CS 739 - AFS-like Distributed FS

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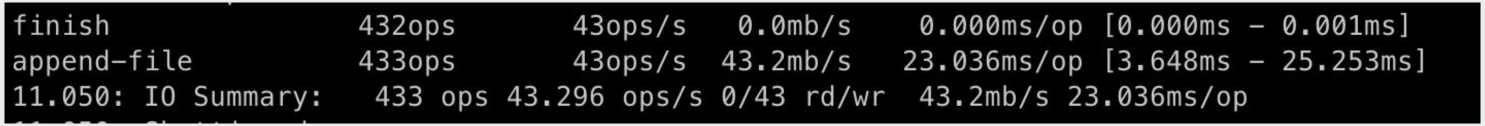
Design

- The file system is implemented with an AFS-like protocol.
- Upon file open, the client will request the entire file from the server and store it in the client’s local cache.
- Subsequent read and write requests will be redirected to the local cached copy. On close, the dirty file will be flushed back to the server. If the file was opened in read-only mode then it is not pushed to server.
- Client replicates the server directory structure.
- Server is stateless in our design.

Basic AFS Functionality

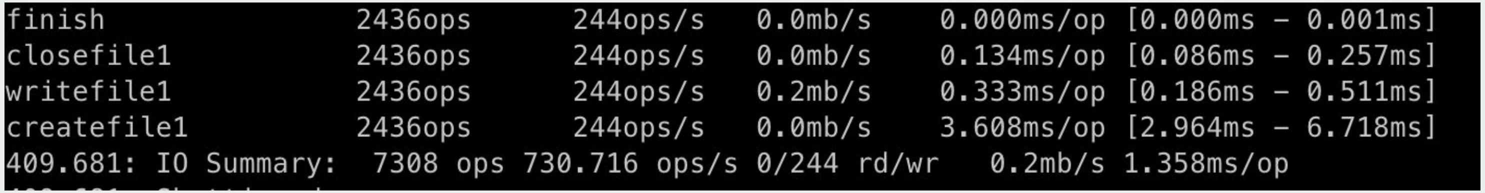
https://drive.google.com/file/d/143lMRjvoMFHVXhyNV5Cs--PV20Gcjnhl/view?usp=sharing

Filecreate.f



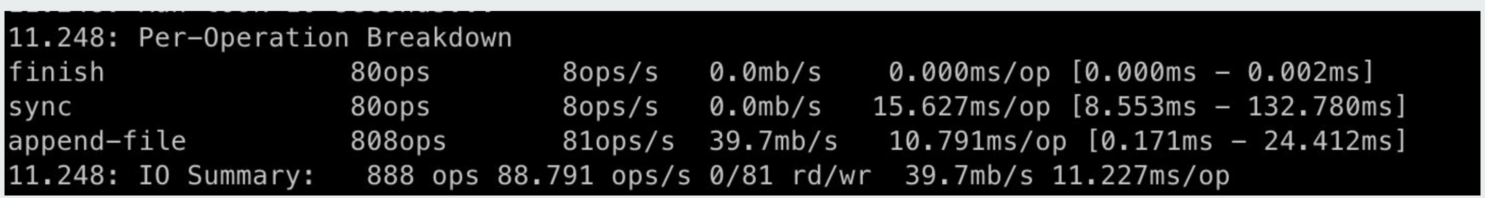
```
finish                  432ops        43ops/s    0.0mb/s     0.000ms/op [0.000ms - 0.001ms]
append-file             433ops        43ops/s   43.2mb/s    23.036ms/op [3.648ms - 25.253ms]
11.050: IO Summary:   433 ops 43.296 ops/s 0/43 rd/wr  43.2mb/s 23.036ms/op
```

Filemicro_createfiles



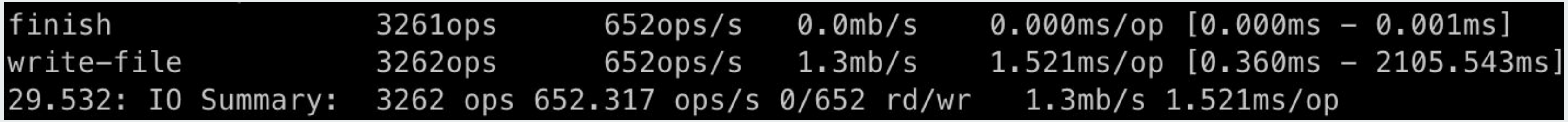
```
finish                  2436ops       244ops/s    0.0mb/s     0.000ms/op [0.000ms - 0.001ms]
closefile1              2436ops       244ops/s    0.0mb/s     0.134ms/op [0.086ms - 0.257ms]
writefile1              2436ops       244ops/s    0.2mb/s     0.333ms/op [0.186ms - 0.511ms]
createfile1             2436ops       244ops/s    0.0mb/s     3.608ms/op [2.964ms - 6.718ms]
409.681: IO Summary:  7308 ops 730.716 ops/s 0/244 rd/wr   0.2mb/s 1.358ms/op
```

Filemicro_createrand



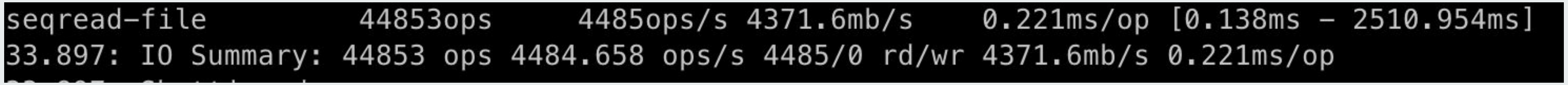
```
11.248: Per-Operation Breakdown
finish                  80ops         8ops/s    0.0mb/s     0.000ms/op [0.000ms - 0.002ms]
sync                    80ops         8ops/s    0.0mb/s    15.627ms/op [8.553ms - 132.780ms]
append-file             808ops        81ops/s   39.7mb/s    10.791ms/op [0.171ms - 24.412ms]
11.248: IO Summary:   888 ops 88.791 ops/s 0/81 rd/wr  39.7mb/s 11.227ms/op
```

Filemicro_rwritedsync.f



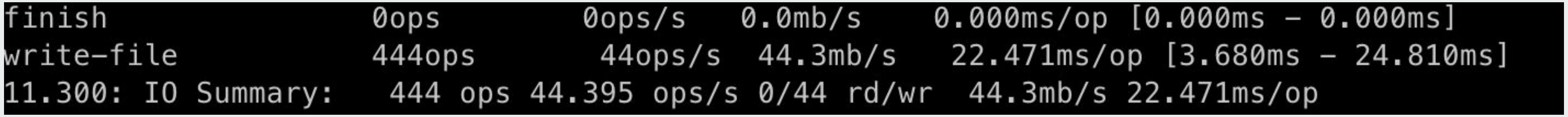
```
finish                 3261ops       652ops/s    0.0mb/s     0.000ms/op [0.000ms - 0.001ms]
write-file             3262ops       652ops/s    1.3mb/s     1.521ms/op [0.360ms - 2105.543ms]
29.532: IO Summary:   3262 ops 652.317 ops/s 0/652 rd/wr   1.3mb/s 1.521ms/op
```

Filemicro_seqread.f



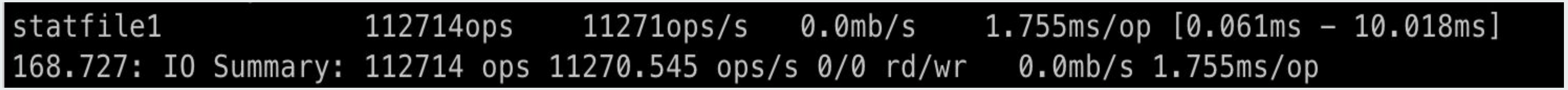
```
seqread-file           44853ops      4485ops/s 4371.6mb/s    0.221ms/op [0.138ms - 2510.954ms]
33.897: IO Summary: 44853 ops 4484.658 ops/s 4485/0 rd/wr 4371.6mb/s 0.221ms/op
```

Filemicro_seqwrite.f



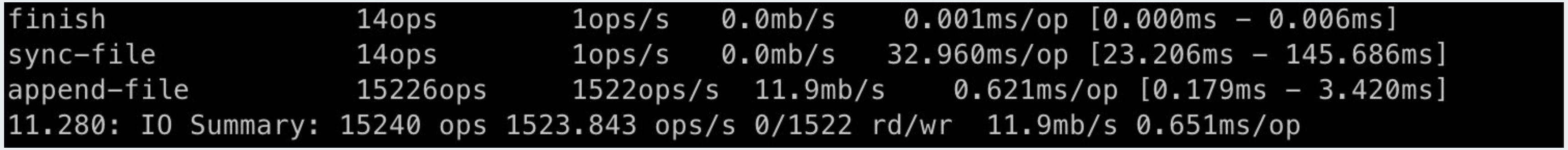
```
finish                     0ops          0ops/s    0.0mb/s     0.000ms/op [0.000ms - 0.000ms]
write-file               444ops          44ops/s  44.3mb/s    22.471ms/op [3.680ms - 24.810ms]
11.300: IO Summary:     444 ops 44.395 ops/s 0/44 rd/wr   44.3mb/s 22.471ms/op
```

Filemicro_statfile.f



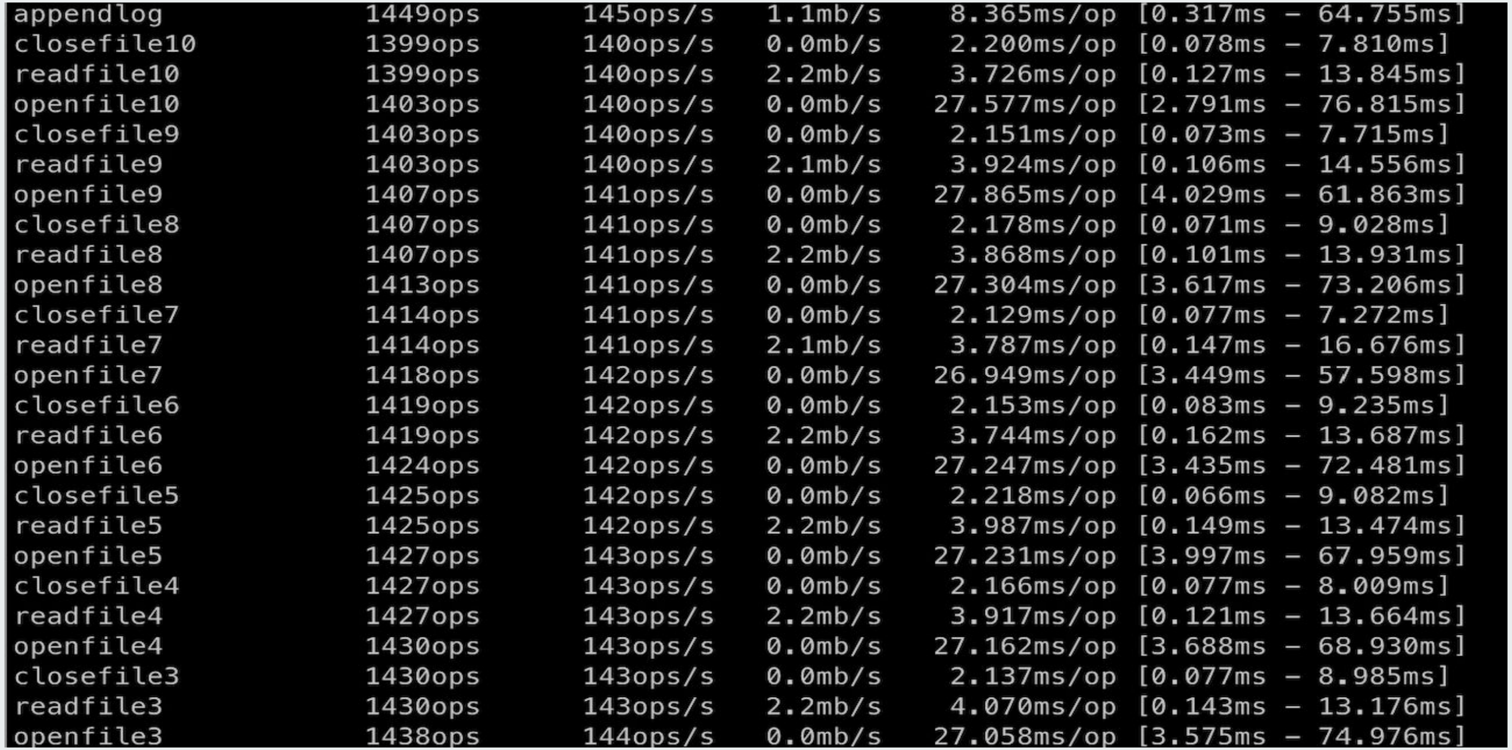
```
statfile1                 112714ops     11271ops/s    0.0mb/s    1.755ms/op [0.061ms - 10.018ms]
168.727: IO Summary: 112714 ops 11270.545 ops/s 0/0 rd/wr    0.0mb/s 1.755ms/op
```

