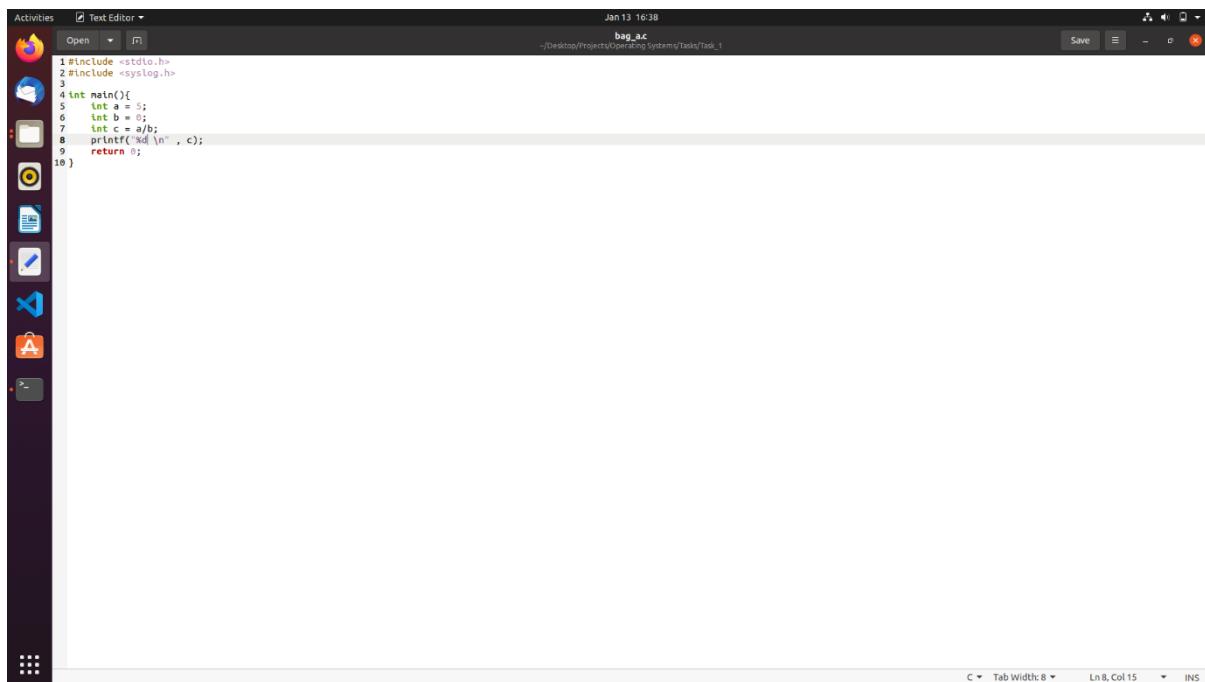


# Assignment 1 - operating systems

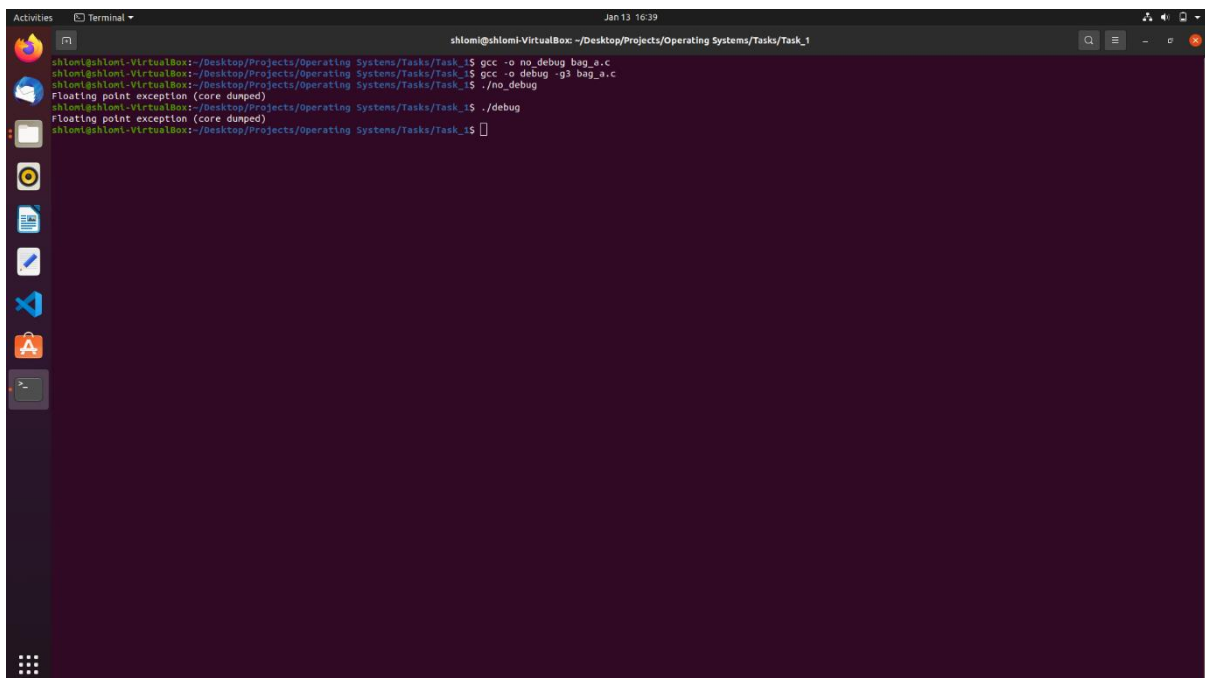
question 1:

