IT314 - Software Engineering

LAB 4 : Class Diagram

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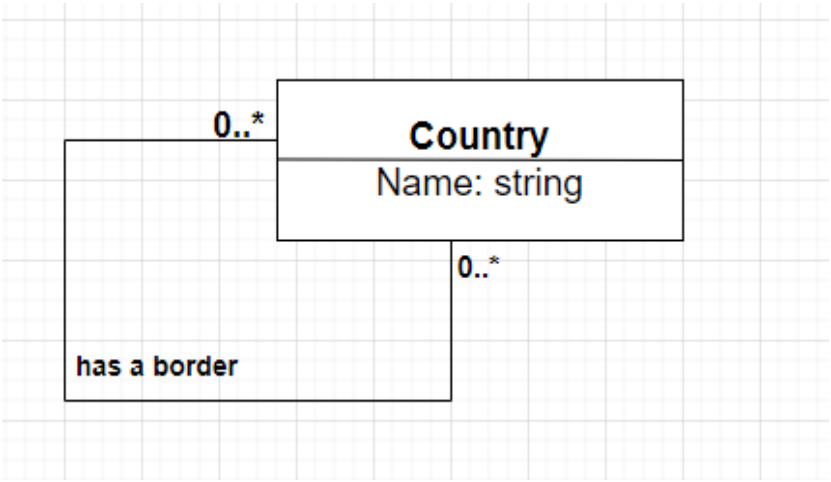
Q: 1)

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

Figure-1

➔



Q: 2)

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.

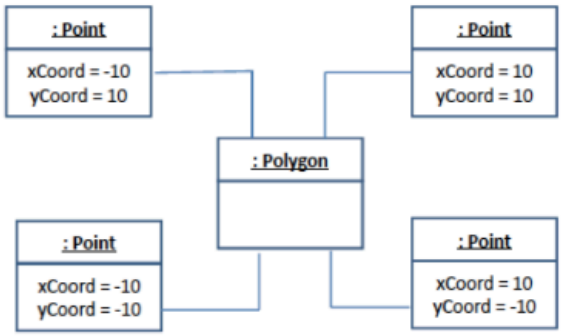


Figure - 2

- **Polygon**: Represents a geometric figure composed of multiple points.
- **Point**: Represents a coordinate in 2D space.

➔ There is an association between the **Polygon** and **Point** classes. - The association is such that a `Polygon` is made up of multiple `Point` objects

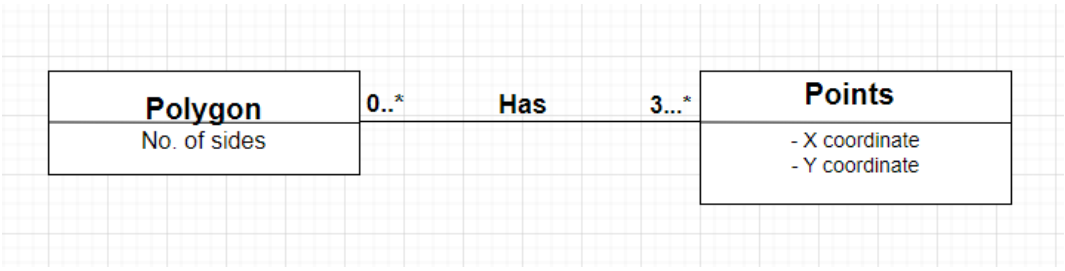
➔ **Polygon to Point Multiplicity:** A Polygon must have at least three `Point` objects (minimum multiplicity of 3) to be considered a valid geometric figure. The upper limit of points is unbounded (`*`).

➔ **Point to Polygon Multiplicity:** Each Point can belong to zero or more (`0..*`) polygons. This is because points can be shared between different polygons.

➔ The smallest number of points required to construct a polygon is 3, as a minimum of three points is necessary to create a closed geometric figure.

