

National Technical University of Ukraine
“Igor Sikorsky Kyiv Polytechnic Institute”
Faculty of Informatics and Computer Science
Department of Information Systems and Technologies

Laboratory work № __3
from the discipline «LINUX »

Subject: « *File system structure. Ubuntu directory/file
management* »

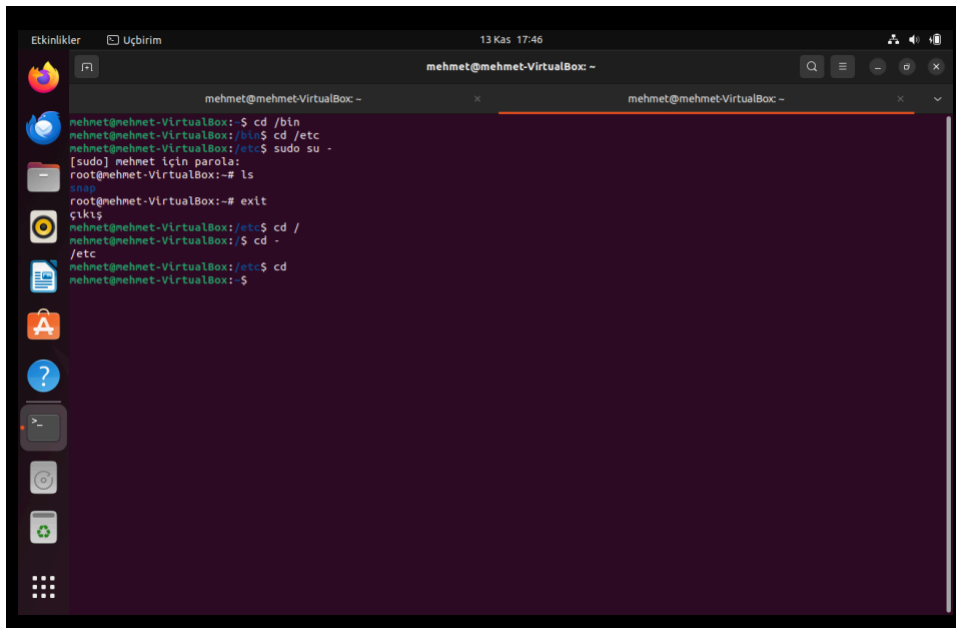
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KYIV 2023

TASK SOLUTION :

Firstly we change our directory using command 'cd' , standard directories like /bin, /etc, /root and home are used. 'cd - ' is used to change current to previous directory.



```
Eklinlikler  Uçbirim 13 Kas 17:46 mehmet@mehmet-VirtualBox -
mehmet@mehmet-VirtualBox -
mehmet@mehmet-VirtualBox:~$ cd /bin
mehmet@mehmet-VirtualBox:bin$ cd /etc
mehmet@mehmet-VirtualBox:etc$ sudo su -
[sudo] mehnec için parola:
root@mehmet-VirtualBox:~# ls
snap
root@mehmet-VirtualBox:~# exit
çıktı
mehmet@mehmet-VirtualBox:etc$ cd /
mehmet@mehmet-VirtualBox:$ cd -
/etc
mehmet@mehmet-VirtualBox:etc$ cd
mehmet@mehmet-VirtualBox:~$
```

-i : for inode

The image shows a Kali Linux desktop environment. At the top, there is a taskbar with icons for 'Eklinikier', 'Uçbirim', and '13 Kas 17:48'. Below the taskbar is a dock containing icons for Firefox, a file manager, a terminal, a web browser, a search icon, a help icon, a question mark icon, a terminal icon, a settings icon, a trash icon, and a grid icon. The main window is a VirtualBox window titled 'mehmet@mehmet-VirtualBox: -'. It contains a terminal window with the following text:

```
mehmet@mehmet-VirtualBox: ~  
mehmet@mehmet-VirtualBox:~$ cd /bin  
mehmet@mehmet-VirtualBox:/bin$ cd /etc  
mehmet@mehmet-VirtualBox:/etc$ sudo su -  
[sudo] mehmet için parola:  
root@mehmet-VirtualBox:~# ls  
snap  
root@mehmet-VirtualBox:~# exit  
çıkış  
mehmet@mehmet-VirtualBox:/etc$ cd /  
mehmet@mehmet-VirtualBox:/$ cd -  
/etc  
mehmet@mehmet-VirtualBox:/etc$ cd  
mehmet@mehmet-VirtualBox:/$ ls  
Belgeler Genel İndirilenler Masaüstü Müzik new_1.txt Resimler snap Şablonlar Videolar  
mehmet@mehmet-VirtualBox:/$ ls -s  
toplam 36  
4 Belgeler 4 Genel 4 İndirilenler 4 Masaüstü 4 Müzik 0 new_1.txt 4 Resimler 4 snap 4 Şablonlar 4 Videolar  
mehmet@mehmet-VirtualBox:/$ ls -a  
.. .bash_history .bashrc .cache Genel .lessshst Masaüstü new_1.txt Resimler .sudo_as_admin_successful Videolar  
... .bash_logout Belgeler .config İndirilenler .local Müzik .profile snap Şablonlar  
mehmet@mehmet-VirtualBox:/$ ls -li  
794748 Belgeler 794745 İndirilenler  
794747 Genel 794744 Masaüstü 800103 new_1.txt 794813 snap 794751 Videolar  
mehmet@mehmet-VirtualBox:/$
```

