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PropGCC Quickstart Guide

The GNU Compiler Collection, or GCC for short, is a professional suite of compiler tools. Parallax Semiconductor is in the process of developing extensions for GCC to be able to compile C and C++ programs for the Propeller P8X32A microcontroller. This collection of tools has been named PropGCC.

You do not need to be a professional to start using PropGCC. This step-by-step guide will get you started by walking you through the Microsoft Windows installation process and show you how to compile and download a simple C program to the Propeller for execution. These steps expect that you have a basic working knowledge of the Microsoft Windows operating system, a basic understanding of C syntax and commands, Parallax Semiconductor's Propeller Tool, and an active internet connection.

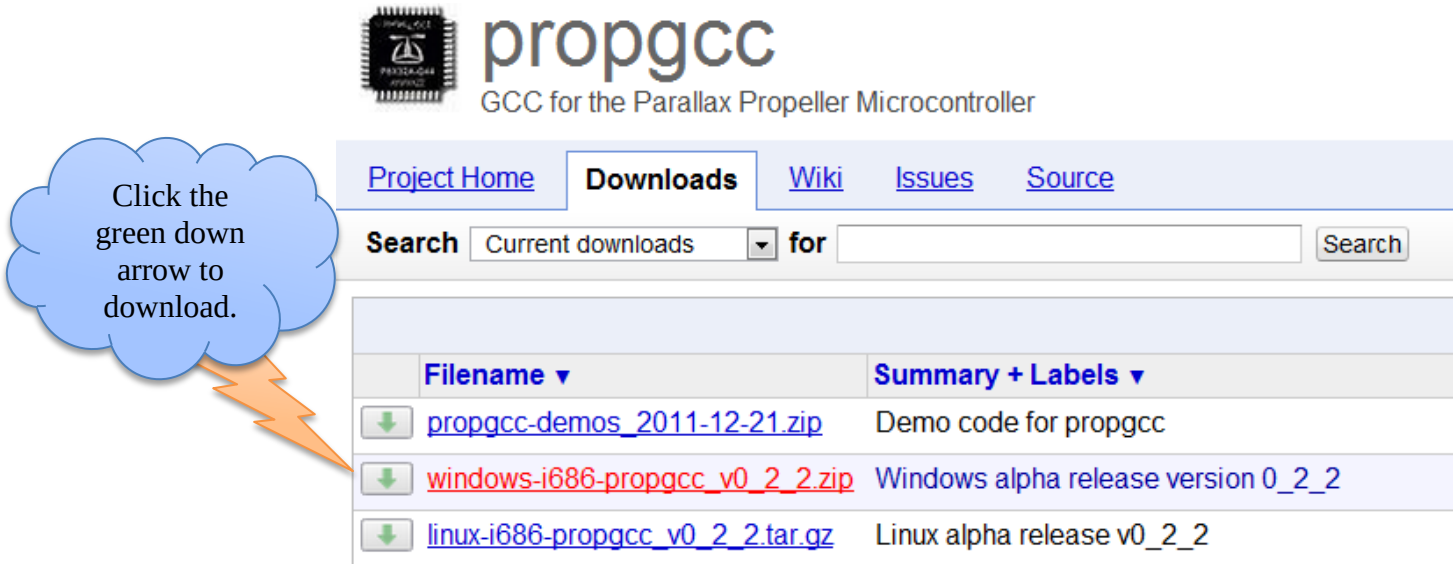
ProPGCC Installation for Microsoft Windows

This section will walk you through the process of installing the PropGCC tool set on your computer. Additionally, you can download a small suite of demos that demonstrate C or C++ programs that can be compiled for the Propeller. While these programs are optional, full instructions on how to download and run the demos are provided.

Downloading the Propeller GCC .zip File

You will need to download a .zip file containing the Propeller GCC files.

