

SOFTWARE INSTALLATION



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4 FRC SOFTWARE INSTALLATION

4.1 SOFTWARE INSTALLATION INTRODUCTION

This section of the control system manual provides detailed steps for the installation and configuration of the programming environments for the 2009 FRC Control System.

Two programming environments are available for use by teams: National Instruments LabVIEW, which supports a graphical programming language, and Wind River Workbench, which supports C and C++ languages. After compiling, executables are transferred to the cRIO, which runs the Wind River VxWorks 6.3 operating system.

4.1.1 Special Note for Teams Receiving the “Early Control System Shipment”

Teams receiving an “early control system shipment” are requested to carefully follow the steps below, recording any deficiencies, confusing points, errors, and/or possible improvements to the installation procedures so that this document can be improved for the use by all teams. Please post your detailed suggestions in the appropriate discussion on the FIRST Control System Support Site.

4.2 INSTALLING THE FRC PROVIDED SOFTWARE

The Install DVDs in the new control system kit contain the FRC versions of the following tools:

DVD 1: National Instruments (NI) LabVIEW 8.5.1 and other NI tools, including NI Measurement and Automation Explorer, NI Vision Assistant, NI-RIO, and NI cRIO Imaging.

DVD 2: Wind River Workbench for C/C++ programming, FRC specific version.

4.2.1 Licensing

The National Instruments LabVIEW license is active until January 15, 2010. The Wind River Workbench license is active until January 5, 2010.

Teams are permitted to install the software on as many team computers as needed, subject to the restrictions and license terms that accompany the applicable software, and provided that only team members or mentors use the software, and solely for the FRC. Rights to use LabVIEW and Workbench are governed solely by the terms of the license agreements that are shown during the installation of the applicable software.

4.2.2 Installation Requirements

The installation has been tested on the following operating systems: Windows XP, Vista.

To install, you must be logged on as an administrator or as a user with administrator privileges. You will need Internet access to activate the Wind River and NI Licenses.

4.2.2.1 Requirements for the LabVIEW Programming Environment

Installation of the “LabVIEW Package” from the FRC DVD requires 3.6 GB total disk space. On a Windows XP platform, this package takes an average of 1.5 hours to install. Installation on a Vista operating system sometimes takes longer. If you currently have National Instruments software on your PC, it will not interfere with that installation.

4.2.2.2 Requirements for the C/C++ Programming Environment

Installation of the “Wind River Package” from the FRC DVD requires 2.4 GB total disk space. Note that even the C/C++ programming environment will require installation of many portions of the NI software to support the cRIO. On a Windows XP platform the Wind River software takes an average of ½ hour to install. The FRC installation must be installed in the directory “c:\WindRiver”.

A different version of Workbench on your PC can remain installed, but it must be in a different directory.

Users of the software must read the license agreements that are shown during installation of the software carefully and completely.

4.2.2.3 Requirements for Both Programming Environments

Both programming environments (the “LabVIEW Package” and the “Wind River Package”) installed together require 4.6 GB total disk space, taking an average of 2 hours to install.

4.2.3 Before Installing

4.2.3.1 Deactivate / Uninstall software

1. Disable any automatic virus detection programs before you install. Some virus detection programs interfere with installation. (NOTE: Some of the beta test teams that did not disable virus detection before installation needed to re-install their programming environments again to remedy problems encountered in installation.)
2. If you have the FIRST Tech Challenge software installed, use the Switch Palette Set dialog box, accessible by selecting Tools»Switch Palette Set in LabVIEW, to switch to the Complete LabVIEW palette set before installing the FRC software.
3. If you have another version of the Wind River Workbench installed, make sure it is not in the C:\WindRiver directory because that is the preferred location for the FRC installation (some of the tools expect that location).

4.2.3.2 Obtain licenses

The install DVD jacket has the serial number to use for LabVIEW activation. If this is not available, LabVIEW may be activated temporarily for 30 days without a license.

The Wind River Workbench License Authorization Code (LAC) is pre-populated in the installer.

4.2.4 Install LabVIEW 8.5.1 and Associated Components

4.2.4.1 Installation Procedure

Insert the FIRST Robotics Competition Software installation DVD 1 and follow the instructions that appear on the screen.

4.2.4.2 Activation Procedure

After the NI software is installed, an NI Activation Wizard starts. (This may happen while the second installation disk is working). Activate the product using the serial number obtained from NI. If no serial number is available, use the 30-day temporary activation option.

If you obtain a license later, follow this procedure to activate LabVIEW permanently:

1. From the Start Menu, select: Programs >> National Instruments >> NI License Manager
2. The License Manager dialog asks you what you would like to activate.
Choose "Automatically activate thru a secure internet connection."
You only need to enter in the number for LabVIEW 8.5.1 Development System.
This will activate all the National Instruments programs that you need for FRC.
3. Press the Activate Button.

