UNIX Domain Sockets

W4118 Operating Systems I

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Credits to Jae

Shared Memory

1. Multiple threads in a single process
    - Process address space is already shared among the threads
2. **Related** processes (i.e., parent and child)
    - Anonymous mmap
3. **Unrelated** processes
    - File-backed mmap

Synchronization

1. Multiple threads in a single process
    - pthread mutex, condition variable,...
2. Multiple processes **with some shared memory**
    - pthread mutex, condition variable,...
    - Unnamed POSIX semaphore
3. Multiple process **with no shared memory**
    - Named POSIX semaphore

Data Passing

1. **Related** processes
    - Unnamed pipe
        i. Created by `pipe()`
        ii. half-duplex
2. **Unrelated** processes
    - Named pipe (aka FIFO)
        i. Created by `mkfifo()`
        ii. half-duplex
3. **Distant** processes
    - TCP/UDP sockets
    - full duplex
    - reliable/unreliable and high/low overhead

Best of both worlds: UNIX domain sockets

1. Unnamed pair of connected sockets for related processes
   a. Created by **`socketpair(AF_UNIX, …)`**
   b. Just like a pipe but full duplex
2. Named local-only socket for unrelated processes
   a. created by **`socket(AF_UNIX, …)`**
   b. represented by a special file
3. Reliable when used in datagram mode
4. Can transport special things like an open file descriptor

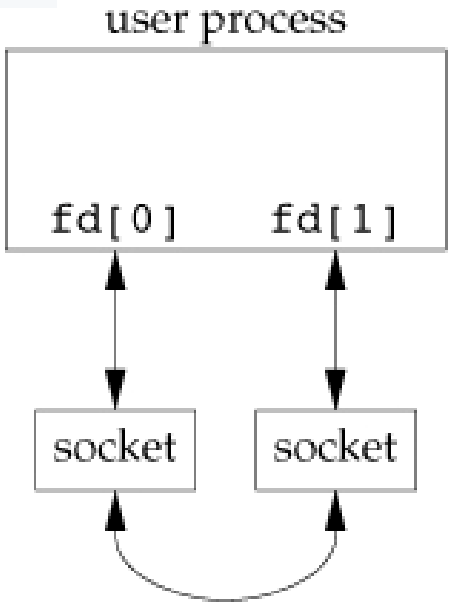
UNIX domain sockets

```
int socketpair(int domain, int type, int protocol, int sv[2]);

        // Returns 0 if OK, -1 on error
```

Same picture as the one for **`pipe()`** but

arrows going both ways



Passing open file descriptors