REDHAWK Architect™ Version 8.4-4 Release Notes

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READ ME BEFORE INSTALLING THIS PRODUCT

concurrent REAL-TIME

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1.0. Introduction

This document provides release information and installation instructions for Concurrent Real-Time's RedHawk Architect™ Version 8.4-4.

1.1 Product Description

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, 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

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

Architect 8.4 can be installed on host systems running the following Linux distributions:

- RedHawk 8.x

- Red Hat (RHEL) 8.0 and newer (workstation and server)

- Rocky 8.4 and newer

- CentOS 8.0, 8.2

- Fedora 30, 31, and 32

Note that only 64-bit host systems are supported and only 64-bit target images can be created and Architect 8.4 only supports version 8.0, 8.2, and 8.4 target images.

Also note that a dual layer-capable DVD drive is required to install 8.0 and 8.2 systems, however, a blu-ray drive is required for 8.4.

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 8.4 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 13) for more information on obtaining board support packages.

4.0. Changes

4.1 Changes in this release (8.4-4)

The following features and enhancements have been added in this release:

- Support for installing on embedded MultiMediaCard (eMMC) storage devices.

- Support for Red Hat Enterprise release 8.10. In order to have access to Red Hat releases beyond 8.4 (8.6, 8.8 and in this release 8.10) the environment variable ARCHITECT_RHEL_NEXT must be set to any non-null value and exported (e.g., **export ARCHITECT_RHEL_NEXT=1**).

- Miscellaneous GUI improvements and bug fixes.

4.2 Changes in the 8.4-3 release

The following have been added in version 8.4-3 of RedHawk Architect:

- Architect now supports RHEL 8.8. Note that in order to have access to releases beyond 8.4 (8.6 and 8.8) you must export and set the environment variable ARCHITECT_RHEL_NEXT to any non-null value (e.g., **export ARCHITECT_RHEL_NEXT=1**).

- RHEL has re-released the base media for RHEL 8.2, 8.4, and 8.6, with a few, small package changes. Architect 8.4 Update 3 has been updated to use the latest versions of all RHEL media. So that you may verify the media, below are the **sha256sum(1)** checksums of the latest RHEL released versions:

REL	CHECKSUM (sha256sum)
8.0	005d4f88fff6d63b0fc01a10822380ef52570edd8834321de7be63002cc6cc43
8.2	5351e820412aa2f218e8ce13edf3026852fd3cc885a2be7bd217abd79eb199ce
8.4	ea5f349d492fed819e5086d351de47261c470fc794f7124805d176d69ddf1fcd
8.6	8cb0dfacc94b789933253d5583a2fb7afce26d38d75be7c204975fe20b7bdf71
8.8	517abcc67ee3b7212f57e180f5d30be3e8269e7a99e127a3399b7935c7e00a09

4.3 Changes in the 8.4-2 Release

The following have been added in version 8.4-2 of RedHawk Architect:

- Command line python scripts that perform functions provided by the Architect GUI. The scripts run independently but coordinate with the Architect tool via the session file. They are documented in an Appendix in the Architect User's Guide.

- An updated optical media installer that now supports writing to both DVD and Blu-ray devices. At this time, writing to CDs is not supported.

- Support for replacing an Architect VM exported to VMM or KVM-RT. Previous to this release, the user had to first remove the VM from VMM or KVM-RT.

- Miscellaneous improvements and bug fixes.

4.4 Changes in the 8.4-1 Release

The following have been added in version 8.4-1 of RedHawk Architect:

- Architect Security Extension (ASE) with support for Security Content Automation Protocol (SCAP) and the DISA STIG profile. ASE is provided in the optional package, **ccur-architect-security**.

- Option to encrypt installation target images.

- Security improvements for the root passwd; only its hash value is now known and saved in the session file.

- Option to automatically mount the ISOs of the various releases imported by the target and to setup the repositories to point to those images, thereby, making it seamless to use the **dnf** tool inside the chroot.

- Search capability for the systemd services table.

- Miscellaneous GUI improvements and bug fixes.

4.5 Changes in the 8.4 Release

The following has been added in Version 8.4 of RedHawk Architect:

- Support for RedHawk 8.4, CentOS 8.4, Rocky 8.4, and Red Hat Enterprise Linux 8.4 hosts.

- Support for RedHawk 8.4 in the target images.

- Support for NightStar version 5.0-2.

- The redefining of RedHawk 8.2 target images to RedHawk 8.2.2.

- Support for Software RAID configurations.

- Miscellaneous bug fixes.

4.6 Changes in the 8.2 Release

The following changes have been made in Version 8.2 of RedHawk Architect:

- Added support for RedHawk 8.2, CentOS 8.2 and Red Hat Enterprise Linux 8.2 hosts.

- Added support for Fedora 32 hosts.

