File Handling in Python Class 12 Notes | Computer Science

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File Handling in Python

File handling is the process of saving data in a file using Python program. The Python file can be stored in a text file or in a binary file. There are six different types of modes available in the Python programming language which is used for reading, writing, and appending files in Python.

Note: The Python file can be stored in a text file or in a binary file.

Text File Mode	Binary File Mode	Description
‘r’	‘rb’	Read

Text File Mode	Binary File Mode	Description
‘w’	‘wb’	Write
‘a’	‘ab’	Append
‘r+’	‘rb+’	Read and write
‘w+’	‘wb+’	Write and read
‘a+’	‘ab+’	Write and read

File Handling Steps

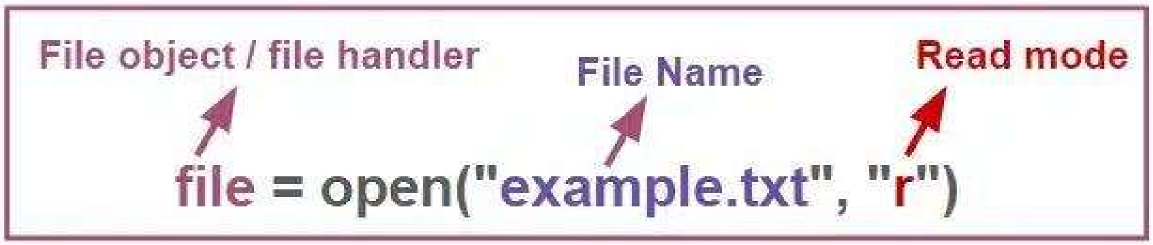
1. Open the file
2. Write and Read operation
3. Close the file

1. Open a file in Python

For reading, writing, or editing a file in Python, you have to open the file first using the **open() method**.

Syntax:

<file_object_name> = open(<filename>, <mode>)



```
file = open("example.txt", "r")
```

2. Write and Read operation

Write operation in Python

When the file is opened in write mode and if a new file does not exist in the specific location on the disk, then the write mode creates the file automatically; otherwise, if it is found in the location, then the same file will be used. The function used to write in the file is **filename.write()**.

Syntax:

file_object.write(<text which you want to write>)

```
file = open("example.txt", "w")      # Open the file in write mode
file.write("Hello, World!")           # Writing content to the file
```

Read operation in Python

The read() function is used to read content from a text file. It is basically used when we want to fetch data from a file that is opened in read mode (‘r).

Syntax:

file_object.read()

```
file = open("example.txt", "r")       # Open the file in read mode
content = file.read()                 # Read the content of the file
print(content)
```

3. Close the file

The close() method is important to close the operation on the file after execution. It defines that the file is properly closed after performing the operation, like reading, writing, or appending, which will help to prevent the file corruption.

Syntax:

close()

```
# Writing to the file
file = open("example.txt", "w")
file.write("Hello, World!")
file.close()                # Close the file

# Reading from the file
file = open("example.txt", "r")
content = file.read()
print(content)
file.close()                # Close the file
```

Reading a Text File

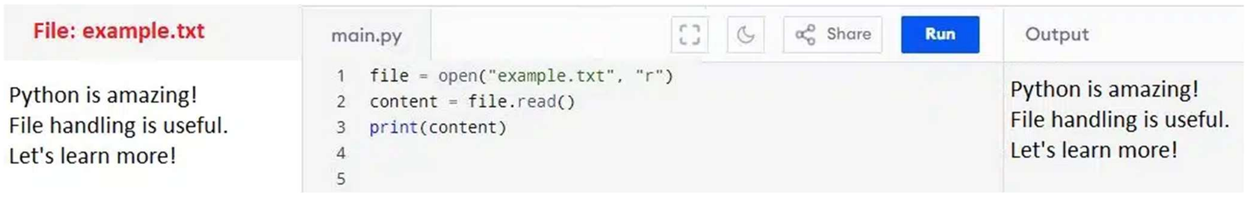
The reading of the text file can be done using 3 different methods as per the requirement.

1. **read():** Reads entire content from a file or a specific number of bytes.
2. **readline():** Reads one line from the file at a time.
3. **readlines():** Reads all lines from the file and returns them as a string.

1. read() method

The read() method is used to read the entire content from a file; it can handle large files but takes lots of memory. The read() method can be used in text files and binary files both such as ‘r’ (text read mode) or ‘rb’ (binary read mode).

Example,



```
Python is amazing!
File handling is useful.
Let's learn more!
```

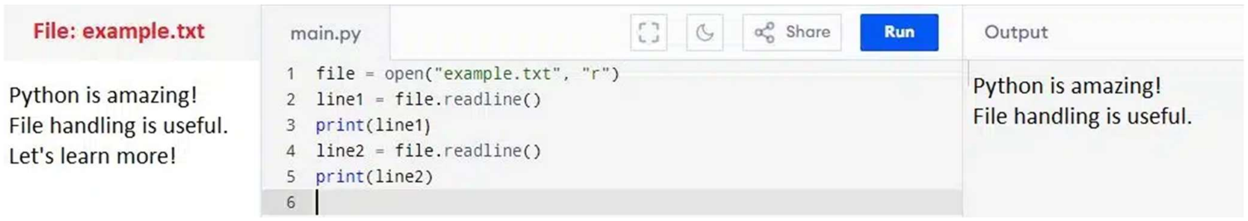
```python
file = open("example.txt", "r")
content = file.read()
print(content)
```

```
Python is amazing!
File handling is useful.
Let's learn more!
```

2. readline() method

Reads one line from the file at a time. This method is useful for reading files line by line, especially in loops.

Example,



```
Python is amazing!
File handling is useful.
Let's learn more!
```

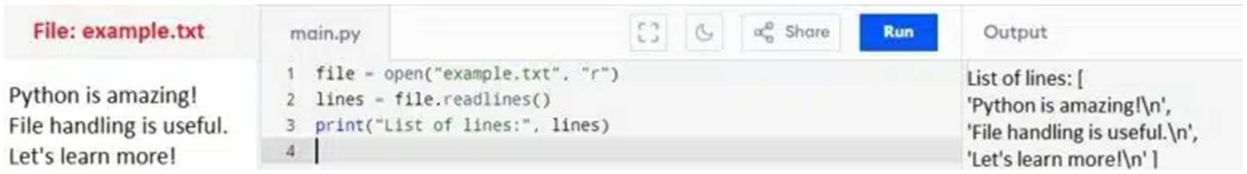
```python
file = open("example.txt", "r")
line1 = file.readline()
print(line1)
line2 = file.readline()
print(line2)
```

```
Python is amazing!
File handling is useful.
```

3. readlines() method

Reads all lines in the file and returns them as a list of strings; each string in the list ends with a newline (\n). Ideal for small to medium sizes of files.

Example,



```
Python is amazing!
File handling is useful.
Let's learn more!
```

```
file = open("example.txt", "r")
lines = file.readlines()
print("List of lines:", lines)
```

```
List of lines: [
'Python is amazing!\n',
'File handling is useful.\n',
'Let's learn more!\n' ]
```

Writing into a Text File

The writing of the content on the text can be done using two methods:

- **write():** Writes a single string to a file at a time; does not add newline characters automatically.
- **writelines():** Writes multiple strings to a file; does not add newline characters automatically.

1. write() method

Writes a single string to a file at a time; does not add newline characters automatically.

```
file = open("example.txt", "w")
file.write("Hello, World!\n") # Writes a single string to the file
file.write("Python is great for file handling!\n") # Adds another line
```

2. writeline() method

Writes multiple strings to a file; does not add newline characters automatically.

```
file = open("example.txt", "w")
lines = [
        "Line 1: File handling in Python.\n",
        "Line 2: This is the second line.\n",
        "Line 3: Let's write multiple lines!"
    ]
    file.writelines(lines)
```

Appending into a Text File

Append mode helps to add new data in the file without erasing the previous one; this new data is added at the end of the existing data. To use this append mode, you need to set “a” as append in the open() function.

```
file = open("example.txt", "a")
file.write("Hello, World!\n")          # The new data will be added at the end of the existing data.
```

Binary File Handling

Binary files are made up of non-human-readable data in the form of bytes. The pickle module is used to convert Python objects like lists, tuples, and dictionaries into a byte stream called pickling or serialization using the dump() method. To restore or to retrieve the data in original form is known as unpickling, which can be done using load() method.

Writing into a binary file

The dump() function is used in Python for writing an object into a binary file.

```
import pickle
data = {
    "name": "Anil",
    "age": 25,
    "skills": ["Python", "Data Science", "Machine Learning"]
}

# Writing data into a binary file
pickle = open("data.bin", "wb")
pickle.dump(data, binary_file) # Serialize and write the data
```

Reading a binary file

The load() method is used to read the binary file in Python. This method unpickles the data from the binary file, which helps to convert the binary stream into the original object.

```
unpickle = open("data.bin", "rb")
data = pickle.load(binary_file) # Deserialize the data (unpickling)
 print(data)
```

What is csv file?

A CSV, which stands for comma-separated values, is just like a text file that stores data in a tabular format. A CSV file is used to store high-volume data in a database.

Writing into a csv File

Python has a built-in module called CSV. CSV is a universal format, and CSV is just like a text file, which is easier to read and edit. While working on a CSV file, there are two methods used to write data: write() and writerow(). To write content in a CSV file, the mode "w" must be specified in the file path. After opening the file, the writer() or writerow() method is used to write content in the file.

Note: The file extension is .csv.

write()	writerow()
Required format rows, commas, quotes etc	Not requried formatting, handled automatically
Less user friendly	User friendly
Handle manually	Automatically escapes characters like , or "

write() method

```
data = [["Name", "Age", "City"], ["Rakesh", 25, "New Delhi"], ["Amit", 30, "Mumbai"]]

file = open("example.csv", "w")

for row in data:
    formatted_row = ",".join(map(str, row)) + "\n"
    file.write(formatted_row)

file.close()
```

writerow() method

```
import csv

header = ["Name", "Age", "City"]
data = ["Alice", 25, "New York"]

file = open("writerow_example.csv", "w", newline="")

writer = csv.writer(file)
writer.writerow(header)
writer.writerow(data)
```

```
file.close()
```

Reading From a csv File

To read data from a CSV file, the file should be opened in the same method, and the mode ‘r’ is used for reading the file. After opening the file, the reader() method will be used.

```
import csv

file = open("example.csv", mode="r")
reader = csv.reader(file)

for row in reader:
    print(row)

file.close()
```