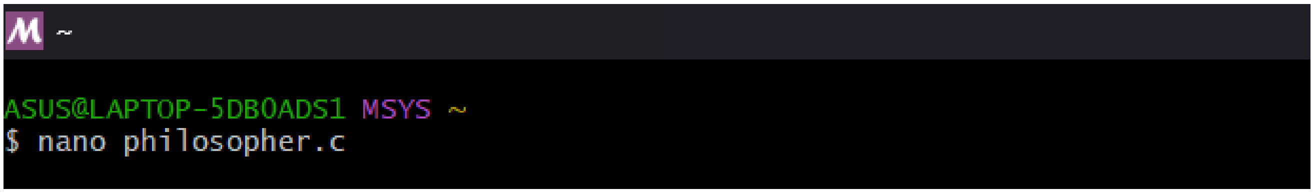
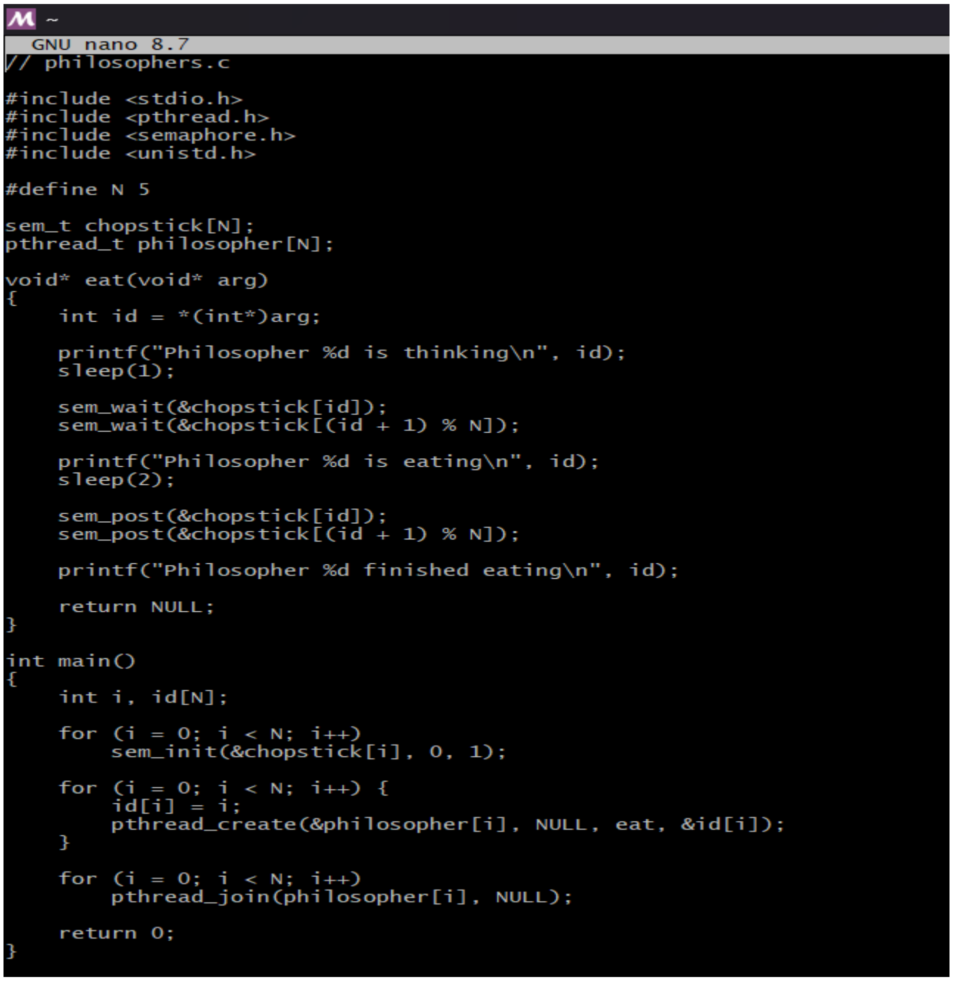
Practical 6

Aim: Considered there are N philosophers seated around a circular table with one chopstick between each pair of philosophers. There is one chopstick between each philosopher. A philosopher may eat if he can pick up the two chopsticks adjacent to him. One chopstick may be picked up by any one of its adjacent followers but not both. Write a program to solve the problem using process synchronization technique.

