CSE-344 SYSTEM PROGRRAMING

SPRING 2024

HOMEWORK 1

REPORT

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gtuStudentGrades (to list commands which exist) command:

```
Enter command: gtuStudentGrades

gtuStudentGrades
(1)
-Without arguments it displays all commands.
Example Usage: gtuStudentGrades
(2)
-With file name parameter if the file is not exist, it creates file.
Example Usage: gtuStudentGrades "grades.txt"

addStudentGrade
-It adds students name, surname and grade to the file.
Example Usage: addStudentGrade "Name Surname" "AA" "grades.txt"

searchStudent
-By entering student name, student and grade can be shown, if it is exist.
Example Usage: searchStudent "Name Surname" "grades.txt"

sortAll
-It sorts  by student name or grade in ascendng or descendng order.
Example Usage: sortAll "gradest.txt"

showAll
-It display all the student with grades.
Example Usage: showAll "grades.txt"

lstGrades
-It displays first 5 students with grades.
Example Usage: lstGrades "grades.txt"

lstSome
-It displays the students withs grades which are between arguments.
Example Usage: lstSome 5 2 "grades.txt"
Example: lstSome 5 2 "grades.txt" command will list entries between 5th and 10th.
Enter command: 
```

gtuStudentGrades (to create file if it is not exist) command:

```
Enter command: gtuStudentGrades grades.txt
File is opened successfully!
Enter command: 
```

addStudentGrade (to add student's name, surname and grade to the file) command:

1-) With correct parameters, it adds student's name, surname and grade to the specified file.

2-) Without file name, it tries to run command, but it gets error because of file name is not exist as parameter.

3-) With correct parameters, , it adds student's two names, surname and grade to the specified file.

4-) With non-existent file, it tries to run command but it gets error because of file's itself is not exist.

5-) It tries to run command with missing arguments.

6-) Wrong command name.

```
Enter command: addStudentGrade Onur Atasever AA grades.txt
Student and grade is added to the file.
Enter command: addStudentGrade Mehmet Burak Bozdağ BA
Error is occured while file is opening
Enter command: addStudentGrade Mehmet Burak Bozdağ DD grades.txt
Student and grade is added to the file.
Enter command: addStudentGrade Onur Atasever CC noFile.txt
Error is occured while file is opening
Enter command: addStudentGrade Onur AA grades.txt
Missing arguments!
Enter command: addstudentgrade Onur Atasever AA grades.txt
Command not found!
Enter command:
```

Adds more student and grade.

```
Enter command: addStudentGrade Ali Küçük CC grades.txt
Student and grade is added to the file.
Enter command: addStudentGrade Ahmet Hamza Şiyak BA grades.txt
Student and grade is added to the file.
Enter command: addStudentGrade Emre Güleç FF grades.txt
Student and grade is added to the file.
Enter command: addStudentGrade Beyza Acar CB grades.txt
Student and grade is added to the file.
Enter command: []
```

This is the grades.txt file:

```
grades.txt
1    Onur Atasever AA
2    Mehmet Burak Bozdağ DD
3    Ali Küçük CC
4    Ahmet Hamza Şiyak BA
5    Emre Güleç FF
6    Beyza Acar CB
7    |
```

searchStudent (it finds according to full name) command:

! To run this command, command supposed to be at least 4 arguments. (command name, name, surname, file name).

1-) With correct parameters and full name it runs command and it gets student's full name and grade.

2-) It tries to run the command without full name and it gets error.

3-) To fix previous error wit runs command with correct parameters and full name and it gets student's full name and grade.

4-) It tries to run with missing arguments. (number of arguments is smaller than 4)

5-) It tries to run with missing arguments. (number of arguments is smaller than 4)

6-) It enters empty command and it gets command not found error.

7-) It tries to reach non-existent file and it gets error.

```
Enter command: searchStudent Onur Atasever grades.txt
Onur Atasever AA
Enter command: searchStudent Ahmet Hamza grades.txt
Student was not found!
Enter command: searchStudent Ahmet Hamza Şiyak grades.txt
Ahmet Hamza Şiyak BA
Enter command: searchStudent Beyza Acar
Missing arguments!
Enter command: searchStudent Beyza grades.txt
Missing arguments!
Enter command:
Command not found!
Enter command: searchStudent Beyza Acar noFile.txt
Error is occured while file is opening
Enter command:
```

sortAll (it sorts according to options) command:

! To run this command, command supposed to be 2 arguments. (command name, file name).

1-) It tries to run command with non- existent file and it gets error.

2-) It tries to run command without file name

3-) It tries to run command more than 2 arguments.

4-) Wrong command name.

```
Enter command: sortAll noFile.txt
Error is occured while file is opening
Enter command: sortAll
Missing arguments!
Enter command: sortAll grades.txt sort
Too many arguments!
Enter command: sortall grades.txt
Command not found!
```

5-) It sort according to student full name in ascending order.

```
Enter command: sortAll grades.txt

------------------ Sort Options ------------------
1. Sort according to student full name in ascending order
2. Sort according to student full name in descending order
3. Sort according to student grade in ascending order
4. Sort according to student grade in descending order

To select, enter the option number!
1
Ahmet Hamza Şiyak BA
Ali Küçük CC
Beyza Acar CB
Emre Güleç FF
Mehmet Burak Bozdağ DD
Onur Atasever AA
```

6-) It sorts according to student full name in descending order.

```
Enter command: sortAll grades.txt

------------------ Sort Options ------------------
1. Sort according to student full name in ascending order
2. Sort according to student full name in descending order
3. Sort according to student grade in ascending order
4. Sort according to student grade in descending order

To select, enter the option number!
2
Onur Atasever AA
Mehmet Burak Bozdağ DD
Emre Güleç FF
Beyza Acar CB
Ali Küçük CC
Ahmet Hamza Şiyak BA
```

7-) It sorts according to student grade in ascending (AA is greater than FF. It is not according to ascii values it depends on real life) order.

```
Enter command: sortAll grades.txt

------------------ Sort Options ------------------
1. Sort according to student full name in ascending order
2. Sort according to student full name in descending order
3. Sort according to student grade in ascending order
4. Sort according to student grade in descending order

To select, enter the option number!
3
Emre Güleç FF
Mehmet Burak Bozdağ DD
Ali Küçük CC
Beyza Acar CB
Ahmet Hamza Şiyak BA
Onur Atasever AA
```

8-) It sorts according to student grade in descending order.

```
Enter command: sortAll grades.txt

------------------ Sort Options ------------------
1. Sort according to student full name in ascending order
2. Sort according to student full name in descending order
3. Sort according to student grade in ascending order
4. Sort according to student grade in descending order

To select, enter the option number!
4
Onur Atasever AA
Ahmet Hamza Şiyak BA
Beyza Acar CB
Ali Küçük CC
Mehmet Burak Bozdağ DD
Emre Güleç FF
```

showAll (it prints all the students from file) command:

! To run this command, command supposed to be 2 arguments. (command name, file name).

1-) It tries to run the command without file name and it gets error.

2-) It tries to run the command with non-existent file name and it gets error.

3-) It tries to run the command with more then 2 arguments and it gets error.

4-) It run command correctly and it shows all the students.

```
Enter command: showAll
File Name is necessary!
Enter command: showAll noFile.txt
Error is occured while file is opening
Enter command: showAll grades.txt extra
Too many arguments!
Enter command: showAll grades.txt
Onur Atasever AA
Mehmet Burak Bozdağ DD
Ali Küçük CC
Ahmet Hamza Şiyak BA
Emre Güleç FF
Beyza Acar CB
Enter command: []
```

lstGrades (it shows first 5 student from file) command:

! To run this command, command supposed to be 2 arguments. (command name, file name).

1-) Wrong command name.

2-) It tries to run the command without file name (number of arguments are smaller than 2) and it gets error.

3-) It tries to run the command with non-existent file name and it gets error.

4-) It tries to run the command with more than 2 arguments and it gets error.

5-) It tries to run the command correctly and it shows first 5 students from the specified file.

```
Enter command: lstGrade
Command not found!
Enter command: lstGrades
File Name is necessary!
Enter command: lstGrades noFile.txt
Error is occured while file is opening
Enter command: lstGrades grades.txt extraArgument
Too many arguments!
Enter command: lstGrades grades.txt
Onur Atasever AA
Mehmet Burak Bozdağ DD
Ali Küçük CC
Ahmet Hamza Şiyak BA
Emre Güleç FF
Enter command:
```

lstSome (It prints the students according to given parameters) command:

! To run this command, command supposed to be 4 arguments. (command name, number of entries, page number, file name).

1-) It tries to run the command with 1 argument, it gets error.

2-) It tries to run the command with 2 argument, it gets error.

3-) It tries to run command with non-existent file name and it gets error.

4-) Wrong command name.

5-) It runs the command with 5 entries and first page and it gets first 5 students.

6-) It runs the command with 5 entries and second page and it tries to get first 5 students but since there is only 1 student, it prints 1 student.

7-) It tries to run the command with 5 entries and third page but there is not any student so it does not print any student.

```
Enter command: lstSome
Please try like: "lstSome 'numofEntries' 'pageNumber' 'grades.txt'"
Enter command: lstSome noFile.txt
Please try like: "lstSome 'numofEntries' 'pageNumber' 'grades.txt'"
Enter command: lstSome 5 1 noFile.txt
Error is occured while file is opening
Enter command: lst some 5 grades.txt
Command not found!
Enter command: lstSome 5 1 grades.txt
Onur Atasever AA
Mehmet Burak Bozdağ DD
Ali Küçük CC
Ahmet Hamza Şiyak BA
Emre Güleç FF
Enter command: lstSome 5 2 grades.txt
Beyza Acar CB
Enter command: lstSome 5 3 grades.txt
Enter command: █
```

In this homework for each file operation, new process is created by using fork() system call. When the file operation is done, the result of the operation is logged to the log file and created process is terminated.

For each file operation system calls are used. To open the file, open() is used; to read from the file, read() is used; to write to the file, write() is used.

Log file examples:

```
grades.txt named file is opened!
grades.txt: People sorted by student grades in ascending order
grades.txt named file is closed!
grades.txt named file is opened!
grades.txt: People sorted by student grades in descending order
grades.txt named file is closed!
showAll: Missing arguments, File name is required!
noFile.txt: Error opening file, possibly null returned!
showAll: too many arguments!
grades.txt named file is opened!
grades.txt: All students were showed.
grades.txt named file is closed!
1stGrade command not found!
1stGrades: Missing arguments, File name is required!
noFile.txt: Error opening file, possibly null returned!
1stGrades: too many arguments!
grades.txt named file is opened!
grades.txt: First 5 students were showed.
grades.txt named file is closed!
1stSome: Wrong argument number!
1stSome: Wrong argument number!
noFile.txt: Error opening file, possibly null returned!
1st command not found!
grades.txt named file is opened!
grades.txt: 1th page first 5 entries were showed.
grades.txt named file is closed!
```

```
grades.txt named file is opened!
Student and grade is added to the file.
grades.txt named file is closed!
grades.txt named file is opened!
Student and grade is added to the file.
grades.txt named file is closed!
grades.txt named file is opened!
grades.txt: Search operation completed successfully!
grades.txt named file is closed!
grades.txt named file is opened!
grades.txt: Search operation completed successfully!
grades.txt named file is closed!
grades.txt named file is opened!
grades.txt: Search operation completed successfully!
grades.txt named file is closed!
searchStudent: Missing arguments!
searchStudent: Missing arguments!
 command not found!
noFile.txt: Error opening file, possibly null returned!
noFile.txt: Error opening file, possibly null returned!
sortAll: Missing arguments!
sortAll: too many arguments!
sortall command not found!
```

To run this program, you can use Makefile by enterin make command. Program does not take any arguments.

To create my own terminal, I used While(1) loop. It waits input from user. It checks if the command has necessary arguments. If it has, for each file operation it creates a new process and it perform the operation if it is possible. After the operation is done, new process is terminated. And it wait input from user again.

