

Solaris 10 Operating Environment Courses

(Platforms: Oracle SPARC and Oracle x86 / x64 based)

Equivalent Classes are available for Solaris 11

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

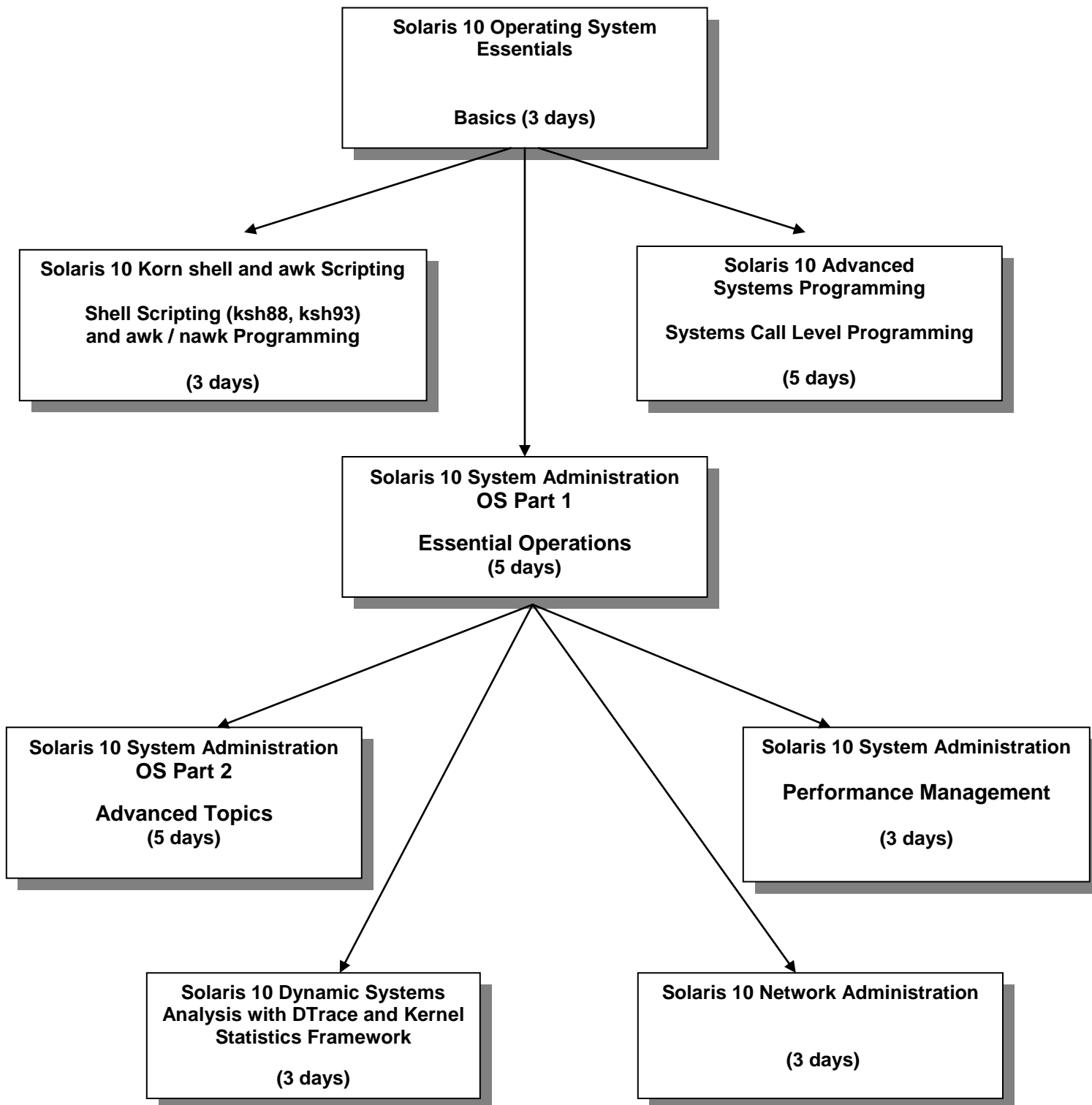


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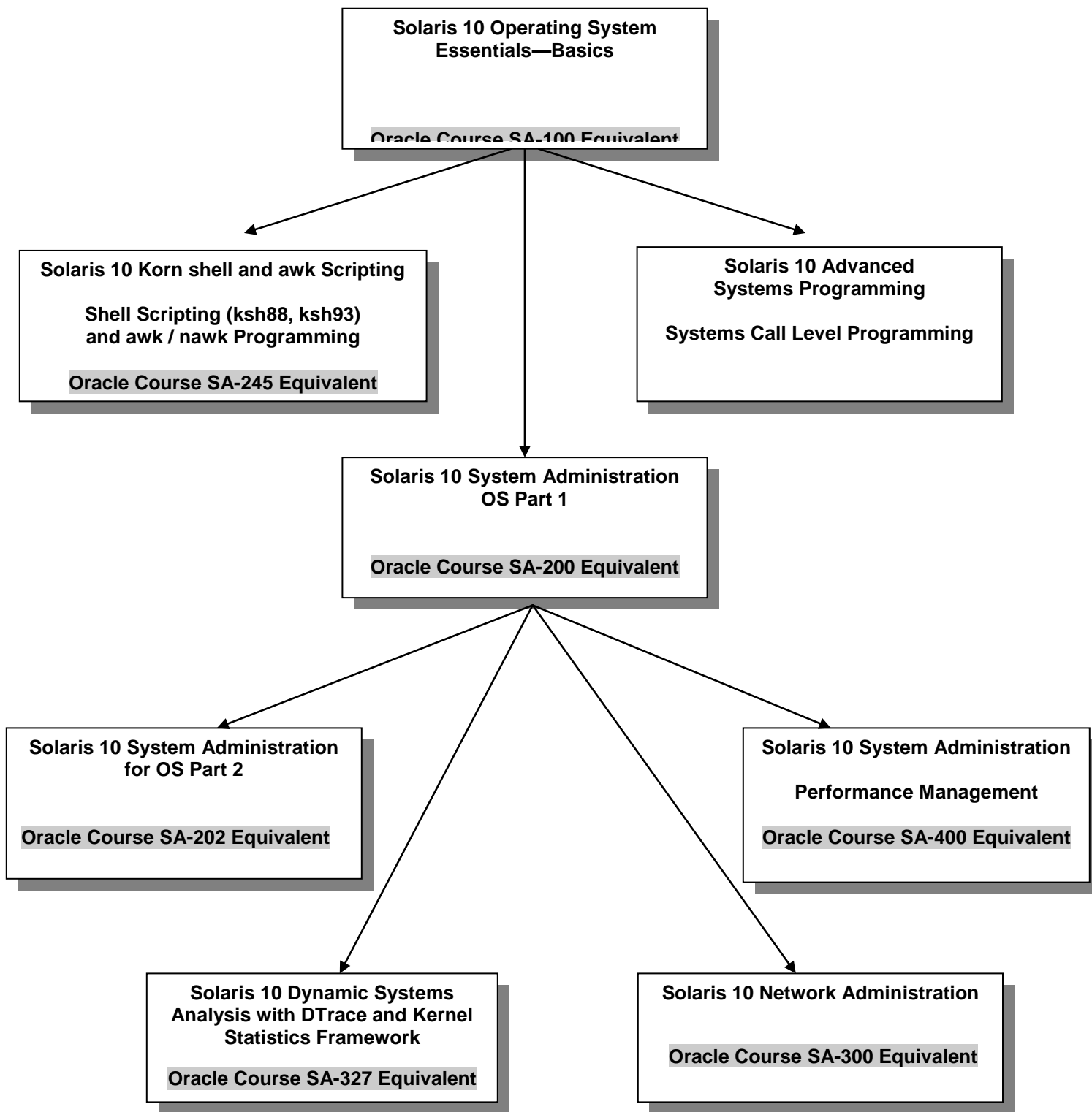
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For Administrators**

Solaris 10 Operating Environment Courses

Equivalent Oracle Course Mappings



Maintain Quality ♦ Value Added ♦ Superior Performance

Solaris 10 Operating System Essentials—Basics—Three (3) days, 50% lecture and 50% lab

Course teaches the basic working environment of a Solaris system. It introduces commonly required operations that can be performed by entering commands interactively in a command terminal, along with functions available in Java Desktop Environment (**JDS**). This course is taught for following platforms: **Solaris 10 SPARC and x86 / x64 platforms.**

COURSE OBJECTIVES—Each participant 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 **JDS** graphical utilities will also be shown.

