

WIND RIVER

Wind River[®]
Diab Compiler

RELEASE NOTES

5.9

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Contents

1	Introduction	1
1.1	Installation and Licensing	1
	Special Note: Installing on Linux Hosts	1
1.2	Latest Release Information	2
2	Changes in This Release	3
2.1	Enhancements	3
2.2	Fixed Problems	6
2.3	Unsupported Features	6
3	System Requirements	6
3.1	Host System Requirements	6
3.2	Installation Requirements and Issues	8
3.3	Target System Requirements	9
4	Usage Caveats	9
4.1	C and C++ Compilers	9
5	Known Problems	10
6	Documentation Errata	10
	Customer Services	11

Wind River Diab Compiler

RELEASE NOTES

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1. Introduction

The Wind River Diab Compiler 5.9.0 is a complete toolkit for embedded application development, including C and C++ compilers, assemblers, linkers, utilities, and standard libraries for a variety of target CPU architectures. In previous releases this product has been named the Wind River Compiler.

1.1 Installation and Licensing

For information on installing the Wind River Diab Compiler and configuring your product licenses, see the Wind River product installation and licensing guides. They are accessible from the following URL:

<http://www.windriver.com/licensing/documents>



NOTE: Make sure that you are using the licensing software (in particular, the **wrsd** daemon) that comes with the current version of the compiler. Using mismatched licensing software—for example, by installing from a machine running an older licensing daemon—may cause compilation to fail.

Special Note: Installing on Linux Hosts

32-bit Run-Time Libraries

In order to install the Wind River Diab Compiler on a Linux host, your host system must include 32-bit run-time libraries. Your installation will fail if you do not have the libraries installed before running the Wind River installer (**setup_linux**). Most Linux distributions provide the libraries in their base install feature set. For some hosts, you must install additional packages. See [3.2 Installation Requirements and Issues](#), p.8 for details.

Permissions Error with **setup_linux**

Note that some Linux distributions either do not automount media, or automount with a **noexec** option that prevents execution of files found on the media.

If `./setup_linux` fails with a permissions error, you may need to remount the DVD. To do so, use the following steps:

1. Log in as root by entering the command `su` in your terminal and entering the root password.

2. Enter the following command:

```
umount dvd_mount_point
```

Where `dvd_mount_point` is the location of the DVD mount. For example, a typical Red Hat or Fedora DVD mount point might be `/media/DVD-12345-67890`.

3. Then enter the following command:

```
mount /dev/cdrom dvd_mount_point
```

Where `dvd_mount_point` is the location of the DVD mount.

4. Exit root mode with the `exit` command.
5. Set your working directory to the location of the DVD mount:

```
cd dvd_mount_point
```

6. Retry the `./setup_linux` command.

1.2 Latest Release Information

The latest information on this release can be found in the Wind River Diab Compiler area of the Wind River Online Support Web site:

<http://www.windriver.com/support>

This site includes links to topics such as known problems, fixed problems, documentation, and patches.

In addition, most Wind River documentation is accessible from the following URL:

<http://documentation.windriver.com>



NOTE: Wind River strongly recommends that you visit the Online Support Web site before installing or using this product. The Online Support Web site may include important software patches or other critical information regarding this release.

For information on accessing the Wind River Online Support Web site, see [Customer Services](#), p.11.

In addition, a list of known issues and other important information is installed in `installDir/readme_wrcompiler.txt`. Be sure to review this file before using the compiler.

2. Changes in This Release

2.1 Enhancements

Supported Processors

For a current list of supported processors for your architecture, use the **dctrl** utility or see the *Wind River Diab Compiler User's Guide: Target Configuration*.

The following are additions for this release:

ARM architecture:

- Support for ARMv5TE instruction set and ARM968E-S core
- Support for ARM Neon instructions in assembler and intrinsics
- Improved optimization for ARM Thumb-2
- Support for ARM Unified Assembler Language
- Support for ARM BE-8 mode. See the description of the linker option **-Xarm-be8** in the *Wind River Diab Compiler User's Guide*.

PowerPC architecture:

- Support for LSI ACP34xx (PPC 476)
- Support for double-precision hardware floating point operations in VLE processors. Use floating point format **H**.

M•CORE architecture

- Support for CKCORE processors

General Optimization

Use **dctrl -s** to display recommended optimization flags based on requirements for speed, code size, and debug capability.

Support for C++ exception handling has been completely rewritten. The new implementation allows full optimizations, including inlining, to be applied to functions that have cleanups (for example local variables with destructors) or functions with **try/catch** blocks.

This will often lead to a much greater degree of inlining than was possible in earlier releases; in some cases customers may want to adjust the value of **-Xinline** to achieve the right balance between code size and performance. More inlining also allows more optimization which in some cases may lead to longer compile times.

