Custom
TRAINING INSTITUTE

# Linux Network Drivers Development (3 Days)

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## Linux Network Drivers Development (CTI 314)

*This course focuses on the aspects of the Linux Kernel related to the development of network device drivers. It gives a general introduction to Linux driver development which enables students to have a basic understanding of how any kind of hardware device could be integrated into the Kernel. The course focuses on network-related device drivers.*

*Prerequisites: Knowledge of the C programming language. Knowledge of the UNIX/Linux shell commands and a common UNIX editor such as vi or emacs. Experience with the data structures and basic functions used in the Linux Kernel.*

*Minimum software requirements: A Linux distribution. (Red Hat 7.0 is recommended.) The Linux-2.4.0 Kernel source tree.*

*Minimum hardware requirements: Pentium 233 mHz or better; 64Mb RAM; 3GB disk; Linux-compatible network cards hooked together for a local Ethernet network (10BaseT or better). A second Ethernet card.*

*Microsoft PowerPoint installed at instructor's workstation for presentation purposes.*

**Module 1: Introduction to Linux Network Driver Development**
- Introduction and Environmental Setup
- Kernel Versions and Compatibility
- Components of the Kernel
- Aims of Driver Development
- Development of a Driver
- How Device Drivers Work
- Stability and Security Issues

**Module 2: Device Drivers**
- Description of the Elements of a Driver
- Benefits and Drawbacks
- Classes of Drivers

**Module 3: Linux Kernel Facilities**
- System Calls
- Data Structures
- Functions

**Module 4: Modules**
- Benefits of Using Modules
- Module-Related Tools
- Compiling, Loading and Unloading
- Module Implementation
- Automatic Module Loading

**Module 5: Character Devices**
- Accessing the Device
- File and Inode Structure
- File Operations
- Reading and Writing
- IOCTLs
- Example of a Character Device

**Module 6: Hardware Aspects**
- Accessing Memory
- Direct Memory Access
- I/O Management
- PCI and ISA

**Module 7: Block Drivers**
- Registration
- The blk.h Header
- Requests and Mounting

**Module 8: Network**
- Layer Model
- Network Communications
- Implementation of the TCP/IP Stack
- Data Structure
  - Socket
  - sk_buff
  - Inet socket
  - proto
- ARP and IP Protocols
- IP Filters
- UDP
- TCP

**Module 9: Network Devices**
- Network Drivers
- Integration in the Kernel
- Ethernet Devices
- SLIP and PPP
- Loopback
- Dummy Devices
- Loading Network Drivers
- Transmitting and Receiving Packets
- Device Configuration
- Statistics

**Module 9: Network Devices**
- Printing with printk
- Queries
- /proc Entries
- Tracing and Debuggers