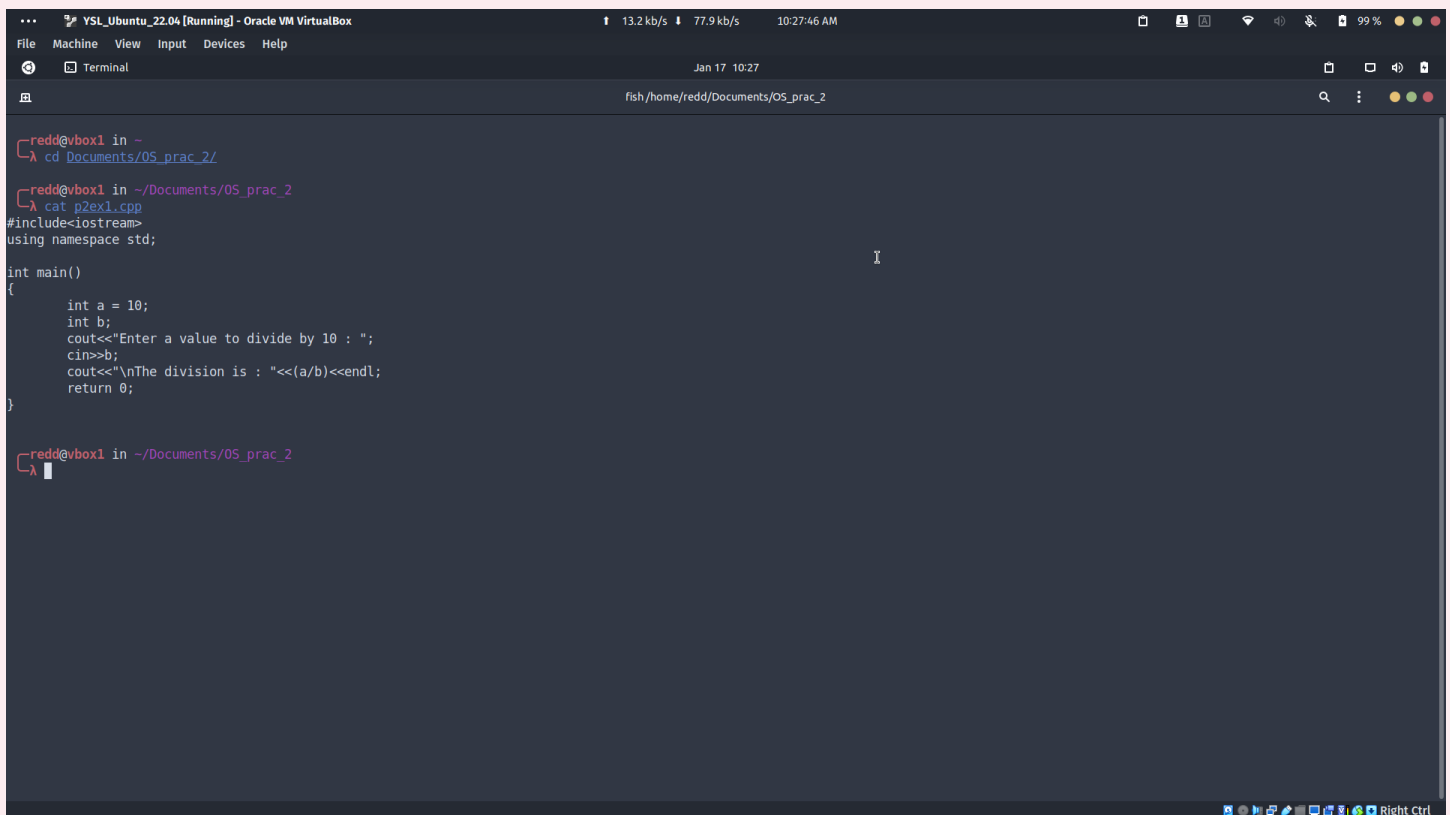


**Name - Yash Lakhtariya**  
**Enrollment number - 21162101012**  
**Branch - CBA    Batch - 41**  
**OS Practical 2**

**Aim** : To debug segmentation fault scenarios using gdb utility for C/C++ programs.

## **Practical Screenshots :**

### **Ex - 1:**



The screenshot shows a terminal window titled "YSL\_Ubuntu\_22.04 [Running] - Oracle VM VirtualBox". The terminal displays the following commands and code:

```
redd@vbox1 in ~  
→ cd Documents/OS_prac_2/  
redd@vbox1 in ~/Documents/OS_prac_2  
→ cat p2ex1.cpp  
#include<iostream>  
using namespace std;  
  
int main()  
{  
    int a = 10;  
    int b;  
    cout<<"Enter a value to divide by 10 : ";  
    cin>>b;  
    cout<<"\nThe division is : "<<(a/b)<<endl;  
    return 0;  
}
```

The terminal window also shows the file explorer and system status at the top, and the system tray at the bottom.

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Enrollment number - 21162101012  
Branch - CBA Batch - 41  
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```
YSL_Ubuntu_22.04 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Terminal
Jan 17 10:28
gdb final2.1 /home/redd/Documents/OS_prac_2

p2ex1.cpp
1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6     int a = 10;
7     int b;
8     cout<<"Enter a value to divide by 10 : ";
9     cin>>b;
10    cout<<"\nThe division is : "<<(a/b)<<endl;
11    return 0;
12 }
13
14
15
16
17
18
19
20
21
22
23
24

multi-thre Thread 0x7ffff7a523 In: main
(gdb) run
Starting program: /home/redd/Documents/OS_prac_2/final2.1
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".
Enter a value to divide by 10 : 0
Program received signal SIGFPE, Arithmetic exception.
0x000055555555527d in main () at p2ex1.cpp:10
(gdb) print b
$1 = 0
(gdb) break
Breakpoint 1 at 0x55555555527d: file p2ex1.cpp, line 10.
(gdb)
```

