IT314

Lab 4

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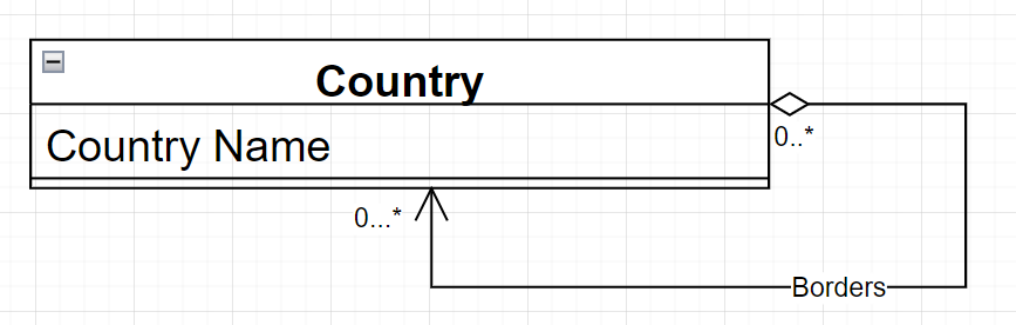
Q.1 Prepare a class diagram for the following object diagram that shows a portion of Europe.

Figure-1

Ans1:



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 points may be shared between polygons? Your answer should address the fact that points are ordered.

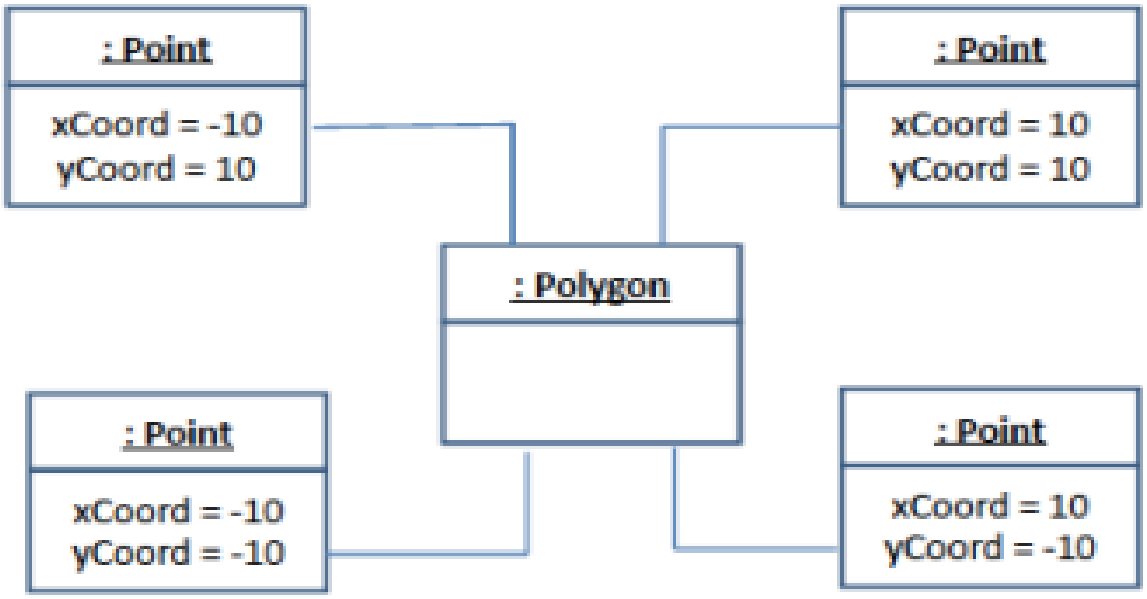
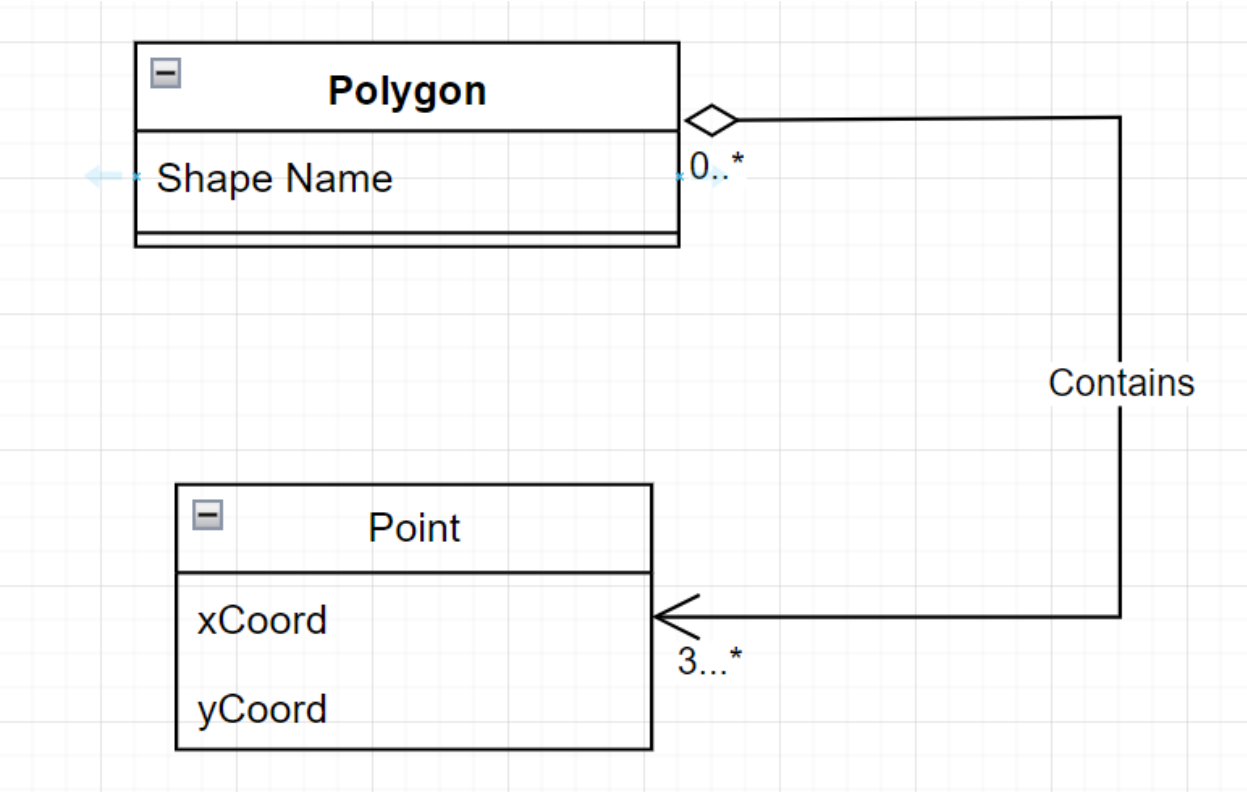


