

CSE344 Homework1 Report

Akif Safa Angi-200104004079

1-) Problem Definition and My Solution Approach

The problem was to develop a student grade management system in C programming language. This system should facilitate the management of student grades stored in a file. Users should be able to perform various operations such as adding new student grades, searching students, sorting students in the file, and displaying students.

SIGINT Handling

I assigned a handler for the SIGINT signal. This handler only sets a sigint flag to 1. I check this flag in various places of the program and if I see it as 1, depending on the function i unlock the file, close the file, freeing memory if needed and terminate the process.

Input Handling

Later, I took input from the user and divided it into tokens. After determining the command the user wanted to perform based on the first token, I checked whether the required number of parameters was entered for this command and whether the parameters were correct.

Child Process Handling

Afterwards, I create a child process with fork() and call the necessary function for this command in the child process according to the given command. If there is any interrupt or error in the function, I terminate the child process with exit. If the function has successfully completed the file and other operations, I end the child process with EXIT_SUCCESS.

In addition, since there is a possibility that more than one process can process the same file at the same time, I lock the file with fcntl in that child process before processing a file. After the child process finishes the process with the file or encounters any error or interrupt, I open the file again with fcntl.

After the last input is received, the main process waits for all child processes to finish using waitpid().

2-) System Requirements

1-) Program just requires one command line and it's the name of the program.

2-) Inputs to be written in the program should be written without the " sign, for example command name surname filename.

You can run the program with ./main command after compiling it using the makefile. The makefile also includes an run command. It can be used by using "make run" command.

Also "make clean" remove the all files except main.c and makefile.

3-) The Parts I Have Completed

I have completed all the requirements of the homework and tested in various ways.

4-) Tests

The commands i tested:

- 1-) gtuStudentGrades
- 2-) gtuStudentGrades grades.txt
- 3-) addStudentGrade Akif Angi AA grades.txt
- 4-) addStudentGrade Safa Angi CB grades.txt
- 5-) addStudentGrade Abc Asd DD grades.txt
- 6-) addStudentGrade James Gonzalez CC grades.txt
- 7-) addStudentGrade Matthew Moore AA grades.txt
- 8-) addStudentGrade James Sanchez BB grades.txt
- 9-) addStudentGrade Patricia Robinson BA grades.txt
- 10-) addStudentGrade Karen Taylor AA grades.txt
- 11-) addStudentGrade Matthew Lee FF grades.txt
- 12-) addStudentGrade Akif Safa DD grades.txt
- 13-) searchStudent Matthew Lee grades.txt
- 14-) searchStudent Deneme Abc grades.txt
- 15-) sortAll name -a grades.txt
- 16-) sortAll name -d grades.txt
- 17-) sortAll grade -a grades.txt
- 18-) showAll grades.txt
- 19-) listGrades grades.txt
- 20-) listSome 3 2 grades.txt
- 21-) abc grades.txt
- 22-) exit

Screenshot of all commands executed in program

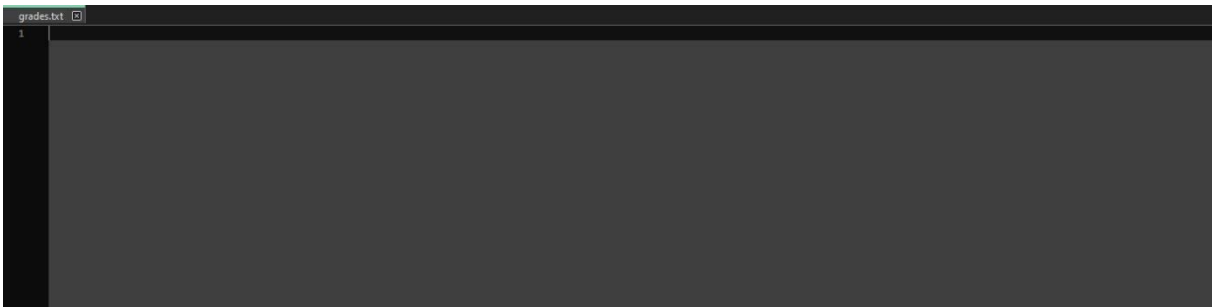
```
gtuStudentGrades
Usage: <command>
Commands:
1. gtuStudentGrades <filename>
2. addStudentGrade <name> <surname> <grade> <filename>
3. searchStudent <name> <surname> <filename>
4. sortAll <sort-type> <which-order> <filename>
5. showAll <filename>
6. listGrades <filename>
7. listSome <numofEntries> <pageNumber> <filename>
gtuStudentGrades grades.txt
addStudentGrade Akif Angi AA grades.txt
addStudentGrade Safa Angi CB grades.txt
addStudentGrade Abc Asd DD grades.txt
addStudentGrade James Gonzalez CC grades.txt
addStudentGrade Matthew Moore AA grades.txt
addStudentGrade James Sanches BB grades.txt
addStudentGrade Patricia Robinson BA grades.txt
addStudentGrade Karen Taylor AA grades.txt
addStudentGrade Matthew Lee FF grades.txt
addStudentGrade Akif Safa DD grades.txt
searchStudent Matthew Lee grades.txt
Matthew Lee, FF
searchStudent Deneme Abc grades.txt
Student doesn't exist
sortAll name -a grades.txt
Abc Asd, DD
Akif Angi, AA
Akif Safa, DD
James Gonzalez, CC
James Sanches, BB
Karen Taylor, AA
Matthew Lee, FF
Matthew Moore, AA
Patricia Robinson, BA
Safa Angi, CB
sortAll name -d grades.txt
Safa Angi, CB
Patricia Robinson, BA
Matthew Moore, AA
Matthew Lee, FF
Karen Taylor, AA
James Sanches, BB
James Gonzalez, CC
Akif Safa, DD
Akif Angi, AA
Abc Asd, DD
```

```
sortAll grade -a grades.txt
Akif Angi, AA
Matthew Moore, AA
Karen Taylor, AA
Patricia Robinson, BA
James Sanches, BB
Safa Angi, CB
James Gonzalez, CC
Abc Asd, DD
Akif Safa, DD
Matthew Lee, FF
showAll grades.txt
Akif Angi, AA
Safa Angi, CB
Abc Asd, DD
James Gonzalez, CC
Matthew Moore, AA
James Sanches, BB
Patricia Robinson, BA
Karen Taylor, AA
Matthew Lee, FF
Akif Safa, DD
listGrades grades.txt
Akif Angi, AA
Safa Angi, CB
Abc Asd, DD
James Gonzalez, CC
Matthew Moore, AA
listSome 3 2 grades.txt
James Gonzalez, CC
Matthew Moore, AA
James Sanches, BB
abc grades.txt
Invalid command: abc
exit
```

