OS Lab
Session 7: Interaction with Linux Kernel

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The /proc File System

The /proc File System

- /proc or procfs is a window into the running Linux kernel
- Files in the /proc file system don't correspond to actual files on a physical device
- they are generated on the fly by the Linux kernel when you read from the file
- let’s see some examples

The /proc File System

- ls -l /proc/version
- cat /proc/version
- In this section, we'll describe some of the features of the /proc file system that are most likely to be useful to application programmers, and we'll give examples of using them. Some of the features of /proc are handy for debugging, too

Another Example

- cat /proc/cpuinfo
- extract info using C

Process Entries

- The /proc file system contains a directory entry for each process running on the GNU/Linux system
- The name of each directory is the process ID of the corresponding process

Process Entries

Each process directory contains these entries:

- cmdline contains the argument list for the process.
- cwd is a symbolic link that points to the current working directory of the process
- environ contains the process's environment.
- exe is a symbolic link that points to the executable image running in the process

Process Entries

- fd is a subdirectory that contains entries for the file descriptors opened by the process
- maps displays information about files mapped into the process's address
- root is a symbolic link to the root directory for this process
- stat contains lots of status and statistical information about the process (not human readable)

Process Entries

- statm contains information about the memory used by the process
- status contains lots of status and statistical information about the process (human readable)

/proc/self

- One additional entry in the /proc file system makes it easy for a program to use /proc **to find information about its own process**. The entry /proc/self is a symbolic link to the /proc directory corresponding to the current process.

Kernel Information

- Many of the entries in /proc provide access to information about the running kernel's configuration and state.
- Some of these entries are at the top level of /proc
- Others are under /proc/sys/kernel

Kernel Information

- Version Information
  - /proc/version
- Hostname and Domain Name
  - /proc/sys/kernel/hostname
  - /proc/sys/kernel/domainname
- Memory Usage
  - /proc/meminfo

Hardware Information

- CPU Information
  - /proc/cpuinfo
- Device Information
  - /proc/devices
- PCI Bus Information
  - /proc/pci
- Serial Port Information
  - /proc/tty/driver/serial

Drives, Mounts, and File Systems

- File Systems
  - /proc/filesystems
- Drives and Partitions
  - /proc/ide
- Mounts
  - /proc/mounts
- Locks
  - /proc/locks

The /sys File System

- Many newer distributions of Linux are using sysfs mounted on /sys as a way of exporting information from the kernel to various applications.
- So, What is the difference between procfs and sysfs?
  - proc is the old one, it is more or less without rules and structure, but sysfs is a little bit more structured.

Sysctl

- Sysctl is an interface for examining and dynamically changing parameters in the BSD and Linux operating systems,
- Using sysctl we can:
- Read the kernel variables
  - sysctl -a
- Change the kernel behaviour
  - sysctl -w net.ipv4.icmp_echo_ignore_all=1

Make sysctl changes permanent

- If you want to make a change permanent, or at least until you change it again, you will need to edit or create the file /etc/sysctl.conf and add the changes there.

Questions?