AST20105 Data Structures & Algorithms

Lab 1 – Hello Data Structures

A. Submission Details

In this lab, you are required to submit **ONE** C++ program to solve the given problem shown in the section "My Information". To make the program implementation easier, you are suggested to write your program using Visual Studio provided instead of doing it directly using paper & pencil. After you have completed the implementation, submit your program file (i.e. MyInfo.h and MyInfo.cpp for this lab) via Canvas, **TWO weeks** after your lab section is conducted. For details, please refer to the following:

You are reminded to double-check your solution to verify everything is correct before submission. You are also required to put your name and student ID at the beginning of your source file.

Important: You are only able to submit your work once.

This lab exercise will not cost you any marks, but you are highly recommended to finish and submit it.

B. Objective

The objective of this lab is to create a couple of C++ programs using Visual Studio, an Integrated Development Environment (IDE) runs on Windows platform. This aims to help you to warm-up yourself with the working programming environment.

We will be using Microsoft's Visual Studio development environment for performing labs and writing programs in this course. The lab machines have a version of Visual Studio installed on them for your use for labs and programming assignments.

The first part of this lab is meant to be a simple review of the basics of writing a program in C++, creating a main function, and using iostream object to do simple program output.

The second part of this lab is producing a simple C++ program which stores your basic information and to show it on the screen.

C. Review on How to Use Visual Studio

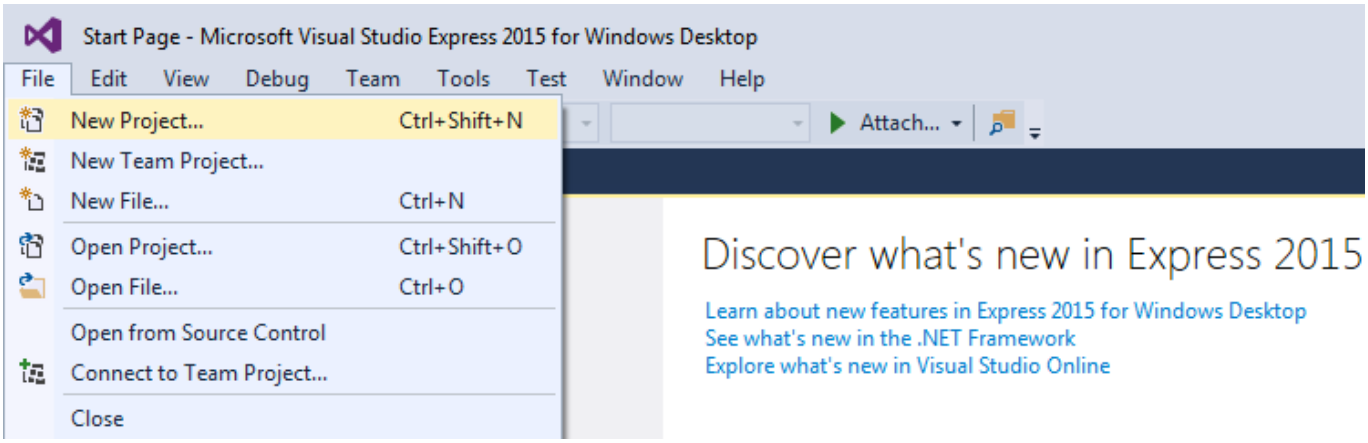
Let's say you have written a C++ program on a paper and want to run it on one of the computers in the lab. The following steps will be involved.

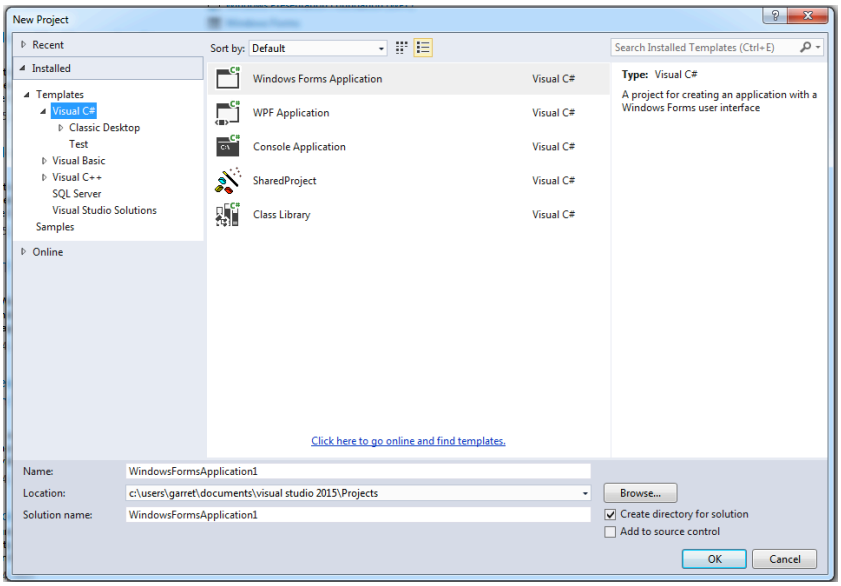
(1) Log on the PC
(2) An **editor** will be used to enter and modify your C++ program
(3) A C++ **compiler** will be invoked / run to translate your C++ program into an executable file (.exe). If your program has syntax errors (i.e. grammatical errors), the compiler will prompt you the errors and you need to go back to step (2) to correct the errors.
(4) Run the executable program on your PC.

In this lab experiment, you will go through the steps above and learn through practice.

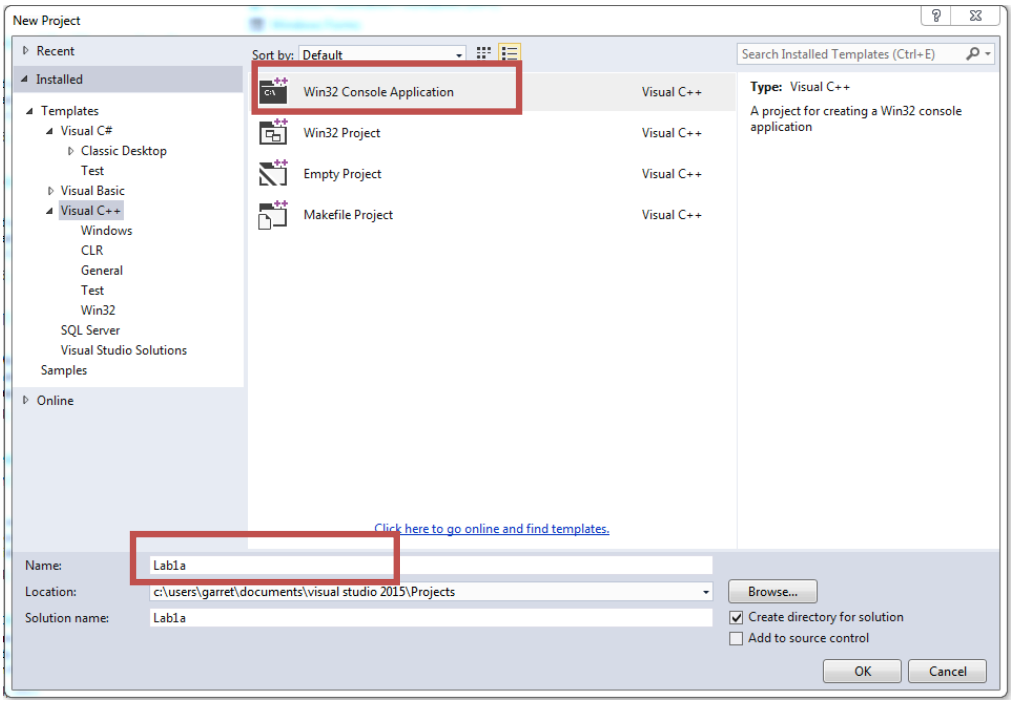
Experiment

1. Start up the Visual Studio development environment (Figure 1) and create a new project (You can click the "New Project" button on the Start Page, OR use the file pull down menu sequence "File->Project". A New Project dialog will be displayed.