1-) gtuStudentGrades, prints the commands of the program.

```
gtuStudentGrades
Usage: <command>
Commands:
1. gtuStudentGrades <filename>
2. addStudentGrade <name> <surname> <grade> <filename>
3. searchStudent <name> <surname> <filename>
4. sortAll <sort-type> <which-order> <filename>
5. showAll <filename>
6. listGrades <filename>
7. listSome <numofEntries> <pageNumber> <filename>
```

2-) gtuStudentGrades grades.txt, it creates a file with the name given in the command.



3-) addStudentGrade Akif Angi AA grades.txt, adds the student whose name and surname are entered to the grades.txt.

```
1 Akif Angi, AA
2
```

4-) addStudentGrade Safa Angi CB grades.txt, adds the student whose name and surname are entered to the grades.txt.

```
1 Akif Angi, AA
2 Safa Angi, CB
3
```

5-) addStudentGrade Abc Asd DD grades.txt, adds the student whose name and surname are entered to the grades.txt.

```
1 Akif Angi, AA
2 Safa Angi, CB
3 Abc Asd, DD
4
```

6-) addStudentGrade James Gonzalez CC grades.txt, adds the student whose name and surname are entered to the grades.txt.

```
1 Akif Angi, AA
2 Safa Angi, CB
3 Abc Asd, DD
4 James Gonzalez, CC
5
```

7-) addStudentGrade Matthew Moore AA grades.txt, adds the student whose name and surname are entered to the grades.txt.

```
1 Akif Angi, AA
2 Safa Angi, CB
3 Abc Asd, DD
4 James Gonzalez, CC
5 Matthew Moore, AA
6
```

8-) addStudentGrade James Sanchez BB grades.txt, adds the student whose name and surname are entered to the grades.txt.

```
1 Akif Angi, AA
2 Safa Angi, CB
3 Abc Asd, DD
4 James Gonzalez, CC
5 Matthew Moore, AA
6 James Sanches, BB
7
```

9-) addStudentGrade Patricia Robinson BA grades.txt, adds the student whose name and surname are entered to the grades.txt.

```
1 Akif Angi, AA
2 Safa Angi, CB
3 Abc Asd, DD
4 James Gonzalez, CC
5 Matthew Moore, AA
6 James Sanches, BB
7 Patricia Robinson, BA
8
```

10-) addStudentGrade Karen Taylor AA grades.txt, adds the student whose name and surname are entered to the grades.txt.

```
1 Akif Angi, AA
2 Safa Angi, CB
3 Abc Asd, DD
4 James Gonzalez, CC
5 Matthew Moore, AA
6 James Sanches, BB
7 Patricia Robinson, BA
8 Karen Taylor, AA
9
```

11-) addStudentGrade Matthew Lee FF grades.txt, adds the student whose name and surname are entered to the grades.txt.

```
1 Akif Angi, AA
2 Safa Angi, CB
3 Abc Asd, DD
4 James Gonzalez, CC
5 Matthew Moore, AA
6 James Sanches, BB
7 Patricia Robinson, BA
8 Karen Taylor, AA
9 Matthew Lee, FF
10
```

