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Final Exam Review

CS 124 – Intro to Software Development

Macbeth – Lesson 14.1

Agenda

- Opening Prayer
- Scripture
- Final Exam Review
- Looking Ahead

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Scripture

Mosiah 4:19,21

For, behold, are we not all beggars? Do we not all depend upon the same Being, even God, for all the substance which we have, for both food and raiment, and for gold, and for silver, and for all the riches which we have of every kind?

And now, if God, who has created you, on whom you are dependent for your lives and for all that ye have and are, doth grant unto you whatsoever ye ask that is right, in faith, believing that ye shall receive, O then, how ye ought to impart of the substance that ye have one to another.

Unit 3 Test – Most Missed Problems

How do you open a file stream to read from a file called "data.txt"?

Answer: ifstream f("data.txt")

Pay attention to the phrase "to read" vs "to write". The latter would be ofstream.

Unit 3 Test – Most Missed Problems

When reading a file using a stream called "fin", what boolean condition would you use to read one word at a time into a variable called "text"?

```
while (<????>)
{
   // Do something with the variable text
}
```

Answer: fin >> text

Make sure the carets are the same as a cin. This will put the word into the text variable. If the read failed because we are at the end of the file, then this will return false and cause the loop to exit.

Unit 3 Test – Most Missed Problems

Which of the following statements is false?

a) When passing an array, the address to the first element of the array is passed to the function. --- true statement
b) Passing an array of floats does not require an array size parameter.
c) Passing an array of characters does not require an array size parameter.
d) Passing an array is done by reference. -- true statement

Answer: b is false. You need to pass the size of the array as a separate parameter so you can traverse it. Remember that character arrays don't need size because you can look for the NULL character.

Unit 3 Test – Most Missed Problems

If you have the following code:

```
int *ptr = 0;
int value = 42;
```

which of the following will create a segmentation fault?

a) ptr = &value -------- this will set ptr to the address of value … a good thing.
b) ptr++ -------- this will set ptr equal to the address of 1 … not useful, but no seg fault
c) *ptr = value -------- this will set the value at address 0 to 42 … very bad … seg fault!
d) value-- -------- this will set value equal to 41 … not our favorite #, but no seg fault

answer: c

Unit 3 Test – Most Missed Problems

What is the output of the following code:

```
int x = 1;
int y = -1;
int *ptr;
if (x < y)          ---- if 1 < -1 (false … goto the else)
{
   ptr = &x;
}
else
{
   ptr = &y;      ----- ptr equal to the address of variable y
}
cout << *ptr;   ----- print value stored at ptr address … which is equal to the address of y …. so print y
```

answer: -1

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Unit 3 Test – Most Missed Problems

For the following code:

```
float x = 5;
```

which of the following would not result in a compiler error?

a) `float *x = &x;` --- Already have a variable called x … compiler error!
b) `float *y = &x;` --- Set float pointer y equal to the address of float x … perfect!
c) `int *z = &x;` --- z is a pointer to an int and x is a float … mismatch … compiler error!
d) `char *w = &x;` --- w is a pointer to a char and x is a float … mismatch … compiler error!

answer: b

Unit 3 Test – Most Missed Problems

For the following character array:

char school[10] = "BYU-I";

what is the address of the letter 'Y'?

answer: school+1

Be careful about the word "address".

school == &school[0] == address of the first character == address of 'B'
school+1 == &school[1] == address of the second character == address of 'Y'
school+2 == &school[2] == address of the third character == address of 'U'
and so forth….

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Unit 3 Test – Most Missed Problems

If the variable "selection" is equal to 2, then what would the output of the following code be:

```
switch(selection)    ----- equal to 2
{
   case 0:           ----- nope … goto the next case
   case 1:           ----- nope … goto the next case
      cout << "a";
      break;
   case 2:           ----- found it!  Do everything until either break or end of switch block
      cout << "b";
   case 3:
      cout << "c";
   default:
      cout << "d";
}
```

answer: bcd

Watch for the breaks!