the required code:



```
1 #include <stdio.h>
2 #include <syslog.h>
3
4 int main(){
5     int a = 5;
6     int b = 0;
7     int c = a/b;
8     printf("a/b = %d", c);
9     return 0;
10 }
```

From here we will run the code once with the debugger and once without the debugger:



```
shlomi@shlomi-VirtualBox: ~/Desktop/Projects/Operating Systems/Task_1
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Task_1$ gcc -o no_debug bag_a.c
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Task_1$ gcc -o debug -g3 bag_a.c
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Task_1$ ./no_debug
Floating point exception (core dumped)
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Task_1$ ./debug
Floating point exception (core dumped)
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Task_1$
```

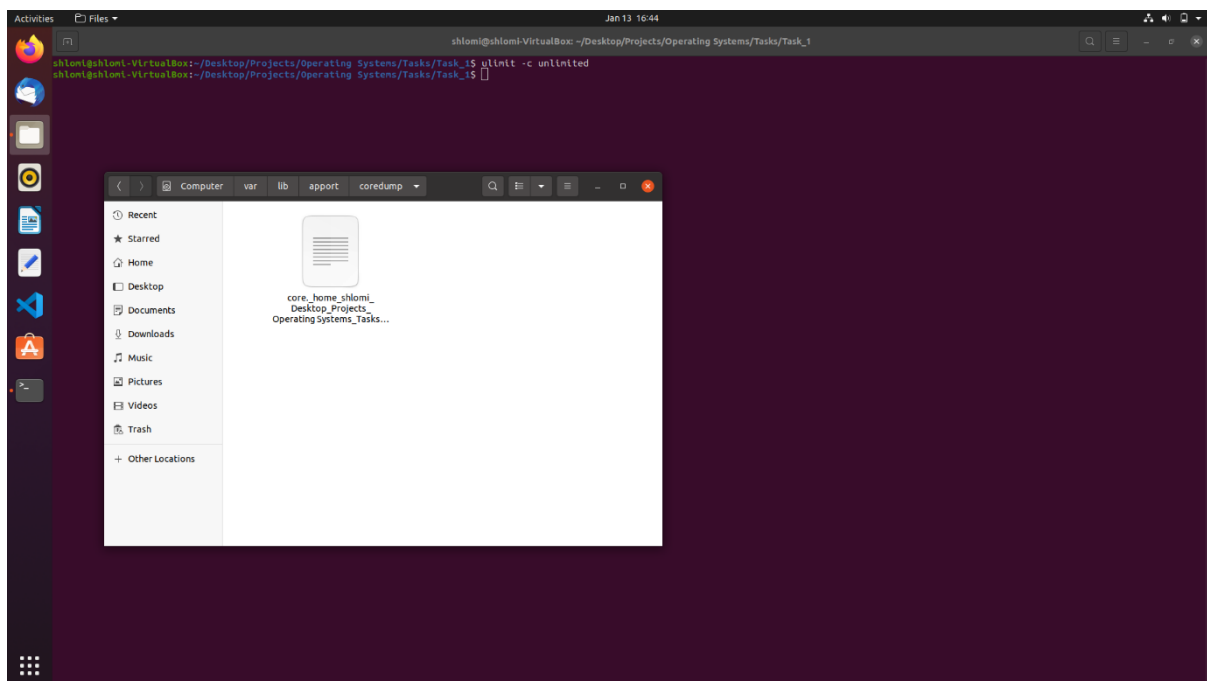
We will note that we both received an error - floating point exception (core dumped)

A core dump file is a snapshot of the working memory of a computer program at a given time, usually when the program crashes or closes abnormally.

