CS 326.01   Processes

File descriptors

Process

HEAP
STACK
DATA
CODE

User

———————————————————

Kernel

proc struct

PID
MMAP
FD TABLE

process control block

0	Stdin
1	Stdout
2	Stderr
3	•

File struct → Console

File pos → inode
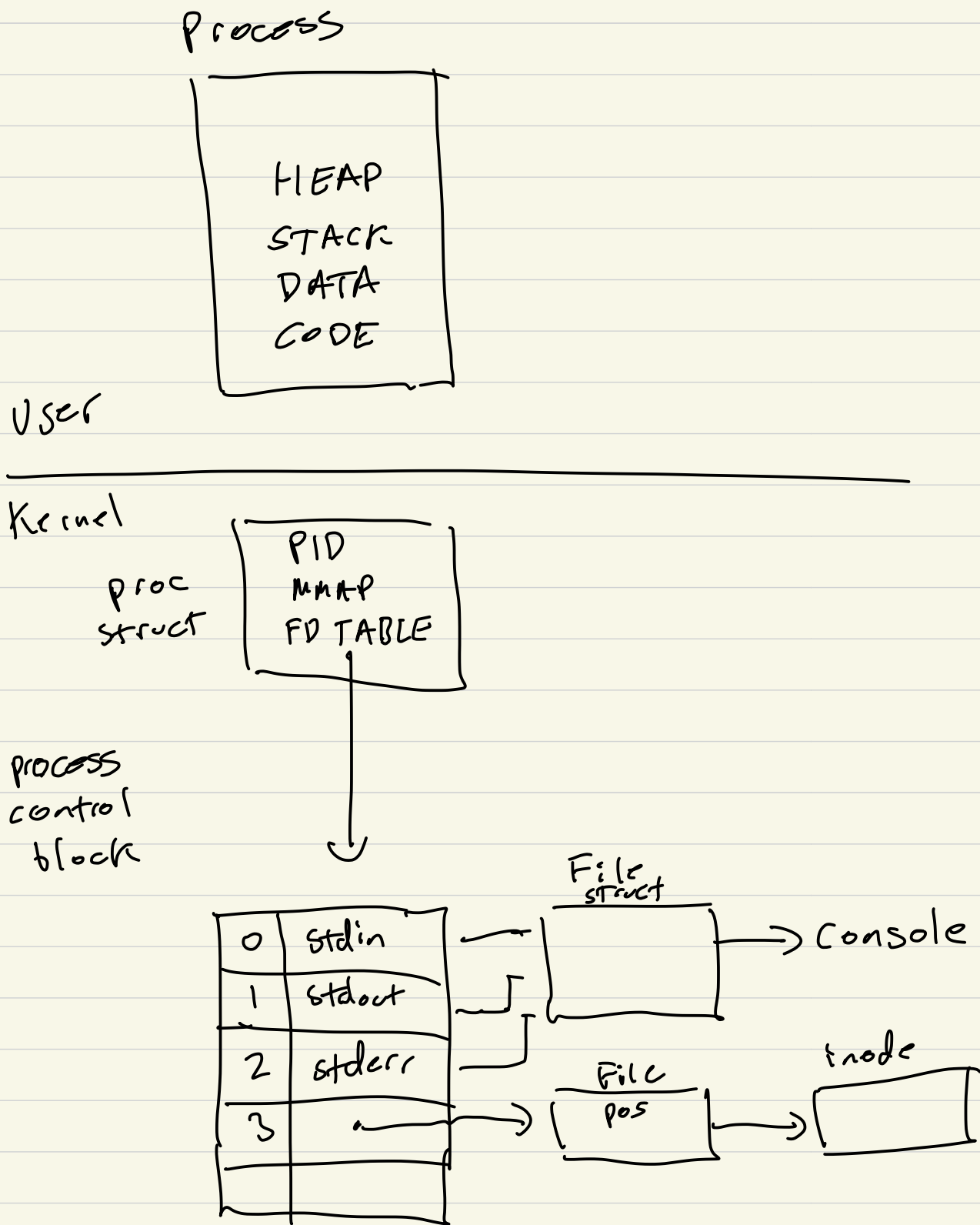
$fd = open("foo.txt", O\_RDONLY)$

Processes

How do we start new processes?

How do we start new programs?

System calls

fork()
wait()
exec()

fork()
returns
id = 0 in child
id = pid of child in parent

Parent
PID = 13

```
main() {


  id = fork()
  if (id == 0) {
    /* child */

  } else {
    /* parent */

  }
}
```

