

# CS326-02 Processes

## File descriptors

Process

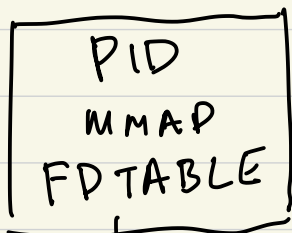


User

Kernel

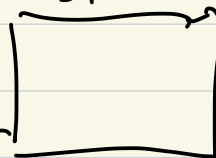
proc

process  
control  
block



0	stdin
1	stdout
2	stderr
3	...

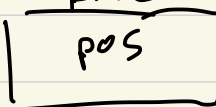
File  
struct



console

File

pos



inode



`fd = open("foo.txt", O_RDONLY)`

# Processes

How do we start a new process?

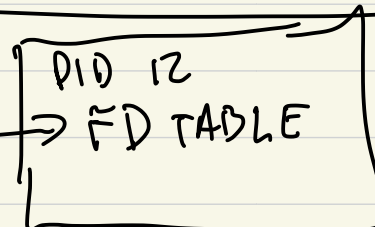
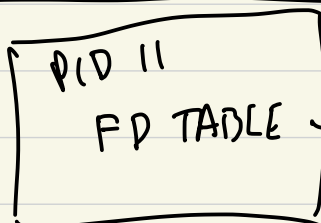
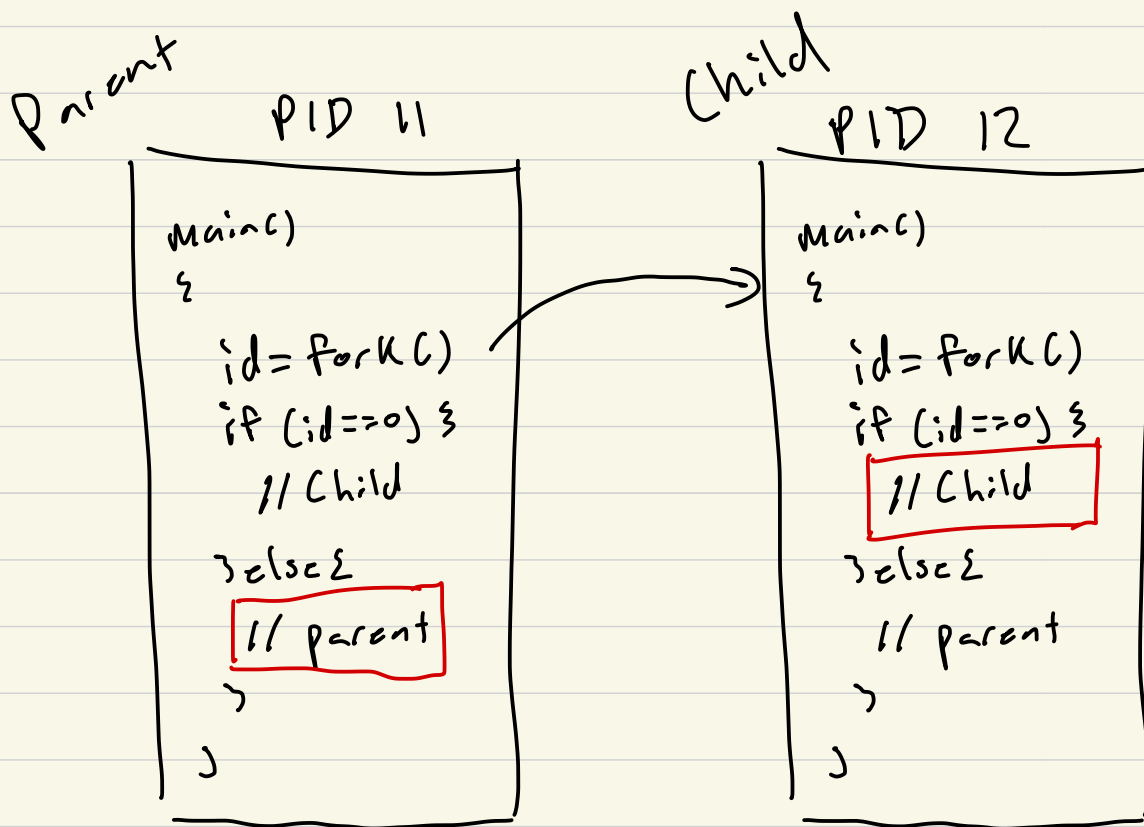
How do we start a new program?

System calls

`fork()`

`wait()`

`exec()`



exec()

PID 7

```
main()
{
    id == fork()
    if (id == 0) {
        exec("ls")
    } else {
        wait()
    }
}
```

PID 8

```
main()
{
    id == fork()
    if (id == 0) {
        exec("ls")
    } else {
        wait()
    }
}
```

PID 8

```
main()
{
    // ls
}
```

PID 7

PID 8

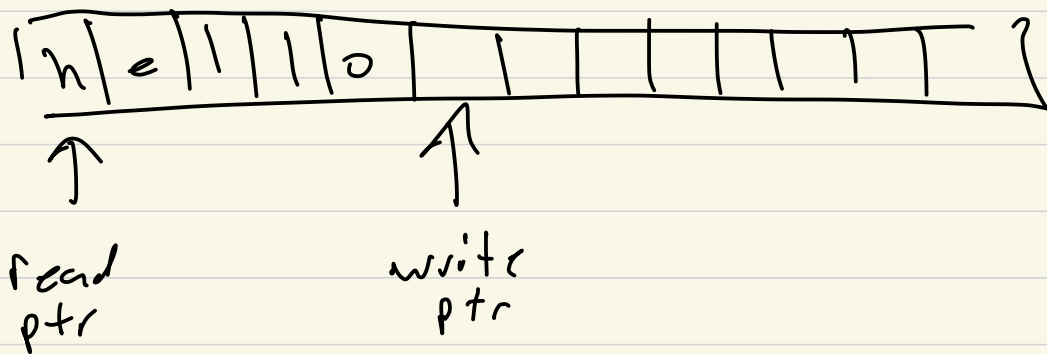
sys-exec()

# redirection

\$ ls > ls.txt

## Pipes

A pipe is a Kernel buffer (circular)



```
int pfd[2];
```

```
pipe(pfd);
```

```
pfd[0] read  
pfd[1] write
```