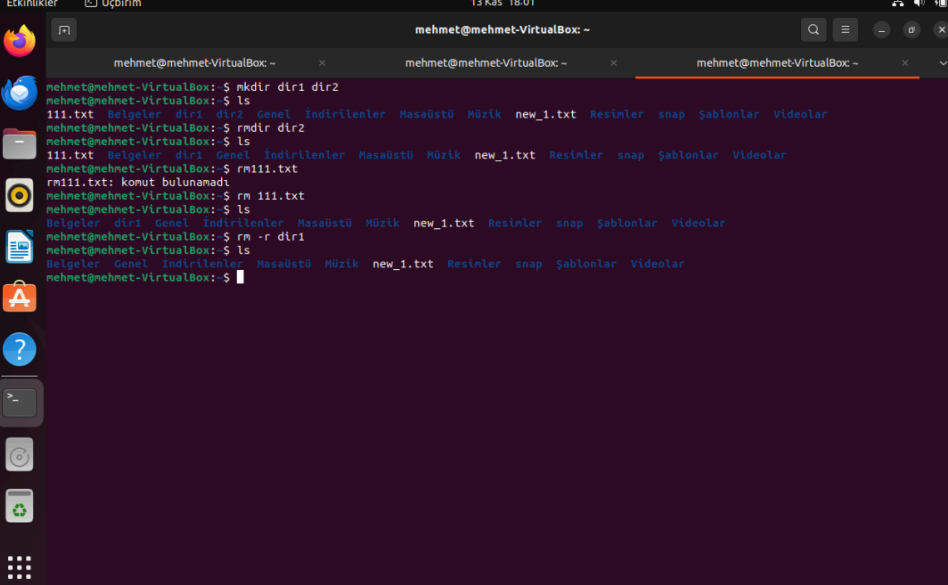
We use the 'mkdir' command to create new directories - dir1 and dir2.

We list the contents of our current directory and find our newly created dir1 & dir2.

Then, we remove dir2 using 'rmdir' command, list to check.

Accordingly, we remove file '111.txt' using 'rm' command.

Now we remove the directory 'dir1' using 'rm': to remove and '-r': for directory, together.

A terminal window titled 'mehmet@mehmet-VirtualBox: ~' with three tabs. The terminal shows a series of commands and their outputs. The commands are: 'mkdir dir1 dir2', 'ls', 'rmdir dir2', 'ls', 'rm 111.txt', 'ls', and 'rm -r dir1'. The outputs show the directory listing after each command, confirming the creation and removal of files and directories. The terminal is running on a Linux system with a dark theme. The left sidebar shows various application icons like a web browser, file manager, and terminal. The top bar shows the system clock as 13 Kas 18:01.

