

CS2263

Lab 5

Date: March 29th, 2024

Student:

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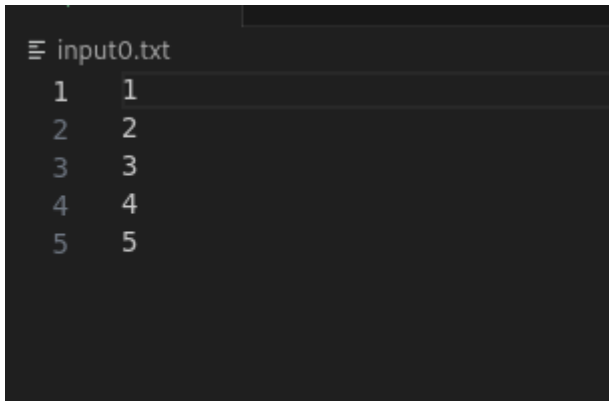
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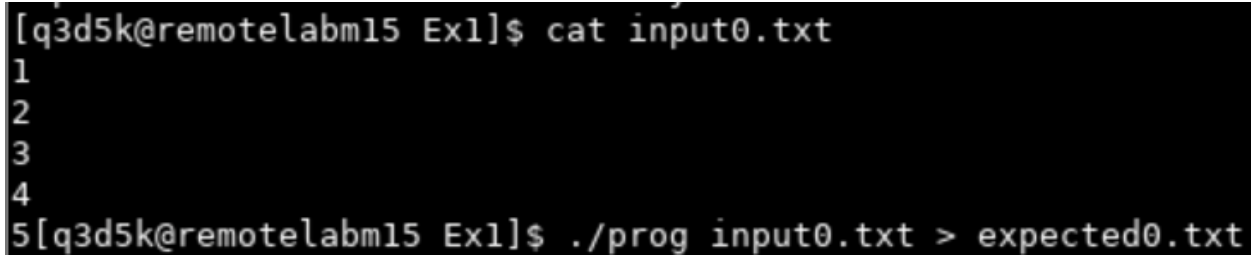
Exercise 1 (preparing input and expected output files for Exercise 2)

Deliverable 1.1a

The printout (or screen shot) showing the first data set with no repeated numbers, i.e. the contents of the file input0.



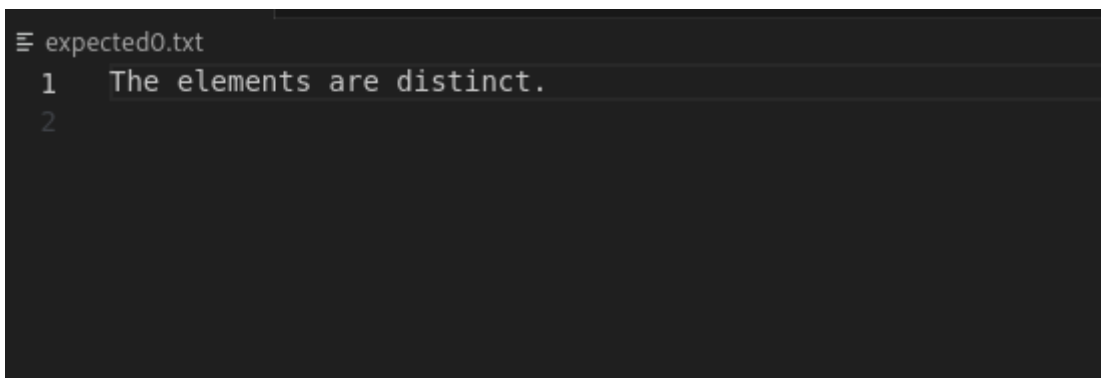
```
≡ input0.txt
1 1
2 2
3 3
4 4
5 5
```



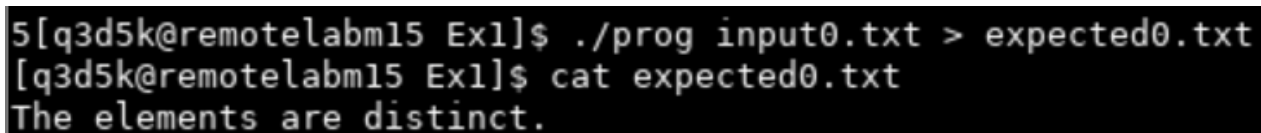
```
[q3d5k@remotelabm15 Ex1]$ cat input0.txt
1
2
3
4
5[q3d5k@remotelabm15 Ex1]$ ./prog input0.txt > expected0.txt
```

