

Exercise 1 -- Flash an LED

Host Computer Setup

This exercise requires you to first install the Ada toolchain for your computer and check out some **git** source code repositories, per the instructions in:

<http://git.munts.com/ada-remoteio-tutorial/Setup.pdf>

After completing the standard setup procedure, the Ada compiler toolchain should be accessible at **C:\PROGRA~1\GNAT** for Windows or **/usr/local/gnat/** for Linux and MacOS X.

Last Minute Setup

If you have **not** already set up your computer per **Setup.pdf**, you can now perform a quick installation procedure, using an archive file provided on a USB memory stick that will be passed around at this time.

Just unpack the archive file on the USB memory stick appropriate for your computer (**windows.zip**, **linux.tgz**, **macos.tgz**) into your home directory.

Note: For Debian and Ubuntu Linux, you must also install these packages:

```
sudo apt install build-essential libhidapi-dev
```

Note: For MacOS, you must also build and install the HID API library:

```
cd $HOME/hidapi  
./bootstrap  
./configure  
make  
sudo make install
```

After completing the last minute setup procedure, the Ada compiler toolchain should be accessible at **%HOMEDRIVE%%HOMEPATH%\gnat** for Windows or **\$HOME/gnat** for Linux and MacOS X.

Hardware Setup

Plug the development board assembly (Raspberry Pi Zero or BeagleBone Green) from the hardware kit into a USB port on your computer. Your computer should automatically configure a USB raw HID device, possibly requiring you to deal with one or more pop-ups.

Exercise Instructions

Following are instructions for Windows, and Linux/MacOS X for this exercise. For each operating system there are two sets of instructions: One using the command line and another using the **gps** IDE for GNAT. It is advisable to use **gps**, if possible, because it allows you to easily examine all of the component source files.

Microsoft Windows

*Note: The **set GNAT** commands below are unnecessary if the Ada toolchain **bin** directory is already in the program path.*

Using the DOS Command Line

1. Open a DOS command window by running **cmd.exe** and run the following commands:

```
set GNAT=C:\PROGRA~1\gnat    or    set GNAT=%HOMEDRIVE%%HOMEPATH%\gnat
cd ada-remoteio-tutorial
compile.cmd test_led
test_led
```

The LED on the LPC1114 I/O processor board should begin blinking.

2. When you are done observing the LED, stop the program with **CONTROL - C** and then run the following command to remove all of the working files and return **ada-remoteio-tutorial/** to the pristine state:

```
clean.cmd
```

Using the GPS IDE (Optional)

1. Open a DOS command window by running **cmd.exe** and run the following commands:

```
set GNAT=C:\PROGRA~1\gnat    or    set GNAT=%HOMEDRIVE%%HOMEPATH%\gnat
cd ada-remoteio-tutorial
copydll.cmd
%GNAT%\bin\gps -P test_led.gpr
```

2. Press **F4** to build **test_led**.
3. Press **SHIFT - F2** to run **test_led**.

The LED on the LPC1114 I/O processor board should begin blinking.

Linux and MacOS X

*Note: The **export** commands below are unnecessary if the **bin** directory for the Ada toolchain you will be using is already in the program path (e.g. you are using the Debian native Ada toolchain).*

Using the Command Line Shell

1. Open a terminal window to get a command shell and run the following commands:

```
export GNAT=/usr/local/gnat    or    export GNAT=$HOME/gnat
cd ada-remoteio-tutorial
make test_led
./test_led
```

The LED on the LPC1114 I/O processor board should begin blinking.

2. When you are done observing the LED, stop the program with **CONTROL - C** and then run the following command to remove all of the working files and return **ada-remoteio-tutorial/** to the pristine state:

```
make clean
```

Using the GPS IDE (Optional)

1. Open a terminal window to get a command shell and run the following commands:

```
export GNAT=/usr/local/gnat    or    export GNAT=$HOME/gnat
cd ada-remoteio-tutorial
$GNAT/bin/gps -P test_led.gpr
```

2. Press **F4** to build **test_led**.
3. Press **SHIFT - F2** to run **test_led**.

The LED on the LPC1114 I/O processor board should begin blinking.