Architect™ User's Guide

concurrent

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Preface

Scope of Manual

This manual describes the RedHawk Architect™, an easy-to-use GUI interface for creating and maintaining a runtime and development environment for a target computer.

Structure of Manual

This manual consists of:

- Chapter 1, which introduces you to RedHawk Architect and guides you through its use.
- Chapter 2, which explains Importing ISO Images to avoid repetetive manual optical media insertion.
- An Index containing an alphabetical reference to key terms and concepts and the pages where they occur in the text.

Syntax Notation

The following notation is used throughout this manual:

italic	Books, reference cards, and items that the user must specify appear in *italic* type. Special terms may also appear in *italic*.
`list bold`	User input appears in **`list bold`** type and must be entered exactly as shown. Names of directories, files, commands, options and man page references also appear in **`list bold`** type.
`list`	Operating system and program output such as prompts, messages and listings of files and programs appears in `list` type.
`[]`	Brackets enclose command options and arguments that are optional. You do not type the brackets if you choose to specify these options or arguments.
hypertext links	When viewing this document online, clicking on chapter, section, figure, table and page number references will display the corresponding text. Clicking on Internet URLs provided in blue type will launch your web browser and display the web site. Clicking on publication names and numbers in red type will display the corresponding manual PDF, if accessible.

Related Publications

The following table lists Concurrent documentation for RedHawk Architect and the components that can be installed using RedHawk Architect. Depending upon the

document, they are available online on RedHawk Linux systems or from Concurrent's documentation web site at **http://redhawk.ccur.com/docs**.

RedHawk Architect	**Pub. Number**
RedHawk Architect Release Notes	0898600
RedHawk Architect User's Guide	0898601
RedHawk Linux	
RedHawk Linux Release Notes	0898003
RedHawk Linux User's Guide	0898004
RedHawk Linux Cluster Manager User's Guide	0898016
RedHawk Linux FAQ	N/A
NightStar RT Development Tools	
NightView User's Guide	0898395
NightTrace User's Guide	0898398
NightProbe User's Guide	0898465
NightTune User's Guide	0898515

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1
Using RedHawk Architect

This chapter introduces you to RedHawk Architect and provides instructions for its use.

Introducing Architect

RedHawk Architect is an easy-to-use GUI interface for configuring, building and flashing embedded solutions.

RedHawk Architect greatly simplifies the following tasks to create and maintain a runtime and development environment for single board computers (SBCs):

- installing custom configurations of the Red Hat® Enterprise Linux distribution
- installing and configuring the RedHawk™ operating system
- installing SBC-specific board support packages (BSPs)
- installing NightStar™ RT application development tools
- installing RedHawk and NightStar software updates
- maintaining and reconfiguring an SBC's root file system
- deploying root file system images onto target systems

With Architect, you choose the Linux and application modules that will be installed with the RedHawk kernel. For example, you can select all packages in categories such as Virtualization or a subset of the packages, for a minimal configuration. Architect allows the Linux file system to be customized and minimized for embedded applications using flash memories as small as 2 GB.

Architect creates and processes a configuration file based upon your selections and performs actual RPM package installations. It prompts you to insert the necessary RedHawk, Red Hat, and NightStar media depending upon the features selected.

Creating a root File System for Target Systems

To create a target file-system image that can be used on a single board computer, use RedHawk Architect on a supported host system to perform the following steps:

1. Select the software to install in the image.
2. Configure the image.
3. Customize the image for your embedded application.

4. Deploy the image on your target boards.

These procedures are described in the sections that follow. The steps may be repeated to change the image and/or deploy it any number of times.

Running Architect

For instructions on installing RedHawk Architect, refer to the *RedHawk Architect Release Notes*.

Architect must be run as the root user.

To run Architect, type **`architect`** at a shell prompt:

```
# architect
```

Note that the **`sudo(8)`** command can alternatively be used to run Architect if that method is preferred to using a root shell.

The very first time Architect is invoked after it is installed, a dialog appears presenting you with the Concurrent End User Agreement.

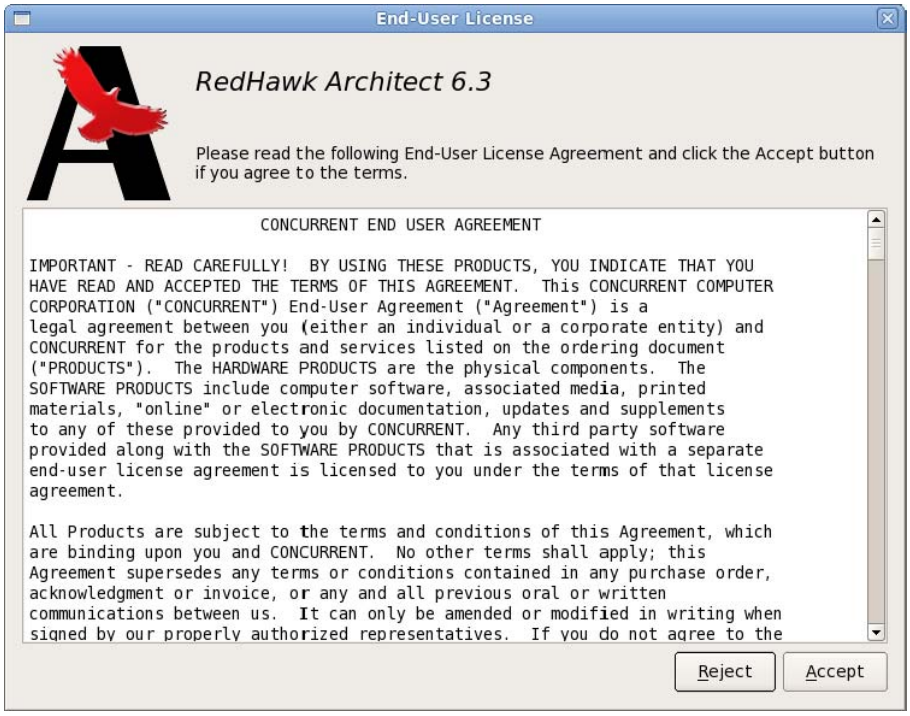


Figure 1-1 Architect End User Agreement

When Architect starts, a dialog appears presenting you with the option to start a new session or load an existing session.

Figure 1-2 Opening RedHawk Architect Dialog

To start a new session, click on the New button. See "Creating a New Session" on page 1-4 for details.

A session can be saved at any time and loaded later to continue work on the file system image. To edit an existing session, click on the Open button. See "Editing an Existing Session" on page 1-51 for details.

When the Cancel button is clicked, the RedHawk Architect main window appears, as shown in the following figure.

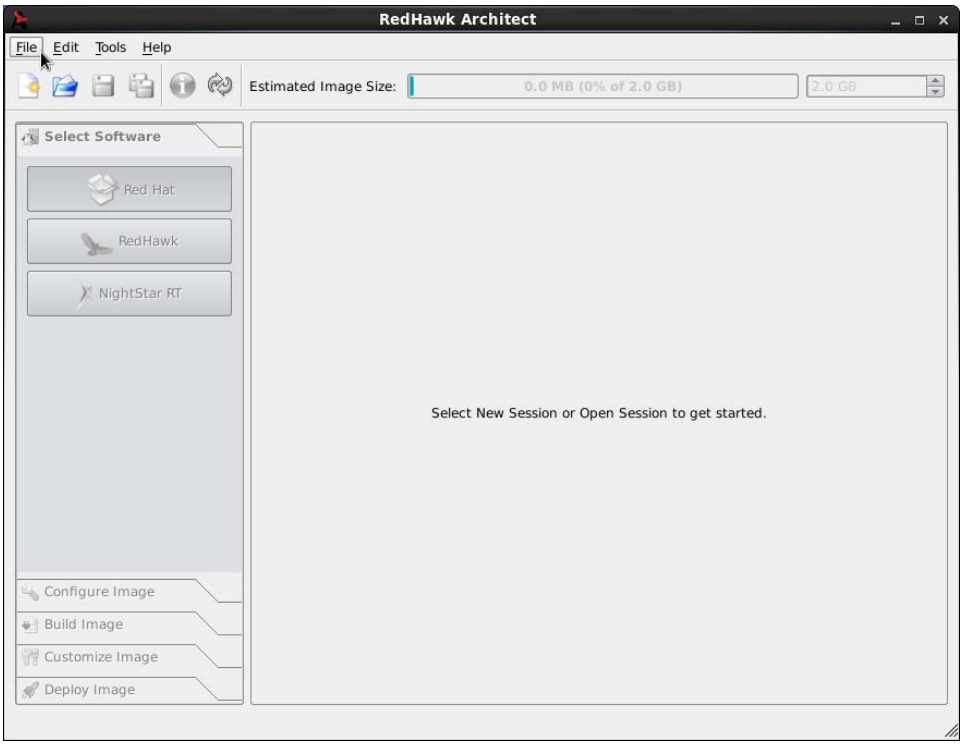


Figure 1-3 RedHawk Architect Main Window

Your choices are:

- start a new session by clicking on the New Session icon or selecting New Session from the File menu along the top of the window. See "Creating a New Session" on page 1-4 for details.
- edit an existing session by clicking on the Open Session icon or selecting Open Session in the File menu. See "Editing an Existing Session" on page 1-51 for details.

Creating a New Session

An Architect session describes all decisions made about a particular target file-system image, including:

- the target SBC
- which software should be installed
- how the software should be configured

When you select the New button from the opening Architect dialog, or the New Session icon or New Session from the File menu along the top of the RedHawk Architect main window, the New Session dialog, shown below, displays.

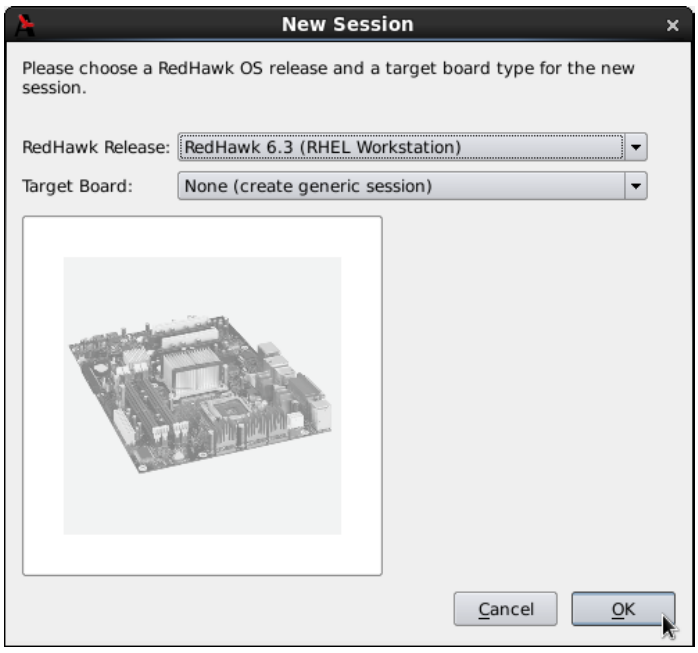


Figure 1-4 New Session Dialog

This dialog enables you to define the target board and its various characteristics using the fields described below.

RedHawk Release

Specify the version of RedHawk to be used for creating the target file-system image. Be sure that you have the correct version of the RedHawk and Red Hat Enterprise Linux media or ISO files necessary to create a target file-system image of the specified RedHawk release.

Target Board

Specify the target board from the dropdown. Select None to build a generic target file-system image that does not target any particular board.

I/O Expansion

This section shows I/O expansion connectors that are available on the board you have selected. For each I/O expansion connector, you may designate an expansion module that you may have connected to it. The choices available depend on the board you have selected.

Selecting Software to Install in the Image

To select the software to install in the file system image, click on Select Software from the toolbox on the left side of the RedHawk Architect main window. This allows you to select software from the following three groups:

- Red Hat Enterprise Linux packages
- RedHawk Linux operating system
- NightStar tools

Some initial selections are made for you by default; e.g. the core RedHawk OS. These packages appear with a gray check mark and cannot be deselected.

The Estimated Image Size gauge at the top of the RedHawk Architect main window indicates the approximate size the file system image will be when built. It also indicates the percentage of the target board's root device that will be consumed by the image.

Once an image is built, you may click on the Refresh Image Size button to calculate the actual image size as it is stored on disk. Alternatively, you may select Refresh Image Size from the Tools menu. The Estimated Image Size gauge will be updated to reflect the *current* actual size.

The spin control box to the right of the Estimated Image Size gauge may be used to change the desired maximum size of the image. This value cannot exceed the known size of the root device but it can be made smaller. If the size of the root device is unknown the maximum value allowed is 1 terabyte.

The Undo button can be used to reverse the last package select or package deselect operation. This can be used repeatedly to reverse several operations if desired, which is useful for experimenting with package sets to see the effect on the estimated image size.

Selecting Red Hat Packages

To select Red Hat Enterprise Linux packages for the file system image, click on the Base Distro selection from the Select Software toolbox.

Red Hat packages may be navigated by way of several "Package Views". Select the desired package view from the Package Views dropdown. The following views are available and are described in the subsections that follow.

- Standard Package Groups
- All Packages
- Selected Packages

Using the Standard Package Groups View

The Standard Package Groups view provides a view of Red Hat packages organized in a hierarchy of groups. The package group hierachy is the standard Red Hat package group hierachy. This view is shown in the following figure.

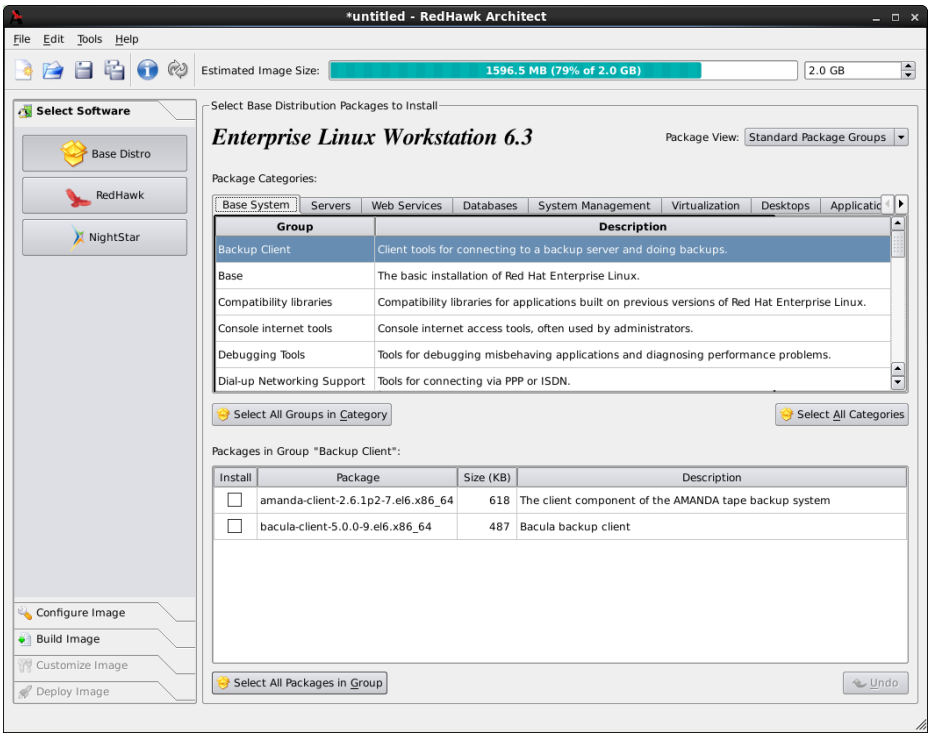


Figure 1-5 Selecting Red Hat Packages, Standard Package Groups View

Packages may be selected or deselected by choosing a package group in the upper pane and then checking or un-checking packages in that group in the lower pane. All the packages in a chosen group may be selected with the Select all packages in Group button.

All the packages that are in all the groups of the currently chosen package category may be selected with the Select All Groups in Category button. Also, the Select All Categories button may be used to select all of the packages in all of the groups of all of the categories.

Using the All Packages View

The All Packages view, as shown in the following figure, provides a sorted linear list of all Red Hat packages.

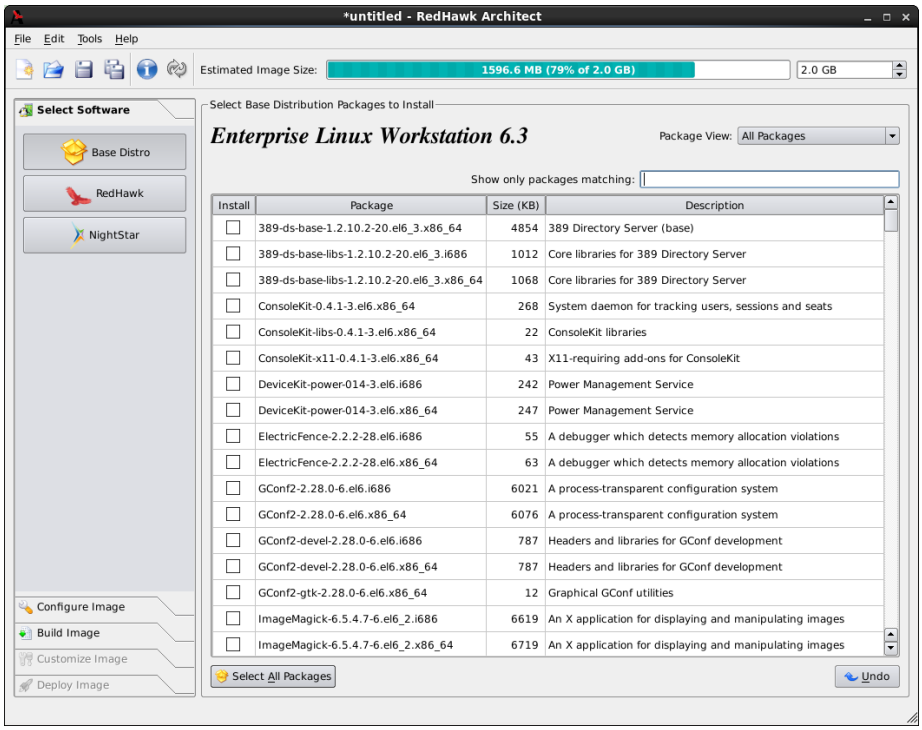


Figure 1-6 Selecting Red Hat Packages, All Packages View

Packages may be selected or deselected from this list. The Show only packages matching box allows you to search for packages by name.

All packages can be selected by clicking on the Select all packages button.

Using the Selected Packages View

The Selected Packages view, as shown in the following figure, provides a sorted linear list of all Red Hat packages that are currently selected for installation.

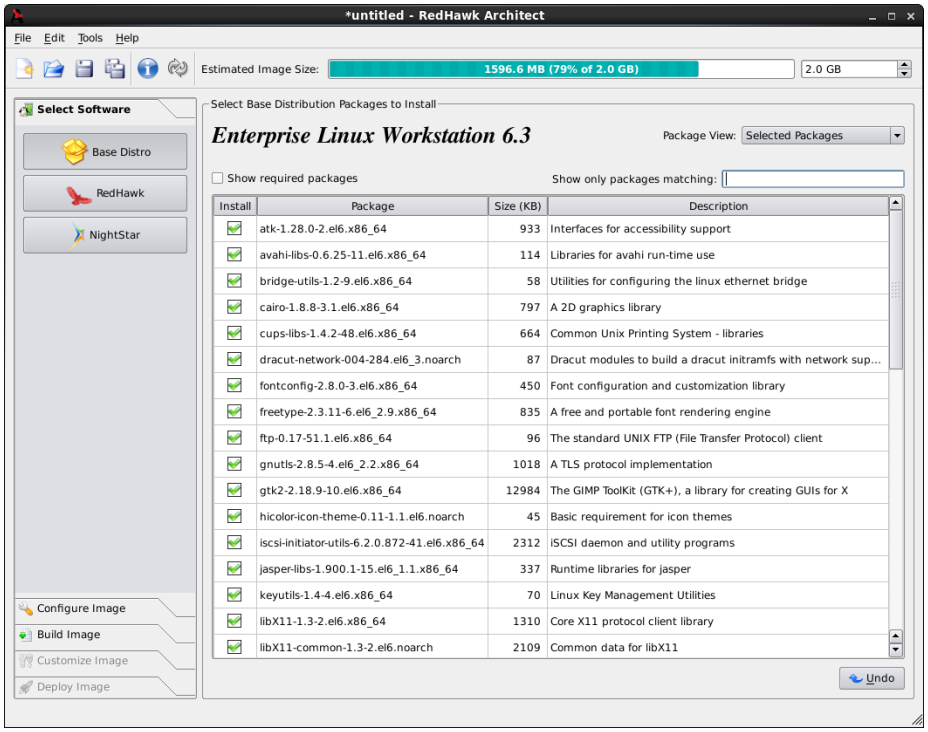


Figure 1-7 Selecting Red Hat Packages, Selected Packages View

Packages may be deselected from this list. The Show only packages matching box allows you to search for packages by name.

To include the required packages in the list, check the Show required packages checkbox. When this box is unchecked, only the optional packages are shown.

Selecting RedHawk OS Options

To select RedHawk Linux OS and kernels for the file system image, click on the RedHawk selection from the Select Software toolbox. The RedHawk page, shown in the following figure, displays.

