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**CIS115 Introduction to Programming and Logic**

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LAB 19 BUILDING A PROGRAM WITH MODULES

# Objectives

- How to design a program with modules

- How to write code for a function

- How to invoke a function

- How to write function prototypes

# Goals

In this lab assignment, students will demonstrate the abilities to:

- Design a program with modules

- Write code for a function

- Invoke a function

- Write function prototypes

# Instruction and Problems

You are asked to correct or write a C++ program in each of the following problem.

## Problem 1

There are two functions in the following program:

**main**

**courseDescription.**

The function **courseDescription** displays a description of CIS115. The code of this function is already written. Please do the following:

(a) Write a function prototype statement for the function **courseDescription**.

(b) Add a statement in **main** function to invoke the function **courseDescription**.

// File: Lab19P1.cpp

// Created by Man-Chi Leung on 7/22/13

// This program display a description of CIS115

#include <cstdlib>

#include <iostream>

using namespace std;

// insert function prototype statement here

int main()

{

// insert statement here to invoke the function **courseDescription**

system("pause");

return 0;

}

void **courseDescription()**

{

cout << "This course introduces computer programming " << endl;

cout << "and problem solving in a structured program " << endl;

cout << "logic environment. Topics include language " << endl;

cout << "syntax, data types, program organization, " << endl;

cout << "problem solving methods, algorithm design, " << endl;

cout << "and logic control structures. Upon completion, " << endl;

cout << "students should be able to manage files with " << endl;

cout << "operating system commands, use top-down " << endl;

cout << "algorithm design, and implement algorithmic " << endl;

cout << "solutions in a programming language." << endl;

}

Please save your C++ program code in a file named **Lab19P1.cpp**. Submit both the source code, **Lab19P1.cpp,** file and the executable, **Lab19P1.exe,** to Blackboard for credit. **Do not change the names of these files**.

## Problem 2

A student was asked to write a two-function program to calculate volume. The design of the program is like this: the main function invokes the function findVolume, which asks for length, width and height and calculates volume. The following is the code written by the student. There are multiple mistakes in the program. Please correct them.

// File: Lab19P2.cpp

// Created by Man-Chi Leung on 7/22/13

// This program calculates volume

#include <cstdlib>

#include <iostream>

using namespace std;

int main()

{

void findVolume()

{

// Declare variables

double length = 0.0;

double width = 0.0;

double height = 0.0;

double volume = 0.0;

// Request input

cout << "Enter length: ";

cin >> length;

cout << "Enter width: ";

cin >> width;

cout << "Enter height: ";

cin >> height;

// Calculate volume and display it

volume = length \* width \* height;

cout << "Volume : " << volume << endl;

}

system("pause");

return 0;

}

Please save your C++ program code in a file named **Lab19P2.cpp**. Submit both the source code, **Lab19P2.cpp,** file and the executable, **Lab19P2.exe,** to Blackboard for credit. **Do not change the names of these files**.

## Problem 3

We saw the following example in a previous lesson. It is a long program that simulates a voice mail system. There are more than 100 lines of code in the **main** function.

// File: VoiceMail.cpp

// Created by Man-Chi Leung on 1/22/13

// This program simulates a hierarchical voice mail system

#include <cstdlib>

#include <iostream>

using namespace std;

int main()

{

// Declare variables

double deptChoice = 0;

double instChoice = 0;

// Request input

cout << "Thank you for calling the Computer Technologies Division." << endl;

cout << "Press 1 for Programming department" << endl;

cout << "Press 2 for Database Management department" << endl;

cout << "Press 3 for Game Development department" << endl;

cout << "Press any other number to go to the secretary" << endl;

cin >> deptChoice;

// Display message depending on dept and instructor choices

if (deptChoice == 1)

{

cout << "You have reached the Programming Department." << endl;

cout << "Press 1 for Al Molin" << endl;

cout << "Press 2 for Witold Sieradzan" << endl;

cout << "Press 3 for Hong Cui" << endl;

cout << "Press 4 for Mary Orazem" << endl;

cout << "Press 5 for Hillary Paul" << endl;

cout << "Press any other number to go to the secretary" << endl;

cin >> instChoice;

if (instChoice == 1)

{

cout << "You have reached the voicemail of Al Molin." << endl;

cout << "Please leave a message after the beep." << endl;

}

else if (instChoice == 2)

{

cout << "You have reached the voicemail of Witold Sieradzan." << endl;

cout << "Please leave a message after the beep." << endl;

}

else if (instChoice == 3)

{

cout << "You have reached the voicemail of Hong Cui." << endl;

cout << "Please leave a message after the beep." << endl;

}

else if (instChoice == 4)

{

cout << "You have reached the voicemail of Mary Orazem." << endl;

cout << "Please leave a message after the beep." << endl;

}

else if (instChoice == 5)

{

cout << "You have reached the voicemail of Hillary Paul." << endl;

cout << "Please leave a message after the beep." << endl;

}

else

{

cout << "You have reached the voicemail of the secretary." << endl;

cout << "Please leave a message after the beep." << endl;

}

}

else if (deptChoice == 2)

{

cout << "You have reached the Database Management Department." << endl;

cout << "Press 1 for Peter Chen" << endl;

cout << "Press 2 for Frank Chao" << endl;

cout << "Press any other number to go to the secretary" << endl;

cin >> instChoice;

if (instChoice == 1)

{

cout << "You have reached the voicemail of Peter Chen." << endl;

cout << "Please leave a message after the beep." << endl;

}

else if (instChoice == 2)

{

cout << "You have reached the voicemail of Frank Chao." << endl;

cout << "Please leave a message after the beep." << endl;

}

else

{

cout << "You have reached the voicemail of the secretary." << endl;

cout << "Please leave a message after the beep." << endl;

}

}

else if (deptChoice == 3)

{

cout << "You have reached the Game Development Department." << endl;

cout << "Press 1 for Cindy Foster" << endl;

cout << "Press 2 for Brad Sewaringen" << endl;

cout << "Press 3 for Brandon Crews" << endl;

cout << "Press any other number to go to the secretary" << endl;

cin >> instChoice;

if (instChoice == 1)

{

cout << "You have reached the voicemail of Cindy Foster" << endl;

cout << "Please leave a message after the beep." << endl;

}

else if (instChoice == 2)

{

cout << "You have reached the voicemail of Brad Sewaringen." << endl;

cout << "Please leave a message after the beep." << endl;

}

else if (instChoice == 3)

{

cout << "You have reached the voicemail of Brandon Crews." << endl;

cout << "Please leave a message after the beep." << endl;

}

else

{

cout << "You have reached the voicemail of the secretary." << endl;

cout << "Please leave a message after the beep." << endl;

}

}

else

{

cout << "You have reached the voicemail of the secretary." << endl;

cout << "Please leave a message after the beep." << endl;

}

system("pause");

return 0;

}

Rewrite this program like this:

**Create 3 additional functions:** **progDept**, **dbaDept** and **gameDept** to handle the call within the programming, database and game development department, respectively. In the **main** function, after the user has chosen a department, invoke the appropriate function to handle the call within the department.

Please save your C++ program code in a file named **Lab19P3.cpp**. Submit both the source code, **Lab19P3.cpp,** file and the executable, **Lab19P3.exe,** to Blackboard for credit. **Do not change the names of these files**.

# Grading rubric

For Problem 1: Function prototype [10 points]

Invoking function [10 points]

For Problem 2 & 3: Function prototype [10 points]

Invoking function [10 points]

Function definition [20 points]