Deliverable 1.1b

The printout of the output from areDistinct program on the first data set, i.e. the contents of the file expected0.



```
≡ expected0.txt
1 The elements are distinct.
2
```



```
5[q3d5k@remotelabm15 Ex1]$ ./prog input0.txt > expected0.txt
[q3d5k@remotelabm15 Ex1]$ cat expected0.txt
The elements are distinct.
```

Deliverable 1.1c

The printout showing the second data set with some numbers repeated, i.e. the contents of the file input1,

```
≡ input1.txt
1 1
2 1
3 2
4 3
5 3
```

```
[q3d5k@remotelabm15 Ex1]$ cat input1.txt
1
1
2
3
3[q3d5k@remotelabm15 Ex1]$ ./prog input1.txt > expected1.txt
```

Deliverable 1.1d

The printout of the output from the program on the second data set, i.e. the contents of the file `expected1`.

```
expected1.txt U X
≡ expected1.txt
1 The elements are not distinct.
2
```

```
3[q3d5k@remotelabm15 Ex1]$ ./prog input1.txt > expected1.txt
[q3d5k@remotelabm15 Ex1]$ cat expected1.txt
The elements are not distinct.
[q3d5k@remotelabm15 Ex1]$
```

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```
[q3d5k@gc112m39 Ex2]$ ls -R -l
.:
total 56
-rw-rw-r-- 1 q3d5k fcsugrad 365 Mar 28 15:17 aredistinct.c
-rw-r--r-- 1 q3d5k fcsugrad 3216 Mar 28 15:17 aredistinct.o
drwxr-xr-x 2 q3d5k fcsugrad 85 Mar 28 15:06 expected
drwxr-xr-x 2 q3d5k fcsugrad 76 Mar 28 15:07 inputs
-rw-rw-r-- 1 q3d5k fcsugrad 765 Mar 28 15:17 main.c
-rw-r--r-- 1 q3d5k fcsugrad 7936 Mar 28 15:17 main.o
-rw-r--r-- 1 q3d5k fcsugrad 625 Mar 28 15:17 Makefile
drwxr-xr-x 2 q3d5k fcsugrad 33 Mar 28 15:17 outputs
drwxr-xr-x 2 q3d5k fcsugrad 30 Mar 28 15:13 photos
-rwxr-xr-x 1 q3d5k fcsugrad 29736 Mar 28 15:17 prog

./expected:
total 12
-rw-r--r-- 1 q3d5k fcsugrad 27 Mar 28 15:07 expected0.txt
-rw-r--r-- 1 q3d5k fcsugrad 31 Mar 28 15:07 expected1.txt
-rw-r--r-- 1 q3d5k fcsugrad 26 Mar 28 15:08 expected2.txt

./inputs:
total 12
-rw-rw-r-- 1 q3d5k fcsugrad 9 Mar 28 15:05 input0.txt
-rw-rw-r-- 1 q3d5k fcsugrad 9 Mar 28 15:05 input1.txt
-rw-rw-r-- 1 q3d5k fcsugrad 9 Mar 28 15:09 input2.txt

./outputs:
total 4
-rw-r--r-- 1 q3d5k fcsugrad 27 Mar 28 15:17 output0.txt

./photos:
total 64
-rw-r--r-- 1 q3d5k fcsugrad 64611 Mar 28 15:13 d2.1.png
[q3d5k@gc112m39 Ex2]$
```

run make to compile your program,

```
[q3d5k@gc112m39 Ex2]$ make
make: 'prog' is up to date.
[q3d5k@gc112m39 Ex2]$ make
```

Deliverable 2.1d

show all the directories and all the files again,

```
[q3d5k@remotelabm39 Ex2]$ ls -R -l
.:
total 56
-rw-rw-r-- 1 q3d5k fcsugrad 365 Mar 28 15:17 aredistinct.c
-rw-r--r-- 1 q3d5k fcsugrad 3216 Mar 29 10:48 aredistinct.o
drwxr-xr-x 2 q3d5k fcsugrad 85 Mar 29 10:48 expected
drwxr-xr-x 2 q3d5k fcsugrad 76 Mar 28 15:07 inputs
-rw-rw-r-- 1 q3d5k fcsugrad 765 Mar 28 15:17 main.c
-rw-r--r-- 1 q3d5k fcsugrad 7936 Mar 29 10:48 main.o
-rw-r--r-- 1 q3d5k fcsugrad 626 Mar 29 10:46 Makefile
drwxr-xr-x 2 q3d5k fcsugrad 79 Mar 29 10:48 outputs
drwxr-xr-x 2 q3d5k fcsugrad 154 Mar 28 15:31 photos
-rwxr-xr-x 1 q3d5k fcsugrad 29736 Mar 29 10:48 prog