Code:

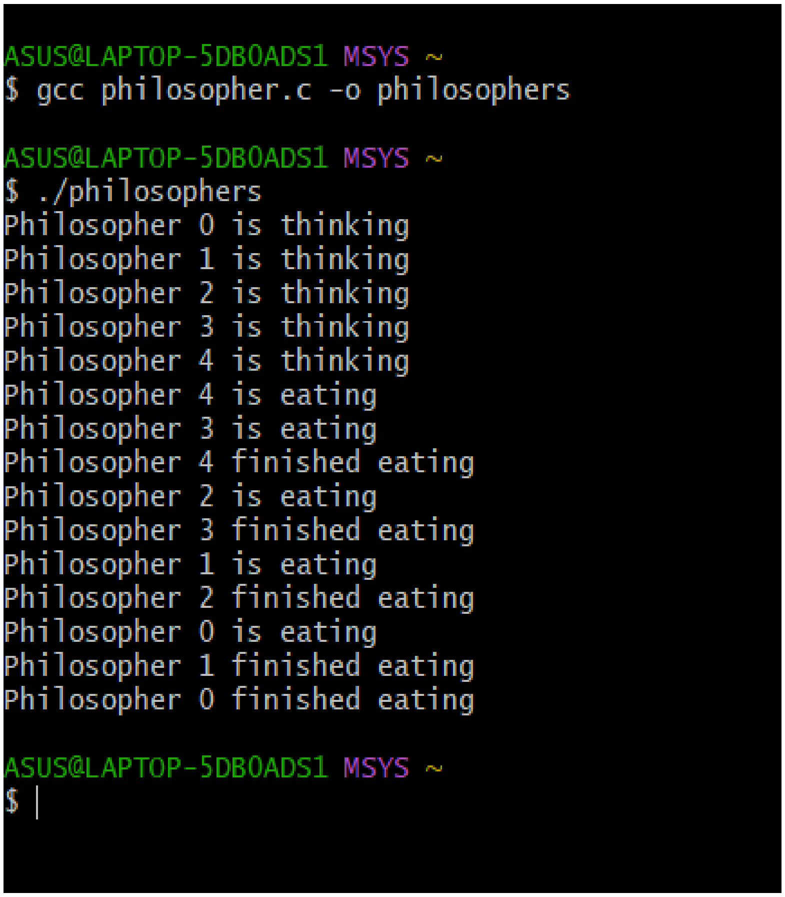


```
ASUS@LAPTOP-5DB0ADS1 MSYS ~
$ nano philosopher.c
```



```
  GNU nano 8.7
// philosophers.c

#include <stdio.h>
#include <pthread.h>
#include <semaphore.h>
#include <unistd.h>

#define N 5

sem_t chopstick[N];
pthread_t philosopher[N];

void* eat(void* arg)
{
    int id = *(int*)arg;

    printf("Philosopher %d is thinking\n", id);
    sleep(1);

    sem_wait(&chopstick[id]);
    sem_wait(&chopstick[(id + 1) % N]);

    printf("Philosopher %d is eating\n", id);
    sleep(2);

    sem_post(&chopstick[id]);
    sem_post(&chopstick[(id + 1) % N]);

    printf("Philosopher %d finished eating\n", id);

    return NULL;
}

int main()
{
    int i, id[N];

    for (i = 0; i < N; i++)
        sem_init(&chopstick[i], 0, 1);

    for (i = 0; i < N; i++) {
        id[i] = i;
        pthread_create(&philosopher[i], NULL, eat, &id[i]);
    }

    for (i = 0; i < N; i++)
        pthread_join(philosopher[i], NULL);

    return 0;
}
```

Output:



```
ASUS@LAPTOP-5DB0ADS1 MSYS ~
$ gcc philosopher.c -o philosophers

ASUS@LAPTOP-5DB0ADS1 MSYS ~
$ ./philosophers
Philosopher 0 is thinking
Philosopher 1 is thinking
Philosopher 2 is thinking
Philosopher 3 is thinking
Philosopher 4 is thinking
Philosopher 4 is eating
Philosopher 3 is eating
Philosopher 4 finished eating
Philosopher 2 is eating
Philosopher 3 finished eating
Philosopher 1 is eating
Philosopher 2 finished eating
Philosopher 0 is eating
Philosopher 1 finished eating
Philosopher 0 finished eating

ASUS@LAPTOP-5DB0ADS1 MSYS ~
$ 
```