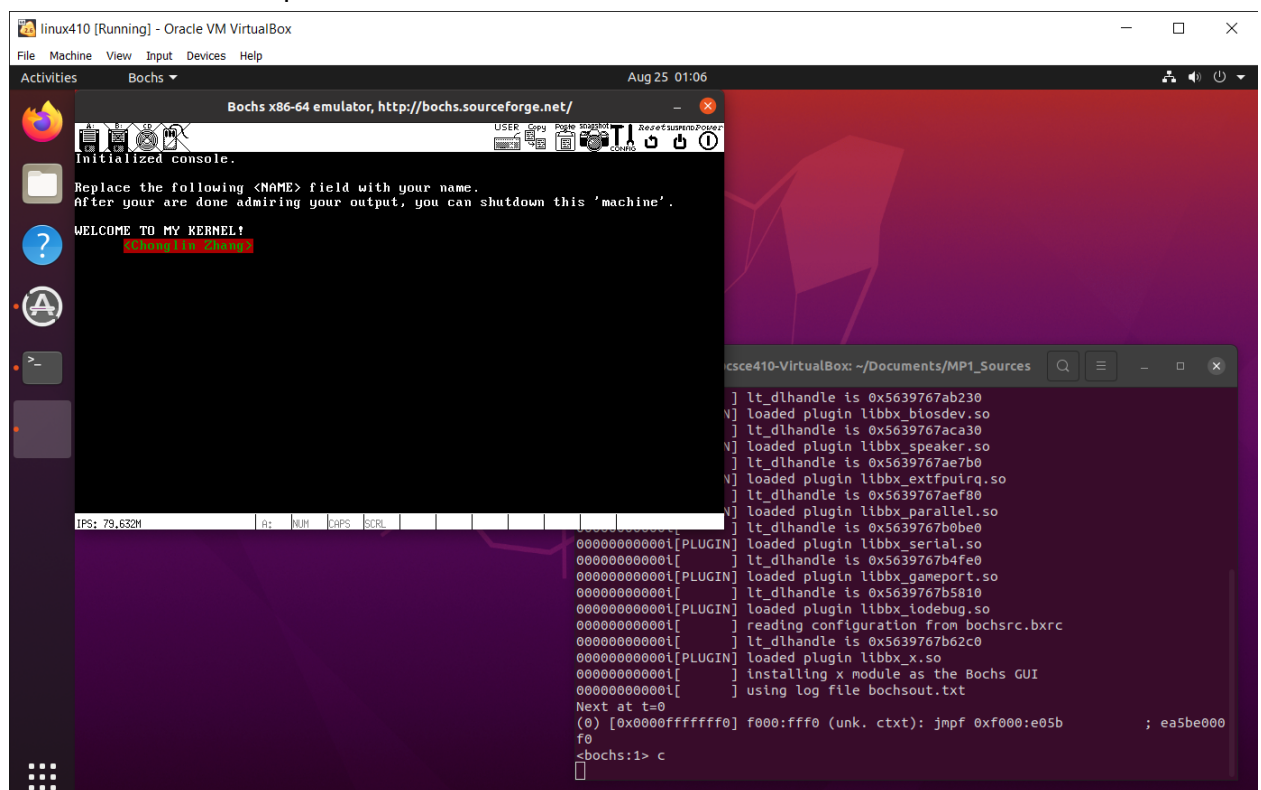


Chonglin Zhang  
CSCE 611  
833003072

How to do:

1. Get into the MP1\_sources directory and edit the kernel.C
2. Compiling source code by using 'make', and it will generate the kernel.bin file
3. After all source codes compile, we need to copy the kernel.bin onto the image by running the ./copykernel.sh
4. Starting with bochs and passing the configuration file by using 'echo c | bochs -f bochsrc.bxrc'
5. Here is the kernel output:

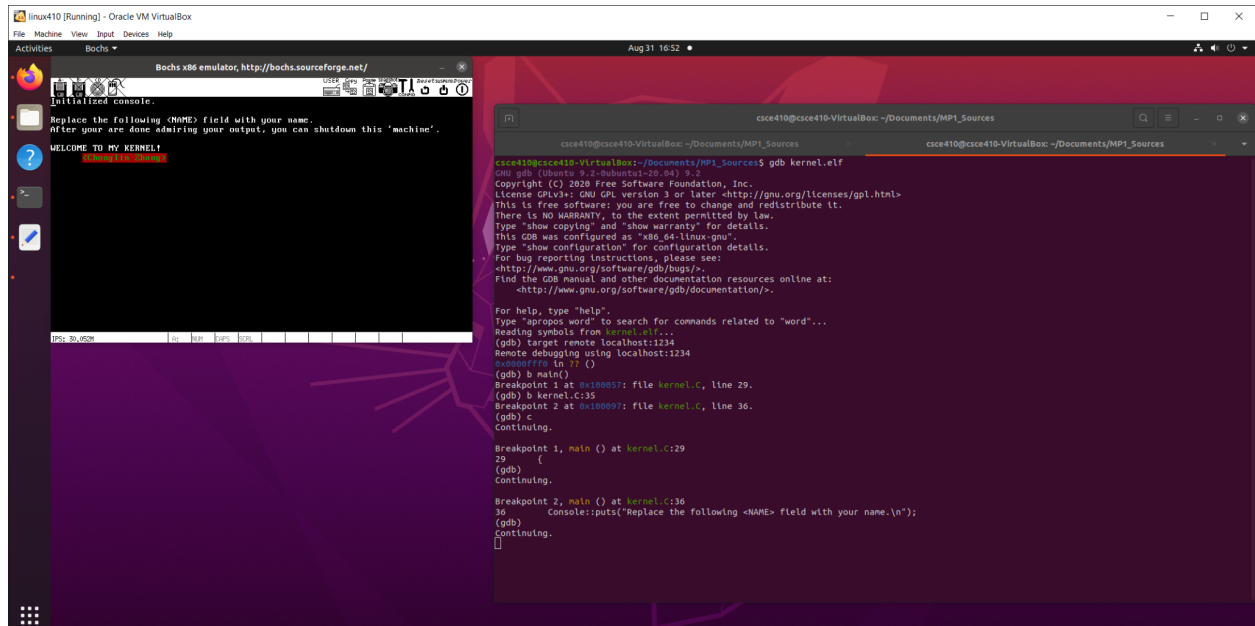


```
linux410 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Bochs Aug 25 01:06
Bochs x86-64 emulator, http://bochs.sourceforge.net/
Initialized console.
Replace the following <NAME> field with your name.
After your are done admiring your output, you can shutdown this 'machine'.
WELCOME TO MY KERNEL!
IPs: 79.632M A: NUH CAPS SCRL
] lt_dhandle is 0x5639767ab230
V loaded plugin libbx_biosdev.so
] lt_dhandle is 0x5639767aca30
V loaded plugin libbx_speaker.so
] lt_dhandle is 0x5639767ae7b0
V loaded plugin libbx_extfpurq.so
] lt_dhandle is 0x5639767aef80
V loaded plugin libbx_parallel.so
] lt_dhandle is 0x5639767b0be0
V loaded plugin libbx_serial.so
] lt_dhandle is 0x5639767b4fe0
V loaded plugin libbx_gameport.so
] lt_dhandle is 0x5639767b5810
V loaded plugin libbx_iodebug.so
] reading configuration from bochsrc.bxrc
] lt_dhandle is 0x5639767b62c0
V loaded plugin libbx_x.so
] installing x module as the Bochs GUI
] using log file bochsout.txt
Next at t=0
(0) [0x0000fffff0] f000:fff0 (unk. ctxt): jmpf 0xf000:e05b; ea5be000f0
<bochs:1> c
```

Integrating GDB with Bochs

1. In the makefile, add gcc -g for utils, console, and kernel
2. For linked.ld, remove the first line
3. For copykernel.sh and makefile, change all 'bin' to 'elf'. For example, kernel.bin to kernel.elf
4. Run the makefile by using make
5. Run ./copykernel.sh

6. For bochsrc.bxrc file, adding this line: gdbstub: enabled=1, port=1234, text\_base=0, data\_base=0, bss\_base=0
7. For GDB tools with bochs, here is the link for how to set up:  
[https://people.engr.tamu.edu/bettati/Courses/OSProjects/the\\_bochs\\_environment.pdf](https://people.engr.tamu.edu/bettati/Courses/OSProjects/the_bochs_environment.pdf)
8. Using bochs -f bochsrc.bxrc -q for bochs
9. Open a new terminal and run gdb kernel.elf and run (gdb) target remote:1234
10. Here is the output with kernel and gdb. On gdb terminal, using b main() and b kernel.C:line to set the breakpoint



The screenshot displays a virtual machine environment with two windows. The left window is titled 'Bochs x86 emulator, http://bochs.sourceforge.net/' and shows a 'WELCOME TO MY KERNEL!' message. The right window is a terminal titled 'csc410@csc410-VirtualBox: ~/Documents/MP1\_Sources' and shows the output of running 'gdb kernel.elf'. The GDB output includes the GNU GPL license, configuration details, and the setting of two breakpoints: one at kernel.C:29 and another at kernel.C:36. The terminal also shows the command 'target remote:1234' and the GDB prompt '(gdb) b main()'.

```
csc410@csc410-VirtualBox: ~/Documents/MP1_Sources
csc410@csc410-VirtualBox: ~/Documents/MP1_Sources
csc410@csc410-VirtualBox: ~/Documents/MP1_Sources$ gdb kernel.elf
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04) 9.2
Copyright (C) 2020 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
This is free software; you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
Type "show copying" and "show warranty" for details.
This GDB was configured as "x86_64-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.

For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from kernel.elf...
(gdb) target remote localhost:1234
Remote debugging using localhost:1234
0x00000000 in ?? ()
(gdb) b main()
Breakpoint 1 at 0x1000057: file kernel.C, line 29.
(gdb) b kernel.C:36
Breakpoint 2 at 0x1000097: file kernel.C, line 36.
(gdb) c
Continuing.

Breakpoint 1, main () at kernel.C:29
29
(gdb)
Continuing.

Breakpoint 2, main () at kernel.C:36
36
Console::puts("Replace the following <NAME> field with your name.\n");
(gdb)
Continuing.
[]
```