

CSMC 412

Operating Systems Prof. Ashok K Agrawala

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Set 12

Mass-Storage Systems

- Overview of Mass Storage Structure
- Disk Structure
- Disk Attachment
- Disk Scheduling
- Disk Management
- Swap-Space Management
- RAID Structure
- Disk Attachment
- Stable-Storage Implementation
- Tertiary Storage Devices
- Operating System Issues
- Performance Issues

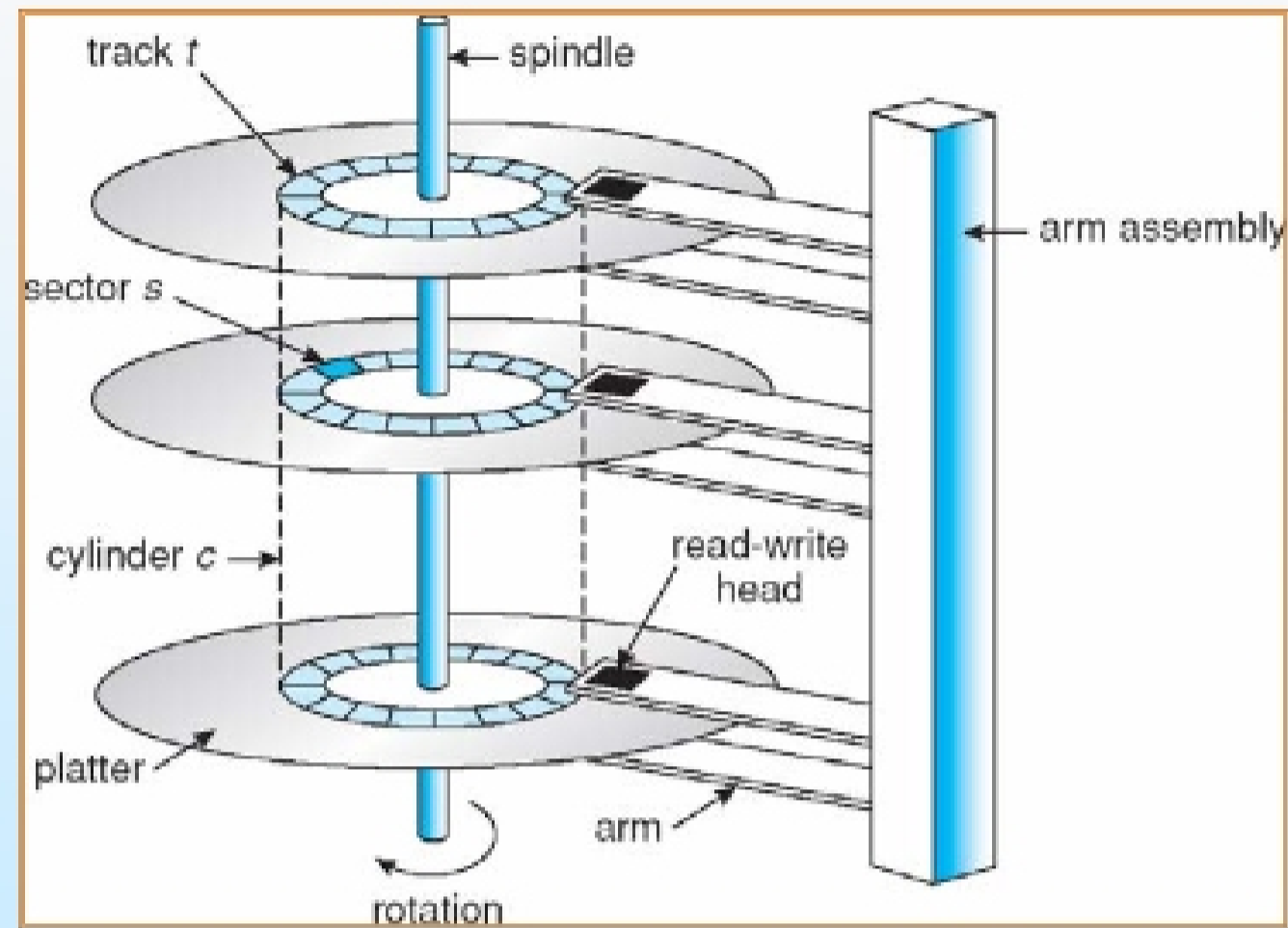
Objectives

- Describe the physical structure of secondary and tertiary storage devices and the resulting effects on the uses of the devices
- Explain the performance characteristics of mass-storage devices
- Discuss operating-system services provided for mass storage, including RAID and HSM

Overview of Mass Storage Structure

- Magnetic disks provide bulk of secondary storage of modern computers
 - Drives rotate at 60 to 200 times per second
 - Transfer rate is rate at which data flow between drive and computer
 - Positioning time (random-access time) is time to move disk arm to desired cylinder (**seek time**) and time for desired sector to rotate under the disk head (**rotational latency**)
 - Head crash results from disk head making contact with the disk surface
 - ▶ That's bad
- Disks can be removable
- Drive attached to computer via I/O bus
 - Busses vary, including EIDE, ATA, SATA, USB, Fibre Channel, SCSI
 - Host controller in computer uses bus to talk to disk controller built into drive or storage array

Moving-head Disk Mechanism



Operating System Concepts

12.6

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Overview of Mass Storage Structure (Cont.)

- Magnetic tape
 - Was early secondary-storage medium
 - Relatively permanent and holds large quantities of data
 - Access time slow
 - Random access ~1000 times slower than disk
 - Mainly used for backup, storage of infrequently-used data, transfer medium between systems
 - Kept in spool and wound or rewound past read-write head
 - Once data under head, transfer rates comparable to disk
 - 20-200GB typical storage
 - Common technologies are 4mm, 8mm, 19mm, LTO-2 and SDLT

Operating System Concepts

12.8

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