

Princeton University
COS 217: Introduction to Programming Systems
Spring 2006 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

Run-length compression, 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:

C Programming (King): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.1-3, 16.5, 17, 18, 19.1-3, 20, 21, 22, 24.1

The Practice of Programming (Kernighan & Pike): 1, 2, 4, 5, 6

Recommended:

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