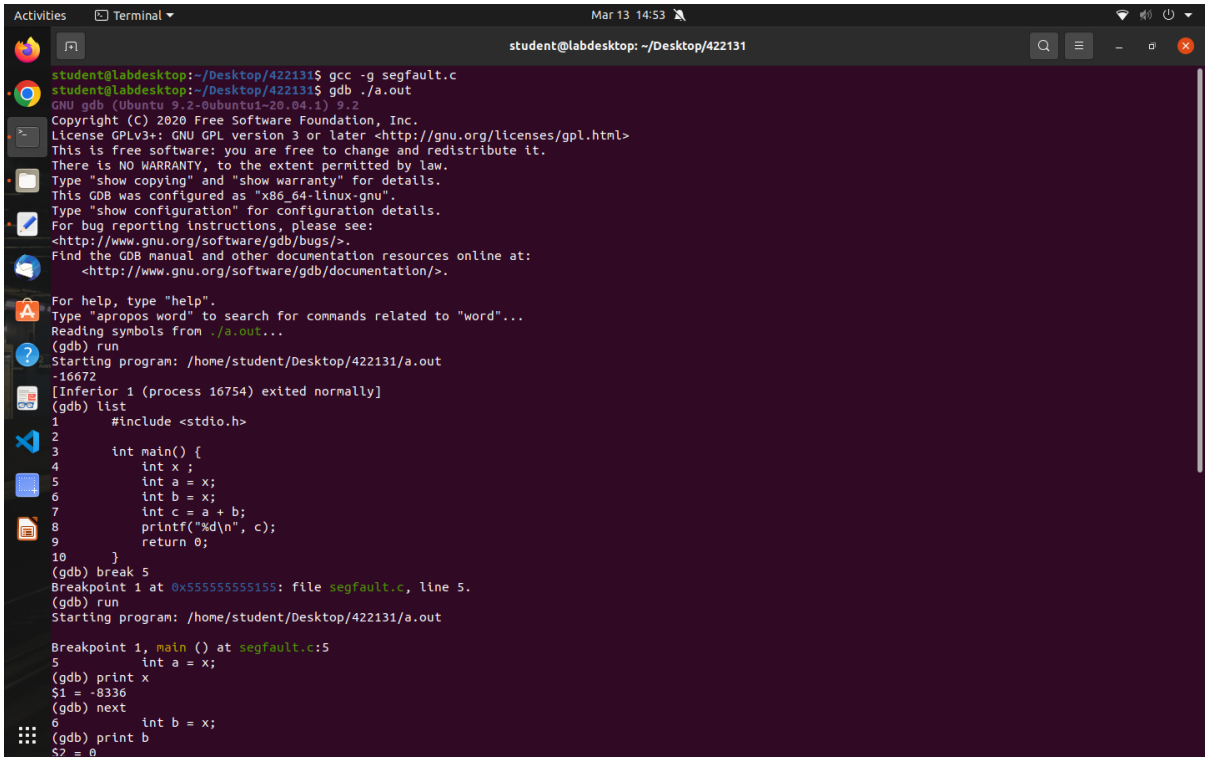
NAME: CH.YESWANTH

ROLLNO : 422131

First program

```
#include <stdio.h>


int main() {
   int x = 10;
   int a = x;
   int b = x;
   int c = a + b;
   printf("%d\n", c);
   return 0;
}
```


Activities
Terminal
Mar 13 14:53
student@labdesktop: ~/Desktop/422131
student@labdesktop:~/Desktop/422131$ gcc -g segfault.c
student@labdesktop:~/Desktop/422131$ gdb ./a.out
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04.1) 9.2
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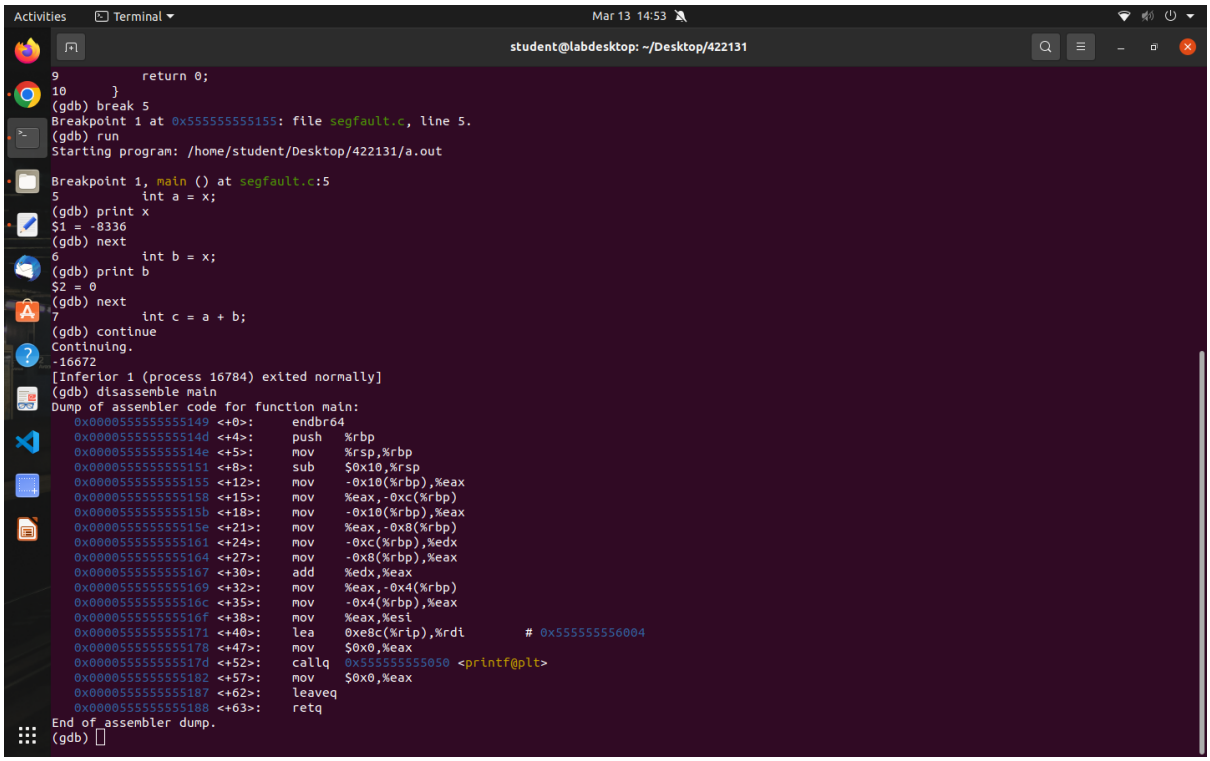
This GDB was configured as "x86_64-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from ./a.out...
(gdb) run
Starting program: /home/student/Desktop/422131/a.out
-16672
[Inferior 1 (process 16754) exited normally]
(gdb) list
1 #include <stdio.h>
2
3 int main() {
4 int x ;
5 int a = x;
6 int b = x;
7 int c = a + b;
8 printf("%d\n", c);
9 return 0;
10 }
(gdb) break 5
Breakpoint 1 at 0x555555555155: file segfault.c, line 5.
(gdb) run
Starting program: /home/student/Desktop/422131/a.out
Breakpoint 1, main () at segfault.c:5
5 int a = x;
(gdb) print x
$1 = -8336
(gdb) next
6 int b = x;
(gdb) print b
$2 = 0


Activities
Terminal
Mar 13 14:53
student@labdesktop: ~/Desktop/422131
9 return 0;
10 }
(gdb) break 5
