

rBuilder 4.1 Administration Guide

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rBuilder 4.1 Administration Guide: 4.1.1-2008-08-18

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Chapter 1. Introduction

rBuilder is the first and only development tool that simplifies and automates the creation of software appliances and virtual appliances. rBuilder combines powerful features with innovative packaging techniques to yield a repeatable appliance creation process. Appliance development makes use of the rBuilder features to organize appliances and their software, and it employs rBuilder to generate appliance images and to release complete appliance products.

The rPath appliance product called rBuilder is licensed by rPath and can be installed and run on a customer's internal network, behind a firewall. The licensed rBuilder provides appliance development features while protecting licensed software and other sensitive information. The licensed rBuilder also provides a client utility for automating some interface tasks.

This document is a guide for system administrators deploying and maintaining a licensed rBuilder from rPath. A separate rBuilder User Guide is also available for rBuilder 4.1 for those using the rBuilder interface as part of appliance development.

Chapter 2. Update Summary for Version 4.1

The following sections provide important information and instructions related to updating an existing rBuilder appliance to version 4.1.

Note

The rPath Wiki has an archive of the versions-specific update summaries for rBuilder versions earlier than those cited in this guide. See the rBuilder main page on the rPath Wiki for more information: <http://wiki.rpath.com/wiki/rBuilder>

2.1. Update Checklist

Use the following checklist as a guide when stepping through an update from 4.0.0, 4.0.1, or 4.0.2. For updates from versions prior to 4.0.0, see Section 2.3, “Specific Concerns for 3.x Updates”.

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2.2. PostgreSQL Migration

Starting with version 4.1.0, the Conary repositories for products in rBuilder can use PostgreSQL databases instead of MySQL databases. PostgreSQL provides better performance, improved concurrency, and higher reliability. After updating rBuilder to 4.1, schedule a maintenance window as appropriate prior to migrating to PostgreSQL.

Warning

Unlike appliance updates performed in the rAPA interface, this migration is irreversible. However, the migration creates new databases and allows users to test the PostgreSQL conversion before selecting to finalize the change and remove the old databases.

During the maintenance window for PostgreSQL migration, a site administrator must put the appliance in maintenance mode (see Section 6.5, “Manage Maintenance Mode”). Then, an appliance administrator should ensure there is a current backup of the appliance to preserve the product repository contents prior to migration.

To start the migration, an appliance administrator must access the rAPA web interface for rBuilder, select the *PostgreSQL Migration* task, and click **Convert**. The administrator should monitor the progress indicator during the process and click **OK** when the conversion is complete. The migration process could take up to two hours for rBuilder appliances with a local mirror of rPath Linux or the rPath Appliance Platform Linux Service.

After the conversion, administrators should exit maintenance mode and allow developers to verify that their day-to-day rBuilder interactions can resume using the converted product repositories.

Specific Concerns for 3.x Updates

If developers are confident they can continue their work without any issues, administrators should return to the *PostgreSQL Migration* task in rAPA and click **Finalize Conversion**. This removes the old databases to free up disk space.

If developers experience issues interacting with product repositories and are not able to continue their work, the Designated Contact for rPath Support on that rBuilder should contact rPath immediately for assistance in repairing the migration.

2.3. Specific Concerns for 3.x Updates

rBuilder 4.0.0 was released for new installations only, and rBuilder 4.0.1 and forward have unique update path from pre-4.x rBuilder installations. Because of major changes in the partition structure and job handling, updating to 4.x from pre-4.x versions requires a backup, new installation, and restore process with scheduled assistance and removable storage from rPath. Those customers who have not completed an update from 3.x to 4.0.1 or later should schedule a 4.x migration with an rPath Services representative and complete the instructions to prepare for this update as described in the following rPath Wiki page: http://wiki.rpath.com/wiki/rBuilder:Update_Path_to_4.x

Chapter 3. Install rBuilder

Plan and perform an install for the rBuilder appliance software using the following sections as a reference.

Warning

rBuilder is packaged as a software appliance and configured to run on dedicated hardware, including consuming all locally-attached disk storage. DO NOT install rBuilder on hardware whose internal or attached storage has data you wish to keep.

3.1. Obtain Installation Media

To obtain rBuilder installation media, please contact your rPath sales representative or field engineer.

3.2. Hardware Specifications

Select dedicated hardware for rBuilder that meets the following minimum requirements. Because of its use of virtual technologies on the physical disk to optimize its operations, rBuilder itself is not supported as a virtual machine install:

- *CPU* -- Server-class 64-bit x86 architecture with one or more 2+ GHz processors
- *RAM* -- Minimum of 4 GB, recommended 8 GB
- *Physical disks* -- 250 GB high-performance storage
 - Includes storage for one branch of rPath Linux, used when developing appliances based on the rPath Appliance Platform
 - Allows for storing additional rPath Linux branches, which will grow over time
 - Provides growing repository space for software development work
- *Removable media* -- CD/DVD drive for installation media and a hardware configuration that ensures that the system can boot from that media
- *Network interface* -- A suitable network interface with either a static or dynamic IP address accessible by an unchanging resolvable fully-qualified domain name
- Ability to contact rPath product repositories using their fully-qualified domain names, as follows:
 - *products.rpath.com*
 - *rap.rpath.com*

Warning

Motherboards with the ICH9 chipset are not compatible with the current version of Xen Hypervisor. rBuilder will not operate properly with ICH9 chipsets. rPath recommends that the ICH9 Chipset not be used for rBuilder. Please contact your hardware manufacturer to ascertain if your server hardware uses this chipset.

3.3. Network Environment Planning

Use the following points when planning a deployment of rBuilder as part of an existing network environment:

- rPath recommends the server is configured to receive an IP address from DHCP prior to rBuilder installation on the server. rBuilder requires a resolvable fully qualified domain name (FQDN) to be assigned during its installation.
- The selected hardware should have a network configuration that is accessible from other hosts on the same network segment.
- In most cases, rBuilder is installed behind a firewall and not directly exposed through outward-facing network interfaces.
- Ensure that the network can accommodate the listening network ports for the deployed rBuilder as shown in the following table:

Table 3.1. rBuilder Listening Network Ports

Port Number	Protocol	Purpose
22	TCP	Secure shell server (SSH)
80	TCP	Hypertext Transfer Protocol (HTTP)
161	TCP, UDP	SNMP
443	TCP	Hypertext Transfer Protocol, secured (HTTPS)
8003, 8004	TCP	rPath Appliance Platform Agent (rAPA)
35000	TCP, UDP	Nagios monitoring program

3.4. Disk Usage and Partition Schema

Each product within rBuilder has its own Conary repository which varies in size based on two factors:

- The size of the application software that resides in the repository
- The extent of modifications over time to the application software and the Conary source used to package it

While a smaller product, such as components used to build other appliances, may require a few megabytes of storage, larger products, such as complete appliances for enterprise server software, can require several gigabytes of storage. Working with developers, estimate the aggregate size of product repositories over time when planning disk usage and backup strategies.

