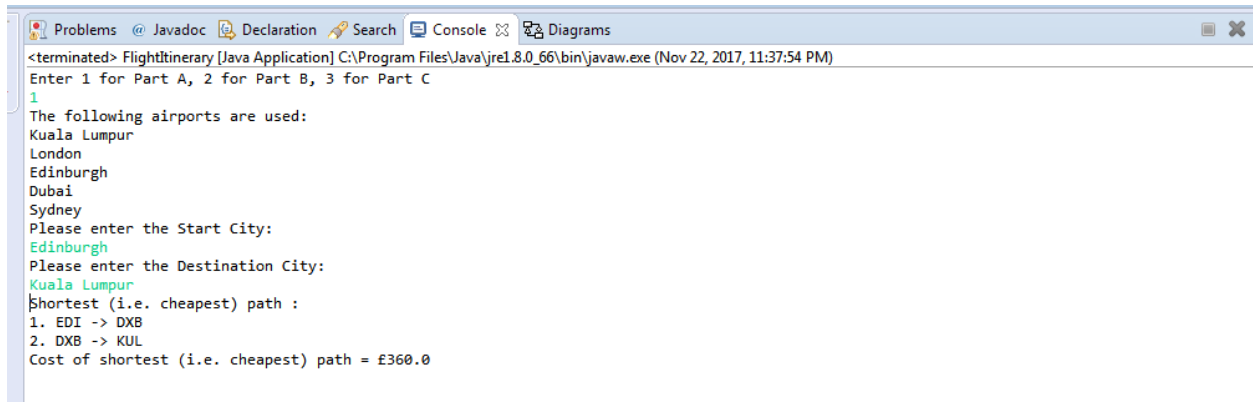


Flight Itinerary Report - F28DA_CW2 - Wang Wu

Part A

SimpleDirectedWeightedGraph was created with route cost as the edge weight. City name is taken as the input. The cheapest path is printed using DijkstraShortestPath.



```
<terminated> FlightItinerary [Java Application] C:\Program Files\Java\jre1.8.0_66\bin\javaw.exe (Nov 22, 2017, 11:37:54 PM)
Enter 1 for Part A, 2 for Part B, 3 for Part C
1
The following airports are used:
Kuala Lumpur
London
Edinburgh
Dubai
Sydney
Please enter the Start City:
Edinburgh
Please enter the Destination City:
Kuala Lumpur
Shortest (i.e. cheapest) path :
1. EDI -> DXB
2. DXB -> KUL
Cost of shortest (i.e. cheapest) path = £360.0
```

Part B

SimpleDirectedWeightedGraph is populated using the provided interfaces and the FlightsReader class and the datasets. The interfaces are implemented to print the itinerary in the required format. Least cost path is found using DijkstraShortestPath. Multiple airports can be there in a city (Eg: LGW,LHR etc in London). This has been handled in the below piece of code.

```
GraphPath<String, Route> leastCostPath = null;

// Handles for multiple airports in the same city
for(String startAirportCode:startAirports){
    for(String destinationAirportCode:destinationAirports){
        if(flightGraph.containsVertex(startAirportCode) && flightGraph.containsVertex(destinationAirportCode)){
            GraphPath<String, Route> path= DijkstraShortestPath.findPathBetween(flightGraph, startAirportCode, destinationAirportCode);
            if(path.getWeight()<leastCost)
            {
                leastCostPath = path;
                leastCost = (int)path.getWeight();
            }
        }
    }
}

if(leastCostPath==null)
```

```

Freetown
Faro
Please enter the Start City:
Edinburgh
Please enter the Destination City:
Toronto
Itinerary for Edinburgh to Toronto
Leg Leave At On Arrive At
1 Edinburgh 1626 BA5985 London 1709
2 London 0413 BA1422 Toronto 1043
Total Journey Cost = £418
Total Time in the Air = 433

```

Part C

```

Faro
Enter a suitable option:
1 for Least Cost Itinerary
2 for Itinerary with Least Number of Changeovers
3 for Meet up city (Least cost) for 2 people starting from 2 different airports
4 for Meet up city (Least Changeovers) for 2 people starting from 2 different airports
5 for Meet up city (Least Time) for 2 people starting from 2 different airports from a given starting time