12-) addStudentGrade Akif Safa DD grades.txt, adds the student whose name and surname are entered to the grades.txt.

```
1 Akif Angi, AA
2 Safa Angi, CB
3 Abc Asd, DD
4 James Gonzalez, CC
5 Matthew Moore, AA
6 James Sanches, BB
7 Patricia Robinson, BA
8 Karen Taylor, AA
9 Matthew Lee, FF
10 Akif Safa, DD
11
```

13-) searchStudent Matthew Lee grades.txt, searches for the student whose name and surname are entered in the grades.txt. Searched for exist student.

```
searchStudent Matthew Lee grades.txt
Matthew Lee, FF
```

14-) searchStudent Deneme Abc grades.txt, searches for the student whose name and surname are entered in the grades.txt. Searched for non-exist student.

```
searchStudent Deneme Abc grades.txt
Student doesn't exist
```

15-) sortAll name -a grades.txt, it sorts the information in the grades.txt by name and prints it in ascending order.

```
sortAll name -a grades.txt
Abc Asd, DD
Akif Angi, AA
Akif Safa, DD
James Gonzalez, CC
James Sanches, BB
Karen Taylor, AA
Matthew Lee, FF
Matthew Moore, AA
Patricia Robinson, BA
Safa Angi, CB
```

16-) sortAll name -d grades.txt, it sorts the information in the grades.txt by name and prints it in descending order.

```
sortAll name -d grades.txt
Safa Angi, CB
Patricia Robinson, BA
Matthew Moore, AA
Matthew Lee, FF
Karen Taylor, AA
James Sanches, BB
James Gonzalez, CC
Akif Safa, DD
Akif Angi, AA
Abc Asd, DD
```

17-) sortAll grade -a grades.txt, it sorts the information in the grades.txt by grade and prints it in ascending order.

```
sortAll grade -a grades.txt
Akif Angi, AA
Matthew Moore, AA
Karen Taylor, AA
Patricia Robinson, BA
James Sanches, BB
Safa Angi, CB
James Gonzalez, CC
Abc Asd, DD
Akif Safa, DD
Matthew Lee, FF
```

18-) showAll grades.txt, lists all entries in grades.txt.

```
showAll grades.txt
Akif Angi, AA
Safa Angi, CB
Abc Asd, DD
James Gonzalez, CC
Matthew Moore, AA
James Sanches, BB
Patricia Robinson, BA
Karen Taylor, AA
Matthew Lee, FF
Akif Safa, DD
```

19-) listGrades grades.txt, lists first 5 entries in grades.txt.

```
listGrades grades.txt
Akif Angi, AA
Safa Angi, CB
Abc Asd, DD
James Gonzalez, CC
Matthew Moore, AA
```

20-) listSome 3 2 grades.txt, lists entries between 3rd and 6th in grades.txt.

```
listSome 3 2 grades.txt
James Gonzalez, CC
Matthew Moore, AA
James Sanches, BB
```

21-) abc grades.txt, it prints warning about wrong command.

```
abc grades.txt
Invalid command: abc
```

22-) exit, terminates the program.

The Log File

```
Fri Mar 22 13:49:29 2024 - gtuStudentGrades command executed. Commands that can be used are printed
Fri Mar 22 13:49:36 2024 - gtuStudentGrades command executed to create a file. grades.txt file has created succesfully
Fri Mar 22 13:49:57 2024 - Student has been succesfully added. Student -> Akif Angi, AA
Fri Mar 22 13:50:04 2024 - Student has been succesfully added. Student -> Safa Angi, CB
Fri Mar 22 13:50:10 2024 - Student has been succesfully added. Student -> Abc Asd, DD
Fri Mar 22 13:50:18 2024 - Student has been succesfully added. Student -> James Gonzalez, CC
Fri Mar 22 13:50:25 2024 - Student has been succesfully added. Student -> Matthew Moore, AA
Fri Mar 22 13:50:34 2024 - Student has been succesfully added. Student -> James Sanches, BB
Fri Mar 22 13:50:42 2024 - Student has been succesfully added. Student -> Patricia Robinson, BA
Fri Mar 22 13:50:49 2024 - Student has been succesfully added. Student -> Karen Taylor, AA
Fri Mar 22 13:50:59 2024 - Student has been succesfully added. Student -> Matthew Lee, FF
Fri Mar 22 13:51:05 2024 - Student has been succesfully added. Student -> Akif Safa, DD
Fri Mar 22 13:51:33 2024 - searchStudent executed. Student has found. Student -> Matthew Lee, FF
Fri Mar 22 13:51:40 2024 - searchStudent executed. Student couldn't find.
Fri Mar 22 13:51:44 2024 - All students sorted and printed according to sort type -> name, order type -> -a
Fri Mar 22 13:51:49 2024 - All students sorted and printed according to sort type -> name, order type -> -d
Fri Mar 22 13:51:54 2024 - All students sorted and printed according to sort type -> grade, order type -> -a
Fri Mar 22 13:52:08 2024 - All students listed
Fri Mar 22 13:52:14 2024 - First 5 entries listed
Fri Mar 22 13:52:23 2024 - Listed 3 entries in page 2
```