OS_LAB_11_Assignment

CE_054

Aim :- Study and implementation of Sleeping barber and Dining philosopher situations .

Code 1 :-

Slepping Barber

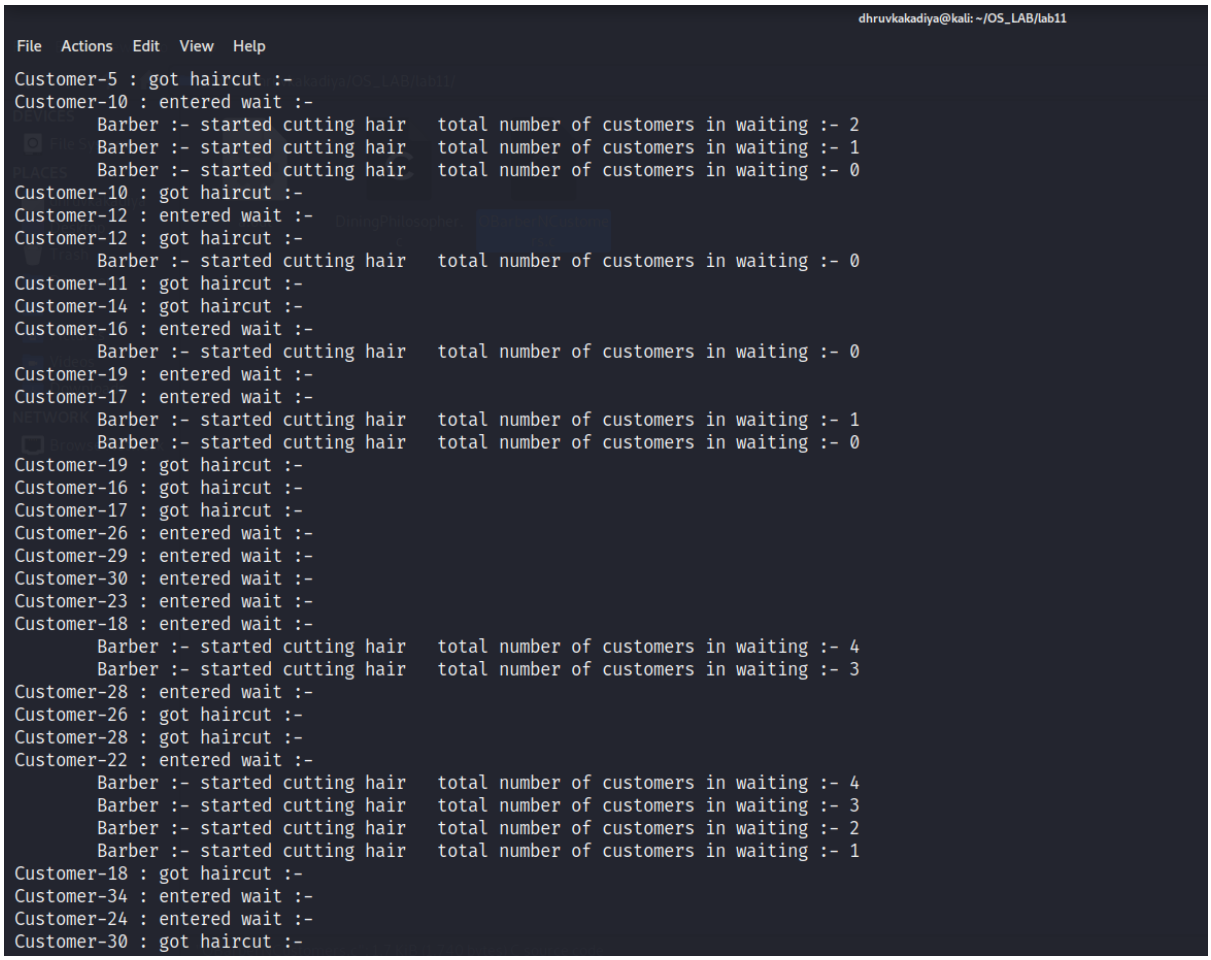
Code :-

```c
// Author : Dhruv B kakadiya
#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>
#include <semaphore.h>
#include <unistd.h>
#define NO_CUSTOMERS 1000
#define NO_BARBER 2
#define CAPACITY 5
sem_t sem_wait_count, sem_cust, sem_barb;
int waited_customer = 0;

void *Customer(void *arg)
{
    int * custId=(int *)arg;
    sem_wait(&sem_wait_count);
    if(waited_customer < CAPACITY)
    {
        waited_customer++;
        printf("Customer-%d : entered wait :- \n", *custId);
        sem_post(&sem_cust);
        sem_post(&sem_wait_count);
        sem_wait(&sem_barb);
        printf("Customer-%d : got haircut :-  \n", *custId);
    }
    else
    {
        sem_post(&sem_wait_count);
    }
}


void *Barber(void *arg)
{
    int waitingTemp = 0;
    while(1)
    {
```

```
        sem_wait(&sem_cust);
        sem_wait(&sem_wait_count);
        waited_customer--;
        waitingTemp=waited_customer;
        printf("\tBarber :-  started cutting hair \t total number of customers
 in waiting :- %d \n", waitingTemp);
        sem_post(&sem_barb);
        sem_post(&sem_wait_count);
    }
}

void main()
{
    int loop, cust_id[NO_CUSTOMERS];
    pthread_t barber_arr[NO_BARBER], customer_arr[NO_CUSTOMERS];
    sem_init(&sem_barb, 0, 0);
    sem_init(&sem_cust, 0, 0);
    sem_init(&sem_wait_count, 0, 1);

    for(loop = 0 ; loop < NO_BARBER ; loop++)
    {
        pthread_create(&barber_arr[loop], NULL,Barber, (void*)NULL);
    }
    for(loop = 0 ; loop < NO_CUSTOMERS ; loop++)
    {
        cust_id[loop] = loop + 1;
        pthread_create(&customer_arr[loop], NULL,Customer, (void*)&cust_id[loo
p]);
    }
    for(loop = 0 ; loop < NO_BARBER ; loop++)
    {
        pthread_join(barber_arr[loop], NULL);
    }
    for(loop = 0 ; loop < NO_CUSTOMERS ; loop++)
    {
        pthread_join(customer_arr[loop], NULL);
    }
}
```

