

PROGRAM CODE

```
#include <stdio.h>
#include <stdlib.h>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <pthread.h>
#include <semaphore.h>
#include <unistd.h>

key_t key;
int shmid, size, in = 0, out = 0;
sem_t full;
sem_t empty;
pthread_mutex_t mutex;

void producer() {
    int *buffer = (int*) shmat(shmid, (void*) 0, 0);

    do {
        int item = rand() % 100;

        sleep(1);
        sem_wait(&empty);
        pthread_mutex_lock(&mutex);

        buffer[in] = item;
        printf("Producer produced %d in buffer at %d\n", item, in);
        in = (in + 1) % size;

        pthread_mutex_unlock(&mutex);
        sem_post(&full);
    } while(1);

    shmdt(buffer);
}

void consumer() {
    int *buffer = (int*) shmat(shmid, (void*) 0, 0);

    do {
        sem_wait(&full);
        pthread_mutex_lock(&mutex);

        int item = buffer[out];
        buffer[out] = 0;
        printf("Consumer consumed %d from buffer at %d\n", item, out);
        out = (out + 1) % size;

        pthread_mutex_unlock(&mutex);
        sem_post(&empty);
    } while(1);

    shmdt(buffer);
}
```

```

void main() {
    key = ftok("shmfile", 65);
    shmid = shmget(key, 1024, 0666 | IPC_CREAT);

    printf("Enter buffer size: ");
    scanf("%d", &size);
    printf("\n");

    sem_init(&full, 0, 0);
    sem_init(&empty, 0, size);
    pthread_mutex_init(&mutex, NULL);

    pthread_t ptid, ctid;

    pthread_create(&ptid, NULL, (void*) producer, NULL);
    pthread_create(&ctid, NULL, (void*) consumer, NULL);

    pthread_join(ptid, NULL);
    pthread_join(ctid, NULL);

    sem_destroy(&full);
    sem_destroy(&empty);
    pthread_mutex_destroy(&mutex);
    shmctl(shmid, IPC_RMID, NULL);
}

```

SAMPLE OUTPUT

Enter buffer size: 5

```

Producer produced 83 in buffer at 0
Consumer consumed 83 from buffer at 0
Producer produced 86 in buffer at 1
Consumer consumed 86 from buffer at 1
Producer produced 77 in buffer at 2
Consumer consumed 77 from buffer at 2
Producer produced 15 in buffer at 3
Consumer consumed 15 from buffer at 3
Producer produced 93 in buffer at 4
Consumer consumed 93 from buffer at 4
Producer produced 35 in buffer at 0
Consumer consumed 35 from buffer at 0
Producer produced 86 in buffer at 1
Consumer consumed 86 from buffer at 1
Producer produced 92 in buffer at 2
Consumer consumed 92 from buffer at 2
Producer produced 49 in buffer at 3
Consumer consumed 49 from buffer at 3
Producer produced 21 in buffer at 4
Consumer consumed 21 from buffer at 4

```