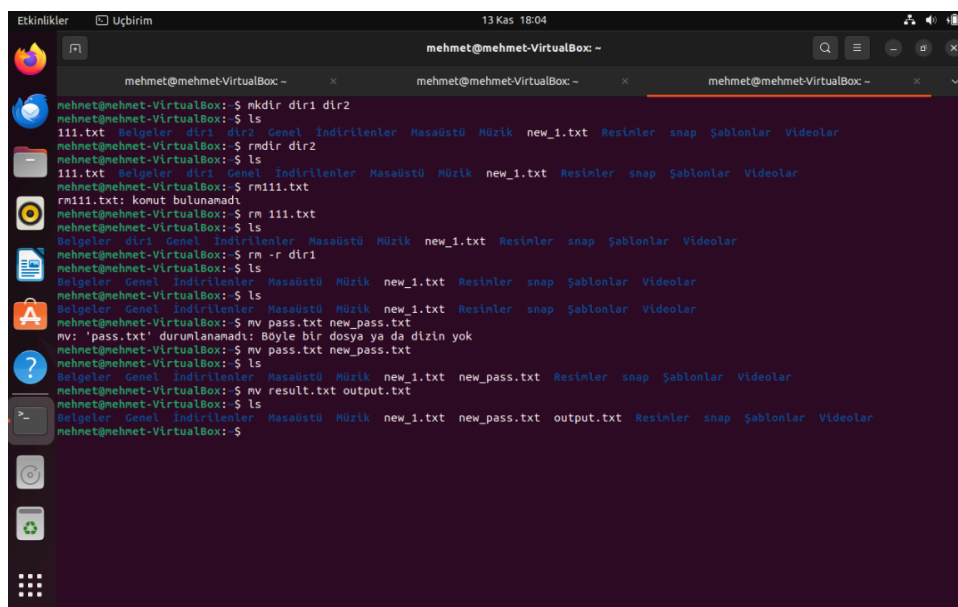
```
mehmet@mehmet-VirtualBox:~$ mkdir dir1 dir2
mehmet@mehmet-VirtualBox:~$ ls
111.txt  Belgeler  dir1  dir2  Genel  Indirilenler  Masaüstü  Müzik  new_1.txt  Resimler  snap  Şablonlar  Videolar
mehmet@mehmet-VirtualBox:~$ rmdir dir2
mehmet@mehmet-VirtualBox:~$ ls
111.txt  Belgeler  dir1  Genel  Indirilenler  Masaüstü  Müzik  new_1.txt  Resimler  snap  Şablonlar  Videolar
mehmet@mehmet-VirtualBox:~$ rm 111.txt
mehmet@mehmet-VirtualBox:~$ ls
Belgeler  dir1  Genel  Indirilenler  Masaüstü  Müzik  new_1.txt  Resimler  snap  Şablonlar  Videolar
mehmet@mehmet-VirtualBox:~$ rm -r dir1
mehmet@mehmet-VirtualBox:~$ ls
Belgeler  Genel  Indirilenler  Masaüstü  Müzik  new_1.txt  Resimler  snap  Şablonlar  Videolar
mehmet@mehmet-VirtualBox:~$
```

Now we see the uses of 'mv' command:

Firstly we list the contents in our current directory- we see pass.txt file

Then using 'mv' we rename it to new_pass.txt

Secondly we move the result.txt file to output.txt, then we list the contents - its moved

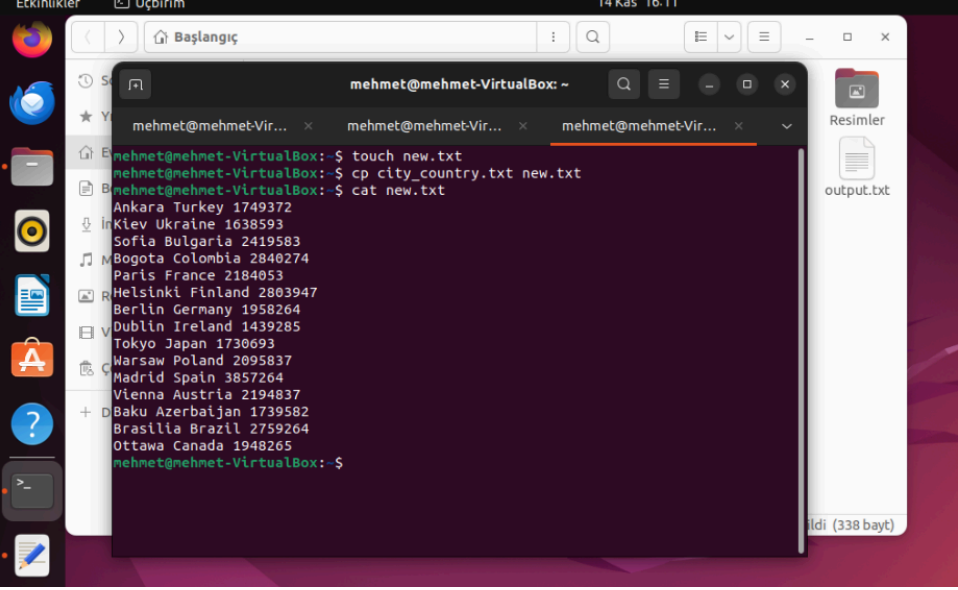


```
mehmet@mehmet-VirtualBox: ~  
mehmet@mehmet-VirtualBox:~$ mkdir dir1 dir2  
mehmet@mehmet-VirtualBox:~$ ls  
111.txt Belgeler dir1 dir2 Genel Indirilenler Masaüstü Müzik new_1.txt Resimler snap Şablonlar Videolar  
mehmet@mehmet-VirtualBox:~$ rmdir dir2  
mehmet@mehmet-VirtualBox:~$ ls  
111.txt Belgeler dir1 Genel Indirilenler Masaüstü Müzik new_1.txt Resimler snap Şablonlar Videolar  
mehmet@mehmet-VirtualBox:~$ rm 111.txt  
rm111.txt: konut bulunamadı  
mehmet@mehmet-VirtualBox:~$ ls  
Belgeler dir1 Genel Indirilenler Masaüstü Müzik new_1.txt Resimler snap Şablonlar Videolar  
mehmet@mehmet-VirtualBox:~$ rm -r dir1  
mehmet@mehmet-VirtualBox:~$ ls  
Belgeler Genel Indirilenler Masaüstü Müzik new_1.txt Resimler snap Şablonlar Videolar  
mehmet@mehmet-VirtualBox:~$ mv pass.txt new_pass.txt  
mv: 'pass.txt' bulunamadı: Böyle bir dosya ya da dizin yok  
mehmet@mehmet-VirtualBox:~$ mv pass.txt new_pass.txt  
mehmet@mehmet-VirtualBox:~$ ls  
Belgeler Genel Indirilenler Masaüstü Müzik new_1.txt new_pass.txt Resimler snap Şablonlar Videolar  
mehmet@mehmet-VirtualBox:~$ mv result.txt output.txt  
mehmet@mehmet-VirtualBox:~$ ls  
Belgeler Genel Indirilenler Masaüstü Müzik new_1.txt new_pass.txt output.txt Resimler snap Şablonlar Videolar  
mehmet@mehmet-VirtualBox:~$
```

