

OPERATING SYSTEMS

Course Code : SWE3001

Slot : F2+TF2

Lab Assignment - 6

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Dinning Philosopher's problem using Semaphores / POSIX Pthreads library.

Code :

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

```
#include<unistd.h>
```

```
#include<pthread.h>
```

```
#include<semaphore.h>
```

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

```
sem_t chopsticks[5];
```

```
void * trying();
```

```
int main()
```

```
{
```

```
    int i;
```

```
    pthread_t philosopher[5];
```

```
    for(i=0;i<5;i++)

    sem_init(&chopsticks[i],0,1);

    for(i=0;i<5;i++)

    {

        pthread_create(&philosopher[i],NULL,trying,&i);

        sleep(1);

    }

    for(i=0;i<5;i++)

    {

        pthread_join(philosopher[i],NULL);

    }

    pthread_exit(0);

    return 0;

}

void * trying(void *k)

{

    int i;

    i=*(int *)k;

    while(1)

    {

        printf("\n Philosopher %d is thinking..",i);
```

```

sleep(rand()%10);

printf("\n Philosopher %d is hungry and planning to grab the
chopstick..",i);

sem_wait(&chopsticks[i]);

printf("\n Philosopher %d grabbed the chopstick %d..",i,(i+1)%5);

printf("\n Philosopher %d is eating..",i);

sleep(rand()%10);

sem_post(&chopsticks[i]);

printf("\n Philosopher %d released the chopstick %d..",i,i);

sem_post(&chopsticks[(i+1)%5]);

printf("\n Philosopher %d released the chopstick %d..",i,(i+1)%5);

}

}

```

Output :

```

1 #include<stdio.h>
2 #include<unistd.h>
3 #include<pthread.h>
4 #include<semaphore.h>
5 #include<stdlib.h>
6
7 sem_t chopsticks[5];
8 void * trying();
9
10 int main()
11 {
12     int i;
13     pthread_t philosopher[5];
14     for(i=0;i<5;i++)
15         sem_init(&chopsticks[i],0,1);
16     for(i=0;i<5;i++)
17     {
18         pthread_create(&philosopher[i],NULL,trying,&i);
19         sleep(1);
20     }
21     for(i=0;i<5;i++)
22     {
23         pthread_join(philosopher[i],NULL);
24     }
25     pthread_exit(0);
26     return 0;
27 }
28 void * trying(void *k)
29 {
30     int i;
31     int *(&i)=k;
32     while(1)
33     {
34         printf("\n Philosopher %d is thinking..",i);
35         sleep(rand()%10);
36         printf("\n Philosopher %d is hungry and planning to grab the chopstick..",i);
37         sem_wait(&chopsticks[i]);
38         printf("\n Philosopher %d grabbed the chopstick %d..",i,(i+1)%5);
39         printf("\n Philosopher %d is eating..",i);
40         sleep(rand()%10);
41         sem_post(&chopsticks[i]);
42         printf("\n Philosopher %d released the chopstick %d..",i,i);
43         sem_post(&chopsticks[(i+1)%5]);
44         printf("\n Philosopher %d released the chopstick %d..",i,(i+1)%5);
45     }
46 }

```

```

deepan2001@ubuntu:~/Desktop/Lab$ gcc stx.c -lpthread
deepan2001@ubuntu:~/Desktop/Lab$ ./a.out
Philosopher 0 is thinking..
Philosopher 1 is thinking..
Philosopher 2 is thinking..
Philosopher 0 is hungry and planning to grab the chopstick..
Philosopher 0 grabbed the chopstick 1..
Philosopher 0 is eating..
Philosopher 3 is thinking..
Philosopher 4 is thinking..
Philosopher 3 is hungry and planning to grab the chopstick..
Philosopher 3 grabbed the chopstick 4..
Philosopher 3 is eating..
Philosopher 1 is hungry and planning to grab the chopstick..
Philosopher 1 grabbed the chopstick 2..
Philosopher 1 is eating..
Philosopher 0 released the chopstick 0..
Philosopher 0 released the chopstick 1..
Philosopher 0 is thinking..
Philosopher 2 is hungry and planning to grab the chopstick..
Philosopher 2 grabbed the chopstick 3..
Philosopher 2 is eating..
Philosopher 1 released the chopstick 1..
Philosopher 1 released the chopstick 2..
Philosopher 1 is thinking..
Philosopher 4 is hungry and planning to grab the chopstick..
Philosopher 4 grabbed the chopstick 0..
Philosopher 4 is eating..
Philosopher 2 released the chopstick 2..
Philosopher 2 released the chopstick 3..
Philosopher 2 is thinking..
Philosopher 2 is hungry and planning to grab the chopstick..
Philosopher 2 grabbed the chopstick 3..
Philosopher 2 is eating..
Philosopher 1 is hungry and planning to grab the chopstick..
Philosopher 1 grabbed the chopstick 2..
Philosopher 1 is eating..
Philosopher 3 released the chopstick 3..
Philosopher 3 released the chopstick 4..
Philosopher 3 is thinking..
Philosopher 1 released the chopstick 1..
Philosopher 1 released the chopstick 2..
Philosopher 1 is thinking..
Philosopher 1 is hungry and planning to grab the chopstick..
Philosopher 1 grabbed the chopstick 2..

