



Software Lab

The proc filesystem

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Summary



- The proc filesystem
- Information about processes
- Information about the system
 - ▶ Hardware components
 - ▶ Kernel
 - ▶ Memory
 - ▶ Statistics

The proc filesystem



- **mount** output: none on /proc type proc (rw)
- **proc** is a virtual filesystem
 - ▶ Not associated to any physical device (none)
 - ▶ It exists only in memory
- Abstraction that lets the user
 - ▶ Access information about the kernel/system
 - ▶ Configure the kernel
- **/proc/sys** are sysctl files
 - ▶ They don't belong to procfs
 - ▶ Handled with a completely different API

procfs details



- Every files has no dimension
- They are generated by the kernel upon read requests
 - ▶ Callbacks to read from and to write to
 - `linux/proc_fs.h`
- Modification date is equal to the current date
- Most of the files has a human readable format but it can be easily parsed
- File names and formats can change with versions
- `man 5 proc`
- `/usr/src/linux/fs/proc`

Information about processes



- A subdirectory for every process in the system
 - ▶ PID as the name
 - ▶ Dynamic as processes
- Structure
 - ▶ **cmdline** : NUL separated argument list
 - ▶ **cwd** : current working directory (symbolic link)
 - ▶ **environ** : process environment
 - ▶ **exe** : executable image (symbolic link)
 - ▶ **fd** : subdirectory with entries for file descriptors opened by the process
 - ▶ **maps** : mapped files in the address space

Information about processes



- Structure (continues)
 - ▶ **root** : usually /, if no chroot
 - ▶ **stat** : status information and statistics (same as info in status but here they are not formatted)
 - ▶ **statm** : memory information
 - ▶ **status** : status information and statistics (same as info in stat but here they are formatted)
 - ▶ **cpu** : in SMP systems contains information about the CPU time (user and system)
- **/proc/self** is a symbolic link to the directory of the current process (in the procfs)

Information about hardware



- `/proc/cpuinfo` for information about the CPU
- `/proc/devices` for information about devices
- `/proc/pci` for information on devices attached on PCI bus, AGP boards, motherboard on-board devices
 - ▶ `lspci` command
- `/proc/tty/driver/serial` for information on serial ports

Information about kernel



- `/proc/version` for information about the kernel version actually being executed
 - ▶ `/proc/sys/kernel/ostype`
 - ▶ `/proc/sys/kernel/osrelease`
 - ▶ `/proc/sys/kernel/version`
- `/proc/sys/kernel/hostname` for the host name
- `/proc/sys/kernel/domainname` for the domain name
- `/proc/meminfo` for information about the memory usage in the system

Information about drives



- `/proc/filesystems` for information about filesystems the kernel recognizes
 - ▶ Useless since modules can be loaded
- `/proc/ide/ide0/hda` for information about the master device on the first IDE channel
 - ▶ `model` contains the id string
 - ▶ `media` contains the type (cdrom, disk, tape, floppy, UNKNOWN)
 - ▶ `capacity` contains the capacity in 512 byte blocks
- `/proc/scsi/scsi` for information about devices on the SCSI bus

Information about drives



- `/proc/sys/dev/cdrom/info` per detailed information on the cdrom
- `/proc/mounts` for information about mounted filesystems
 - ▶ Identical to `/etc/mtab`
- `/proc/locks` for information about system file locks
 - ▶ Every row is a lock
 - `POSIX`, `ADVISORY` for locks created with `fcntl`
 - Process that owns the lock
 - Lock type (`READ`, `WRITE`)

Statistics



- `/proc/loadavg` for information about the load of the system
 - ▶ Average of running processes in the last 1, 5, 15 minutes
 - ▶ Number of actually runnable processes divided by the total number of processes
 - ▶ PID of the last executed process
- `/proc/uptime` for information about the system activity time and the system idle time
 - ▶ Same information using the `uptime` command