What Data Do We Have?

Sections 2.2, 2.5

August 29, 2008

Today

- Last time, we saw a C++ program
  - You wrote your first program in Lab!
- What are the main components of every C++ program?
- Today we will
  - learn more about output
  - learn how C++ stores data
    - what types of data can C++ store?

---

main Function

- **int main()**
- A group of one or more programming statements
- The set of parentheses indicate a function
- C++ is case-sensitive
  - **int Main()** is incorrect!!!

cout Object

- **cout** object is the standard output object
- The monitor is the standard output device
- **cout** is a stream object and works with streams of data
  - o Streams of characters
  - o Streams?

- What statement gives us access to **cout**?

cout Object

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

- Standard output (monitor screen): **cout**

- **cout << "Hello out there!";**
  - o right operand
    - string literal
    - variable

cout Object

- What is the output?

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

- **endl** will move the cursor to a new line
- Statement must end in a semicolon

cout Object

- Other ways of outputting the same message

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

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

- Everything will output to the same line unless you specify otherwise

---

cout Object

- Separate components with **<<**

```
int kms;
kms = 4;
cout << "Enter the distance in miles" << endl;
cout << "The distance in kilometers is " << kms << endl;
```

- Don't break string literals across a line

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

  o Compiler error!

Problem

- 1. What is the output?

```
cout << "My name is: ";
cout << "Doe, Jane." << endl;
cout << "I live in ";
cout << "Ann Arbor, MI ";
cout << "and my zip code is "
    << 48109 << ". " << endl;
```

3

Problem

- 2. How are the following different?
  - o what will each look like on the

- What is the output?

  ```
  cout << "Please type your name: " << endl;
  ```

- What is the output?

  ```
  cout << "Please type your name: ";
  ```

Escape Characters

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

Problem

- 3. Write the C++ statements necessary to perform the following operation
  - o Display the message below onto the screen

    ```
    "C++      is a useful
    language to know"
    ```

4

Examples

- 4. What is the output?

```
cout << "This is a C++ program\n";
cout << "This is a \nC++ program";
cout << "\"This is a C++ program\"";
cout << "This is a\tC++\tprogram";
```
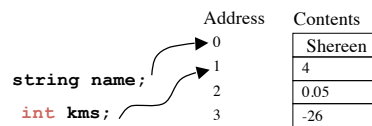
Variables

- Named storage location for holding data
  - o named piece of memory
- You need to determine what variables you need
  - o what **data** do we need to handle?

	Address	Contents
	0	Shereen
`string name;`	1	4
	2	0.05
`int kms;`	3	-26

Variable Definition

- `int number;`
- Tells the compiler
  - o The variable's type (`int`)
  - o The variable's name (number)
- `int` is short for integer
- Variable definitions end with a semicolon

Assignment

- **number = 5;**

- = is an operator that copies the value on its right into the variable on its left

- The item to the left of the = operator must be a variable

- Let's look at program 2-7 on p. 38, also on the next slide

Variables

```
1  // This program has a variable
2  #include <iostream>
3  using namespace std;
4
5  int main() // what is the output of this program?
6  {
7    int number;
8
9    number = 5;
10   cout << "The value of number is " << "number" << endl;
11   cout << "The value of number is " << number << endl;
12
13   number = 7;
14   cout << "Now the value of number is " << number << endl;
15
16   return 0;
17 }
```

Problem

- 5. What variables/data will you need for the following program? (talk it over with your neighbor)

- Write a program that will determine your average exam grade in this course and output that average to the screen. Remember, we will have three midterm exams. Don't count the final exam in this average.

String Literals

- Placing quotations around a variable name changes it to a string literal

```
cout << "The value of number is " << "number" << endl;
```

- What is the output of the statement
  - `cout << "endl";`

Exercises

- 6. Which of the following are legal C++ statements?

```
int a;


a = 7;
7 = a;
7 = 7;
```

7. What problems can you spot?

```
1  // What problems can you spot here?
2  #include "iostream"
3  user namespace standard;
4
5  int MAIN()
6  { /* this program has errors in it!  Can you find them?
7    string number;
8    int number;
9    number = 5;
10   cout << "The value of number is " << "number" endl;
11   cout >> "The value of number is " >> number >> endl;
12
13   7 = number;
14   cout << "Now the value of number is " << number << endl;
15
16
17 }
```

Summary

- In today's lecture we covered
  - **main** function
  - **cout** object
  - How data that is used by a program can be declared and stored

- We have covered sections 2.2 & 2.5 of your textbook
- Homework: page 67: 1-5, 9 - 12