

RED
HAWK *Architect™ User's Guide*

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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 single board computer (SBC).

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 repetitive 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:

<i>italic</i>	Books, reference cards, and items that the user must specify appear in <i>italic</i> type. Special terms may also appear in <i>italic</i> .
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
<i>RedHawk Architect Release Notes</i>	0898600
<i>RedHawk Architect User's Guide</i>	0898601
RedHawk Linux	
<i>RedHawk Linux Release Notes</i>	0898003
<i>RedHawk Linux User's Guide</i>	0898004
<i>RedHawk Linux Cluster Manager User's Guide</i>	0898016
<i>RedHawk Linux FAQ</i>	N/A
NightStar RT Development Tools	
<i>NightView User's Guide</i>	0898395
<i>NightTrace User's Guide</i>	0898398
<i>NightProbe User's Guide</i>	0898465
<i>NightTune User's Guide</i>	0898515

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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
- 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, select networking, web server, web browser, database, X server, minimal or all packages. 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 RT 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. Create a target file-system image by selecting the software to be installed and building 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 for 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 Architect End User License Agreement.

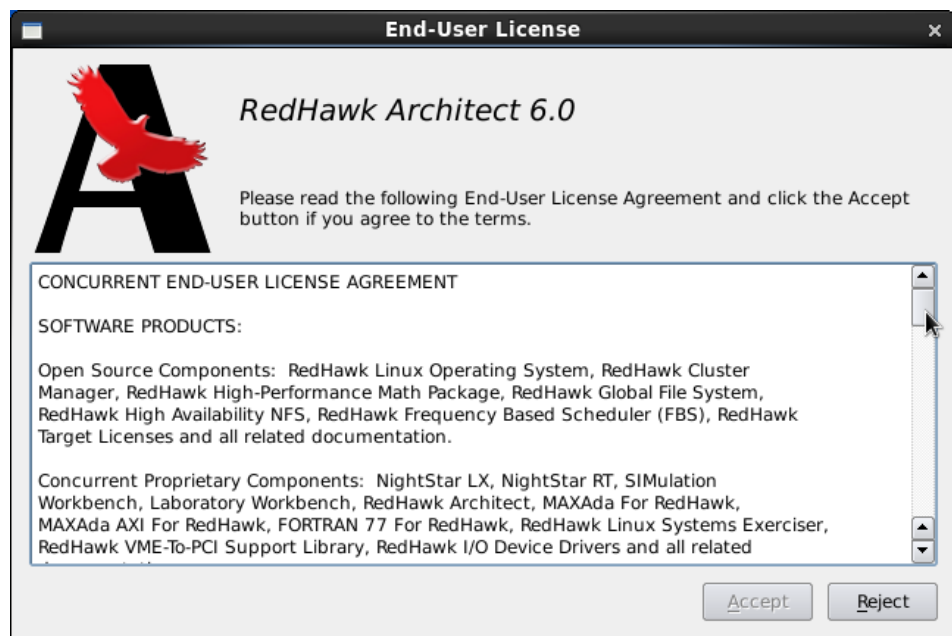


Figure 1-1 Architect End User License Agreement

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 1-43 for details.

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

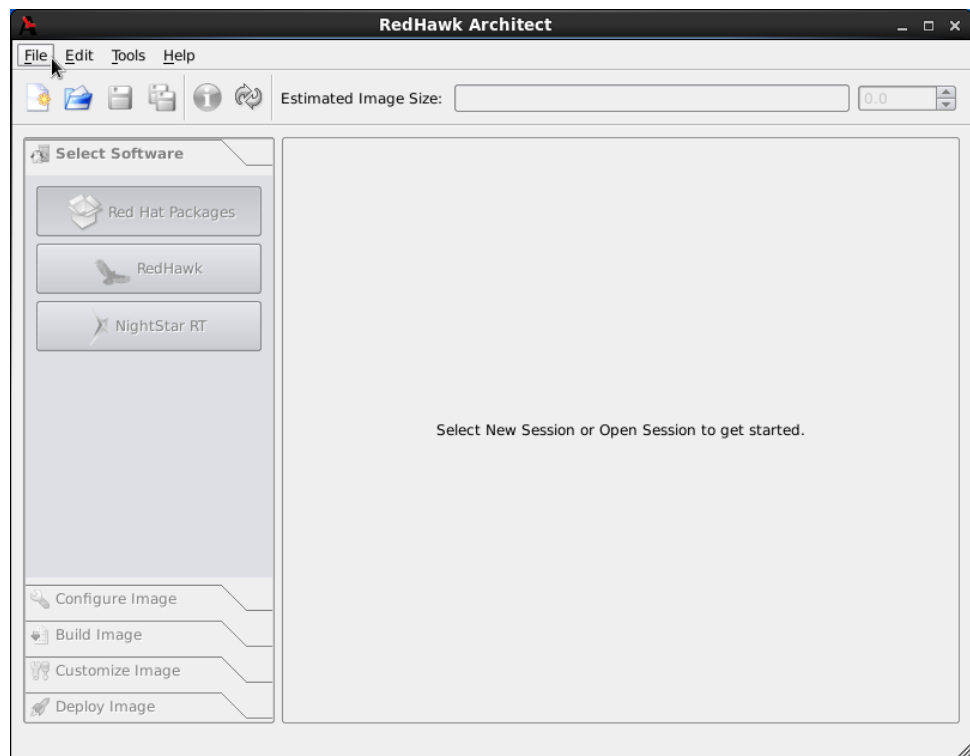




Figure 1-3 RedHawk Architect Main Window


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 1-43 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.

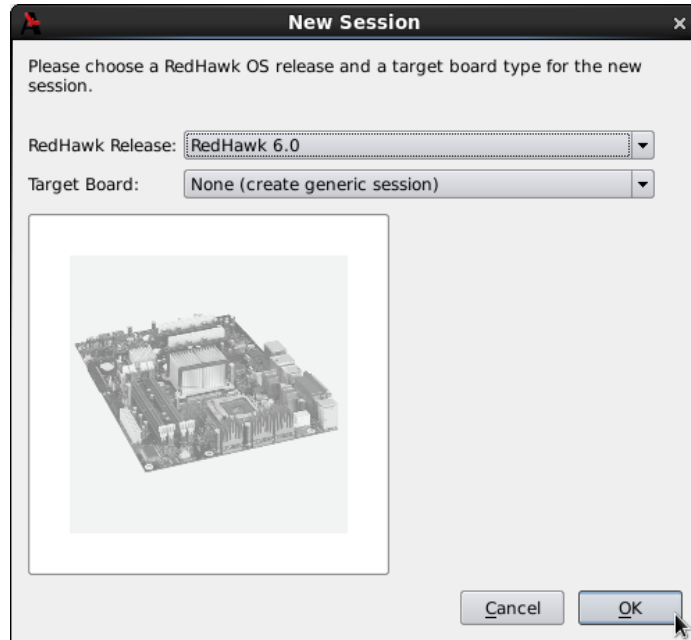


Figure 1-4 New Session Dialog

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 Products` 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 RT tools

Some initial selections are made for you by default; e.g. the core RedHawk OS.

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.

Selecting Red Hat Packages

To select Red Hat Enterprise Linux packages for the file system image, click on the `Red Hat Packages` selection from the `Select Products` 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.

- Red Hat Package Groups
- All Packages
- Selected Packages

Using the Red Hat Package Groups View

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

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 packages may be selected with the Select all packages in group button.

The Undo button cancels out your last select or unselect operation.

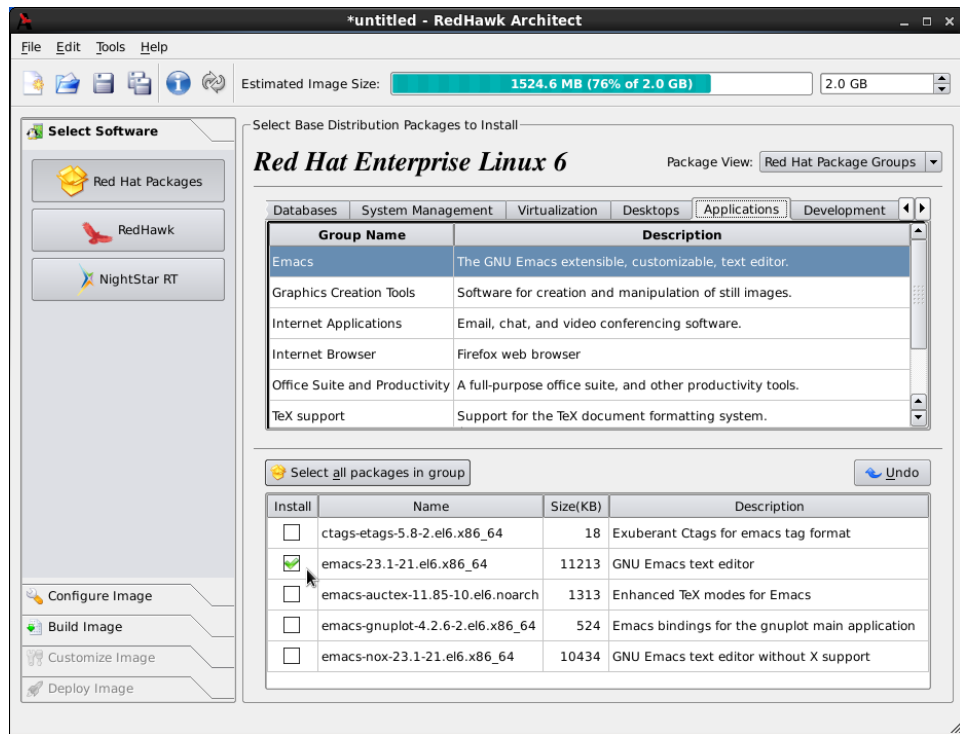


Figure 1-5 Selecting Red Hat Packages, Red Hat Package Groups View

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.

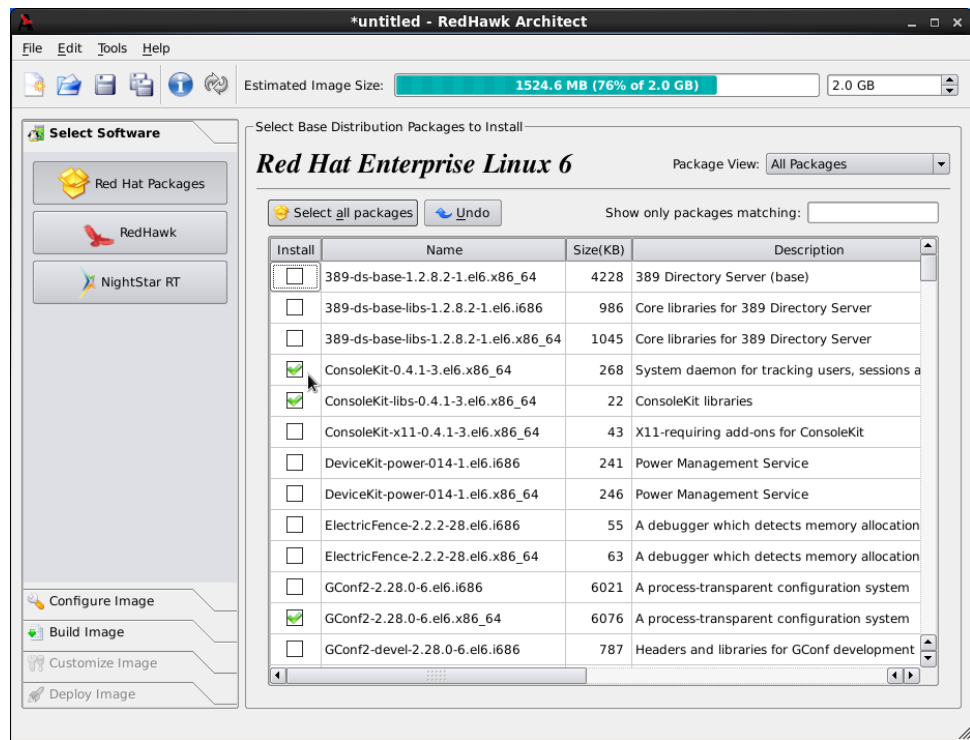


Figure 1-6 Selecting Red Hat Packages, All Packages View

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.

