CSE344 Systems Programming

Homework 5 Report

Ömer Faruk Çolakel

200104004043

How to Compile and Run

```
omerfcolakel@fakurdesktop:~/Desktop/sysprog/HW5/put_your_codes_here$ make clean
rm -f MWCp
omerfcolakel@fakurdesktop:~/Desktop/sysprog/HW5/put_your_codes_here$ make
gcc 200104004043_main.c -lrt -lpthread -o MWCp
omerfcolakel@fakurdesktop:~/Desktop/sysprog/HW5/put_your_codes_here$ valgrind  .
/MWCp 10 10 ../testdir/src/libvterm ../tocopy
==102995== Memcheck, a memory error detector
==102995== Copyright (C) 2002-2024, and GNU GPL'd, by Julian Seward et al.
==102995== Using Valgrind-3.23.0 and LibVEX; rerun with -h for copyright info
==102995== Command: ./MWCp 10 10 ../testdir/src/libvterm ../tocopy
==102995==
Copied: ../testdir/src/libvterm/bin/unterm.c -> ../tocopy/bin/unterm.c
Copied: ../testdir/src/libvterm/bin/vterm-ctrl.c -> ../tocopy/bin/vterm-ctrl.c
Copied: ../testdir/src/libvterm/bin/vterm-dump.c -> ../tocopy/bin/vterm-dump.c
Copied: ../testdir/src/libvterm/doc/seqs.txt -> ../tocopy/doc/seqs.txt
Copied: ../testdir/src/libvterm/doc/URLs -> ../tocopy/doc/URLs
Copied: ../testdir/src/libvterm/include/vterm_keycodes.h -> ../tocopy/include/vt
erm_keycodes.h
Copied: ../testdir/src/libvterm/include/vterm.h -> ../tocopy/include/vterm.h
Copied: ../testdir/src/libvterm/src/GvimExt/gvimext.def -> ../tocopy/src/GvimExt
/gvimext.def
Copied: ../testdir/src/libvterm/src/GvimExt/gvimext.inf -> ../tocopy/src/GvimExt
/gvimext.inf
Copied: ../testdir/src/libvterm/src/GvimExt/gvimext.cpp -> ../tocopy/src/GvimExt
```

- make: Compile main.c as MWCp.
- make clean: Remove MWCp.

Changes Over the HW4

1.
```c
pthread_barrier_t barrier;                          // Global barrier variable
```
Addition of a global barrier.

2.
```c
if (pthread_barrier_init(&barrier, NULL, numberOfWorkers + 1) != 0)
{
    perror("pthread_barrier_init");
    exit(EXIT_FAILURE);
}
```
Initializing the barrier at the main function before creating the threads.

3.
```
pthread_barrier_destroy(&barrier);
```
Destroying the barrier at the end of the program (standard exit).

4.
```
// Wait for all worker threads to reach this point
pthread_barrier_wait(&barrier);
```
Waiting in the manager thread for all worker threads to reach this point.

5.
```
pthread_barrier_wait(&barrier); // Wait for all worker threads to reach this point
```
Waiting for all workers to reach this point at the end of every worker thread.

6.
```
pthread_barrier_destroy(&barrier);
```
Destroying the barrier with SIGINT handler.

