CS241L Fall 2022 - Homework #1 Computer Systems. Algorithms, data, programs.

Soraya Abad Mota

Assigned on Aug. 25, 2022 - **Due** **Sep.** **1,** **2022**

1. Answer all the following review questions about the topics discussed on Chapter 1 of the textbook.

(a) Fill in the blanks:

i. A computer system consists of both software and hardware.

ii. List the three major hardware components of a computer.

RAM, CPU, persistent storage.

iii. A compiler translates a high-level language program to machine language.

iv. Information supplied to an application program is called input devices.

v. Information produced by an application program is called output devices .

2. Consider these two programming hints:

● Variables used for totals and counts must always be properly initialized to reﬂect the possibility that there may not be any data to process .

● Check that input data is valid. Validation of input data is critical.

Give examples of consequences of not following them and getting an execution error or in- correct results, from your experience in a programming language that you have used before (could be Python or Java). Be very speciﬁc and provide some erroneous code that would lead to inconsistent results or errors.

Copyright: this question from leetcode. written in Java.

class {

public int numGoodNodes = 1;

public int goodNodes(TreeNode root) {

dfs(root, Integer.MIN\_VALUE);

return numGoodNodes;

}

public void dfs(TreeNode node, int maxSoFar){

if(maxSoFar <= node.val){

numGoodNodes++;

}

if(node.right != null){

dfs(node.right, Math.max(node.val, maxSoFar));

}

if(node.left != null){

dfs(node.left, Math.max(node.val, maxSoFar));

}

}

}

From this example, all the input data are valid however the result is incorrect due to assigning the wrong pointer in the array. If changes the input value of 1 on line 2 to 0 which the computer will calculated from index 1 of the array instead of the index 2.

3. Do the following exercises from Chapter 2.

(a) Exercises 2.7 and 2.8 on page 80.

2.7) Identify and correct the errors in each of the following statements. (Note: There may be more than one error per statement.)

a) Missing the % becuase it is a format specifier. It should be scanf(“%d”, value);

b) Because \n is also a escape sequence, so it should be included in the double quote. It should be printf(“The product of %d and %d is %d\n”, x, y);

c) There are two errors in here, first, it missing a semicolon. Second since the equal sign is calculated from right to left so it should be sumOfNumbers=firstNumber+secondNumber;

d) There are two errors in here, first it should be >=, also, it should use comparison operator which is = instead of == in here. "if (number >= largest) {

    largest = number;

 }"

e) The multiline comment should be /\*, the asterisk should be inside of the slash. "/\* Program to determine the largest of three integers \*/"

f) First of all, all key terms all lower case. Second & is required. scanf(“%d”, &anInteger);

g) It should be specify that x%y is %d type, therefore another %d should added before \n. printf(“Remainder of %d division by %d is %d\n”, x, y, x%y);

h) since it is an equivalency, it should be ==, and there should be no semicolon in if statement before {, and there is a missing double quote. If(x==y){ printf(“%d is equal to %d\n”, x, y); }

i) first, because the statement include %d, so it should be printf, then the double quote should qppear before the comma. So, printf(“The sum is %d\n”, x+y);

j) Three errors, smaller case P, missing double quote, and no & should be used in here. It’s like printf(“The value you entered is: %d\n”, value);

2.8) Fill-In the blanks in each of the following:

a) Comments are used to document a program and improve its readability.

b) The function used to display information on the screen is printf().

c) A C statement that makes a decision is if statement.

d) Calculations are normally performed by arithmetic statements.

e) The scanf function inputs values from the keyboard."

(b) Exercises 2.10, 2.12, and 2.13 on page 81.

2.10) State which of the following are true and which are false. If false, explain why.

a) false. Not all C operators evaluate from left to right, for example the equality operator are read from right to left.

b) true

c) false. Because it is a string in a printf statement, it should not only a string, there should be some assignment with the string for printf statement.

d) true

e) false.h22 is a valid variable name in here while the others are not.

2.12) What, if anything, displays when each of the following statements is performed? If nothing displays, then answer “Nothing.” Assume x=2 and y=3.

A) 2

B) 4

C) x=

1. x=2
2. 5=5
3. Nothing
4. Nothing
5. Nothing

I)

\*\*a new lint in here\*\*

2.13) Which of the following C statements contain variables whose values are replaced?

A) No values here are being replaced.

B)  i + j + k + 7 is being replaced to the value p in here.

1. No values here are being replaced.
2. No values here are being replaced.