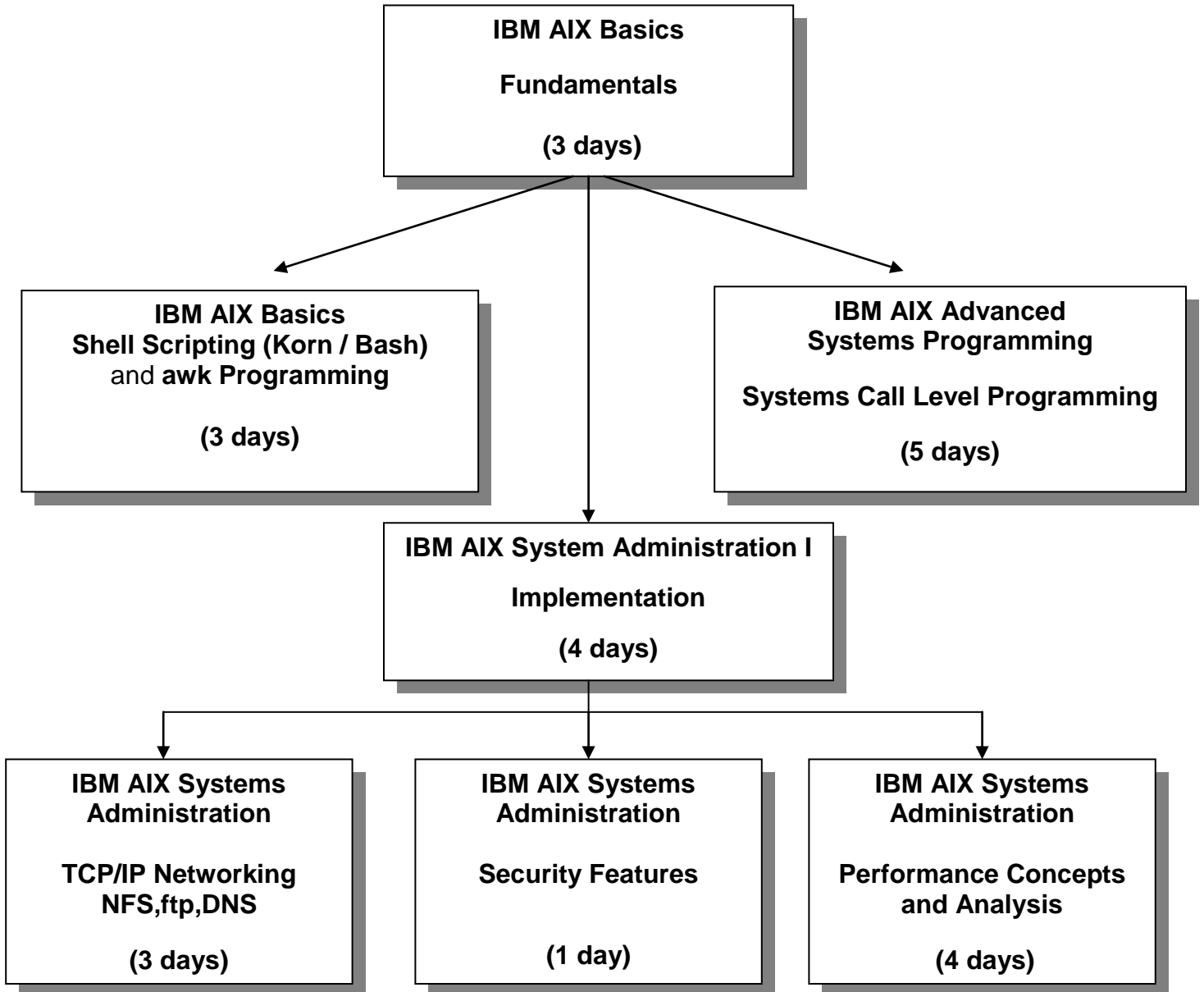


IBM AIX Operating System Courses

(Platforms: POWER4+ based)

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



- Training materials cover both supported IBM AIX platforms listed above

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IBM AIX Basics—Fundamentals—Three (3) days, 50% lecture and 50% lab

This course teaches the basic working environment of an **IBM AIX** system. It introduces commonly required operations that can be performed by entering commands interactively in a command terminal, along with functions available in the Common Desktop Environment (**CDE**). This course is taught for the following **IBM AIX** platforms: **POWER4+** , all **AIX operating system versions**.

