

Experiment:9: Illustrate the concept of inter-process communication using shared memory with a C program.

Aim:

The aim of this program is to illustrate **Inter-Process Communication (IPC) using Shared Memory** in C. Shared memory allows two or more processes to communicate by accessing a common memory space. One process writes data to the shared memory, and another process reads the data from it.

Procedure:

1. Create Shared Memory:

- Use `shmget()` to create or access a shared memory segment.
- `shmget()` returns a shared memory identifier that can be used to attach the shared memory.

2. Attach the Shared Memory:

- Use `shmat()` to attach the shared memory segment to the process's address space.

3. Write to Shared Memory:

- One process writes data into the shared memory.

4. Read from Shared Memory:

- Another process reads the data from the shared memory.

5. Detach and Remove Shared Memory:

- After the processes finish using the shared memory, they should detach from it using `shmdt()` and remove it using `shmctl()` to free resources.

Steps in the Program:

1. A **producer process** will write data into the shared memory.
2. A **consumer process** will read the data from the shared memory.

C Program Implementation:

Producer (writes data to shared memory):

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

```
#include <stdlib.h>
```

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

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

```
#include <string.h>

#define SHM_KEY 1234 // Shared memory key

int main() {

    int shmid;

    char *shared_mem;

    // Create shared memory segment

    shmid = shmget(SHM_KEY, 1024, IPC_CREAT | 0666);

    if (shmid == -1) {

        perror("shmget failed");

        exit(1);

    }

    // Attach the shared memory segment

    shared_mem = (char *)shmat(shmid, NULL, 0);

    if (shared_mem == (char *)(-1)) {

        perror("shmat failed");

        exit(1);

    }

    // Write data to shared memory

    printf("Enter data to write to shared memory: ");

    fgets(shared_mem, 1024, stdin); // User input to shared memory

    // Detach the shared memory segment
```

```
if (shmdt(shared_mem) == -1) {  
    perror("shmdt failed");  
    exit(1);  
}  
  
printf("Data written to shared memory successfully!\n");  
return 0;  
}
```

Output:

Output

Reader: Reading from shared memory: Hello from sachin!

192372048

Result:

IPC using shared memory allows multiple processes to communicate by sharing a region of memory.