Logical Volume Management (LVM) is used by rBuilder to support its image building tasks. Using LVM allows rBuilder to increase or decrease partition size as needed and to adapt dynamically to increases or decreases in activity.

The partition schema for rBuilder is diagramed below. Note that the product repositories reside in the root partition:

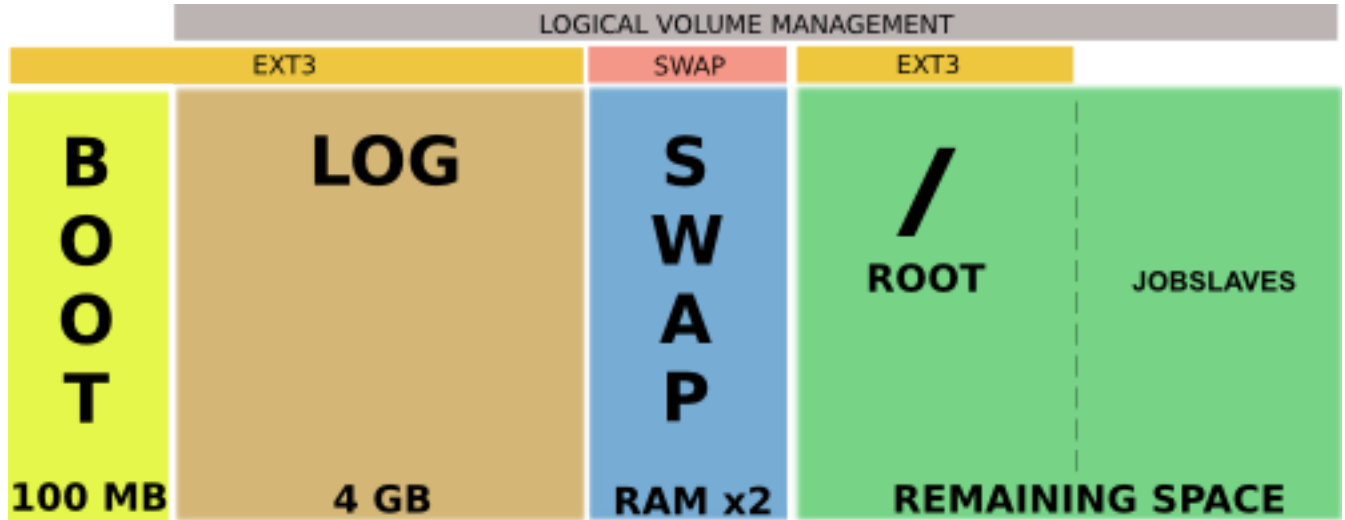


Figure 3.1. rBuilder Parition Structure

The rBuilder partitions are created in the following manner, though note that they may not be created in the order shown:

- 100 MB is reserved for the boot partition (filesystem type ext3)
- 4 GB is reserved for `/var/logs` (filesystem type ext3 with LVM)
- The swap partition is automatically set at a size that is double the amount of RAM (filesystem type swap with LVM)
- The remaining space not previously described is split between the root partition (filesystem type ext3 with LVM) and an area managed by LVM for managing image building

3.5. Installation Process

When installing rBuilder from install media (such as a DVD), follow the same steps as with installing appliances built with rBuilder. An rBuilder installation takes approximately 30 minutes. See the rPath Wiki if necessary to reference possible responses to each step in the graphical install (http://wiki.rpath.com/wiki/Appliance_Administration:Installation_Process).

Chapter 4. Configure rBuilder

When rBuilder first boots after installation, it start web services and provides administration interfaces in their initial configuration mode. To access the rBuilder administration interface, use a computer system on the same network segment as the rBuilder. Then, from a web browser with JavaScript support enabled, access its fully-qualified domain name using HTTP, such as in `http://rbuilder.example.com`.

The following sections step through three initial configuration steps:

1. Complete the rBuilder as prompted site configuration to complete its basic settings. See Section 4.1, “rBuilder Site Configuration” as a detailed reference.
2. Step through the rPath Appliance Platform Agent configuration wizard for initial appliance administration tasks. See Section 4.2, “rAPA Configuration Wizard” as a detailed reference.
3. Add the rPath Appliance Platform as an externally-managed product. See Section 4.3, “Add the rPath Appliance Platform” as a detailed reference.

4.1. rBuilder Site Configuration

rBuilder site administration should be the responsibility of one or more individuals who have an understanding of the purpose and use of rBuilder as part of appliance development work. Though a system administrator can perform appliance installation plus administration using the rPath Appliance Platform Agent, site administration can be delegated to those responsible for the day-to-day appliance development work using rBuilder. After this initial configuration, see Chapter 6, *rBuilder Site Administration* as a reference for performing ongoing rBuilder administration.

rBuilder displays a configuration page upon the first successful access to the web interface. Use this page to add or modify some initial characteristics of rBuilder. Some of the field values are populated with default settings that you can modify as needed. Use the following points as a guide:

- *Branding* -- Type the organization's name and the URL for the organization's public website or intranet website.
- *Server Setup* -- The DHCP-assigned values for the rBuilder hostname and domain name are shown by default. This should have been arranged when planning the rBuilder deployment on that network (see Chapter 3, *Install rBuilder*). In the rare case this needs to be changed, modify the values as appropriate, but be aware of network issues that may arise if this information does not correspond with the network settings on the system. The hostname must be different than any product short names used on products created within that rBuilder.
- *Repository Setup* -- System administrators should work with appliance developers to set this value as appropriate for the intended use of rBuilder. This value makes up the corporate tag used in all the Conary labels for products in this rBuilder instance. rPath suggests working with a field engineer to find a value that works best with your organization's product development and release management.
- *(Optional) External Passwords* -- This field is reserved.
- *(Optional) Miscellaneous* -- Use the checkbox for the OpenPGP key requirement if you require that developers sign each commit (a group of items checked in to an rBuilder repository). If this is required, inform each developer that after he sets up his rBuilder account, and he

is added to one or more products, he must upload an OpenPGP key as part of his account settings. To upload a key, click the *Edit my account* link in the rBuilder interface to edit account settings, and click the *Upload a package signing key* link to select and upload a public key. (See [openpgp.org](http://www.openpgp.org) [http://www.openpgp.org] for more information about generating and using OpenPGP keys.)

