Lecture _7

LINUX essentials

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Filtering Input

grep command in Unix/Linux

- The grep command is one of the most useful tools in Linux and Unix systems. It is used to search for specific words, phrases, or patterns inside text files, and shows the matching lines on your screen. grep Command is useful when you need to quickly find certain keywords or phrases in logs or documents.
- The grep command is a text filter that will search input and return lines which contain a match to a given pattern.

Syntax of grep Command in Unix/Linux

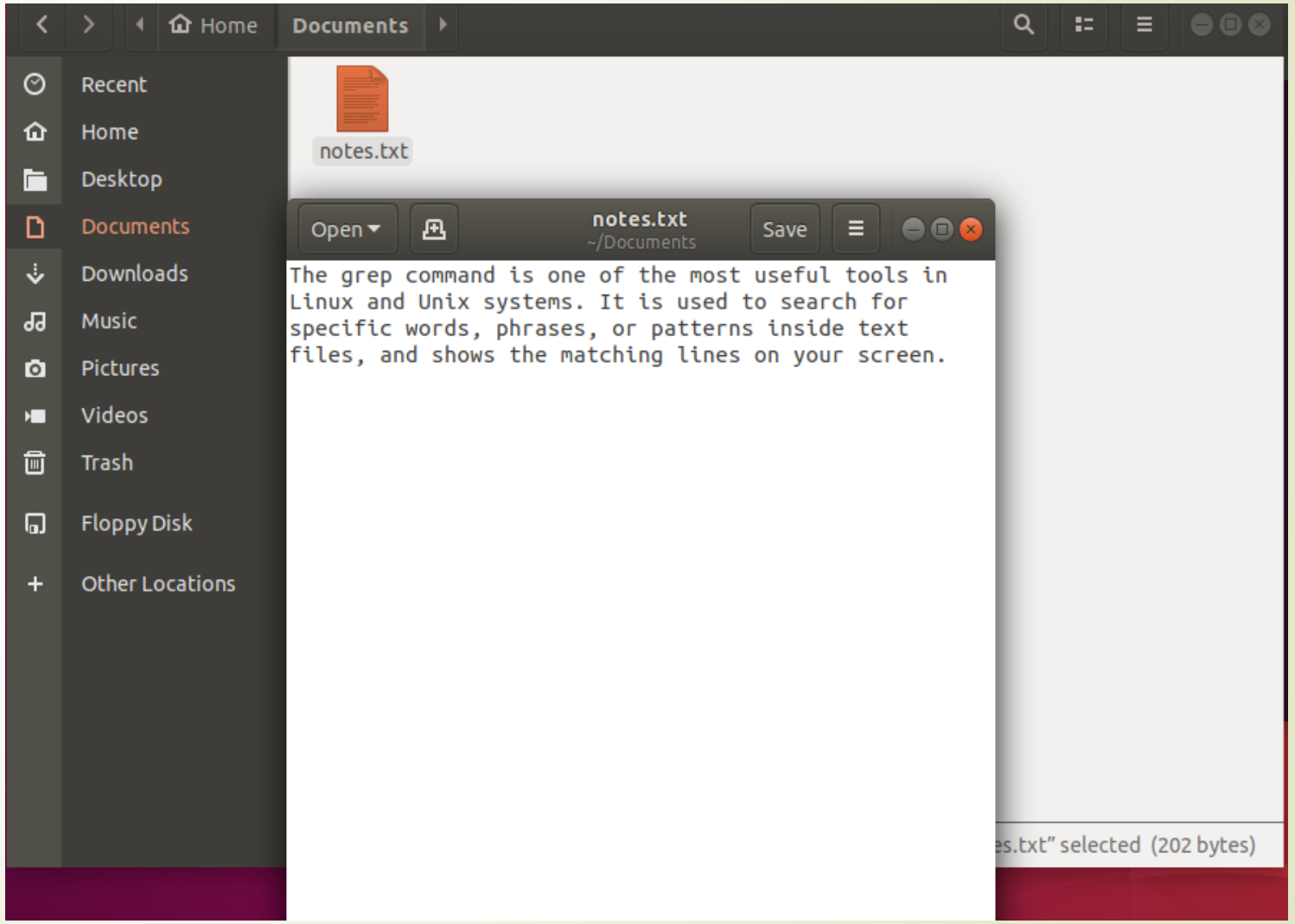
- The basic syntax of the `grep` command is as follows:

```
grep [options] pattern [files]
```

  - **options**: These are command-line flags that modify the behaviour of grep.
  - **pattern**: This is the regular expression you want to search for.
  - **File**: This is the name of the file(s) you want to search within. You can specify multiple files for simultaneous searching.

grep Command example_1

- Suppose we have A file called notes.txt as shown:



you want to find all lines containing the word command

```
ahmed@ubuntu:~/Documents$ cat notes.txt
The grep command is one of the most useful tools in Linux and Unix systems. It is used to search for specific words,
 or patterns inside text files, and shows the matching lines on your screen.
ahmed@ubuntu:~/Documents$ grep command notes.txt
The grep command is one of the most useful tools in Linux and Unix systems. It is used to search for specific words,
 or patterns inside text files, and shows the matching lines on your screen.
ahmed@ubuntu:~/Documents$
```

Commonly Used grep Options

Case insensitive search

- The -i option enables to search for a string case insensitively in the given file. It matches the words like "UNIX", "Unix", "unix".

```
ahmed@ubuntu:~/Documents$ grep -i grep notes.txt
The grep command is one of the most useful tools in Linux and Unix systems. It is used to sea
nside text files, and shows the matching lines on your screen.
The Grep command is one of the most useful tools in Linux and Unix systems.
Th  GREP command is one of the most useful tools in Linux and Unix systems.
ahmed@ubuntu:~/Documents$
```

Displaying the Count Matches Using grep

- We can find the number of lines that matches the given string/pattern.
-

```
ahmed@ubuntu:~/Documents$ grep -c grep notes.txt
1
ahmed@ubuntu:~/Documents$
```

Checking Whole Words Using grep

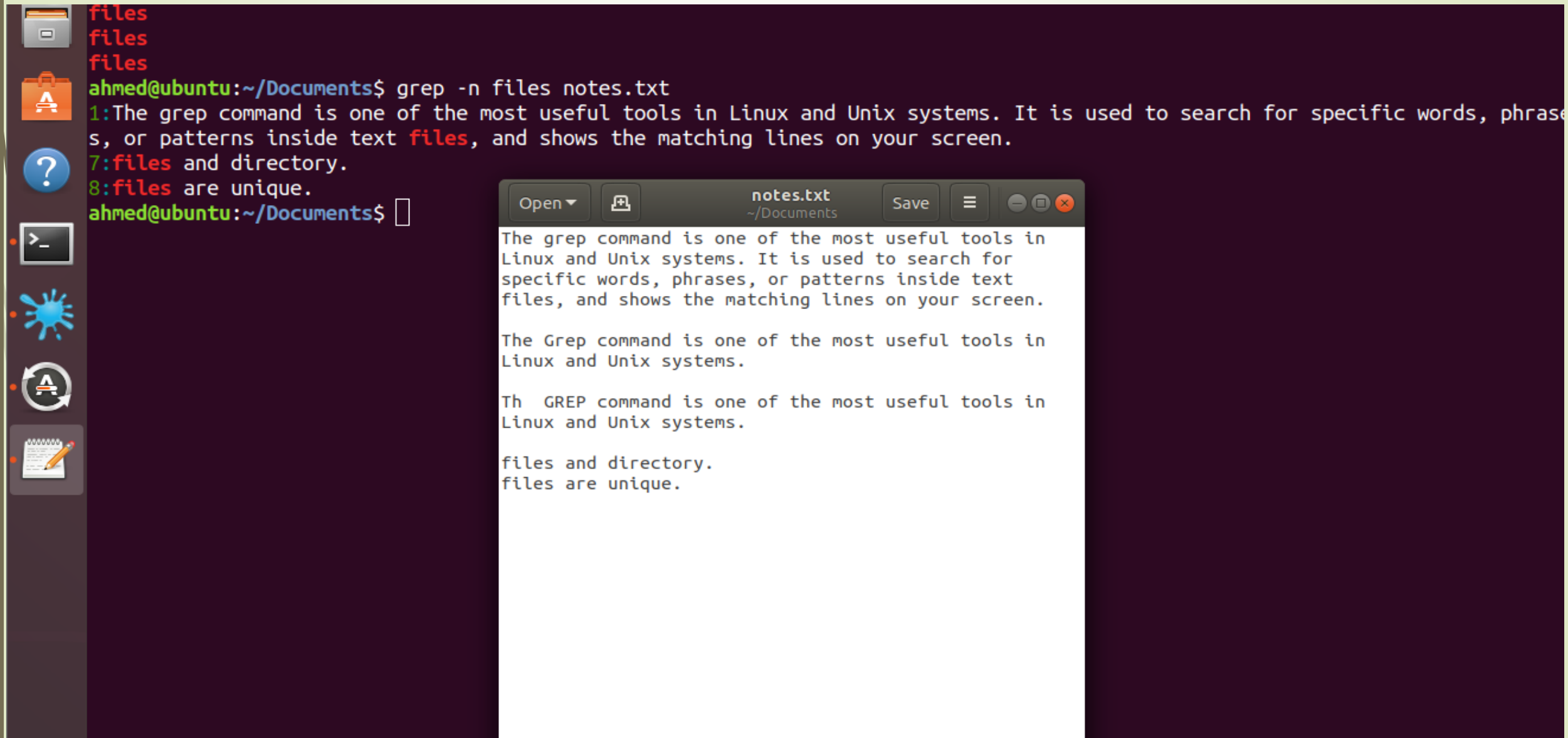
By default, grep matches the given string/pattern even if it is found as a substring in a file. The -w option to grep makes it match only the whole words. grep -w searches for a whole word only, not part of another word.
It matches only when the pattern is a complete word with boundaries (space, punctuation, line start/end).

```
administrator@GFG19566-LAPTOP:~$ grep -w "unix" geekfile.txt
unix is great os. unix was developed in Bell labs.
uNix is easy to learn.unix is a multiuser os.Learn unix .unix is a powerful.
administrator@GFG19566-LAPTOP:~$
```