Output :-

```
dhruvkakadiya@kali: ~/OS_LAB/lab11
File  Actions  Edit  View  Help
dhruvkakadiya@kali:~/OS_LAB/lab11$ gcc OBarberNCustomers.c -lpthread
dhruvkakadiya@kali:~/OS_LAB/lab11$ ./a.out
Customer-1 : entered wait :-
Customer-3 : entered wait :-
        Barber :- started cutting hair   total number of customers in waiting :- 1
        Barber :- started cutting hair   total number of customers in waiting :- 0
Customer-2 : entered wait :-
Customer-2 : got haircut :-
Customer-1 : got haircut :-
        Barber :- started cutting hair   total number of customers in waiting :- 0
Customer-3 : got haircut :-
Customer-6 : entered wait :-
        Barber :- started cutting hair   total number of customers in waiting :- 0
Customer-6 : got haircut :-
Customer-5 : entered wait :-
Customer-9 : entered wait :-
Customer-11 : entered wait :-
Customer-7 : entered wait :-
Customer-14 : entered wait :-
        Barber :- started cutting hair   total number of customers in waiting :- 4
        Barber :- started cutting hair   total number of customers in waiting :- 3
        Barber :- started cutting hair   total number of customers in waiting :- 2
        Barber :- started cutting hair   total number of customers in waiting :- 1
Customer-9 : got haircut :-
Customer-13 : entered wait :-
        Barber :- started cutting hair   total number of customers in waiting :- 1
Customer-15 : entered wait :-
Customer-13 : got haircut :-
Customer-15 : got haircut :-
        Barber :- started cutting hair   total number of customers in waiting :- 1
Customer-7 : got haircut :-
Customer-8 : entered wait :-
Customer-8 : got haircut :-
Customer-5 : got haircut :-
Customer-10 : entered wait :-
        Barber :- started cutting hair   total number of customers in waiting :- 2
        Barber :- started cutting hair   total number of customers in waiting :- 1
        Barber :- started cutting hair   total number of customers in waiting :- 0
Customer-10 : got haircut :-
```



