

SYSTEMS PROGRAMMING

HOMEWORK 1

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1-)understanding the problem

In this assignment, we are asked to write operations such as opening a new file, adding students and their grades, sorting students by grade or name, to the file using system commands such as read, write, open, close, wait. We will write in the log file that it was successful.

2-)File Sturcture

Make file

```
all: compile run

compile:
    gcc hw1.c

run:
    ./a.out

clean:
    rm -f *.out *.txt

clean2:
    rm -f *.log
```

.TXT

These are files created by the user themselves.

.LOG

It is the output of the program, such as error or success.

.C

It is the file containing the functions and main code.

It consists of only a single c file

Coding Approach

Library

<sys/types.h>: Contains constants and data types defining system types.

<sys/stat.h>: Provides macros to determine file status (permissions, size, date, etc.) and file type (regular file, directory, symbolic link, etc.).

<fcntl.h>: Offers macros, constants, and functions for file control operations (open, close, lock, etc.).

<sys/wait.h>: Contains functions to wait for the termination of child processes and obtain their exit status.

Read ,write and open operations

These operations(system call) in C are used to read from and write to files and to open files for reading, writing, or both, respectively.

When I read from the file with read, I created a buffer for each line and cleared the buffer when the line was finished.

```
memset(buffer, 0, sizeof(buffer)); clear buffer.
```

I used lseek to go to the beginning of the file

```
lseek(fd, 0, SEEK_SET);
```

Split input

I used the following line of code to separate quotes in input

```
sscanf(input, "%s \"%^[^\" ]\" \"%^[^\" ]\" \"%^[^\" ]\" ", command,  
name, grade, fileName)
```

Functions

I used bubble sort to sort students.

I used strcmp to check whether the name comes before or after.

```

int compare_grade(StudentGrade a, StudentGrade b) {
    return strcmp(a.grade, b.grade);
}

int compare_name(StudentGrade a, StudentGrade b) {
    return strcmp(a.name, b.name);
}

// Bubble Sort fonksiyonu
void bubblesort(StudentGrade* array, int n, char* command) {
    int i, j;
    StudentGrade temp;
    for (i = 0; i < n - 1; i++) {
        for (j = 0; j < n - i - 1; j++) {
            if (strcmp(command, "name") == 0) {
                if (compare_name(array[j], array[j + 1]) > 0) {
                    temp = array[j];
                    array[j] = array[j + 1];
                    array[j + 1] = temp;
                }
            }
            else if (strcmp(command, "grade") == 0) {
                if (compare_grade(array[j], array[j + 1]) > 0) {
                    temp = array[j];
                    array[j] = array[j + 1];
                    array[j + 1] = temp;
                }
            }
        }
    }
}

```

Handling Memory

I used the free function to avoid running out of memory and getting memory error

Input and Outputs

correct input

```
root@DESKTOP-A7RVC4K:/mnt/c/Users/feridun/Desktop/gtu/Syste programng# make
gcc hw1.c
./a.out
enter q for exit
Enter command and student information gtuStudentGrades
gtuStudentGrades "filename" : Lists student grades from the specified 'filename' file.
addStudentGrade "Name Surname" "Grade" "filename": Adds the specified 'Name Surname' and 'Grade' information to the file.
searchStudent "Name Surname" "filename": Searches for the specified 'Name Surname' student in the file and displays their information if found.
sortAll "filename" : Sorts the student grades in the file (by name or grade) and rewrites it to the file.
showAll "filename" : Lists all student grades from the file.
listGrades "filename" : Lists student grades from the file.
listSome "numofEntries" "pageNumber" "filename" : Lists student grades from the file using the specified number of entries and page number.
Enter command and student information gtuStudentGrades "grades.txt"
Enter command and student information addStudentGrade "Ali Veli" "AA" "grades.txt"
Student grade added successfully.
Enter command and student information addStudentGrade "Ayşe Yılmaz" "BB" "grades.txt"
Student grade added successfully.
Enter command and student information addStudentGrade "Mehmet Can" "FF" "grades.txt"
Student grade added successfully.
Enter command and student information addStudentGrade "Zeynep Güneş" "DD" "grades.txt"
Student grade added successfully.
Enter command and student information addStudentGrade "Emre Çelik" "CC" "grades.txt"
Student grade added successfully.
Enter command and student information addStudentGrade "Deniz Demir" "BA" "grades.txt"
Student grade added successfully.
Enter command and student information searchStudent "Emre Çelik" "grades.txt"
Student found:
Name: Emre Çelik
Grade: CC
Enter command and student information listGrades "grades.txt"
1.Grade: AA
2.Grade: BB
3.Grade: FF
4.Grade: DD
5.Grade: CC
```

```
Enter command and student information showAll "grades.txt"
Ali Veli   AA
Ayşe Yılmaz BB
Mehmet Can  FF
Zeynep Güneş DD
Emre Çelik  CC
Deniz Demir BA
Enter command and student information sortAll "grades.txt"
Sort by (name/grade): name
Sort in (asc/desc)ending order: asc
Student grades sorted and written back to the file.
Enter command and student information showAll "grades.txt"
Ali Veli   AA
Ayşe Yılmaz BB
Deniz Demir BA
Emre Çelik  CC
Mehmet Can  FF
Zeynep Güneş DD
```

```
Enter command and student information listSome "2" "2" "grades.txt"
Name: Deniz Demir Grade: BA
Name: Emre Çelik Grade: CC
```


Wrong input

```

root@DESKTOP-A7RVC4K:/mnt/c/Users/feridun/Desktop/gtu/Syste programng# make
gcc hw1.c
./a.out
enter q for exit
Enter command and student information reqreqrq
Error: Invalid command
Enter command and student information addStudentGrade "Ali ahmet" "ss" "grades.txt"
Error: Invalid grade format
Enter command and student information addStudentGrade "Ali ahmet" "ss" "new.txt"
Error: Unable to open file
Enter command and student information addStudentGrade "Ali ahmet" "AA" "grades.txt"
Student grade added successfully.
Enter command and student information showAll "grades.txt"
Ali Veli    AA
Ayşe Yılmaz BB
Deniz Demir BA
Emre Çelik  CC
Mehmet Can  FF
Zeynep Güneş DD
Ali ahmet   AA
Enter command and student information showAll "graewqeq.txt"
Enter command and student information showPicture "grades.txt"
Error: Invalid command
Enter command and student information sortAll "grades.txt"
Sort by (name/grade): name
Sort in (asc/desc)ending order: rq
Error: Invalid sorting order
Enter command and student information q
exited terminalEnter command and student information q
exited terminalmake: *** [makefile:7: run] Error 1
root@DESKTOP-A7RVC4K:/mnt/c/Users/feridun/Desktop/gtü/Syste programng# make
gcc hw1.c
./a.out
enter q for exit
Enter command and student information sortAll "grades.txt"
Sort by (name/grade): name
Sort in (asc/desc)ending order: req
Error: Invalid sorting order
Enter command and student information q
exited terminalmake: *** [makefile:7: run] Error 1
root@DESKTOP-A7RVC4K:/mnt/c/Users/feridun/Desktop/gtü/Syste programng# make

```

Log file

 log_file - Not Defteri

Dosya Düzen Biçim Görünüm Yardım

Creat_file log_file.log

reqreqrq

Error: Invalid command or missing command part

addStudentGrade grades.txt Error: Invalid grade format

addStudentGrade new.txt Error: Unable to open file

addStudentGrade grades.txt Ali ahmet,AA

Student grade added successfully.

showAll grades.txt

Student successfully show.

Error: Unable to open file

showPicture

Error: Invalid command or missing command part

sortAll grades.txt

Error: Invalid sorting order

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