```

1. Path with least number of changeovers was found by creating a `AsUnweightedDirectedGraph` from the `SimpleDirectedWeightedGraph` (i.e. all the weights will be the same). Hence, `DijkstraShortestPath` on this `AsUnweightedDirectedGraph` will give the path with least number of hops (changeovers).

```

Faro
Enter a suitable option:
1 for Least Cost Itinerary
2 for Itinerary with Least Number of Changeovers
3 for Meet up city (Least cost) for 2 people starting from 2 different airports
4 for Meet up city (Least Changeovers) for 2 people starting from 2 different airports
5 for Meet up city (Least Time) for 2 people starting from 2 different airports from a given starting time
2
Do you want to exclude any airports in the search? [y/n]
n
Please enter the Start City:
Toronto
Please enter the Destination City:
New York
Itinerary for Toronto to New York
Leg Leave At On Arrive At
1 Toronto 1106 EK2442 Dubai 2342
2 Dubai 0218 EK6360 New York 1541
Total Journey Cost = £1233
Total Time in the Air = 1559

```

2. Least path after excluding 1 or more airport was done by removing the vertices from the `SimpleDirectedWeightedGraph` and following the same

procedure as above.

```

Enter a suitable option:
1 for Least Cost Itinerary
2 for Itinerary with Least Number of Changeovers
3 for Meet up city (Least cost) for 2 people starting from 2 different airports
4 for Meet up city (Least Changeovers) for 2 people starting from 2 different airports
5 for Meet up city (Least Time) for 2 people starting from 2 different airports from a given starting time
2
Do you want to exclude any airports in the search? [y/n]
y
Enter the list of airports[3-letter airport code] you want to exclude seperated by a space and press Enter
DXB KUL
Please enter the Start City:
Toronto
Please enter the Destination City:
New York
Itinerary for Toronto to New York
Leg Leave      At On      Arrive      At
1 Toronto      0011 BA5100 London      0641
2 London       0024 BA8819 New York    0607
Total Journey Cost = £703
Total Time in the Air = 733

```

3. Least cost and least hop meet-up place was computed by calculating the cost of traversing from either airport to all other airports in the graph. And calculated the least sum of the costs to reach any airport.

```

raro
Enter a suitable option:
1 for Least Cost Itinerary
2 for Itinerary with Least Number of Changeovers
3 for Meet up city (Least cost) for 2 people starting from 2 different airports
4 for Meet up city (Least Changeovers) for 2 people starting from 2 different airports
5 for Meet up city (Least Time) for 2 people starting from 2 different airports from a given starting time
3
Please enter the Airport Code[3 letter code] of Person 1:
DEN
Please enter the Airport Code[3 letter code] of Person 2:
DXB
Least Cost Meet Up city for two people starting from DEN and DXB is London (LHR)

```

4. Least time to a meet-up place was computed by using AllDirectedPaths class from JGraphT library, which will give all the paths between two vertices. To reduce time complexity, we are keeping the path length at 4. Now, we compute similar to the above method, but also keeping in mind the start time. (Note: if start time is greater than the path's departure time from source, then we compute the time of path's departure time of next day).

```

Enter a suitable option:
1 for Least Cost Itinerary
2 for Itinerary with Least Number of Changeovers
3 for Meet up city (Least cost) for 2 people starting from 2 different airports
4 for Meet up city (Least Changeovers) for 2 people starting from 2 different airports
5 for Meet up city (Least Time) for 2 people starting from 2 different airports from a given starting time
5
Please enter the Airport Code[3 letter code] of Person 1:
AUH
Please enter the Airport Code[3 letter code] of Person 2:
MAA
Please enter the starting time in hhmm format:
0200
Least Time Meet Up city for two people starting from AUH and MAA starting at 0200 is Madras (MAA)

```

```
Enter a suitable option:
1 for Least Cost Itinerary
2 for Itinerary with Least Number of Changeovers
3 for Meet up city (Least cost) for 2 people starting from 2 different airports
4 for Meet up city (Least Changeovers) for 2 people starting from 2 different airports
5 for Meet up city (Least Time) for 2 people starting from 2 different airports from a given starting time
5
Please enter the Airport Code[3 letter code] of Person 1:
AUH
Please enter the Airport Code[3 letter code] of Person 2:
MAA
Please enter the starting time in hhmm format:
1538
Least Time Meet Up city for two people starting from AUH and MAA starting at 1538 is Muscat (MCT)
```

```
Enter a suitable option:
1 for Least Cost Itinerary
2 for Itinerary with Least Number of Changeovers
3 for Meet up city (Least cost) for 2 people starting from 2 different airports
4 for Meet up city (Least Changeovers) for 2 people starting from 2 different airports
5 for Meet up city (Least Time) for 2 people starting from 2 different airports from a given starting time
5
Please enter the Airport Code[3 letter code] of Person 1:
AUH
Please enter the Airport Code[3 letter code] of Person 2:
MAA
Please enter the starting time in hhmm format:
1233
Least Time Meet Up city for two people starting from AUH and MAA starting at 1233 is London (LHR)
```