

# CS150 - 1

## Lab 2: Software Development

**Date:** Tuesday, September 3, 2003.

**Total points:** 20.

**Summary of assignment:** Write a simple program and make a backup copy.

**Due date:** Tuesday, September 9, 2003 at 8:00 am.

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The objective of this lab is to learn to use the software development method to solve a problem.

In this lab, we will do the following:

- 1) Apply the Software Development Method to a problem.
- 2) Write a simple program and create a backup copy of the program.

This lab is also an exercise in following directions. Carefully read each step and do not proceed to the next step unless you have successfully completed your current step.

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### **First Things First:**

- The first thing we want to do is create a new project. Start CodeWarrior and create a new project. Call the project 'xxxxx-Lab2', replacing the x's with your PU net ID. **Remember to create the project in your (Winter) folder.**
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Now, we're ready to start programming! First, we need a problem to solve. Here is your mission for today:

### **The Problem:**

**You are applying for a loan to buy a new car. Luckily, for you, you managed to get a simple, indicated interest loan. You want to write a program that calculates the monthly payments for any length of the loan (e.g. 12 months, 24 months, etc.) Since we assume that the payments will be equal, the formula for calculating the payment is:**

**`Payment=(principal*(1+interest rate)+service charge)/number of months`**

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### **Steps for Software Development:**

- 1) First we need to understand the program requirements. What needs to be calculated? Is there any more information that we need?

2) Next, we need a program analysis. Answering the following questions will help step you through the process.

- What is the input for your program? What units will it be in?
- What is the output of your program? What units will it be in?
- Is there any data that will be internal to your program?
- What are the calculations needed for your program?

3) What is the algorithm to do this problem?

4) I've written the C++ code that solves this problem. Type the program into CodeWarrior replacing the current contents of 'hello.cpp'. Compile the program and run it.

Now, look at the file. I left out a lot of comments. Please add the appropriate comments to the file that document the steps used to the problem. Also, write comments that tell you what each constant and variable is when it is declared. Make sure the program still runs properly after you added the comments.

5) How can you verify that this program works properly?

6) You've changed your mind about this problem. You feel that the program should be more general. How would you change the program so that it worked for any loan amount and interest rate? Make those changes in your code.

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### **Creating a Backup:**

It is always a good idea to create backup copies of your work. You should do this whenever you work on your code, not just when you finish. In this case, create a backup copy of your program folder. Call it 'xxxxx-Lab2-bak'. How could you do this? Can you think of more than one way to do this?

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### **Finishing the lab:**

If you've managed to finish the lab during lab time, notify the lab assistant or the professor to show them your work. They will record that you successfully completed the lab. You're done! If you don't finish during lab time, then place BOTH your program AND the backup copy of your program in the 'CS150-01 Lab' folder on Winter.

**You must place your program for this lab in the folder by next Monday at 8:00 am or you won't receive credit.**

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### **Post Lab Exercise:**

See if you can write a program that calculates the area of a circle. Use the software development method demonstrated in this lab.

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```

// Author: Shereen Khoja
// Date: Aug 29 2003
// -----
// Purpose: This program calculates the monthly payments on a loan.
// -----

#include <iostream>

int main()

    using namespace std;

    const float servicecharge = 25.0;

    float principal;
    float interestrate;
    float payment;
    int numberofmonths;

    principal = 2000.0;
    interestrate = 0.105;

    cout << "The principle is: $" << principal << endl;
    cout << "The interestrate is: $" << interestrate << endl;
    cout << "The service charge is: $" << servicecharge << endl << endl;

    cout << "What is the loan period in months? ";
    cin >> numberofmonths;

    payment = (principal * (1 + interestrate) + servicecharge) / numberofmonths;

    cout << endl << "Your payment will be: $" << payment << " per month";

    return 0;

```