Solaris 10 System Administration Boot Camp

Course Summary

Length: 5 days (12 hrs per day) **Prerequisite:** Solaris fundamentals course

Recommendation Statement:
The student should have a minimum of six months UNIX system administration experience, completed a UNIX fundamentals course, and a strong desire to learn Solaris OS administration in an accelerated, intense environment. This course is also recommended for system administrators migrating from HP's HP-UX or IBM's AIX.

Course Description:
This course teaches intermediate and advanced topics in Solaris system administration by combining both the Solaris 10 System Administration Part 1 and Part 2 courses. The operating system will be Solaris 10 (SunOS 5.10 version 9/10). The course is taught on Sun SPARC servers and x86-based systems.

This course prepares the student for the Oracle Certified Professional, Oracle Solaris 10 System Administrator Certification Exams (CX-310-200, CX-310-202 & CX-310-203)

Upon completion of this course the student will be able to:

- Perform system boot and shutdown procedures on SPARC and x86-based systems
- Administer the Service Management Facility (SMF)
- Manage Solaris file systems
- Install the Solaris 10 Operating environment on SPARC and x86-based systems
- Create and administer user accounts
- Understand security issues and perform security administration
- Manage system processes
- Perform system backups and restorations
- Describe network basics
- Configure the network interface and network services
- Understand and administer ZFS file systems
- Describe remote administration with the Solaris Management Console software
- Manage virtual file systems and core dumps
- Manage storage volumes (SVM)
- Control access and configure system messaging
- Configure role-based access control (RBAC)
- Set up name services
- Introduction to LDAP
- Perform advanced installation procedures (Flash archive, JumpStart and WAN boot)
- Install the OS on a mirrored ZFS root pool
- Perform a Solaris Live Upgrade
- Perform a Solaris Flash installation
- Understand differences between SPARC and x86-based Solaris Operating environments.
- Understand and administer Zones and Containers.
- Use the Solaris Resource Manager with Zones
- Migrate a UFS root file system to a ZFS root pool

Solaris 10 System Administration Boot Camp

Detailed Course Outline

Overview of the Solaris 10 Operating Environment

- System concepts
- The main parts of the Solaris OS
- The Client/Server environment
- Describe the Solaris 10 Directory Hierarchy
  - Understand Solaris 10 file types
  - Understand hard links and soft links

System Startup and Shutdown Procedures – SPARC-Based Systems

- Understand phases of the boot process – SPARC
- Booting the system
- The Advanced Lights Out Manager (ALOM)
- Understanding OpenBoot and programmable read-only memory (PROM)
  - OpenBoot Firmware tasks
  - PROM fundamentals
  - PROM commands and syntax
  - Understand how to view and set PROM parameters from (OpenBoot and the shell)
  - Understand how to view and set device aliases
  - OpenBoot security
  - OpenBoot diagnostics
- Boot PROM and program phases
- Stopping the system for recovery purposes (Interrupting an unresponsive system)
- Understand the pros and cons of the various shutdown procedures

System Startup and Shutdown Procedures – x86/x64-Based Systems

- Understand phases of the boot process – x86-based systems
- The BIOS, Boot archive, and GRUB
- Configuring the video display
- Understand the pros and cons of the various shutdown procedures

GRUB – Grand Unified Bootloader (x86/x64 platform)

- Introduction to GRUB
  - How GRUB based booting works
- Modifying boot behavior with GRUB
- Use the eeprom and kernel commands
- GRUB device naming conventions
- Booting the x86-based system with GRUB
- GRUB boot archives
  - Boot the failsafe archive for recovery
- Interrupting and unresponsive system

Service Management Facility (SMF)

- Describe features of the SMF and the phases of the boot process
  - The init process and the /etc/inittab file
  - svc.startd daemon (master starter/restarter)
- Understand services and service instances
- Understand the SMF manifest
  - Creating the manifest
- Understand the SMF repository database
  - Modify the service configuration repository
- Understand the Fault Management Resource Identifier (FMRI)
- Understand service dependencies
- Identify run level fundamentals
  - Describe SMF Milestones
  - Changing milestones
- Compare run levels and SMF milestones
  - Understand when to use a SMF service vs. a legacy service
  - Identify phases of the boot process
- SMF command line administration utilities

- Display information about services
- Starting and stopping services using SMF
- Starting services during boot
- Troubleshooting SMF problems
- Control boot processes and services
- SMF message logging
- Creating new service scripts
  - Convert a legacy service to a SMF managed service
- Legacy services
  - Administering the SMF
  - Troubleshooting SMF
- Using run control scripts to stop / start legacy services
  - Adding scripts to the run control directories

