CPSC 122 Computer Science II

Gonzaga University

Daniel Olivares

Software Development Method

- Equivalent to the "Scientific Method" in the sciences and the "Systems Approach" in business.
- Six basic steps:
    - Specify problem requirements
    - Analyze the problem
    - Design an algorithm to solve the problem
    - Implement the algorithm
    - Test and verify the completed program
    - Maintain and update the program
- Developing software is an iterative process, your first solution is generally not your best. Your understanding of software your required to build evolves as you understand the problem more. At this point don't be afraid to make mistakes!

Software Development Practice Problems

Apply the software development method to the practice problems below. To help you do this, answer the following questions for each problem:

1. **Specify the problem requirements** (state the problem clearly in your own words):

2. **Analyze the problem** (identify the following):
    a. Inputs:

    b. Outputs:

    c. Additional requirements (relationship between the inputs and outputs?):

3. **Design the algorithm to solve the problem** (write it out in pseudocode):

4. **Implement the algorithm** (code up your solution in the VM)

5. **Test and verify the completed program** (be sure to run your program with different inputs and double check the output is correct)

Note: Some problem descriptions have been adapted from Chapter 2 of Hanly & Koffman.

For the example problem, you'll see a possible demonstration of the software development method applied to a solution on the following page.

Example Problem: Tax Program

Write a program to compute the total price for a purchase after sales tax. Prompt the user to enter the purchase amount and the sales tax percent. Display the total price after adding the sales tax to the purchase amount.

Example output:

```
Please enter the purchase price: 9.00
Please enter the sales tax as a percent (%): 7.8
Total purchase price after tax: $9.70
```

```cpp
#include <iostream>

using namespace std;

int main() {
    // SW development method
    // 1. problem requirements
    // compute total purchase amount based on price and tax percent

    // 2. analyze the problem
    // inputs: purchase price and tax percent
    // outputs: total amount you pay
    // relationships:
    // tax amount = percent tax / 100.0 * purchase price
    // total amount you pay = purchase price + tax amount

    // 3. design the algorithm (pseudocode)
    // prompt for purchase price and tax percent
    // compute tax amount using purchase price and tax percent
    // compute total amount using purchase price and tax amount
    // display total amount result

    // 4. implement the algorithm (C++)
    double purchasePrice = 0.0;
    double taxPercent = 0.0;
    double taxAmount = 0.0;
    double totalPrice = 0.0;

    cout << "Enter the purchase price: ";
    cin >> purchasePrice;
    cout << "Enter the tax percent: ";
    cin >> taxPercent;

    taxAmount = purchasePrice * taxPercent / 100.0;
    totalPrice = purchasePrice + taxAmount;
    cout << "Total purchase price after tax: $" << totalPrice << endl;

    // 5. test the completed program
    // test with values from sheet
    // $9.00 and 7.8% -> $9.70

    // 6. maintain the program

    return 0;
}
```