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SYSTEM PROGRAMMING

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SYSTEM ROGRAMMING

A PRACTICAL APPROACH ON (LINUX,WINDOWS,UNIX)

1. Introduction

- ☞ System Software, Application Software
- ☞ Evolution of Operating Systems
- ☞ Operating System & Kernel
- ☞ Functions of Operating System.
- ☞ Machine Structure
- ☞ Evolution of components of a programming system (Assembler, Loader, Macros, Compiler, Formal Systems)

2. Linux Essential

- ☞ Open source and Kernel source tree
- ☞ Kernel Architecture
- ☞ Kernel compilation
- ☞ Important of Make files for kernel compilation
- ☞ User mode and kernel mode
- ☞ Writing Modules and Kernel module

3. Introduction to Assembly Language Program

- ☞ Basic Concepts
- ☞ Assembler programming
- ☞ Assembler language instructions
- ☞ Interruptions and file managing
- ☞ Macros and procedures
- ☞ Program examples

4. The Boot Process-BIOS Level

- ☞ Master Boot Record (MBR)
- ☞ Boot Loader-Run Level, and run level program
- ☞ Setup, startup_32 functions
- ☞ The start_kernel() function

5. Shell scripting

- ☞ Invoking shell
- ☞ Bash programming overview
- ☞ Variable
- ☞ Expression
- ☞ Iteration
- ☞ Conditions

6. Advance File and Libraries

- ☞ File locking , unlocking
- ☞ File linking and unlinking
- ☞ System calls and std.library for file
- ☞ Static library
- ☞ Dynamic Library
- ☞ Dynamic Loaded Library

7. Implementing System Calls

- ☞ System Calls Defined
- ☞ System Calls and APIs
- ☞ System Call Table
- ☞ Unistd.h ,signal.c and Syscall_table.S files
- ☞ Implementing a new system call

8. Process, threads and Signal

- ☞ Background and foreground process
- ☞ Parent and child process

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- ⊖ Process Creation , System calls related to process
- ⊖ Process Descriptor Structures in the kernel
- ⊖ Threads and signal
- 9. Inter Process Communication**
 - ⊖ Pipes, FIFO's, signals
 - ⊖ System-V IPC's
 - ⊖ Message queues
 - ⊖ Shared memory
 - ⊖ Semaphores
 - ⊖ Memory Mapping
 - ⊖ Socket
- 10. Socket Programming/Network Programming**
 - ⊖ Introduction-Server/Client model
 - ⊖ OSI, TCP Models
 - ⊖ TCP, IP, UDP Protocols
 - ⊖ IP (Classes, Datagram formats, IP routing, v4 v5 v6)
 - ⊖ Network Program over process model / Thread model
- 11. Locking Mechanism**
 - ⊖ Mutex
 - ⊖ File locking
 - ⊖ Semaphore
- 12. Memory Management**
 - ⊖ Address types
 - ⊖ Virtual address space
 - ⊖ Address translation
 - ⊖ Paging and segmentation
 - ⊖ Memory allocation and deallocation
 - ⊖ Process organization in memory
- 13. Development Tools**
 - ⊖ Programming development tools: Make, scope, ldd,pmap, ps, gcc,nm, top, cvsroot, ftp, strace
 - ⊖ Debugging tools: gdb
 - ⊖ Optimization tools: splint, gprof, strace, ltrace
 - ⊖ Memory detector tools: valgrind: memcheck, massif, callgrind, kcachegrind

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