* to test the WMI connection.

If an error message is returned, a WMI connection cannot be established between PlateSpin Forge and your workload.

Troubleshooting DCOM Connectivity

- 1 Log into the workload that you want to protect.
- 2 Click *Start > Run*.
- 3 Type `dcomcnfg` and press Enter.
- 4 Check connectivity:
 - ♦ For Windows systems (XP/Vista/2003/2008/7), the Component Services window is displayed. In the *Computers* folder of the console tree of the Component Services administrative tool, right-click the computer that you want to check for DCOM connectivity, then click *Properties*. Click the *Default Properties* tab and ensure that *Enable Distributed COM on this computer* is selected.
 - ♦ On a Windows 2000 Server machine, the DCOM Configuration dialog box is displayed. Click the *Default Properties* tab and ensure that *Enable Distributed COM on this computer* is selected.
- 5 If DCOM was not enabled, enable it and either reboot the server or restart the Windows Management Instrumentation Service. Then try adding the workload again.

Troubleshooting RPC Service Connectivity

There are three potential blockages for the RPC service:

- ♦ The Windows Service
- ♦ A Windows firewall
- ♦ A network firewall

For the Windows Service, ensure that the RPC service is running on the workload. To access the services panel, run `services.msc` from a command prompt. For a Windows firewall, add an RPC exception. For hardware firewalls, you can try the following strategies:

- ♦ Putting PlateSpin Forge and the workload on the same side of the firewall
- ♦ Opening up specific ports between PlateSpin Forge and the workload (See [“Access and Communication Requirements across your Protection Network” on page 21](#)).

8.1.2 Disabling AntiVirus Software

Antivirus software might occasionally block some of the PlateSpin Forge functionality related to WMI and Remote Registry. In order to ensure that workload inventory is successful, it might be necessary to first disable the antivirus service on a workload. In addition, antivirus software might occasionally lock access to certain files, allowing access only to certain processes or executables. This might occasionally obstruct file-based data replication. In this case, when you configure the workload protection, you can select services to disable, such as services installed and used by antivirus software. These services are only disabled for the duration of the file transfer, and are restarted when the process completes. This is not necessary during block-level data replication.

8.1.3 Enabling File/Share Permissions and Access

To successfully protect a workload, PlateSpin Forge needs to successfully deploy and install software within the workload. Upon deployment of these components to a workload, as well as during the Add Workload process, PlateSpin Forge uses the workload's administrative shares. PlateSpin Forge needs administrative access to the shares, using either a local administrator account or a domain administrator account for this to work.

To ensure that the Administrative shares are enabled:

- 1 Right-click *My Computer* on the desktop and select *Manage*.
- 2 Expand *System Tools > Shared Folders > Shares*
- 3 In the *Shared Folders* directory, you should see *Admin\$*, among other shares.

After confirming that the shares are enabled, ensure that they are accessible from within the Forge VM:

- 1 Go to your Forge VM.
See [“Downloading the VMware Client Program” on page 39](#).
- 2 Click *Start > Run*, type `\\<server_host>\Admin$`, then click *OK*.
- 3 If you are prompted, use the same credentials as those you will use to add the workload to the PlateSpin Forge workload inventory.
The directory is opened and you should be able to browse and modify its contents.
- 4 Repeat the process for all shares with the exception of the *IPC\$* share.
Windows uses the *IPC\$* share for credential validation and authentication purposes. It is not mapped to a folder or file on the workload, so the test always fails; however, the share should still be visible.

PlateSpin Forge does not modify the existing content of the volume; however, it creates its own directory, to which it requires access and permissions.

8.2 Troubleshooting Workload Inventory (Linux)

Problems or Messages	Solutions
Unable to connect neither to the SSH server running on <IP_address> nor to VMware Virtual Infrastructure web-services at <ip_address>/sdk	<p>This message has a number of possible causes:</p> <ul style="list-style-type: none">♦ The workload is unreachable.♦ The workload does not have SSH running.♦ The firewall is on and the required ports have not been opened.♦ The workload's specific operating system is not supported. <p>For network and access requirements for a workload, see “Access and Communication Requirements across your Protection Network” on page 21.</p>
Access denied	<p>This authentication problem indicates either an invalid username or password. For information on proper workload access credentials, see “Guidelines for Workload Credentials” on page 74.</p>

