CS:3620 Operating Systems

Inter Process Communication (IPC)

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- Processes do not share any memory with each other

- Some processes might want to work together for a task, so need to
communicate information

- IPC mechanisms to share information between processes

Shared Memory

- Processes can both access same region of memory via *shmget()* system call

  - *int shmget (key_t key, int size, int shmflg)*

- By providing same key, two processes can get same segment of memory

- Can read/write to memory to communicate

- Need to take care that one is not overwriting other's data

Signals

- A certain set of signals supported by OS
  - Some signals have fixed meaning (e.g., signal to terminate process)
  - Some signals can be user-defined
- Signals can be sent to a process by OS or another process (e.g., if you type Ctrl+C, OS sends SIGINT signal to running process)
- Signal handler: every process has a default code to execute for each signal
  - Exit on terminate signal
- Some signal handlers can be overridden to do other things

Sockets

- Sockets can be used for two processes on same machine or different

  machines to communicate

  - TCP/UDP sockets across machines

  - Unix sockets in local machine

- Communicating with sockets

  - Processes open sockets and connect them to each other

  - Messages written into one socket can be read from another

  - OS transfers data across socket buffers

Message Queues

- Mailbox abstraction

- Process can open a mailbox at a specified location

- Processes can send/receive messages from mailbox

- OS buffers messages between send and receive

Blocking vs. non-blocking communication

- Some IPC actions can block

  - Reading from socket that has no data, or reading from empty message queue

  - Writing to a full socket/message queue

- The system calls to read/write have versions that block or can return with an error code in case of failure

  - A socket read can return error indicating no data to be read, instead of blocking

Disclaimer

- *These lecture slides are based on a slide set by Youjip Won (Hanyang University) and Mythili Vutukuru (IIT Bombay)*