

OS LAB 4

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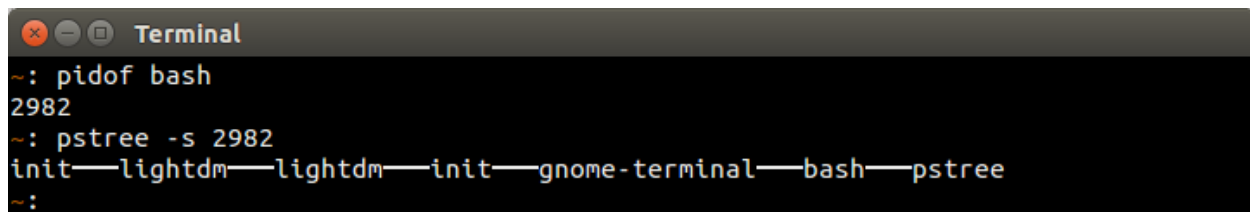
Q1.

init——lightdm——lightdm——init——gnome-terminal——bash——pstree

Commands used :

To get pid : `pidof bash`

To get tree : `pstree -s <pid>`



```
Terminal
~: pidof bash
2982
~: pstree -s 2982
init——lightdm——lightdm——init——gnome-terminal——bash——pstree
~:
```

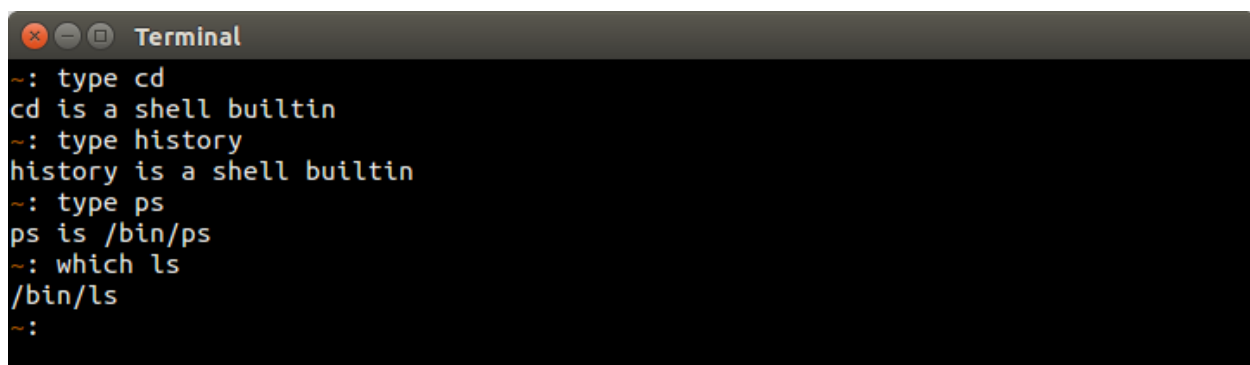
Q2.

cd and history are implemented by bash.

ps and ls are binary executables found in /bin directory.

Commands used :

`type <cmd>` and `which <cmd>`

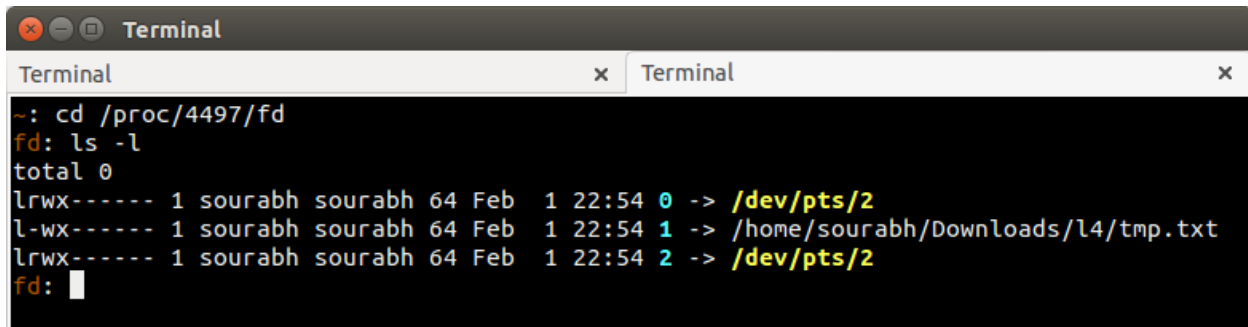


```
Terminal
~: type cd
cd is a shell builtin
~: type history
history is a shell builtin
~: type ps
ps is /bin/ps
~: which ls
/bin/ls
~:
```

Q3.

