StarJourney
TRAINING & CONSULTING

Linux Internals Outline

Overview of the Linux Kernel

- Role of the Kernel
- Code Contexts
- Ring Architectures
- Kernel Mode
- User Mode
- System Call Interface

Compiling the Linux Kernel

- Reasons to compile a Linux kernel
- Source Source
- Source Tree
- Preparing for compilation
- Compilation options
- Compiling kernel & modules
- Installing modules
- cscope
- git
- Lab: Compiling the kernel

Modules

- Kernel modules
- Utilities
- Modules & Devices
- Compiling a module
- Inserting a module
- Removing a module
- Module parameters
- Lab: Building a module

The Linux API

- Multi-tasking
- Stacks
- User/Kernel Mode stacks
- Task Structures
- A Linux Process
- Kernel Memory
- Lab: Examining Task Structures

Synchronization

- Need for synchronization
- Critical sections
- Mutexes
- Semaphores
- Atomic Bit operations
- Atomic Integers
- Spinlocks
- Read-Write Spinlocks
- Locking alternatives
- Completions
- Lab: Synchronization

Memory Management

- Virtual Memory challenge
- x86 Page Tables
- x86-64 Page Tables
- Memory Zones
- Allocations within the kernel
- Page Frames
- Slab Allocator
- kmalloc
- vmalloc
- Lab: Memory Management

Processes

- What is a Linux process
- Creating processes
- Process resources
- Process memory
- pmap
- Kernel threads
- Process 0
- Killing a process
- Process context switch
- The scheduler
- Kernel preemption

The Scheduler

- What the scheduler does
- Priority
- Time slices
- Run Queues
- Priority Arrays
- Scheduler algorithm
- Wait Queues
- Load Balancing
- CFS

The File System

- File systems supported by Linux
- File system limits
- Journeling
- ext2
- ext3
- Other file system choices

The Kernel File System

- /proc file system
- /sysfs
- /devices
- /bus
- /class
- /block

Sockets

- What is a socket
- Types of sockets
- Socket addressing
- Interface
- Socket creation
- Listen & Accept
- Send & Receive
- Datagrams
- inetd
- /etc/networks

Device Drivers

- Purpose of a driver
- User requests
- Driver events
- Device registration
- Announcing entry points
- Unified Device Model

The Linux Boot Process

- BIOS stage
- Bootloader
- Initial RAM disk
- grub
- Kernel
- init
- Run levels
- An Overview of the Linux Kernel
- Process Management
- Linux System Calls
- Linux Virtual Memory Manager
- Disk-Based File Systems
- Kernel File System Structures
- Signals
- Sockets
- The Device I/O Subsystem