

CSE 344
System Programming
5th Assignment
Report



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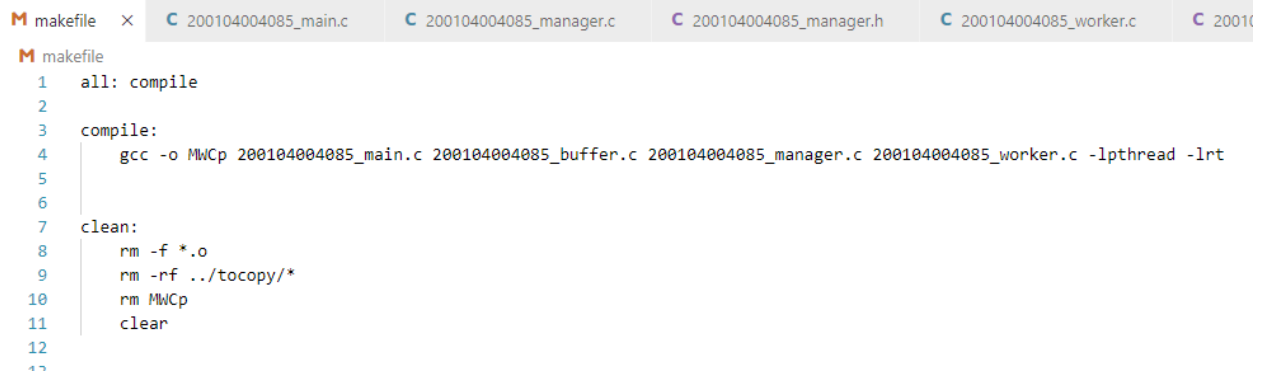
Date

29.05.2024

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1. Makefile:



```
M makefile x 200104004085_main.c 200104004085_manager.c 200104004085_manager.h 200104004085_worker.c 200104004085_worker.h
M makefile
1 all: compile
2
3 compile:
4     gcc -o MWCp 200104004085_main.c 200104004085_buffer.c 200104004085_manager.c 200104004085_worker.c -lpthread -lrt
5
6
7 clean:
8     rm -f *.o
9     rm -rf ../tocopy/*
10    rm MWCp
11    clear
12
13
```

2. Makefile Commands:

All: Compiles the code.

Compile: Compiles the code.

Clean: Clears terminal and deletes the tocopy's inside.

3. How to run the code?

To run the program, you can write **make all** or just **make** in terminal and then **./MWCp #buffer_size #ofworkers ../source_file_directory ../destination_file_directory**.

4. Key changes from HW4:

In HW5 we are asked to implement using conditional variables and barriers. In HW4 I used conditional variables. In HW5 I made an improvement by adding barriers to the code I used in HW4. Here are the places I changed:

buffer.h: I added **pthread_barrier_t barrier** to the **buffer_str** structure.

buffer.c: I initialized the barrier with **pthread_barrier_init** in the **buffer_init** function. I destroyed the barrier with **pthread_barrier_destroy** in the **buffer_destroy** function.

worker.c: I added `pthread_barrier_wait(&buffer->barrier);` to synchronize all worker threads at the end of the copying process.

manager.c: I added `pthread_barrier_wait(&buffer->barrier);` to ensure all threads reach this point before proceeding at the end of the manager function.

buffer.c: I modified the `buffer_destroy` function to check if the file descriptors are valid before closing them:

```
if (buffer->fds[idx].src_fd != -1)
{
    close(buffer->fds[idx].src_fd);
}
if (buffer->fds[idx].dst_fd != -1)
{
    close(buffer->fds[idx].dst_fd);
}
```

5. Code Explanation and pseudocodes:

5.1. **Buffer.c and Buffer.h:** The buffer structure for handling file descriptors and the corresponding synchronization techniques required for worker threads to copy files in parallel is defined and put into practice by the `buffer.h` and `buffer.c` files. The `buffer_init` function initializes the buffer, setting up mutexes, condition variables, indices, and a barrier for thread coordination, among other synchronization primitives. By locking the mutex, ending file descriptors, releasing memory that has been allotted, and eliminating synchronization primitives, `buffer_destroy` frees up resources. By employing a mutex lock and condition variables to manage full buffer states and indicate when new items are added, the `buffer_add` method reliably adds file descriptors to the buffer. Similarly, `buffer_remove` uses condition variables to wait and indicate changes when extracting file descriptors, guaranteeing thread safety and synchronization, particularly when the buffer is empty. The done flag is set by the `buffer_set_done` function, which also notifies all waiting threads of the completion by broadcasting this status. This approach makes it possible to handle file descriptors effectively and synchronously, which is essential for the directory copying utility's simultaneous copying operation.

Pseudocode:

// Initialize the buffer

function buffer_init(buffer, size)

 set buffer size

 set buffer count to 0

 set buffer done flag to 0

 set buffer input index to 0

 set buffer output index to 0

 allocate memory for file descriptors

 if memory allocation fails

 print error and exit

 initialize mutex

 initialize not full condition variable

 initialize not empty condition variable

 initialize barrier with num_workers + 1

// Destroy the buffer and free resources

function buffer_destroy(buffer)

 lock mutex

 for each file descriptor in the buffer

 if source file descriptor is valid

 close source file descriptor

 if destination file descriptor is valid

 close destination file descriptor

 unlock mutex

 free file descriptor memory

 destroy mutex

 destroy not full condition variable

 destroy not empty condition variable

destroy barrier

// Add a file descriptor to the buffer

function buffer_add(buffer, fd)

 lock mutex

 while buffer is full and not done

 wait for not full condition

 if done

 unlock mutex and return

 add file descriptor to buffer at input index

 update input index

 increment buffer count

 signal not empty condition

 unlock mutex

// Remove a file descriptor from the buffer

function buffer_remove(buffer)

 lock mutex

 while buffer is empty and not done

 wait for not empty condition

 if buffer is empty and done

 unlock mutex and return invalid file descriptor

 get file descriptor from buffer at output index

 update output index

 decrement buffer count

 signal not full condition

 unlock mutex

 return file descriptor

```
// Set the done flag of the buffer

function buffer_set_done(buffer)

    lock mutex

    set done flag

    broadcast not empty condition

    broadcast not full condition

    unlock mutex
```