- *Initial Administrator Account* -- Complete this account information for the initial site administrator who should have unrestricted access to rBuilder and should perform regular site administration such as configuring Update Service connections and managing rBuilder user accounts.

The branding can be updated at any time as part of site administration. See Section 6.6, “Re-run Initial Setup” for more information.

4.2. rAPA Configuration Wizard

rBuilder appliance administration should be the responsibility of one or more individuals who perform regular administration tasks on the system, such as backups, updates, and log viewing. Those who use the rPath Appliance Platform Agent on rBuilder do not need to know the details of appliance development work with rBuilder. After this initial configuration, see Chapter 7, *rBuilder Appliance Administration* as a reference for ongoing system administration

Note

System administrators, referred to here as *appliance administrators*, should rarely require command-line access to rBuilder. Such low-level access should only be used if rPath support provides instructions for using command line when addressing a specific issue.

After the site configuration for rBuilder, step through the rPath Appliance Platform Agent (rAPA) configuration wizard. When used in an appliance, rAPA is used to perform common appliance administration tasks, such as updates and backups. The rAPA interface can be customized to the needs of the appliance, and the rBuilder appliance has such customizations in its own rAPA interface.

Use the following steps to step through the rAPA configuration wizard in a new rBuilder install:

1. Log in to rBuilder as the initial administrator configured as part of the site configuration.
2. Click **Site administration**.
3. Click **Enter rPath Appliance Agent**, and verify a new browser window is launched. Note that it is typical to receive warning messages that the certificate being used was not created by a recognized Certificate Authority, but no action is required regarding these warnings during this rAPA configuration wizard.
4. When the sign in dialog is displayed, enter the same rBuilder user name and password.
5. At the rAPA sign in, enter the rAPA default credentials: user name **admin** and password **password**.
6. Step through the configuration wizard as prompted, including changing admin's password for rAPA, configuring email notifications of appliance events, uploading an entitlement for rBuilder as provided by rPath, and selecting an initial backup configuration. See Chapter 7, *rBuilder Appliance Administration* as a reference for these rAPA tasks.

4.3. Add the rPath Appliance Platform

Before rBuilder users create and develop appliance products based on the rPath Appliance Platform, site administrators should add the rPath Appliance Platform product and any other externally-managed products used for appliance development.

Log in to rBuilder as the initial site administrator if necessary, click **Site administration**, and then click **Add External Product**. On the first access of this task, the fields are pre-populated with the appropriate values for adding the rPath Appliance Platform:

- *Product Name* -- **rap**
- *Product Title* -- **rPath Appliance Platform - Linux Service**
- *Product Label* -- **rap.rpath.com@rpath:linux-1**
- *Repository URL* -- Leave this field blank
- *Authentication* -- Select to **Use an entitlement** and provide the entitlement class and key provided by your rPath representative
- *Mirror Settings* -- rPath recommends caching contents of the rPath Appliance Platform locally as needed rather than mirroring all the contents to the rBuilder. Keep the default selection to *Cache contents of this repository over the network*. To read more about this selection, see Section 6.2, “Externally-managed Products”.
- *Backup Settings* -- In the rare cases in which administrators choose to mirror the rPath Appliance Platform contents, they also have the option to include the mirrored contents when performing backups. As noted in the interface, this will make rBuilder backups much larger as it includes a lot of historical data that has been mirrored. It is because of that substantial size that rPath recommends caching the platform components as they are used rather than mirroring them in their entirety.

After adding the rPath Appliance Platform product, rBuilder redirects to the local product page corresponding to the externally-managed product. If the product repository should be pre-loaded from a mirror, click the **Load mirror** link on that product page and follow the interface steps to perform the preload.

Warning

Even though there is a product home page in rBuilder for each externally-managed product, no appliance development work will be performed directly on that product. Instead, consider the product home within rBuilder as just a browser for the externally-managed product.

To add other externally-managed products, or to manage how those products are tied in with rBuilder, return to the *Add External Product* task in the *Site administration* area, and use Section 6.2, “Externally-managed Products” as a reference.

4.4. Create a Test Product

Create a product on a newly installed and configured rBuilder to test the completed setup. Create the product as described in rBuilder User Guide, and add one or more developers for that product. Then, have those developers test packaging software for the product's repository. Interactions between the appliance development environment and rBuilder should be prompt and error-free.

Chapter 5. What to Tell Developers

After installing and configuring a new rBuilder, administrators must provide the following information to those who will use that rBuilder as part of appliance development work:

- *rBuilder URL* -- The web address (URL) required to access the main rBuilder web interface
- *User credentials* -- If a rBuilder user was registered by the administrators, this is the user name and password required for that user to log in to rBuilder
- *Include configuration URL* -- The URL of the configuration file on the rBuilder appliance that developers can use in their environments in place of maintaining multiple repository map lines; this is typically the URL of the rBuilder with `"/conaryrc"` added to the end (such as in `http://builder.example.com/conaryrc`) which, in a browser, displays a list of `repositoryMap` lines, one corresponding to each rBuilder product repository

Chapter 6. rBuilder Site Administration

Site administration tasks are specific to the rBuilder software and include configuring externally-managed products, configuring Update Service interaction, and managing users and maintenance mode. For rBuilder appliance administration, such as performing updates and backups, see Chapter 7, *rBuilder Appliance Administration*.

Use the links on the left side of the rBuilder site administration interface to access each task, and use the following sections as a reference for each task.

6.1. Create and Manage Users

Use the form on this page to create rBuilder users. To assign those users to particular roles on particular products, use the rBuilder interface for those products as described in the rBuilder User Guide.

To edit or delete users, or to manage site administrators, click **users** in the search area at the top of the primary rBuilder interface (not site administration). Browse the alphabetical list of users to find a particular user, or use the search tool to help narrow down the choices. Click the *User Name* value for the user you wish to modify, and then use the drop-down list of actions under *Administrative Options* to take one of the following actions. Click **Go** after the selection is made to complete the action:

- *Reset Password* -- reset the user's password, and email the user his or her new password
- *Cancel Account* -- close the user's account so that the user no longer has access to this rBuilder instance
- *Grant Administrative Privileges/Revoke Administrative Privileges* -- grant or revoke rBuilder site administration privileges; note this does not include appliance administration with rAPA, which has a different user registration (see Chapter 7, *rBuilder Appliance Administration*)

6.2. Externally-managed Products

Add externally-managed products to rBuilder through the *Externally-Managed Products* task in site administration. Externally-managed products appear in rBuilder just as native products do, but the external product's repository is not managed on the local rBuilder appliance.

