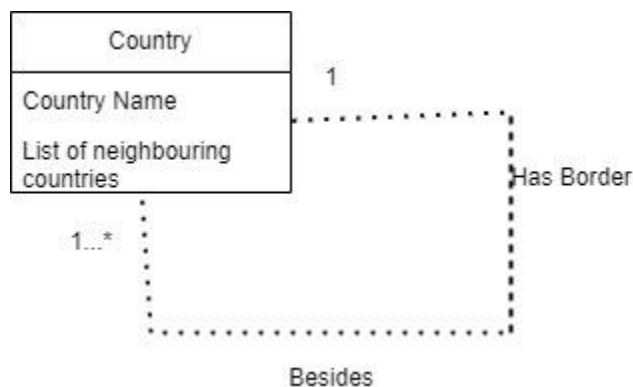# IT - 314 Software Engineering

Lab - 4

Student Name : Harsh Bosamiya
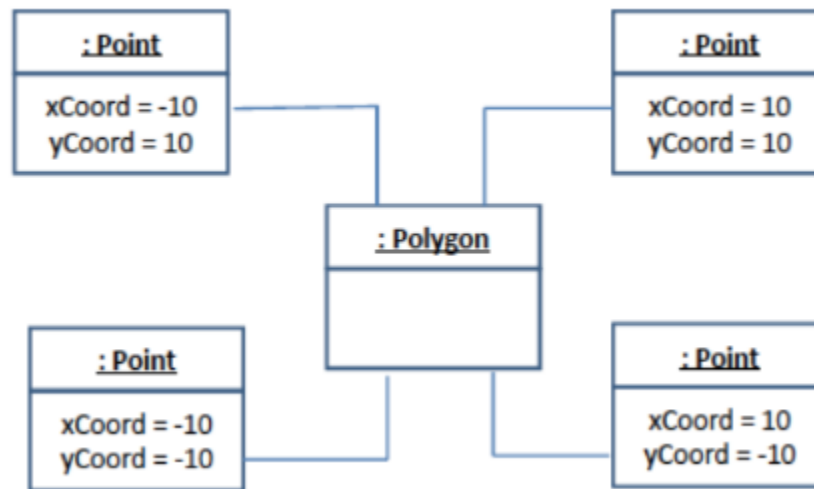
Student ID : 202201243

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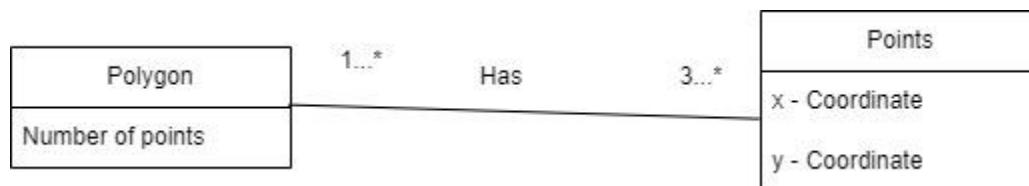

Solution :

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.

: Point
xCoord = -10   yCoord = 10

: Point
xCoord = 10   yCoord = 10

: Polygon

: Point
xCoord = -10   yCoord = -10

: Point
xCoord = 10   yCoord = -10

Solution:

Polygon
Number of points

1...*   Has   3...*

| Points |
| --- |
| x - Coordinate |
| y - Coordinate |

1) **Smallest Number of Points required to construct a polygon**

❖ The smallest number of points required to construct a polygon is 3. This is because according to the definition of polygon it is defined as " a closed shape which has at least three sides".

