

CSE 451: Operating Systems

Spring 2017

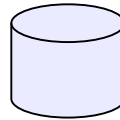
Module 19

File System Summary

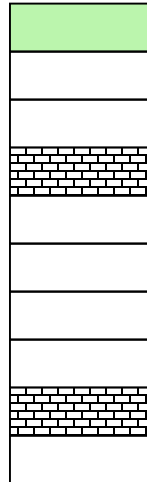
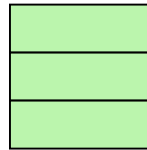
John Zahorjan

UFS

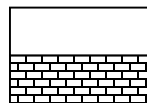
Hardware Device



inodes



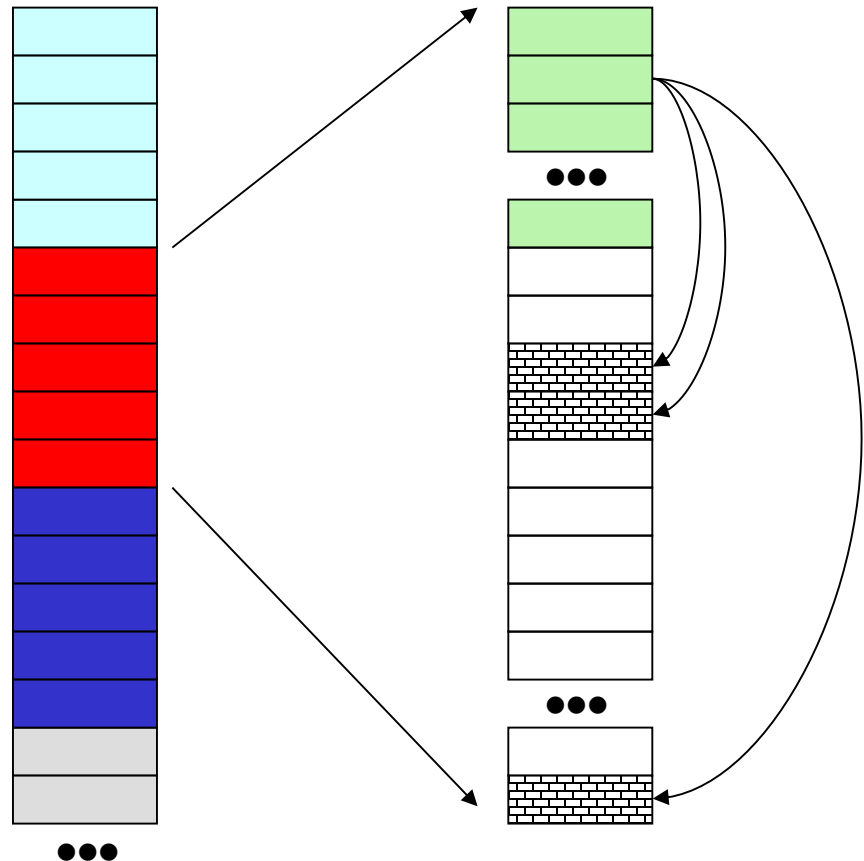
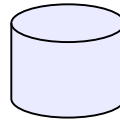
data blocks



Low throughput addressed by:

- larger blocks
- cylinder groups
- aggressive caching
- hardware awareness

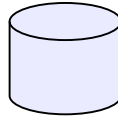
FFS



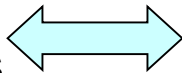
Long post-crash boot times
addressed by:

- transactional journal of changes
- propagated back to “real” file system asynchronously

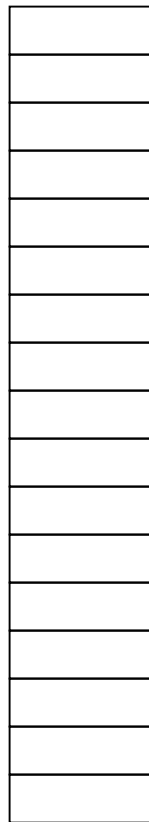
JFS



App
requests



Main
memory
cache



Journal
+
file system

Example: file creation

- ...
- Start t
- Alloc inode 1067
- Write inode 1067 w/
[data]
- Write block 22731 w/
[data]
- Commit t
-

