Review 2

EECE6029

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3/16/2016

I/O Devices -- Hardware

- block devices vs character devices
- device controller
- data buffer, checksum
- memory-mapped I/O, mmap in UNIX
- direct memory access (DMA), DMA controller
- interrupts, precise interrupts, interrupt vector, interrupt controller

I/O Devices -- Software

- device independence, uniform interfacing, block size
- layers of I/O system
- device drivers
- synchronous and asynchronous transfers: blocking vs interrupt-driven
- buffering, double buffering
- programmed I/O, polling, busy waiting
- interrupt-driven I/O, interrupt handlers
- I/O using DMA
- spooling

Disks

- cylinder, track, sector
- seek time, rotation time, transfer time
- logical block addressing
- RAID vs SLED, striping
- disk formatting, sector 0, MBR
- disk arm scheduling, FCFS, SSF, elevator algorithm
- bad sectors
- stable storage

Clocks

- crystal oscillator, clock tick
- programmable clock
- simulating multiple timers with a single clock

Deadlocks

- resources, preemptable and nonpreemptble
- resource acquisition
- resource deadlock
- resource allocation graph
- deadlock detection, one resource, multiple resources for each type
- E (existing resource vector), A (available resource vector)
- C (current allocation matrix), R (request matrix)
- scheduling with banker’s algorithm
- livelock and starvation

Virtualization

- type 1 and type 2 hypervisors
- virtual kernel mode
- binary translation
- basic block
- paravirtualization
- shadow page table
- nested page tables
- overcommitment and deduplication

Shared-Memory Multiprocessor

- uniform memory access (UMA) vs NUMA
- crossbar switch
- multistage switching network
- NC-NUMA vs CC-NUMA
- directory-based multiprocessor
- Manycore chips, GPU, GPGPU
- master-slave multiprocessor
- symmetric multiprocessor

Multicomputers and Distributed Systems

- cluster computers
- grid, mesh, double torus, cube, hypercube
- store-and-forward packet switching, circuit switching
- load balancing
- file-system-based middleware
- object-based middleware, CORBA
- coordination-based middleware, Linda

Security

- ACL, C-list
- multilevel security, Bell-LaPadula, Biba
- covert channel
- trusted platform module (TPM), remote attestation
- salt and one-time passwords
- buffer overflow attacks
- command injection attacks
- trojan horse, virus, worm, spyware, rootkit
- code signing, jailing, static model-based intrusion detection, sandboxing