Your First C++ Program

C++

- Based on the C programming language

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

- Language + Libraries
  - 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
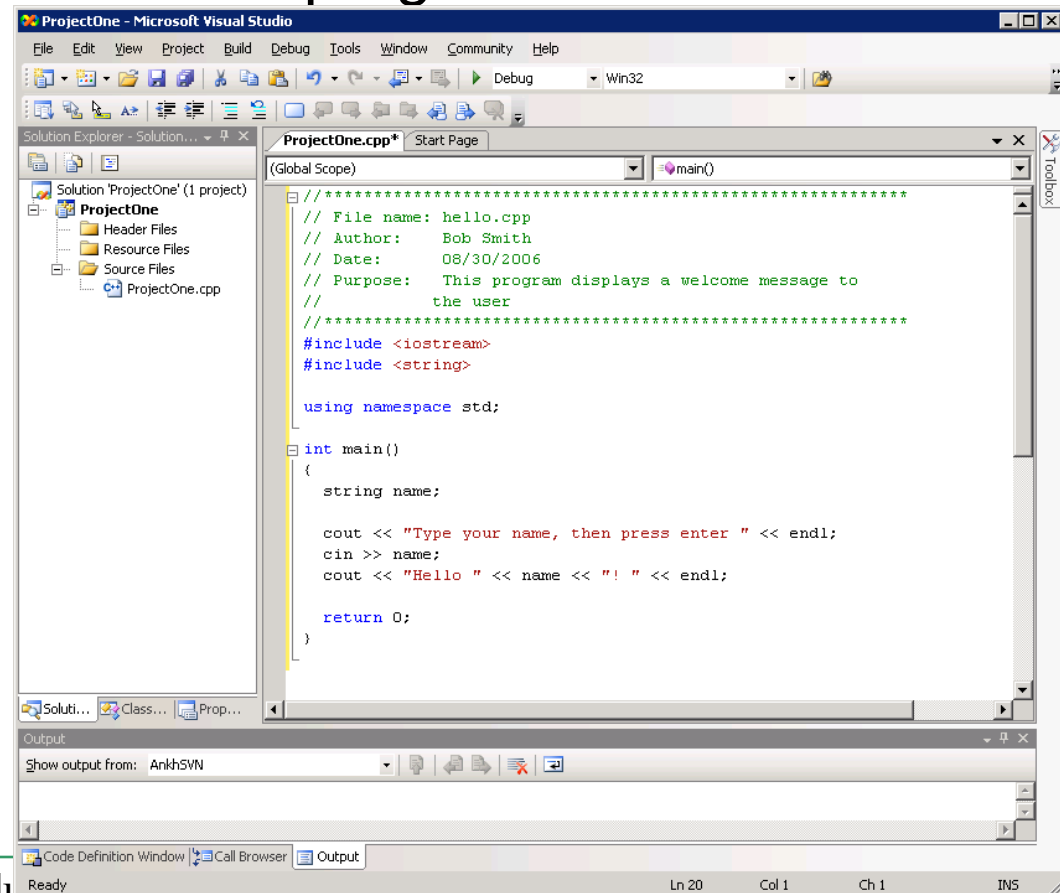
Problem

- 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:      09/02/2009
// 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
Doug
Hello Doug!
```

File   Edit   View   Project   Build   Debug   Tools   Window   Community   Help

Debug   Win32

(Global Scope)   main()

ProjectOne.cpp*   Start Page

