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Solaris 10 Operating System Internals

Varighed: 5 Days   Kursus Kode: SI-365-S10

Beskrivelse:

The Solaris 10 Operating System Internals course provides students with information about the various kernel subsystems, routines, and structures that make up the Solaris 10 Operating System. Students will use Solaris Dynamic Tracing (DTrace) to step through process creation, execution, signal delivery, and scheduling, correlating observations with source code available through OpenSolaris. The labs make extensive use of dtrace, kmdb, and mdb commands to examine the system structures on live systems. The labs also make use of OpenSolaris web access to facilitate understanding how the operating system works. The kernel subsystems covered include the multithreaded architecture, virtual memory, scheduling, process lifetime, signal management, the vnode layer, and file systems such as UFS, ZFS and swapfs.

Målgruppe:

Programmers, System Engineers, Advanced System Administrators and Support Personnel

Agenda:

- Explain step-by-step how a lock is acquired
- Discuss the reason for priority inheritance and its implementation
- Identify the steps performed in a virtual to physical memory address translation
- List the process structures and routines needed to implement a scheduling class
- List the process structures used to implement multiple scheduling classes and the fields in the time-sharing and real-time dispatch Describe the paging and swapping algorithms that manage physical memory as a cache
- Describe process creation, execution, and termination
- Discuss kernel thread scheduling and preemption
- Use kmdb, mdb, and DTrace to locate and display the system structures for an open file in a given process
- Describe the placement policies that the UNIX file system (UFS) uses to place inodes and blocks of data
- Describe the disk layout of a ZFS file system
- Describe the block allocation algorithm, and free space mapping for ZFS
- Describe the ZIO pipeline

Forudsætninger:

- Ability to read and write scripts
- Manage system processes
- Read C programs and explain the meaning of a = (struct foo *) b and int func(int)
- Understand and be able to explain the concept of pointers, structures, unions, link lists, hashing, and binary trees

Indhold:

Introducing the Solaris 10 Operating System

- Define the purpose of the operating system and explain the concept of kernel layering
- Explain and diagram the segments that make up the process address space
- Explain the trap mechanism
- Differentiate between hardware and software interrupts
- List the new features in recent releases of the Solaris 10 OS
- Start using tools such as mdb, kmdb, and DTrace to examine kernel data structures

Examining the Multithread Architecture

- Describe the kernal thread
- Use the lightweight process (LWP)
- List the structures that describe the state of a kernel thread, an LWP, and a process
- Describe Sleep Queues
- Explain how a Mutex lock works
- Describe how a counting semaphore is implemented
- Explain how a multiple-reader, single-writer lock works

Hardware Memory Management

- Describe the steps in virtual-to-physical address translation
- List the differences between the x86/x64 memory management unit (MMU) and the SPARC SFMMU
- Describe types of cache implemented on Sun systems

Examining Software Memory Management

- List the layers of the SunOS 5.10 software virtual memory (VM) system
- List the mapping structures that make up process address space
- Locate the page structures and process address space structures
- Explain how the memory mapping and memory control system calls can be used to manage process memory

Examining Paging and Swapping

- Explain the layered approach to page-fault handling
- List the conditions under which the page daemon runs
- List the functions of the page daemon
- List the conditions under which the swapper runs

The swapfs File System

- Describe the memory scructures used to implement the swapfs file system
- List the advantages obtained by adding the swapfs file system

Scheduling

- List at least two major barriers to real-time processing
- Explain the difference between a fully preemptible kernel and a kernel with preemption points
- List a routine used to place a thread on a dispatch queue
- Describe when a thread is placed at the head of a dispatch queue
- Describe how the sleep queues are ordered
- Define a user-level and kernel-level preemption
- Define deterministic dispatch latency
- Define priority inversion

Process Lifetime

- Explain the differences among the system calls used to create a new process
- Describe the kernel routines used to implement process creation
- List the different types of executables supported in the Solaris 10 OS
- Explain the routines used to implement executable and linking format (ELF) executables
- List the advantages of the ELF executable format
- Describe the actions taken by a process when it exits

Signals

- List the different types of signals that can be delivered to a process or thread
- Explain the difference between a trap signal and an interrupt signal
- List the signal management routines and describe their functions
- Describe what the signal facility is for, and how a signal is delivered

File Systems

- Describe the vnode interface layer to a file system
- List the four fields in a directory entry
- Explain the advantages of ZFS
- Describe the function of the superblock and cylinder group structures
- List the fields in the disk inode structure and explain how they are used
- Name the routines involved in determining the global placement policies
- Describe how the ARC works

Flere Informationer:

For yderligere informationer eller booking af kursus, kontakt os på tlf.nr.: 44 88 18 00

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