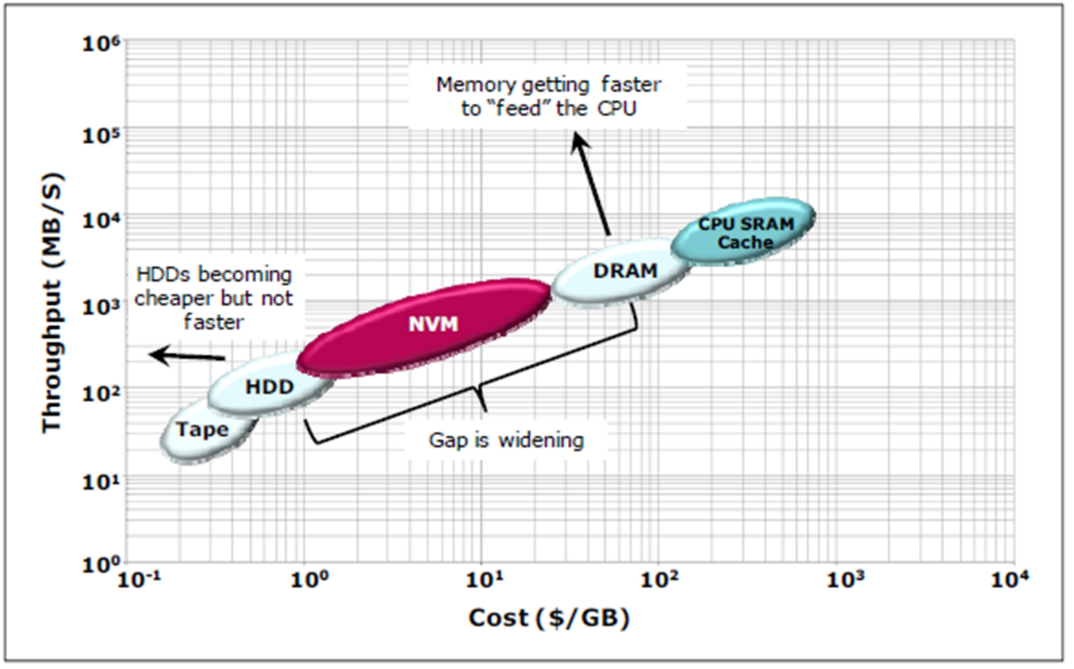
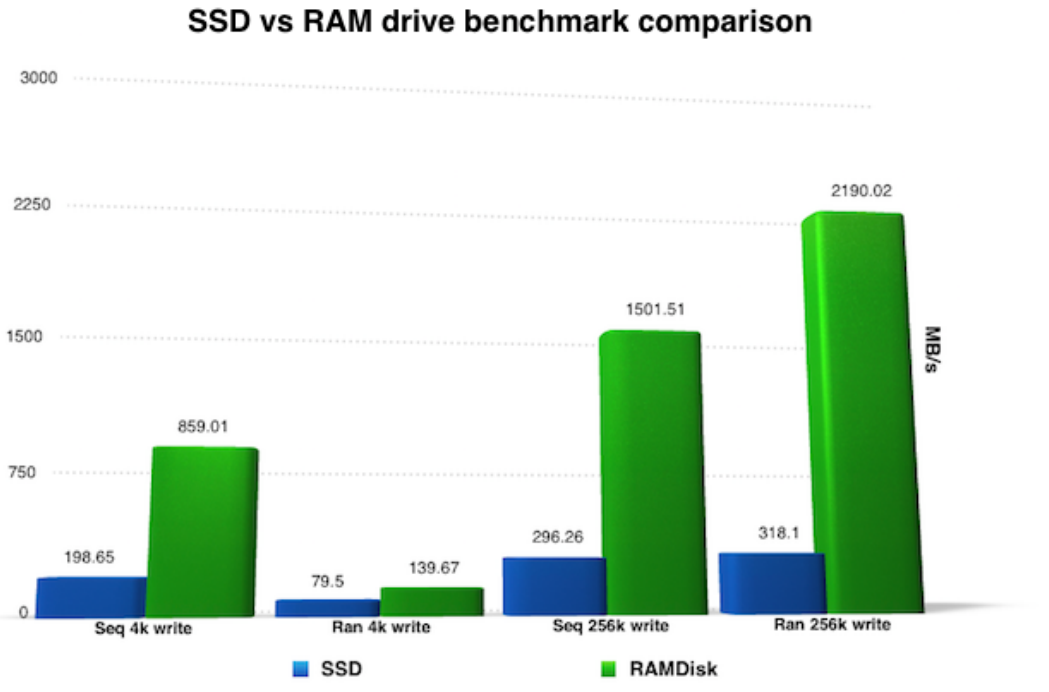
CS3210: File Systems

Tim Andersen

Storage trend



Do SSDs solve the problem?