1. Enter the following URL into your web browser's address bar: http://code.google.com/p/propgcc/downloads/list
2. Locate the Windows release package and click the green arrow to begin downloading the .zip file. Though the version number of the package will change, the download file will always start with "windows-i686-propgcc…"



3. If prompted by your browser, save the download zip file to an easy to access location – you will need to open the .zip archive to extract its contents.

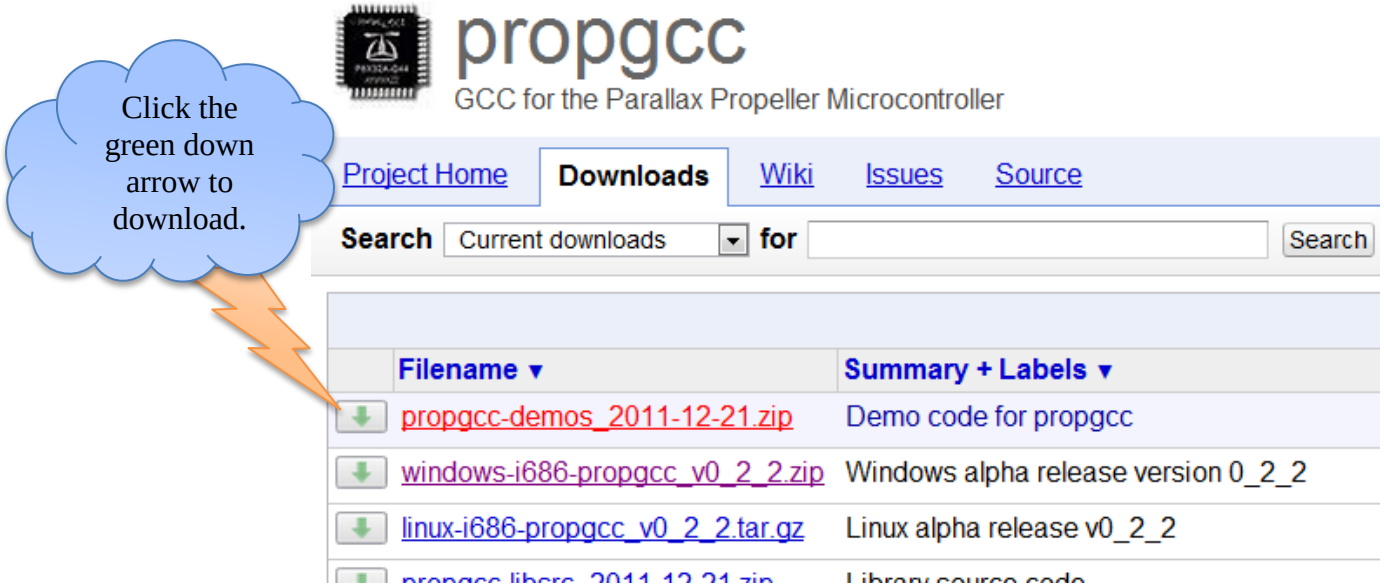
Once the download is complete, extract the contents of the archive to your computer's C:\ drive.

4. Open the downloaded .zip archive.
5. There will be one folder containing all the files necessary for the compiler, the "propgcc" folder. Right-click on the folder and click on "Copy
6. Navigate to the C:\ drive's root directory.
7. Paste the copied folder into the C:\ drive's root directory. You can do this if you right-click in an empty area (a space without icons) and click on "Paste".
8. The "propgcc" folder should now be extracted to the C:\ drive.

Downloading the PropGCC Demo .zip File

If you like, you can download a set of demo files to help you get started with PropGCC. The following eight steps are optional, but the compilation examples in this document expect that you have completed these steps.

1. Enter the following URL into your web browser's address bar: http://code.google.com/p/propgcc/downloads/list
2. Locate the demo code package and click the green arrow to begin downloading the .zip file. Though the version number or date of the package may change, the download file will always start with "propgcc-demos…"



3. If prompted by your browser, save the download zip file to an easy to access location – you will need to open the .zip archive to extract its contents.