COURSE OBJECTIVES—Each student will be able 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 the **CDE** graphical utilities will also be shown.

COURSE TOPICS**Understanding the User Environment**

Unix / AIX Software Overview
Process Concepts
The Common Desktop Environment GUI

Getting Started with the Command Language

Logging Into an **AIX** System
- Graphically through the **CDE**
- Non-graphically thru **telnet** or **ssh**
Shell Syntax Rules
Command Line Editing
Obtaining help using **man** and **CDE helpview**
Korn shell history control
Basic Network Operations

Managing Files

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

IBM AIX Basics—Fundamentals—Three (3) days Continued
50% lecture and 50% lab

COURSE TOPICS

Creating and Editing Text Files: Part 1

Using GUI-based editors (**dtpad**)
vi Editor
ex Editor (commands within **vi**)

Creating and Editing Text Files: Part 2

Advanced Features of the **vi** Editor
abbreviations
mapping keys
alternative editors: **vim nedit**

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 **lpr** and **lp** Commands and Qualifiers
Using the **CDE** print manager
The **at** Command and Qualifiers

Basic Archiving Techniques

The **tar** Command and Options
Compressing **tar** archives with **gzip**

COURSE PREREQUISITES—This course is considered to be the basic **IBM AIX** course.

Experience with any other interactive system is helpful.

IBM AIX Basics—Shell Scripting—Three (3) days, 50 % lecture, and 50 % lab

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

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

COURSE TOPICS**Basics of Shell Script (Common Features)**

- Bourne 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
- 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 PREREQUISITES—This is an advanced **IBM AIX** course. Participant should have attended **AIX Basics—Fundamentals** course, or have equivalent experience with a Unix system.

IBM AIX Advanced Systems Call Level Programming—Five (5) Days 60 % lecture, 40 % lab

This course introduces the participants to system level programming in the **C language** in a **IBM AIX** environment. Focuses on **HP-UX** system calls and library functions, how to use them, and their underlying mechanisms. Deals with many facets of **IBM AIX** 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 the participant through: execution of common **IBM AIX** 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 **IBM AIX** system.

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

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

COURSE TOPICS**System Programming Environment of the IBM AIX 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

IBM AIX Advanced Systems Call Level Programming —Five (5) Days Continued
60 % lecture, 40 % lab

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 PREREQUISITES—Participant should have a solid background in basic **IBM AIX** utilities and editors (such as **vi**), and a working knowledge of the **C** (or **C++**) programming language(s).

IBM AIX System Administration I—Implementation—Four (4) days, 60% lecture, and 40% lab

This course will teach the commands and methods needed to setup and manage **IBM AIX** systems. The course will also use a problem solving approach in the lab exercises to teach system managers advanced topics, for long-term management goals.

Systems: **IBM AIX, running on RS/6000 or POWER configurations.**

COURSE OBJECTIVES—On completion of this course, a system manager should be able to install, update, and boot the **IBM AIX** operating system; 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
- Using the **smit** graphical and non-graphical interfaces
- Manipulating system default environment files

System Installation and Updating

- Installation types and methods
- Installing the **AIX** operating systems
- Upgrading to a newer version of **AIX**
- Maintaining the system via patches
- Adding additional products to the system (**lpp**)
- Reconfiguring the **AIX** kernels via parameters

Startup and Shutdown

- Default bootstrap
- Boot to single-user mode
- Startup methods and procedures
- Adding procedures to the startup mechanism
- Shutdown methods and control

Managing of System Users

- UID and GID concepts
- Creation of a user account
- Security through password aging
- Login sequence

Managing Printer Queues

- Creation of an execution print queue
- Commands to manipulate queues
- Commands to manipulate jobs in queues

IBM AIX System Administration I—Implementation—Four (4) days Continued
60% lecture, and 40% lab**Managing Disk and Tape Volumes**