4.2.5 Install Wind River Workbench 3.0 and Workbench Update for FRC

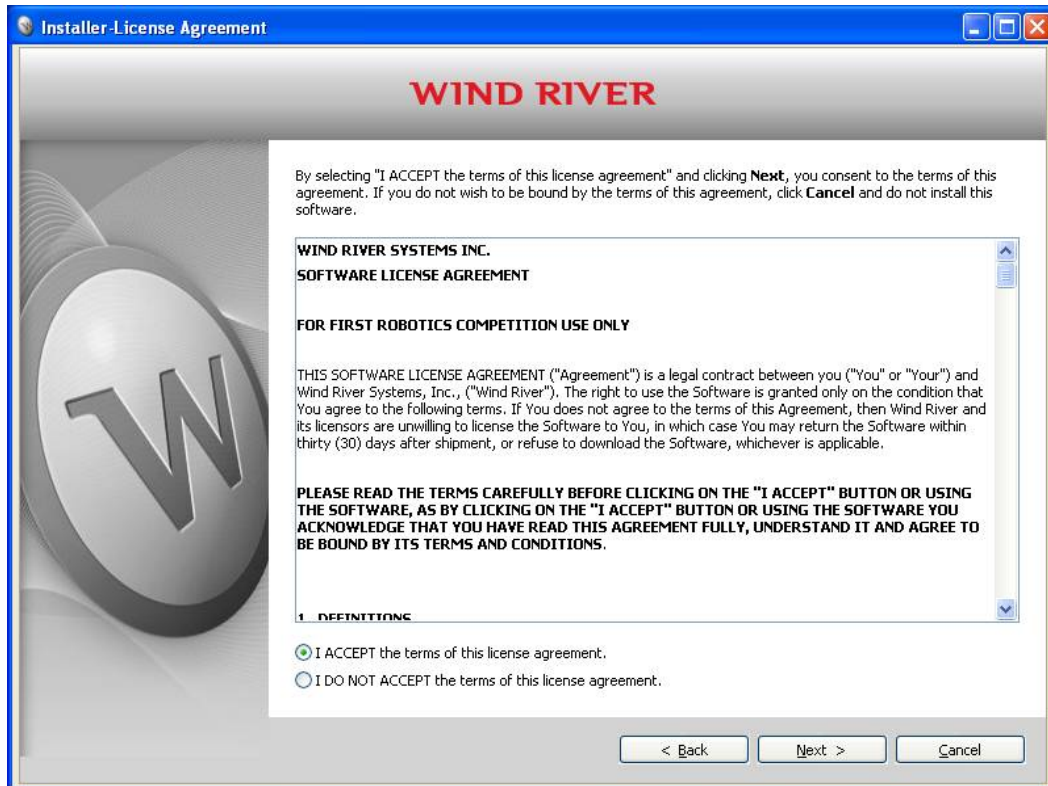
4.2.5.1 Installation Procedure

Note: If you have just installed the previous DVD, the National Instruments Activation Wizard may start while Workbench is being installed. Internet access is needed to complete the install for Workbench.

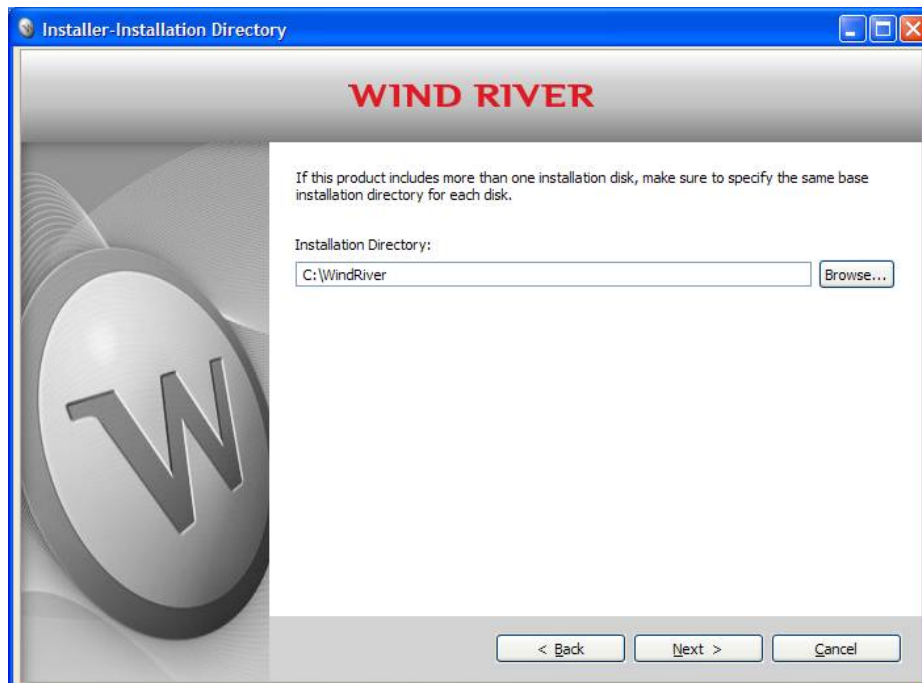
Insert the FIRST Robotics Competition Software installation DVD 2 and follow the instructions that appear on the screen. The installer should launch automatically, as shown:



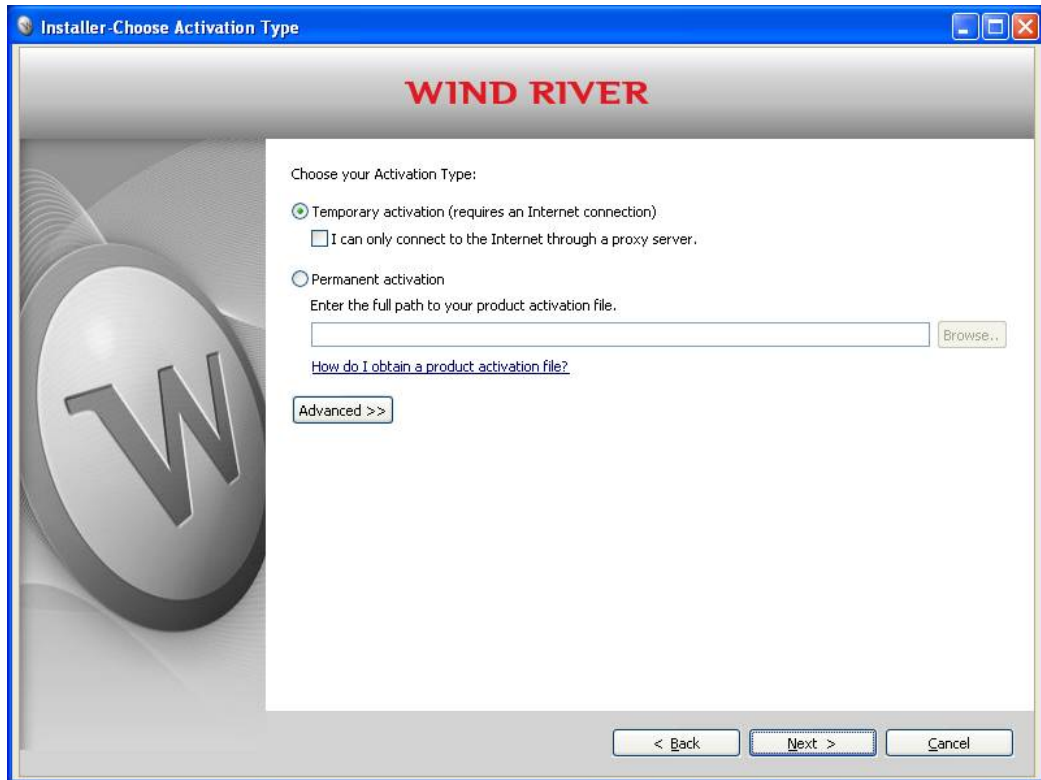
- The “Installer-Welcome” dialog window should appear (as shown above), indicating that the Wind River General Purpose Platform VxWorks Edition 3.3 including VxWorks 6.3, Workbench 3.0.1, GNU Compiler 3.4.4, and Wind River Compiler 5.4.0 will be installed. Select “Next” to continue.



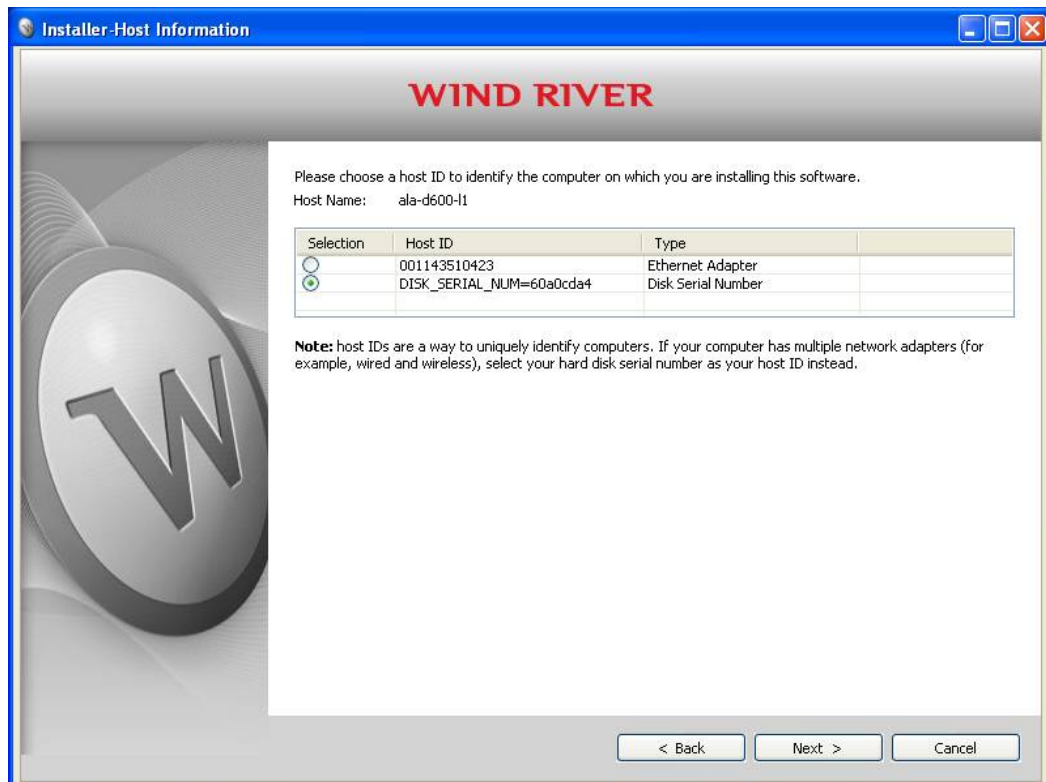
- The “Installer-License Agreement” dialog window should appear, as shown above. Review the license agreement, select “I ACCEPT the terms of this license agreement.” And select “Next” to continue.
-