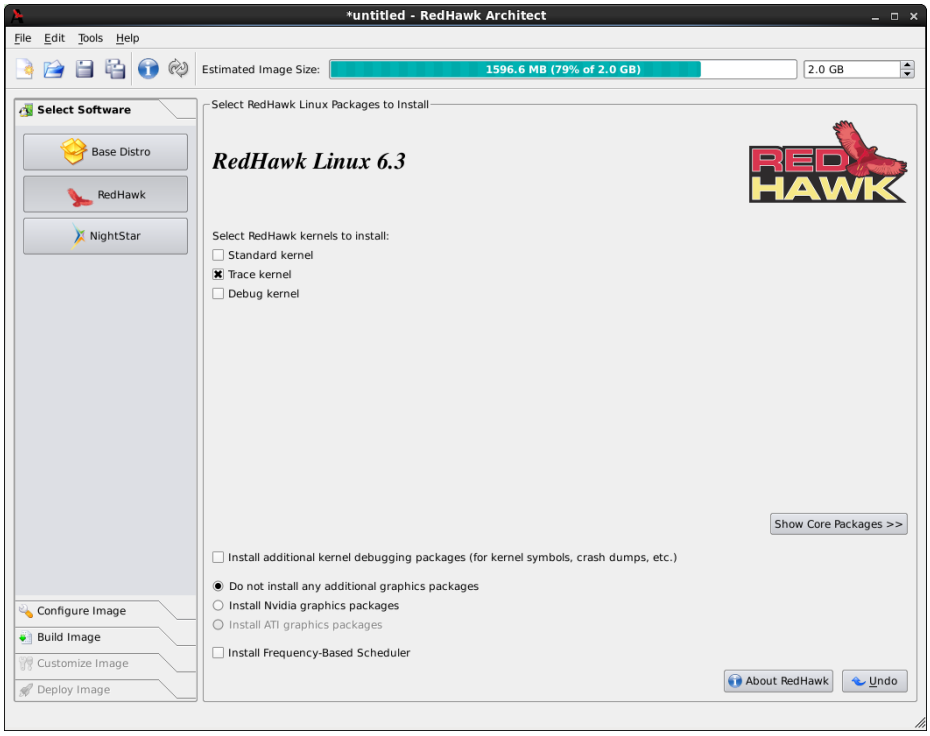


Figure 1-8 Selecting RedHawk Options

Select which RedHawk kernel(s) to install by checking the appropriate checkbox(es): Standard, Trace and/or Debug. The standard kernel does not have tracing or debugging capabilities and it is the smallest sized kernel option. The trace kernel does offer tracing capabilities but it does not have debugging capabilities. The debug kernel offers both debugging and tracing capabilities. Note that at least one kernel *must* be selected; the GUI enforces this by ensuring that a sole remaining selection cannot be deselected.

Advanced users may wish to press the Show Core Packages >> button to refine exactly which RedHawk packages they wish to install from the complete set of RedHawk packages that are available on the media. Normally this is not necessary, but the option exists to facilitate minimizing the image size for very small flash devices.

Select Install additional kernel debugging packages to install extra support for live kernel debugging. This option is also required for RedHawk to be able to create crash dumps. See the *RedHawk User's Guide* for more information.

If the target system has an NVIDIA graphics or CUDA card you may want to select the Install NVIDIA graphics pacakges radio button. Note that you should only select this option if the target system actually has NVIDIA hardware.

Select Install Frequency-Based Scheduler if you have previously purchased and wish to install the RedHawk FBS software into the target image.

Selecting NightStar Options

To select NightStar tools for the image, click on the NightStar selection from the Select Products toolbox. The NightStar RT page, shown in the following figure, displays.

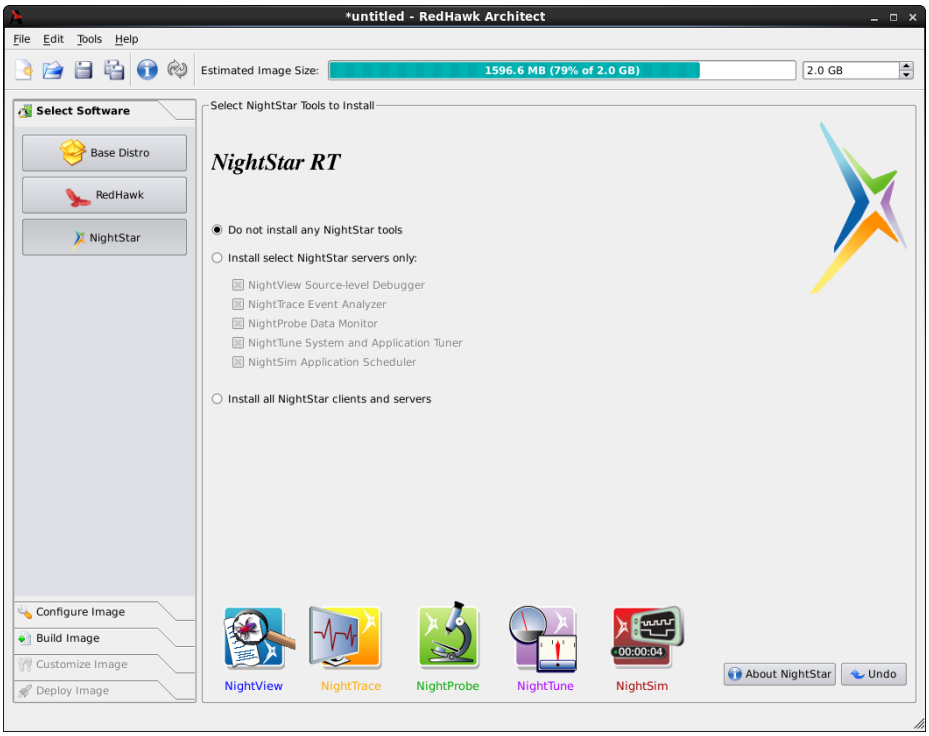


Figure 1-9 Selecting NightStar Tools

By default no NightStar tools will be installed in the target image. Choose the Install select NightStar servers only radio button if you wish to only install NightStar remote support for various tools. You may select individual servers from the list by clicking on the checkboxes for each tool. The remote support allows NightStar tools running on a host system to connect to and control the target remotely.

Choose the Install all NightStar clients and servers radio button to indicate that all NightStar servers and clients are to be installed in the image. This allows the target to run all NightStar tools locally, in addition to providing the remote support described above.

Click on the About NightStar button to see a detailed description of each of the individual NightStar tools that are available for installation.

Configuring an Image

It is possible to configure a target file-system image before or after the image has been built by selecting Configure Image from the toolbox on the left side of the RedHawk Architect main window. This selection is available before and after an image is built, however note that there are additional Apply buttons present on the pages *after* an image has been built. It is necessary to apply any changes made after the image has been built in order for the changes to be reflected in the on-disk file-system image.

To configure the file system image, select Configure Image from the toolbox on the left side of the RedHawk Architect main window. This allows you to configure the following four groups:

- General Settings
- Console
- Networking
- File Systems

Some initial selections are made for you by default.

Configuring General Settings

To configure time zone, root password and default system run level for the file system image, click on General Settings from the Configure Image toolbox. The General Settings configuration page appears, as shown in the following figure.

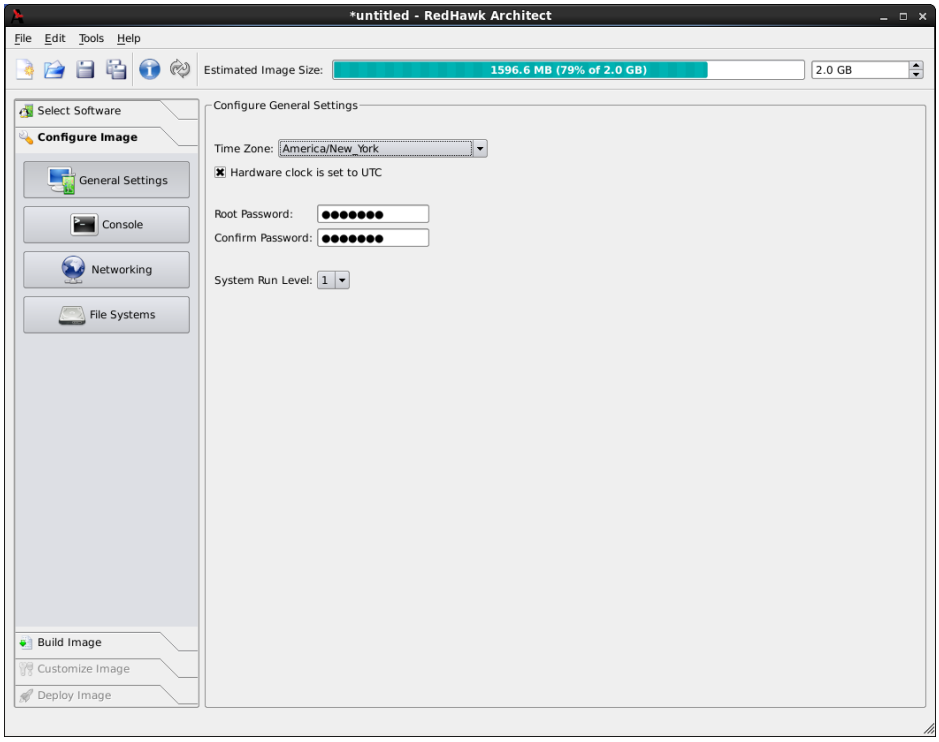


Figure 1-10 General Settings Configuration Page

In the Time Zone section, select the proper time zone for your location from the dropdown. Click in the checkbox to indicate if your system clock uses UTC.

NOTE

By default the Hardware clock is set to UTC checkbox is selected, so be sure to set the target system's BIOS clock in Coordinated Universal Time. If you do not select this, set the BIOS clock according to the selected time zone.

In the Root Password section, enter the root password in the Password field. Reenter it in the Confirm Password field.

NOTE

The default root password is `redhawk` (all lowercase letters and only one word with no spaces).

In the Run Level section, select the desired default run level from the dropdown.

If a change is made to this page after the target file-system image has been built, it is necessary to click on the Apply Settings. button to apply the settings to the image. This button will not appear before the image has been built.

Configuring a Console

To configure a serial console for the file system image, click on Console from the Configure Image toolbox. The Configure Console page appears, as shown in the following figure.

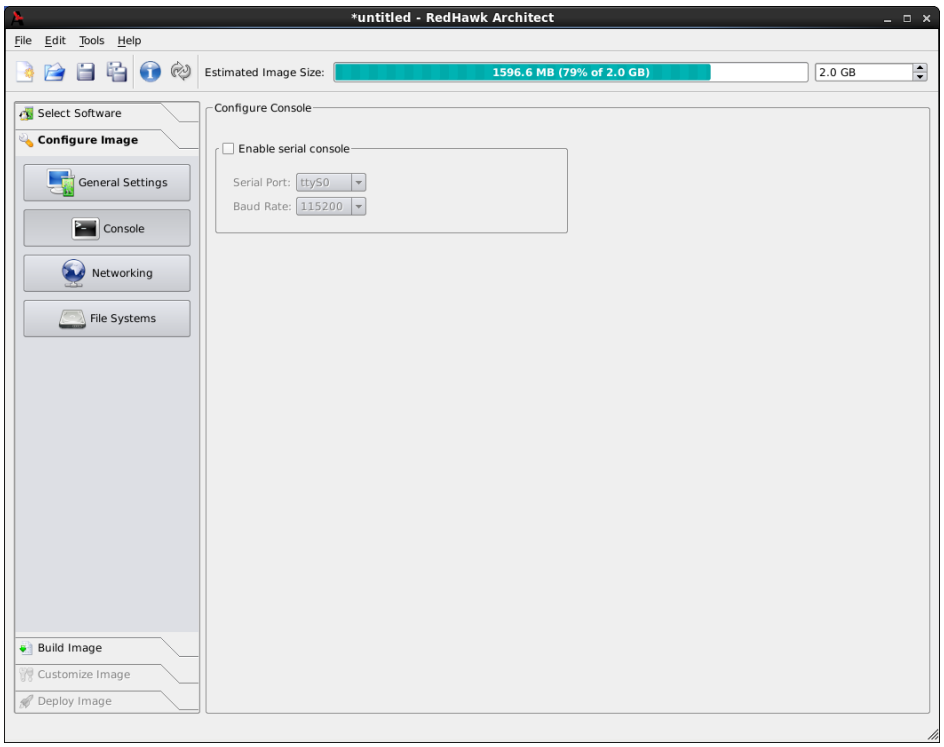


Figure 1-11 Console Configuration Page

Click on the Enable serial console checkbox to activate the fields that define the port and baud rate for the console.

Select a port from the Serial Port dropdown.

Select a baud rate from the Baud Rate dropdown.

If a change is made to this page after the target file-system image has been built, it is necessary to click on the Apply Settings. button to apply the settings to the image. This button will not appear before the image has been built.

NOTE

If your target system does not have a serial port do not configure a serial console on this page.

Configuring Networking

To configure networking for the file system image, click on Networking from the Configure Image toolbox. The Configure Networking page appears, as shown in the following figure.

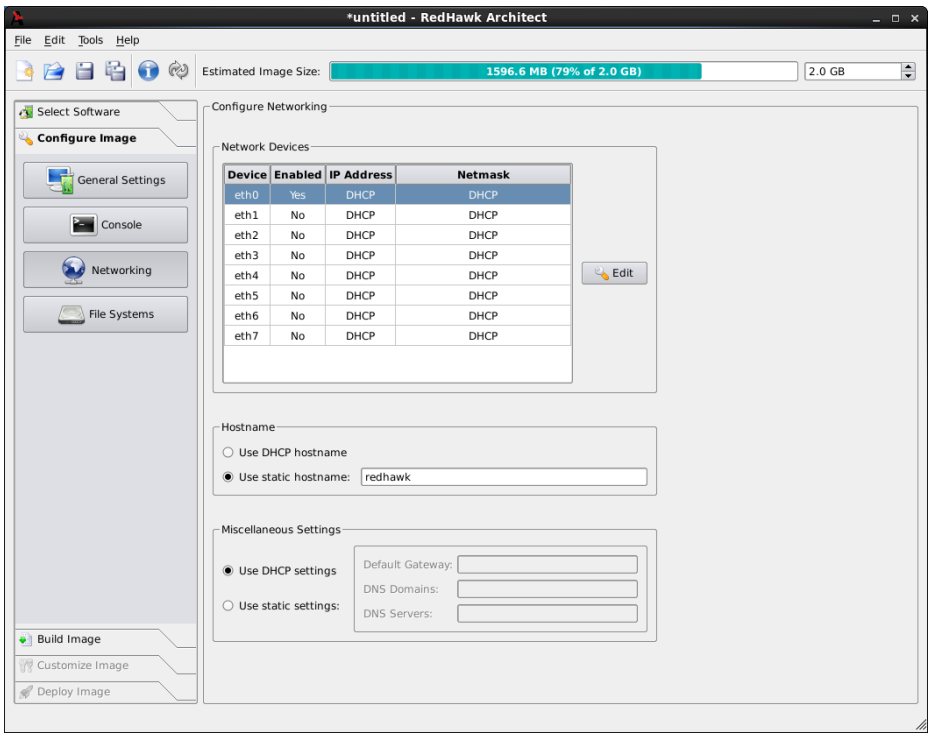


Figure 1-12 Network Configuration Page

All available network devices are listed in the Network Devices section. There may be more or less devices shown depending on the target board selected.

To configure a particular network device, click on the device to select it, then click on the Edit button. The Configure Network Device dialog shown in the following figure displays.

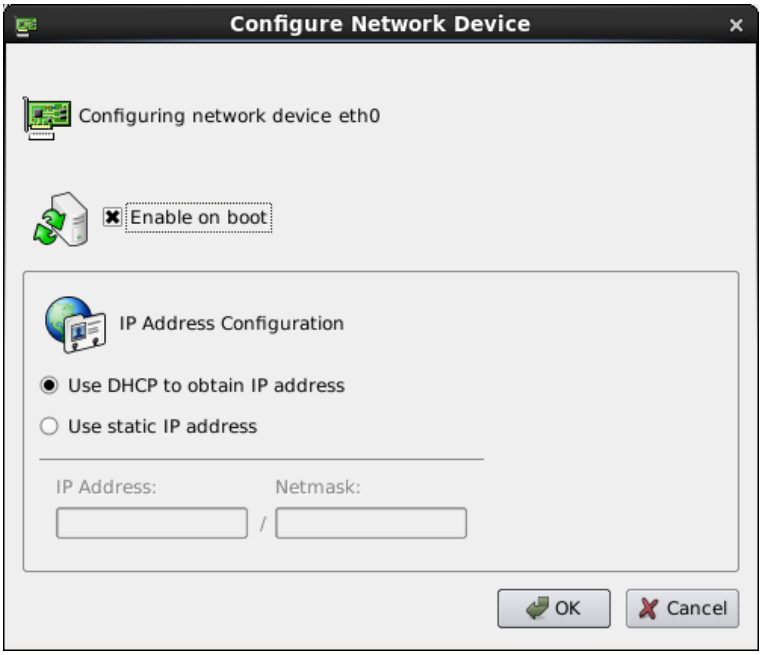


Figure 1-13 Configure Network Device Dialog

The selected network device is displayed at the top of the dialog.

Click on the Enable On Boot checkbox to enable/disable the device automatically on boot.

Choose the Use DHCP to obtain IP address radio button to enable dynamic address configuration, or choose the Use static IP address radio button to enable manual address configuration. For manual configurations, enter the IP address and netmask in the appropriate fields.

Click on OK to apply the settings to the image and close the dialog. Click Cancel to cancel changes.

On the Configure Networking dialog under the Hostname and Miscellaneous Settings areas, either select the Use DHCP settings or supply the hostname, default gateway, domains, and DNS server addresses in the appropriate fields. Note that multiple DNS domains and DNS servers may be specified by separating multiple entries with either spaces or commas. Be sure to select the Use DHCP setting if a DHCP server will be providing the network parameters dynamically.

If a change is made to this page after the target file-system image has been built, it is necessary to click on the Apply Settings button to apply the settings to the image. This button will not appear before the image has been built.

Configuring File Systems

To configure file system options for the file system image, click on File Systems from the Configure Image toolbox. The Configure File System page appears, as shown in the following figure.

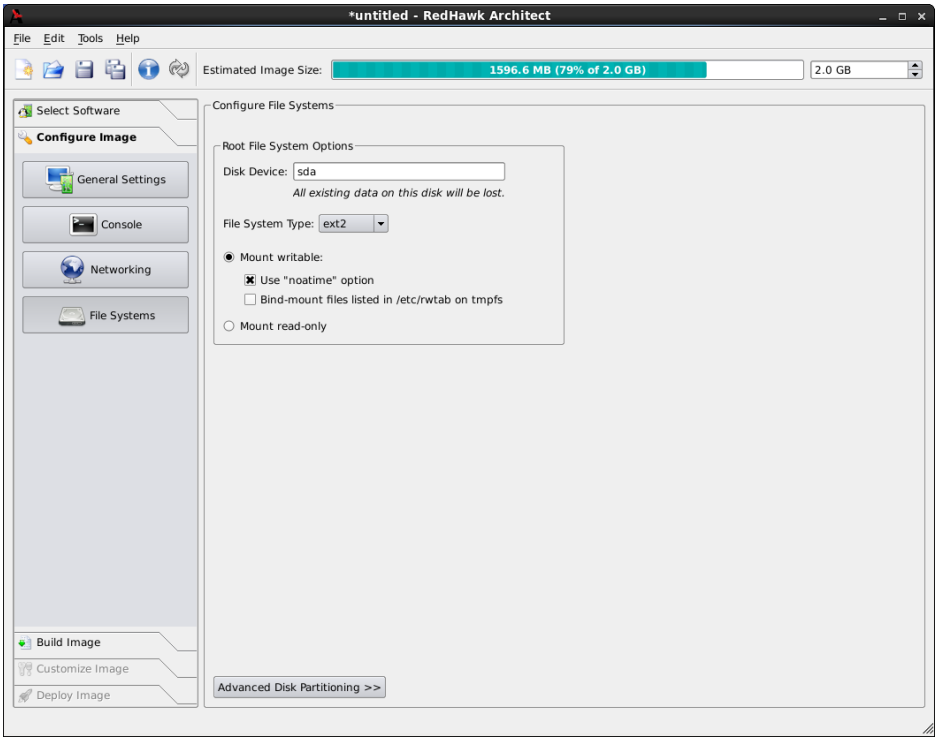


Figure 1-14 File System Configuration Page

There are two different partitioning modes supported: Simple Disk Partitioning and Advanced Disk Partitioning. By default this page is in the simple disk partitioning mode.

NOTE

When using the PXE Diskless deployment method, all file system configuration settings are ignored; any local drive media that is present on the target will be untouched and ignored. See "Booting Diskless via PXE over a Network" on page 1-47 for more information.

Simple Disk Partitioning

Simple disk partitioning is the traditional partitioning that was offered by previous versions of RedHawk Architect. In this mode only a single partition will be created on the specified disk device.

Indicate the desired root device in the Disk Device field. Use the File System Type pulldown menu to select the file-system type that you wish to use for the file system that will be created on the target.

By default Mount writable is selected and the root file system will be mounted with both read and write permissions.

Check the Use "noatime" option box to mount the root file system with the *noatime* option. This helps to minimize the number of writes to the root device when root is *not* mounted read-only.

Check the Bind-mount files listed in /etc/rwtab in tmpfs box to mount the files and directories listed in `/etc/rwtab` as writable but temporary files in a *tmpfs* file system. This is automatically enabled for read-only file systems, however even for writable file systems it may be useful to help minimize the number of writes to the root device.

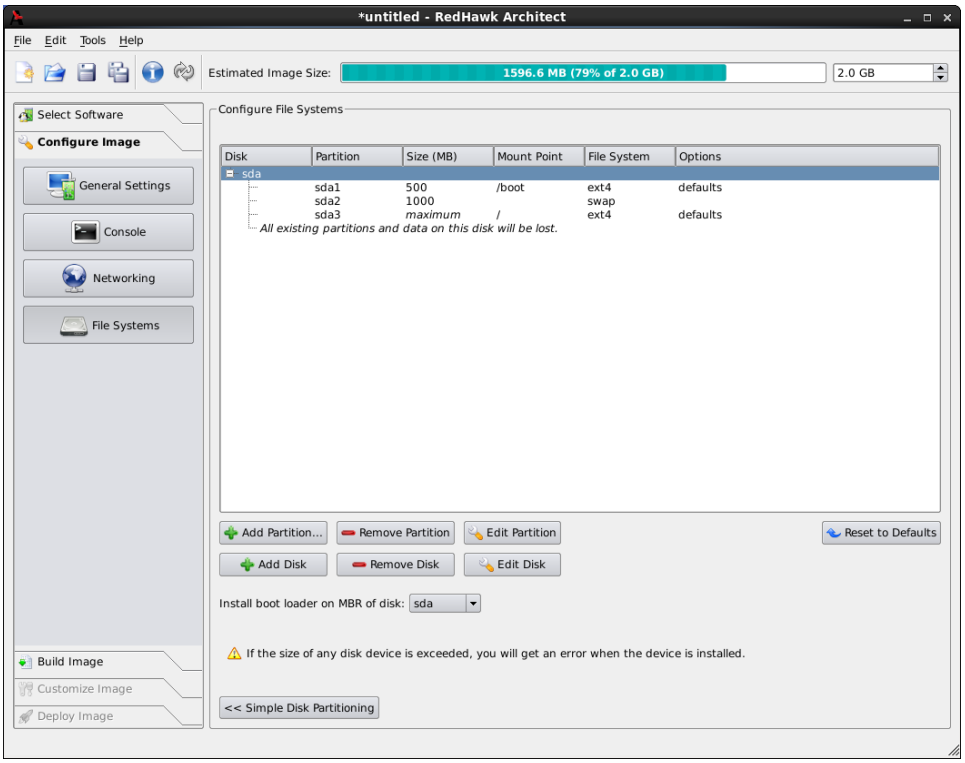
Select Mount read-only to mount the root file system *read-only*. Mounting the root file system read-only offers improved security and it will also help preserve the life of root flash devices.

If a change is made to this page after the target file-system image has been built, it is necessary to click on the Apply Settings button to apply the settings to the image. This button will not appear before the image has been built.

Advanced Disk Partitioning

The advanced disk partition mode provides a more modern and flexible disk partitioning scheme. In this mode multiple partitions and even multiple disks can be defined and configured.

The Advanced Disk Partitioning mode is shown in the following figure.



Press Add Partition... to add new partitions to the currently selected disk.

Press Remove Partition to remove the currently selected partition.

Press Edit Partition to edit attributes of the currently selected partition.

Press Add Disk to add a new disk to the set of currently available disks.

Press Remove Disk to remove the currently selected disk from the set of available disks.

Press Edit Disk to edit attributes of the currently selected disk.

Use the Install boot-loader on MBR of disk pulldown to choose the disk that you will be booting from if multiple disks have been defined.

NOTE

You must ensure that any additional disks defined using advanced partitioning in fact exist on the target for installation to succeed.

NOTE

Multiple disks cannot be partitioned with the USB Device deployment tool. In order to use multiple disks you must deploy with one of the Installer methods (via DVD, USB or PXE).

Building an Image

To build the file system image by installing the selected software, select Build Image from the toolbox on the left side of the RedHawk Architect main window. The Build Image page shown in the following figure displays.

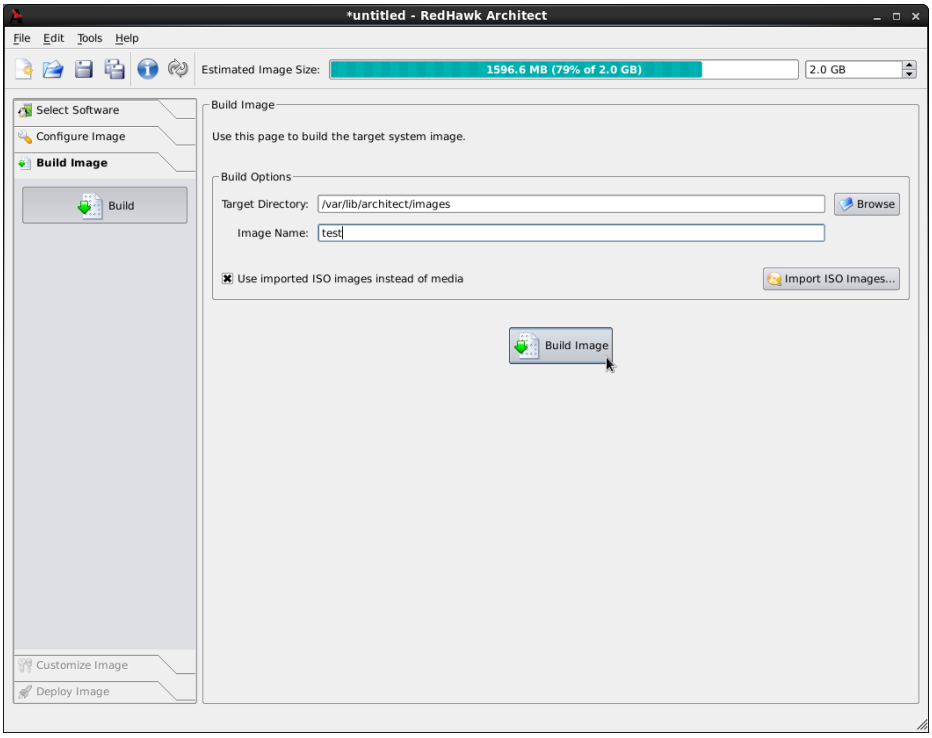


Figure 1-15 Build Image Page

Choose a directory in which to build the file system image and enter it in the Target Directory field, or click on the Browse button to display a file browser from which to choose.

NOTE

Do not use **`/tmp`** as the target directory. Packages like "tmp-watch" might remove files that have not been accessed in a certain number of days, thereby sabotaging the image directory.

Choose a name for the file system image and enter it in the Image Name field.

NOTE

Make sure that the directory you specify has enough free disk space to hold one or more file system images, each of which can be several gigabytes in size.

Click on the Build button to begin the build process. The rest of this section assumes that you have *not* previously imported the ISOs from their respective media by clicking on the Import ISO Images... button or selecting Import ISO Images... in the Tools menu. Advanced users may wish to do that to avoid inserting DVD or CD media repeatedly. See "Chapter 2: Importing ISO Images" for more information.

Dialogs are presented to guide you through the process of installing the software into the image. For example, you will be prompted to insert various DVD or CD media, as shown in the following figure. Follow the directions to load the media, then click OK to begin.

Figure 1-16 Build Prompt to Insert Red Hat Media

When OK is selected, the Red Hat installation begins. The Build Image screen overlays the RedHawk Architect main window and tracks the progress, as shown in the following figure.

Clicking Abort at any time in the build process aborts the build. A confirmation message then displays and you must click on the Close button to close the message box and reactivate the RedHawk Architect main window.

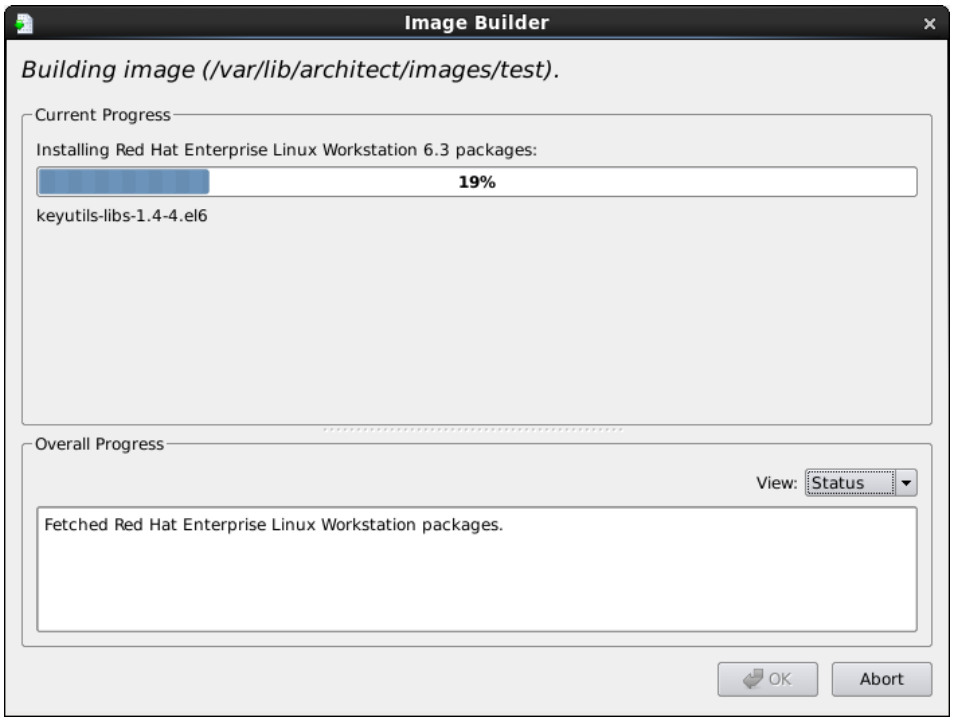


Figure 1-17 Status of Red Hat Installation

A progress bar at the top of the Image Builder screen shows the progress of the Red Hat installation from the media.

A status area in the lower half of the screen tracks the progress of the complete build process. The status area can be changed to show an error log using the View dropdown.

View

When Status is selected, the overall progress messages are displayed. When Error Log is selected, the error log is displayed, which shows any error messages generated by the build process. Regardless of the View setting, critical error messages result in pop-up error dialogs with which you can interact.

Abort

Click on this button to abort the build. A confirmation dialog displays allowing you to confirm or decline aborting the build process.

OK

Once the build is completed or aborted, click on the OK button to close the Build Image screen and reactivate the RedHawk Architect main window.

When the Red Hat installation is complete, the dialog shown in the following figure appears.

Figure 1-18 Build Prompt to Insert RedHawk Media

Load the RedHawk Linux media, then click OK. The RedHawk installation begins and the Image Builder screen tracks the progress, as shown in the following figure.

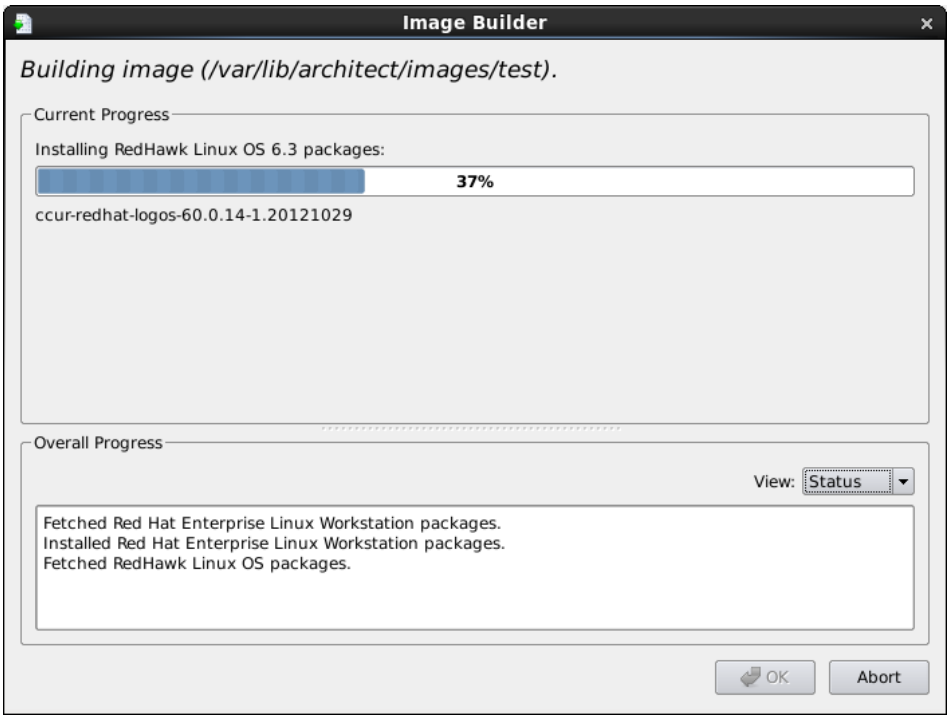


Figure 1-19 Status of RedHawk Installation

If you have selected to install the RedHawk Frequency Based Scheduler optional product the following figure will appear during the RedHawk installation.

Figure 1-20 Build Prompt to Insert FBS Media

Load the RedHawk FBS media, then click OK. The RedHawk installation begins and the Image Builder screen tracks the progress, as shown in the following figure.

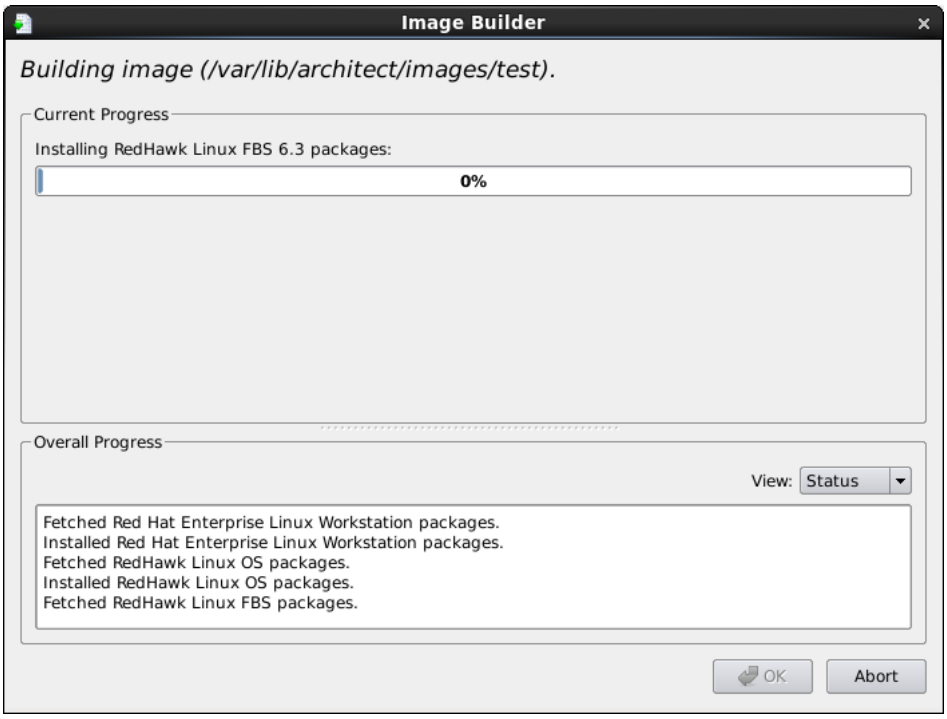


Figure 1-21 Status of RedHawk FBS Installation

When the RedHawk installation is complete, the dialog shown in the following figure appears if the NightStar tools have been previously selected for this image.

Figure 1-22 Build Prompt to Insert NightStar Media

Load the NightStar media, then click OK to begin. The NightStar installation begins and the Image Builder screen tracks the progress, as shown in the following figure.

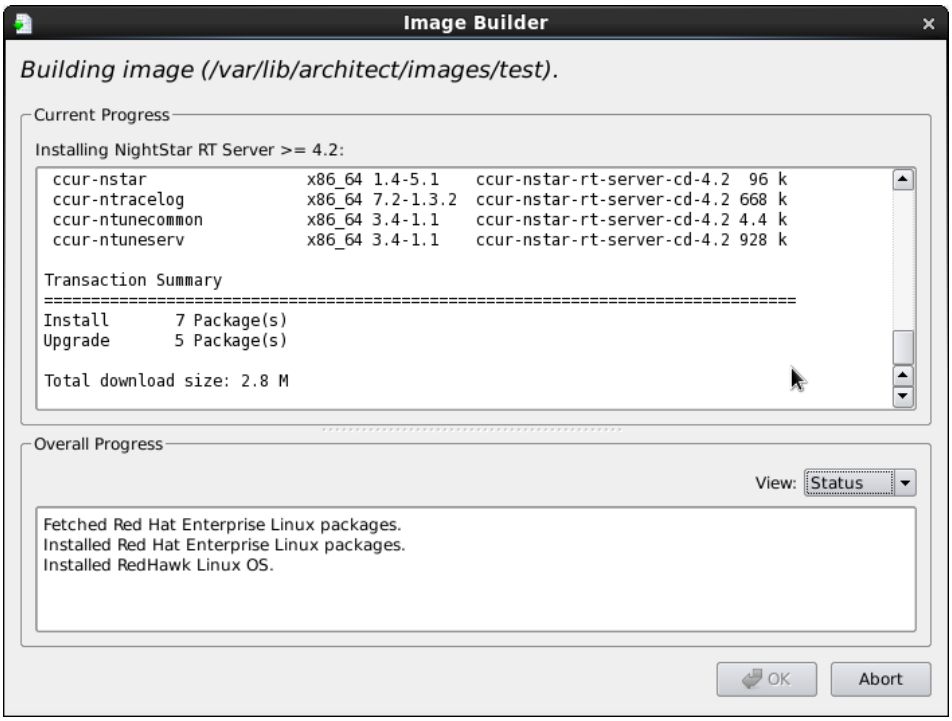


Figure 1-23 Status of NightStar Installation

When all software is installed, the completion message shown in the following figure appears.

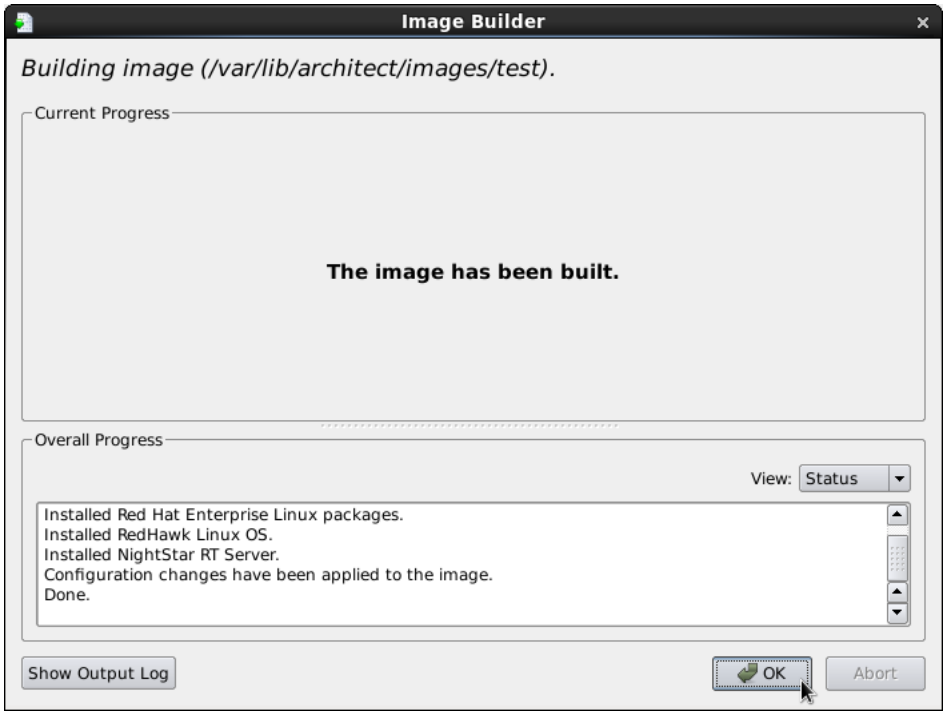


Figure 1-24 Build Completed Successfully Message

Click OK in the Build Image screen to close it and reactivate the RedHawk Architect main window.

Customizing an Image

To further customize the file system image, select Customize Image from the toolbox on the left side of the RedHawk Architect main window. This allows you to customize the following groups:

- Software Updates
- Kernel Manager
- Additional RPMs
- File Manager
- Chroot Shell
- Image Cleanup

Each of these customizations will be fully described in the following sections.

Software Updates

To install RedHawk and NightStar updates into the file system image, click on Software Updates in the Customize Image toolbox. The Software Updates page appears, as shown in the following figure.

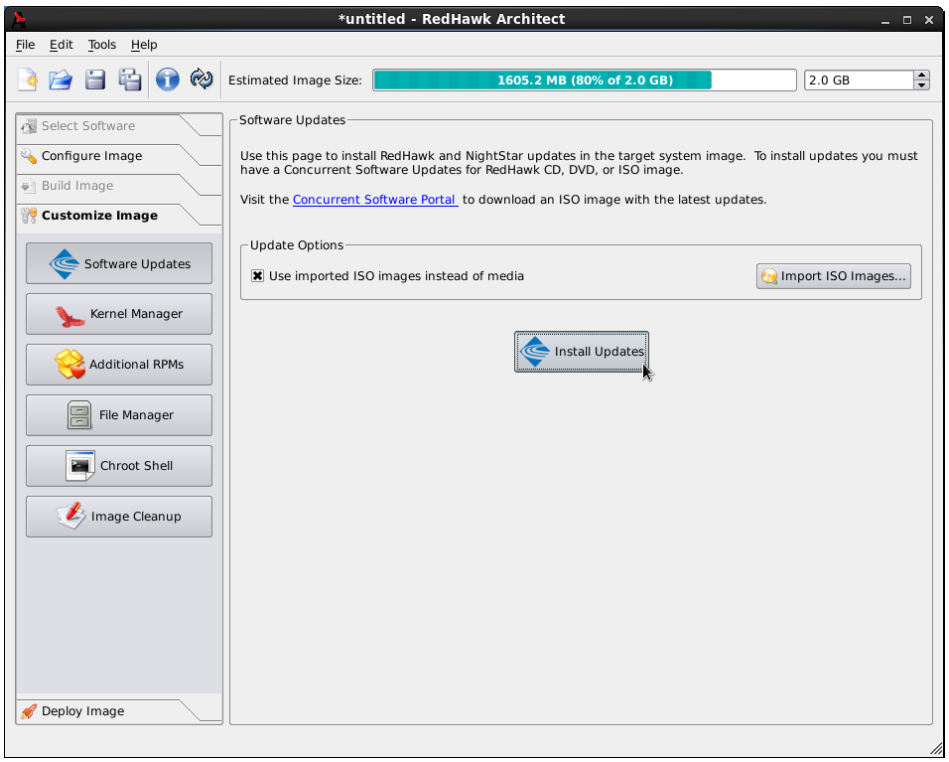


Figure 1-25 Software Updates Page

Press the Install Updates button to install updates and you will be prompted for to insert the media. Follow the instructions as they are presented. You should see the following dialog displayed once all updates have been successfully installed.