Filemicro_writefsync.f



```
finish                     14ops          1ops/s    0.0mb/s    0.001ms/op [0.000ms - 0.006ms]
sync-file                  14ops          1ops/s    0.0mb/s   32.960ms/op [23.206ms - 145.686ms]
append-file                15226ops       1522ops/s  11.9mb/s    0.621ms/op [0.179ms - 3.420ms]
11.280: IO Summary: 15240 ops 1523.843 ops/s 0/1522 rd/wr  11.9mb/s 0.651ms/op
```

Webserver.f



```
appendlog           1449ops     145ops/s   1.1mb/s    8.365ms/op [0.317ms - 64.755ms]
closefile10         1399ops     140ops/s   0.0mb/s    2.200ms/op [0.078ms - 7.810ms]
readfile10          1399ops     140ops/s   2.2mb/s    3.726ms/op [0.127ms - 13.845ms]
openfile10          1403ops     140ops/s   0.0mb/s   27.577ms/op [2.791ms - 76.815ms]
closefile9          1403ops     140ops/s   0.0mb/s    2.151ms/op [0.073ms - 7.715ms]
readfile9           1403ops     140ops/s   2.1mb/s    3.924ms/op [0.106ms - 14.556ms]
openfile9           1407ops     141ops/s   0.0mb/s   27.865ms/op [4.029ms - 61.863ms]
closefile8          1407ops     141ops/s   0.0mb/s    2.178ms/op [0.071ms - 9.028ms]
readfile8           1407ops     141ops/s   2.2mb/s    3.868ms/op [0.101ms - 13.931ms]
openfile8           1413ops     141ops/s   0.0mb/s   27.304ms/op [3.617ms - 73.206ms]
closefile7          1414ops     141ops/s   0.0mb/s    2.129ms/op [0.077ms - 7.272ms]
readfile7           1414ops     141ops/s   2.1mb/s    3.787ms/op [0.147ms - 16.676ms]
openfile7           1418ops     142ops/s   0.0mb/s   26.949ms/op [3.449ms - 57.598ms]
closefile6          1419ops     142ops/s   0.0mb/s    2.153ms/op [0.083ms - 9.235ms]
readfile6           1419ops     142ops/s   2.2mb/s    3.744ms/op [0.162ms - 13.687ms]
openfile6           1424ops     142ops/s   0.0mb/s   27.247ms/op [3.435ms - 72.481ms]
closefile5          1425ops     142ops/s   0.0mb/s    2.218ms/op [0.066ms - 9.082ms]
readfile5           1425ops     142ops/s   2.2mb/s    3.987ms/op [0.149ms - 13.474ms]
openfile5           1427ops     143ops/s   0.0mb/s   27.231ms/op [3.997ms - 67.959ms]
closefile4          1427ops     143ops/s   0.0mb/s    2.166ms/op [0.077ms - 8.009ms]
readfile4           1427ops     143ops/s   2.2mb/s    3.917ms/op [0.121ms - 13.664ms]
openfile4           1430ops     143ops/s   0.0mb/s   27.162ms/op [3.688ms - 68.930ms]
closefile3          1430ops     143ops/s   0.0mb/s    2.137ms/op [0.077ms - 8.985ms]
readfile3           1430ops     143ops/s   2.2mb/s    4.070ms/op [0.143ms - 13.176ms]
openfile3           1438ops     144ops/s   0.0mb/s   27.058ms/op [3.575ms - 74.976ms]
```

Consistency

https://drive.google.com/file/d/1zqRifms4HjGXSbSg96NgvsrR9uTCtWlm/view?usp=sharing

Here we show that the “Last write wins”. We flush the contents to the server on close. Whichever client closes last, writes the file.

Durability

https://drive.google.com/file/d/1obtqeifZqcu1WHcKPzWL6bm1Il2-fsL9/view?usp=sharing

Thank you