```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;
}
```
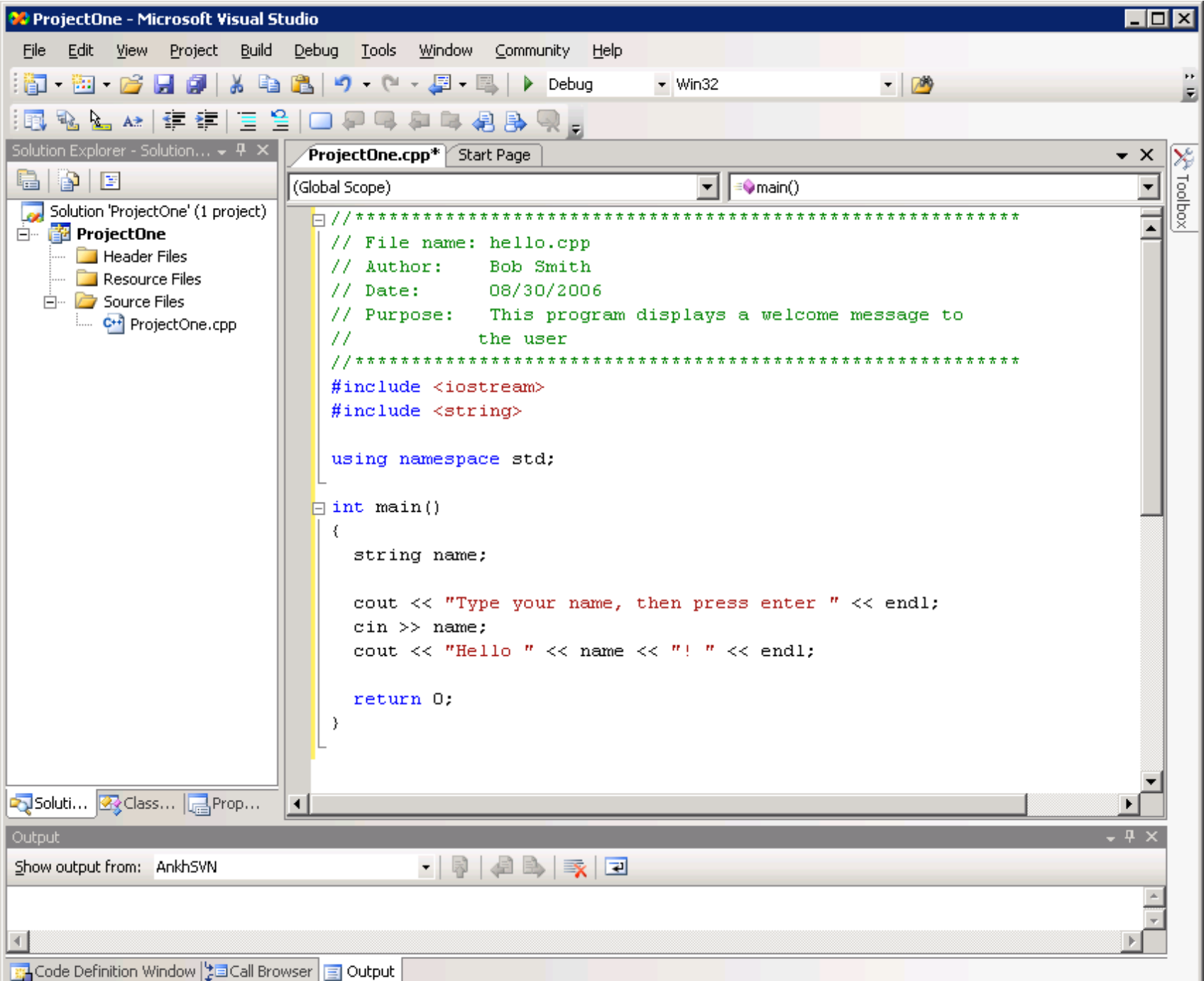
Solution Explorer - Solution...

Solution 'ProjectOne' (1 project)
ProjectOne
    Header Files
    Resource Files
    Source Files
        ProjectOne.cpp

Soluti...   Class...   Prop...

Output

Show output from: AnkhSVN

Code Definition Window   Call Browser   Output

Ready   Ln 20   Col 1   Ch 1   INS

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++

Compiler

↩

Object Code

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

⬅

↳ link, ld

Linker ➡

app.exe

