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COURSE NAME : 19CSB201 – OPERATING SYSTEMS

II YEAR/ IV SEMESTER

UNIT – V I/O Systems

Topic: Mass-Storage Systems - Stable-Storage Implementation

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Assistant Professor

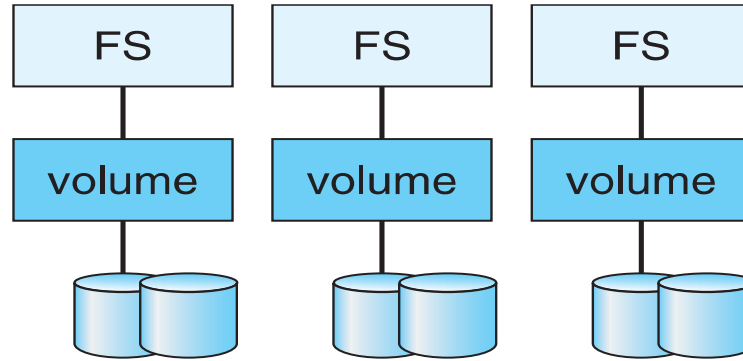Department of Computer Science and Engineering

Mass-Storage Systems

- Overview of Mass Storage Structure

- Disk Structure

- Disk Attachment

- Disk Scheduling

- Disk Management

- Swap-Space Management

- RAID Structure

- Stable-Storage Implementation

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Traditional and Pooled Storage

(a) Traditional volumes and file systems.

(b) ZFS and pooled storage.

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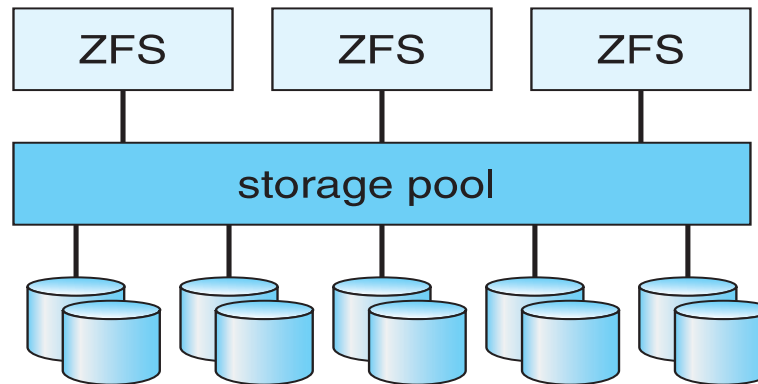
Stable-Storage Implementation

- Write-ahead log scheme requires stable storage

- Stable storage means data is never lost (due to failure, etc)

- To implement stable storage:
  - Replicate information on more than one nonvolatile storage media with independent failure modes
  - Update information in a controlled manner to ensure that we can recover the stable data after any failure during data transfer or recovery

- Disk write has 1 of 3 outcomes
  1. **Successful completion -** The data were written correctly on disk
  2. **Partial failure -** A failure occurred in the midst of transfer, so only some of the sectors were written with the new data, and the sector being written during the failure may have been corrupted
  3. **Total failure -** The failure occurred before the disk write started, so the previous data values on the disk remain intact

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Stable-Storage Implementation (Cont.)

- If failure occurs during block write, recovery procedure restores block to consistent state
  - System maintains 2 physical blocks per logical block and does the following:
    1. Write to 1st physical
    2. When successful, write to 2nd physical
    3. Declare complete only after second write completes successfully
  - Systems frequently use NVRAM as one physical to accelerate

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REFERENCES

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T1   Silberschatz, Galvin, and Gagne, "Operating System Concepts", Ninth Edition, Wiley India Pvt Ltd, 2009.)

T2.   Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education, 2010

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R1   Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.

R2   Harvey M. Deitel, "Operating Systems", Third Edition, Pearson Education, 2004.

 R3   Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.

R4.   William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011

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