EE458 - Embedded Systems
Lecture 2 – RTEMS Installation

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  - RTEMS Configuration

- **Reference**
  - Getting Started with RTEMS
Installing RTEMS

- RTEMS installation is described in the “Getting Started with RTEMS” (GS) manual. This manual can be found on the RTEMS web site (under the “Documentation Sets” link) and also on the course web site.
Installing RTEMS

- After installing RTEMS locally you can also find the documentation under the `/c/opt/rtems/rtems-4.10.2/tools` directory in the `rtemsdocs-4.10.2/share/rtems/html` subdirectory. (Open `index.html`)

- Note: This is the Msys path. The Windows path begins with `c:` instead of `/c`.
Installing RTEMS

- The GS manual describes building RTEMS from source. You will need to go through this process on your personal computer.
- A pre-built version of RTEMS (along with the RTEMS source code and documentation) has already been installed on the computers in the classroom.
Installing RTEMS

- The installation instructions on the web site assume you are working on a Windows host and targeting an Intel-compatible PC.
- We will now discuss installation from source.
Installing RTEMS

- RTEMS development can be done on almost any UNIX system. Development is also supported on Windows under MSYS.

- Note: For development on Windows, the first step is to install MSYS (a UNIX-like build environment for Windows). Refer to the Installing Software link on the course web site for information.
Installing RTEMS

• RTEMS is built using the GNU compiler collection (GCC) toolset. The toolset can be hosted on UNIX or Windows/MSYS. The toolset supports native and cross compilation to a large number of different target microprocessors.

• Building the toolset from source is described in Chapter 4 of the GS manual. (This process can take several hours.)
Installing RTEMS

- As an alternative to building the toolset from source, the RTEMS download site contains prebuilt toolsets for Solaris, Linux, and Windows/MSYS for several different target processors.
Installing RTEMS

- Chapter 3 of the GS manual describes installing the prebuilt toolsets. The tools are installed under `/c/opt/rtems/rtems-4.10/bin`.

- The tool names are prefixed with the string "target-rtems4.10-". For example `gcc` for the i386 target is named `i386-rtems4.10-gcc`. This naming convention prevents confusion with native tools. It also allows toolsets for different targets to be installed.
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- The toolset directory must be added to your PATH environment variable in order for the tools to be found when building RTEMS and RTEMS applications. The easiest way to do this is to add the following line to the `.profile` file in your HOME directory:

```
PATH=/c/opt/rtems/rtems-4.10/bin:$PATH
```
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- After the toolset is in place, the next step is to build RTEMS for the desired target. This process is described in Chapter 5 of the GS manual.

- First install the RTEMS source code. The source code should be extracted to the /c/rtems/opt/rtems-4.10.2/tools directory.
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- Then create a build directory. The GS manual suggests creating a `build-rtems` directory under `/c/opt/rtems/rtems-4.10.2/tools`. (The build directory can be anywhere and can be deleted after installation is complete.)

- The `configure` script in the `/c/opt/rtems/rtems-4.10.2/tools/rtems-4.10.2` directory should then be run to create the appropriate Makefiles.
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- The `configure` script takes a number of arguments that indicate the target processor, the target board support package (BSP), and the install directory.

- The list of supported target processors and board support packages is listed in the `README.configure` file in the directory `/c/opt/rtems/rtems-4.10.2/tools/rtems-4.10.2`
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- The configure script used to build RTEMS on the web site is:

  rtems-4.10.2/configure --target=i386-rtems4.10 \
  --disable-posix --disable-networking --disable-cxx \
  --enable-rtemsbsp=pc386 \
  --prefix=/c/opt/rtems/rtems-4.10

- After running `configure`, run `make` as:

  make all install
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• Before building applications, you also need to define the RTEMS_MAKEFILE_PATH variable as described in Chapter 6 of the GS manual. As mentioned earlier, your PATH should also contain the directory with the cross-compilation tools. Your .profile file should contain at least the following:

PATH=/c/opt/rtems/rtems-4.10/bin:$PATH
export RTEMS_MAKEFILE_PATH=/c/opt/rtems/rtems-4.10/i386-rtems4.10/pc386
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• Notes:
  - After installation, test the installation by building one of the applications from the RTEMS examples archive. (You'll learn how to do this in today's in-class exercise.)