File Systems Review

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Questions?

- What are the advantages and disadvantages of continuous allocation of free blocks to files?

- The good:
  - **Easy to implement**
  - **Read performance is great.** Only need one seek to locate the first block in the file. The rest is easy.
- The bad:
  - **Disk becomes fragmented over time**
  - It is necessary to know **the file's final size** prior to even allocating any space

Questions?

- Give an example where contiguous allocation of file blocks on disks can be used in practice.
  - When you're **writing a memory dump** to disk because your OS crashed
  - It is still used on **write-once optical media**, because prior to **burning your CD, DVD or BD** the system knows exactly how much space each file uses on said disk.

Questions?

- What are the advantages and disadvantages of linked-list allocation of free blocks to files?

- The good
  - **Gets rid of fragmentation**
- The bad
  - **Random access is slow.** Need to chase pointers to get to a specified block

Questions?

- What file access pattern is particularly suited to linked-list allocation of free blocks to files?
  - It is fine for **sequential access** because every block needs to be read regardless. It's a living nightmare for random access files because we introduce a lot of unnecessary, wasted “read” operations to the FS.

Questions?

- What is i-node?
  - The i-node is a data structure which **lists all attributes and points to all the addresses of the disk blocks corresponding to that file**.

Questions?

- What file allocation strategy is most appropriate for random access files?
  - An i-node (indexed node) based file allocation strategy. It is a form of file allocation table that offers temporal locality.
  - **The i-node only needs to be located in memory when its corresponding file is open**.

Questions?

- What is the reference count field in the i-node?
  - The reference count field is a counter of **how many times the i-node is "referenced" by name**.
  - Adding a directory entry increments this counter. **When the count falls to zero**, (i.e. there are no longer any directory entries to that file), its i-node and all corresponding disk blocks can be safely **deallocated**.