COMP201 Lab 2
Fall 2020

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Introduction to File Permission in Linux and vi Editor

File Permission in Linux

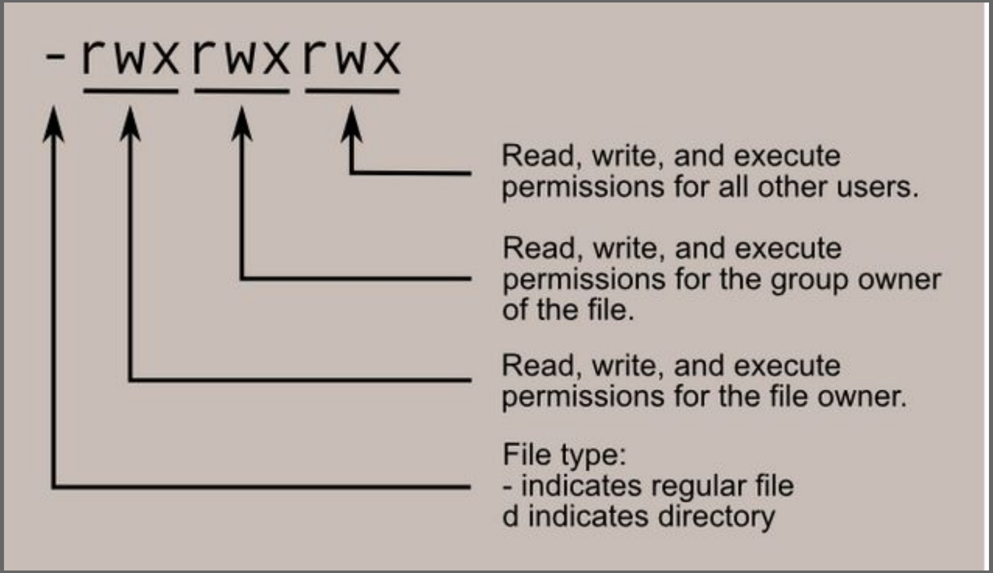
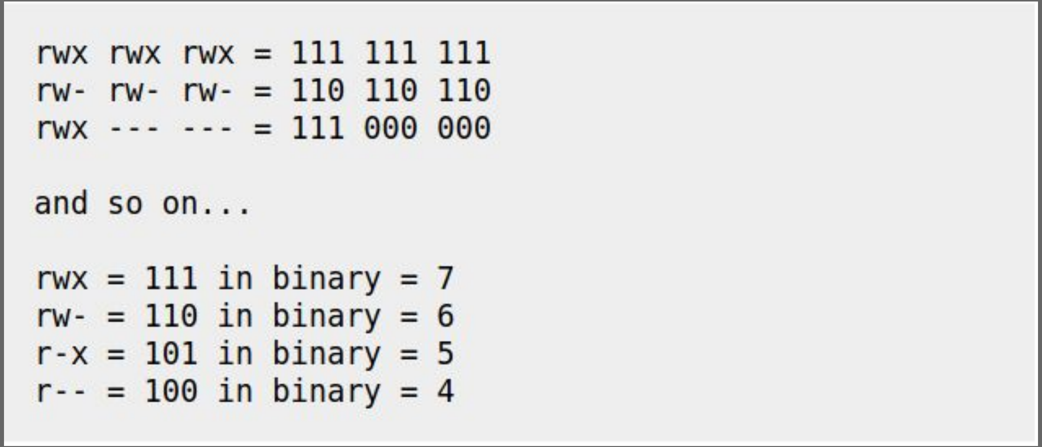

-rwxrwxrwx
Read, write, and execute permissions for all other users.
Read, write, and execute permissions for the group owner of the file.
Read, write, and execute permissions for the file owner.
File type:
- indicates regular file
d indicates directory

Image source: http://linuxcommand.org/lc3_lts0090.php

File Permission in Linux



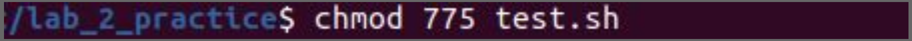
```
rwx rwx rwx = 111 111 111
rw- rw- rw- = 110 110 110
rwx --- --- = 111 000 000

and so on...

rwx = 111 in binary = 7
rw- = 110 in binary = 6
r-x = 101 in binary = 5
r-- = 100 in binary = 4
```

Image source: http://linuxcommand.org/lc3_lts0090.php

Initially, test.sh cannot be executed, to grant -rwx rwx r-x permission to test.sh file:



```
:/lab_2_practice$ chmod 775 test.sh
```

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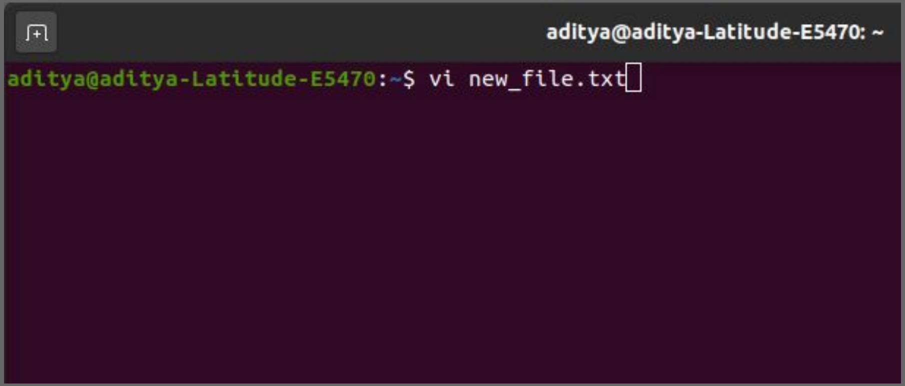
What is Vi?



```
aditya@aditya-Latitude-E5470:~$ vi new_file.txt
```

- Vi is the default text editor in the UNIX operating system.
- Using vi, we can read create a new file, read, and edit an existing file.
- To open vi, type “vi” or “vi filename”. If the file “filename” doesn’t exist, it will be created when you save it.

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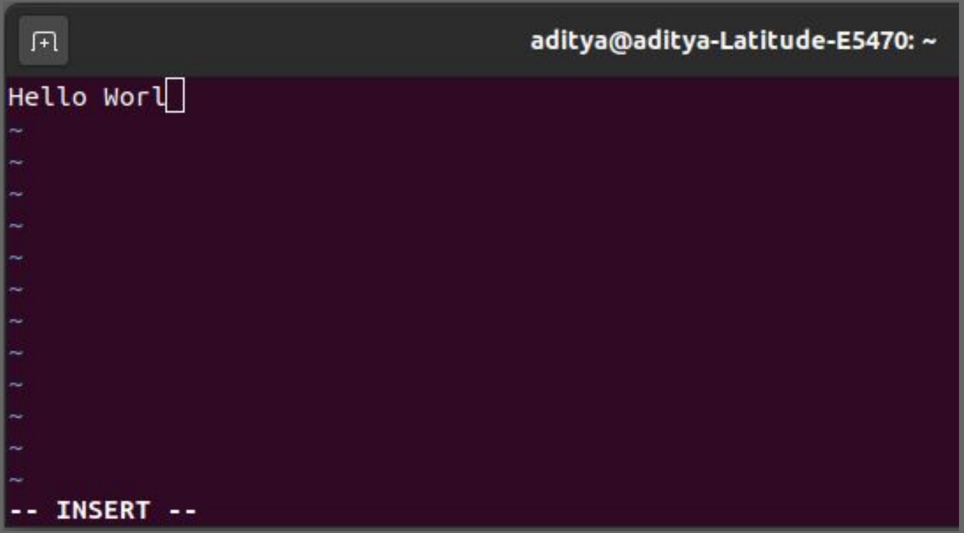
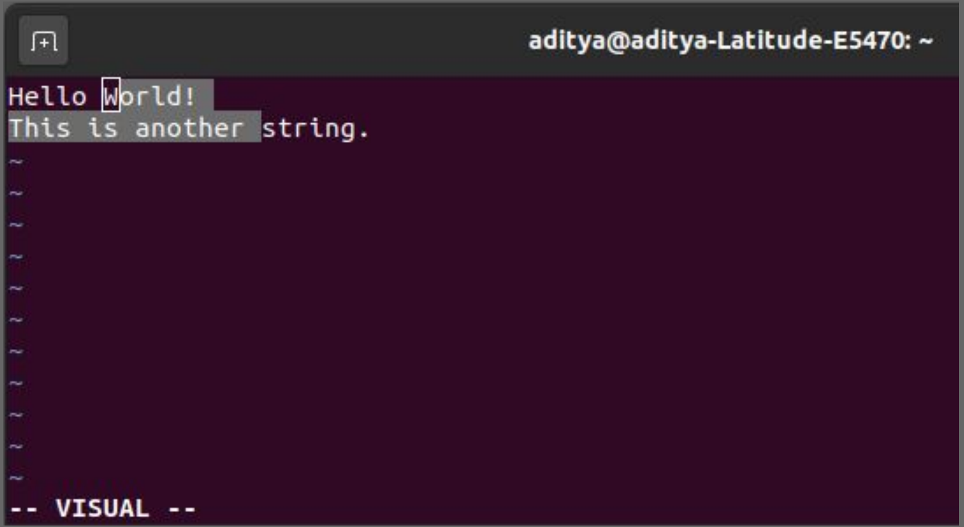
Operation Modes in vi



```
Hello Worl
~
~
~
~
~
~
~
~
~
~
~
~
-- INSERT --
```

- Normal mode
  - The default mode in vi.
  - In some source, like https://www.cs.colostate.edu/helpdocs/vi.html, it is also called command mode.
  - Every character you type is interpreted as a command.
- Insert mode
  - The one on the left picture.
  - To switch from normal mode to insert mode, type 'i' in the normal mode.
  - Every character you type is put to the file.
  - To switch back to normal mode, press <Esx>

Operation Modes in vi



```
aditya@aditya-Latitude-E5470: ~
Hello World!
This is another string.
~
~
~
~
~
~
~
~
~
~
~
-- VISUAL --
```

- Visual mode
  - To switch from normal mode to visual mode, type ‘v’.
  - You can select blocks of text.
  - Type d to delete the block, c to delete the block and switch to insert mode to replace the deleted block with another string.
  - To switch back to normal mode, type <Esc>.

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Basic Commands in vi (in Normal Mode)

- Basic movements: h (left), j (down), k (up), l (right)
- Moving across words: w (next word), b (beginning of word), e (end of word)
- Jumping in a line: 0 (beginning of line), $ (end of line)
- Jumping in a file: gg (beginning of file), G (end of file), :{num}<Enter> (moving to line number num)
- Searching for a string: /{regex}, n (moving forward to find the next match), N (moving backward to find a previous match)
- :q (quitting a file without saving), :q! (quitting a file by discarding modification), :w (saving a file without quitting the file), :x (saving a file and quitting it)

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Demo

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Bitwise Operations and Bit Representation of Floating Point Numbers

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Bitwise Operations

- In today's lab practice, you are going to use some bitwise operators.
  - & ^ >> +
  - Examples of bitwise operations:
    - 1110 & 0011 = 0010 (getting least significant 2 bits of 1110)
    - 1110 ^ 0011 = 1101 (flipping least significant 2 bits of 1110)
    - 1010 >> 2 = 1110 (arithmetic right shift by 2 bits)
    - (1010 >> 2) & 0011 = 1110 & 0011 = 0010 (getting the most significant 2 bits of 1010)

Bitwise Operations at Byte Level

- 0x6e & 0x0f = 01101110 & 00001111 = 00001110 = 0x0e (getting the least 4-bits of 0x6e)
- 0x6e ^ 0x0f = 01101110 ^ 00001111 = 01100001 = 0x061 (flipping the least significant 4-bits of 0x6e)
- 0xee >> 4 = 11101110 >> 4 = 11111110 = 0xfe (arithmetic right shift by 4 bits)
- (0xe5 >> 4) & 0x0f = (11100101 >> 4) & 00001111 = 11111110 & 00001111 = 00001110 = 0x0e (getting the most significant 4 bits of 0xe5)

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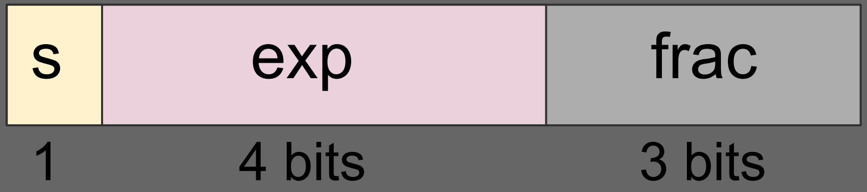
Bit Representation of Floating Point Numbers



- one bit is for sign
- four bits are for exponent
- three bits are for fraction
- How to read:
    - If exp > 0, floating point number = (s ? -1 : 1) * (1.frac) * $2^{(exp - 7)}$
    - If exp = 0, floating point number = (s ? -1 : 1) * (0.frac) * 2^{-6}

Lab Practice

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