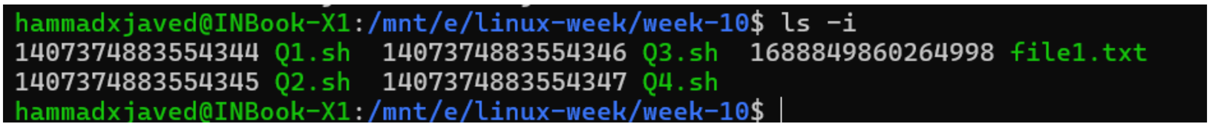
Week 9

1. Write a report on the structure of the Linux file system.

The Linux file system is a hierarchical directory structure that starts from the root directory (/). Here are the key components:

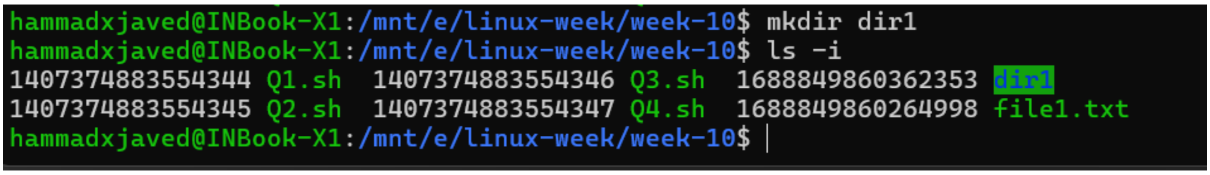
- **Root Directory (/)**: The top-level directory.
- **/bin**: Essential command binaries.
- **/boot**: Boot loader files.
- **/dev**: Device files.
- **/etc**: Configuration files.
- **/home**: User home directories.
- **/lib**: Essential shared libraries.
- **/media**: Mount points for removable media.
- **/mnt**: Temporary mount points.
- **/opt**: Optional software packages.
- **/proc**: Process and kernel information.
- **/root**: Home directory for the root user.
- **/sbin**: System binaries.
- **/tmp**: Temporary files.
- **/usr**: User binaries and read-only data.
- **/var**: Variable data files.

2. Display inode information using ls -i and interpret the results.



```
hammadxjaved@INBook-X1:/mnt/e/linux-week/week-10$ ls -i
1407374883554344 Q1.sh  1407374883554346 Q3.sh  1688849860264998 file1.txt
1407374883554345 Q2.sh  1407374883554347 Q4.sh
hammadxjaved@INBook-X1:/mnt/e/linux-week/week-10$ 
```

3. Create and delete files and directories, and observe changes in inode numbers.



```
hammadxjaved@INBook-X1:/mnt/e/linux-week/week-10$ mkdir dir1
hammadxjaved@INBook-X1:/mnt/e/linux-week/week-10$ ls -i
1407374883554344 Q1.sh  1407374883554346 Q3.sh  1688849860362353 dir1
1407374883554345 Q2.sh  1407374883554347 Q4.sh  1688849860264998 file1.txt
hammadxjaved@INBook-X1:/mnt/e/linux-week/week-10$
```

4. Explain the significance of inodes in file management and demonstrate with examples.

Inodes store metadata about files, such as:

- File size
- Permissions
- Owner and group
- Timestamps
- Data block pointers

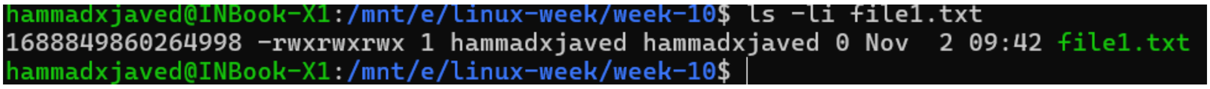
Example:

ls -li file1.txt

Output:

1234567 -rw-r--r-- 1 user group 0 Nov 15 22:19 file1.txt

The inode number 1234567 stores all metadata except the filename.



```
hammadxjaved@INBook-X1:/mnt/e/linux-week/week-10$ ls -li file1.txt
1688849860264998 -rwxrwxrwx 1 hammadxjaved hammadxjaved 0 Nov  2 09:42 file1.txt
hammadxjaved@INBook-X1:/mnt/e/linux-week/week-10$
```