child
PID = 14

```
main() {


  id = fork()
  if (id == 0) {
    /* child */

  } else {
    /* parent */

  }
}
```
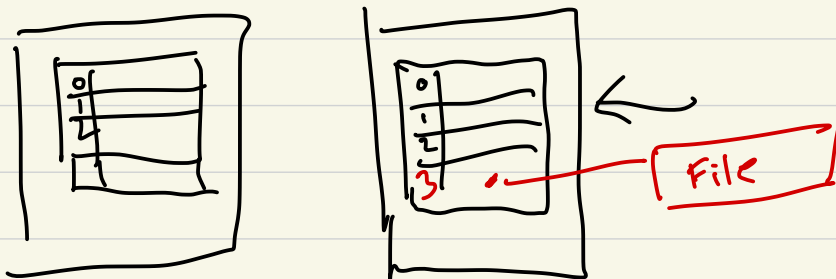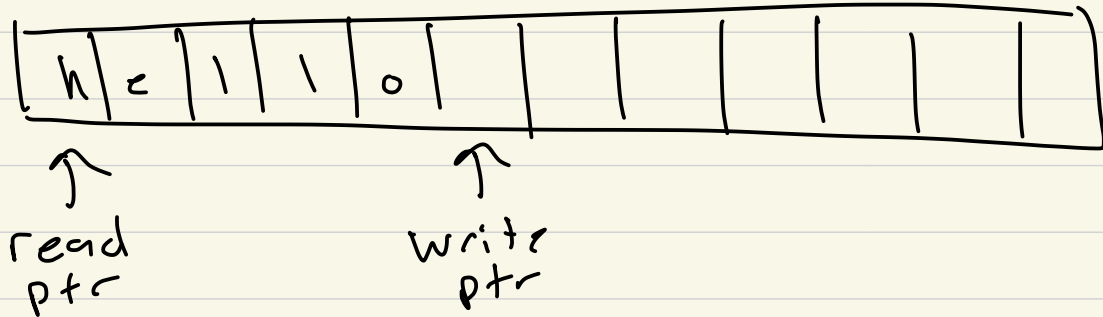
proc | PID 13

proc | PID 14

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 */
}
```

12

```
fork()
```

13

```
fork
fd=open
exec
```

File
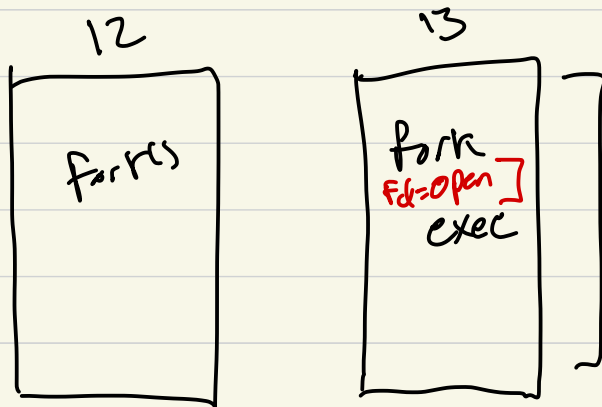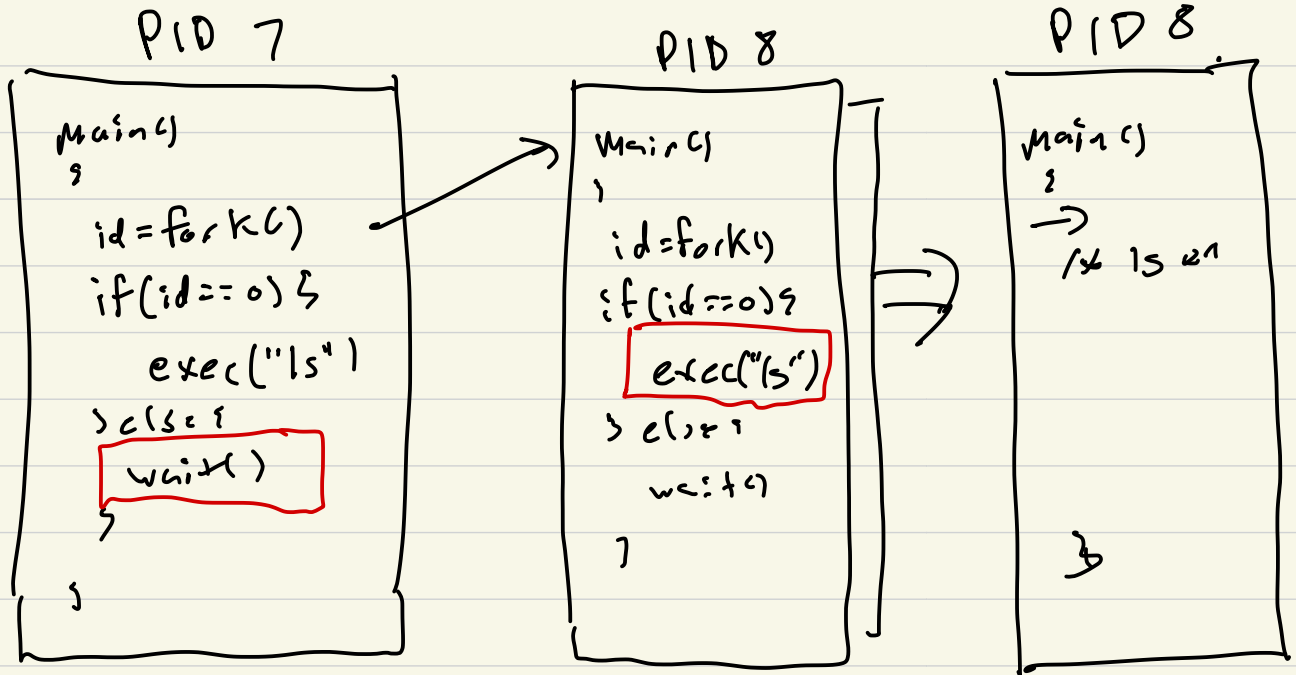
Pipes

A pipe is an in kernel buffer circular buffer

	h	e	l	l	o									

↑ read ptr   ↑ write ptr

int pfds[2]

pipe (pfds)

K

0	
1	
2	
3	● → read
4	● → write

read / write → | | | | | | |

pfds[0] read end
pfds[1] write end