IT314 : Software Engineering
Lab - 4 : Class Modeling

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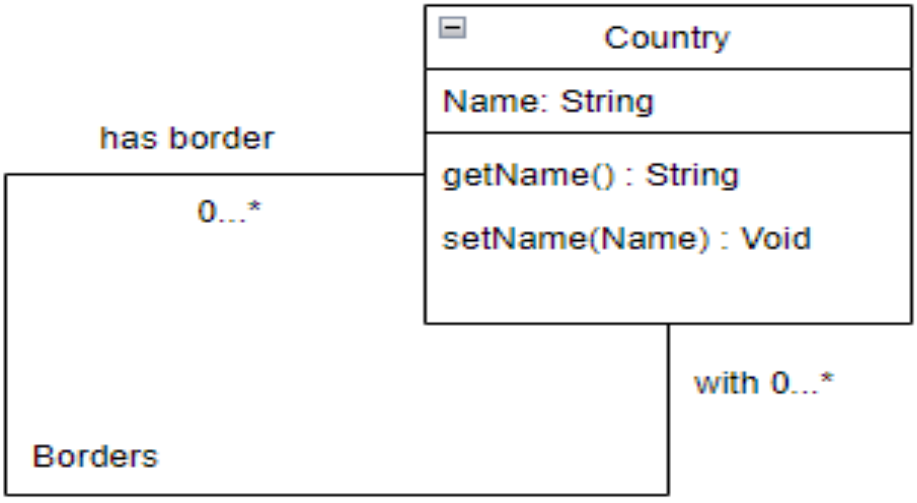
Q.1 Prepare a class diagram for the following object diagram that shows a portion of Europe.

Answer :



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 difference whether or not point may be shared between polygons? Your answer should address the fact that points are ordered.

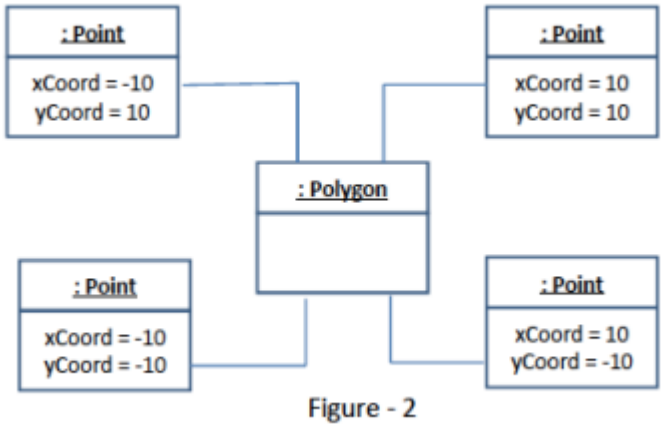


Figure - 2

Answer :

(1) Smallest Number of Points Required to Construct a Polygon

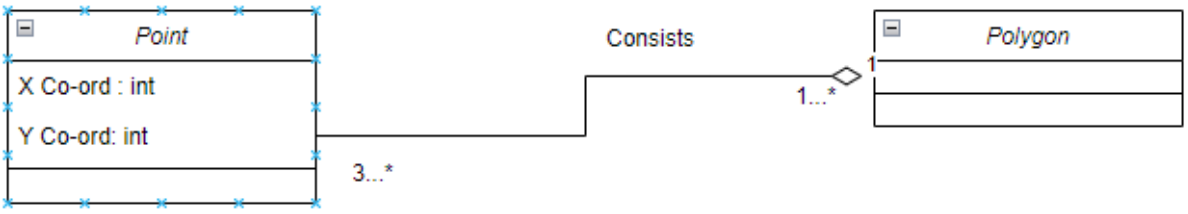
- To construct a polygon, the smallest number of points required is 3. This is because a polygon is defined as a closed shape with at least three sides.
- Triangle is the simplest polygon and has exactly 3 points.

