

Solaris 10 Operating Environment Courses

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

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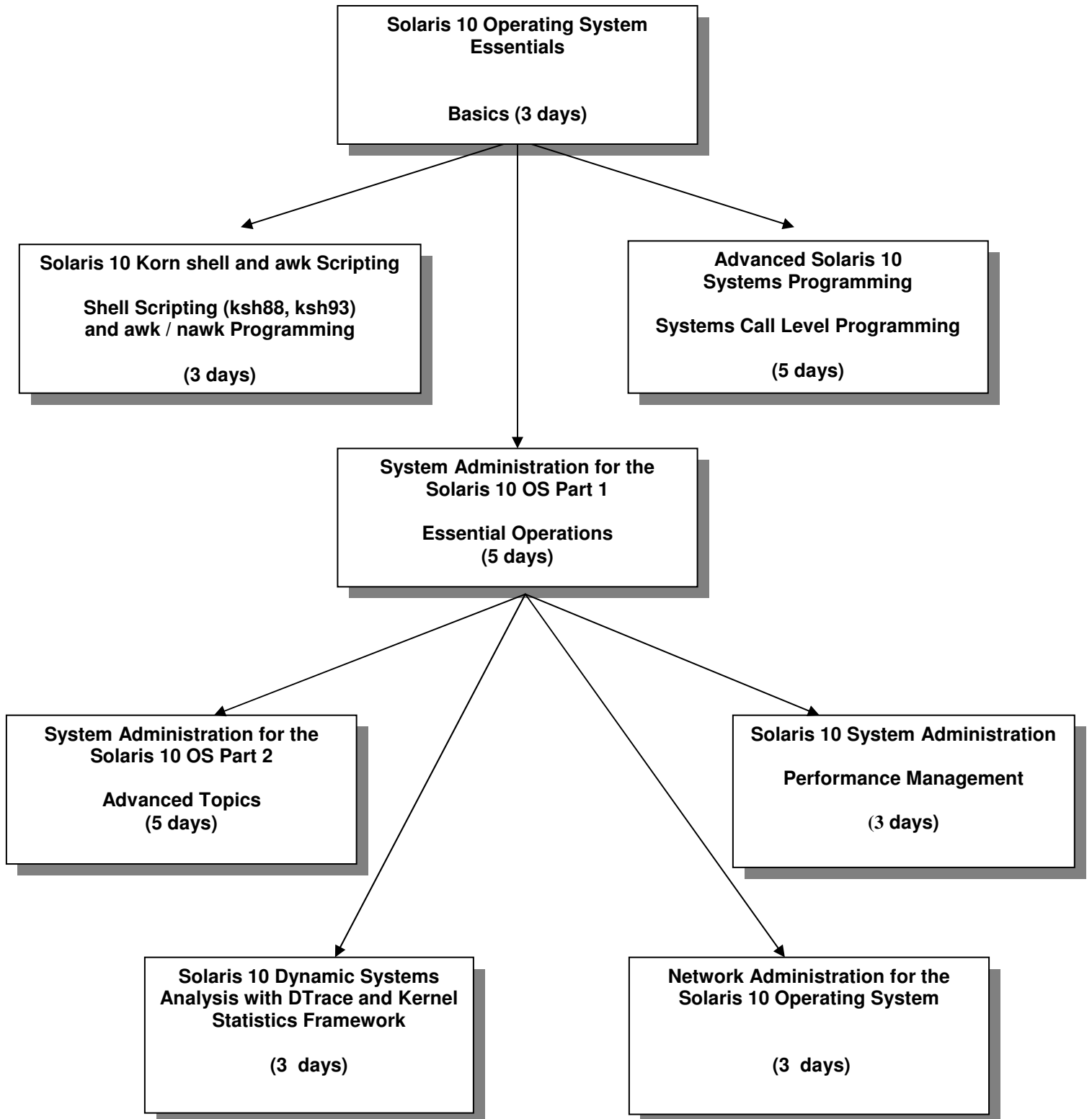
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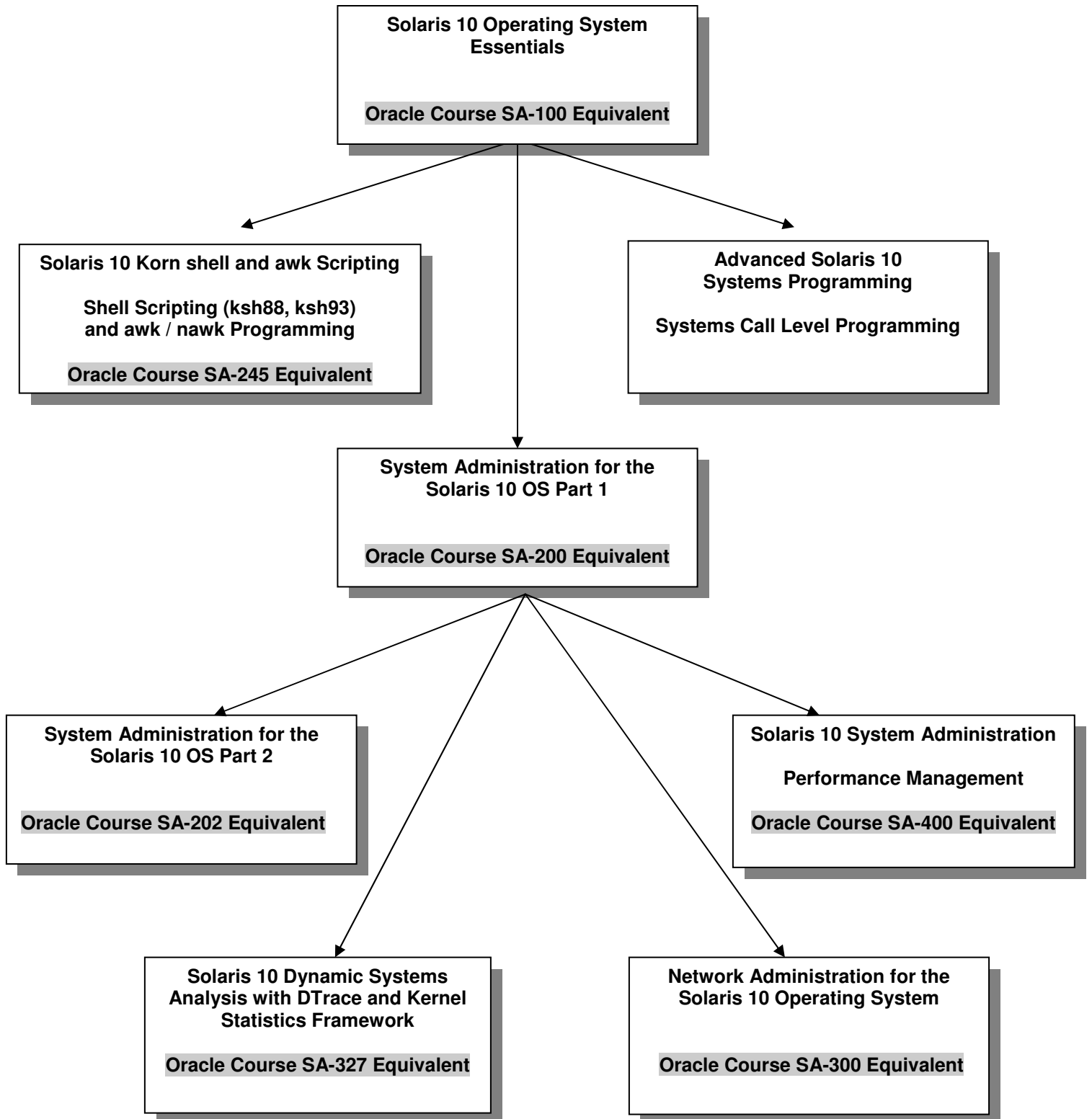
Solaris 10 Operating Environment Courses

