

Lab 01 Getting Started with C++ Programming

This Lab sheet involves exercises in 3 parts:

Guided Exercises (Q1-Q2) → Skill-Drilling Exercise (Q3-4) → Take-Home Exercises (Q5-Q10)

Preparation

(1) Login a PC.

(2) Login Canvas and enter the course CS2310. You'll get all necessary links and files there.

(3) Login the PASS system.

Throughout the course,
Don't upload other people's code with your account ☹
(All files you upload to PASS will serve as an indicator of your course progress.)

Install VS2015 at Your Computers

Students may install Visual Studio 2015 at your computers:

- Visit <https://msdnaa.cs.cityu.edu.hk/>
- Sign on using your EID (CITYUMD\EID) and password.
- Select [Visual Studio 2015]. Then, add Visual Studio 2015 Enterprise Update 2 to your Shopping Cart.
- Download and run the executable files.
- Burn the iso files to DVDs (or using software to mount the DVD image).
- Click the setup program to install VS 2015.

If needed, seek helps from CSLab staff (MMW 2/F).

You can also get VS 2015 Enterprise from the following folder (including the space) directly in CSLab *via cable, not via WiFi*

\\cifs0.cs.cityu.edu.hk\CDSrc\Programming\Visual Studio 2015 Enterprise with Update 2