The Undo button cancels out your last select or unselect operation.

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.

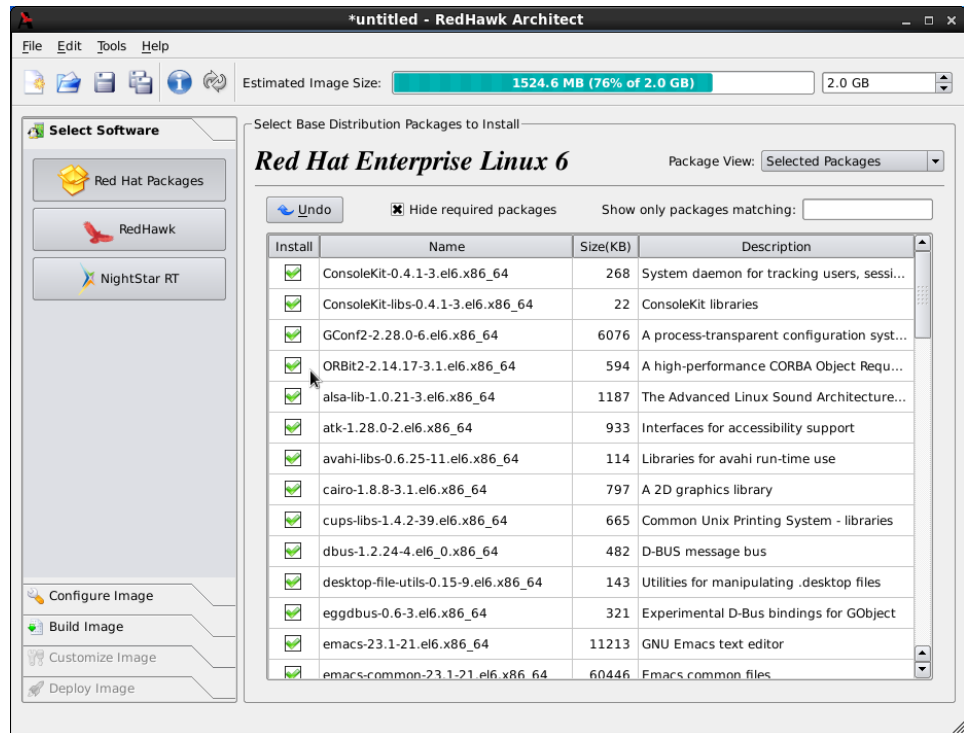


Figure 1-7 Selecting Red Hat Packages, Selected Packages View

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 Hide required packages checkbox. When this box is unchecked, only the optional packages are shown.

The Undo button cancels out your last select or unselect operation.

Selecting RedHawk OS Options

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

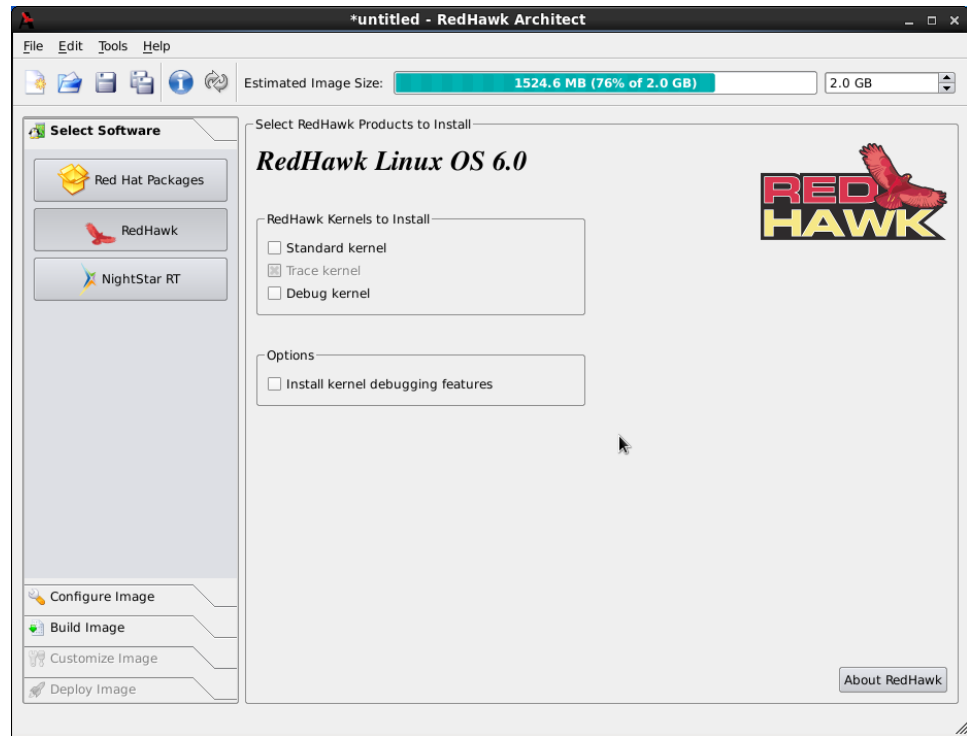


Figure 1-8 Selecting RedHawk Options

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.

Select `Install kernel debugging features` 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.

Selecting NightStar RT Options

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

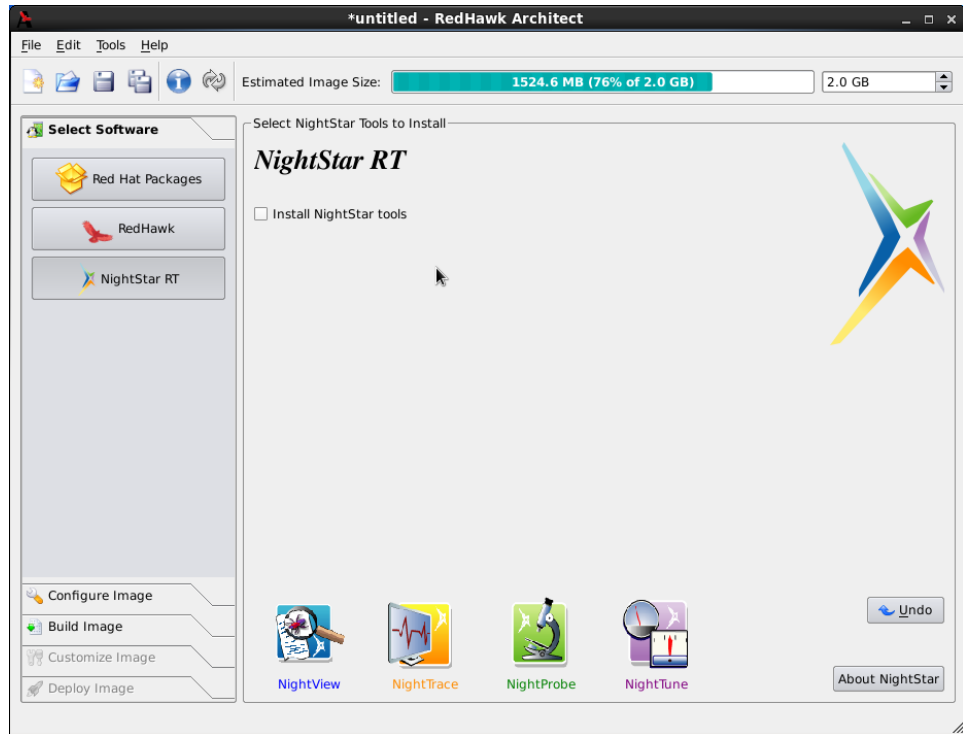


Figure 1-9 Selecting NightStar RT Tools

Click on the **Install NightStar tools** check box to indicate that NightStar RT software is to be installed in the image. Once selected, you are presented with various NightStar Installation Options that you can choose from.

Click on the **Install all NightStar clients and servers** radio button to indicate that all NightStar RT servers and clients are to be installed in the image.

Click on the **Install select NightStar servers only** radio button to indicate that only NightStar RT servers should be installed in the image. You may select individual servers from the list by clicking on the checkboxes for each tool.

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.

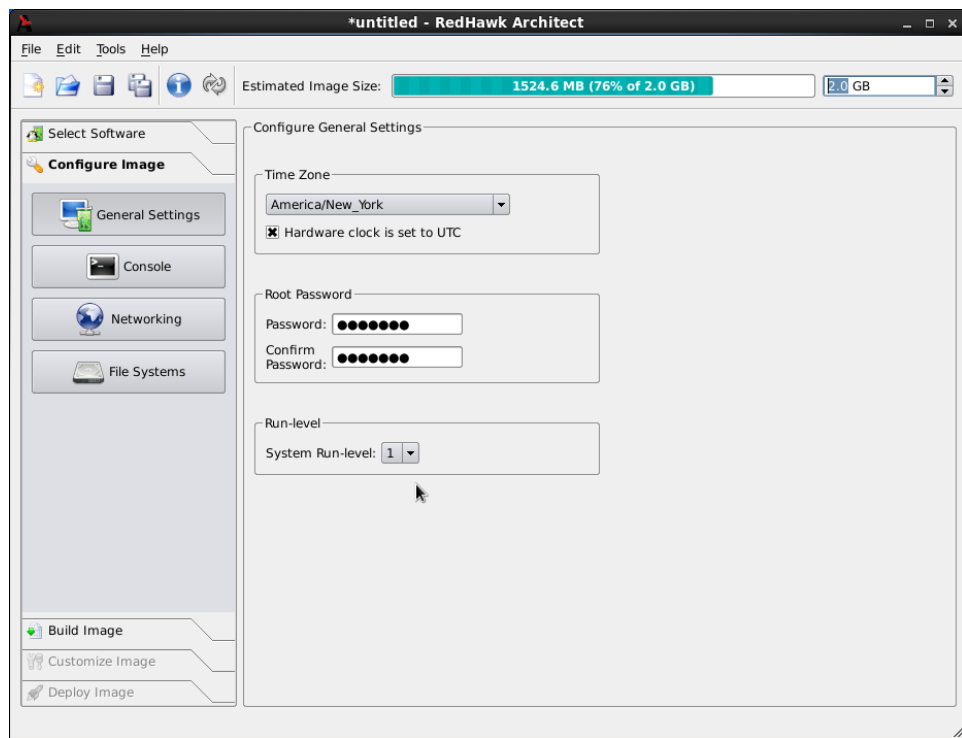


Figure 1-10 General Settings Configuration Page

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

If you select the **Hardware clock is set to UTC** checkbox, 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 General 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 **Console Configuration** page appears, as shown in the following figure.