(2) Sharing Points Between Polygons

- **If points are shared :** Sharing points between polygons doesn't change the minimum number of points needed to

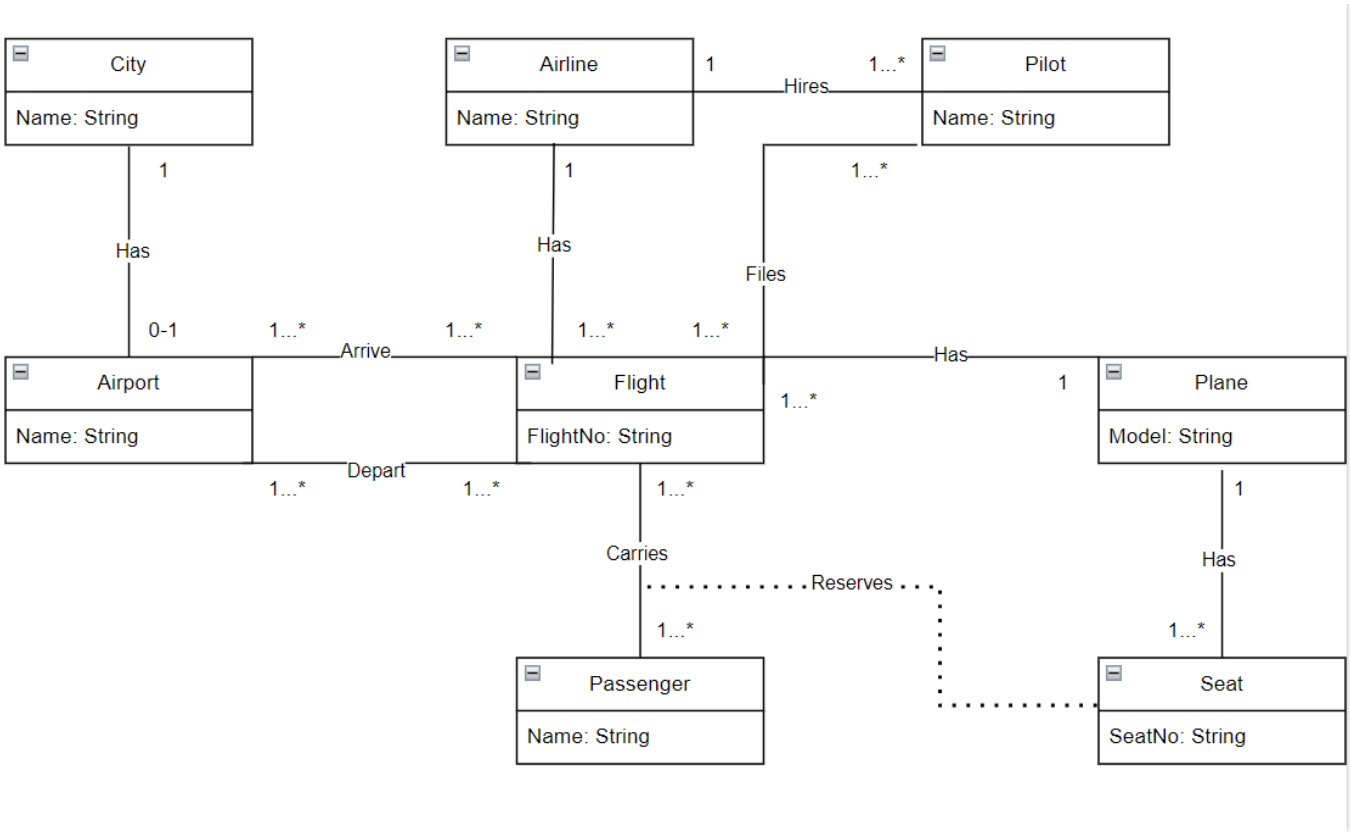
form a polygon. Each individual polygon still requires at least 3 unique points to be defined, but those points can be shared among multiple polygons.

- **If points are not shared** : If points cannot be shared between polygons, each polygon must have its own set of at least 3 distinct points.
- **Ordered Points :** In both cases, points are typically ordered to define the sequence in which they connect to form edges. For instance, a triangle is defined by an ordered triplet of points.