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



Solaris 10 Operating Environment Courses

Equivlant Oracle Course Mappings



Solaris 10 Operating System Essentials

COURSE DESCRIPTION

This 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 the Java Desktop Environment (**JDS**). This course is taught for the 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

COURSE TOPICS

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**)

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

Solaris 10 Operating System Essentials

COURSE TOPICS

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 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 **Unix** / **Solaris 10** course. Experience with any (other) interactive system is helpful.

Solaris 10 Korn shell and awk Scripting

COURSE DESCRIPTION

This course teaches the **Solaris 10** professional (user, systems administrator, application/system programmer) the 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 the 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 the (n)awk facility.

COURSE TOPICS

Basics of Shell Scripting

- Types of shell scripts

 - driver

 - 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 and floating point variables

Solaris 10 Korn shell and awk Scripting

COURSE TOPICS

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 DURATION

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

COURSE PREREQUISITES

This is an advanced **Solaris 10** course. It is assumed that participants either have attended the **Fundamentals of Solaris 10** course, or have equivalent experience with a **Solaris 10** system.

Advanced Solaris 10 Systems Programming

Course Description

This course introduces the 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

Advanced Solaris 10 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 **Unix** utilities and editors (such as **vi**), and a working knowledge of the **C** (or **C++**) programming language(s). The 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.

System Administration for the Solaris 10 OS Part 1

Essential Operations

COURSE DESCRIPTION

This course will teach the commands and methods needed to setup and manage a **Solaris 10** 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.

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**)

System Administration for the Solaris 10 OS Part 1

Essential Operations

COURSE TOPICS

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

Managing of 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**

System Administration for the Solaris 10 OS Part 1

Essential Operations

COURSE TOPICS

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
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

System Administration for the Solaris 10 OS Part 1

Essential Operations

COURSE TOPICS

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 DURATION

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

COURSE PREREQUISITES

It is assumed that the participant has successfully completed the **Solaris 10 Operating System Essentials** course, or has equivalent system time as a user.

System Administration for the Solaris 10 OS Part 2

Advanced Topics

COURSE DESCRIPTION

The **System Administration for the 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 the 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**)

System Administration for the Solaris 10 OS Part 2

Advanced Topics

COURSE TOPICS

Features of Solaris Zones

- types (**sparse** and **whole root**)
- creation and usage of control daemons
- networking capabilities
- operating states
- the **global** zone
- use 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

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

System Administration for the Solaris 10 OS Part 2

Advanced Topics

COURSE TOPICS

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 DURATION

This course normally requires **four (4) days**, approximately 60% lecture, and 40% lab time.

COURSE PREREQUISITES

It is assumed that the participant has successfully completed the **System Administration for the Solaris 10 OS Part 1** course, or has equivalent system time as a user, and is comfortable with basic systems administration functions.

Solaris 10 Systems Administration

Performance Management (Monitoring, Analysis, Modifications)

COURSE DESCRIPTION

The **Solaris Systems Administration: Performance Management** course introduces participants to performance management principles, monitoring utilities / tools, and analysis for the **Solaris 10** Operating Environment. The 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, a 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 Systems Administration

Performance Management (Monitoring, Analysis, Modifications)

COURSE TOPICS

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)

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

Solaris 10 Systems Administration

Performance Management (Monitoring, Analysis, Modifications)

COURSE TOPICS

I/O Management

Breakdown of disk I/O

Measuring Disk and I/O

UFS performance

File system structure concepts

File system caching

Name Lookup Caching

Tuning the Paged Buffer Cache Size

Monitoring tools

File system performance statistics

UFS parameters to improve efficiency

Alternative write strategies to UFS buffering

ZFS performance

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

Solaris 10 Systems Administration

Performance Management (Monitoring, Analysis, Modifications)

COURSE DURATION

This course normally requires **three** (3) days, approximately 60% lecture, and 40% lab time.

COURSE PREREQUISITES

It is assumed that the participant has successfully completed the **System Administration for the Solaris 10 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

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

COURSE DESCRIPTION

The **Solaris 10 Dynamic Systems Analysis** course introduces participants to 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

Solaris 10 Dynamic Systems Analysis

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

COURSE TOPICS

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
- 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

Solaris 10 Dynamic Systems Analysis

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

COURSE TOPICS

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 DURATION

This course normally requires **three** (3) days, approximately 60% lecture, and 40% lab time.

COURSE PREREQUISITES

It is assumed that the participant has successfully completed the **System Administration for the Solaris 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**.

Network Administration for the Solaris 10 Operating System

COURSE DESCRIPTION

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

COURSE OBJECTIVES

On completion of this course, a systems administrator should be able to

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

Network Administration for the Solaris 10 Operating System

COURSE TOPICS

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

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**

Network Administration for the Solaris 10 Operating System

COURSE TOPICS

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

Network Administration for the Solaris 10 Operating System

COURSE TOPICS

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 DURATION

This course normally requires **three** (3) days, approximately 60% lecture, and 40% lab time.

COURSE PREREQUISITES

It is assumed that the participant has successfully completed the **System Administration for the Solaris 10 OS Part 1** course.