Commands to manipulate disks/filesystems
creating volume groups and logical volumes
creating file systems (**crfs** and **mkfs**)
manipulating file system structures
verifying file system structures with **fsck**
making file systems available to software (**mount**)
Commands to manipulate archival volumes:

tar utility

cpio utility

backup and **restore** utilities

Monitoring System Activity

Informational Utilities
The **vmstat** utility
The **iostat** utility
The **sar** utility
The **netstat** utility
Maintaining swap and paging space(s)
Building and using the **top** facility

Maintaining System Integrity

Using cron tables

Network Setup and Configuration

TCP/IP address selection
Host names and related files
Configuring network devices
Network testing with **ping**
Network utilities: **telnet**, **rlogin**, **rcp**, **rsh**

COURSE PREREQUISITES—Participant has successfully completed **IBM AIX Basics—Fundamentals** course, or has equivalent system time as a user.

IBM AIX Systems Administration—Networking Features and Setup—Three (3) Days
60% lecture, and 40% lab

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.

COURSE OBJECTIVES—On completion of this course, a system administrator 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

File Transfer Capabilities

- The ftp utility
 - setup
 - file capabilities
 - additional features
- Using trivial ftp (tftp)

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

IBM AIX Systems Administration—Networking Features and Setup Continued
Three (3) Days 60% lecture, and 40% lab

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
Setting up anonymous ftp

Maintaining System Integrity

Specifying auditing events
Improving shell performance
Using the error report facility
More on performance analysis

COURSE PREREQUISITES—Participant has completed the **IBM AIX Basics—Fundamentals**, and **IBM AIX System Administration I—Implementation** courses, or has equivalent system experience.

IBM AIX Systems Administration—Security Features—Two (2) Days, 60% lecture, 40% lab

This course will teach commands and methods needed to setup and enforce a security domain on an IBM AIX system. Class uses a problem solving approach in lab exercises to give systems administrator's hands-on reinforcement of these methods.

COURSE OBJECTIVES—On completion of this course, a system manager should be able to load the IBM AIX operating system with enhanced auditing features; check file systems for security problems; design and enforce a secure password specification and modification mechanism; and review security considerations in other areas of a Unix system.

COURSE TOPICS**Advanced System Concepts for System Administrators**

- Process concepts
- Shell command usage and review
- 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 and sulog/messages

Network Security

- Proper maintenance of the /etc/hosts file
- Using the "r" commands
 - The restricted shell - NFS security implications
 - Known problems with SMTP (sendmail)
 - finger utility security issues - TFTP issues

COURSE PREREQUISITES—Participant has completed **IBM AIX Basics—Fundamentals**, and **IBM AIX Systems Administration I—Implementation** courses, or has equivalent experience.

IBM AIX Systems Administration—Performance Concepts and Analysis—Four (4)
days, 70 % lecture, and 30 % lab time

This course is designed to teach performance concepts relating to Unix systems (**IBM AIX pSeries and RS/6000 hardware platforms**), and to use these concepts to develop a tuning methodology to monitor, interpret, and adjust mechanisms that affect performance. The course will Develop skills to measure, analyze, and tune **AIX** subsystems for optimum performance. The course will also show how to use standard AIX performance tools (**sar, iostat, vmstat, and trace**), along with advanced **AIX** performance tools (**tprof, vmon, filemon, monitor, and nmon**).

COURSE OBJECTIVES—Upon completion of this course, a system performance analyst will be able to : understand fundamental performance concepts for memory management, CPU management, and I/O management in **AIX** systems; use supplied monitoring tools to interpret performance statistics.

COURSE TOPICS**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** parameters
- Priority boosting
- Differences in hardware implementations
- Monitoring tools

I/O Management

- Breakdown of disk I/O
- Measuring Disk and terminal I/O
- File system structure concepts
- File system caching
- Name Lookup Caching
- Tuning the Usage of Non-Computational Memory
- Monitoring tools

IBM AIX Systems Administration—Performance Concepts and Analysis Continued

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

- using **smit** to change basic parameters
- dynamic changes with **vmtune**, **schedtune**,
schedo, **iotune**

Summaries

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

COURSE PREREQUISITIES—Participant has completed **IBM AIX Basics—Fundamentals**, and **IBM AIX Systems Administration I—Implementation** courses, has experience with **interactive Unix systems with user-level commands, basic Shell or PERL scripting techniques**, and **IBM AIX System Administration I—Implementation** courses.