Display Matched Pattern Using grep

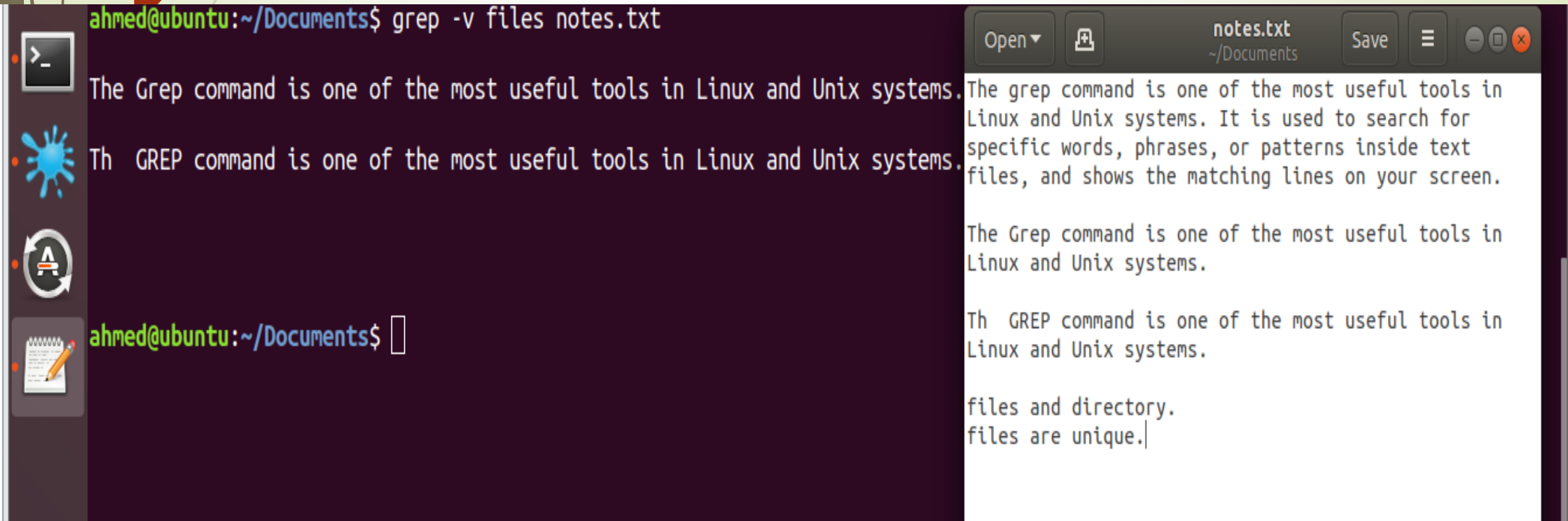
- By default, grep displays the entire line which has the matched string. We can make the grep to display only the matched string by using the -o option.

Show Line Numbers with grep -n



Inverting the Pattern Match Using grep

- You can display the lines that are not matched with the specified search string pattern using the -v option.



Regular expressions

- Regular expressions are patterns that only certain commands are able to interpret. Regular expressions can be expanded to match certain sequences of characters in text.
- Regular expressions have two common forms: basic and extended. Most commands that use regular expressions can interpret basic regular expressions. However, extended regular expressions are not available for all commands and a command option is typically required for them to work correctly

Basic Regex Character(s)	Meaning
[ ]	Any one specified character
[^]	Not the one specified character
*	Zero or more of the previous character
^	If first character in the pattern, then pattern must be at beginning of the line to match, otherwise just a literal ^
$	If last character in the pattern, then pattern must be at the end of the line to match, otherwise just a literal $

```
ahmed@ubuntu:~/Documents$ grep [i] notes.txt
The grep command is one of the most useful tools in Linux and Unix systems. It is used to search for specific words, phrases
 or patterns inside text files, and shows the matching lines on your screen.
The Grep command is one of the most useful tools in Linux and Unix systems.
Th  GREP command is one of the most useful tools in Linux and Unix systems.
files and directory.
files are unique.
ahmed@ubuntu:~/Documents$
```

The first anchor character ^ is used to ensure that a pattern appears at the beginning of the line.

```
ahmed@ubuntu:~/Documents$ grep ^A notes.txt
A is for Apple  sara
ahmed@ubuntu:~/Documents$ grep ^T notes.txt
This new idea
ahmed@ubuntu:~/Documents$
```

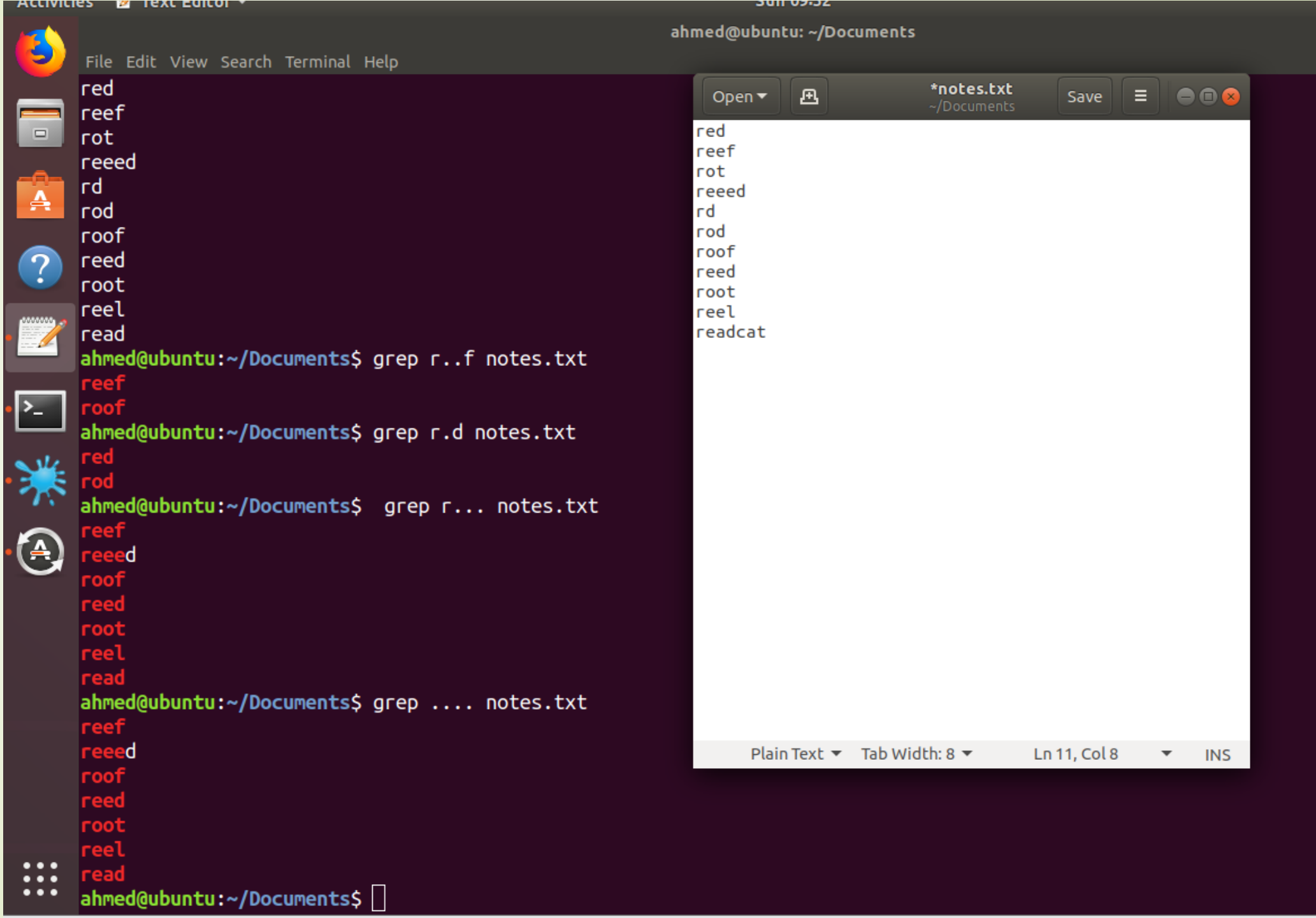
```
A is for Apple  sara
B is for Bear
C is for Cat
E is for Elephant
G is for Grapes
H is for Happy
K is for Kangaroo
O is for Oval
P is for Pickle sara
Q is for Quark

This new idea
```