```
YSL_Ubuntu_22.04 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Terminal
Jan 17 10:34
fish /home/redd/Documents/OS_prac_2

redd@vbox1 in ~/Documents/OS_prac_2 took 5ms
└─ cat p2ex1.cpp
#include<iostream>
using namespace std;

int main()
{
    int a = 10;
    int b;
    cout<<"Enter a value to divide by 10 : ";
    cin>>b;
    while(b == 0)
    {
        cout<<"Cannot divide by 0"<<"\nPlease enter non zero value : ";
        cin>>b;
    }
    cout<<"\nThe division is : "<<(a/b)<<endl;
    return 0;
}

redd@vbox1 in ~/Documents/OS_prac_2 took 1ms
└─ g++ -g -o final2.1 p2ex1.cpp

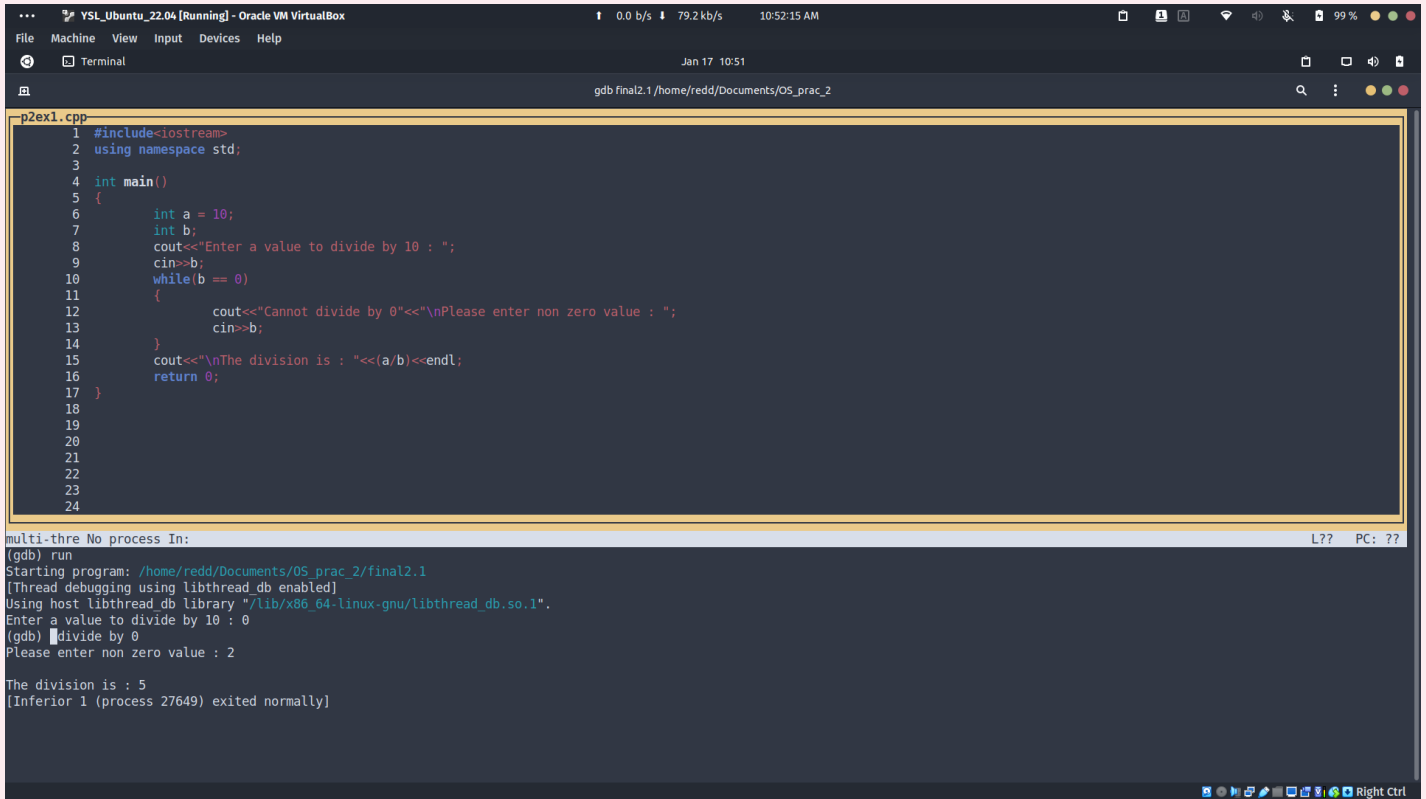
redd@vbox1 in ~/Documents/OS_prac_2 took 228ms
└─ gdb final2.1
```

# Name - Yash Lakhtariya

## Enrollment number - 21162101012

### Branch - CBA    Batch - 41

## OS Practical 2



The screenshot shows a VirtualBox window titled 'YSL\_Ubuntu\_22.04 [Running] - Oracle VM VirtualBox'. The terminal window displays the following content:

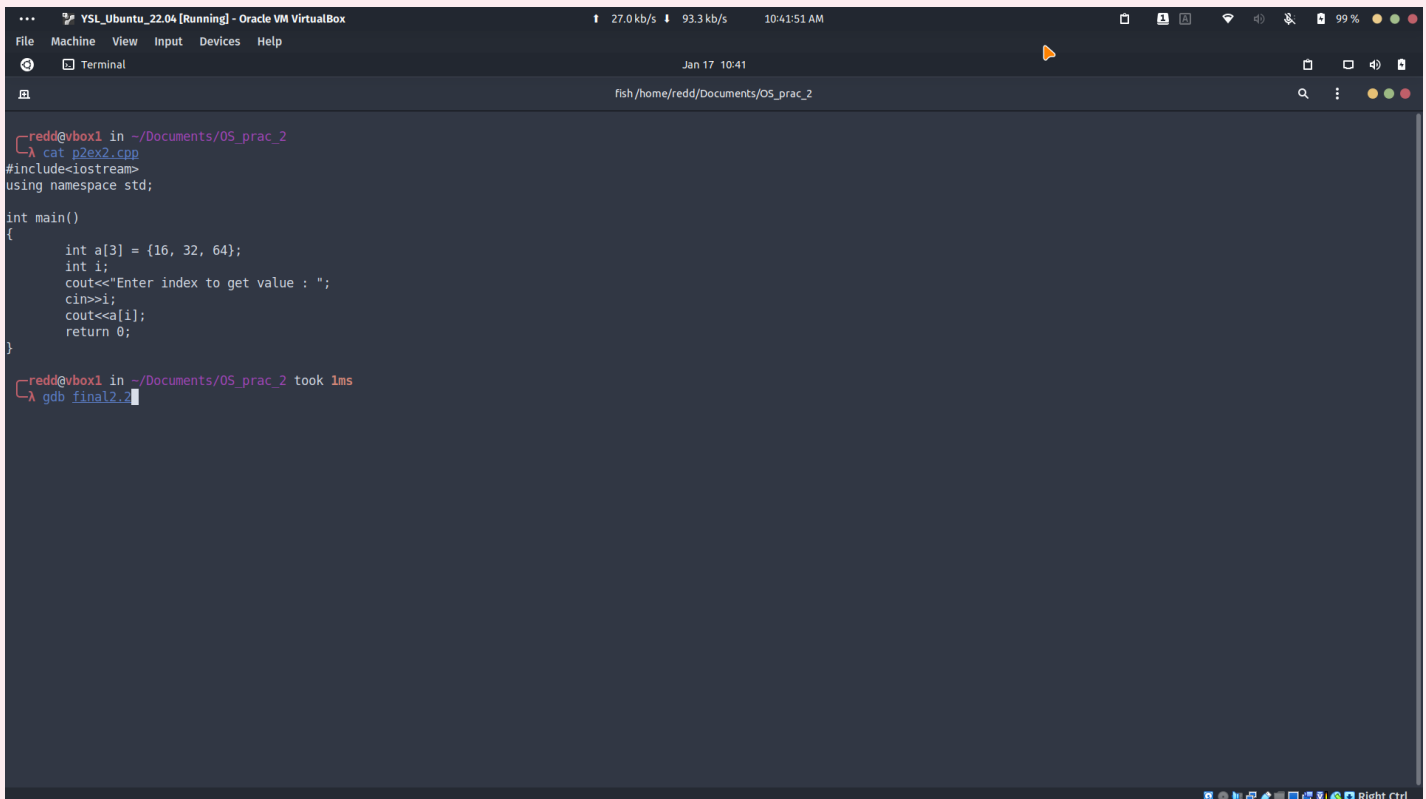
```
gdb final2.1 /home/redd/Documents/OS_prac_2

