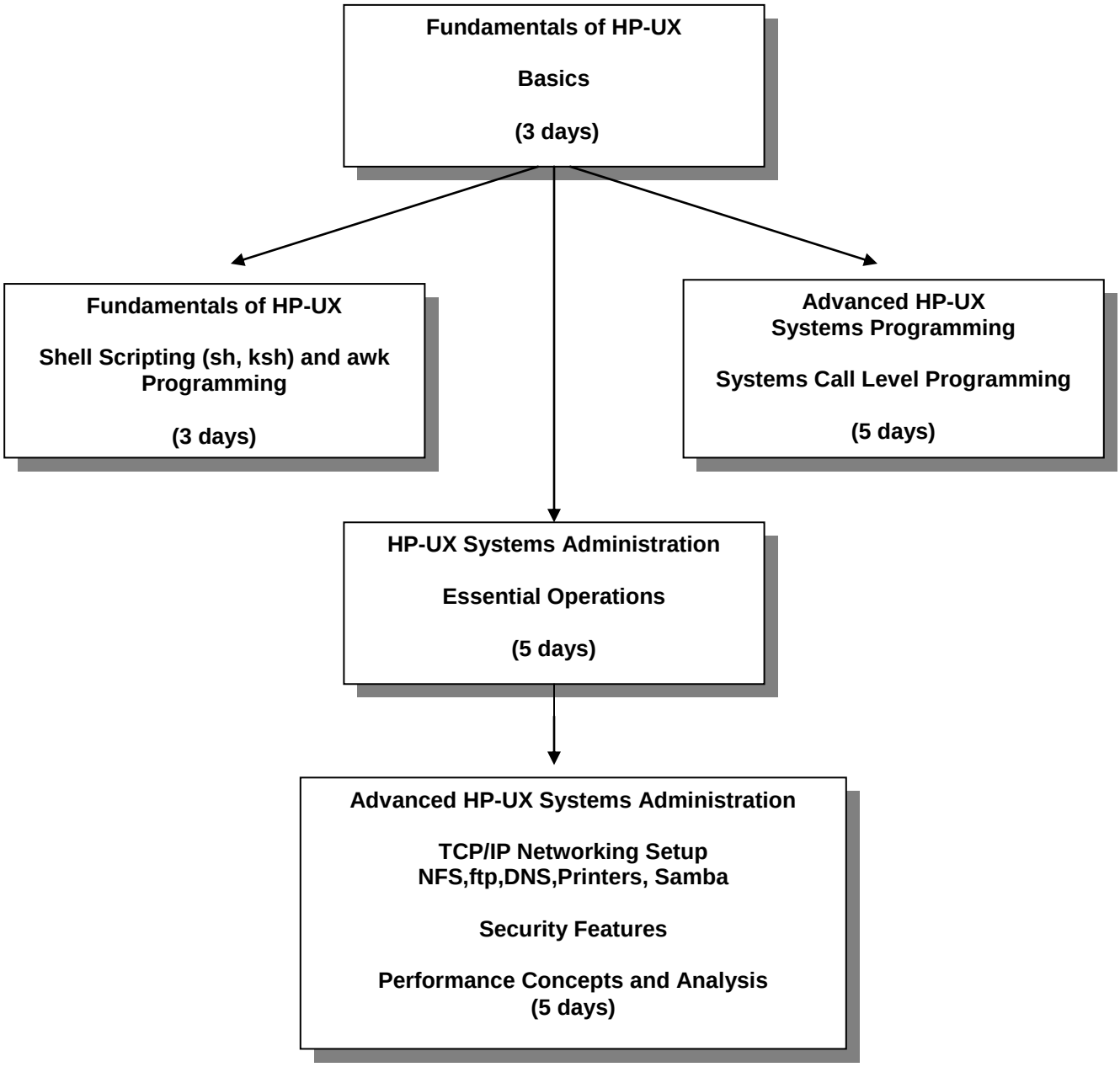
HP-UX Operating System Courses

Our Experts Can Cover Any and All Topics—Topics Can Be Added or Deleted per Customer needs.



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Fundamentals of HP-UX Basics—Three (3) days, 50% lecture and 50% lab

Supporting Platforms: HP-UX (PA-RISC, Integrity)

Course teaches basic working environment of an **HP-UX** system. It introduces commonly required operations that can be performed by entering commands interactively in a command terminal, along with features in the Common Desktop (**CDE**) graphical environment. This course supports the following platforms: **HP-UX (V11i v3)**

COURSE OBJECTIVES—Each participant will learn to use **Korn** Shell techniques and commands to maintain collections of files, create files using interactive editor utilities, create and execute basic command procedures, communicate with other users, and tailor the interactive environment to meet their needs. Environment control using **CDE** graphical utilities will also be shown.

