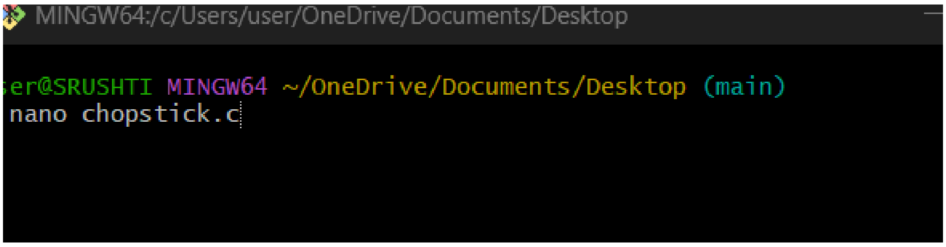
Practical 6: **Aim:** Considered there are N philosophers seated around a circular table with one chopstick between each pair of philosophers. There is one chopstick between each philosopher. A philosopher may eat if he can pick up the two chopsticks adjacent to him. One chopstick may be picked up by any one of its adjacent followers but not both.

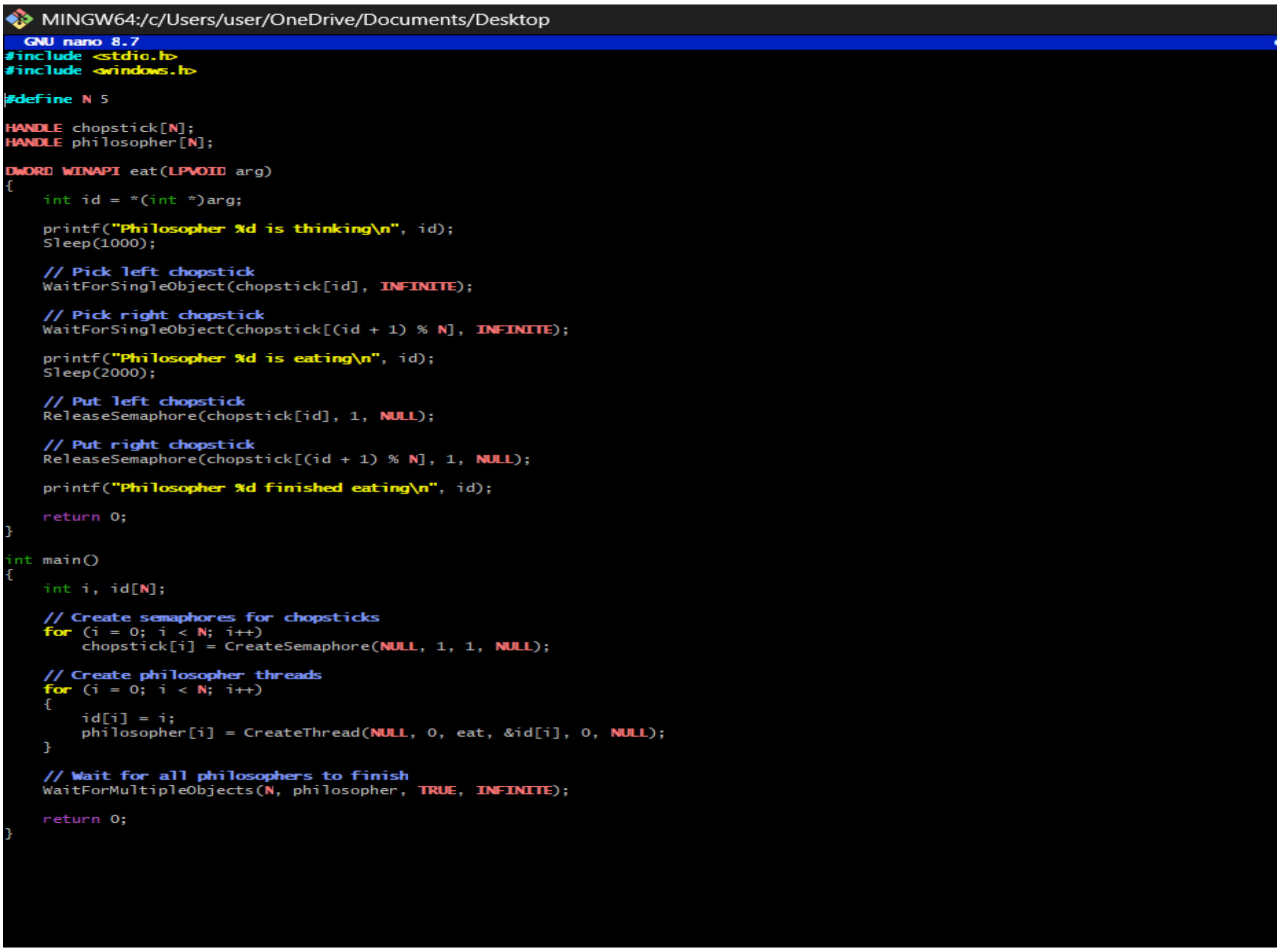
Write a program to solve the problem using process synchronization technique.