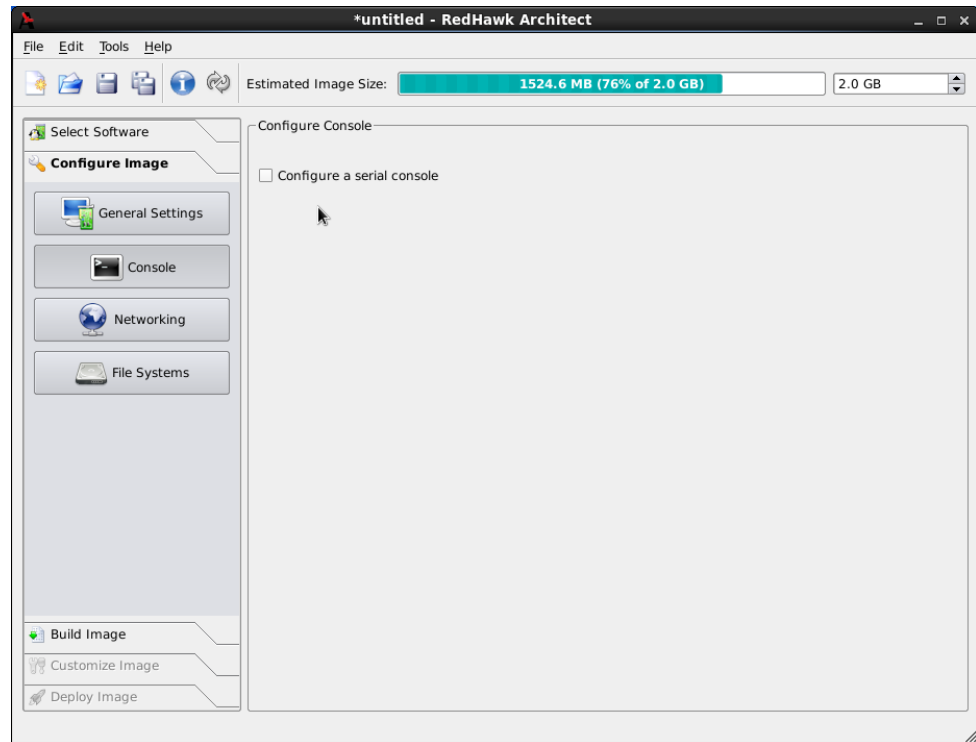


Figure 1-11 Console Configuration Page

Click on the **Configure a 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 Console Settings...** button to apply the settings to the image. This button will not appear before the image has been built.

Configuring Networking

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

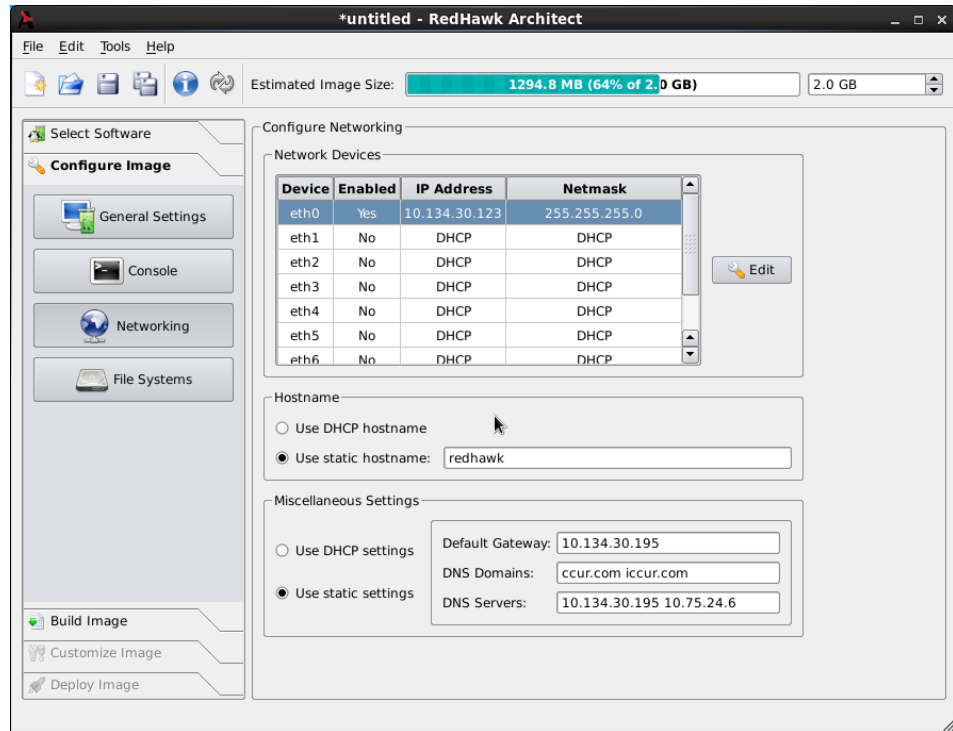


Figure 1-12 Network Configuration Page

All available network devices are listed in the Network Devices section.

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.

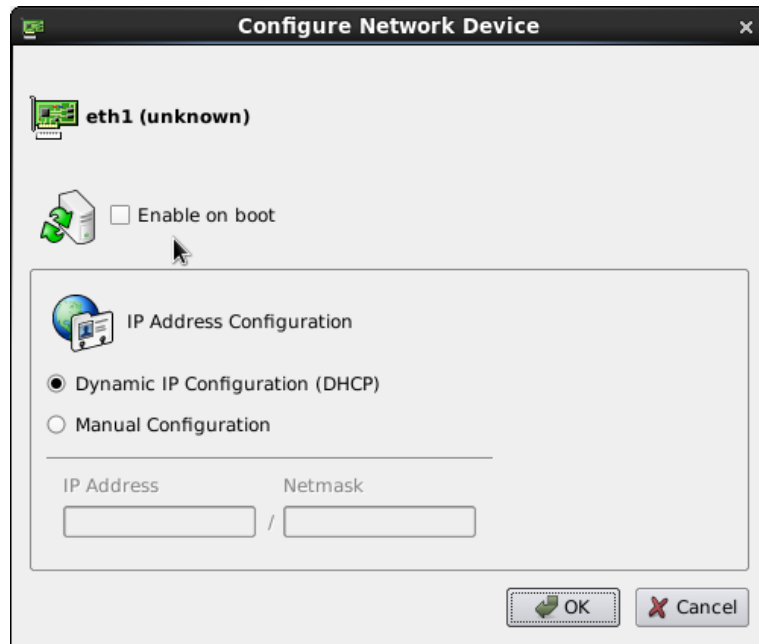


Figure 1-13 Configure Network Device Dialog

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.

Select **Dynamic** or **Manual** address configuration by clicking on the appropriate radio button. 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 **Network Configuration** dialog under the **Network Settings** checkbox, either check the **Use DHCP** checkbox 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 check the **Use DHCP** checkbox 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 **File System Configuration** page appears, as shown in the following figure.

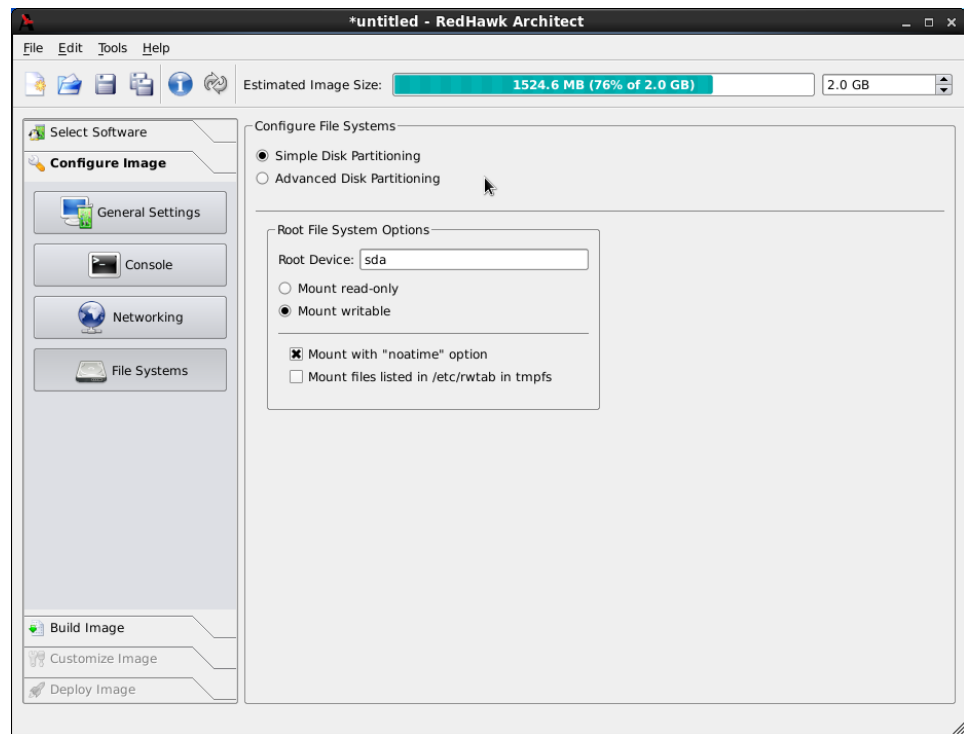


Figure 1-14 File System Configuration Page

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.

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 root device.

Indicate the desired root device in the Root Device field.

Check the Mount read-only box to mount the root file system *read-only*. If the root device is a flash device, this will help preserve the life of the device.

Check the Mount with "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.

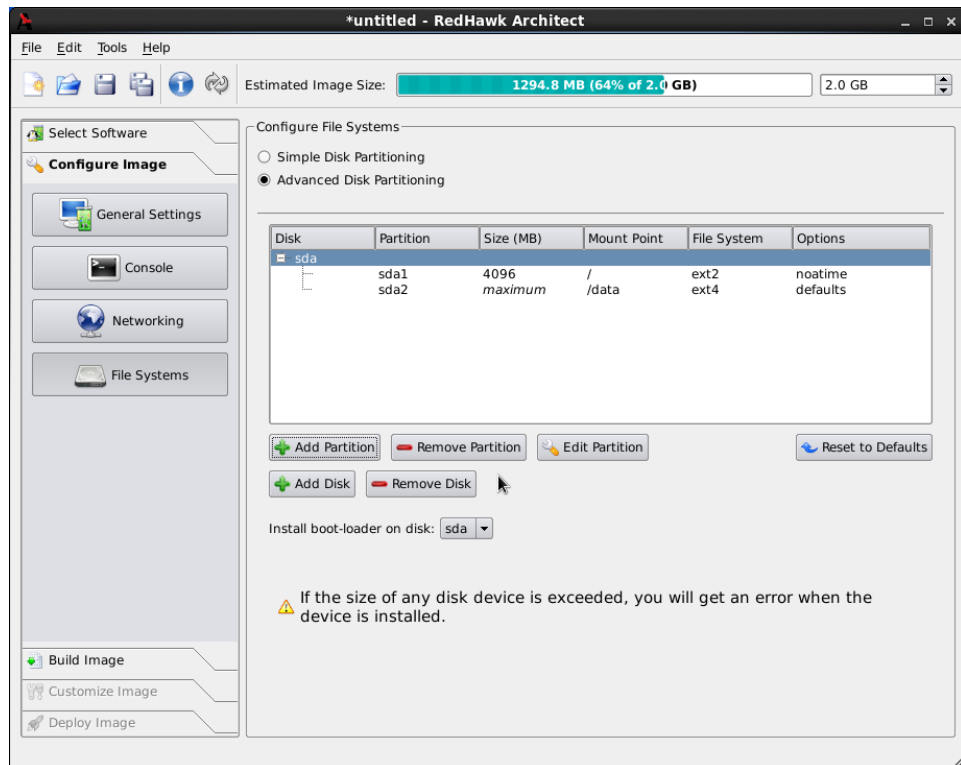
Check the Mount resources listed in */etc/rwtab* in *tmpfs* box to mount the files and directories listed in */etc/rwtab* as writable but temporary files in a *tmpfs* file system. This is required to make a read-only root file system work. If root is not mounted read-only, this option is still useful to help minimize the number of writes to the root device.

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.

Use the **Install boot-loader on 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 Flash Image deployment tool. In order to use multiple disks you must deploy with one of the Installer methods (via DVD or via USB).

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.

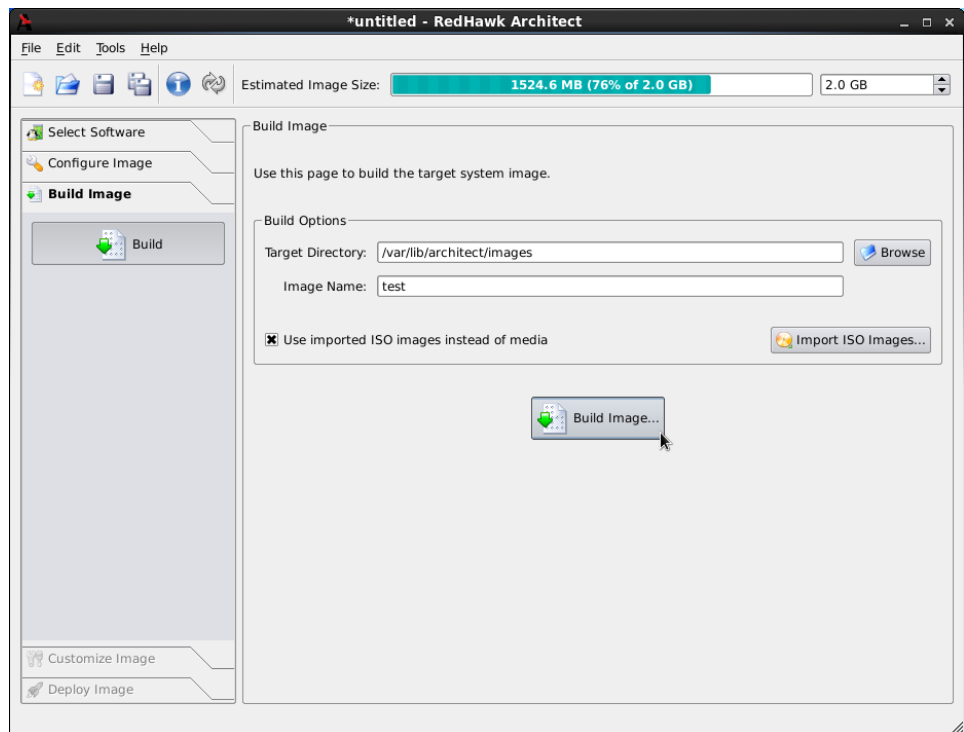


Figure 1-15 Build Image Page

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.

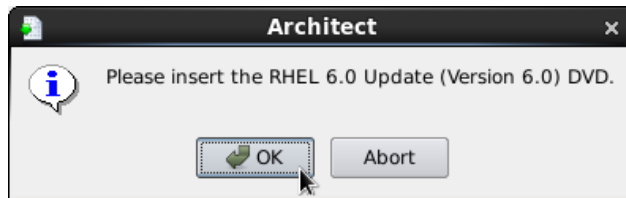


Figure 1-16 Build Prompt to Insert Red Hat Media

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.

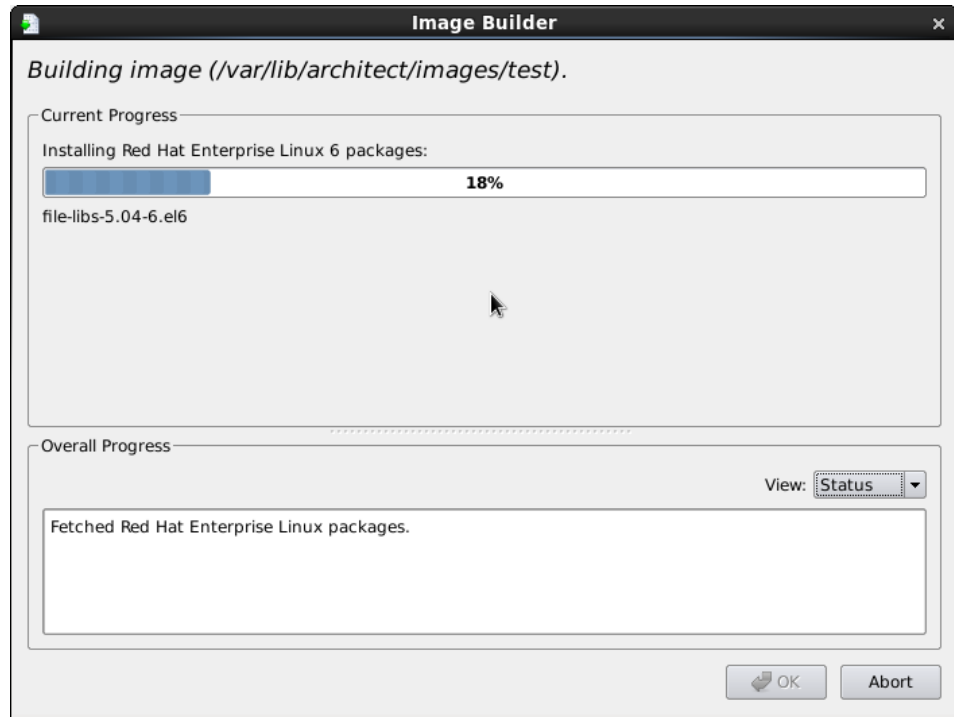


Figure 1-17 Status of Red Hat Installation

A progress bar at the top of the **Build Image** 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 Build Image screen tracks the progress, as shown in the following figure.

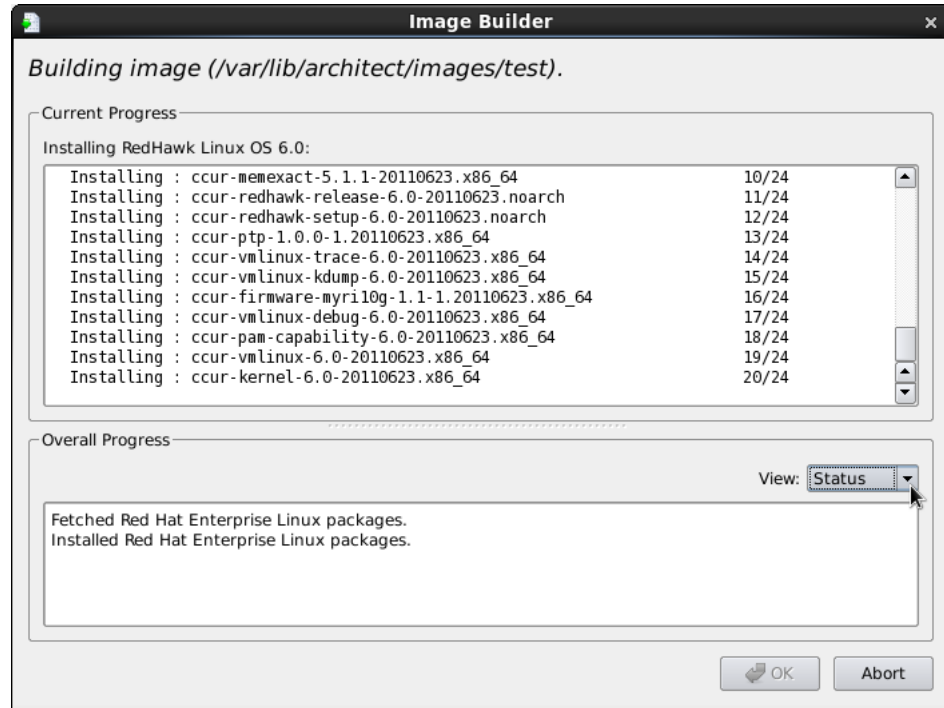


Figure 1-19 Status of RedHawk Installation

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

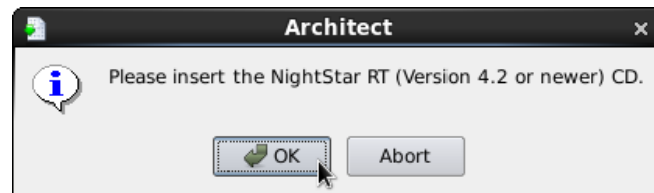


Figure 1-20 Build Prompt to Insert NightStar RT Media

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

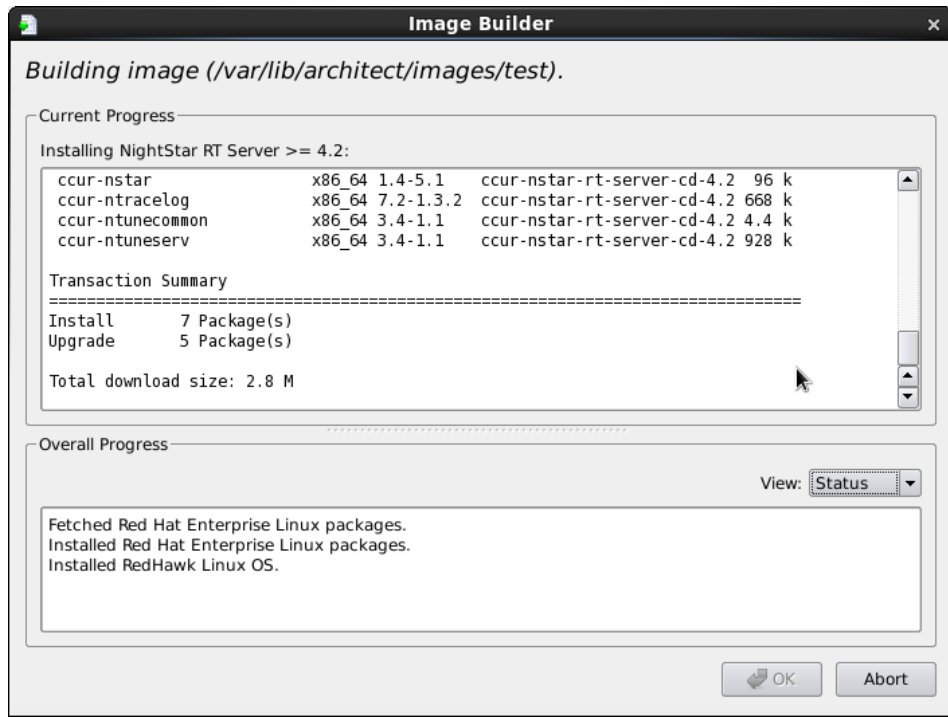


Figure 1-21 Status of NightStar RT Installation

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

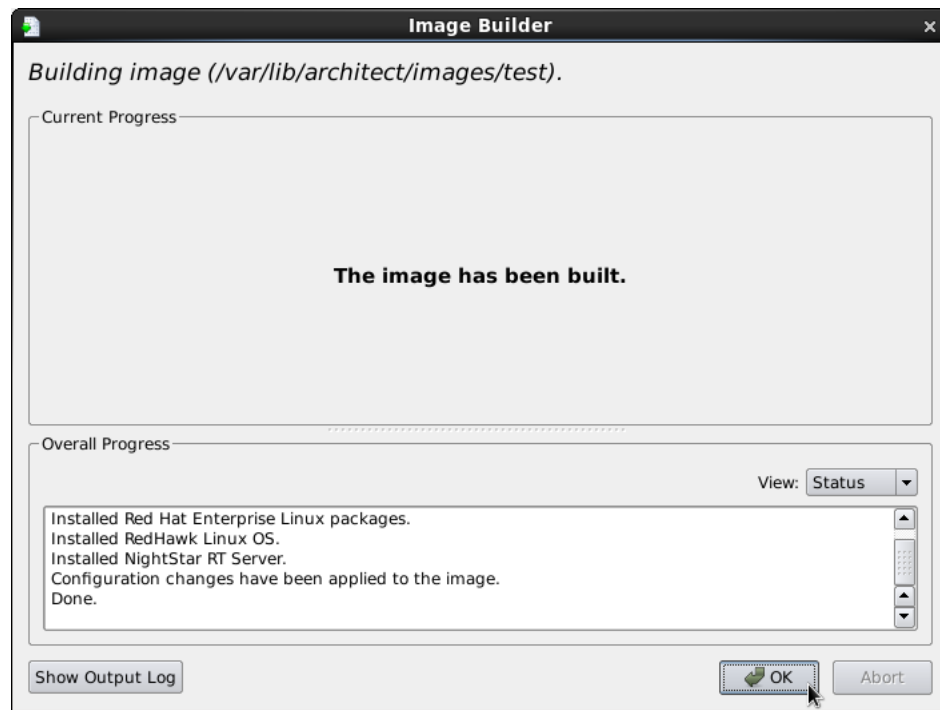


Figure 1-22 Build Completed Successfully Message

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.

