Filesystem Reliability Activity Instructions

(format borrowed from TIDES and FIC workshops:)

Filesystem reliability is measured through filesystem consistency, which we then provide through a journaling file system. Or, at least we do now.

Today you are spending the day working for the filesystems group at SlowToCatchOn, Inc. (STCO). STCO is currently still using fsck, and they are concerned that their recovery method for a file append is not correct. They have asked you to review their work.

1. You review best by first thinking through the problem yourself, and then comparing your results to the proposed results. You begin by listing out all the steps for a file append, particularly noting any metadata structure updates. You assume the append requires additional data block allocations, since that is the interesting case.
2. Once you have your list of needed updates, you consider recovery. You order the updates so that, should power be lost, the system has the best chance of recovering correctly.
3. You list out what is known, what is not known, and what can be recovered at each step.
4. Finally, you take your results to the group's manager. She asks you how you can tell the difference between an append and a deletion. What do you say?

After that rousing discussion, you become convinced that STCO should move to a journaling filesystem, and you make the case to the manager. The manager is hesitant, and asks you to draw out the steps for the same file append in a journaling file system.

1. Draw your log.
2. Draw what the transaction would look like on the log.
3. Once that is complete, draw a disk and a separate log, and show the state of the file system after the transaction is completely written, updated, and the log cleared.
4. Now draw a third picture that shows what happens if there is a power failure in the middle of the update.

After all the explanation, the manager is on board! And you are lucky, as she asks you to implement the new file system for STCO (Project 4?).