Example Input and Outputs

1. Test1

```
Copied: ../testdir/src/libvterm/t/45screen_resize.test -> ../tocopy/t/45screen_r
esize.test
Copied: ../testdir/src/libvterm/t/45screen_protect.test -> ../tocopy/t/45screen_
protect.test
Copied: ../testdir/src/libvterm/t/46screen_extent.test -> ../tocopy/t/46screen_e
xtent.test
Copied: ../testdir/src/libvterm/t/47screen_dbl_wh.test -> ../tocopy/t/47screen_d
bl_wh.test
Copied: ../testdir/src/libvterm/t/48screen_termprops.test -> ../tocopy/t/48scree
n_termprops.test
Copied: ../testdir/src/libvterm/t/90vttest_01-movement-1.test -> ../tocopy/t/90v
ttest_01-movement-1.test
Copied: ../testdir/src/libvterm/t/90vttest_01-movement-2.test -> ../tocopy/t/90v
ttest_01-movement-2.test
Copied: ../testdir/src/libvterm/t/90vttest_01-movement-4.test -> ../tocopy/t/90v
ttest_01-movement-4.test
Copied: ../testdir/src/libvterm/t/90vttest_01-movement-3.test -> ../tocopy/t/90v
ttest_01-movement-3.test
Copied: ../testdir/src/libvterm/t/90vttest_02-screen-1.test -> ../tocopy/t/90vtt
est_02-screen-1.test
Copied: ../testdir/src/libvterm/t/90vttest_02-screen-2.test -> ../tocopy/t/90vtt
est_02-screen-2.test
Copied: ../testdir/src/libvterm/t/90vttest_02-screen-3.test -> ../tocopy/t/90vtt
est_02-screen-3.test
Copied: ../testdir/src/libvterm/t/90vttest_02-screen-4.test -> ../tocopy/t/90vtt
est_02-screen-4.test
Copied: ../testdir/src/libvterm/t/92lp1640917.test -> ../tocopy/t/92lp1640917.te
st
Copied: ../testdir/src/libvterm/t/run-test.pl -> ../tocopy/t/run-test.pl
Copied: ../testdir/src/libvterm/.bzrignore -> ../tocopy/.bzrignore
Copied: ../testdir/src/libvterm/t/harness.c -> ../tocopy/t/harness.c
Copied: ../testdir/src/libvterm/.gitignore -> ../tocopy/.gitignore
Copied: ../testdir/src/libvterm/Makefile -> ../tocopy/Makefile
Copied: ../testdir/src/libvterm/LICENSE -> ../tocopy/LICENSE
Copied: ../testdir/src/libvterm/README -> ../tocopy/README
Copied: ../testdir/src/libvterm/vterm.pc.in -> ../tocopy/vterm.pc.in
Copied: ../testdir/src/libvterm/tbl2inc_c.pl -> ../tocopy/tbl2inc_c.pl
Copied: ../testdir/src/libvterm/src/MRT10.pdf -> ../tocopy/src/MRT10.pdf
Copied: ../testdir/src/libvterm/src/isl1551098739430.pdf -> ../tocopy/src/isl155
1098739430.pdf
All files copied successfully.

--------------STATISTICS-------------------
Consumers: 10 - Buffer Size: 10
Number of Regular File: 194
Number of FIFO File: 0
Number of Directory: 7
TOTAL BYTES COPIED: 25009680
TOTAL TIME: 00:00.251 (min:sec.mili)
==104052==
==104052== HEAP SUMMARY:
==104052==     in use at exit: 0 bytes in 0 blocks
==104052==   total heap usage: 214 allocs, 214 frees, 1,064,240 bytes allocated
==104052==
==104052== All heap blocks were freed -- no leaks are possible
==104052==
==104052== For lists of detected and suppressed errors, rerun with: -s
==104052== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
omerfcolakel@fakurdesktop:~/Desktop/sysprog/HW5/put_your_codes_here$
```

2. Test2

```
Copied: ../testdir/src/libvterm/src/gvimtutor -> ../toCopy/gvimtutor
Copied: ../testdir/src/libvterm/src/gvim.exe.mnf -> ../toCopy/gvim.exe.mnf
Copied: ../testdir/src/libvterm/src/if_ole.cpp -> ../toCopy/if_ole.cpp
Copied: ../testdir/src/libvterm/src/gui_gtk_vms.h -> ../toCopy/gui_gtk_vms.h
Copied: ../testdir/src/libvterm/src/if_ole.h -> ../toCopy/if_ole.h
Copied: ../testdir/src/libvterm/src/if_ole.idl -> ../toCopy/if_ole.idl
Copied: ../testdir/src/libvterm/src/if_lua.c -> ../toCopy/if_lua.c
Copied: ../testdir/src/libvterm/src/if_mzsch.c -> ../toCopy/if_mzsch.c
Copied: ../testdir/src/libvterm/src/if_perl.xs -> ../toCopy/if_perl.xs
Copied: ../testdir/src/libvterm/src/ex_eval.c -> ../toCopy/ex_eval.c
Copied: ../testdir/src/libvterm/src/ex_cmds.h -> ../toCopy/ex_cmds.h
Copied: ../testdir/src/libvterm/src/if_perlsfio.c -> ../toCopy/if_perlsfio.c
Copied: ../testdir/src/libvterm/src/ex_cmds2.c -> ../toCopy/ex_cmds2.c
Copied: ../testdir/src/libvterm/src/if_python.c -> ../toCopy/if_python.c
Copied: ../testdir/src/libvterm/src/if_python3.c -> ../toCopy/if_python3.c
Copied: ../testdir/src/libvterm/src/if_tcl.c -> ../toCopy/if_tcl.c
Copied: ../testdir/src/libvterm/src/if_xcmdsrv.c -> ../toCopy/if_xcmdsrv.c
Copied: ../testdir/src/libvterm/src/infplist.xml -> ../toCopy/infplist.xml
Copied: ../testdir/src/libvterm/src/iid_ole.c -> ../toCopy/iid_ole.c
Copied: ../testdir/src/libvterm/src/if_ruby.c -> ../toCopy/if_ruby.c
Copied: ../testdir/src/libvterm/src/if_py_both.h -> ../toCopy/if_py_both.h
Copied: ../testdir/src/libvterm/src/INSTALL -> ../toCopy/INSTALL
Copied: ../testdir/src/libvterm/src/install-sh -> ../toCopy/install-sh
Copied: ../testdir/src/libvterm/src/INSTALLami.txt -> ../toCopy/INSTALLami.txt
Copied: ../testdir/src/libvterm/src/INSTALLmac.txt -> ../toCopy/INSTALLmac.txt
Copied: ../testdir/src/libvterm/src/indent.c -> ../toCopy/indent.c
Copied: ../testdir/src/libvterm/src/installman.sh -> ../toCopy/installman.sh
Copied: ../testdir/src/libvterm/src/insexpand.c -> ../toCopy/insexpand.c
Copied: ../testdir/src/libvterm/src/installml.sh -> ../toCopy/installml.sh
Copied: ../testdir/src/libvterm/src/INSTALLvms.txt -> ../toCopy/INSTALLvms.txt
Copied: ../testdir/src/libvterm/src/INSTALLpc.txt -> ../toCopy/INSTALLpc.txt
Copied: ../testdir/src/libvterm/src/INSTALLx.txt -> ../toCopy/INSTALLx.txt
Copied: ../testdir/src/libvterm/src/iscygpty.c -> ../toCopy/iscygpty.c
Copied: ../testdir/src/libvterm/src/iscygpty.h -> ../toCopy/iscygpty.h
Copied: ../testdir/src/libvterm/src/json.c -> ../toCopy/json.c
Copied: ../testdir/src/libvterm/src/json_test.c -> ../toCopy/json_test.c
Copied: ../testdir/src/libvterm/src/keyboard.c -> ../toCopy/keyboard.c
Copied: ../testdir/src/libvterm/src/keymap.h -> ../toCopy/keymap.h
Copied: ../testdir/src/libvterm/src/kword_test.c -> ../toCopy/kword_test.c
Copied: ../testdir/src/libvterm/src/mouse.c -> ../toCopy/mouse.c
Copied: ../testdir/src/libvterm/src/parser.c -> ../toCopy/parser.c
Copied: ../testdir/src/libvterm/src/pen.c -> ../toCopy/pen.c
Copied: ../testdir/src/libvterm/src/rect.h -> ../toCopy/rect.h
Copied: ../testdir/src/libvterm/src/termscreen.c -> ../toCopy/termscreen.c
Copied: ../testdir/src/libvterm/src/state.c -> ../toCopy/state.c
Copied: ../testdir/src/libvterm/src/utf8.h -> ../toCopy/utf8.h
Copied: ../testdir/src/libvterm/src/unicode.c -> ../toCopy/unicode.c
Copied: ../testdir/src/libvterm/src/vterm.c -> ../toCopy/vterm.c
Copied: ../testdir/src/libvterm/src/vterm_internal.h -> ../toCopy/vterm_internal
.h
Copied: ../testdir/src/libvterm/src/MRT10.pdf -> ../toCopy/MRT10.pdf
Copied: ../testdir/src/libvterm/src/isl1551098739430.pdf -> ../toCopy/isl1551098
739430.pdf
All files copied successfully.

----------------STATISTICS--------------------
Consumers: 4 - Buffer Size: 10
Number of Regular File: 140
Number of FIFO File: 0
Number of Directory: 2
TOTAL BYTES COPIED: 24873082
TOTAL TIME: 00:00.020 (min:sec.mili)
omerfcolakel@fakurdesktop:~/Desktop/sysprog/HW5/put_your_codes_here$
```
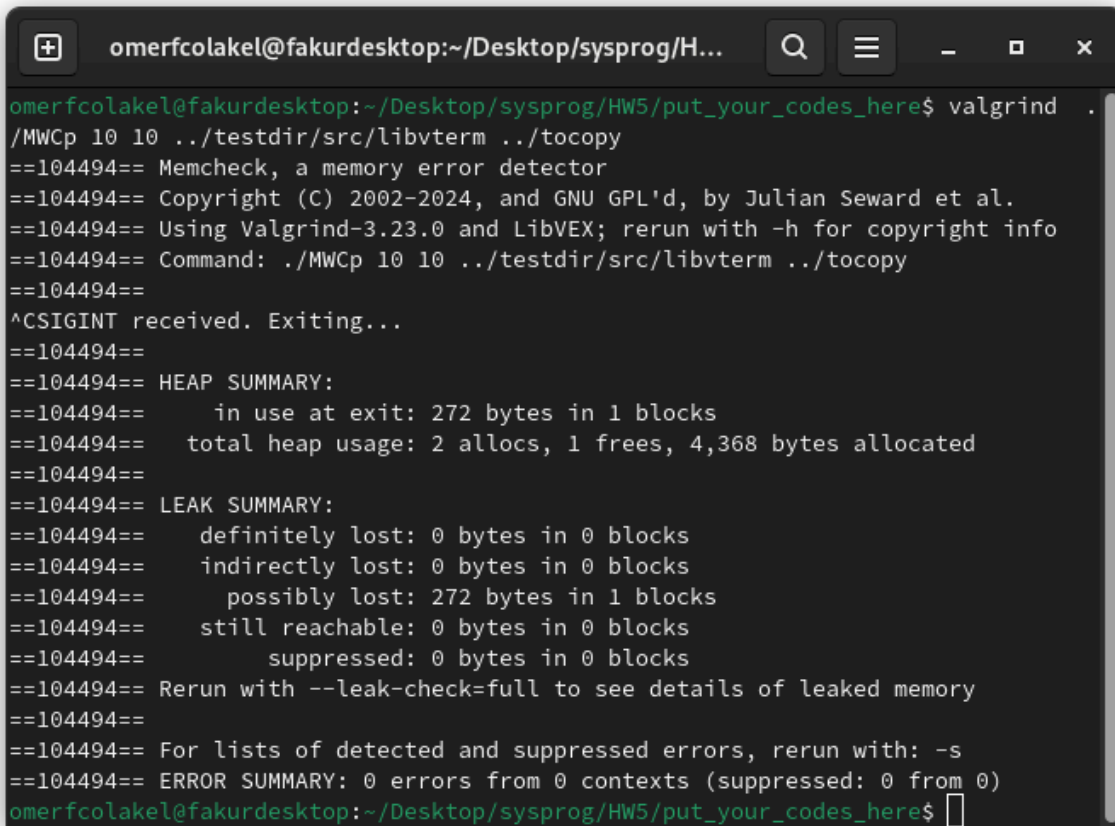
3. Test3

```
Copied: ../testdir/src/screen.c -> ../toCopy/src/screen.c
Copied: ../testdir/src/tools.bmp -> ../toCopy/src/tools.bmp
Copied: ../testdir/src/typemap -> ../toCopy/src/typemap
Copied: ../testdir/src/term.c -> ../toCopy/src/term.c
Copied: ../testdir/src/syntax.c -> ../toCopy/src/syntax.c
Copied: ../testdir/src/terminal.c -> ../toCopy/src/terminal.c
Copied: ../testdir/src/uninstal.c -> ../toCopy/src/uninstal.c
Copied: ../testdir/src/ui.c -> ../toCopy/src/ui.c
Copied: ../testdir/src/usercmd.c -> ../toCopy/src/usercmd.c
Copied: ../testdir/src/undo.c -> ../toCopy/src/undo.c
Copied: ../testdir/src/version.h -> ../toCopy/src/version.h
Copied: ../testdir/src/vim.def -> ../toCopy/src/vim.def
Copied: ../testdir/src/version.c -> ../toCopy/src/version.c
Copied: ../testdir/src/userfunc.c -> ../toCopy/src/userfunc.c
Copied: ../testdir/src/vim.ico -> ../toCopy/src/vim.ico
Copied: ../testdir/src/vim.rc -> ../toCopy/src/vim.rc
Copied: ../testdir/src/vim.tlb -> ../toCopy/src/vim.tlb
Copied: ../testdir/src/vim.h -> ../toCopy/src/vim.h
Copied: ../testdir/src/vimio.h -> ../toCopy/src/vimio.h
Copied: ../testdir/src/vimrun.c -> ../toCopy/src/vimrun.c
Copied: ../testdir/src/vimtutor -> ../toCopy/src/vimtutor
Copied: ../testdir/src/vim_error.ico -> ../toCopy/src/vim_error.ico
Copied: ../testdir/src/vim_alert.ico -> ../toCopy/src/vim_alert.ico
Copied: ../testdir/src/spellfile.c -> ../toCopy/src/spellfile.c
Copied: ../testdir/src/vim_icon.xbm -> ../toCopy/src/vim_icon.xbm
Copied: ../testdir/src/vim_info.ico -> ../toCopy/src/vim_info.ico
Copied: ../testdir/src/vim_mask.xbm -> ../toCopy/src/vim_mask.xbm
Copied: ../testdir/src/vim_quest.ico -> ../toCopy/src/vim_quest.ico
Copied: ../testdir/src/which.sh -> ../toCopy/src/which.sh
Copied: ../testdir/src/winclip.c -> ../toCopy/src/winclip.c
Copied: ../testdir/src/xpm_w32.c -> ../toCopy/src/xpm_w32.c
Copied: ../testdir/src/xpm_w32.h -> ../toCopy/src/xpm_w32.h
Copied: ../testdir/.gitignore -> ../toCopy/.gitignore
Copied: ../testdir/tools/rename.bat -> ../toCopy/tools/rename.bat
Copied: ../testdir/.hgignore -> ../toCopy/.hgignore
Copied: ../testdir/src/window.c -> ../toCopy/src/window.c
Copied: ../testdir/.lgtm.yml -> ../toCopy/.lgtm.yml
Copied: ../testdir/appveyor.yml -> ../toCopy/appveyor.yml
Copied: ../testdir/.travis.yml -> ../toCopy/.travis.yml
Copied: ../testdir/configure -> ../toCopy/configure
Copied: ../testdir/CONTRIBUTING.md -> ../toCopy/CONTRIBUTING.md
Copied: ../testdir/Filelist -> ../toCopy/Filelist
Copied: ../testdir/README.md -> ../toCopy/README.md
Copied: ../testdir/README.txt -> ../toCopy/README.txt
Copied: ../testdir/uninstal.txt -> ../toCopy/uninstal.txt
Copied: ../testdir/Makefile -> ../toCopy/Makefile
Copied: ../testdir/vimtutor.bat -> ../toCopy/vimtutor.bat
Copied: ../testdir/vimtutor.com -> ../toCopy/vimtutor.com
All files copied successfully.


---------------STATISTICS-------------------
Consumers: 100 - Buffer Size: 10
Number of Regular File: 3116
Number of FIFO File: 0
Number of Directory: 151
TOTAL BYTES COPIED: 73520554
TOTAL TIME: 00:00.080 (min:sec.mili)
omerfcolakel@fakurdesktop:~/Desktop/sysprog/HW5/put_your_codes_here$
```

4. Test1 with interrupt.

```
omerfcolakel@fakurdesktop:~/Desktop/sysprog/HW5/put_your_codes_here$ valgrind   .
/MWCp 10 10 ../testdir/src/libvterm ../tocopy
==104494== Memcheck, a memory error detector
==104494== Copyright (C) 2002-2024, and GNU GPL'd, by Julian Seward et al.
==104494== Using Valgrind-3.23.0 and LibVEX; rerun with -h for copyright info
==104494== Command: ./MWCp 10 10 ../testdir/src/libvterm ../tocopy
==104494==
^CSIGINT received. Exiting...
==104494==
==104494== HEAP SUMMARY:
==104494==     in use at exit: 272 bytes in 1 blocks
==104494==   total heap usage: 2 allocs, 1 frees, 4,368 bytes allocated
==104494==
==104494== LEAK SUMMARY:
==104494==    definitely lost: 0 bytes in 0 blocks
==104494==    indirectly lost: 0 bytes in 0 blocks
==104494==      possibly lost: 272 bytes in 1 blocks
==104494==    still reachable: 0 bytes in 0 blocks
==104494==         suppressed: 0 bytes in 0 blocks
==104494== Rerun with --leak-check=full to see details of leaked memory
==104494==
==104494== For lists of detected and suppressed errors, rerun with: -s
==104494== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
omerfcolakel@fakurdesktop:~/Desktop/sysprog/HW5/put_your_codes_here$
```