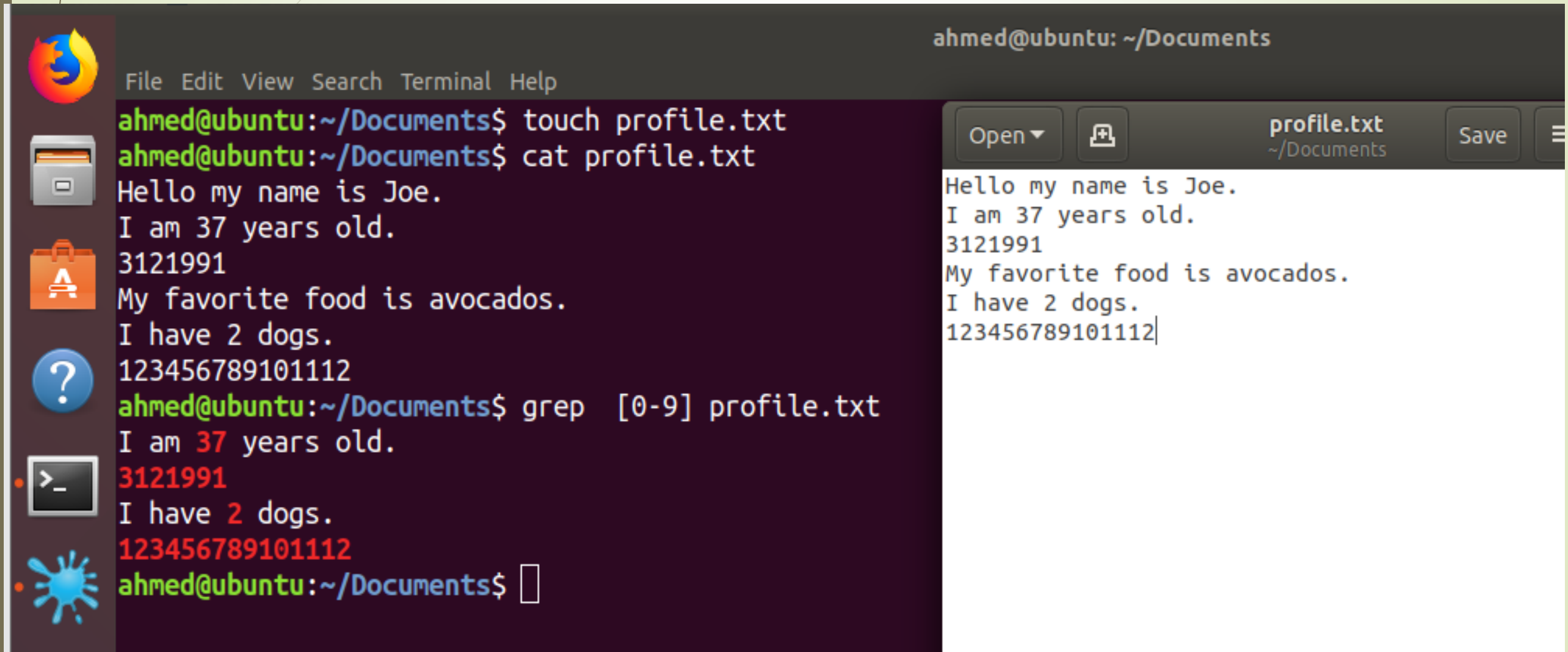
The second anchor character $ can be used to ensure a pattern appears at the end of the line.

```
ahmed@ubuntu:~/Documents$ cat red.txt
banana
cola
lemon
tea
mangoa
apple
ahmed@ubuntu:~/Documents$ grep a$ red.txt
banana
cola
tea
mangoa
ahmed@ubuntu:~/Documents$
```

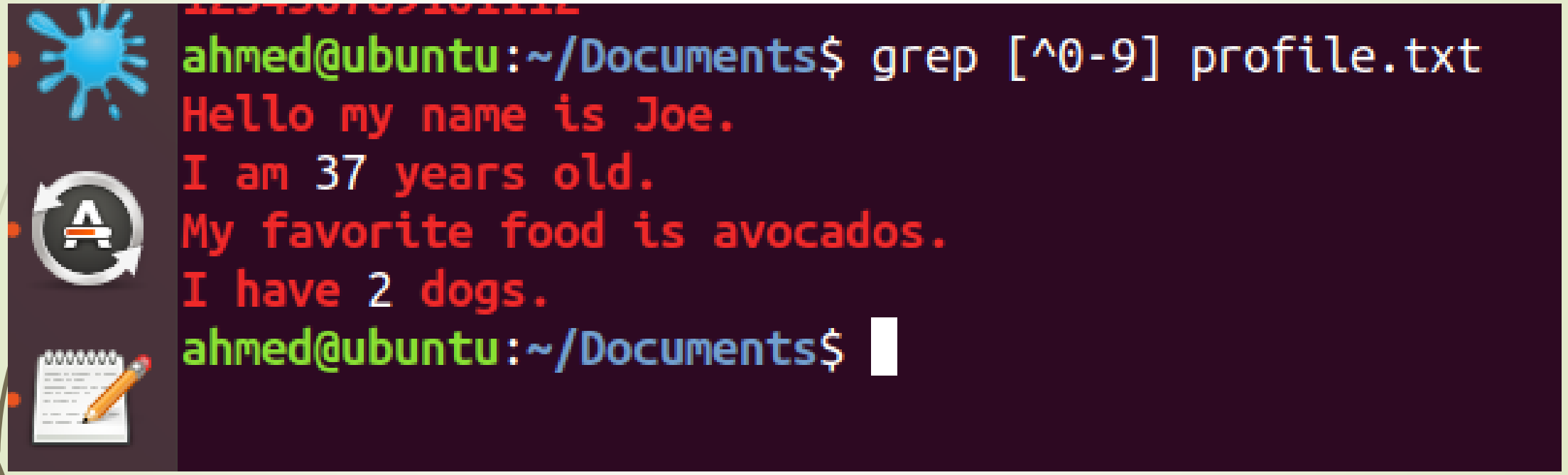
Match a Single Character With .



To find all the lines in the profile.txt which have a number in them, use the pattern [0123456789] or [0-9]:



On the other hand, to find all the lines which contain any non-numeric characters, insert a ^ as the first character inside the brackets.



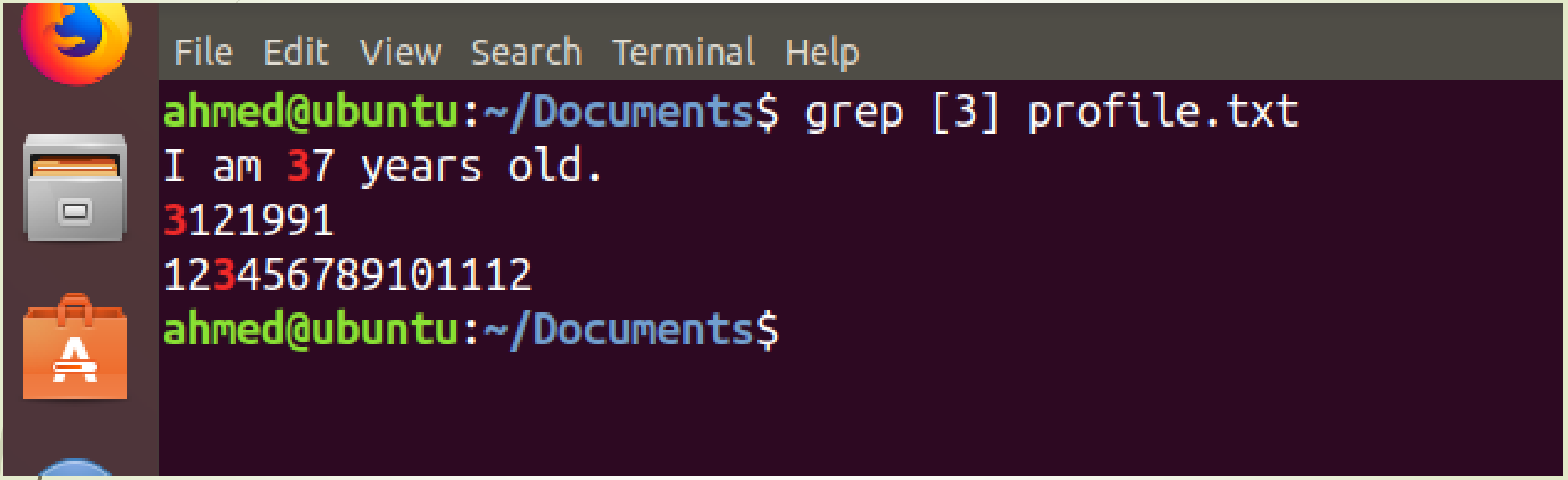
The . normally matches any one character, but placed inside the square brackets, then it will just match itself.

```
ahmed@ubuntu:~/Documents$ cat  profile.txt
Hello my name is Joe.
I am 37 years old.
3121991
My favorite food is avocados.
I have 2 dogs.
123456789101112
ahmed@ubuntu:~/Documents$ grep [a] profile.txt
Hello my name is Joe.
I am 37 years old.
My favorite food is avocados.
I have 2 dogs.
ahmed@ubuntu:~/Documents$ grep [.] profile.txt
Hello my name is Joe.
I am 37 years old.
My favorite food is avocados.
I have 2 dogs.
```

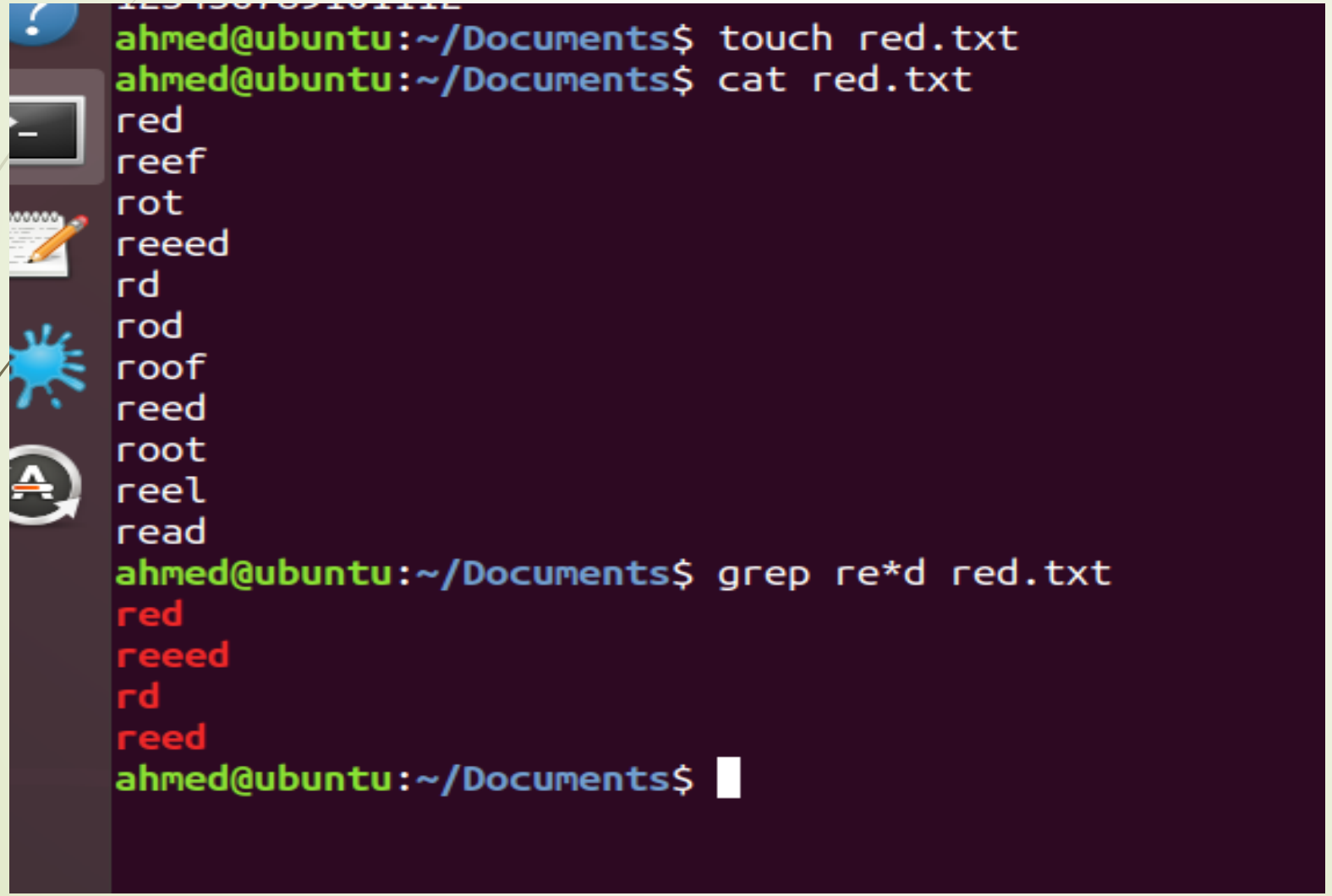
Open ▾ | profile.txt ~/Documents | Save

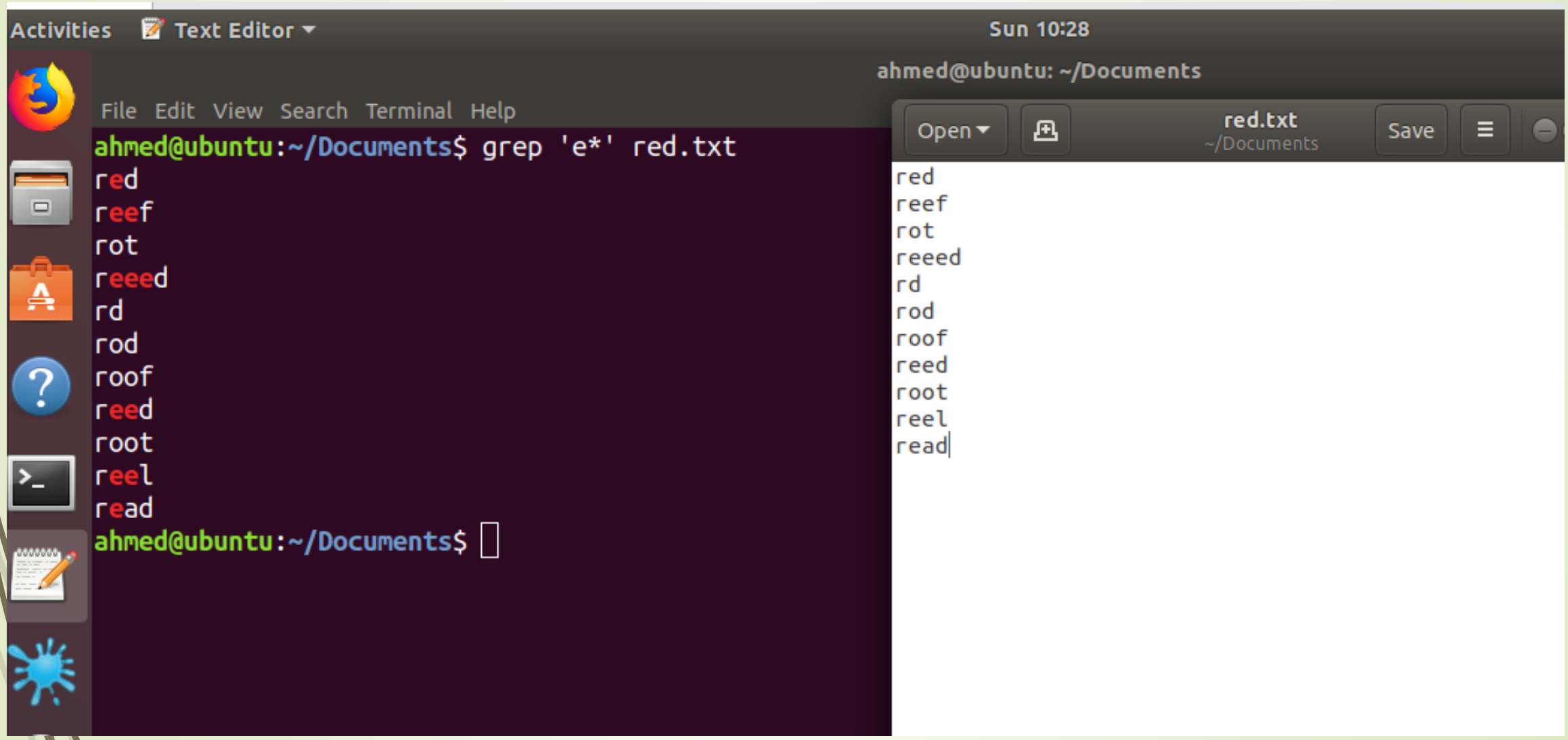
```
Hello my name is Joe.
I am 37 years old.
3121991
My favorite food is avocados.
I have 2 dogs.
123456789101112
```

Plain Text ▾ Tab Width: 8 ▾ Ln 6, Col 16 ▾ INS


File Edit View Search Terminal Help
ahmed@ubuntu:~/Documents$ grep [3] profile.txt
I am 37 years old.
3121991
123456789101112
ahmed@ubuntu:~/Documents$

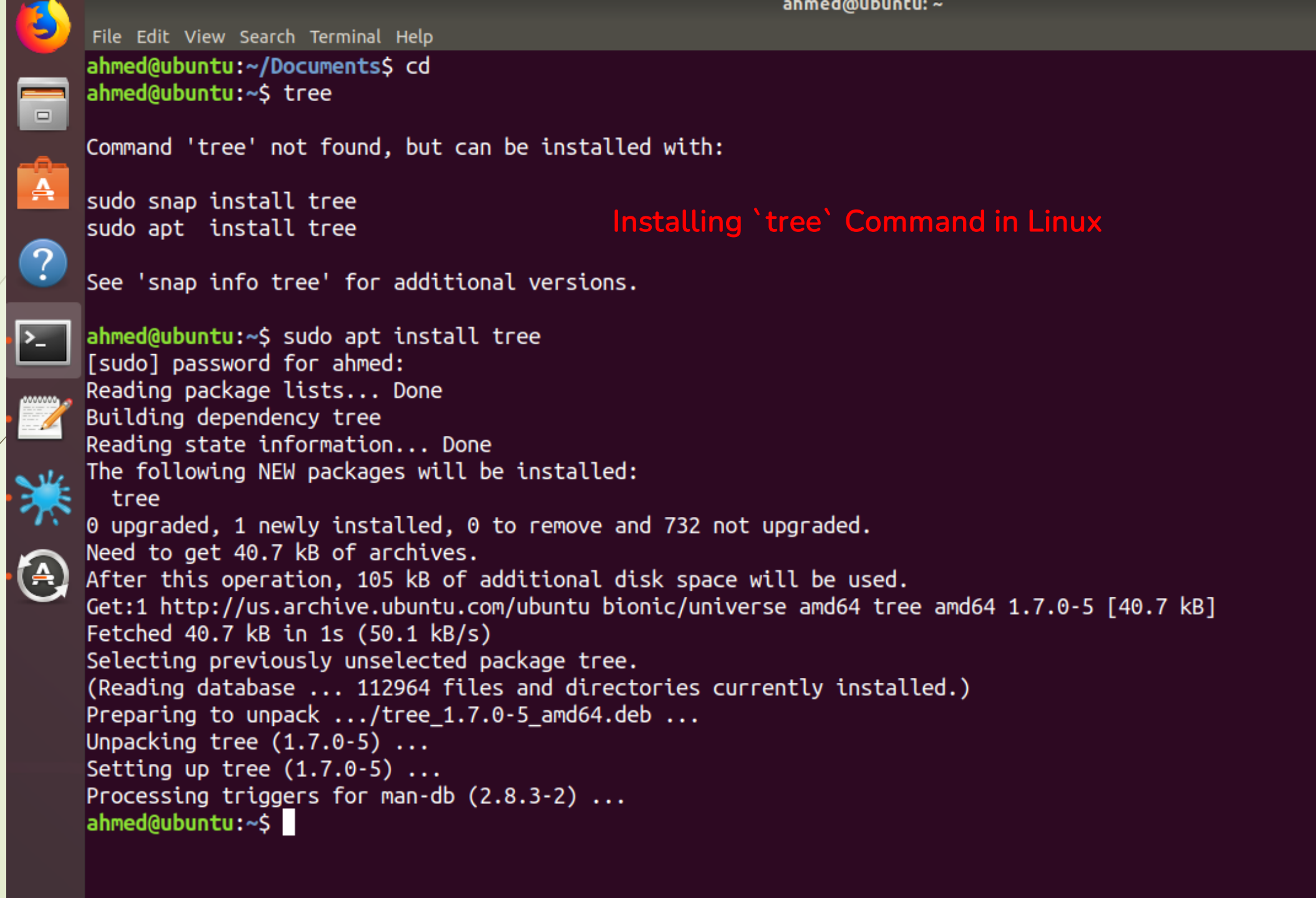
Match a Repeated Character Or Patterns With * .The regular expression character * is used to match zero or more occurrences of a character or pattern preceding it

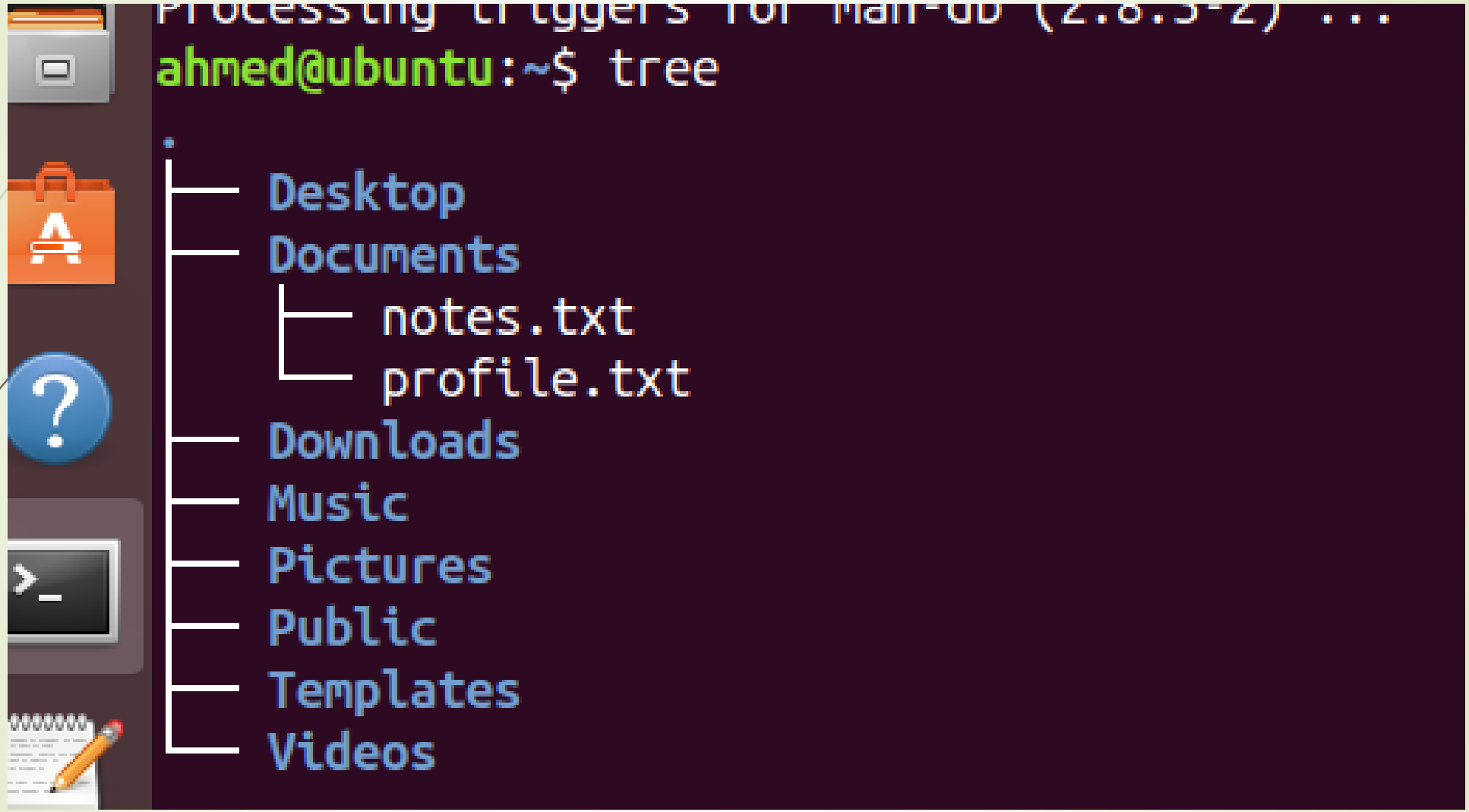



Activities
Text Editor
Sun 10:28
ahmed@ubuntu: ~/Documents
File Edit View Search Terminal Help
ahmed@ubuntu:~/Documents$ grep 'e*' red.txt
red
reef
rot
reeed
rd
rod
roof
reed
root
reel
read
ahmed@ubuntu:~/Documents$
Open
red.txt
~/Documents
Save
red
reef
rot
reeed
rd
rod
roof
reed
root
reel
read

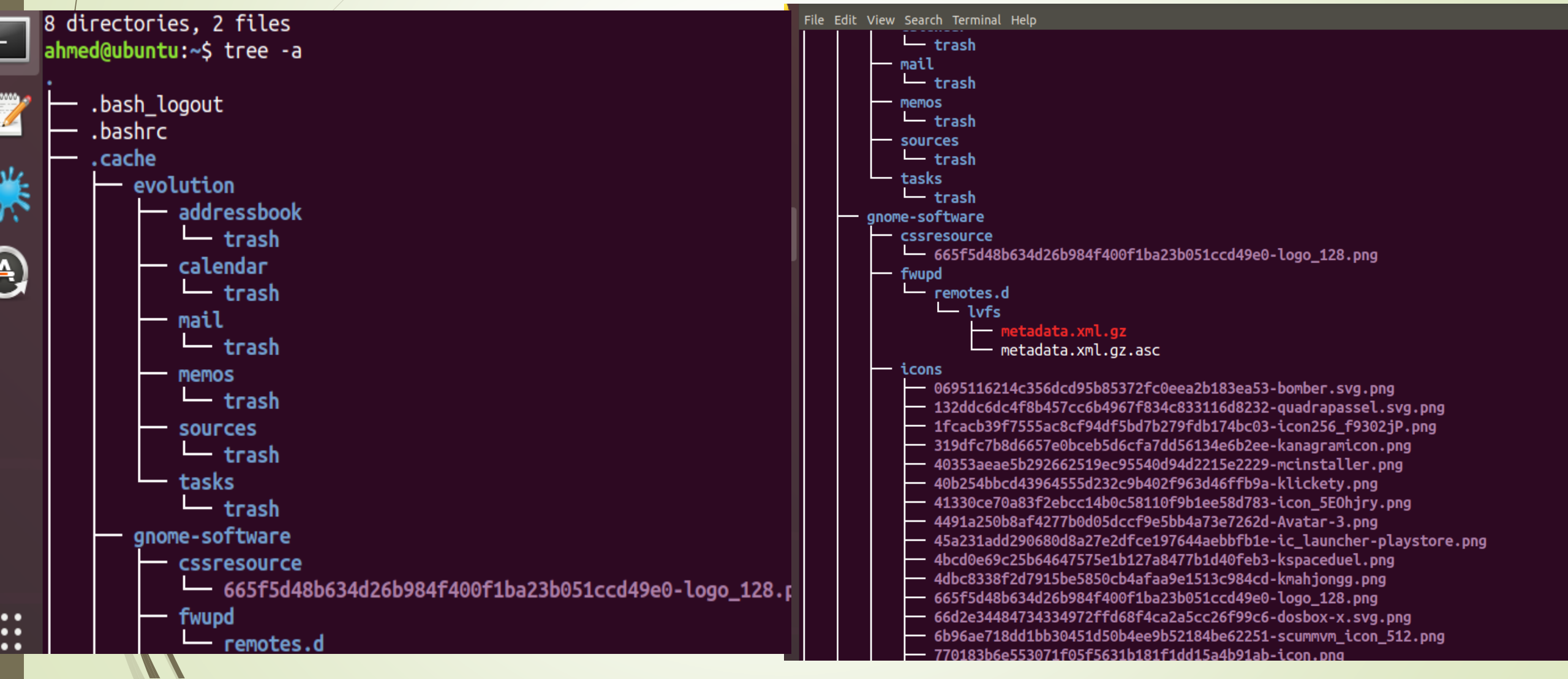
Displaying Directory Structure in a Tree Format in Linux

- The tree command in Linux displays the directory structure in a hierarchical, tree-like format, providing a clear visual representation of files and subdirectories.
- Tree command helps visualize the organization of the filesystem.
- It can include hidden files and limit the depth of display.
- Useful for quickly analysing complex directory structures.