COURSE TOPICS

Understanding the User Environment

Unix / Solaris Software Overview

Process Concepts

The Java Desktop Environment GUI

Getting Started with the Command Language

Logging Into a **Solaris 10** System

- Graphically through the **JDS**

- Non-graphically thru telnet or emulation

Shell Syntax Rules

Command Line Editing

Obtaining help using **man** and **JDS helpview**

Using the E-mail Utilities

Using the **write** and **talk** Utilities

Basic Network Operations

Solaris 10 Operating System Essentials

Managing Files

File Specification Syntax

Device Specifications

Directory Specifications

Using the **JDS Nautilus** file manager

Regular Expressions and Special Characters

Unix / Solaris Commands to Manipulate Files

JDS utilities to manipulate files

File Protection Mechanisms

Standard Permission Code Scheme

Access Control Lists (**ACLs**)

Creating and Editing Text Files: Part 1

Using GUI-based editors (**xedit**, **dtpad**, **gedit**)

vi Editor

ex Editor (commands within **vi**)

Solaris 10 Operating System Essentials—Basics—Three (3) days Continued
50% lecture and 50% lab

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** Procedures

Print and Batch Mechanisms

The **lp** command and options
Using the **JDS** print manager
The **at** command and options

User Level Tape Operations

tar utility syntax
tar commands for product access
Using compression/uncompression commands
compress / **uncompress**
gzip / **gunzip**

COURSE PREREQUISITES—Course is considered to be the basic **Unix / Solaris 10** course.
Experience with any (other) interactive system is helpful.

Maintain Quality ♦ Value Added ♦ Superior Performance

Solaris 10 Korn shell and awk Scripting—Three (3) days 60% lecture and 40% lab

Course teaches the **Solaris 10** professional (user, systems administrator, application/system programmer) techniques needed to develop advanced shell and reporting type procedures under **Solaris 10**. Techniques in the major shells will be shown. **All Solaris 10 platforms support techniques in this course.**

COURSE OBJECTIVES—Each participant will be able to use **Solaris 10, 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

Basics of Shell Scripting

- Types of shell scripts—driver and complex
- Available shells in Solaris 10
- Developing a template
- Adding documentation to shell scripts

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 & floating point variables

Writing Korn Shell Scripts (continued)

- the **select** construct (for menus)
- using and defining functions
- accessing files' records using pipes
- handling signals with **trap**
- defining and using indexed arrays

Writing Advanced Korn Shell Scripts

- defining and using active variables | nameref variables (references)
- defining and using associative arrays
- accessing files' records directly with exec
- special parameter/variable substitutions
- Korn shell parent / co-process communications
- adding option processing in shell scripts
- accessing socket level TCP/IP connections

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 **Solaris 10** course. Participants have attended **Solaris 10 Operating System Essentials**, or have equivalent experience with **Solaris 10** system.

Solaris 10 Advanced System Programming—Five (5) days 60% lecture and 40% lab



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Course introduces participants to system level programming in the **C language** in a **Solaris 10** environment. The course focuses on **Unix** system calls and library functions, how to use them, and their underlying mechanisms. The course deals with many facets of the Unix 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 **Solaris 10** 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 **Solaris 10** system.

Course Objectives

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

- Explain the various mechanisms available to the programmer in a **Solaris 10** environment
- Write a wide variety of applications using standard **Unix** system calls and library functions

Course Topics

System Programming Environment of the Solaris 10 Operating Environment

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

Solaris 10 Advanced System Programming—Five (5) days Continued
60% lecture and 40% lab

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 has a solid background in basic **Unix** utilities and editors (such as **vi**), and a working knowledge of the **C** (or **C++**) programming language(s). Material in this course applies to all major **Unix** variants (**Sun Solaris, HP-UX, IBM AIX, and all Linux types**). Environmental or execution differences will be shown when applicable.

