Subject: Software Engineering

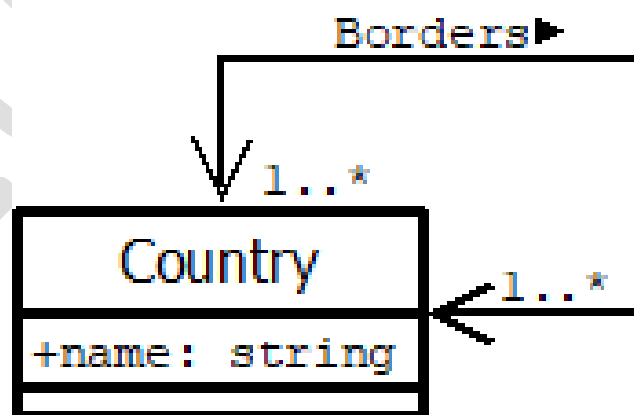**Subject code: IT 314**

Lab 4

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Topic:- Class Modeling

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

Q.2 Prepare a class diagram for the object diagram given in Figure -2. Explain your multiplicity decisions.
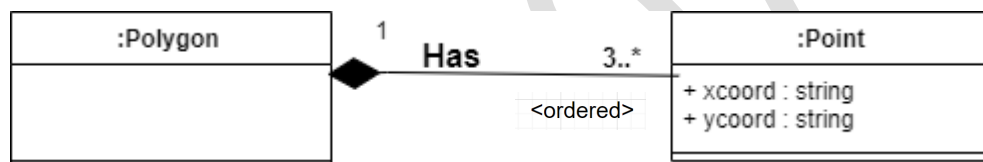
What is the smallest number of points required to construct a polygon? Does it make a difference

whether or not points may be shared between polygons? Your answer should address the fact that

points are ordered.

Ans:-

Class Diagram:

Here We consider the Fact that we need to have **at least 3 points** for the making of the polygon.

Here all we need to ensure that is **points must be in order.** Because if we change the order of the point it may not construct a polygon.

Yes, sharing points between polygons affects their graphical representation, but the order of points within each polygon remains crucial for defining their shape accurately. The order determines the polygon's shape, regardless of shared vertices.

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.
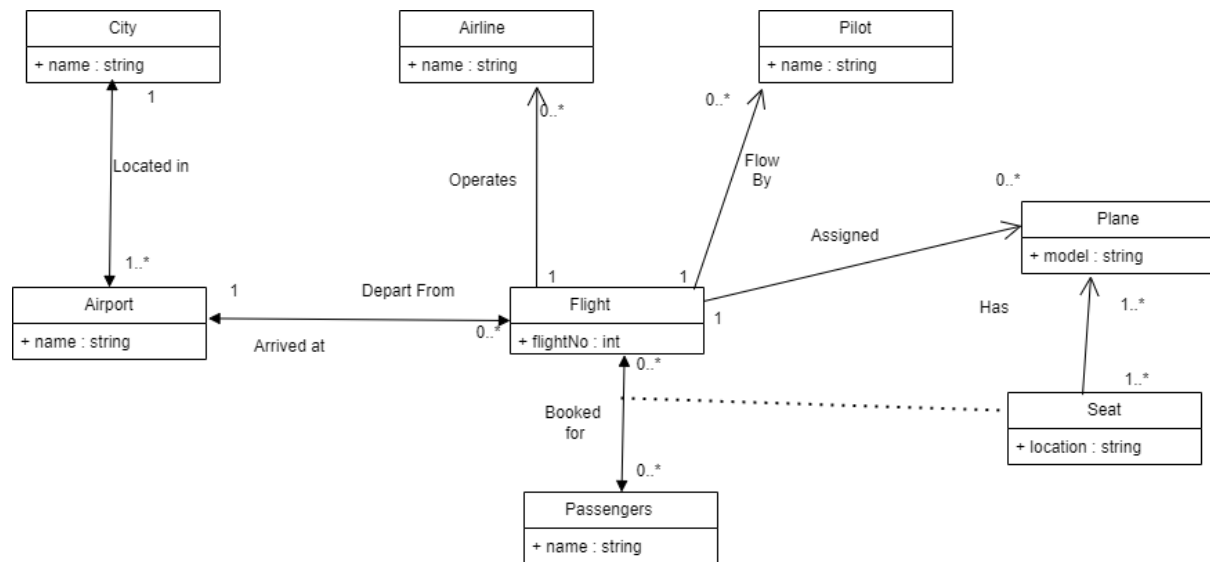
Assumptions:

1. City - Airport

- A city can have multiple airports.
- An airport is located in exactly one city.

2. Airport - Flight (Depart)

- An airport can be the departure point for many flights.
- A flight departs from exactly one airport.

3. Airport - Flight (Arrive)

- An airport can be the arrival point for many flights.
- A flight arrives at exactly one airport.

4. Airline - Flight

- An airline operates many flights.
- A flight is operated by exactly one airline.

5. Flight - Passenger

- A flight can have many passengers.
- A passenger can be booked on multiple flights.

6. Flight - Pilot

- A pilot can fly multiple flights.
- A flight is flown by one pilot.

7. Flight - Plane

- A plane can be assigned to multiple flights over time.
- A flight is assigned to one plane.

8. Plane - Seat

- A plane has many seats.
- A seat belongs to exactly one plane.

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.

Ans: