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Script started on 2020-03-29 21:29:58+0530
 ]0;Harshini@Harshini: ~/Desktop/semaphore  [01;32mHarshini@Harshini [00m:
[01;34m~/Desktop/semaphore [00m$ gcc producer.c -o p -lpthread
 ]0;Harshini@Harshini: ~/Desktop/semaphore  [01;32mHarshini@Harshini [00m:
[01;34m~/Desktop/semaphore [00m$ gcc consumer.c -o c -lpthread
 ]0;Harshini@Harshini: ~/Desktop/semaphore  [01;32mHarshini@Harshini [00m:
[01;34m~/Desktop/semaphore [00m$ cat producer.c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
// For semaphore operations sem_init,sem_wait,sem_post
#include <semaphore.h>
#include <pthread.h>
#include <unistd.h>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <sys/sem.h>
#include <sys/wait.h>
#include <sys/errno.h>
#include <sys/types.h>
#include<unistd.h>
extern int errno;
#define SIZE 10 /* size of the shared buffer */
#define VARSIZE 1 /* size of shared variable = 1 byte */
#define INPUTSIZE 20
#define SHMPERM 0666 /* shared memory permissions */
int segid; /* ID for shared memory buffer */
int empty_id;
int full_id;
int mutex_id;
char *buff;
char *input_string;
sem_t *empty;
sem_t *full;
sem_t *mutex;
int p = 0;
int main()
{
    int i = 0;
    pid_t temp_pid;
    segid = shmget(100, SIZE, IPC_CREAT | IPC_EXCL | SHMPERM );
    empty_id=shmget(101, sizeof(sem_t), IPC_CREAT | IPC_EXCL | SHMPERM);
    full_id=shmget(102, sizeof(sem_t), IPC_CREAT | IPC_EXCL | SHMPERM);
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    mutex_id=shmget(103,sizeof(sem_t), IPC_CREAT | IPC_EXCL | SHMPERM);
    buff = shmat(segid, (char *)0, 0);
    empty = shmat(empty_id, (char *)0, 0);
    full = shmat(full_id, (char *)0, 0);
    mutex = shmat(mutex_id, (char *)0, 0);
    // Initializing Semaphores Empty, Full & Mutex
    sem_init(empty, 1, 10);
    sem_init(full, 1, 0);
    sem_init(mutex, 1, 1);
    printf("\nProducer Process Started\n");
    while (i < 10)
    {
        int val = random()%10;
        printf("\nProducer %d trying to acquire Semaphore Empty\n", getpid());
        sem_wait(empty);
        printf("\nProducer %d successfully acquired Semaphore Empty\n", getpid());
        printf("\nProducer %d trying to acquire Semaphore Mutex\n", getpid());
        sem_wait(mutex);
        printf("\nProducer %d successfully acquired Semaphore Mutex\n", getpid());
        buff[p] = (char)(val + 48);
        printf("\nProducer %d Produced Item [%d]\n", getpid(), val);
        i++;
        p++;
        printf("\nItems produced: %d\n", p);
        sem_post(mutex);
        printf("\nProducer %d released Semaphore Mutex\n", getpid());
        sem_post(full);
        printf("\nProducer %d released Semaphore Full\n", getpid());
        sleep(2);
    }
    shmdt(buff);
    shmdt(empty);
    shmdt(full);
    shmdt(mutex);
    printf("\nProducer Process Ended\n");
    return(0);
}
 ]0;Harshini@Harshini: ~/Desktop/semaphore  [01;32mHarshini@Harshini [00m:
[01;34m~/Desktop/semaphore [00m$ cat consumer.c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
//For semaphore operations - sem_init, sem_wait, sem_post
```

