Paper “RAID”

- Redundant array of independent disks
- What are the two main goals of RAID?
- What is Amdahl’s Law?
- What are downsides of redundant disks?
Paper “RAID”

- Track $t$
- Sector $s$
- Cylinder $c$
- Platter
- Spindle
- Arm assembly
- Rotation
- Arm
- Read-write head

Paper “RAID”

- Platter
- Track
- Track sector
- Disk sector
- Head
- Actuator arm
- Cluster
Paper “RAID”

- Seek time, rotational latency, data transfer time
- *What are techniques to reduce these times?*
- DMA (Figure 2)

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Paper “RAID”

- Fine-grained vs. coarse-grained interleaving
- “Hot spots”; concentrated/distributed patterns
- Load balancing
Paper “RAID”

- Reliability and correlated disk failures
- Buffering/caching
- Floating parity
- On-line spare disks

- **Thoughts on RAID? Pros/cons?**
- **Do Google, Microsoft, Facebook, etc. use RAID?**
Paper “Differential RAID”

- SSD vs. HD
- SLC vs. MLC
- Bit error rate (BER)
- Correlated failures
- Age differential: low vs. high differential?
- Diff-Raid technique 1: distribute parity unevenly (why?)
- Diff-Raid technique 2: reshuffle parity on drive replacements (why?)

Paper “Differential RAID”

- Pages & blocks; erase operations
- Wear-leveling algorithms
- RAID-5 load balancing & reliability
- Diff-RAID: why focus on parity distribution?
- Uneven parity distribution
- “Aging older devices faster”
- Thoughts on Diff-RAID? Pros/cons?