Maintain Quality ♦ Value Added ♦ Superior Performance

Solaris 10 System Administration OS Part 1—Essential Operations—Five (5) days 60% lecture and 40% lab

Course will teach commands and methods needed to setup and manage a **Solaris 10** system. Course will also use a problem solving approach in lab exercises to teach system administrators advanced topics, for long-term management of system. Systems: **Solaris 10 UPD 9 (09/10) SPARC and x86/x64 platforms.**

COURSE OBJECTIVES—On completion of this course, a systems administrator should be able to install, update, and boot the **Solaris 10** 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 (role)
 - Introduction to Role Based Access Control (**RBAC**)
 - Using the **SMC** graphical interfaces
 - Manipulating system default environment files

System Installation and Updating

- Installation types and methods
- Installing the **Solaris 10** operating system
- Upgrading to a newer release of **Solaris 10**
- Maintaining the system via patches
- Adding additional products to the system (packages)
- Reconfiguring the **Solaris** kernel via parameters (**mdb**)

Startup and Shutdown

- Components involved in the **Solaris 10** boot
- Grub** loader stages and configuration
- Manipulating **EEPROM** commands and parameters
- Default bootstrap
 - Boot to single-user mode
 - Solaris fail-safe boot features
 - SMF** startup methods, tools, and procedures
 - Understanding **milestones**
 - Adding procedures to the startup mechanisms
- Shutdown methods and control

Solaris 10 System Administration OS Part 1—Essential Operations Continued

Five (5) days 60% lecture and 40% lab

Managing System Users

- UID and GID concepts
- Creation of a user account
 - Security through **password aging**
 - password lifetime and composition
 - using password history and dictionaries
- Controlling access by groups
- Login sequence
 - Setting up user environment files
- Using and maintaining user login files
 - Viewing and controlling running processes
- Basic setup and control of the **JDS**
 - gdm-binary** (login manager)
 - .gnome*** files and directories (menus and layouts)
- Remote graphical environments
 - gdmsetup**
 - /etc/X11/gdm/gdm.conf**

Managing Disk and Backup Volumes

- Commands to manipulate **ufs** disks/filesystems
 - partitioning disk surfaces with **format**
 - creating ufs file systems (**newfs**)
 - manipulating file system structures
 - verifying file system structures with **fsck**
 - making file systems available to software (**mount**)
- Creating and using **zfs** file systems
- Commands to manipulate archival volumes:
 - tar** utility
 - ufsdump** and **ufsrestore** utilities
 - ufs** snapshots
 - zfs** snapshots
 - zfs** send and receive utilities
- Preparing and Using **Flash Archives (flar)**

Monitoring System Activity

- Informational Utilities
 - The **vmstat** utility
 - The **iostat** utility
 - The **sar** utility

Solaris 10 System Administration OS Part 1—Essential Operations Continued
Five (5) days 60% lecture and 40% lab

The **netstat** utility
Maintaining swap and paging space(s)
Building and using the **top** facility
An Introduction to **kstat** and **DTrace**

Managing Printer Queues

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

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, ssh**
Controlling network services via **SMF (inetadm)**

Maintaining System Integrity

Login and user accounting
Command/process level accounting
Using **cron** tables

COURSE PREREQUISITES—Participant has successfully completed **Solaris 10 Operating System Essentials—Basics** course, or has equivalent system time as a user.

Solaris 10 System Administration OS Part 2—Advanced Topics—Five (5) days

60% lecture and 40% lab

System Administration for Solaris 10 Part 2 course introduces participants to: virtualization (**zones**), configuring access to networked directories and file systems (**NFS**), dynamic system tracing for system analysis (**DTrace**), core dump analysis, an introduction to the usage of access control lists (**ACL**) and implementation of privileges in **Solaris 10**. In many areas of discussion, emphasis will be placed on writing tools for monitoring and/or access. These tools will include **Korn shell** scripts, **Perl** procedures, and **C language** programs. Systems: **Solaris 10 09/10 UPD 9, SPARC** or **x86/x64** hardware platforms.

