User Manual

Installing LEON VxWorks 6.9

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1. Introduction

This document is a guide on how to install the Cobham Gaisler VxWorks 6.9 2.2.4 distribution. The distribution includes a SPARC port of the VxWorks 6.9 kernel, a generic BSP for LEON processors, and several board specific BSPs. It also includes the GNU GCC toolchain targeted to LEON processors.

The installation process consists of the following steps:

1. Install the WindRiver VxWorks GPP Platform (WindRiver source license). Basic build support exists for the PNE platform, however the added functionality is not supported. Other WindRiver platforms than GPP or PNE, such as Automotive, are not supported at this time. Only version 3.3 of the workbench is supported.
2. Install Service Pack 12 for VxWorks 6.9.4
3. Install Workbench 3.3 Update 6
4. Install the GNU GCC LEON toolchain
5. Install the Cobham Gaisler LEON distribution over the VxWorks Platform
6. Build the SPARC/LEON VxWorks kernel and libraries
7. Update Workbench build rules

You need to have a WindRiver source license for GPP 6.9 to install and run the LEON SPARC BSP and Hardware Abstraction Layer (HAL). The installation steps are described in separate chapters and each step must be executed in the order indicated by the chapter arrangement.

2. Installing VxWorks 6.9

Before proceeding with the installation, the WindRiver VxWorks General Purpose Platform (GPP), including the Workbench and full kernel sources, must be installed and working.

If the Windriver installer presents a screen saying *Updates are available for the Installer itself*, then choose *Skip*.

Make sure to install at least one extra architecture in addition to Sparc to make sure that all kernel source files are installed.

For the default paths to match, the WindRiver Platform should be installed into C:\WindRiver6.9 on Windows or /opt/WindRiver6.9 on Linux. This is however not a requirement.

Note that the VxWorks version from WindRiver must be of the same version as the Cobham Gaisler VxWorks distribution, i.e. WindRiver VxWorks 6.7 can not be used with the Cobham Gaisler VxWorks 6.9 distribution.

3. Install Service Packs and Updates

The LEON VxWorks distribution is created against WindRiver VxWorks Platform version 6.9.4.12 and Workbench 3.3.6. To avoid compability errors these exact versions of VxWorks needs to be installed.

4. Installing the GCC Toolchain

The section describes how to install the GNU GCC LEON toolchain. The toolchain can be downloaded from the protected web download area at www.gaisler.com/vxworks6/vxworks-6.9.html.

NOTE: WindRiver distributes a GCC toolchain together with the VxWorks CD/DVD. It can *not* be used together with LEON. If the WindRiver GCC toolchain was installed from the WindRiver CD/DVD, one must make sure that the Gaisler GCC is found first (must be first in PATH).

The toolchain is required to be located at C:\opt (Windows) or at /opt (Linux).

4.1. Installing GCC on Windows

On Windows there are two ways of installing the GNU GCC toolchain, manually or by using the installer.

4.1.1. Installer

The Windows GCC toolchain installer is named `sparc-wrs-vxworks-4.9-x.y.z-mingw.exe`. The installation procedure is started by executing the file.
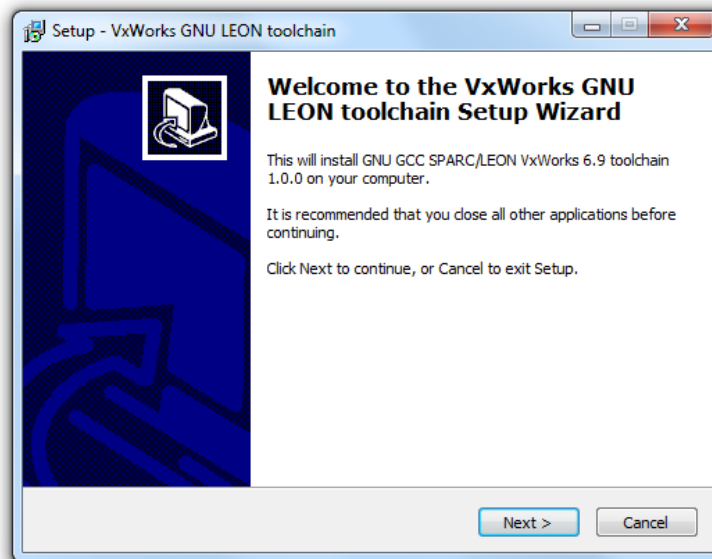

Figure 4.1. VxWorks GNU GCC LEON toolchain Windows installer

The installer will install the toolchain to `C:\opt\sparc-wrs-vxworks`, and add the `bin` directory where the executable files are located to the Windows PATH environment variable.