Add the rPath Appliance Platform as the first externally-managed product. This should have been done as part of initial configuration as described in Section 4.3, “Add the rPath Appliance Platform”. Reference that section for the key information used to set up rPath Appliance Platform as an externally-managed product.

Click **Externally-Managed Products** in the site administration interface to add and manage other external products, such as the rPath Appliance Platform Agent. When adding a new external product, click **Add a New External Product**, complete the form, and click **Add**. Use the following points as a guide when completing the form:

- *Product Short Name* and *Product Title* -- Type the values here that correspond to the short name and title for the product as it resides on the remote rBuilder or Update Service.
- *Product Label* -- Type the product label used by that product, and note that rBuilder users will have access to more of that product than just that particular label.

- *Repository URL* -- Type the repository URL for the external product, or leave this field blank to have rBuilder use the standard URL format derived from the product's label (such as *http://app.example.com/conary/* for the label *app.example.com@rpl:1*).
- *Authentication* -- If the external product's repository requires authentication, select the appropriate authentication method to use. If the external product is public, you may not need to provide credentials. If the external product is private, and you have permission to access the remote product's repository, type the credentials required for that remote repository. If you have been provided an entitlement for access to the external product, type or paste the entitlement key.
- *Mirror Settings* -- rPath recommends selecting to cache the contents of externally-managed products so that the only data stored on the local rBuilder appliance is that which is in use. However, in rare cases, administrators may choose to have a local mirror of the entire product repository, typically to provide faster, more dependable access at sites with less dependable Internet connections. Note the following if selecting to mirror contents:
 - Selecting to mirror the contents requires regular network updates to ensure the local mirror is synchronized with the external product's repository.
 - The initial mirroring could take a significant amount of time, and they synchronize once each hour by default.
 - To change this inbound mirroring schedule, or to manually launch synchronization, use the *Schedule Inbound Mirroring* feature as part of appliance administration with rAPA (see Chapter 7, *rBuilder Appliance Administration*).
 - Use the form to select whether to mirror any labels other than the one provided in the *Project Label* field, and type each separated by spaces in the text box provided.
- *Backup Settings* -- By default, rBuilder will not include any externally-managed products in its backups. Check this box to include this particular product in those backups, and be aware of the impact on backup size when adding this product mirror.

Note

Each developer must be informed that when setting up his development environment, an `includeConfigFile` directive should be added the global section of his Conary configuration file (`~/conaryrc`). If it is not included, the development environment is unable to determine the appropriate access permissions to externally-managed products such as the rPath Appliance Platform from rPath. The line to add to the file is similar to the following, replacing "rbuilder.example.com" with your rBuilder hostname:

```
includeConfigFile http://rbuilder.example.com/conaryrc
```

6.3. Configure Update Services

The rPath Appliance Platform Update Service is used to mirror appliance software from a rBuilder repository behind a firewall to one or more externally-accessible Update Service appliances (rUS). This protects software still in development while providing released software to deployed appliances when they check in for updates.

Starting with version 4.1.0, uses the *Configure Update Services* interface for adding target Update Service appliances to which software should be mirrored. There are two ways in which the software can be mirrored:

Configure Update Services

- *Mirror by published release* -- all the software associated with a published releases on products within rBuilder is automatically mirrored to the given target
- *Mirror by label* -- only specific labels and contents are mirrored to the given target, whether or not the software is part of a published release

Prior to version 4.1.0, mirroring to rUS was configured in the *Configure Outbound Mirroring* feature only. This feature requires specifying what contents must be mirrored out to the Update Service appliance.

A corresponding feature added in 4.1.0 is the *appliance update* release. This allows developers to provide a software release without generating a new set of images. By combining new features, most developers should be able to eliminate the extra step of using *Configure Outbound Mirroring*. See the rBuilder User Guide for more information about creating and publishing releases, both with images and with appliance updates.

Use this feature instead of *Configure Outbound Mirroring* if you only need to publish software identified with an appliance release. If you need to mirror software that is not a part of a release, or if you need to mirror packages or labels that are not defined for an appliance product, use *Configure Outbound Mirroring* instead.

Note

If you have updated to rBuilder 4.1 from a previous version, and you had outbound mirroring configured before, the targets you had configured are already listed in the new *Configure Update Services* interface. However, mirroring by published releases is disabled in favor of mirroring by label as configured in the *Configure Outbound Mirroring* interface. See Section 6.4, “Configure Outbound Mirroring” to learn more about how this feature was updated and how to remove a configuration in favor of mirroring by published release.

Use the following instructions to manage each rUS target to which releases should be published:

1. Be sure that the Update Service appliance itself is configured to receive updates from the rBuilder appliance. See the Update Service Guide for further instructions.
2. Click **Add an Update Service** to add a new rUS to the list.
3. Complete the *Add Update Service* form with the Update Service appliance hostname and the credentials of the administrator account on that rUS. This information should be determined when configuring the rUS and should be provided by the individuals responsible for that rUS. See the Update Service Guide for more information.
4. Click **Submit** to add the rUS, or click **Cancel** to cancel this action.

Use the checkboxes provided in the list of Update Service targets to select any of them for removal. Click **Remove Selected** to remove the targets permanently.

No additional steps are required by site administrators to ensure that published releases are mirrored to the listed Update Service targets. Also, any currently published releases will automatically synchronize to each new rUS added to this target list.

Warning

If this is the first time you have used this feature, and you have existing published releases in your rBuilder, verify those releases should be published to the targets before

adding them to the list. If necessary, unpublish any releases prior to adding rUS targets, or disable mirroring temporarily as described in Section 7.11, “Schedule Outbound Mirroring”. When applicable, modify or remove outbound mirrors for the same products as configured in the *Configure Outbound Mirroring* interface.

6.4. Configure Outbound Mirroring

Prior to version 4.1.0, mirroring to rUS was configured in the *Configure Outbound Mirroring* feature only. This feature requires specifying what contents must be mirrored out to the Update Service appliance. In version 4.1.0 or later, developers can choose to mirror by label in this way, or to mirror by published release. See Section 6.3, “Configure Update Services” to read about these two different ways of mirroring software to Update Service appliances.

Use this feature in addition to *Configure Update Services* if you need to mirror software that is not a part of an image or appliance update release, or if you need to mirror packages or labels that are not defined for an appliance product. If you only need to mirror software identified with an appliance release, do not configure outbound mirrors in this interface, but use *Configure Update Services* alone to mirror by published release.