COURSE OBJECTIVES— On completion of this course, a system administrator should be able to:

- configure and setup **NFS** server and client systems
- create and control virtualization features (**zones**)
- configure a basic **JumpStart Solaris 10** server
- use both file and directory **ACLs**
- distinguish between privilege and non-privilege aware programs
- control privileges at the executable and user process levels

COURSE TOPICS**Virtualization in Solaris 10**

virtualization types

hardware based

software based

benefits of software virtualization

overview of **Solaris 10** implementation (**zones**)**Features of Solaris Zones**types (**sparse** and **whole root**)

creation and usage of control daemons

networking capabilities

operating states

the **global** zoneuse of **LOFS** in accessing the global zone**Initial Operations on Solaris Zones**

configuring zones (features)

booting zones

installing zones (identification and attributes)

using the zone virtual console

zone shutdown

zone deletion

Solaris 10 System Administration OS Part 2—Advanced Topics Continued

Five (5) days 60% lecture and 40% lab

Administrative Operations on Solaris Zones

- package management
- patch control, addition, removal
- Solaris 10** update considerations with active zones
- renaming, moving, cloning, migrating zones
- backup and recovery mechanisms

Storage Access in Solaris Zones

- accessing **UFS** data
- sharing zpool/zfs global zone data
- NFS** client/server capabilities

Solaris 10 Volume Manager (SVM) and RAID

- creating **RAID-0** and **RAID-1** sets
- mapping **SVM** onto **RAID** sets
- comparison to **ZFS** software **RAID** configurations

Security Features in Solaris 10

- File and Directory **ACLs**
- Using Role Based Access Control (**RBAC**)
- Principle of Least Privilege
- Assigning privileges to users and programs

Advanced Networking Features

- NFS** client and server setup
- automounter** setup and configuration
- DNS** client setup
- LDAP** client setup
- Introduction to **LDAP** structure and server
- Configuring local and remote **syslog**

Advanced Solaris 10 Installation Setup

- Basic JumpStart server configuration
- Adding Post Installation Scripts
- Live Upgrade configuration and setup

COURSE PREREQUISITES—Participant has successfully completed **Solaris 10 System Administration OS Part 1** course, or has equivalent system time as a user, and is comfortable with basic systems administration functions.

Solaris 10 System Administration

Performance Management (Monitoring, Analysis, Modifications)—Three (3) days
60% lecture and 40% lab

Solaris Systems Administration: Performance Management course introduces participants to performance management principles, monitoring utilities / tools, and analysis for the **Solaris 10** Operating Environment. Course includes a review of Solaris subsystems, along with the utilities provided to monitor system efficiency including **sar** and the ***stat** family of tools. This revision also presents tools new to **Solaris 10**, including **dtrace** and **kstat**. In each area of discussion, emphasis will be placed on writing tools for monitoring and analysis. These tools will include **Korn shell** scripts, **Perl** procedures, and **C language** programs.

Systems: **Solaris 10 09/10 UPD 9, SPARC or x86/x64** hardware platforms.

COURSE OBJECTIVES—On completion of this course, systems administrator should be able to:

- Describe performance management fundamentals
- Use the **Solaris 10 OS** and third-party tools to analyze performance
- Write tools in various languages
- Use **Solaris 10** performance data extensions (**kstat**, **dtrace**)
- View and set kernel-based tuning parameters
- Monitor and report on process and thread activity
- Modify **CPU** scheduling and virtual memory operations

COURSE TOPICS**Performance Basics**

Describe the principles of performance analysis
Describe the performance management process
Terms used to describe performance aspects
Factors affecting system performance
Performance metrics
Virtual system caching

Solaris 10 Monitoring Capabilities

Monitoring tools provided with **Solaris 10**
***stat** family of programs
sar / sadc
kstat (command, modules, libraries)
dtrace (introduction to usage)
Third party / freely available tools
SE Toolkit programs
ManageEngine
tools from **OpenSolaris**
User-written tools methods and rules
Kernel tunables (viewing, changing)

Solaris 10 System Administration**Performance Management (Monitoring, Analysis, Modifications)—Continued****Memory Management**

Memory layout and distribution		Memory usage by the kernel
Process creation		Process virtual address space
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
- Using **dispadm** to adjust **CPU** mechanisms
 - Tuning Java threaded applications
- Process states
 - Monitoring tools

I/O Management

Breakdown of disk I/O		Measuring Disk and I/O
UFS performance <ul style="list-style-type: none"> File system structure concepts File system caching Name Lookup Caching Tuning the Paged Buffer Cache Size Monitoring tools <ul style="list-style-type: none"> File system performance statistics UFS parameters to improve efficiency Alternative write strategies to UFS buffering 		
ZFS performance <ul style="list-style-type: none"> zpool creation considerations ZFS file system parameters ZFS compression performance Monitoring Tools 		

Network Management

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

Summaries

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

COURSE PREREQUISITES—Participant has successfully completed **Solaris 10 System Administration for OS Part 1** course, or has equivalent system time as a user, and is comfortable with basic systems administration functions.

