VNIVERSITAT DE VALÈNCIA

STRUCTURES Laboratory

DATA AND ALGORITHMS

Degree in Data Science (1st)

Academic year 2023-24

Practice No. 3: Object-oriented programming (Classes)
Completion period: Week of**03/11 to 03/14/2023**

Work methodology

Phases	Guy	Dedication
1. Solve the tasks set out in this scriptbefore to start the face-to-face session in the laboratory.	No presential	Max. 4.5 hrs.
2. Solve a problem in the laboratorynew exercise based on the resolution of previous tasks.	In person	Max. 3 hrs.

Introduction

In this practice, a class that can be used in various programs must be completely defined. Before carrying out the laboratory session, the class indicated in the following exercise must be implemented, in accordance with the established requirements. During the laboratory session this class will be reused to solve a specific problem.

Exercises (Phase 1)

Homework 1

A class must be built to represent international airports registered in an open data system. A file "pr3_aeropuerto.py" must be written that includes the definition of a new data type Airport (Python class) that meets the following requirements:

Representation: The data of the typeAirportThey are characterized by the following information:

- **ID**: Numeric identifier of the airport (it is unique).
- **Name**: Name of the airport. It may or may not include the name of the city.
- **City**: Main city served by the airport.
- **Country**: Country or territory where the airport is located.
- **IATA**: 3 letter IATA code. "\"N"[1] if it does not have an assigned/known code. (https://es.wikipedia.org/wiki/C%C3%B3digo_de_aeropuertos_de_IATA)
- **ICAO**: ICAO code of 4 letters. "\"N"if it does not have an assigned/known code. (https://es.wikipedia.org/wiki/C%C3%B3digo_de_aeropuertos_de_OACI)
- **Latitude**: Decimal degrees. Negative is South, positive is North.

[1]The '\' character is interpreted in a special way by Python. In order to assign the string "\"N"to a variable it is necessary to write "\\N" (duplicate the '\' character).

- **Length**: Decimal degrees. Negative is West, positive is East.
- **Altitude**: Altitude in feet (1 foot = 30.48 cm).
- **Timezone**: Time zone. Displacement in hours with respect to the UTC (Coordinated Universal Time) reference. There may be shifting with decimals, e.g. India is 5.5. (https://es.wikipedia.org/wiki/Coordinated_universal_Time)
- **DST**: Summer schedule. Possible values: E (Europe), A (US/Canada), S (South America), O (Australia), Z (New Zealand), N (None) or U (Unknown/Unknown).

Operations: Data of this type can perform the following operations:

- Builder:You will need to construct a new object with default values for its attributes. All alphanumeric attributes will have the value "\"N"and all numeric attributes will have the value0 (zero).
- Operations to establish (modify) the value of each airport data, which will be called: **SetID**,**SetName**,**SetCity**,**SetCountry**,**SetIATA**,**SetICAO**,**SetLatitude**, **SetLength**, **SetAltitude**,**SetTimezone**,**SetDST**.
- Operations to obtain (query) the value of each airport data, which will be called: **GetID**,**GetName**,**GetCity**,**GetPais**,**GetIATA**,**GetICAO**,**GetLatitude**, **GetLength**, **GetAltitude**,**GetTimezone**,**GetDST**.
- str:Allows you to obtain a string format version of the attributes of an airport. The format must be the following:

  ID;Name;City;Country;IATA;ICAO;Latitude;Longitude;Altitude;Timezone;DST

Operations that modify some of the data of an airport must validate that the values to be modified are correct. This validation affects only three attributes with the following criteria:

- IATA: Must be a sequence of 3 uppercase letters or the value "\"N".
- ICAO: It must be a sequence of 4 capital letters or the value "\"N".
- DST: Must be one of the following possible values:E, A, S, O, Z, N, Uor the value "\"N".

The operations that modify the previous data of the object (the callsSet...)**No** They must modify the object if the input value is incorrect. These three operations will throw an exception of type RuntimeErrorin case of receiving an input value that does not meet the established requirements[2].

To carry out the data validation processes, 3 auxiliary (private) methods must be defined in class 3, which perform each of the required checks. These methods will be called:

```
def __ValidateIATA(s:str)->bool def
__ValidateICAO(s:int)->bool def
__ValidateDST(s:str)->bool
```

Each of these methods will have the value to be verified as an argument and will provide a logical result that will indicate whether the argument meets the requirement established in each case (*true*) or not (*False*).

[2]Use the sentence**raise**, as indicated in theory class.

To check that everything has been done correctly, run the file "pr3_test.py"and checks that the results provided correspond to those expected. If any data in the output does not match the reference, it is indicative that there is an error in the implementation.

Upon successful completion of the task, the file "pr3_airport.py"can be imported and the classAirportused with guarantees from other programs.

testing bench(expected output of the test program)

```
Practice 3 (2024). Airport Class Test

This file should not be modified,
must be executed to check the correct operation of the Airport class


@author: Jesus Albert
@date: 03/05/2024

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
 * * * * * * * * * * * * Airport Class Test Program
    This program must provide the results indicated in each test after all operations have
    been completed correctly and the relevant checks have been included.


* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* * * * * * * * * TEST 1. Default airport:

 0;\N;\N;\N;\N;\N;0.0;0.0;0.0;0.0;\N

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
* * * * * * * * TEST 2. Airport with correct values   assigned:

 1;Goroka Airport;Goroka;Papua New Guinea;GKA;AYGA;-6.081689835;145.3919983;5282.0;10.0;U

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
TEST 3. Airport with incorrect values   assigned (NOTHING should change):
       Correct: Exception detected when assigning values

 1;Goroka Airport;Goroka;Papua New Guinea;GKA;AYGA;-6.081689835;145.3919983;5282.0;10.0;U

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
TEST 4. Show airport values   using Get operations:

       Id: 1
       Name:      Goroka Airport
       City:      Goroka
       Country:   Papua New Guinea
       IATA:      GKA
       ICAO:      AYGA
       Latitude:     - 6.081689835
       length:        145.3919983
       Altitude:     5282.0
       Timezone:     10.0
       DST:U
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
END
```

Phase 2: Final task

Resolution of a new exercise proposed during the face-to-face session in the laboratory.