./expected:
total 12
-rw-r--r-- 1 q3d5k fcsugrad 27 Mar 29 10:47 expected0.txt
-rw-r--r-- 1 q3d5k fcsugrad 31 Mar 29 10:47 expected1.txt
-rw-r--r-- 1 q3d5k fcsugrad 27 Mar 29 10:48 expected2.txt

./inputs:
total 12
-rw-rw-r-- 1 q3d5k fcsugrad 9 Mar 28 15:05 input0.txt
-rw-rw-r-- 1 q3d5k fcsugrad 9 Mar 28 15:05 input1.txt
-rw-rw-r-- 1 q3d5k fcsugrad 9 Mar 28 15:09 input2.txt

./outputs:
total 12
-rw-r--r-- 1 q3d5k fcsugrad 27 Mar 29 10:48 output0.txt
-rw-r--r-- 1 q3d5k fcsugrad 31 Mar 29 10:48 output1.txt
-rw-r--r-- 1 q3d5k fcsugrad 31 Mar 29 10:48 output2.txt

./photos:
total 344
-rw-r--r-- 1 q3d5k fcsugrad 90716 Mar 28 15:19 d2.1c.png
-rw-r--r-- 1 q3d5k fcsugrad 97598 Mar 28 15:31 d2.1h.png
-rw-r--r-- 1 q3d5k fcsugrad 64611 Mar 28 15:13 d2.1.png
-rw-r--r-- 1 q3d5k fcsugrad 7784 Mar 28 15:20 run.png
-rw-r--r-- 1 q3d5k fcsugrad 21573 Mar 28 15:24 test0.png
-rw-r--r-- 1 q3d5k fcsugrad 20968 Mar 28 15:26 test1.png
-rw-r--r-- 1 q3d5k fcsugrad 33608 Mar 28 15:27 test2.png
[q3d5k@remotelabm39 Ex2]$
```

Deliverable 2.1e

show the time stamps for one of the source code .c files, the created corresponding object code .o file and for the executable file. Which one has an earlier times stamp (if there is a difference)?

```
[q3d5k@remotelabm15 Ex2]$ stat main.o
  File: main.o
  Size: 7936          Blocks: 16          IO Block: 1048576 regular file
Device: 2fh/47d Inode: 6998875674  Links: 1
Access: (0644/-rw-r--r--)  Uid: (15370/  q3d5k)   Gid: ( 1006/fcsugrad)
Access: 2024-03-29 12:27:18.518838263 -0300
Modify: 2024-03-29 12:27:18.519838281 -0300
Change: 2024-03-29 12:27:18.519838281 -0300
 Birth: -
[q3d5k@remotelabm15 Ex2]$ stat main.c
  File: main.c
  Size: 765          Blocks: 8          IO Block: 1048576 regular file
Device: 2fh/47d Inode: 7000978765  Links: 1
Access: (0664/-rw-rw-r--)  Uid: (15370/  q3d5k)   Gid: ( 1006/fcsugrad)
Access: 2024-03-28 15:17:23.418172469 -0300
Modify: 2024-03-28 15:17:23.261169675 -0300
Change: 2024-03-28 15:17:23.262169693 -0300
 Birth: -
[q3d5k@remotelabm15 Ex2]$ stat prog
  File: prog
  Size: 29736        Blocks: 64          IO Block: 1048576 regular file
Device: 2fh/47d Inode: 6998995275  Links: 1
Access: (0755/-rwxr-xr-x)  Uid: (15370/  q3d5k)   Gid: ( 1006/fcsugrad)
Access: 2024-03-29 12:27:18.525838388 -0300
Modify: 2024-03-29 12:27:18.535838566 -0300
Change: 2024-03-29 12:27:18.536838584 -0300
 Birth: -
[q3d5k@remotelabm15 Ex2]$
```

The earlier timestamps, we seen that our modify key word when running main.c, main.o and prog. We see the difference in time. The Makefile has a recursive nature, which checks the top line which will executable to the object file. Then the .c file which is why we see the .o files are modified later then the .c file.

Deliverable 2.1f

show the output (if any) from make, i.e. from running all the tests,

```
[q3d5k@remotelabm39 Ex2]$ make clean
/bin/rm -f *.o prog outputs/*
[q3d5k@remotelabm39 Ex2]$ make testall
gcc -g -Wall -Wshadow -c aredistinct.c
gcc -g -Wall -Wshadow -c main.c
gcc -g -Wall -Wshadow aredistinct.o main.o -o prog # no -c
./prog inputs/input0.txt > outputs/output0.txt
diff expected/expected0.txt outputs/output0.txt
./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
1c1
< The elements are distinct.
---
> The elements are not distinct.
make: *** [Makefile:25: test2] Error 1
[q3d5k@remotelabm39 Ex2]$
```

Deliverable 2.1g

show all the directories and all the files again,