The new implementation of exception handling also fixes or changes the behavior in some cases from that of earlier releases:

- Now if no catch handler is found then **terminate** is called immediately; no stack unwinding is performed, and no cleanups are run. In earlier releases stack unwinding would be done before calling **terminate**. Both behaviors are compatible with the C++ standard. However the new behavior is the one mandated by the C++ ABI.
- An exception is now considered caught when **terminate** or **unexpected** is called by the runtime. In particular if this was the only currently active

exception then `std::unhandled_exception()` will return false when called from a user installed `terminate` or `unexpected` handler.

- Exceptions thrown from a user installed `unexpected` handler are now dealt with correctly.

`unexpected` is called as a result of a violated exception specification. If the `unexpected` handler itself throws then the following happens:

- If the new exception is compatible with the original violated exception specification then it is allowed to propagate.
- Otherwise if the `std::bad_exception` is compatible with the original violated exception specification then the runtime will throw a new exception of type `std::bad_exception`.
- Otherwise the runtime will call `terminate`.

PowerPC Optimizations

The compiler supports optimization using a static single-assignment graph structure, option `-Xssa`.

The compiler option `-Xcode-factor` enables the linker to find common code sequences at link time and share them, reducing code size at the cost of inserting some additional branches.

Register Allocation Using `-Xcoloring`

The `-Xcoloring` option can now be used for ARM, PowerPC, MIPS, and TriCore.

Compiler Options

The following are new or changed command-line compiler options. For complete details see the *Wind River Diab Compiler User's Guide*.

- `-Xinline-asm-off`. Disable inlining for functions with ASMs.
- `-Xc++-template-name-lookup-old`. Disable standards-conformant two-phase lookup for names used in templates.
- `-Xdollar-in-ident` is no longer enabled by default.
- `-Xmake-dependency` on a Windows host now translates path separator characters from back slashes to forward slashes. This may be required if the output is processed by utilities such as `gmake`. To disable this translation, use the option `-Xmake-dependency-canonicalize-path-off` in conjunction with `-Xmake-dependency`.
- `-Xdebug-source-line-barriers-on` restricts scheduling optimizations to single source code statements. This reduces the benefits of pipelining, but may make the generated code easier to understand. The default is `-Xdebug-source-line-barriers-off`.
- `-Xapu-ibm-mac` (PowerPC). Enable multiply and accumulate instructions.
- `-Xcode-factor` (PowerPC). Share common code sequences.
- `-Xintc-eoir` (PowerPC). Write end of interrupt register. This was available with release 5.8, but was not documented.

- **-Xasm-const-pound=2** (ColdFire and 68K/CPU32). Prefix each generated numeric constant in the assembly output with a “#” character, except for macro parameters passed as constants.

Compiler Syntax

GCC-style statement expressions are supported. This applies to C++ programs or C programs compiled with **-Xc-new**. For example:

```
((int j; j = f(); j;))
```

Attributes

The new **__attribute__((always_inline))** forces a function to be inlined.

__attribute__ is no longer supported with **-Xstrict-ansi**.

C++

The C++ ABI has changed from an older "cfront" type ABI to the more modern industry standard ABI defined at the following location:

<http://www.codesourcery.com/public/cxx-abi/>

This is often known as the "IA64" ABI, although it is applicable to all targets.

The new ABI is not compatible with the ABI used in previous releases of the Wind River Diab Compiler. All C++ code must be recompiled.



NOTE: Although GCC also conforms to the C++ ABI, the Wind River Diab Compiler and GCC C++ are not completely interoperable in this release. GCC C++ code should not be mixed with Wind River Diab Compiler C++ code.

Long long (LL) constants now give a warning instead of an error in **-Xstrict-ansi** mode.

By default, the compiler now performs standards-conformant two-phase lookup for names used in templates. **-Xc++-template-name-lookup-old** disables this, which may be useful for some older C++ source.

The macro **__cplusplus** now has the value 1 when compiling C++ code. In previous releases, the value was 199711.

Assembler

The **.set** and **.equ** directives can set the size and type of a symbol, if the expression in the directive contains a single symbol.

Linker

The new **KEEP** directive in linker command files identifies sections that should not be removed by the **-Xremove-unused-sections** option. It is typically used to prevent removal of interrupt/exception vector tables and boot code.

The linker command language now supports generating a cyclic redundancy check (CRC). The resulting value is stored in a section of the output file. See the description of the CRC specification in the *Wind River Diab Compiler User's Guide: Linker Command Language*.

ddump Utility

The ddump utility now supports Intel hex record format as an output format. Use option **ddump -X**.

ddump -D will now visually indicate the nesting of DWARF debug information entries. Tools that rely on the detailed output of **ddump -D** may need to be modified to account for this change.

