

Unix assignment 4

```
student@at-HP-ProDesk-600-G4-MT: ~/422109-unix$ gcc -g err.c student@at-HP-ProDesk-600- G4-MT: ~/422109-unix$
gdb ./a.out
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04) 9.2
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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 ./a.out... (gdb) run
Starting program: /home/student/422111-unix/a.out
Program received signal SIGSEGV, Segmentation fault.
0x0000553333333333 in findMedian (arr=0x0, size=5) at err3.9:8
8
return arr[size / 2]; // Accessing middle element for odd-sized array
(gdb) b
Breakpoint 1 at 0x5555555551d5: file err.c, line 8. (gdb) break 8
Breakpoint 2 at 0x5555555551b8: file err.c, line 8. (gdb) next
Program terminated with signal SIGSEV, Segmentation fault.
The program no longer exists. (gdb) run
Starting program: /home/student/422111-unix/a.out
Breakpoint 2, findMedian (arr=0x0, size=5) at err3.0:8
8
(gdb) break 8
return arr[size / 2]; // Accessing middle element for odd-sized array
Note: breakpoint 2 also set at pc 0x555555555108.
Breakpoint 3 at 0x5555555551b8: file err.c, line 8. (gdb) break 8
Note: breakpoints 2 and 3 also set at pc 0x555555555168.
Breakpoint 4 at 0x5555555551b8: file err.c, line 8. (gdb) break 8
Note: breakpoints 2, 3 and 4 also set at pc 0x5555555551b8.
Breakpoint 5 at 0x55555555556g. file eeea.a. 1ine

Breakpoint 3 at 0x555555555168: file err.c, line 8. (gdb) break 8
Note: breakpoints 2 and 3 also set at pc 0x5555555551680
Breakpoint 4 at 0x555555555158: file err.c, line 8. (gdb) break 8
Note: breakpoints 2, 3 and 4 also set at PC 0x555555555168.
Breakpoint 5 at 0x555555555168: file err.c, line 8. (gdb) break 8
Note: breakpoints 2, 3, 4 and 5 also set at pc 0x555555555158.
Breakpoint 6 at 0x5555555551b8: file err.c, line 8. (gdb) break 8
Note: breakpoints 2, 3, 4, 5 and 6 also set at pc 0x555555555158-
Breakpoint 7 at 0x5555555551b8: file err3.c, line 8. (gdb) break 8
Note: breakpoints 2, 3, 4, 5, 6 and 7 also set at pc 0x5555555551b8.
Breakpoint 8 at 0x5555555551b8: file err.c, line 8. (gdb) continue Continuing.
Breakpoint 1, 0x00005555555551d5 in findMedian (arr=0x0, size=5) at err3.6:8
8
return arr[size / 21; // Accessing middle element for odd-sized array
(gdb) disassemble main
Dump of assembler code for function main:
0X00005555555551dd <+0>:
endbr64
9x0000553
```

```
wwwle
<+4>:
push
0X0000
Biez
<+5>:
%rbp
moV
0X0000
<+8>:
sub
$0x10,%rsp
0X0000
<+12>:
mova
9X99005
Soxo, - 0x8% bp)
<+20>:
movl
0X0000
55551f8
<+27>:
moV
$0x5, - 0x10 (%rbp)
0X00005
55511Ð
<+30>:
moV
-0x10 (%rbp) ,%edx
0X0000
5551F6
<+34>:
mov
- 0x8 (%bp),% ax
%edx,%est
0X00005
いゝいゝいゝ204
<+36>:
mov
%rax,%rdt
0X00005353
55555204
<+39>:
calla
0X55555355149 <findMedian>
0x0000555555552091
<+44>:
movd
%xmms,%eax
0X000055555555200
<+48>:
mov
%eax, - 0xc(%rbp)
0x0000555555552101
<+51>:
cvtss2sd
0X000055355555215
<+56>:
lea
0X00005
<+63>:
mov
Oxec(%rip),%rdi
```

```
#
0x555555550008
$0x1,%eax
0X000055555555221
<+68>:
calla
①X55555555050 <printf@plt>
0x000055555555220
<+73>:
mov
Sox0,%eax
0x000055555555226
<+78>:
leaveq
000005555555220
<+79>:
retq
End of
assembler dump.
(gdb)
```

```
student@at-HP-ProDesk-600- G4-MT: ~/422109-unix$ gcc ptr_gdb.c
student@at-HP-ProDesk-600-G4-MT: ~/422109-unix$ ./a.out
Segmentation fault (core dumped)
student@at-HP-ProDesk-600-G4-MT:~/422109-unix$ gcc -g ptr_gdb.c
student@ai-HP-ProDesk-600-G4-MT: ~ /422109-unix$ gdb ./a.out
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04) 9.2
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Find the GDB manual and other documentation resources online at:
http://www.gnu.org/software/gdb/documentation/>.
Typ heap propose id to search for commands related to "word".
Reading symbols from ./a.out...
(gdb) run
Starting program: /home/student/422111-unix/a.out
Program received signal SIGSEGV, Segmentation fault.
0X0000555555551de
21
in main () at ptr_gdb.c:21
(gdb) b
*ptr = 10; // Trying
to assign a value to a NULL pointer, causing a segmentation fault
Breakpoint 1 at 0x555555551de: file ptr_gdb.c, line 21. (gdb) break 21
Breakpoint 2 at 0x555555551da: file ptr_gdb.c, line 21. (gdb) continue Continuing.
Program terminated with signal SIGSEV, Segmentation fault.
The program no longer exists. (gdb) disassemble main
0x@009555555555166
≤+295/6 ·
mov
9D2X:80x199bo
Terminal
Q
=
=
```

