RedHawk Architect™ Version 9.6 Release Notes

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concurrent REAL-TIME

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Note: Information subject to change without notice.

Contents

1.0. Introduction

This document provides release information and installation instructions for Concurrent Real-Time's RedHawk Architect™ Version 9.6.

1.1 Product Description Version 9.6

RedHawk Architect is a powerful tool with an easy-to-use GUI that lets a developer choose the Linux and application modules to be included in RedHawk target images. Target images can be scaled from complete workstations to dedicated servers and even down to small embedded applications.

RedHawk Architect will allow customization of the RedHawk kernel itself and provides deployment tools for installing onto hard drives, flash memories, CD, DVD and Blu-ray discs or even USB flash. It includes mechanisms for network PXE installing and also for network PXE diskless booting of multiple nodes with the same version of RedHawk. Architect can also build virtual target images for use with QEMU/KVM.

RedHawk Architect greatly simplifies the following tasks to create and maintain a runtime and development environment:

- installing custom configurations of the Rocky™, CentOS® or Red Hat® Enterprise Linux distribution
- installing and configuring the RedHawk™ Linux® operating system
- installing NightStar™ RT application development tools
- maintaining and reconfiguring a target's root file system
- deploying root file system images to target systems

RedHawk Architect also includes support for enhancing the security of deployed target systems. This includes configuring, creating, and deploying target system images with FIPS, SELinux and SCAP security policy enabled.

Note that SCAP support is provided in the Advanced Security Edition of Architect by an optional package named **ccur-architect-security**. If this package is not installed on the system, the SCAP security extension will not be available.

1.2 Related Publications

The following table lists Concurrent Real-Time 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 the Concurrent Real-Time documentation web site at **http://redhawk.concurrent-rt.com/docs**.

1.3 Syntax Notation

The following notation is used throughout this document:

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.

2.0. Prerequisites

RedHawk Architect 9.6 can be installed on host systems running releases in the 9.x series on any of the following distributions: RedHawk Linux, Rocky and Rocky compatible distributions like Oracle and Red Hat.

Note that only 64-bit host systems are supported and only 64-bit target images can be created and Architect only supports version target images.

Also note that a blu-ray drive is required to install 9.6 systems.

It is also important to be aware of the following host system assumptions:

- The host system is assumed to be a separate system than the target system. In particular, the host system must have a working blu-ray drive in order to load the media required for target installation. In addition, it is expected that the host system will have a free USB port for use in flashing the target image.
- If you are going to be configuring custom kernels using the Kernel Manager page in Architect, the host system must have the following RPMs installed: 'gcc', 'gcc-c++', ‘bison’, ‘flex’, 'libXi-devel', and 'qt5-qtbase-devel’. The tool will inform if any of them are missing.
- The network installation and diskless deployment features of Architect require network access between the host system and the targets. It is recommended that any firewall on the host be disabled during all network deployments. If disabling the host firewall is not permitted at your site, the system administrator must ensure that the DHCP, TFTP and NFS protocols are allowed in both directions through the host firewall.
- By default Architect root images are placed under the `/var/lib/architect` directory. In addition, network installation and diskless deployment target images are placed under `/var/lib/tftpboot`. To avoid disk space problems it is recommended that Architect host systems have adequate space configured for the host system’s `/var` disk partition. In addition, you can configure the Architect Default image directory preference to specify a directory on a different partition or disk that has ample free space.
- It is necessary to run Architect on the host system with root permissions. To do this it is recommended that **`sudo(8)`** be properly configured and used on the host system. If using **`sudo`** is not an option, you may log in as root or alternatively issue the **`su`** command.

3.0. Target Boards

3.1 Supported Target Boards

In addition to creating target images that work with generic hardware configurations, RedHawk Architect Version 9.6 provides optimized support for the following target boards:

- Concurrent Technologies VR E1x/msd (VPX)
- Concurrent Technologies VP B1x/msd (VME)
- Concurrent Technologies VP 92x/41x (VME)
- Concurrent Technologies VP 92x/01x (VME)
- Concurrent Technologies VP 717/08x (VME)
- Concurrent Technologies VP 426/231 (VME)
- Concurrent Technologies TP 442/34x (CompactPCI)
- GE Fanuc V7812 (VME)
- GE Fanuc V7865 (VME)
- GE Fanuc mITX-945E-P (Mini-ITX)
- Intel Desktop Board D945GCLF2 (Mini-ITX)

3.2 Board Support Packages

Many Single Board Computers (SBCs) require a Board Support Package (BSP) to enable devices that are not supported by the standard RedHawk kernels.