Figure - 2

Ans2:



Polygon-Point Relationship:

The association between the **Polygon** and **Point** is depicted with a multiplicity of `3...*` on the **Point** side and `0...*` on the **Polygon** side. This relationship is labeled as "Contains," meaning a **Polygon** contains multiple points.

Explanation:

A **Polygon** requires **at least 3 points** to form a valid shape. Hence, the multiplicity on the **Point** side is `3..*`, indicating that a polygon can have three or more points.
The multiplicity of `0...*` on the **Polygon** side indicates that a **Point** can either not belong to any polygon (in case of isolated points) or can be shared across multiple polygons. This allows for **shared**

points between polygons, which can be useful in cases where polygons have overlapping vertices.

Smallest Number of Points for a Polygon:

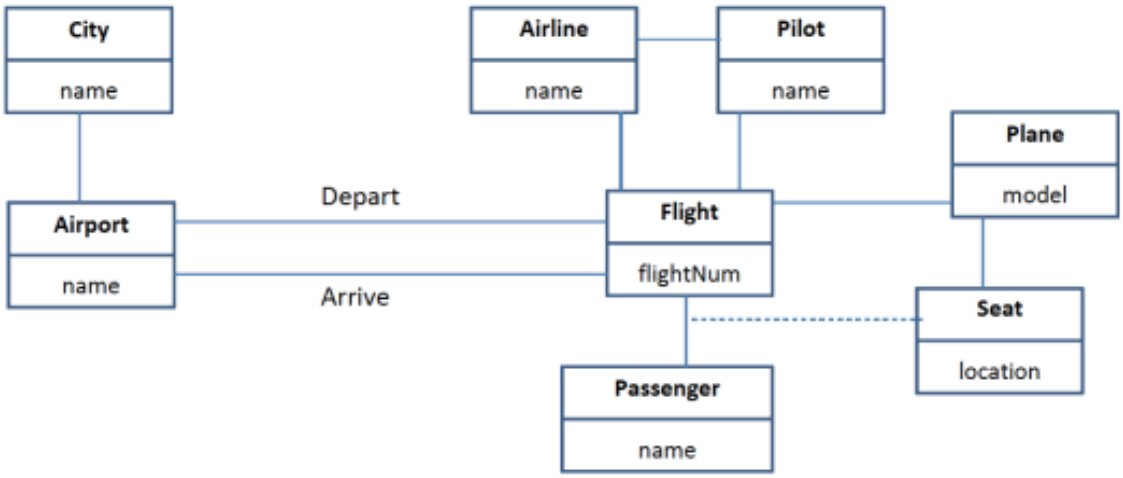
At least 3 points are required to construct a polygon. A shape with fewer than 3 points does not define a closed boundary and thus is not a valid polygon.

Impact of Shared Points:

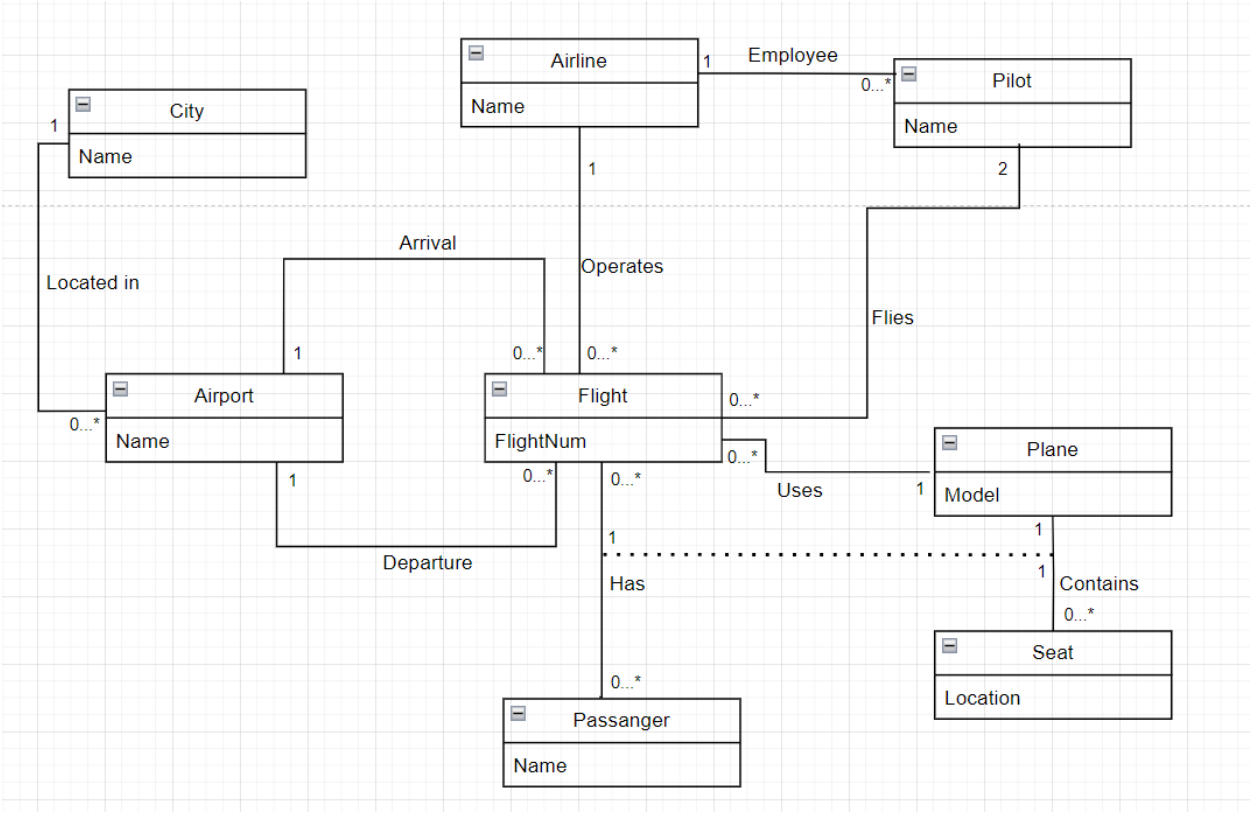
No, it doesn't matter if the Points are shared between the polygons.