VxWorks

VxWorks kernel-mode programming now uses the options **-Xc-new -Xdialect-c89**. This may result in more warning messages.

2.2 Fixed Problems

For a list of problems fixed in the Wind River Diab Compiler, visit the Online Support Web site (see [1.2 Latest Release Information](#), p.2).

2.3 Unsupported Features

-Xcomdat-off is no longer supported. The new C++ ABI requires COMDAT support to correctly implement the semantics of the language.

3. System Requirements

This section lists the minimum requirements for the Wind River Diab Compiler where the host and target are separate computers.

3.1 Host System Requirements

The host is the computer on which you do your development work. This section lists the minimum requirements for running the Wind River Diab Compiler in the standard configuration.

These system requirements are for the Wind River Diab Compiler only; they do not take into consideration any other software you are running on the host computer.

Windows Host

- One of the following:
 - Microsoft Windows XP Professional (Service Pack 2 or 3), x86-32
 - Microsoft Windows Vista Business, x86-32
 - Microsoft Windows Vista Enterprise, x86-32
 - Microsoft Windows 7, x86-32/64
- Administrator rights.

- Monitor capable of displaying 1024 x 768 @ 16 bpp or better.
- Intel Pentium 4 class computer with a 2 GHz processor, or a computer with higher performance.
- 1 GB of RAM (2 GB of RAM is recommended for larger projects).
- 500 MB disk space for installing all supported architectures. Installing a subset of supported architectures will require less disk space. When calculating the amount of disk space needed, be sure to reserve space for your own applications and development.
- A local DVD-ROM drive or access to a network for installation.
- A current version of a standards-compliant Web browser.
- TCP/IP must be installed on the host system, even if it is being used as a standalone PC with a serial connection to the target.
- A network interface card for debugging over a network (recommended).
- An active Internet connection is recommended during initial installation to access patches, documentation, and other important information from the Wind River Online Support Web site. (See [1.2 Latest Release Information](#), p.2.)

Solaris Host

- Sun Solaris 10 (with GTK), Update 11/06, Sparc 32-bit
- Monitor capable of displaying 1024 x 768 @ 16 bpp or better.
- A Blade 150 workstation with a 500 MHz processor, or a workstation with higher performance.
- 1 GB of RAM.
- 500 MB disk space for installing all supported architectures. Installing a subset of supported architectures will require less disk space. When calculating the amount of disk space needed, be sure to reserve space for your own applications and development.
- A local DVD-ROM drive or access to a network for installation.
- A current version of a standards-compliant Web browser.
- CDE Window Manager (recommended).
- An active Internet connection is recommended during initial installation to access patches, documentation, and other important information from the Wind River Online Support Web site. (See [1.2 Latest Release Information](#), p.2.)

Linux Host



NOTE: There are usage caveats associated with installing on Linux Hosts. Refer to [3.2 Installation Requirements and Issues](#), p.8 before installing the Wind River Diab Compiler.

- One of the following:
 - Red Hat Enterprise Linux Workstation 4, Updates 6&8, x86-32
 - Red Hat Enterprise Linux Desktop with Workstation option 5, Updates 2&3, x86-32 and x86-64

- SUSE Linux/openSUSE 11.0 and 11.1, x86-32 and x86-64
- Novell SUSE Linux Enterprise Desktop 10, Service Pack 2, x86-32 and x86-64
- Novell SUSE Linux Enterprise Desktop 11, x86-64
- Fedora 9, x86-64
- Fedora 11, x86-32 and x86-64
- Ubuntu Desktop 8.04 Update 4, x86-64
- Ubuntu Desktop 9.04, Update 4, x86-32 and x86-64
- Monitor capable of displaying 1024 x 768 @ 16 bpp or better.
- GNOME Window Manager.
- Intel Pentium 4 class computer with a 1 GHz processor, or a computer with higher performance.
- 1 GB of RAM.
- 500 MB disk space for installing all supported architectures. Installing a subset of supported architectures will require less disk space. When calculating the amount of disk space needed, be sure to reserve space for your own applications and development.
- A local DVD-ROM drive or access to a network for installation.
- TCP/IP must be installed on the host system.
- A network interface card for debugging over a network (recommended).
- A current version of a standards-compliant Web browser.
- An active Internet connection is recommended during initial installation to access patches, documentation, and other important information from the Wind River Online Support Web site. (See [1.2 Latest Release Information](#), p.2.)
- 32-bit run-time libraries.



NOTE: In order to install the Wind River Diab Compiler on a Linux host, your host system must include 32-bit run-time libraries. The Wind River product installation process fails if you do not have the libraries installed before running the Wind River installer (the **setup_linux** program). Most Linux distributions provide the libraries in their base feature set; for others, you must install the 32-bit libraries.