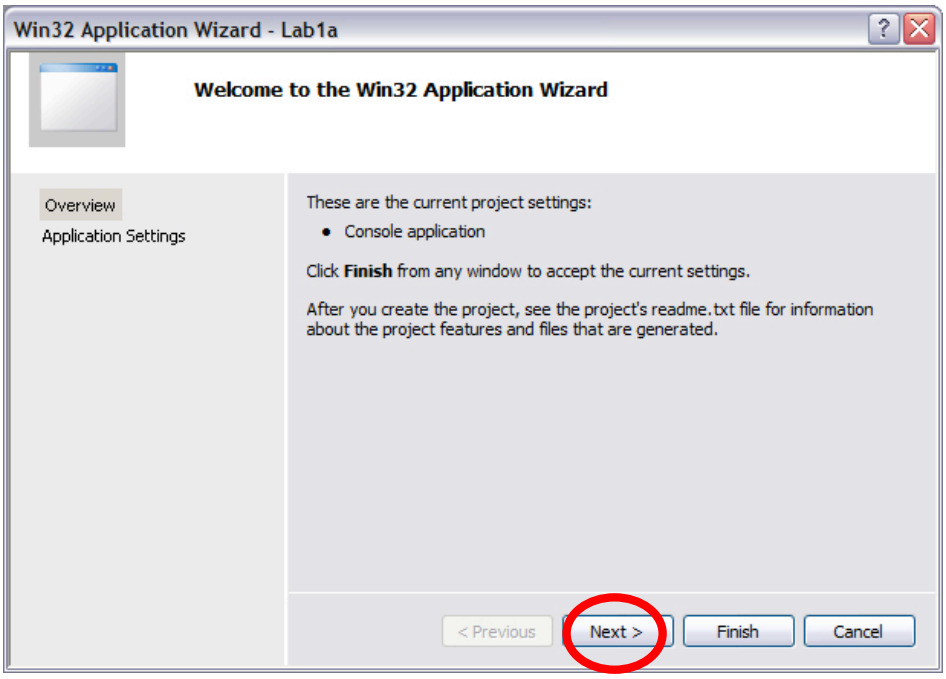


Expand the Visual C++ projects in the Project types on the left and select the Visual C++ (Win32 Console Application). Finally you need to name your project. Give your project the name **Lab1a** and press "OK" (Figure 3). Whenever you are starting a new lab or programming assignment, your first step will be this one, to **create a new empty project** and give it a name.



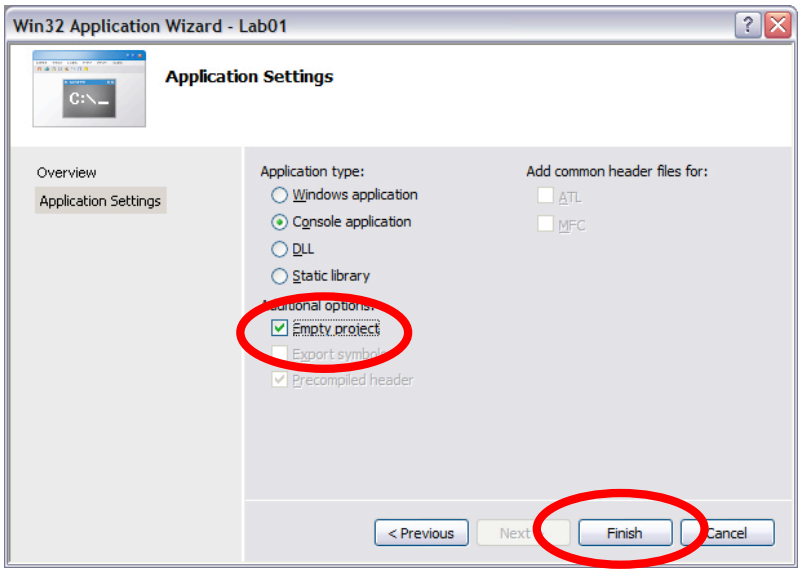
Create a Win32 console application and give a name "Lab1a"

Click "Next" to change the project settings (Figure 4).



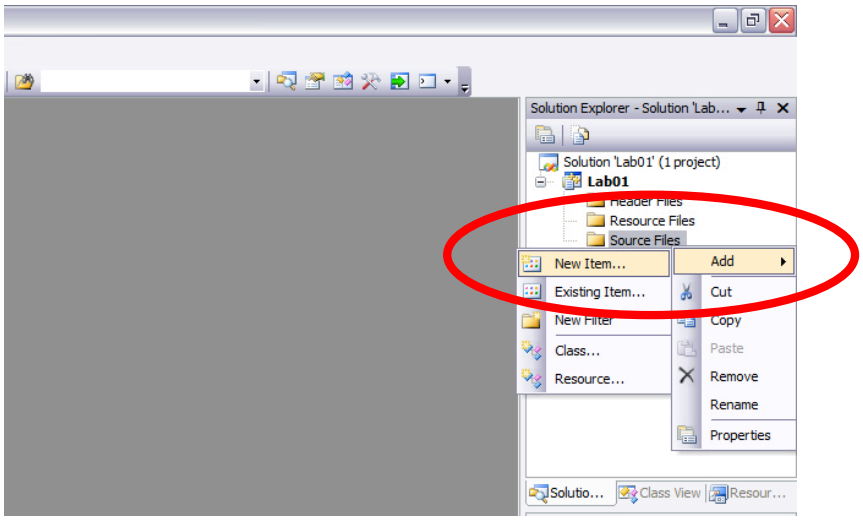
Change the project settings

Check the “Empty project” item under the additional options and click “Finish” to confirm the setting (Figure 5).