```
#include <semaphore.h>
#include <pthread.h>
#include <unistd.h>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <sys/sem.h>
#include <sys/wait.h>
#include <sys/errno.h>
#include <sys/types.h>
#include<unistd.h>
extern int errno;
#define SIZE 10 /* size of the shared buffer */
#define VARSIZE 1 /* size of shared variable = 1 byte */
#define INPUTSIZE 20
#define SHMPERM 0666 /* shared memory permissions */
int segid; /* ID for shared memory buffer */
int empty_id;
int full_id;
int mutex_id;
char *buff;
char *input_string;
sem_t *empty;
sem_t *full;
sem_t *mutex;
int p = 0, c = 0;
int main()
{
   int i = 0;
   pid_t temp_pid;
   segid = shmget (100, SIZE, IPC_EXCL | SHMPERM );
   empty_id = shmget(101, sizeof(sem_t), IPC_EXCL | SHMPERM);
   full_id = shmget(102, sizeof(sem_t), IPC_EXCL | SHMPERM);
   mutex_id=shmget(103, sizeof(sem_t), IPC_EXCL | SHMPERM);
   buff = shmat(segid, (char *)0, 0);
   empty = shmat(empty_id, (char *)0, 0);
   full = shmat(full_id, (char *)0, 0);
   mutex = shmat(mutex_id, (char *)0, 0);
   printf("\nConsumer Process Started\n");
   while (i < 10)
   {
      printf("\nConsumer %d trying to acquire Semaphore Full\n", getpid());
      sem_wait(full);
      printf("\nConsumer %d successfully acquired Semaphore Full\n", getpid());
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        printf("\nConsumer %d trying to acquire Semaphore Mutex\n", getpid());
        sem_wait(mutex);
        printf("\nConsumer %d successfully acquired Semaphore Mutex\n", getpid());
        printf("\nConsumer %d Consumed Item [%c]\n", getpid(), buff[c]);
        buff[c]=' ';
        c++;
        printf("\nItems consumed: %d\n", i+1);
        i++;
        sem_post(mutex);
        printf("\nConsumer %d released Semaphore Mutex\n", getpid());
        sem_post(empty);
        printf("\nConsumer %d released Semaphore Empty\n", getpid());
        sleep(1);
    }
    shmdt(buff);
    shmdt(empty);
    shmdt(full);
    shmdt(mutex);
    shmctl(segid, IPC_RMID, NULL);
    semctl(empty_id, 0, IPC_RMID, NULL);
    semctl(full_id, 0, IPC_RMID, NULL);
    semctl(mutex_id, 0, IPC_RMID, NULL);
    sem_destroy(empty);
    sem_destroy(full);
    sem_destroy(mutex);
    printf("\nConsumer Process Ended\n");
    return(0);
}
 ]0;Harshini@Harshini: ~/Desktop/semaphore  [01;32mHarshini@Harshini [00m:
[01;34m~/Desktop/semaphore [00m$ ./p