This software is typically proprietary and cannot be distributed as source code. It usually requires a special agreement between Concurrent Real-Time and the copyright holder.

For example, a board support package might be required to enable a PCI-VME bridge chip or for utilities such as EEPROM flash programs.

Contact Concurrent Real-Time (see "Direct Software Support" on page 12) for more information on obtaining board support packages.

4.0. Changes in the 9.x releases

4.1 Changes in this release (9.6)

- Support for RedHawk 9.6.
- Support for RedHawk's NightStar version 5.3.
- Support for modern UEFI systems to use grub2 instead of pxelinux to boot via PXE.
- Modified the RedHawk software configuration page to complement the new RedHawk 9.6 kernel packaging design.
- All the deployment methods (including diskless and virtual machines) now support FIPS customization.
- Deprecated support for Fedora hosts.
- Miscellaneous bug fixes and GUI enhancements.

4.2 Changes in release 9.2-3

- A new tool, Session Extraction, extracts the session and target image from Architect-generated media (optical disc or ISO). This tool can be invoked from the Tools Menu, the Welcome page when you first start Architect or from an icon in the icon menu bar.
- Better support for NVIDIA installation in image. Changes to the NVIDIA installer and Architect now enable NVIDIA drivers to be installed in the chroot of an image.
- Filesystem specific mount options supported. While only generic mount options were previously supported, mount options specific to the selected filesystem type are now also accepted.
- Better VMM and KVM-RT integration. Changes to avoid specific error cases when re-exporting a VM that is already exported.
- Miscellaneous bug fixes and GUI enhancements.

4.3 Changes in release 9.2-2

The following features were added to this release:

- Support for RedHawk's NightStar 5.2 installation in target images.
- Support for installing on embedded MultiMediaCard (eMMC) storage devices.
- Various bug fixes and minor GUI improvements.

4.4 Changes in release 9.2-1

In this release the optional product, Advanced Security Edition of Architect, is offered. The package name is **ccur-architect-security**. If this package is not installed on the system, the SCAP security extension will not be available.

4.5 Changes in the 9.2 release

The following are supported in version 9.2 of RedHawk Architect:

- RHEL, Rocky, and Oracle 9.2 hosts.
- Fedora 33, 34 and 35 hosts.
- RedHawk 9.2 target images.
- NightStar 5.1 installation in target images.

In addition, various bug fixes and minor GUI improvements were made.

5.0. Installation & Upgrade Procedures

Perform the following installation steps as the root user to both install and upgrade Architect:

1. Insert the installation media in the drive.
2. The media should normally be automatically mounted under the **/run/media/root** directory. If it does not mount automatically, create a mount point directory and invoke the **mount** command as follows:

   ```
   mount /dev/cdrom /media/cdrom
   ```

   NOTE

   /media/cdrom is used in the examples in this section, however any other unique mount point directory can be used instead.

3. Change the current working directory to the directory containing the installation script:

   ```
   cd /media/cdrom
   ```

4. Invoke the installation script:

   ```
   ./install-architect
   ```

5. When prompted, you must accept EULA to continue.
6. When installation is complete, change the current working directory outside of **/media/cdrom**:

   ```
   cd /
   ```

7. Unmount the CD-ROM device (may be required to remove the installation CD from the CD-ROM device):

   ```
   umount /media/cdrom
   ```

6.0. Software Removal

Should you desire to uninstall RedHawk Architect, perform the following steps as the root user.

1. Insert the installation media in the drive.
2. Mount the CD-ROM drive:

   ```
   mount /dev/cdrom /media/cdrom
   ```

   Note: Your CD device mount point may be different.

