

Daniyal Khan

3765942

CS-2263

Lab 4

Exercise 1:

```
#include <stdio.h>

int areDistinct(int *arr, int len);

#define MAX_SIZE 1000

int main(int argc, char **argv) {
    FILE *fptr = fopen(argv[1], "r");
    if(fptr == NULL) {
        printf("Could not open file.\n");
        return 1;
    }

    int arr[MAX_SIZE];
    int i = 0;
    while (fscanf(fptr, "%d", &arr[i]) == 1 && i < MAX_SIZE) {
        i++;
    }
    fclose(fptr);

    if(areDistinct(arr, i)) {
        printf("The given file has distinct numbers.\n");
    } else {
        printf("The given file does not have distinct numbers.\n");
    }

    return 0;
}

int areDistinct(int *arr, int len) {
    int ind1, ind2;
```

```

for(ind1 = 0; ind1 < len; ind1++) {
    for(ind2 = ind1 + 1; ind2 < len; ind2++) {
        if(arr[ind1] == arr[ind2]) {
            // found two elements with the same value
            return 0;
        }
    }
}

// have not found two elements of the same value
return 1;
}

```

Output:

No repeated numbers:

Test data:

The screenshot shows a file explorer window with three tabs: 'C Exercise1.c', 'testdata1.txt', and 'testdata2.txt'. The 'testdata1.txt' tab is active, displaying the file's contents: '1 1 2 3 4 5'.

The screenshot shows a terminal window with the following text:


```
~/OneDrive - University of New Brunswick/CS-XXXX/CS2263/Labs/Lab4 main !10 ?12
./a.out testdata1.txt
The given file has distinct numbers.
```

Repeated numbers:

Test data:

```
C Exercise1.c  testdata1.txt  testdata2.txt x
testdata2.txt
1  1 2 3 2 5
```

```
~/OneDrive - University of New Brunswick/CS-XXXX/CS2263/Labs/Lab4 main !10 ?12
./a.out testdata2.txt
The given file does not have distinct numbers.
```

Exercise 2:

ls:

```
~/OneDrive - University of New Brunswick/CS-XXXX/CS2263/Labs/Lab4 main !10 ?12
ls -R -l
total 256
-rwxr-xr-x@ 1 daniyal  staff  33736 Jun  3 20:01 a.out
-rw-r--r-- 1 daniyal  staff    952 Jun  3 20:13 Exercise1.c
-rw-r--r-- 1 daniyal  staff   1528 Jun  3 19:31 Exericse3.c
drwxr-xr-x 5 daniyal  staff    160 Jun  3 20:16 expected
drwxr-xr-x 5 daniyal  staff    160 Jun  3 20:13 inputs
-rw-r--r--@ 1 daniyal  staff  68378 Jun  3 05:58 lab4.pdf
drwxr-xr-x 2 daniyal  staff     64 Jun  3 19:57 outputs
-rw-r--r-- 1 daniyal  staff    736 Jun  3 19:29 tags.c
-rw-r--r-- 1 daniyal  staff    104 Jun  3 19:29 tags.h
-rw-r--r-- 1 daniyal  staff     9 Jun  3 19:33 testdata1.txt
-rw-r--r-- 1 daniyal  staff     9 Jun  3 19:33 testdata2.txt

./expected:
total 24
-rw-r--r--@ 1 daniyal  staff   37 Jun  3 20:13 expected1.txt
-rw-r--r--@ 1 daniyal  staff   47 Jun  3 20:13 expected2.txt
-rw-r--r-- 1 daniyal  staff   37 Jun  3 20:13 expected3.txt

./inputs:
total 24
-rw-r--r-- 1 daniyal  staff   9 Jun  3 20:12 input1.txt
-rw-r--r-- 1 daniyal  staff   9 Jun  3 20:13 input2.txt
-rw-r--r-- 1 daniyal  staff   7 Jun  3 20:13 input3.txt

./outputs:
total 0
```

Contents of expected files:

```
C Exercise1.c  expected1.txt  C Exercise3.c  C tags.h  C tags.c  ...  expected2.txt  ...  expected3.txt
expected > # expected1.txt
1 The given file has distinct numbers.
2
expected > # expected2.txt
1 The given file does not have distinct numbers.
2 |
expected > # expected3.txt
1 The given file has distinct numbers.
2
```

Contents of input files:

```
C Exercise1.c  C Exercise3.c  C tags.h  # input1.txt  C tags.c  ...  # input2.txt  ...  # input3.txt
inputs > # input1.txt
1 1 2 3 4 5
inputs > # input2.txt
1 1 2 3 2 5
inputs > # input3.txt
1 5 7 5 8
```

Makefile:

```
GCC = gcc
CFLAGS = -g -Wall -Wshadow

prog: Exercise1.o
    $(GCC) $(CFLAGS) Exercise1.o -o prog

Exercise1.o: Exercise1.c
    $(GCC) $(CFLAGS) -c Exercise1.c

testall: test1 test2 test3

test1: prog
    ./prog inputs/input1.txt > outputs/output1.txt
    diff expected/expected1.txt outputs/output1.txt

test2: prog
    ./prog inputs/input2.txt > outputs/output2.txt
    diff expected/expected2.txt outputs/output2.txt

test3: prog
```

```
./prog inputs/input3.txt > outputs/output3.txt  
diff expected/expected3.txt outputs/output3.txt
```

clean:

```
rm -f *.o prog outputs/*
```

Running make file to compile program:

```
~/OneDrive - University of New Brunswick/CS-XXXX/CS2263/Labs/Lab4 main !10 ?12  
make  
gcc -g -Wall -Wshadow -c Exercise1.c  
gcc -g -Wall -Wshadow Exercise1.o -o prog
```

ls after running it:

```
~/OneDrive - University of New Brunswick/CS-XXXX/CS2263/Labs/Lab4 main !10 ?12
ls -R -l
total 280
-rw-r--r-- 1 daniyal staff 952 Jun 3 20:13 Exercise1.c
-rw-r--r--@ 1 daniyal staff 5544 Jun 3 20:40 Exercise1.o
-rw-r--r-- 1 daniyal staff 1528 Jun 3 19:31 Exericse3.c
drwxr-xr-x 5 daniyal staff 160 Jun 3 20:16 expected
drwxr-xr-x 5 daniyal staff 160 Jun 3 20:13 inputs
-rw-r--r--@ 1 daniyal staff 68378 Jun 3 05:58 lab4.pdf
-rw-r--r--@ 1 daniyal staff 545 Jun 3 20:35 Makefile
drwxr-xr-x 2 daniyal staff 64 Jun 3 20:40 outputs
-rwxr-xr-x@ 1 daniyal staff 34136 Jun 3 20:40 prog
-rw-r--r-- 1 daniyal staff 736 Jun 3 19:29 tags.c
-rw-r--r-- 1 daniyal staff 104 Jun 3 19:29 tags.h
-rw-r--r-- 1 daniyal staff 9 Jun 3 19:33 testdata1.txt
-rw-r--r-- 1 daniyal staff 9 Jun 3 19:33 testdata2.txt

./expected:
total 24
-rw-r--r--@ 1 daniyal staff 37 Jun 3 20:13 expected1.txt
-rw-r--r--@ 1 daniyal staff 47 Jun 3 20:13 expected2.txt
-rw-r--r-- 1 daniyal staff 37 Jun 3 20:13 expected3.txt

./inputs:
total 24
-rw-r--r-- 1 daniyal staff 9 Jun 3 20:12 input1.txt
-rw-r--r-- 1 daniyal staff 9 Jun 3 20:13 input2.txt
-rw-r--r-- 1 daniyal staff 7 Jun 3 20:13 input3.txt

./outputs:
total 0
```

Timestamps for .c file, .o file and the executable file

```
-rw-r--r-- 1 daniyal staff 952 Jun 3 20:13 Exercise1.c
-rw-r--r--@ 1 daniyal staff 5544 Jun 3 20:40 Exercise1.o

-rwxr-xr-x@ 1 daniyal staff 34136 Jun 3 20:40 prog
```

Makefile to run all the tests:

```

~/OneDrive - University of New Brunswick/CS-XXXX/CS2263/Labs/Lab4 main !10 ?12
make testall
./prog inputs/input1.txt > outputs/output1.txt
diff expected/expected1.txt outputs/output1.txt
./prog inputs/input2.txt > outputs/output2.txt
diff expected/expected2.txt outputs/output2.txt
./prog inputs/input3.txt > outputs/output3.txt
diff expected/expected3.txt outputs/output3.txt
1c1
< The given file has distinct numbers.
---
> The given file does not have distinct numbers.
make: *** [test3] Error 1