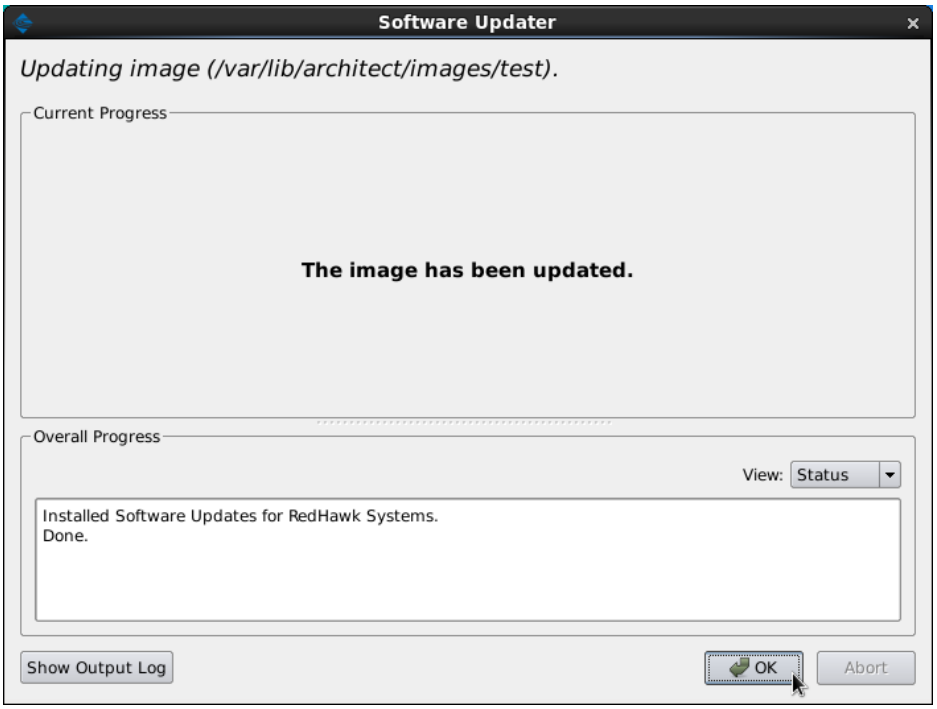


Figure 1-26 Software Updater Dialog

Kernel Manager

By default you can choose to boot a standard RedHawk kernel in your target image. However you may also wish to customize the kernel to include additional components or possibly to exclude existing components.

To customize kernel settings for the target image, click on Kernel Manager from the Customize Image toolbox. The Kernel Manager page appears, as shown in the following figure.

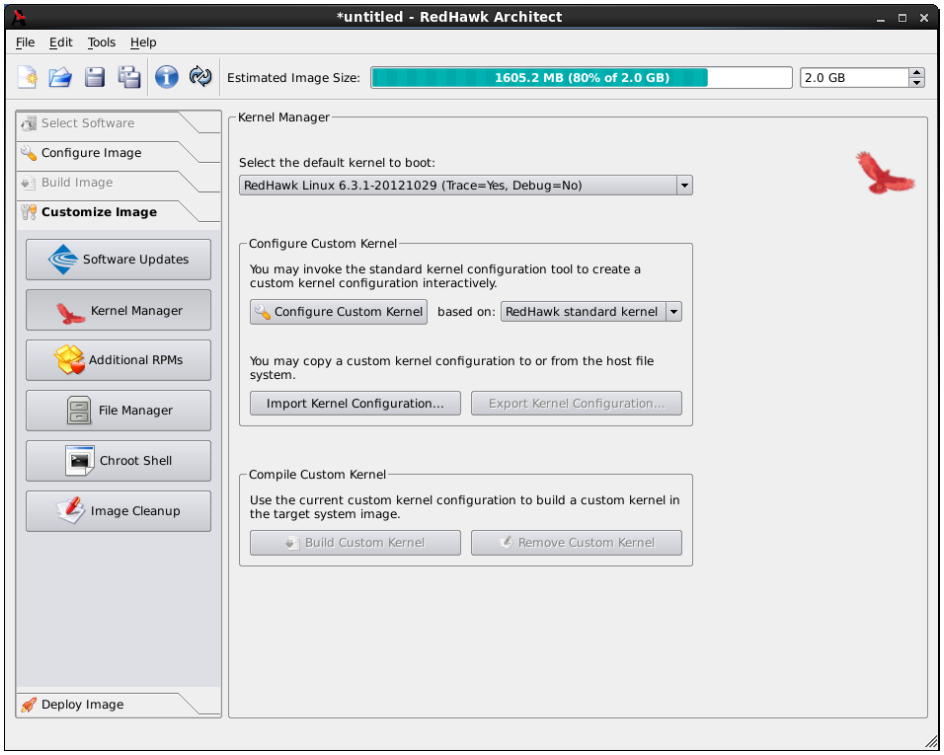


Figure 1-27 Kernel Manager Page

The Kernel Manager allows you to perform different functions with the kernel configuration in the target image.

The Select the default kernel to boot pulldown allows you to choose which installed kernel should be the default kernel that boots in the target image. Any change made to this setting is customized in the target image immediately.

The Configure Custom Kernel area contains functions related to configuring custom kernels for the target image. The Compile Custom Kernel area contains functions related to building custom kernels for the target image. These functions will be described in the following sections.

Note that only one custom kernel configuration, and therefore one custom kernel, can be associated with a specific target image at any given time.

Configure Custom Kernel

The Configure Custom Kernel button begins the process of creating a custom kernel configuration. The custom kernel configuration is based upon the kernel configuration that is selected in the dropdown menu that is immediately to the right of the Configure Custom Kernel button.

The choices in the dropdown are: RedHawk standard kernel, RedHawk trace kernel, RedHawk debug kernel and Custom kernel (available

once a custom kernel configuration has been imported or configured). The first three create new configurations based on the configurations of the standard RedHawk kernels.

The Custom kernel choice bases the new configuration on the current custom kernel configuration that is associated with the image; thus, the Custom kernel choice can be used to further customize a configuration that you have already customized or imported.

Pressing the Configure Custom Kernel button will bring up two different dialog windows. The first dialog window displays overall configuration progress status, as shown in the following figure.

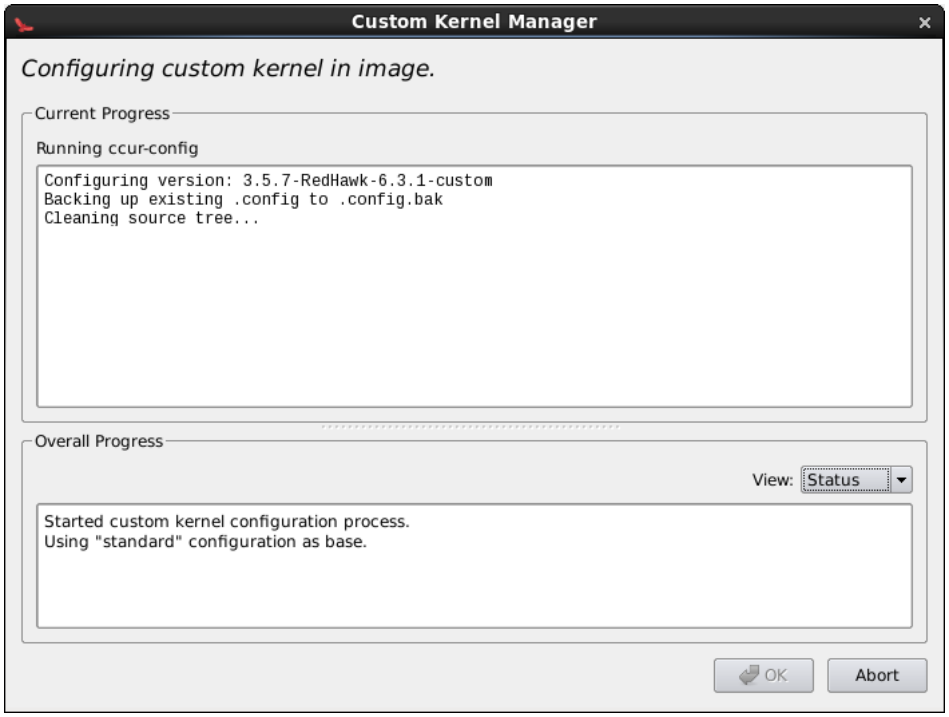


Figure 1-28 Custom Kernel Dialog

This window shows the status of running the **`ccur-config`** command in the target image kernel source directory. The **`ccur-config`** command will eventually bring up the Linux Kernel Configuration window to customize the kernel, as shown in the following figure.

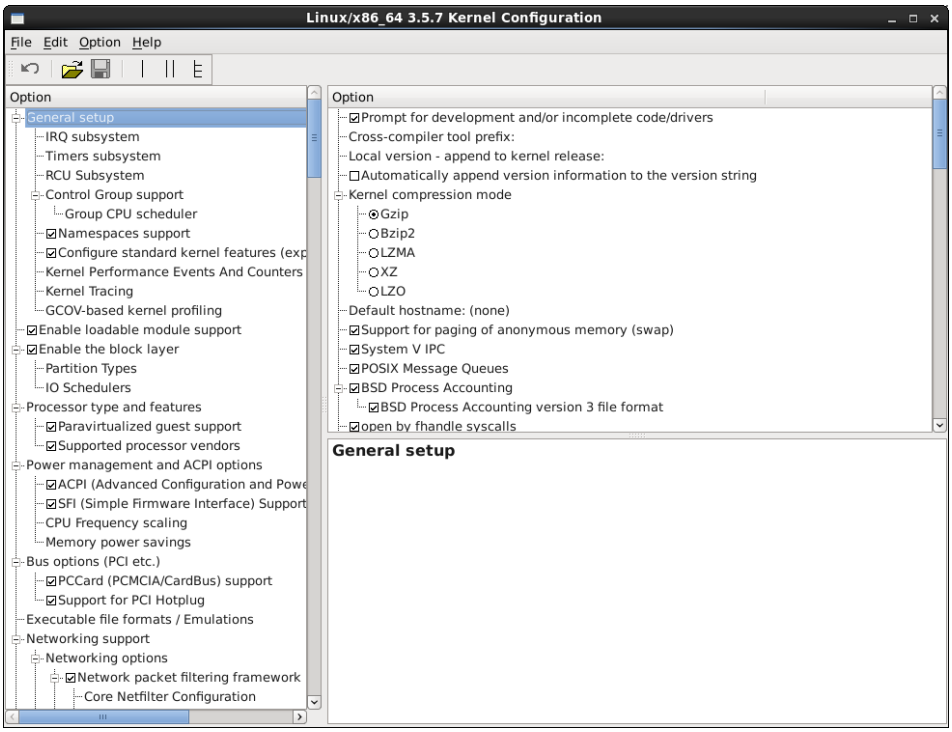


Figure 1-29 Linux Kernel Configuration Dialog

This window allows you to customize almost any aspect of the custom kernel configuration. It is expected that users who are performing this step have a thorough understanding of Linux kernel configuration.

Note that you must Save the kernel configuration before you exit the Linux Kernel Configuration window. Failure to Save the configuration will result in an error being displayed in the Custom Kernel Manager dialog window and no changes to the custom kernel configuration will be made.

NOTE

Certain compilation related RPMs must be installed on the host system in order to successfully configure and build a custom kernel (e.g. **`make`**, **`gcc`**). If any of these RPMs are missing you will be presented with a dialog detailing which RPMs must first be installed on the host system before you can proceed.

Import Kernel Configuration

The Import Kernel Configuration button allows you to choose a Linux kernel configuration file on the host system and import it to become the custom kernel configuration in the target image.

Note that once a custom kernel configuration has been imported you can further customize it by using the Configure Custom Kernel button and selecting the Custom kernel to base the configuration on.

Export Kernel Configuration

The Export Kernel Configuration button allows you to copy the target's current custom kernel configuration to the host system.

Build Custom Kernel

The Build Custom Kernel button allows you to build and install a complete custom kernel in the target image. You must first have created a custom kernel configuration, either by using the Configure Custom Kernel button or by using the Import Kernel Configuration button.

Building a custom kernel compiles each file that comprises the Linux kernel and this process can take quite a bit of time to complete. Once you start the process, you will see the Custom Kernel Manager dialog appear, as shown in the following figure and it will describe the entire process.

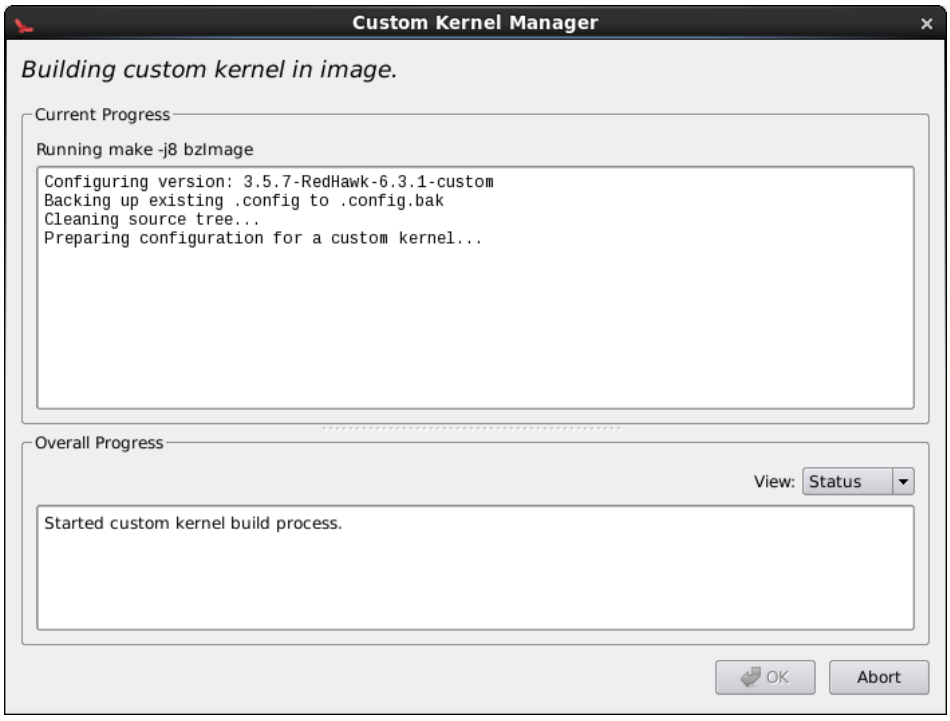


Figure 1-30 Initial Build Progress

Initially **`ccur-config`** will be invoked and once that completes the kernel build stages will begin, as shown in the following figure.

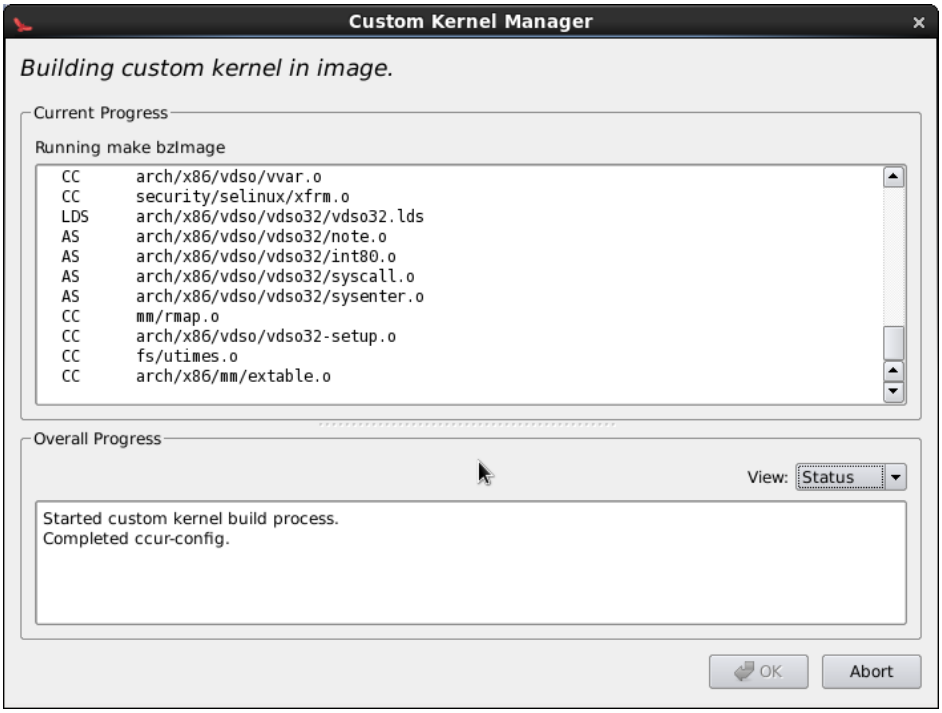


Figure 1-31 Kernel Build Stages

Finally, once the entire build and install process is complete, the kernel source tree will be cleaned to free up the temporary space used to build the kernel. At this point the entire build process will be complete, as shown in the following figure.

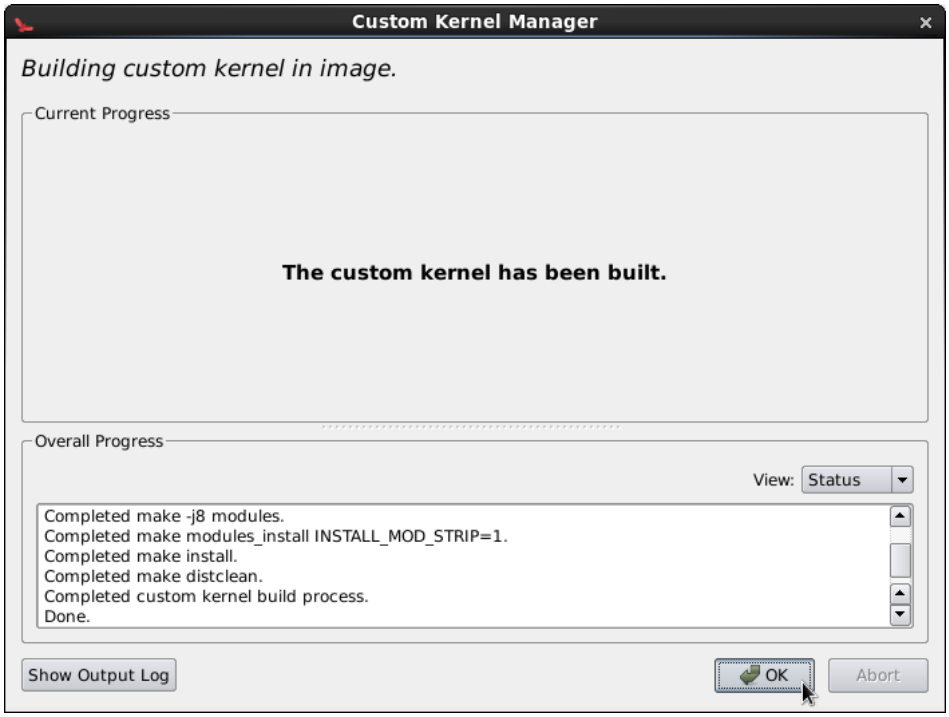


Figure 1-32 Kernel Build Complete

The custom kernel automatically becomes the default kernel to boot. If this choice is not desired, change the kernel to boot using the Kernel To Boot area as described above.

Remove Custom Kernel

The Remove Custom Kernel button allows you to remove the current custom kernel from the target image. This will remove the entry in **`grub.conf`** as well as all of the associated kernel files in the image.

Note that the custom kernel configuration itself is not removed. Thus, it is still possible to build a custom kernel based on the current custom kernel configuration that still remains in the target image.

Additional RPMs

To install additional RPMs into the target file system image manually, click on Additional RPMs from the Customize Image toolbox. The Install Additional RPMs page appears, as shown in the following figure.

