z/OS UNIX System Services Implementation

Course Summary

Description

This course is designed to help MVS system programmers understand, install, maintain, and support z/OS UNIX System Services and software running on top of UNIX System Services.

Topics

- UNIX Background and Basics
- z/OS UNIX Architecture & System Programming
- Understanding the zSeries File System
- Understanding z/OS UNIX Security
- Customizing and Using Shells
- Setting up UNIX Daemons
- z/OS UNIX Operation
- z/OS TCP/IP Stack
- z/OS Web Server
- z/OS UNIX Performance Tuning
- Intro to UNIX Application Development
- Debugging & Diagnosing UNIX Problems
- Shell Programming Essentials (optional topic)
- Using REXX with UNIX System Services (optional topic)

Audience

This course is designed for technical staff who are responsible for installing, maintaining, troubleshooting and tuning IBM mainframe computer systems running z/OS.

Prerequisites

The student should have attended the Introduction to z/OS UNIX course or have equivalent familiarity with end user UNIX commands and access to UNIX on z/OS. The student should also be familiar with z/OS architecture and systems programming.

Duration

Four days

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Course Outline

I. z/OS UNIX Background and Basics

A. Introduction to UNIX system services
B. UNIX history
C. Standards ,Standards Organizations
D. z/OS UNIX system services
E. z/OS UNIX release history
F. z/OS UNIX vs. S/390 Linux
G. UNIX Connection & Process Mgr.
H. UNIX Connection Scaling
I. UNIX Parallel Operation Environment
J. IBM products exploiting USS - TCP/IP, Java
K. IBM products exploiting USS – Web, Websphere
L. IBM products exploiting USS – Notes, Print
M. z/OSUNIX serving PC files
N. Third-party USS products
O. Navigating USS documentation
P. z/OS UNIX help on-line
Q. UNIX commands: file & text mgmt
R. UNIX commands: system process mgmt
S. UNIX commands: storage mgmt, TCP/IP
T. UNIX commands: printing, programming
U. Reading the manual: the man command
V. UNIX command review quiz

II. z/OS UNIX Architecture & System Programming

A. USS architecture
B. SYS1.PARMLIB
C. BPXPRMxx wizard
D. USS startup
E. File systems, understanding hierarchical file system
F. Creating a HFS dataset
G. Sharing HFSs (V2R9 & up)
H. Sysplex Root HFS, System-Specific HFS, Version HFS
I. New Parmlib Options
J. HFS Sharing under the covers
K. Sharing HFSs (Pre V2R9)
L. Mounting HFS datasets and file systems
M. Understanding Automount, Setting Up Automount
N. File system maintenance planning
O. File system maintenance issues - SMP/E
P. File system maintenance – backup, restore
Q. Extended attributes - APF auth
R. Under the covers of the file system
S. Linking files, Hard vs. Symbolic links
T. Linking to a file, External links
U. Understanding the zSeries File System
V. Key zFS Features
W. Compatibility Issues:
X. zFS Terminology
Y. zFS Architecture
Z. Sysplex zFS Sharing Issues
AA. Creating a zFS Dataset
BB. IOEAGFMT Options
CC. Installing zFS
DD. Controlling zFS File System Mgr
EE. IOEFSPRM Parm File Options
FF. Sample IOEFSPRM Parm File
GG. zFS Aggregate Management Tools
HH. zfsadm Subcommand Summary
II. zfsadm Examples
JJ. zFS Backup, Restore via DFDSS
KK. zFS Documentation & Information

III. z/OS UNIX Security

A. CA-ACF2 Release Levels
B. USS Security OMVS Segment
C. USS Security Facility Classes
D. USS Security - Superuser
E. OMVS Segment: RACF, ACF2, Top Secret
F. User Admin using the ISPF Shell
G. Extended Attributes - APF Auth
H. Understanding the UNIXPRIV Class
I. Selected UNIXPRIV Class Resources

IV. Customizing and Using Shells

A. Why Use a Given Shell?
B. Setting up the POSIX Shell
C. Time Zone Decoding
D. Setting up the tcsh Shell
E. Using the OHELP TSO Command
F. Setting up the OHELP TSO Cmd
G. Setting Up Man Pages
H. Setting Up for Internationalization
I. Setting Up mail Clients
J. Posix Shell Initialization Scripts
K. Posix & Korn Shell Variable Review
L. Sample /etc/profile Script
M. Time Zone Decoding
N. tcsh Shell Initialization Scripts
O. Sample /etc/csh.login Script
P. Sample $HOME/.cshrc Script
Q. Other tcsh Files

z/OS UNIX System Services Implementation

Course Outline (cont'd)

R. tcsh Setup Lab
S. Using the OHELP TSO Command
T. Setting up the OHELP TSO Cmd
U. Setting Up Man Pages
V. Setting Up for Internationalization
W. z/OS UNIX System Services Implementation

V. Environment Variables for locales
A. Locale Switch in $HOME/.login
B. Variant Characters
C. When to Convert between Code Pages
D. Code Page Conversion Tools
E. Commands for working with locale
F. Choosing a Mail Client
G. Setting Up mail

VI. Setting Up UNIX Daemons
A. IBM Supplied UNIX Daemons
B. Daemon Startup & Monitoring
C. syslogd startup via Shell Script
D. syslogd startup via MVS JCL
E. syslogd Startup via Bpxbatch JCL
F. cron Overview and Setup Issues
G. Controlling the cron Daemon
H. cron Files and Directories
I. cron Setup Issues
J. cron Files and Directories

VII. z/OS UNIX Operation
A. Operator tools and interfaces
B. Console commands D A
C. Console commands D OMVS
D. Console commands SETOMVS, SET OMVS
E. USS operator issues
F. USS operator issues - JES2 hot start
G. UNIX operation using ISPF shell