COURSE TOPICS

Understanding the User Environment
- **HP-UX** Software Overview
- Process Concepts
- The Common Desktop Environment

Getting Started with the Command Language
- Logging Into an **HP-UX** System
  - Graphically through the **CDE** / **ssh tunnel**
  - Non-graphically thru **telnet** or **ssh**
- Shell Syntax Rules
- Command Line Editing
- Obtaining help using **man,** CDE **helpview**
- **Korn Shell** history controls
- Basic Network Operations

Managing Files
- File Specification Syntax
- Device Specifications
- Directory Specifications
- Using the **CDE dtfile** file manager
- Regular Expressions and Special Characters
- **HP-UX** Commands to Manipulate Files
  - **CDE** utilities to manipulate files
- File Protection Mechanisms

Creating and Editing Text Files: Part 1
- Using GUI-based editors (**dtpad (CDE)**)
- **vi** Editor
- **ex** Editor (commands within **vi**)

Fundamentals of HP-UX Basics—Three (3) days Continued

Creating and Editing Text Files: Part 2
- Advanced Features of the **vi** Editor
  - abbreviations
  - mapping keys

Improving the User Interface
- Saving History Commands
- Creating Command Aliases
- Redirection of Input and Output
- Using Hard and Symbolic Links
- Process Control Commands

Shell Script Procedures
- Rules for Creating Procedures
- The **.profile** Procedure
- The **.kshrc** Procedure

Print and Batch Mechanisms
- The **lp** Commands and Options
  - Using the **CDE** print manager
- The **at** Command and Options

Basic Archiving Techniques
- The **tar** Command and Options
- Compressing **tar** archives with **gzip**

COURSE PREREQUISITES—This course is considered to be the basic **HP-UX** course. Experience with any (other) interactive system is helpful.

Fundamentals of Unix— Supporting Platforms: Sun Solaris, IBM AIX, HP-UX
Shell Programming and Report Generation—Three (3) days, 50% lecture, 50% lab

Teaches **Unix** computer professional (user, systems administrator, application/system programmer) techniques needed to develop advanced shell and reporting type procedures under **Unix**. Techniques in major shells will be shown. All **Unix** systems support all techniques in this course.

COURSE OBJECTIVES—Each student will be able to use Unix, awk, nawk, and Korn shell commands to maintain collections of files, control usage of shell command scripts, and generate reports using (n)awk facility.

COURSE TOPICS

Common Features of Shell Scripting
- Common Shell environment variables
- User-defined variables
- Substitution of variables
- Looping statement constructs
- Decision statements
- Command substitution in variables
- Using **export** and **expr**
- Handling signals with **trap**

Writing Korn Shell Scripts
- Korn Shell environment variables
- User-defined variables
- Substitution of variables
- Command substitution in variables

Writing Korn Shell Scripts (continued)
- Decision statements
- Looping statement constructs
- **typeset**ting variables for output
- **typeset**ting integer variables
- the **select** construct (for menus)
- using and defining functions
- accessing files' records using pipes
- accessing files' records directly with **exec**
- special parameter/variable substitutions
- Korn shell parent-child process communications
- defining and using arrays

Using the awk Utility to Generate Reports
- awk utility calling techniques
- Patterns and actions
- Using the BEGIN and END patterns
- Using awk built-in variables
- Procedure-defined variables in awk
- Formatted output using **printf**

COURSE PREREQUISITES—This is an advanced Unix course. Participants should have attended **Fundamentals of Unix (Basics)** course, or have equivalent experience with Unix system.

Advanced HP-UX Systems Call Programming—Five (5) days, 60% lecture, 40% hands on lab

Course introduces participants to system level programming in **C language** in a **HP-UX** environment. Course focuses on **HP-UX** system calls and library functions, how to use them, and their underlying mechanisms. Course deals with many facets of the **HP-UX** operating system, including: introduction to UNIX kernel structure, I/O, Signals, Signal handlers, Timers, Processes, Multi-Tasking, Inter-Process Communication (IPC) Pipes, Shared memory, Message Queues, Semaphores, Networking, Sockets, using TCP/IP and UDP/IP. Information presented is related to participant through: execution of common **HP-UX** user/administrator commands, and writing, compiling, and executing example **C language** programs which demonstrate the use of system routines and accessing system data structures on a live **HP-UX** system.