The PATH variable is changed but is not updated until next log-on, please log-out and log-in again before proceeding. Otherwise the kernel compilation step will fail.

4.1.2. Manual install

The Windows toolchain is compressed in the ZIP-file named `sparc-wrs-vxworks-4.9-x.y.z-mingw.zip`.

The toolchain must be extracted into `C:\opt` creating the directory `C:\opt\sparc-wrs-vxworks`. The `C:\opt\sparc-wrs-vxworks\bin` directory must be added to the PATH variable by "My Computer -> Advanced Tab -> Environment Variable".

4.2. Installing GCC on Linux

The Linux toolchain is compressed in the archive named `sparc-wrs-vxworks-4.9-x.y.z-linux.tar.bz2`. It needs to be extracted into `/opt` creating the directory `/opt/sparc-wrs-vxworks`. The `/opt/sparc-wrs-vxworks/bin` directory must be added to the PATH variable:

```
$ cd /opt
$ tar -xf sparc-wrs-vxworks-4.9-x.y.z-linux.tar.bz2
$ export PATH=/opt/sparc-wrs-vxworks/bin:$PATH
```

5. Installing the LEON VxWorks distribution

The section describes how to install the LEON VxWorks distribution. The LEON VxWorks distribution is provided as a password protected zip archive. It is available on the distribution CD or can be downloaded from the protected web download area at www.gaisler.com/vxworks6/vxworks-6.9.html. The distribution is named dist-vxworks-6.9-x.y.z.tar.gz.zip.

Please contact support@gaisler.com for the password.

5.1. Installing on Windows

Note: It is recommended to make a backup of the WindRiver Platform installation using an archive tool like Zip or WinRAR. Using the backup the previous state can be recovered in case an error occurs while installing the LEON SPARC port.

A Windows installer is available that installs all files of the distribution. The installer is located in `dist-x.y.z/install/setup-6.9-x.y.z.exe` and can be started by a double click. The installation script requires the WindRiver path, the path to where the WindRiver platform was installed.
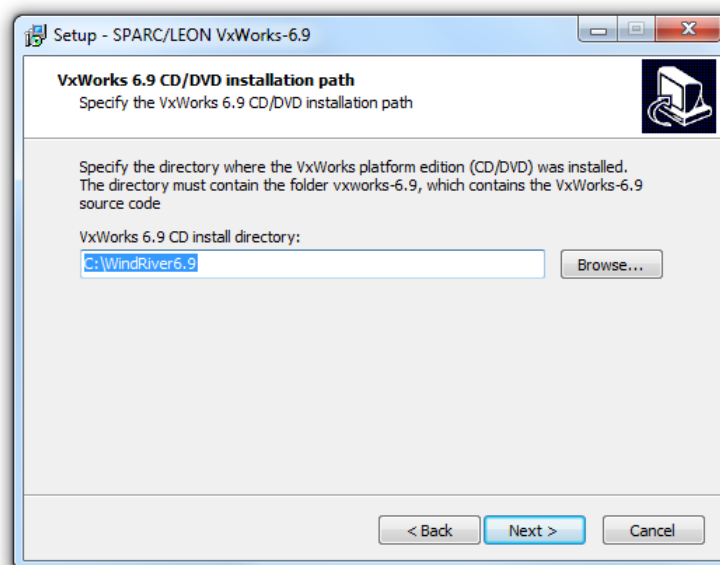

Figure 5.1. Windows installer, enter WindRiver path

The installer will backup existing files into a newly created folder `grbck` inside the WindRiver platform directory. It will also create a folder `grbck.new` where newly created files will be registered. You can browse the two directories after the installation has finished.

After the installation is finished the LEON sources will be located in the vxworks-6.9 directory in the WindRiver directory.

5.2. Installing on Linux

The installation is performed by an installation script located at `dist-x.y.z/install/install.sh`. The installation script will perform the following steps:

1. Uninstall previous LEON distribution
2. Install the LEON BSP and SPARC Port sources

The installation script require write permission in the WindRiver directory. The `WindRiver6.9/vxworks-6.9` directory will be backed up to `WindRiver6.9/vxworks-6.9.ori` and all files replaced outside the vxworks-6.9 directory will be backed up with the filename ending ".grbak" and all new files will be marked by an empty file with the ending ".grnew". This way the uninstallation script can restore the original files.