- Added support for RedHawk 8.2 target images.

- Added support for NightStar 5.0 installation.

- Added support for the logical volume manager (LVM) so that target file systems can be configured to use LVM.

- Added Linux Unified Key Setup (LUKS2) support for block-device level encryption.

- Added Federal Information Processing Standards (FIPS) support for target kernels.

- Added feature to synchronize target system images with already deployed targets.

4.7   Changes in the 8.0 Release

- Added support for RedHawk 8.0, CentOS 8.0 and Red Hat Enterprise Linux 8.0 hosts.

- Added support for RedHawk 8.0 target images.

- Added support for Fedora 30 and 31 hosts.

- Added support for NightStar 4.8 installation in target images.

- Many improvements to the GUI and bug fixes.

- Added support for the export of target images to be used by KVM-RT.

- Added a new Architect launcher integrated with GNOME and MATE desktops.

- Added support for the use of virtio disk devices and UEFI secure-boot configuration for virtual machines.

- Updated to support a wider-range of target hardware.

- Added support for booting installation DVDs on UEFI systems.

- Added support for using NVMe drives on target systems.

- Added support for 'lazytime' file system mount option.

- Added a much-improved target file manager.

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.

Rocky to replace CentOS

Rocky Linux is a community enterprise operating system designed to be compatible with Enterprise Linux. CentOS has reached its End Of Life and its last release, CentOS 8.4, is supported for Architect hosts, but not supported for targets. The earlier CentOS 8.x releases are still supported for both hosts and targets.

Blu-ray drive needed to install 8.4 distros

System installations no longer fit on a dual-layer DVD. Starting with release 8.4, a blu-ray disc (BD) drive is now required to install.

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

Remote scanning is not supported on displays other than :0. Hence, you cannot **ssh** into a system and perform remote scans. Even when executing on the VGA console the DISPLAY setting may differ. Verify your DISPLAY environment setting by issuing '`echo $DISPLAY`' on the command line. For more information about this issue, see **https://bugzilla.redhat.com/show_bug.cgi?id=1801590**

RedHawk 8.2.2 media required for building 8.2 target images

RedHawk's 8.2.2 release is now required for building RedHawk 8.2 images. Any existing 8.2 architect sessions can still be used with Architect 8.4, but when rebuilt, the image will be upgraded to 8.2.2.

NightStar 5.0-2 (or newer) media required

NightStar 5.0-2 or later is required to build target images with NightStar pre-installed.

RedHawk 8.4 Custom Kernel Build Failure

When building a RedHawk 8.4 custom kernel with no updates installed on the target system, you will need to turn off CONFIG_BPF_PRELOAD in the target's kernel configuration prior to building the kernel. Otherwise the build will fail with various errors starting with this one: `/usr/bin/env: 'python3': No such file or directory`

Note that this issue has been resolved in the 8.4.1 update of RedHawk Linux.

PXE RAMDISK option does not work in the RedHawk 8.4 release

RAMDISK, one of the options of the PXE Diskless deployment method, does not work in the RedHawk Linux release 8.4. It still works in the RedHawk 8.0 and 8.2 releases.

Note that this issue has been resolved in the 8.4.1 update of RedHawk Linux.

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.

PXE RAMDISK Size Limitation

With the Live RAMDISK option, **syslinux** may impose a limit on the file size of the Live RAMDISK that can be loaded.

PXE diskless booting is slow on UEFI systems

PXE booting of UEFI target systems, for both the NFS and RAMDISK options, can be slow and the **tftp** transfer of large **initrd** images may time-out.

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 older than Architect 8.0 are not compatible with this version of Architect. All 8.x session files are compatible with this version of Architect.

