

TALLER 01

ESTRUCTURAS DE DATOS

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ACTIVIDAD 1

The screenshot shows a C++ IDE with a file named `exercise1.cpp` and a terminal window. The code defines a `Node` class with a `value` and a `next` pointer. It creates a linked list with 5 nodes. The terminal output shows the program running successfully for the first 4 nodes, but it crashes with a segmentation fault when trying to create the 5th node. The error message is "Segmentation fault (core dumped)".

```
1 // exercise2.cpp (Andrea Rueda)
2 // based on:
3 // main.cc (Andrew Gilpin, aggl@cec.wustl.edu)
4
5 // This file contains a modification of the example program used
6 // in the
7 // gdb debugging tutorial. The tutorial can be found on the web at
8 // http://students.cec.wustl.edu/~aggl/tutorial/
9
10 #include <iostream>
11
12 using namespace std;
13
14 int numb_inst = 0;
15
16 template <class T>
17 class Node {
18 public:
19     Node (const T &value, Node<T> *next = 0) {
20         value_ = value;
21         next_ = next;
22         cout << "Creating Node, "
23              << ++numb_inst
24              << " are in existence right now" << endl;
25     }
26     ~Node () {
27         cout << "Destroying Node, "
28              << --numb_inst
29              << " are in existence right now" << endl;
30     }
31 }
```

```
~/Taller01exercise1$ g++ -std=c++11 -c exercise1.cpp
~/Taller01exercise1$ g++ -std=c++11 -o ml_ejercicio1 exercise1.cpp
~/Taller01exercise1$ ./ml_ejercicio1
Creating Node, 1 are in existence right now
Creating Node, 2 are in existence right now
Creating Node, 3 are in existence right now
Creating Node, 4 are in existence right now
The fully created list is:
4
3
2
1
Now removing elements:
Creating Node, 5 are in existence right now
Destroying Node, 4 are in existence right now
4
3
2
1
Segmentation fault (core dumped)
~/Taller01exercise1$
```

