OPERATING SYSTEM DESIGN

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OS Structures & Kernel Programming

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System Calls

- A System program that traces system calls and signals of a script or a program
- Allows the customization of the output to focus on the area you need to examine
- Quickly see the permissions issue
- Find files that are opened and closed
- To check for installation: strace -V
- Installation
  - sudo apt install strace
  - Sudo spt install ltrace

System Calls

- Usage: strace –option command/script
- Useful Options
  - -v – verbose (additional info on each system call)
  - -c – statistics info on each system call
  - -e – specific system call
  - -r – timespent for each system call
  - -p – processed
  - -s – output line size
  - -f – follow forks
- Additional option: -o – output goes to a file

System Calls

- Strace –e trace=file - will trace only file accesses
- Strace –e trace=file – will trace network activity
- Strace –e trace=read – will trace only read system call
- Strace –e trace=!open – will trace other than open system call
- Strace –e trace=file,read,open,write
- Strace –e trace=process
- Strace –e trace=signal

System Calls

- Strace shows these system calls

read	fork	setgid
write	connect	execve
open	getuid	chmod
close	getgid	chown
stat	setuid	

- Strace shows these signals

SIGINT (ex. ctrl-c)
SIGKILL (kill -9)
ENOENT (file or directory not found)
EPERM (permission error) (chmod)

ENOPERM (permission error (chown)
EACCESS if -1 (permission denied)
SIGSEGV (Segmentation fault)

System Calls

- Strace will not show
  - Program logic
  - Computation
- It is not a debugger

System Calls

$ su –

#cd tmp.

Create a directory testdir and two files file1, file2 under it

#ltrace ls testdir/

#ltrace ls testdir/

#strace –o trace.log ls testdir/file1 file2

#ls –l trace.log

#grep write trace.log

#strace –v ls testdir

System Calls

- Open two terminals
- In one terminal just put cat command
- In another terminal, ps –ef|grep cat
- Followed by that : strace –p “pid_of_cat”
- Now move to another terminal and type some text
- You can see twice, the text. One input and the other output by the system call to write into the terminal
- In the other terminal, you can see the system calls

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