```
1010
1101
```

Executable Code
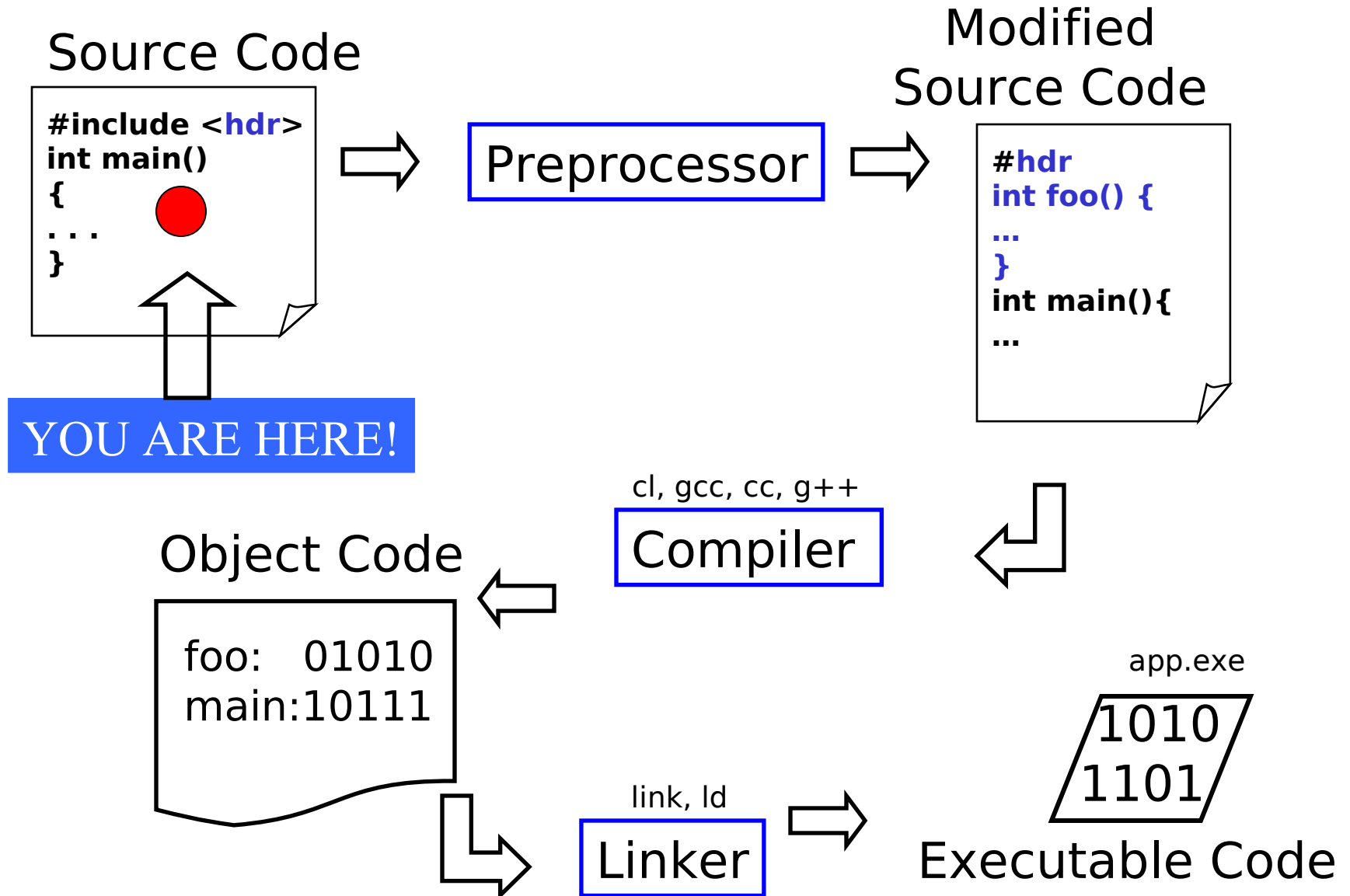
Language Elements

- 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	Doug
1	354
2	0.05
3	-26

`string name;`
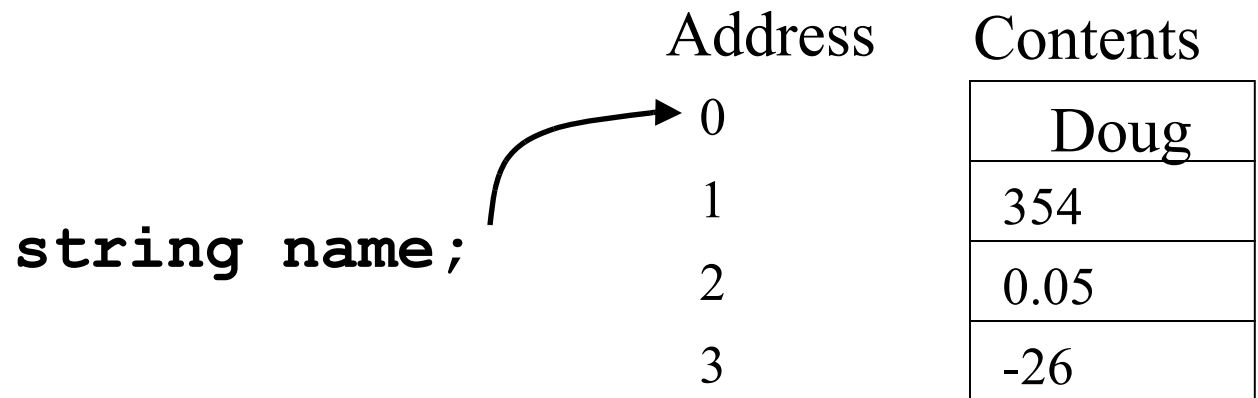
Program Components

- The C++ program on the "Your First C++ Program" 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 color 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

    o 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