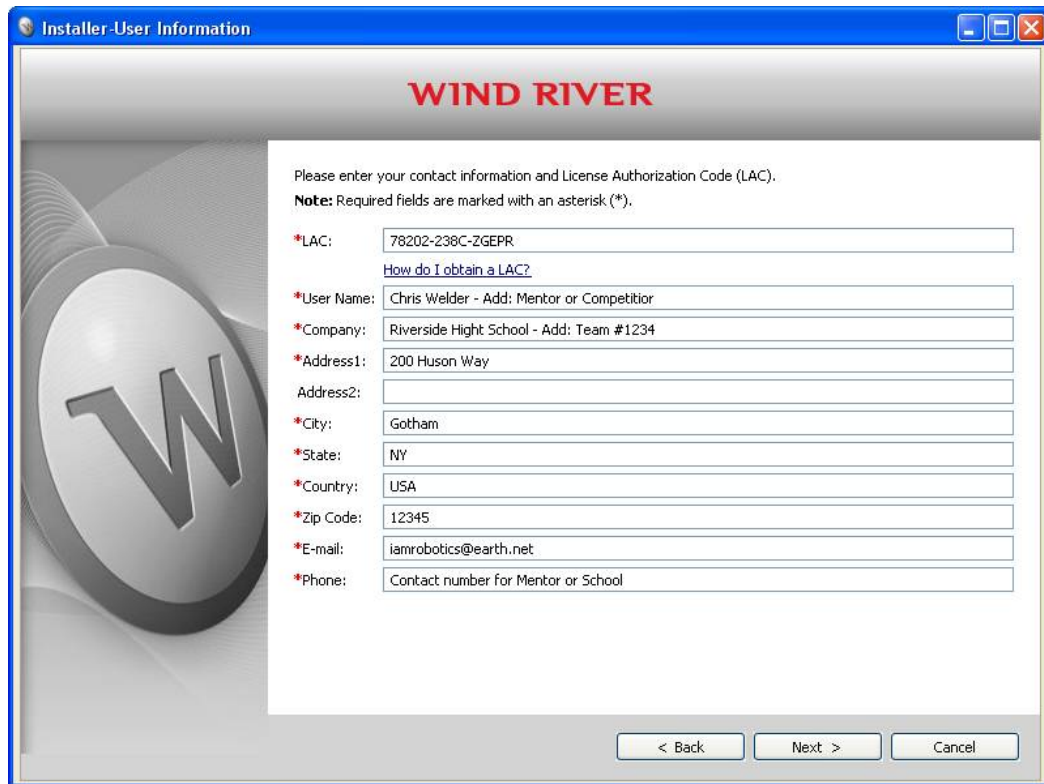
- The “Installer-Installation Directory” dialog window should appear. Accept the default installation directory of “C:\WindRiver” and select “Next” to continue. (If the directory does not yet exist, a new dialog will appear asking if you want to create it. Select “Yes” to create the directory.)



- The “Installer-Choose Activation Type” dialog window should appear. Select “Temporary activation.” Select “Next” to continue.



- At this point a “Host Information” dialog window may appear. If so, select the Disk Serial Number as the host ID to identify the computer.
- Select “Next” to continue.



- The “User Information” dialog window should appear, with a pre-populated License Activation Code (LAC).
- Enter your user information as requested.
- At the Installer - User Information window, all participants and mentors must provide their information for product registration. Wind River maintains this information as confidential. Product registration is a necessary step of the installation process, without which installation is not completed.

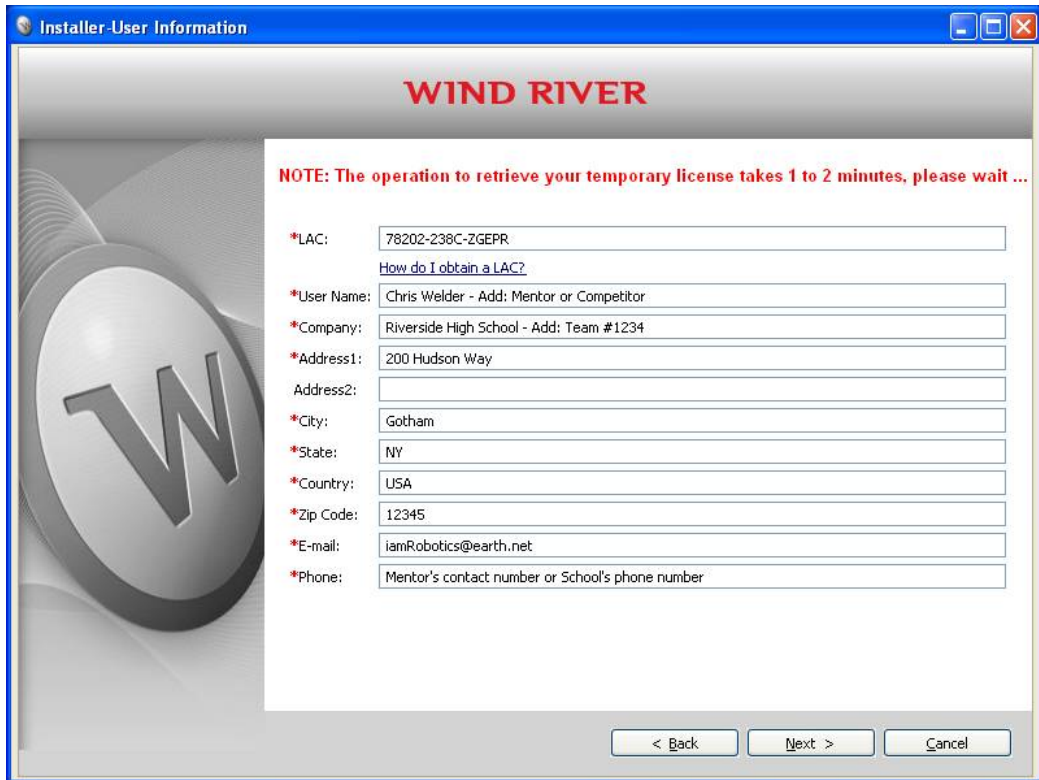
FIRST mentors and participants should provide their FIRST specific information to these fields:

- 1 Under User Name, please add identification as a "Mentor" or "Competitor".
- 2 For Company, please list your School name and FRC Team number.
- 3 For Phone, provide the School phone number or your mentor's contact number.