ACTIVIDAD 2

```
1 // exercise1.cxx (Andrea Rueda)
2
3 // Main program that uses the functionality of rectangle.h
4
5 #include <iostream>
6 #include "rectangle.h"
7
8 using namespace std;
9
10 int main () {
11
12     Rectangle rect1;
13     int a, b;
14
15     cout << "Ingrese coordenada X de la posicion del rectangulo: ";
16     cin >> rect1.posX;
17     cout << "Ingrese coordenada Y de la posicion del rectangulo: ";
18     cin >> rect1.posY;
19     cout << "Ingrese ancho del rectangulo: ";
20     cin >> rect1.width;
21     cout << "Ingrese alto del rectangulo: ";
22     cin >> rect1.height;
23 }
```

```
~/Taller01/exercise2$ g++ -std=c++11 -c exercise2.cxx
~/Taller01/exercise2$ g++ -std=c++11 -o ml_ejercicio2 exercise2.cxx
~/Taller01/exercise2$ ./ml_ejercicio2
Ingrese coordenada X de la posicion del rectangulo: 3
Ingrese coordenada Y de la posicion del rectangulo: 6
Ingrese ancho del rectangulo: 2
Ingrese alto del rectangulo: 7

Perimetro del rectangulo: 11
Area del rectangulo: 9
Distancia del rectangulo al origen de coordenadas: 6.7082
~/Taller01/exercise2$ g++ -std=c++11 -g -o ml_ejercicio2.cxx
/nix/store/039g378vc3pc3dvi9d2d1rd0i4q93qwf-binutils-2.39/bin/ld: /nix/store/4nlqxb09sdr5inc9hdm8az5b08vzkqx-glibc-2.35-163/lib/crt1.o: in function '_start':
(.text+0x1b): undefined reference to 'main'
collect2: error: ld returned 1 exit status
~/Taller01/exercise2$ gdb ml_ejercicio2
GNU gdb (GDB) 12.1
Copyright (C) 2022 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-unknown-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<https://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 ml_ejercicio2...
(NB debugging symbols found in ml_ejercicio2)
(gdb) run
Starting program: /home/runner/Taller01/exercise2/ml_ejercicio2
warning: Error disabling address space randomization: Operation not permitted
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/nix/store/4nlqxb09sdr5inc9hdm8az5b08vzkqx-glibc-2.35-163/lib/libthre
ad_db.so.1".
Ingrese coordenada X de la posicion del rectangulo: 5
```

```
1 // exercise1.cxx (Andrea Rueda)
2
3 // Main program that uses the functionality of rectangle.h
4
5 #include <iostream>
6 #include "rectangle.h"
7
8 using namespace std;
9
10 int main () {
11
12     Rectangle rect1;
13     int a, b;
14
15     cout << "Ingrese coordenada X de la posicion del rectangulo: ";
16     cin >> rect1.posX;
17     cout << "Ingrese coordenada Y de la posicion del rectangulo: ";
18     cin >> rect1.posY;
19     cout << "Ingrese ancho del rectangulo: ";
20     cin >> rect1.width;
21     cout << "Ingrese alto del rectangulo: ";
22     cin >> rect1.height;
23 }
```

```
/nix/store/039g378vc3pc3dvi9d2d1rd0i4q93qwf-binutils-2.39/bin/ld: /nix/store/4nlqxb09sdr5inc9hdm8az5b08vzkqx-glibc-2.35-163/lib/crt1.o: in function '_start':
(.text+0x1b): undefined reference to 'main'
collect2: error: ld returned 1 exit status
~/Taller01/exercise2$ gdb ml_ejercicio2
GNU gdb (GDB) 12.1
Copyright (C) 2022 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-unknown-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<https://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 ml_ejercicio2...
(NB debugging symbols found in ml_ejercicio2)
(gdb) run
Starting program: /home/runner/Taller01/exercise2/ml_ejercicio2
warning: Error disabling address space randomization: Operation not permitted
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/nix/store/4nlqxb09sdr5inc9hdm8az5b08vzkqx-glibc-2.35-163/lib/libthre
ad_db.so.1".
Ingrese coordenada X de la posicion del rectangulo: 5
Ingrese coordenada Y de la posicion del rectangulo: 8
Ingrese ancho del rectangulo: 10
Ingrese alto del rectangulo: 4

Perimetro del rectangulo: 24
Area del rectangulo: 14
Distancia del rectangulo al origen de coordenadas: 9.43398
[Inferior 1 (process 1849) exited normally]
(gdb) backtrace
No stack.
(gdb) quit
~/Taller01/exercise2$
```

ACTIVIDAD 3

Plan de pruebas: función Perímetro del rectángulo			
Descripción de caso	Valores de entrada	Resultado esperado	Resultado obtenido
1: Alto como el doble de Ancho	Ancho = 2, Alto = 4	8	8
2: Alto igual a Ancho	Ancho = 3, Alto = 3	9	9
3: un numero en cero	Ancho = 5, Alto = 0	0	10

Plan de pruebas: función Área del rectángulo			
Descripción de caso	Valores de entrada	Resultado esperado	Resultado obtenido
1: Alto como el doble de Ancho	Ancho = 2, Alto = 4	8	6
2: Alto igual a Ancho	Ancho = 3, Alto = 3	9	6
3: un numero en cero	Ancho = 5, Alto = 0	0	5

Plan de pruebas: función Distancia del rectángulo al origen			
Descripción de caso	Valores de entrada	Resultado esperado	Resultado obtenido
1: números positivos	x = 15, y = 32	35.34	35.34
2: un número 0	x = 0, y = 32	32	32
3: números iguales	x = 15, x = 15	21.21	21.21

The screenshot shows a C++ IDE with the following components:

- Files Panel:** Lists files including `main.cpp`, `exercise2.cxx`, `main-debug`, `mi_ejemplo2`, `mi_ejercicio2`, `rectangle.cxx`, and `rectangle.h`.
- Tools Panel:** Includes icons for Docs, Chat, Threads, Git, Debugger, Shell, Console, Secrets, and Database.
- Source Code (exercise2.cxx):**

```

1 // exercise1.cxx (Andrea Rueda)
2
3 // Main program that uses the functionality of
  rectangle.h
4
5 #include <iostream>
6 #include "rectangle.h"
7
8 using namespace std;
9
10 int main () {
11
12     Rectangle rect1;
13     int a, b;
14
15     cout << "Ingrese coordenada X de la posición del
  rectángulo: ";
16     cin >> rect1.posX;
17     cout << "Ingrese coordenada Y de la posición del
  rectángulo: ";
18     cin >> rect1.posY;
19     cout << "Ingrese ancho del rectángulo: ";
20     cin >> rect1.width;
21     cout << "Ingrese alto del rectángulo: ";
22     cin >> rect1.height;
23
24     cout << "\nPerímetro del rectángulo: " <<
  perimeterRect( rect1 ) << endl;
25     cout << "Área del rectángulo: " << areaRect( rect1
  ) << endl;

