

CS422

Computer Architecture

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<http://web.cse.iitk.ac.in/~cs422/index.html>

Lecture Outline

- Some queuing theory
- UNIX Fast File System
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- *Scribe for today?*

I/O Performance

- Producer-Server Model
- Throughput vs. Response Time
- Response time and think time
- Queuing theory
 - Arrival rate, service time, utilization
 - Little's law
 - Squared coefficient of variance
 - Average residual time
 - Response time and utilization
 - M/G/1 and M/M/1 models

UNIX's Old File System

- Superblock
- Free-list
- Directory: special file – has pointer to file's inode
- Inodes have:
 - Direct points, singly indirect pointers, doubly indirect, and triply indirect pointers
- Problem: file's blocks get distributed all over the disk, deteriorating performance
- Also, block size: 512 bytes (poor performance)

UNIX Fast File System (FFS)

- Cylinder groups are defined
- Inodes are close to data blocks
- Block size: 4096 bytes
 - But, poor disk usage (close to 50% wasted)
- Idea: fragment blocks
 - But only last block of file is allowed to be fragmented
- All files of a directory are preferably in same cylinder group
- Other enhancements: long file names, file locking, symbolic links, rename, quota