VG101 — Intoduction to Computer and Programming

Lab 0 — New Semester

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Goals of the Lab

- Sign up on Joint Online Judge
- Install MATLAB
- Install C & C++ Compiler
- Install Open Graphic Library
- Submit on Joint Online Judge

Introduction

Haruka, Kana and Chiaki are three sisters of the Minami family[1]. One day, they met the teaching assistants of VG101 and found that, instead of watching videos, playing games and just surfing on the Internet, computers are actually far more powerful and can complete many interesting tasks. To check whether the teaching assistants are just boasting, they turn to you, who is also a beginner at computer and programming, for problems they meet in their daily life.

Sign up on Joint Online Judge

To show that they're not lying, the teaching assistants will put the problems on the Joint Online Judge. And in order to help them, the first task of you is to sign up on Joint Online Judge. Please click the hyperlink and login with your jAccount from the top right of the web page, and click here to join the course.

Install MATLAB[2]

The Minamis choosed the first tool to be MATLAB. Fortunately, instead of using the online installer, which means that you need to download the resources from MathWorks®, the Student Innovation Center has provided an offline installer so that you can download all the meterials at once.

Please unzip the file. For Windows users, please run setup.exe. For Mac OS X users, please run InstallForMacOSX.app. And for linux users, please run ./install.

Please keep your computer connected to the Internet, choose **Log in with a MathWorks Account** and click **Next**.

If you already have a MathWorks Account created with your email address at SJTU (*jAccount*@sjtu.edu.cn), please just log in with that MathWorks Account and click **Next**. Please enter your email address at SJTU, create a password, enter your first name, last name, activition key: **15551-48137-97653-02633-82894**, and click **Next**. Then MathWorks will send an email to your SJTU email, please check your mailbox and click on the verification link, return to the installation program and click **Next**.

If you activated two-step verification, the installation program will require verification code. If it is the case, please check your mailbox, enter the verification code and click **Next**.

If you haven't been asked for the activation key , the installation program will require it this time, please enter **15551-48137-97653-02633-82894** and click **Next**. Other wise please select the license and click **Next**.

Then please choose the installation folder, click **Next** and select the product you would like to install. Please **DO NOT select the License Manager**, and for the other products, you can select them all since you may need them in the future, even in other courses. Once you have done that, please click **Next** to continue.

Please click here to download the license and specify its location in the installation program. Please click **Next**, select all the rest options as you like and click **Install** to install MATLAB on your computer.

In the end, please note that it's a campus version which means that you need to connect the SJTU networks each time you launch MATLAB. If you are off-campus and need to use MATLAB, you could use the SJTU VPN. In the exam, since you may not be allowed to connect the internet, you may need a trail version at that time (so please do not use the trail version since it only last for a month), the teaching assistents will try their best to communicate with the IT office so that you can get an off version before the exam.

Install C & C++ Compiler[3]

Another tool that the Minamis choosed is C & C++. Since the Minamis prefer different operating systems, the teaching assistants choosed the GNU Compiler Collection (GCC) to be used and have prepared guides to install C & C++ Compilers on different operating systems.

Linux (Debian/Ubuntu)

Please enter the following commands in terminal:

```
$ sudo apt install gcc g++
```

And gcc & g++ will be installed automatically.

Mac OS

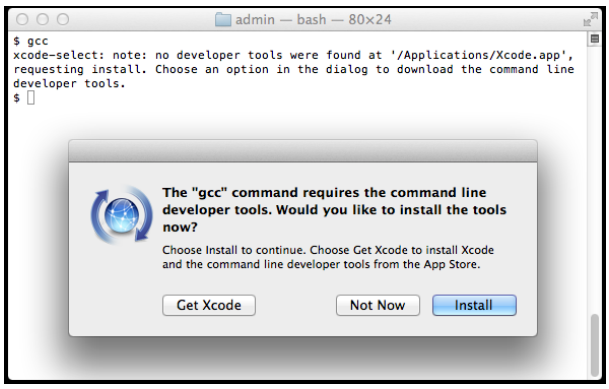

Figure 1: System Prompt for Command Line Developer Tool

Please enter the following commands in terminal:

```
$ gcc
```

If you haven't command line developer tools installed, The system will prompt you as Figure 1.

Please click **Install** to download and install command line developer tools and **DO NOT** click "Get Xcode" since you don't need to get Xcode from the App Store.

Windows

You may click here to download MinGW and use the config shown in Figure 2.