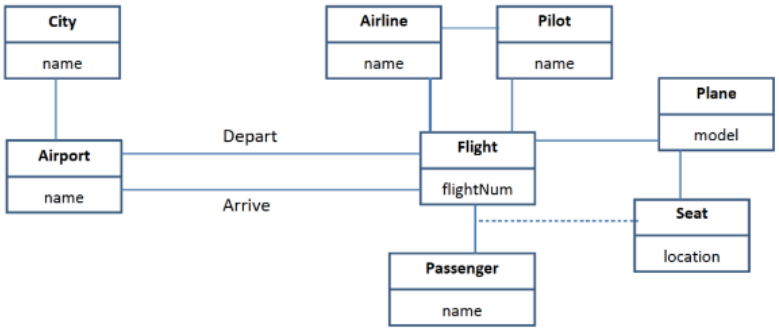
➔ If points are shared between polygons, then the same `Point` instance can be associated with multiple Polygon objects, allowing for complex geometric structures where multiple polygons intersect or overlap.

➔



Q : 3)

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.



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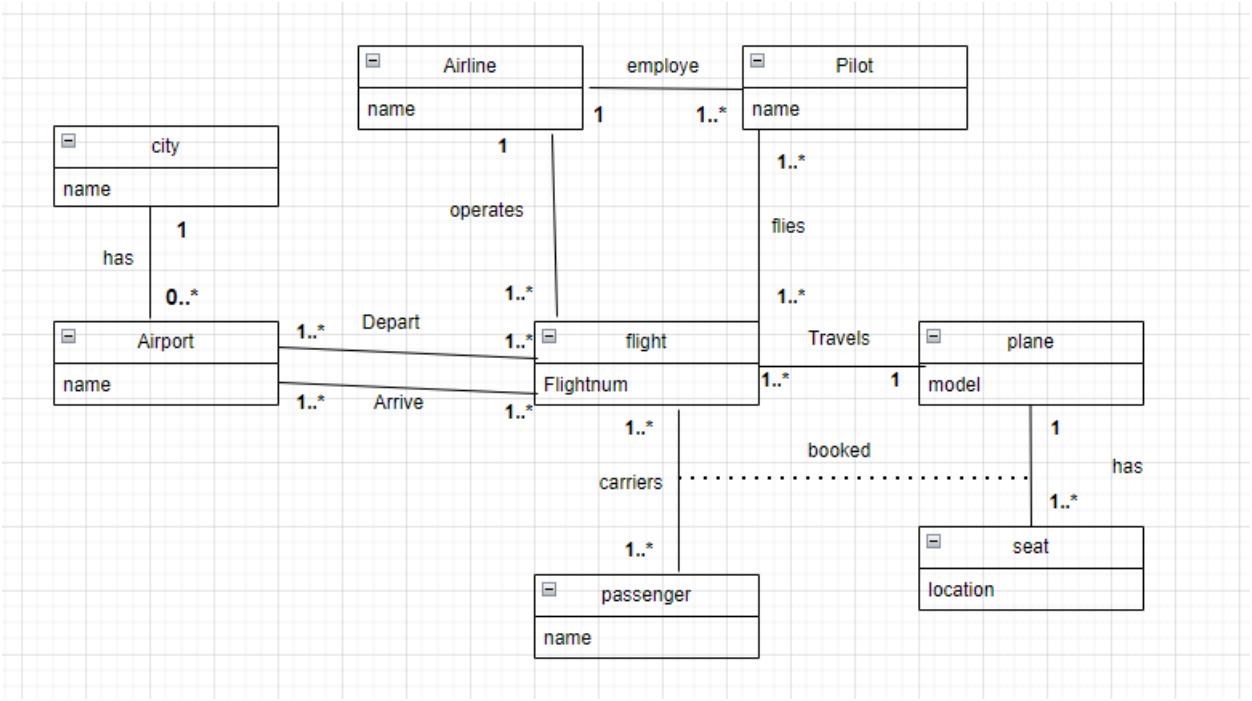

Q.4 We want to model a system for management of flights and pilots. An airline operates flights. Each airline has an ID. Each flight has an ID a departure airport and an arrival airport: an airport as a unique identifier. Each flight has a pilot and a co-pilot, and it uses an aircraft of a certain type; 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.

➔