Installing the Solaris 10 Software

- Requirements and preparation for installing the Solaris 10 software
  - Supported architectures
  - Minimum system requirements
- Software Terminology: Packages, Groups (Clusters), and Configuration Groups
  - Software package
    - Software groups and configuration groups
- Upgrade vs. Initial installation
- Disk storage systems
  - Considerations for planning partition sizes
  - Partition arrangements on multiple disks
- Methods of installing the Solaris 10 software
  - Interactive (CLI)
  - Custom JumpStart
  - Flash Archive
  - WAN boot
  - Live Upgrade
- Secure by Default
- The Solaris interactive installation process
- Installation and Secure by Default

Managing Local Disk Devices

- Describe disk architecture
- Describe device naming conventions
  - Physical device name
  - Instance name
  - Logical device name
  - Block and character device files
  - Tools to list devices
  - Reconfiguring devices
- Describe the format utility
  - Perform disk partitioning using the format utility
  - Perform disk partitioning using the Solaris Management Console (SMC)

Managing File Systems

- A file system defined
- Defining a disk’s geometry
  - Disk controller
  - Defect list
  - Disk label (EFI vs. SMI labels)
  - Partition table
  - Formatting SPARC and x86 drives
- Solaris file system types
  - Disk-based file systems (UFS, ZFS, HSFS, PCFS)
  - Network-based file systems
  - Virtual file systems (SWAPFS, PROCFS, LOFS, CacheFS, DEVfs, TMPFS)
- Disk slices
- Displaying disk configuration information

- Using format
- Logical volumes
- Parts of a UFS file system
  - The bootblock
  - The superblock
  - The inode
  - The storage block
  - Free blocks
- Creating a UFS file system
- Understanding custom file system parameters
- File system operations
  - Synchronizing a file system
  - Repairing file systems
  - Using fsck

Mounting and Unmounting File Systems

- Mounting file systems
  - The /etc/vfstab file
  - Using the mount command
  - Displaying mounted file systems
  - Mounting a file system with large files
  - Mounting a file system with UFS logging enabled
  - The /etc/mnttab file
- Displaying a file system's disk space usage
- Displaying directory size information
- Controlling user disk space usage
- Constructing a file system
- Large vs. Small files
- Unmounting a file system
  - The fuser command
- Volume manager (vold)
  - Troubleshooting volume manager
  - Using fdformat
- Information on file systems
- Troubleshooting file systems

Introduction to the ZFS File System

- Introduction to ZFS
  - ZFS Terms
  - Hardware and Software requirements for ZFS
  - What is Self-Healing?
- ZFS RAID configurations
- Create a ZFS file system
  - Rename a ZFS file system
  - Listing a ZFS file system
- Remove a ZFS file system
- Remove a ZFS Storage Pool
- ZFS Components
  - Disks, Files, Virtual Devices
  - Naming convention
- Using disks in a ZFS storage pool
- Using files in a ZFS storage pool
- Mirrored storage pools
  - Converting a non-redundant pool to a mirrored pool
  - Detach a device from a mirrored pool
- RAID-Z storage pools
- Displaying ZFS storage pool information
- Adding devices to a ZFS storage pool
- Attaching and Detaching devices in a storage pool
- Taking storage pool devices offline and online
- ZFS history
- ZFS properties

- Native and settable properties
- Setting ZFs properties
- Mounting ZFS file systems
- Legacy mount points
- Sharing ZFS file systems
- ZFS Web-based management GUI
- ZFS snapshots
  - Creating snapshots
  - Listing snapshot information
  - Saving and Restoring a ZFS snapshot
  - Renaming a ZFS snapshot
  - Rolling back a ZFS snapshot
  - Save/Restore to a remote system
- ZFS Clones
  - Creating and destroying ZFS clones
  - Replacing a ZFS file system with a ZFS clone
- Zpool scrubbing
- Replacing Devices in a Storage Pool
- Using ZFS with Solaris Zones
  - Adding a ZFS dataset to a non-global zone
  - Delegating a ZFS dataset to a non-global zone
- Emulated volumes
  - Using ZFS as a swap or dump device
- Designating hot spares in a storage pool

The Solaris Network Environment

- The Solaris Client/Server model
- Network interfaces Network Hardware
  - Configuring and Monitoring network interfaces
  - Configuring static information
  - Configuring dhcp
- Configuring the Network Interface
  - /etc/hostname.interface
  - /etc/nodename
  - /etc/defaultdomain
  - /etc/inet/hosts
- Configuring Network Services
  - Enable and disable server processes using the Service Management Service (SMF)
  - Understanding inetd and the inetd.conf file in the SMF environment
  - Starting services on well-known ports
  - Using inetadm
- Understand and monitor RPC services
- Network Security Files
- Understand how to configure the secure shell (ssh)
- Network Maintenance and Troubleshooting