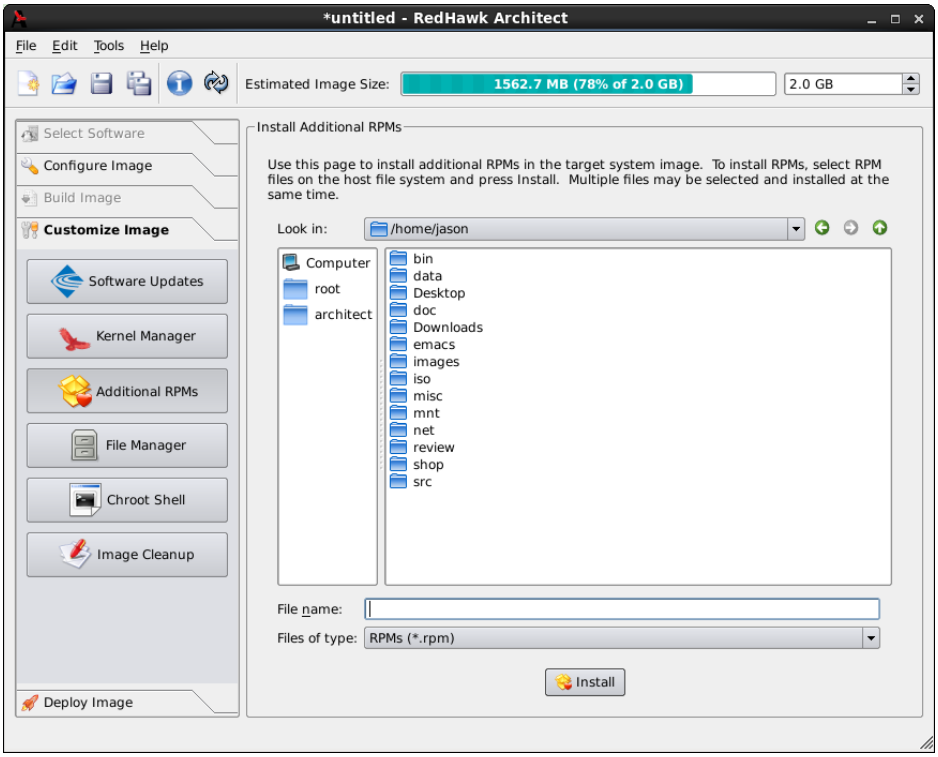


Figure 1-33 Install Additional RPMs Page

The Install Additional RPMs page can be used to locate RPM files on the host system and then easily install them into the target file system image. Note that the interface supports multiple selection; if you have a set of RPMs that have dependencies upon each other you will need to select all of the RPMs simultaneously to have them properly installed together into the target file system image.

Installing Board Support Packages

Concurrent provides *Board Support Packages* (BSPs) for several supported SBCs. These BSPs are distributed as RPMs that may be installed in an image using the Additional RPMs page as described above. Contact Concurrent (*support@ccur.com* or 1-800-245-6453) for information on how to obtain BSPs for a particular SBC.

File Manager

To copy various files into the target file system image manually, click on File Manager from the Customize Image toolbox. The File Manager page appears, as shown in the following figure.

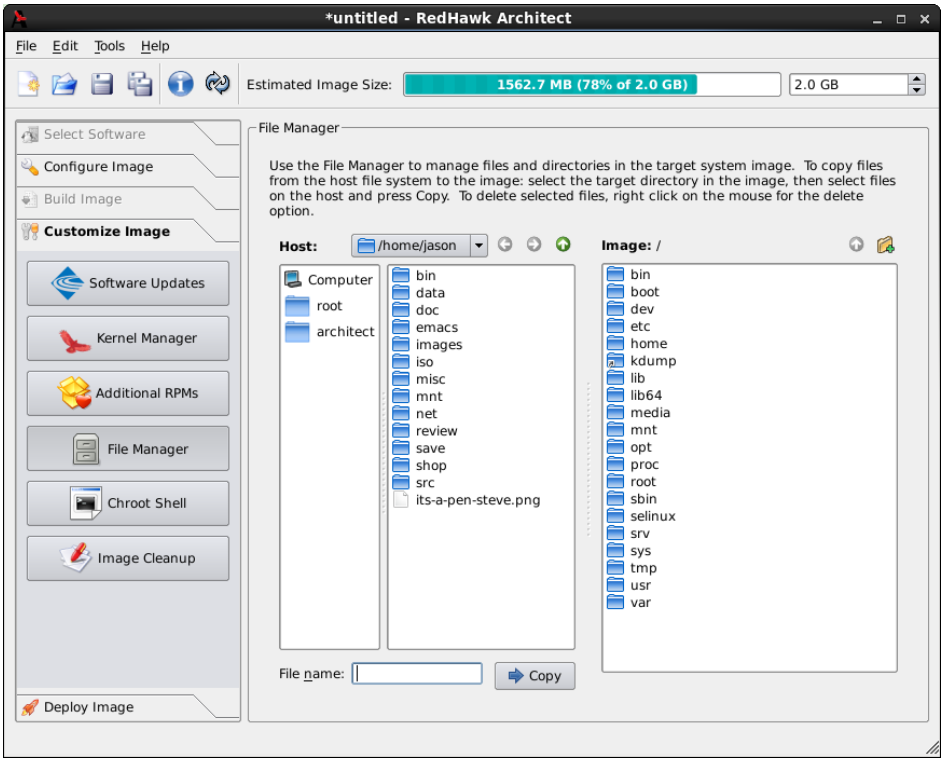


Figure 1-34 File Manager Page

The File Manager page supports many features including multiple selection, the ability to create new directories in the target file system image, and the ability to delete files in the target system image.

Chroot Shell

To customize the target file system image manually, click on the Chroot Shell from the Customize Image toolbox. The Chroot Shell page appears, as shown in the following figure

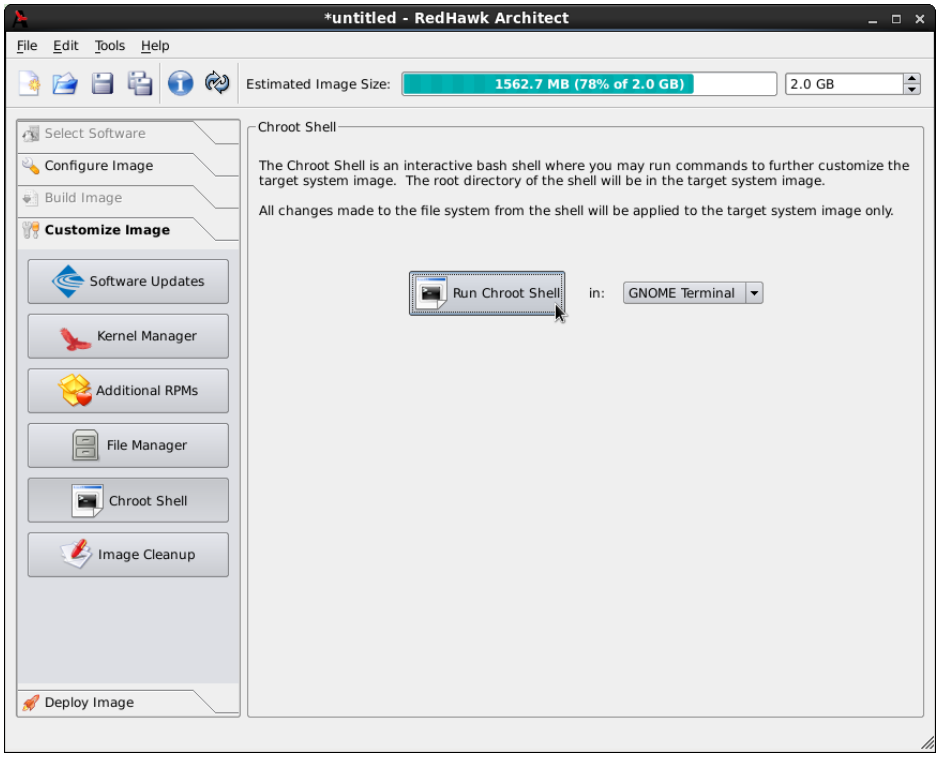


Figure 1-35 Chroot Shell Page

From this toolbox you can open a "chroot" shell in a terminal window. Select the type of terminal from the dropdown and click on the Run chroot shell button. A terminal screen opens, as shown in the following figure.

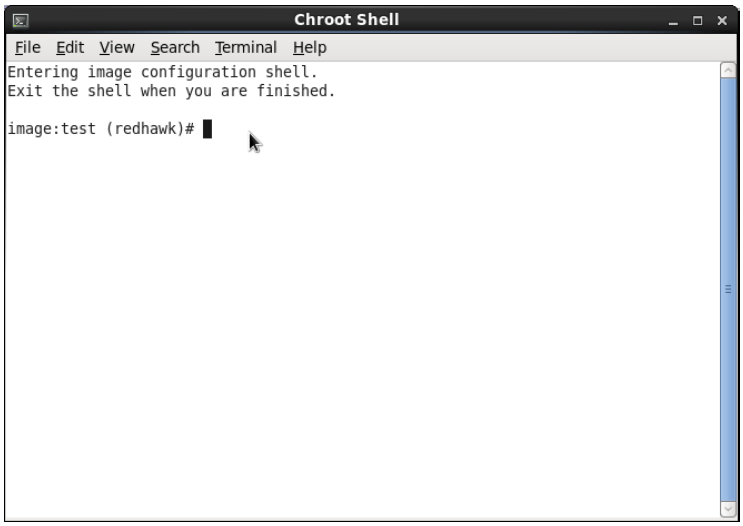


Figure 1-36 chroot Shell

This provides a shell with the root directory being the file system image directory. All changes made to system files (including software installed or removed) will be done in the file system image directory only. The host's root file system will not be affected.

Exit the shell when changes are complete.

Image Cleanup

You may reduce the size of the file system image by removing various types of files that may be unnecessary for the image. To remove unnecessary files from the image, click on Image Cleanup in the Customize Image toolbox. The Image Cleanup page appears, as shown in the following figure.

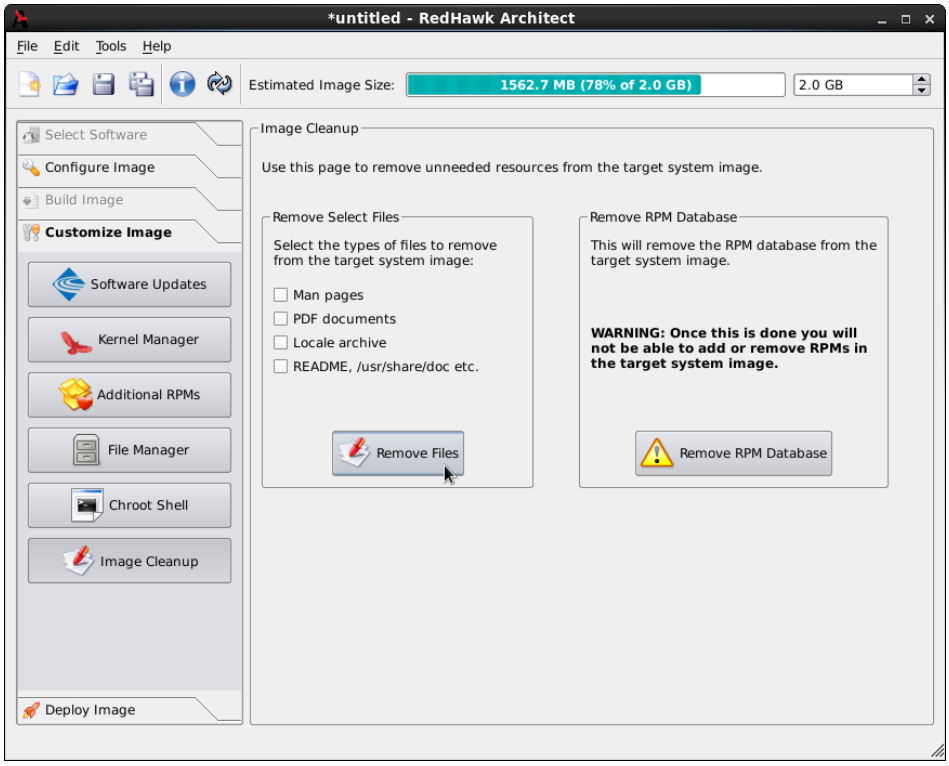


Figure 1-37 Image Cleanup Page

Select the types of files to remove from the file system image and click the Remove Files button.

To remove the RPM database from the file system click the Remove RPM Database button. Once this is done you will lose all ability to manage RPMs in the image. This cannot be undone. Only do this once you are sure you do not have to add or update any more RPMs in the image.

Deploying an Image

Target root file system images can be deployed onto target boards in several differnt ways with RedHawk Architect .

- USB devices can be directly flashed with the root file system image. This includes USB drives and also CompactFlash cards in CompactFlash-to-USB adapters. These devices can then be inserted into a target board and the board will boot the image upon a restart. See "Deploy Image" on page 1-38 for more information.
- DVD media installers can be created with the root file system image on it. Architect creates a bootable installation DVD that will boot on the target and install the root file system onto the target board's local media. Once complete, the DVD is removed and the board will boot the image upon a restart. See "Install via DVD media" on page 1-42 for more information.
- A USB drive installer can be created with the root file system on it. Architect creates a bootable installation USB drive that will boot on the target and install the root file system onto the target board's local media. Once complete, the USB drive is removed and the board will boot the image upon a restart. See "Install via USB drive" on page 1-43 for more information.
- RedHawk Architect can deploy the root file system image over the network. It can deploy an installer that will install the root file system image onto the target board's local media, or it can deploy the root file system image via NFS for fully diskless booting. See "Installing via PXE over a Network" on page 1-44 for more information on network installation, and see "Booting Diskless via PXE over a Network" on page 1-47 for more information on diskless booting.

Deploy Image

To copy a target root file system image to a USB device, select Deploy Image from the toolbox on the left side of the RedHawk Architect main window and click on the USB

Device button. This will display the Deploy Image to USB Device page, as shown in the following figure.

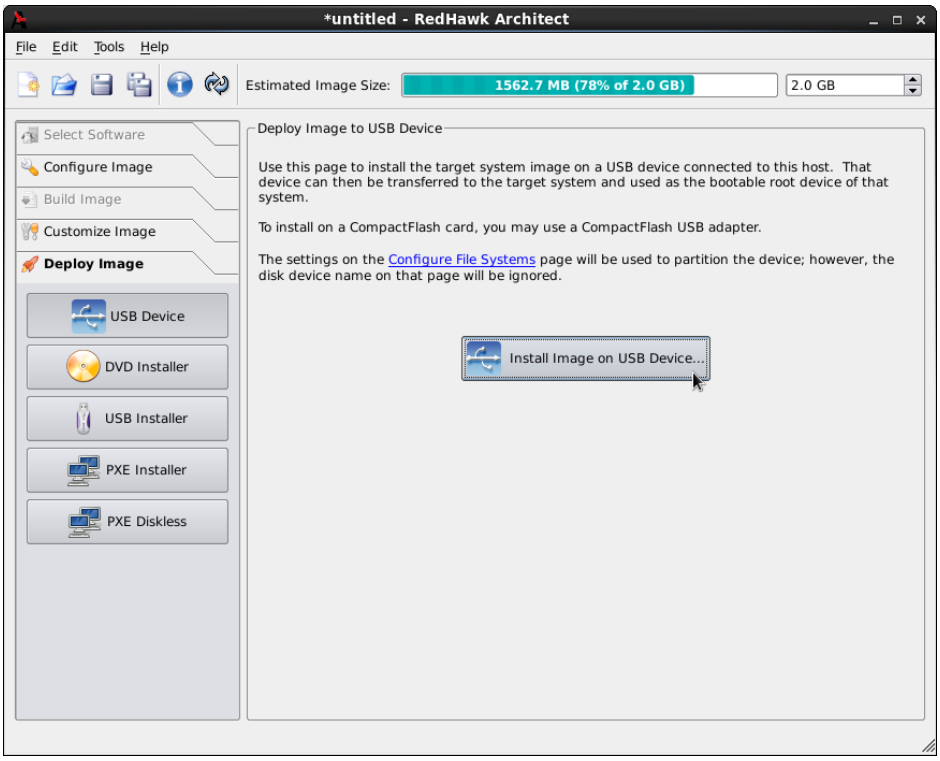


Figure 1-38 Deploy Image USB Device Page

The Install Image on USB Device... button allows you to copy a root file system image onto a USB flash device (e.g. a standard USB Flash Drive or a CompactFlash that is connected directly to the host machine via a USB-to-CompactFlash adapter). Note that IDE/SATA CompactFlash adapters are not supported at this time.

NOTE

CompactFlash devices and USB drives can be bought inexpensively at many retail stores that sell computer accessories. Note that the duration of the flashing process depends upon the performance rating of the specific CompactFlash device or USB drive. It is recommended to use CompactFlash devices or USB drives that have a minimum of a 40MB/s read/write performance rating.

Pressing the Install Image on USB Device... button will begin copying the target root file system onto the USB device by bringing up the USB Device Flasher dialog, as shown in the following figure.

Figure 1-39 Flash Image Dialog

The host system will now be scanned for attached USB flash storage devices. If multiple devices are found a choice will be presented to the user, otherwise the sole device found will be selected by default. Once a device is found or chosen, a confirmation dialog similar to the following will appear:

Figure 1-40 Flash Device Confirmation

Press OK to confirm the operation and then the copy will begin, as shown in Figure 1-41.

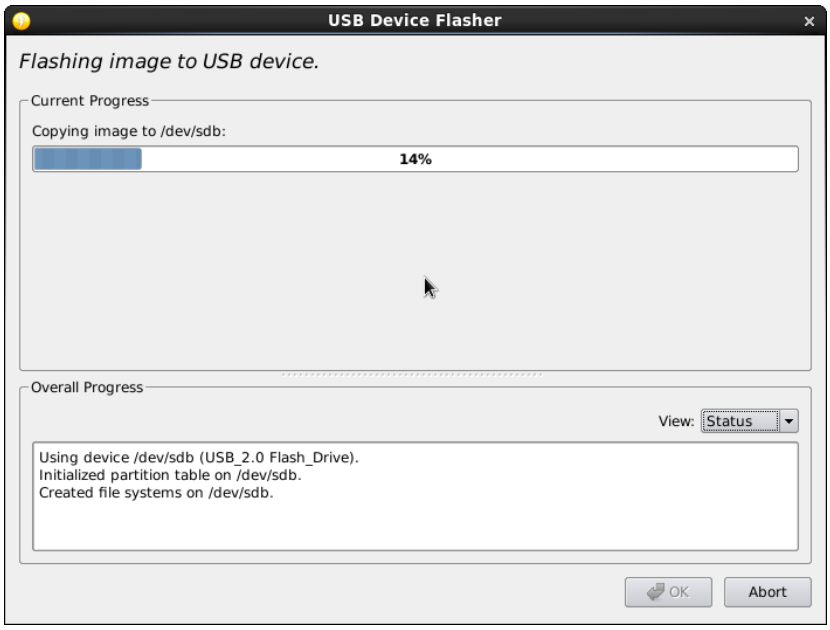


Figure 1-41 Flash Copy Begins

Note that no initial check is made to determine whether the image will fit onto the size of the selected CompactFlash device. If the copy fails because of insufficient space, an error message will be displayed, as shown in the following figure.

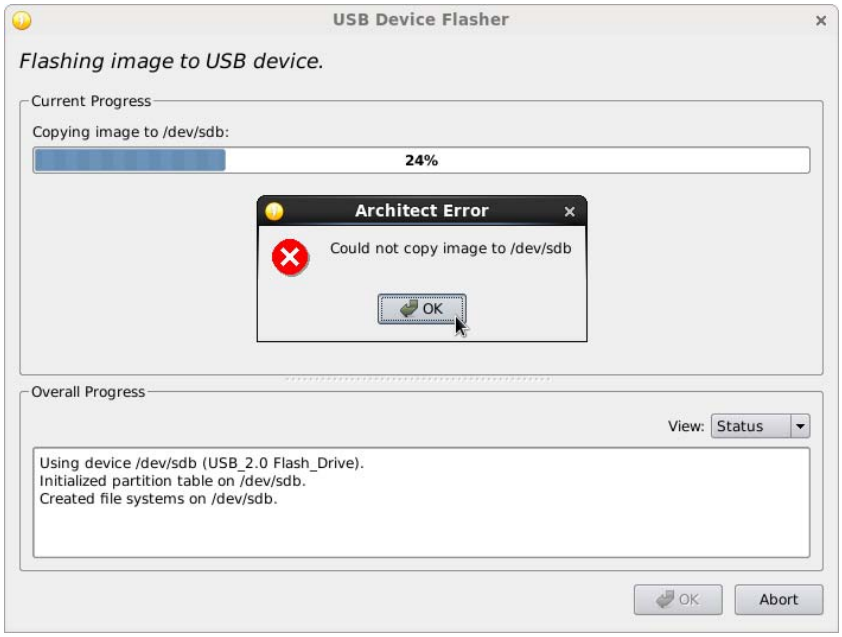


Figure 1-42 Flash Dialog Error

If the CompactFlash is large enough to hold the image, and no other error occurs during the copy, a success dialog will be presented, as shown in Figure 1-43.

Figure 1-43 Flash Copy Completed

Once the copy has completed successfully the CompactFlash can then be placed onto the intended target board and the board can be reset to boot into a fresh RedHawk installation.

Install via DVD media

To create a bootable DVD media that will install the target root file system image into a target system, select DVD Installer from the toolbox on the left side of the RedHawk

Architect main window. This will display the Deploy Image via Installation DVD page, as shown in the following figure.

