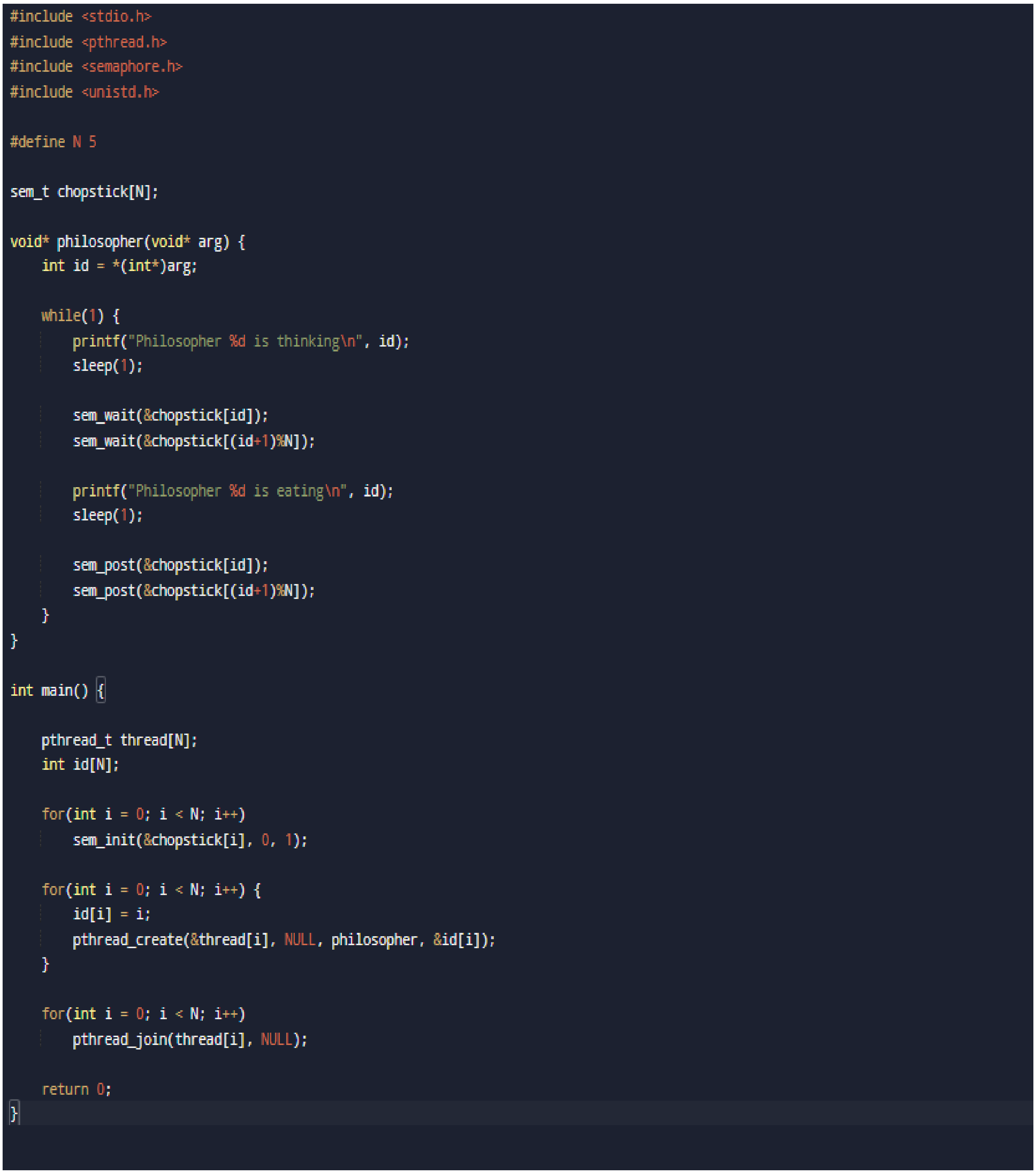
Consider there are N philosophers seated around a circular table with one chopstick between each pair of philosophers.

• Each philosopher needs two chopsticks to eat.
• A philosopher may eat only if he can pick up both adjacent chopsticks.
• One chopstick can be picked up by only one of its adjacent philosophers at a time (not both).