COURCE OBJECTIVES—Upon completion of this course the participant will be able to:

- Explain the various mechanisms available to the programmer in a **HP-UX** environment
- Write a wide variety of applications using standard **Unix** system calls and library functions

Course Topics

System Programming Environment of the HP-UX Operating System

- Environment of a **C** language program
- System level programming requirements:
  - **C** compiler issues
  - Header files and libraries
  - Special data types used
  - Useful functions
  - Error handling (basic)
- Documentation
- Security Issues

File Systems

- Types of file I/O
- File I/O structures
- File I/O access types
- Dealing with STDIN, STDOUT, STDERR
- Creating and using temporary files
- Directory file access and manipulation
- Permissions

Process Creation and Control

- Attributes (username, UID, PID, Groups)
- Creation methods
- Multi-tasking
- Shells
- Synchronization
- An introduction to threads

Synchronization and System Information

- Time issues:
  - how time is maintained

Advanced HP-UX Systems Call Programming—Five (5) days Continued

- timers
- General synchronization
  - semaphores
  - mutexes
  - signals (generation and handling)
- System information:
  - uname
  - hostname
  - load averages

Interprocess Data Communication Facilities

- Overview of Unix IPC Facilities
- Memory Mapped files
- Pipes and Named Pipes
- Messages Queues
- Creating and Using Shared Memory structures

Sharing Code Between Processes

- Building shared object (libraries)
- Static Linking
- Dynamic Linking

Networking

- Concepts and basic requirements
- Socket creation and usage
- TCP/IP level connections
- UDP/IP level connections

Course Prerequisites—Participant should have a solid background in basic **HP-UX** utilities and editors (such as **vi**), and a working knowledge of the **C** (or **C++**) programming language(s).

HP-UX System Administration (Essential Operations)—Five (5) days, 60% lecture, 40% lab

This course will teach the commands and methods needed to setup and manage an **HP-UX** system. The course will also use a problem solving approach in the lab exercises to teach system administrators advanced topics, for long-term mangement of the system.

Customized for: **HP-UX 11i v3, PA-RISC & Itanium platforms**

COURSE OBJECTIVES—On completion of this course, a systems administrator should be able to install, update, and boot **HP-UX** operating environment; set up user accounts and directories; prepare queues for use; perform backups for integrity and performance reasons; monitor the system for performance and do basic setup of network software and capabilities.

COURSE TOPICS

Advanced System Concepts for System Administrators
- Process concepts
- Shell command usage and review
- Optimizing system help information
- System administrator functions
- Using the root account
- **HP-UX** administrative tools
  - commands
  - SAM
  - System Management Homepage

System Installation and Updating
- Installation types and methods
- Installing the **HP-UX** operating system (**Ignite-UX**)
- Updating HP-UX using update-ux
- **HP-UX** product control (**swinstall**, **swlist**, **swremove**)
- Obtaining and installing patches to **HP-UX**
- Rebuilding/reconfiguring the **HP-UX** kernel

Startup and Shutdown
- Comparison of **PA-RISC** and **Itanium** boot sequences
- Default bootstrap
- Boot Admin mode (PA-RISC) & EFI modes (Itanium)
- Boot to single-user mode
- Startup methods and procedures
- Shutdown procedures

Managing of System Users
- **/etc/passwd /etc/group** files and contents
- **Standard**, **Shadow**, and **Trusted** modes
- UID and GID concepts

HP-UX System Administration (Essential Operations)—Five (5) days Continued

Creation of a user account
Controlling access by groups
Login sequence
Setting up user environment files
Removing a user account

Managing Printer Queues
Creation of an execution print queue
Commands to manipulate queues
Commands to manipulate jobs in queues

File System Concepts and Review
Whole disk and LVM disk layouts
Device naming conventions
File system structure contents
Supported file types
Special permission codes
Manipulation of Access Control Lists (ACLs)

Managing Disk and Tape Volumes
Creating (disk) device files
Creating file systems with **newfs**
Changing file system attributes - **tunefs** & **vxtunefs**
Checking file system structure with **fsck**
mounting and **umount**ing file systems
open file control via **fuser** and **lsof**

Managing Disk and Tape Volumes Continued
Using **LVM** on **HP-UX**
physical volume creation (**pvcreate**)
volume group creation (**vgcreate**)
logical volume creation (**lvcreate**)
controlling software mirroring and striping
volume group and logical volume extensions
file system extensions (**fsadm**)
Commands to manipulate tape volumes:
tar utility
cpio utility
(**vx**)**dump** and (**vx**)**restore** utilities
fbackup and **frestore** utilities

HP-UX System Administration (Essential Operations)—Five (5) days Continued

Monitoring System Activity
- Informational Utilities
- The **vmstat** utility
- The **iostat** utility
- The **sar** utility
- The **netstat** utility

Maintaining System Integrity
- Login and user accounting
- Command/process level accounting
- Disk space usage utilities
- Using **cron** tables
- Basic **CDE** data files and setups

Network Setup and Configuration
- Automated methods: **sam** and **/etc/set_parms**
- TCP/IP address selection
- Host names and related files
- Configuring network devices
- Defining routers and subnet addressing
- Network testing with **ping**
- Network utilities: **telnet,rlogin, rcp, remsh**

COURSE PREREQUISITES—Participant should have successfully completed the **Fundamentals of HP-UX** course, or has equivalent system time as a user.