System Security

- Physical security
- Controlling system access
- User account information
- Restricted shells
- Controlling file access
  - umask
  - Sticky bit
  - Setting the correct PATH
  - setuid / setgid programs
- Auditing users
  - Monitoring users and system usage
  - Checking who’s logged in
  - The whodo command
  - The last command
- Network security

- Securing superuser access
- Automated security enhancement tool (ASET)
- Common sense security techniques
- Securing services

Administering User Accounts

- Describe user administration fundamentals
- Adding, modifying, and deleting a user account from the command line and SMC
  - Adding a group from the command line and SMC
  - Setting up and customizing the user's shell
- Managing initialization files
  - The /home directory
  - Name services

Software Package Administration

- Describe fundamentals of package administration
- Tools for managing software from the command line and from the system GUI tools
  - Adding and removing software packages
  - Listing and verifying installed packages

Managing Software Patches on the Solaris 10 OS

- The fundamentals of patch administration
- Installing / verifying / removing a patch and patch clusters
- Introducing Sun Connection services
  - Using Sun connection services to automate patching
  - Using the update manager from the GUI and from the command line

Controlling System Processes

- Viewing system processes
  - Commands used to monitor system resources and processes
  - PROC tools
- Process types
- Using signals
  - The kill command
- Scheduling processes
  - The fair share scheduler (FSS)
  - Scheduling and changing process priorities
  - The nice and priocntl commands
- Clear frozen and "zombie" processes
- Using the Solaris batch-processing facility to schedule execution of commands
  - Configuring crontab for executing recurring processes
  - Using the at command for automatic one-time execution of a command

Backup and Recovery

- Backup and recovery fundamentals
- Solaris backup and restoration utilities
  - Using the tar, dd, cpio, and pax utilites
  - Using ufsdump and ufsrestore
- Recovering the root (/) and /usr file system
- Backing up a mounted file system
- Creating a UFS snapshot
- Backing up the snapshot file
- Creating a Flash Archive

Advanced Solaris 10 Installation Procedures

- Perform a Flash Installation
  - Describe a flash install
  - Create a flash archive
  - Create a differential flash archive
  - Manipulate a flash archive
  - Using a flash archive for cloning a server
  - Using a flash archive for cloning a server disaster recovery

- Perform a JumpStart and PXE Installation
  - Overview
  - Preparing a Custom Jumpstart Installation
  - What Happens During a Custom JumpStart Installation
  - Setting up the Server
  - Setting up the Install Server
  - Setting up the Boot Server
  - The rules File
  - Creating Profiles
  - Using a Flash Archive for a JumpStart Installation
  - Example Jumpstart Installation
  - Setup JumpStart to create a ZFS mirrored root pool
- Pre-Execution Boot Environment (PXE)
  - Prepare a PXE boot client
  - Setup a DHCP server to support x86 JumpStart clients
  - Network booting the x86-based system
- Install the OS Using a Flash Archive
  - Create a Flash Archive
  - Create a differential Flash Archive
- WAN Boot
  - The WAN boot process
  - Configure the WAN boot environment and the WAN boot server
  - Booting the WAN boot client
  - Using a Flash Archive for a WANboot Installation
- Install the OS using ZFS on the root file system
  - Creating a mirrored root pool
  - Migrating a UFS root disk to ZFS
  - Booting a ZFS root file system
  - ZFS related OpenBoot commands
  - Multiple ZFS boot environments
  - Booting a ZFS file system in FailSafe mode
  - Replacing a disk in a ZFS root pool
  - Boot From a Alternate Disk in a Mirrored ZFS Root Pool
  - Root pool snapshots
  - Recreate a ZFS Root Pool and Restore Root Pool Snapshots
  - Roll Back Root Pool Snapshots

Solaris Live Upgrade

- Understand the Solaris Live Upgrade Process (when and where to use it)
- Understand the Live Upgrade requirements
- Understand the Live Upgrade commands
- Create an alternate boot environment cloned from a running system
- Create a new boot environment on the SPARC and x86 platforms
- Upgrade a boot environment
- Patch a boot environment
- Modify a boot environment
- Activate a new boot environment on the SPARC and x86 platforms
- Maintain the Solaris Live Upgrade boot environment
- Manage multiple boot environments
- Advantages of using Live Upgrade on a ZFS root environment
- OpenBoot commands and options when using multiple boot environments

Managing SWAP Space

- Describe swap and virtual memory concepts
  - Swap space and TMPFS
- Configure, size and monitor swap space
- Setup swap space
- Expand swap space

Managing Crash Dumps and Core Files

- Understand Core dumps
  - Core dump configuration
  - Manage core file behavior
- Understand Crash Dumps
  - Crash dump configuration
  - Manage crash dump behavior

