C++ for Science and Engineering COSC3000/6000

2018 Spring Semester

Part IV
Functions for All Subtasks

1 void-functions

- In top-down design, a subtask might produce
    - No value (just input or output for example)
    - One value
    - More than one value
- We have seen how to implement functions that return one value
- A **void-function** implements a subtask that returns no value or more than one value

1.1 void-Function Definition

- Two main differences between void-function definitions and the definitions of functions that return one value
    - Keyword **void** replaces the type of the value returned
        * **void** means that no value is returned by the function
    - The return statement does not include and expression
- Example:
```cpp
void show_results(double f_degrees, double c_degrees)
{
        using namespace std;
        cout << f_degrees << " degrees Fahrenheit is euivalent to " << endl
                << c_degrees << " degrees Celsius." << endl;
}
```

1.2 Using a void-Function

- void-function calls are executable statements
    - They do not need to be part of another statement
    - They end with a semi-colon
- Example:
```cpp
show_results(32.5, 0.3);
```
NOT:
```cpp
cout << show_results(32.5, 0.3);
```

1.3   void-Function Calls

- Mechanism is nearly the same as the function calls we have seen

    - Argument values are substituted for the formal parameters
        * It is fairly common to have no parameters in void-functions
            · In this case there will be no arguments in the function call
    - Statements in function body are executed
    - Optional return statement ends the function
        * Return statement does not include a value to return
        * Return statement is implicit if it is not included

1.4   return statement in void-Function

- Is a return-statement ever needed in a void-function since no value is returned?

    - Yes!
        * What if a branch of an if-else statement requires that the function ends to avoid producing more output, or creating a mathematical error?

```cpp
void show_results(double f_degrees, double c_degrees)
{
        using namespace std;
        if (isnan(f_degrees) || (isnan(c_degrees)){
                return;
        }
        cout << f_degrees << " degrees Fahrenheit is euivalent to " << endl
                << c_degrees << " degrees Celsius." << endl;
}
```

1.5   The Main Function

- The main function in a program is used like a void function...do you have to end the program with a return-statement?

    - Because the main function is defined to return a value of type **int**, the return is needed.
    - C++ standard says the return 0 can be omitted, but many compilers still require it.