#include <stdio.h>

#include <stdlib.h>

#include <pthread.h>

#include <semaphore.h>

#include <unistd.h>

#define NUM\_PHILOSOPHERS 5

sem\_t forks[NUM\_PHILOSOPHERS];

int i;

void\* philosopher(void\* num)

{

int id = \*(int\*)num;

int left\_fork = id;

int right\_fork = (id + 1) % NUM\_PHILOSOPHERS;

for (i = 0; i < 3; i++)

{

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

sleep(rand() % 2);

sem\_wait(&forks[left\_fork]);

printf("Philosopher %d picked up left fork %d.\n", id, left\_fork);

sem\_wait(&forks[right\_fork]);

printf("Philosopher %d picked up right fork %d.\n", id, right\_fork);

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

sleep(rand() % 2);

sem\_post(&forks[right\_fork]);

printf("Philosopher %d put down right fork %d.\n", id, right\_fork);

sem\_post(&forks[left\_fork]);

printf("Philosopher %d put down left fork %d.\n", id, left\_fork);

}

return NULL;

}

int main()

{

pthread\_t philosophers[NUM\_PHILOSOPHERS];

int philosopher\_ids[NUM\_PHILOSOPHERS];

for (i = 0; i < NUM\_PHILOSOPHERS; i++)

{

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

}

for (i = 0; i < NUM\_PHILOSOPHERS; i++)

{

philosopher\_ids[i] = i;

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

}

for (i = 0; i < NUM\_PHILOSOPHERS; i++)

{

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

}

for (i = 0; i < NUM\_PHILOSOPHERS; i++)

{

sem\_destroy(&forks[i]);

}

return 0;

}

'''

Philosopher 1 is thinking.

Philosopher 3 is thinking.

Philosopher 3 picked up left fork 3.

Philosopher 3 picked up right fork 4.

Philosopher 3 is eating.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 2 is thinking.

Philosopher 1 is thinking.

Philosopher 0 is thinking.

Philosopher 1 picked up left fork 1.

Philosopher 1 picked up right fork 2.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is eating.

Philosopher 1 put down right fork 2.

Philosopher 1 put down left fork 1.

Philosopher 1 is thinking.

Philosopher 0 picked up left fork 0.

Philosopher 1 is thinking.

Philosopher 0 picked up right fork 1.

Philosopher 0 is eating.

Philosopher 1 is thinking.

Philosopher 2 is thinking.

Philosopher 2 picked up left fork 2.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 2 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 2 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 2 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 2 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 2 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 2 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 2 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 1 is thinking.

Philosopher 3 put down right fork 4.

Philosopher 3 put down left fork 3.

Philosopher 3 is thinking.

Philosopher 2 picked up right fork 3.

Philosopher 2 is eating.

Philosopher 2 put down right fork 3.

Philosopher 2 put down left fork 2.

Philosopher 2 is thinking.

Philosopher 2 picked up left fork 2.

Philosopher 2 picked up right fork 3.

Philosopher 2 is eating.

Philosopher 0 put down right fork 1.

Philosopher 0 put down left fork 0.

Philosopher 1 picked up left fork 1.

'''