Code 2 :-

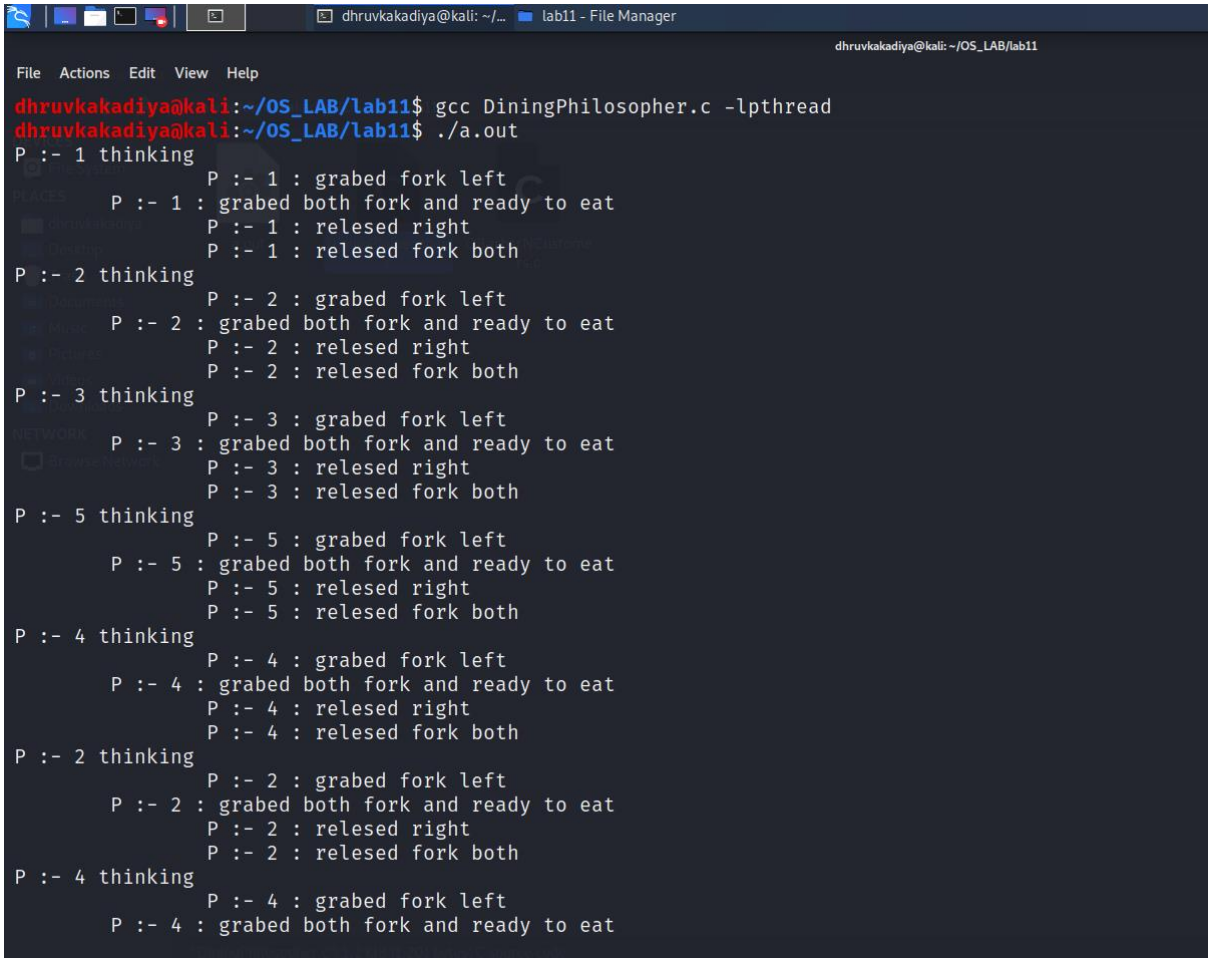
Priority -> Writer

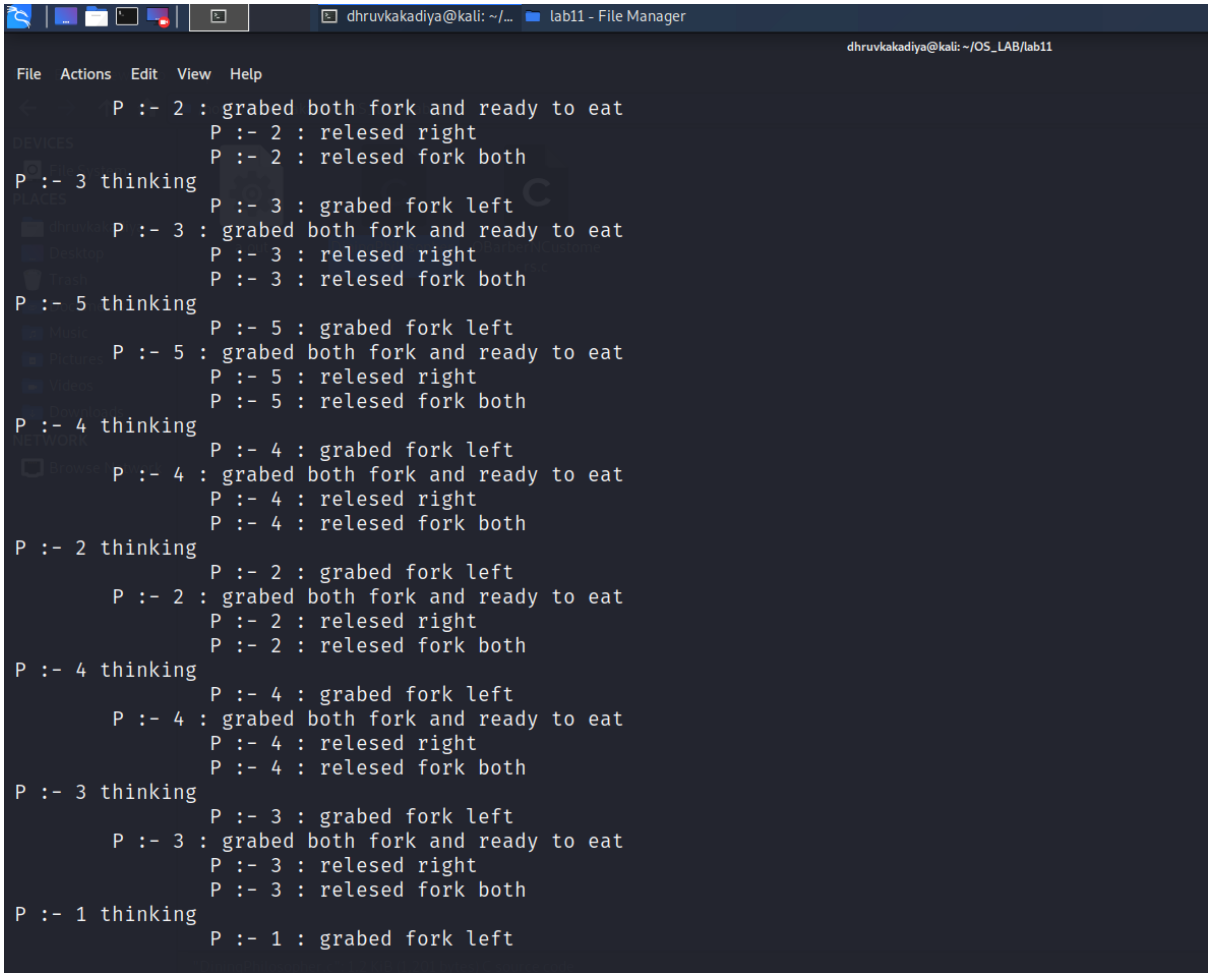
Code :-

```c
// Author : Dhruv B kakadiya
#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>
#include <semaphore.h>
#include <unistd.h>

#define ph_counter 5
sem_t sem_fork[ph_counter], sem_room;
```

```
void *Philosopher(void *arg)
{
    int *ph_id = (int *)arg;
    while(1)
    {
        sem_wait(&sem_room);
        printf("P :- %d thinking\n", *ph_id);
        sem_wait(&sem_fork[*ph_id - 1]);
        printf("\t\tP :- %d : grabed fork left\n", *ph_id);
        sem_wait(&sem_fork[(*ph_id)%ph_counter]);
        printf("\tP :- %d : grabed both fork and ready to eat\n", *ph_id);
        sem_post(&sem_fork[(*ph_id)%ph_counter]);
        printf("\t\tP :- %d : relesed right\n", *ph_id);
        sem_post(&sem_fork[*ph_id - 1]);
        printf("\t\tP :- %d : relesed fork both\n", *ph_id);
        sem_post(&sem_room);
        sleep(1);
    }
}

void main()
{
    pthread_t phi_thread[ph_counter];
    int loop, ph_id[ph_counter];
    sem_init(&sem_room,0, ph_counter-1);
    for(loop = 0 ; loop < ph_counter ; loop++)
    {
        sem_init(&sem_fork[loop], 0, 1);
    }
    for(loop = 0 ; loop < ph_counter ; loop++)
    {
        ph_id[loop] = loop + 1;
        pthread_create(&phi_thread[loop], NULL, Philosopher, (void*)&ph_id[loo
p]);
    }
    for(loop = 0 ; loop < ph_counter ; loop++)
    {
        pthread_join(phi_thread[loop], NULL);
    }
}
```