3. Change the current working directory to the directory containing the installation script:

   ```
   cd /media/cdrom
   ```

4. Invoke the uninstall script:

   ```
   ./uninstall-architect
   ```

5. When the uninstall is complete, change the current working directory outside of **`/media/cdrom`**:

   ```
   cd /
   ```

6. Unmount the CD-ROM device (may be required to remove the installation CD from the CD-ROM device):

   ```
   umount /media/cdrom
   ```

7.0. Known Issues

Special consideration should be given to the following areas.

Blu-ray drive needed to install 9.2 distros

A blu-ray (BD) drive is required to install the various distros. For target deployment, a CD, DVD or blu-ray optical medium may be used depending on the size of the image.

Scap-workbench: remote scans fail with `cannot open display :0`

The **`scap-workbench`** tool hardcodes the DISPLAY setting to :0 in **ssh-askpass**. Therefore logins will fail when DISPLAY is not set to :0. For example, when you have ssh'd into the system. Even when executing on the VGA console the DISPLAY setting may differ. To circumvent this issue, execute Architect from the console and verify the DISPLAY setting of :0 (type **`echo $DISPLAY`** on the command line) OR bypass **ssh-askpass** by setting the root and non-root user with SSH passwordless logins. Following is an example of how to set up SSH passwordless logins:
On the Architect host system, logged in as root:

ssh-keygen
Skip the passphrase prompts by pressing ENTER

On the target system; logged in as the non-root user:

ssh-keygen
Skip the passphrase prompts by pressing ENTER
scp root@*host***:/root/.ssh/id_rsa.pub ~***user***/.ssh/authorized_keys**
chmod 600 ~*user***/.ssh/authorized_keys**

For more information about this issue, see
https://bugzilla.redhat.com/show_bug.cgi?id=1801590

RAID

Partitioning RAID devices is not supported at this time. Booting from a RAID device is also not supported at this time.

Remote Sync function and `/boot` on RAID

The remote sync function will fail with errors if the **`/boot`** file system is configured on a RAID.

FIPS Support

A separate **`/boot`** filesystem is required for FIPS.

Unable to install targets with UEFI Secure Boot Set

UEFI Secure Boot must be disabled before attempting to install a target system. After the installation completes, you may then re-enable Secure Boot.

DVD installer on UEFI systems ignores Serial Flow Control

When using the DVD Installer deployment method and serial console is set, the flow control setting is ignored on UEFI systems.

Architect session file version compatibility

Session files created by versions of Architect before the 9.2 release are not compatible with this version of Architect. All 9.x session files are compatible with this version

Chroot Shell error

When the chroot shell is launched from the Customize Image menu, it may print the following error when the mount /proc button is unchecked: "`basename: missing operand`". This error can be safely ignored.

Whitespace characters in directory names breaks building custom kernels

The Linux kernel Makefiles do not correctly handle whitespace characters in directory names; if you plan to build custom kernels in a target image, you cannot choose an Image Name with any embedded whitespace characters, and you cannot have any embedded whitespace characters in any directory of the image's leading path.

Desktop media automounting might confuse Architect

Recent versions of the GNOME desktop automatically mount loopback-mountable media images (e.g., ISO images and virtual machine hard drive images). This feature can confuse Architect because Architect also needs to periodically mount and unmount media images.

Architect has been modified to be more compatible with automatic media image mounting, and these changes are discussed in "GNOME/MATE Desktop Integration" on page 11 of this document.

8.0. GNOME/MATE Desktop Integration

When running on GNOME and MATE desktops, Architect attempts to automatically disable and enable the desktop media automounting feature when it would interfere with Architect usage. Architect does this by manipulating the `/org/gnome/desktop/media-handling/automount` or `/org/mate/desktop/media-handling/automount` **`dconf`** key for the current desktop session. See **`dconf`**(7) for more information.

Architect will always manage media automounting correctly if the current desktop session is initiated by the root user. However, some issues may be encountered if **`sudo`** or **`su`** is used to run Architect from a desktop session belonging to a non-root user.