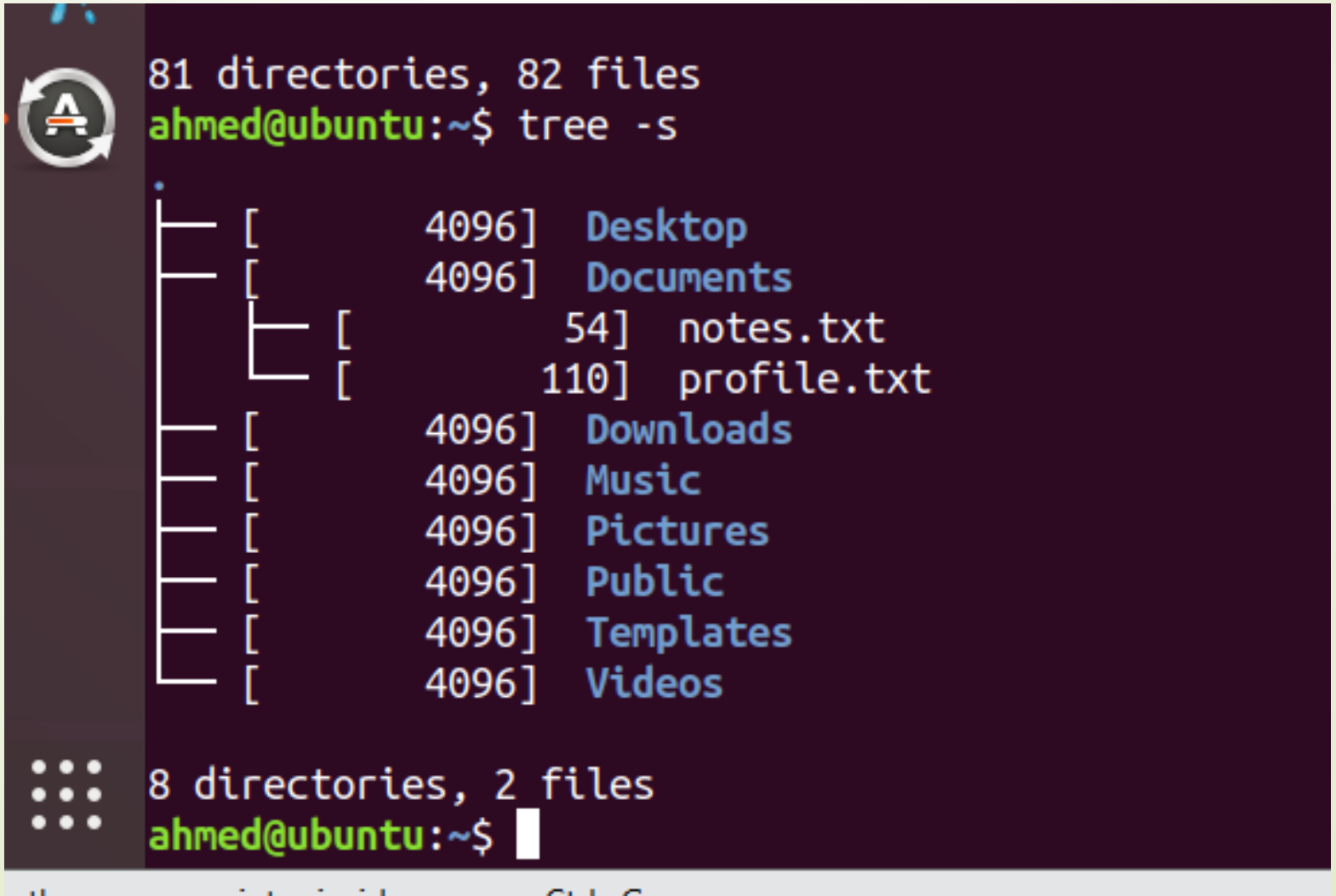

ahmed@ubuntu: ~
File Edit View Search Terminal Help
ahmed@ubuntu:~/Documents$ cd
ahmed@ubuntu:~$ tree
Command 'tree' not found, but can be installed with:
sudo snap install tree
sudo apt install tree
See 'snap info tree' for additional versions.
ahmed@ubuntu:~$ sudo apt install tree
[sudo] password for ahmed:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
tree
0 upgraded, 1 newly installed, 0 to remove and 732 not upgraded.
Need to get 40.7 kB of archives.
After this operation, 105 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu bionic/universe amd64 tree amd64 1.7.0-5 [40.7 kB]
Fetched 40.7 kB in 1s (50.1 kB/s)
Selecting previously unselected package tree.
(Reading database ... 112964 files and directories currently installed.)
Preparing to unpack .../tree_1.7.0-5_amd64.deb ...
Unpacking tree (1.7.0-5) ...
Setting up tree (1.7.0-5) ...
Processing triggers for man-db (2.8.3-2) ...
ahmed@ubuntu:~$
Installing `tree` Command in Linux


Processing triggers for man-db (2.8.3-2) ...
ahmed@ubuntu:~$ tree
.
Desktop
Documents
notes.txt
profile.txt
Downloads
Music
Pictures
Public
Templates
Videos

tree -a will display hidden files along with directories and files.



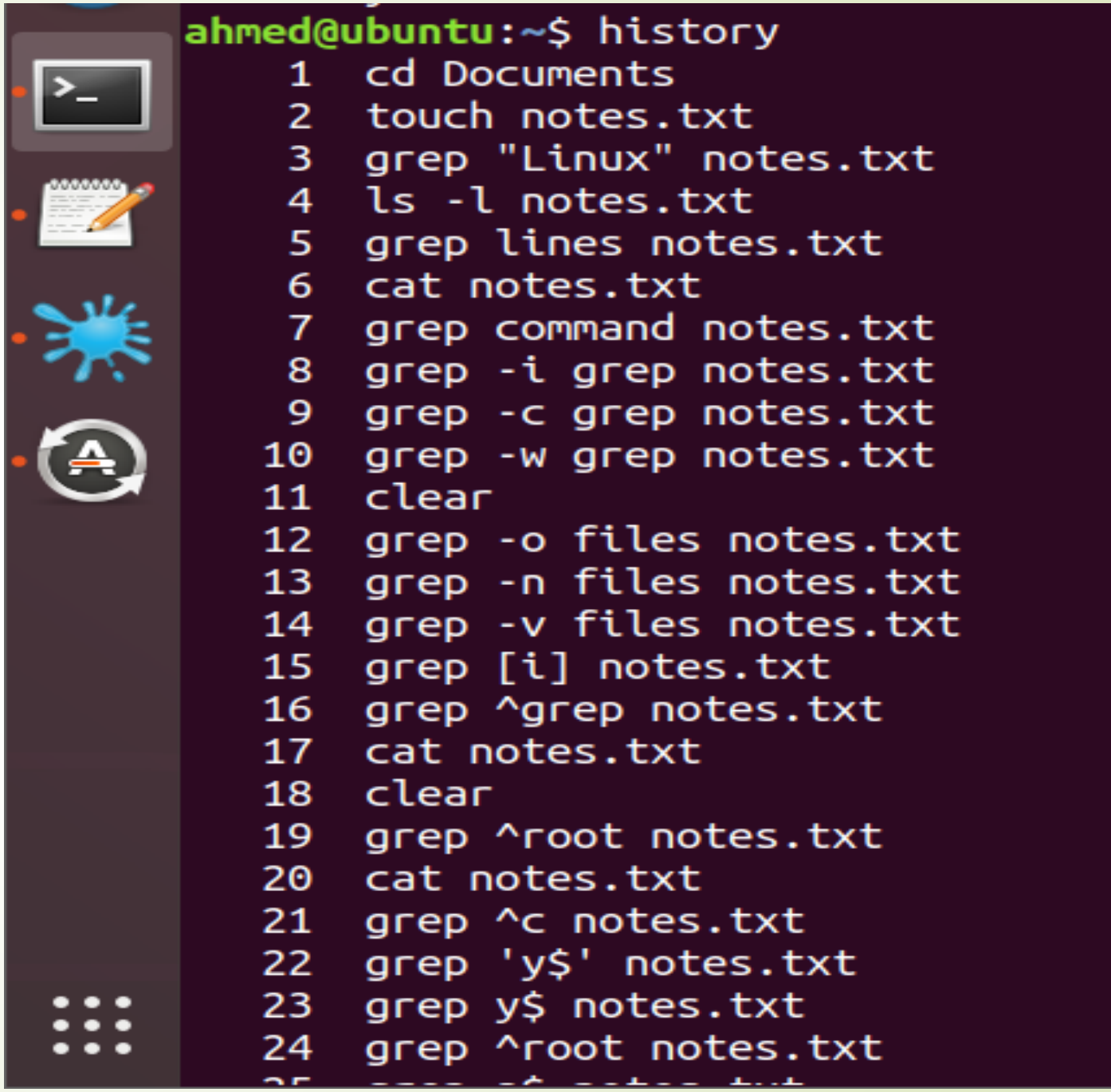
tree -s will display the file size as shown below. While using this option, it prints out the size of the files along with the file names.



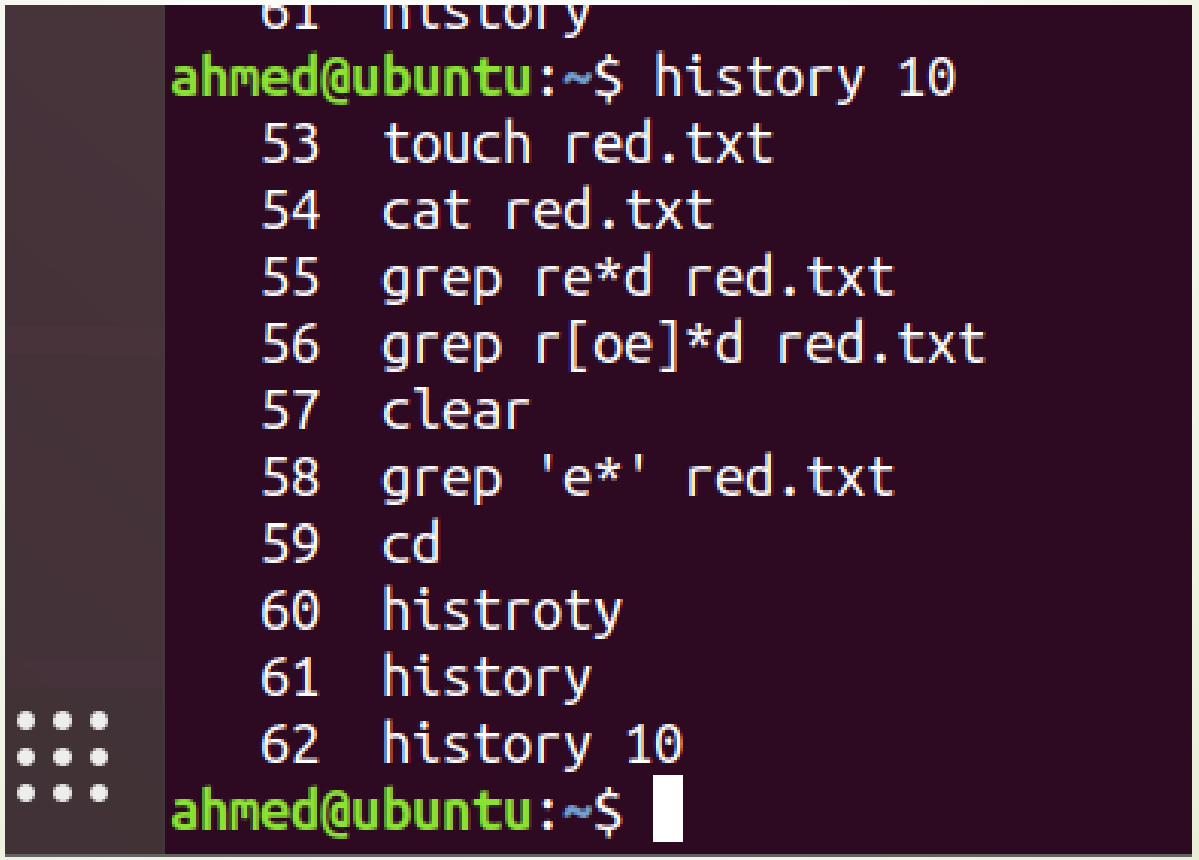
Command History in Linux | history Command

- The **history command** in **Linux** displays a list of commands that were previously entered in the terminal. By default, it shows the last **1000 commands**, but this can be configured. This feature allows users to recall, reuse, and modify commands without having to retype them.

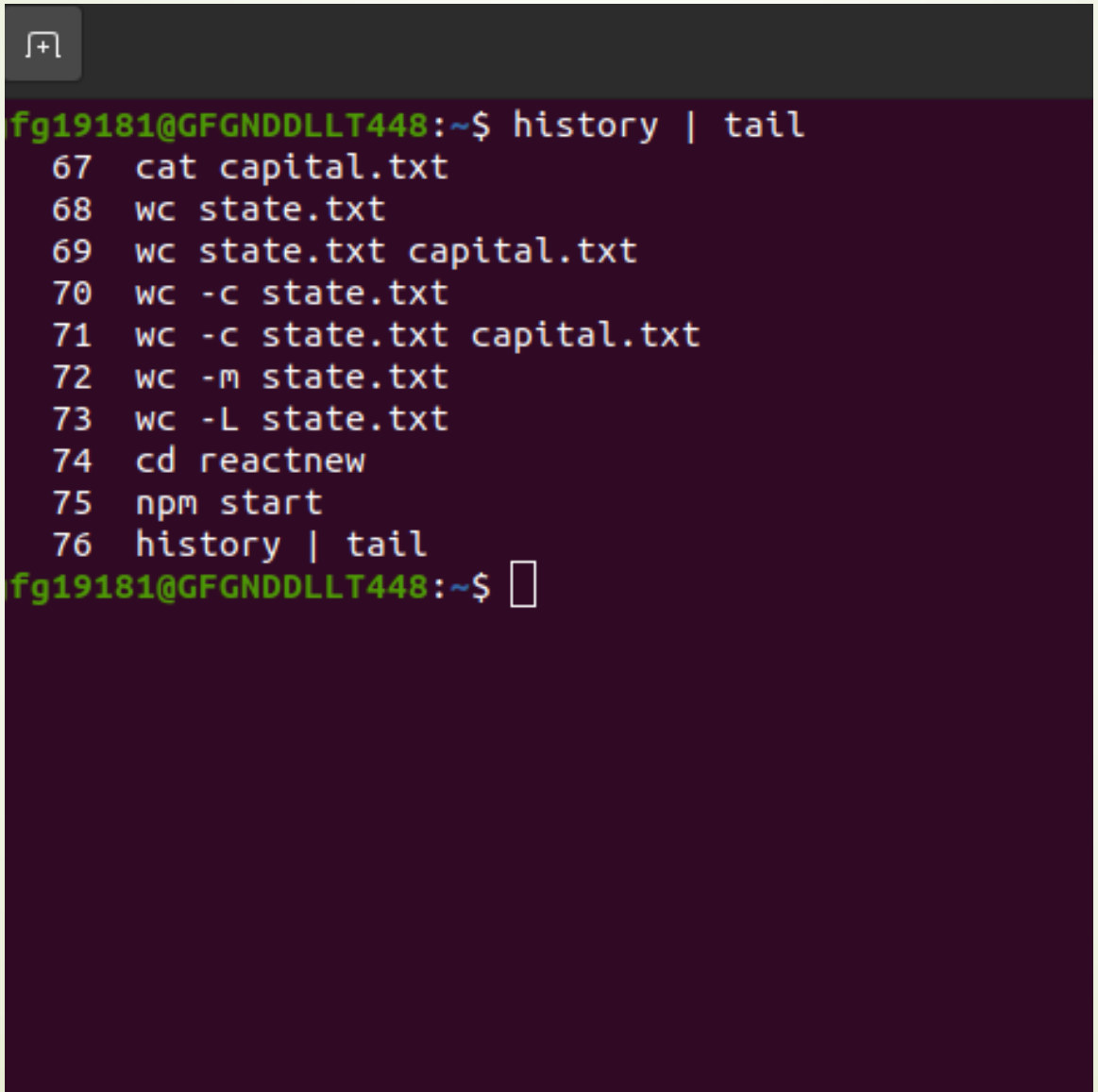
Display a Limited Number of Commands History