8.3 Troubleshooting Problems during the Prepare Replication Command (Windows)

Problems or Messages	Solutions
Authentication error when verifying the controller connection while setting up the controller on the source.	<p>The account used to add a workload needs to be allowed by this policy. See “Group Policy and User Rights” on page 99.</p>
Failure to determine whether .NET Framework is installed (with exception The trust relationship between this workstation and the primarydomain failed).	<p>Check whether the Remote Registry service on the source is enabled and started. See also “Troubleshooting Workload Inventory (Windows)” on page 95.</p>

8.3.1 Group Policy and User Rights

Because of the way that PlateSpin Forge interacts with the source workload's operating system, it requires the administrator account that is used to add a workload to have certain user rights on the source machine. In most instances, these settings are defaults of group policy; however, if the environment has been locked down, the following user rights assignments might have been removed:

- ♦ Bypass Traverse Checking
- ♦ Replace Process Level Token
- ♦ Act as part of the Operating System

In order to verify that these Group Policy settings have been set, you can run `gpresult /v` from the command line on the source machine, or alternately `RSOP.msc`. If the policy has not been set, or has been disabled, it can be enabled through either the Local Security Policy of the machine or through any of the Domain Group Policies being applied to the machine.

You can refresh the policy immediately by using `gpupdate /force` (for Windows 2003/XP) or `secedit /refreshpolicy machine_policy /enforce` (for Windows 2000).

8.4 Troubleshooting Workload Replication

Problems or Messages	Solutions
Recoverable error during replication either during <i>Scheduling Taking Snapshot of Virtual Machine</i> or <i>Scheduling Reverting Virtual Machine to Snapshot before Starting</i> .	This problem occurs when the server is under load and the process is taking longer than expected. Wait until the replication is complete.
Workload issue requires user intervention	Several types of issues might cause this message. In most cases the message should contain further specifics about the nature of the problem and the problem area (such as connectivity, credentials, . After troubleshooting, wait for a few minutes. If the message persists, contact PlateSpin Support.
All workloads go into recoverable errors because you are out of disk space.	Verify the free space. If more space is required, remove a workload.
Slow network speeds under 1 MB.	Confirm that the source machine's network interface card's duplex setting is on and the switch it is connected to has a matching setting. That is, if the switch is set to auto, the source can't be set to 100 MB.
Slow network speeds over 1 MB.	Measure the latency by running the following command from the source workload: <code>ping ip-t</code> (replace <i>ip</i> with the IP address of your Forge VM). Allow it to run for 50 iterations and the average indicates the latency. Also see "Optimizing Data Transfer over WAN Connections" on page 23.
The file transfer cannot begin - port 3725 is already in use or 3725 unable to connect	Ensure that the port is open and listening: Run <code>netstat -ano</code> on the workload. Check the firewall. Retry the replication.
Controller connection not established Replication fails at the <i>Take Control of Virtual Machine</i> step.	This error occurs when the replication networking information is invalid. Either the DHCP server is not available or the replication virtual network is not routable to the Forge VM. Change the replication IP to a static IP or enable the DHCP server. Ensure that the virtual network selected for replication is routable to the Forge VM.

Problems or Messages	Solutions
Replication job does not start (stuck at 0%)	<p>This error can occur for different reasons and each has a unique solution:</p> <ul style="list-style-type: none"> For environments using a local proxy with authentication, bypass the proxy or add proper permissions to resolve this problem. See KB Article 20339 (http://www.novell.com/support/viewContent.do?externalId=7920339) for more details. If local or domain policies restrict required permissions, follow the steps outlined in KB Article 7920862 (http://www.novell.com/support/viewContent.do?externalId=7920862). <p>This is a common issue when Forge VM is affiliated with a domain and the domain policies are applied with restrictions. See “Group Policy and User Rights” on page 99.</p>

8.5 Generating and Viewing Diagnostic Reports

In the PlateSpin Forge Web Interface, after you have executed a command, you can generate detailed diagnostic reports about the command's details.

- 1 Click *Command Details*, then click the *Generate Diagnostics* link.