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 12 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
```

9.0. 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 web site at **http://www.concurrent-rt.com/support**.

9.2 Software Updates

Updates to Concurrent Real-Time 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 CD 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 Yum 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.

Instructions for configuring NUU can be found in the **QuickStart.pdf** document available at **http://redhawk.concurrent-rt.com/network/QuickStart.pdf.**
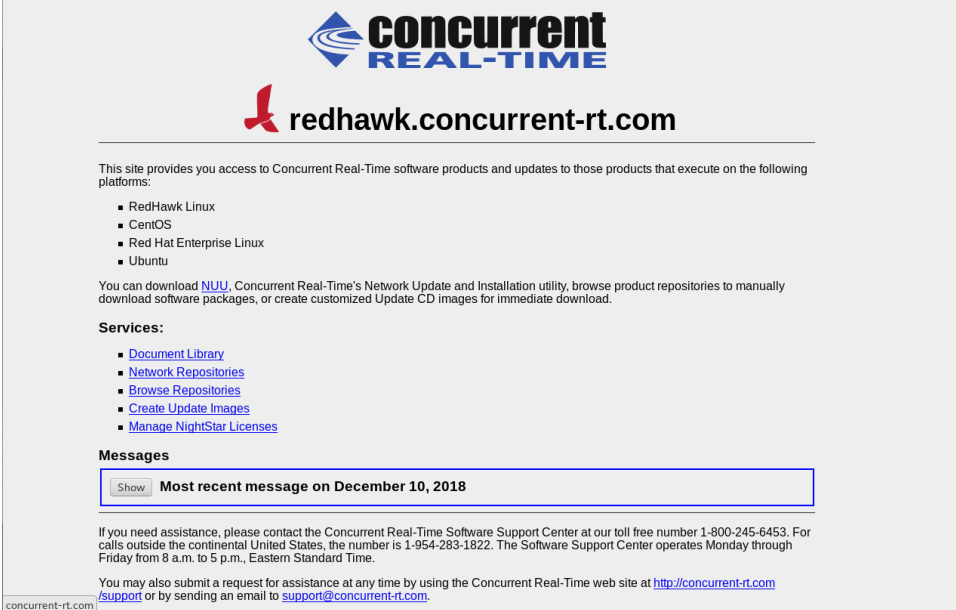
The first time you invoke NUU you will need to specify your redhawk.concurrent-rt.com Login ID and Password that were provided in the shipping documents accompanying your system. If you require assistance, refer to "Direct Software Support" on page 13.

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.

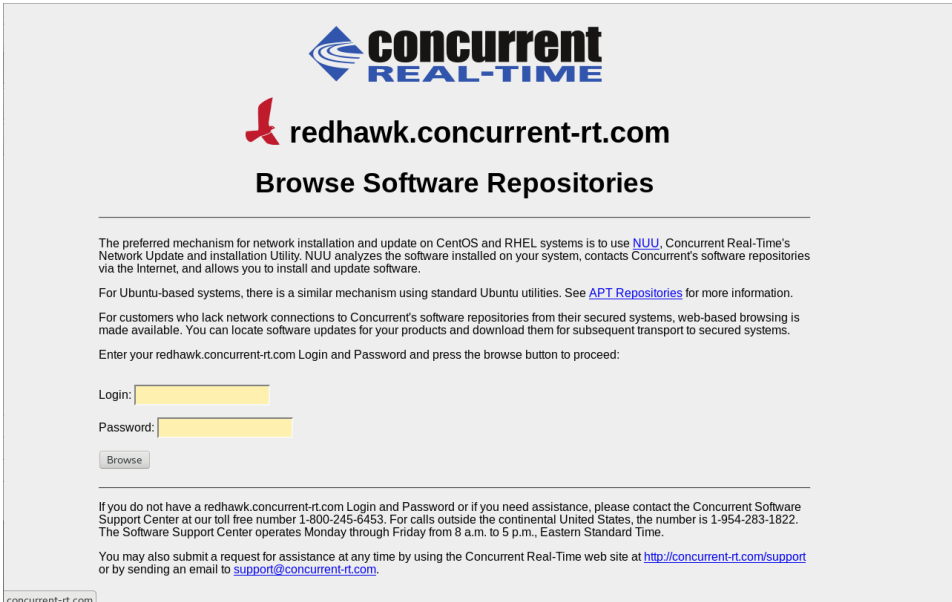### 9.2.2 Installing Manually Downloaded RPMs

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

Access the RedHawk Updates web site (**http://redhawk.concurrent-rt.com**) by clicking on the "Concurrent Real-Time Software Portal" icon on the desktop. Accessing this web site displays the following screen:

Clicking on the **Browse Repositories** link takes you to an authentication page.

Enter your redhawk.concurrent-rt.com Login ID and Password and click the **Browse** button.

Select the products of interest and architecture to see the list of RPMs in the product software repository. To locate the latest RPMs in the repository, click on the Last modified column header to sort by date. You may need to click twice to set the sort order to newest-to-oldest.

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).

NOTE

If you have installed an update containing new RedHawk kernels on a system that has post-installation loadable modules present, those modules must be recompiled for the new kernel; for example, an NVIDIA driver that is a later version than the one included with RedHawk or any third party package that uses loadable modules.

9.2.3 Customized Update CDs

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

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

Access the RedHawk Updates web site (**http://redhawk.concurrent-rt.com**) by clicking on the "Concurrent Real-Time Software Portal" icon on the desktop, then click on **Create Update images**.

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

9.2.4 Automatic Notification of Available Updates

When updates, incremental releases or major releases occur, those who have subscribed to Concurrent Real-Time's automatic notification service are automatically sent an email with a link to the redhawk.concurrent-rt.com site describing the updates relative to your company. Multiple email addresses can be subscribed per customer site.

To subscribe, unsubscribe or change notification options, click on the "Subscribe to the Update Notification Service" link on the **http://redhawk.concurrent-rt.com** site.

9.3 Documentation Updates

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