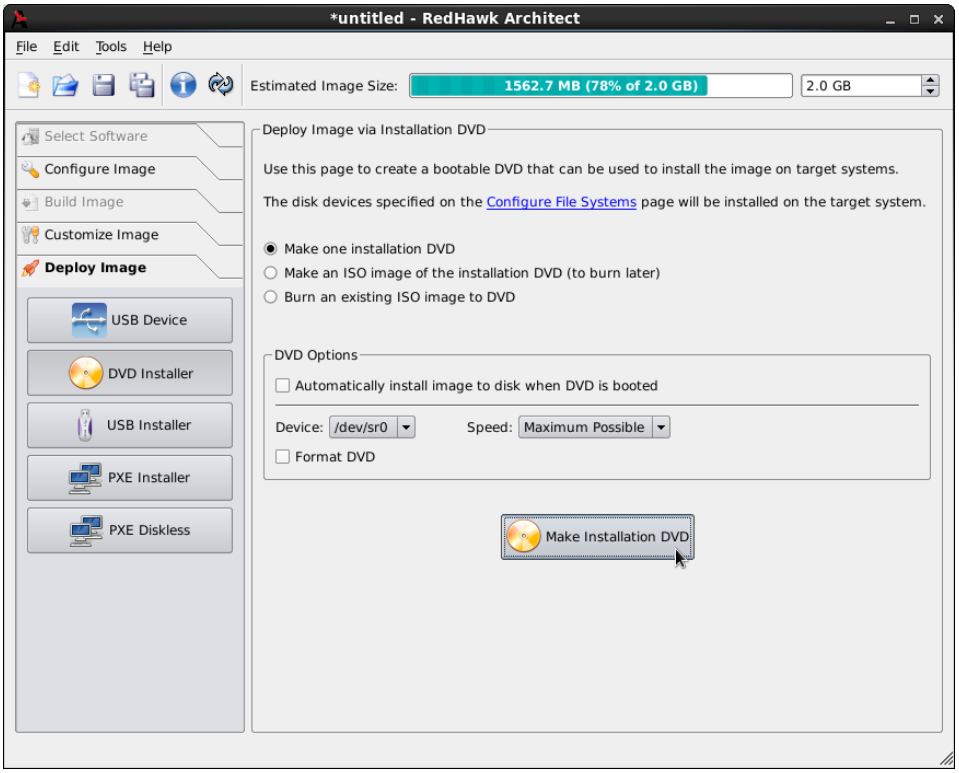


Figure 1-44 Make Installation DVD Page

Choose Make one installation DVD to directly burn a DVD that will install the target root file system image onto DVD media. No ISO image will be saved on disk in this mode.

Choose Make an ISO image for the installation DVD to create an ISO file that contains an installer image. This ISO image can be later burned to DVD, or it may be useful with other tools or for long term storage.

Choose Burn an existing ISO image to DVD to burn a previously created ISO image to DVD media.

Install via USB drive

To create a bootable USB drive that will install the target root file system image into a target system, select USB Installer from the toolbox on the left side of the RedHawk

Architect main window. This will display the Deploy Image via Installation USB Stick page, as shown in the following figure.

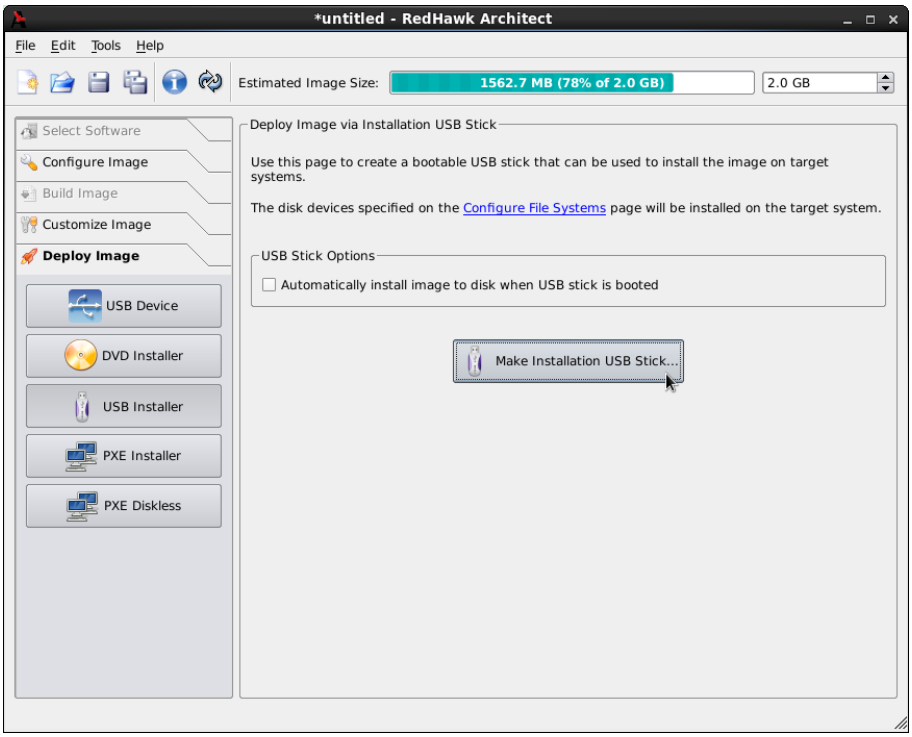


Figure 1-45 Make Installation USB Stick Page

Press the Make Installation USB Stick... button to write a bootable installer image to an attached USB drive.

Choose Automatically install image to disk when USB stick is booted to create a USB stick that will install the target root file system image onto a target board's local media without any prompting or user interaction.

NOTE

This will destroy any data on the target system's local media whenever booted into a target system and therefore this should be used carefully; however, it is useful on systems without an attached console display or configured and connected serial console.

Installing via PXE over a Network

RedHawk Architect can deploy a root file system image to a target system over an Ethernet network connecting the host machine to the target machine. Installation of the root file system is performed by first creating a PXE-bootable installation image. A target

machine can boot this installation image via PXE, which will then remotely copy the root file system image into the target's local drive media.

This deployment method does not require the preparation of any removable installation media and it is often the fastest installation deployment method, however it does require some initial networking configuration on both the host and target systems.

NOTE

Various host system networking services must be properly configured before attemting to deploy a PXE-bootable installation image for the first time. If you have not configured the host networking services yet, you will need to invoke the PXE Target Manager and choose to Initialize PXE Services. See "Managing PXE Targets" on page 3-8 for more information.

To create a PXE-bootable installation image that will install the target root file system image over a network into a target system, select PXE Installer from the toolbox on the left side of the RedHawk Architect main window. The Deploy Image via PXE Installation page will then appear, as shown in the following figure.

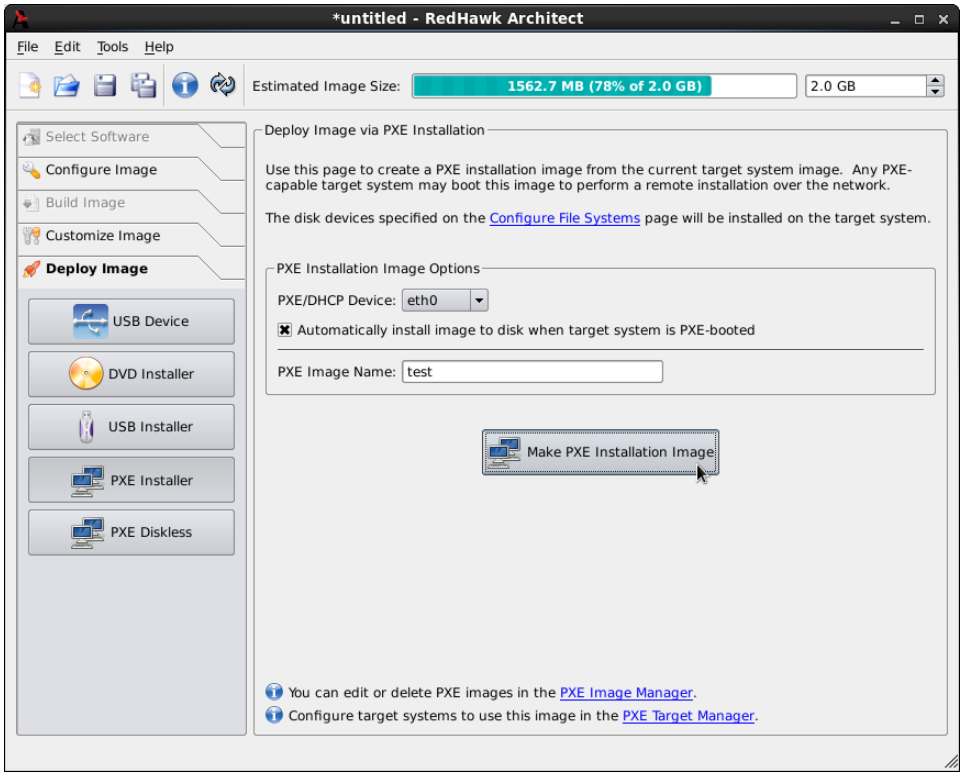


Figure 1-46 Make PXE Installation Image Page

Choose the PXE/DHCP Device network interface that the target system will use for communicating with the host. The target hardware must be configured to perform a PXE broadcast on this network interface at boot time.

Verify that the Automatically install image to disk when target system is PXE-booted checkbox is checked to have the target perform installation non-interactively. If this checkbox is not checked then the target will first display a menu and a user must press a key before the installation will begin.

Enter a PXE Image Name for the installation image that will be created. Each installation image must have a unique name to identify it, though the names can be arbitrarily chosen by the user. Multiple images may be created and shared between targets. See "Managing PXE Images" on page 3-4 for more information.

Press Make PXE Installation Image to begin building the named PXE installation image. The PXE Installation Image Builder dialog will appear as shown in the following figure.

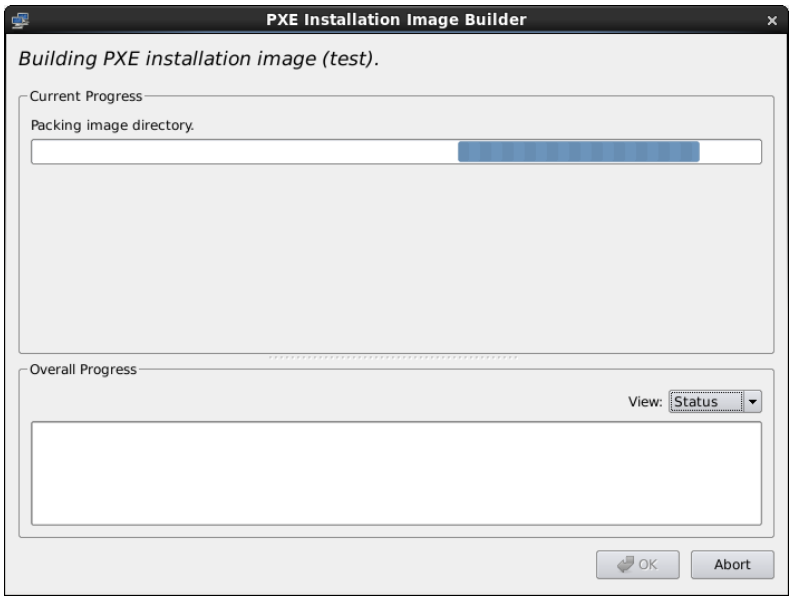


Figure 1-47 PXE Installation Image Builder Dialog

NOTE

The PXE installation images are placed under a directory named `architect` which must reside under the system's tftpboot directory. The tftpboot directory defaults to `/var/lib/tftpboot`. While this directory is configurable, at this time the Architect tool only supports the default location.

Packing the PXE installation image will take several minutes. Once complete the PXE Installation Image Builder dialog will appear as shown in the following figure.

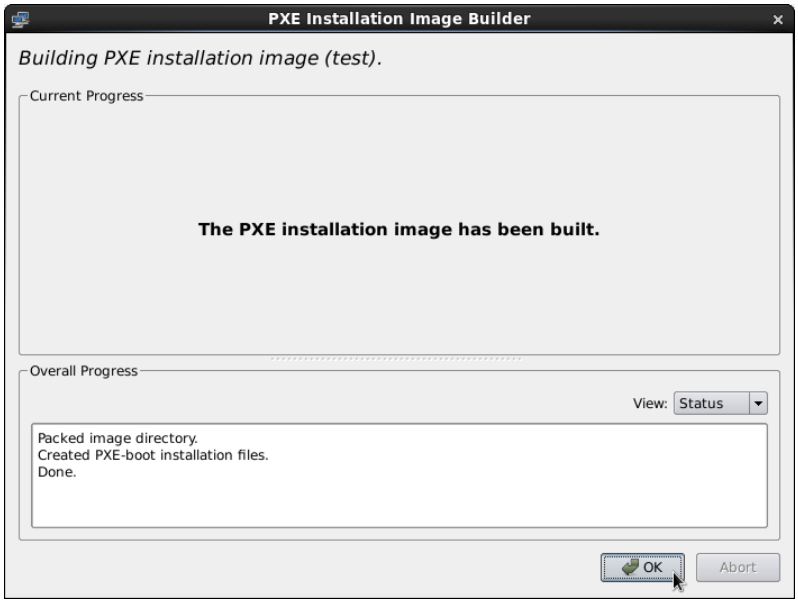


Figure 1-48 PXE Installation Image Building Complete

Press Okay to dismiss the dialog.

Once the PXE installation image is successfully built you can use the PXE Target Manager to schedule installation of the image for specific targets. See "Managing PXE Targets" on page 3-8 for more information.

Booting Diskless via PXE over a Network

RedHawk Architect can deploy a root file system image to a diskless target system over an Ethernet network connecting the host machine to the target machine. This is done by first creating a PXE-bootable diskless image. A target machine can boot this diskless image via PXE, which will then mount the root file system image via NFS.

This deployment method does not require any local drive media to be present on the target system; any local drive media that is present on the target will be untouched and ignored. However, the host must be able to communicate with the target for the duration of the time the target is booted. This method also requires some initial networking configuration on both the host and target systems.

To create a PXE-bootable diskless image that will mount the target root file system image via NFS on a target system, select PXE Diskless from the toolbox on the left side of the RedHawk Architect main window. The Deploy Image to Diskless Systems via PXE page will then appear. Note that the first time that you select the PXE Diskless deployment method you will be presented with the initial page shown in the following figure:

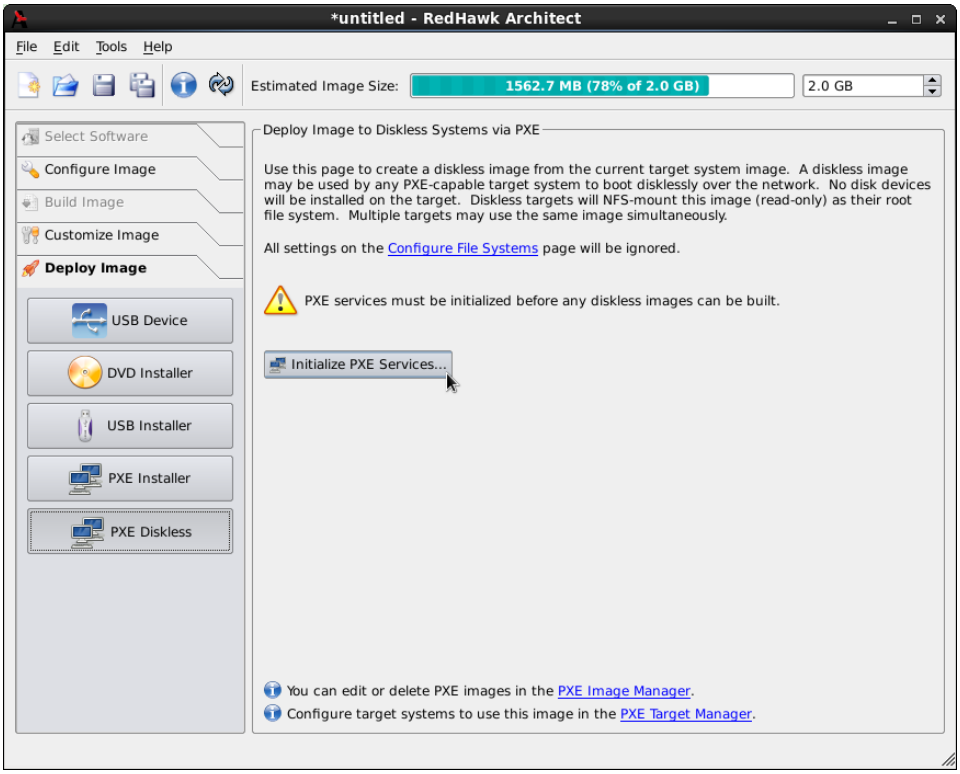


Figure 1-49 Initial PXE Diskless Deployment Page

Thus, before you can create PXE diskless deployment images you must press the Initialize PXE Services... button. See "Initializing PXE Services" on page 3-1 for more information. Once you have initialized the PXE Services the complete page will appear as shown in the following figure.

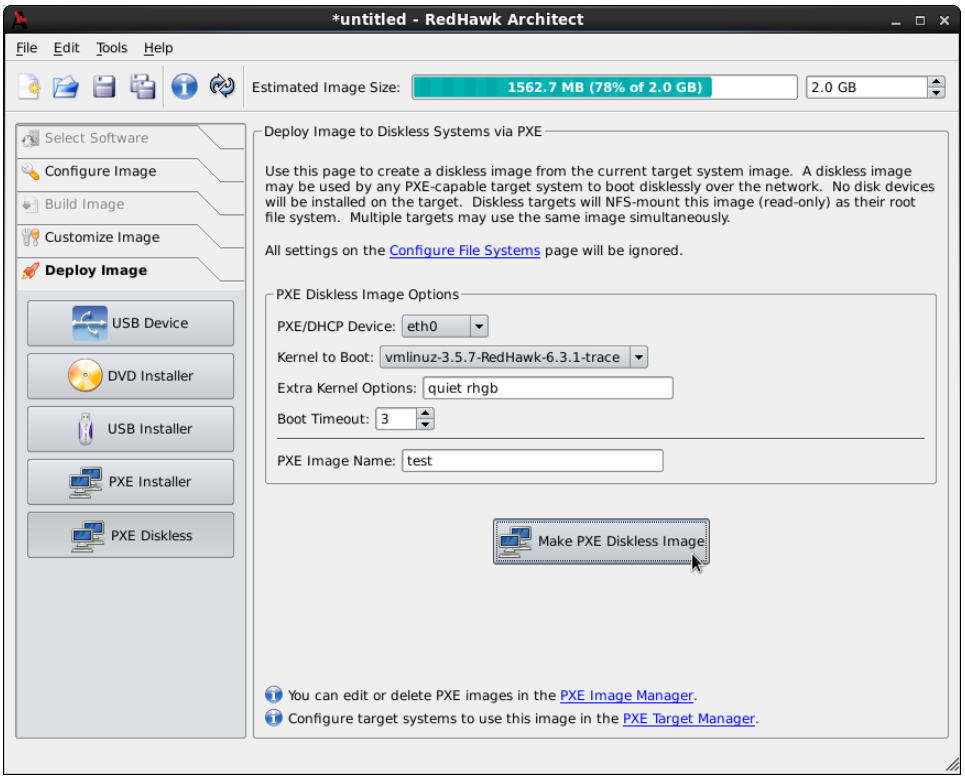


Figure 1-50 PXE Diskless Deployment Page

Choose the PXE/DHCP Device network interface that the target system will use for communicating with the host. The target hardware must be configured to perform a PXE broadcast on this network interface at boot time.

Choose the Kernel to Boot for the target. This will default to the kernel that has already been chosen as the default in the Kernel Manager, however a diskless image may specify a different default if desired.

Enter any Extra Kernel Options that you would like to use for the diskless image. All kernel parameters specified here will be appended to the kernel's boot-time options. See the **`kernel-parameters.txt`** file in the kernel source Documentation directory for a complete list of the standard boot options.

Modify the Boot Timeout count to change the number of seconds the boot menu will be displayed before the diskless image will start booting. Increase the timeout if you wish to have more time to interrupt the boot menu to choose different kernels or boot options.

Enter a PXE Image Name for the diskless image that will be created. Each diskless image must have a unique name to identify it, though the names can be arbitrarily chosen by the user. Multiple images may be created and shared between targets. See "Managing PXE Images" on page 3-4 for more information.

Press Make PXE Diskless Image to begin building the named PXE diskless image. The PXE Diskless Image Builder dialog will appear as shown in the following figure.

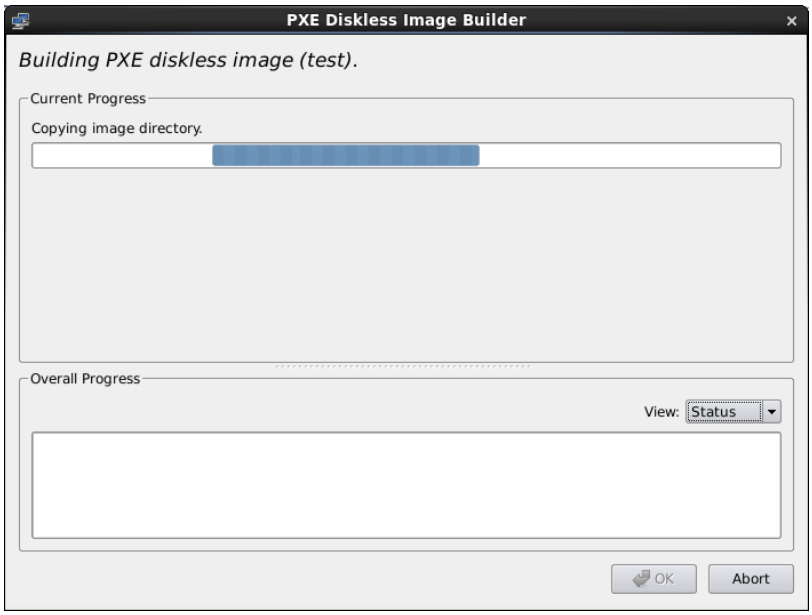


Figure 1-51 PXE Diskless Image Builder Dialog

NOTE

The PXE diskless images are placed under a directory named `architect` which must reside under the system's tftpboot directory. The tftpboot directory defaults to `/var/lib/tftpboot`. While this directory is configurable, at this time the Architect tool only supports the default location.

Creating the PXE diskless image should take several minutes. Once complete the PXE Diskless Image Builder dialog will appear as shown in the following figure.

Figure 1-52 PXE Diskless Image Building Complete

Press Okay to dismiss the dialog.

Once the PXE diskless image is successfully built you can use the PXE Target Manager to configure diskless booting of the image for specific targets. See "Managing PXE Targets" on page 3-8 for more information.

Editing an Existing Session

A session can be saved at any time and loaded later to continue work on a file system image.

To save the current session click on the Save Session icon or on Save Session in the File menu. Selecting Save Session As in the File menu displays a file selection dialog and allows you to save the current session using a different name.

To make a copy of the current session click on the Duplicate Session icon or on Duplicate Session in the File menu. Duplicating a session makes a copy of the current session and optionally copies an existing image to go with it.

To load an existing session, click on the Open Session icon or on Open Session in the File menu. You may also click on the Open button from the opening dialog when Architect first starts.

2
Importing ISO Images

This chapter describes how to create or import on-disk ISO images to dramatically speed up and virtually automate target file-system image creation.

Importing ISO Images

Normally when bulding a target file-system image the user is prompted to insert various optical media discs containing the software that is required in order to create the initial target file-system image. If only one or two images are being produced, manually inserting optical media is generally acceptable.

However, if the user is generating and maintaining several different target file-system image configurations, it is often preferable to create on-disk ISO images of the various optical media discs. To accomplish this, select the Import ISO Images item in the Tools menu, or click the Import ISO Images button on the Build Image page, and the following dialog will appear.

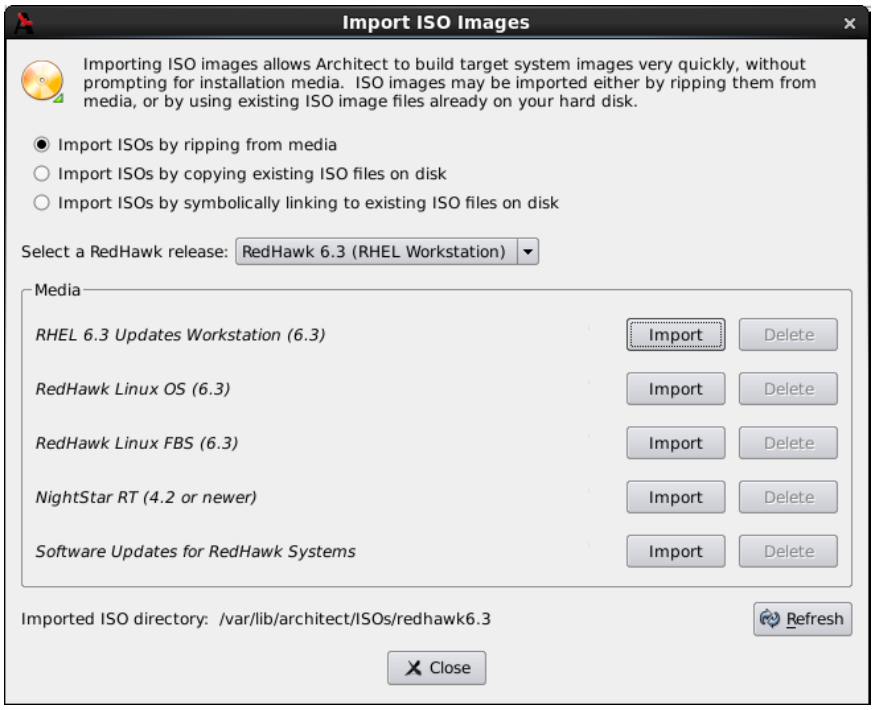


Figure 2-1 Import ISO Images Dialog

There are three different methods that can be used to import ISO images:

- Import ISO images directly from manually inserted optical media
- Copy ISO images from already existing ISO image files
- Link ISO images to already existing ISO images files

These various methods will be described in the following sections.

The user can import different sets of ISO images for different RedHawk release versions; use the Select a RedHawk release pull-down menu to select which version of RedHawk to import ISO images for.

In addition, different import methods can be used *within* a specific RedHawk release. For example, it is possible to use one import method to import the Red Hat ISO images and a different import method to import the RedHawk and NightStar ISO images. All combinations are valid.

Importing ISO Images From Optical Media

To use this method select the Import ISOs by ripping from media import method and then press the Import button to begin the import process. A dialog similar to the following dialog will be displayed.

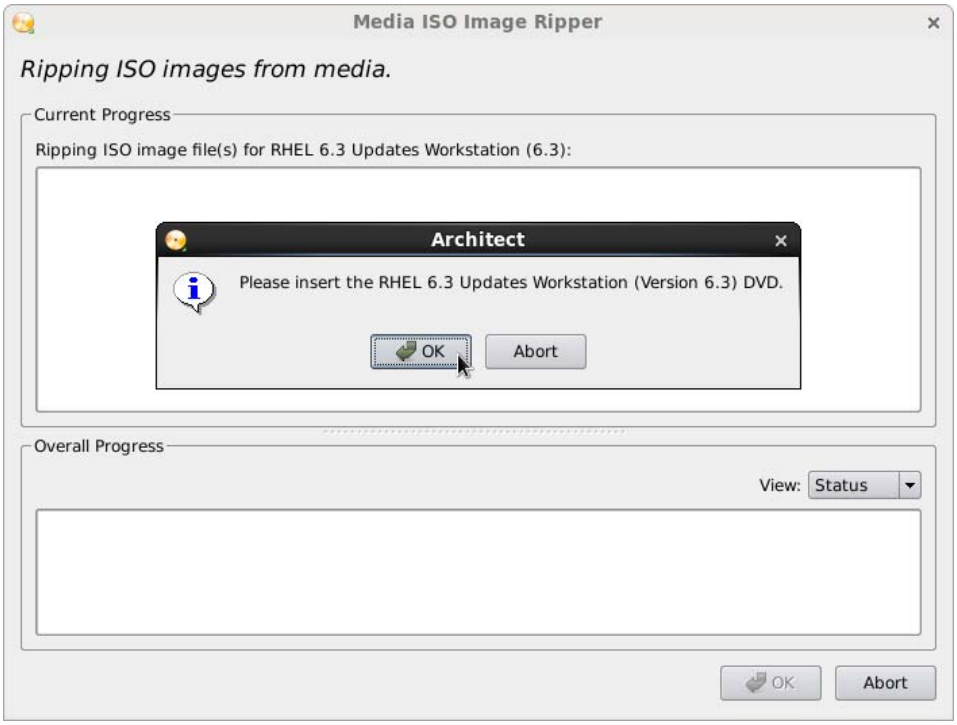


Figure 2-2 Rip ISO Images From Media

At this point the correct optical media disc for the requested item should be manually inserted into the host system's optical media tray. Once the optical media has been inserted, press OK to begin copying the ISO image from the optical media onto the host system's hard-drive. Various status messages will be displayed as the copy progresses.

Copying ISO Images From Existing ISO Images

To use this method select the Import ISOs by copying existing ISO files on disk import method and then press the Import button to begin the import process. A file selection dialog similar to the following dialog will be displayed.

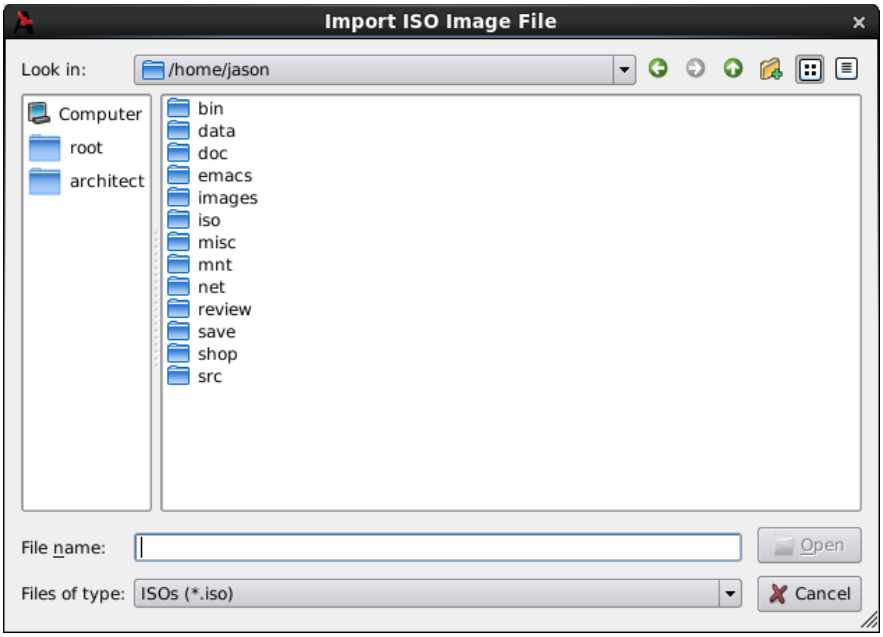


Figure 2-3 Copy ISO Image File Selector

Navigate the file selection dialog to the appropriate directory, select the ISO image and then press the Open button. This will begin the process of copying the ISO image file into Architect's `/var/lib/architect/ISOs` directory. Once the copy is completed, the ISO image file that was copied is no longer needed and can be removed if necessary.

Linking To Existing ISO Images

To use this method select the Import ISOs by symbolically linking to existing ISO files on disk import method and then press the Import button to begin the import process. A file selection dialog similar to the following dialog will be displayed.

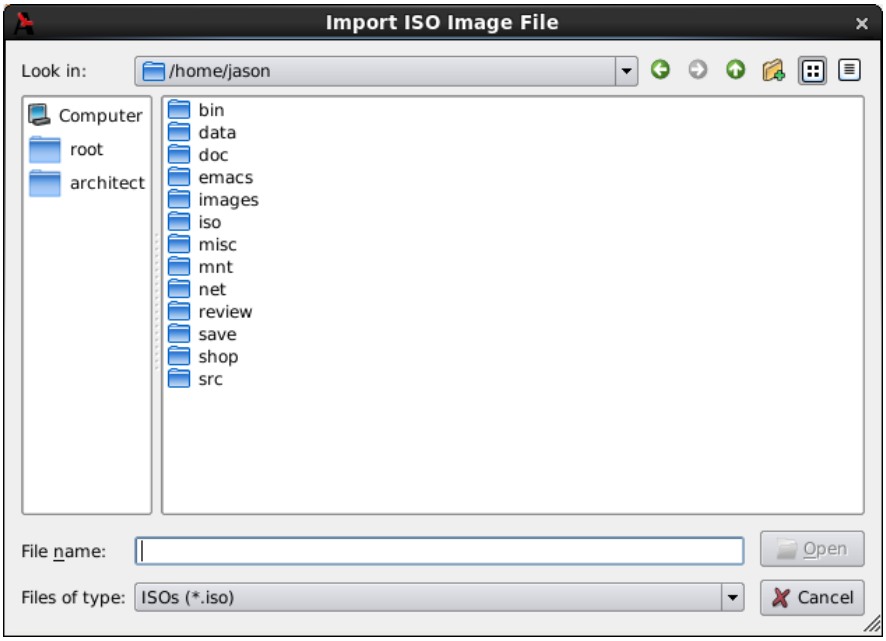


Figure 2-4 Symlink To ISO Image File Selector

Navigate the file selection dialog to the appropriate directory, select the ISO image and then press the Open button. This will immediately create a symbolic link to the selected ISO image file. The symbolic link will be created and placed inside Architect's `/var/lib/architect/ISOs` directory. Once the copy is completed, the ISO image file that was linked to must be preserved and kept at the exact same file-system location in order for Architect's symbolic link to be valid.

NOTE

Architect will detect if it has symbolic links to ISO image files that have been erroneously removed and ISO image will no longer be shown as a valid ISO image in the list of imported ISO images.

If this happens, the ISO image must be imported again to be valid, otherwise Architect will prompt for the corresponding optical media disc during any subsequent target file-system image builds.

Deleting Imported ISO Images

Previously imported ISO images can be deleted at any time by pressing the Delete button of the corresponding ISO image. This is not generally necessary, but can be done in order to save disk space or to recover from the rare case of a file corruption.

3
PXE Management

This chapter describes how to manage PXE resources on the host and how targets in your network environment will use these PXE resources.

Enabling PXE on Targets

The Preeboot eXecution Environment (PXE) provides a method for booting target systems using a network interface, without the requirement of having access to any local storage on the target system.

To use PXE, targets must first be configured to perform a PXE broadcast during boot. To enable the PXE broadcast perform the following steps:

1. Reboot the target and stop the system immediately after POST (Power-On Self-Test), normally by pressing Delete or F2, to get into the BIOS settings menu.
2. Each kind of computer has a slightly different BIOS settings menu, however the general rule is to navigate to the 'PCI Device' or the 'Integrated Devices' section of the BIOS menu and enable PXE boot on the first Ethernet interface that is present. Ensure that the chosen interface is connected to a switch that is present on the same network as the host system.
3. Record the MAC address of the target's Ethernet interface for later use with Architect's PXE Target Manager dialog. See "Managing PXE Targets" on page 3-8 for more information.

NOTE

Some older BIOSes do not provide an option to boot with PXE. The *Etherboot* utility can be used instead, however Concurrent does not support this configuration. See **http://etherboot.org** for more information.

Initializing PXE Services

Various PXE-related services on the host system need to be properly initialized before any of the PXE-based image deployment methods can be used. To initialize these services, click on PXE Target Manager in the Tools menu and you will be presented with the following dialog.

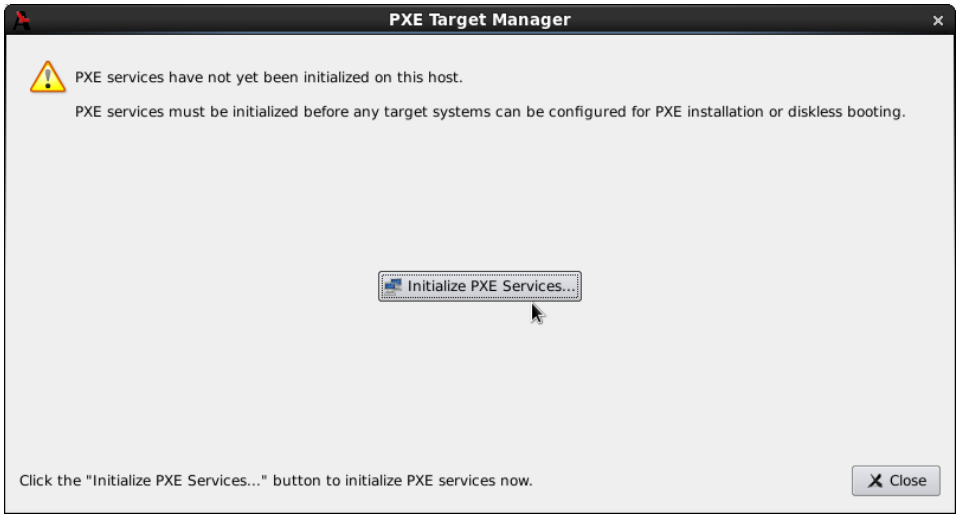


Figure 3-1 PXE Target Manager Unitialized

Press Initialize PXE Services... to begin initializing the PXE services and you will then be presented with the following dialog.

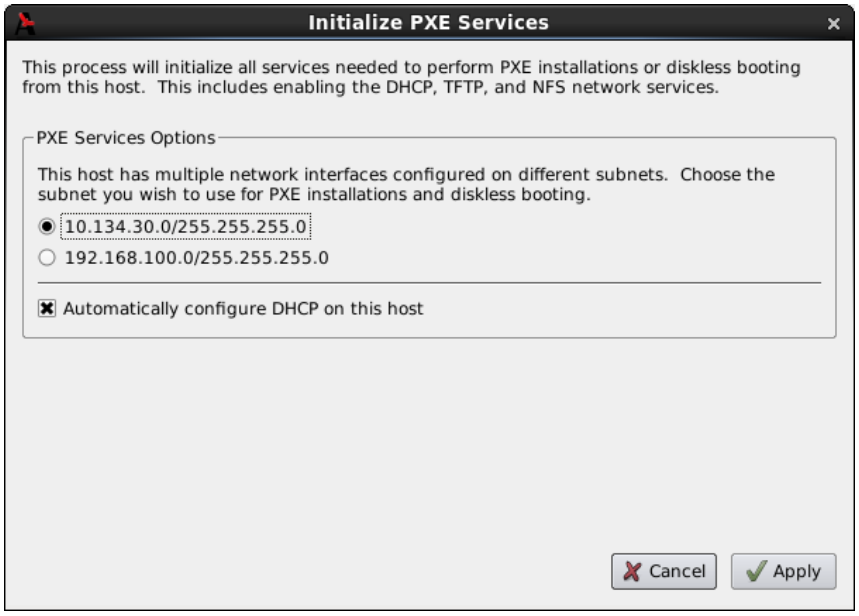


Figure 3-2 Initialize PXE Services Dialog

First, choose the network subnet that you wish to use for all PXE communications between the host and its targets. If only one subnet is available a choice cannot be made, however the information is still presented so that the user can verify that the subnet is the desired subnet.

By default DHCP services will be automatically configured and enabled on the host, and this is the recommended approach. However if another DHCP server already exists on the

chosen subnet you will need to uncheck Automatically configure DHCP on this host or the two DHCP servers will conflict with each other. In this case, you will need to manually merge the DHCP configuration files generated by Architect on the host with those of the actual DHCP server. See "Manual DHCP Configuration" on page A-1 for more information.

Once these settings are correct for your environment click Apply and the following dialog will appear and display the initialization progress.

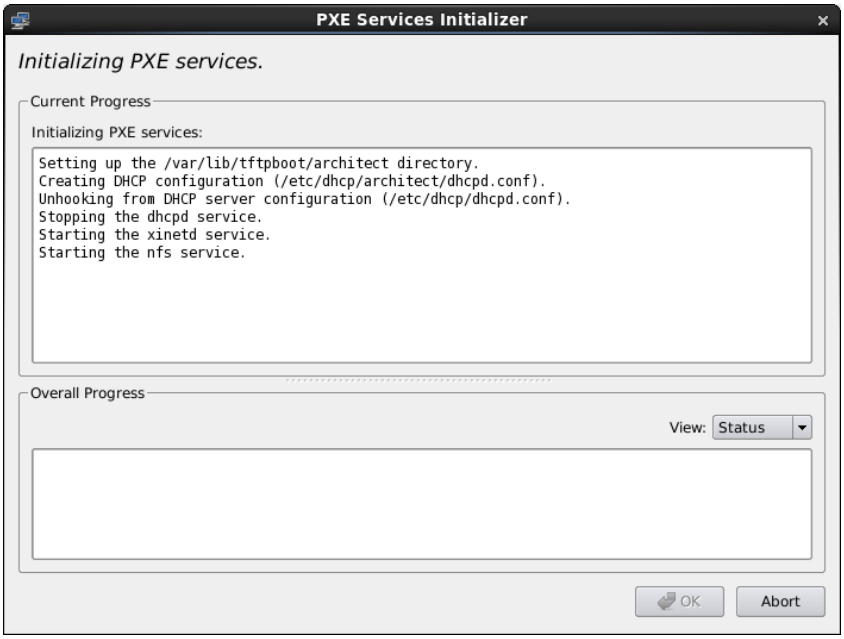


Figure 3-3 PXE Services Initializer Dialog

Once the initialization has completed successfully you will see the following displayed in the dialog.

Figure 3-4 PXE Services Initializer Done

Press Okay to return to the main PXE Target Manager window. At this point the host is now configured with the required networking services to enable PXE image deployments.

Managing PXE Images

Root file system image deployments that have been created with the PXE Installer and PXE Diskless tools in RedHawk Architect's Deploy Image toolbox are resources that can be inspected and managed with the PXE Image Manager.

Select PXE Image Manager from the Tools menu to access the PXE Image Manager. If no PXE images have yet been deployed you will be presented with the following empty dialog.

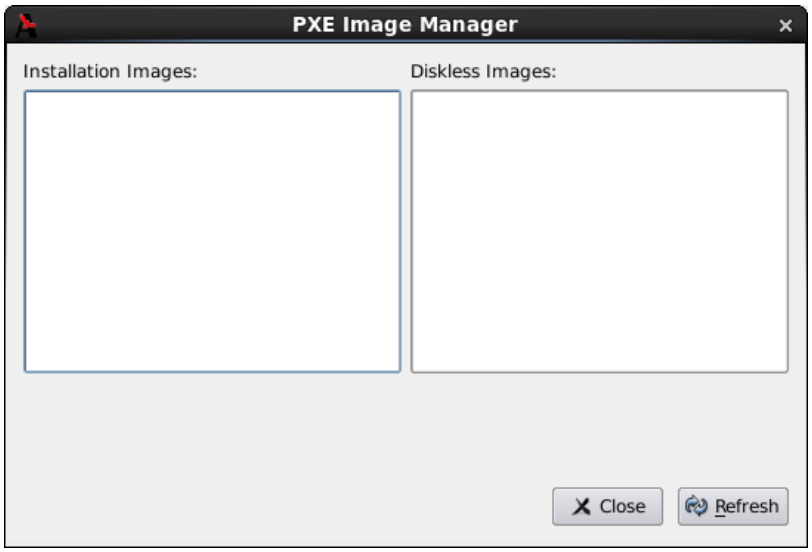


Figure 3-5 PXE Image Manager

The PXE Image Manager will remain empty until PXE images are deployed using the PXE deployment tools in the Deploy Image toolbox.

PXE Installer Images

The PXE Image Manager lists all of the installation images that have been deployed by the PXE Installer tool. The following dialog shows an example of the PXE Image Manger with deployed installer images.