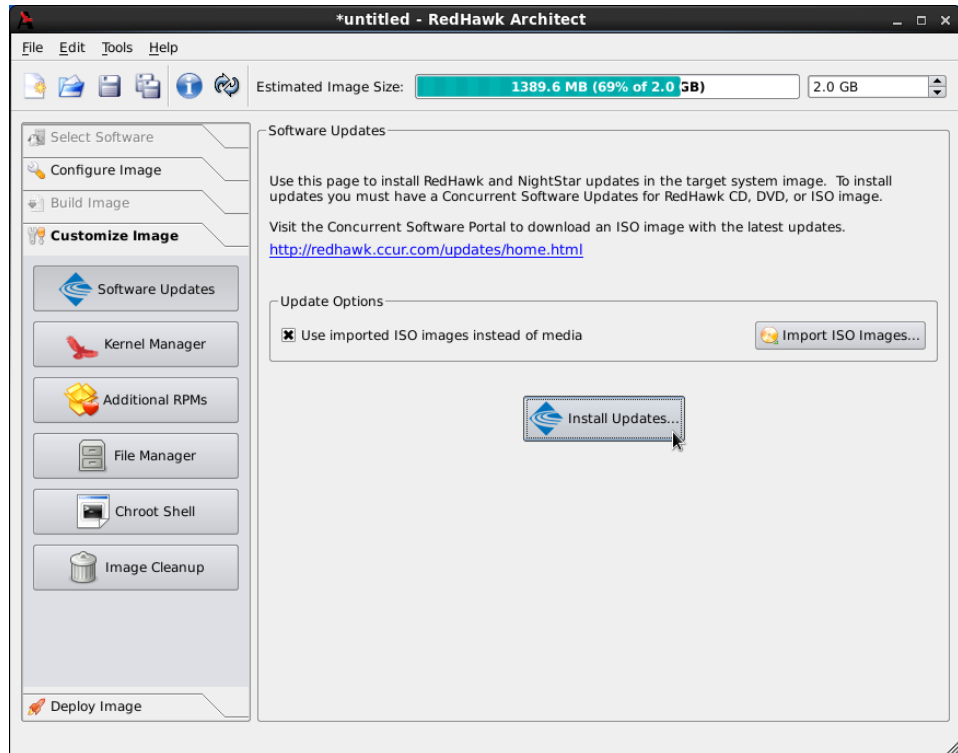


Figure 1-23 Software Updates Page

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.

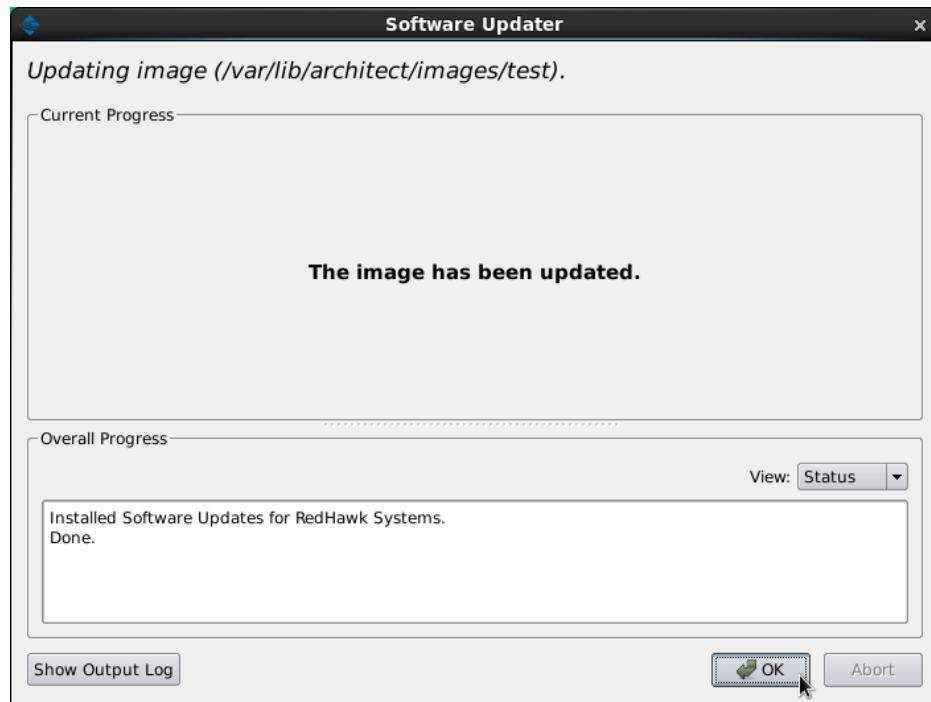


Figure 1-24 Software Updater Dialog

Kernel Manager

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

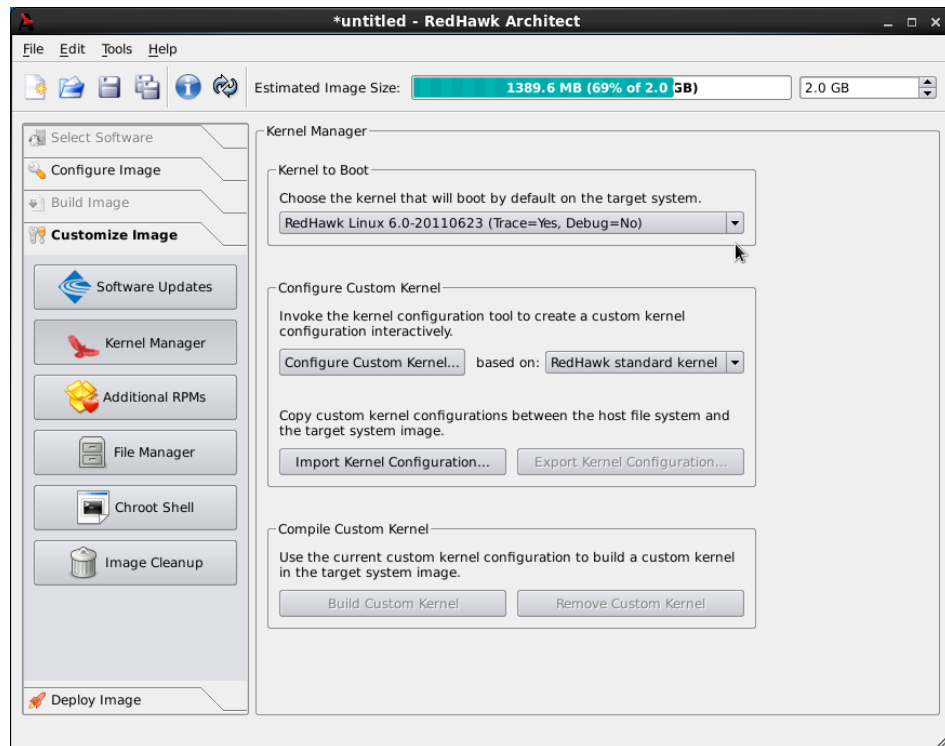


Figure 1-25 Kernel Manager Page

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

The Kernel to Boot area 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.

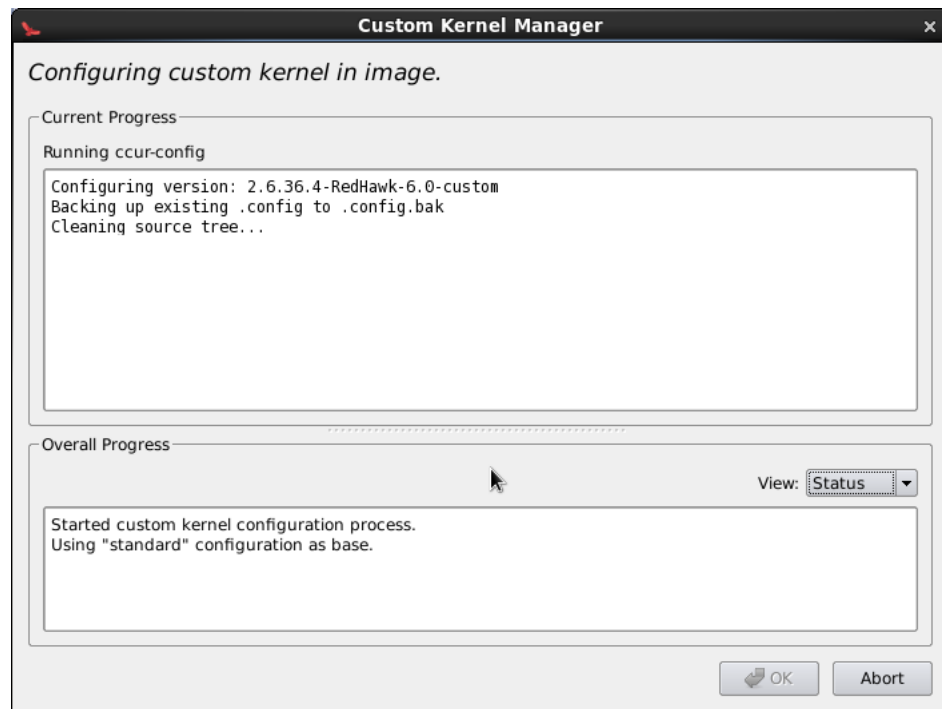


Figure 1-26 Custom Kernel Dialog

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.

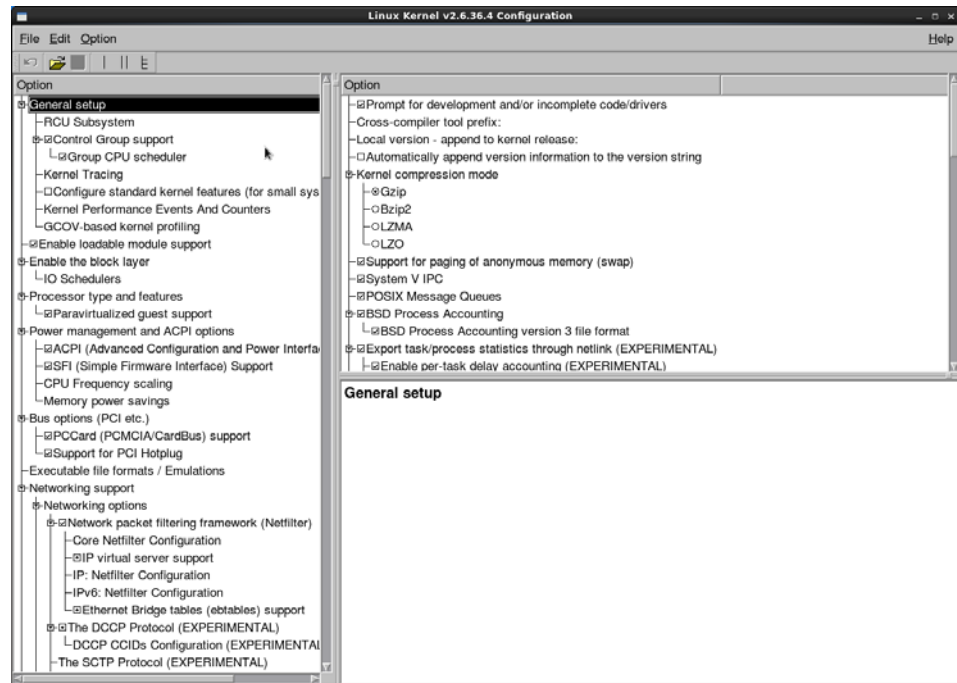


Figure 1-27 Linux Kernel Configuration Dialog

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 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 image's current custom kernel configuration to the host system.