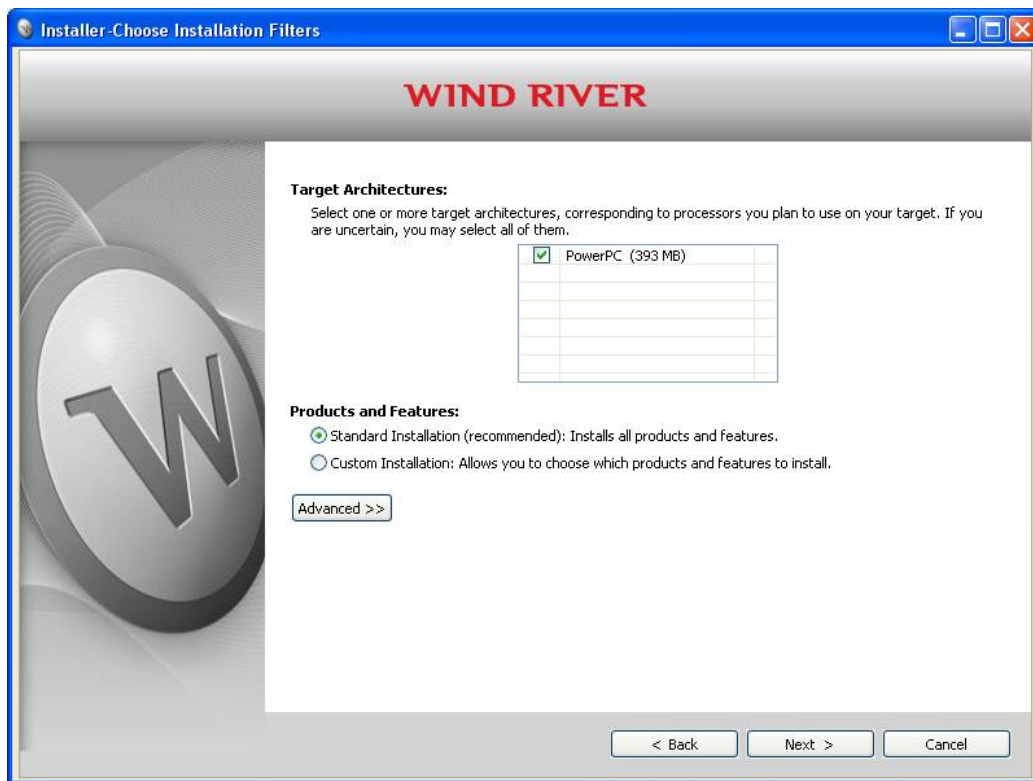
Please note that fields marked with a red asterisk cannot be left blank in order to proceed.

The registration process connects to a Wind River server, which requires users to have an Internet connection active when installing. User information is confirmed and the installation keys are supplied in return.

Important Note: Once, the install is underway and progress bars have appeared on the Installer-Standard Installation window, connectivity to the Internet is no longer needed to install and run Wind River software.



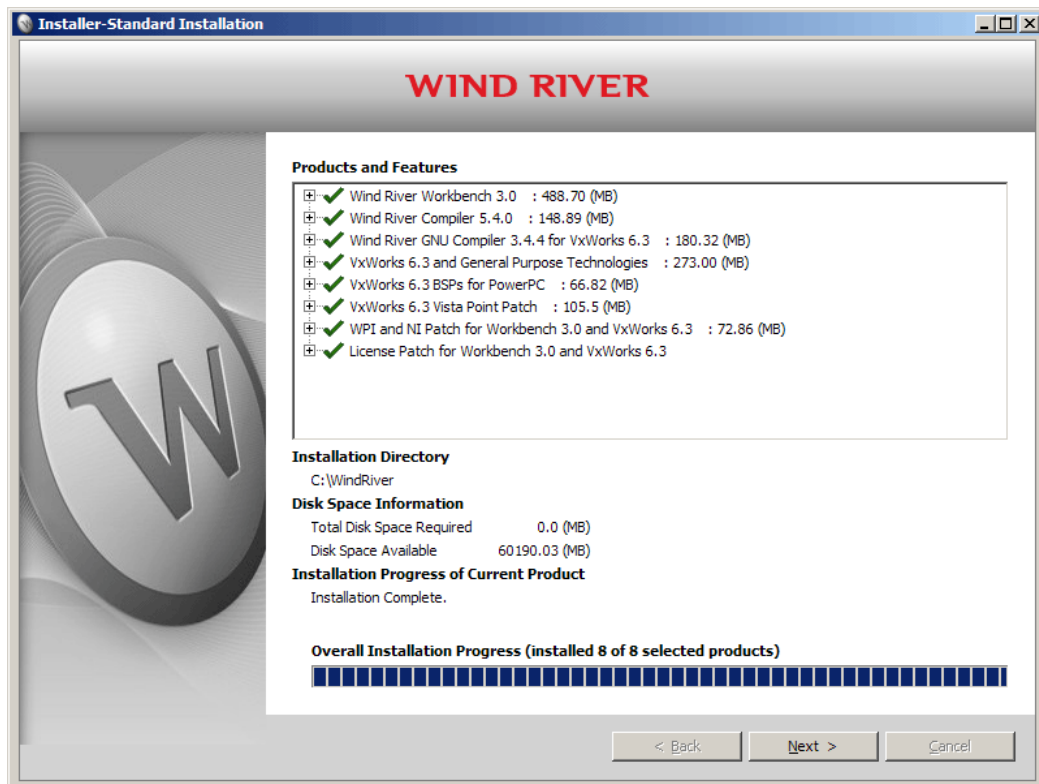
- Select “Next” to continue. (Licensing will be automatically installed on your Windows host).



