



Dhirubhai Ambani Institute of Information &  
Communication Technology

## **IT314-Software Engineering Lab4-Class Modeling**

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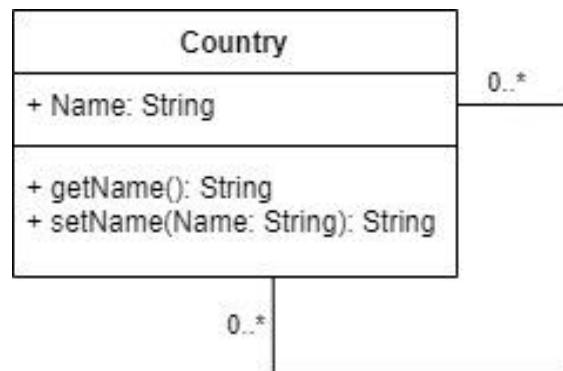
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**Q.1 Prepare a class diagram for the following object diagram that shows a portion of Europe.**



Figure-1

- **Class Diagram:**



**Q.2 Prepare a class diagram for object diagram given in Figure-2. Explain your multiplicity decisions. What is the smallest number of points required to construct a polygon? Does it make a difference whether or not point may be shared between polygons? Your answer should address the fact that points are ordered.**

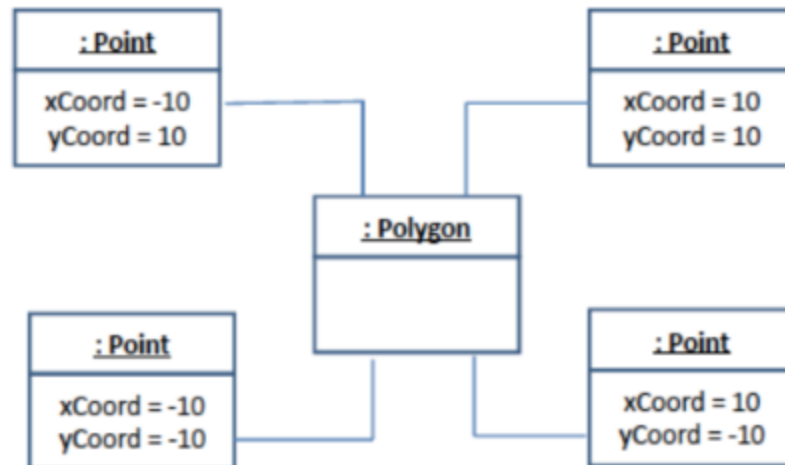


Figure - 2

- **Class Diagram:**



## Explanation of Multiplicity:

- **Polygon to Point:**
  - A polygon has at least 3 points.
  - A point can belong to multiple polygons (many-to-many relationship).
  - Hence, Multiplicity is 3..\*.
- **Ordered Points:**
  - The relationship between Polygon and Point is ordered, meaning the order of the points matters when forming the shape.

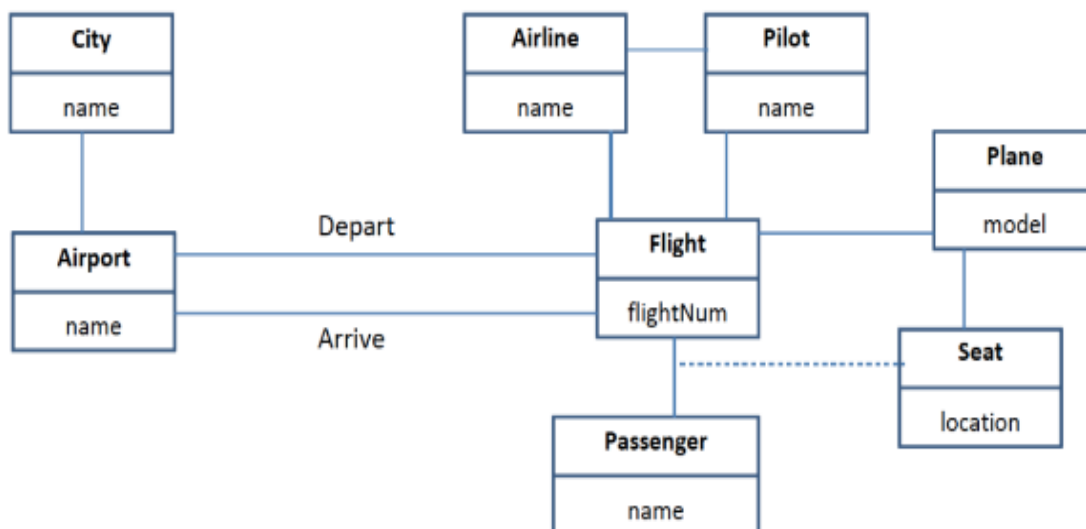
### Smallest Number of Points:

- The smallest number of points required to construct a polygon is 3, as a polygon needs at least three vertices to form a closed shape (a triangle).