The list on the *Outbound Mirrored Products* task page displays the name of each mirrored product from rBuilder, the fully-qualified domain name (FQDN) of the Update Service targets, and the packages and labels within the product which are mirrored to those targets. The mirrors are synchronized in the order displayed.

Warning

If you configure an outbound mirror target in this feature, it automatically overrides mirroring by published releases. For each product, select which method to use to mirror software to Update Service appliances.

6.4.1. Add and Modify Mirrored Products

Adding a new outbound mirror is a two-step process: selecting what software to mirror, and selecting the targets to which the software is mirrored.

First, click **Add an Outbound Mirror**, complete the form, and click **Save** to designate contents to mirror from a particular product. Use the following as a guide when completing the form:

- Whether mirroring by published releases or mirroring by label, add each Update Service appliance in the *Configure Update Services* interface.
- Select a product to mirror from the given drop-down list which includes all products in rBuilder.
- Check the boxes for the configured Update Service targets to which the software should be mirrored.
- Select which method should be used to mirror the software. See Section 6.3, “Configure Update Services” for more information about each method, and note that if you are mirroring by published releases, you do not need to configure this outbound mirror.
- Select whether to mirror all labels in the product repository, or to only mirror selected labels. The labels listed are all those on which software exists in that product repository. When mirroring only selected labels, use the checkboxes to select those labels.

Adjust the Mirroring Order and Schedule

- Select whether to mirror all contents on the selected labels or to only mirror certain groups on those labels. Mirroring groups automatically includes all the packages referenced by those groups. The groups listed are all those that exist on any label within that product repository. When mirroring only selected groups, use the checkboxes to select those labels.
- If applicable, check the box to include source components when mirroring. Be aware of open source licenses which require this availability to consumers, and be aware of closed-source licenses which protect certain sources.

Use the main *Configure Outbound Mirroring* task page to remove projects and to change the order of products in the list.

6.4.2. Adjust the Mirroring Order and Schedule

Because the mirrors are synchronized in the order shown, the order in which the mirrors are listed is important when one repository's contents depends on another. For example, if you are mirroring `rap.rpath.com@rpath:linux-1`, which represents the rPath Appliance Platform on which appliances can be based, this should be listed before other products that are built on the rPath Appliance Platform. Use the up-arrow and down-arrow buttons in the *Order* column to change the order for outbound mirroring actions.

Mirrors will synchronize between the rBuilder and rUS as configured in the *Schedule Outbound Mirroring* task in rBuilder appliance administration with rAPA. Use this task to enable and disable scheduled synchronization and to manually launch a synchronization. See Chapter 7, *rBuilder Appliance Administration* as a detailed reference for this feature.

As described in the *Configure Update Services* section, each Update Service appliance must be configured to receive the mirror updates from the rBuilder. rBuilder will display an error if it cannot connect as configured. See the Update Service Guide for further reference.

6.5. Manage Maintenance Mode

Use maintenance mode for rBuilder to suspend normal operation and perform maintenance that is not possible when rBuilder is in use. Click **Manage Maintenance Mode** in the site administration interface, and note the current operating condition displayed. The task provides a button to toggle to its alternate condition: to place the rBuilder in maintenance mode, click **Invoke Maintenance Mode**; to exit maintenance mode, click **Restore Normal Operation**.

6.6. Re-run Initial Setup

Use *Re-run Initial Setup* to change the configuration of some of the items configured upon initial post-install site configuration. Though the namespace value in *Repository Setup* cannot be changed, items such as the organization branding be updated as needed. See Section 4.1, “rBuilder Site Configuration” as a reference. Click **Save Changes** to save any changes, or navigate away from the setup page to continue using the current settings.

6.7. Launch the rPath Appliance Platform Agent

The rPath Appliance Platform Agent (rAPA) is used to perform appliance administration tasks, such as performing updates and backups. In some cases, such tasks may be performed by system

Launch the rPath Appliance Platform Agent

administrators who do not use rBuilder on a regular basis. System administrators can access the URL for the rBuilder rAPA interface directly when needed, and site administrators can use that URL or the *Enter rPath Appliance Agent* link from site administration. Log in to rAPA with the credentials of a rAPA user on the rBuilder appliance (such as the initial "admin" user who performed the initial appliance configuration as described in Section 4.2, "rAPA Configuration Wizard". See the rAPA inline help as well as Chapter 7, *rBuilder Appliance Administration* for reference when using rAPA on rBuilder.

Chapter 7. rBuilder Appliance Administration

Appliance administration tasks are tasks that a typical system administrator would perform on a regular basis to maintain or troubleshoot the rBuilder appliance. These tasks include scheduling updates, performing backups, viewing system logs, downloading system information, and configuring networking and web proxies. For rBuilder site administration, such as managing image build jobs and configuring outbound mirroring, see Chapter 6, *rBuilder Site Administration*

Appliance administration for rBuilder is performed in its rPath Appliance Platform Agent web interface at the following address and port, replacing *builder.example.com* with the fully qualified domain name of the rBuilder appliance:

```
https://builder.example.com:8003
```

7.1. Appliance Summary Page

View a summary of appliance information upon first logging in to rAPA, and access the summary at any time by clicking on the rPath logo at the top of the interface. The summary includes some hardware and disk usage information, update and backup statuses, and a listing of the installed software.

7.2. Appliance Logs

Use the *Appliance Logs* task to view the most recent portions of log files on rBuilder, and to download an entire selected log. Use these logs to monitor appliance health, troubleshoot errors, and provide a particular piece of information to rPath Support. Use the drop-down list to select a log to view, and click **Download** to download that entire log. Click **Refresh** at any point to refresh the output to show the most recent information.

Note

rPath Support recommends using the *Collection Tool* task to gather the information needed to help troubleshoot rBuilder issues. The Collection Tool includes several important logs, avoiding the need to select one or more from the *Appliance Logs* interface. See Section 7.4, “Collection Tool” for more information.

7.3. Back Up and Restore

Use the *Backup and Restore* task to specify a particular backup location, to configure a backup schedule, to perform an on-demand backup, and to restore from a backup. Before any backups can be performed, either on-demand or scheduled, rAPA requires initial backup settings. The *Backups* tab is inaccessible until these settings are saved in the *Backup Configuration* tab. Use

the following sections as a guide when configuring backups and when performing backup and restore operations.

Note

Critical rBuilder data, including product settings and repository contents, is in `"/srv/rbuilder"` on the rBuilder filesystem. This critical data (minus caches and temporary files) is included in rBuilder appliance backups.