VIII. z/OS TCP/IP Stack
A. z/OS TCP/IP stack roadmap
B. Key TCP configuration parameters
C. Key TCP configuration datasets
D. TCP dataset (IL) logic
E. TCP device configuration
F. TCP routing
G. TCP device configuration example
H. TCP routing (static)
I. TCP/IP subnetting
J. Key TCP configuration datasets
K. DNS domains
L. z/OS TCP/IP resolver data
M. z/OS TCP/IP HOST.LOCAL
N. z/OS TN3270 server configuration
O. z/OS TCP/IP SYS1.VTAMLST
P. z/OS TCP/IP sockets
Q. Well known UDP & TCP ports
R. FTP server configuration: FTP.DATA
S. FTP server configuration: PROC
T. Setting up INETD - /etc/inetd.conf
U. Setting up INETD - PROC
V. Accessing USS with Telnet/Rlogin
W. Many more TCP/IP services

IX. z/OS Web Server
A. IBM Web server overview
B. IBM WebSphere overview, components
C. How the Web works – URL, MIME, HTTP
D. How the Web works – HTML, Scripts, XML
E. IBM HTTP server installation
F. BPXPRMxx recommendations
G. HTTP server security definitions, RACF
H. Started class
I. DAEMONs & SUPERUSERs
J. Surrogates, Surrogate class
K. RACF program control
L. Program control for HFS
M. Server configuration
N. Configuration file directives
O. Web server proc
P. Additional LE parms
Q. Environment variable file
R. User ID
S. Basic directives
T. Welcome page directives
U. Resource mapping directives
V. GWAPI directives
W. Access control directives
X. Access control directives protection
Y. Sample protection schemes
Z. Logging and reporting
AA. Access logging
BB. Enabling access logging
CC. Filtering log entries
DD. Managing log files
EE. Error logging

X. z/OS UNIX Performance Tuning
A. z/OS UNIX monitoring tools
B. z/OS UNIX SMF data
C. File system maintenance
D. Configfhfs example

z/OS UNIX System Services Implementation

Course Outline (cont'd)

E. Using RMF
F. USS tuning tips: general
G. USS tuning tips: RMF reports
H. USS tuning tips: BPXPRM
I. USS tuning tips: ESQA
J. USS tuning tips: UID/GID
K. USS tuning tips: V2.7/filecache
L. USS tuning tips: STEPLIBs
M. USS tuning tips: file system
N. USS tuning tips: shell variables
O. USS tuning tips: using LPA
P. Debugging & Diagnosing UNIX Problems
Q. UNIX Component Trace
R. Starting & Controlling UNIX Component Trace
S. Dumping the Correct UNIX ASIDs
T. Using IPCS to Troubleshoot Dumps
U. Sample OMVSDATA header
V. UNIX Return and Reason Codes
W. Related Documentation

XI. z/OS Introduction to UNIX Application Development
A. Development tools
B. Daemons & fork – overview, flowchart, example
C. Daemons & fork - demo
D. Processes, address spaces, threads
E. Fork vs. Spawn
F. Some z/OS UNIX porting difficulties

XII. Debugging & Diagnosing UNIX Problems
A. UNIX Component Trace
B. Starting & Controlling UNIX Component Trace
C. Dumping the Correct UNIX ASIDs
D. Using IPCS to Troubleshoot Dumps
E. Sample OMVSDATA header
F. UNIX Return and Reason Codes
G. Related Documentation

XIII. Shell Programming Essentials
A. Why learn & Use the Korn Shell?
B. What are the Korn Shell Versions?
C. Korn Shell Syntax Example
D. Using the print Command
E. Using Korn Shell Variables
F. KornShell Variable Types
G. typeset Command
H. typeset for Mathematics
I. Defining and Using Array Variables
J. Reading User Input: Ksh88 & Ksh93 Example
K. Korn Shell Arithmetic
L. Korn Shell Arithmetic Operators
M. Korn Shell Arithmetic: Lab
N. Command Line Arguments: Example
O. Condition Testing: if/then/elif/else
P. Condition Testing: [[ ]] command
Q. String Condition Testing: Example, Patterns
R. Compound Condition Testing
S. Condition Testing: Optional Lab
T. Conditional Execution
U. Exiting from a script
V. File Validation & Exit: Optional Lab
W. Condition Testing: case/esac
X. Looping Overview: for, while, and until
Y. for Loop Example: User List, Filename Expansion, Counting
Z. while Loop, nested while Loops
AA. Infinite Loops with while, Optional Lab
BB. while Loops: Optional Lab
CC. File I/O Overview
DD. Shell Statement Redirection Syntax
EE. Redirecting the Shell with exec
FF. File I/O: Optional Lab
GG. Shell Statement Piping Syntax
HH. Shell Statement Piping: Example
II. Multitasking in a Shell Program

XIV. Using REXX w/ UNIX System Services
A. Why Use REXX in z/OS UNIX?
B. REXX in UNIX System Services
C. USS REXX Address Environments
D. Sample USS REXX Program
E. REXX in TSO vs. REXX in Shell
F. Understanding SYSCALLS()
G. Bi-Modal USS REXX Program
H. ADDRESS SYSCALL: File Manipulation
I. ADDRESS SYSCALL: File I/O
J. ADDRESS SYSCALL: File System Information
K. ADDRESS SYSCALL: Directory Manipulation
L. ADDRESS SYSCALL: Process Manipulation
M. ADDRESS SYSCALL: Signal handling
N. ADDRESS SYSCALL: Security-Related
O. ADDRESS SYSCALL: Miscellaneous