Advanced Unix Systems Administration—Five (5) days, 70 % lecture, 30 % lab
Networking Configuration, Security Considerations, Performance Monitoring and Tuning

This course will teach the commands and methods needed to setup and manage advanced features in a Unix system. Course will also use a problem solving approach in the lab exercises to teach system managers proper application of advanced features. Systems: **HP-UX**

COURSE OBJECTIVES—On completion of this course, a system manager should be able to implement networking features for the system and its users; define name service capabilities; and use advanced options and setups for the shell command interpreters.

COURSE TOPICS

Review of System Concepts for Systems Administrators
- Process concepts
- Shell command usage and review

Advanced Network Features
- Review of network basic setup
- Subnet addressing
  - Using arp (address resolution protocol)
  - Network statistics
- Controlling the inetd process
  - Miscellaneous network commands/tools
- DHCP setup – client and server

File Transfer Capabilities
- The ftp utility
  - setup
  - file capabilities
  - trivial ftp and anonymous ftp setups

Advanced Unix Systems Administration
Networking Configuration
Security Considerations
Performance Monitoring and Tuning

Advanced Network File System (NFS) Features
- Review of basic NFS setup
- Advanced capabilities of server setup
- Advanced capabilities in client setup
- Using the automount feature

Using and Configuring Samba
- Reasons for using **samba** features
- Selecting aserver host
- Defining client hosts

Advanced Unix Systems Administration—Five (5) days, Continued

Name Services
- Capabilities of **DNS**
- BIND configurations
- Configuring the resolver
- Configuring the named process
- Cache initialization
- Using n**slookup** to obtain information

Configuring Remote Printers
- Printer setup databases (and control)
- Remote printer usage

Tape Device Access Through TCP/IP
- Using data dump (dd)
- Combining tar with dd
- Remote file system dumping

Maintaining System Integrity
- Specifying auditing events
- Improving shell performance

Using the error report facility

Advanced Unix Systems Administration

Networking Configuration

Security Considerations

Performance Monitoring and Tuning

Security Concepts for System Administrators

Overview of issues related to Unix security
- System administrator functions related to security

System Security Features Updating
- Security levels in a Unix system

Rebuilding the Unix kernel with auditing

Managing of System Users
- Using the root account securely
- Password issues
  - changing
  - encryption
  - ging and expirations
  - shadow files
- Groups

Advanced Unix Systems Administration—Five (5) days, Continued

File System Security
File permissions review
Special permissions: SUID,SGID,Sticky Bits
Device files
Using chown and chgrp
Backups

Using Unix Log Files
Users
lastlog,utmp,wtmp,pacct,syslog
System
shutdownlog
sulog/messages

Network Security
Proper maintenance of the /etc/hosts file
Using the "r" commands
The restricted shell
NFS security implications

Performance Basics
Factors affecting system performance
Performance metrics
Virtual system caching
Effects of Computer Architecture

Memory Management
Memory usage by the kernel
Process creation
Buffer Cache (and allocation control)
Shared Memory / Page Caching
Paging and Swapping
Monitoring Tools

CPU Management
Software priorities concepts
Impact of the nice parameter
Priority boosting
Differences in hardware implementations
Monitoring tools

I/O Management
Breakdown of Disk I/O
Measuring Disk I/O

Advanced Unix Systems Administration—Five (5) days, Continued

File system structure concepts
File system caching
Name Lookup Caching
Monitoring tools

Network Management
TCP/IP Layers
Socket controls
Controlling network services
Setting network buffer values
Monitoring tools

NFS Performance
RPC Performance Considerations
Impact of NFS Blocking and Caching Sizes
Optimizing NFS Servers and Clients
Monitoring tools

X-window basics and implementation
Client-server communications
Optimizing a system with X
Reducing xterm memory usage
Monitoring tools

Modification of Performance Parameters
SUN Solaris
HP-UX
IBM AIX

Summaries
Memory management
CPU management
I/O management
Network management
User program management

COURSE PREREQUISITES—It is assumed that the student has experience with interactive Unix systems with user-level commands, basic shell or **Perl** scripting techniques, and essential systems administrator functions.