After the installation is finished the LEON sources will be located in the vxworks-6.9 directory in the WindRiver6.9 directory.

On Linux hosts the installation script must be started from a terminal console, the script must be started from the `dist-x.y.z/install` directory. The installation script has been tested with *bash* and the WindRiver shell. The script requires write permission in the WindRiver directory and in the distribution directory as mentioned above.

The script requires one argument, the WindRiver directory. It can be started as follows if the WindRiver installation is located in /opt/WindRiver6.9:

```
$ cd dist-x.y.z
$ bash ./install/install.sh /opt/WindRiver6.9
```

5.3. Manual installation

If the standard installation flow does not fit your needs, a manual installation may be an option. A manual installation involves extracting the SPARC/LEON VxWorks source files and workbench files.

5.3.1. Install VxWorks Sources

Make a backup copy of the `vxworks-6.9`, `components`, and `workbench-3.3` folder before installing the SPARC/LEON VxWorks source files. Then extract the file `release/vxworks-6.9-x.y.z.tar.gz` to the `WindRiver6.9` directory.

```
$ cd WindRiver6.9
$ cp -r vxworks-6.9 vxworks-6.9.ori
$ cp -r components components.ori
$ cp -r workbench-3.3 workbench-3.3.ori
$ tar xf /path/to/dist-x.y.z/release/vxworks-6.9-x.y.z.tar.gz
```

6. Building LEON VxWorks

The section describes how to build the LEON VxWorks kernel and libraries. The kernel needs to be compiled once for each targeted processor. For soft float support the kernel needs to be compiled twice for each processor, one time for hard float and one time for soft.

The distribution supports the following processors:

Table 6.1. CPU targets

Processor	Floating point	SMP	Comment
SPARCV7	Hard/Soft	Yes	For custom LEON processors without hardware mul/div support
SPARCV8	Hard/Soft	Yes	For custom LEON processors and the GR740.
SPARCUT700	Hard/Soft	No	For the UT699e and UT700 only. Includes B2B errata fixes.
SPARCGR712	Hard/Soft	Yes	For the GR712 only. Includes B2B errata fixes.
SPARCUT699	Hard/Soft	No	For the UT699 only. Includes UT699 specific errata fixes.

6.1. Windows

The kernel and libraries can be built using the GUI build utility found in `dist-x.y.z/install/compile-6.9.exe`. Note that the compilation can take a very long time to finish.
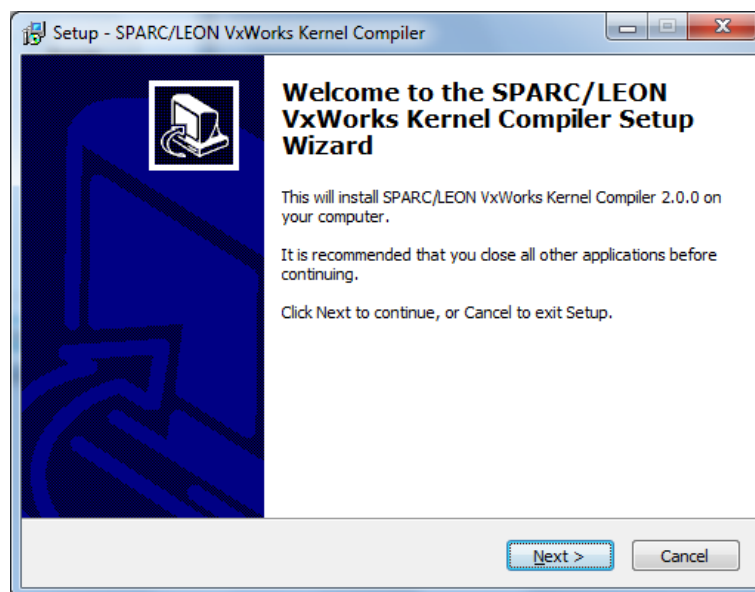
6.1.1. GUI Kernel builder