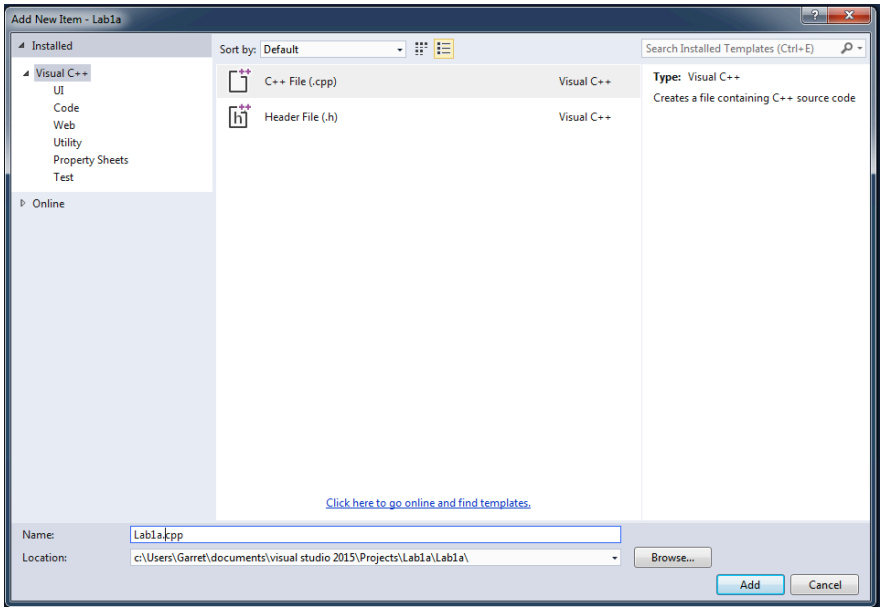
Select empty project and confirm the project settings

2. Our project for lab 1a will be very simple as it will consist of a single source file. You need to add a source file to your project so that you can write your C++ code for this lab. If you cannot see the Solution Explorer in Visual Studio, open it up by selecting the menu sequence “View->Solution Explorer”. The solution explorer is used to manage all of the files and resources you use to build a project, and looks something like the picture below. You need to add a source file to your project, called Lab1a.cpp. To do this, right click on the “Source Files” folder in the Solution Explorer and select Add->Add New Item (Figure 6).



Add a source file to your project

Select the C++ (.cpp) as the file template, and name the file Lab1a.cpp. You should now see that a file called Lab1a.cpp has been added to your Lab1a project in your Source Files, and you should have a new tab with a title of Lab1a.cpp ready to type in your source code for the project (Figure 7).



Add a C++ file (.cpp) named "Lab1a.cpp" to your project

3. Let's create a simple "Welcome to AST20105 – Data Structures and Algorithms" program. Type in the following code in your Lab1a.cpp source file:

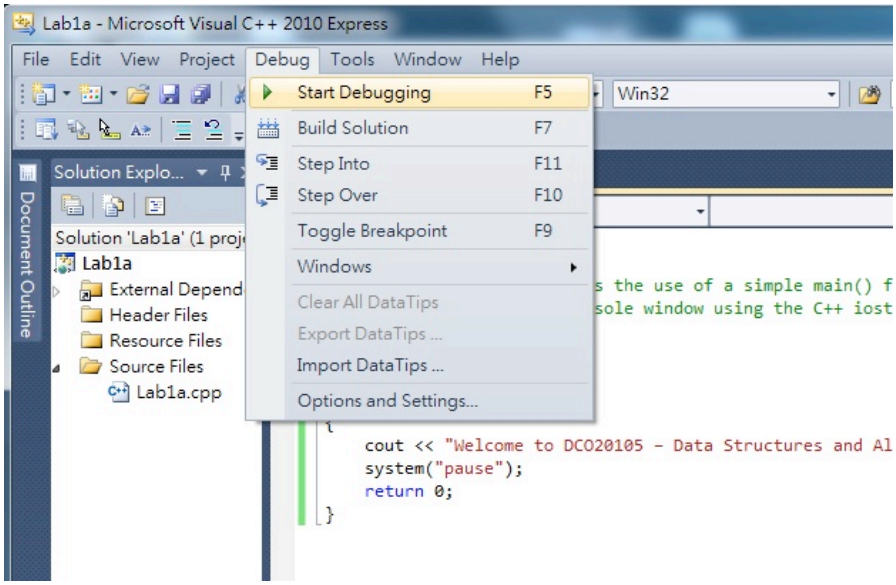
```
// Assignment: Lab #1a
// Description:
// This program demonstrates the use of a simple main() function, and
// displays output to a console window using the C++ iostream library.

#include <iostream>
using namespace std;
int main()
{
    cout << "Welcome to AST20105 – Data Structures and Algorithms" << endl;
    system("pause");
    return 0;
}
```

Make sure you save your file at this point (press Ctrl-S or click the sequence "File"-> "Save Lab01a.cpp").

