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Introduction

This document describes the contents, installation procedure, and current status of release 3.2.0 of the **RTEMS** executive. An installation procedure is provided which describes the steps necessary to load and configure the **RTEMS** environment, including the GNU Development Environment and the Cygnus NEWLIB ANSI C Library, on a host computer. The status of the **RTEMS** environment is given, which includes supported processors and target boards, versions of the GNU utilities which were used by the **RTEMS** developers for this release, support libraries status, features which are not implemented, and any known existing problems.

The release package contains the following general components:

- ***RTEMS C** Executive*
- ***RTEMS C** Documentation Set*
- ***C** Support Libraries*
- ***RTEMS** Ada Executive*
- ***RTEMS** Ada Documentation Set*
- *Ada Support Libraries*

1.1 Supporting Tools

This section discusses the freely available tools and libraries which are part of the **RTEMS** Development Environment. None of the tools discussed in this section were developed by the **RTEMS** project, although some do include submissions

from the project. All of the tools and libraries required to build **RTEMS** are available on the **RTEMS** ftp server. Additionally, some libraries which may be used by **RTEMS** applications are also on the **RTEMS** ftp server.

1.1.1 GNU Development Tools

Numerous **GNU** tools are used in the **RTEMS** Development Environment including C and Ada compilers, the GNU make program, GNU m4, the GNU assembler and binary utilities (linker, librarian, etc.), GNU tar, GNU zip, and the GNU debugger. These tools are distributed in source form and are all licensed under the GNU Public License which allows for unrestricted distribution under the condition that source code always be available. The Free Software Foundation is officially the originator of most of the GNU tools although many individuals have contributed to the GNU projects. In keeping with the spirit of the GPL, most of the time the GNU tools are distributed as source code without executables. It is the responsibility of the local site to install each tool. Numerous organizations and individuals supply executables for the GNU tools. All are required by the terms of the GPL to also make the source code available to the end user.

The primary ftp site for the FSF GNU tools is prep.ai.mit.edu (18.71.0.38). These are mirrored on numerous ftp sites including the **RTEMS** ftp site lancelot.gcs.redstone.army.mil (136.205.144.31).

Intel maintains a toolset for their i960 processor family based on the GNU tools referred to as GNU/960. The source code for this toolset is available from ftp.intel.com (143.185.65.2). [NOTE: The GNU/960 toolset generally includes an older version of GCC than that available from the FSF. When the FSF version of GNU C is significantly newer than that in the GNU/960 release, the **RTEMS** developers replace the GCC in the GNU/960 toolset with the FSF release.]

1.1.2 ANSI C Libraries

This section discusses the following freely distributable ANSI C Libraries:

- *GNU C Library, and*
- *Cygnus NEWLIB*

No C Library is included in the standard **RTEMS** distribution. It is the responsibility of the user to obtain and install a C Library separately.

1.1.2.1 GNU C Library

The GNU C Library is a robust and well-documented C Library which is distributed under the terms of the Library GNU Public License (LGPL). This

library was not designed for use in real-time, embedded systems and the resource requirements of some of the routines in this library are an obvious indication of this. Additionally, this library does not have support for reentrancy in the sense that each task in a multitasking system could safely invoke every routine in the library. Finally, the distribution terms of the LGPL are considered undesirable by many embedded systems developers. However, the GNU C Library is very complete and is compliant with as many standards as possible. Because of this, it may be the only choice for many developers.

There is currently no **RTEMS** support for the GNU C Library.

The primary ftp site for this library is prep.ai.mit.edu (18.71.0.38). It is mirrored on numerous ftp sites including the **RTEMS** ftp site lancelot.gcs.redstone.army.mil (136.205.144.31).

1.1.2.2 Cygnus NEWLIB C Library

The Cygnus NEWLIB C Library was specifically designed for real-time embedded systems. It is a small, reasonably documented Library with support for reentrancy. This library is a collection of freely distributable and public domain source code and is freely distributable with as few restrictions as possible placed on the end user.

The **RTEMS** specific support code for NEWLIB has been submitted to the NEWLIB maintainers and should be included in a future release. Until that time, it is recommended that the beta version of NEWLIB with **RTEMS** support added be used by the application developer. The beta version of NEWLIB with **RTEMS** specific support is **ONLY** available on the **RTEMS** ftp site.

The primary ftp site for this library is ftp.cygnus.com (140.174.1.3). It is mirrored on the **RTEMS** ftp site lancelot.gcs.redstone.army.mil (136.205.144.31).

1.1.3 Modules

Modules is a tool which aids in user environment configuration on UNIX™. Typically, users initialize their environment when they login to the system and do not change it while logged in. In this model, the environment information for every application which *might* be used during a login session is set. Modules is a database and set of scripts that simplify shell initialization and lets users easily modify their environment during a single session. Modules scripts are independent of the shell used by a user. Thus a system administrator creates a Modules file which describes the environment requirements for a single software package which is shared by all users. In addition, Modules packages may be unloaded or

loaded dynamically thus making it easy to alter the user environment during a single login session.

Modules is used in the **RTEMS** Development Environment to tailor the user environment for a particular target. The build process for **RTEMS** assumes that a handful of environment variables are set and Module files are provided to do this for the standard target boards.

The primary ftp site for Modules is ftp.eng.auburn.edu (131.204.110.13). It is mirrored on the **RTEMS** ftp site lancelot.gcs.redstone.army.mil (136.205.144.31).

1.2 Documentation

The **RTEMS** Documentation Set is provided as reference information for all levels of **RTEMS** users. The set includes the following documents:

- *Ada Applications User's Guide*
- *Tartan MC68020 Ada Applications Supplement*
- *C Applications User's Guide*
- *Intel i386 C Applications Supplement*
- *Intel i960CA C Applications Supplement*
- *Motorola MC68020 C Applications Supplement*
- *Hewlett Packard PA-RISC C Applications Supplement*
- *Development Environment Guide*
- *Release Notes*

Additionally, there are some documents available on the **RTEMS** ftp site which are not part of **RTEMS** and, usually, were not developed by the **RTEMS** project. Currently, the following additional documents are available:

- *The Cygnus C Support Library*
- *The Cygnus C Math Library*