7.3.1. Configure Backup Settings

Select **Yes** for *Enable Backups* to enable backup operations, with or without a schedule. To enable automatic backups on a given schedule, select **Yes** for *Enable Backup Schedule*, and use the interface to select the schedule frequency. The remaining configuration, within *Backup Options*, should be completed as follows:

1. In the *Number of Backups* text box, type the whole number of backups that should be stored at the location specified. Note that the minimum number of backups that the system maintains by default is 2, even if the number is set less. If this number is ever reduced, the number of existing backups does not change until the next backup is performed.
2. Configure the backup location by selecting the appropriate *Backup Type* from the drop-down list. Use the following points as a reference when determining which type to select and what to type in the text boxes for each type:
 - *Network File System Share (NFS)* -- Select this for backup locations accessible by the appliance as NFS shares. The *Connection Host* is the DNS hostname or IP address of the system providing the NFS share, and the *Connection Path* value is the full path of the NFS export and subdirectories where the backups should be stored. In the following example, the NFS export is `/mnt/nfsshare`, and the connection path indicates to save all backups in the `backups` subdirectory in that export:
 - Connection Host: `sharehost.example.com`
 - Connection Path: `/mnt/nfsshare/backups`
 - *Windows(R) Filesystem Share (CIFS or SMB)* -- Select this for backup locations accessible as Common Internet File System (CIFS), Server Message Block (SMB), or Samba shares. The title indicates that this is the type referred to when people say "Windows shares" in reference to file systems on Microsoft(R) products. The *Connection Host* is the DNS hostname or IP address of the system providing the filesystem share, and the *Connection path* is the full path of the share and subdirectories where the backups should be stored. User credentials must be configured if they are required for access to the share, but they can be left blank otherwise. In the following example, the CIFS share is `WinShare` with a subdirectory of `backups`, and the credentials are provided for *backupuser*:
 - Connection Host: `sharehost.example.com`
 - Connection Path: `/WinShare/backups`
 - Connection User Name: `backupuser`
 - Connection Password: `*****`

Note that the direction of the slashes in the path are forward ("/") in the style of DNS rather than backward ("\") in the style of Windows (DOS or NTFS) file paths.

- *Mounted Filesystem (Label)* -- Select this for backup locations that are mounted to the local filesystem on the appliance. The *Disk Label* is the "LABEL" value associated

On-demand Backups

with the mounted filesystem, and the *Connection Path* is the directory path relative to the mountpoint where the backups should be stored. In the following example, `SAN_FS_LABEL` is the disk label that refers to the mountpoint, and `backups` is a directory in that mountpoint:

- Disk Label: `SAN_FS_LABEL`
- Connection Path: `/backups`

3. Click **Save** to save the backup configuration.

7.3.2. On-demand Backups

Click **Back up Now** on the *Backups* tab to perform an on-demand backup. These manual backups do not interrupt the backup schedule.

7.3.3. Restore from a Backup

When the need arises to restore rBuilder from a particular backup, choose that backup from the list displayed on the *Backups* tab. Select the backup file from which to restore from one of the following options:

- To restore from a backup listed in the interface, click the corresponding button in the *Restore* column for the desired backup.
- To restore from a backup file on a different resource, click **Scan Now** to scan mounted filesystems, and click **Restore** for the backup file that is found.

Click **Restore** in the dialog box to verify the restore, or click **Cancel** to cancel the action. Note the warning dialog that advises the appliance will be rebooted when the restoration process completes. When the restore is complete, click **OK** to refresh the page.

7.3.4. Planning and Troubleshooting

Use the following guidelines when planning, performing, and troubleshooting backups on rBuilder:

- Before performing backups and restores, a site administrator should put the rBuilder appliance in Maintenance Mode as described in Section 6.5, “Manage Maintenance Mode”, and be sure to switch out of Maintenance Mode when a backup or restore is complete.
- Ensure the backup destination and the backup file within it are world-readable.
- Use the interface to view the details of a given backup, including start and finish times, file size, and backup file location.
- Use a separate rBuilder instance to periodically stage recovery from a catastrophic behavior, including when the rBuilder is first installed, to ensure that a recovery is successful.
- After a successful test, compare the names of the backup file created and the backup file from which you are restoring. Verify the names are the same except for the time stamp embedded in the name.
- When necessary, check rAPA logs in *Appliance Logs* to monitor and troubleshoot the backup and restore operations.

7.4. Collection Tool

Use the *Collection Tool* task to run a collection operation which creates a compressed archive of important rBuilder appliance information. Appliance administrators can download that file

to view the information, and rPath Support may request a download of this information when troubleshooting rBuilder appliance issues.

7.5. Configuration

Use the tasks in the *Configuration* submenu to configure certain aspects of the appliance. Use the guide text and help as a reference for each task. The following lists each task and a basic description of how to use it:

- *Configure Canary* -- Configure the Canary install label path which determines the location that rBuilder searches for its own appliance updates.
- *Configure Email* -- Configure an SMTP relay server and "From" address used when the rBuilder appliance sends email notifications about system events.
- *Configure Networking* -- Configure network settings for the rBuilder appliance, including verifying information that is obtained from DHCP.
- *Configure Notification* -- Configure the email addresses that should receive notifications about system events.
- *Configure Proxy* -- Configure HTTP and HTTPS proxy servers used for Internet interactions. By using this tool instead of any other Linux utilities or command line modifications, these proxy settings should work without any additional configuration.
- *Manage Entitlements* -- View and upload an entitlement for rBuilder as provided by rPath, required to obtain regular updates to the rBuilder appliance.
- *Root Password* -- Configure the password for the top administrative user (root) on the underlying Linux system.
- *Time Zone and Time* -- Configure the time zone in which rBuilder resides as well as the system time or time servers from which time is maintained.
- *Upload SSL Certificate* -- Upload an SSL certificate that should be used by the rBuilder appliance during secure network interactions.

7.6. Disk Usage

Use the *Disk Usage* task to view the current used and available space on all mounted filesystems.

7.7. Job Control Console

Use the *Job Control Console* task to view information on running and finished "jobs," or task-specific processes running on rBuilder. This includes image building processes. rBuilder uses a master control program (MCP) and a system of job masters and job slaves to handle jobs.

The *Jobs tab* shows information about the last five jobs that were started, including their status as also reported in the product pages during image creation.

The *Nodes tab* shows the detail of how jobs are being handled. This tab provides an option to change the maximum number of job slaves that can be running at one time. Change this number as follows to manage system resources:

- Note that the amount of RAM used for processing jobs is the same no matter how many jobs are running.
- Increase the number to handle more jobs at one time, but note that the hard disk performance will decrease with more simultaneous job slaves.