The screenshot displays the PlateSpin Forge Web Interface. At the top, there is a navigation bar with links: Dashboard, Workloads, Tasks, Reports, Settings, About, and Help. Below the navigation bar, the 'Command Details' tab is selected. The main content area shows the command 'Running First Replication' with a status of 'Running' and a progress bar at 80%. The command is associated with the user 'DI-Sies11.platespin.com'. Below the command details, there is a 'Command Summary' section with fields for Status, Start Time, Duration, and Steps. A 'Generate Diagnostics' link is highlighted with a red box. The 'Replication Transfer Summary' section shows Average Transfer Speed, Total Data Transferred, and Duration. The bottom section is labeled 'Workload Commands'.

After a few moments, the page refreshes and displays a *View* link above the *Generated Diagnostics* link.

- 2 Click *View*.

A new page opens with comprehensive diagnostic information about the current command.

- 3 Save the diagnostics page and have it ready if you need to contact technical support.

8.6 Removing Workloads

In some circumstances you might need to remove a workload from the PlateSpin Forge inventory and re-add it later.

- 1 On the Workloads page, select the workload that you want to remove, then click *Remove Workload*.

(Conditional) For Windows workloads previously protected through block-level replication, the PlateSpin Forge Web Interface prompts you to indicate whether you also want to remove the Block-Based Components. You can make the following selections:

- ♦ **Do not remove components:** The components will not be removed.
- ♦ **Remove components but do not restart workload:** The components will be removed. However, a reboot of the workload will be required to complete the uninstallation process.
- ♦ **Remove components and restart workload:** The components will be removed, and the workload will be automatically rebooted. Make sure you carry out this operation during scheduled downtime.

- 2 On the Command Confirmation page, click *Confirm* to execute the command.
Wait for the process to complete.

8.7 Post-Protection Workload Cleanup

Use these steps to clean up your source workload from all PlateSpin software components when required, such as following an unsuccessful or problematic protection.

8.7.1 Cleaning Up Windows Workloads

Component	Removal Instructions
PlateSpin Block-Based Transfer Component	See KB Article 7005616 (http://www.novell.com/support/viewContent.do?externalId=7005616).
Third-party Block-based Transfer Component (discontinued)	<ol style="list-style-type: none">1. Use the Windows Add/Remove Programs applet (run <code>appwiz.cpl</code>) and remove the component. Depending on the source, you might have either of the following versions:<ul style="list-style-type: none">♦ SteelEye Data Replication for Windows v6 Update2♦ SteelEye DataKeeper For Windows v72. Reboot the machine.
File-based Transfer Component	At root level for each volume under protection, remove all files named <code>PlateSpinCatalog*.dat</code>
Workload Inventory software	In the workload's Windows directory: <ul style="list-style-type: none">♦ Remove all files named <code>machinediscovery*</code>.♦ Remove the subdirectory named <code>platespin</code>.

Component	Removal Instructions
Controller software	<ol style="list-style-type: none"> 1. Open a command prompt and change the current directory to: <ul style="list-style-type: none"> ♦ \Program Files\platespin* (32-bit systems) ♦ \Program Files (x86)\platespin* (64-bit systems) 2. Run the following command: <pre>ofxcontroller.exe /uninstall</pre> 3. Remove the platespin* directory

8.7.2 Cleaning Up Linux Workloads

Component	Removal Instructions
Controller software	<ul style="list-style-type: none"> ♦ Kill these processes: <ul style="list-style-type: none"> ♦ <code>pkill -9 ofxcontrollerd</code> ♦ <code>pkill -9 ofxjobexec</code> ♦ remove the OFX controller rpm package: <pre>rpm -e ofxcontrollerd</pre> ♦ In the workload's file system, remove the <code>/usr/lib/ofx</code> directory with its contents.
Block-level data transfer software	<ol style="list-style-type: none"> 1. Check if the driver is active: <pre>lsmod grep blkwatch</pre> <p>If the driver is still loaded in memory, the result should contain a line, similar to the following:</p> <pre>blkwatch_7616 70924 0</pre> 2. (Conditional) If the driver is still loaded, remove it from memory: <pre>rmmod blkwatch_7616</pre> 3. Remove the driver from the boot sequence: <pre>blkconfig -u</pre> 4. Remove the driver files by deleting the following directory with its contents: <pre>/lib/modules/[Kernel_Version]/Platespin</pre> 5. Delete the following file: <pre>/etc/blkwatch.conf</pre>

