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/*Laboratorio de Computacao Distribuida
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Exercicio: Corrida de Threads com Sincronizacao*/

#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>
#include <semaphore.h>
#include <unistd.h>
#include <time.h>

#define NUM_RUNNERS 5
int position = 1;
sem_t semaphore;

void* corredor(void* arg) {
    int id = *(int*)arg;
    int time = (rand() % 5) + 1;

    printf("Runner %d started with the time: %d\n", id, time);

    sleep(time);
    sem_wait(&semaphore);

    int arrivalPosition = position;
    position++;
    printf("Runner %d finished in %d° place!\n", id, arrivalPosition);

    sem_post(&semaphore);

    pthread_exit(NULL);
}

int main(int argc, char const *argv[])
{
    pthread_t threads[NUM_RUNNERS];
    int thread_ids[NUM_RUNNERS] = {1,2,3,4,5};
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    srand(time(NULL));

    if (sem_init(&semaphore, 0, 1) != 0) {
        fprintf(stderr, "semaphoreaphore start error\n");
        return 1;
    }

    printf("Run started!\n");

    for(int i = 0; i < NUM_RUNNERS; i++){
        if(pthread_create(&threads[i], NULL, corredor, (void*)
&thread_ids[i])){
            fprintf(stderr, "Unable to create thread %d\n", i+1);
            return 1;
        }
    }

    for(int j=0; j<NUM_RUNNERS; j++){
        pthread_join(threads[j], NULL);
    }

    sem_destroy(&semaphore);

    printf("Finish RUN\n");
    return 0;
}
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joprieto@PC-Joca:/mnt/c/WSL/CompDist$ ls
first first.exe hello helloWorld.c runner runner.c semaphore.c semaphore.exe thread1.c thread1.exe
joprieto@PC-Joca:/mnt/c/WSL/CompDist$ gcc runner.c -o ex
joprieto@PC-Joca:/mnt/c/WSL/CompDist$ ./ex
Run started!
Runner 1 started with the time: 4
Runner 2 started with the time: 2
Runner 3 started with the time: 4
Runner 4 started with the time: 1
Runner 5 started with the time: 4
Runner 4 finished in 1º place!
Runner 2 finished in 2º place!
Runner 3 finished in 3º place!
Runner 1 finished in 4º place!
Runner 5 finished in 5º place!
Finish RUN
joprieto@PC-Joca:/mnt/c/WSL/CompDist$ ./ex
Run started!
Runner 1 started with the time: 5
Runner 2 started with the time: 1
Runner 4 started with the time: 1
Runner 5 started with the time: 4
Runner 3 started with the time: 5
Runner 4 finished in 1º place!
Runner 2 finished in 2º place!
Runner 5 finished in 3º place!
Runner 1 finished in 4º place!
Runner 3 finished in 5º place!
Finish RUN

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joprieto@PC-Joca:/mnt/c/WSL/CompDist$ ./ex
Run started!
Runner 1 started with the time: 2
Runner 3 started with the time: 2
Runner 2 started with the time: 2
Runner 4 started with the time: 2
Runner 5 started with the time: 2
Runner 2 finished in 1º place!
Runner 1 finished in 2º place!
Runner 4 finished in 3º place!
Runner 3 finished in 4º place!
Runner 5 finished in 5º place!
Finish RUN
joprieto@PC-Joca:/mnt/c/WSL/CompDist$ ./ex
Run started!
Runner 1 started with the time: 1
Runner 2 started with the time: 4
Runner 3 started with the time: 4
Runner 4 started with the time: 2
Runner 5 started with the time: 1
Runner 1 finished in 1º place!
Runner 5 finished in 2º place!
Runner 4 finished in 3º place!
Runner 3 finished in 4º place!
Runner 2 finished in 5º place!
Finish RUN
joprieto@PC-Joca:/mnt/c/WSL/CompDist$ █

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