Breakpoint 1 at 0x555555555155: file segfault.c, line 5.
(gdb) run
Starting program: /home/student/Desktop/422131/a.out
Breakpoint 1, main () at segfault.c:5
5 int a = x;
(gdb) print x
$1 = -8336
(gdb) next
6 int b = x;
(gdb) print b
$2 = 0
(gdb) next
7 int c = a + b;
(gdb) continue
Continuing.
-16672
[Inferior 1 (process 16784) exited normally]
(gdb) disassemble main
Dump of assembler code for function main:
0x0000555555555149 <+0>: endbr64
0x000055555555514d <+4>: push %rbp
0x000055555555514e <+5>: mov %rsp,%rbp
0x0000555555555151 <+8>: sub $0x10,%rsp
0x0000555555555155 <+12>: mov -0x10(%rbp),%eax
0x0000555555555158 <+15>: mov %eax,-0xc(%rbp)
0x000055555555515b <+18>: mov -0x10(%rbp),%eax
0x000055555555515e <+21>: mov %eax,-0x8(%rbp)
0x0000555555555161 <+24>: mov -0xc(%rbp),%edx
0x0000555555555164 <+27>: mov -0x8(%rbp),%eax
0x0000555555555167 <+30>: add %edx,%eax
0x0000555555555169 <+32>: mov %eax,-0x4(%rbp)
0x000055555555516c <+35>: mov -0x4(%rbp),%eax
0x000055555555516f <+38>: mov %eax,%esi
0x0000555555555171 <+40>: lea 0xe8c(%rip),%rdi # 0x555555556004
0x0000555555555178 <+47>: mov $0x0,%eax
0x000055555555517d <+52>: callq 0x555555555050 <printf@plt>
0x0000555555555182 <+57>: mov $0x0,%eax
0x0000555555555187 <+62>: leaveq
0x0000555555555188 <+63>: retq
End of assembler dump.