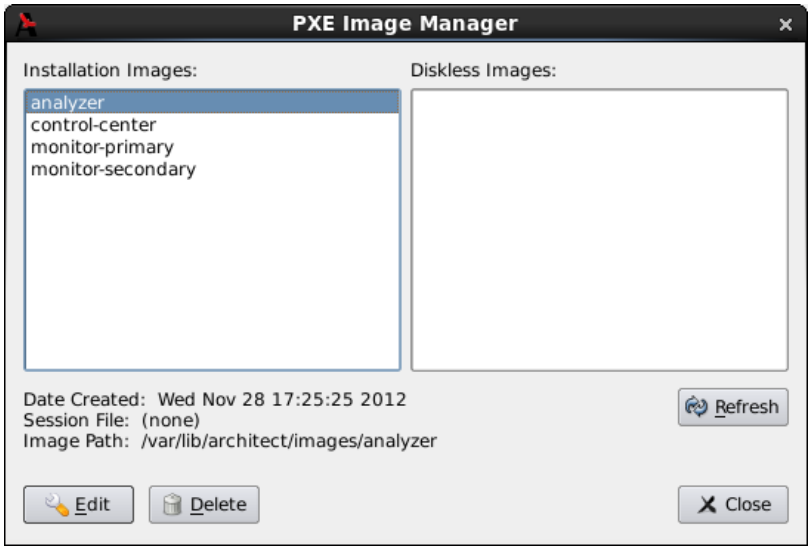


Figure 3-6 PXE Image Manager with Installation Images

Each PXE installation image that is created using the PXE Installer deployment method is effectively a snapshot in time of the root file system image being managed during an Architect session. These images can be inspected and/or individually removed.

Selecting an installation image from the list will display the following details about the image:

- The date the installation image was deployed
- The session file that was being used at the time of deployment; if the session has not yet been saved the string `None` will be displayed instead
- The path of the root file system image that was deployed in the image

To delete an installation image, first select it in the list and then press the Delete button. You will be presented with a dialog asking for confirmation and simply press Yes to delete it.

To edit the attributes of an installation image, first select it in the list and then press the Edit button. You will be presented with a dialog allowing you to modify several attributes of the installation image including:

- The PXE/DHCP Device that the installation image should use for all PXE and DHCP network traffic.
- The Automatically install image to disk when target is PXE-booted checkbox.

Press OK to apply any changes made to the attributes of the installation image.

The Refresh button will refresh the list to match the resources currently on disk, however refresh is only useful if multiple copies of Architect are being used simultaneously to create and manage PXE installation images.

Press Close at any time to dismiss the dialog and return to the Architect main window.

PXE Diskless Images

The PXE Image Manager lists all of the diskless images that have been deployed by the PXE Diskless tool. The following dialog shows an example of the PXE Image Manger with deployed diskless images.

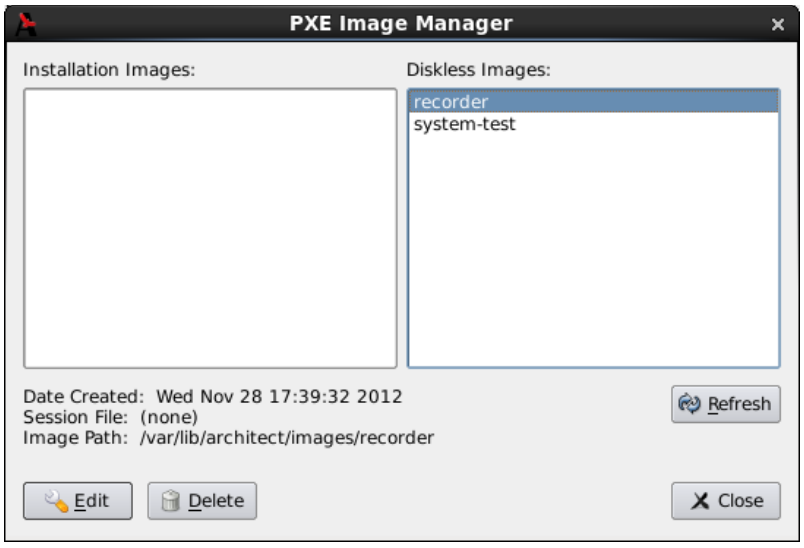


Figure 3-7 PXE Image Manager with Diskless Images

Similar to PXE installation images, PXE diskless images created using the PXE Diskless deployment method create a snapshot in time of the root file system image being managed. These images can be inspected and/or individually removed.

Selecting a diskless image from the list will display the following details about the image:

- The date the diskless image was deployed
- The session file that was being used at the time of deployment; if the session has not yet been saved the string `None` will be displayed instead
- The path of the root file system image that will be accessed by the image

To delete diskless image, first select it in the list and then press the Delete button. You will be presented with a dialog asking for confirmation and simply press Yes to delete it.

To edit the attributes of a diskless image, first select it in the list and then press the Edit button. You will be presented with a dialog allowing you to modify several attributes of the diskless image including:

- The PXE/DHCP Device that the diskless image should use for all PXE and DHCP network traffic.
- The Kernel to Boot for the diskless image.
- Any Extra Kernel Options for the diskless image's kernel to use.
- The Boot Timeout for the diskless image's boot menu to use.

Press OK to apply any changes made to the attributes of the diskless image.

The Refresh button will refresh the list to match the resources currently on disk, however refresh is only useful if multiple copies of Architect are being used simultaneously to create and manage PXE diskless images.

Press Close at any time to dismiss the dialog and return to the Architect main window.

Managing PXE Targets

Root file system image deployments that have been created with the PXE Installer and PXE Diskless tools in RedHawk Architect's Deploy Image toolbox are resources that can be assigned to targets using the PXE Target Manager.

Select PXE Target Manager from the Tools menu to access the PXE Target Manager. If no targets have yet been added you will be presented with the following dialog showing an empty list of targets.

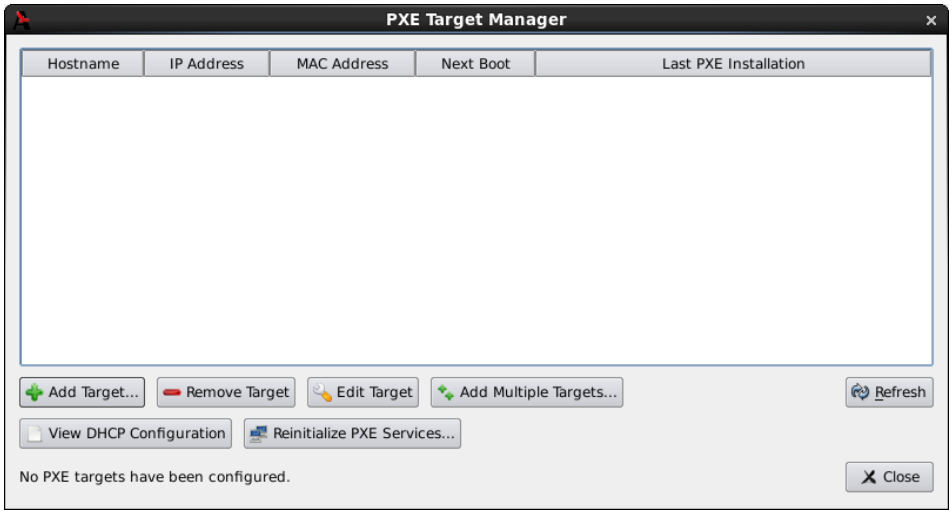


Figure 3-8 PXE Target Manager

The PXE Target Manager's target list will remain empty until targets are added using one of the Add buttons below the list.

Adding Targets

All targets that will be using PXE installation images and/or PXE diskless images must first be added to the PXE Target Manager. Targets can be added either individually or in groups, and these two methods are described in the following sections.

Adding Single Targets

A single target can be added to the PXE Target Manager by pressing the Add Target... button on the PXE Target Manager dialog. The following dialog will be shown.

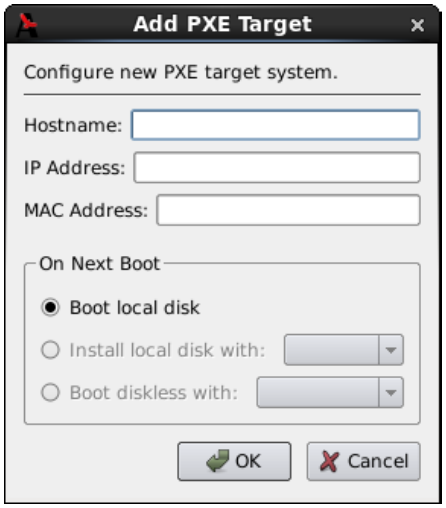


Figure 3-9 Add PXE Target Dialog

Enter the hostname, IP address and MAC address of the target in the corresponding fields.

In the On Next Boot area of the dialog, choose the desired target behavior that it will perform after its next reboot and subsequent PXE broadcast. The following behaviors are supported:

- Choose Boot local disk to have the target simply boot from its local disk upon next reboot.
- Choose Install local disk with and select a PXE installer image from the pulldown to have the target install the local disk with the selected PXE installer image upon next reboot. This option is only available if PXE installer images have previously been deployed; see "Installing via PXE over a Network" on page 1-44 for more information.
- Choose Boot diskless with and select a PXE diskless image from the pulldown to have the target boot disklessly with the selected PXE diskless image upon next reboot. This option is only available if PXE diskless images have previously been deployed; see "Booting Diskless via PXE over a Network" on page 1-47 for more information.

Press OK to add this target to the PXE Target Manager and dismiss the dialog.

After targets have been entered the PXE Target Manager will look similar to the following example:

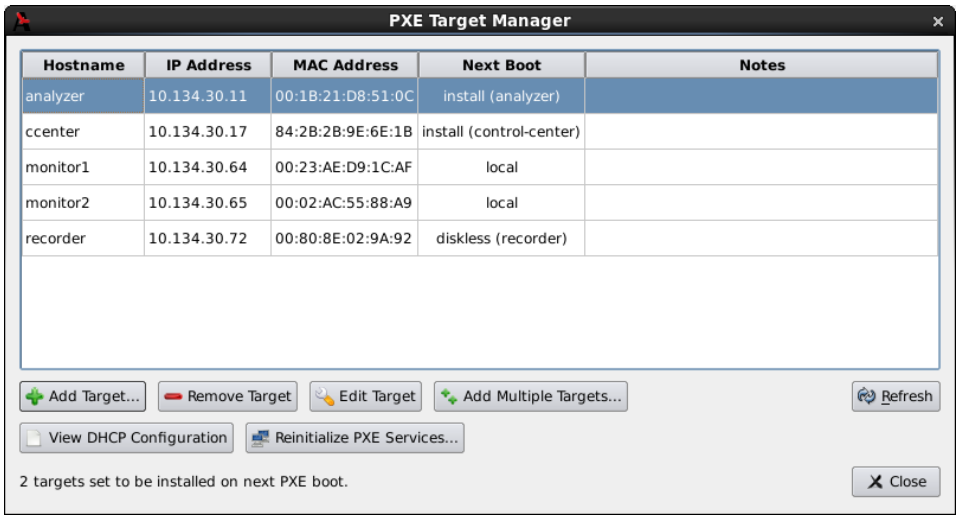


Figure 3-10 PXE Target Manager with Targets

When you are finished adding targets press the Close button to return to the Architect main page.

Adding Multiple Targets

Multiple target can be added to the PXE Target Manager by pressing the Add Multiple Targets... button on the PXE Target Manager dialog. The following dialog will be shown.

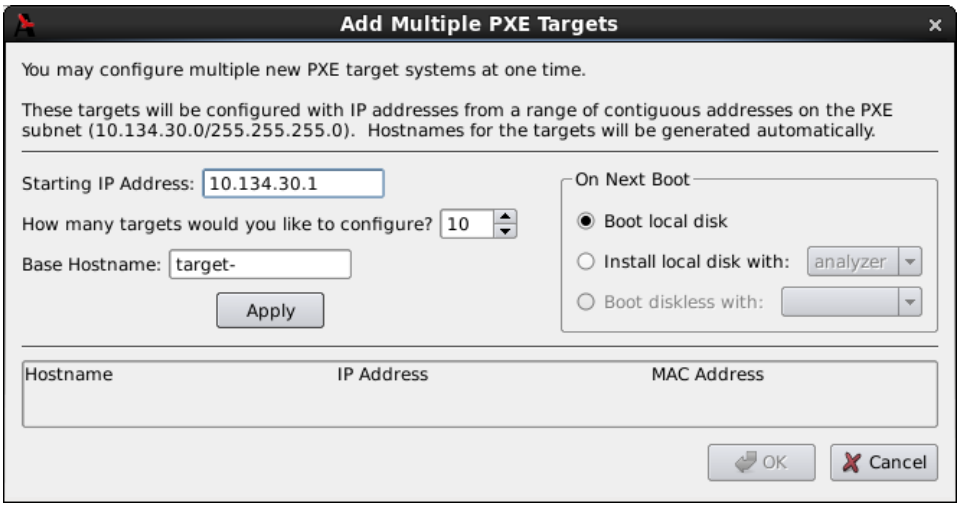


Figure 3-11 Add Multiple PXE Targets Dialog

Enter the starting IP address in the corresponding field. This will be the address of the *first* target in the target group, and each additional target will simply increment this setting by one IP address.

Choose the number of targets to configure in the corresponding field. You can configure up to 256 targets simultaneously using this interface.

Enter the hostname prefix to be used for all targets in the Base Hostname field. This prefix will be used for the start of each hostname generated and a unique integer suffix will be appended for each target.

In the On Next Boot area of the dialog, choose the desired target behavior that it will perform after its next reboot and subsequent PXE broadcast. See the discussion of On Next Boot above on page 3-8 for more information.

Once the desired settings have been entered, click the Apply button. A dialog similar to the following will be shown:

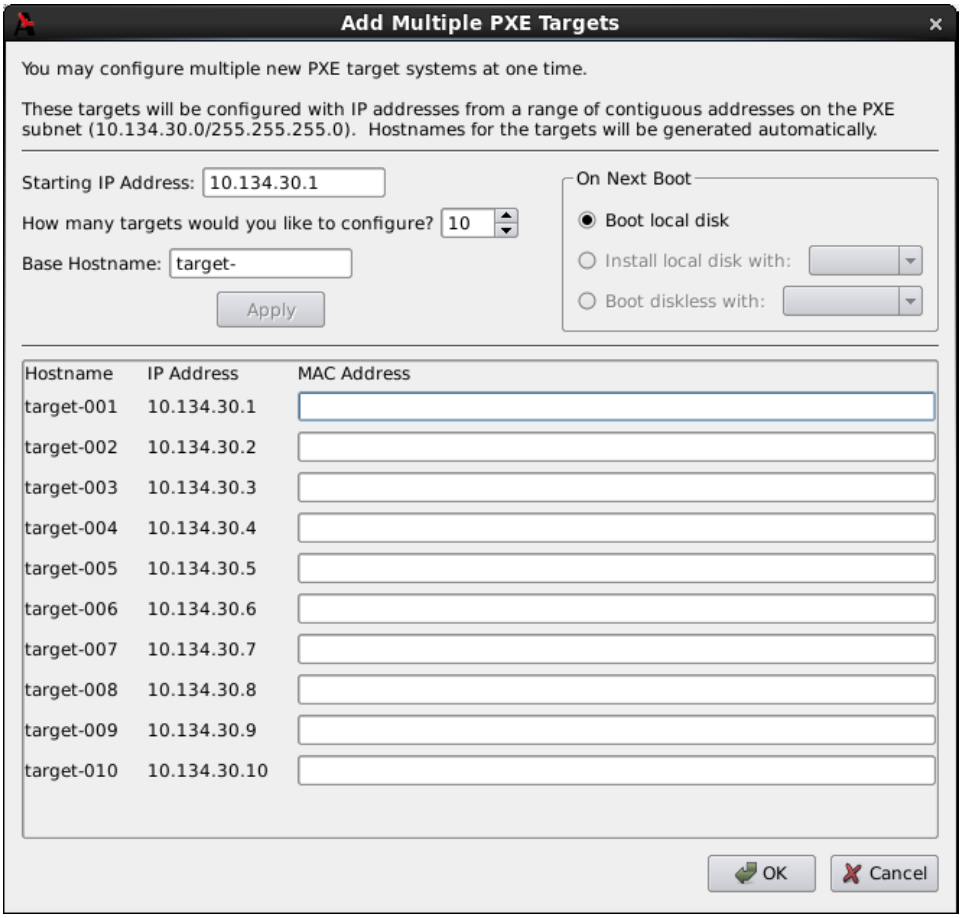


Figure 3-12 Add Multiple PXE Targets after Apply

Pressing Apply caused the dialog to generate hostname entries for all of the requested targets. Enter the MAC address of each target into its corresponding MAC Address field.

NOTE

Entering MAC addresses here is highly recommended, however it is not strictly necessary if you are *not* using Architect to directly manage DHCP services; in that case you can leave them blank. See "Manual DHCP Configuration" on page A-1 more more information.

Removing Targets

To remove a target that is currently being managed by the PXE Target Manager first select the target hostname in the list and then press the Remove Target button. You will be presented with a confirmation dialog. Press Yes to remove the target. Note that the target can be again added at any time if desired.

Editing Targets

To change the settings for a target currently being managed by the PXE Target Manager first select the target hostname in the list and then press the Edit Target button. You will be presented with a dialog similar to the following:

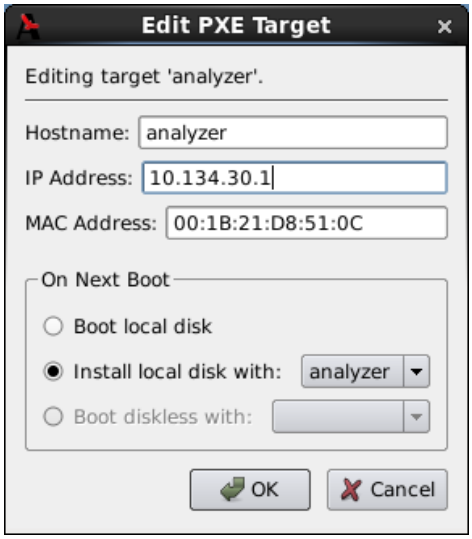


Figure 3-13 Edit PXE Target Dialog

With this dialog you can change the hostname, IP address and MAC address of the host. You can also change the On Next Boot setting to change the behavior of the target upon next reboot. Refer to the discussion of On Next Boot above on page 3-8 for more information.

Press OK to apply these settings and return to the PXE Target Manager.

A
Manual DHCP Configuration

This appendix describes how to add the required DHCP configuration for Architect PXE targets to an active existing DHCP server configuration. It is preferable to allow the Architect tool to administer DHCP by checking the box labeled Automatically configure DHCP on this host, however if another DHCP server already exists on the desired subnet you must follow the steps described in this section. Refer to "Initializing PXE Services" on page 3-1 and also the **dhcpd.conf**(5) man page for more information.

Overview

The View DHCP Configuration button on the PXE Target Manager may be used to view the required DHCP configuration for Architect PXE targets. The information displayed may be cut and pasted into a text editor when editing the existing DHCP server configuration.

Alternatively, the DHCP configuration files maintained by Architect may be viewed or copied directly from the `/etc/dhcp/architect` directory on the host system where Architect is installed. This directory contains two files: `dhcpd.conf` and `dhcpd-targets.conf`. The `dhcpd.conf` file contains a subnet stanza with all required DHCP parameters set for PXE targets and it will look similar to the following example:

```
subnet 10.134.30.0 netmask 255.255.255.0 {
        option subnet-mask 255.255.255.0;
        option broadcast-address 10.134.30.255;

        server-name cholula;
        next-server 10.134.30.166;
        filename "architect/pxelinux.0";

        use-host-decl-names on;
        include "/etc/dhcp/architect/dhcpd-targets.conf";
}
```

In this example, the PXE subnet is the `10.134.30.0/24` subnet. The last line includes all PXE target host declarations from the `dhcpd-targets.conf` file, which will look similar to the following example:

```
host monitor2 {
    hardware ethernet 00:02:AC:55:88:A9;
    fixed-address 10.134.30.65;
}
host analyzer {
    hardware ethernet 00:1B:21:D8:51:0C;
    fixed-address 10.134.30.11;
```

```
}
host ccenter {
    hardware ethernet 84:2B:2B:9E:6E:1B;
    fixed-address 10.134.30.17;
}
host monitor1 {
    hardware ethernet 00:23:AE:D9:1C:AF;
    fixed-address 10.134.30.64;
}
host recorder {
    hardware ethernet 00:80:8E:02:9A:92;
    fixed-address 10.134.30.72;
}
```

This configuration data must be added to the active DHCP server configuration file(s). On most systems, the main DHCP configuration file is `/etc/dhcp/dhcpd.conf`.

Installing DHCP Configuration

The simplest way to add the Architect DHCP configuration to the DHCP server is to copy the files from `/etc/dhcp/architect` on the Architect host to the same location on the DHCP server host, and then add a single `include` line to the existing `/etc/dhcp/dhcpd.conf` file to include the Architect configuration. If creating the `/etc/dhcp/architect` directory on the DHCP server host is not possible, you may use any valid location on the file system; simply adjust the include lines accordingly.

To accomplish this perform the following steps:

1. Copy files from the Architect host to the DHCP server host. For example, run this command on the Architect host:

   `scp -r /etc/dhcp/architect` *`dhcp_server`*`:/etc/dhcp`

   where *dhcp_server* is the name or IP address of the DHCP server host.

2. Include this configuration in the main DHCP server configuration file. Edit `/etc/dhcp/dhcpd.conf` on the DHCP server host and add this line near the bottom of the file:

   ```
   include "/etc/dhcp/architect/dhcpd.conf";
   ```

Note that most DHCP servers allow multiple subnet stanzas to be defined for the same subnet, each with different parameters defined within the scope of the stanza. Because of this, you are allowed to have the PXE target systems declared within one subnet stanza, and other DHCP clients or a dynamic IP address pool declared in another subnet stanza for the same subnet.

NOTE

You cannot have duplicate host declarations or reuse an IP address or MAC address in different host declarations anywhere in the entire DHCP configuration.

See the **`dhcpd.conf`**(5) man page for more information.

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