For the string in the commands, do not use quotes. Enter command like:

lstSome 5 2 grades.txt

First of all you should create a .txt file (if you want you can use a file which is already exist). You can use gtuStudentGrades "filename.txt" command for this. Then you can perform other operations by specifying file name. To learn more about commands please use gtuStudentGrades command.

Memory Leak Checks:

```
Enter command: sortAll newGrades.txt

------------------ Sort Options ------------------
1. Sort according to student full name in ascending order
2. Sort according to student full name in descending order
3. Sort according to student grade in ascending order
4. Sort according to student grade in descending order

To select, enter the option number!
1
Onur Özcan AA
==162357==
==162357== HEAP SUMMARY:
==162357==     in use at exit: 0 bytes in 0 blocks
==162357==   total heap usage: 4 allocs, 4 frees, 2,535 bytes allocated
==162357==
==162357== All heap blocks were freed -- no leaks are possible
==162357==
==162357== For lists of detected and suppressed errors, rerun with: -s
==162357== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
```

```
Enter command: gtuStudentGrades

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(2)
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Example Usage: gtuStudentGrades "grades.txt"

addStudentGrade
-It adds students name, surname and grade to the file.
Example Usage: addStudentGrade "Name Surname" "AA" "grades.txt"

searchStudent
-By entering student name, student and grade can be shown, if it is exist.
Example Usage: searchStudent "Name Surname" "grades.txt"

sortAll
-It sorts  by student name or grade in ascendng or descendng order.
Example Usage: sortAll "gradest.txt"

showAll
-It display all the student with grades.
Example Usage: showAll "grades.txt"

lstGrades
-It displays first 5 students with grades.
Example Usage: lstGrades "grades.txt"

lstSome
-It displays the students withs grades which are between arguments.
Example Usage: lstSome 5 2 "grades.txt"
Example: lstSome 5 2 "grades.txt" command will list entries between 5th and 10th.
==161359==
==161359== HEAP SUMMARY:
==161359==     in use at exit: 0 bytes in 0 blocks
==161359==   total heap usage: 3 allocs, 3 frees, 2,520 bytes allocated
==161359==
==161359== All heap blocks were freed -- no leaks are possible
==161359==
==161359== For lists of detected and suppressed errors, rerun with: -s
==161359== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
```

```
Enter command: showAll newGrades.txt
Onur Özcan AA
==161206==
==161206== HEAP SUMMARY:
==161206==     in use at exit: 0 bytes in 0 blocks
==161206==   total heap usage: 3 allocs, 3 frees, 2,520 bytes allocated
==161206==
==161206== All heap blocks were freed -- no leaks are possible
==161206==
==161206== For lists of detected and suppressed errors, rerun with: -s
==161206== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
```

```
Enter command: searchStudent Onur Özcan newGrades.txt
Onur Özcan AA
==160955==
==160955== HEAP SUMMARY:
==160955==     in use at exit: 0 bytes in 0 blocks
==160955==   total heap usage: 3 allocs, 3 frees, 2,520 bytes allocated
==160955==
==160955== All heap blocks were freed -- no leaks are possible
==160955==
==160955== For lists of detected and suppressed errors, rerun with: -s
==160955== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
```

```
Enter command: addStudentGrade Onur Özcan AA newGrades.txt
Student and grade is added to the file.
==160311==
==160311== HEAP SUMMARY:
==160311==     in use at exit: 0 bytes in 0 blocks
==160311==   total heap usage: 3 allocs, 3 frees, 2,520 bytes allocated
==160311==
==160311== All heap blocks were freed -- no leaks are possible
==160311==
==160311== For lists of detected and suppressed errors, rerun with: -s
==160311== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
```

```
Enter command: gtuStudentGrades newGrades.txt
File is opened successfully!
==159918==
==159918== HEAP SUMMARY:
==159918==     in use at exit: 0 bytes in 0 blocks
==159918==   total heap usage: 3 allocs, 3 frees, 2,520 bytes allocated
==159918==
==159918== All heap blocks were freed -- no leaks are possible
==159918==
==159918== For lists of detected and suppressed errors, rerun with: -s
==159918== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
```