CONTENTS OF TAR ARCHIVE:

“mytoolkit.c” – C file for the programming project

“README.docx” – README file

“makefile” – file for compiling mytoolkit.c

1. This makefile will produce an executable file named mytoolkit, which will be added to the local directory when the makefile is compiled.
   * There is nothing special for compiling this project. Just use the keyword “make” in the command line.
   * Use **./mytoolkit** to execute mytoolkit
   * Use keyword “make clean” for cleaning executables

ASSUMPTIONS:

1. When user types in a command at mytoolkit’s prompt, mytoolkit will parse the command string (command name, some arguments, <, >, and | tokens) into meaningful separate tokens. I assume that the user enters commands where tokens are separated by a single space. Multiple commands cannot be executed without having a single space in between them (E.g., **CMD1|CMD2** will not work but **CMD1 | CMD2** will execute successfully)
2. Commands “myexit”, “mycd”, “mypwd”, “mytree”, “mytime”, “mymtimes”, and “mytimeout” in mytoolkit are implemented as internal commands in the terminology of Unix shells.
3. All existing external Unix commands are implemented as external commands (i.e., executable programs that can be found in one of the search paths contained in environment variable PATH)

KNOWN BUGS:

1. Major Errors:
   1. Hitting up arrow multiple times then hitting return raises the command line.
   2. Having too many up arrows or some up arrows with some (command)'s will cause a severe crash (unexpected behavior).

UNFINISHED PORTION OF THE PROJECT :

1. command “mymtimes”
   1. Currently only able to show the files modified in last 24 hours. Unable to group the files according to their last modification time into hourly time intervals in the last 24 hours.

MY TEST CASES:

1. myexit:  
   $ myexit  
   Exiting shell...
2. mycd: To test this command user should first create sub-directory before running mytoolkit if there is no any sub-directory in current working directory of mytoolkit as it doesn’t have functionality to create directory during runtime.

E.g.

1. $ mycd examples  
   changes the working directory of toolkit to examples i.e., from /home/grads/shrestha/COP5570 to /home/grads/shrestha/COP5570/examples
2. $ mycd /home  
   changes the working directory of toolkit to home
3. mypwd:   
   $ mypwd  
   /home/grads/shrestha/COP5570. This is the absolute path of current working directory.
4. mytree:   
   $ mytree

mytoolkit.o

examples

lec2

b.c

makefile2

Makefile

example6.c

example7.c

myprog.h

myprog1.c

makefile

example1.c

myheader1.h

x.mk

example4.c

myprog2.c

example8.c

myheader2.h

a.mk

example1a.c

example5a.c

example0.c

example2.c

example5b.c

example4.x

example5.c

example3.c

a.c

maefile3

myprog3.c

makefile

mytoolkit

a.out

project1.c

mytoolkit.c

1. mytime: Time is shown in millisecond unit.  
   $mytime ls

a.out examples makefile mytoolkit mytoolkit.c mytoolkit.o project1.c

real 4.0000ms

user 1.0000ms

sys 2.0000ms

$ mytime ls -la

total 3

drwx------ 3 shrestha CS-Grads 1024 Feb 13 01:59 .

drwx------ 3 shrestha CS-Grads 1024 Feb 25 06:20 ..

drwxr-xr-x 2 shrestha CS-Grads 1024 Feb 20 07:13 lec2

real 9.0000ms

user 1.0000ms

sys 3.0000ms

1. mymtimes  
   Thu Feb 25 12:34:52 2021

Thu Feb 25 13:59:16 2021

Thu Feb 25 02:28:14 2021

Thu Feb 25 14:07:14 2021

Thu Feb 25 13:51:14 2021

Thu Feb 25 13:51:14 2021

Fri Feb 26 00:46:56 2021

Fri Feb 26 00:46:50 2021

Thu Feb 25 23:33:27 2021

Thu Feb 25 14:13:55 2021

Thu Feb 25 17:58:40 2021

1. mytimeout:  
   $mytimeout 4 ping 8.8.8.8

PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.