5.2. Manager.c and Manager.h: The directory copying utility's manager thread's functionality is defined and implemented by the manager.h and manager.c files. The buffer and source and destination directory locations, as well as function prototypes for controlling the directory copying operation, are stored in the manager_args structure provided in manager.h. The implementation of these functions may be found in the manager.c file. create_directory_if_not_exists checks to see if a given directory already exists and, if not, creates it. The function ensure_parent_directories_exist verifies the existence of each parent directory for a specified file path. copy_file takes care of adding file descriptors to the buffer, updating pertinent counters, and copying a file or establishing a FIFO. Process_directory copies files and directories in a directory while updating counters in a recursive manner. By identifying the kind of source path—directory, FIFO, or ordinary file—and executing the relevant methods to handle them, the manager function starts the process by making sure directories are established and files are copied. When copying is finished, it marks the buffer as done and uses a barrier to wait for all worker threads to synchronize. This approach controls tasks and worker-manager thread interactions to enable synchronized and efficient copying of directories and files.

Pseudocode:

```
// Function to create a destination directory if it does not exist

function create_directory_if_not_exists(dir_path)

    if directory does not exist

        create directory

        if creation fails

            print error and exit

// Function to ensure the parent directories exist for the given file path

function ensure_parent_directories_exist(file_path)

    duplicate file path

    find the last slash in the path
```

```
if last slash exists
    terminate string at the last slash
    create directory if it does not exist
free duplicated string
```

```
// Function to copy a file from source to destination
```

```
function copy_file(src_path, dst_path, buffer, mode)
```

```
    ensure parent directories exist
```

```
    if file is FIFO
```

```
        create FIFO file
```

```
        if creation fails
```

```
            print error
```

```
            return
```

```
        increment FIFO file counter
```

```
    else // Regular file
```

```
        open source file
```

```
        if opening fails
```

```
            print error
```

```
            return
```

```
        open destination file
```

```
        if opening fails
```

```
            print error and close source file descriptor
```

```
            return
```

```
        create file descriptor structure
```

```
        add file descriptor to buffer
```

```
        increment regular file counter
```

```
// Function to process a directory
```

```
function process_directory(src_dir, dst_dir, buffer)
```



```
ensure destination directory exists
open source directory
if opening fails
    print error and set buffer as done
    return
while reading directory entries and not done
    if entry is . or ..
        continue
    construct source path
    construct destination path
    get file status
    if getting status fails
        print error and continue
    if entry is a directory
        recursively process directory and increment directory counter
    else if entry is a FIFO
        copy FIFO file
    else if entry is a regular file
        copy regular file
close source directory
```

// Manager function to handle copying process

```
function manager(arg)
    cast argument to manager_args pointer
    get buffer from arguments
    get source and destination paths from arguments
    get status of source path
    if getting status fails
        print error and set buffer as done
```

```
    return NULL

if source path is a directory
    create root destination directory
    ensure root destination directory exists
    process source directory
else if source path is a FIFO
    construct destination file path
    copy FIFO file
else if source path is a regular file
    construct destination file path
    copy regular file
else
    print error for unsupported file type and set buffer as done
    return NULL

set buffer as done

wait for all worker threads to reach this point

return NULL
```

5.3 Worker.c and Worker.h: The directory copying utility's worker thread functionality is defined in the worker.h and worker.c files. The shared buffer for file descriptors is represented by a buffer_str pointer, which is converted to the parameter of the worker function in worker.c. After allocating memory for a buffer to read from and write to files, it starts a loop that uses buffer_remove to retrieve file descriptors until the global done variable indicates that the loop should end. It transfers data from the source file to the destination file while properly managing mistakes and interruptions. File descriptors are closed and a message is printed after copying. Using a mutex to update the global total_bytes_copied variable securely, the worker keeps track of the total number of bytes copied. To ensure effective and synchronized file copying across many threads, the worker thread then waits at a barrier for synchronization with other threads before clearing the allocated buffer and quitting.

Pseudocode:

// Worker thread function

function worker(arg)

 cast arg to buffer_str pointer

 allocate memory for buffer

 if memory allocation fails

 print error and return

 initialize total bytes copied by this thread to 0

 while not done

 get file descriptors from buffer

 if file descriptors are invalid

 break

 while read data from source file into buffer

 if read fails and is not interrupted by signal

 print error

 close file descriptors

 free buffer

 return

 write data from buffer to destination file

 while data remains to be written

 if write fails and is not interrupted by signal

 print error

 close file descriptors

 free buffer

 return

update write pointer and bytes remaining

update total bytes copied by this thread

if read fails and is not interrupted by signal

print error

close file descriptors

print copy completion message

lock mutex

update global total bytes copied

unlock mutex

wait for all threads to finish using barrier

free buffer

return

5.4 Main.c: The directory copying utility's main.c file handles the main logic, initializing global variables and managing command-line options for source, destination, buffer size, and worker count. It initializes the buffer, configures SIGINT signal handling for graceful termination, and starts worker threads and a manager thread for handling file copying and directory processing, respectively. To guarantee effective, parallel file copying, execution time is monitored and threads are synchronized with the use of mutexes and barriers. A thorough and synchronized method of parallel directory copying is provided by the destruction of the buffer, memory release, and printing of statistics, which include the total number of files transferred, total bytes copied, and elapsed time, once all threads have finished their duties.