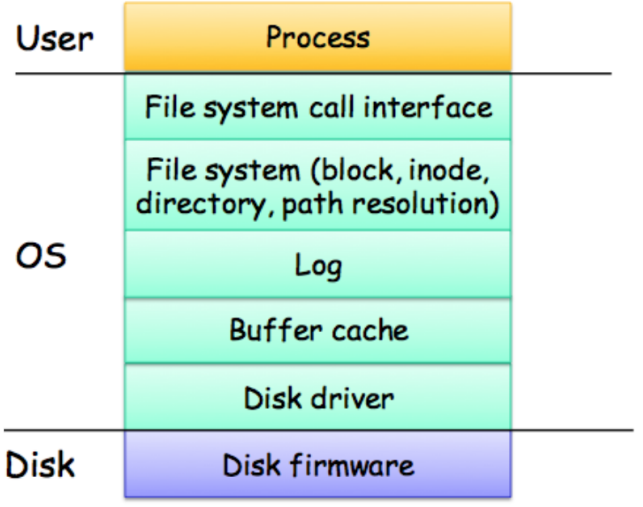
- http://www.makeuseof.com/tag/ram-drives-faster-ssds-5-things-must-know/

High speed storage in NVM is approaching RAM

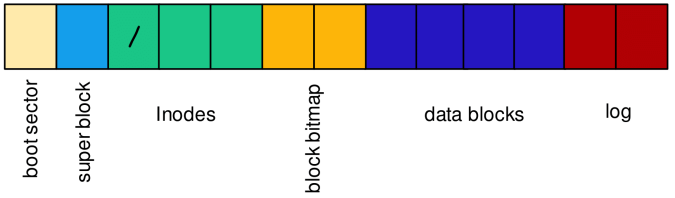
- High performance data recorders can approach RAM speeds, e.g., 2.5 GB/sec
- These solutions, however, are far more expensive than DRAM
- Used in applications where reliable persistent storage is required such as real-time sensor (radar, imagery, etc.) data recording.

- None of this is useful, however, without an efficient file system.

FS software layers



On-disk layout



- fs.h, fs.c, mkfs.c
- *struct superblock*

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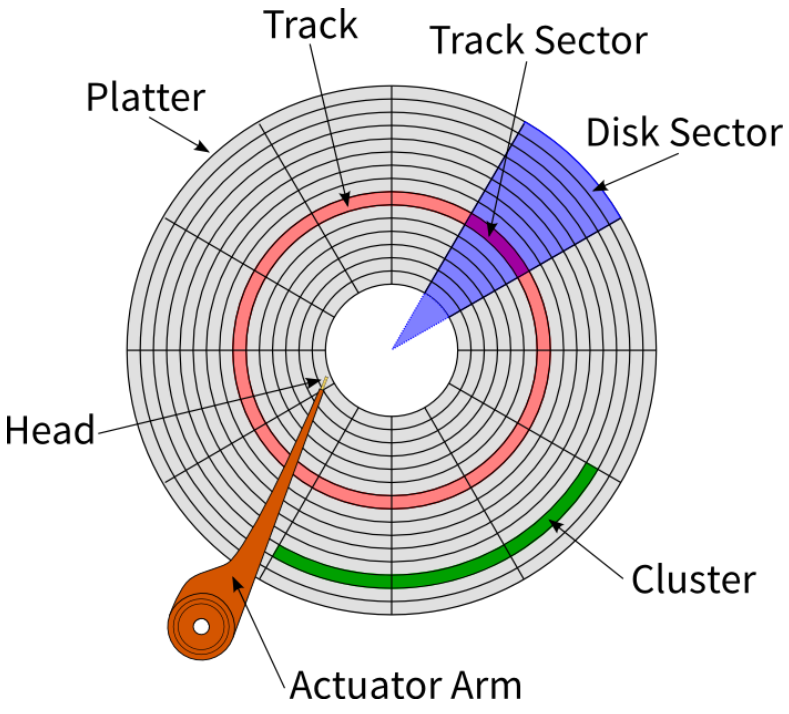
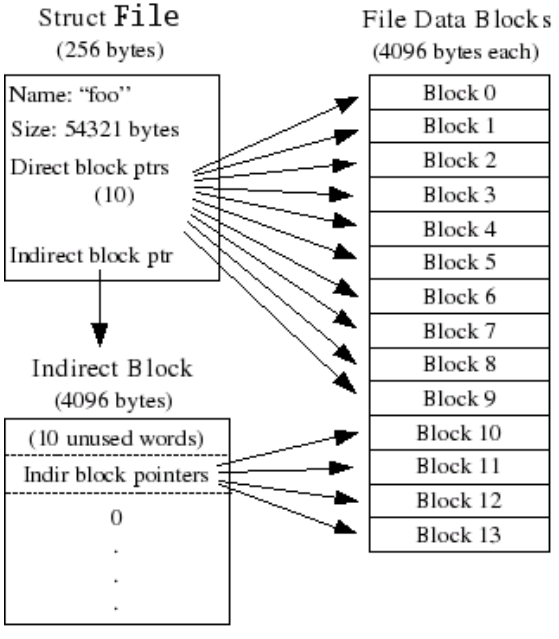
- Let's discuss each layer

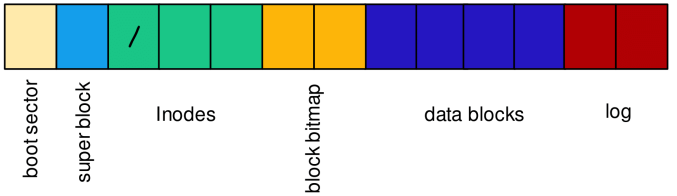
Hard disk


Track
Track Sector
Platter
Disk Sector
Head
Cluster
Actuator Arm

Direct and indirect blocks



Free block bitmap



- fs.h, fs.c, mkfs.c
- *struct superblock*

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- xv6 maintain free bitmap on disk – one bit per block (sb->bmapstart)
  - 0 means block is free, 1 means block in use
- Checking if a block is free if you know block number
  - buf[blockNum/8] & (0x1 << (blockNum % 8))