# Your First C++ Program

Aug 27, 2008

C++

- Based on the C programming language

- One of today's most popular programming languages
  - o used extensively in industry

- Language + Libraries
  - o Libraries: bits of programs you can use

Visual Studio

- Microsoft Tools
  - o **I**ntegrated **D**evelopment **E**nvironment
  - o all the tools you need to write a program!
- Source code editor
  - o highlights source code as you type
- Debugger
- Extra Libraries
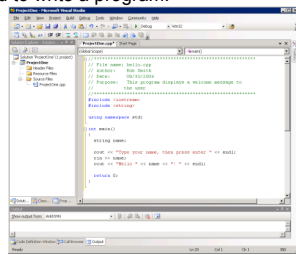
Problem

- Programs are written to solve problems
  - source code
  - process data

- Imagine that you have been asked to solve the following problem
  - Write a program that asks the user to enter their name and display a personalized welcome message

Your First C++ Program

```cpp
//********************************************************
// File name: hello.cpp
// Author:    Bob Smith
// Date:      08/30/2006
// Purpose:   This program displays a welcome message to
//            the user
//********************************************************
#include <iostream>
#include <string>

using namespace std;

int main()
{
   string name;

   cout << "Type your name, then press enter" << endl;
   cin >> name;
   cout << "Hello " << name << "!" << endl;

   return 0;
}
```
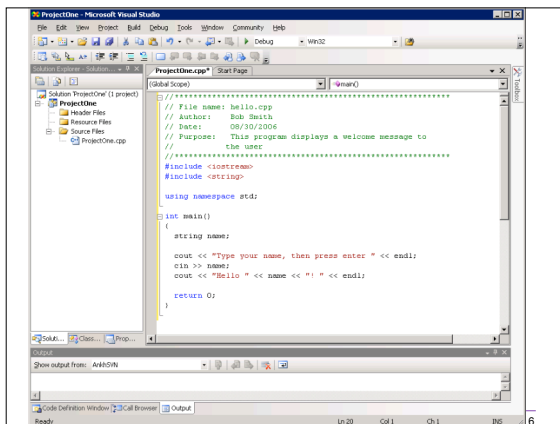
Program Output:

```
Type your name, then press enter
Shereen
Hello Shereen!
```

Building an Application

Source Code

```
#include <hdr>
int main()
{
...
}
```


YOU ARE HERE!

Preprocessor

Modified
Source Code

```
#hdr
int foo() {
...
}
int main(){
...
```

cl, gcc, cc, g++

Object Code

```
foo:  01010
main:10111
```

Compiler

app.exe

1010
1101

link, ld

Linker

Executable Code
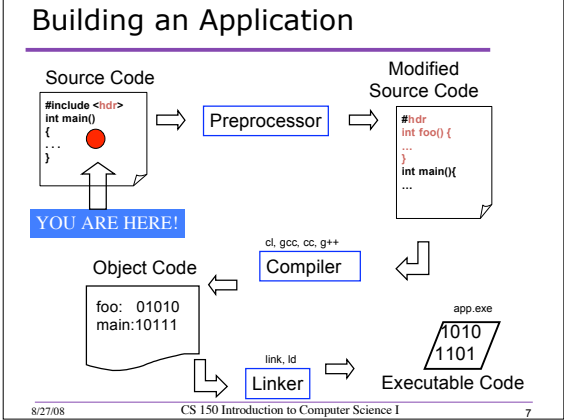
Language Elements

- Key Words
  - Have special meaning in C++
  - **using   namespace   int**
- Programmer-Defined Identifiers
  - Names made up by the programmer
  - **name**
- Operators
  - Perform operations
  - ***   =**
- Punctuation
  - Used to mark the beginning and end of the program
  - **;**

Syntax (Grammar)

- Rules that must be followed when constructing a program

- Controls the use of key words, programmer-defined identifiers, operators, and punctuation

Variables

- Names storage location in the computers memory

- Holds data

- The data can change

Address	Contents
0	Shereen
1	354
2	0.05
3	-26

`string name;`
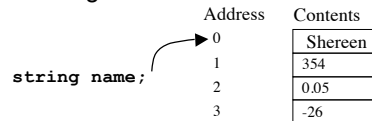
Program Components

- The C++ program on the previous slide consists of the following elements:
  - Comments
  - Preprocessor directives
  - Standard namespace
  - **main** function
  - Declaration statements
  - Executable statements

Comments

- Comments are
  - How you explain in English what the different parts of your program do
  - Ignored by the compiler
  - Very important for you and me

- The editor in Visual Studio will colour code your comments. They will be green

Comments

- There are two ways to write comments
  - `// I am a comment`
    - Anything after `//` to the end of the line will be a comment
  - `/* I am another comment */`
    - You must start the comment with `/*` and end it with `*/` in this style of comment

Preprocessor directives

- `#include <iostream>`
- `#` signifies preprocessor directive
- Processed before program translation
- `#include` tells the preprocessor to look for libraries
- `<>` signifies part of standard C++ libraries
- We'll see other examples of preprocessor directives later

Preprocessor directives

- `iostream` is the input/output stream library
- It is needed to output data to the screen and read in data from the keyboard
- `#include` takes the contents of the library file and places them in the current program

Namespace std

- **using namespace std;**
- Indicates that we will be using objects (**cout** & **cin**) that are named in a region called **std**
  - predefined objects C++ provides
- The statement ends in a semicolon
- The statement appears in all our programs

main Function

```
int main()
{
  // program statements
 return 0;
}
```

- Where the start of your program execution begins
- **return 0;** ends the main function and indicates that the program terminated successfully
- Everything within the double braces {} should be indented
  - Style!

Program Statements

- There are two types of statements that you can write inside the main (or any other) function
  - Declaration statements
    - Specify the data that is needed by the program
  - Executable statements
    - Perform operations

- All statements must end with a semicolon;

Program Statements

- Declaration statements

```
string name;
```

- Executable statements

```
cout << "Type your name, then press enter" << endl;

cin >> name;

cout << "Hello " << name << "!" << endl;
```

Program Skeleton

- All programs in C++ should have the following skeleton

```
//************************************************************
// File name: filename.cpp
// Author:    Your Name
// Date:      09/01/2004
// Purpose:   Description about what the program does
//************************************************************
#include <iostream>

using namespace std;

int main()
{
    // declaration statements

    // executable statements

    return 0;
}
```

Do try this at home (or in the lab) !

- Add New Project
  - o Visual C++ | General | Empty Project
- Add New Item
  - o C++ Source File
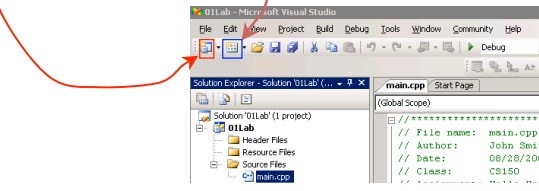
Summary

- Today we
  - Wrote our first C++ program
  - Introduced the basic components of a C++ program
- We covered p. 12 - 33 from your textbook