While forking a child bash copies all three fd's corresponding to stdin, stdout and stderr which are same (/dev/pts/2) as all three belong to terminal.

When the output is redirected to a file, bash closes stdout and opens a file with fd = 1. Thus, child process' output get redirected to the corresponding file.



```
Terminal
Terminal x Terminal x
~: cd /proc/4497/fd
fd: ls -l
total 0
lrwx----- 1 sourabh sourabh 64 Feb 1 22:54 0 -> /dev/pts/2
l-wx----- 1 sourabh sourabh 64 Feb 1 22:54 1 -> /home/sourabh/Downloads/l4/tmp.txt
lrwx----- 1 sourabh sourabh 64 Feb 1 22:54 2 -> /dev/pts/2
fd: █
```

Q4.

Bash creates a pipe which has 2 fd's corresponding to input and output end.

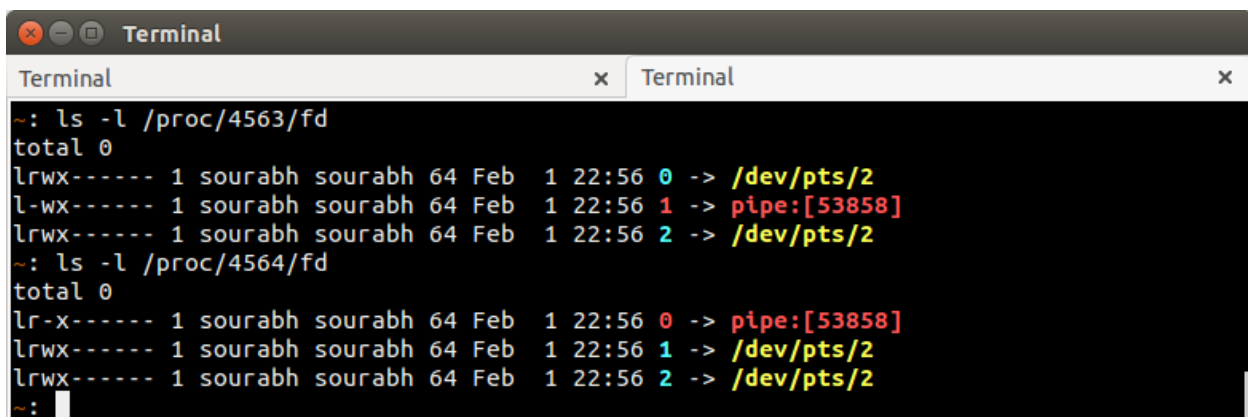
Bash copies all fd's to both the children.

It closes stdout(1) of first child, copies output end of pipe at slot 1 and then closes the pipe.

Similarly, it closes stdin(0) of second child, copies input end at slot 0 and then closes the pipe.

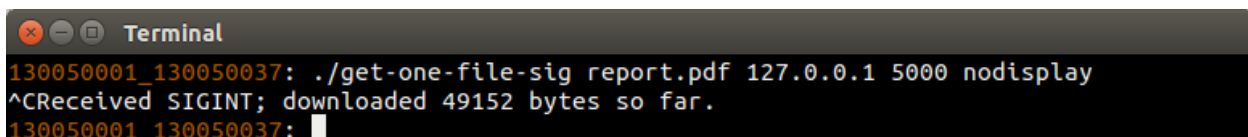
Thus, when the first proc writes to stdout, it get passed to the second proc as stdin via the pipe.

Other fds remain the same.



```
Terminal
Terminal x Terminal x
~: ls -l /proc/4563/fd
total 0
lrwx----- 1 sourabh sourabh 64 Feb 1 22:56 0 -> /dev/pts/2
l-wx----- 1 sourabh sourabh 64 Feb 1 22:56 1 -> pipe:[53858]
lrwx----- 1 sourabh sourabh 64 Feb 1 22:56 2 -> /dev/pts/2
~: ls -l /proc/4564/fd
total 0
lr-x----- 1 sourabh sourabh 64 Feb 1 22:56 0 -> pipe:[53858]
lrwx----- 1 sourabh sourabh 64 Feb 1 22:56 1 -> /dev/pts/2
lrwx----- 1 sourabh sourabh 64 Feb 1 22:56 2 -> /dev/pts/2
~: █
```

Q7.



```
Terminal
130050001_130050037: ./get-one-file-sig report.pdf 127.0.0.1 5000 nodisplay
^CReceived SIGINT; downloaded 49152 bytes so far.
130050001_130050037: █
```