Once the download is complete, extract the contents of the archive to the propgcc directory located at "C:\propgcc\".

4. Open the downloaded .zip archive.
5. There will be one folder containing all the demo programs, the "demos" folder. Right-click on the folder and click on "Copy".
6. Navigate to the propgcc directory located at C:\propgcc\.
7. Paste the copied folder into the propgcc directory. You can do this if you right-click in an empty area (a space without icons) and click on "Paste".
8. The "demos" folder should now be extracted to C:\propgcc\.

Using PropGCC

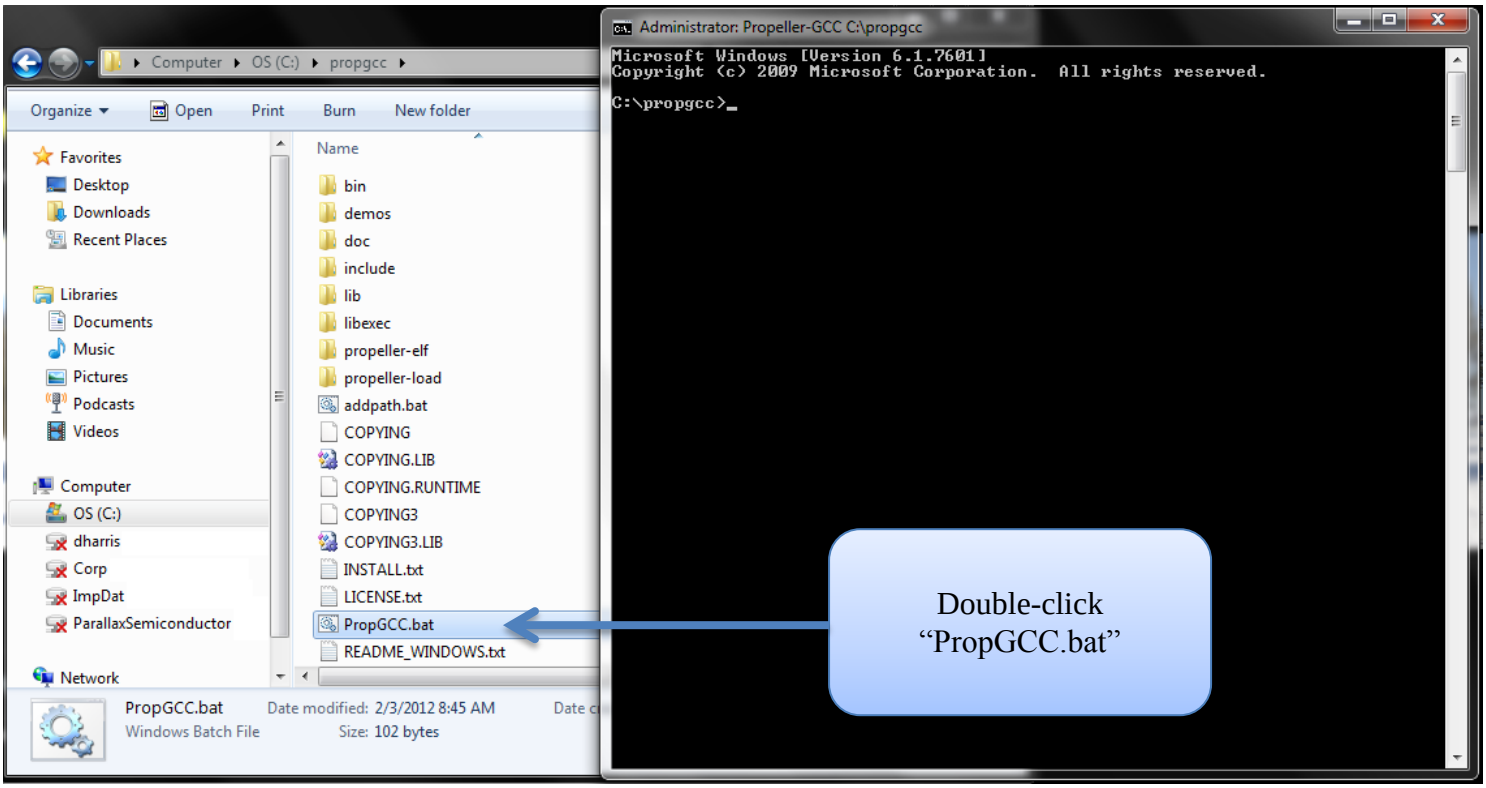
From a high level perspective, the process of getting your C or C++ program downloaded to the Propeller is a two-step process: compiling your program and downloading the binary generated from the compilation process to the Propeller. For now, these steps have to be performed on the Windows command line. When Parallax moves the PropGCC project into the beta phase (expected March 2012), a graphical interface for this process will be available.