Figure 6.1. LEON VxWorks Kernel builder GUI

The installation script requires the WindRiver path. The default path is taken from the `settings` file created by the installation script.
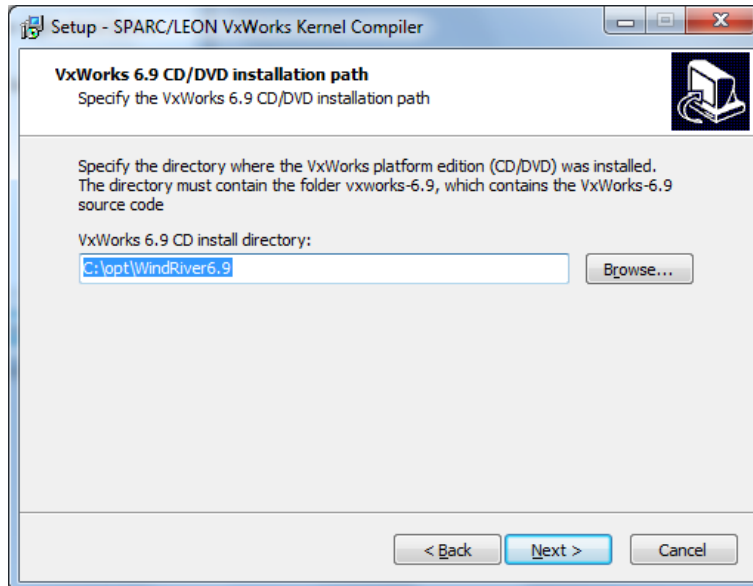
Figure 6.2. Kernel Builder, enter WindRiver path

In the second step, one select for which processors the kernel should be compiled and if soft float and/or SMP support should be enabled.
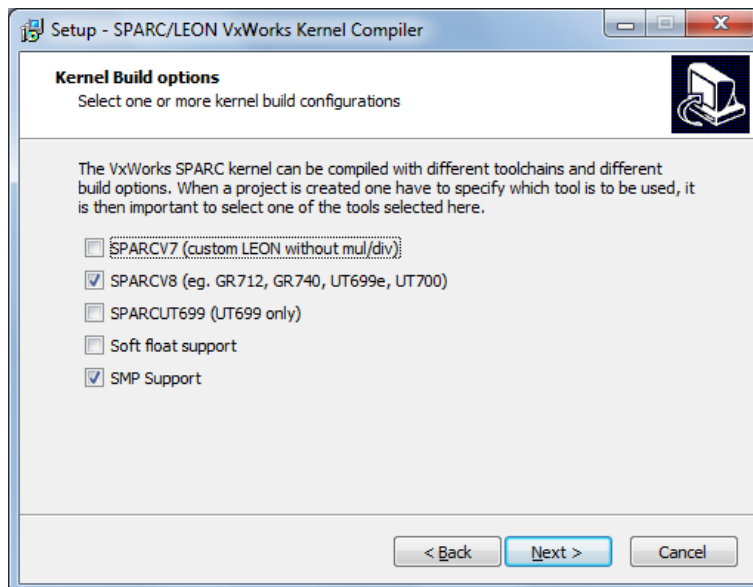

Figure 6.3. Kernel Builder, enter WindRiver path

When the build script is started a Windows console will appear and run the Makefile compiling the kernel. It must not be shutdown. Note that the build procedure may take quite some time.
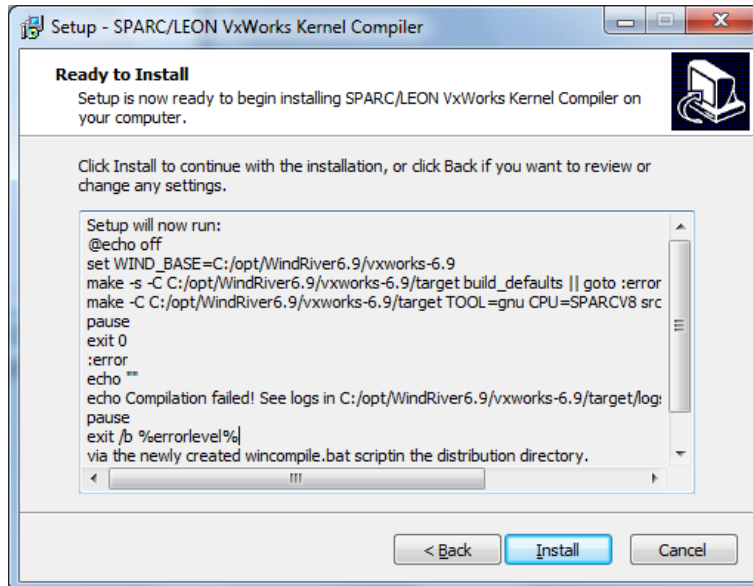
Figure 6.4. Kernel builder GUI invoked the build scripts