- Decrease the number to improve hard disk performance, but note that more jobs will be queued to wait for those available slots.
- Set the limit to 0 when performing updates and backups on the appliance, putting jobs on hold until slots are allocated again.

Each tab will check every few seconds to report the most recent information.

7.8. PostgreSQL Conversion

Starting with version 4.1.0, the Conary repositories for products in rBuilder can use PostgreSQL databases instead of MySQL databases. As stated in the task interface, PostgreSQL provides better performance, improved concurrency, and higher reliability. In addition to reading the interface guide text, see the important information about making this update as part of Chapter 2, *Update Summary for Version 4.1*.

7.9. Pre-load Mirrored Repositories

Mirror pre-loading is a feature provided to rPath customers to add externally-managed products from rPath (such as the rPath Appliance Platform) using an offline portable media resource. Because the mirrors for such products are large, this feature is typically offered to customers as a means to quickly establish the mirror or to prevent issues mirroring a large amount of data over an unreliable network connection. This process is coordinated with an rPath representative only who will use this task as part of that process. See Section 6.2, “Externally-managed Products” for as a reference for the corresponding site administration feature, and see Section 7.10, “Schedule Inbound Mirroring” to determine how to configure the schedule for ongoing network updates from these product repositories.

7.10. Schedule Inbound Mirroring

When configuring externally-managed products in rBuilder, site administrators can choose whether to maintain a complete mirror of each product's repository (see Section 6.2, “Externally-managed Products”). These mirrors are synchronized with the upstream repository between the hour selected and the following hour, with the precise time shown in a message dialog when the schedule is saved. Use the *Schedule Inbound Mirroring* task manage the synchronization schedule and to request an on-demand synchronization.

Use the *Enable* and *Disable* radio buttons to enable or disable the synchronization schedule. When the schedule is enabled, use the interface options to select the frequency of the synchronization. Click **Save** to save these settings.

Click **Mirror Now** to launch an on-demand mirror synchronization whether or not the mirroring schedule is enabled.

7.11. Schedule Outbound Mirroring

rBuilder mirrors particular repository contents to one or more Update Service appliances configured by site administrators in the *Configure Update Services* task (see Chapter 6, *rBuilder Site Administration*).

In the *Schedule Outbound Mirroring* task, use the *Enable* and *Disable* radio buttons to enable or disable the synchronization schedule. When the schedule is enabled, use the interface options to select the frequency of the synchronization. Click **Save** to save these settings.

Click **Mirror Now** to launch an on-demand mirror synchronization whether or not the mirroring schedule is enabled.

Note

Site administrators should use site administration to control the order in which this synchronization occurs as described in see Section 6.4, “Configure Outbound Mirroring”).

7.12. Schedule Reboot

Use the *Schedule Reboot* task to reboot or shut down the rBuilder appliance. Click **Reboot Now** for an immediate reboot, and click **Shutdown Now** for an immediate shutdown. Click **Schedule Reboot** and use the calendar tool to schedule a single reboot at some time in the future. Note that only one reboot can be scheduled at a time, and the rAPA interface will not be available during reboots or following a shutdown.

7.13. System Updates

Use the *System Updates* task to check for available rBuilder appliance updates, to schedule regular checks for updates, and to perform on-demand updates. Note that an available update represents all the changes necessary to bring the rBuilder appliance from its current version to the latest available version, eliminating the need to run multiple update operations to bring the appliance up-to-date.

Note

Some versions of rBuilder require some special considerations when performing an update to that version. See Chapter 2, *Update Summary for Version 4.1* for version-specific update considerations.

7.13.1. On-demand Checks and Updates

Click **Check Now** in the *System Updates* tab to launch a new check for updates. Click **OK** when the check is complete. If an update is available, rAPA downloads it during the check and indicates that the update is available in the *System Updates* tab. Use the down-arrow next to the update listing to expand the list of items that would be affected on the rBuilder appliance if the update is applied. Click **Apply Now** to apply the update immediately, or use the **Schedule Update** option to schedule that update for some point in the future.

Note

If rBuilder is configured to check for updates on a regular schedule, there may already be an available update. Click **Check Now** at any time to replace the available update with a more recent update (if one is available).

7.13.2. Scheduled Checks and Updates

Use the *Settings* tab to schedule regular checks for updates and to select whether rBuilder should apply an update immediately when one is available. If updates are checked regularly, but are not automatically applied, then each new available update will replace any previous downloaded update, and rBuilder will make the latest download available for administrators to apply when ready. When selecting to apply updates automatically after downloading them, consider the impact on the live rBuilder and the need to monitor the appliance health on a regular schedule corresponding to those updates.

See Section 7.15, “View and Apply Rollbacks” for information about returning the appliance to a previous state prior to one or more recent updates.

7.14. User Management

Use the *User Management* task to change the current user's password and to manage other users who have access to the rAPA interface for rBuilder. Though rAPA offers appliance developers options to create multiple roles for rAPA users on appliance products, the rAPA customized for rBuilder provides a single `admin` role that provides a user with permission to perform all tasks within its rAPA interface. The default `admin` user group provides this `admin` role and includes the default `admin` user. Appliance administrators can create any number of users to add to this `admin` group.

7.15. View and Apply Rollbacks

Use the *View and Apply Rollbacks* task to roll back one or more appliance updates as performed in the *System Updates* task. A rollback is a prompt to reverse an update to the appliance software. When each update is made, a corresponding rollback is created. The underlying system places the rollback on top of a stack of previous rollbacks. To roll back the appliance software to a previous state, select how many updates must be reversed, and apply their corresponding rollbacks, starting from the top of the stack.

The rollbacks displayed in *View and Apply Rollbacks* are those corresponding to the most recent updates, with the highest number being the most recent. Click the corresponding arrow button for a rollback to see what software packages are affected, and click a package name in that display to see how that package will change if the rollback is applied.

Click **Do Rollback** in the corresponding roll back information to apply the rollback, returning rBuilder to its state prior to that corresponding appliance update. Rollbacks must be applied in chronological order starting with the most recent, as if removing each rollback from the top of the stack when applying that rollback.

7.16. rBuilder Migration

Updates from 3.1.4 to the 4.x branch are scheduled with an rPath representative as described in Chapter 2, *Update Summary for Version 4.1*. If the *rBuilder Migration* task is displayed in the rAPA interface, it is used for this update process. Do not use this task unless otherwise instructed by an rPath Services representative.

