UNIX

Processes and Related Commands

What is a Process?

- **Characteristics of processes:**
  - Process is an instance of program in execution.
  - Many processes can run at the same time.
  - Processes are identified by the Process Identifier.
  - PID is allocated by kernel.

Concepts

- On logging to a system, a process is set up due to execution of shell.
- Shell is the parent process for every other process setup due to the execution of commands.
- Every process, with the exception of PID 0 processes, has a parent process.
- Parent process waits for death of child process before resuming execution.

Running a Command

- **ls command: Steps for running a Unix command**
  - The shell performs a fork. This creates a new process that the shell uses to run the ls program.
  - The shell performs an exec of the ls program. This replaces the shell program and data with the program and data for ls and then starts running that new program.
  - The ls program is loaded into the new process context, replacing the text and data of the shell.
  - The ls program performs its task, listing the contents of the current directory .

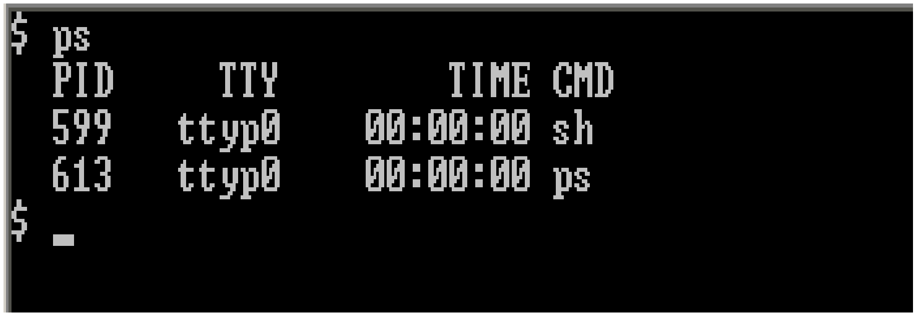
PS Command

- **ps command displays characteristics of a process.**
- **Syntax:**

```
ps [ option [ arguments ] ... ]
```

- **Options:**
  - -f - full form
  - -u- details of only users processes
  - -a- all processes details
  - -l - detailed listing
  - -e- system processes

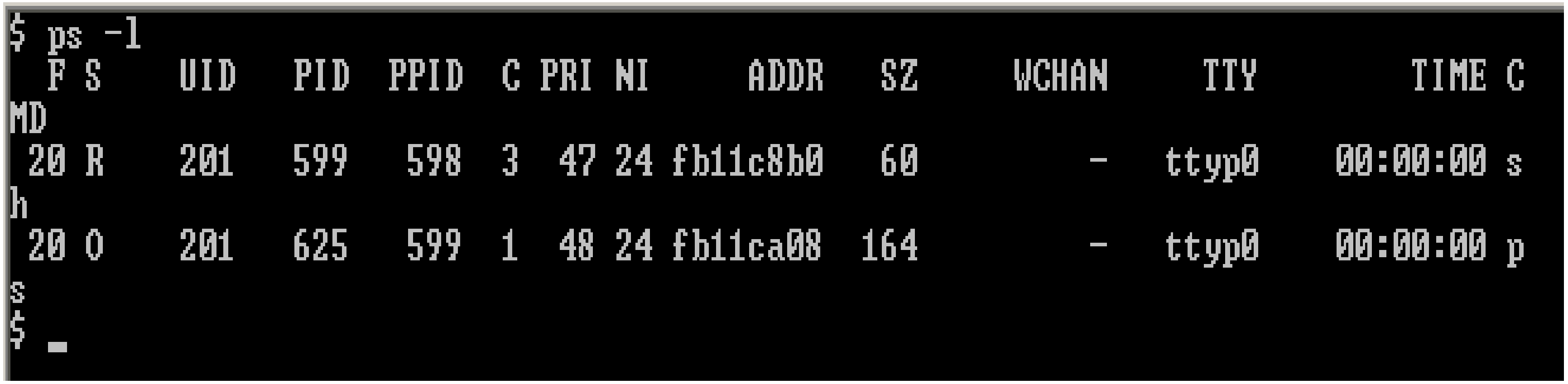
ps



```
$ ps
  PID     TTY         TIME CMD
  599   ttyp0     00:00:00 sh
  613   ttyp0     00:00:00 ps
$ _
```

Example

- **Output of ps –l command:**



```
$ ps -l
  F S    UID   PID  PPID  C PRI NI     ADDR   SZ    WCHAN    TTY       TIME C
MD
 20 R    201   599   598  3  47 24 fb11c8b0   60        -  ttyp0   00:00:00 s
h
 20 O    201   625   599  1  48 24 fb11ca08  164        -  ttyp0   00:00:00 p
s
$ _
```

Process in Background Mode

- **Processes can run in foreground or background mode.**
  - Only one process can run in foreground mode but multiple processes can run in background mode.
  - The processes, which do not require user intervention can run in background mode, e.g. sort, find.
  - To run a process in background, use & operator
    - `$sort -o emp.lst  emp.lst &`
- **nohup (no hangup) - permits execution of process even if user has logged off.**
  - `$nohup sort emp.lst &`   (sends output to nohup.out)

Kill Command

- **Kill Command- Used to terminate a process**
- **Syntax :**
  - kill [-signumber] pid ...
- **Example:**
  - $kill 1030   (default signal 15) - kills job with pid 1005
  - $kill -9 1030   - sure killing of job
  - $kill 0 - kills all background process

Details

- **Scheduling Policy:**
  - *time-sharing* technique
  - Several processes are allowed to run "concurrently," which means that the CPU time is roughly divided into "slices," one for each runnable process.
  - The scheduling policy is also based on process priority
  - In UNIX, process priority is dynamic.

Continued…

- **Processes are traditionally classified as** "I/O-bound**" or "**CPU-bound**."**
  - **I/O-bound Processes:**

    Make heavy use of I/O devices and spend much time waiting for I/O operations to complete.
  - **CPU-bound Processes:**

    Are number-crunching applications that require a lot of CPU time.

Continued…

- **Processes can also be classified as:**
  - **Interactive processes**:

    These interact constantly with their users, and therefore spend a lot of time waiting for key presses and mouse operations.
  - **Batch processes**:

    These do not need user interaction, and hence they often run in the background.
  - **Real-time processes:**
    - Should never be blocked by lower-priority processes.
    - Should have a short response time.

nice and wait command

- **nice - runs a program with modified scheduling priority.**
- **Syntax :**

```
nice [OPTION] [COMMAND [ARG]...]
```

  – $ nice cat chap?? | nice wc –l > wclist &

- **Wait - waits for child process to complete.**
- **Syntax :**

```
wait  [ process id…  ]
```

  – $wait 138 - waits for background job with pid 138

cron

- **A system daemon which performs a specific task at regular intervals**
- **The command and schedule information is kept in the directory /var/spool/cron/crontabs or in /usr/spool/cron/crontabs.**
- **Each user has a crontab file. cron wakes up periodically and executes any job that are scheduled for that minute.**
- **Only users who are listed in /etc/cron.allow or not listed in cron.deny can make an entry in the crontab.**
- **Crontab <filename>   -used to make an entry in the crontab file.**
  - where the file contains the commands to execute

MIN	HOUR	DOM	MOY	DOW	COMMAND
(0-50)	**(0-23)**	**(1-31)**	**(1-12)**	**(0-6)**	**---**
$ 0	**18**	*****	*****	*****	**/bin /sh /home/user1/myfile.sh**