

Disk Layout & File System

Disk Layout:

Label the disk with its different region.
For each region, write a few words describing its purpose.

DISK LAYOUT

A vertical rectangle divided into five horizontal sections, intended for labeling disk regions. The sections are empty, providing space for the student to write labels and descriptions for each region of the disk layout.

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File System:

What is an inode (`inode struct`)?

How is it different than a file descriptor (`file_info struct`)?

What is a dinode (`dinode struct`)?

Which files do the first and second inode represent?

The disk cannot be interacted with when holding a spinlock.
How can synchronization be handled at the file system level?

When overwriting 1 block of data, how many times will `bwrite` be called?

When appending 1 block of data to an existing file, assuming the extent is large enough, how many times will `bwrite` be called?

When adding a new file, how many times will `bwrite` be called?
This would include allocating a new extent.

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Logging:

Describe a scenario that can happen where the file system gets corrupted (assume no logging).

What's the difference between a REDO and UNDO log?
What are some of the trade-offs between them?

Let's call the metadata for the log region the Log Header. What type of metadata needs to be stored in the Log Header?

What's the point of the commit flag for the log?

How can the log be synchronized among transactions?

Imagine the case where the log has been updated for the current transaction, and the transaction is being written to disk.
Why is it ok if a failure happens during this time? What will happen on reboot?