7.17. Command Line Access

While the majority of rBuilder appliance administration can be performed in the rAPA web interface, administrators may have a rare need to access the command line of the underlying Linux system to carry out instructions from rPath Support. Remote access to the rBuilder is possible using a secure shell (ssh) protocol client. Access the rBuilder using an ssh command resembling the following, replacing <host> with the actual hostname or IP address assigned to the rBuilder:

```
$> ssh root@<host>
```

rBuilder includes the nano text editor. Under typical circumstances, you should not need to edit files directly because all appliance administration is done through the rBuilder web interface. If instructed by rPath Support to edit one or more files, launch the nano editor with the command `nano -w` (the `-w` option will avoid automatic line breaks which could cause problems with configuration files).

Chapter 8. Important Files and Directories

The following sections describe some of the important underlying files and directories in the rBuilder appliance. Use the information as a reference when performing site administration and appliance administration, but do not modify these files in ways that violate a support agreement with rPath.

Warning

Much of this information can be downloaded and viewed using the *Appliance Logs* or *Collection Tool* as described in Chapter 6, *rBuilder Site Administration*. Rarely should any appliance administrator require command line access to obtain this information.

8.1. rBuilder Directories

rBuilder-specific data is maintained within particular directories under `/srv/rbuilder` on the rBuilder appliance. The directory paths referenced in the following table include a `version` placeholder to represent an actual rBuilder version string, such as `4.1`:

Table 8.1. rBuilder Data Directories

Directory	Description
/srv/rbuilder/changesets	Bind mount point for the directory /srv/rbuilder/jobserver/<version>/srv/rbuilder/changesets; contains the changeset cache for creating installable ISO images
/srv/rbuilder/changesets	Directory for the Conary configuration for the rBuilder appliance
/srv/rbuilder/rbuilder.conf	The primary configuration file for the rBuilder, containing settings that enable or disable particular behaviors, specify directory paths, and set unique values, such as specifying the organization name and website
/srv/rbuilder/data	Directory for the rBuilder database
/srv/rbuilder/entitlements	Directory for entitlements granting access to specific products required by the rBuilder appliance
/srv/rbuilder/finished-images	BIND mount point for the directory /srv/rbuilder/jobserver/<version>/srv/rbuilder/finished-images; used to store all finished images
/srv/rbuilder/jobserver	Directory for rBuilder functionality for processing jobs, facilitating such tasks as cooking groups and generating images
/srv/rbuilder/logs	Directory for rBuilder log data
/srv/rbuilder/repos	Directory for repository data for all products managed by the rBuilder appliance
/srv/rbuilder/run	Directory for run-time data, such as log files
/srv/rbuilder/tmp	Directory for temporary data

8.2. Web Server Log Files

The standard web server logs contain useful information about access and error conditions for the server covering both HTTP and HTTPS access. The following table describes these logs and notes their locations:

Table 8.2. Web Server Log Files

Log File	Description
<code>/var/log/httpd/access.log</code>	HTTP log that contains records of all client access to the web interface server in the following format: client address, client identity, user id, data and time, client request, server status code, size of object returned, referrer HTTP request header, and user-agent HTTP request header; log fields contain hyphens ('-') where data is not available
<code>/var/log/httpd/error.log</code>	HTTP log that contains record of all errors resulting from access to the web interface server in the following format: date and time, the log message level, client address, and the error message
<code>/var/log/httpd/ssl_access.log</code>	HTTPS log that contains records of all client access to the web interface server in the following format: client address, client identity, user id, data and time, client request, server status code, and size of object returned
<code>/var/log/httpd/ssl_error.log</code>	HTTPD log that contains records of all error resulting from access to the web interface server in the following format: date and time, the log message level, client address, and the error message
<code>/var/log/httpd/ssl_request.log</code>	HTTPS log that contains records of all requests to the web interface server in the the following format: date and time, client address, the Secure Sockets Layer (SSL) protocol, the SSL cipher, the requested location, and the number of bytes in the served document

8.3. rPath Appliance Platform Agent Log Files

The rPath Appliance Platform Agent (rAPA) has a set of logs on each appliance on which it runs, including rBuilder. The following table describes these logs and notes their locations:

Table 8.3. rAPA Log Files

Log File	Description
<code>/var/log/raa/raa-service.log</code>	Contains information about operation of the rAPA service, including startup, shutdown, tasks, and threads
<code>/var/log/raa/web</code>	Contains information about the rAPA web interface
<code>/var/log/raa/web-access</code>	Contains information recorded upon each access of the rAPA web interface, including timestamps, client address, URL, result code, returned data size, and additional messages

8.4. System Log Files

Because rBuilder uses a Linux operating system, the rBuilder appliance includes many standard Linux system logs in addition to its software-specific logs. Such logs can be useful for diagnosing problems with the hardware. The following table describes some more frequently referenced logs and notes their locations:

Table 8.4. System Log Files

Log File	Description
<code>/var/log/dmesg</code>	Contains messages pertaining to hardware devices during boot time
<code>/var/log/messages</code>	Contains notifications from system entities such as the <code>cron</code> daemon and the kernel
<code>/var/log/secure</code>	Contains security messages, such as those from <code>sshd</code> and <code>sudo</code>

8.5. Scheduled Events

The file `/etc/cron.d/apache` is used to instruct the `cron` utility to schedule execution of several commands related to rBuilder package indexes and mirroring. These commands are executed as the `apache` user who has rights to use the web server. The following table lists the commands that are run regularly and describes their purpose and frequency:

Table 8.5. Commands Used for Scheduled Events

Command	Purpose	Frequency
<code>/usr/share/rbuilder/scripts/update-package-index</code>	Updates the local rBuilder package index	Every 12 minutes
<code>/usr/share/rbuilder/scripts/update-package-index-external</code>	Updates the package index on externally-managed products, such as the rPath Appliance Platform	Every 30 minutes
<code>/usr/share/rbuilder/scripts/mirror-inbound</code>	Updates locally-mirrored products	Hourly
<code>/usr/share/rbuilder/scripts/mirror-outbound</code>	Updates externally-mirrored products	Hourly

8.6. Temporary Files

The `tmpwatch` utility in Linux is used to remove certain files after a specific period of time. Files removed by `tmpwatch` at regular intervals include the following:

- `/etc/cron.daily/rbuilder-jobserver-x.x.x.tmpwatch` which includes:
 - All temporary job server images, which are removed after two days after they are created
 - All debugging data generated by the job server, which is removed two weeks after it is created
- `/etc/cron.daily/rbuilder.tmpwatch` which includes:
 - Cached changeset files, which are removed two weeks after they are created
 - Temporary rBuilder images, which are removed two weeks after they are created