Solaris 10 Dynamic Systems Analysis

Maintain Quality ♦ Value Added ♦ Superior Performance

Kernel Statistics Framework (KSTATs) / Dynamic Tracing (DTrace)—**Three (3)** days
60% lecture and 40% lab

Solaris 10 Dynamic Systems Analysis course introduces participant's o the new facilities: **DTrace** and **KSTATS**. Using these tools, a systems administrator / systems programmer / systems analyst is able to watch kernel and systems level activity as they are occurring.

Systems: **Solaris 10 09/10 UPD 9**, **SPARC** or **x86/x64** hardware platforms.

COURSE OBJECTIVES— On completion of this course, the participant should be able to:

- Describe system troubleshooting fundamentals
- Understand the components in Dynamic Tracing (**DTrace**)
- Learn the basics of the **D** scripting language
- Write **DTrace** one-line and scripted procedures
- Monitor system level activity
- Look at the modules that comprise the Kernel Statics Framework
- Write **C** programs to access the **KSTATS** cells
- Build system monitors using **KSTATS** with shell and **Perl** scripts

COURSE TOPICS

Dynamic Tracing (DTrace) Architecture

DTrace Components

Providers | Probes | Functions | Built-in variables
Required privileges

Zone considerations

DTrace Procedures

The **D** Scripting Language

Components

Techniques

Writing **D** based scripts

one - liners

programmatic

DTrace Kernel Level Tracing

Commonly traced areas

system calls

TCP/IP

kernel variables

open files

Maintain Quality ♦ Value Added ♦ Superior Performance

Solaris 10 Dynamic Systems Analysis

Kernel Statistics Framework (KSTATs) / Dynamic Tracing (DTrace) Continued

Three (3) days 60% lecture and 40% lab

Writing **D** based scripts
one - liners
programmatic

DTrace Application Level Tracing

Commonly traced process areas
system calls
environment variables
open files

DTrace Impact Considerations

Anonymous tracing
Speculative tracing
Performance impact of **DTrace**
Use and size **DTrace** buffers

Kernel Statistics Framework (KSTATs) Architecture

C library functions (from **Sun**)
kstat command interface
shell scripting interface
Perl module interface

KSTATs Procedures

Accessing system areas
CPU
virtual memory
disk I/O
network I/O

Case Studies

DTrace
KSTATs

COURSE PREREQUISITES—Participant has successfully completed **Solaris 10 System Administration 10 OS Part 1** course, or has equivalent system time as a user, and is comfortable with basic systems administration functions and scripting, preferably with either **Korn shell, awk/nawk** and **Perl**.

Solaris 10 Network Administration—Three (3) days 60% lecture and 40% lab

Course provides participants with the **concepts** and **tools** needed to understand and configure selected **network server components** in **Solaris 10** Operating System.

COURSE OBJECTIVES—On completion of this course, systems administrator should be able to setup and maintain system network.

COURSE TOPICS**Networking capabilities (overview)**

Networking protocols

Transmission Control Protocol/IP (TCP/IP)

UDP | ARP | ICMP

Networking configuration (hardware)

LANs | NIC devices

Networking utilities (hardware)

netstat | ifconfig

snoop | kstat

arp | ping

dladm

Networking configuration (automated)

sys-unconfig | SMC

Interface configuration files (static IP)`/etc/hosts``/etc/nodename``/etc/hostname.interface``/etc/netmasks``/etc/defaultrouter`

troubleshooting a static IP configuration

IPv6 configuration

Interface configuration files (DHCP client)`/etc/hosts``/etc/nodename``/etc/dhcp.interface``/etc/netmasks``/etc/defaultrouter``/etc/default/dhcpagent`

troubleshooting a DHCP IP configuration

Solaris 10 Network Administration—Three (3) days 60% lecture and 40% lab Continued**Creating logical interfaces**

connections to different subnets
usage in **Solaris 10** Zones

NIC channel bonding (aggregation)

advantages and types
creation (**dladm**)
monitoring
persistence via */etc/hostname.aggregate-name*