3.2 Installation Requirements and Issues

In order to install and run Wind River products on certain Linux hosts, you must resolve some package dependencies. Before installing the Wind River Diab Compiler, perform the steps described in this section for your particular host type.

Fedora 9 64-Bit Host

Install the 32-bit libraries that are required in order to run the installer:

```
# sudo yum install glibc.i386
# sudo yum install libgtk-java.i586
```

Fedora 11 64-bit Host

Install the 32-bit libraries that are required in order to run the installer:

```
# sudo yum install glibc.i686
# sudo yum install libgtk-java.i586
```

Ubuntu 8.04 64-Bit Host

Install the 32-bit libraries that are required in order to run the installer:

```
$ sudo apt-get install ia32-libs
$ sudo apt-get install lib32nss-mdns
```

Ubuntu 9.04 64-Bit Host

Install the 32-bit libraries that are required in order to run the installer:

```
$ sudo apt-get install ia32-libs
$ sudo apt-get install lib32nss-mdns
```

3.3 Target System Requirements

The target is the processor for which you are developing. The Wind River Diab Compiler is separately licensed for a variety of target architecture families. For a list of specific target CPUs supported by the tools, use the `dctrl` utility, or see the *Wind River Compiler User's Guide* for each architecture family.

4. Usage Caveats**4.1 C and C++ Compilers****Far Relative Addressing and VLE**

The following applies to PowerPC code using the VLE (Variable Length Encoding) instruction set.

Programs compiled to use far (32-bit) relative addressing, either for code or data (for example, programs compiled with `-Xcode-far-relative` or `-Xdata-far-relative`), must explicitly reference the symbols `_SDA_BASE` and `_SDA2_BASE`. If these symbols are not referenced anywhere in the program, the linker will generate incorrect code. Specifically, it will try to use "absolute SDA," in which `r0` is used as a base register to indicate a base location of zero. See the user's guide section on ELF Relocation Information for more on absolute SDA.

This is not a problem for non-VLE code, where `r0` is interpreted as zero; in contrast, in VLE mode, `r0` is interpreted as the *contents* of `r0`.

Limited Support for RTA Profiling

Only one compiler option for generating Run-Time Analysis profiling information is supported in VxWorks. That option is `-Xrtc`. Other compiler profiling options, such as `-Xprof`, are not supported in VxWorks.

For `-Xrtc` itself, all mask options are supported except `mask = 0x4`.

5. Known Problems

For a complete list of known problems in the Wind River Diab Compiler, visit the Online Support Web site (see [1.2 Latest Release Information](#), p.2).

6. Documentation Errata

This section lists some documentation errata for documents associated with the Wind River Diab Compiler. For a detailed list of documentation errata for the Wind River Diab Compiler, visit the Online Support Web site (see [1.2 Latest Release Information](#), p.2).

Wind River Diab Compiler for TriCore User's Guide

The description of the linker option **-Xtricore-no-relax-ldata** is incorrect. This is not the default.

The description of the linker option **-Xtricore-relax-ldata** is incomplete. The correct description is as follows:

When **-Xtricore-relax-ldata** is set, the linker can resolve references properly between modules compiled with and without **-Xconst-in-data**. This is the default.

For example, assume module **m1.o** has been compiled with **-Xconst-in-data**. If **m1.o** contains a reference to a small **const** symbol, the reference will be to a symbol in the **.sdata** section. However, if the symbol definition is in a module that has not been compiled with **-Xconst-in-data**, it will be in the **.ldata** section. **-Xtricore-relax-ldata** allows the linker to resolve the symbol properly.

CUSTOMER SERVICES

Wind River is committed to meeting the needs of its customers. As part of that commitment, Wind River provides a variety of services, including training courses and contact with customer support engineers, along with a Web site containing the latest advisories, FAQ lists, known problem lists, and other information resources.

Customer Support

For customers holding a maintenance contract, Wind River offers direct contact with support engineers experienced in Wind River products. The Customer Support program is described in the *Standard Support User's Guide* available at:

www.windriver.com/support

The guide describes the services available, including assistance with installation problems, product software, documentation, and service errors.

You can reach Customer Support by e-mail or telephone:

Location	Phone	E-mail
North and South America, Asia/Pacific (outside Japan)	800-872-4977 (toll-free)	support@windriver.com
Europe, Africa, Middle East	+(00) 800-4977-4977 (toll-free)	support-EC@windriver.com
Japan	81-3-5778-6001	support-jp@windriver.com

For detailed contact information, including contact information specific to your products, see the Support Web site shown above.

Wind River Online Support

Wind River Customer Services also provides Wind River Online Support, an online service available under the Support Web site. This is a basic service to all Wind River customers and includes advisories, online manuals, and a list of training courses and schedules. For maintenance contract holders, Online Support also provides access to additional services, including known problems lists, patches, answers to frequently asked questions, and demo code.