Operating System Lab: CS341

LAB 2: Process Visualization

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Proc file system

- The /proc file system in Linux is a virtual file system that provides a mechanism to access kernel data structures. It is often referred to as a process information pseudo-file system. Instead of containing real files, it contains runtime system information (e.g., system memory, devices mounted, hardware configuration, etc.) and the status of running processes.

- The proc file system is a virtual file system that is created on the fly when the system boots and is dissolved when the system shuts down.

- Each running process has a corresponding directory within /proc, named by its process ID (PID). For example, the directory /proc/1234 would contain information about the process with PID 1234.

➢ The /proc file system also contains files and directories that provide information about the system as a whole, such as:

- **/proc/cpuinfo**: Information about the CPU.
- **/proc/meminfo**: Information about system memory usage.
- **/proc/uptime**: The system uptime.
- **/proc/version**: The kernel version.
- **/proc/loadavg**: The system load average.

Common used commands in “/proc” file systems

- **grep:** grep is a powerful command-line utility used for searching plain-text data for lines that match a regular expression.

  Syntax: **grep [options] pattern [file_name]**

- **“physical id”:** Counts the number of unique physical CPUs (sockets) by searching for “physical id”.

- **wc –l:** The wc -l command is a simple and effective way to count the number of lines in a file or in the output of another command.

- **“core id”:** Counts the number of unique cores per physical CPU by searching for "core id".

- **/proc/cpuinfo:** It is a virtual file in the /proc directory on Unix-like operating systems, including Linux. This file contains detailed information about the CPU(s) in the system.

- **“processor”:** Counts the total number of logical processors (threads) by searching for "processor".

- **“model name”:** Extracts the CPU model name.

- **“stepping”:** Extracts the CPU stepping information.

- **“cpu MHz”:** Extracts the current frequency of each CPU core in MHz.

- **“MemTotal”:** Shows the total physical memory in the system.

- “**MemFree|MemAvailable”:** Extracts the free and available memory. MemFree is the completely unused memory, while MemAvailable is the memory available for new applications.

- “**SwapTotal”:** Shows the total amount of swap memory.

- “**SwapFree”:** Shows the amount of unused swap memory.

- **‘/proc/meminfo’:** /proc/meminfo is a virtual file in the /proc directory on Unix-like operating systems that provides detailed information about the system's memory usage. It includes various statistics such as total memory, free memory, available memory, buffers, cached memory, and more, which are useful for monitoring and managing system performance.

- **uname -r:** Shows the version of the currently running kernel.

- **uptime:** Shows how long the system has been running and the average system load.

- **/proc/stat:** /proc/stat is a virtual file in the /proc directory on Unix-like systems that contains various kernel and system statistics, including CPU usage, context switches, boot time, and interrupts. It provides essential information for system monitoring and performance analysis.

- **“ctxt”:** Shows the total number of context switches since the system was booted.

- **du -sh /proc:** Shows the size of the /proc directory.

- **/proc/diskstats**: This file provides a snapshot of disk statistics in the /proc filesystem. The /proc filesystem is a special filesystem in Linux that provides information about the kernel and system state. diskstats specifically contains information about disk I/O statistics for each block device.

- **df:** Stands for "disk free." This command reports the amount of disk space used and available on filesystems.

- **-h:** This is an option (short for "human-readable") that modifies the output to display sizes in a more understandable format (e.g., GB, MB) rather than in bytes.

- **/proc/net/dev**: This file contains network interface statistics, such as the number of bytes transmitted and received by each network device.

- **ip**: The main command for network interface configuration and management.

- **addr**: A subcommand for managing and displaying IP addresses.

- **/proc/<PID>/fd**: This is the path in the /proc filesystem that contains symbolic links to the file descriptors for the process with the ID <PID>.

- **-l**: This option provides a detailed listing format that includes permissions, ownership, size, and modification date.

- **/proc/mounts**: This file in the /proc filesystem contains information about the filesystems currently mounted on the system.

- **lsblk**: The base command that lists block devices and their associated details.

- **ps aux:** The ps aux command is used in Unix and Unix-like operating systems (like Linux) to display information about all the running processes on the system.

- **pstree –p <PID>:** Lists all the child process of the process with the corresponding PID.

- **kill:** The base command used to send signals to processes.

- **-SIGSTOP:** The specific signal being sent. SIGSTOP is a signal that stops (pauses) a process, which can later be resumed.

- **<PID>:** The process ID of the target process that will receive the signal.

- The command **kill -SIGCONT <PID>** is used to send a signal to a process in Unix and Unix-like operating systems to continue (resume) its execution if it has been stopped.

- **strace:** Utility to trace system calls and signals.
- **-o ls_trace.txt:** Option to output the trace to ls_trace.txt.
- **head:** Command to display the beginning of a file.
- **-n 10:** Option to show the first 10 lines.
- **diff:** Command to compare files line by line.
- **less:** Command to view the contents of a file interactively.