```
< The elements are distinct.
...
> The elements are not distinct.
make: *** [Makefile:25: test2] Error 1
[q3d5k@remotelabm39 Ex2]$ make clean
/bin/rm -f *.o prog outputs/*
[q3d5k@remotelabm39 Ex2]$ ls -R -l

total 12
-rw-rw-r-- 1 q3d5k fcsugrad 365 Mar 28 15:17 aredistinct.c
drwxr-xr-x 2 q3d5k fcsugrad 85 Mar 29 10:48 expected
drwxr-xr-x 2 q3d5k fcsugrad 76 Mar 28 15:07 inputs
-rw-rw-r-- 1 q3d5k fcsugrad 765 Mar 28 15:17 main.c
-rw-r--r-- 1 q3d5k fcsugrad 626 Mar 29 10:46 Makefile
drwxr-xr-x 2 q3d5k fcsugrad 10 Mar 29 10:56 outputs
drwxr-xr-x 2 q3d5k fcsugrad 154 Mar 28 15:31 photos

./expected:
total 12
-rw-r--r-- 1 q3d5k fcsugrad 27 Mar 29 10:47 expected0.txt
-rw-r--r-- 1 q3d5k fcsugrad 31 Mar 29 10:47 expected1.txt
-rw-r--r-- 1 q3d5k fcsugrad 27 Mar 29 10:48 expected2.txt

./inputs:
total 12
-rw-rw-r-- 1 q3d5k fcsugrad 9 Mar 28 15:05 input0.txt
-rw-rw-r-- 1 q3d5k fcsugrad 9 Mar 28 15:05 input1.txt
-rw-rw-r-- 1 q3d5k fcsugrad 9 Mar 28 15:09 input2.txt

./outputs:
total 0

./photos:
total 344
-rw-r--r-- 1 q3d5k fcsugrad 90716 Mar 28 15:19 d2.1c.png
-rw-r--r-- 1 q3d5k fcsugrad 97598 Mar 28 15:31 d2.1h.png
-rw-r--r-- 1 q3d5k fcsugrad 64611 Mar 28 15:13 d2.1.png
-rw-r--r-- 1 q3d5k fcsugrad 7784 Mar 28 15:20 run.png
-rw-r--r-- 1 q3d5k fcsugrad 21573 Mar 28 15:24 test0.png
-rw-r--r-- 1 q3d5k fcsugrad 20968 Mar 28 15:26 test1.png
-rw-r--r-- 1 q3d5k fcsugrad 33608 Mar 28 15:27 test2.png
[q3d5k@remotelabm39 Ex2]$
```

Deliverable 2.1h

briefly describe what output and what files were generated when we used the make utility to run all three tests at once.

When using the make utility to run all three tests. They create the output.txt files, they contain information about the numbers being distinct or not. This happens due to the input redirection where the inputs are fed into the program and the results are stored in the outputs .txt files.

Exercise 3 (running, with make, two versions of htags and automatically comparing the results)

Deliverable 3.1a

show the directory structure and all the files of your project,

```
[q3d5k@gc112m39 Ex3]$ ls -R -l
.:
total 84
drwxr-xr-x 2 q3d5k fcsugrad 136 Mar 28 16:12 a2
drwxr-xr-x 2 q3d5k fcsugrad 163 Mar 28 15:38 a3
drwxr-xr-x 2 q3d5k fcsugrad 60 Mar 28 16:14 expected
-rwxr-xr-x 1 q3d5k fcsugrad 28056 Mar 28 16:32 htags
-rwxr-xr-x 1 q3d5k fcsugrad 30040 Mar 28 16:33 htags2
-rw-r--r-- 1 q3d5k fcsugrad 10024 Mar 28 16:33 htags2.o
-rw-r--r-- 1 q3d5k fcsugrad 5784 Mar 28 16:32 htags.o
drwxr-xr-x 2 q3d5k fcsugrad 32 Mar 28 15:40 inputs
-rw-r--r-- 1 q3d5k fcsugrad 555 Mar 28 16:32 Makefile
drwxr-xr-x 2 q3d5k fcsugrad 136 Mar 28 16:33 outputs