Pseudocode:

```
// Function to print usage message
function print_usage(prog_name)
    print "Usage: prog_name <buffer_size> <num_workers> <src_dir> <dst_dir>"

// Signal handler for SIGINT
function handle_signal(sig)
    if sig is SIGINT
        print "Ctrl-C signal received. Copying stopped."
        set interrupted and done flags to 1
        set buffer as done

// Function to print statistics
function print_statistics(num_workers, buffer_size, elapsed)
    calculate elapsed time in minutes, seconds, and milliseconds
    print statistics including number of files, directories, total bytes copied, and total time

// Main function
function main(argc, argv)
    if argc is not 5
        print_usage(argv[0])
        exit with failure

    parse buffer_size, num_workers, src_dir, dst_dir from argv
    if buffer_size or num_workers is less than or equal to 0
        print_usage(argv[0])
        exit with failure

    print welcome message
```

set up signal handling for SIGINT

create destination directory if it does not exist

start measuring time

initialize buffer with buffer_size

print "Files are copying..."

create and start manager thread with src_dir, dst_dir, and buffer

allocate memory for worker threads

if allocation fails

 print error and exit with failure

create and start worker threads with buffer

wait for manager thread to finish

wait for all worker threads to finish

destroy buffer and free memory

stop measuring time and calculate elapsed time

print statistics with num_workers, buffer_size, and elapsed time

print "Files copy operation completed successfully. Goodbye!"

return 0

6. Example Outputs:

6.1. Test 1 (in pdf):

```
seker@seker-VirtualBox: ~/Desktop/hw5/put_your_codes_here
File Edit View Search Terminal Help
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ make
gcc -o MMCP 200104004085_main.c 200104004085_buffer.c 200104004085_manager.c 200104004085_worker.c -pthread -lrt
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ valgrind ./MMCP 10 10 ./testdir ./tocopy
==2030== Memcheck, a memory error detector
==2030== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==2030== Using Valgrind 3.13.0 and LibVEX; rerun with -h for copyright info
==2030== Command: ./MMCP 10 10 ./testdir ./tocopy
==2030==
Welcome to the MMCP directory copying system!!!
Files are copying...

----- STATISTICS -----
Consumers: 10 - Buffer Size: 10
Number of Regular Files: 3110
Number of FIFO Files: 0
Number of Directories: 151
TOTAL BYTES COPIED: 73020554
TOTAL TIME: 01:30.320 (minisec.millis)
Files are copy operation completed successfully.
Goodbye!!!
==2030==
==2030== HEAP SUMMARY:
==2030==   in use at exit: 0 bytes in 0 blocks
==2030==   total heap usage: 3,292 allocs, 3,292 frees, 5,131,301 bytes allocated
==2030==
==2030== All heap blocks were freed -- no leaks are possible
==2030==
==2030== For counts of detected and suppressed errors, rerun with: -v
==2030== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$

seker@seker-VirtualBox:~/Desktop/hw5/tocopy/testdir
File Edit View Search Terminal Help
seker@seker-VirtualBox:~/Desktop/hw5/tocopy$ ls -l
total 0
seker@seker-VirtualBox:~/Desktop/hw5/tocopy$ cd testdir/
seker@seker-VirtualBox:~/Desktop/hw5/tocopy/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 29 10:20 appveyor.yml
drwx----- 2 seker seker 4096 May 29 10:20 ci
-rw-rw-r-- 1 seker seker 182 May 29 10:20 configure
-rw-rw-r-- 1 seker seker 2907 May 29 10:27 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 29 10:27 filelist
-rw-rw-r-- 1 seker seker 21217 May 29 10:20 Makefile
drwx----- 3 seker seker 4096 May 29 10:20 nsts
drwx----- 2 seker seker 4096 May 29 10:27 plmmaps
-rw-rw-r-- 1 seker seker 5946 May 29 10:20 README.md
-rw-rw-r-- 1 seker seker 4096 May 29 10:20 README.txt
drwx----- 19 seker seker 4096 May 29 10:28 runtime
drwx----- 15 seker seker 12288 May 29 10:27 src
drwx----- 2 seker seker 4096 May 29 10:27 tools
-rw-rw-r-- 1 seker seker 3843 May 29 10:20 uninstall.txt
-rw-rw-r-- 1 seker seker 1612 May 29 10:20 vntutor.bat
-rw-rw-r-- 1 seker seker 2901 May 29 10:27 vntutor.com
seker@seker-VirtualBox:~/Desktop/hw5/tocopy/testdir$

seker@seker-VirtualBox:~/Desktop/hw5/testdir
File Edit View Search Terminal Help
seker@seker-VirtualBox:~/Desktop/hw5/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 25 21:24 appveyor.yml
drwx----- 2 seker seker 4096 May 25 21:18 ci
-rw-rw-r-- 1 seker seker 182 May 25 21:24 configure
-rw-rw-r-- 1 seker seker 2907 May 25 21:24 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 25 21:24 filelist
-rw-rw-r-- 1 seker seker 21217 May 25 21:24 Makefile
drwx----- 3 seker seker 4096 May 25 21:18 nsts
drwx----- 2 seker seker 4096 May 25 21:18 plmmaps
-rw-rw-r-- 1 seker seker 5946 May 25 21:24 README.md
-rw-rw-r-- 1 seker seker 4096 May 25 21:24 README.txt
drwx----- 19 seker seker 4096 May 25 21:18 runtime
drwx----- 15 seker seker 12288 May 25 21:18 src
drwx----- 2 seker seker 4096 May 25 21:18 tools
-rw-rw-r-- 1 seker seker 3843 May 25 21:24 uninstall.txt
-rw-rw-r-- 1 seker seker 1612 May 25 21:24 vntutor.bat
-rw-rw-r-- 1 seker seker 2901 May 25 21:24 vntutor.com
seker@seker-VirtualBox:~/Desktop/hw5/testdir$
```

