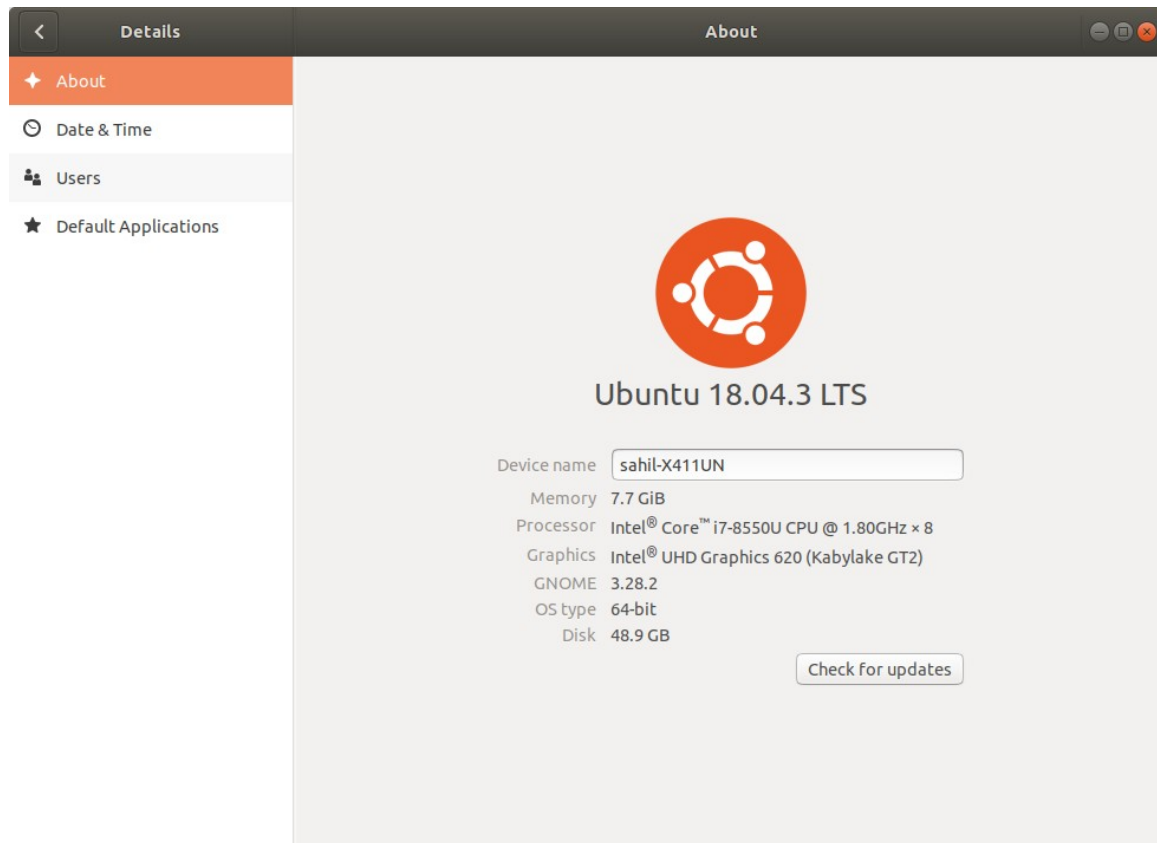


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## 1) Ubuntu dual boot



2) The command for compiling a cpp file with a specific output name is -  
`g++ buggy.cpp -o buggy`

4)

```
sahil@sahil-X411UN: ~/git_workspace/CSCE_313
File Edit View Search Terminal Help
sahil@sahil-X411UN:~/git_workspace/CSCE_313$ g++ buggy.cpp -o buggy
sahil@sahil-X411UN:~/git_workspace/CSCE_313$ ./buggy
Segmentation fault (core dumped)
sahil@sahil-X411UN:~/git_workspace/CSCE_313$
```

5) The command for compiling a cpp file in debug mode is -  
g++ -g buggy.cpp -o buggy

6)

```
sahil@sahil-X411UN: ~/git_workspace/CSCE_313
File Edit View Search Terminal Help

sahil@sahil-X411UN:~/git_workspace/CSCE_313$ gdb buggy
GNU gdb (Ubuntu 8.1-0ubuntu3) 8.1.0.20180409-git
Copyright (C) 2018 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 buggy...done.
(gdb) run
Starting program: /home/sahil/git_workspace/CSCE_313/buggy

Program received signal SIGSEGV, Segmentation fault.
0x0000555555554bb4 in create_LL (
    mylist=std::vector of length 3, capacity 3 = {...}, node_num=3)
    at buggy.cpp:14
14          mylist[i]->val = i;
```

```
sahil@sahil-X411UN: ~/git_workspace/CSCE_313
File Edit View Search Terminal Help

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 buggy...done.
(gdb) run
Starting program: /home/sahil/git_workspace/CSCE_313/buggy

Program received signal SIGSEGV, Segmentation fault.
0x0000555555554bb4 in create_LL (
    mylist=std::vector of length 3, capacity 3 = {...}, node_num=3)
    at buggy.cpp:14
14          mylist[i]->val = i;
(gdb) backtrace
#0  0x0000555555554bb4 in create_LL (
    mylist=std::vector of length 3, capacity 3 = {...}, node_num=3)
    at buggy.cpp:14
#1  0x0000555555554cbc in main (argc=1, argv=0x7fffffffdf28) at buggy.cpp:37
(gdb) █
```

7)

```
sahil@sahil-X411UN: ~/git_workspace/CSCE_313
File Edit View Search Terminal Tabs Help
sahil@sahil-X411UN: ~/git_workspace/CSC... x sahil@sahil-X411UN: ~/git_workspace/CSC... x
Type "apropos word" to search for commands related to "word"...
Reading symbols from buggy...done.
(gdb) run
Starting program: /home/sahil/git_workspace/CSCE_313/buggy

Program received signal SIGSEGV, Segmentation fault.
0x0000555555554bb4 in create_LL (
    mylist=std::vector of length 3, capacity 3 = {...}, node_num=3)
    at buggy.cpp:14
warning: Source file is more recent than executable.
14          mylist[i]->val = i;
(gdb) b 14
Breakpoint 1 at 0x555555554b99: file buggy.cpp, line 14.
(gdb) run
The program being debugged has been started already.
Start it from the beginning? (y or n) y
Starting program: /home/sahil/git_workspace/CSCE_313/buggy

Breakpoint 1, create_LL (mylist=std::vector of length 3, capacity 3 = {...},
    node_num=3) at buggy.cpp:14
14          mylist[i]->val = i;
(gdb) print mylist[i]
$1 = (node *) 0x0
(gdb) █
```

8) The value stored in `mylist[i]->val` is 0. A segmentation fault occurs here as the node `mylist[i]` was never instantiated in dynamic memory. Therefore, trying to set `mylist[i]->val` will cause an segmentation fault. Added a line of code to instantiate `mylist[i]` node.

9) On line 25 of the file, the linked list is being created. It is linking the first node in the vector to the second, the second to the third and so on. The last node in the vector attempts to link to a node that is out of the range of the vector, causing a segmentation fault. Editing the code makes the last node in the vector point to NULL, eliminating the segmentation fault.