Chapter 2
Introduction to C++

- Reading: Chapter 2 (2.1 to 2.3)
- Good Problems to Work: p. 37 [2.3, 2.4]

Parts of a C++ Program

- The C++ Hello World program consists of the following elements:
  - Comments
  - Preprocessor directives
  - Standard namespace
  - main function
  - Declaration statements
  - Executable statements
Program Skeleton
All programs at the beginning of this course should have the following C++ skeleton

```cpp
//***********************************************************
// File name:  filename.cpp
// Author:     Your Name
// Date:       Completion Date
// Class:      CS 150-01
// Assignment: Title of assignment
// Purpose:    Description about what the program does
//***********************************************************
#include <iostream>
#include <string>
using namespace std;

int main()
{
    // declaration statements
    // executable statements
    return EXIT_SUCCESS;
}
```

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. Comments will be green.

Comments

- There are two ways to write comments
  ```cpp
  // 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

- These need to appear at the beginning of every program that you write
- Includes C++ libraries into your program
- Examples:
  
  ```
  #include <iostream>
  #include <string>
  ```

namespace std

```using namespace std;```;

- The statement appears in all of our programs
- Programs contain several items with unique names (i.e. variables, functions, ..)
- namespaces are used to organize these names
- The statement (using namespace std;) declares that the program will be accessing entities whose names are part of the namespace called std

main function

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

- main is where program execution begins
- return EXIT_SUCCESS; ends the main function and indicates that the program terminated successfully where EXIT_SUCCESS is a predefined constant that is returned
- Everything within the double braces {} must be indented 2 spaces for correct program style
- There can be at most one main function in a program
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

string name;

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

**cout object**

- **cout** is an executable statement
- **cout** is the standard output object
- The monitor is the standard output device
- **cout** is a stream object and works with streams of data
- The executable statement
  
  ```
  cout << "Hello " << endl;
  ```
  places what into the output stream?
cout object

- Output operator (insertion operator): `<<`

- Standard output (monitor, screen): `cout`

  ```cpp
  cout << "Hello ";
  ```

  - right operand can be a string literal or variable

Program Segment #1

```cpp
cout << "one" << "two" << endl;
```

Program Segment #2

```cpp
cout << "one" << endl << "two" << endl;
```

- What is the purpose of the `endl`?
- What goes into the stream?
- What is the output?

Separate components with `<<`

```cpp
int age;
age = 18;
cout << "Sara is " << age << " years old" << endl;
```

- Don't break string literals across a line as this causes a compiler error

  ```cpp
  cout << "Sara is " << age << "years old" << endl;
  ```
Escape Characters

- These are special characters that can be output
  - escape characters are part of a string literal
- They are always preceded by a backslash \
- Examples of escape characters include:
  - \n: new line: equivalent to endl
  - \t: moves the cursor to the next tab stop
  - \": displays the backslash
  - \": outputs the double quotes
  - \a: outputs a beep!

Examples

- What is the output if a tab is set to two spaces?

```cpp
cout << "A C++ program\n";
cout << "A \nC++ program";
cout << "A C++ \nprogram";
cout << "A\tC++\n\tprogram";
```

Tricky Question

- What is the output produced by executing the following C++ statement?

```cpp
cout << "\\" << endl << "\n";
```