5. Write a program in python to find alphabet/s having maximum number of instances in a given file.

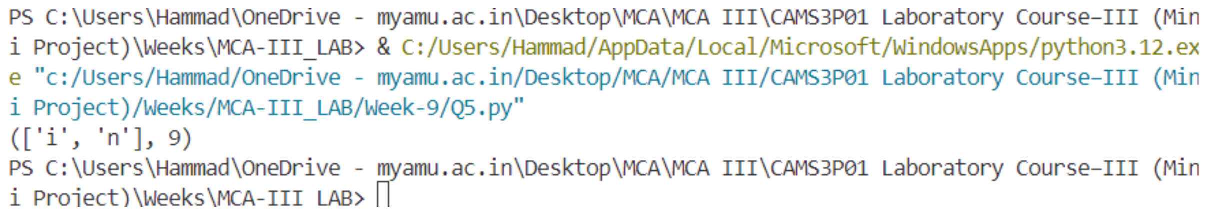
```
def max_alphabet_instances(file_path):
    with open(file_path, 'r') as file:
        content = file.read().lower()

    alphabet_count = {}
    for char in content:
        if char.isalpha():
            alphabet_count[char] = alphabet_count.get(char, 0) + 1

    max_count = max(alphabet_count.values())
    max_alphabets = [char for char, count in alphabet_count.items() if count == max_count]

    return max_alphabets, max_count

print(max_alphabet_instances('Week-9/file.txt'))
```



```
PS C:\Users\Hammad\OneDrive - myamu.ac.in\Desktop\MCA\MCA III\CAMS3P01 Laboratory Course-III (Min
i Project)\Weeks\MCA-III_LAB> & C:/Users/Hammad/AppData/Local/Microsoft/WindowsApps/python3.12.ex
e "c:/Users/Hammad/OneDrive - myamu.ac.in/Desktop/MCA/MCA III/CAMS3P01 Laboratory Course-III (Min
i Project)/Weeks/MCA-III_LAB/Week-9/Q5.py"
(['i', 'n'], 9)
PS C:\Users\Hammad\OneDrive - myamu.ac.in\Desktop\MCA\MCA III\CAMS3P01 Laboratory Course-III (Min
i Project)\Weeks\MCA-III_LAB> 
```

6. A file contains information about programs and courses in the following format:

Program,course. Write a Python program to find the number of courses against each program.

Eg:

Program,Course

MCA,Database

MCA,Java

M.Sc,Data Structure

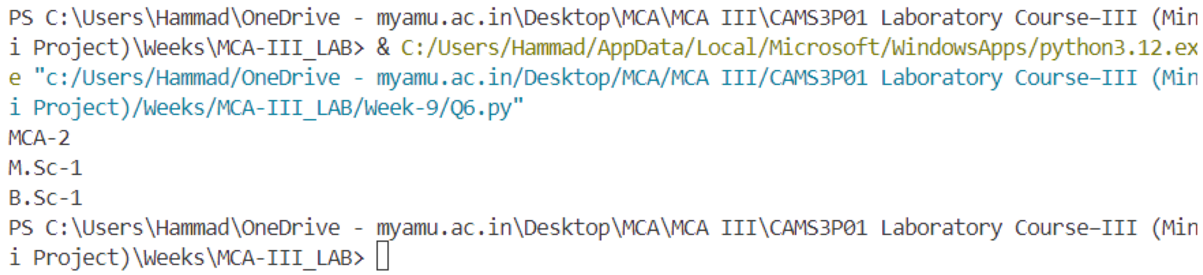
B.Sc, Python

```
def count_courses(file_path):
    course_count = {}

    with open(file_path, 'r') as file:
        for line in file:
            program, course = line.strip().split(',')
            if program in course_count:
                course_count[program] += 1
            else:
                course_count[program] = 1

    for program, count in course_count.items():
        print(f"{program}-{count}")


count_courses('Week-9/programs.csv')
```



```
PS C:\Users\Hammad\OneDrive - myamu.ac.in\Desktop\MCA\MCA III\CAMS3P01 Laboratory Course-III (Min
i Project)\Weeks\MCA-III_LAB> & C:/Users/Hammad/AppData/Local/Microsoft/WindowsApps/python3.12.ex
e "c:/Users/Hammad/OneDrive - myamu.ac.in/Desktop/MCA/MCA III/CAMS3P01 Laboratory Course-III (Min
i Project)/Weeks/MCA-III_LAB/Week-9/Q6.py"
MCA-2
M.Sc-1
B.Sc-1
PS C:\Users\Hammad\OneDrive - myamu.ac.in\Desktop\MCA\MCA III\CAMS3P01 Laboratory Course-III (Min
i Project)\Weeks\MCA-III_LAB> 
```

7. A file contains information about employees with the following parameters: Name, Id, Salary, Dname. Write a Python program to write one more column HRA (House rent allowances) to this file, where HRA= 18%of salary

Eg: Suppose the existing file is as follows, where you need to add HRA column:

Name,id,salary, Dname

Amar,101,20000,Sales

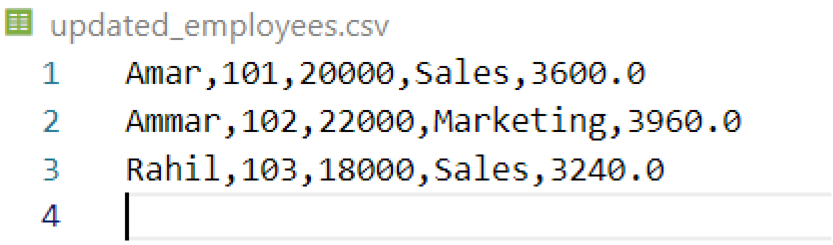
Ammar,102,22000,Marketing

Rahil,103,18000,Sales

```
def add_hra_column(file_path):
    with open(file_path, 'r') as file:
        lines = file.readlines()

    with open('updated_employees.csv', 'w') as file:
        for line in lines:
            name, emp_id, salary, dname = line.strip().split(',')
            hra = round(0.18 * float(salary), 2)
            file.write(f"{name},{emp_id},{salary},{dname},{hra}\n")

add_hra_column('Week-9/employees.csv')
```



```
Amar,101,20000,Sales,3600.0
Ammar,102,22000,Marketing,3960.0
Rahil,103,18000,Sales,3240.0

```