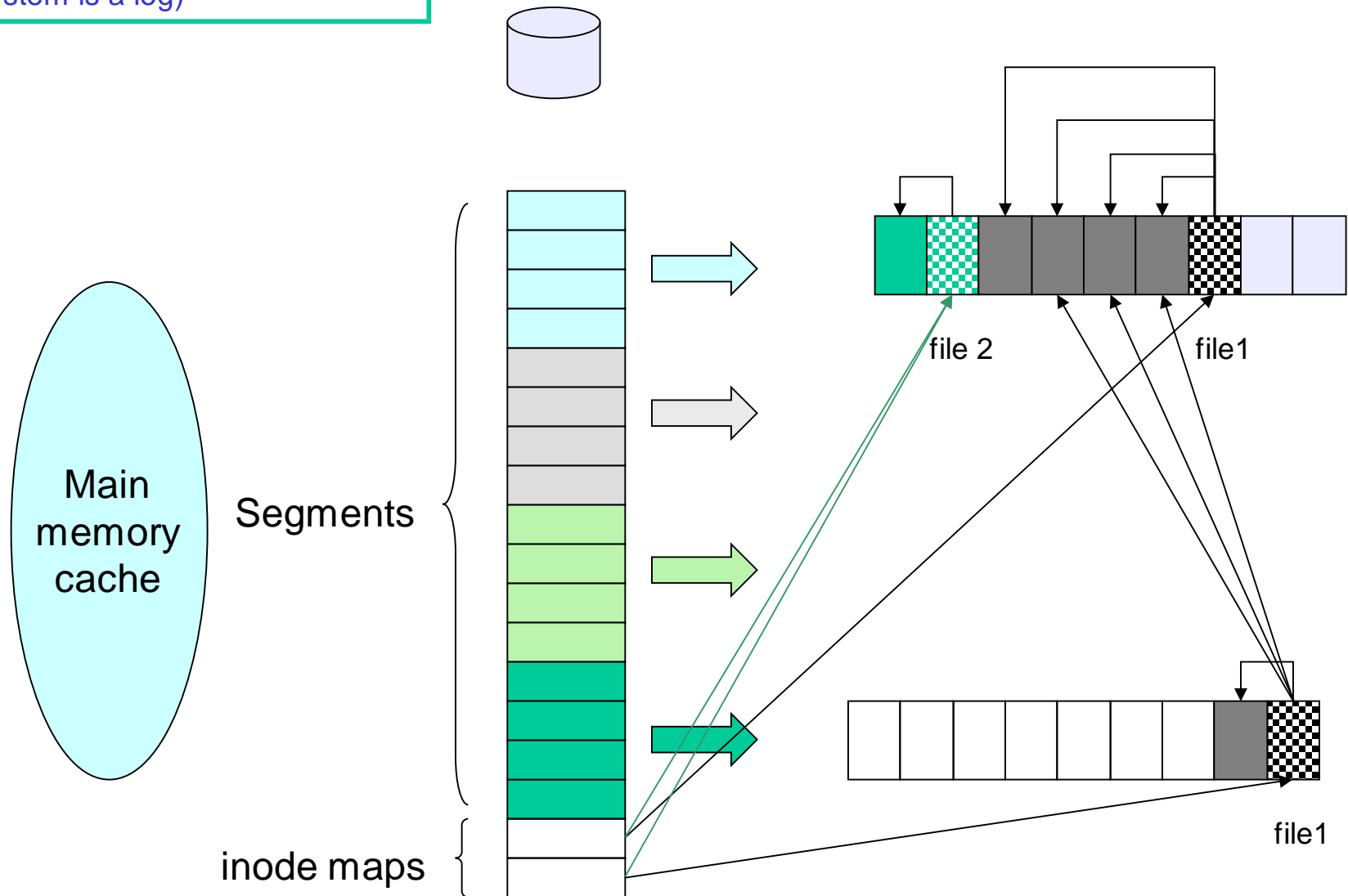
*If data block updates are not
journalled, after a crash files may
have garbage blocks*

(To be clear: FS and FFS
have a cache too – I just
didn't draw it.)

Write throughput addressed by:

- large sequential writes (the file system is a log)

LFS



Supporting Multiple File Systems: vfs

