April 2nd

Additional File System stuff
- naming
- distributed file systems
- non-file systems
- consistency & replication
- more algorithms
- benchmark

**Naming**
- flat, hierarchical
  - (inode) (path)

Flat namespace
- early (MVS, apple II, ...)
- specialized
  \[ URL \rightarrow \text{[hash]} \] (example)
  \[
  /a/a/ /l/3a52 ...
  /ab /a1 ...
  \]

Single tree (Unix)
host namespace
- host / device / dir / file / ext / version

Mounting
mount table
- home, usr, etc

Root FS
- super inodes
- data
Namespace operations:
- mount
- hard link
- soft link

soft link: name \rightarrow "string"

/home
  ↓
charles \rightarrow "/home2/charles"
dave \rightarrow "/home1/dave"

/home2/charles
  ↓
dave

/home1/dave/file1 \rightarrow /home2/dave/file1

device file:
  major #: 8
  minor #: 1
  type: character / block

fd = open("/dev/ttyS0")
write(fd ...)

serial driver
open
read
write
**Newer stuff**

**consistency**

\[ \begin{array}{c}
P_1 & \xrightarrow{\text{open}} & P_2 \\
\xrightarrow{w_1} & \xleftarrow{\text{open}} & \xrightarrow{R_2}
\end{array} \]

- casual orderings

\[ w_2, x \]

\[ R_2 = x' \leftrightarrow \leftarrow w_2 = x' \]

**close-to-open consistency**

\[ \begin{array}{c}
P_1 & \xrightarrow{\text{open}} & P_2 \\
\xrightarrow{\text{modify}} & \xleftarrow{\text{open}} & \xrightarrow{P_2 \text{ will see the change of } P_1}
\end{array} \]

leases