Princeton University
COS 217: Introduction to Programming Systems
Spring 2008 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:

(1) 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, "constant variables"
- Input/output functions
- Text files
- Structures
- Dynamic memory management: malloc(), calloc(), realloc(), free()
- Void pointers
- Function pointers and function callbacks
- Macros and their dangers (see King Section 14.3)
- The assert() macro
- Bitwise operators

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

(3) Representations
  The binary, octal, and hexadecimal number systems
  Signed vs. unsigned integers
  Binary arithmetic
  Signed-magnitude, one's complement, and two's complement representation of
  negative integers

(4) Applications
  De-commenting
  Lexical analysis via finite state automata
  String manipulation
  Symbol tables, linked lists, hash tables
  Dynamically expanding arrays
  XOR encryption

(5) Tools: The UNIX/GNU programming environment
  UNIX, bash, xemacs, gcc, gdb

Readings

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

Required:

  C Programming (King): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18,
  19.1-3
  Alternate: *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, 5, 6

Recommended:

  C Programming (King): 19.4

  Computer Systems (Bryant & O'Hallaron): 1

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