



Bharatiya Vidya Bhavan's
Sardar Patel Institute of Technology
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous College Affiliated to University of Mumbai)

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:

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

B.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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```
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

```
#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:

```
amal@macbook ~ % ./A
Sum: 8282
Elements:
1 2 2 2 2 3 3 3 3 4 4 4 5 8 9 12 12 12 1
3 21 21 23 32 123 123 123 123 231 234 323 324
353 544 2134 3212
amal@macbook ~ % ./B
Term 0: 123
Term 14: 3
Term 15: 2
Term 16: 3
Term 17: 4
Term 18: 3212
Term 19: 2
Term 20: 3
Term 21: 21
Term 22: 231
Term 23: 544
Term 24: 2
Term 25: 13
Term 26: 12
Term 27: 5
Term 28: 213
Term 29: 12
Term 37: 32
Term 38: 323
Term 39: 123
40
amal@macbook ~ % ./C
Term 1: 9
Term 2: 8
Term 3: 12
Term 4: 123
Term 5: 2
Term 6: 3
Term 7: 4
Term 8: 2
Term 9: 1
Term 10: 23
Term 11: 4
Term 12: 21
Term 13: 123
Term 30: 12
Term 31: 3
Term 32: 324
Term 33: 234
Term 34: 4
Term 35: 353
Term 36: 2134
amal@macbook ~ %
```