CSE 15L: Software Tools and Techniques Laboratory

Fall 2018 - http://ieng6.ucsd.edu/~cs15x/

GARY GILLESPIE

Lecture 11

November 5th, 2018

Today's Topics

1. UNIX Processes

The Process ID (PID)

What is the PID?

- PID: is the Process IDentifier
- It is a number used by UNIX to uniquely identify an active process.
- This number may be used as a parameter in various function calls allowing processes to be manipulated, such as killing it.

- Two commands: ps and top

Child, parent and grandparent of processes…

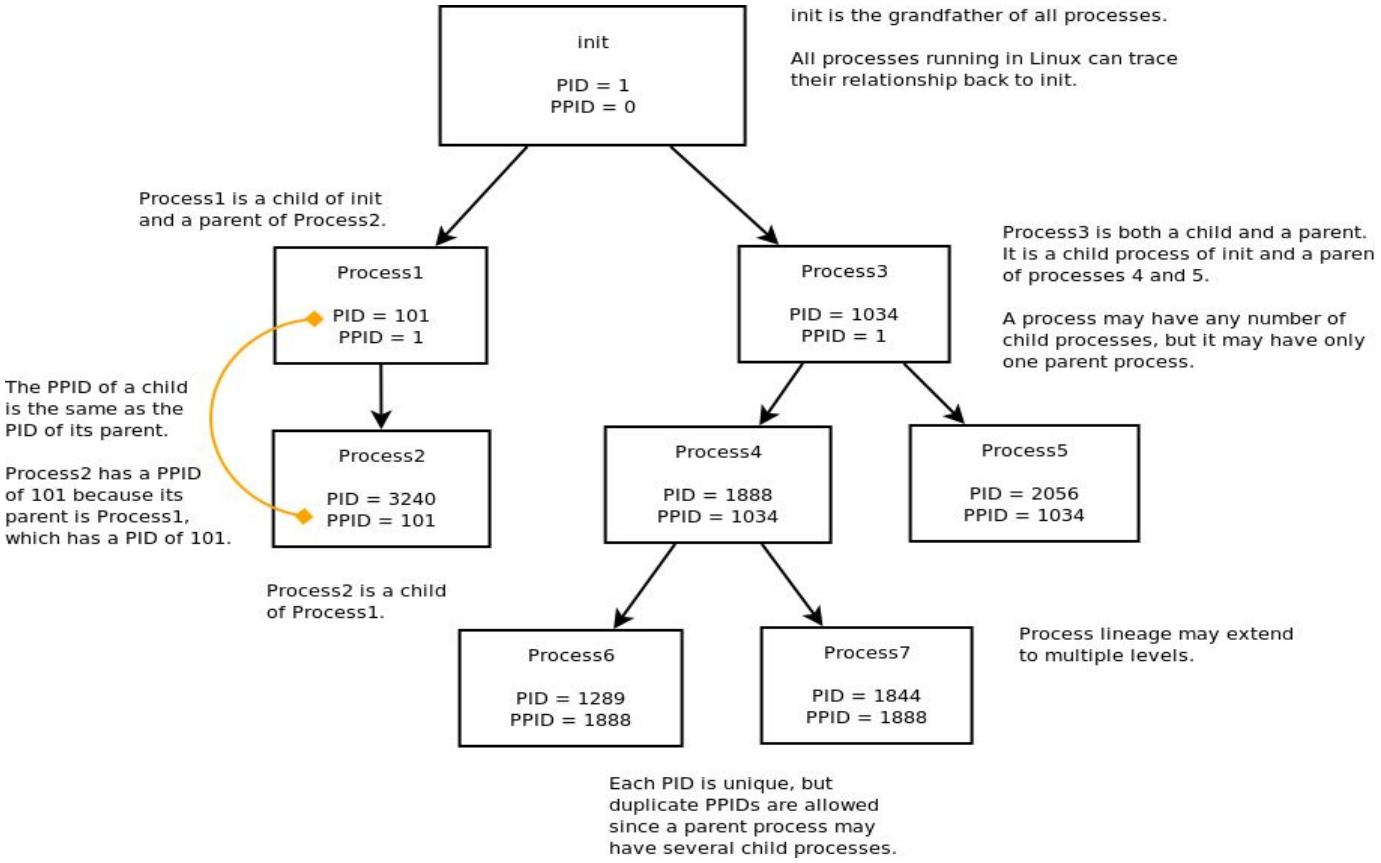
- The grandparent:
  - In every Unix based system, there is a process with PID = 1.
  - This is the grandparent of all processes, e.g., init or launchd.
  - The kernel itself has a PID of 0.

- The parent:

In addition to a unique PID each process has also a PPID (Parent Process ID) that tells which process started it. The PPID is the PID of the process's parent.

Child, parent and grandparent of processes…

pstree: this command will show the relationship of all processes in a tree like structure



Child, parent and grandparent of processes…

- fork(): In Unix a child process is created when the parent process invoke the fork() system call.

- Orphan process: when a parent process dies, the child becomes an orphan process. But don’t worry, It will be immediately adopted by the grandparent: the init process!

Daemons and Zombies

- **Daemon process**: a daemon is a process orphaned intentionally. Its parent is init, it will run as a background process without being controlled by an interactive user

- A **zombie process** is a process that has completed execution but still has an entry in the process table.
  - A zombie in not an orphan!

How to kill a process?

Step 1: First look at all the processes that are running and filter the ones you want to kill

```
ps [options]
```

This shows all the processes that are currently running

```
ps -aef | grep altintas
```

This shows the running processes limited to those belonging to adam.

Step 2: Then kill the process you selected

```
kill 125
```

This command will kill the process which PID number is 125

Step 3: Then make sure that the process was killed:

```
ps –efl
```

You look again at the process table and make sure that the process which PID is 125 is not listed.

Step 4: Or you can kill it dead:

```
kill -9 125
```

If the process has not stopped, you can kill it dead with the -9 option.

Errors and Signals and Traps

- Consider the following program:

```
echo "this script will endlessly loop until you stop it"
while true; do
        : # Do nothing
done
```

- After you launch this script it will hang: it is stuck inside a loop!
- Once started, the script will continue until bash receives a signal to stop it. You can send such a signal by typing ctrl –c which is the signal called SIGINT (short for SIGnal INTerupt)

The trap command

- The trap command allows to execute a command when a signal is received by your script
- Syntax: trap args signals

“signals” is a list of signals to intercept and “arg” is the command to execute when the signals is received.

Common signals…

Signal name	Signal number	Signal description
SIGHUP	1	Hang up detected on controlling terminal or death of controlling process
SIGINT	2	Issued if the user sends an interrupt signal (Ctrl –c)
SIGQUIT	3	Issued if the user sends a quit signal (Ctrl –D)
SIGFPE	8	Issued if an illegal mathematical operation is attempted (division by 0)
SIGKILL	9	If a process gets this signal it must quit immediately, and will not perform any cleanup operations
SIGALRM	14	Alarm clock signal (used for timers)
SIGTERM	15	Software termination signal (sent by kill by default)

kill -l : this command will display all the signals supported by the system.

More interesting commands

- finger: is a program you can use to find information about computer users. It usually shows the login name, the full name and other details about the user you are fingering.

Syntax: finger *username*

Permissions: Read – write - execute

Permissions	file	directory
read	Read the file	Read the names of the files inside directory, but cannot find other information about them
write	Modify a file content	Modify the files/directories inside the directory: create new file, rename or delete
execute	Execute a file: the file must be executable programs such as shell scripts	Access file contents and meta information if name is known. But it doesn't list files inside the directory unless the read is set also

Next Lecture

- XML
- Ant