```

ls after it:

```

~/OneDrive - University of New Brunswick/CS-XXXX/CS2263/Labs/Lab4 main !10 ?12
ls -R -l
total 280
-rw-r--r-- 1 daniyal staff 952 Jun 3 20:13 Exercise1.c
-rw-r--r--@ 1 daniyal staff 5544 Jun 3 20:40 Exercise1.o
-rw-r--r-- 1 daniyal staff 1528 Jun 3 19:31 Exericse3.c
drwxr-xr-x 5 daniyal staff 160 Jun 3 20:16 expected
drwxr-xr-x 5 daniyal staff 160 Jun 3 20:13 inputs
-rw-r--r--@ 1 daniyal staff 68378 Jun 3 05:58 lab4.pdf
-rw-r--r--@ 1 daniyal staff 545 Jun 3 20:35 Makefile
drwxr-xr-x 5 daniyal staff 160 Jun 3 20:41 outputs
-rwxr-xr-x@ 1 daniyal staff 34136 Jun 3 20:40 prog
-rw-r--r-- 1 daniyal staff 736 Jun 3 19:29 tags.c
-rw-r--r-- 1 daniyal staff 104 Jun 3 19:29 tags.h
-rw-r--r-- 1 daniyal staff 9 Jun 3 19:33 testdata1.txt
-rw-r--r-- 1 daniyal staff 9 Jun 3 19:33 testdata2.txt

./expected:
total 24
-rw-r--r--@ 1 daniyal staff 37 Jun 3 20:13 expected1.txt
-rw-r--r--@ 1 daniyal staff 47 Jun 3 20:13 expected2.txt
-rw-r--r-- 1 daniyal staff 37 Jun 3 20:13 expected3.txt

./inputs:
total 24
-rw-r--r-- 1 daniyal staff 9 Jun 3 20:12 input1.txt
-rw-r--r-- 1 daniyal staff 9 Jun 3 20:13 input2.txt
-rw-r--r-- 1 daniyal staff 7 Jun 3 20:13 input3.txt

./outputs:
total 24
-rw-r--r--@ 1 daniyal staff 37 Jun 3 20:41 output1.txt
-rw-r--r--@ 1 daniyal staff 47 Jun 3 20:41 output2.txt
-rw-r--r--@ 1 daniyal staff 47 Jun 3 20:41 output3.txt

```

Exercise 3:

Source code:

```
#include <stdio.h>
#include <stdlib.h>
#include "tags.h"

# define N 100000
# define T 100

void readInput(char *p, int *length);
void countTags(char *arr, int length);
void printTags(char **tags, int *tagCounts, int tagNum);

int main(int argc, char **argv) {
    char inputArr[N];
    int inputArrLength = 0;
    readInput(inputArr, &inputArrLength);

    countTags(inputArr, inputArrLength);
    putchar('\n');
}

void countTags(char *arr, int length) {
    char *tags[T];
    int tagCounts[T] = {0};

    int tagNum = 0;
    char *end = arr + length;
    while (arr < end) {
        if (*arr == '<' && *(arr+1) != '!' && *(arr+1) != '/') {
            if (!exists(tags, arr, tagCounts, &tagNum)) {
                *(tags+tagNum) = arr;
                tagCounts[tagNum]++;
                tagNum++;
            }
        }
        arr++;
    }
}
```

```

    }
}
arr++;
}
printTags(tags, tagCounts, tagNum);
}

void printTags(char **tags, int *tagCounts, int tagNum) {
    char **end = tags + tagNum;

    while (tags < end) {
        char *tagPtr = *tags;
        printf("<");
        while (*tagPtr != '>' && *tagPtr != ' ' && *tagPtr != '/') {
            if (*tagPtr != '<') {
                printf("%c", *tagPtr);
            }
            tagPtr++;
        }
        printf(">");

        putchar('\t');
        printf("%i", *tagCounts);
        putchar('\n');
        tags++;
        tagCounts++;
    }
}

void readInput(char *p, int *length) {
    char ch;
    while ((ch = getchar()) != EOF && *length < N - 1) {
        *p = ch;
    }
}

```

```

    p++;
    (*length)++;
}
}

```

Tags.c: (exists function)

```

#include "tags.h"

int exists(char **tags, char *arr, int *tagCounts, int *tagNum) {
    char **end = tags + (*tagNum);

    while (tags < end) {
        char *tagPtr = *tags;
        char *arrPtr = arr;
        while (*tagPtr && *arrPtr &&
            *tagPtr != '>' && *tagPtr != ' ' && *tagPtr != '/' &&
            *arrPtr != '>' && *arrPtr != ' ' && *arrPtr != '/' &&
            *tagPtr == *arrPtr) {
            tagPtr++;
            arrPtr++;
        }
        if ((*tagPtr == '>' || *tagPtr == ' ' || *tagPtr == '/') &&
            (*arrPtr == '>' || *arrPtr == ' ' || *arrPtr == '/'))
        {
            (*tagCounts)++;
            return 1;
        }

        tags++;
        tagCounts++;
    }
}

```

```
    return 0;  
}
```

Headerfile:

```
#ifndef TAGS_H  
#define TAGS_H  
  
int exists(char **tags, char *arr, int *tagCounts, int *tagNum);  
  
#endif
```