Component	Removal Instructions
LVM snapshots	<p>LVP snapshots used by ongoing replications are named according to a <i>volume_name-PS-snapshot</i> convention. For example, a snapshot of a LogVol01 volume will be named LogVol01-PS-snapshot.</p> <p>To remove these LVM snapshots:</p> <ol style="list-style-type: none"> 1. Generate a list of snapshot on the required workload by using one of the following ways: <ul style="list-style-type: none"> ♦ Use the PlateSpin Forge Web Interface to generate a Job Report for the failed job. The report should contain information about LVM snapshots and their names. - OR - ♦ On the required Linux workload, run the following command to display a list of all volumes and snapshots: <pre># lvdisplay -a</pre> 2. Note the names and locations of the snapshots you want to remove. 3. Remove the snapshots by using the following command: <pre>lvremove <i>snapshot_name</i></pre>
Bitmap files	<p>For each volume under protection, at the root of the volume, remove the corresponding <i>.blocks_bitmap</i> file.</p>
Tools	<p>On the source workload, under <i>/sbin</i>, remove the following files:</p> <ul style="list-style-type: none"> ♦ <i>bmaputil</i> ♦ <i>blkconfig</i>

Glossary

Appliance Host. See [Container](#).

Container. The VM host that contains the failover workload (a protected workload's bootable virtual replica).

Event. A PlateSpin Forge Server message that contains information about important steps throughout the workload protection lifecycle.

Failback. Restoration of the business function of a failed workload in its original environment when the business function of a temporary failover workload within PlateSpin Forge is no longer required.

Failover. Taking over the business function of a failed workload by a failover workload within a PlateSpin Forge VM container.

Failover Workload. A protected workload's bootable virtual replica.

Incremental. 1. (noun) An individual scheduled transfer or manual transfer of differences between a protected workload and its replica (the failover workload).

2. (adjective) Describes the scope of *replication* (1), in which the initial replica of a workload is created differentially, based on differences between the workload and its prepared counterpart.

Management VM. The management virtual machine containing the PlateSpin Forge software.

Prepare for Failover. A PlateSpin Forge operation that boots the failover workload in preparation of a full Failover operation.

Protection Tier. A customizable collection of workload protection parameters that define the frequency of replications and criteria for the system to consider a workload as failed.

Protection Contract. A collection of currently-active settings pertaining to the complete lifecycle of a workload's protection (*Add-inventory*, initial and ongoing *Replications*, *Failover*, *Failback*, and *Reprotect*).

Recovery Point. A point-in-time snapshot, allowing a replicated workload to be restored to a previous state.

Recovery Point Objective (RPO). Tolerable data loss measured in time and defined by a configurable interval between incremental replications of a protected workload.

Recovery Time Objective (RTO). A measure of a workload's tolerable downtime defined by the time a failover operation takes to complete.

Replication. 1. *Initial Replication*, the creation of an initial base copy of a workload. Can be carried out as a *Full Replication* (all workload data is transferred to a 'blank' failover VM), or as an *Incremental Replication* (see [Incremental](#) (2)).

2. Any transfer of changed data from a protected workload to its replica in the container.

Replication Schedule. The schedule that is set up to control the frequency and scope of replications.

Reprotect. A PlateSpin Forge command that reestablishes a protection contract for a workload following the failover and failback operations.

Source. A workload or its infrastructure that is the starting point of a PlateSpin Forge operation. For example, upon initial protection of a workload, the source is your production workload. In a failback operation, it is the failover workload in the container.

See also [Target](#).

Target. A workload or its infrastructure that is the outcome of a PlateSpin Forge command. For example, upon initial protection of a workload, the target is the failover workload in the container. In a failback operation, it is either your production workload's original infrastructure or any supported container that has been inventoried by PlateSpin Forge.

See also [Source](#).

Test Failover. A PlateSpin Forge operation that boots a failover workload in an isolated networking environment for testing the functionality of the failover and verifying the integrity of the failover workload.

Test Time Objective (TTO). A measure of the ease with which a disaster recovery plan can be tested. It is similar to RTO, but includes the time needed for a user to test the failover workload.

Workload. The basic object of protection in a data store. An operating system, along with its middleware and data, decoupled from the underlying physical or virtual infrastructure.