SYSTEM PROGRAMMING

HOMEWORK 4

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1 THE MAIN THREAD

the program starts with parsing the command line , it checks if it is valid or not and returns the names of the given input files then it opens the input files and checks if the have opened successfully . After that it checks if the homework input file is valid or not , if not it prints an error message and then terminates the program . After that it starts reading the students input file and store them in an array with their information (speed , price and quality) . Then it initializes the semaphores and creates the other threads . then in a loop , it first checks if the termination signal has arrived or if the homework queue is empty and the homework file is already closed , if so it terminates all the other threads , frees all the memory blocks and terminates the program . If not , the main thread unlocks the critical region (reading and writing into the homework queue)(mutex1) then it waits until one thread start doing the previous homework (homeworkTakensem) then checks if there are any homeworks in the queue(sem1) , after that it reads one homework from the queue and places it in a global variable , then it calls find student function to decide which student must do the homework . IF find student function returns (-1) it means that the money left is not enough so the main thread terminates the program, otherwise it waits until there is at least one student not working (student-finished semaphore).

2 H THREAD

IT reads the given file until it reaches the end of the file or until the money amount is not enough , it locks the region before adding to the queue , then it posts (sem1) semaphore to notify the main thread that at least there is one homework in the queue

3 STUDENTS TO HIRE THREADS

It gets the students array as an argument , as each student has his own semaphore , it waits until the main thread notify him(posts his semaphore) to start doing

the homework , it checks if exit is '1' or not , if so it exits if not it sets the flag to '1' (means that its busy) ,posts (homework-taken)semaphore to tell the main thread that another homework can be posted to be done ,then goes to sleep after waking up it notify the main thread that he is not working and can start doing another homework if available .