To ensure that Architect can manage media automounting correctly when the desktop session belongs to a non-root user, start Architect using one of the following techniques:

1. Run **`sudo`** with the *preserve user environment* option, as in the following example:

   ```
   # sudo -E architect
   ```

2. Run **`su`** as in the following example:

   ```
   # su -c architect
   ```

Alternatively, you can choose to simply disable the media automounter by issuing one of the following commands as the desktop session user:

```
$ dconf write /org/gnome/desktop/media-handling/automount false
$ dconf write /org/mate/desktop/media-handling/automount false
```

If desired, you can re-enable the media automounter after you have exited Architect by issuing one of the following commands:

```
$ dconf write /org/gnome/desktop/media-handling/automount true
$ dconf write /org/mate/desktop/media-handling/automount true
```

9. Software Updates and Support

9.1 Direct Software Support

Software support is available from a central source. If you need assistance or information about your system, please contact the Concurrent Real-Time Software Support Center at our toll free number 1-800-245-6453. For calls outside the continental United States, the number is 1-954-283-1822. The Software Support Center operates Monday through Friday from 8 a.m. to 5 p.m., Eastern Standard Time.

Calling the Software Support Center gives you immediate access to a broad range of skilled personnel and guarantees you a prompt response from the person most qualified to assist you. If you have a question requiring on-site assistance or consultation, the Software Support Center staff will arrange for a field analyst to return your call and schedule a visit.

You may also submit a request for assistance at any time by using the Concurrent Real-Time, Inc. web site at **https://concurrent-rt.com/support**

9.2 Software Updates

Updates to Concurrent Real-Time RedHawk software can be obtained via Concurrent Real-Time's Software Portal. There are three ways of installing product updates:

- Using the Network Update Utility (NUU) installed on your RedHawk system
- Manual installation after browsing and downloading individual RPMs from Concurrent Real-Time's software repositories
- Building a customized Update disc using Concurrent Real-Time's web site for immediate download

9.2.1 Updating via NUU

NUU supports installation and updating of software products from Concurrent Real-Time software repositories over a network. NUU utilizes DNF and the RPM subsystems to install and update software.

NUU is installed automatically with RedHawk, however, you should configure it to include all of the Concurrent Real-Time software products installed on your system.

Clicking on the "Updates (NUU)" icon on your desktop launches NUU to check to see if Concurrent Real-Time updates are available for your system.

NOTE

It is recommended that all Rocky repositories should be disabled when checking for Concurrent Real-Time updates. In NUU, select the Repositories -> Edit Configuration menu item and ensure that the *base*, *updates* and *extras* repositories are disabled.

Instructions for configuring NUU can be found in the QuickStart.pdf document available when you click on the NUU link on the redhawk.concurrent-rt.com website or directly via this link **https://redhawk.concurrent-rt.com/network/QuickStart.pdf**

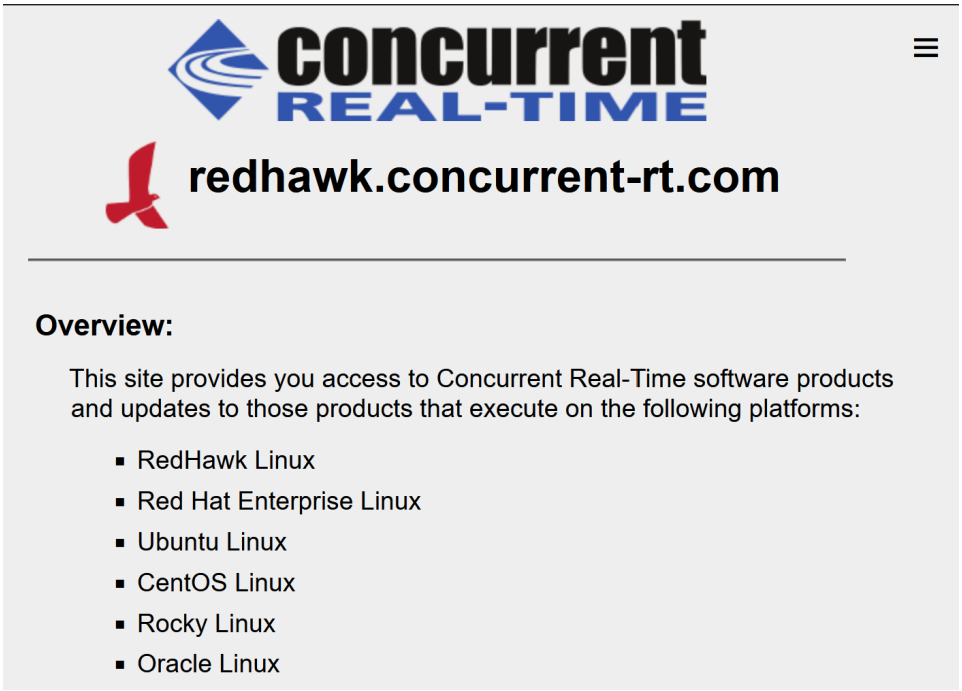
The first time you invoke NUU you will need to specify your redhawk.concurrent-rt.com Login ID and Password that were provided in the shipping documents accompanying your system. If you require assistance, refer to “Direct Software Support” on page 12.

