You will be using Visual Studio/VSCode to solve the coding questions (only Windows users can use Visual Studio). Below are steps on how to set up both to build C++ programs. You can use either g++/clang++ to compile on VSCode.

Please note that you will **not** be allowed to use an IDE for exams. Exams will be taken online and will be administered using Respondus Lockdown Browser and Monitor.

For homeworks, feel free to use any other development environment, online IDEs, etc.

Windows (choose one of the following)

- **Setting up Visual Studio** (recommended option for newcomers to C++ on Windows since the VSCode option requires more setup than on macOS/Linux)

Download Visual Studio for Windows Community edition and follow the on-screen instructions: https://visualstudio.microsoft.com/

- **Setting up g++**

If you're on Windows and want to use VSCode instead, you should install MinGW or MinGW-w64. It'll give you the g++ compiler.

MinGW: https://sourceforge.net/projects/mingw/
MinGW-w64: https://sourceforge.net/projects/mingw-w64/files/Toolchains%20targetting%20Win32/Personal%20Builds/mingw-builds/installer/mingw-w64-install.exe

Follow the on-screen instructions to finish installing MinGW/MinGW-w64. Then open your Windows search bar and type *Edit environment variables for your account*. Select *Path* → *Edit* and enter a new field with the path leading to the MinGW's bin folder, e.g., `C:\DevTools\mingw64\bin`. This will let your operating system know where to look for the g++ compiler. If you navigate to your path where MinGW was installed and open the bin folder, you can see g++ is located there along with many other files used for development.

If you're interested in using a shell besides the one on Windows by default, you can also download git bash (https://git-scm.com/downloads). This will give your Windows machine a bash shell to work with and unix-like commands. It also gives you git, a version control software that you should definitely learn at some point.

macOS

- **Setting up clang++**

If you're on macOS, you should use clang++, and setting it up should be much easier. Open a terminal instance and type *clang++ --version*. If the command is not found, you will need to install it; type *xcode-select --install*. This will take a bit, but once it's installed, type *clang++ --version* again (or *clang --version* if it doesn't work) and it should output information related to the current version of clang you have installed.

If you get a warning that says "Can't install the software because it is not currently available from the Software Update server.", try going to the app store first and download Xcode before running the command again.

Mac: Setting Up VSCode

This video is from the developers of VS Code at Microsoft, and may help if you prefer video tutorials: https://youtu.be/qeEcV6u1kV4?feature=shared

Step 1: Download and Install VS Code

1. **Open your web browser** (like Chrome).
2. **Go to the website:** `https://code.visualstudio.com/`
3. **Click** the big blue button that says "Download for macOS."
4. Once it's downloaded, **double-click** the downloaded file (it should be in your "Downloads" folder).
5. Now, **drag** the "Visual Studio Code" icon into the **Applications** folder.
6. Open the **Applications** folder, find **VS Code**, and **double-click** it to open!

Step 2: Install Command Line Tools (to get the compiler)

Next, you'll need a tool called **Clang** to compile (build) C++ code. It is usually packaged with **Xcode Command Line Tools**.

1. **Open Terminal** (you can find it by pressing `Command + Space` and typing "Terminal," then press Enter).
2. In the Terminal, type this command and press Enter:
   `xcode-select --install`
3. A box will pop up. **Click "Install"** to download the tools. Wait for it to finish installing. Now you have Clang, a compiler, which will help run your C++ programs!

Step 3: Set Up C++ in VS Code

1. **Open VS Code** (from the Applications folder or just a Spotlight search).
2. In VS Code, on the left, click on the **Extensions** icon (it looks like four squares). This is where we add special tools to help us code.
3. In the search bar at the top, type **C++**.
4. Install the extension called **C/C++ by Microsoft** by clicking the **Install** button.

Step 4: Write Your First C++ Program

1. **Create a new file**: In VS Code, click **File > New File**.
2. **Save the file**: Press `Command + S`, type `hello.cpp` as the file name, and choose where you want to save it (any directory you choose, like a folder on your Desktop).
3. **Write this code** in your new file:

```
#include <iostream>

using namespace std;

int main() {
    cout << "Hello, World!" << endl;
    return 0;
}
```

Step 5: Run Your C++ Program

1. Open the **Terminal** in VS Code: Click `Terminal` from the top menu and choose **New Terminal**.
2. Be sure you are in the directory (or folder) you saved your file to.
3. In the Terminal, type this command to compile your program:
   `clang++ hello.cpp -o hello`
4. Once it's done, run your program by typing in the terminal: `./hello`
5. You should see it print: `Hello, World!`

Step 6 (Optional): Install "Code Runner" Extension to save time

1. Code Runner will compile and run your code in a simple click to save you time, though it is not required. More information here:

Helpful Commands for VSCode

- Build a C++ program (use the command corresponding to the compiler you have). Note that there are many flags that you can append when compiling, e.g., -Wall, which shows all warnings, but the commands below are enough to give you an executable to run your C++ program. Feel free to research more on g++/clang++ and the additional flags/options you can use. The following link contains all of them for g++ (you're not expected to learn them): https://linux.die.net/man/1/g++

  g++ fileName.cpp -o executableFileName
  clang++ fileName.cpp -o executableFileName

Mac: Setting Up Visual Studio IDE

Step 1: Download and Install Visual Studio for Mac

1. **Open your web browser** (like Chrome).
2. **Go to the website:** `https://visualstudio.microsoft.com/`
3. At the top, hover over "Downloads" and **click** on **"Visual Studio for Mac"**.
4. **Click the green button** that says "Download Visual Studio for Mac."
5. Once the download finishes, **open the file** from your "Downloads" folder.
6. **Follow the instructions** on the screen to install Visual Studio on your Mac. It might ask for your password to allow the installation.

Step 2: Set Up Visual Studio for C++

1. Once Visual Studio is installed, **open it** from the Applications folder or by searching in Spotlight (`Command + Space`).
2. **Sign in** with your Microsoft account (or create one if you don't have one). It's free!
3. When the setup asks which workloads to install, make sure to check the box for **"Desktop development with C++"**.
4. Continue with the installation and wait for it to complete. Visual Studio will install everything you need for C++ development, including the **Clang** compiler.

Step 3: Create Your First C++ Project

1. **Open Visual Studio** if it's not already open.
2. On the start screen, click **"New Project"**.
3. Choose **Console Application** under **C++**. This will allow you to create a simple text-based program.
4. Give your project a name (e.g., `HelloWorld`) and choose where to save it (like your Desktop), then click **Create**.

Step 4: Write Your C++ Code

1. Visual Studio will create a file for you called `main.cpp`. **Open this file**.
2. Replace any existing code with the following C++ code:

```
#include <iostream>

using namespace std;


int main() {
    cout << "Hello, World!" << endl;
    return 0;
}
```

Step 5: Build and Run Your C++ Program

1. At the top of Visual Studio, click **"Build"** from the menu and choose **"Build All"** (or press Command + B).
2. To run your program, click the **"Run" button** at the top (it looks like a green play button).
3. You should see a terminal window pop up and print `Hello, World!`