IP Network Multipathing (IPMP)

Features of **IP** multipathing
types (probe-based / link-based)
configuring **IP** multipathing
MAC addresses (**SPARC**)
/etc/hostname.interface changes
/etc/notrouter
multipath daemon
using **if_mpadm**
troubleshooting and testing **IPMP**

Routing Configurations

static
/etc/networks
/etc/defaultrouter
/etc/norouter
/etc/inet/routing.conf
route command
routeadm utility
dynamic
/etc/gateways
in.routed daemon
routeadm utility
routing tables
multi-homed host setup
troubleshooting and testing routing

Configuring a DHCP server

components (**dhcpcmgr** / **dhcpconfig** / **pntadm**)
control files and logging (**dhtadm**)
troubleshooting a **DHCP** server

Solaris 10 Network Administration for Operating System Continued

Three (3) days 60% lecture and 40% lab

DNS (Domain Name System)

concepts and functions

Configure **DNS** servers

Primary (files and utilities)

Secondary (files and utilities)

troubleshooting and testing **DNS** services

Configuring NTP (Network Time Protocol)

time management in **Solaris 10**

Configure an **NTP** server (**/etc/inet/ntp.server**)

Configure an **NTP** client (**/etc/inet/ntp.client**)

troubleshooting **NTP**

Networking Security

secure by default (netservices)

inetadm default (**SMF**) properties

service-specific (**SMF**) properties

local / remote restrictions

FTP (inbound) security controls

TCP Wrappers configuration and usage

Solaris10 IP Filter Firewall

configuration (**/etc/ipf/ipf.conf**)

packet filtering control (**/etc/ipf/pfil.ap**)

control (**ipf / ipfstat / ipmon**)

troubleshooting and testing IP Filter Firewall

COURSE PREREQUISITES—Participant has successfully completed **Solaris 10 System Administration for OS Part 1** course.

Transitioning to Oracle Solaris 11—Two (2) to Three (3) Days 50 % lecture, and 50 % lab

This course presents to an **Oracle Solaris 10** systems administrator, or system programmer the techniques needed to effectively and successfully move to **Oracle Solaris 11**.

COURSE OBJECTIVES

Each participant will see and use the new and modified areas and features of **Oracle Solaris 11**.

COURSE TOPICS**User and Programmer—Level New Features and Changes**

- Desktop (**GNOME**)
- Removed and deprecated utilities
- Shells (**BASH** and **Korn**)

Installing and Upgrading Solaris 11

- Changes to the **Solaris** installation media
- Methods of starting a **Solaris 11** installation
 - automated installer (**AI**)
 - interactive installer

- JumpStart** migration
- Post installation operations
- Upgrading / migration techniques

Software Packaging and Installation

- Image Packaging System (IPS)
- IPS repositories
- Compatibility with the **pkg*** utilities

Boot and Startup Mechanisms

- New areas controlled by **SMF**
- New **GRUB** loader features

Zones

- New features and enhancements
 - configuration
 - migration of **Solaris 10** zones (**P2V** or **V2V**)

Note: We can perform Solaris 10 to 11 Transition Class for Application Programmers and Users.

Transitioning to Oracle Solaris 11—Two (2) to Three (3) Days Continued

COURSE TOPICS

Networking

- New utilities and enhancements
 - Auto-magic (**NWAM**)
 - virtualization
 - resource controls
- IPMP**

Storage

- ZFS new and enhanced storage features
 - deduplication
 - snapshots
 - zpool (mirror) split

Security

- New and improved features
 - password hashing algorithms
 - data encryption
- BART**

General Utilities

- User and Programmer
- Systems Administrator
- Networking
- Security
- Performance Monitoring

COURSE PREREQUISITES—Participants should be familiar with features, commands, and utilities present in **Oracle Solaris 10**.

Audience—Network Administrator, Support Engineer, System Administrator, System Programmer

Note: We can perform Solaris 10 to 11 Transition Class for Application Programmers and Users.