LAB 12 ASSIGNMENT

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1). WAP to implement solution of Sleeping Barber Problem.

CODE:

```
#include <pthread.h>
#include <semaphore.h>
#include <stdio.h>
#include <unistd.h>
#include <stdlib.h>
sem_t customers, barbers, mutex;
int waiting = 0;
const int chairs = 10;
void *barber()
{
      while (1)
      {
            sem_wait(&customers);
            sem_wait(&mutex);
            waiting--;
            sem_post(&barbers);
            sem_post(&mutex);
            puts("barber is cutting");
            printf("%d custmoers are in waiting\n", waiting);
            sleep(2);
      }
}
void *customer()
```

```
{
	sem_wait(&mutex);
	if (waiting < chairs)
	{
		waiting++;
		sem_post(&customers);
		sem_post(&mutex);
		sem_wait(&barbers);
		sleep(5);
	}
	else
	{
		sem_post(&mutex);
	}
}
int main()
{
	pthread_t barber_thread, customer_thread[3];
	sem_init(&customers, 0, 0);
	sem_init(&barbers, 0, 0);
	sem_init(&mutex, 0, 1);
	pthread_create(&barber_thread, NULL, barber, NULL);
	for (int i = 0; i < 10; i++)
	{
		pthread_create(&customer_thread[i], NULL, customer, NULL);
	}
	pthread_join(barber_thread, NULL);
	for (int i = 0; i < 10; i++)
	{
		pthread_join(customer_thread[i], NULL);
	}
	return 0;
}
```

OUTPUT:

```
birva@LAPTOP-TJ5CO14G:/mnt/c/Users/Admin/Documents/OS/LAB-12$ gcc task1.c -pthread
birva@LAPTOP-TJ5CO14G:/mnt/c/Users/Admin/Documents/OS/LAB-12$ ./a.out
barber is cutting
6 custmoers are in waiting
barber is cutting
8 custmoers are in waiting
barber is cutting
7 custmoers are in waiting
barber is cutting
6 custmoers are in waiting
barber is cutting
5 custmoers are in waiting
barber is cutting
4 custmoers are in waiting
barber is cutting
3 custmoers are in waiting
barber is cutting
2 custmoers are in waiting
barber is cutting
1 custmoers are in waiting
barber is cutting
0 custmoers are in waiting
```

2). WAP to implement solution of Dining Philosophers Problem.

CODE:

```
#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>
#include <semaphore.h>
#include <unistd.h>
sem_t chopstick[5];
void *philos(void *);
void eat(int);
int main()
{
	int i, n[5];
	pthread_t T[5];
	for (i = 0; i < 5; i++)
		sem_init(&chopstick[i], 0, 1);
	for (i = 0; i < 5; i++)
	{
		n[i] = i;
```

```
            pthread_create(&T[i], NULL, philos, (void *)&n[i]);
      }
      for (i = 0; i < 5; i++)
            pthread_join(T[i], NULL);
}
void *philos(void *n)
{
      int ph = *(int *)n;
      printf("Philosopher %d wants to eat\n", ph);
      printf("Philosopher %d tries to pick left chopstick\n", ph);
      sem_wait(&chopstick[ph]);
      printf("Philosopher %d picks the left chopstick\n", ph);
      printf("Philosopher %d tries to pick the right chopstick\n", ph);
      sem_wait(&chopstick[(ph + 1) % 5]);
      printf("Philosopher %d picks the right chopstick\n", ph);
      eat(ph);
      sleep(2);
      printf("Philosopher %d has finished eating\n", ph);
      sem_post(&chopstick[(ph + 1) % 5]);
      printf("Philosopher %d leaves the right chopstick\n", ph);
      sem_post(&chopstick[ph]);
      printf("Philosopher %d leaves the left chopstick\n", ph);
}
void eat(int ph)
{
      printf("Philosopher %d begins to eat\n", ph);
}
```

OUTPUT:

```
birva@LAPTOP-TJ5CO14G:/mnt/c/Users/Admin/Documents/OS/LAB-12$ gcc task2.c -pthread
birva@LAPTOP-TJ5CO14G:/mnt/c/Users/Admin/Documents/OS/LAB-12$ ./a.out
Philosopher 0 wants to eat
Philosopher 0 tries to pick left chopstick
Philosopher 0 picks the left chopstick
Philosopher 0 tries to pick the right chopstick
Philosopher 0 picks the right chopstick
Philosopher 0 begins to eat
Philosopher 2 wants to eat
Philosopher 2 tries to pick left chopstick
Philosopher 2 picks the left chopstick
Philosopher 2 tries to pick the right chopstick
Philosopher 2 picks the right chopstick
Philosopher 2 begins to eat
Philosopher 1 wants to eat
Philosopher 1 tries to pick left chopstick
Philosopher 4 wants to eat
Philosopher 4 tries to pick left chopstick
Philosopher 4 picks the left chopstick
Philosopher 4 tries to pick the right chopstick
Philosopher 3 wants to eat
Philosopher 3 tries to pick left chopstick
Philosopher 0 has finished eating
Philosopher 0 leaves the right chopstick
Philosopher 0 leaves the left chopstick
Philosopher 1 picks the left chopstick
Philosopher 1 tries to pick the right chopstick
Philosopher 4 picks the right chopstick
Philosopher 4 begins to eat
Philosopher 2 has finished eating
Philosopher 2 leaves the right chopstick
Philosopher 2 leaves the left chopstick
Philosopher 3 picks the left chopstick
Philosopher 3 tries to pick the right chopstick
Philosopher 1 picks the right chopstick
Philosopher 1 begins to eat
Philosopher 4 has finished eating
Philosopher 4 leaves the right chopstick
Philosopher 4 leaves the left chopstick
Philosopher 3 picks the right chopstick
Philosopher 3 begins to eat
Philosopher 1 has finished eating
Philosopher 1 leaves the right chopstick
Philosopher 1 leaves the left chopstick
Philosopher 3 has finished eating
Philosopher 3 leaves the right chopstick
Philosopher 3 leaves the left chopstick
birva@LAPTOP-TJ5CO14G:/mnt/c/Users/Admin/Documents/OS/LAB-12$
```