lsof List open files

CONCEPTS

> On Unix everything is a file: regular files, directories, pipes, sockets and devices all show up. Run as root to see other users' processes.

> Selection options are ORed by default, so lsof -u me -i lists both. Add -a to require all of them.

> Always add -nP when scripting or debugging: it skips slow DNS and service-name lookups.

FIND BY PROCESS

`lsof -p <pid>`
Open files of a process

`lsof -p <pid1>,<pid2>`
Several processes

`lsof -c <prefix>`
Processes by command-name prefix

`lsof -d cwd -a -p <pid>`
Working directory of a process

FIND BY USER AND FILE

`lsof -u <user>`
Files opened by a user

`lsof <file>`
Processes holding a file open

`lsof <mountpoint>`
Processes using a filesystem

`lsof +d <dir>`
Open files directly in a dir

`lsof +D <dir>`
Open files in a dir tree

`lsof -a -u <user> -d ^mem`
AND selectors together

NETWORK

`lsof -i`
All network files

NETWORK (cont.)

`lsof -i :<port>`
Who uses a port

`lsof -i TCP:<port>`
Restrict to TCP port

`lsof -i @<host>`
Connections to a host

`lsof -iTCP -sTCP:LISTEN`
Listening TCP sockets

`lsof -iTCP -sTCP:ESTABLISHED`
Established connections

`lsof -nP -i`
No DNS or port-name lookups

`lsof -i -a -p <pid>`
Network files of one process

OUTPUT CONTROL

`lsof -t <selectors>`
PIDs only, no header

`lsof +L1`
Unlinked (deleted) but open files

READING THE TABLE

Common FD values

FD	Meaning
`cwd`	Current directory
`txt`	Program binary
`mem`	Memory-mapped file or library
`rtd`	Root directory
`3u`	Descriptor 3, open read and write
`4r / 5w`	Read-only / write-only
`DEL`	Mapped file deleted

> A '(deleted)' suffix on NAME means the file was removed but a process still holds it, so its disk space is not freed.

> Without sudo, lsof only shows your own processes and may exit 1 with no output; that does not always mean nothing is open.