Build Custom Kernel

The Build Custom Kernel button allows you to build a complete and installed 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.

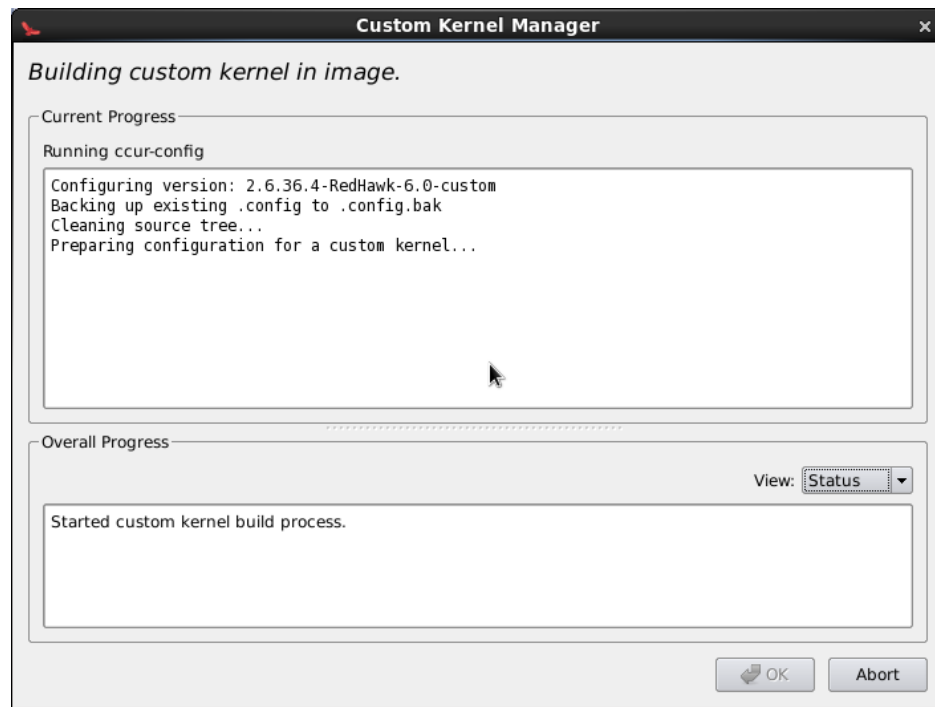


Figure 1-28 Initial Build Progress

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

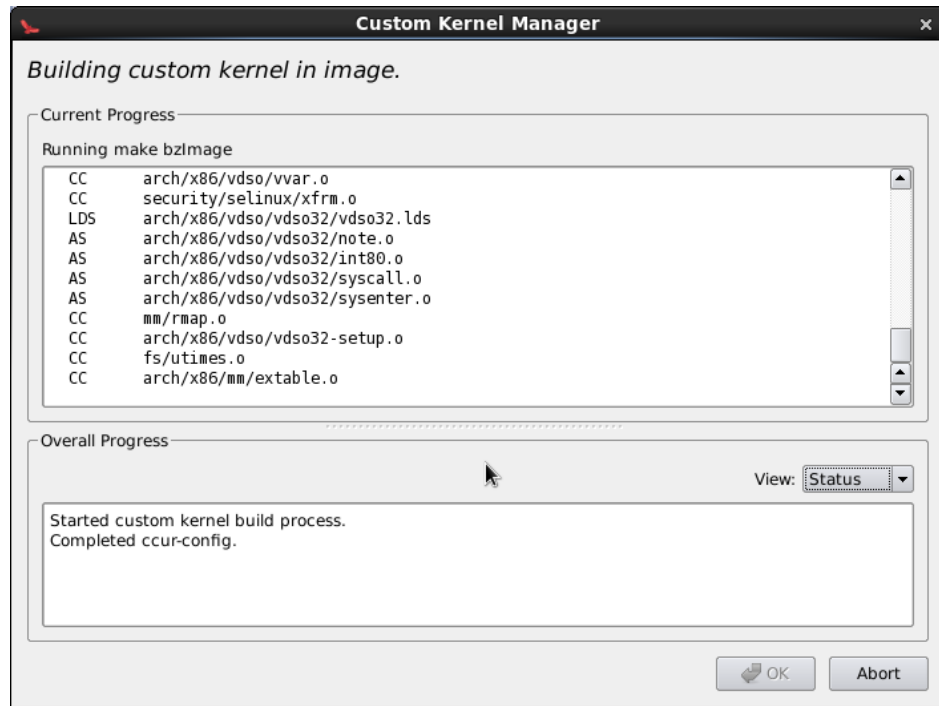


Figure 1-29 Kernel Build Stages

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.

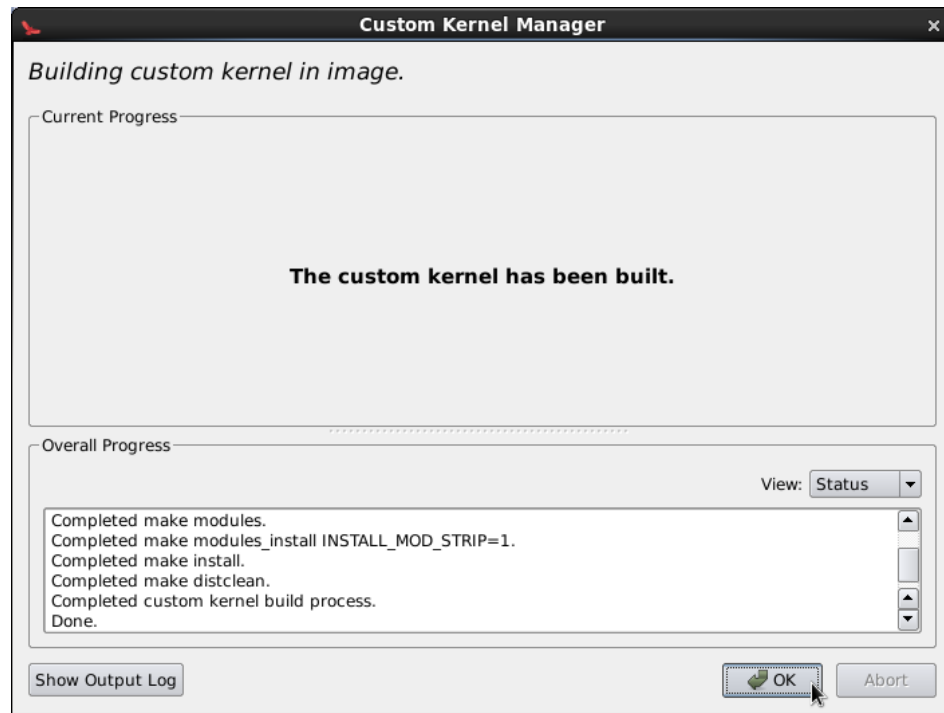


Figure 1-30 Kernel Build Complete

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.

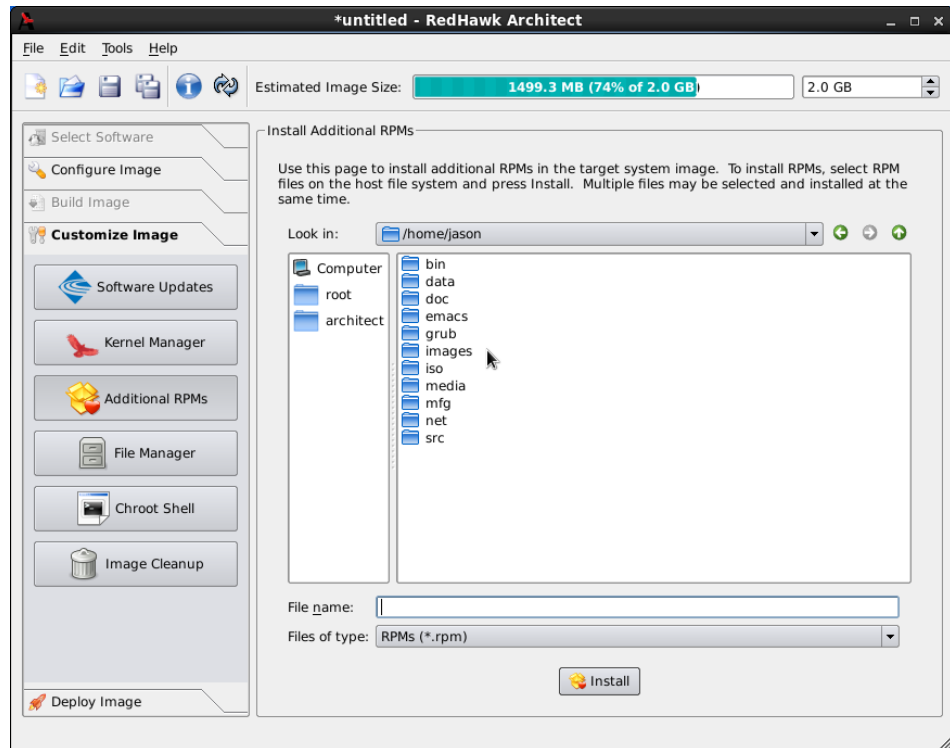


Figure 1-31 Install Additional RPMs Page

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.