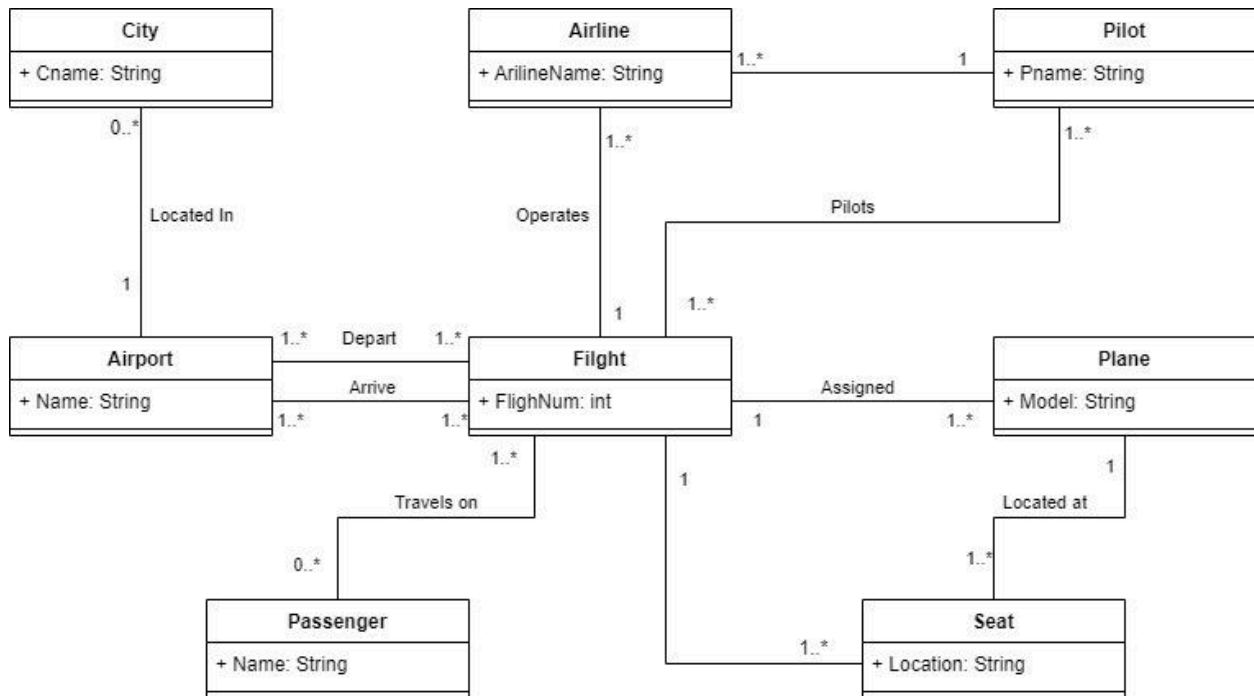
### Sharing Points Between Polygons:

- Yes, points can be shared between polygons (e.g., neighboring polygons on a mesh or grid may share vertices). This does not affect the validity of the polygon, but it may impact the specific shape depending on how points are shared and ordered.

**Q.3** Figure 3 is a partially completed class diagram of an air transportation system. Add multiplicities in the diagram. Also add association names to unlevelled associations.



- **Class Diagram:**



**Q.4 We want to model a system for management of flights and pilots. An airline operates flights. Each airline has an ID. Each flight has an ID a departure airport and an arrival airport: an airport as a unique identifier. Each flight has a pilot and a co-pilot, and it uses an aircraft of a certain type; a flight has also a departure time and an arrival time. An airline owns a set of aircrafts of different types. An aircraft can be in a working state or it can be under repair. In a particular moment an aircraft can be landed or airborne. A company has a set of pilots: each pilot has an experience level: 1 is minimum, 3 is maximum. A type of aeroplane may need a particular number of pilots, with a different role (e.g.: captain, co-pilot, navigator): there must be at least one captain and one co-pilot, and a captain must have a level 3.**

- **Class Diagram:**