Before using NUU to install any updated software modules, check for NUU updates separately. Apply any NUU updates and then restart NUU before applying any other updates.

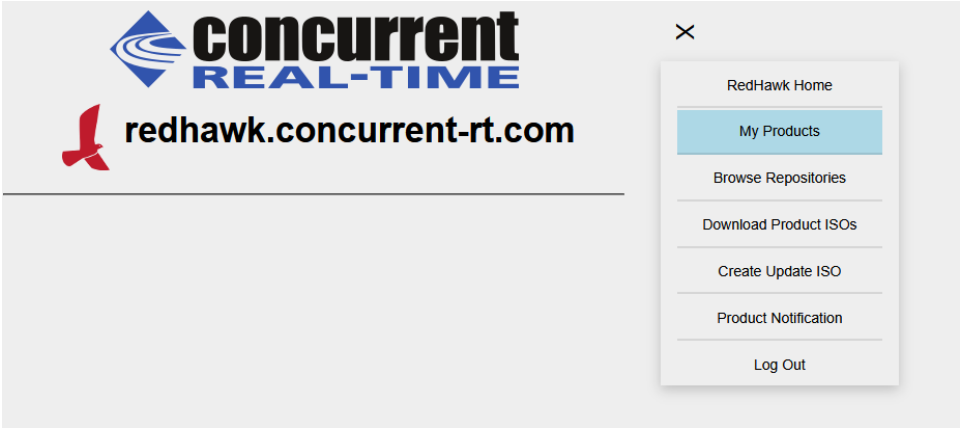
9.2.2 Installing Manually Downloaded RPMs

You can browse Concurrent Real-Time’s software repositories to locate updated RPMs and download them for manual installation.

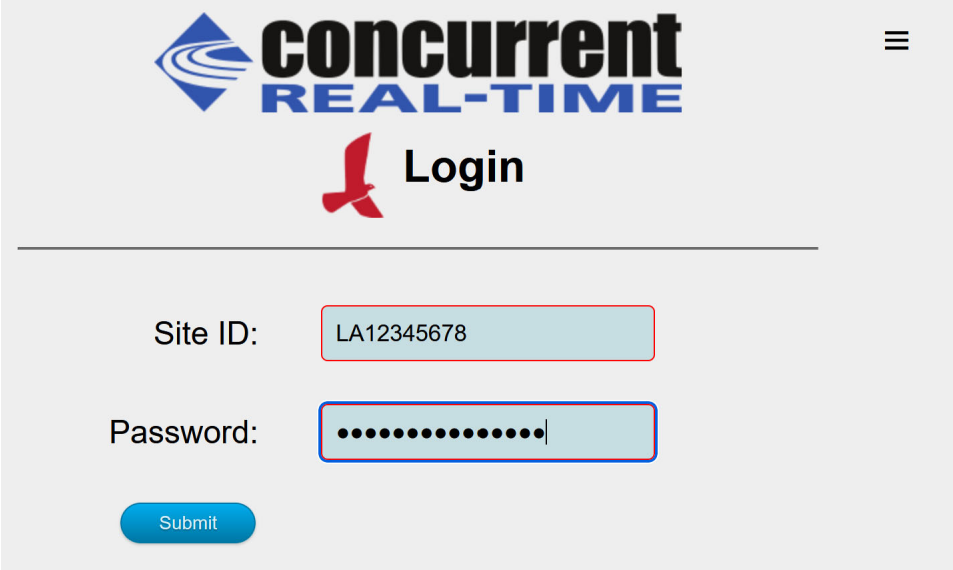
Start by accessing Concurrent’s RedHawk site at **https://redhawk.concurrent-rt.com**. You will see the page similar to the one shown below. Note that only the top section is displayed.