64 bytes from 8.8.8.8: icmp\_seq=1 ttl=118 time=7.63 ms

64 bytes from 8.8.8.8: icmp\_seq=2 ttl=118 time=7.56 ms

64 bytes from 8.8.8.8: icmp\_seq=3 ttl=118 time=7.58 ms

64 bytes from 8.8.8.8: icmp\_seq=4 ttl=118 time=7.55 ms

ping 8.8.8.8 terminates after 4 sec

1. External unix command:
   1. **ls**  
      a.out examples makefile mytoolkit mytoolkit.c mytoolkit.o project1.c
   2. **ls -la**  
      total 113

drwx------ 3 shrestha CS-Grads 1024 Feb 25 04:59 .

drwx------ 7 shrestha CS-Grads 1024 Feb 25 04:58 ..

-rwx------ 1 shrestha CS-Grads 18800 Feb 21 14:35 a.out

drwx------ 3 shrestha CS-Grads 1024 Feb 13 01:59 examples

-rw-r--r-- 1 shrestha CS-Grads 237 Feb 25 04:58 makefile

-rwx------ 1 shrestha CS-Grads 31000 Feb 25 04:59 mytoolkit

-rw-r--r-- 1 shrestha CS-Grads 15595 Feb 25 04:54 mytoolkit.c

-rw------- 1 shrestha CS-Grads 30360 Feb 25 04:59 mytoolkit.o

-rw-r--r-- 1 shrestha CS-Grads 12865 Feb 21 14:35 project1.c

1. Piping: Tested for two pipes.
   1. Single pipe**: ls | sort -r**project1.c

mytoolkit.o

mytoolkit.c

mytoolkit

makefile

examples

a.out

* 1. Two pipes: **ls -la | sort -r | more**total 113

-rwx------ 1 shrestha CS-Grads 31000 Feb 25 04:59 mytoolkit

-rwx------ 1 shrestha CS-Grads 18800 Feb 21 14:35 a.out

-rw-r--r-- 1 shrestha CS-Grads 237 Feb 25 04:58 makefile

-rw-r--r-- 1 shrestha CS-Grads 15595 Feb 25 04:54 mytoolkit.c

-rw-r--r-- 1 shrestha CS-Grads 12865 Feb 21 14:35 project1.c

-rw------- 1 shrestha CS-Grads 30360 Feb 25 04:59 mytoolkit.o

drwx------ 7 shrestha CS-Grads 1024 Feb 25 04:58 ..

drwx------ 3 shrestha CS-Grads 1024 Feb 25 04:59 .

drwx------ 3 shrestha CS-Grads 1024 Feb 13 01:59 examples-rw------- 1 shrestha CS-Grads 30360 Feb 25 04:59 mytoolkit.o

-rw-r--r-- 1 shrestha CS-Grads 12865 Feb 21 14:35 project1.c

Some tested commands:  
**cat sample.txt | head -7 | tail -5**  
  
make file gyan.txt with contents   
Bat

Dog

Apple

**cat gyan.txt | grep -v a | sort – r**output:

Dog

Apple

1. I/O Redirection:
   1. Output redirection**: command > file**e.g., **ls > test.txt**  
      ls command output is redirected to file test.txt

* 1. Input redirection**: command < file**  
     e.g., **more < test.txt**   
     Outputs the contents of file test.txt   
     examples

makefile

mytoolkit

mytoolkit.c

mytoolkit.o

project1.c

test.txt

* 1. I/O redirection: **command1 < file1 > file2**  
     First create sample.txt using **ls -la > sample.txt**sample.txt is as follows:total 114

drwx------ 3 shrestha CS-Grads 1024 Feb 25 06:20 .

drwx------ 7 shrestha CS-Grads 1024 Feb 25 04:58 ..

-rwx------ 1 shrestha CS-Grads 18800 Feb 21 14:35 a.out

drwx------ 3 shrestha CS-Grads 1024 Feb 13 01:59 examples

-rw-r--r-- 1 shrestha CS-Grads 237 Feb 25 04:58 makefile

-rwx------ 1 shrestha CS-Grads 31000 Feb 25 04:59 mytoolkit

-rw-r--r-- 1 shrestha CS-Grads 15595 Feb 25 04:54 mytoolkit.c

-rw------- 1 shrestha CS-Grads 30360 Feb 25 04:59 mytoolkit.o

-rw-r--r-- 1 shrestha CS-Grads 12865 Feb 21 14:35 project1.c

-rw------- 1 shrestha CS-Grads 0 Feb 25 06:20 sample.txt

-rw------- 1 shrestha CS-Grads 78 Feb 25 06:02 test.txt  
  
**more < sample.txt > test.txt**On checking the test.txt contents using more test.txt we can find that the content of test.txt is replaced with that of sample.txt