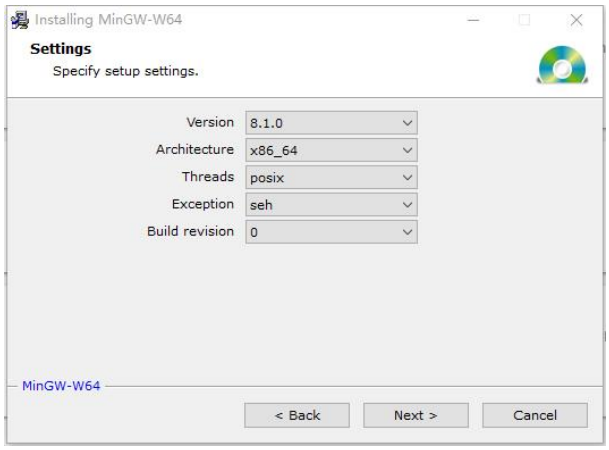

Figure 2: MinGW Installation Settings

Next, you need to set the environment variable. For example, if you installed MinGW in D:\MinGW (there is gcc.exe & g++.exe under D:\MinGW\bin), then please push **Win+R**, enter **cmd** and enter the the following commands in cmd:

```
set path=%path%;D:\MinGW\bin
```

Text Editors & Integrated Development Environments

Once you have installed GCC, you'll also need text editors to write your code. And instead of using command line to compile your code, you may also use an IDE (Integrated Development Environment), in this case you do not need to follow the guides above.

You may choose any text editors or IDEs, but please **DO NOT use Microsoft Visual C / C++, Microsoft Visual Studio IDE, or Dev-C++** since Visual Studio is not generalized and Dev-C++ will include libraries automatically. You may take a look at the previous lab mamual for reference.

In addition, since the teaching assistants may just be unfamiliar with your computer, your IDE, your text editor, or even your operating system, they may just be unable to answer your questions about these topics.

Install Open Graphic Library[4]

The last tool you will need is OpenGL. Similarly, the installing process is different depending on the operating system as well as the compiler you are using.

Linux (Debian/Ubuntu)

Please enter the following commands in terminal:

```
$ sudo apt install build-essential libgl1-mesa-dev libglu1-mesa-dev
↪  freeglut3-dev
```

And FreeGLUT will be installed automatically.

MacOS + LLVM/Clang

GLUT is originally contained in MacOS so there's nothing you need to do for environment setup.

Windows + MinGW

In order to install FreeGLUT, you may click here to download the corrent latest release. Please untar freeglut-3.0.0.tar.gz to wherever you like. For example, D:\FreeGLUT (there is CMakeLists.txt under D:\FreeGLUT).

Another tool you will need is cmake, you may click here, download a **Binary distribution** depending on the operation system you are using, and install the cmake.

Please push **Win+R**, enter **cmd** and enter the the following commands in cmd:

```
d:
cd D:\FreeGLUT
mkdir build
cd build
cmake -G "MinGW Makefiles" ..
mingw32-make
```

Then, please follow the instructions listed below and the installation is done.

- copy the folder D:\FreeGLUT\include into D:\MinGW
- copy the folder D:\FreeGLUT\build\lib into D:\MinGW
- copy the file D:\FreeGLUT\build\bin\libfreeglut.dll into D:\MinGW\bin

Compile with Command Line

You may click here to download a sample code to display a teapot using OpenGL, please go to the directory where the code is stored and use the following command to compile the code.

Linux

```
g++ -Wall -Werror -pedantic -Wno-unused-result
↪  -Wno-deprecated-declarations -std=c++14 -o teapot OpenGL.cpp
↪  -lglut -lGL -lGLU
```

MacOS

```
g++ -Wall -Werror -pedantic -Wno-unused-result
↪  -Wno-deprecated-declarations -std=c++14 -o teapot OpenGL.cpp
↪  -framework OpenGL -framework GLUT
```

Windows

```
g++ -Wall -Werror -pedantic -Wno-unused-result
↪  -Wno-deprecated-declarations -std=c++14 -o teapot OpenGL.cpp
↪  -lglu32 -lfreeglut -lopengl32
```

You may enter **./teapot** in the terminal (Linux or MacOS) or **teapot** in cmd (Windows) to get the result as shown in Figure 3.

Figure 3: Teapot

Submit on Joint Online Judge

In the end, the Minamis would like to have a MATLAB script that outputs "**Hello, World!**" Please save your code as **ex1.m**, tar the file and submit it on Joint Online Judge.

For Linux & MacOS users, you may tar the file with the following command, where **StudentID** should be replaced with your ID number. For Windows users, you may use 7-Zip to tar the file and rename the tar file with your ID number.

```
tar -cf StudentID.tar ex1.m
```

References

[1] Sakuraba, Koharu. *Minami-ke*. vol.1, Kodansha, 5 Nov. 2004, pp. 6.

[2] "Shanghai Jiao Tong University MATLAB Campus Version Installation Guide" *lic.si.sjtu.edu.cn*, 27 Jun. 2018, lic.si.sjtu.edu.cn/Softs/good/id/1632. Accessed 10 Sep. 2018.

[3] Liu, Yihao. "Lab 3". *umjicanvas.com*, 11 Jun. 2018, umjicanvas.com/courses/848/files/114641/download?wrap=1. Accedded 11 Jun. 2018.

[4] Liu, Yihao. "Lab 7". *umjicanvas.com*, 23 Jun. 2018, umjicanvas.com/courses/848/files/114642/download?wrap=1. Accedded 23 Jun. 2018.