File Handling

Creating and Manipulating Files

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Built-In Functions to Create and Manipulate Files

Python File Object

- Built-in functions to create and manipulate files
- `io` module is the default module for accessing files
  - Don't need to import it
- `open()` returns a **file object** whose type depends on:
  - The mode
  - File operations such as reading and writing
  - Files in a text mode (`'w'`, `'r'`, `'wt'`, `'rt'`, etc.) return a `TextIOWrapper`

Opening a File

Opens a File and Returns a File Object

open() Function

- `open()` function in Python opens a file and returns a file object

```
file = open('text.txt', 'r')
```

- The arguments are **file name** and the **mode** (reading, etc.)
- All arguments except `file` are optional and have default values
- If the file is not in the current directory, the full path to the file can be provided

```
file = open('D:\\text.txt', 'r')
```

open() Function with Invalid File

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- If the file does not exist, **FileNotFoundError** is thrown

```
file = open('invalid.txt', 'r')  # FileNotFoundError
```

- It can be caught as a try-finally block

```
try:
    file = open('invalid.txt', 'r')  # FileNotFoundError
except FileNotFoundError:
    print("File not found or path is incorrect")
finally:
    print("exit")
```

File Modes

- The `mode` argument is optional and specifies the mode for manipulating the file
- Its default value is '`r`' - open for reading in text mode
- File modes in Python
  - `w` - open for writing, truncating the file first
  - `x` - create a new file and open it for writing
  - `a` - open for writing, appending to the end of the file if it exists
  - `t` - text mode (default)
  - `b` - binary mode
  - `+` - open a disk file for updating (reading and writing)

Problem: File Opener

- Create a program that opens the file called `'text.txt'`
- If the file is found, print `'File found'`
- If the file is not found, print `'File not found'`

```
try:
    text_file = open('text.txt', 'r')
    print("File found")
except FileNotFoundError:
    print("File not found")
```

Reading a File

Build-In Methods for Reading from File

Reading Functions - read()

- Returns the first n bytes of the file
- Returns the entire file if a number of bytes is not passed as an argument

```
file = open("asd.txt")  # 'Hello, SoftUni!'
print(file.read(2))     # 'He'
print(file.read(2))     # 'll'
print(file.read(2))     # 'o,'
print(file.read())      # ' SoftUni!'
```

Reading Functions - readline()

- Returns at most **n** bytes of a single line of a file
- It does not read more than one line
- If no argument is passed, the entire line (or rest of the line) is read

```
file = open("text.txt")  # 'Hello, SoftUni!'
print(file.readline(5))  # 'Hello'
print(file.readline(5))  # ' ,Sof'
print(file.readline(5))  # 'tUni!'
print(file.readline())   # '' Goes to the new line
print(file.readline(5))  # 'Secon' Print second line
```

Reading Functions - readlines()

- Read the remaining lines from the file object and return them as a list

```
file = open("text.txt")
print(file.readlines())
# ['Every\n', 'Word\n', 'is\n', 'line']
```

- Keep in mind every line in the file treats the **new line symbol** as a string

```
file = open("text.txt")
lines = file.readlines()
[print(line, end="") for line in lines]
```

Looping Over a File Object

- To return all lines from a file you can loop over it
- More memory efficient and fast manner
  - Simple and easy to read

```
file = open("python.txt", 'r')

for line in file:
    print(line, end="")
    # print every line in a new line
```

Problem: File Reader

- Create a program that reads the numbers from the file called `'numbers.txt'`
- Print on the console the sum of those numbers

```
numbers_file = open('numbers.txt', 'r')
numbers_sum = 0
for number in numbers_file:
    numbers_sum += int(number)
print(numbers_sum)
```

Writing and Creating a File

Write, Append, Close Methods and `with` Statement

Creating and Writing a File

- Using '**w**' (write) mode - **creates** a file with the given name
  - If the file exists, this mode **overwrites** it

```
file = open('python.txt', 'w')
# Creates or opens the file

file.write("This is the write command.\n")
file.write("It allows us to write in a particular file")
file.close()
```

Append to a File

- Using 'a' mode - **opens** a file and writes at the end of the file
  - If the file does not exist, it will be **created**

```
file = open('python.txt', 'a')
file.write("This is the write command.\n")
file.write("It allows us to write in a particular file")
file.close()
```

```
file = open('python.txt', 'a')
lines = ["Write ", "in ", "file"]
file.writelines(lines)  # Write multiple strings
file.close()
```

Closing Files

- We should always make sure that an open file is properly **closed**
- In **most cases**, upon the **termination** of an application or script, a file will be **closed eventually**
  - There is **no guarantee** when exactly that will happen
- To avoid **unwanted behavior, always close** the files
  - This is a **good practice!**

with Statement

- Files opened with **with** statement will be **closed automatically** once the **with** block is left
- Provides much cleaner syntax and exception handling

```
with open("file.txt", "w") as f:
    f.write("Hello World!!!")
```

Problem: File Writer

- Create a program that creates a file called **`'my_first_file.txt'`**
- In that file write a single line with the content: **`'I just created my first file!'`**

```
created_file = open('my_first_file.txt', 'w')
created_file.write('I just created my first file!')
```

Deleting a File

OS module, Check if File Exists and Delete File

Deleting a File

- To delete a file, you must import the `os` module

```
import os

os.remove("python.txt")
os.remove("D:\\text.txt")  # Can use full path
```

Deleting a File

- Keep in mind if the file does not exist, an error will be raised
- To avoid getting an error
  - Check whether the file exists
  - Delete file

```
import os

file_path = "text.txt"
if os.path.exists(file_path):
    os.remove(file_path)
```

Problem: File Delete

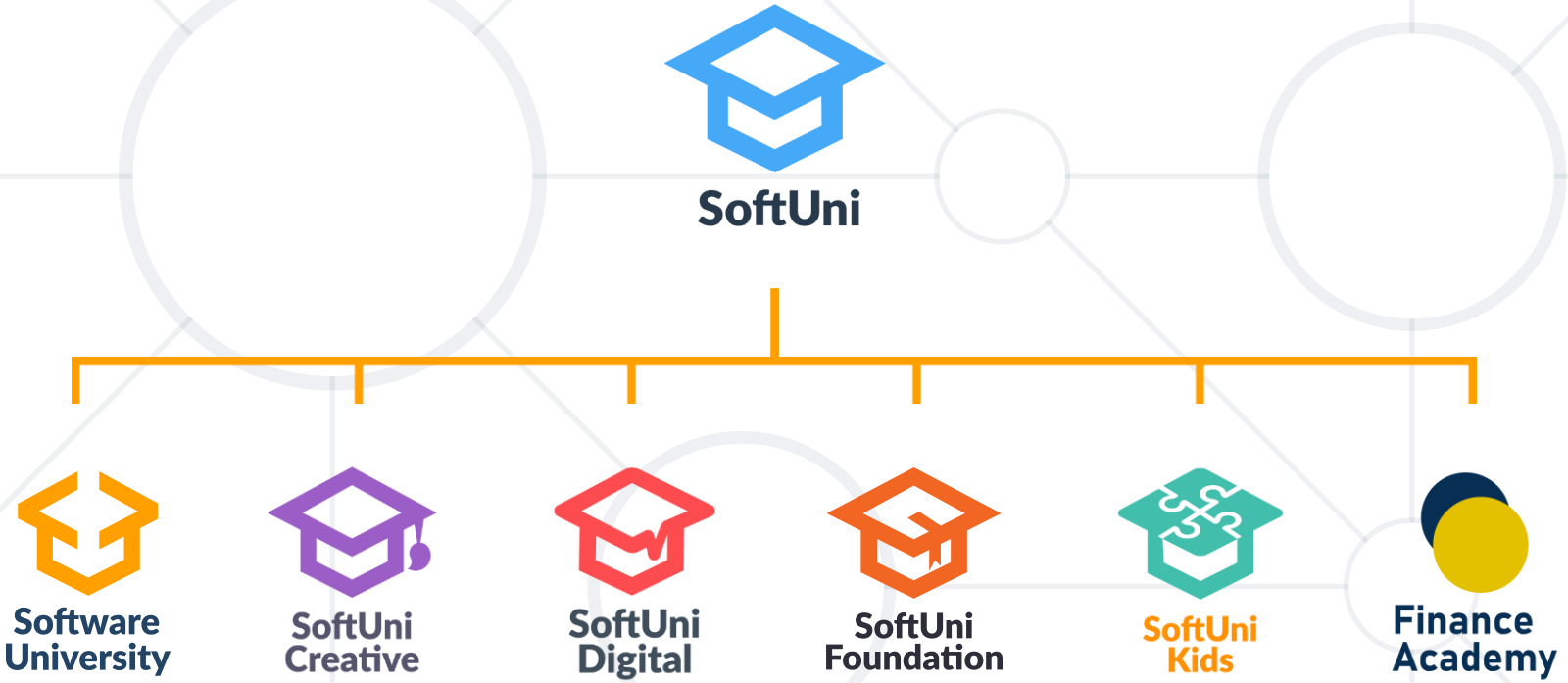
- Create a program that deletes the file you created in the previous task
- If you try to delete the file multiple times, print the message: **'File already deleted!'**

```
import os
try:
    os.remove('my_first_file.txt')
except FileNotFoundError:
    print("File already deleted!")
```

Summary

- Open or create a file
- Choose the appropriate file mode
- Manipulate the file
- Close the file
- Delete file
  - Import OS module
  - Check whether the file exists
  - Delete file

Questions?



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