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.

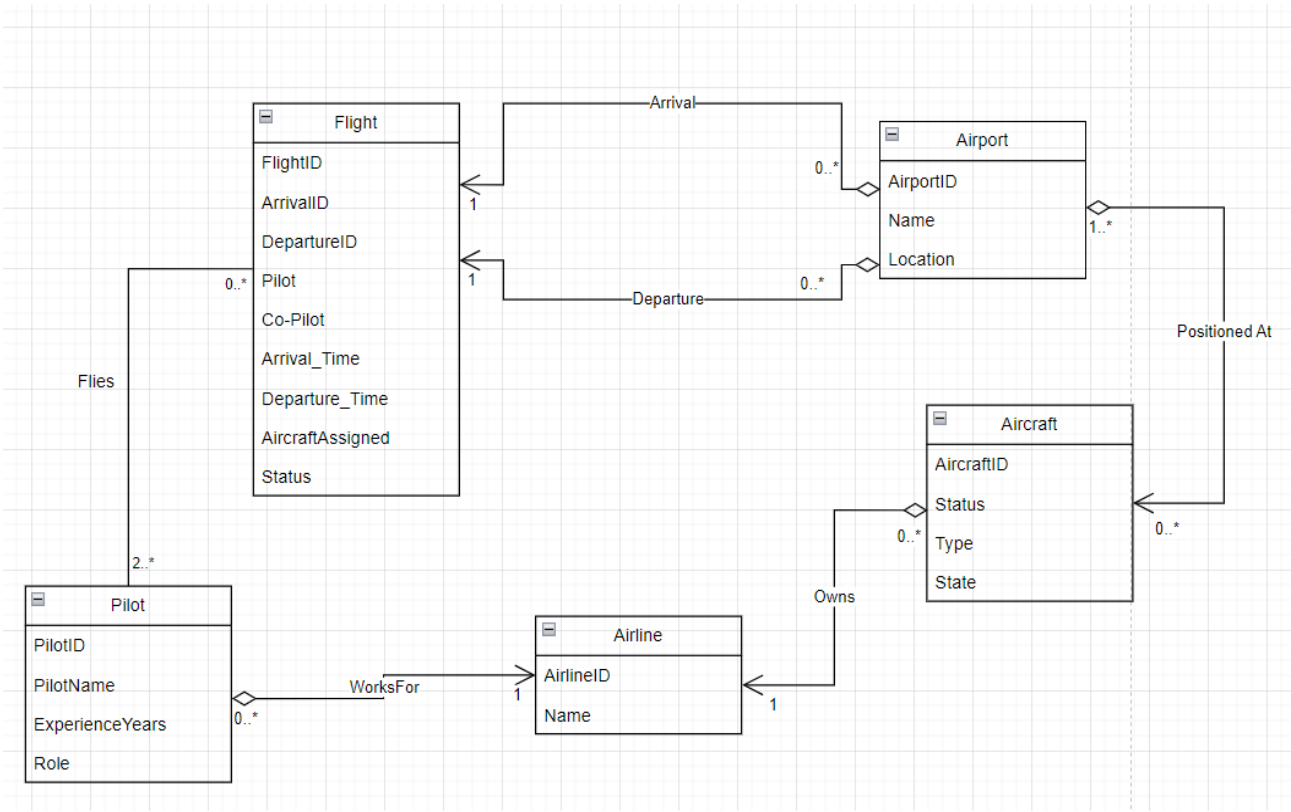


Ans3



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 departure time and arrival time. An airline owns a set of aircraft 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.

Ans4:


Flight
FlightID
ArrivalID
DepartureID
Pilot
Co-Pilot
Arrival_Time
Departure_Time
AircraftAssigned
Status
Arrival
Departure
Airport
AirportID
Name
Location
Positioned At
Aircraft
AircraftID
Status
Type
State
Flies
Pilot
PilotID
PilotName
ExperienceYears
Role
WorksFor
Airline
AirlineID
Name
Owns
0..*
1
1..*
2..*