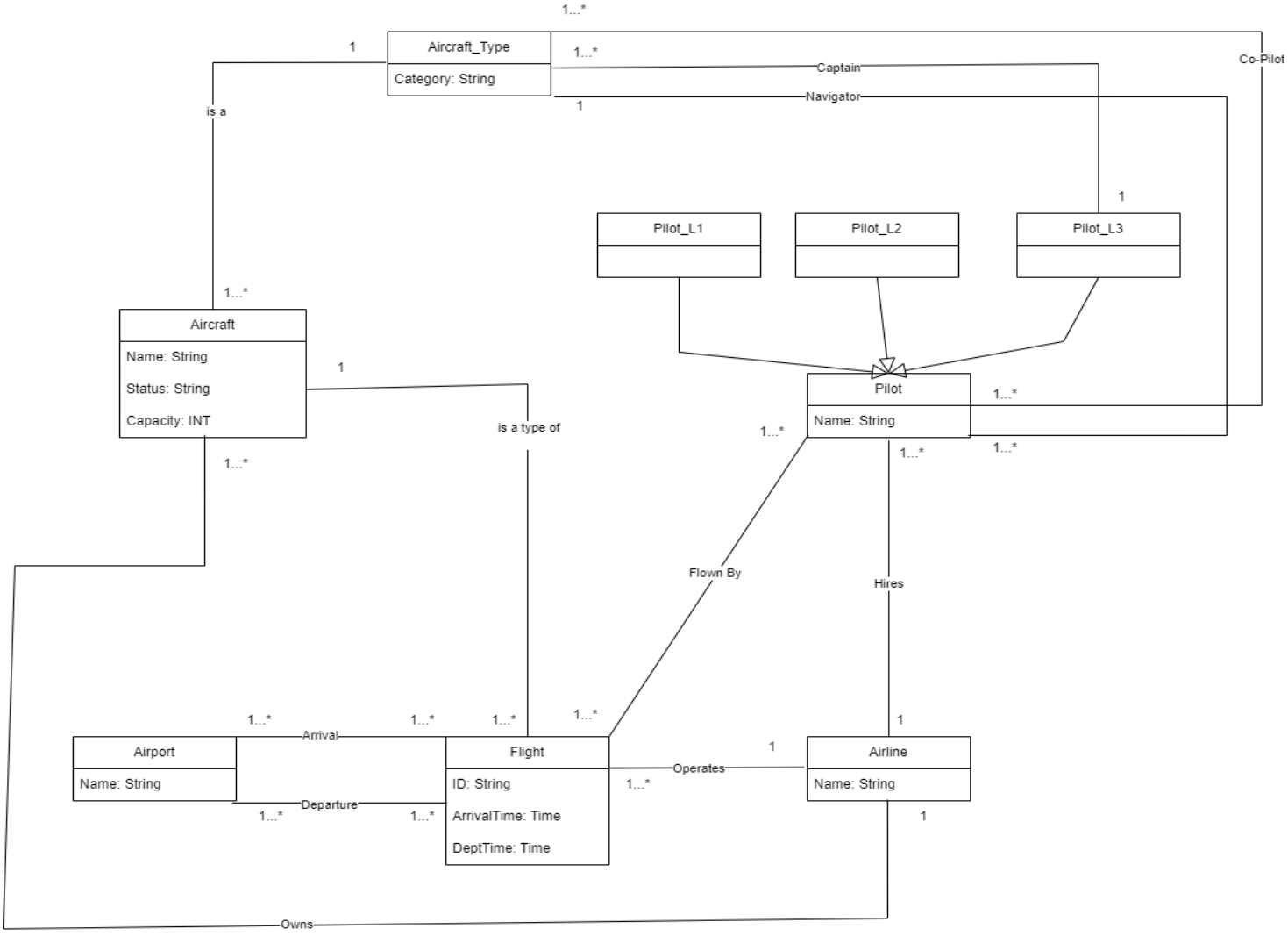
Q.3 Figure 3 is a partially completed class diagram of an air transportation system. Add multiplicities in the diagram. Also add association names to unlevelled associations.

Answer :



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.

Answer :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Navigator
Co-Pilot
is a
Pilot_L1
Pilot_L2
Pilot_L3
Aircraft
Name: String
Status: String
Capacity: INT
is a type of
Pilot
Name: String
Flown By
Hires
Airport
Name: String
Arrival
Departure
Flight
ID: String
ArrivalTime: Time
DeptTime: Time
Operates
Airline
Name: String
Owns