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Hitachi Consulting UK

.NET Coding Challenge (Transport)

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|  | 18/01/2010 |

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# Scenario

A shipping operator has a network of routes to various ports around the Atlantic Ocean. This network of routes is represented in the following diagram:

New York

Liverpool

Casablanca

Buenos Aires

Cape Town

Please note that the routes are one way (according to the direction of the arrow). The only journey with a direct return is the Liverpool – Casablanca route, as indicated by the two arrows. The journey times for the routes are as follows:

* Buenos Aires 🡪 New York = 6 days
* Buenos Aires 🡪 Casablanca = 5 days
* Buenos Aires 🡪 Cape Town = 4 days
* New York 🡪 Liverpool = 4 days
* Liverpool 🡪 Casablanca = 3 days
* Liverpool 🡪 Cape Town = 6 days
* Casablanca 🡪 Liverpool = 3 days
* Casablanca 🡪 Cape Town = 6 days
* Cape Town 🡪 New York = 8 days

The challenge is to produce a model (in code) that will answer the following questions:

* What is the total journey time for the following direct routes (your model should indicate if the journey is invalid):
  + - Buenos Aires 🡪 New York 🡪 Liverpool
    - Buenos Aires 🡪 Casablanca 🡪 Liverpool
    - Buenos Aires 🡪 Capetown 🡪 New York 🡪 Liverpool 🡪 Casablanca
    - Buenos Aires 🡪 Capetown 🡪 Casablanca
* Find the shortest journey time for the following routes:
  + - Buenos Aires 🡪 Liverpool
    - New York 🡪 New York
* Find the number of routes from Liverpool to Liverpool with a maximum number of 3 stops.
* Find the number of routes from Buenos Aires to Liverpool where exactly 4 stops are made.
* Find the number of routes from Liverpool to Liverpool where the journey time is less than or equal to 25 days.

# Requirements

Please read the following carefully:

* Create a class library to model the scenario and solve the problems.
* Your model/solution should be able to accept other network configurations.
* Create a set of unit tests (in a separate class library) to prove that your model works.
* For the class library implementing your solution you may only use features of the .NET Framework to solve the problem. Do not use any 3rd party libraries.
* For the class library implementing your unit tests you may use/reference any libraries you wish.
* Do not produce a graphical user interface (GUI) for your solution, please deliver only the two class libraries specified.
* C# is the preferred language at Hitachi Consulting though you can choose any .NET language to solve the problem.
* The solution should demonstrate good industry practice.

#### Change History

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| **Date** | **Name** | **Version** | **Change reference** |
| 07/02/2008 | Callum Hibbert | 1.0 |  |
| 18/01/2010 | Ant Seddon | 2.0 |  |

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