Information Technology Department

Academic Year: 2021-2022

Class: S.Y.B.Tech   **Sem.:** IV   **Course:** IT206 Operating Systems

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Class: IT (Batch-D)

Experiment No.: 7

Title: Semaphores

Aim: The program r.c initializes n number of semaphores. It first assigns count equal -1, which is then used by process p and q. This count is protected by semaphore. It also allocates shared memory of size 40 ints. It waits for process p and q to enter all n1 and n2 elements through different terminals. This program r.c sorts shared data in ascending order. It waits to finish p and q. At end, The program r.c detaches and deletes n semaphores and prints the sum of all elements of the list.

Code:

<u>A.c</u>

```c
#include <stdio.h>
#include <semaphore.h>
#include <unistd.h>
#include <time.h>
#include <stdlib.h>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <stdbool.h>
#include <sys/wait.h>
#include <fcntl.h>

int main()
{
```

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```c
sem_t mutex;
key_t key = 1234;
int shm_id = shmget(
   key,
   41 * sizeof(int),
   IPC_CREAT | 0666);
int *sh = (int *)shmat(shm_id, NULL, 0);
sem_t *sem = sem_open("my_mutex", O_CREAT | O_EXCL, 0777, 0);
int data = -1;
sem_wait(sem);
sem_wait(sem);
int i, j;
for (i = 0; i < 40-1; i++)
for (j = 0; j < 40-i-1; j++)
   if (sh[j] > sh[j+1]){
      int temp = sh[j];
      sh[j] = sh[j+1];
      sh[j+1] = temp;
   }
int ans = 0;
for(int i = 0 ; i < 40 ; i++) {
   ans += sh[i];
}
printf("Sum: %d\n", ans);
printf("Elements: \n");
for(int i = 0 ; i < 40 ; i++) {
```

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```c
        printf("%d ", sh[i]);
    }
    printf("\n");
    sem_unlink("my_mutex");
    return 0;
}
```

<u>B.c</u>

```c
#include <stdio.h>
#include <semaphore.h>
#include <unistd.h>
#include <time.h>
#include <stdlib.h>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <stdbool.h>
#include <sys/wait.h>
#include <fcntl.h>

int main() {
    key_t key = 1234;
    int shm_id = shmget(
        key,
        41 * sizeof(int),
        IPC_CREAT | 0666);
    int *sh = (int *)shmat(shm_id, NULL, 0);
```

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```c
sem_t *sem = sem_open("my_mutex",O_RDWR);
for(int i = 0 ; i < 20 ; i++) {
    int idx = sh[40];
    sh[40]++;
    printf("Term %d: ", idx);
    scanf("%d", &sh[idx]);
}
printf("%d\n", sh[40]);
sem_post(sem);
}
```

C.c

```c
#include <stdio.h>
#include <semaphore.h>
#include <unistd.h>
#include <time.h>
#include <stdlib.h>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <stdbool.h>
#include <sys/wait.h>
#include <fcntl.h>

int main() {
    key_t key = 1234;
    int shm_id = shmget(
```

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```
    key,
    41 * sizeof(int),
    IPC_CREAT | 0666);
int *sh = (int *)shmat(shm_id, NULL, 0);
sem_t *sem = sem_open("my_mutex",O_RDWR);
for(int i = 0 ; i < 20 ; i++) {
    int idx = sh[40];
    sh[40]++;
    printf("Term %d: ", idx);
    scanf("%d", &sh[idx]);
}
sem_post(sem);
}
```

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Output: