DT265 Programming Project Assignment:
Travelling **E**xecutive **S**alesperson **T**ravel **I**nventory **N**avigation **G**uide
(TESTING for short!)

Problem Statement

The sales manager for your company wants a program that will streamline the sales teams travel plans. He describes the problem to you as follows:

Each month, a salesperson needs to leave their home city and visit prospective customers in 4 other cities. These cities could be different each month. The sales manager wants to minimise the travel costs by choosing the most economic route between the cities for each sales person.

Rules

- The first airport is the home airport and the other 4 are destinations.
- Start and finish in first city. Visit each other city (at least) once
- There must be 5 days between trips so 7 trips in total can be done in one month
- Distance between airports calculated as great circle flight
- Cost of leg calculated in local currency of city.
- The cost for a given leg of a journey is calculated as the exchange rate of origin city airport versus the destination city airport) multiplied by the distance
- The best route is the cheapest option

Tasks

- Create a program that will allow a user to choose 5 airports.
- The program needs to read a file with a list of sales people and airports and write a file with the best routes calculated per sales person
- A graphic user interface to allow a sales person to input their routes and display the cost

Data

You will be provided with comma separates text files (csv files) containing a list of airports, a list of currencies and a list of exchange rates.

Assessment

Working implementation	
Basic version	30
With File Handling	10
With UI	10
Code style and efficiency	10
Class model structure	10
Error handling and exception handling	10
Comments	10
Tests	10
Total	**100**

Working Implementation

Basic version

If the program can take in 5 airports from a given list of 10 and give a correct price it is considered working.

With File Handling

If the program reads the airports and currency information from comma delimited files and uses a full airport and currency dataset and reads and writes input and output data it will be considered to have working file handling

With UI

If a user interface can take 5 airports as an input and display the cost it will be considered to have a UI.

Code style and efficiency

These marks will be awarded for laying the program out in a logical and efficient manner. This includes: efficient use of data structures (think for loops rather than repeated code), code reuse in functions and classes (breaking code up into logical chunks that keep code-blocks and files reasonable length i.e. no 1000 line files!), efficient storage and searching of data (think dictionaries)

Class Model Structure

Create classes that model the problem and abstract the main program from the underlying data structure. For example, the mainline code shouldn't need to understand anything about parsing a CSV file or calculating great circle distance or currency rates calculation. This means it should be apparent that you have you created classes that model the problem and assigned useful attributes and methods to the classes. The solution should define classes for holding data that will be used in the problem, e.g. there will need to be a class for `Currency` and `Airport`.

Errors and Exception Handling

How robust is your program to errors? Have you implemented error checking and exception handling, especially to handle unexpected user inputs or data?

E.g. do you have error handling to identify and warn if the wrong number of airports are contained in the input, or one or more of the airports is not a valid airport in your list?

Comments

Is all of your code well commented? Are the variable names and methods/functions meaningful?

Bonus marks

If you have completed the basic assignment but want to practice your coding and earn bonus marks you could

- have a map that displays the route it would be even nicer!
- A set of test classes to test run on and demo the program under a variety of valid and error conditions that will exercise your program and its exception handling

Example Input File:

"Alice","DUB","JFK","AAL","CDG","SYD"
"Bob","DUB","LHR","AMS","AAL","CDG"
"Tom","LHR","AMS","SFO","SIN","DUB"
"Jane","DUB","LHR","DUB","ARN","SIN"

Example Cities:

"JFK","John F Kennedy Intl","United States",40.639751,-73.778925
"AAL","Aalborg","Denmark",57.092789,9.849164
"CDG","Charles De Gaulle","France",49.012779,2.55
"SYD","Sydney Intl","Australia",-33.946111,151.177222
"LHR","Heathrow","United Kingdom",51.4775,-0.461389
"DUB","Dublin","Ireland",53.421333,-6.270075
"ARN","Arlanda","Sweden",59.651944,17.918611
"SIN","Changi Intl","Singapore",1.350189,103.994433
"AMS","Schiphol","Netherlands",52.308613,4.763889
"SFO","San Francisco Intl","United States",37.618972,-122.374889

Example Distances, Costs and Currency for Alice:

DUB JFK	Dist: 5103	Cost: 5103.03	Currency: Euro
DUB AAL	Dist: 1096	Cost: 1096.74	Currency: Euro
DUB CDG	Dist: 784	Cost: 784.97	Currency: Euro

DUB SYD	Dist: 17215	Cost: 17215.28	Currency: Euro
JFK DUB	Dist: 5103	Cost: 4841.75	Currency: US Dollar
JFK AAL	Dist: 5966	Cost: 5661.39	Currency: US Dollar
JFK CDG	Dist: 5833	Cost: 5534.97	Currency: US Dollar
JFK SYD	Dist: 16013	Cost: 15193.63	Currency: US Dollar
AAL DUB	Dist: 1096	Cost: 146.96	Currency: Danish Krone
AAL JFK	Dist: 5966	Cost: 799.56	Currency: Danish Krone
AAL CDG	Dist: 1021	Cost: 136.82	Currency: Danish Krone
AAL SYD	Dist: 16140	Cost: 2162.80	Currency: Danish Krone
CDG DUB	Dist: 784	Cost: 784.97	Currency: Euro
CDG JFK	Dist: 5833	Cost: 5833.66	Currency: Euro
CDG AAL	Dist: 1021	Cost: 1021.04	Currency: Euro
CDG SYD	Dist: 16944	Cost: 16944.34	Currency: Euro
SYD DUB	Dist: 17215	Cost: 12486.24	Currency: Australian Dollar
SYD JFK	Dist: 16013	Cost: 11614.61	Currency: Australian Dollar
SYD AAL	Dist: 16140	Cost: 11706.56	Currency: Australian Dollar
SYD CDG	Dist: 16944	Cost: 12289.73	Currency: Australian Dollar

So, it's cheaper to fly from Dublin (DUB) to New York (JFK) than JFK to DUB. But it is much cheaper to fly from Aalborg (AAL) to JFK and JFK to DUB. But AAL to SYD is the best saving so maybe that's the best route to use.