6.2. Test 2 (in pdf):

```
seker@seker-VirtualBox: ~/Desktop/hw5/put_your_codes_here
File Edit View Search Terminal Help
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ make all
gcc -o MMCP 200104004085_main.c 200104004085_buffer.c 200104004085_manager.c 200104004085_worker.c -pthread -lrt
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ ./MMCP 10 4 ./testdir/src ./libbterm/src
Welcome to the MMCP directory copying system!!!
Files are copying...

----- STATISTICS -----
Consumers: 4 - Buffer Size: 10
Number of Regular Files: 140
Number of FIFO Files: 0
Number of Directories: 2
TOTAL BYTES COPIED: 24873082
TOTAL TIME: 00:02.420 (minisec.millis)
Files are copy operation completed successfully.
Goodbye!!!
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$

seker@seker-VirtualBox:~/Desktop/hw5/testdir/src/libbterm/src
File Edit View Search Terminal Help
seker@seker-VirtualBox:~/Desktop/hw5/testdir/src/libbterm/src$ ls
autocmd.c      ex_cmdidxs.h  gui_photon.c  iid_ole.c
beval.c        ex_cmds2.c    gui_w32.c     indent.c
beval.h        ex_cmds.c     gui_w32_rc.h  inrp1st.xml
btgvin4.bat    ex_cmds.h     gui_x11.c     insexpand.c
btgvin.bat     ex_dcmd.c     gui_x11_pm.h  INSTALL
blob.c         ex_eval.c     gui_xmbw.h    INSTALLani.txt
blowfish.c    ex_getln.c    gui_xmbw.c    INSTALLmac.txt
buffer.c       feature.h     gui_xmbwp.h   INSTALLsh
change.c       fileio.c     gvln.exe.mnf  INSTALLpc.txt
channel.c      findfile.c   gvlnxst       install-sh
charset.c      fold.c        gvlnxst       installsh
config.h.in    getchar.c    gvimtutor     INSTALLvms.txt
config.mk.dist glib_lme.cpp hanguln.c     INSTALLx.txt
config.mk.in   glib_lme.h   hardcopy.c    iscopyty.c
configure      global.h     hashstab.c    iscopyty.h
configure.ac   gui_at_fs.c  tf_escscope.c lsl1551098739430.pdf
create_cmdidxs.vim gui_at_sch.h tf_lua.c      json.test.c
crypt.c        gui_at_sb.c  tf_mzsch.c   keyboard.c
debugger.c     gui_beval.c  tf_ole.c     keyword.test.c
dehqx.py       gui_c         tf_ole.cpp   mouse.c
dict.c         gui_dwrite.cpp tf_ole_idl   MRT10.pdf
diff.c         gui_dwrite.h  tf_perl_msvc parser.c
dtgraph.c      gui_gtk.c    tf_perlftlo.c pen.c
dlldata.c     gui_gtk_rc.c tf_perl_x86  rect.h
dosinst.c     gui_gtk_res.xml tf_py_both.h state.c
dosinst.h     gui_gtk_vms.h tf_python3.c termscreen.c
edit.c        gui_gtk_x11.c tf_python.c  unicode.c
encoding.c     gui_h        tf_ruby.c    utf8.h
eval.c         gui_mac.c    tf_tcl.c     vterm.c
evalfunc.c     gui_motif.c  tf_xcvsrv.c  vterm_internal.h
seker@seker-VirtualBox:~/Desktop/hw5/testdir/src/libbterm/src$
```

6.3. Test 3 (in pdf):

```
seker@seker-VirtualBox: ~/Desktop/hw5/put_your_codes_here
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ make
gcc -o MMCP 200104004085_main.c 200104004085_buffer.c 200104004085_manager.c 200104004085_worker.c -lpthread -lrt
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ ./MMCP 10 10 ../testdir ../toCopy
Welcome to the MMCP directory copying system!!!
Files are copying...
----- STATISTICS -----
Consumers: 10 - Buffer Size: 10
Number of Regular Files: 3116
Number of FIFO Files: 0
Number of Directories: 151
TOTAL BYTES COPIED: 73520554
TOTAL TIME: 00:05.314 (minisc.mllll)
Files are copy operation completed successfully.
Goodbye!!!
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$

seker@seker-VirtualBox: ~/Desktop/hw5/testdir
seker@seker-VirtualBox:~/Desktop/hw5/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 25 21:24 appveyor.yml
drwx----- 2 seker seker 4096 May 25 21:18 cl
-rw-rw-r-- 1 seker seker 182 May 25 21:24 configure
-rw-rw-r-- 1 seker seker 2907 May 25 21:24 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 25 21:24 Filelist
-rw-rw-r-- 1 seker seker 21217 May 25 21:24 Makefile
drwx----- 3 seker seker 4096 May 25 21:18 nsis
drwx----- 2 seker seker 4096 May 25 21:18 plxmaps
drwx----- 19 seker seker 4096 May 25 21:18 README.md
-rw-rw-r-- 1 seker seker 5940 May 25 21:24 README.nd
-rw-rw-r-- 1 seker seker 4900 May 25 21:24 README.txt
drwx----- 15 seker seker 12288 May 25 21:18 runtime
drwx----- 2 seker seker 4096 May 25 21:18 src
drwx----- 2 seker seker 4096 May 25 21:18 tools
-rw-rw-r-- 1 seker seker 3843 May 25 21:24 uninstall.txt
-rw-rw-r-- 1 seker seker 1812 May 25 21:24 vintutor.bat
-rw-rw-r-- 1 seker seker 2901 May 25 21:24 vintutor.com
seker@seker-VirtualBox:~/Desktop/hw5/testdir$

seker@seker-VirtualBox: ~/Desktop/hw5/toCopy/testdir
seker@seker-VirtualBox:~/Desktop/hw5/toCopy/testdir$ cd ..
seker@seker-VirtualBox:~/Desktop/hw5$ ls -l
total 12
drwxrwxr-x 3 seker seker 4096 May 29 16:30 put_your_codes_here
drwx----- 10 seker seker 4096 May 25 21:18 testdir
drwxrwxr-x 2 seker seker 4096 May 29 16:30 toCopy
seker@seker-VirtualBox:~/Desktop/hw5$ cd toCopy/
seker@seker-VirtualBox:~/Desktop/hw5/toCopy$ ls -l
total 4
drwx----- 10 seker seker 4096 May 29 16:35 testdir
seker@seker-VirtualBox:~/Desktop/hw5/toCopy/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 29 16:35 appveyor.yml
drwx----- 2 seker seker 4096 May 29 16:35 cl
-rw-rw-r-- 1 seker seker 182 May 29 16:35 configure
-rw-rw-r-- 1 seker seker 2907 May 29 16:35 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 29 16:35 Filelist
-rw-rw-r-- 1 seker seker 21217 May 29 16:35 Makefile
drwx----- 3 seker seker 4096 May 29 16:35 nsis
drwx----- 2 seker seker 4096 May 29 16:35 plxmaps
drwx----- 19 seker seker 4096 May 29 16:35 README.md
-rw-rw-r-- 1 seker seker 5940 May 29 16:35 README.nd
-rw-rw-r-- 1 seker seker 4900 May 29 16:35 README.txt
drwx----- 15 seker seker 12288 May 29 16:35 runtime
drwx----- 2 seker seker 4096 May 29 16:35 src
drwx----- 2 seker seker 4096 May 29 16:35 tools
-rw-rw-r-- 1 seker seker 3843 May 29 16:35 uninstall.txt
-rw-rw-r-- 1 seker seker 1812 May 29 16:35 vintutor.bat
-rw-rw-r-- 1 seker seker 2901 May 29 16:35 vintutor.com
seker@seker-VirtualBox:~/Desktop/hw5/toCopy/testdir$
```