(gdb)

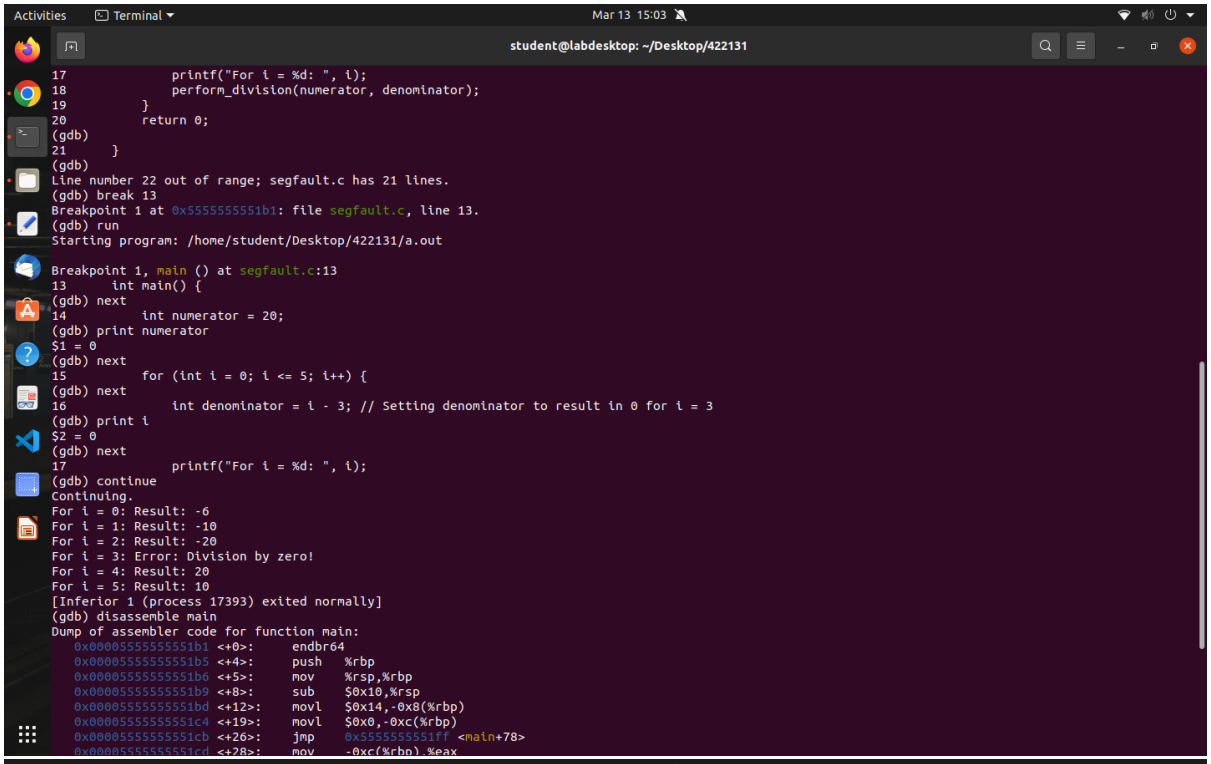
Second code:

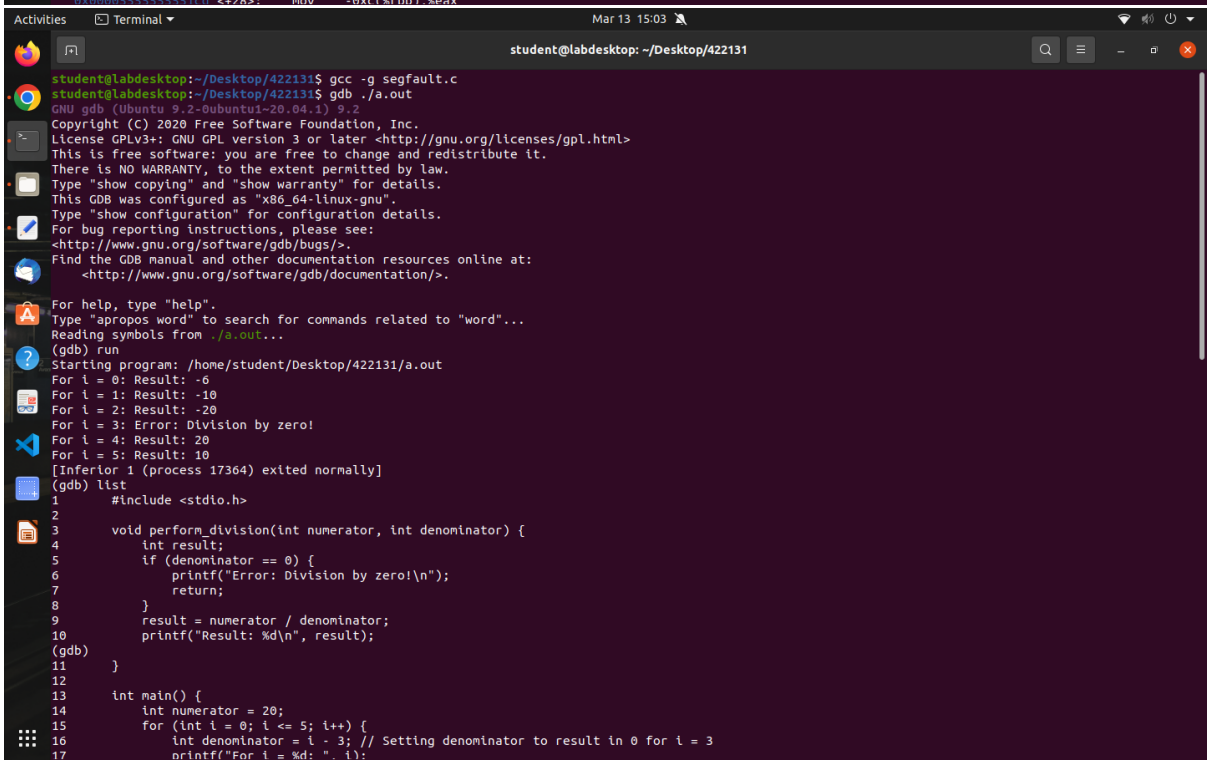
```
#include <stdio.h>

void perform_division(int numerator, int denominator) {
   int result;
   if (denominator == 0) {
      printf("Error: Division by zero!\n");
      return;
   }
   result = numerator / denominator;
   printf("Result: %d\n", result);
}

int main() {
   int numerator = 20;
   for (int i = 0; i <= 5; i++) {
      int denominator = i - 3; // Setting denominator to result in 0 for i = 3
      printf("For i = %d: ", i);
      perform_division(numerator, denominator);
   return 0;
}
```

}


Activities
Terminal
Mar 13 15:03
student@labdesktop: ~/Desktop/422131
17 printf("For i = %d: ", i);
18 perform_division(numerator, denominator);
19 }
20 return 0;
(gdb)
21 }
(gdb)
Line number 22 out of range; segfault.c has 21 lines.
(gdb) break 13
Breakpoint 1 at 0x5555555551b1: file segfault.c, line 13.
(gdb) run
Starting program: /home/student/Desktop/422131/a.out
Breakpoint 1, main () at segfault.c:13
13 int main() {
(gdb) next
14 int numerator = 20;
(gdb) print numerator
$1 = 0
(gdb) next
15 for (int i = 0; i <= 5; i++) {
(gdb) next
16 int denominator = i - 3; // Setting denominator to result in 0 for i = 3
(gdb) print i
$2 = 0
(gdb) next
17 printf("For i = %d: ", i);
(gdb) continue
Continuing.
For i = 0: Result: -6
For i = 1: Result: -10
For i = 2: Result: -20
For i = 3: Error: Division by zero!
For i = 4: Result: 20
For i = 5: Result: 10
[Inferior 1 (process 17393) exited normally]
(gdb) disassemble main
Dump of assembler code for function main:
0x00005555555551b1 <+0>: endbr64
0x00005555555551b5 <+4>: push %rbp
0x00005555555551b6 <+5>: mov %rsp,%rbp
0x00005555555551b9 <+8>: sub $0x10,%rsp
0x00005555555551bd <+12>: movl $0x14,-0x8(%rbp)
0x00005555555551c4 <+19>: movl $0x0,-0xc(%rbp)
0x00005555555551cb <+26>: jmp 0x555555551ff <main+78>
0x00005555555551cd <+28>: mov -0xc(%rbp),%eax


Activities
Terminal
Mar 13 15:03
student@labdesktop: ~/Desktop/422131
student@labdesktop:~/Desktop/422131$ gcc -g segfault.c
student@labdesktop:~/Desktop/422131$ gdb ./a.out
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04.1) 9.2
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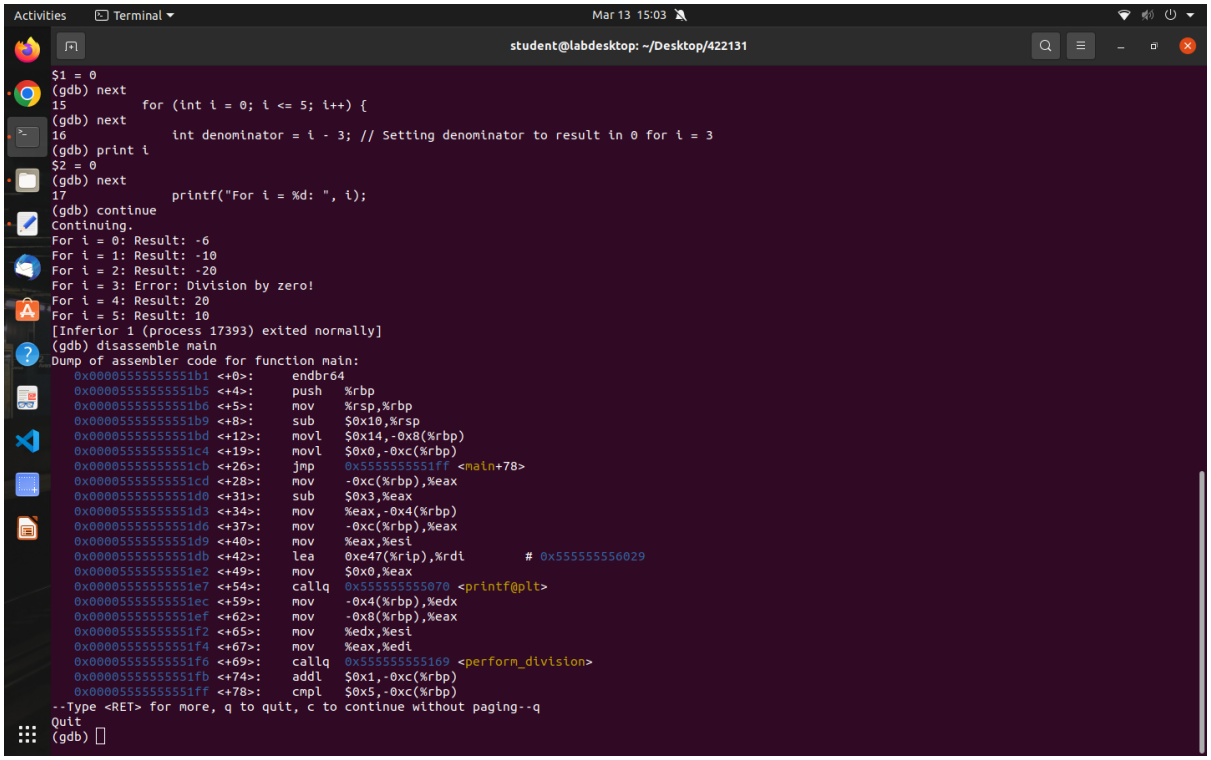
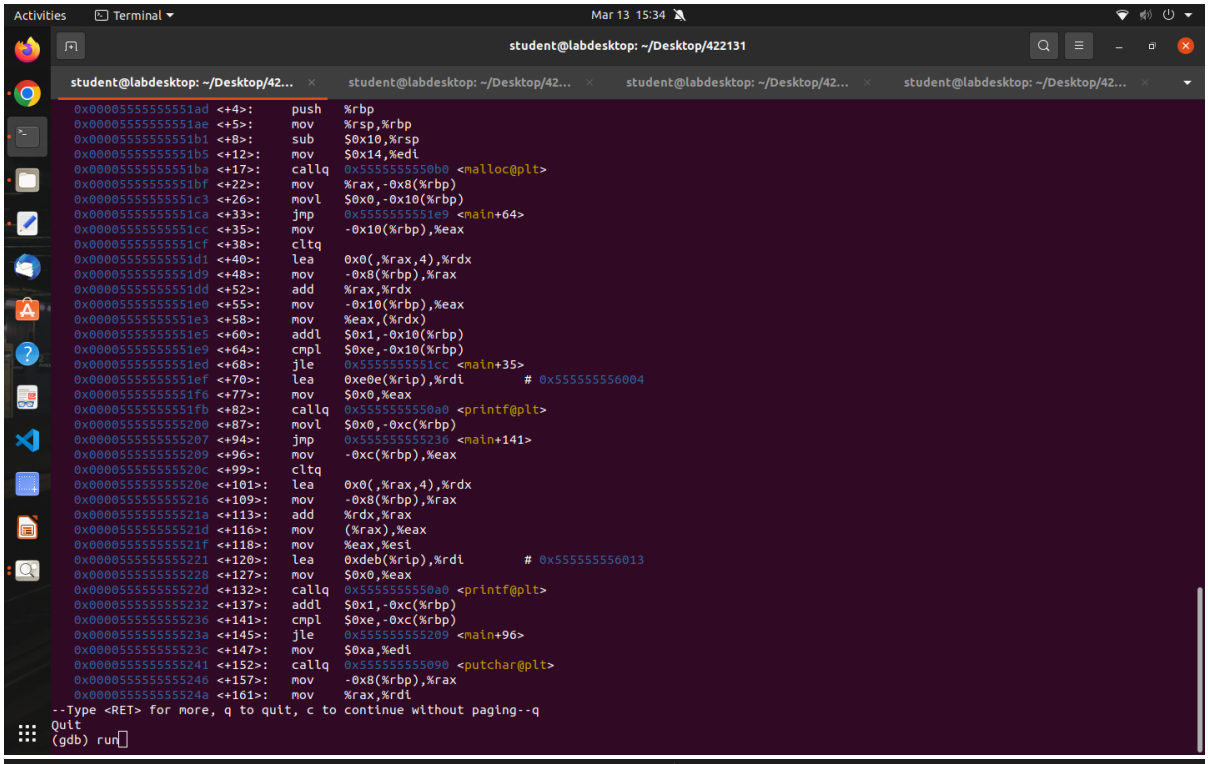
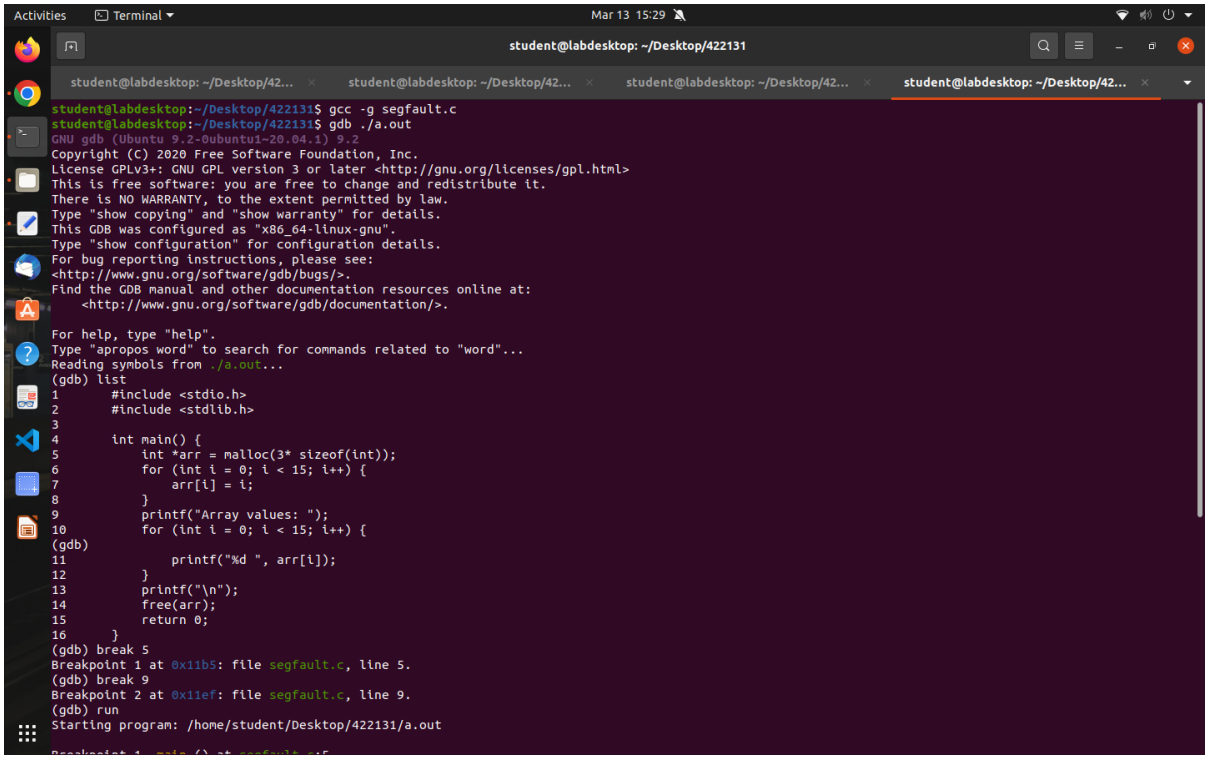
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from ./a.out...
(gdb) run
Starting program: /home/student/Desktop/422131/a.out
For i = 0: Result: -6
For i = 1: Result: -10
For i = 2: Result: -20
For i = 3: Error: Division by zero!
For i = 4: Result: 20
For i = 5: Result: 10
[Inferior 1 (process 17364) exited normally]
(gdb) list
1 #include <stdio.h>
2
3 void perform_division(int numerator, int denominator) {
4 int result;
5 if (denominator == 0) {
6 printf("Error: Division by zero!\n");
7 return;
8 }
9 result = numerator / denominator;
10 printf("Result: %d\n", result);
(gdb)
11 }
12
13 int main() {
14 int numerator = 20;
15 for (int i = 0; i <= 5; i++) {
16 int denominator = i - 3; // Setting denominator to result in 0 for i = 3
17 printf("For i = %d: ", i);



THIRD CODE:

```
#include <stdio.h>

#include <stdlib.h>


int main() {

   int *arr = malloc(10 * sizeof(int));

   for (int i = 0; i < 15; i++) {

      arr[i] = i;

   }

   printf("Array values: ");

   for (int i = 0; i < 15; i++) {

      printf("%d ", arr[i]);

   }

   printf("\n");

   free(arr);

   return 0;

}
```


Activities
Terminal
Mar 13 15:34
student@labdesktop: ~/Desktop/422131
0x00005555555551ad <+4>: push %rbp
0x00005555555551ae <+5>: mov %rsp,%rbp
0x00005555555551b1 <+8>: sub $0x10,%rsp
0x00005555555551b5 <+12>: mov $0x14,%edi
0x00005555555551ba <+17>: callq 0x5555555550b0 <malloc@plt>
0x00005555555551bf <+22>: mov %rax,-0x8(%rbp)
0x00005555555551c3 <+26>: movl $0x0,-0x10(%rbp)
0x00005555555551ca <+33>: jmp 0x5555555551e9 <main+64>
0x00005555555551cc <+35>: mov -0x10(%rbp),%eax
0x00005555555551cf <+38>: cltq
0x00005555555551d1 <+40>: lea 0x0(,%rax,4),%rdx
0x00005555555551d9 <+48>: mov -0x8(%rbp),%rax
0x00005555555551dd <+52>: add %rax,%rdx
0x00005555555551e0 <+55>: mov -0x10(%rbp),%eax
0x00005555555551e3 <+58>: mov %eax,(%rdx)
0x00005555555551e5 <+60>: addl $0x1,-0x10(%rbp)
0x00005555555551e9 <+64>: cmpl $0xe,-0x10(%rbp)
0x00005555555551ed <+68>: jle 0x5555555551cc <main+35>
0x00005555555551ef <+70>: lea 0xe0e(%rip),%rdi # 0x555555556004
0x00005555555551f6 <+77>: mov $0x0,%eax
0x00005555555551fb <+82>: callq 0x5555555550a0 <printf@plt>
0x0000555555555200 <+87>: movl $0x0,-0xc(%rbp)
0x0000555555555207 <+94>: jmp 0x555555555236 <main+141>
0x0000555555555209 <+96>: mov -0xc(%rbp),%eax
0x000055555555520c <+99>: cltq
0x000055555555520e <+101>: lea 0x0(,%rax,4),%rdx
0x0000555555555216 <+109>: mov -0x8(%rbp),%rax
0x000055555555521a <+113>: add %rdx,%rax
0x000055555555521d <+116>: mov (%rax),%eax
0x000055555555521f <+118>: mov %eax,%esi
0x0000555555555221 <+120>: lea 0xdeb(%rip),%rdi # 0x555555556013
0x0000555555555228 <+127>: mov $0x0,%eax
0x000055555555522d <+132>: callq 0x5555555550a0 <printf@plt>
0x0000555555555232 <+137>: addl $0x1,-0xc(%rbp)
0x0000555555555236 <+141>: cmpl $0xe,-0xc(%rbp)
0x000055555555523a <+145>: jle 0x555555555209 <main+96>
0x000055555555523c <+147>: mov $0xa,%edi
0x0000555555555241 <+152>: callq 0x5555555555090 <putchar@plt>
0x0000555555555246 <+157>: mov -0x8(%rbp),%rax
0x000055555555524a <+161>: mov %rax,%rdi
--Type <RET> for more, q to quit, c to continue without paging--q
Quit
(gdb) run


Activities
Terminal
Mar 13 15:29
student@labdesktop: ~/Desktop/422131
student@labdesktop:~/Desktop/422131$ gcc -g segfault.c
student@labdesktop:~/Desktop/422131$ gdb ./a.out
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04.1) 9.2
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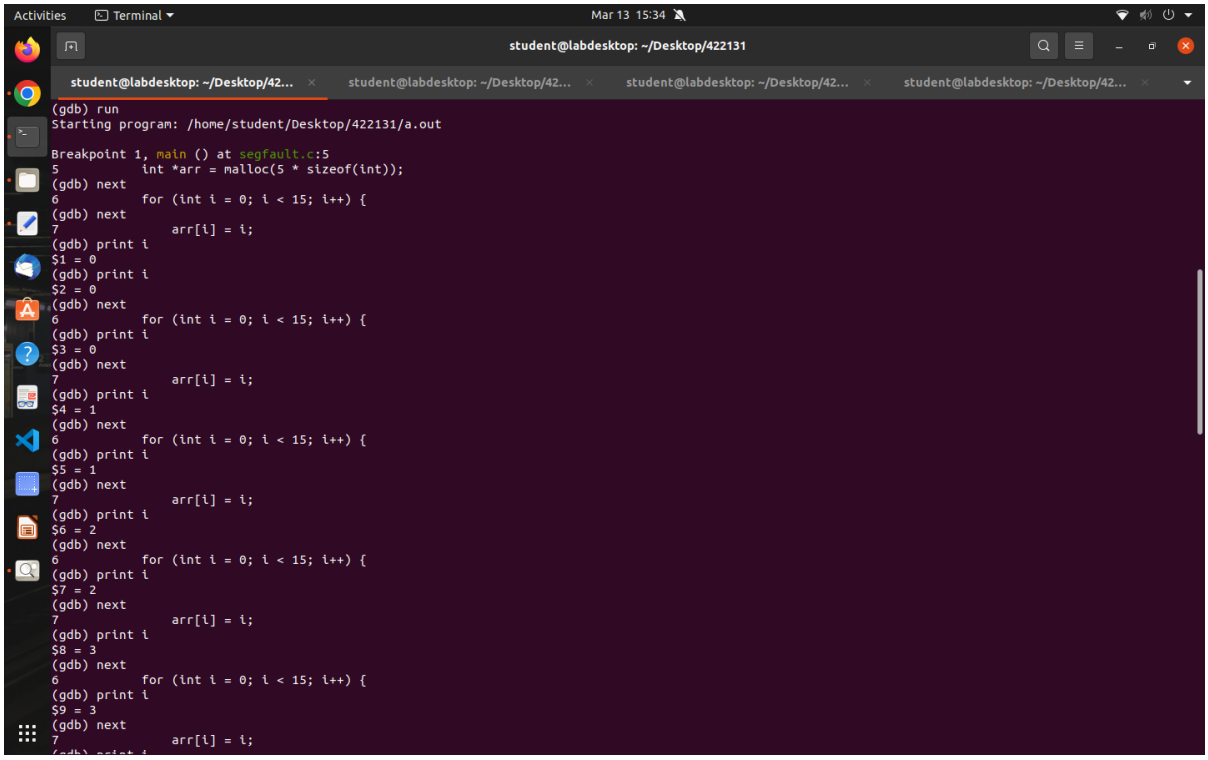
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
<http://www.gnu.org/software/gdb/documentation/>.
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from ./a.out...
(gdb) list
1 #include <stdio.h>
2 #include <stdlib.h>
3
4 int main() {
5 int *arr = malloc(3* sizeof(int));
6 for (int i = 0; i < 15; i++) {
7 arr[i] = i;
8 }
9 printf("Array values: ");
10 for (int i = 0; i < 15; i++) {
(gdb)
11 printf("%d ", arr[i]);
12 }
13 printf("\n");
14 free(arr);
15 return 0;
16 }
(gdb) break 5
Breakpoint 1 at 0x11b5: file segfault.c, line 5.
(gdb) break 9
Breakpoint 2 at 0x11ef: file segfault.c, line 9.
(gdb) run
Starting program: /home/student/Desktop/422131/a.out


Activities
Terminal
Mar 13 15:34
student@labdesktop: ~/Desktop/422131
student@labdesktop: ~/Desktop/42...
student@labdesktop: ~/Desktop/42...
student@labdesktop: ~/Desktop/42...
student@labdesktop: ~/Desktop/42...
(gdb) run
Starting program: /home/student/Desktop/422131/a.out
Breakpoint 1, main () at segfault.c:5
5 int *arr = malloc(5 * sizeof(int));
(gdb) next
6 for (int i = 0; i < 15; i++) {
(gdb) next
7 arr[i] = i;
(gdb) print i
$1 = 0
(gdb) print i
$2 = 0
(gdb) next
6 for (int i = 0; i < 15; i++) {
(gdb) print i
$3 = 0
(gdb) next
7 arr[i] = i;
(gdb) print i
$4 = 1
(gdb) next
6 for (int i = 0; i < 15; i++) {
(gdb) print i
$5 = 1
(gdb) next
7 arr[i] = i;
(gdb) print i
$6 = 2
(gdb) next
6 for (int i = 0; i < 15; i++) {
(gdb) print i
$7 = 2
(gdb) next
7 arr[i] = i;
(gdb) print i
$8 = 3
(gdb) next
6 for (int i = 0; i < 15; i++) {
(gdb) print i
$9 = 3
(gdb) next
7 arr[i] = i;