



Before You Begin

Before using this book, please read this section to understand our conventions and ensure that your computer can compile and run our example programs.

Font and Naming Conventions

We use fonts to distinguish application elements and C++ code elements from regular text. For on-screen application elements, we use a **sans-serif bold font**, as in the **File** menu. For C code elements, we use a `sans-serif font`, as in `sqrt(9)`.

Obtaining the Code Examples

We maintain the code examples for *C How to Program, 9/e* in a GitHub repository. The book's web page

<https://deitel.com/c-how-to-program-9-e>

includes a link to the repository and a link to a ZIP file containing the code. If you download the ZIP file, be sure to extract its contents once the download completes. In our instructions, we assume the examples reside in your user account's Documents folder in a subfolder named `examples`.

If you're not familiar with Git and GitHub but are interested in learning about these essential developer tools, check out their guides at

<https://guides.github.com/activities/hello-world/>

Compilers We Use in *C How to Program, 9/e*

We tested *C How to Program, 9/e*'s examples using the following free compilers:

- For Microsoft Windows, we used Microsoft Visual Studio Community edition¹, which includes the Visual C++ compiler and other Microsoft development tools. Visual C++ can compile C code.
- For macOS, we used Apple Xcode, which includes the Clang C compiler. Command-line Clang also can be installed on Linux and Windows Systems.
- For Linux, we used the GNU `gcc` compiler—part of the GNU Compiler Collection (GCC). GNU `gcc` is already installed on most Linux systems and can be installed on macOS and Windows systems.

1. At the time of this writing, the current version was Visual Studio 2019 Community edition.

vi Before You Begin

This Before You Begin section describes installing the compilers. Section 1.10’s test-drives demonstrate how to compile and run C programs using these compilers.

Before You Begin Videos

To help you get started with each of our preferred compilers, we provide Before You Begin videos at:

<https://deitel.com/c-how-to-program-9-e>

We also provide a Before You Begin video demonstrating how to install the GNU GCC Docker container. This enables you to use the gcc compiler on any Docker-enabled computer.² See the section, “Docker and the GNU Compiler Collection (GCC) Docker Container” later in this Before You Begin section.

Installing Visual Studio Community Edition on Windows

If you use Windows, first ensure that your system meets the requirements for Microsoft Visual Studio Community edition at:

<https://docs.microsoft.com/en-us/visualstudio/releases/2019/system-requirements>

Next, go to:

<https://visualstudio.microsoft.com/downloads/>

then perform the following installation steps:

1. Click **Free download** under **Community**.
2. Depending on your web browser, you may see a pop-up at the bottom of your screen in which you can click **Run** to start the installation process. If not, double-click the installer file in your **Downloads** folder.
3. In the **User Account Control** dialog, click **Yes** to allow the installer to make changes to your system.
4. In the **Visual Studio Installer** dialog, click **Continue** to allow the installer to download the components it needs for you to configure your installation.
5. For this book’s examples, select the option **Desktop Development with C++**, which includes the Visual C++ compiler and the C and C++ standard libraries.
6. Click **Install**. Depending on your Internet connection speed, the installation process can take a significant amount of time.

Installing Xcode on macOS

On macOS, perform the following steps to install Xcode:

1. Click the Apple menu and select **App Store...**, or click the **App Store** icon in the dock at the bottom of your Mac screen.

2. “Docker Frequently Asked Questions (FAQ).” Accessed January 3, 2021. <https://docs.docker.com/engine/faq/>.

2. In the **App Store**'s **Search** field, type **Xcode**.
3. Click the **Get** button to install Xcode.

Installing GNU gcc on Linux

Most Linux users already have a recent version of GNU gcc installed. To check, open a shell or Terminal window on your Linux system, then enter the command

```
gcc --version
```

If it does not recognize the command, you must install GNU gcc. We use the Ubuntu Linux distribution. On that distribution, you must be logged in as an administrator or have the administrator password to execute the following commands:

1. `sudo apt update`
2. `sudo apt install build-essential gdb`

Linux distributions often use different software installation and upgrade techniques. If you are not using Ubuntu Linux, search online for “Install GCC on *MyLinuxDistribution*” and replace *MyLinuxDistribution* with your Linux version. You can download the GNU Compiler Collection for various platforms at:

```
https://gcc.gnu.org/install/binaries.html
```

Installing GNU GCC in Ubuntu Linux Running on the Windows Subsystem for Linux

Another way to install GNU gcc on Windows is via the **Windows Subsystem for Linux (WSL)**, which enables you to run Linux on Windows. Ubuntu Linux provides an easy-to-use installer in the Windows Store, but first you must install WSL:

1. In the search box on your taskbar, type “Turn Windows features on or off,” then click **Open** in the search results.
2. In the Windows Features dialog, locate **Windows Subsystem for Linux** and ensure that it is checked. If it is, WSL is already installed. Otherwise, check it and click **OK**. Windows will install WSL and ask you to reboot your system.
3. Once the system reboots and you log in, open the **Microsoft Store** app and search for **Ubuntu**, select the app named **Ubuntu** and click **Install**. This installs the latest version of Ubuntu Linux.
4. Once installed, click the **Launch** button to display the Ubuntu Linux command-line window, which will continue the installation process. You’ll be asked to create a username and password for your Ubuntu installation—these do not need to match your Windows username and password.
5. When the Ubuntu installation completes, execute the following two commands to install the GCC and the GNU debugger—you may be asked enter your Ubuntu password for the account you created in Step 6:

```
sudo apt-get update
sudo apt-get install build-essential gdb
```

6. Confirm that `gcc` is installed by executing the following command:

```
gcc --version
```

To access our code files, use the `cd` command change the folder within Ubuntu to:

```
cd /mnt/c/Users/YourUserName/Documents/examples
```

Use your own user name and update the path to where you placed our examples on your system.

GNU Compiler Collection (GCC) Docker Container

Docker is a tool for packaging software into **containers** (also called **images**) that bundle everything required to execute software across platforms. Docker is particularly useful for software packages with complicated setups and configurations. You typically can download preexisting Docker containers (often at <https://hub.docker.com>) for free and execute them locally on your desktop or notebook computer. This makes Docker a great way to get started with new technologies quickly and conveniently.

Docker makes it easy to use the GNU Compiler Collection on most versions of Windows 10, and on macOS and Linux. The GNU Docker containers are located at

```
https://hub.docker.com/\_/gcc
```

Installing Docker

To use the GCC Docker container, first install Docker. Windows (64-bit)³ and macOS users should download and run the **Docker Desktop** installer from:

```
https://www.docker.com/get-started
```

then follow the on-screen instructions. Linux users should install **Docker Engine** from:

```
https://docs.docker.com/engine/install/
```

Also, sign up for a **Docker Hub** account on this webpage so you can install pre-configured containers from <https://hub.docker.com>.

Downloading the Docker Container

Once Docker is installed and running, open a Command Prompt (Windows), Terminal (macOS/Linux) or shell (Linux), then execute the command:

```
docker pull gcc:latest
```

Docker downloads the GNU Compiler Collection (GCC) container's current version.⁴ In one of Section 1.10's test-drives, we'll demonstrate how to execute the container and use it to compile and run C programs.

3. If you have Windows Home (64-bit), follow the instructions at <https://docs.docker.com/docker-for-windows/install-windows-home/>.

4. At the time of this writing, the current version of the GNU Compiler Collection is 10.2.