

# Assignment 4

Name Guthikonda kovidha

Roll no 422154

Assignment 4

Debug different c programs using GDB utility in linux

Debugging:identifying logical errors Default debugger- GNU debug :GDB

\$gcc -g -o test test.c -test

\$gdb./test-it does debug

\$gdb l-list the code

\$(gdb) -b5createabreakpointatline5

\$(gdb) p a -prints variable a value

\$(gdb) p b - prints variable b value

\$(gdb) n-moves to the next Lone of the code

\$(gdb) r(or)run-runstheabovecode

\$(gdb) disableb-disables breakpoint

\$(gdb) enable b -enables breakpoint

\$info b -list out breakpoint

\$(gdb) clear-remove all break points

```
Activities Terminal Mar 13 3:59 PM student@desktop-27: ~/422154unix

student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x

student@desktop-27:~/422154unix$ gcc -g -o test.c
gcc: fatal error: no input files
compilation terminated.
student@desktop-27:~/422154unix$ gcc -g -o test test.c
student@desktop-27:~/422154unix$ gdb ./test
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04.1) 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 ./test...
(gdb) l
1      #include <stdio.h>
2      int main () {
3          int x;
4          int a = x;
5          int b = x;
6          int c = a+b;
7          printf("%d\n",c);
8          return 0;
9      }
(gdb) b 4
Breakpoint 1 at 0x1155: file test.c, line 4.
(gdb) p a
No symbol "a" in current context.
(gdb) n
The program is not being run.
(gdb) run
Starting program: /home/student/422154unix/test

Breakpoint 1, main () at test.c:4
4      int a = x;
(gdb) n
5      int b = x;
```

```
Activities Terminal Mar 13 4:00 PM student@desktop-27: ~/422154unix

student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x

Breakpoint 1, main () at test.c:4
4      int a = x;
(gdb) n
5      int b = x;
(gdb) n
6      int c = a+b;
(gdb) r
The program being debugged has been started already.
Start it from the beginning? (y or n) n
Program not restarted.
(gdb) b b
Function "b" not defined.
Make breakpoint pending on future shared library load? (y or [n]) y
Breakpoint 2 (b) pending.
(gdb) disable b
(gdb) enable b
(gdb) info
"info" must be followed by the name of an info command.
List of info subcommands:

info address -- Describe where symbol SYM is stored.
info all-registers -- List of all registers and their contents, for selected stack frame.
info args -- All argument variables of current stack frame or those matching REGEXPs.
info auto-load -- Print current status of auto-loaded files.
info auxv -- Display the inferior's auxiliary vector.
info bookmarks -- Status of user-settable bookmarks.
info breakpoints -- Status of specified breakpoints (all user-settable breakpoints if no argument).
info checkpoints -- IDs of currently known checkpoints.
info classes -- All Objective-C classes, or those matching REGEXP.
info common -- Print out the values contained in a Fortran COMMON block.
info copying -- Conditions for redistributing copies of GDB.
info dcache -- Print information on the dcache performance.
info display -- Expressions to display when program stops, with code numbers.
info exceptions -- List all Ada exception names.
info extensions -- All filename extensions associated with a source language.
info files -- Names of targets and files being debugged.
info float -- Print the status of the floating point unit.
info frame -- All about the selected stack frame.
info frame-filter -- List all registered Python frame-filters.
info functions -- All function names or those matching REGEXPs.
info guile -- Prefix command for Guile info displays.
info handle -- What debugger does when program gets various signals.
info inferiors -- Print a list of inferiors being managed.
info line -- Give addresses of the code for a source line.
```

```
Activities Terminal Mar 13 4:00 PM student@desktop-27: ~/422154unix
student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x
info guile -- Prefix command for Guile info displays.
info handle -- What debugger does when program gets various signals.
info inferiors -- Print a list of inferiors being managed.
info line -- Core addresses of the code for a source line.
info locals -- All local variables of current stack frame or those matching REGEXPs.
info macro -- Show the definition of MACRO, and it's source location.
info macros -- Show the definitions of all macros at LINESPEC, or the current source location.
info mem -- Memory region attributes.
info module -- Print information about modules.
info modules -- All module names, or those matching REGEXP.
info os -- Show OS data ARG.
info pretty-printer -- GDB command to list all registered pretty-printers.
