Exam 1 Review

CS 2308
Spring 2013
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Exam 1

• Mon, Feb. 25 and Tues, Feb. 26
• In class, closed book, closed notes, clean desk
• 20% of your final grade
• 80 minutes to complete it
• I recommend using a pencil (and eraser)
• All writing will be done on the test paper I will hand out.
• No calculators.

Exam Format

• 100 points total
  - Writing programs/functions/code
  - Multiple choice
  - Fill-in-the-blank/short answer
  - Tracing code (what is the output)
  - Tracing search/sort algorithms

C++ Programming on Linux

• What is Linux
• Linux file system
  - Basic shell commands
    
    | command | command |
    |---------|---------|
    | pwd     | more/less/cat |
    | ls      | cp       |
    | cd      | mv       |
    | mkdir   | rm       |
• Basic file editing (nano, etc.)
• edit, compile, run
  
<table>
<thead>
<tr>
<th>command</th>
</tr>
</thead>
<tbody>
<tr>
<td>nano</td>
</tr>
<tr>
<td>g++</td>
</tr>
<tr>
<td>./a.out</td>
</tr>
</tbody>
</table>
• know how to use the commands
Chapters 1-7 Review

- Know how to program with arrays and functions
- Passing parameters by reference
- Passing arrays to functions
- Overloaded functions
- Default arguments
- Understand Programming Assignment 1

Ch. 8: Searching and Sorting Arrays

- Searching
  - Linear Search
  - Binary Search
- Sorting
  - Bubble Sort
  - Selection Sort
- Efficiency
  - Growth rate functions, which are faster/slower
  - Efficiency of each searching/sorting algorithm
  
  You will not need to know the code
  --but I may ask you to implement linear search
  See exercises at end for the others

Ch 9: Pointers

- Address operator (&)
- Pointer variables: how to define (data type)
- Dereferencing operator (*)
- Pointers and arrays
  - an array variable is the address of its first element
  - array[index] = *(array + index)
- Pointer arithmetic (if ptr points to a var of type d):
  - ptr + n = address in ptr + n * sizeof(d)
- Initializing Pointers

Ch 9: Pointers, cont.

- Comparing pointers
- Pointers as function parameters
  - Pass by reference using pointers as parameters
  - Pointers used as parameters accepting arrays as arguments
- Dynamic memory allocation
  - new operator
  - new with arrays
  - delete
  - return pointers from functions
Ch. 10: Strings and Things

- Character testing + conversion
  - isalpha, isdigit, isupper, islower, isspace
  - toupper tolower
- C-strings
  - definition (char array), ‘\0’-terminated
- C-strings: library functions
  - strlen
  - strcpy (assignment)
  - strcmp (test, comparison)

Ch. 10: Strings and Things (cont.)

- Predefined string class
  - how to define and initialize string variables
- operations:
  - =, <<, >>, +, relational ops, [n]
- member functions
  - length()
  - size()
  - append(str) and append(n,char)
- know how to use these to write code

Ch 11: Structured Data

- Structures:
  - Definition (new data type)
  - Variable definitions
  - How to access members (fields)
  - Operations (which are valid)
  - Arrays of structures
  - Nested structures
  - Structures as function args

Example Programming Problem

Write a function that accepts an array of integers and the size of the array and prints out a table listing how many values in the array fall in each of the following ranges:

- less than 50
- 50 to 59
- 60 to 69
- 70 to 84
- 85 to 99
- over 100
Example Tracing Problem

What will the EXACT output of the following program be?

```c
int main () {
    int *ptr1, *ptr2;
    int foo1, foo2 = 13;
    foo1 = 42;
    ptr1 = &foo1;
    ptr2 = ptr1;
    cout << "*ptr1 - " << *ptr1 << endl;
    cout << "foo1 - " << foo1 << endl;
    cout << "*ptr2 - " << *ptr2 << endl;
    *ptr1 = 100;
    *ptr2 = 200;
    cout << endl;
    cout << "*ptr2 - " << *ptr2 << endl;
    cout << "what? " << foo1%10 << endl;
    return EXIT_SUCCESS;
}
```

Binary Search Example

The target of your search is 42. Given the following list of integers, record the values of first, last, and middle during a binary search. Assume the following numbers are in an array.

```
1 7 8 14 20 42 55 67 78 101 112 122 170 179 190
```

Repeat the exercise with a target of 82

```
first 0 0 4  
last 14 6 6 
middle 7 3 5
```

Sorting Example

Use the following array for both questions:

```
11 8 14 7 12 18 2 17
```

Show the contents of the array after 2 passes of the selection sort

```
0 1 2 3 4 5 6 7
```

Show the contents of the array after 2 passes of the bubble sort

How to Study

- Review the slides
  - understand all the concepts
- Use the book to help understand the slides
  - there will be no questions over material (or code) that is in the book but not on the slides
- Review assignments + solutions
- Try some exercises from the book
- Practice, practice, practice
- Get some sleep