Guided Exercises

Q1. The simplest Hello World program (Version 1)

```
Lab01_Q1.cpp
#include <iostream>
using namespace std;

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

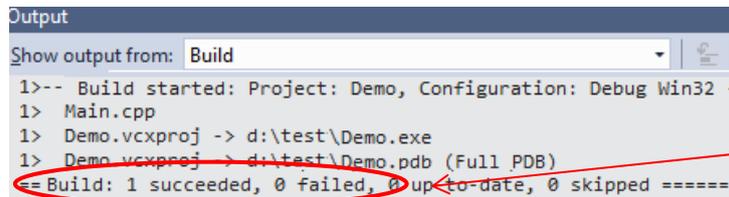
:

Canvas → CS2310 → Useful Links and Notes

Step 1. Create, compile, and run the program according to:

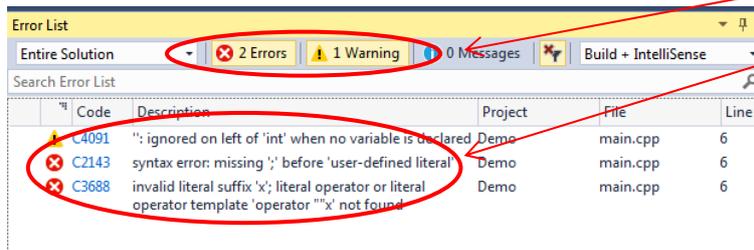
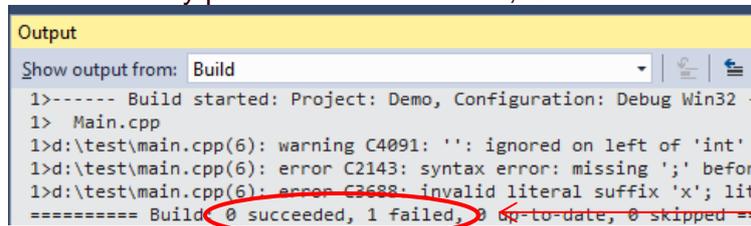
[Complete Demo of C++ Programming](#)

Step 2. Make sure the compilation result is: **free of errors and warnings**



OK

If there is any problem as seen below, fix it!



Problem! Need to fix before running the program.

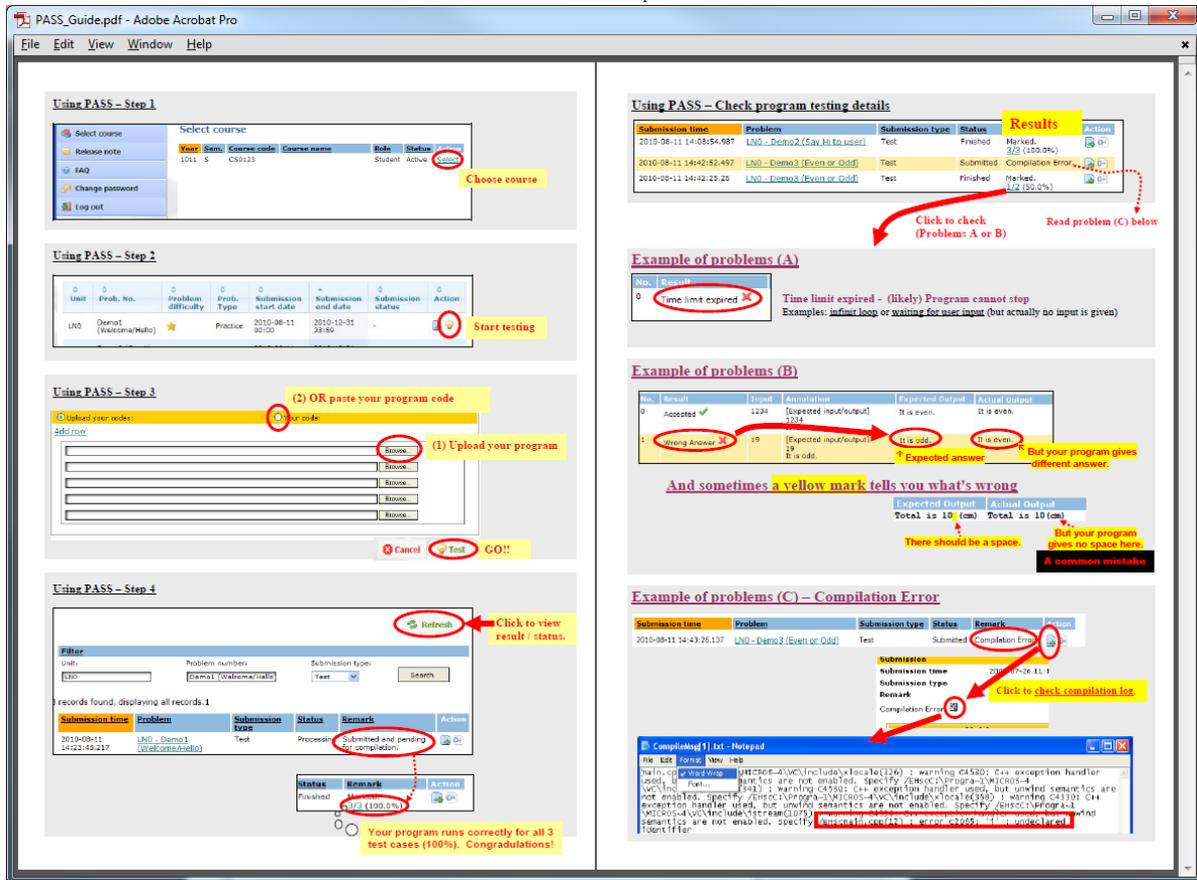
Step 3. Run the program. It should give:

Any question / problem? Ask!



Step 7. Upload Lab01_Q02.cpp to PASS for submission and testing. Please read *PASS Guide.pdf* for details. Make sure you get **100%** correct in PASS.

PASS Guide.pdf



Checkpoints (Make sure you fulfill the following items and put a ✓ where appropriate.)

Name: _____
 Eg. Chan Siu Pang

- I have successfully finished Q1 and Q2 (Hello World programs version 1 and version 2).
- I know how to setup a project in Visual Studio for creating a console-mode program with C++.
- I know what are *compilation errors*.