6.2. Linux

The kernel and libraries can be built invoking the `compile.sh` scripts from the WindRiver shell. The WindRiver shell is started by:

```
$ /opt/WindRiver6.9/wrenv.sh -p vxworks-6.9
```

From there the `compile.sh` can be executed. Below is an example building the kernel for the SPARCV8 processor with SMP and soft float support.

```
$ ./compile.sh SPARCV8 smp soft
```

6.3. Build status

After the build has been completed the build logs from the kernel and the user libraries are located in the `/opt/WindRiver6.9/vxworks-6.9/target/logs` folder.

Note that the PATH variable when installing the GNU toolchain using the Windows-installer is not updated until next log-on. Failing to find *ccsparc* will result in a build error.

7. Update build rules

This section describes how to update the RTP and Downloadable Kernel Module (DKM) build rules for the Workbench. The update is done from within the workbench GUI. The build rules must be updated for each workspace created. RTP and DKM projects can not be created for SPARC/LEON if this step is not completed.

The build rules can be updated by starting the workbench and selecting "Window -> Preferences -> Wind River -> Build -> Build Properties" as indicated by Figure 7.1 and Figure 7.2.
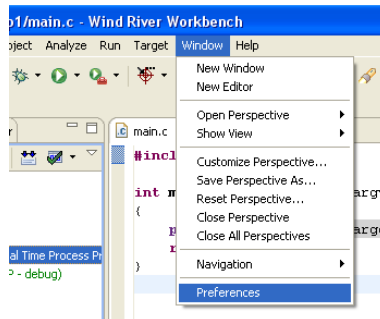
Figure 7.1. Open the Workbench 3.3 preferences

All the VxWorks build rules must be updated by selecting a build rule, one at a time in the combo box, and pressing "restore Defaults" every time.
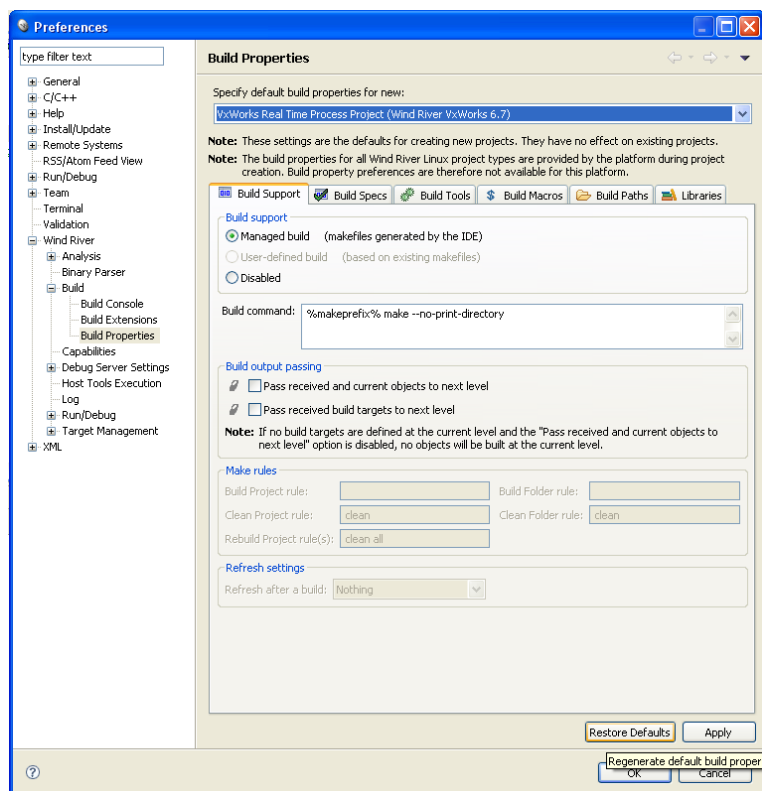
Figure 7.2. VxWorks project build rules for Workbench 3.3

8. Proceeding

The installation procedure is now complete and the kernel build done. There is a getting started guide how to create a project and run it on a LEON target, please see the docs directory in the distribution.

9. Support

For Support, contact the Cobham Gaisler support team at support@gaisler.com.

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