6.4. ./MMCP 10 10 ../testdir ../toCopy:

```
seker@seker-VirtualBox: ~/Desktop/hw5/put_your_codes_here
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ make
gcc -o MMCP 200104004085_main.c 200104004085_buffer.c 200104004085_manager.c 200104004085_worker.c -lpthread -lrt
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ ./MMCP 10 10 ../testdir ../toCopy
Welcome to the MMCP directory copying system!!!
Files are copying...
----- STATISTICS -----
Consumers: 10 - Buffer Size: 10
Number of Regular Files: 3116
Number of FIFO Files: 0
Number of Directories: 151
TOTAL BYTES COPIED: 73520554
TOTAL TIME: 00:05.076 (minisc.mllll)
Files are copy operation completed successfully.
Goodbye!!!
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$

seker@seker-VirtualBox: ~/Desktop/hw5/testdir
seker@seker-VirtualBox:~/Desktop/hw5/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 25 21:24 appveyor.yml
drwx----- 2 seker seker 4096 May 25 21:18 cl
-rw-rw-r-- 1 seker seker 182 May 25 21:24 configure
-rw-rw-r-- 1 seker seker 2907 May 25 21:24 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 25 21:24 Filelist
-rw-rw-r-- 1 seker seker 21217 May 25 21:24 Makefile
drwx----- 3 seker seker 4096 May 25 21:18 nsis
drwx----- 2 seker seker 4096 May 25 21:18 plxmaps
drwx----- 19 seker seker 4096 May 25 21:18 README.md
-rw-rw-r-- 1 seker seker 5940 May 25 21:24 README.nd
-rw-rw-r-- 1 seker seker 4900 May 25 21:24 README.txt
drwx----- 15 seker seker 12288 May 25 21:18 runtime
drwx----- 2 seker seker 4096 May 25 21:18 src
drwx----- 2 seker seker 4096 May 25 21:18 tools
-rw-rw-r-- 1 seker seker 3843 May 25 21:24 uninstall.txt
-rw-rw-r-- 1 seker seker 1812 May 25 21:24 vintutor.bat
-rw-rw-r-- 1 seker seker 2901 May 25 21:24 vintutor.com
seker@seker-VirtualBox:~/Desktop/hw5/testdir$

seker@seker-VirtualBox: ~/Desktop/hw5/toCopy/testdir
seker@seker-VirtualBox:~/Desktop/hw5/toCopy/testdir$ cd ..
seker@seker-VirtualBox:~/Desktop/hw5$ ls -l
total 0
seker@seker-VirtualBox:~/Desktop/hw5/toCopy$ cd testdir/
seker@seker-VirtualBox:~/Desktop/hw5/toCopy/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 29 16:37 appveyor.yml
drwx----- 2 seker seker 4096 May 29 16:37 cl
-rw-rw-r-- 1 seker seker 182 May 29 16:37 configure
-rw-rw-r-- 1 seker seker 2907 May 29 16:37 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 29 16:37 Filelist
-rw-rw-r-- 1 seker seker 21217 May 29 16:37 Makefile
drwx----- 3 seker seker 4096 May 29 16:37 nsis
drwx----- 2 seker seker 4096 May 29 16:37 plxmaps
drwx----- 19 seker seker 4096 May 29 16:37 README.md
-rw-rw-r-- 1 seker seker 5940 May 29 16:37 README.nd
-rw-rw-r-- 1 seker seker 4900 May 29 16:37 README.txt
drwx----- 15 seker seker 12288 May 29 16:37 runtime
drwx----- 2 seker seker 4096 May 29 16:37 src
drwx----- 2 seker seker 4096 May 29 16:37 tools
-rw-rw-r-- 1 seker seker 3843 May 29 16:37 uninstall.txt
-rw-rw-r-- 1 seker seker 1812 May 29 16:37 vintutor.bat
-rw-rw-r-- 1 seker seker 2901 May 29 16:37 vintutor.com
seker@seker-VirtualBox:~/Desktop/hw5/toCopy/testdir$
```


6.5. valgrind ./MWCp 1024 10 ../testdir ../tocopy:

```
seker@seker-VirtualBox: ~/Desktop/hw5/put_your_codes_here
File Edit View Search Terminal Help
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ make
gcc -o MWCp 200104004085_main.c 200104004085_buffer.c 200104004085_manager.c 200104004085_worker.c -lpthread -lrt
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ valgrind ./MWCp 1024 10 ../testdir ../tocopy
==2261== Memcheck, a memory error detector
==2261== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==2261== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==2261== Command: ./MWCp 1024 10 ../testdir ../tocopy
==2261==
Welcome to the MWCp directory copying system!!!
Files are copying...

----- STATISTICS -----
Consumers: 10 - Buffer Size: 1024
Number of Regular Files: 3116
Number of FIFO Files: 0
Number of Directories: 151
TOTAL BYTES COPIED: 73328554
TOTAL TIME: 00:01:831 (min:sec.mlltt)
Files are copy operation completed successfully.
Goodbye!!!
==2261==
==2261== HEAP SUMMARY:
==2261==   in use at exit: 0 bytes in 0 blocks
==2261==   total heap usage: 3,292 allocs, 3,292 frees, 5,149,553 bytes allocated
==2261==
==2261== All heap blocks were freed -- no leaks are possible
==2261==
==2261== For counts of detected and suppressed errors, rerun with: -v
==2261== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$

seker@seker-VirtualBox:~/Desktop/hw5/tocopy$ ls -l
total 4
drwx----- 10 seker seker 4096 May 29 16:39 testdir
seker@seker-VirtualBox:~/Desktop/hw5/tocopy$ cd testdir/
seker@seker-VirtualBox:~/Desktop/hw5/tocopy/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 29 16:39 appveyor.yml
drwx----- 2 seker seker 4096 May 29 16:39 ci
-rw-rw-r-- 1 seker seker 182 May 29 16:39 configure
-rw-rw-r-- 1 seker seker 2907 May 29 16:39 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 29 16:39 filelist
-rw-rw-r-- 1 seker seker 21217 May 29 16:39 makefile
drwx----- 3 seker seker 4096 May 29 16:39 nsis
drwx----- 2 seker seker 4096 May 29 16:39 plxmaps
drwx----- 2 seker seker 4096 May 29 16:39 README.txt
-rw-rw-r-- 1 seker seker 4900 May 29 16:39 runtime
drwx----- 19 seker seker 4096 May 29 16:39 src
drwx----- 15 seker seker 12288 May 29 16:39 tools
-rw-rw-r-- 1 seker seker 3843 May 29 16:39 uninstall.txt
-rw-rw-r-- 1 seker seker 1812 May 29 16:39 vintutor.bat
-rw-rw-r-- 1 seker seker 2901 May 29 16:39 vintutor.com
seker@seker-VirtualBox:~/Desktop/hw5/tocopy/testdir$

seker@seker-VirtualBox:~/Desktop/hw5/testdir
File Edit View Search Terminal Help

seker@seker-VirtualBox:~/Desktop/hw5/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 25 21:24 appveyor.yml
drwx----- 2 seker seker 4096 May 25 21:18 ci
-rw-rw-r-- 1 seker seker 182 May 25 21:24 configure
-rw-rw-r-- 1 seker seker 2907 May 25 21:24 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 25 21:24 filelist
-rw-rw-r-- 1 seker seker 21217 May 25 21:24 makefile
drwx----- 3 seker seker 4096 May 25 21:18 nsis
drwx----- 2 seker seker 4096 May 25 21:18 plxmaps
drwx----- 2 seker seker 4096 May 25 21:18 README.txt
-rw-rw-r-- 1 seker seker 4900 May 25 21:18 runtime
drwx----- 19 seker seker 4096 May 25 21:18 src
drwx----- 15 seker seker 12288 May 25 21:18 tools
-rw-rw-r-- 1 seker seker 3843 May 25 21:24 uninstall.txt
-rw-rw-r-- 1 seker seker 1812 May 25 21:24 vintutor.bat
-rw-rw-r-- 1 seker seker 2901 May 25 21:24 vintutor.com
seker@seker-VirtualBox:~/Desktop/hw5/testdir$
```

6.6. ./MWCp 1024 10 ../testdir ../tocopy:

```
seker@seker-VirtualBox: ~/Desktop/hw5/put_your_codes_here
File Edit View Search Terminal Help
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ make
gcc -o MWCp 200104004085_main.c 200104004085_buffer.c 200104004085_manager.c 200104004085_worker.c -lpthread -lrt
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ ./MWCp 1024 10 ../testdir ../tocopy
Welcome to the MWCp directory copying system!!!
Files are copying...

----- STATISTICS -----
Consumers: 10 - Buffer Size: 1024
Number of Regular Files: 3116
Number of FIFO Files: 0
Number of Directories: 151
TOTAL BYTES COPIED: 73328554
TOTAL TIME: 00:00:160 (min:sec.mlltt)
Files are copy operation completed successfully.
Goodbye!!!
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$

seker@seker-VirtualBox:~/Desktop/hw5/tocopy$ ls -l
total 4
drwx----- 10 seker seker 4096 May 29 16:41 testdir
seker@seker-VirtualBox:~/Desktop/hw5/tocopy$ cd testdir/
seker@seker-VirtualBox:~/Desktop/hw5/tocopy/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 29 16:41 appveyor.yml
drwx----- 2 seker seker 4096 May 29 16:41 ci
-rw-rw-r-- 1 seker seker 182 May 29 16:41 configure
-rw-rw-r-- 1 seker seker 2907 May 29 16:41 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 29 16:41 filelist
-rw-rw-r-- 1 seker seker 21217 May 29 16:41 makefile
drwx----- 3 seker seker 4096 May 29 16:41 nsis
drwx----- 2 seker seker 4096 May 29 16:41 plxmaps
drwx----- 2 seker seker 4096 May 29 16:41 README.txt
-rw-rw-r-- 1 seker seker 4900 May 29 16:41 runtime
drwx----- 19 seker seker 4096 May 29 16:41 src
drwx----- 15 seker seker 12288 May 29 16:41 tools
-rw-rw-r-- 1 seker seker 3843 May 29 16:41 uninstall.txt
-rw-rw-r-- 1 seker seker 1812 May 29 16:41 vintutor.bat
-rw-rw-r-- 1 seker seker 2901 May 29 16:41 vintutor.com
seker@seker-VirtualBox:~/Desktop/hw5/tocopy/testdir$

seker@seker-VirtualBox:~/Desktop/hw5/testdir
File Edit View Search Terminal Help

seker@seker-VirtualBox:~/Desktop/hw5/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 25 21:24 appveyor.yml
drwx----- 2 seker seker 4096 May 25 21:18 ci
-rw-rw-r-- 1 seker seker 182 May 25 21:24 configure
-rw-rw-r-- 1 seker seker 2907 May 25 21:24 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 25 21:24 filelist
-rw-rw-r-- 1 seker seker 21217 May 25 21:24 makefile
drwx----- 3 seker seker 4096 May 25 21:18 nsis
drwx----- 2 seker seker 4096 May 25 21:18 plxmaps
drwx----- 2 seker seker 4096 May 25 21:18 README.txt
-rw-rw-r-- 1 seker seker 4900 May 25 21:18 runtime
drwx----- 19 seker seker 4096 May 25 21:18 src
drwx----- 15 seker seker 12288 May 25 21:18 tools
-rw-rw-r-- 1 seker seker 3843 May 25 21:24 uninstall.txt
-rw-rw-r-- 1 seker seker 1812 May 25 21:24 vintutor.bat
-rw-rw-r-- 1 seker seker 2901 May 25 21:24 vintutor.com
seker@seker-VirtualBox:~/Desktop/hw5/testdir$
```