❖ The simplest polygon is triangle and it has 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. This is because each individual polygon still requires minimum 3 unique points to be defined, but those points can be shared among multiple polygons.
- ❖ **If points are not shared :** If points can't be shared between polygons, each polygon must have its own set of at minimum 3 distinct points.
- ❖ **Ordered Points :** In both cases, points are typically ordered to define the sequence in which they connect to form edges. For example, a triangle is defined as 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.
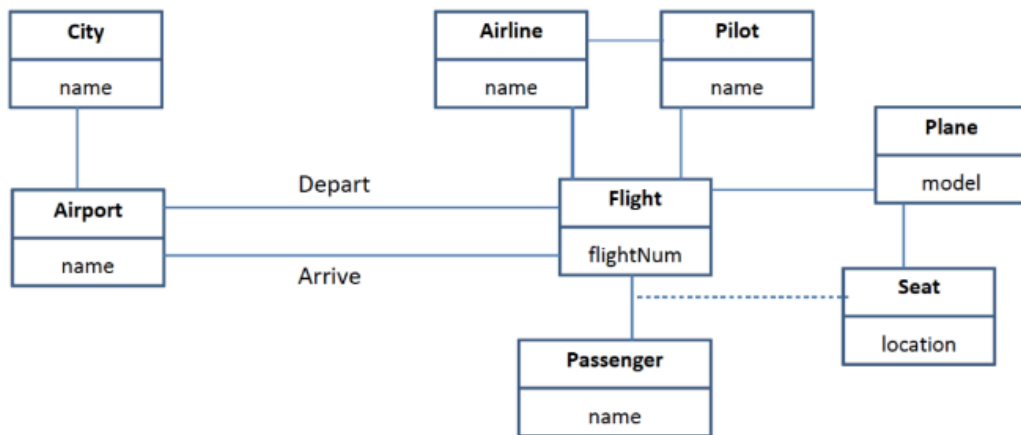
Solution :
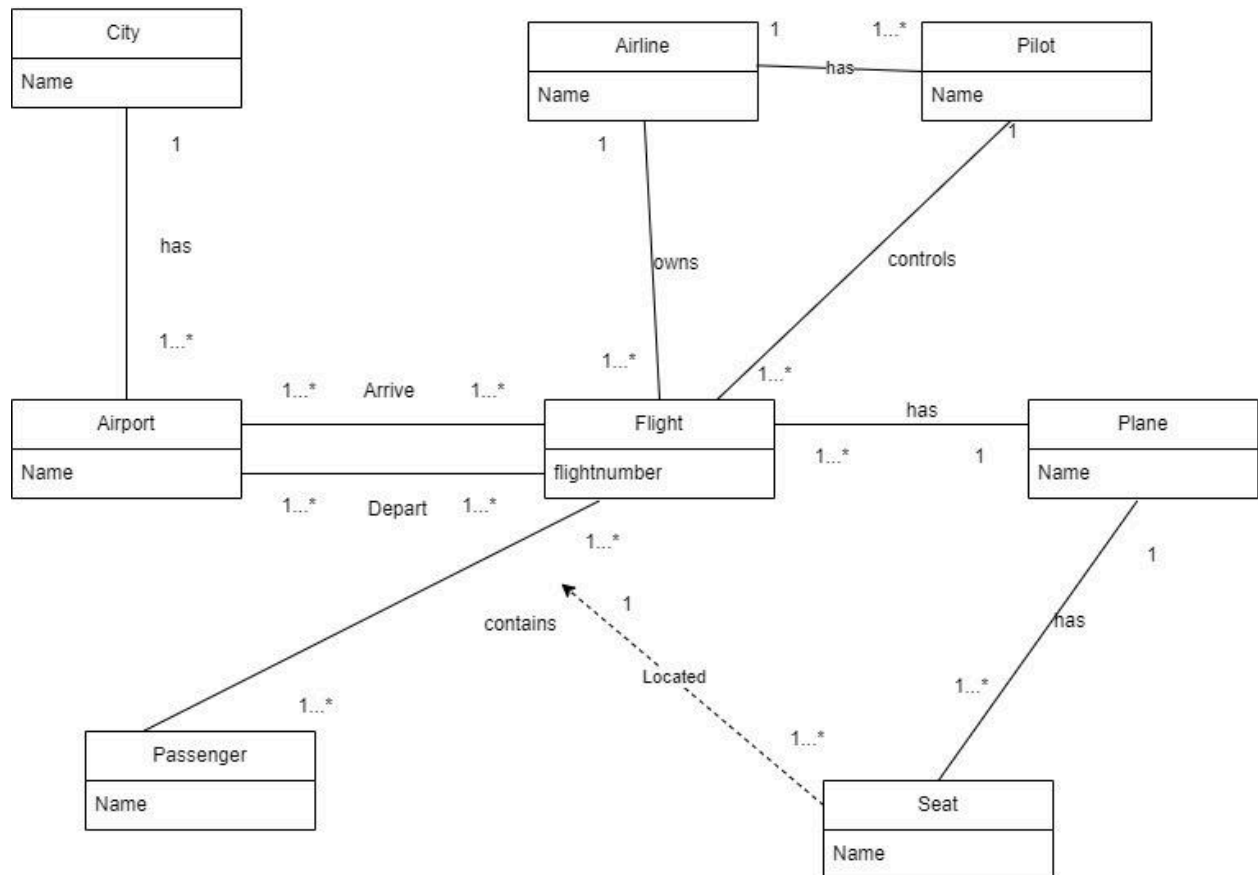
Q.4. We want to model a system for management of flights and pilots. An airline operates flights. Each airline has an ID. Each flight has an ID a departure airport and an arrival airport: an airport as a unique identifier. Each flight has a pilot and a co-pilot, and it uses an aircraft of a certain type; 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.

Solution :

Aircraft_Type

Category : String

1...* — CoPilot
1...* — Captain
1 — Navigator

1

is a

1...*

Pilot
_L_1

Pilot_L_2

Pilot_L_3

1

Aircraft

Name : String

Status : String

Capacity : Integer

1 — is a type of

Pilot

Name : String

1...*

1...*

1...*

1...*

1...*

FlownBy

Hires

Owns

1...*

Airport

Name : String

1...* — 1...*
Arrival
Departure

1...* — 1...*

Flight

ID : String

ArrivalTime : Time

DepartureTime : Time

1...*

Operates

1...*

1

Airline

Name : String

1

1