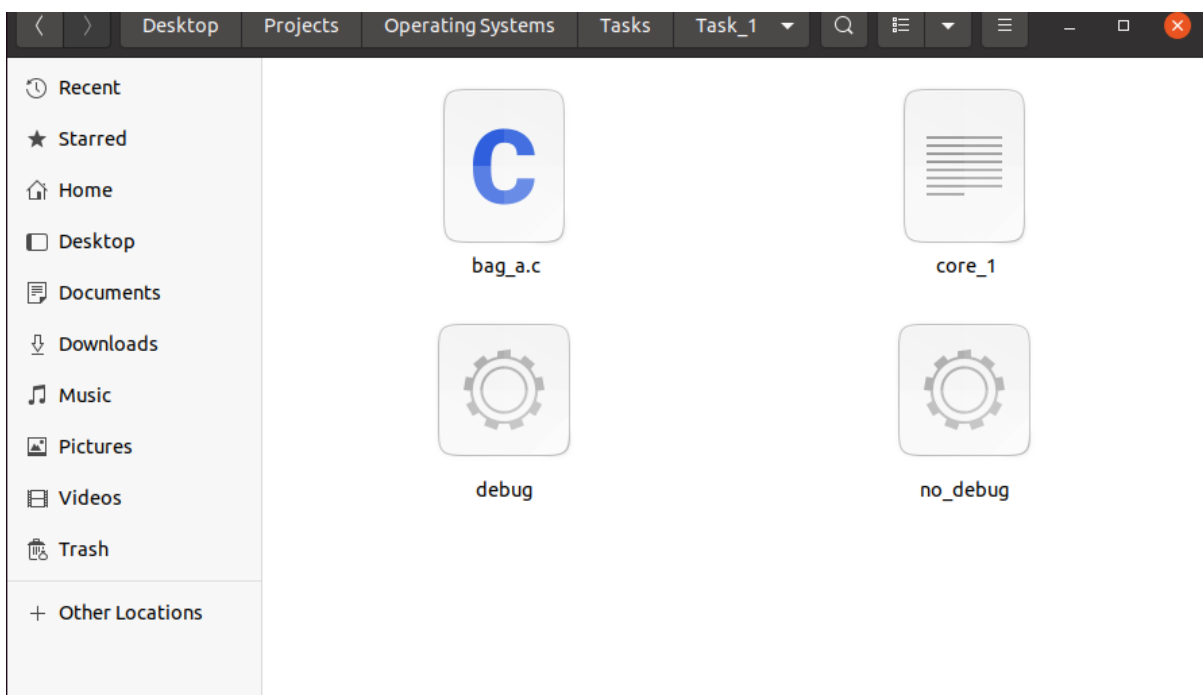
What does a core dump file contain?

- The contents of the entire working memory of the process
- The values of the registers of the processor
- Information about the activation process (process state)
- Operating system information

It seems that after writing `ulimit -c unlimited`, the file `core` was created for us

