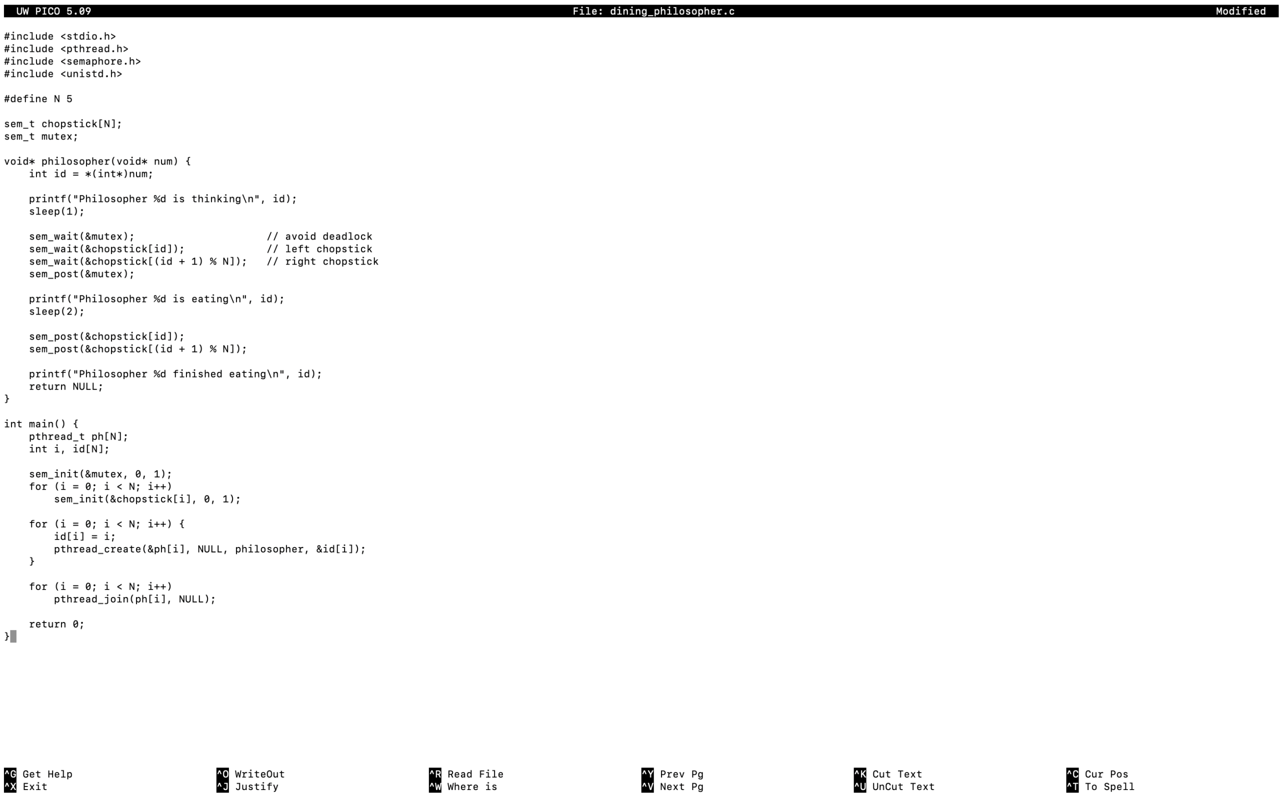
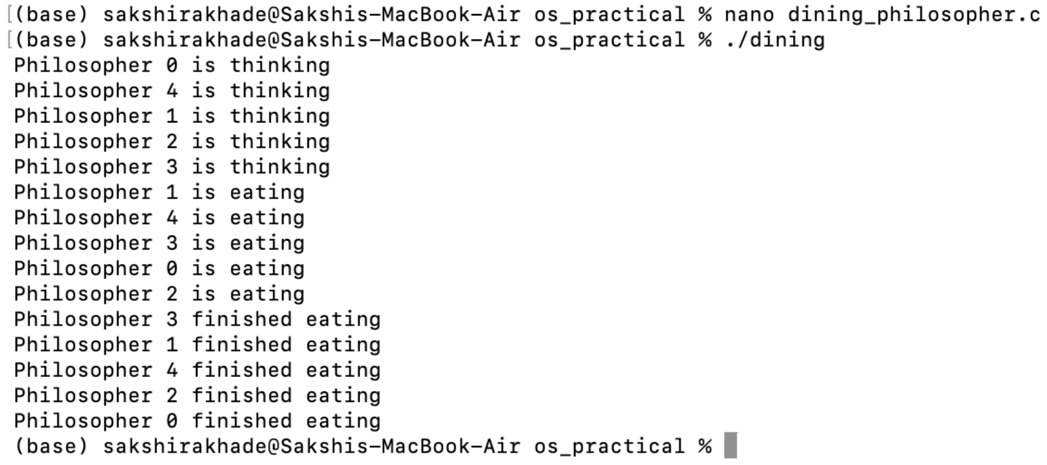
PRACTICAL 6

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 philosophers but not both.
Write a program to solve the Dining Philosopher Problem using process synchronization techniques.



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

#define N 5

sem_t chopstick[N];
sem_t mutex;

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

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

    sem_wait(&mutex);                    // avoid deadlock
    sem_wait(&chopstick[id]);            // left chopstick
    sem_wait(&chopstick[(id + 1) % N]);   // right chopstick
    sem_post(&mutex);

    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() {
    pthread_t ph[N];
    int i, id[N];

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

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

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

    return 0;
}
```



```
[(base) sakshirakhade@Sakshis-MacBook-Air os_practical % nano dining_philosopher.c
[(base) sakshirakhade@Sakshis-MacBook-Air os_practical % ./dining
 Philosopher 0 is thinking
 Philosopher 4 is thinking
 Philosopher 1 is thinking
 Philosopher 2 is thinking
 Philosopher 3 is thinking
 Philosopher 1 is eating
 Philosopher 4 is eating
 Philosopher 3 is eating
 Philosopher 0 is eating
 Philosopher 2 is eating
 Philosopher 3 finished eating
 Philosopher 1 finished eating
 Philosopher 4 finished eating
 Philosopher 2 finished eating
 Philosopher 0 finished eating
 (base) sakshirakhade@Sakshis-MacBook-Air os_practical %
```