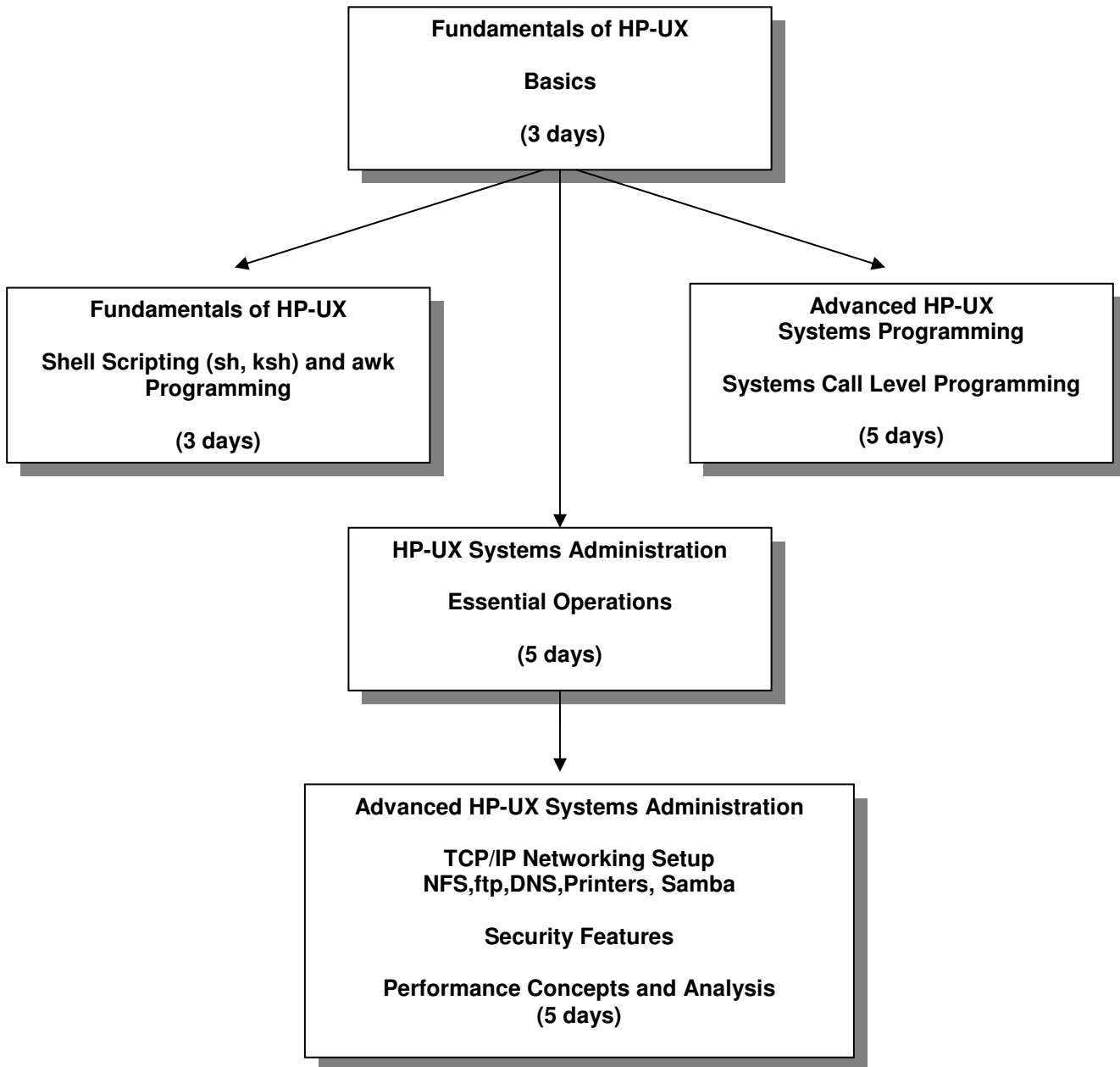


HP-UX Operating System Courses



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Fundamentals of HP-UX

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

COURSE DESCRIPTION

This course teaches the 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

Fundamentals of HP-UX

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

COURSE TOPICS

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**)

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

Fundamentals of HP-UX

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

COURSE TOPICS

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 DURATION

This course normally requires three (3) days, approximately 50% lecture and 50% lab time.

COURSE PREREQUISITES

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

Fundamentals of Unix

Shell Programming and Report Generation

Supporting Platforms: HP-UX

COURSE DESCRIPTION

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

Fundamentals of Unix

Shell Programming and Report Generation

Supporting Platforms: Sun Solaris, IBM AIX, HP-UX

COURSE TOPICS

Writing Korn Shell Scripts (continued)

- Decision statements
- Looping statement constructs
- typesetting** variables for output
- typesetting** 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 DURATION

This course normally requires three (3) days, approximately 50 % lecture, and 50 % lab time.

COURSE PREREQUISITES

This is an advanced Unix course. It is assumed that participants either have attended the **Fundamentals of Unix (Basics)** course, or have equivalent experience with a Unix system.

Advanced HP-UX Systems Programming

Course Description

This course introduces the participants to system level programming in the **C language** in a **HP-UX** environment. The course focuses on **HP-UX** system calls and library functions, how to use them, and their underlying mechanisms. The 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. Throughout the course the information presented is related to the participant through: the 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.

Course 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

Advanced HP-UX Systems Programming

Course Topics

Synchronization and System Information

Time issues:

- how time is maintained

- 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 Duration

This course normally requires five (5) days, 60% lecture, 40% hands on lab exercises.

Course Prerequisites

It is assumed that the participant has 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)

COURSE DESCRIPTION

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 management 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 the **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

HP-UX SYSTEM ADMINISTRATION (Essential Operations)

COURSE TOPICS

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
- 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)

HP-UX SYSTEM ADMINISTRATION (Essential Operations)

COURSE TOPICS

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 **umounting** file systems

open file control via **fuser** and **lsof**

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

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

HP-UX SYSTEM ADMINISTRATION (Essential Operations)

COURSE TOPICS

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 DURATION

This course normally requires five (5) days, approximately 60% lecture, and 40% lab time.

COURSE PREREQUISITES

It is assumed that the student has successfully completed the **Fundamentals of HP-UX** course, or has equivalent system time as a user.

Advanced Unix Systems Administration

Networking Configuration

Security Considerations

Performance Monitoring and Tuning

COURSE DESCRIPTION

This course will teach the commands and methods needed to setup and manage advanced features in a Unix system. The course will also use a problem solving approach in the lab exercises to teach system managers the 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 it's 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

COURSE TOPICS

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 a server host
- Defining client hosts

Name Services

- Capabilities of **DNS**
- BIND configurations
- Configuring the resolver
- Configuring the named process
- Cache initialization
- Using **nslookup** 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

COURSE TOPICS

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
 aging and expirations
 shadow files
Groups

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

Advanced Unix Systems Administration

Networking Configuration

Security Considerations

Performance Monitoring and Tuning

COURSE TOPICS

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

Advanced Unix Systems Administration

Networking Configuration

Security Considerations

Performance Monitoring and Tuning

COURSE TOPICS

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

Advanced Unix Systems Administration

Networking Configuration

Security Considerations

Performance Monitoring and Tuning

COURSE DURATION

This course requires five (5) days, approximately 70 % lecture, and 30 % lab time.

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.