CS150 Intro to CS I

Fall 2015

Chapter 6
Functions

- Reading: pp. 299-323
- Good Problems to Work: pp. 321 [6.5, 6.6, 6.7, 6.8, 6.10]

Function

- "A collection of statements that perform a specific task"
  - Functions can be accessed at any point in the code through a *function call*
  - Functions can optionally *return* a value
  - Built-in functions already exist

```
#include <cmath>
cout << pow (2.0, 3.0); // 2.0 raised to 3.0
```

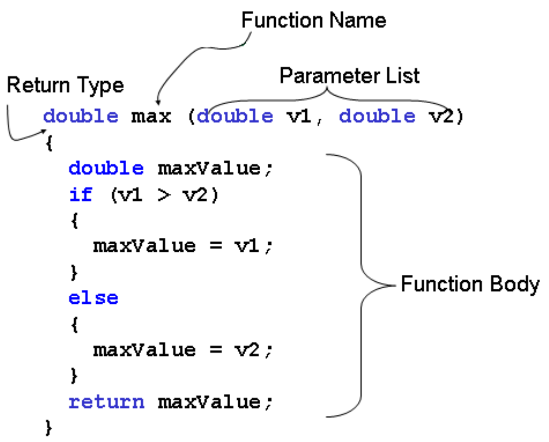
Function

- Functions
  1. are a way of building *modules* in your program
  2. encapsulate some calculation
  3. result in less repetitive code
  4. have a singular theme

Writing Functions

- Suppose we want to write a function **max** that returns the maximum value of two double values.
- What would a ***call*** to the function look like?

Max Function Definition



```
double max (double v1, double v2)
{
  double maxValue;
  if (v1 > v2)
  {
    maxValue = v1;
  }
  else
  {
    maxValue = v2;
  }
  return maxValue;
}
```

Function Calls

```
int main ()
{
  double value1, value2, x = 1.5, y = 1.51;

  // must match data types & parameters
  value1 = max (4.2, 2.4);
  value2 = max (x, y);

  cout << value1 << " " << value2
       << max (-1.0, -2.0);

  return EXIT_SUCCESS;
}
```

Compiling Functions Method 1 (preferred method)

```
// Function prototype (or function declaration)
double max (double v1, double v2);

int main ()
{
  cout << max (4.2, 2.4);
  return EXIT_SUCCESS;
}

// Function definition (slide 6 has complete definition)
double max (double v1, double v2)
{
  . . .
  return maxValue;
}
```

Compiling Functions
Method 2

```
// Function definition
double max (double v1, double v2)
{
  . . .
  return maxValue;
}

int main ()
{

  cout << max (4.2, 2.4);
  return EXIT_SUCCESS;
}
```

Functions

- You are to use method 1 for your programming assignment solutions
- A function is a group of statements intended to perform a specific task (not specific tasks)
- The function is accessed through a function call
- A function can optionally return a value

Practice

- Write a function **factorial** (N! = N * (N-1) * … * 2 * 1) to calculate the factorial of a given integer.
- Write some C++ statement to use the function to print 4!

void Functions

- Not all functions need to produce a value

```
void printDayOfWeek (int day)
{
  if (SUNDAY == day)
  {
    cout << " Sunday ";
  }
  else if (MONDAY == day)
  {
    cout << " Monday ";
  }
  . . .
  return; // no return value!
}
```

Practice

- Write a function that will calculate the average of three integers and print the result to the screen.
  - What parameters do your need?
  - What should the return type be?
- Write some C++ statements to call this function to determine the average of three integers given by the user.

Commenting a function definition

```
/*****************************************************
Function:    maximum

Description: finds the maximum value of two values

Parameters:  value1 - first value of the pair
             value2 - second value of the pair

Returned:    the maximum value
*****************************************************/

double maximum (double value1, double value2)
```

Practice

- Write a function **charFlip** that flips the case of a letter. When an upper case letter is given, return the lower case version. When a lower case letter is given, return the upper case version.
- If a punctuation or numeric character is given, just return that character.
  - What parameters do you need?
  - What should the return type be?

Passing Arguments

- What is a function argument?
- What is a function parameter?

- A copy of the argument is made in the parameter
- If a parameter is changed in the function, is that reflected in main?

What will happen?

- What are the arguments? parameters?

```
void swap (int value1, int value2)
{
  int tmp = value1;

  value1 = value2;
  value2 = tmp;
  cout << value1 << " " << value2 << endl;
  return;
}

int main ()
{
  int x = 9, y = 10;
  swap (x, y);
  cout << x << " --- " << y << endl;
  return EXIT_SUCCESS;
}
```