6.7. valgrind ./MWCp 10 4 ../testdir/src/libvterm/src ../newfile:

```
seker@seker-VirtualBox: ~/Desktop/hw5/put_your_codes_here
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ make
gcc -o MWCp 200104004085_main.c 200104004085_buffer.c 200104004085_manager.c 200104004085_worker.c -lpthread -lrt
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ valgrind ./MWCp 10 4 ../testdir/src/libvterm/src ../newfile
==2376== Memcheck, a memory error detector
==2376== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==2376== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==2376== Command: ./MWCp 10 4 ../testdir/src/libvterm/src ../newfile
==2376==
Welcome to the MWCp directory copying system!!!
Files are copying...
----- STATISTICS -----
Consumers: 4 - Buffer Size: 10
Number of Regular Files: 140
Number of FIFO Files: 0
Number of Directories: 2
TOTAL BYTES COPIED: 24073082
TOTAL TIME: 00:16:764 (minisec.millis)
Files are copy operation completed successfully.
Goodbye!!!
==2376==
==2376== HEAP SUMMARY:
==2376==   in use at exit: 0 bytes in 0 blocks
==2376== total heap usage: 155 allocs, 155 frees, 104,758 bytes allocated
==2376==
==2376== All heap blocks were freed -- no leaks are possible
==2376==
==2376== For counts of detected and suppressed errors, rerun with: -v
==2376== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
seker@seker-VirtualBox:~/Desktop/hw5/testdir/src/libvterm/src
blob.c          ex_eval.c      gui_xmldlg.c   INSTALLant.txt
blowfish.c     ex_getln.c     gui_xmnewb.c   INSTALLmac.txt
buffer.c        feature.h      gui_xmnewb.h   installman.sh
change.c        fileto.c       gui_xmnewb.h   installml.sh
channel.c       findfile.c     gvln.exe.mnf   INSTALLipc.txt
charset.c       fold.c         gvln.exe.mnf   INSTALLpc.txt
config.h.in    config.mk.dlst glib_lme.cpp   INSTALLvms.txt
config.mk.in   glib_lme.h     hardcopy.c     iscopypty.c
configure      globals.h      hashstab.c     iscopypty.h
configure.ac   gui_at_fs.c    tf_cscope.h    json.c
create_cndidx.vtm gui_athena.c   tf_lua.c       json_test.c
crypt.c        gui_at_sb.c    tf_lua.c       keyboard.c
debugger.c     gui_at_sb.h    tf_mzsch.h     keynap.h
dehqx.py       gui_beval.c    tf_mzsch.h     keyword_test.c
dict.c         gui_c.c        tf_ole.cpp     mouse.c
diff.c         gui_dwrtite.cpp tf_ole.h       MRT10.pdr
dlgraph.c      gui_dwrtite.h  tf_ole.idl     parser.c
dlm.idl        gui_gtk.c      tf_perl_msvc   perl5fio.c
dlldata.c     gui_gtk_f.h    tf_perl.xs     rect.h
dosinst.c     gui_gtk_res.xml tf_py_both.h   state.c
edit.c        gui_gtk_vms.h  tf_python3.c   termscreen.c
encoding.c    gui_gtk_x11.c  tf_ruby.c      unicode.c
eval.c        gui_h          utf8.h         utf8.h
evalfunc.c    gui_mac.c      tf_vterm.c     vterm.c
               gui_motif.c    tf_xcndrv.c    vterm_internal.h
seker@seker-VirtualBox:~/Desktop/hw5/testdir/src/libvterm/src$
```

6.8. valgrind ./MWCp 10 10 ../testdir ../toCopy:

```
seker@seker-VirtualBox: ~/Desktop/hw5/put_your_codes_here
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ make
gcc -o MWCp 200104004085_main.c 200104004085_buffer.c 200104004085_manager.c 200104004085_worker.c -lpthread -lrt
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ valgrind ./MWCp 10 10 ../testdir ../toCopy
==2403== Memcheck, a memory error detector
==2403== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==2403== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==2403== Command: ./MWCp 10 10 ../testdir ../toCopy
==2403==
Welcome to the MWCp directory copying system!!!
Files are copying...
----- STATISTICS -----
Consumers: 10 - Buffer Size: 10
Number of Regular Files: 3116
Number of FIFO Files: 0
Number of Directories: 151
TOTAL BYTES COPIED: 73520554
TOTAL TIME: 01:33:066 (minisec.millis)
Files are copy operation completed successfully.
Goodbye!!!
==2403==
==2403== HEAP SUMMARY:
==2403==   in use at exit: 0 bytes in 0 blocks
==2403== total heap usage: 3,292 allocs, 3,292 frees, 5,131,301 bytes allocated
==2403==
==2403== All heap blocks were freed -- no leaks are possible
==2403==
==2403== For counts of detected and suppressed errors, rerun with: -v
==2403== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$
seker@seker-VirtualBox:~/Desktop/hw5/testdir
seker@seker-VirtualBox:~/Desktop/hw5/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker 695 May 25 21:24 appveyor.yml
-rw-rw-r-- 2 seker seker 4096 May 25 21:18 ci
-rw-rw-r-- 1 seker seker 182 May 25 21:24 configure
-rw-rw-r-- 1 seker seker 2907 May 25 21:24 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 21108 May 25 21:24 FileList
-rw-rw-r-- 1 seker seker 21217 May 25 21:24 Makefile
drwx----- 3 seker seker 4096 May 25 21:18 nsls
drwx----- 2 seker seker 4096 May 25 21:18 pixmaps
drwx----- 2 seker seker 4096 May 25 21:48 READMEdr
-rw-rw-r-- 1 seker seker 5940 May 25 21:48 README.md
-rw-rw-r-- 1 seker seker 4900 May 25 21:24 README.txt
drwx----- 19 seker seker 4096 May 25 21:18 runtime
drwx----- 15 seker seker 12288 May 25 21:18 src
drwx----- 2 seker seker 4096 May 25 21:18 tools
-rw-rw-r-- 1 seker seker 3843 May 25 21:24 uninstall.txt
-rw-rw-r-- 1 seker seker 1812 May 25 21:24 vintutor.bat
-rw-rw-r-- 1 seker seker 2901 May 25 21:24 vintutor.com
seker@seker-VirtualBox:~/Desktop/hw5/testdir$
```

6.9. valgrind ./MWCp 10 10 ../testdir ../tocopy (with Ctrl-C signal):

```
seker@seker-VirtualBox: ~/Desktop/hw5/put_your_codes_here
File Edit View Search Terminal Help
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ make
gcc -o MWCp 200104004085_main.c 200104004085_buffer.c 200104004085_manager.c 200104004085_worker.c -lpthread -lrt
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$ valgrind ./MWCp 10 10 ../testdir ../tocopy
==2524== Memcheck, a memory error detector
==2524== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==2524== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==2524== Command: ./MWCp 10 10 ../testdir ../tocopy
==2524==
Welcome to the MWCp directory copying system!!!
Files are copying...
ACtrl-C signal received.
Copying stopped.

----- STATISTICS -----
Consumers: 10 - Buffer Size: 10
Number of Regular Files: 556
Number of FIFO Files: 0
Number of Directories: 23
TOTAL BYTES COPIED: 4546471
TOTAL TIME: 00:00:523 (min:sec.millis)
Files are copy operation completed successfully.
Goodbye!!!
==2524==
==2524== HEAP SUMMARY:
==2524==    in use at exit: 0 bytes in 0 blocks
==2524==    total heap usage: 604 allocs, 604 frees, 818,601 bytes allocated
==2524==
==2524== All heap blocks were freed -- no leaks are possible
==2524==
==2524== For counts of detected and suppressed errors, rerun with: -v
==2524== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
seker@seker-VirtualBox:~/Desktop/hw5/put_your_codes_here$

seker@seker-VirtualBox: ~/Desktop/hw5/tocopy/testdir
File Edit View Search Terminal Help
seker@seker-VirtualBox:~/Desktop/hw5/tocopy$ ls -l
total 0
seker@seker-VirtualBox:~/Desktop/hw5/tocopy$ ls -l
total 4
drwx----- 6 seker seker 4096 May 29 10:51 testdir
seker@seker-VirtualBox:~/Desktop/hw5/tocopy$ cd testdir/
seker@seker-VirtualBox:~/Desktop/hw5/tocopy/testdir$ ls -l
total 64
-rw-rw-r-- 1 seker seker  695 May 29 10:51 appveyor.yml
-rw-rw-r-- 1 seker seker  182 May 29 10:51 configure
-rw-rw-r-- 1 seker seker 21217 May 29 10:51 Makefile
drwx----- 3 seker seker  4096 May 29 10:51 nsis
drwx----- 2 seker seker  4096 May 29 10:51 READMEdir
-rw-rw-r-- 1 seker seker  5946 May 29 10:51 README.md
-rw-rw-r-- 1 seker seker  4900 May 29 10:51 README.txt
drwx----- 6 seker seker  4096 May 29 10:51 src
-rw-rw-r-- 1 seker seker 3843 May 29 10:51 uninstall.txt
seker@seker-VirtualBox:~/Desktop/hw5/tocopy/testdir$

seker@seker-VirtualBox: ~/Desktop/hw5/testdir
seker@seker-VirtualBox:~/Desktop/hw5/testdir$ ls -l
total 124
-rw-rw-r-- 1 seker seker  695 May 25 21:24 appveyor.yml
drwx----- 2 seker seker  4096 May 25 21:18 ci
-rw-rw-r-- 1 seker seker  182 May 25 21:24 configure
-rw-rw-r-- 1 seker seker 2907 May 25 21:24 CONTRIBUTING.md
-rw-rw-r-- 1 seker seker 23108 May 25 21:24 Filelist
-rw-rw-r-- 1 seker seker 21217 May 25 21:24 Makefile
drwx----- 3 seker seker  4096 May 25 21:18 nsis
drwx----- 2 seker seker  4096 May 25 21:18 plxmaps
drwx----- 2 seker seker  4096 May 25 21:18 READMEdir
-rw-rw-r-- 1 seker seker  5946 May 25 21:24 README.md
-rw-rw-r-- 1 seker seker  4900 May 25 21:24 README.txt
drwx----- 19 seker seker  4096 May 25 21:18 runtime
drwx----- 15 seker seker 12288 May 25 21:18 src
-rw-rw-r-- 2 seker seker  4096 May 25 21:18 tools
-rw-rw-r-- 1 seker seker 3843 May 25 21:24 uninstall.txt
-rw-rw-r-- 1 seker seker 1812 May 25 21:24 vintutor.bat
-rw-rw-r-- 1 seker seker 2901 May 25 21:24 vintutor.com
seker@seker-VirtualBox:~/Desktop/hw5/testdir$
```