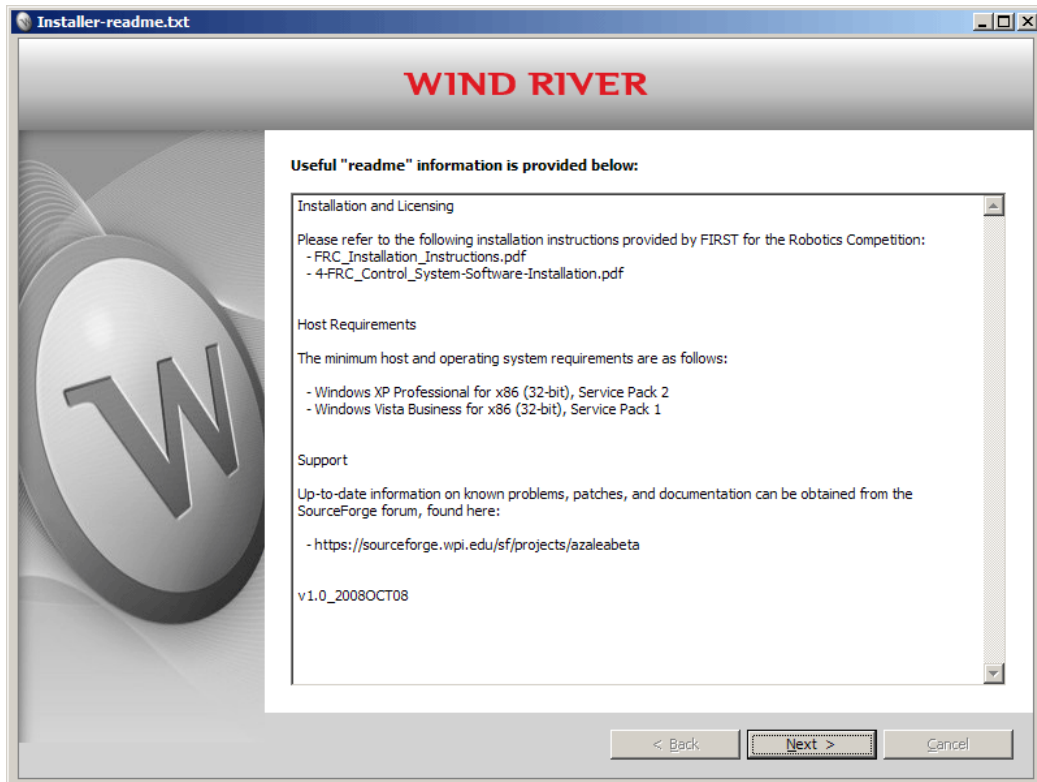
- The “Installer-Choose Installation Filters” dialog window should appear. Ensure that the target architecture selected is “PowerPC.” Select “Standard Installation” and then select “Next” to continue.

- The “Installer-Standard Installation” dialog window should appear. Note that each of the following tools should be listed:
 - Wind River Workbench 3.0
 - Wind River Compiler 5.4.0
 - Wind River GNU Compiler 3.4.4 for VxWorks 6.3
 - VxWorks 6.3 and General Purpose Technologies
 - VxWorks 6.3 BSPs for PowerPC
 - VxWorks 6.3 Vista Point Patch
 - WPI and NI Patch for Workbench 3.0 and VxWorks 6.3
 - License Patch for Workbench 3.0 and VxWorks 6.3

Select “Install” to proceed with the installation. (The installation will take about 30 minutes on XP and possibly more than one hour on Vista PCs.) The licensing will be automatically installed on the PC.



- After the “Overall Installation Progress” meter shows that installation has completed, select “Next” to continue.

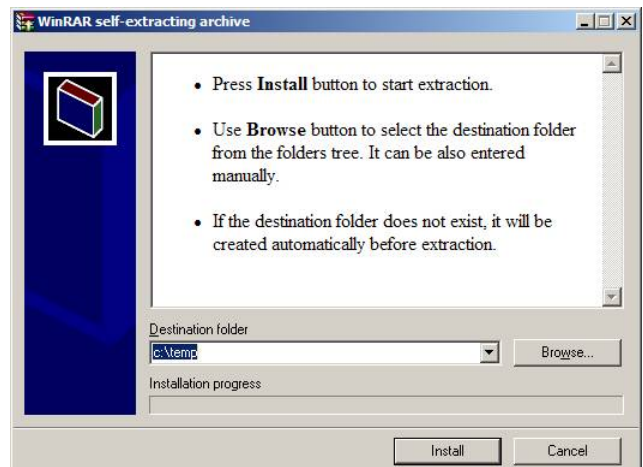


- The “Installer-readme.txt” dialog will be shown. Review the “readme” information and select “Next” to continue.
- The “Installer-Finish” dialog will be shown. Please deselect the “Launch Wind River Workbench 3.0” checkbox so that you can upgrade the Workbench Installation with the latest FIRST software (see the next section) before running Workbench. According to your preference either deselect or select the “Create a desktop icon for Workbench 3.0” checkbox. Select “Finish” to complete the installation of Workbench 3.0.

4.2.5.2 Upgrading the Workbench Installation with latest FIRST software

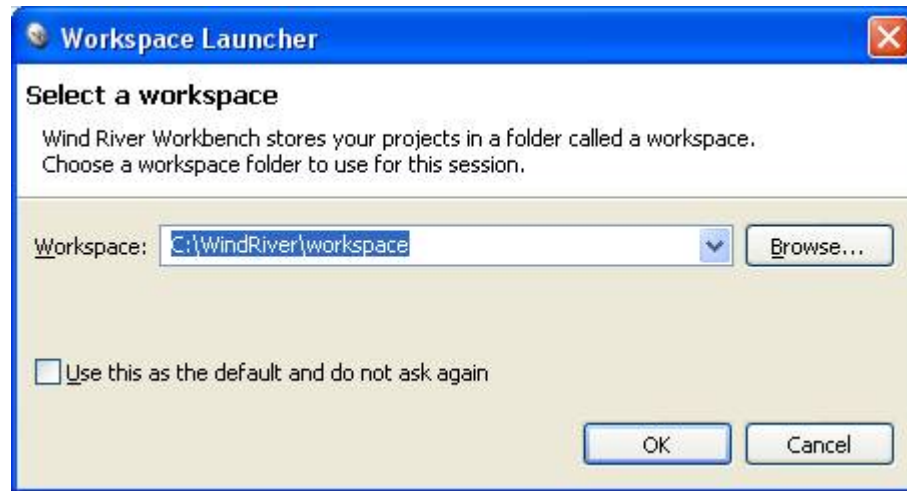
After installing the Workbench software from the DVD, it is necessary to apply a patch to upgrade the installed software to the latest version in order for the C/C++ software to be compatible with that in the latest cRIO image. Please follow the steps below in order to upgrade your Workbench software:

- Download the “WorkbenchUpdate4.exe” executable from www.usfirst.org/frccontrolsystem
- Run the “WorkbenchUpdate4.exe” executable that you saved on your computer. You will see the “WinRAR self-extracting archive” welcome screen. (Shown at right.)
- The archive utility will extract itself to C:\Temp and then install the appropriate files your WindRiver installation in C:\WindRiver. Click “Install” to continue.
- A command window will be shown briefly during installation. When the WinRAR window and command window both close, the installation of the Workbench patch for the latest FIRST code is complete.



4.2.5.3 Starting Wind River Workbench 3.0.1 for the First Time

Start the Wind River Workbench up via “Start -> All Programs -> Wind River -> Workbench 3.0 -> Workbench 3.0”.



- The Wind River Workbench 3.0 “splash screen” should appear, shortly followed by the “Workspace Launcher” dialog window. Accept the workspace location of c:\WindRiver\workspace and select “OK” to continue. It is highly recommended that you use this default workspace so that the default code library mappings will work.
- NOTE: If you are running a Windows Firewall, you may observe dialog windows requiring you to allow various features with the publisher of Wind River Systems.

The Wind River Workbench will appear with a single large “Welcome” pane. You can make use of the welcome pane features (Overview, etc.) or close the “Welcome” pane by clicking on the “x” next to the “Welcome” tab.

4.3 INSTALLING ESSENTIAL UPDATES

The software provided on the DVD is no longer the most recent software versions available to teams. There are additional software updates that must be installed.

4.3.1 Installing NI Updates

Visit <http://joule.ni.com/nidu/cds/view/p/lang/en/id/1180> to download the most recent NI Update and install it as described on that web page.

4.4 INSTALLING ADDITIONAL SOFTWARE FOR THE C/C++ PROGRAMMING ENVIRONMENT

4.4.1 Subversion

Source code is controlled on the WPI site in a Subversion (SVN) repository. There are many subversion clients, but some that are useful are the SVN plugin for Eclipse (Subclipse), Tortoise SVN, which integrates nicely with the Windows explorer, and SlikSVN, a standalone command line Subversion client.

Caution: The C/C++ version of WPILib uses an option in SlikSVN to display version numbers. If you compile WPILib from source code and do not have SlikSVN installed, you will see an error when compiling WPILib from source, but the code will compile and run without it.

4.4.1.1 Install the SVN plugin for Eclipse / Wind River Workbench

After clicking on the “x” next to the Welcome tab, the standard “Application Development – Wind River Workbench” window will be shown. To acquire the latest WPILib software for the FRC 2009 Controller, first install the Subversion plug-in for Workbench, as follows:

- Begin the installation from the Workbench (Eclipse) Help menu item: “Help -> Software Updates -> Find and Install...”
- The “Install/Update” dialog will appear; select “Search for new features to install” and select “Next” to continue.
- The “Install” dialog will appear. Click the “New Remote Site”... button.
- A “New Update Site” window will appear. In the “Name” field, enter “Subclipse” and in the “URL” field, enter http://subclipse.tigris.org/update_1.4.x Click “OK” to add this site to the list and dismiss the “New Update Site” dialog window.
- Back in the “Install” dialog, observe that the “Subclipse” update site is now included in the list and checked. Click on the “Subclipse” line in the list to ensure that it is selected, and then click on “Finish” to proceed with the installation of the update.
- After checking the website, the “Updates” dialog should appear. Expand the “Subclipse” item in the list to show the subcomponents. Select the “JavaHL Adapter (recommended)” line and the “Subclipse (required)” line so that both of these items are checked. Then select “Next” to continue. (DO NOT check the “Integrations” or “SVNKit Adapter BETA” boxes.)
- The “Feature License” dialog should appear. Review the license agreement, select “I accept the terms in the license agreement” and then select “Next” to continue.
- The “Installation” dialog will show the features to be installed (Subclipse, Subversion Client Adapter and Subversion Native Library Adapter (JavaHL)). Select “Finish” to perform the installation.
- The “Verification” dialog will likely appear, warning that the feature to be installed has not been digitally signed. Select “Install All” if you approve the installation of an unsigned feature.
- The “Install/Update” dialog will appear, indicating that Workbench needs to be restarted for the changes to take effect. Select “Yes” to restart Workbench.

4.4.1.2 Install Tortoise SVN Subversion Client

TortoiseSVN is not required for use of the WPI subversion server, but is a very helpful utility for Windows. It provides an alternative SVN interface using the Windows Explorer, without requiring Wind River Workbench to be running. If you plan to use Subversion for source control TortoiseSVN will enable you to access files directly from the Windows Explorer. When TortoiseSVN is installed, right clicking on a file in the Explorer displays the SVN options available. To download and for more information, see <http://tortoisesvn.net/downloads>

4.4.1.3 Install SlikSVN Command Line Subversion Client

SlikSVN is not required for use of the WPI subversion server, but it is used in the compilation of WPILib in order to embed version information in the built executable. If you intend to build WPILib from source code, we highly recommend installing SlikSVN to avoid spurious error messages when compiling WPILib. See <http://www.sliksvn.com/en/download>

4.4.2 Using Wind River Workbench to Create Projects and Build Robot Code

For detailed information on the WPI Robotics Library and how to use Workbench to build robot code, please see the C/C++ Programming Guide for FRC. This document is included in the installation in the WindRiver/docs/extensions/FRC directory. Updated versions will be posted on the FIRST Web Site at <http://www.usfirst.org/community/frc/content.aspx?id=10934> with the 2009 FRC Control System Manual.

