



Unix & Linux Shell Programming

Students Will Learn:

- Input/Output Techniques
- Looping and Conditional Branching
- Functions, Math, and Arrays

- String Manipulation
- Command Line Arguments
- File Handling and Manipulation

Course Description: This hands on Korn and Bash Shell scripting course provides a comprehensive introduction to writing Korn and Bash shell scripts. Besides covering fundamental syntax for program flow control, variable assignment and substitution, I/O control, and mathematical expressions, it emphasizes the powerful features of these shells, including built-in string operators, variable typesetting/conversion, functions, and coprocess communication and control. The creative use of standard UNIX and Linux utilities within scripts to solve problems is stressed throughout. The course is designed for the administrators and programmers who are developing, testing, or integrating software on UNIX or Linux, as well as for advanced UNIX or Linux users. Both the commonalities and differences between the Korn and Bash shells are examined, and students will have the opportunity to learn from examples coded in both shells.

Course Prerequisites: Familiarity with UNIX file system and commands



Korn Shell and Bash Shell Programming Course Overview:

Introduction

- Comparing Popular Shells
- Korn Shell Compatibility for Bash
- Korn and Bash Shell Advantages
- Korn and Bash Shell Disadvantages
- Versions of ksh and bash
- Shell Command Syntax
- Comments
- Continuing a Command on Multiple Lines
- Special Characters
- Pattern Matching
- Complex Pattern Combinations
- Tilde Expansion

Writing Scripts

- Shell Programming Language
- Reserved Words
- How to Write and Run Scripts
- Debugging
- Data Types
- Using Variables
- The typeset Command
- Constants
- Special Predefined Variables
- Printing to the Screen (echo, print)
- The printf Command
- Accepting Input with ksh
- Accepting Input with bash
- Arithmetic Operators
- Floating-Point Numbers
- Bitwise Operators
- Grouping Operations
- Binary, Octal, and Hexadecimal
- Indexed Arrays
- Quoting, Command Substitution

Process Management

- Process Priority
- Background Jobs
- Signals
- Traps
- DEBUG and EXIT
- ksh Co-Processing
- bash Co-Processing
- Pausing
- Time and Date
- Scheduling Execution
- Run Commands Later
- Aliases
- How the Shell Finds Commands
- Command History and Editing

Advanced Customization of the Shell Environment

- Command Line Options
- The set command
- Parents and Children
- Inheritance
- Exporting
- Dot Scripts
- Startup Scripts
- Environment Variables
- Setting Prompts in ksh and bash



Programming Logic

- Conditional Expressions
- Testing Strings
- Testing Options
- Numeric Conditions
- Testing Completion Status
- Truth in Korn and Bash Shells
- The case Statement
- Loops: while and until
- The for Loop
- Menus and the select Statement
- Redirection and Loops
- When to Use Different Constructs

String Manipulation

- String Comparison
- String Relations
- Concatenation
- Substring Manipulations
- Wildcards and Pattern Matching

Command Line Processing

- Getting Data Into Scripts
- Manipulating Positional Parameters (set, sort, shift)
- Analyzing Switches with getopt
- Options
- Reserved Variables (OPTARG, OPTIND, IFS)
- Setting Default Values

Advanced I/O with Streams

- Redirection Review
- Opening Additional Streams
- Redirection Operators
- Inheriting and Duplicating Streams
- Caution with exec
- here Documents

Security

- Process Ownership
- suid and sgid
- Restricted Shells
- Other Security Features
- The newgrp Command
- Statement blocks
- case Statement

Performance and Porting Issues

- Improving the Performance of Scripts
- Timing Commands and Scripts
- System Resources
- Setting Limits
- Portability Issues



Overview of File Manipulation Utilities

- Editing a File from a Script
- Scripting with ed or sed
- UNIX and Linux Utilities to Manipulate Files
- Regular Expressions
- grep and egrep
- The Stream Editor sed
- Sorting in Scripts
- Generating Reports with awk
- Splitting Large Files
- Counting Words, Lines, and Characters
- Transforming File Contents
- Extracting Text Strings

Additional File Processing Commands

- Examining and Comparing Files
- Reporting Differences Between Files
- Comparing Files of Any Format
- Displaying Data in Octal and Hex
- Compressing Data
- Converting File Formats

Functions

- Writing Functions
- Returning Value from Functions
- Returning String Output
- Local and Global Variables
- Defining Functions
- ksh Autoload Functions

Compound Commands

- Pipelines
- Command Lists
- And and Or Lists
- Background Jobs
- Command Grouping
- I/O Redirection