

Process- 3.3

CS3600

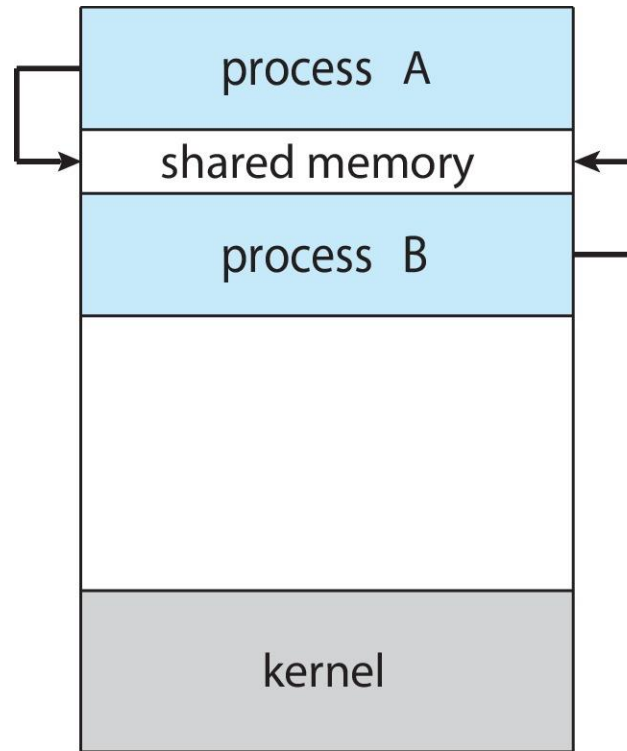
Spring2022

Inter-process Communication

- Processes within a system may be ***independent*** or ***cooperating***
- Cooperating process can affect or be affected by other processes, including sharing data
- Reasons for cooperating processes:
 - Information sharing
 - Computation speedup
 - Modularity
 - Convenience
- ***Independent*** process cannot affect or be affected by the execution of another process
- ***Cooperating*** process can affect or be affected by the execution of another process
- Cooperating processes need **inter-process communication (IPC)**
- Two models of IPC
 - **Shared memory**
 - **Message passing**

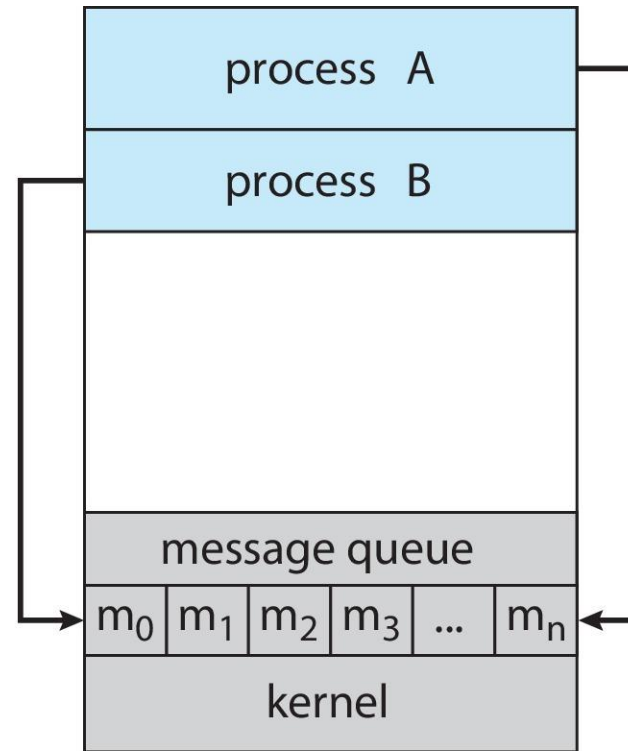
Communications Models

(a) Shared memory.



(a)

(b) Message passing.



(b)

Inter-process Communication – Shared Memory

- An area of memory shared among the processes that wish to communicate
- The communication is under the control of the users processes not the operating system.
- Major issues is to provide mechanism that will allow the user processes to synchronize their actions when they access shared memory.

Shared Memory Program

```
#include <stdio.h>
```

```
#include <sys/shm.h>
```

```
main(){
```

```
int shmid,status,i;
```

```
int *a, *b;
```

```
shmid = shmget(IPC_PRIVATE, 2*sizeof(int), 0777|IPC_CREAT);
```

```
b = (int *) shmat(shmid, 0, 0);
```

```
b[0]=10 ;
```

```
printf("\tChild reads: %d\n",b[0]);
```

```
shmdt(b);
```

Lab 2.2

1. Download shmDemo1.c from Canvas and run write what you observed.
2. Download shmDemo2.c from Canvas and modify the program to print values in shared memory both from child and parent alternatively.

Lab 2.2- Q2

Expected Output

```
rr@rr-VirtualBox:~/Demo$ ./shmDemo2
Parent writes: 1,2
Child reads: 1,2
Parent writes: 3,5
Child reads: 3,5
Parent writes: 8,13
Child reads: 8,13
Parent writes: 21,34
Child reads: 21,34
Parent writes: 55,89
Child reads: 55,89
Parent writes: 144,233
Child reads: 144,233
Parent writes: 377,610
Child reads: 377,610
Parent writes: 987,1597
Child reads: 987,1597
Parent writes: 2584,4181
Child reads: 2584,4181
Parent writes: 6765,10946
Child reads: 6765,10946
```

Resources

- *Resource Control Block (RCB).*
 - *Data structure representing resources*
 - *Resource Description*
 - *Property*
 - *State*
 - *current availability*
 - *waiting_list*
 - *Resource waiting list*

Resource Request /Release

```
request(r) {  
    if (r.state == free) {  
        r.state = allocated  
        Insert r into self.other_resources  
    }  
    else {  
        self.state = blocked  
        Move self from RL to r.waiting_list  
        scheduler()  
    }  
}
```

```
release(r) {  
    Remove r from self.other_resources  
    if (r.waiting_list == empty)  
        r.state = free  
    else  
        Remove process q from the head of r.waiting_list  
        Insert r into q.other_resources  
        q.process_state = ready  
        Move q from r.waiting_list to RL  
        scheduler()  
}
```

Classwork



Announcements (02/08/22)

- Read Module 2.5
- Complete Lab 2.2