```cpp
//*****************************************************
// File name: filename.cpp
// Author:    Your Name
// Date:      09/01/2009
// Purpose:   Description about what the program does
//*****************************************************
#include <iostream>

using namespace std;

int main()
{
   // declaration statements

   // executable statements

   return 0;
}
```
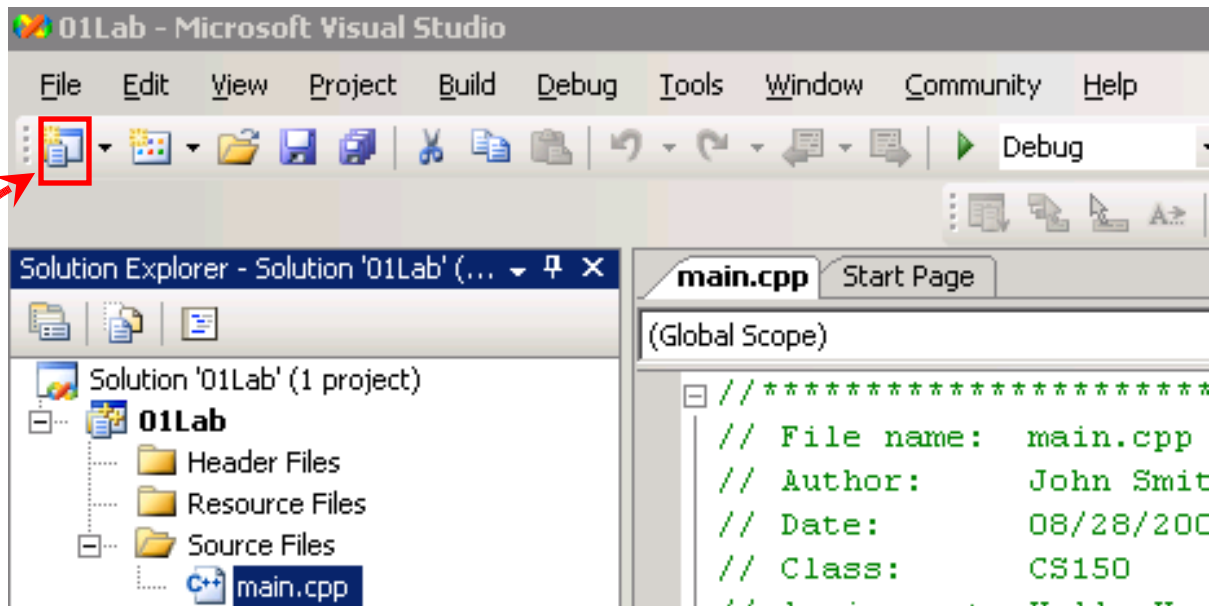
Do try this at home (or in the lab) !

- Add New Project
  - Visual C++ | General | Empty Project

