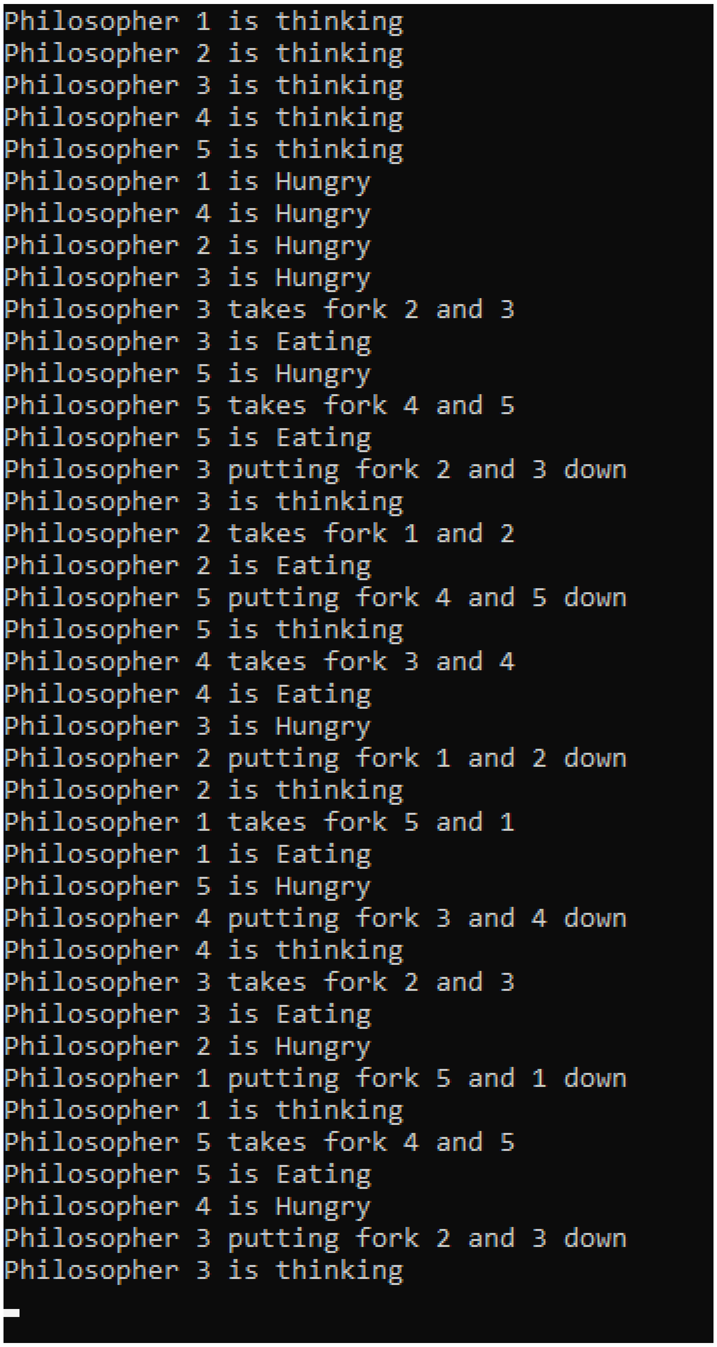
DINING PHILOSOPHER

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

#define N 5
#define THINKING 2
#define HUNGRY 1
#define EATING 0
#define LEFT (phnum + 4) % N
#define RIGHT (phnum + 1) % N

int state[N];
int phil[N] = { 0, 1, 2, 3, 4 };

sem_t mutex;
sem_t S[N];

void test(int phnum)
{
   if (state[phnum] == HUNGRY
      && state[LEFT] != EATING
      && state[RIGHT] != EATING) {
      state[phnum] = EATING;
      sleep(2);
      printf("Philosopher %d takes fork %d and %d\n",phnum + 1, LEFT + 1, phnum + 1);
      printf("Philosopher %d is Eating\n", phnum + 1);
      sem_post(&S[phnum]);
   }
}

void take_fork(int phnum)
{

   sem_wait(&mutex);
   state[phnum] = HUNGRY;
```

```
    printf("Philosopher %d is Hungry\n", phnum + 1);
    test(phnum);
    sem_post(&mutex);
    sem_wait(&S[phnum]);
    sleep(1);
}

void put_fork(int phnum)
{

    sem_wait(&mutex);
    state[phnum] = THINKING;
    printf("Philosopher %d putting fork %d and %d down\n",phnum + 1, LEFT + 1, phnum + 1);
    printf("Philosopher %d is thinking\n", phnum + 1);
    test(LEFT);
    test(RIGHT);
    sem_post(&mutex);
}

void* philosopher(void* num)
{

    while (1) {
        int* i = num;
        sleep(1);
        take_fork(*i);
        sleep(0);
        put_fork(*i);
    }
}

int main()
{

    int i;
    pthread_t thread_id[N];
    sem_init(&mutex, 0, 1);
        for (i = 0; i < N; i++)
        sem_init(&S[i], 0, 0);
    for (i = 0; i < N; i++) {
        pthread_create(&thread_id[i], NULL,philosopher, &phil[i]);
        printf("Philosopher %d is thinking\n", i + 1);
    }
    for (i = 0; i < N; i++)
        pthread_join(thread_id[i], NULL);
}
```

OUTPUT:



```
Philosopher 1 is thinking
Philosopher 2 is thinking
Philosopher 3 is thinking
Philosopher 4 is thinking
Philosopher 5 is thinking
Philosopher 1 is Hungry
Philosopher 4 is Hungry
Philosopher 2 is Hungry
Philosopher 3 is Hungry
Philosopher 3 takes fork 2 and 3
Philosopher 3 is Eating
Philosopher 5 is Hungry
Philosopher 5 takes fork 4 and 5
Philosopher 5 is Eating
Philosopher 3 putting fork 2 and 3 down
Philosopher 3 is thinking
Philosopher 2 takes fork 1 and 2
Philosopher 2 is Eating
Philosopher 5 putting fork 4 and 5 down
Philosopher 5 is thinking
Philosopher 4 takes fork 3 and 4
Philosopher 4 is Eating
Philosopher 3 is Hungry
Philosopher 2 putting fork 1 and 2 down
Philosopher 2 is thinking
Philosopher 1 takes fork 5 and 1
Philosopher 1 is Eating
Philosopher 5 is Hungry
Philosopher 4 putting fork 3 and 4 down
Philosopher 4 is thinking
Philosopher 3 takes fork 2 and 3
Philosopher 3 is Eating
Philosopher 2 is Hungry
Philosopher 1 putting fork 5 and 1 down
Philosopher 1 is thinking
Philosopher 5 takes fork 4 and 5
Philosopher 5 is Eating
Philosopher 4 is Hungry
Philosopher 3 putting fork 2 and 3 down
Philosopher 3 is thinking
```