Dump of assembler code for function main:

```
0X000055555555149 <+0>: endbr64
0x00005555555514d1<+4>: push
                        %rbp
0X000055555555140 <+5>: mov
0X000055555555151 <+8>: sub
                        $0x20,%rsp
0X000055555555155 <+12>:movl
                        $0x0, -0x14(%rbp)
0x000055555555150 <+19>:movl
                        50x65, - 0x18 (%rbp)
```

<http://www.gnu.org/software/gdb/documentation/>.

For help, type "help".

Type "apropos word" to search for commands related to "word"...

Reading symbols from ./a.out... (gdb) run

Starting program: /home/student/422111-unix/a.out

Program received signal SIGSEGV, Segmentation fault.

0x0000555555551de in main (at ptr_gdb.c: 21

21

*ptr = 10; // Trying to assign a value to a NULL pointer, causing a segmentation fault

(gdb) b

Breakpoint 1 at 0x555555551d: file ptr_gdb.c, line 21. (gdb) break 21

Breakpoint 2 at 0x555555551d: file ptr_gdb.c, line 21. (gdb) continue Continuing.

Program terminated with signal SIGSEGV, Segmentation fault.

The program no longer exists.

(gdb) disassemble main

Dump of assembler code for function main:

```
9x000055555555149 <+0>:          endbr64
0X00005555555514          <+4>: push    %rbp
⑨x90992                  <+5>: movl
35555140
0X0000                    <+8>: sub     $0x20,%rsp
5555151
0X00005                    <+12>:movl    $0x0, -0x14(%rbp)
55555159
0X00005                    <+19>:movl    $0x65, -0x18(%rbp)
55555150
0                          <+26>:movl    -0x18 (%rbp),%eax
0x000055555555166        <+29>:movl    %ax, -0x10 (%rbp)
0X000055555555169        <+32>:jmp     0X555555551cc <main+131>
0X00005555555516b        <+34>:        -0x18(%rbp),%edx
0X000055555555169        <+37>:movslq  %edx,%rax
0x000055555555174        <+40>:imul    $0x66666667,%rax,%rax
0X000055555555178        <+47>:shr     $0x20,%rax
0X000055555555170        <+51>:mov     %eax,%ecx
0x000055555555170        <+53>:sar     $0x2,%ecx
0X000055555555181        <+56>:mov     %edx,%eax
0X00005555555518         <+58>:sar     $0x1f,%eax
0X000055555555186        <+61>:Sub     %eax,%ecx
0x000055555555188        <+63>:mov     %ecx,%eax
0X00005555555518g        <+65>:shl     $0x2,%eax
0X000055555555180        <+68>:add     %ecx,%eax
0X00005555555518f        <+70>:add
```