- Add New Item
  - C++ Source File

CS 150 Introduction to Computer Science I
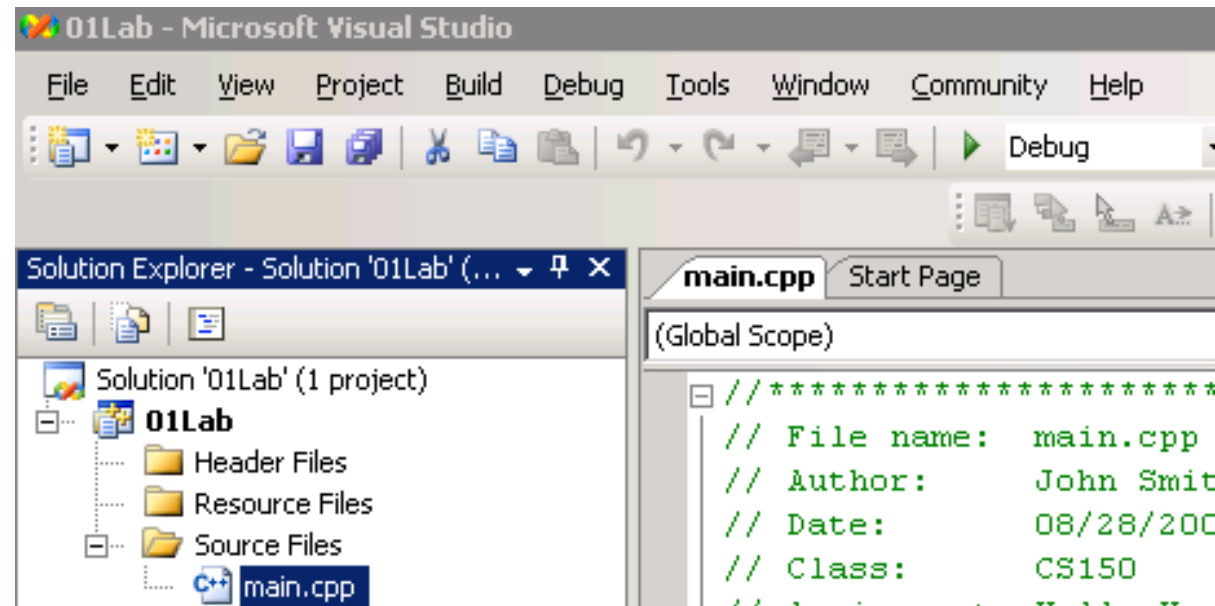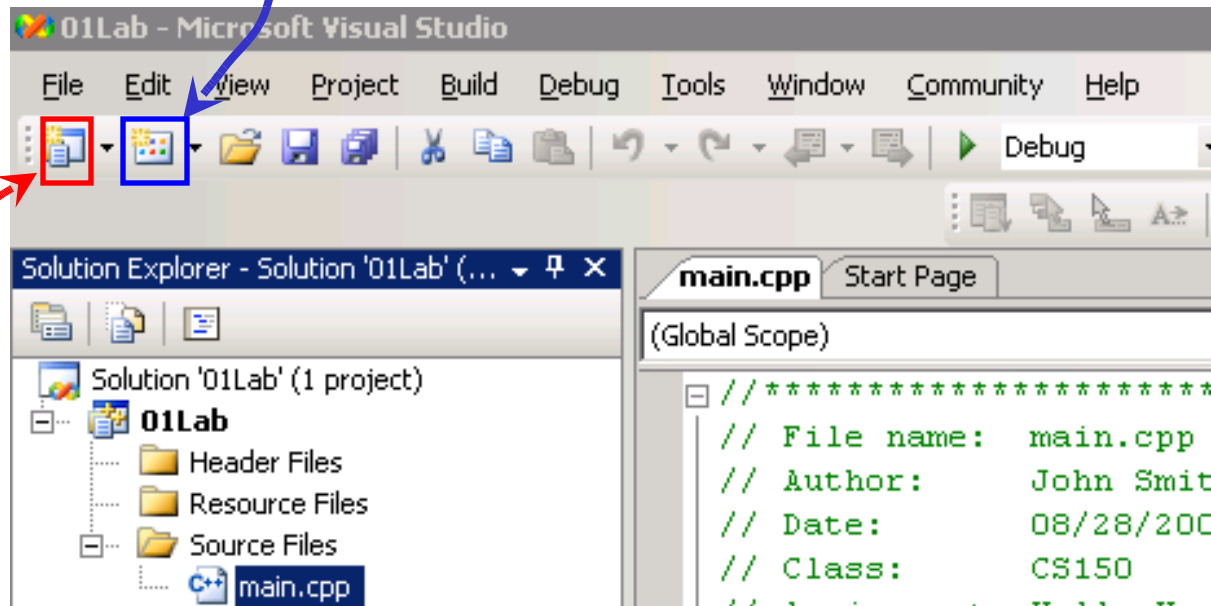
Do try this at home (or in the lab) !

- Add New Project
  - Visual C++ | General | Empty Project

- Add New Item
  - C++ Source File

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

- Add New Project
  - ○ Visual C++ | General | Empty Project

- Add New Item
  - ○ 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