# Introduction to Computer Programming

## Week 7.1: Reading & Writing Files

# Writing files `w`

**Example:**
Write the high score table shown to a new file with the filename scores.csv

| | |
|---|---|
| Elena | 550 |
| Sajid | 480 |
| Tom | 380 |
| Farhad | 305 |
| Manesha | 150 |

In [344]:
```
names = ['Elena', 'Sajid', 'Tom', 'Farhad', 'Manesha']
scores = [550, 480, 380, 305, 150]
```

In [345]:
```
names = ['Elena', 'Sajid', 'Tom', 'Farhad', 'Manesha']
scores = [550, 480, 380, 305, 150]

f = open('sample_data/scores.csv', 'w')


# loop through two lists
for n, s in zip(names, scores):
    #f.write(n + ', ' + str(s) + '\n') # numbers converted to s

    f.write(f'{n}, {s}\n') # using f strings


f.close()
```

***Try it yourself***

**Example:**
Write the high score table shown to a new file with the filename scores.txt

| | |
|---|---|
| Elena | 550 |
| Sajid | 480 |
| Tom | 380 |
| Farhad | 305 |
| Manesha | 150 |

In [346]:
```
f = open('sample_data/scores.txt', 'w')


# loop through two lists
for n, s in zip(names, scores):
    f.write(n + ' ' + str(s) + '\n') # numbers converted to str

    #f.write(f'{n} {s}\n') # using f strings


f.close()
```

# Appending files a

**Example:** Append (add a new entry to the end of) scores.txt so that the table reads

(Code structure identical to write, apart from mode specifier)

| | |
|---|---|
| Elena | 550 |
| Sajid | 480 |
| Tom | 380 |
| Farhad | 305 |
| Manesha | 150 |
| Jen | 100 |

In [348]:
```
f = open('sample_data/scores.txt', 'a')

f.write('Jen 100\n')

f.close()

```

# Reading Files `r`

(Default argument so mode specifier can be omitted.)

File object is:

- iterable (can use for loop etc)
- not subscriptable (cannot index individual elements)

In [349]:
```
f = open('sample_data/scores.txt', 'r')

#print(f[0])    # not subscriptable

for line in f:  # iterable
    print(line) # each line is a string
```

```
Elena 550

Sajid 480

Tom 380

Farhad 305

Manesha 150

Jen 100
```

**Example:**

Print the list of names and a list of scores from the file `'sample_data/scores.txt'`

Print the name and score of the winner from the file `scores.txt'`

In [351]:
```
f = open('sample_data/scores.txt', 'r')

file = list(f)                # convert to list of strings (line

print('winner: ', file[0])    # subscriptable (no need to return

f.close()
```

```
winner:  Elena 550
```

***Try it yourself***

**Example:**

Print the first three names and scores from the file you created earlier `'scores.txt'`

In [352]:
```
f = open('sample_data/scores.txt', 'r')

file = list(f)                # convert to list of strings (line

for line in file[:2]:
    print(line)

f.close()
```

```
Elena 550

Sajid 480
```

# Reading and Writing with `r+, w+, a+`

## a+

**Example**: When we want to edit (append only) and read.

The stream position is:

- at the *end* when opened (must be moved to the start to read).
- always moved to the *end* before writing when `write` is called (previous contents never overwritten).
- at the *end* after writing.

In [353]:
```
f = open('sample_data/scores.txt', 'a+')

f.write('Tim 50\nMajid 500\n')

f.seek(0)

for line in f:
    print(line, end='')

f.close()
```

```
Elena 550
Sajid 480
Tom 380
Farhad 305
Manesha 150
Jen 100
Tim 50
Majid 500
```

## r+

**Example**: When we want to read and edit.

The stream position is:

- at the *start* when opened
- at the *end* after reading

In [354]:
```
f = open('sample_data/scores.txt', 'r+')

for line in f:
    print(line, end='')

f.write('Ben 50\n')
f.write('Ola 500\n')

f.seek(0)

for line in f:
    print(line, end='')

f.close()
```

```
Elena 550
Sajid 480
Tom 380
Farhad 305
Manesha 150
Jen 100
Tim 50
Majid 500
Elena 550
Sajid 480
Tom 380
Farhad 305
Manesha 150
Jen 100
Tim 50
Majid 500
Ben 50
Ola 500
```

## w+

**Example**: When we want to overwrite file then read

The stream position is:

- at the *start* when opened (previous contents overwritten).
- at the *end* after writing (subsequent lines added using `write` will appended the file, not overwrite previous contents, until file is closed).

Writing *must* happen before reading.

In [355]:
```
f = open('sample_data/scores.txt', 'w+')

f.write('Tim 50\nMajid 500\n')

f.seek(0)

for line in f:
    print(line, end='')

f.write('Ola 500\n')

f.seek(0)

for line in f:
    print(line, end='')
```

```
Tim 50
Majid 500
Tim 50
Majid 500
Ola 500
```

**Example**: Edit the file to remove the unwanted line that reads `500` (between Jo and Ola).

The file can be erased from a position onwards with `truncate()`, (default position is current position)

In [357]:
```
f = open('sample_data/scores.txt', 'r+')

file = list(f)      # convert to list of strings (lines)

del file[2]         # remove element 2

print(file)

f.seek(0)           # go to start of file

for line in file:   # overwrite original file
    f.write(line)

f.truncate()        # remove trailing characters as new message

f.close()


```

```
['Sid 50\n', 'Jo 20\n', 'Ola 500\n']
```

In [358]:
```
f = open('sample_data/scores.txt', 'r+')

for line in f:                # read file contents
    print(line, end='')

f.close()
```

```
Sid 50
Jo 20
Ola 500
```

In [ ]:
```

```