COIS 3380H - Systems Programming in C

Lab 2 - Command Line Arguments and File Processing -Vishal Singh (0720487)

Submissions: Please note that I have provided a LogFile along with all the files that were created executing the below tests in my zipped submission. I made this markdown PDF to show the sequential execution of my script tests in a more interactive manner, and it is pretty much the same thing as what I sdemonstrated in the Log File *(But with Comments here)*.

Here is my C Code for the Lab: (Lab2.c)

```c
#include <stdio.h>
#include <fcntl.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/stat.h>

// Function to reverse bytes from the inputFile and write to the outputFile
void reverseBytes(int inputFile, int outputFile) {
    // Get the size of the file
    off_t fileSize = lseek(inputFile, 0, SEEK_END);
    // Move the file pointer back to the beginning
    lseek(inputFile, 0, SEEK_SET);

    char buffer;
    // Iterate through the file in reverse order
    for (off_t i = fileSize - 1; i >= 0; --i) {
        // Move to the i-th byte from the end
        lseek(inputFile, i, SEEK_SET);
        // Read one byte from the input file
        read(inputFile, &buffer, 1);
        // Write the byte to the output file
        write(outputFile, &buffer, 1);
    }
}

int main(int argc, char *argv[]) {
    // Check if correct number of command-line arguments is provided
    if (argc != 3) {
        fprintf(stderr, "Usage: %s <inputFile> <outputFile>\n", argv[0]);
        return 1;
    }

    // Open the input file in read-only mode
    int inputFile = open(argv[1], O_RDONLY);
    if (inputFile == -1) {
        perror("Error opening the input file");
        return 1;
```

```c
    }

    // Open the output file in write-only mode, create if not exists, truncate to
zero length
    int outputFile = open(argv[2], O_WRONLY | O_CREAT | O_TRUNC, S_IRUSR |
S_IWUSR);
    if (outputFile == -1) {
        perror("Error opening the output file");
        // Close the input file before returning
        close(inputFile);
        return 1;
    }

    // Call the function to reverse bytes from input to output
    reverseBytes(inputFile, outputFile);

    // Close both input and output files
    close(inputFile);
    close(outputFile);

    return 0;
}
```

Compiling the above Code in Putty

```
[vishalsingh@loki lab2]$ gcc -std=c99 -o lab2 lab2.c
```

Sample Run for a .txt File

```
[vishalsingh@loki lab2]$ ./lab2 /home/COIS/3380/lab2_document.txt
reverse_lab2_document.txt

[vishalsingh@loki lab2]$ ls
lab2  lab2.c  reverse_lab2_document.txt  VishalSingh_lab2_logfile.txt
```

Displaying the Content of the Reversed text File

```
[vishalsingh@loki lab2]$ cat reverse_lab2_document.txt

.rats elttil ,elkniwt ,elkniwT
,era uoy tahw ton wonk I hguohT
,krad eht ni rellevart eht sthgiL
kraps ynit dna thgirb ruoy sA
```

```
.yks eht ni si nus eht lliT
eye ruoy tuhs reven uoy roF
,peep sniatruc ym hguorht netfo dnA
,peek uoy yks eulb krad eht nI

.os elkniwt ton did uoy fI
,og ot erehw ees ton dluoc eH
;kraps ynit ruoy rof uoy sknahT
krad eht ni rellevart eht nehT

.thgin eht hguorht ,elkniwt ,elkniwT
,thgil elttil ruoy wohs uoy nehT
,nopu senihs gnihton eh nehW
,enog si nus gnizalb eht nehW

.yks eht ni dnomaid a ekiL
,hgih os dlrow eht evoba pU
!era uoy tahw rednow I woH
,rats elttil ,elkniwt ,elkniwT
```

Recreating the Original File by Passing the reversed File back to the program

```
[vishalsingh@loki lab2]$ ./lab2 reverse_lab2_document.txt
reverse_reverse_lab2_document.txt
```

Displaying the Content of the recreated File

```
[vishalsingh@loki lab2]$ cat reverse_reverse_lab2_document.txt
Twinkle, twinkle, little star,
How I wonder what you are!
Up above the world so high,
Like a diamond in the sky.

When the blazing sun is gone,
When he nothing shines upon,
Then you show your little light,
Twinkle, twinkle, through the night.

Then the traveller in the dark
Thanks you for your tiny spark;
He could not see where to go,
If you did not twinkle so.

In the dark blue sky you keep,
And often through my curtains peep,
For you never shut your eye
Till the sun is in the sky.

As your bright and tiny spark
```

```
Lights the traveller in the dark,
Though I know not what you are,
Twinkle, twinkle, little star.
```

Md5 CheckSums to Compare the Files

```
[vishalsingh@loki lab2]$ md5sum /home/COIS/3380/lab2_document.txt >
original_md5sum-1.txt

[vishalsingh@loki lab2]$ md5sum reverse_reverse_lab2_document.txt >
reversed__md5sum-1.txt

[vishalsingh@loki lab2]$ diff original_md5sum-1.txt reversed__md5sum-1.txt
1c1
< 414c7f0d9ee9513bbcda93a3097a2031  /home/COIS/3380/lab2_document.txt
---
> 414c7f0d9ee9513bbcda93a3097a2031  reverse_reverse_lab2_document.txt
```

Sample Run with md5sum checks for a PDF File

```
[vishalsingh@loki lab2]$ ./lab2 /home/COIS/3380/lab3/arasaurolopus_baby.pdf
reverse_arasaurolopus_baby.pdf

[vishalsingh@loki lab2]$ ./lab2 reverse_arasaurolopus_baby.pdf
reverse_reverse_arasaurolopus_baby.pdf


[vishalsingh@loki lab2]$ md5sum /home/COIS/3380/lab3/arasaurolopus_baby.pdf  >
original_md5sum-2.txt

[vishalsingh@loki lab2]$ md5sum reverse_reverse_arasaurolopus_baby.pdf  >
reveresed__md5sum-2.txt

[vishalsingh@loki lab2]$ diff original_md5sum-2.txt reveresed__md5sum-2.txt
1c1
< 8145704e80855b3f7d570361053784f9  /home/COIS/3380/lab3/arasaurolopus_baby.pdf
---
> 8145704e80855b3f7d570361053784f9  reverse_reverse_arasaurolopus_baby.pdf
```

Sample Run with md5sum Checks for a JPG File

```
[vishalsingh@loki lab2]$ ./lab2 /home/COIS/3380/lab3/jewel.jpg reverse_jewel.jpg

[vishalsingh@loki lab2]$ ./lab2 reverse_jewel.jpg reverse_reverse_jewel.jpg

[vishalsingh@loki lab2]$ md5sum /home/COIS/3380/lab3/jewel.jpg  > original_md5sum-
```

```
    3.txt

[vishalsingh@loki lab2]$ md5sum reverse_reverse_jewel.jpg  > reversed_md5sum-3.txt

[vishalsingh@loki lab2]$ diff original_md5sum-3.txt reversed_md5sum-3.txt
1c1
< 8f87ca8a026c94d8d457794f3e07da3a  /home/COIS/3380/lab3/jewel.jpg
---
> 8f87ca8a026c94d8d457794f3e07da3a  reverse_reverse_jewel.jpg
```

When No Input or Output File Given:

```
[vishalsingh@loki lab2]$ ./lab2
Usage: ./lab2 <inputFile> <outputFile>
```