Producer Process Started

Producer 2231 trying to acquire Semaphore Empty

Producer 2231 successfully acquired Semaphore Empty

Producer 2231 trying to acquire Semaphore Mutex

Producer 2231 successfully acquired Semaphore Mutex

Producer 2231 Produced Item [3]
```

Items produced: 1

Producer 2231 released Semaphore Mutex

Producer 2231 released Semaphore Full

Producer 2231 trying to acquire Semaphore Empty

Producer 2231 successfully acquired Semaphore Empty

Producer 2231 trying to acquire Semaphore Mutex

Producer 2231 successfully acquired Semaphore Mutex

Producer 2231 Produced Item [6]

Items produced: 2

Producer 2231 released Semaphore Mutex

Producer 2231 released Semaphore Full

Producer 2231 trying to acquire Semaphore Empty

Producer 2231 successfully acquired Semaphore Empty

Producer 2231 trying to acquire Semaphore Mutex

Producer 2231 successfully acquired Semaphore Mutex

Producer 2231 Produced Item [7]

Items produced: 3

Producer 2231 released Semaphore Mutex

Producer 2231 released Semaphore Full

Producer 2231 trying to acquire Semaphore Empty

Producer 2231 successfully acquired Semaphore Empty

Producer 2231 trying to acquire Semaphore Mutex

Producer 2231 successfully acquired Semaphore Mutex

Producer 2231 Produced Item [5]

Items produced: 4

Producer 2231 released Semaphore Mutex

Producer 2231 released Semaphore Full

Producer 2231 trying to acquire Semaphore Empty

Producer 2231 successfully acquired Semaphore Empty

Producer 2231 trying to acquire Semaphore Mutex

Producer 2231 successfully acquired Semaphore Mutex

Producer 2231 Produced Item [3]

Items produced: 5

Producer 2231 released Semaphore Mutex

Producer 2231 released Semaphore Full

Producer 2231 trying to acquire Semaphore Empty

Producer 2231 successfully acquired Semaphore Empty

Producer 2231 trying to acquire Semaphore Mutex

Producer 2231 successfully acquired Semaphore Mutex

Producer 2231 Produced Item [5]

Items produced: 6

Producer 2231 released Semaphore Mutex

Producer 2231 released Semaphore Full

Producer 2231 trying to acquire Semaphore Empty

Producer 2231 successfully acquired Semaphore Empty

Producer 2231 trying to acquire Semaphore Mutex

Producer 2231 successfully acquired Semaphore Mutex

Producer 2231 Produced Item [6]

Items produced: 7

Producer 2231 released Semaphore Mutex

Producer 2231 released Semaphore Full

Producer 2231 trying to acquire Semaphore Empty

Producer 2231 successfully acquired Semaphore Empty

Producer 2231 trying to acquire Semaphore Mutex

Producer 2231 successfully acquired Semaphore Mutex

Producer 2231 Produced Item [2]

Items produced: 8

Producer 2231 released Semaphore Mutex

Producer 2231 released Semaphore Full

Producer 2231 trying to acquire Semaphore Empty

Producer 2231 successfully acquired Semaphore Empty

Producer 2231 trying to acquire Semaphore Mutex

Producer 2231 successfully acquired Semaphore Mutex

Producer 2231 Produced Item [9]

Items produced: 9

Producer 2231 released Semaphore Mutex

Producer 2231 released Semaphore Full

Producer 2231 trying to acquire Semaphore Empty

Producer 2231 successfully acquired Semaphore Empty

Producer 2231 trying to acquire Semaphore Mutex

Producer 2231 successfully acquired Semaphore Mutex

Producer 2231 Produced Item [1]

Items produced: 10

Producer 2231 released Semaphore Mutex

Producer 2231 released Semaphore Full

Producer Process Ended
]0;Harshini@Harshini: ~/Desktop/semaphore [01;32mHarshini@Harshini [00m:
[01;34m~/Desktop/semaphore [00m$ exit
exit

// consumer output
Consumer Process Started

Consumer 2232 trying to acquire Semaphore Full

Consumer 2232 successfully acquired Semaphore Full

Consumer 2232 trying to acquire Semaphore Mutex

Consumer 2232 successfully acquired Semaphore Mutex

Consumer 2232 Consumed Item [3]

Items consumed: 1

Consumer 2232 released Semaphore Mutex

Consumer 2232 released Semaphore Empty

Consumer 2232 trying to acquire Semaphore Full

Consumer 2232 successfully acquired Semaphore Full

Consumer 2232 trying to acquire Semaphore Mutex

Consumer 2232 successfully acquired Semaphore Mutex

Consumer 2232 Consumed Item [6]

Items consumed: 2

Consumer 2232 released Semaphore Mutex

Consumer 2232 released Semaphore Empty

Consumer 2232 trying to acquire Semaphore Full

Consumer 2232 successfully acquired Semaphore Full

Consumer 2232 trying to acquire Semaphore Mutex

Consumer 2232 successfully acquired Semaphore Mutex

Consumer 2232 Consumed Item [7]

Items consumed: 3

Consumer 2232 released Semaphore Mutex

Consumer 2232 released Semaphore Empty

Consumer 2232 trying to acquire Semaphore Full

Consumer 2232 successfully acquired Semaphore Full

Consumer 2232 trying to acquire Semaphore Mutex

Consumer 2232 successfully acquired Semaphore Mutex

Consumer 2232 Consumed Item [5]

Items consumed: 4

Consumer 2232 released Semaphore Mutex

Consumer 2232 released Semaphore Empty

Consumer 2232 trying to acquire Semaphore Full

Consumer 2232 successfully acquired Semaphore Full

Consumer 2232 trying to acquire Semaphore Mutex

Consumer 2232 successfully acquired Semaphore Mutex

Consumer 2232 Consumed Item [3]

Items consumed: 5

Consumer 2232 released Semaphore Mutex

Consumer 2232 released Semaphore Empty

Consumer 2232 trying to acquire Semaphore Full

Consumer 2232 successfully acquired Semaphore Full

Consumer 2232 trying to acquire Semaphore Mutex

Consumer 2232 successfully acquired Semaphore Mutex

Consumer 2232 Consumed Item [5]

Items consumed: 6

Consumer 2232 released Semaphore Mutex

Consumer 2232 released Semaphore Empty

Consumer 2232 trying to acquire Semaphore Full

Consumer 2232 successfully acquired Semaphore Full

Consumer 2232 trying to acquire Semaphore Mutex

Consumer 2232 successfully acquired Semaphore Mutex

Consumer 2232 Consumed Item [6]

Items consumed: 7

Consumer 2232 released Semaphore Mutex

Consumer 2232 released Semaphore Empty

Consumer 2232 trying to acquire Semaphore Full

Consumer 2232 successfully acquired Semaphore Full

Consumer 2232 trying to acquire Semaphore Mutex

Consumer 2232 successfully acquired Semaphore Mutex

Consumer 2232 Consumed Item [2]

Items consumed: 8

Consumer 2232 released Semaphore Mutex

Consumer 2232 released Semaphore Empty

Consumer 2232 trying to acquire Semaphore Full

Consumer 2232 successfully acquired Semaphore Full

Consumer 2232 trying to acquire Semaphore Mutex

Consumer 2232 successfully acquired Semaphore Mutex

Consumer 2232 Consumed Item [9]

Items consumed: 9

Consumer 2232 released Semaphore Mutex

Consumer 2232 released Semaphore Empty

Consumer 2232 trying to acquire Semaphore Full

Consumer 2232 successfully acquired Semaphore Full

Consumer 2232 trying to acquire Semaphore Mutex

Consumer 2232 successfully acquired Semaphore Mutex

Consumer 2232 Consumed Item [1]

Items consumed: 10

Consumer 2232 released Semaphore Mutex

Consumer 2232 released Semaphore Empty

Consumer Process Ended

Script done on 2020-03-29 21:31:01+0530