info probes -- Show available static probes.
info proc -- Show additional information about a process.
info program -- Execution status of the program.
info record -- Info record options.
info registers -- List of integer registers and their contents, for selected stack frame.
info scope -- List the variables local to a scope.
info selectors -- All Objective-C selectors, or those matching REGEXP.
--Type <RET> for more, q to quit, c to continue without paging--
info set -- Show all GDB settings.
info sharedlibrary -- Status of loaded shared object libraries.
info signals -- What debugger does when program gets various signals.
info skip -- Display the status of skips.
info source -- Information about the current source file.
info sources -- All source files in the program or those matching REGEXP.
info stack -- Backtrace of the stack, or innermost COUNT frames.
info static-tracepoint-markers -- List target static tracepoints markers.
info symbol -- Describe what symbol is at location ADDR.
info target -- Names of targets and files being debugged.
info tasks -- Provide information about all known Ada tasks.
info terminal -- Print inferior's saved terminal status.
info threads -- Display currently known threads.
info tracepoints -- Status of specified tracepoints (all tracepoints if no argument).
info tvariables -- Status of trace state variables and their values.
info type-printers -- GDB command to list all registered type-printers.
info types -- All type names, or those matching REGEXP.
info unwinder -- GDB command to list unwinders.
info variables -- All global and static variable names or those matching REGEXPs.
info vector -- Print the status of the vector unit.
info vtbl -- Show the virtual function table for a C++ object.
info warranty -- Various kinds of warranty you do not have.
info watchpoints -- Status of specified watchpoints (all watchpoints if no argument).
info win -- List of all displayed windows.
```

```
Activities Terminal Mar 13 4:00 PM student@desktop-27: ~/422154unix
student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x
info os -- Show OS data ARG.
info pretty-printer -- GDB command to list all registered pretty-printers.
info probes -- Show available static probes.
info proc -- Show additional information about a process.
info program -- Execution status of the program.
info record -- Info record options.
info registers -- List of integer registers and their contents, for selected stack frame.
info scope -- List the variables local to a scope.
info selectors -- All Objective-C selectors, or those matching REGEXP.
--Type <RET> for more, q to quit, c to continue without paging--
info set -- Show all GDB settings.
info sharedlibrary -- Status of loaded shared object libraries.
info signals -- What debugger does when program gets various signals.
info skip -- Display the status of skips.
info source -- Information about the current source file.
info sources -- All source files in the program or those matching REGEXP.
info stack -- Backtrace of the stack, or innermost COUNT frames.
info static-tracepoint-markers -- List target static tracepoints markers.
info symbol -- Describe what symbol is at location ADDR.
info target -- Names of targets and files being debugged.
info tasks -- Provide information about all known Ada tasks.
info terminal -- Print inferior's saved terminal status.
info threads -- Display currently known threads.
info tracepoints -- Status of specified tracepoints (all tracepoints if no argument).
info tvariables -- Status of trace state variables and their values.
info type-printers -- GDB command to list all registered type-printers.
info types -- All type names, or those matching REGEXP.
info unwinder -- GDB command to list unwinders.
info variables -- All global and static variable names or those matching REGEXPs.
info vector -- Print the status of the vector unit.
info vtbl -- Show the virtual function table for a C++ object.
info warranty -- Various kinds of warranty you do not have.
info watchpoints -- Status of specified watchpoints (all watchpoints if no argument).
info win -- List of all displayed windows.
info xmethod -- GDB command to list registered xmethod matchers.

Type "help info" followed by info subcommand name for full documentation.
Type "apropos word" to search for commands related to "word".
Type "apropos -v word" for full documentation of commands related to "word".
Command name abbreviations are allowed if unambiguous.
(gdb) clear
No breakpoint at this line.
(gdb)
```

Activities Terminal Mar 13 4:02 PM student@desktop-27: ~/422154unix

student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de...

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 test...  
/home/student/422154unix/it: No such file or directory.  
(gdb) l

```
1      #include <stdio.h>
2      int main () {
3          int x;
4          int a = x;
5          int b = x;
6          int c = a+b;
7          printf("%d\n",c);
8          return 0;
9      }
```

(gdb) r  
Starting program: /home/student/422154unix/test  
-16480  
[Inferior 1 (process 30327) exited normally]  
(gdb) b 4  
Breakpoint 1 at 0x55555555155: file test.c, line 4.  
(gdb)  
Note: breakpoint 1 also set at pc 0x55555555155.  
Breakpoint 2 at 0x55555555155: file test.c, line 4.  
(gdb) p a  
No symbol "a" in current context.  
(gdb) n  
The program is not being run.  
(gdb) run  
Starting program: /home/student/422154unix/test

Breakpoint 1, main () at test.c:4  
4 int a = x;  
(gdb) █

Activities Terminal Mar 13 4:03 PM student@desktop-27: ~/422154unix

student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de...

For help, type "help".  
Type "apropos word" to search for commands related to "word"...

Reading symbols from test...  
/home/student/422154unix/it: No such file or directory.  
(gdb) l

```
1      #include <stdio.h>
2      int main () {
3          int x;
4          int a = x;
5          int b = x;
6          int c = a+b;
7          printf("%d\n",c);
8          return 0;
9      }
```

(gdb) r  
Starting program: /home/student/422154unix/test  
-16480  
[Inferior 1 (process 30327) exited normally]  
(gdb) b 4  
Breakpoint 1 at 0x55555555155: file test.c, line 4.  
(gdb)  
Note: breakpoint 1 also set at pc 0x55555555155.  
Breakpoint 2 at 0x55555555155: file test.c, line 4.  
(gdb) p a  
No symbol "a" in current context.  
(gdb) n  
The program is not being run.  
(gdb) run  
Starting program: /home/student/422154unix/test

Breakpoint 1, main () at test.c:4  
4 int a = x;  
(gdb) l

```
1      #include <stdio.h>
2      int main () {
3          int x;
4          int a = x;
5          int b = x;
6          int c = a+b;
7          printf("%d\n",c);
8          return 0;
9      }
```

(gdb) █

```
Activities Terminal Mar 13 4:05 PM student@desktop-27: ~/422154unix

student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x

9 }
(gdb)
[2]+ Stopped gdb test it core
student@desktop-27:~/422154unix$ gcc -std=c99 -g -o test test.c
student@desktop-27:~/422154unix$ ls -lart
total 260
-rw-rw-r-- 1 student student 64 Feb 28 14:04 sedfile.txt
-rw-rw-r-- 1 student student 1257 Feb 28 14:09 sedfile.sh
-rw-rw-r-- 1 student student 1341 Feb 28 14:20 tar.sh
-rw-rw-r-- 1 student student 483 Feb 28 14:20 cpio.sh
-rw-rw-r-- 1 student student 232 Feb 28 15:27 taroutput.txt
-rw-rw-r-- 1 student student 301 Feb 28 15:28 cpiooutput.txt
-rw-rw-r-- 1 student student 1385 Feb 28 15:30 sedoutput.txt
-rw-rw-r-- 1 student student 38912 Feb 28 16:26 one.cpio
-rw-rw-r-- 1 student student 10240 Feb 28 16:26 one.tar
-rw-rw-r-- 1 student student 742 Feb 28 16:35 file1.tar.gz
-rw-rw-r-- 1 student student 46 Feb 28 16:35 file2.tar.tbz
-rw-rw-r-- 1 student student 10240 Feb 28 16:35 file.tar
-rw-rw-r-- 1 student student 1887 Feb 28 16:36 output.txt
-rw-rw-r-- 1 student student 817 Mar 6 15:10 static.txt
-rw-rw-r-- 1 student student 279 Mar 6 15:14 fact.c
-rw-rw-r-- 1 student student 336 Mar 6 15:14 sum.c
-rw-rw-r-- 1 student student 50 Mar 6 15:15 head.h
-rw-rw-r-- 1 student student 114 Mar 6 15:17 main.c
-rw-rw-r-- 1 student student 1856 Mar 6 15:22 fact_obj.o
-rw-rw-r-- 1 student student 1944 Mar 6 15:23 sum_obj.o
-rw-rw-r-- 1 student student 1632 Mar 6 15:23 main_obj.o
-rw-rw-r-- 1 student student 4022 Mar 6 15:25 eg_static.a
-rwxrwxr-x 1 student student 16344 Mar 6 15:31 eg_dynamic.so
-rwxrwxr-x 1 student student 16720 Mar 6 15:33 main_result
-rw-rw-r-- 1 student student 1284 Mar 6 15:48 string_manipulation.c
-rwxrwxr-x 1 student student 371 Mar 6 15:52 generate_dynamic_lib.sh
-rwxrwxr-x 1 student student 353 Mar 6 15:54 generate_static_lib.sh
-rw-rw-r-- 1 student student 50 Mar 6 15:56 head.c
-rw-rw-r-- 1 student student 158 Mar 13 13:58 segfault_example2.c
drwxr-xr-x 73 student student 12288 Mar 13 14:37 ..
-rw-rw-r-- 1 student student 351 Mar 13 15:35 factorial.c
-rwxrwxr-x 1 student student 19456 Mar 13 15:46 a.out
-rw-rw-r-- 1 student student 104 Mar 13 15:56 test.c
drwxrwxr-x 2 student student 4096 Mar 13 16:04 .
-rwxrwxr-x 1 student student 19136 Mar 13 16:04 test
student@desktop-27:~/422154unix$
```

```
Activities Terminal Mar 13 4:06 PM student@desktop-27: ~/422154unix

student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x

drwxrwxr-x 2 student student 4096 Mar 13 16:04 .
-rwxrwxr-x 1 student student 19136 Mar 13 16:04 test
student@desktop-27:~/422154unix$ gdb ./test
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04.1) 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 ./test...
(gdb) l
1      #include <stdio.h>
2      int main () {
3          int x;
4          int a = x;
5          int b = x;
6          int c = a+b;
7          printf("%d\n",c);
8          return 0;
9      }
(gdb) b 4
Breakpoint 1 at 0x1155: file test.c, line 4.
(gdb) b 2
Breakpoint 2 at 0x1149: file test.c, line 2.
(gdb) info b
Num      Type      Disp Enb Address            What
1        breakpoint keep y  0x0000000000001155 in main at test.c:4
2        breakpoint keep y  0x0000000000001149 in main at test.c:2
(gdb) disable b 2
(gdb) info b
Num      Type      Disp Enb Address            What
1        breakpoint keep y  0x0000000000001155 in main at test.c:4
2        breakpoint keep n  0x0000000000001149 in main at test.c:2
(gdb)
```

```
Activities Terminal Mar 13 4:08 PM student@desktop-27: ~/422154unix

student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x

1 breakpoint keep y 0x0000000000001155 in main at test.c:4
2 breakpoint keep y 0x0000000000001149 in main at test.c:2
(gdb) disable b 2
(gdb) info b
Num Type Disp Enb Address What
1 breakpoint keep y 0x0000000000001155 in main at test.c:4