Output :-


dhruvkakadiya@kali: ~/...
lab11 - File Manager
dhruvkakadiya@kali: ~/OS_LAB/lab11
File Actions Edit View Help
dhruvkakadiya@kali:~/OS_LAB/lab11$ gcc DiningPhilosopher.c -lpthread
dhruvkakadiya@kali:~/OS_LAB/lab11$ ./a.out
P :- 1 thinking
P :- 1 : grabed fork left
P :- 1 : grabed both fork and ready to eat
P :- 1 : relesed right
P :- 1 : relesed fork both
P :- 2 thinking
P :- 2 : grabed fork left
P :- 2 : grabed both fork and ready to eat
P :- 2 : relesed right
P :- 2 : relesed fork both
P :- 3 thinking
P :- 3 : grabed fork left
P :- 3 : grabed both fork and ready to eat
P :- 3 : relesed right
P :- 3 : relesed fork both
P :- 5 thinking
P :- 5 : grabed fork left
P :- 5 : grabed both fork and ready to eat
P :- 5 : relesed right
P :- 5 : relesed fork both
P :- 4 thinking
P :- 4 : grabed fork left
P :- 4 : grabed both fork and ready to eat
P :- 4 : relesed right
P :- 4 : relesed fork both
P :- 2 thinking
P :- 2 : grabed fork left
P :- 2 : grabed both fork and ready to eat
P :- 2 : relesed right
P :- 2 : relesed fork both
P :- 4 thinking
P :- 4 : grabed fork left
P :- 4 : grabed both fork and ready to eat


dhruvkakadiya@kali: ~/...
lab11 - File Manager
dhruvkakadiya@kali: ~/OS_LAB/lab11
File Actions Edit View Help
P :- 2 : grabed both fork and ready to eat
P :- 2 : relesed right
P :- 2 : relesed fork both
P :- 3 thinking
P :- 3 : grabed fork left
P :- 3 : grabed both fork and ready to eat
P :- 3 : relesed right
P :- 3 : relesed fork both
P :- 5 thinking
P :- 5 : grabed fork left
P :- 5 : grabed both fork and ready to eat
P :- 5 : relesed right
P :- 5 : relesed fork both
P :- 4 thinking
P :- 4 : grabed fork left
P :- 4 : grabed both fork and ready to eat
P :- 4 : relesed right
P :- 4 : relesed fork both
P :- 2 thinking
P :- 2 : grabed fork left
P :- 2 : grabed both fork and ready to eat
P :- 2 : relesed right
P :- 2 : relesed fork both
P :- 4 thinking
P :- 4 : grabed fork left
P :- 4 : grabed both fork and ready to eat
P :- 4 : relesed right
P :- 4 : relesed fork both
P :- 3 thinking
P :- 3 : grabed fork left
P :- 3 : grabed both fork and ready to eat
P :- 3 : relesed right
P :- 3 : relesed fork both
P :- 1 thinking
P :- 1 : grabed fork left