Princeton University
COS 217: Introduction to Programming Systems
Fall 2005 Midterm Exam Preparation

Topics

You are responsible for all material covered in lectures, precepts, assignments, and required readings. This is a non-exhaustive list of topics that were covered:

C programming
- The program preparation process
- Memory layout (text, stack, heap, rodata, data, bss sections)
- Data types
- Variable declarations and definitions
- Variable scope, linkage, and duration/extent
- Variables vs. values
- Operators
- Statements
- Function declarations and definitions
- Pointers
- Call-by-value and call-by-reference
- Arrays
- Strings
- Command-line arguments
- Constants: #define, enumerations, the "const" keyword
- Input/output functions
- Text files
- Structures
- Dynamic memory management (malloc(), calloc(), realloc(), free())
- Void pointers
- Function pointers and function callbacks
- Macros and their dangers
- The assert() macro
- Bitwise operators

Programming style
- Modularity, interfaces, implementations
- Programming by contract
- Multi-file programs using header files
- Protecting header files against accidental multiple inclusion
- Opaque pointers
- Abstract data types
- Memory "ownership"
- Testing

Number Systems

       The binary, octal, and hexadecimal number systems

       Signed-magnitude, one's complement, and two's complement representation of negative integers

Applications

       De-commenting, lexical analysis via finite state automata

       String manipulation

       Symbol tables, linked lists, hash tables

       Dynamically expanding arrays

       XOR encryption

Tools: The UNIX/GNU programming environment

       UNIX, bash, xemacs, gcc, gdb

Readings

As specified by the course "Schedule" web page...

Required:

       The C Programming Language (Kernighan & Ritchie): 1, 2, 3, 4, 5, 6, 7, B1, B2, B3, B4, B5, B6, B11

       The Practice of Programming (Kernighan & Pike): 1, 2, 4

Recommended:

       Programming with GNU Software (Loukides & Oram): 1, 2, 3, 4, 6