Design a C program to simulate the concept of Dining-Philosophers problem

#include <stdio.h>

#include <pthread.h>

#include <semaphore.h>

#include <unistd.h>

#define N 5

sem\_t forks[N];

pthread\_t philosophers[N];

int ids[N];

void\* philosopher(void\* num) {

int id = *(int*)num;

int left = id;

int right = (id + 1) % N;

for (int i = 0; i < 3; i++) { // Simulate 3 cycles

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

sleep(1);

sem\_wait(&forks[left]);

sem\_wait(&forks[right]);

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

sleep(2);

sem\_post(&forks[left]);

sem\_post(&forks[right]);

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

sleep(1);

}

return NULL;

}

int main() {

for (int i = 0; i < N; i++) {

sem\_init(&forks[i], 0, 1);

ids[i] = i;

}

for (int i = 0; i < N; i++) {

pthread\_create(&philosophers[i], NULL, philosopher, &ids[i]);

}

for (int i = 0; i < N; i++) {

pthread\_join(philosophers[i], NULL);

}

for (int i = 0; i < N; i++) {

sem\_destroy(&forks[i]);

}

printf("Simulation completed.\n");

return 0;

}