Makefile:

```
GCC = gcc  
CFLAGS = -g -Wall -Wshadow  
  
prog: htag1.o tags.o  
    $(GCC) $(CFLAGS) htag1.o tags.o -o htag1  
  
htag1.o: htag1.c tags.h  
    $(GCC) $(CFLAGS) -c htag1.c  
  
tags.o: tags.c tags.h
```

```
$(GCC) $(CFLAGS) -c tags.c

test1: prog
    ./htag1 < inputs/sample.html > outputs/output1.txt

test2: prog
    ./htag1 < outputs/output1.txt > outputs/output2.txt

compare: test1 test2
    diff outputs/output1.txt outputs/output2.txt

tests: compare

clean:
    rm -f *.o htag1 outputs/*
```

Running the makefile:

```
~/OneDrive - University of New Brunswick/CS-XXXX/CS2263/Labs/Lab4 main !10 ?12
make tests
gcc -g -Wall -Wshadow Exercise3.o tags.o -o htag1
./htag1 < htag1_project/inputs/sample.html > htag1_project/outputs/output1.txt
./htag1 < htag1_project/outputs/output1.txt > htag1_project/outputs/output2.txt
diff htag1_project/outputs/output1.txt htag1_project/outputs/output2.txt
6c6
< <p> 2
----
> <p> 1
make: *** [compare] Error 1
```

ls after:

```

ls -R -l
total 1704
-rwxr-xr-x@ 1 daniyal staff 33928 Jun 3 20:53 a.out
-rw-r--r-- 1 daniyal staff 952 Jun 3 20:13 Exercise1.c
-rw-r--r-- 1 daniyal staff 1579 Jun 3 21:04 Exercise3.c
-rw-r--r--@ 1 daniyal staff 5184 Jun 3 21:20 Exercise3.o
drwxr-xr-x 5 daniyal staff 160 Jun 3 20:16 expected
-rwxr-xr-x@ 1 daniyal staff 34776 Jun 3 21:20 htag1
drwxr-xr-x 5 daniyal staff 160 Jun 3 21:08 htag1_project
drwxr-xr-x 5 daniyal staff 160 Jun 3 21:07 inputs
-rw-r--r--@ 1 daniyal staff 68378 Jun 3 05:58 lab4.pdf
-rw-r--r-- 1 daniyal staff 574 Jun 3 21:20 Makefile
-rw-r--r--@ 1 daniyal staff 545 Jun 3 20:35 Makefile1
drwxr-xr-x 2 daniyal staff 64 Jun 3 21:18 outputs
-rwxr-xr-x@ 1 daniyal staff 34136 Jun 3 20:40 prog
-rwxr-xr-x@ 1 daniyal staff 33928 Jun 3 21:04 tagcounter
-rw-r--r-- 1 daniyal staff 736 Jun 3 19:29 tags.c
-rw-r--r-- 1 daniyal staff 104 Jun 3 19:29 tags.h
-rw-r--r--@ 1 daniyal staff 607904 Jun 3 20:53 tags.h.gch
-rw-r--r--@ 1 daniyal staff 3088 Jun 3 21:20 tags.o
-rw-r--r-- 1 daniyal staff 9 Jun 3 19:33 testdata1.txt
-rw-r--r-- 1 daniyal staff 9 Jun 3 19:33 testdata2.txt

./expected:
total 24
-rw-r--r--@ 1 daniyal staff 37 Jun 3 20:13 expected1.txt
-rw-r--r--@ 1 daniyal staff 47 Jun 3 20:13 expected2.txt
-rw-r--r-- 1 daniyal staff 37 Jun 3 20:13 expected3.txt

./htag1_project:
total 0
drwxr-xr-x 3 daniyal staff 96 Jun 3 21:20 inputs
drwxr-xr-x 4 daniyal staff 128 Jun 3 21:20 outputs

./htag1_project/inputs:
total 8
-rw-r--r-- 1 daniyal staff 201 Jun 3 21:08 sample.html

./htag1_project/outputs:
total 16
-rw-r--r--@ 1 daniyal staff 53 Jun 3 21:20 output1.txt
-rw-r--r--@ 1 daniyal staff 53 Jun 3 21:20 output2.txt

./inputs:
total 24
-rw-r--r-- 1 daniyal staff 9 Jun 3 20:12 input1.txt
-rw-r--r-- 1 daniyal staff 9 Jun 3 20:13 input2.txt
-rw-r--r-- 1 daniyal staff 7 Jun 3 20:13 input3.txt

./outputs:
total 0

```

Comment on result from tests:

After running make tests, the program worked but the outputs were different. The first output showed <p> counted 2 times, but in the second run it only showed 1. So the program doesn't give the same result when run on its own output. Because the program counts the number of tags as the first input and second input had 2 and 1 tag count for <P> respectively.