```

```
Ubuntu 64-bit - VMware Workstation 16 Player (Non-commercial use only)
Player
Activities
Terminal
Apr 22 09:51
deepan2001@ubuntu: ~/Desktop/Lab

1 #include<stdio.h>
2 #include<unistd.h>
3 #include<pthread.h>
4 #include<semaphore.h>
5 #include<stdlib.h>
6
7 sem_t chopsticks[5];
8 void * trying();
9
10 int main()
11 {
12     int i;
13     pthread_t philosopher[5];
14     for(i=0;i<5;i++)
15     {
16         sem_init(&chopsticks[i],0,1);
17     }
18     pthread_create(&philosopher[i],NULL,trying,&i);
19     sleep(1);
20 }
21 for(i=0;i<5;i++)
22 {
23     pthread_join(philosopher[i],NULL);
24 }
25 pthread_exit(0);
26 return 0;
27 }
28 void * trying(void *k)
29 {
30     int i;
31     i=*(int *)k;
32     while(1)
33     {
34         printf("\n Philosopher %d is thinking..",i);
35         sleep(rand()%10);
36         printf("\n Philosopher %d is hungry and planning tograb the chopstick..",i);
37         sem_wait(&chopsticks[i]);
38         printf("\n Philosopher %d grabbed thechopstick %d..",i,(i+1)%5);
39         printf("\n Philosopher %d is eating..",i);
40         sleep(rand()%10);
41         sem_post(&chopsticks[i]);
42         printf("\n Philosopher %d released thechopstick %d..",i,(i+1)%5);
43         sem_post(&chopsticks[(i+1)%5]);
44         printf("\n Philosopher %d released thechopstick %d..",i,(i+1)%5);
45     }
46 }
```

```
Philosopher 2 is eating..
Philosopher 0 is hungry and planning tograb the chopstick..
Philosopher 0 grabbed thechopstick 1..
Philosopher 0 is eating..
Philosopher 1 released thechopstick 1..
Philosopher 1 grabbed thechopstick 2..
Philosopher 1 is thinking..
Philosopher 3 is hungry and planning tograb the chopstick..
Philosopher 3 grabbed thechopstick 4..
Philosopher 3 is eating..
Philosopher 2 released thechopstick 2..
Philosopher 2 grabbed thechopstick 3..
Philosopher 2 is thinking..
Philosopher 4 is hungry and planning tograb the chopstick..
Philosopher 4 grabbed thechopstick 0..
Philosopher 4 is eating..
Philosopher 0 released thechopstick 0..
Philosopher 0 grabbed thechopstick 1..
Philosopher 0 is thinking..
Philosopher 3 released thechopstick 3..
Philosopher 3 grabbed thechopstick 4..
Philosopher 3 is thinking..
Philosopher 1 is hungry and planning tograb the chopstick..
Philosopher 1 grabbed thechopstick 2..
Philosopher 1 is eating..
Philosopher 2 is hungry and planning tograb the chopstick..
Philosopher 2 grabbed thechopstick 3..
Philosopher 2 is eating..
Philosopher 0 is hungry and planning tograb the chopstick..
Philosopher 0 grabbed thechopstick 1..
Philosopher 0 is eating..
Philosopher 1 released thechopstick 1..
Philosopher 1 grabbed thechopstick 2..
Philosopher 1 is thinking..
Philosopher 0 released thechopstick 0..
Philosopher 0 grabbed thechopstick 1..
Philosopher 0 is thinking..
Philosopher 4 released thechopstick 4..
Philosopher 4 grabbed thechopstick 0..
Philosopher 4 is thinking..
Philosopher 2 released thechopstick 2..
Philosopher 2 grabbed thechopstick 3..
Philosopher 2 is thinking..
Philosopher 3 is hungry and planning tograb the chopstick..
Philosopher 3 grabbed thechopstick 4..
```