```
- Console:** Shows the execution output for three test cases:
 - Case 1: Input (3, 3, 3, 3) results in Perímetro: 9 and Área: 6.
 - Case 2: Input (15, 32, 2, 4) results in Perímetro: 35.34 and Área: 8.
 - Case 3: Input (15, 32, 5, 0) results in Perímetro: 21.21 and Área: 5.

The image shows a C++ IDE with a file explorer on the left, a code editor in the center, and a console on the right. The code editor displays the following C++ code:

```
1 // exercise1.cxx (Andrea Rueda)
2
3 // Main program that uses the functionality of
  rectangle.h
4
5 #include <iostream>
6 #include "rectangle.h"
7
8 using namespace std;
9
10 int main () {
11
12     Rectangle rect1;
13     int a, b;
14
15     cout << "Ingrese coordenada X de la poscion del
  rectangulo: ";
16     cin >> rect1.posX;
17     cout << "Ingrese coordenada Y de la poscion del
  rectangulo: ";
18     cin >> rect1.posY;
19     cout << "Ingrese ancho del rectangulo: ";
20     cin >> rect1.width;
21     cout << "Ingrese alto del rectangulo: ";
22     cin >> rect1.height;
23
24     cout << "\nPerimetro del rectangulo: " <<
  perimeterRect( rect1 ) << endl;
25     cout << "Area del rectangulo: " << areaRect( rect1
  ) << endl;
  }
```

The console shows the output of the program for three different rectangles:

```
Ingrese coordenada Y de la poscion del rectangulo: 3
Ingrese ancho del rectangulo: 5
Ingrese alto del rectangulo: 0
Perimetro del rectangulo: 10
Area del rectangulo: 5
Distancia del rectangulo al origen de coordenadas: 4.24264
~/Taller01/exercise2$ g++ -std=c++11 -c exercise2.cxx
~/Taller01/exercise2$ g++ -std=c++11 -o mi_ejemplo2 exercise2.cxx
~/Taller01/exercise2$ ./mi_ejemplo2
Ingrese coordenada X de la poscion del rectangulo: 15
Ingrese coordenada Y de la poscion del rectangulo: 32
Ingrese ancho del rectangulo: 2
Ingrese alto del rectangulo: 4
Perimetro del rectangulo: 8
Area del rectangulo: 6
Distancia del rectangulo al origen de coordenadas: 35.3412
~/Taller01/exercise2$ g++ -std=c++11 -c exercise2.cxx
~/Taller01/exercise2$ g++ -std=c++11 -o mi_ejemplo2 exercise2.cxx
~/Taller01/exercise2$ ./mi_ejemplo2
Ingrese coordenada X de la poscion del rectangulo: 0
Ingrese coordenada Y de la poscion del rectangulo: 32
Ingrese ancho del rectangulo: 3
Ingrese alto del rectangulo: 3
Perimetro del rectangulo: 9
Area del rectangulo: 6
Distancia del rectangulo al origen de coordenadas: 32
~/Taller01/exercise2$ g++ -std=c++11 -c exercise2.cxx
~/Taller01/exercise2$ g++ -std=c++11 -o mi_ejemplo2 exercise2.cxx
~/Taller01/exercise2$ ./mi_ejemplo2
Ingrese coordenada X de la poscion del rectangulo: 15
Ingrese coordenada Y de la poscion del rectangulo: 15
Ingrese ancho del rectangulo: 3
Ingrese alto del rectangulo: 3
Perimetro del rectangulo: 9
Area del rectangulo: 6
Distancia del rectangulo al origen de coordenadas: 21.2132
~/Taller01/exercise2$
```