Now we use 'touch' command to create new_1.txt file

Then we copy the contents of city.txt file to the newly created file using 'cp'

Using 'cat' we display the contents of the new_1.txt file.



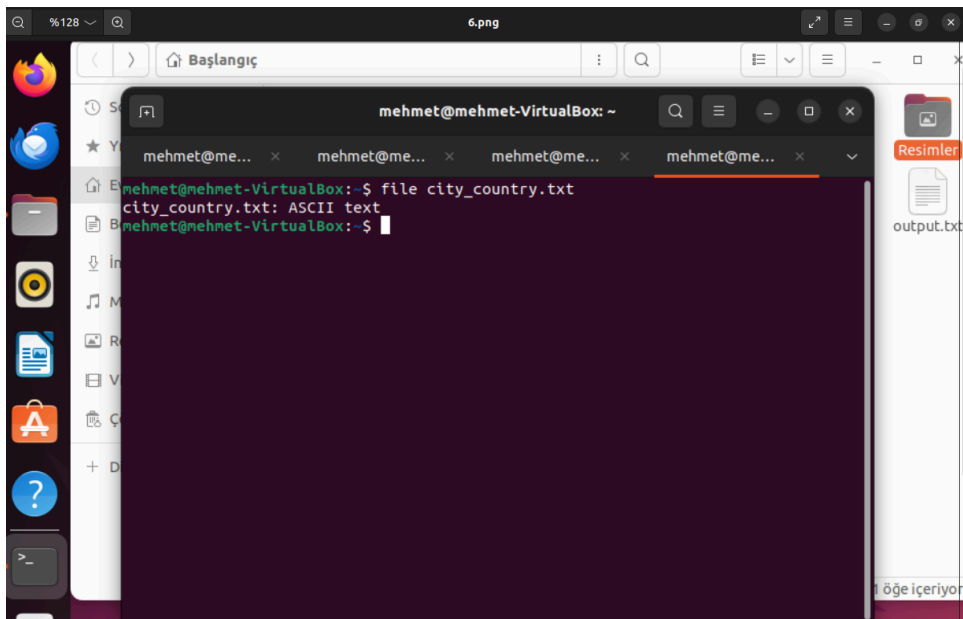
The screenshot shows a Linux desktop environment with a terminal window open. The terminal displays the following commands and output:

```
mehmet@mehmet-VirtualBox: ~  
mehmet@mehmet-VirtualBox: $ touch new.txt  
mehmet@mehmet-VirtualBox: $ cp city_country.txt new.txt  
mehmet@mehmet-VirtualBox: $ cat new.txt  
Ankara Turkey 1749372  
Kiev Ukraine 1638593  
Sofia Bulgaria 2419583  
Bogota Colombia 2840274  
Paris France 2184053  
Helsinki Finland 2803947  
Berlin Germany 1958264  
Dublin Ireland 1439285  
Tokyo Japan 1730693  
Warsaw Poland 2095837  
Madrid Spain 3857264  
Vienna Austria 2194837  
Baku Azerbaijan 1739582  
Brasilia Brazil 2759264  
Ottawa Canada 1948265  
mehmet@mehmet-VirtualBox: $
```

The terminal window is titled 'mehmet@mehmet-VirtualBox: ~'. The desktop background is dark purple. On the left, there is a sidebar with various application icons. On the right, there is a panel with a search bar and a list of files, including 'output.txt'.

Here we use 'file' command to check the type of file for 'city.txt'

The output is shown : it is an ASCII text

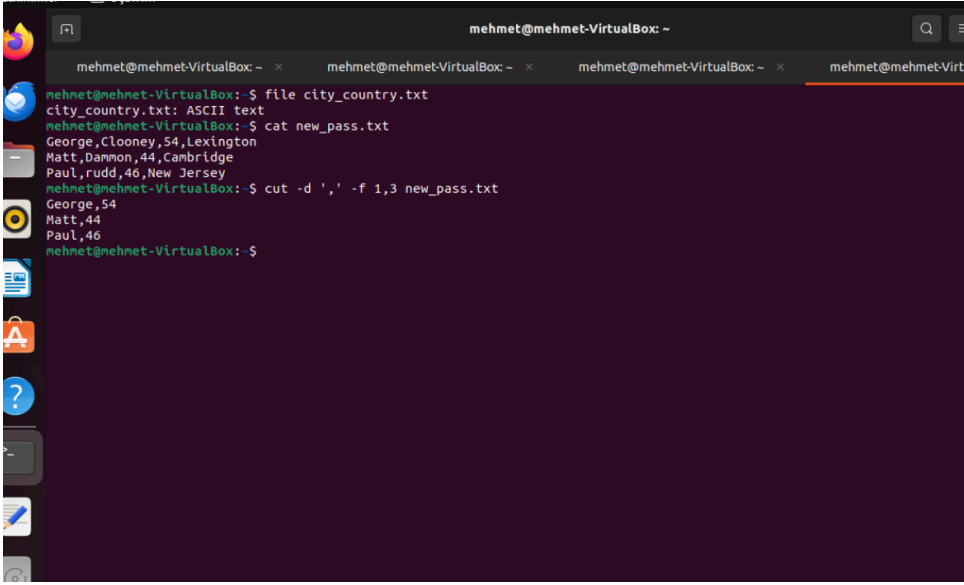


Now we concatenate the contents of new_pass.txt file

Then we use 'cut' to separate our required fields or contexts of the file

Here we cut delimiter (-d) comma(,) and field(-f) first and third (1,3) from the new_pass.txt file

We see the output of the 1st & 3rd fields separated by commas

A terminal window titled 'mehmet@mehmet-VirtualBox: ~' with four tabs. The terminal shows the following commands and output:

```
mehmet@mehmet-VirtualBox:~$ file city_country.txt
city_country.txt: ASCII text
mehmet@mehmet-VirtualBox:~$ cat new_pass.txt
George,Clooney,54,Lexington
Matt,Damon,44,Cambridge
Paul,rudd,46,New Jersey
mehmet@mehmet-VirtualBox:~$ cut -d ',' -f 1,3 new_pass.txt
George,54
Matt,44
Paul,46
mehmet@mehmet-VirtualBox:~$
```

The terminal window has a dark background with a light-colored text. The left sidebar shows various application icons. The top bar displays the window title and tabs.

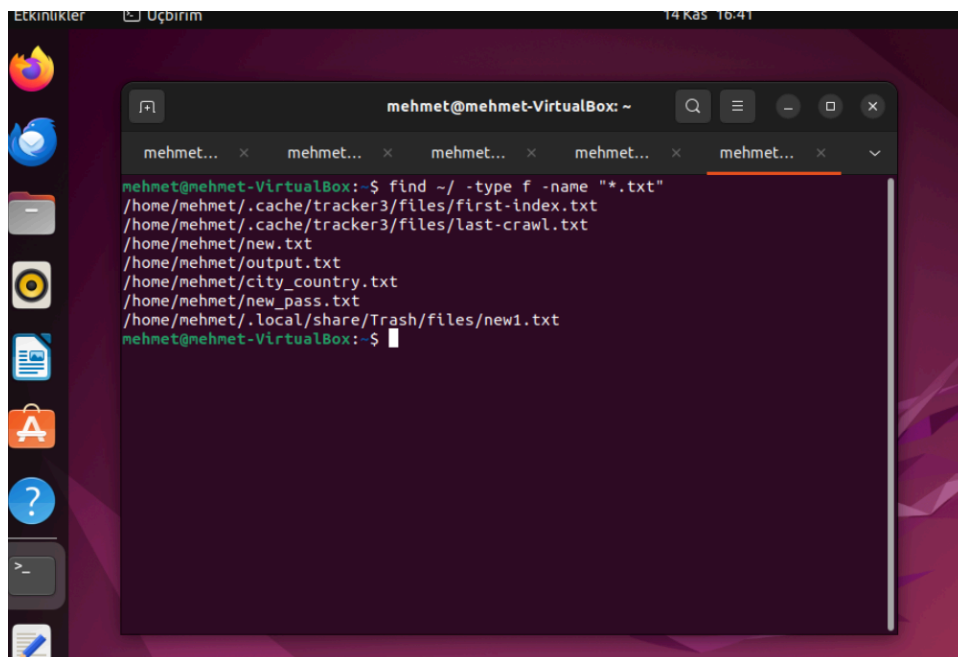
Find - we use this command to find our required files, directories, etc in a

directory hierarchy based on various criteria such as file name, type, size, and more.

`~/` : specifies the starting directory for the search, which is your home directory

`-type f` : specifies the type which is file here

`-name "*.txt"` specifies that we want to find files with names ending in ".txt."



The screenshot shows a terminal window titled "mehmet@mehmet-VirtualBox: ~" with a search bar and window controls. The terminal displays the command `find ~/ -type f -name "*.txt"` and its output, which lists several text files in the user's home directory and subdirectories. The files listed are: `/home/mehmet/.cache/tracker3/files/first-index.txt`, `/home/mehmet/.cache/tracker3/files/last-crawl.txt`, `/home/mehmet/new.txt`, `/home/mehmet/output.txt`, `/home/mehmet/city_country.txt`, `/home/mehmet/new_pass.txt`, and `/home/mehmet/.local/share/Trash/files/new1.txt`. The terminal prompt is `mehmet@mehmet-VirtualBox:~$`.

```
mehmet@mehmet-VirtualBox:~$ find ~/ -type f -name "*.txt"
/home/mehmet/.cache/tracker3/files/first-index.txt
/home/mehmet/.cache/tracker3/files/last-crawl.txt
/home/mehmet/new.txt
/home/mehmet/output.txt
/home/mehmet/city_country.txt
/home/mehmet/new_pass.txt
/home/mehmet/.local/share/Trash/files/new1.txt
mehmet@mehmet-VirtualBox:~$
```

Now we see an example of file gobbling:

We use '*' to represent any type of characters , numbers, strings, spaces and any number of them before .txt to list all the text files in our current directory

```
mehmet@mehmet-VirtualBox:~$ ls *.txt  
city_country.txt  new_pass.txt  new.txt  output.txt  
mehmet@mehmet-VirtualBox:~$
```

Here's an example of how to create a tar archive (compressed with gzip) with all the necessary files in a directory and then extract them.

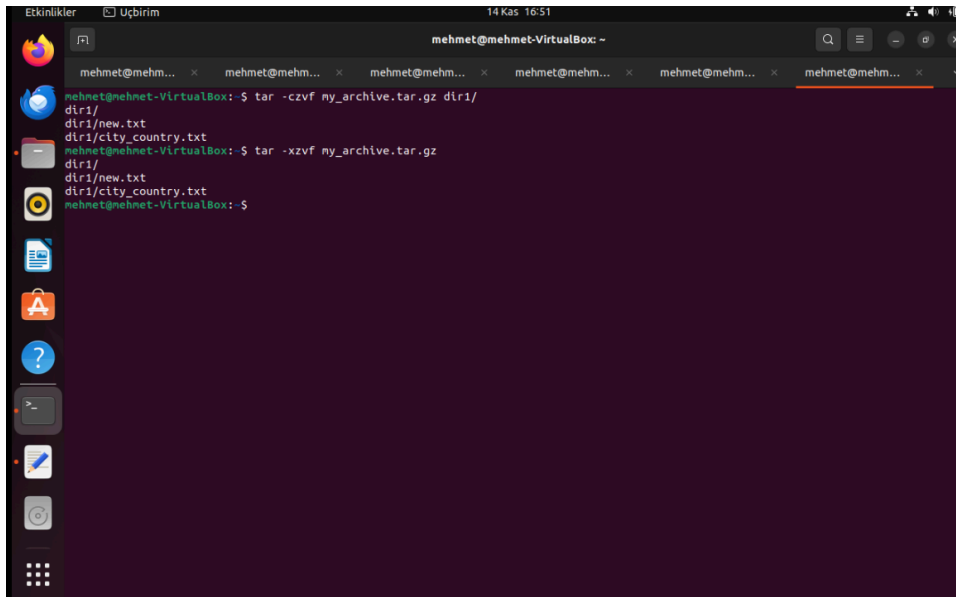
Firstly we create a tar file 'my_archive.tar.gz' with the files of dir1

- c: for creating new archive
- z: compressing the archive using gzip
- v: verbosely list the files processed
- f: specifying archive file name

Then, we extract the files from our compressed tar archive named 'my_archive.tar.gz'

- x: for extracting
- z for decompressing

We see the files and the subdirectories extracted.

A screenshot of a terminal window within a virtual machine. The window title is 'mehmet@mehmet-VirtualBox: ~'. The terminal shows a series of commands and their outputs. First, the user runs 'tar -czvf my_archive.tar.gz dir1/'. The output lists the files being archived: 'dir1/', 'dir1/new.txt', and 'dir1/city_country.txt'. Then, the user runs 'tar -xvzf my_archive.tar.gz'. The output shows the files being extracted: 'dir1/', 'dir1/new.txt', and 'dir1/city_country.txt'. The terminal is running on a Linux system, as indicated by the icons on the left sidebar. The window has multiple tabs open, all with the same title 'mehmet@mehmet-VirtualBox: ~'. The system clock at the top right shows '14 Kas 16:51'.

We use 'gzip' command to compress the city.txt file

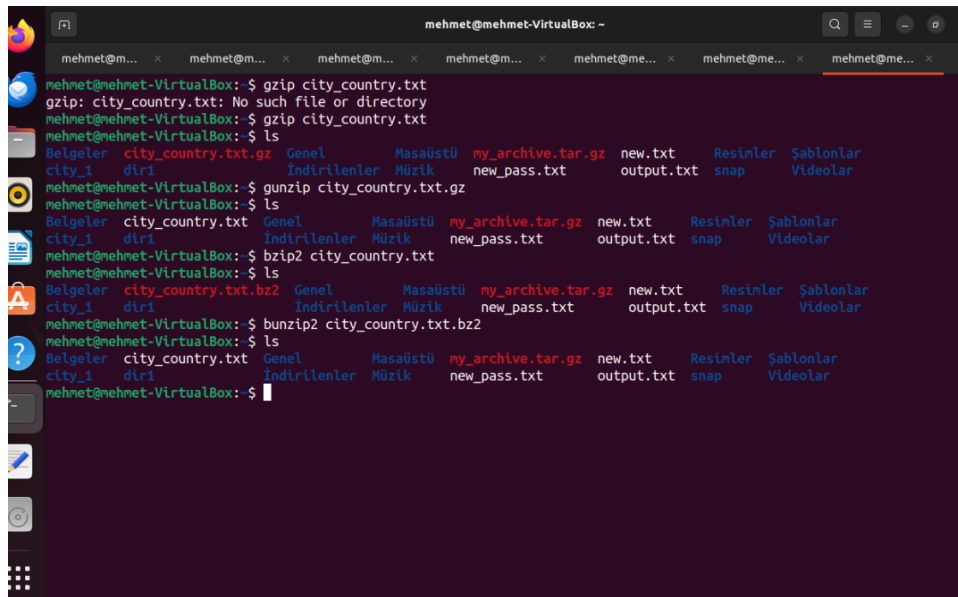
After listing the contents of our current directory 'city.txt.gz' - our compressed file is shown.

Then to decompress the file we use command 'gunzip', and list the contents to check.

Similarly we use 'bzip2' command to compress the city.txt file

After listing the contents of our current directory 'city.txt.bz2' - our compressed file is shown

To decompress the file we use 'bunzip2' and list the contents to check.



```
mehmet@mehmet-VirtualBox: ~  
mehmet@mehmet-VirtualBox: $ gzip city_country.txt  
gzip: city_country.txt: No such file or directory  
mehmet@mehmet-VirtualBox: $ gzip city_country.txt  
mehmet@mehmet-VirtualBox: $ ls  
Belgeler  city_country.txt.gz  Genel      Masaüstü  my_archive.tar.gz  new.txt  Resimler  Şablonlar  
city_1    dir1                 İndirilenler  Müzik     new_pass.txt       output.txt  snap      Videolar  
mehmet@mehmet-VirtualBox: $ gunzip city_country.txt.gz  
mehmet@mehmet-VirtualBox: $ ls  
Belgeler  city_country.txt  Genel      Masaüstü  my_archive.tar.gz  new.txt  Resimler  Şablonlar  
city_1    dir1             İndirilenler  Müzik     new_pass.txt       output.txt  snap      Videolar  
mehmet@mehmet-VirtualBox: $ bzip2 city_country.txt  
mehmet@mehmet-VirtualBox: $ ls  
Belgeler  city_country.txt.bz2  Genel      Masaüstü  my_archive.tar.gz  new.txt  Resimler  Şablonlar  
city_1    dir1                 İndirilenler  Müzik     new_pass.txt       output.txt  snap      Videolar  
mehmet@mehmet-VirtualBox: $ bunzip2 city_country.txt.bz2  
mehmet@mehmet-VirtualBox: $ ls  
Belgeler  city_country.txt  Genel      Masaüstü  my_archive.tar.gz  new.txt  Resimler  Şablonlar  
city_1    dir1             İndirilenler  Müzik     new_pass.txt       output.txt  snap      Videolar  
mehmet@mehmet-VirtualBox: $
```

dd - is used for copying and converting files.

Here's a simple example of using dd to create a copy of a file.

Supposedly, we have a file named "city.txt," and we want to create a copy of it named "destination_file.txt." We can use the dd command to achieve this.

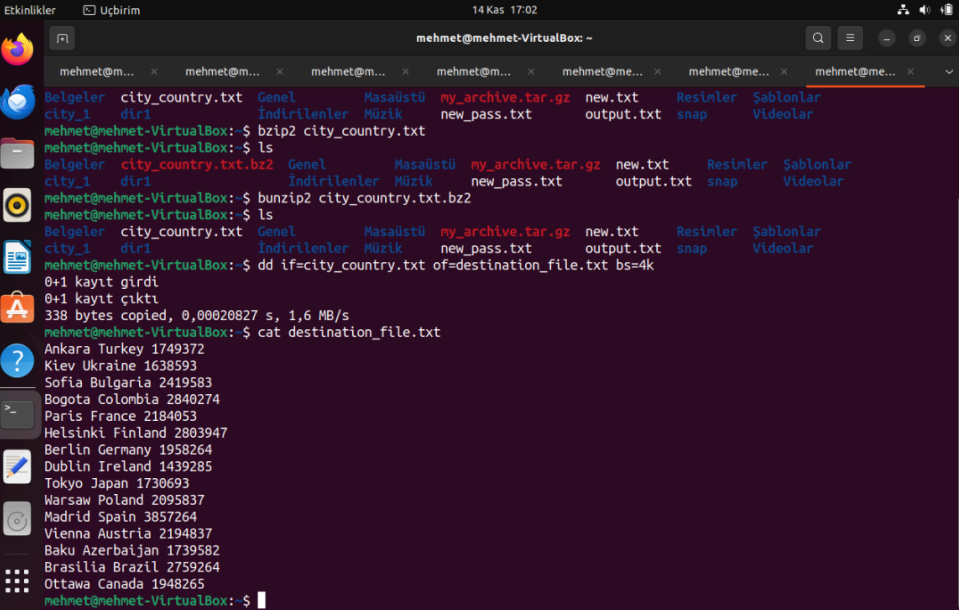
if : input file / source file

of : output file/ destination file

bs : Block size - size of data blocks to be read and written, here we have used 4KB

We see that 320 bytes is copied into our destination_file.txt

To check we concatenate the contents of 'destination_file.txt'

A screenshot of a Linux terminal window titled "mehmet@mehmet-VirtualBox: ~". The terminal shows a series of commands and their outputs. The user starts by listing files in the current directory, then compresses a file with bzip2, decompresses it with bunzip2, and finally copies a file using dd. The output of the dd command shows the file size and transfer speed. The cat command at the end displays a list of cities and their coordinates.

```
mehmet@mehmet-VirtualBox: ~  
mehmet@mehmet-VirtualBox:~$ ls  
Belgeler city_country.txt Genel Masaüstü my_archive.tar.gz new.txt Resimler Şablonlar  
city_1 dir1 İndirilenler Müzik new_pass.txt output.txt snap Videolar  
mehmet@mehmet-VirtualBox:~$ bzip2 city_country.txt  
mehmet@mehmet-VirtualBox:~$ ls  
Belgeler city_country.txt.bz2 Genel Masaüstü my_archive.tar.gz new.txt Resimler Şablonlar  
city_1 dir1 İndirilenler Müzik new_pass.txt output.txt snap Videolar  
mehmet@mehmet-VirtualBox:~$ bunzip2 city_country.txt.bz2  
mehmet@mehmet-VirtualBox:~$ ls  
Belgeler city_country.txt Genel Masaüstü my_archive.tar.gz new.txt Resimler Şablonlar  
city_1 dir1 İndirilenler Müzik new_pass.txt output.txt snap Videolar  
mehmet@mehmet-VirtualBox:~$ dd if=city_country.txt of=destination_file.txt bs=4k  
0+1 kayıt girdi  
0+1 kayıt çıktı  
338 bytes copied, 0,00020827 s, 1,6 MB/s  
mehmet@mehmet-VirtualBox:~$ cat destination_file.txt  
Ankara Turkey 1749372  
Kiev Ukraine 1638593  
Sofia Bulgaria 2419583  
Bogota Colombia 2840274  
Paris France 2184053  
Helsinki Finland 2803947  
Berlin Germany 1958264  
Dublin Ireland 1439285  
Tokyo Japan 1730693  
Warsaw Poland 2095837  
Madrid Spain 3857264  
Vienna Austria 2194837  
Baku Azerbaijan 1739582  
Brasilia Brazil 2759264  
Ottawa Canada 1948265  
mehmet@mehmet-VirtualBox:~$
```

Conclusion :

I have learned how to navigate the Linux command line using commands like `cd`, `ls`, create and manage directories, manipulate files with commands like `rm`, `mv`, `cp`, and work with file content using `cat` and `cut`. I also explored file globbing to work with multiple files. Additionally, I have gained knowledge of data compression utilities such as `tar`, `gzip`, and “`bzip2`” for archiving and compressing files, as well as using `dd` for file copying and conversion. Lastly, I have learned how to use the `find` command for searching files based on specific criteria. These skills are fundamental for efficient Linux system management and file manipulation.

Specifications : using the Universal Type-2 Hypervisor (UTM) and the Ubuntu 22.03.4 Linux distribution on a virtual machine within UTM.