4.4.3 Installing the FRC 2009 WPILib Source Code

4.4.3.1 Install from the WPI SVN Repository

If you do not wish to compile WPILib from source code, please skip this section.

- After having installed the Subclipse plugin, to acquire the software for the FRC 2009 Controller, select “File->New->Project...”
- The “New Project” dialog will appear. Select “SVN->Checkout Projects from SVN” and then select “Next” to continue.
- The “Checkout from SVN” dialog will appear. Select “Create a new repository location” and “Next”. Enter the URL of *****coming soon***** and select “Next”.
- In the “Select Folder” dialog, expand the “CProgramming” folder, then the “trunk” folder, and then select the “WPILib” folder. After selecting the “WPILib” folder, select “Next”.
- The “Check Out As” dialog will appear; select “Check out as a project in the workspace” (accepting the default name of WPILib) and select “Next”. Accept the default workspace location and select “Finish”. WPILib will be checked out into your workspace.
- NOTE: Sometimes when checking out a project from SVN, the project type is indicated as a "Native Application (Host OS) Project" rather than as a "Wind River VxWorks 6.3 Downloadable Kernel Module Project" as defined in the SVN repository. A workaround for this problem can be performed as follows:
 - Exit Workbench and then restart Workbench immediately after checking out the project from SVN. (Before attempting to build the just-checked-out project.)
 - When Workbench restarts, an "Intializing Workspace" dialog appears and changes the project type to the correct type!

4.5 CHANGING BETWEEN WIND RIVER AND LABVIEW PROGRAMMING ENVIRONMENTS ON THE CRIO

The Imaging tool documented in Section 5 is used to switch environments without requiring re-imaging of the cRIO. The “ni-rt.ini” file on the cRIO requires different settings for the two environments. The Imaging tool updates this file based on the environment specified. For detailed instructions see the section titled “Update Firmware on cRIO”.

4.6 USING WIND RIVER WORKBENCH

The C/C++ Programming Guide for FRC (see reference section) contains instructions for configuring Workbench, creating, running and debugging programs in the Workbench environment. Workbench also has extensive help documents. New users are encouraged to do the “Getting Started” Tutorial under Wind River Documentation. For the FRC installation, some features of Workbench are disabled, and others are not used in the FRC environment using the cRIO target.

4.7 TROUBLESHOOTING

4.7.1 Wind River Workbench

4.7.1.1 Slow Startup

The first time the workbench starts; it takes longer because it is initializing the workspace. After that it scans the workspace every time it starts. If your workspace is set to the **C:** drive instead of **C:/WindRiver/workspace**, this scan can take a long time. We have also encountered an issue with the antivirus Sophos that slowed the startup significantly.

4.7.1.2 License Issues

“System Time has changed” – On startup, WindRiver checks every file on the filesystem to see if the creation or last modified date of each file and folder is later than the current date.

To fix this error, you can delete all files and folders with a creation date later than the current date or get a program that can modify the creation date.

For files with a last modified date later than the current date, you can open the file then save it. For folders with a last modified date later than the current date, you can create a folder inside the offending folder then delete it.

Another possible solution is to run Workbench in a virtual machine. This should also increase the startup time of Workbench, as it would only check the files in the virtual machine. (We didn't try this).

4.7.1.3 Other Issues

See the C/C++ Programming Manual for Troubleshooting tips for Workbench Usage.

4.8 FOR MORE INFORMATION

4.8.1 FIRST

For programming support, forums and links, see: www.usfirst.org/frccontrolsystem

4.8.2 LabVIEW

Getting Started with LabVIEW for the FIRST Robotics Competition

This manual covers the LabVIEW graphical programming environment and the basic LabVIEW features you can use to build FRC applications.

To access this file, go to: <http://decibel.ni.com/content/docs/DOC-2451>

Robotics Programming Guide for the FIRST Robotics Competition

This manual provides information about robotics programming concepts, reference information about the FIRST Robotics Competition VIs, and guidelines for troubleshooting in LabVIEW. Access

To access this file, go to: <http://decibel.ni.com/content/docs/DOC-2631>

4.8.3 Wind River Workbench

Wind River Workbench User's Guide

Use the Wind River Workbench User's Guide to access information about building and debugging an application in the Wind River programming environment.

To access this file, in the Workbench, select *Help»Help Contents*. Then on the Contents tab of the Help – Wind River Workbench help window, navigate to the *Wind River Documentation»Guides»Host Tools»Wind River Workbench User's Guide 3.0, VxWorks Version book*

4.8.4 FRC/WPI Robotics Library C/C++ Programming Guide for FRC

This is the definitive source of information about WPILib, and includes FRC-specific usage information for Workbench. This guide describes using the WPILib C++ library and how to create projects with WindRiver Workbench.

This document is provided with the Workbench install under WindRiver>Docs>Extensions>FRC
Updates can be obtained from www.usfirst.org/frcontrols/system

Doxygen output for WPILib C Library

This is the definitive source of information about WPILib. It is derived from comments extracted from the source code. You should unzip it into a directory, then open index.html with a browser. To access go to: <http://users.wpi.edu/~bamiller/WPIRoboticsLibrary/>

4.8.5 FRC Vision Specification (C/LabVIEW)

Includes both the LabVIEW and C Programming interfaces to the vision libraries for image processing.

This document is provided with the Workbench install under WindRiver>Docs>Extensions>FRC
Updates can be obtained from www.usfirst.org/frcontrols/system