Introduction to Zones

- Consolidation and Resource Management
- Describe the advantages of Zones
- Understand Zones and COntainers
- Branded Zones for Solaris 8,9, and Linux environments
- Solaris Zones
  - Types of Zones
- Zone States
- Zone Features
- Non-global Zone Root File System Models
  - Whole Root Zones
  - Sparse Root Zones
- Networking in a Zone Environment
- Zone Daemons
- Configuring a Zone
  - The “zonecfg” command and subcommands
  - Zonecfg resource types
  - Creating a whole root Zone
  - Creating a sparse root zone
  - Using a sysidcfg file when configuring a zone
- Viewing the Zone Configuration File
- Installing a Zone
- Booting a Zone
- Halting a Zone
- Rebooting a Zone
- Uninstalling a Zone
- Deleting a Zone
- Making modifications to an existing zone
- Moving a Zone
- Cloning a zone
- Migrating a zone
- Backing up a zone
- Zone Login
  - Initial Zone Login
  - Logging in to the Zone Console
  - Logging in to a Zone
  - Running a Command in a Zone
- Security Considerations when Using Solaris Containers
- Introduction to Solaris Resource Manager
  - Resource controls
  - Using resource controls to contain zones
- Upgrade the Solaris 10 OS with installed Zones
- Patch the Solaris 10 OS with installed Zones
  - Patch the global zone
  - Patching nonglobal zones

Role Based Access Control (RBAC)

- Describe RBAC fundamentals
- Overview of Roles
  - Authorizations
  - Rights profiles
- Using RBAC
  - Manage RBAC by using the Solaris Management Console

- Manage RBAC by using the command line
- Describe RBAC components and their interaction within RBAC

Solaris Management Console

- Starting the Solaris Management Console
- Customizing the Solaris Management Console

Using the Solaris Volume Manager Software

- Describe redundant array of independent disks (RAID) as related to SVM
- Describe Solaris Volume Manager software concepts
  - Understand RAID 0,1, 5, 0+1, 1+0
- SVM volumes
  - Soft partitions
  - Stripes/Concatenated Stripes
  - Mirrors
  - RAID5 volumes
- Planning your SVM Configuration
- Understand SVM Commands
- Understand the state database
  - Creating the State Database
  - Monitoring the state database
  - Recovering the state database
- Create a RAID 0 Concatenated Volume
- Create a RAID 0 Stripe Volume
  - Monitor a volume
- Create a Soft Partition
- Expand an SVM Volume
- Create a Mirror
- Unmirroring a Non-critical File System
- Placing a Submirror Offline
- Mirroring the Root File System on SPARC based systems
- Mirroring the Root File System on x86/x64 based systems
- Unmirroring the Root File System
- Troubleshooting SVM

Configure The NFS/AutoFS Environment

- Servers and Clients
  - NFSv4
- The benefits of NFS on Solaris
- NFS Daemons
- Setting up NFS
- NFS Security
  - NFS logging
- Mounting a Remote File System
- Troubleshooting NFS errors
- Describe the fundamentals of the AutoFS file system
- AutoFS Maps
  - Master Map
  - Direct Map
  - Indirect Map
- When to use Automount

Introduction to LDAP

- Understand the use of LDAP as a naming service
- Describe basic LDAP concepts and terminology
- Identify the Directory Server Enterprise Edition requirements
- Identify Solaris LDAP Client requirements
- Setting up the LDAP client
- Modifying the LDAP client
- Listing the LDAP client properties
- Uninitializing the LDAP client

Solaris 10 Name Services

- Describe the Name Service concept and why it is used
- Structure of the NIS Network
  - Server, slaves, and clients
- Planning your NIS Domain
  - Information to be Managed by NIS
  - Planning your NIS master server and slaves
- Configuring an NIS Master Server
  - Creating the source files
  - Preparing the Makefile
  - Creating custom NIS maps
- Setting Up the Master Server With ypinit
- Starting and Stopping NIS on the Master Server services
- Setting up NIS slave servers
- Setting up NIS clients
- The Name Service Switch
  - Templates
  - Name service sources
  - Name service status codes
- Local /etc files
- Troubleshooting NIS
  - Binding problems
  - Server problems
- DNS
  - Configuring the DNS client
- LDAP
  - Configure the LDAP client
- Name Service Cache Daemon (nscd)
  - Understanding the nscd daemon
  - The nscd.config file and attributes
  - The “nscd” command and options
- Using the “getent” command

Configuring System Messaging

- Describe the fundamentals of the syslog function
- Using “logger”
- Important system log files
- Configure syslog messaging
  - Using the Solaris Management Console log viewer
- Monitoring Users and System Usage
- Monitoring logins