

Global Climate Processes

Exercise -1

Answer all the questions.

Each answer carries 1 point.

Solutions can be uploaded as a pdf into OLAT submission folder.

If necessary you can also attach screen shots in your solutions.

1. Which command displays your present working directory?

- `pwd`

2. Enter the command `cd abcd` in your terminal. What happens?

- `cd: no such file or directory: abcd`

Because `abcd` file or directory does not exist

3. Enter the `cd` command in your terminal. What happens?

Working directory changed. So, current directory changed to the home directory.

4. Enter the command `ls -ltr`. What did you notice?

- `ls` : listing command
- `-l` : gives details
- `t` : lists all files in the last modified files first order
- `r`: orders reversely

```
Last login: Wed Oct 27 12:35:18 on ttys000
(base) onurhanaydin@ONURHANS-MacBook-Air ~ % ls -lt
total 464
drwx-----@ 17 onurhanaydin  staff    544 Oct 27 13:14 Desktop
drwx-----+ 16 onurhanaydin  staff    512 Oct 27 13:11 Downloads
drwxr-xr-x 11 onurhanaydin  staff    352 Oct 24 12:13 seaborn-data
drwx-----+ 5 onurhanaydin  staff    160 Oct 15 18:24 Documents
drwx-----@ 73 onurhanaydin  staff   2336 Oct 11 13:55 Library
drwxr-xr-x 3 onurhanaydin  staff     96 Oct 9 08:00 VirtualBox VMs
-rw-r--r-- 1 onurhanaydin  staff 235781 Jun 29 23:10 Matplotlib.ipynb
drwx-----+ 4 onurhanaydin  staff    128 Apr 22 2021 Music
drwx-----+ 4 onurhanaydin  staff    128 Mar 17 2021 Movies
drwx-----@ 3 onurhanaydin  staff     96 Mar 14 2021 Applications
drwx-----+ 4 onurhanaydin  staff    128 Mar 14 2021 Pictures
drwxr-xr-x+ 4 onurhanaydin  staff    128 Mar 14 2021 Public
(base) onurhanaydin@ONURHANS-MacBook-Air ~ % ls -ltr
total 464
drwxr-xr-x+ 4 onurhanaydin  staff    128 Mar 14 2021 Public
drwx-----+ 4 onurhanaydin  staff    128 Mar 14 2021 Pictures
drwx-----@ 3 onurhanaydin  staff     96 Mar 14 2021 Applications
drwx-----+ 4 onurhanaydin  staff    128 Mar 17 2021 Movies
drwx-----+ 4 onurhanaydin  staff    128 Apr 22 2021 Music
-rw-r--r-- 1 onurhanaydin  staff 235781 Jun 29 23:10 Matplotlib.ipynb
drwxr-xr-x 3 onurhanaydin  staff     96 Oct 9 08:00 VirtualBox VMs
drwx-----@ 73 onurhanaydin  staff   2336 Oct 11 13:55 Library
drwx-----+ 5 onurhanaydin  staff    160 Oct 15 18:24 Documents
drwxr-xr-x 11 onurhanaydin  staff    352 Oct 24 12:13 seaborn-data
drwx-----+ 16 onurhanaydin  staff    512 Oct 27 13:11 Downloads
drwx-----@ 17 onurhanaydin  staff    544 Oct 27 13:14 Desktop
(base) onurhanaydin@ONURHANS-MacBook-Air ~ %
```

5. Can you create a folder named “my_folder” and check what kind of permissions does your folder contain?

- `touch "my_folder"`
 - `(base) onurhanaydin@ONURHANS-MacBook-Air Desktop % ls -l /Users/onurhanaydin/Desktop/my_folder`
 - `-rw-r--r-- 1 onurhanaydin staff 0 Oct 27 13:25 /Users/onurhanaydin/Desktop/my_folder`
- r: read, w: write

6. Change the permission of your “my_folder” to read, write, edit .

- `chmod u=rwx,g=rwx,o=rwx my_folder`

u: users, g: group, o: others

7. Try to tar the folder “my_folder” to “my_folder.tar.gz”. How does tarring help?

- `tar -czvf my_folder.tar.gz /Users/onurhanaydin/Desktop/my_folder`

It is widely used for compressing or extracting a file or directory. Thanks to this command, huge amount of data can easily be carried in a disk or a machine.

8. Untar the folder “my_folder.tar.gz”?

- `tar -xf my_folder.tar.gz`

9. Can you write about the commands `mkdir`, `ls`, `mv`, `cp` and try to do an example for each of these commands in your terminal?

```
[(base) onurhanaydin@ONURHANS-MacBook-Air Desktop % mkdir exercise ]
[(base) onurhanaydin@ONURHANS-MacBook-Air Desktop % ls ]
CW Enrollment Agreement_Group_2(Pro-FULL)      SQL Assignment-1.docx
Data Science                                  STM
Documents                                     SampleSales_Database
Ekran Resmi 2021-10-26 19.45.24.png             Users
Ekran Resmi 2021-10-27 13.15.23.png             exercise
Evraklar                                       my_folder
Goethe University                             my_folder.tar.gz
IT                                              test
MSc
[(base) onurhanaydin@ONURHANS-MacBook-Air Desktop % mv /Users/onurhanaydin/Desktop/exercise /Users/onurhanaydin/Desktop/test
[(base) onurhanaydin@ONURHANS-MacBook-Air Desktop % cp /Users/onurhanaydin/Desktop/test/exercise /Users/onurhanaydin/Desktop
cp: /Users/onurhanaydin/Desktop/test/exercise is a directory (not copied).
[(base) onurhanaydin@ONURHANS-MacBook-Air Desktop % cp /Users/onurhanaydin/Desktop/test/test.txt /Users/onurhanaydin/Desktop
[(base) onurhanaydin@ONURHANS-MacBook-Air Desktop % ]
```

10. Create a subfolder named “my_subfolder” in the directory “my_folder”.

- `mkdir my_folder/my_subfolder`

11. Create a .txt file and write “this is my first txt file”, in the folder “ my_subfolder” and save it.

- `cd my_subfolder`
- `touch a.txt`
- `vi a.txt`

Initially the sentence was inserted by pushing “i” from the keyboard. Next, the a.txt file was exited by using “:wq” command so that the changing was saved.

12. Name two data formats in which climate data is stored?

- GRIB
- NetCDF
- HDF
- Binary
- ASCII

13. In the command `gfortran -o hello hello_world.f90` what does the “-o” stand for?

When we firstly use the comman “`gfortran hello_world.f90`”, it creates an output file as a.out . We have to use `./a.out` to run this fortran code. However, if we use “`gfortran -o hello hello_world.f90`” after the first command, then we call the fortran code as hello. So, now we can use `./hello`. Consequently, “-o” assigns a name to the fortran code. It compiles the fortran code.

14. Can you download any single .nc (netcdf extension) from the weblink

- brew install wget
- wget
https://downloads.psl.noaa.gov/Datasets/ncp.reanalysis/surface_gauss/air.2m.gauss.1948.nc
- ls

```
(base) onurhanaydin@ONURHANS-Air Desktop % ls
CW Enrollment Agreement_Group_2(Pro-FULL)
Data Science
Documents
Ekran Resmi 2021-10-26 19.45.24.png
Ekran Resmi 2021-10-27 13.15.23.png
Evraklar
Goethe University
IT
MSc
SQL Assignment-1.docx
STM
SampleSales_Database
air.2m.gauss.1948.nc
test
(base) onurhanaydin@ONURHANS-Air Desktop %
```

<https://psl.noaa.gov/data/gridded/data.ncp.reanalysis.pressure.html>

15. Please write few lines about the language packages such as “R” , “Python” and “Grads”. Also explain how they are useful in Climate Data analysis?

R is a programming language and software environment for statistical analysis, graphics representation and reporting. R was created by Ross Ihaka and Robert Gentleman at the University of Auckland, New Zealand, and is currently developed by the R Development Core Team.

The Grid Analysis and Display System (GrADS) is an interactive desktop tool that is used for easy access, manipulation, and visualization of earth science data. GrADS has two data models for handling gridded and station data. GrADS supports many data file formats, including binary (stream or sequential), GRIB (version 1 and 2), NetCDF, HDF (version 4 and 5), and BUFR (for station data).

First developed in the late of 1980s by Guido van Rossum. Python is an object-oriented (based around data), high-level (easier for humans to understand) programming language. As such, it's an ideal coding language for those who want rapid development. It was derivated from C program.

A combination of software tools and languages will be needed. Because data has no meaning without visuallization that's why Scientists use various computer programs so that they can easily understand and predict data. Climate data processing has 3 steps: file handling, data manipulation and computations, and data visualization. There are three different software categories used for climate data processing and visualization; first is compiled languages like fortran, C, C++, second one is command line operators and viewers such as NCO, CDO, ncview, and third is interpreted languages (NCL, GrADS, Ferret, R, Python). These all tools and program languages are in use to enhance climate science. In short, not only climate science but also other scientific fields can not be developed without these types of tools.