Have no fear; Parallax has taken steps to make the compilation and download processes as straightforward as possible!

Starting the PropGCC Development Environment

To compile a program and load it to the Propeller, PropGCC makes calls to many different files and programs in the propgcc file tree. A batch file has been written to automatically set up the command line environment's path information to know where to look for required files. To set this up, follow these steps:

1. Using Windows Explorer, navigate into the "propgcc" directory at C:\propgcc\.
2. Execute the "PropGCC.bat" batch file (double-click the file to execute it).
3. A command window will appear. Within this command window, the correct path settings have been set. Compile and load your programs in this command window.



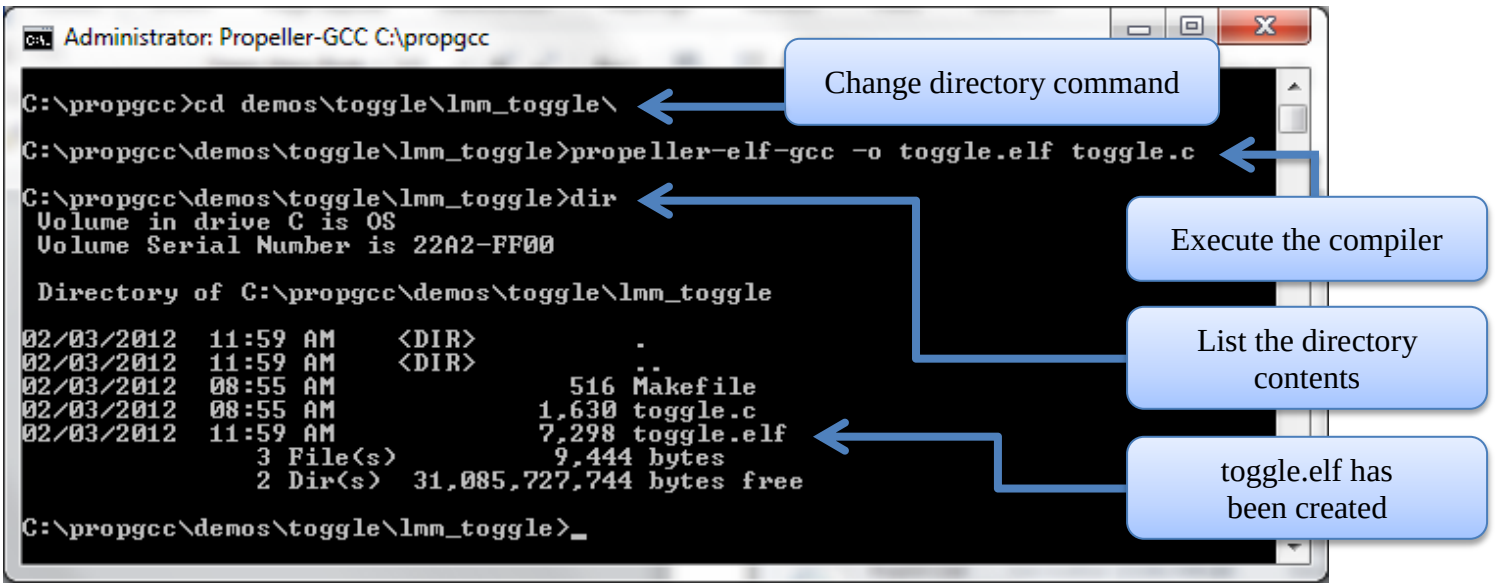
Compiling a C Program with the Default Options