Reminder:

1. Did you remember the semi-colon ; at the end of your statements?
2. Did you use double quotes?

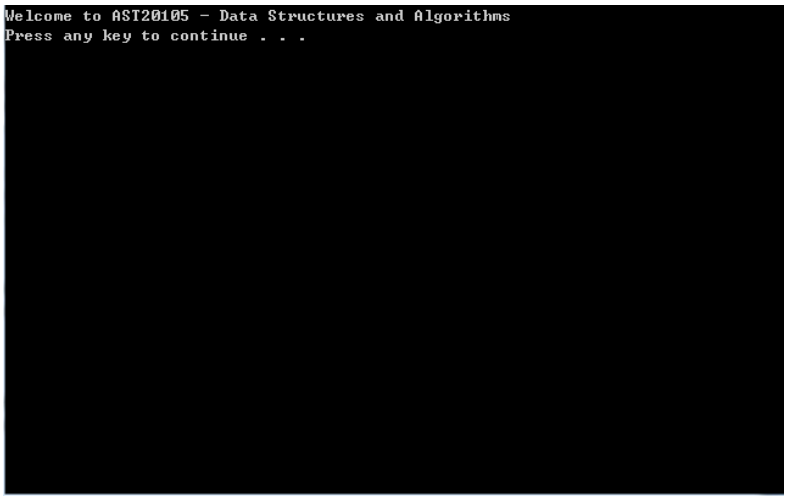
We will now try to compile your program. To compile your program, use the debug menu item to select "Debug->Start Debugging" (Figure 8).



Compile and run your program by clicking "Debug-> Start Debugging"

This causes all of the files in your project to be compiled and run together.

4. If your program was correct and successfully runs, you should see a DOS terminal pop up and display the words "Welcome to AST20105 – Data Structures and Algorithms" followed on the next line by "Press any key to continue…" (Figure 10). If you press a key, the terminal should go away and you can go back to Visual Studio and do more work if needed.



Terminal displaying "Welcome to AST20105 – Data Structures and Algorithms"

This completes the first part of our lab. At this point you should start re-familiarized yourself with how to start up the Visual Studio development environment. Also how to create a simple project, adding a file to the project, and writing a simple C++ main function to display the words "Welcome to AST20105 – Data Structures and Algorithms". You should also be familiar now how to compile a program in Visual Studio and how to run the program and see its results.

D. Assignment – My Information

In this part, you are required to:

i) Create a New Project and give your project the name Lab1b.

ii) Construct a class called MyInfo to store your name and student id.

iii) Also, create an array in the class, randomly generate 10 numbers range from 1 to 50 (inclusive) and store them in the array. Google srand() and rand() for random number generation.

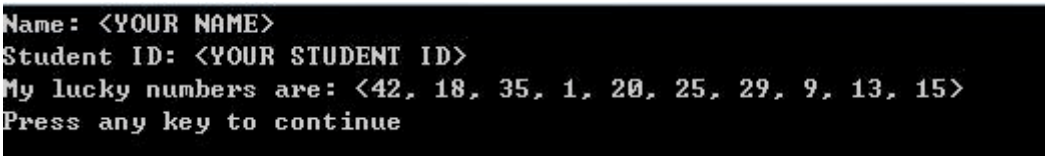
iv) The class should have a constructor taking 2 parameters, name and student id. The three functions are called getName(), getStudentID() and printArray().

v) Show your name, student id and the ten random numbers on the screen.

vi) The class definition and implementation should be separated in two files (i.e. MyInfo.h and MyInfo.cpp).

vii) After the implementation, download the main.cpp from Canvas to test your work.

viii) The result should look like this.



Program Submission Checklist

Before submitting your work, please check the following items to see you have done a decent job.

Items to be checked	☑ / ☒
1. Did I put my name and student ID at the beginning of all the source files?	☐
2. Did I put reasonable amount of comments to describe my program?	☐
3. Are they all in .cpp extension and named according to the specification?	☐
4. Have I checked that all the submitted codes are compliable and run without any errors?	☐
5. Did I zip my source files using Winzip / zip provided by Microsoft Windows? Also, did I check the zip file and see if it could be opened? ***(Only applicable if the work has to be submitted in zip format.)***	☐
6. Did I submit my lab assignment to Canvas?	☐

-End-