SOLUTION:



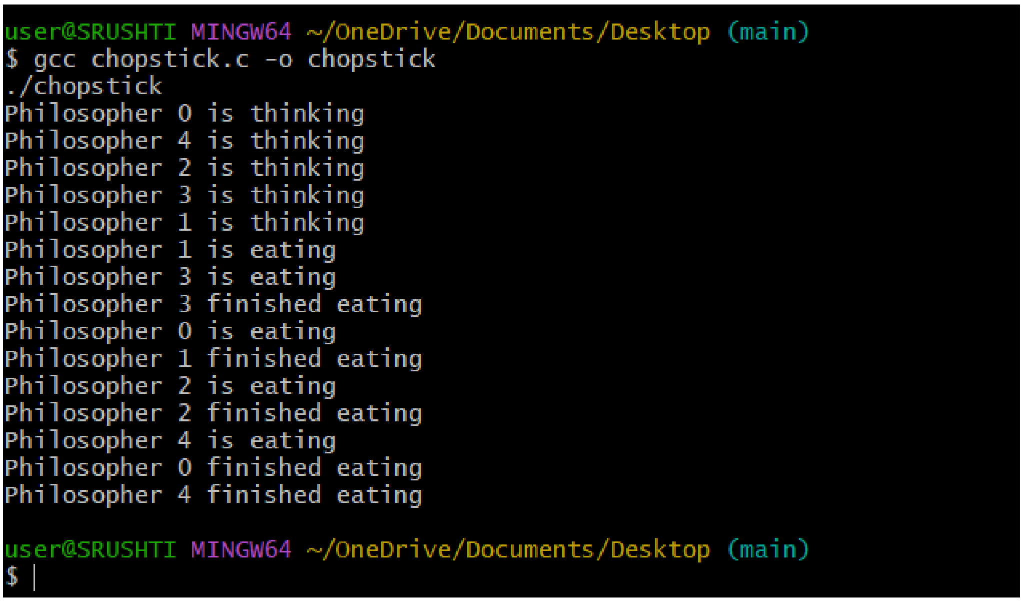
```
MINGW64:/c/Users/user/OneDrive/Documents/Desktop

er@SRUSHTI MINGW64 ~/OneDrive/Documents/Desktop (main)
 nano chopstick.c
```

Code:



```
MINGW64:/c/Users/user/OneDrive/Documents/Desktop
  GNU nano 8.7
#include <stdio.h>
#include <windows.h>

#define N 5

HANDLE chopstick[N];
HANDLE philosopher[N];

DWORD WINAPI eat(LPVOID arg)
{
    int id = *(int *)arg;

    printf("Philosopher %d is thinking\n", id);
    Sleep(1000);

    // Pick left chopstick
    WaitForSingleObject(chopstick[id], INFINITE);

    // Pick right chopstick
    WaitForSingleObject(chopstick[(id + 1) % N], INFINITE);

    printf("Philosopher %d is eating\n", id);
    Sleep(2000);

    // Put left chopstick
    ReleaseSemaphore(chopstick[id], 1, NULL);

    // Put right chopstick
    ReleaseSemaphore(chopstick[(id + 1) % N], 1, NULL);

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

    return 0;
}

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

    // Create semaphores for chopsticks
    for (i = 0; i < N; i++)
        chopstick[i] = CreateSemaphore(NULL, 1, 1, NULL);

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

    // Wait for all philosophers to finish
    WaitForMultipleObjects(N, philosopher, TRUE, INFINITE);

    return 0;
}
```

Output:



```
user@SRUSHTI MINGW64 ~/OneDrive/Documents/Desktop (main)
$ gcc chopstick.c -o chopstick
./chopstick
Philosopher 0 is thinking
Philosopher 4 is thinking
Philosopher 2 is thinking
Philosopher 3 is thinking
Philosopher 1 is thinking
Philosopher 1 is eating
Philosopher 3 is eating
Philosopher 3 finished eating
Philosopher 0 is eating
Philosopher 1 finished eating
Philosopher 2 is eating
Philosopher 2 finished eating
Philosopher 4 is eating
Philosopher 0 finished eating
Philosopher 4 finished eating

user@SRUSHTI MINGW64 ~/OneDrive/Documents/Desktop (main)
$ |
```