It's time to compile our first C program for the Propeller. These instructions will walk you through the simplest compilation process; we will only specify the minimum number of required options so that the compiler will run using its default configuration. The PropGCC tool set gives the developer many options to compile and change the way code is generated for the Propeller. Several more advanced compiler options will be described later in this document.

The program we will compile is called "toggle.c". It is a very simple C program that toggles Propeller pins P0-P29 at a 1 Hz frequency.

1. Within the Propeller-GCC command window, change directory to the folder "C:\propgcc\demos\toggle\lmm_toggle\". If the command window is already in "C:\propgcc\", then use the command "`cd demos\toggle\lmm_toggle\`".
2. Compile the C program using the command "`propeller-elf-gcc -o toggle.elf toggle.c`".

3. List the directory contents with the "dir" command to verify that the compiler generated an output elf binary. You should see the "toggle.elf" file listed.



Here is a quick breakdown of what we instructed the compiler to do:

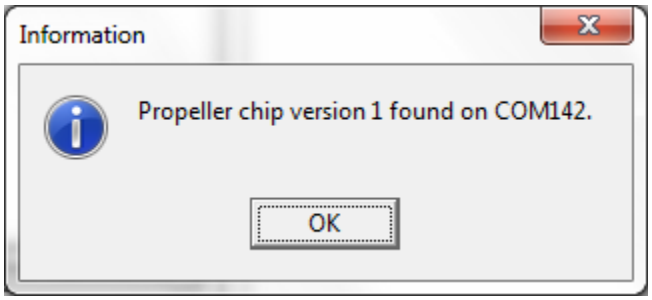
- We told Windows to run the compiler program "propeller-elf-gcc".
- We used the "-o" flag to instruct the compiler to name the output binary "toggle.elf".
- We told the compiler to compile the program contained in the "toggle.c" file.

Downloading a Compiled Binary to the Propeller

Once you have compiled your C program into a binary executable, you will use the "propeller-load.exe" program to load the binary to your Propeller board. The propeller-load program offers different options and great flexibility for downloading to a Propeller board. The following instructions will walk you through loading a compiled binary to your Propeller board. Few options are used to keep things simple. Several more advanced options for the propeller-load program will be described later in this document.