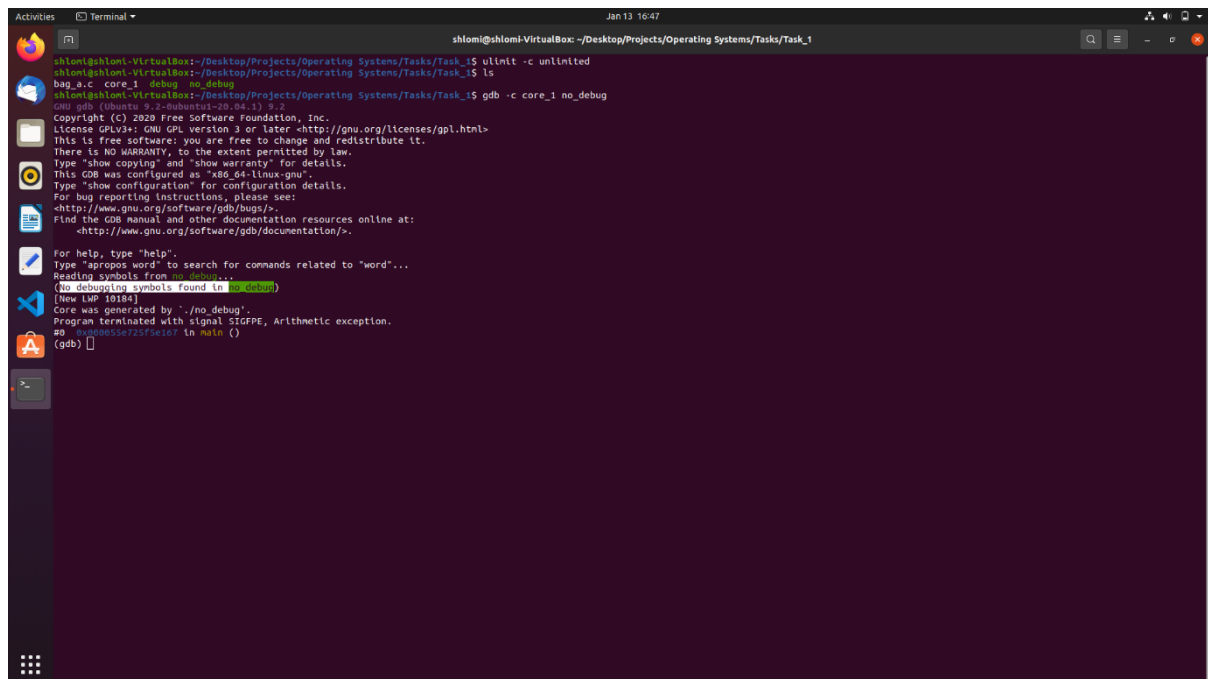


We will transfer the same file to the folder of the code



Now we would like to run gdb (it is a powerful debugger tool that allows in-depth analysis of core dump files, debugging and efficient software development) And we will see for the file that is compiled with a debugger and for the file that is compiled without a debugger:

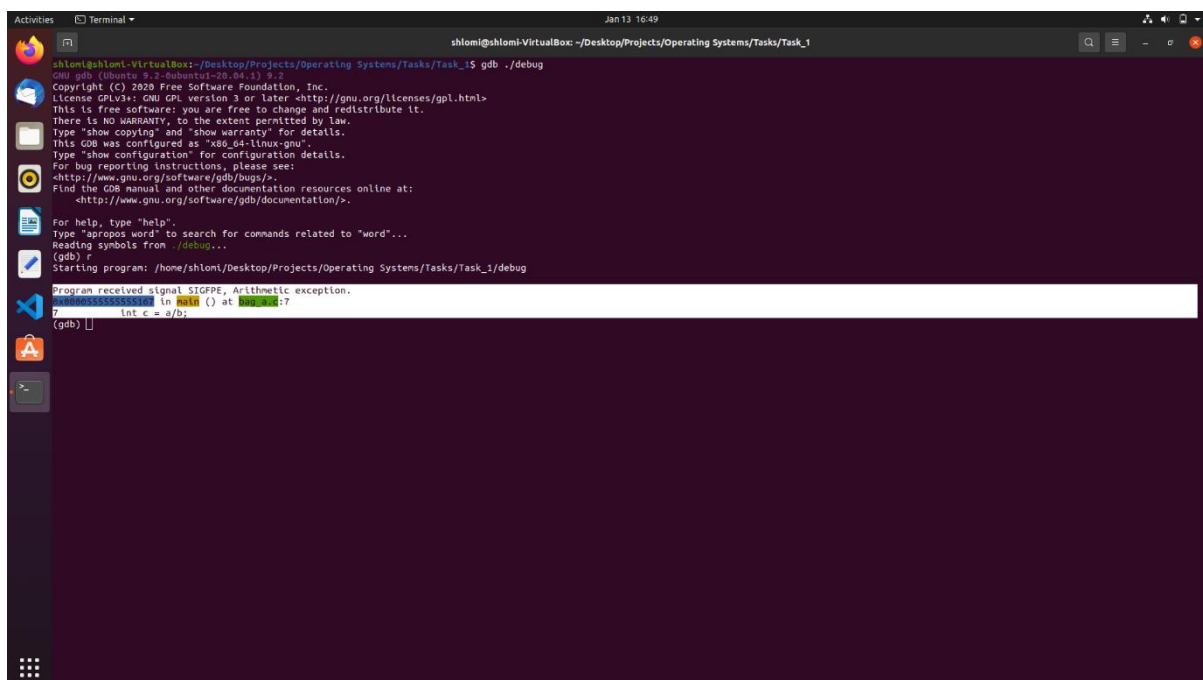
No debugger : It seems to emphasize to us that no debugger has been activated



```
shlomi@shlomi-VirtualBox: ~/Desktop/Projects/Operating Systems/Tasks/Task_1
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Tasks/Task_1$ ulimit -c unlimited
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Tasks/Task_1$ ls
bag_a.c core_1 debug no_debug
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Tasks/Task_1$ gdb -c core_1 no_debug
GNU gdb (Ubuntu 9.2-2ubuntu1~20.04.1) 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 no_debug...
[No debugging symbols found in no_debug]
[New LWP 10184]
Core was generated by './no_debug'.
Program terminated with signal SIGFPE, Arithmetic exception.
#0  0x0000555e123f5e1f in main ()
(gdb)
```