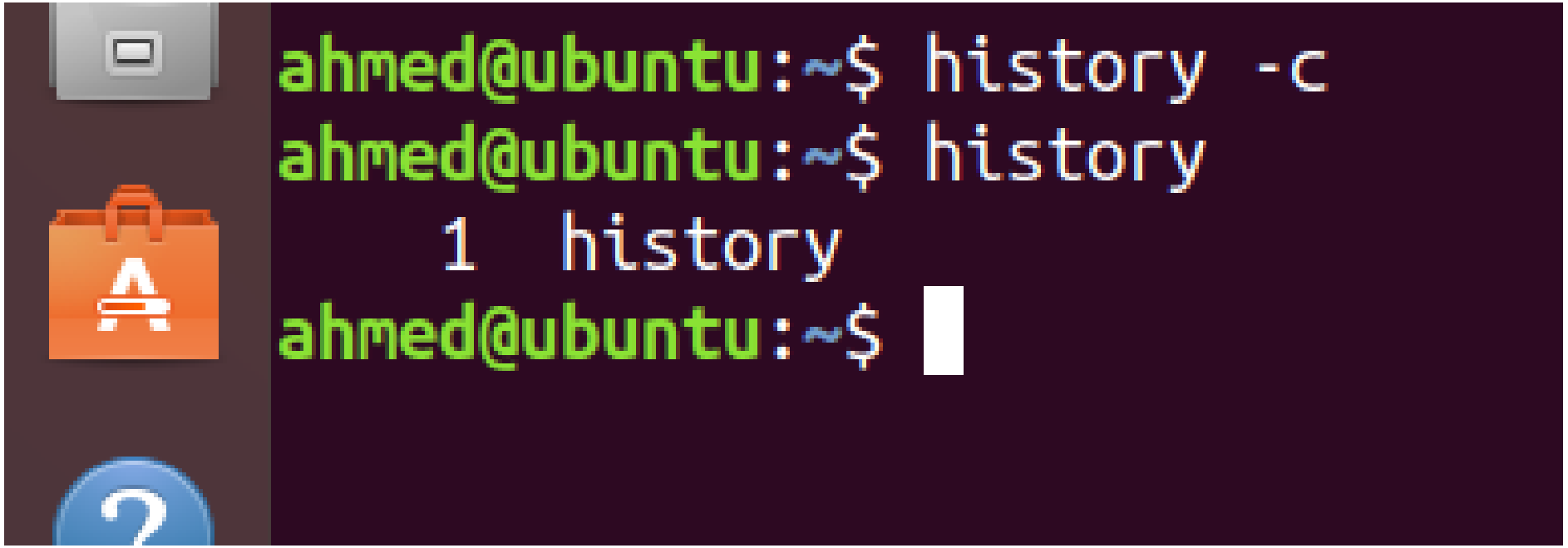


Display a Limited Number of Commands History



View the Last 10 Commands History

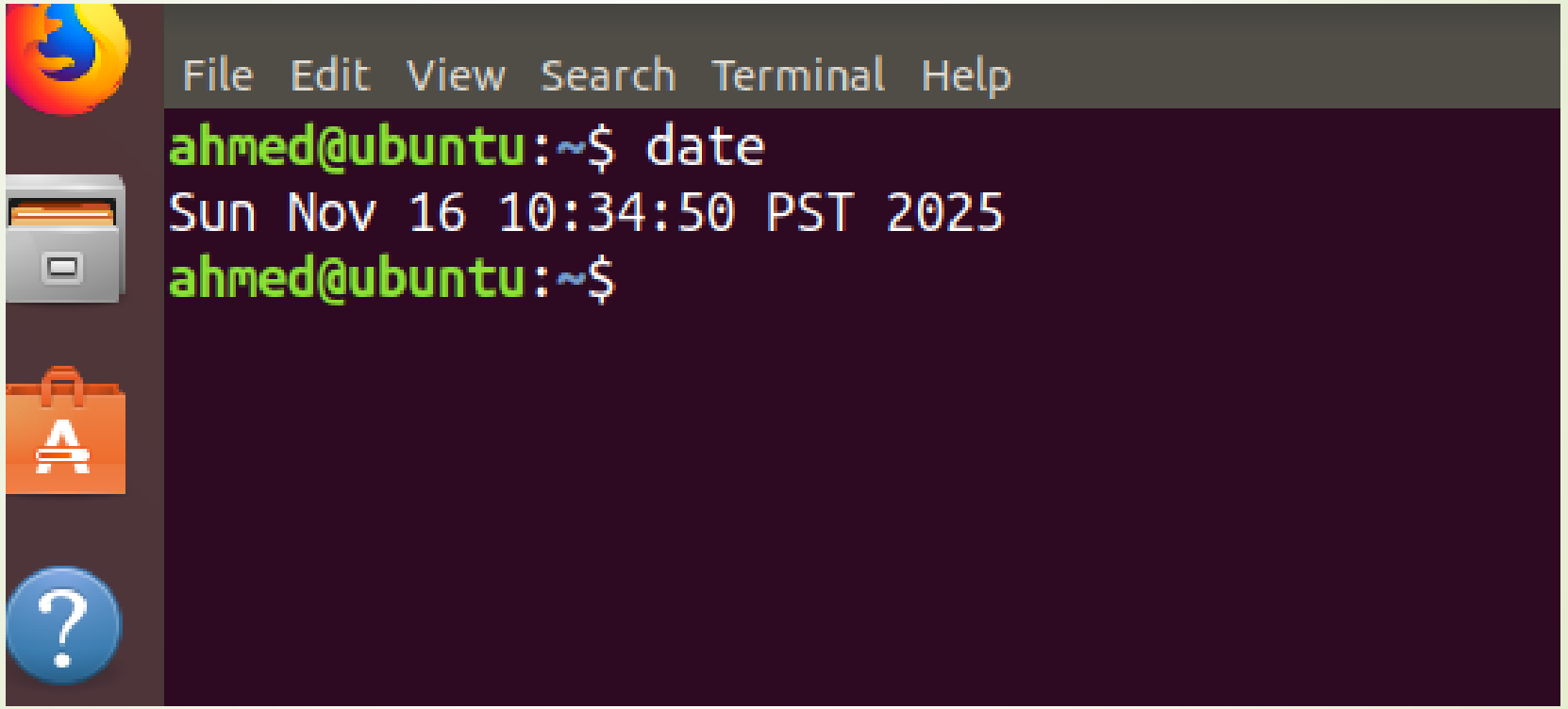




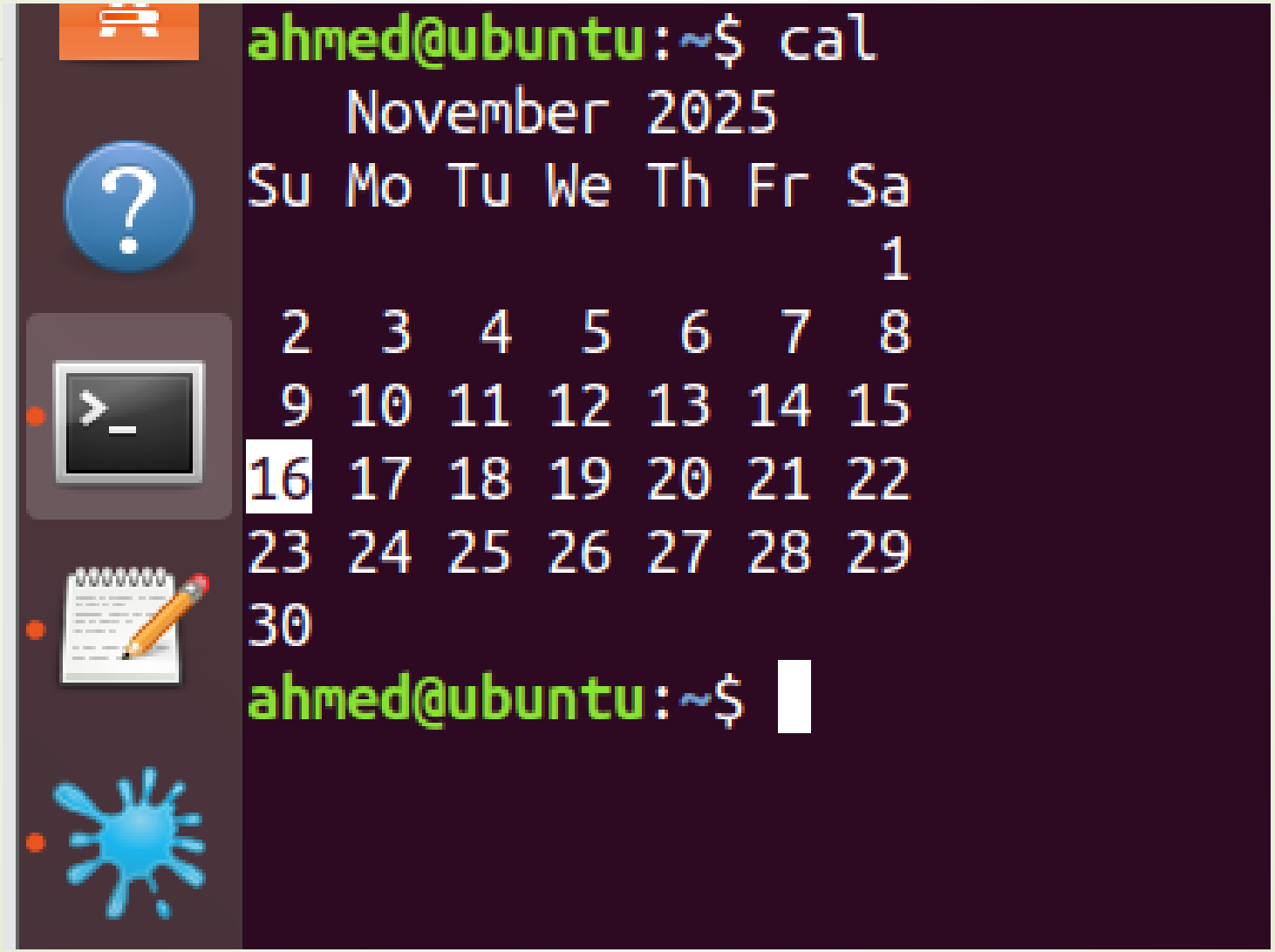
Clear Entire Command History

- Clear the entire command history using the history -c option.

date command to display the date and time



show calendar



References

- Ramses van Zon," Securing File Access Permissions on Linux ", SciNet HPC, University of Toronto ,27 October 2022.
- https://www.geeksforgeeks.org/linux-unix/grep-command-in-unixlinux/
- https://www.geeksforgeeks.org/linux-unix/tree-command-unixlinux/
- https://www.geeksforgeeks.org/linux-unix/history-command-in-linux-with-examples/