



UNIX/Linux Fundamentals

Five days

Course Description: This course introduces the effective use of the UNIX Operating System. Topics covered include the operating system's major features and facilities, frequently used commands, command usage, the vi text editor, the file system, user communication, file access permissions, and redirection of input and output. It also introduces the shell programming language capabilities of the UNIX Shell, including commands particularly useful in conjunction with Shell programs, as well as some of the programming constructs available within the UNIX Shell.

Audience: Programmers, analysts, managers, technical and non-technical users, who require a basic knowledge of how to use the UNIX Operating System will benefit from this course.

Prerequisites: Some understanding of computer systems would prove helpful.

Learning Outcome:

- Log onto and off a UNIX system.
- List the types of UNIX files.
- Describe and use various UNIX commands and command line options.
- Use the UNIX User Reference Manual to locate appropriate commands.
- Use the UNIX editor ex/vi to create and modify files.
- Use Regular Expressions to match patterns of characters.
- Describe and use the file system capabilities provided by UNIX.
- Communicate with other users.
- Protect files from unauthorized access using the UNIX file permission capabilities.
- Redirect input and output to and from UNIX commands.
- Initiate background (asynchronous) command execution.
- Describe the purpose and functions of the Shell Interpreter.
- Use UNIX System commands useful for shell programming.
- Create and execute simple shell programs ("shell scripts").
- Use additional forms of input and output redirection in conjunction with Shell programs.
- Establish and use parameters and variables within Shell programs.
- Describe and use special Shell variables.
- Use the Shell quoting mechanisms to escape the meaning of special characters.
- Use two of the Shell's control structures (if and while).

Outline:

UNIX INTRODUCTION:

- What is UNIX?
- Where to Obtain UNIX
- Logging in
- Logging Out
- The Shell
- UNIX Documentation

- Exercises
- Exercise Solutions

THE SHELL:

- What is The Shell?
- The Role of the Shell
- Determining Your Shell Type
- Changing Your Shell



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- Exercises
- Exercise Solutions

COMMANDS:

- Command Line Syntax
- Viewing Files
- Listing Directory Contents
- Miscellaneous
- Commands: date
- Miscellaneous Commands: who
- Miscellaneous Commands: cal
- Miscellaneous Commands: echo
- Exercises
- Exercise Solutions

FILES AND DIRECTORIES:

- What's In a File?
- What's In a Directory?
- Creating a Directory
- Removing a Directory
- Pathnames
- Absolute Pathnames
- Relative Pathnames
- Korn Shell Tilde (~) Substitution
- The Current Directory
- Changing to a Different Directory
- File Systems
- Typical System Directories
- Filename Generation
- Exercises
- Exercise Solutions

FILE OPERATIONS:

- Copying Files: cp
- Moving/Renaming Files: mv
- Removing Files: rm
- Linking
- Files: ln
- Creating Symbolic Link Files: ln -s
- Exercises
- Exercise Solutions

THE VI EDITOR:

- Why Learn vi?
- Basic Operation

- Starting a Session
- Basic Concepts: The Operating Modes
- Basic Concepts: The Command Sets
- Ending a Session
- Moving the Cursor
- Adding Text
- Deleting Text
- Modifying Text
- Cut, Copy and Paste
- Exercises
- Exercise Solutions

COMMAND HISTORY:

- Overview of Shell Command History
- Examining Your History: history fixing
- Your Commands: fc
- Redo Commands: r
- Using the Built In vi Editor
- Exercises
- Exercise Solutions

THE VI/EX EDITOR:

- About vi and ex
- Command Addresses
- Deleting Lines the ex Way
- Regular Expressions
- Searching For a Pattern
- Substituting In Place Of a Pattern
- Substituting With the &
- Escaping Metacharacters
- Exercises
- Exercise Solutions

FILE PERMISSIONS:

- Permissions Overview
- Users and Groups
- Determining Your Identity
- Examining the Permissions
- Understanding What the Permission Mean: Regular Files
- Understanding What the Permission Mean: Directories
- The Default Permission
- Changing the Default Permissions
- Changing the Permissions



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- Changing a File's Owner
- Changing a File's Group
- Changing Your Primary Group
- Changing Your User ID
- Exercises
- Exercise Solutions

SPECIAL FILE PERMISSIONS:

- Permissions Overview
- Set User ID
- Set Group ID
- Saved Text: The "Sticky" Bit
- Examining the Special Permissions
- Changing the Special Permissions
- A Security Note
- Exercises
- Exercise Solutions

I/O REDIRECTION:

- Overview
- Standard Input
- Standard Output
- Standard Error
- Redirecting Standard Input
- Redirecting Standard Output
- Redirecting Standard Error
- Sending Standard Output and Standard Error to the Same Place
- Combining Redirections
- Pipes
- Piping Through a tee
- Exercises
- Exercise Solutions

UTILITY COMMANDS:

- Overview
- Finding Patterns: grep
- Extracting fields: cut
- Sorting Records: sort
- Translating Characters: tr
- Putting It Together Again: paste
- Standard Input: The –
- Automating Changes: sed

- Comparing Text Files: diff
- Comparing Binary Files: cmp
- Searching For Files: find
- Combining Most Of It
- Exercises
- Exercise Solutions

SHELL METACHARACTERS AND QUOTING:

- Shell Metacharacters
- Variable or Parameter Substitution: \$
- Command Substitution: ``
- The Backslash As a Quote: \
- Single Quotes: '
- Double Quotes: "'
- Exercises
- Exercise Solutions

VARIABLES:

- Overview
- Variable Assignment
- Variable Substitution: \$
- Variable Dump: set
- Variable Assignment: read
- Removing a Variable: unset
- Exporting Variables: export
- Exercises
- Exercise Solutions

INTRODUCTION TO SHELL SCRIPTS:

- Overview
- Creating a Shell Script
- Comments
- The Subshell Type Descriptor Record
- Whitespaces
- Conditional Execution: if
- Conditional Execution: Else
- Return Values
- Conditional Execution: elif
- The test Command
- The test Operators
- The exit Command
- Looping: while
- Positional Parameters
- Accessing Positional Parameters: Shift

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- Exercises
- Exercise Solutions

LOGIN SCRIPTS:

- Overview
- The Scripts
- Typical Login Script Commands
- "Sourcing" a Script
- The Parent-Child Relationship
- Customizing the Prompt
- Exercises
- Exercise Solutions

USER COMMUNICATION:

- Overview
- Reading the News: news
- Instant Communication: write
- A Better Way to Write: talk
- Writing to All: wall
- To Receive or Not to Receive: mesg
- Electronic
- Mail Overview: mail vs. mailx
- Sending Mail
- Sending Mail: The Tilde (~) Commands
- Reading Mail
- Reading Mail: The Actions
- Customizing the Mail Environment
- Exercises
- Exercise Solutions

PROCESS MANAGEMENT:

- Overview
- Foreground Processing
- Background Processing: & Process
Status: ps
- Terminating a Process: kill
- Keyboard Signals
- Job Control
- Letting the
Children Survive: nohup
- Exercises
- Exercise Solutions