Linux Internals & Networking

System programming using Kernel interfaces

Team Emertxe

Contents

Linux Internals & Networking

Contents

Inter Process Communications (IPC)

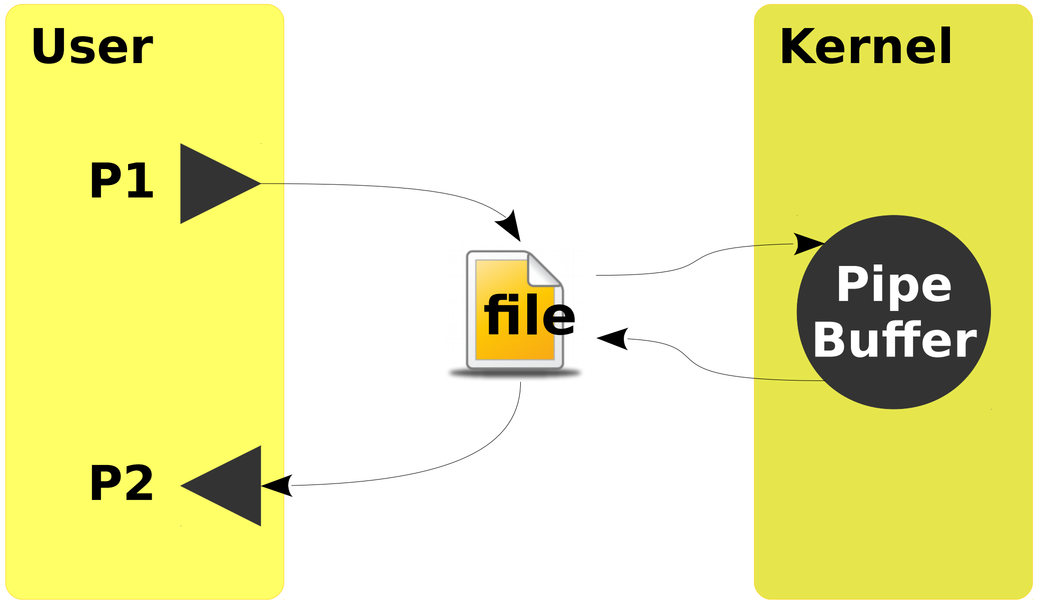
Inter Process Communications

FIFO - Properties

- A *first-in, first-out (FIFO)* file is a pipe that has a name in the file-system
- FIFO file is a pipe that has a name in the file-system
- FIFOs are also called Named Pipes
- FIFOs is designed to let them get around one of the shortcomings of normal pipes

Inter Process Communications

FIFO - Working



Inter Process Communications
FIFO - Creation

- FIFO can also be created similar to directory/file creation with special parameters & permissions
- After creating FIFO, read & write can be performed into it just like any other normal file
- Finally, a device number is passed. This is ignored when creating a FIFO, so you can put anything you want in there
- Subsequently FIFO can be closed like a file

Function	Meaning
int mknod(const char *path, mode_t mode, dev_t dev)	✓ path: Where the FIFO needs to be created (Ex: "/tmp/Emertxe") ✓ mode: Permission, similar to files (Ex: 0666) ✓ dev: can be zero for FIFO

Inter Process Communications

FIFO - Access

- Access a FIFO just like an ordinary file
- To communicate through a FIFO, one program must open it for writing, and another program must open it for reading
- Either low-level I/O functions (open, write, read, close and so on) or C library I/O functions (fopen, fprintf, fscanf, fclose, and so on) may be used.

```
user@user:~] ls -l myfifo
prw-rw-r-- 1 satya satya       0 Mar 8 17:36 myfifo
```

prw-

Inter Process Communications

FIFO vs PIPES

- Unlike pipes, FIFOs are not temporary objects, they are entities in the file-system
- Any process can open or close the FIFO
- The processes on either end of the pipe need not be related to each other
- When all I/O is done by sharing processes, the named pipe remains in the file system for later use

Inter Process Communications

FIFO - Example

- Unrelated process can communicate with FIFO

Shell 1

```
user@user:~] cat > /tmp/my_fifo
Hai hello
```

Shell 2

```
user@user:~] cat /tmp/my_fifo
Hai hello
```

Inter Process Communications

FIFO - Pros & Cons

PROS

- Naturally synchronized
- Simple to use and create
- Unrelated process can communicate.
- No extra system calls required to communicate (read/write)
- Work like normal file

CONS

- Less memory size (4K)
- Only two process can communicate
- One directional communication
- Kernel is involved

Inter Process Communications
Summary

- We have covered

Data exchange

Communication

- Pipes
- FIFO
- Shared memory
- Signals
- Sockets

Resource usage/access/control

Synchronization

- Semaphores

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