With a debugger: it seems to highlight our error, which is actually dividing a number by 0



```
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Tasks/Task_1$ gdb -c debug
GNU gdb (Ubuntu 9.2-2ubuntu1~20.04.1) 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 ./debug...
(gdb) r
Starting program: /home/shlomi/Desktop/Projects/Operating Systems/Tasks/Task_1/debug
Program received signal SIGFPE, Arithmetic exception.
0x0000555e123f5e1f in main () at bag_a.c:7
7          int c = a/b;
(gdb)
```

```
shlomi@shlomi-VirtualBox: ~/Desktop/Projects/Operating Systems/Tasks/Task_1
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Tasks/Task_1$ gdb ./debug
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 ./debug...
(gdb) r
Starting program: /home/shlomi/Desktop/Projects/Operating Systems/Tasks/Task_1/debug
Program received signal SIGFPE, Arithmetic exception.
0x0000555555555555 in main () at bug_n.c:7
7       int c = a/b;
(gdb) list
2       #include <syslog.h>
3
4       int main(){
5           int a = 5;
6           int b = 0;
7           int c = a/b;
8           printf("d\n", c);
9           return 0;
10      }
(gdb) 
```

We will now run the compiled file with a debugger using DDD.

DDD is a graphical user interface (GUI) for the GDB debugger tool. It allows you to run C programs, stop them at desired points, check the values of variables, perform individual steps within the code and easily navigate between the DDD code files, which significantly facilitates the process of debugging programs

```
shlomi@shlomi-VirtualBox: ~/Desktop/Projects/Operating Systems/Tasks/Task_1
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Tasks/Task_1$ ddd ./debug core
Warning: locale not supported by Xlib, locale set to c
Creating "/home/shlomi/.ddd/"...done.
Creating "/home/shlomi/.ddd/sessions/"...done.
Creating "/home/shlomi/.ddd/themes/"...done.
Creating "/home/shlomi/.ddd/themes/"...done.
Warning: Cannot convert string "-*-helvetica-medium-r-*-*-*120-*-*-*iso8859-*" to type FontStruct
(Annoyed? Try "Edit->Preferences->General->Suppress X Warnings!")
Warning: Cannot convert string "-*-helvetica-medium-r-*-*-*180-*-*-*iso8859-*" to type FontStruct
Warning: Cannot convert string "-*-lucidatypewriter-medium-r-*-*-*120-*-*-*iso8859-*" to type FontStruct
Warning: Cannot convert string "-*-lucidatypewriter-bold-r-*-*-*120-*-*-*iso8859-*" to type FontStruct
Warning: Cannot convert string "-*-helvetica-bold-r-*-*-*120-*-*-*iso8859-*" to type FontStruct
Warning: Cannot convert string "-*-helvetica-medium-r-*-*-*120-*-*-*iso8859-*" to type FontStruct
Warning: Cannot convert string "-*-helvetica-bold-r-*-*-*180-*-*-*iso8859-*" to type FontStruct
Warning: Cannot convert string "-*-symbol-*-*-*120-*-*-*adobe-*" to type FontStruct
Warning: Could not load font "-*-lucidatypewriter-medium-r-*-*-*120-*-*-*iso8859-*", using font "fixed" instead
Warning: Could not load font "-*-lucidatypewriter-bold-r-*-*-*120-*-*-*iso8859-*", using font "fixed" instead
shlomi@shlomi-VirtualBox:~/Desktop/Projects/Operating Systems/Tasks/Task_1$ 
```

The interface:

