03 - Program Structure and Variables

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Outline

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Startup

1. Log in to your shell account
2. `cd cs1-fall2019-username`
3. `git pull`

hello.cpp

```
#include <iostream>

using namespace std;

int main()
{
    cout << "hello, world" << endl;
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- Preprocessor directives begin with `#`.
- The include directive copies the contents of a file to its location.
- `iostream` is a C++ library file which contains definitions for input and output.
- For any program that does input and output in C++, you must therefore have the directive:
  `#include<iostream>`

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  `std::cout << "hello, world" << std::endl;`
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- The using line tells c++ to import all the objects from a namespace so we don't have to use `::` to access them.
  `using namespace std;`

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- The main function returns an integer to the operating system. A 0 means success, all other numbers are errors.
- If you do not specify a return value, the compiler will default to 0.
- All of your code, for now, will go in between the curly braces that mark the start and end of the main function.

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- Blocks can be nested inside each other (more on this later).

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- `/* */` are c-style comments and can be used to make multi-line comments, but be careful!
- Every program should have comments (lest they lose points when being graded).

boilerplate.cpp

1. `cd ~/cs1-fall2019-`*`username`*
2. Create the file `boilerplate.cpp` and enter the following:

```
// File:
// Purpose:
// Author:
#include <iostream>

using namespace std;

int main()
{

}
```

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- Inserting data into `cout` will display it on the screen.
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- `endl` is a constant which means “end of line”.
- So the line of C++:
  `cout « "hello, world" « endl;`
  means “Display the words ‘hello, world’ and then end the line”
- **Something to Try**: Remove the `« endl` portion of this line in hello.cpp. Recompile and run it. What changed?

Multiple Lines of Output

Often, we want to have multiple lines of text. This can be done in one statement!

```
cout << "Tell me, where is fancy bred?" << endl
     << "  Or in the heart, or in the head?" << endl
     << "                  --William Shakespeare" << endl
     << "                   (Merchant of Venice)" << endl;
```

Challenge: Draw a Diamond!

Challenge: Write a program `diamond.cpp` in your `labs/week2` folder which uses a single statement to print the following figure (begin by copying your `boilerplate.cpp` file!:

```
        #
       ###
      #####
     #######
    #########
  ###########
    #########
     #######
      #####
       ###
        #
```

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- Variables can be assigned values, be used in operations, and can be changed.
- In C++, variables are strongly typed. That is, each variable can only store one type of information!

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- Variables must be declared before they are used:

```
int x;
char letter;
double num;
```

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- must be unique.

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- For example:
  `cin » x;`
  would allow the user to enter an integer which is then stored in `x`.

Example: multiple_choice.cpp

Compile and run this program (found in your examples folder)

```
#include <iostream>

using namespace std;

int main()
{
    char choice;  //The choice made by the user

    //Get the user's choice
    cout << "In my opinion, computer programming is _______." << endl
         << "\tA) the best part of my day" << endl
         << "\tB) what gives me a sense of purpose" << endl
         << "\tC) how I scream into the void" << endl
         << endl
         << "Your Choice? ";
    cin >> choice;

    //report the user's choice
    cout << "You chose " << choice << "." << endl;
}
```

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- Buy Stocks

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- Run Reports
- Store Stock Data in a File

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Main Menu

Write a program `stock.cpp` which displays the main menu of the stock portfolio system and reads a user's choice.

```
$ ./stock
        Stock Portfolio Management System
                Please Make a Selection
        1 -- Buy a Stock
        2 -- Sell a Stock
        3 -- Report Current Holdings
        4 -- Report Gains and Losses
        5 -- Remove a Current Holding
        6 -- Done!  (quit)

        Choice? 6
```

Finishing Up

- Make sure you have the following files in `cs1-fall2019-`*`username`*`/labs/week2`
  - `hello.cpp`
  - `diamond.cpp`
  - `stock.cpp`
- Make sure you have `boilerplate.cpp` in your `cs1-fall2019-`*`username`* directory.
- These programs must all be in working order to receive full credit for the week!
- `git add -A`
- `git commit -a -m 'Finished Week2!'`
- `git push`

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