p2ex1.cpp
1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6     int a = 10;
7     int b;
8     cout<<"Enter a value to divide by 10 : ";
9     cin>>b;
10    while(b == 0)
11    {
12        cout<<"Cannot divide by 0"<<"\nPlease enter non zero value : ";
13        cin>>b;
14    }
15    cout<<"\nThe division is : "<<(a/b)<<endl;
16    return 0;
17 }
18
19
20
21
22
23
24

multi-thre No process in:
(gdb) run
Starting program: /home/redd/Documents/OS_prac_2/final2.1
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".
Enter a value to divide by 10 : 0
(gdb) divide by 0
Please enter non zero value : 2

The division is : 5
[Inferior 1 (process 27649) exited normally]
```

## Ex - 2



The screenshot shows a VirtualBox window titled 'YSL\_Ubuntu\_22.04 [Running] - Oracle VM VirtualBox'. The terminal window displays the following content:

```
redd@vbox1 in ~/Documents/OS_prac_2
└─ cat p2ex2.cpp
#include<iostream>
using namespace std;

int main()
{
    int a[3] = {16, 32, 64};
    int i;
    cout<<"Enter index to get value : ";
    cin>>i;
    cout<<a[i];
    return 0;
}

redd@vbox1 in ~/Documents/OS_prac_2 took 1ms
└─ gdb final2.2
```

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```
YSL_Ubuntu_22.04 [Running] - Oracle VM VirtualBox
752.0 b/s 56.1 kb/s 10:42:35 AM
File Machine View Input Devices Help
Terminal
Jan 17 10:41
gdb final2.2 /home/redd/Documents/OS_prac_2

p2ex2.cpp
1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6     int a[3] = {16, 32, 64};
7     int i;
8     cout<<"Enter index to get value : ";
9     cin>>i;
10    cout<<a[i];
11    return 0;
12 }
13
14
15
16
17
18
19
20
21
22
23
24

multi-thre Thread 0x7ffff7a523 In: main L10 PC: 0x5555555524d
(gdb) run
Starting program: /home/redd/Documents/OS_prac_2/final2.2
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".
Enter index to get value : 999
Program received signal SIGSEGV, Segmentation fault.
0x00005555555524d in main () at p2ex2.cpp:10
(gdb) break
Breakpoint 1 at 0x5555555524d: file p2ex2.cpp, line 10.
(gdb)
```

```
YSL_Ubuntu_22.04 [Running] - Oracle VM VirtualBox
0.0 b/s 48.0 kb/s 10:43:31 AM
File Machine View Input Devices Help
Terminal
Jan 17 10:42
fish /home/redd/Documents/OS_prac_2

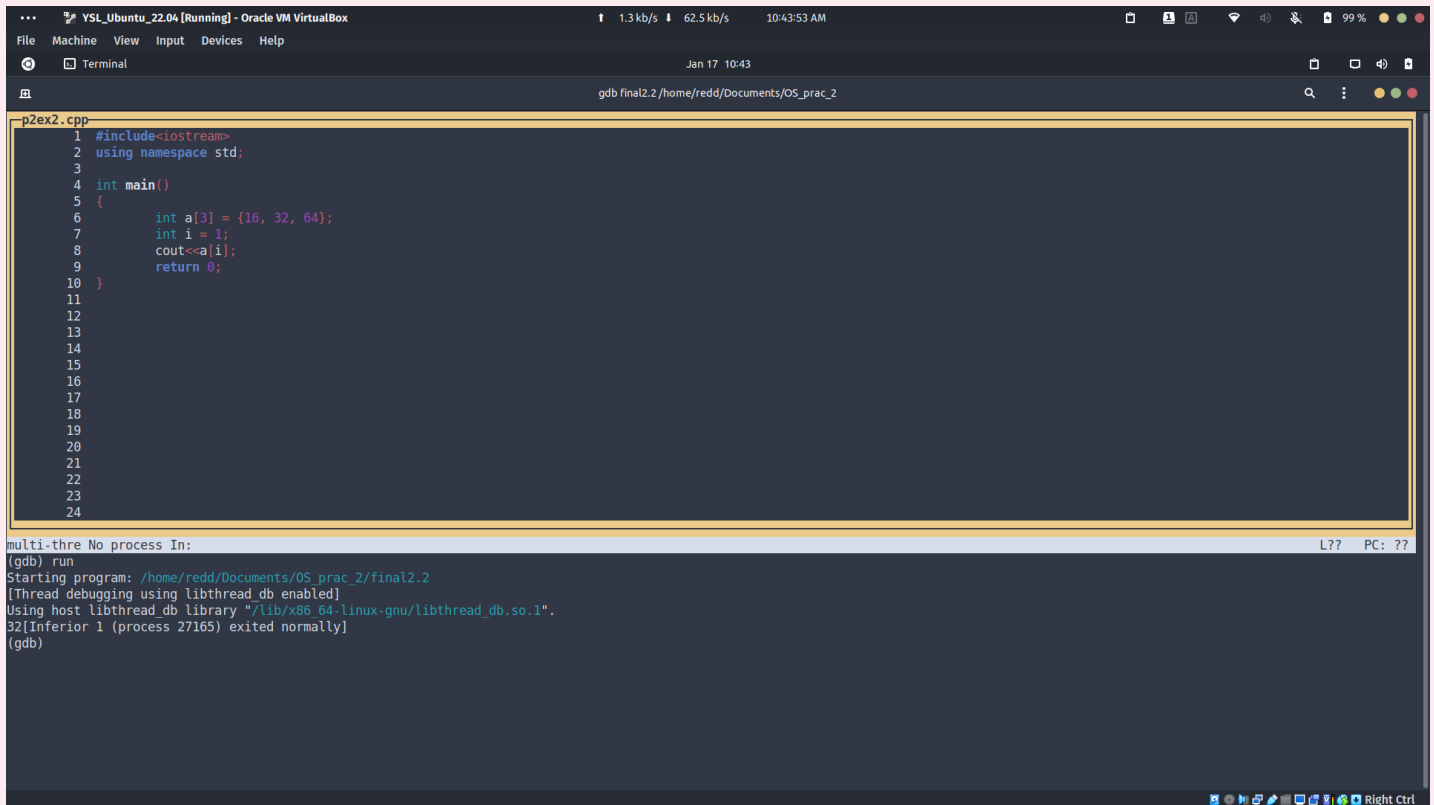
redd@vbox1 in ~/Documents/OS_prac_2
λ cat p2ex2.cpp
#include<iostream>
using namespace std;

int main()
{
    int a[3] = {16, 32, 64};
    int i = 1;
    cout<<a[i];
    return 0;
}

redd@vbox1 in ~/Documents/OS_prac_2
λ g++ -g -o final2.2 p2ex2.cpp

redd@vbox1 in ~/Documents/OS_prac_2 took 222ms
λ gdb final2.2
```

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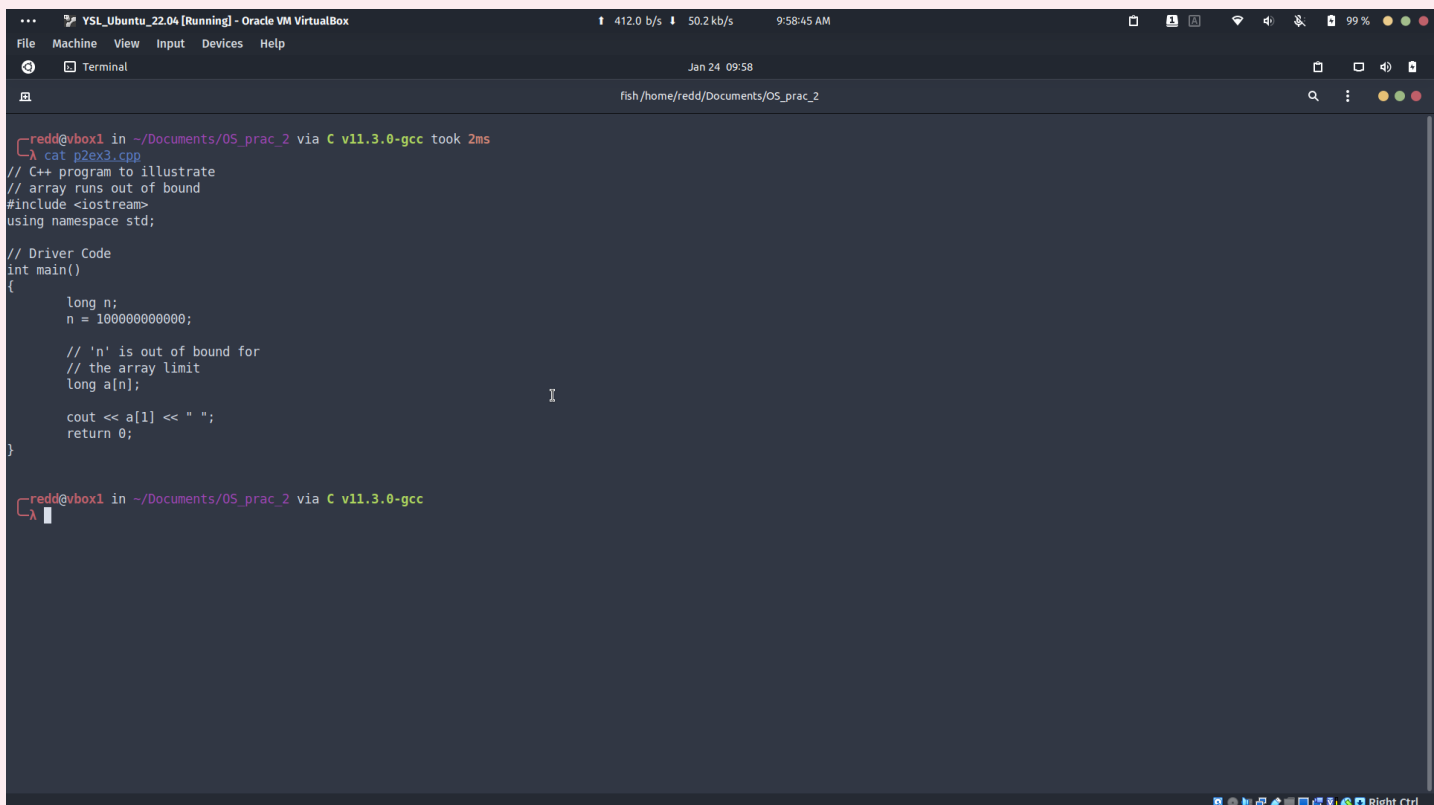


```
... YSL_Ubuntu_22.04 [Running] - Oracle VM VirtualBox 1.3 kb/s 62.5 kb/s 10:43:53 AM
File Machine View Input Devices Help
Terminal Jan 17 10:43
gdb final2.2 /home/redd/Documents/OS_prac_2

p2ex2.cpp
1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6     int a[3] = {16, 32, 64};
7     int i = 1;
8     cout<<a[i];
9     return 0;
10 }
11
12
13
14
15
16
17
18
19
20
21
22
23
24

multi-thre No process in: L?? PC: ??
(gdb) run
Starting program: /home/redd/Documents/OS_prac_2/final2.2
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".
32[Inferior 1 (process 27165) exited normally]
(gdb)
```

## Ex - 3



```
... YSL_Ubuntu_22.04 [Running] - Oracle VM VirtualBox 412.0 b/s 50.2 kb/s 9:58:45 AM
File Machine View Input Devices Help
Terminal Jan 24 09:58
fish/home/redd/Documents/OS_prac_2

redd@vbox1 in ~/Documents/OS_prac_2 via C v11.3.0-gcc took 2ms
$ cat p2ex3.cpp
// C++ program to illustrate
// array runs out of bound
#include <iostream>
using namespace std;

// Driver Code
int main()
{
    long n;
    n = 10000000000000;

    // 'n' is out of bound for
    // the array limit
    long a[n];

    cout << a[1] << " ";
    return 0;
}

redd@vbox1 in ~/Documents/OS_prac_2 via C v11.3.0-gcc
$ g++ p2ex3.cpp
```

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```
YSL_Ubuntu_22.04 [Running] - Oracle VM VirtualBox
3.6 kb/s 45.2 kb/s 10:00:28 AM
File Machine View Input Devices Help
Terminal
Jan 24 10:00
gdb final2.3 /home/redd/Documents/OS_prac_2

p2ex3.cpp
2 // array runs out of bound
3 #include <iostream>
4 using namespace std;
5
6 // Driver Code
7 int main()
8 {
9     long n;
10    n = 1000000000000;
11
12    // 'n' is out of bound for
13    // the array limit
14    long a[n];
15
16    cout << a[1] << " ";
17    return 0;
18 }
19
20
21
22
23
24
25

multi-thre Thread 0x7ffff7a523 In: main
(gdb) run
Starting program: /home/redd/Documents/OS_prac_2/final2.3
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".

Program received signal SIGSEGV, Segmentation fault.
0x000055555555525d in main () at p2ex3.cpp:14
(gdb)
```

```
YSL_Ubuntu_22.04 [Running] - Oracle VM VirtualBox
376.0 b/s 46.0 kb/s 10:01:35 AM
File Machine View Input Devices Help
Terminal
Jan 24 10:01
fish /home/redd/Documents/OS_prac_2

redd@vbox1 in ~/Documents/OS_prac_2 via C v11.3.0-gcc
cat p2ex3.cpp
// C++ program to illustrate
// array runs out of bound
#include <iostream>
using namespace std;

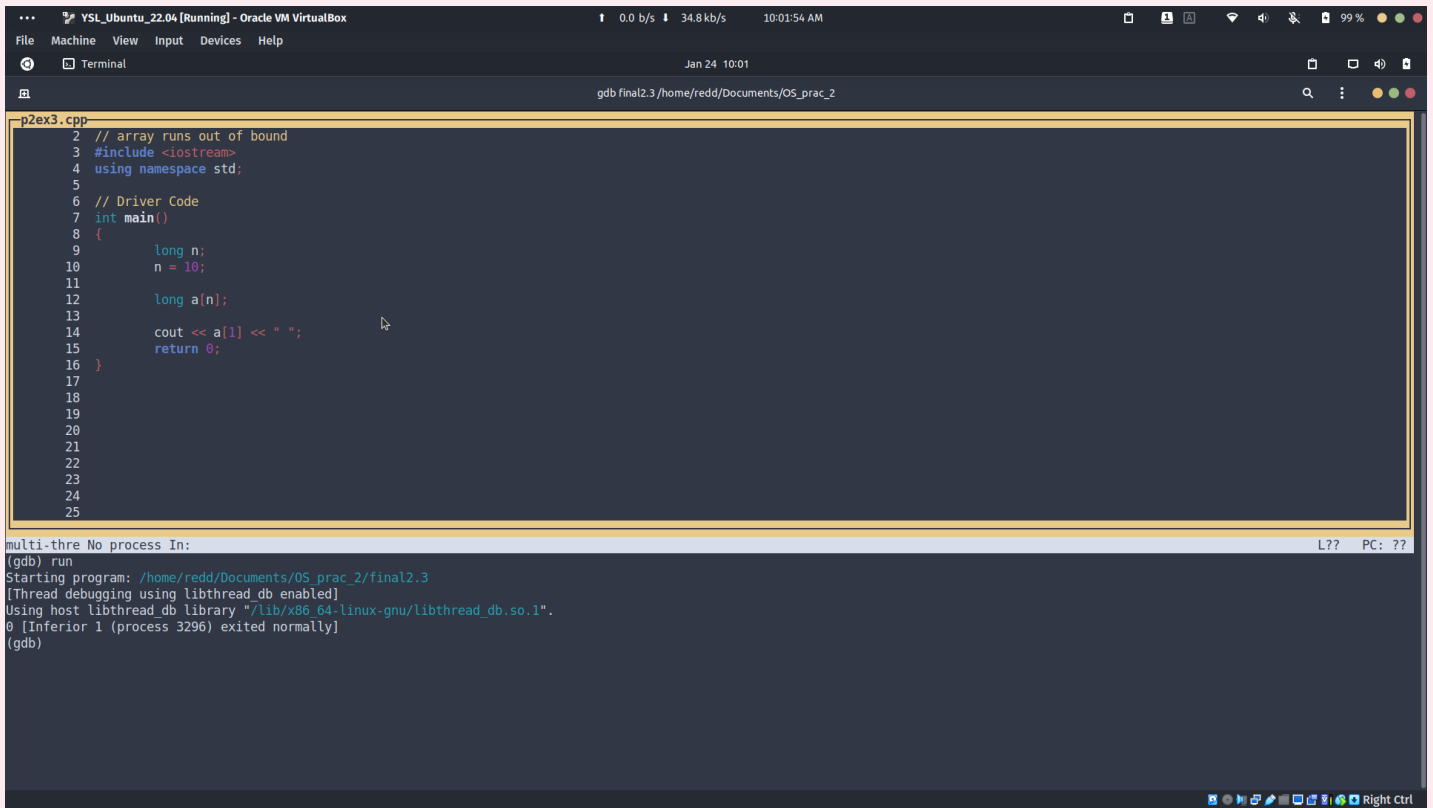
// Driver Code
int main()
{
    long n;
    n = 10;

    long a[n];

    cout << a[1] << " ";
    return 0;
}

redd@vbox1 in ~/Documents/OS_prac_2 via C v11.3.0-gcc
```

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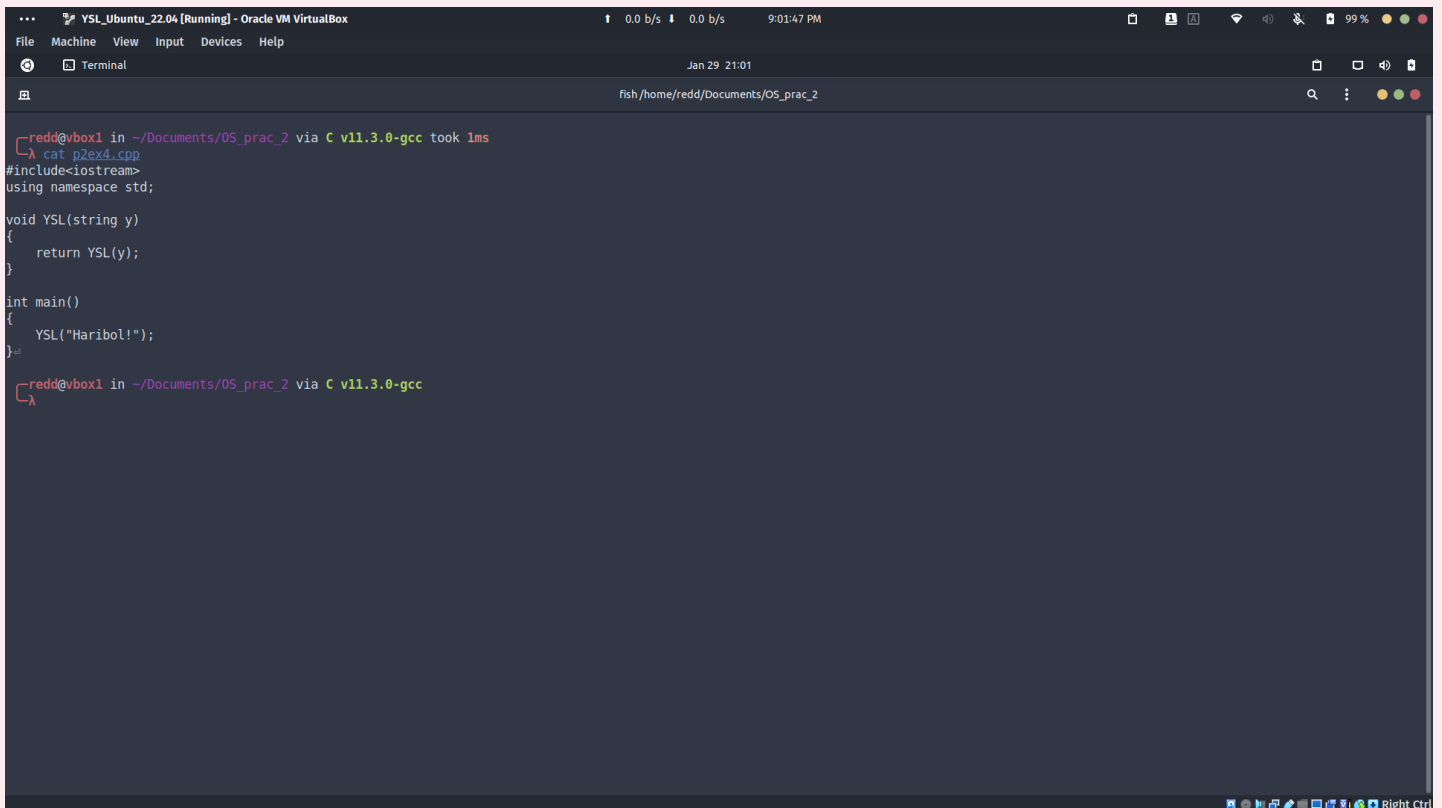


```
YSL_Ubuntu_22.04 [Running] - Oracle VM VirtualBox
0.0 b/s 34.8 kb/s 10:01:54 AM
Machine View Input Devices Help
Terminal
gdb final2.3 /home/redd/Documents/OS_prac_2

p2ex3.cpp
2 // array runs out of bound
3 #include <iostream>
4 using namespace std;
5
6 // Driver Code
7 int main()
8 {
9     long n;
10    n = 10;
11
12    long a[n];
13
14    cout << a[1] << " ";
15    return 0;
16 }
17
18
19
20
21
22
23
24
25

multi-thre No process in:
(gdb) run
Starting program: /home/redd/Documents/OS_prac_2/final2.3
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".
0 [Inferior 1 (process 3296) exited normally]
(gdb)
```

## Ex - 4



```
YSL_Ubuntu_22.04 [Running] - Oracle VM VirtualBox
0.0 b/s 0.0 b/s 9:01:47 PM
Machine View Input Devices Help
Terminal
fish /home/redd/Documents/OS_prac_2

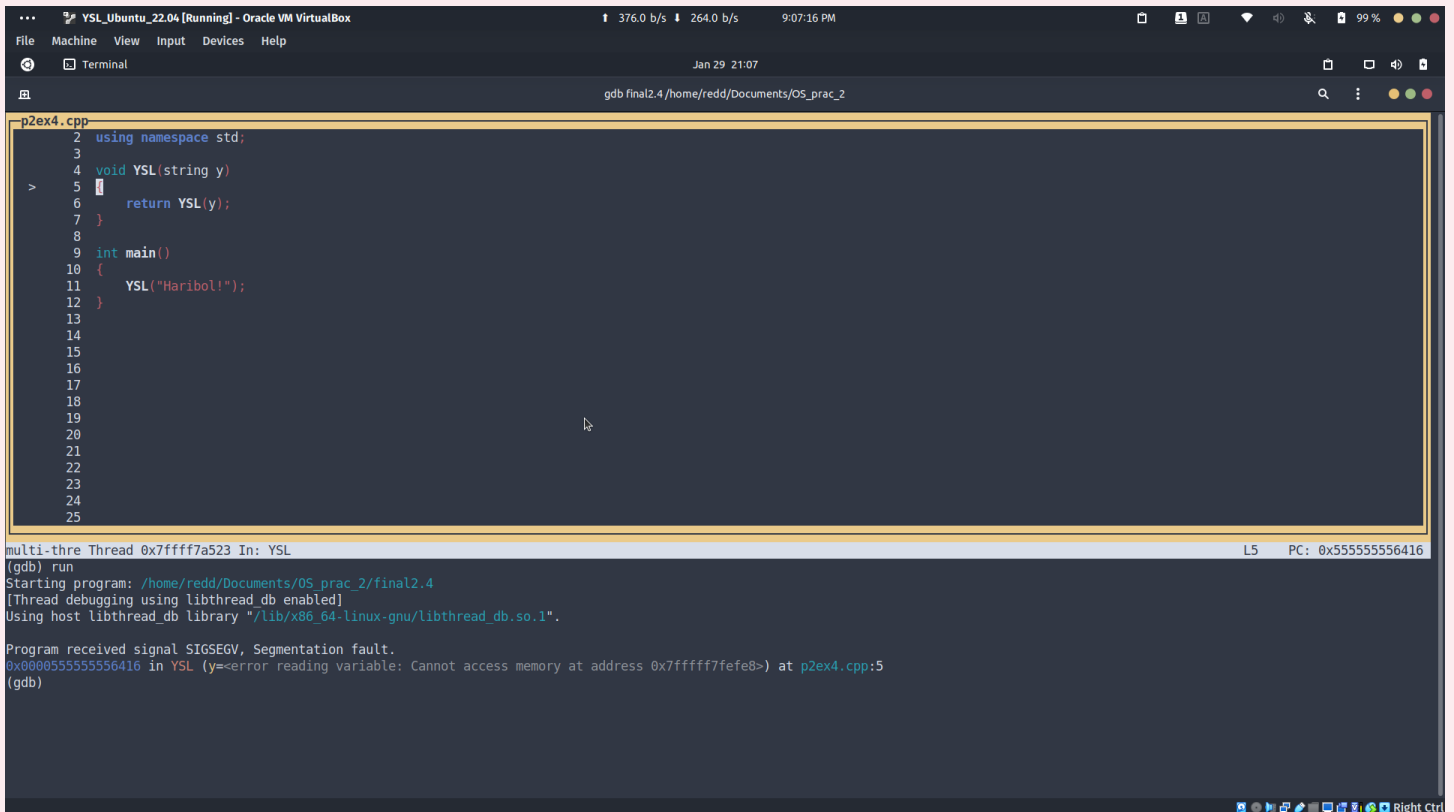
redd@vbox1 in ~/Documents/OS_prac_2 via C v11.3.0-gcc took 1ms
cat p2ex4.c
#include<iostream>
using namespace std;

void YSL(string y)
{
    return YSL(y);
}

int main()
{
    YSL("Haribol!");
}

redd@vbox1 in ~/Documents/OS_prac_2 via C v11.3.0-gcc
```

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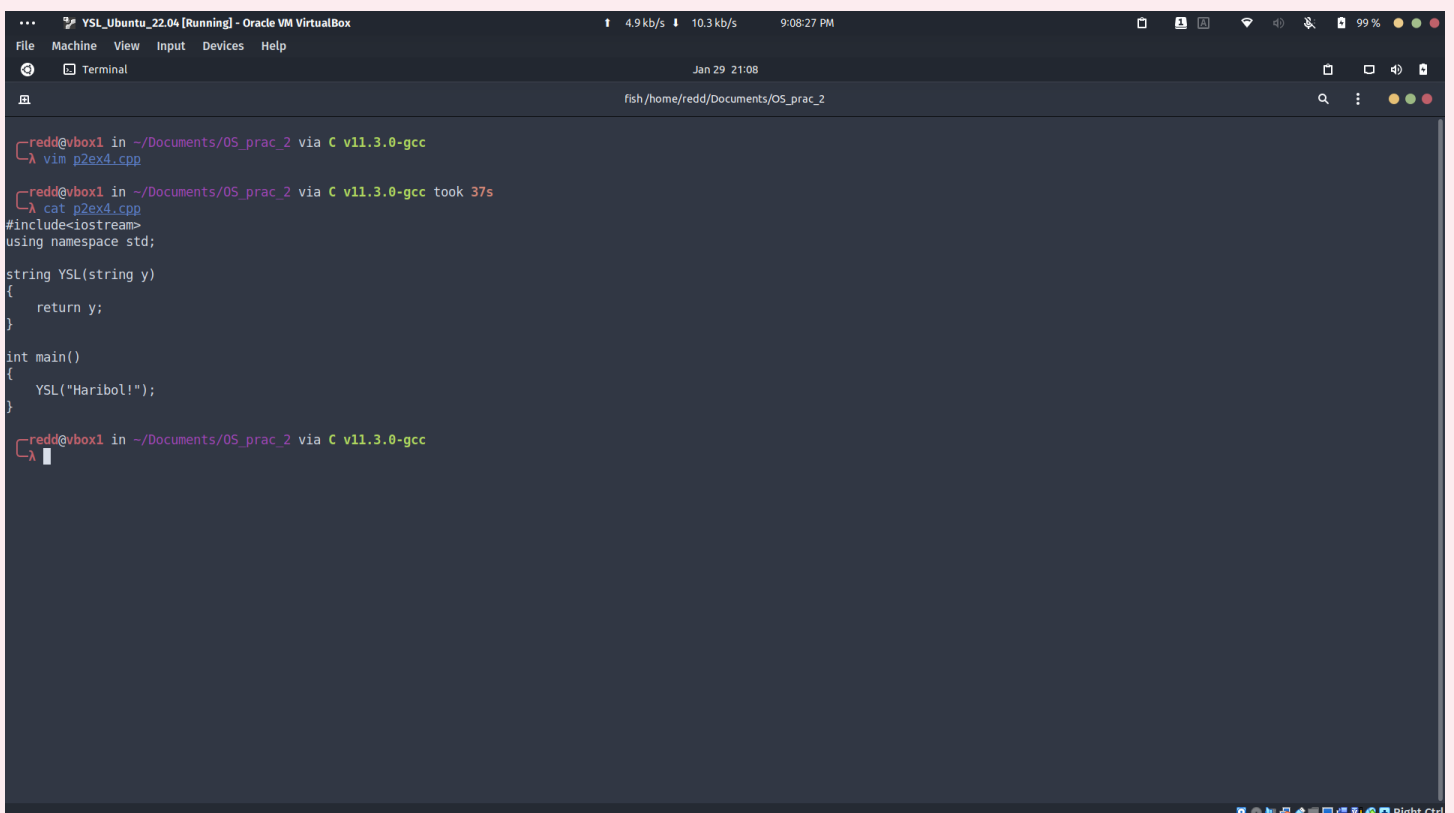


The screenshot shows a GDB terminal window titled "YSL\_Ubuntu\_22.04 [Running] - Oracle VM VirtualBox". The window displays the source code of a C++ program named "p2ex4.cpp". The code defines a recursive function "YSL" that prints "Haribol!" and calls itself. The main function calls "YSL("Haribol!")". The GDB session shows the program running and then crashing with a segmentation fault (SIGSEGV). The error message indicates that the program tried to read from an invalid memory address (0x7ffff7fefe8>).

```
p2ex4.cpp
2 using namespace std;
3
4 void YSL(string y)
5 {
6     return YSL(y);
7 }
8
9 int main()
10 {
11     YSL("Haribol!");
12 }
13
14
15
16
17
18
19
20
21
22
23
24
25

multi-thre Thread 0x7ffff7a523 In: YSL
(gdb) run
Starting program: /home/redd/Documents/OS_prac_2/final2.4
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".

Program received signal SIGSEGV, Segmentation fault.
0x0000555555556416 in YSL (y=<error reading variable: Cannot access memory at address 0x7ffff7fefe8>) at p2ex4.cpp:5
(gdb)
```



The screenshot shows a terminal window titled "YSL\_Ubuntu\_22.04 [Running] - Oracle VM VirtualBox". The window displays the commands used to compile and run the C++ program. The user uses "vim" to edit "p2ex4.cpp", "cat" to view the file, and "g++" to compile it. The output shows the compilation was successful and the program was executed.

```
redd@vbox1 in ~/Documents/OS_prac_2 via C v11.3.0-gcc
λ vim p2ex4.cpp

redd@vbox1 in ~/Documents/OS_prac_2 via C v11.3.0-gcc took 37s
λ cat p2ex4.cpp
#include<iostream>
using namespace std;

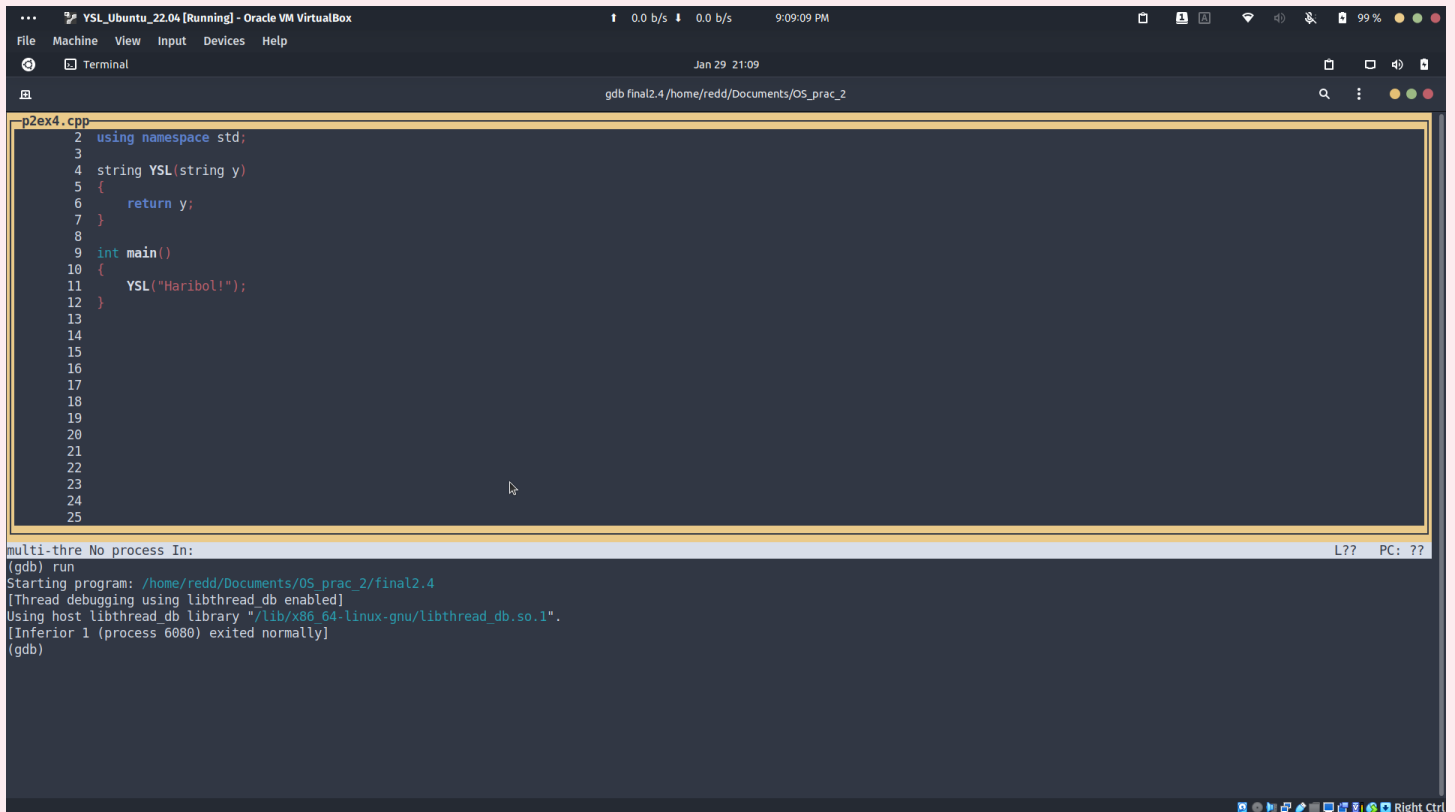
string YSL(string y)
{
    return y;
}

int main()
{
    YSL("Haribol!");
}

redd@vbox1 in ~/Documents/OS_prac_2 via C v11.3.0-gcc
λ
```



Name - Yash Lakhtariya  
Enrollment number - 21162101012  
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The screenshot shows a GDB terminal window titled "YSL\_Ubuntu\_22.04 [Running] - Oracle VM VirtualBox". The window has a menu bar (File, Machine, View, Input, Devices, Help) and a toolbar. The terminal output is as follows:

```
gdb final2.4 /home/redd/Documents/OS_prac_2
p2ex4.cpp
 2  using namespace std;
 3
 4  string YSL(string y)
 5  {
 6      return y;
 7  }
 8
 9  int main()
10  {
11      YSL("Haribol!");
12  }
13
14
15
16
17
18
19
20
21
22
23
24
25

multi-thre No process in:
(gdb) run
Starting program: /home/redd/Documents/OS_prac_2/final2.4
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".
[Inferior 1 (process 6080) exited normally]
(gdb)
```

The bottom status bar of the window shows system icons and the text "Right Ctrl".