2 breakpoint keep n 0x0000000000001149 in main at test.c:2
(gdb) enable b 2
(gdb) info b
Num Type Disp Enb Address What
1 breakpoint keep y 0x0000000000001155 in main at test.c:4
2 breakpoint keep y 0x0000000000001149 in main at test.c:2
(gdb) r
Starting program: /home/student/422154unix/test

Breakpoint 2, main () at test.c:2
2 int main(){
(gdb) n

Breakpoint 1, main () at test.c:4
4 int a = x;
(gdb) p x
$1 = -8240
(gdb) p a
$2 = 32767
(gdb) n
5 int b = x;
(gdb) p c
$3 = 0
(gdb) n
6 int c = a+b;
(gdb) n
7 printf("%d\n",c);
(gdb) n
-16480
8 return 0;
(gdb) n
9 }
(gdb) n
__libc_start_main (main=0x55555555149 <main>, argc=1, argv=0x7fffffffd8, init=<optimized out>, fini=<optimized out>, rtd_fini=<optimized out>,
stack_end=0x7ffffffdc8) at ../csu/libc-start.c:342
../csu/libc-start.c: No such file or directory.
(gdb) 
```

```
Activities Terminal Mar 13 4:08 PM student@desktop-27: ~/422154unix

student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x

drwxrwxr-x 2 student student 4096 Mar 13 16:04 .
-rwxrwxr-x 1 student student 19136 Mar 13 16:04 test
student@desktop-27:~/422154unix$ gdb ./test
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04.1) 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 ./test...
(gdb) l
1 #include <stdio.h>
2 int main(){
3 int x;
4 int a = x;
5 int b = x;
6 int c = a+b;
7 printf("%d\n",c);
8 return 0;
9 }
(gdb) b 4
Breakpoint 1 at 0x1155: file test.c, line 4.
(gdb) b 2
Breakpoint 2 at 0x1149: file test.c, line 2.
(gdb) info b
Num Type Disp Enb Address What
1 breakpoint keep y 0x0000000000001155 in main at test.c:4
2 breakpoint keep y 0x0000000000001149 in main at test.c:2
(gdb) disable b 2
(gdb) info b
Num Type Disp Enb Address What
1 breakpoint keep y 0x0000000000001155 in main at test.c:4
2 breakpoint keep n 0x0000000000001149 in main at test.c:2
(gdb) enable b 2
(gdb) info b
```



```
Activities Terminal Mar 13 4:14 PM student@desktop-27: ~/422154unix
student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x
student@desktop-27:~/422154unix$ gcc -g -o test test.c
student@desktop-27:~/422154unix$ gdb ./test
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04.1) 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 ./test...
(gdb) l
1      #include <stdio.h>
2      int main () {
3          int x;
4          int a = x;
5          int b = x;
6          int c = a+b;
7          printf("%d\n",c);
8          return 0;
9      }
(gdb) b 6
Breakpoint 1 at 0x1161: file test.c, line 6.
(gdb) b 8
Breakpoint 2 at 0x1182: file test.c, line 8.
(gdb) run
Starting program: /home/student/422154unix/test

Breakpoint 1, main () at test.c:6
6      int c = a+b;
(gdb) p x
$1 = -8240
(gdb) p y
No symbol "y" in current context.
(gdb) p a
$2 = -8240
(gdb) p b
$3 = -8240
```

```
Activities Terminal Mar 13 4:15 PM student@desktop-27: ~/422154unix
student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x student@de... x
(gdb) b 8
Breakpoint 2 at 0x1182: file test.c, line 8.
(gdb) run
Starting program: /home/student/422154unix/test

Breakpoint 1, main () at test.c:6
6      int c = a+b;
(gdb) p x
$1 = -8240
(gdb) p y
No symbol "y" in current context.
(gdb) p a
$2 = -8240
(gdb) p b
$3 = -8240
(gdb) p result
$4 = '\000' <repeats 113 times>
(gdb) n
7      printf("%d\n",c);
(gdb) n
-16480

Breakpoint 2, main () at test.c:8
8      return 0;
(gdb) p result
$5 = '\000' <repeats 113 times>
(gdb) disable b 8
No breakpoint number 8.
(gdb) info b
Num      Type      Disp Enb Address      What
1        breakpoint keep y 0x0000555555555161 in main at test.c:6
          breakpoint already hit 1 time
2        breakpoint keep y 0x0000555555555182 in main at test.c:8
          breakpoint already hit 1 time
(gdb) cclear

(gdb) q
Deleted breakpoint 2 A debugging session is active.

Inferior 1 [process 31040] will be killed.

Quit anyway? (y or n) y
student@desktop-27:~/422154unix$
```