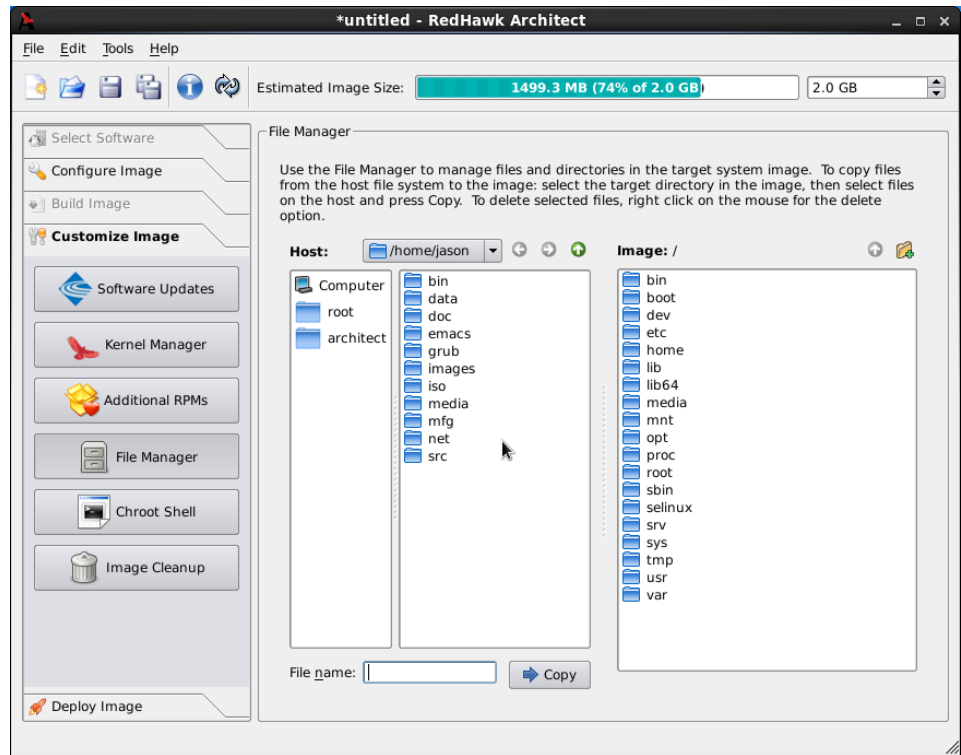


Figure 1-32 File Manager Page

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

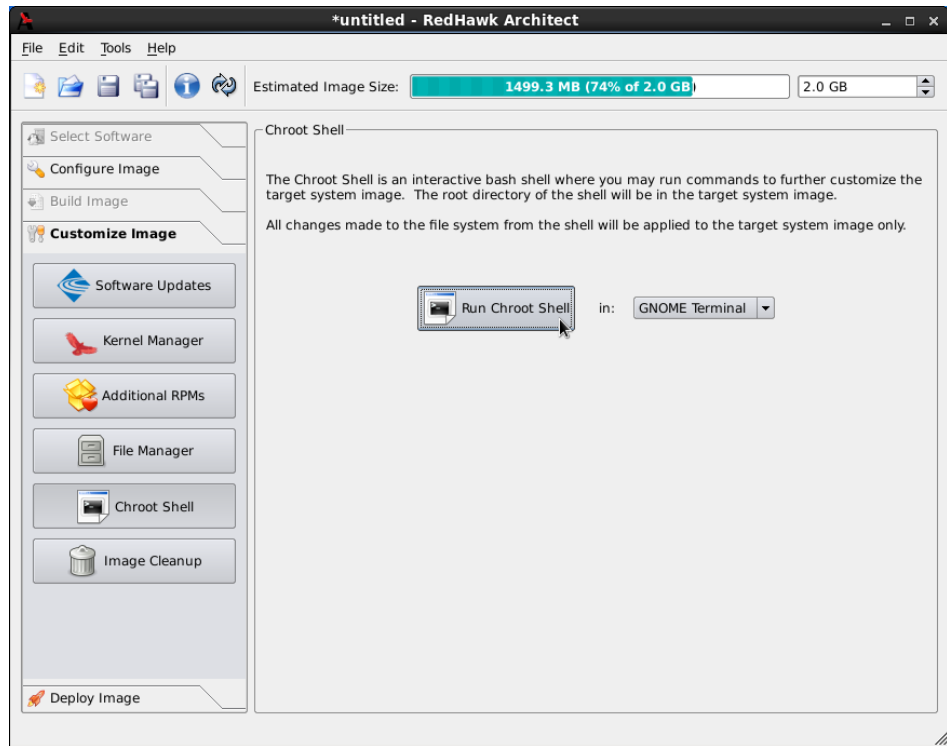


Figure 1-33 Chroot Shell Page

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 1-34 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.

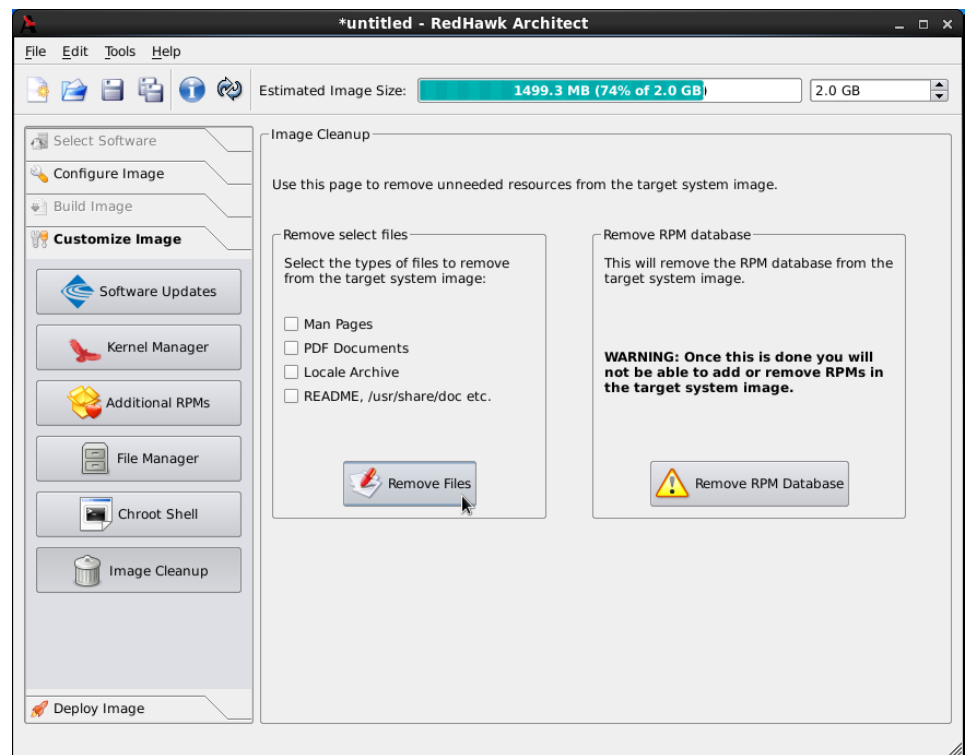


Figure 1-35 Image Cleanup Page

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 different 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 “Flash Image” on page 1-36 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 1-40 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 1-41 for more information.
- ClusterManger 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 “Using Cluster Manager to Deploy an Architect Image” on page 1-42 for more information on using ClusterManager.

Flash Image

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

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

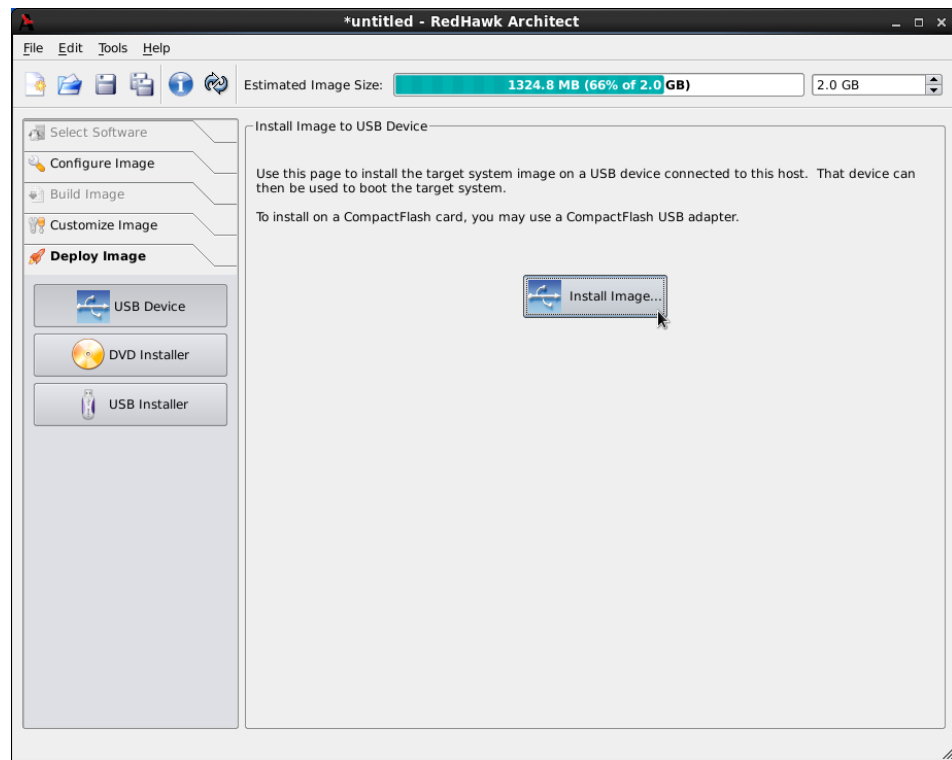


Figure 1-36 Deploy Image USB Device Page

The Install Image... button allows you to copy a root file system image onto a USB device (e.g. a standard USB 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... 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 1-37 Flash Image Dialog

The host system will now be scanned for attached CompactFlash 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, the following confirmation dialog will appear:



Figure 1-38 Flash Device Confirmation

Press **OK** to confirm the operation and then the copy will begin, as shown in Figure 1-39.

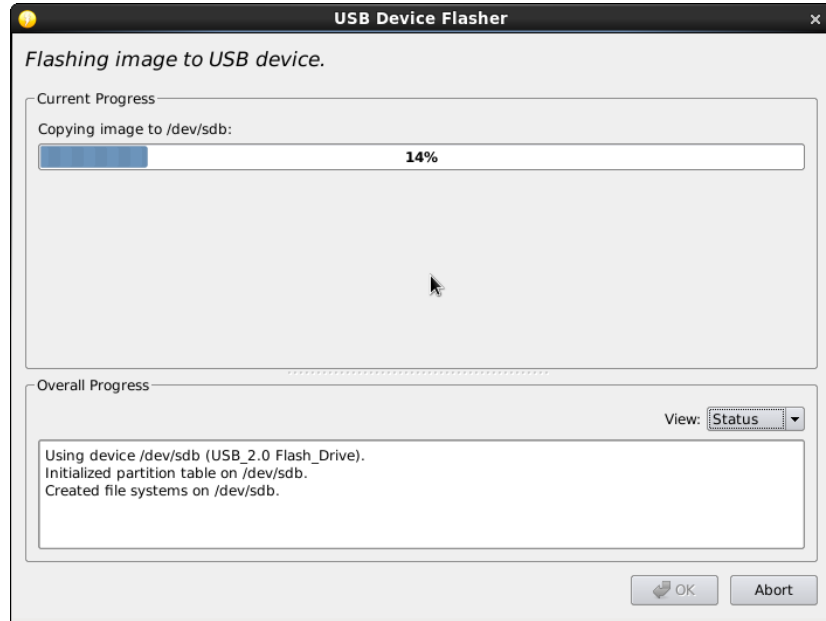


Figure 1-39 Flash Copy Begins

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 1-40 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 1-41.



Figure 1-41 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 an 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 Make Installation DVD page, as shown in the following figure.

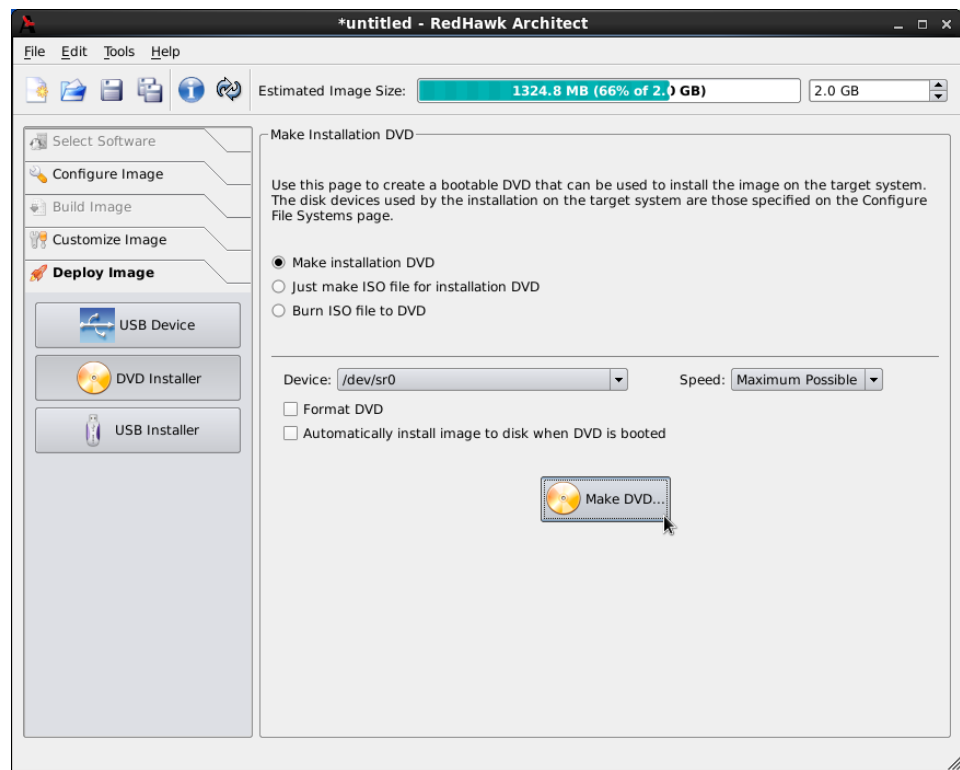


Figure 1-42 Make Installation DVD Page

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

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

Choose **Burn ISO file to DVD** to burn a previously created ISO file 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 Make Installation USB Stick page, as shown in the following figure.