Unit 3 Test – Most Missed Problems

Which of the following is true about case labels within a switch statement:

a) Case labels can contain variables ---- nope! only literals like integers and characters … can never change.
b) Case labels can be floats ---- nope! no real numbers … just integers and characters.
c) Case labels can define a range using a common ---- nope! it would be nice, but no ranges
d) Case labels can be integers --- YES!

answer: d

Remember case's can only contain integers and characters.

Unit 4 Test – Most Missed Problems

What array would best represent a picture that was 20 pixels by 20 pixels where each pixel can be either black or white?

Possible options:

a) float picture[20][20];
b) double picture[20][20];
c) string picture[20][20];
d) char picture[20][20];
e) int picture[20][20];
f) bool picture[20][20];

To decide, look at what each array element would be equal to … in this case, one of two things: black or white. On the test, the only options were float and bool. While you could use float, it does not best represent the information we are storing. Another example, would you use int or float with Sudoku?

answer: bool picture[20][20];

Unit 4 Test – Most Missed Problems

What is the best loop to populate a file from a multi-dimensional array?

answer: Two For Loop's --- "from a multi-dimensional array" … you know how big the array is.

What is the best loop to populate a multi-dimensional array from a file?

answer: While Loop --- "from a file" … don't know how big the file is.

Pay attention to the wording in the question.

Unit 4 Test – Most Missed Problems

What is the output of this code:

```
int data[3][3] = {{1, 2, 3},
                  {2, 4, 6},
                  {3, 6, 9}};

for (int row=0; row<3; row++)
{
   for (int col=0; col<3; col++)
   {
      cout << data[row][col] << " | ";     -- Put a vertical bar after each entry
   }
   cout << endl;
   if (row != 2)                           -- Put the funny line after each row … except row == 2 (the last row)
   {
      cout << "(----------)" << endl;
   }
}
```

```
1 | 2 | 3 |
(----------)
2 | 4 | 6 |
(----------)
3 | 6 | 9 |
```

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Unit 4 Test – Most Missed Problems

How would you dynamically allocate space for text that can store a word with a maximum size of 9 characters (ex: chocolate)?

answer: char *word = new char[10];

Remember that character arrays storing text need space for the NULL character. The word chocolate has 9 characters. If we try to put that in char[9], the NULL might cause a seg fault.

If this was not character array … if it was 9 integers, the int[9] would have been fine … no NULL character.

Unit 4 Test – Most Missed Problems

How would you dynamically allocate an array of 200 doubles?

answer: double *list = new double[200];

Remember the previous slide? The only time you need to increase by 1 is if it's a character array and you need room for the NULL.

Unit 4 Test – Most Missed Problems

How do you read text with embedded spaces from the keyboard into a string variable called "address".

answer: getline(cin, address);

This is different from reading into a char array variable …. cin.getline(address, 256).

Unit 4 Test – Most Missed Problems

How would you convert the following to use a single dimensional array of strings?

char story[256][32];

answer: string story[256];

We read the char array as: An array of 256 character arrays of which each one has size of 32 … or read it as, an array of 256 words where each word has size of 32.

If we use strings, we don't care about the size of each word. We just want an array of 256 strings.

Unit 4 Test – Most Missed Problems

Which of the following function declarations properly receives an array of strings?

a) void analyze(string list[10]) ----- do not specify the size of the array
b) void analyze(string list[]) ----- how big is the array?
c) void analyze(string list[], int num) ----- perfect … we have the size of the array now
d) void analyze(string list[][10], int num) ------ this is a 2D array of strings … we just wanted a simple array of strings

answer: c

Remember, we need a size parameter for any array except for character arrays (we look for the NULL). An array of strings is no different from an array of integers when it comes to passing them between functions.

Unit 4 Test – Most Missed Problems

If argv contains parameters passed into the program, which of the following will give the value of "BYU-I" if the program a.out was executed from the command line as follows:

a.out BYU-I BYU BYU-H BYUI-PW

answer: argv[1]

argv[0] = a.out … remember that the first one is the actual program name
argv[1] = BYU-I
argv[2] = BYU
… and so on

also, note that argc would be equal to 5 in this example.

Looking Forward

- Today - Last day to show Sudoku Solver in my office
- Wednesday – Final Exam (normal class time)