Final Exam	
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Start Time: May 02, 2001 13:50	**Time Allowed:** 120 minutes
Number of Questions: 12	

Finish
Help

Welcome to the CMPUT 201 final exam

This Exam counts 35% towards your final grade in this course.
DON'T PANIC! The exam is long for the time alloted, so pick and choose the questions you are going to answer carefully, It's better to answer what you can answer correctly than to try to fill in stuff for everything that may not be right.
The questions may or may not have obvious answers. Think carefully before answering.
IMPORTANT

- If you don't understand something - Raise your hand and ask!
- You are allowed to have the web browser open to the exam.
- You are permitted to consult any published public resources on the net (i.e. web pages on the net) during the exam
- You are permitted to have a login open using putty to one of the computing science OpenBSD machines in the lab.
- **YOU ARE NOT PERMITTED TO CONVERSE WITH ANY LIVE PERSON DURING THE EXAM, ELECTRONICALLY OR OTHERWISE. Doing so will be considered CHEATING, and treat ed as such under the code of student behaviour.** This means that you can go out and find answers, but you can't ask questions or talk to anyone in any way while doing the exam. *Your network connections, as well as keystrokes and desktops will be monitored and snooped to look for evidence of sort of activity*
- **Do not** click the "Finish" button until you are finished everything. Once you click the "Finish" button your quiz is submitted, and you will be able to see the answers.
- **Be sure to click the "save" button at the bottom of a question frequently** , in case your browser crashes, and to ensure that time does not run out without you having submitted your work.

Question 1 (5 points)

I have a program that requires a Symbol table - that is, a mapping of unique strings to integer numbers, so that I can add sybols (strings) to the table with values (intgers) and then later retrieve values from the table, using the strings as an index.

Design a minimal usable interface to a symbol table and implement a clean symbol table module in C or C++.

Save answer

Question 2 (5 points)

Consider the following Class:

```
class Shape {
   // no common variables
 public:
   Shape() { }; // constructor does nothing
   virtual ~Shape() { }; // destructor does nothing but must be virtual
   virtual void print() = 0; // this should print out basic info
   virtual double area() = 0; // this should print out the area
 }
```

Derive and implement two Classes from `Shape`; `Circle` which implements a Circle, and `Rectangle` which implements a Rectangle.

Save answer

Question 3 (2 points)

Consider the following prototype. This function is supposed to swap the values in the two integers that it gets passed pointers to.

```
void swap(int *a, int *b);
```

Write the swap function, and a sample main program that calls it to swap two integers in two integer variables.

Save answer

Question 4 (5 points)

Congratulations, You have been hired to T.A. cmput 201! You are now faced with a poor confused student who is asking you a question, in that they don't understand how subroutine parameters work, and how we could possible change anything passed as a parameter. In C, all function parameters are passed by value.We can also pass pointers to something, but this is still passing by value. Explain to the student how it works to pass a pointer by value to a subroutine, and yet be able to in the subroutine change what the pointer points to.

Save answer

Question 5 (7 points)

Write a short C or C++ program that reads lines of input on standard input and "folds" long lines. That is, it breaks a line into shorter lines by splitting the line after the last non-blank character that occurs before the 80th character in the line. Make sure your program does something intelligent with very long lines, and if there are no blanks or tabs before the 80th character. Make sure as well that your program places no artificial restriction on the length of line it can handle beyond the memory available to you.

Save answer

Question 6 (5 points)

In C, the standard library function calloc returns a pointer to n objects of size size. realloc() adjusts the size of a block of memory up or down, preseving the contents, and leaving the original block unchanged if that is impossible to do. You may refer to the man page for calloc() and realloc() for details.

Pretend calloc() and realloc() didn't exist, and you only have malloc() and free(). Write versions of the calloc() and realloc() functions that work exactly like theq real ones. (you may use malloc() and free() to implement them).

Save answer

Question 7 (5 points)

Recall Assignement 3, and the encoding of the registers into one byte. Imagine now that instead of only 4 registers, there are 8 of them, numbered 0-7. and that the first register argument is encoded in the rightmost 4 bits of the byte (they can't fit in two bits anymore). and the second is encoded in the leftmost 4 bits of the byte. Show a C or C++ code fragment that correctly will encode and decode registers.

Save answer

Question 8 (4 points)

Please tell me what your UNIX login id is in the lab, the name of one of the lab machines running OpenBSD that you can log into, and please give the commands you would use to:

- Set your `CVSROOT` environment variable to the proper value for assignment 3
- update a checked out copy of your repository, assuming your partner has made some changes since you last updated.
- add a file `svm.c` to the repository in the ass2 directory.
- commit these changes to the repository

Also, tell me how, when you updated the copy above, would you know if your partner's changes were successfully integrated into your files?

Save answer

Question 9 (2 points)

The following function is supposed to swap two integers. provide any changes you think need to be made for it to work.

```
void swap (int &a, int &b) {
        int tmp;
        tmp = a;
        a = b;
        b = c;
}
```

Save answer

Question 10 (2 points)

Two of your 201 buddies are fighting over the following program. The program is supposed to print out all lines with 10 characters or more in them. Trinity, your friend from CompSci, insists that the program is right. Morpheus, your buddy from MIS, insists that the program isn't up to spec.

Here's the program:

```
#include <stdio.h>

int main () {
  int i, ch, count;
```

```
    char line[10];

    ch = getchar();
    count = 0;
    do {
      switch(ch) {
      case '\n':
      case EOF:
        if (count >= 9) {
          putchar('\n');
        }
        count = 0;
        break;
      default:
        if (count == 9) {
          for (i = 0; i < count; i++) {
            putchar(line[i]);
          }
          putchar(ch);
        }
        else if (count > 9) {
          putchar(ch);
        }
        else {
          line[count]=ch;
        }
        count++;
        break;
      }

    } while ((ch = getchar()) != EOF);
}
```

- Settle the argument by telling us who is right and *WHY* they are right.
- Include a correct version of the program below your answer to the above (there might of course be no changes).

Save answer

Question 11 (4 points)

You have a C++ class `Ale` with the interface defined in the file `Ale.h`, and the implementation in `Ale.cc`. You also have another class `Stout` interface in `Stout.h` and implementation in `Stout.cc` You then have a C++ program `BlackDog` which needs to be built from `Blackdog.cc`. The `BlackDog` uses both the `Ale` and the `Stout` Classes. Provide a Makefile where the default target will correctly build the `Blackdog` program. Be sure to get all dependencies correct and ensure that no extra recompilation is done if a file changes.

Save answer

Question 12 (4 points)

Consider that you had an array of characters like this:

```
char Stuff[32768];
```

You want to store both single characters, and short ints into this array. single characters are of course, easy, since it's just an array of characters. Short ints are a little tougher, since they involve storing two bytes into the array. Show me the code you would use to store a short integer starting at position 10 in the array, and show the code that you would use to then retrieve the short integer at position 10 of the array back out again.

Save answer

Finish

Help