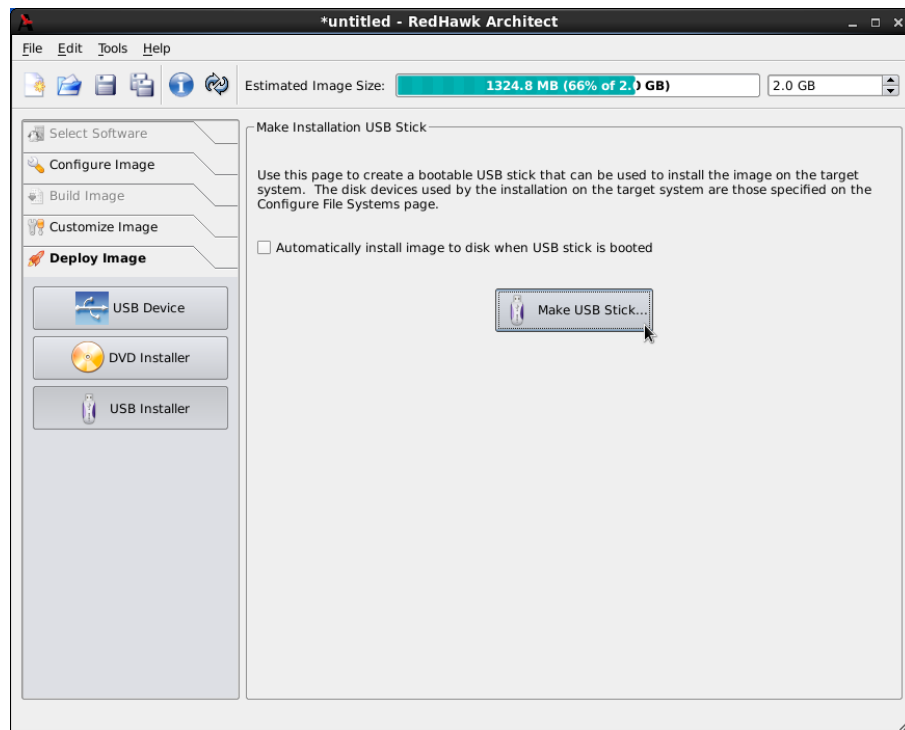


Figure 1-43 Make Installation USB Stick Page

Press the Make 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.

Using Cluster Manager to Deploy an Architect Image

RedHawk Linux Cluster Manager provides Architect users with additional methods of deploying file system images. With Cluster Manager, images may be remotely installed

directly to disk devices on target systems, or target systems may be booted diskless from an Architect image.

NOTE

Using Cluster Manager is only possible when the host machine and target device are connected via networking, and the target device fully supports the Preboot eXecution Environment (PXE) standard.


Using Cluster Manager to diskless-boot Architect images is especially useful during development of an embedded application and the file system image. Test systems may be quickly booted to test each iteration of the file system image. When diskless booting an Architect image, the image remains in-place where it was built and configured by Architect. Various services are configured by Cluster Manager to allow target systems to diskless-boot the image. Multiple target systems may diskless-boot the same image simultaneously.


To begin using Cluster Manager with Architect images, install Cluster Manager as described in the *RedHawk Linux Cluster Manager User's Guide*, then run the **cm-import** command to import an Architect image into Cluster Manager.


Consult the *RedHawk Linux Cluster Manager Evaluation User's Guide* for details on installing or diskless-booting images.

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.

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 building 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.

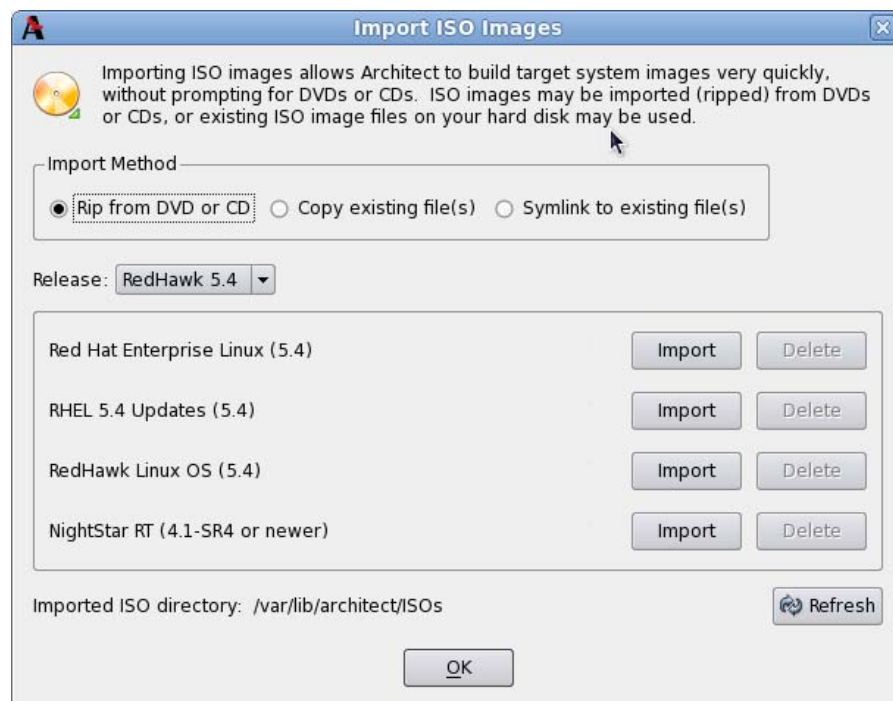


Figure 2-1 Import ISO Images Dialog

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 **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 Rip from DVD or CD import method and then press the **Import** button to begin the import process. A dialog similar to the following dialog will be displayed.

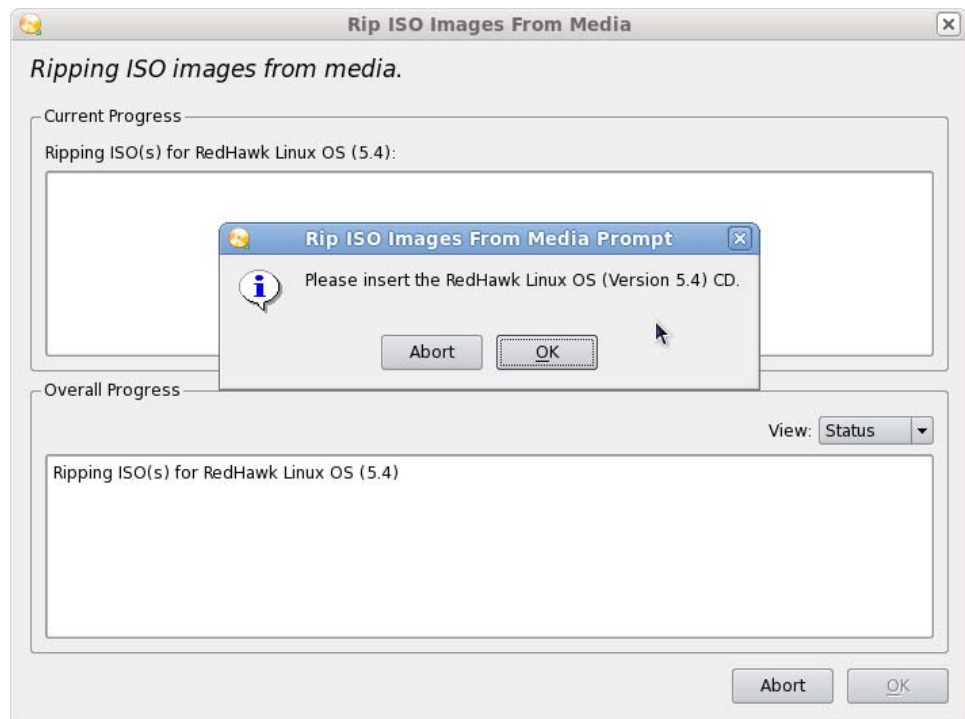


Figure 2-2 Rip ISO Images From Media

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 Copy existing file(s) 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.

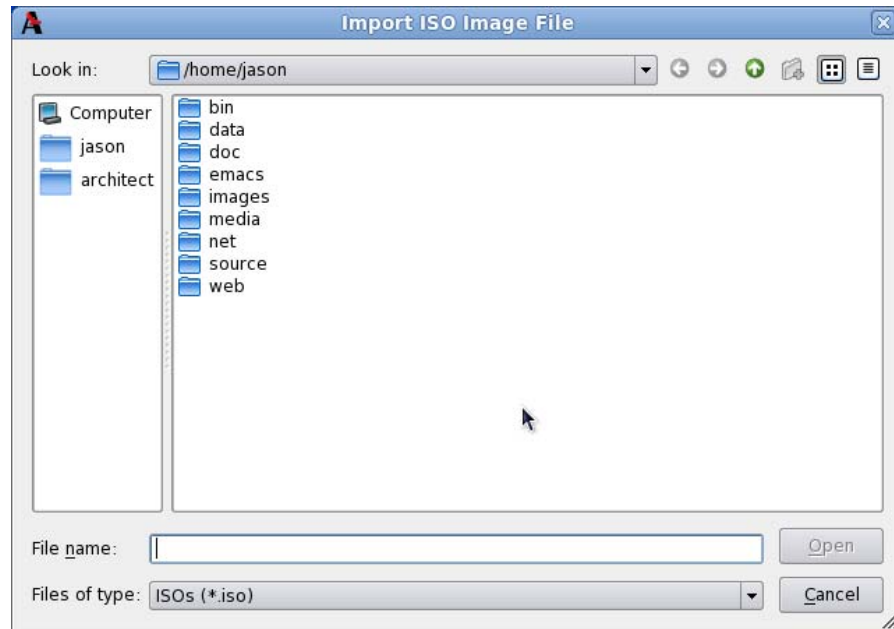


Figure 2-3 Copy ISO Image File Selector

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 Symlink to existing files(s) 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.

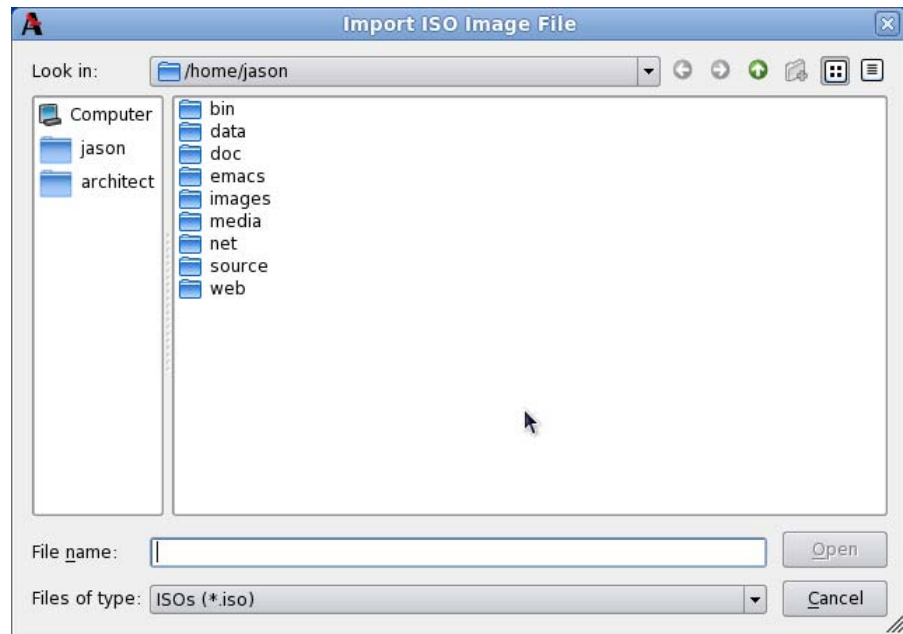


Figure 2-4 Symlink To ISO Image File Selector

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.

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