Click on the horizontal three bars in the upper right hand corner to bring up the menu shown below. Click on the My Products option as highlighted below.



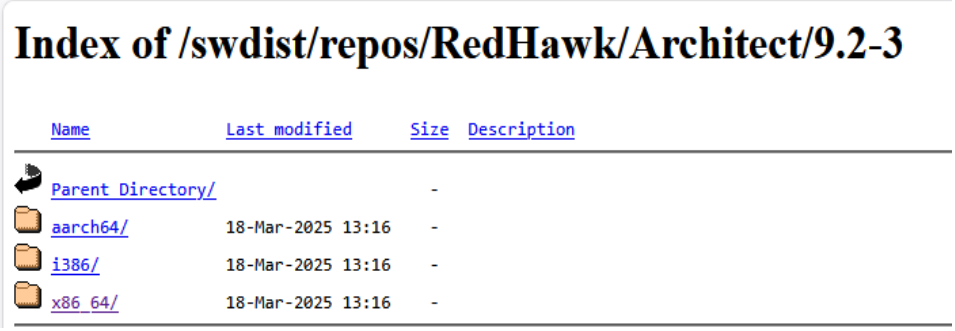
An authentication page will display. Enter your Site ID and Password and click on the Submit button. The page with example entries follows.



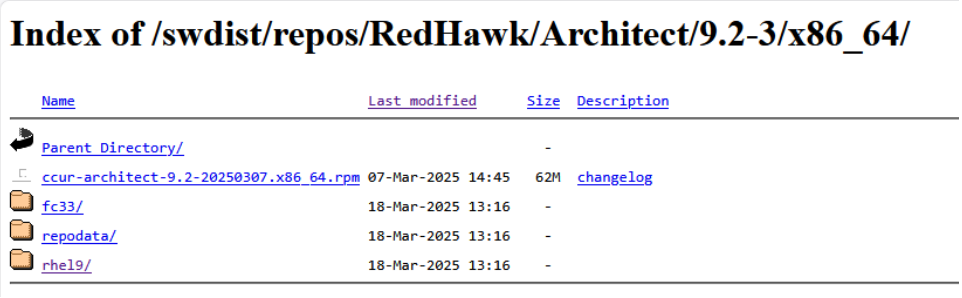
Again press on the horizontal three bars in the upper right hand corner and this time choose the Browse Repositories option.

You are then presented with your list of products and the latest release of each (page not shown). Look for the RedHawk Architect label and choose the release level desired. You may change the release to an earlier release by clicking on the release box.

Then select the architecture in the page that appears next, similar to the one below. Note that for this example, we chose an older version (9.2-3) and not the current release, 9.6.



Once you select the architecture, you will see a page with the packages that are available for download, similar to the one below.



After locating the RPMs of interest and downloading them to your system, you can manually install them.

To install newly downloaded packages, follow these steps:

1. Log in as root and take the system down to single-user mode:
    a. Right click on the desktop and select Open Terminal.

b. At the system prompt, type **`init 1`**.

2. Change directory to the location of the updates and issue the following command:

   ```
   rpm -Uvh *.rpm
   ```

   The time it takes to install will vary depending on the number of updates being installed.

3. When complete, exit single-user mode (Ctrl-D).

9.2.3 Customized Update Discs

You can use Concurrent Real-Time's Software Portal to create a customized Update Disc for your system which you can then download and burn onto physical media, or simply mount as an ISO9660 image.

Update discs have customized copies of product software repositories and a simple graphical interface for selecting packages for update and installation. These discs use NUU (described above) to talk to the disc to obtain packages -- no network access is required during installation via Update Discs.

Access the RedHawk Updates web site (**https://redhawk.concurrent-rt.com**) then click on Create Update ISO.

You will need to enter your redhawk.concurrent-rt.com Login ID and Password and then you can select the products to update. A disc image is built as part of the web session. At the end of the session, you can immediately download it for subsequent installation.

9.3 Documentation Updates

For the latest documents, including updated Release Notes and User Guides, go to Concurrent Real-Time's documentation web site at **https://redhawk.concurrent-rt.com/docs**.