 - I have experienced compilation errors in this exercise.
 - I haven't experienced compilation errors in this exercise.
- I know how to upload a program to PASS for testing.
- I know that I can submit to PASS again and again until 100% correct. (Or now you know about it from this sentence. ☺)

Are you familiar with the procedures covered in Q1 and Q2?

If you have any doubt about the above, don't hurry for the next exercise. Ask and clarify. It may also be better to REDO Q1 and Q2 again later.

↪ After finishing the first trial, **re-doing** won't take you much time but is worthy.

**** Submission: Put down this handout on the front desk and get the Skill-Drilling Exercise**

Skill-Drilling Exercise

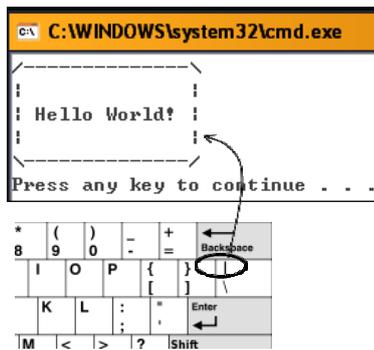
Q3. Create another Hello World program (Version 3): Lab01_Q03.cpp

Note: No file for you to download this time. ☺

Please create Lab01_Q03.cpp yourself (eg. like how you created Lab01_Q01.cpp).

Beside adding Lab01_Q03.cpp to the project, remember to remove Lab01_Q02.cpp from the project as well!!!

This time the program should work like this:



IMPORTANT:

In program code, `\` in text strings have special meaning.

In order to show a `\` in the output, we need to type `\\` **2 times** in our code:

```
cout<<"/-----\\ "<<endl;
```

This point will be covered in the coming lecture.

Your tasks: Finish this program. Make sure it runs correctly in your computer.
Upload Lab01_Q03.cpp to PASS for submission and testing.

Checkpoints (Make sure you fulfill the following items and put a ✓ where appropriate.)

- I know that `\` in text strings needs special handling. (Though I may not know the reason yet.)
- I have successfully finished Q3 (Hello World version 3) and it is 100% correct in PASS.

I find that Q4 is: very easy quite easy moderate _____

Q4. Welcome World or Hello World:

Download **Lab01_Q04.cpp**. This program should ask the user for his choice: 'w' or 'h'.

If he inputs 'w', display

```
C:\ C:WINDOWS\system32\cmd.exe
Input your choice (<'w' or 'h')>: w
Welcome World!
Press any key to continue . . .
```

If he inputs 'h', display

```
C:\ C:WINDOWS\system32\cmd.exe
Input your choice (<'w' or 'h')>: h
Hello World!
Press any key to continue . . .
```

For other cases, display nothing:

```
C:\ C:WINDOWS\system32\cmd.exe
Input your choice (<'w' or 'h')>: s
Press any key to continue . . .
```

Now the code is not yet completed - (Content missed at lines 17-20, that handles the 'h' case.)

<pre> 1 #include <iostream> 2 using namespace std; 3 4 int main() 5 { 6 char choice; 7 cout << "Input your choice ('w' or 'h')> "; 8 9 cin >> choice; 10 11 if (choice == 'w') 12 { 13 cout << "Welcome World!"; 14 cout << endl; 15 } 16 17 if (18 { 19 20 21 } 22 return 0; 23 }</pre>	<p><u>Explanations</u></p> <p>← A char (character) variable is defined. Its name is <i>choice</i>.</p> <p>← An Output-Statement</p> <p>← An Input-Statement It waits for the user's input (ended with <enter>), and stores in the variable <i>choice</i>.</p> <p>← This is an if-statement - The condition is stated in () - The actions to be done are inside { } - == is for comparing 2 values - We type 'w', not "w" (because it is a single character).</p>
---	--

Your tasks: Study the code and read the explanations given above.

Complete this program and make sure it runs well in your computer for all 3 cases. Upload it to PASS for submission and further testing. (You will see 3 test cases in PASS.)

Checkpoints (Make sure you fulfill the following items and put a ✓ where appropriate.)

Name: _____ (Eg. Chan Siu Pang)

I have successfully finished Q4 (Hello World version 4) and it is 100% correct in PASS.

I find that Q4 is: very easy quite easy moderate _____

** Submission: Put down this handout on the front desk and get the **Take-Home Exercises**

Take-Home Exercises

Before proceeding, check (✓) the points below:

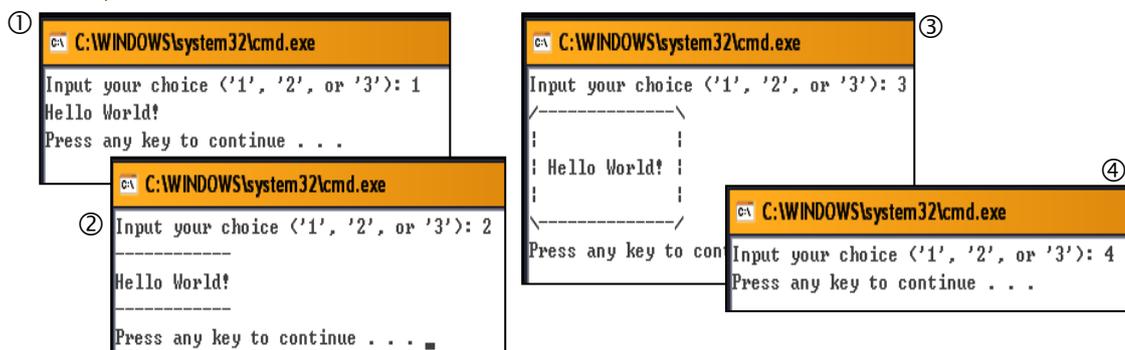
- I'm okay with the lecture notes and examples covered during the lecture.
- I'm okay with the previous exercises.

Q5. Hello World: 1, 2, 3 - Lab01_Q05.cpp

Based on the style of Q4, we need to get user's input '1', '2', or '3' (using the *char choice* variable) and show the right version of "Hello World!".

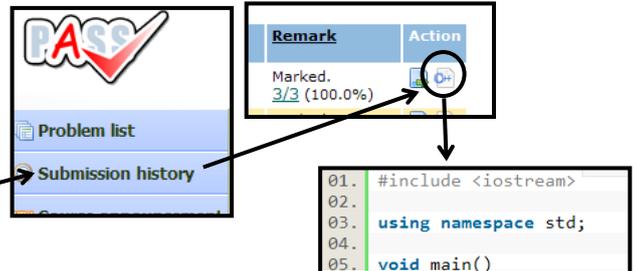
If the user types a wrong choice, the program should show nothing – see ④ below.

Therefore, there are 4 cases:



Note – For each case, you may simply copy your previous program files (Q1-Q3).

If you have lost the program files for Q2 and Q3, you may get them back from PASS:



Your tasks: Finish the program and make sure it runs well in your computer for all 4 cases. Upload it to PASS for submission and further testing.

If you need any hint / help, send email to Helena.
DON'T wait until next lesson!!

Q6. Hello or Welcome - 1, 2, 3 (Lab01_Q06.cpp)

Based on Q4-Q5, create an extended program that lets the user choose both the message and the version:

```

C:\WINDOWS\system32\cmd.exe
Input your choice for the message ('w' or 'h'): w
Input your choice for the style ('1', '2', or '3'): 3
-----
|                                     |
| Welcome World!                     |
|                                     |
|-----|
Press any key to continue . . .
  
```

Note – (1) You need to use **2 variables**:

```

...
int main()
{
    char choice123;
    char choiceWH;

    cout << "Input your choice ..
    cin >> choiceWH;

    cout << "Input your choice ..
    cin >> choice123;
    ...
  
```

(2) Also, you need to use **nested if-statements**: **{{}}**

```

...
if (choice123 == '1')
{
    if (choiceWH == 'w')
    {
        cout << "Welcome World!";
        cout << endl;
    }
    if (choiceWH == 'h')
    {
        cout << "Hello World!";
        cout << endl;
    }
}

if (choice123 == '2')
{
    if (choiceWH == 'w')
    {
  
```

After you have finished the program and tested in your computer, upload it to PASS for further testing.

Q7. Calculation of Study Hours

During the lecture, we already saw the following program that calculates study hours based on the credit units of a course:

```

C:\WINDOWS\system32\cmd.exe
Input the number of credit units of this course: 3
In this semester, you need to study approximately 120 to 150 hours for this course.
Press any key to continue . . .
  
```

```

#include <iostream>
using namespace std;

int main()
{
    int n;
    cout << "Input the number of credit units of this course: ";
    cin >> n;
    cout << "In this semester, you need to study approximately ";
    cout << 40 * n;
    cout << " to ";
    cout << 50 * n;
    cout << " hours for this course." << endl;
    return 0;
}
  
```

[Lecture notes (page 7)]

Your task – Download and modify the program to show the calculation details like:

```

C:\WINDOWS\system32\cmd.exe
Input the number of credit units of this course: 3
40 x 3 = 120
50 x 3 = 150
In this semester, you need to study approximately 120 to 150 hours for this course.
Press any key to continue . . .
  
```

Hint: `40 x 3 =` ← `cout << 40 << " x " << n << " = " ...`

After you have finished the program and tested in your computer, upload it to PASS for further testing.

If you need any hint / help, send email to Helena

DON'T wait until next lesson!!



To assure your progress, ask yourself this question:

Do you have confidence to redo Q1-7 with minimum hints from the lab-sheet? **Try!!**

After finishing the first trial, it should be much easier. **Re-doing** won't take you much time and is **worthy**.

Self-check for Q5 - Q7

- I have completed Q5 - Q7 before next lecture, all 100% correct in PASS.
- I have applied **char** variables + **input-statements** in programming.
- I have used the **if-statement**. It makes decisions by checking a condition. The actions to be done are actually a group of statements, which are included inside { } of that if-statement.
 - ↖ Simple statements, or other if-statements (nesting) ..
- To compare 2 values, we use `==`.
- The output statements (cout <<..) can output text messages as well as variable values (Q7)

(No need to hand-in this page – Your work will be recorded in PASS.)

Q8. [Skill-sharpening Exercise]

Create a program like Lab01 – Q06, but this time ask the user to choose among 2 styles only (please refer to Lab01 – Q01 and Q02), while 3 messages will be available: 'w' for "Welcome!", 'h' for "Hello!", and 'c' for "Cheers!".

Example 1:

```
Input your choice for the style ('1' or '2'): 1
Input your choice for the message ('w', 'h', or 'c'): w
Welcome!
Press any key to continue . . .
```

Example 2:

```
Input your choice for the style ('1' or '2'): 2
Input your choice for the message ('w', 'h', or 'c'): c
-----
Cheers!
-----
Press any key to continue . . .
```

Q9. [Skill-sharpening Exercise]

Imagine that in order to book a venue in the current week, we need to state the day and the duration (start hour and end hour). Create a program as shown below, that prompts for these inputs and summarizes the booking in one line.

Example 1:

```
Input the day ('M' - Mon, 'T' - Tue, 'W' - Wed, 'R' - Thu, 'F' - Fri): F
Input the start hour: 12
Input the end hour: 14

Your booking is: Friday 12:00 - 14:00 (Total: 2 hours)

Press any key to continue . . .
```

Example 2:

```
Input the day ('M' - Mon, 'T' - Tue, 'W' - Wed, 'R' - Thu, 'F' - Fri): M
Input the start hour: 8
Input the end hour: 11

Your booking is: Monday 8:00 - 11:00 (Total: 3 hours)

Press any key to continue . . .
```

Q10. [Skill-sharpening Exercise]

Create a program that displays the contents as shown below (no user input).

```
C:\WINDOWS\system32\cmd.exe
Peter has learnt the following from Lab01:

(1) It is wrong to write: cout >> "Hello!";
    It is right to write: cout << "Hello!";

(2) To output one '\', we need to type '\\'.
    Example: cout << "\\";

Press any key to continue . . .
```

Hint: `cout << "\\";` displays the double-quote character `"`.

↖ Two single quotes enclosing one double quote.