-Type «RET» for more, q to quit, c to continue without paging--

student@at-HP-ProDesk-600-G4-MT: ~/422109-unix\$ gcc -g ptr_gdb.c

student@at-HP-ProDesk-600-G4-MT: ~/422109- nix\$ gcc err2.c

```
student@at-HP-ProDesk-600-G4-MT: ~/422109-unix$ ./a.out
121 is not an Armstrong number.
Segmentation fault (core dumped)
student@at-HP-ProDesk-600-G4-MT: ~/422109-unix$ gcc -g err2.c
student@at-HP-ProDesk-600-G4-MT: ~/422109-unix$ gdb ./a.out
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04) 9.2
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<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to
search for commands related to "word"...
Reading symbols from ./a.out... (gdb) run
Starting program: /home/student/422111-unix/a.out
121 is not an Armstrong number.
Program received signal SIGSEGV, Segmentation fault.
0x00007ffff0000005 in ?? (gdb) b
Breakpoint 1 at 0x7ffff0000005 (gdb) run
The program being debugged has been started already.
Start it from the beginning? (y or n) y
Starting program: /home/student/422111-unix/a.out
Warning:
Cannot insert breakpoint 1.
Cannot access memory at address 0x7ffff0000005
(gdb) b
Note: breakpoint 1 also set at pc 0x7ffff0000005.
Breakpoint 2 at 0x7ffff0000005
Warning:
Cannot insert breakpoint 1.
Cannot access memory at address 0x7ffff0000005
```

|

```
Note:
breakpoint 1 also set at pc 0x7ffff0000005.
Breakpoint 2 at 0x7ffff0000005
Warning:
Cannot insert breakpoint 1.
Cannot access memory at address 0x7ffff0000005
(gdb) disassemble main
Dump of assembler code for function main:
0x0000555555555189
<+0>:
endbr64
0x0000555555555180
<+4>:
push
0x0000555555555180
<+5>:
mov
0x0000555555555191
<+8>:
sub
0x0000555555555193
<+12>:
mov
```

0x000055555555190
<+21>:
mOV
0x000055555555122
<+25>:
XoΓ
0X00005
55551a4
<+27>:
movl
0x0000555555551ab
<+34>:
movl
⑨x⑨⑨⑨95553
B5551b2
<+41>:
mOV
9x009955555555152
< +4428
moV
⑨x⑨⑨⑨95555
BB555158
<+47>:
0x0000555555551bg
cmpl
<+51>:
9x90002552
B5551 be
<+53>:
jle
9X9999
5W1CE
<+60>:
cmpl
fle
0X00005
51c7
<+62>:
lea
0X0001
<+69>:
calla
0X000
0X000
0X0000
5551d3
5551db
5551 dif
<+74>:
mova
<+82>:
moV
<+86>:
movl
0x00002
<+92>:
moV
0X0000
5551eal
<+97>:
0X000051
55551ef

```

jmpq
<+102>:
movi
0x000055
55551F6
<+109>:
jmp
0X000055555555178
<+111>:
mov
0X00005535555531b
<+114>:
movsla
0x0000555555551f0
<+117>:
lnul
0x000055555555205
<+124>:
shr
0x000055555555209
<+128>:
mov
0X00005535555520b
<+130>:
sar
0X00005555555520
<+133>:
mov
0X000055555555210
<+135>:
sar
0x000055555555213
<+138>:
Sub
0x000055555555215
<+140>:
mov
000005555555217
<+142>:
shl
0x00005555555521a
<+145>:
add
0x000055555555210
<+147>:
add
0x9999555559
5552—0
<+14970
sule
%sp,%rbp
SOx40,%rsp
%fs: 0x28,%rax
%rax, - 0x8(%rp)
%ax,%eax
Soxo, -0x40 (%rbp)
$0x79, - 0x38(%rbp)
- 0x38 (%bp),%eax
%eax, - 0x3c(%rp)
$0x63, - 0x38(%rbp)
0x555555551c7 <main+62>
$0x37, - 0x38 (%rbp)
9X555555551efamain+102>

```

0X555555555070 <puts@plt>

\$0x0, -0x28(%rbp)

- 0x28(%bp),%rax

Soxa, (%rax)

soxo,%eax

0X55

555555228

<main+287>

\$0x5,0x8% bp)

0X555555555207l

<main+222>

- 0x3 (%rbp),%edx

%edx,%rax

\$0x66666667,%rax,%rax

\$0x20,%rax

%eax,%ecx

\$0x2,%ecx

0X555555556008

\$0x1f,%eax

xeax, %ecx

%ecx, %eax

\$0x2,%eax

%eax,%eax

Yeay