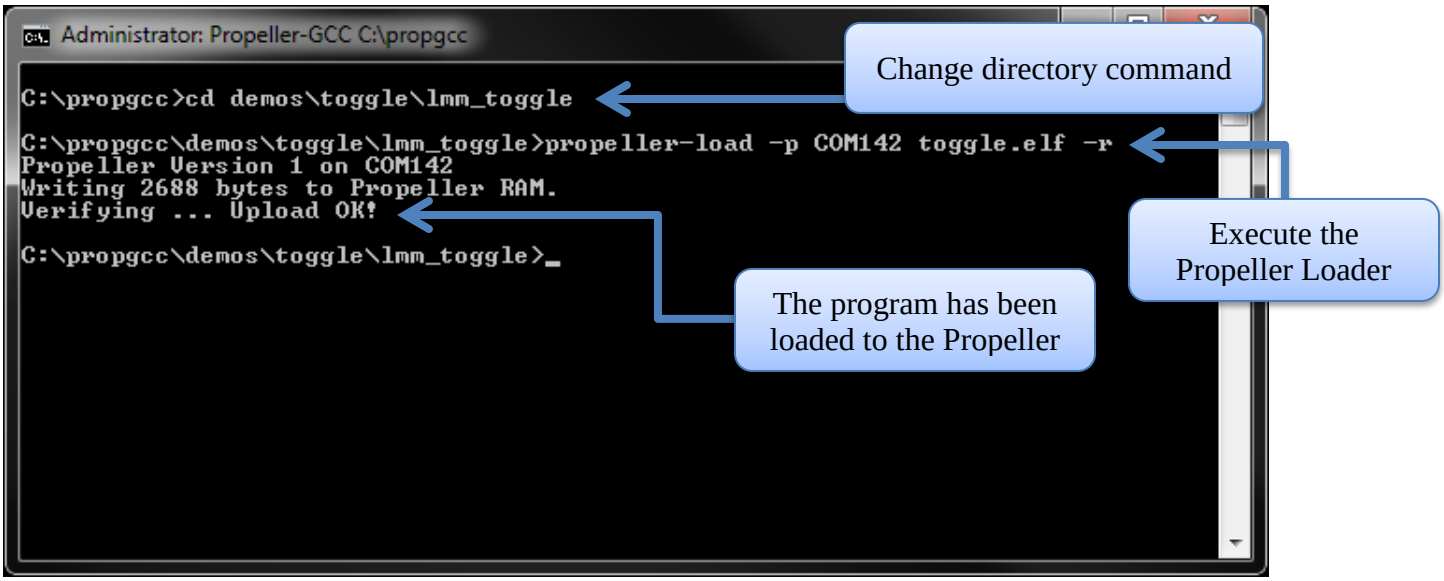
1. Connect your Propeller board to the computer and let Windows enumerate the port. If you have plugged in your Propeller board previously, this should take less than 1 second, assuming that you have properly set up the FTDI driver package. This driver package comes with the Propeller Tool, so you should be fine if you have previously installed the Propeller Tool.
2. You will need to determine which COM port your Propeller board is attached to on the computer. The easiest way to do this is to use Parallax's Propeller Tool to search for your Propeller board.
    a. Open the Propeller Tool.
    b. Press the "F7" key on your keyboard to identify any Propeller hardware connected to your computer.

c. The Propeller Tool will report if it has detected any Propeller attached to the computer. Record the COM port listed.



d. Close the Propeller Tool.

3. If it is not already running, start the PropGCC Development Environment.
4. Within the Propeller-GCC command window, change directory to the folder "C:\propgcc\demos\toggle\lmm_toggle\". If the command window is already in "C:\propgcc\", then use the command "`cd demos\toggle\lmm_toggle\`".
5. Load the program to your Propeller board by using the command: "`propeller-load -p COM# toggle.elf -r`", where the "#" represents the COM port number of your Propeller board.
6. Propeller pins P0-P29 should now be toggling on and off at 1 Hz. If you have any LEDs connected to these pins, you will see them blinking.



Here is a quick breakdown of what we instructed the Propeller loader to do:

- We told Windows to run Propeller loader program, "propeller-load".
- We used the "-p" flag to tell the Propeller loader to use COM port COM142.
- We told the Propeller loader to load the Propeller with the binary file "toggle.elf".
- We used the "-r" flag to tell the Propeller to run the program that was just loaded.

Additional Compiler Options

PropGCC is a highly configurable software suite with many options to give the developer the ability to change the way Propeller binaries are created. Full documentation of available options will become available as the PropGCC project progresses. For now, there is great information about common and useful compiler options on the PropGCC Project page's wiki. Find information about additional compiler options here:

http://code.google.com/p/propgcc/wiki/PropGccCompileOptions

Additional Loader Options

The Propeller loader used with PropGCC has been written with flexibility in mind. Thus, added flexibility comes with the need for configuration. Full documentation about the Propeller loader will become available as the PropGCC project progresses. For now, there is very complete information about the Propeller loader's configuration options on the PropGCC Project page wiki. Find information about the Propeller loader's options here:

http://code.google.com/p/propgcc/wiki/PropGccLoader