./a2:
total 92
-rw-rw-r-- 1 q3d5k fcsugrad 23340 Mar 28 15:33 A1W2024.html
-rw-rw-r-- 1 q3d5k fcsugrad 24948 Mar 28 15:33 A2W2024.html
-rw-rw-r-- 1 q3d5k fcsugrad 325 Mar 28 15:33 file.html
-rwxr-xr-x 1 q3d5k fcsugrad 25968 Mar 28 16:12 htags
-rw-rw-r-- 1 q3d5k fcsugrad 1375 Mar 28 15:33 htags.c
-rw-rw-r-- 1 q3d5k fcsugrad 44 Mar 28 16:19 test.html

./a3:
total 332
-rw-rw-r-- 1 q3d5k fcsugrad 23336 Mar 28 15:33 A1W2024.html
-rw-rw-r-- 1 q3d5k fcsugrad 10415 Mar 28 15:33 A3W2024.html
-rwxr-xr-x 1 q3d5k fcsugrad 26224 Mar 28 15:38 htags2
-rw-rw-r-- 1 q3d5k fcsugrad 3145 Mar 28 15:33 htags2.c
-rw-rw-r-- 1 q3d5k fcsugrad 251742 Mar 28 15:33 htags2.exe
-rw-rw-r-- 1 q3d5k fcsugrad 11453 Mar 28 15:33 index2.html
-rw-rw-r-- 1 q3d5k fcsugrad 44 Mar 28 15:33 index.html

./expected:
total 8
-rw-r--r-- 1 q3d5k fcsugrad 65 Mar 28 16:32 expected0.txt
-rw-r--r-- 1 q3d5k fcsugrad 56 Mar 28 16:32 expected1.txt

./inputs:
total 4
-rw-rw-r-- 1 q3d5k fcsugrad 44 Mar 28 15:38 input.html

./outputs:
total 8
-rw-r--r-- 1 q3d5k fcsugrad 65 Mar 28 16:32 output0.txt
-rw-r--r-- 1 q3d5k fcsugrad 56 Mar 28 16:33 output1.txt
[q3d5k@gc112m39 Ex3]$
```

Deliverable 3.1b

show the contents of the Makefile,

```

q3d5k@gc112m39:Ex3
GCC = gcc
CFLAGS = -g -Wall -Wshadow

htags: a2/htags.o
    $(GCC) $(CFLAGS) htags.o -o htags

htags2: a3/htags2.o
    $(GCC) $(CFLAGS) htags2.o -o htags2

a2/htags.o: a2/htags.c
    $(GCC) $(CFLAGS) -c a2/htags.c

a3/htags2.o: a3/htags2.c
    $(GCC) $(CFLAGS) -c a3/htags2.c

testall: test0 test1

test0: htags
    ./htags < inputs/input.html > outputs/output0.txt
    diff expected/expected0.txt outputs/output0.txt

test1: htags2
    ./htags2 inputs/input.html > outputs/output1.txt
    diff expected/expected1.txt outputs/output1.txt

clean:
    /bin/rm -f *.o prog outputs/*
~
~
~
~
~

```

run the tests (the make should compile the files automatically),

```

[q3d5k@gc112m39 Ex3]$ make
gcc -g -Wall -Wshadow -c a2/htags.c
gcc -g -Wall -Wshadow htags.o -o htags

```

Deliverable 3.1c

show the output from make, if any,

```

[q3d5k@gc112m39 Ex3]$ make htags
gcc -g -Wall -Wshadow -c a2/htags.c
gcc -g -Wall -Wshadow htags.o -o htags
[q3d5k@gc112m39 Ex3]$ make htags2
gcc -g -Wall -Wshadow -c a3/htags2.c
gcc -g -Wall -Wshadow htags2.o -o htags2
[q3d5k@gc112m39 Ex3]$ make test0
gcc -g -Wall -Wshadow -c a2/htags.c
gcc -g -Wall -Wshadow htags.o -o htags
./htags < inputs/input.html > outputs/output0.txt
diff expected/expected0.txt outputs/output0.txt
[q3d5k@gc112m39 Ex3]$ make test1
gcc -g -Wall -Wshadow -c a3/htags2.c
gcc -g -Wall -Wshadow htags2.o -o htags2
./htags2 inputs/input.html > outputs/output1.txt
diff expected/expected1.txt outputs/output1.txt
[q3d5k@gc112m39 Ex3]$

```

Deliverable 3.1d

comment on the result from this test of two version of the htags program.

Testing the htags and htags2 program, with htags from as2 we had to use file redirection to feed the input into the program giving us a output, while with htags2 from as3 we fed the file name in through the terminal line or in our cause in the test line in our Makefile test. Once the file was complete it was important to make sure that both had the recuired output to make sure both tests passed with the expected output.