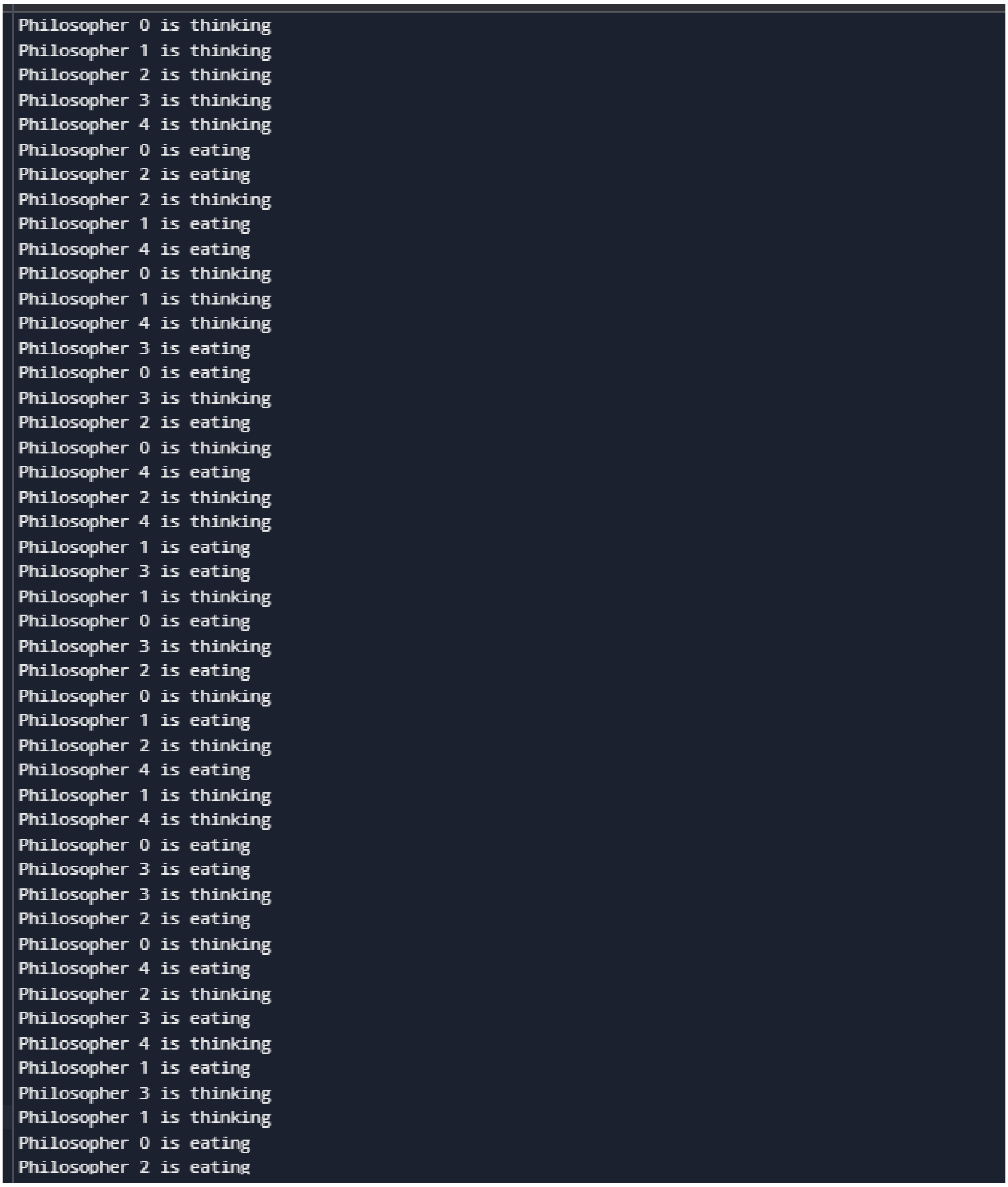
Write a program to solve the problem using process synchronization technique.

CODE:



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

#define N 5

sem_t chopstick[N];

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

    while(1) {
        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(1);

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

int main() {

    pthread_t thread[N];
    int id[N];

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

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

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

    return 0;
}
```

OUTPUT:



```
Philosopher 0 is thinking
Philosopher 1 is thinking
Philosopher 2 is thinking
Philosopher 3 is thinking
Philosopher 4 is thinking
Philosopher 0 is eating
Philosopher 2 is eating
Philosopher 2 is thinking
Philosopher 1 is eating
Philosopher 4 is eating
Philosopher 0 is thinking
Philosopher 1 is thinking
Philosopher 4 is thinking
Philosopher 3 is eating
Philosopher 0 is eating
Philosopher 3 is thinking
Philosopher 2 is eating
Philosopher 0 is thinking
Philosopher 4 is eating
Philosopher 2 is thinking
Philosopher 4 is thinking
Philosopher 1 is eating
Philosopher 3 is eating
Philosopher 1 is thinking
Philosopher 0 is eating
Philosopher 3 is thinking
Philosopher 2 is eating
Philosopher 0 is thinking
Philosopher 1 is eating
Philosopher 2 is thinking
Philosopher 4 is eating
Philosopher 1 is thinking
Philosopher 4 is thinking
Philosopher 0 is eating
Philosopher 3 is eating
Philosopher 3 is thinking
Philosopher 2 is eating
Philosopher 0 is thinking
Philosopher 4 is eating
Philosopher 2 is thinking
Philosopher 3 is eating
Philosopher 4 is thinking
Philosopher 1 is eating
Philosopher 3 is thinking
Philosopher 1 is thinking
Philosopher 0 is eating
Philosopher 2 is eating
```