Dhirubhai Ambani
Institute of Information & Communication Technology

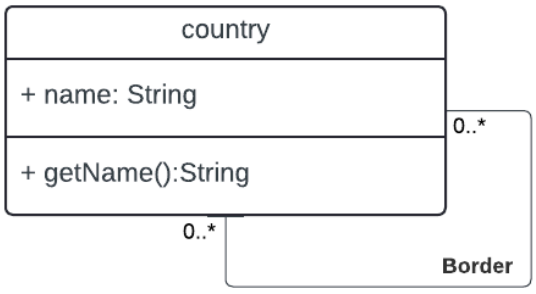
IT-314 Software Engineering
Instructor: Prof. Saurabh Tiwari

Lab 04: Class Diagram
Divyarajsinh Chundavat - 202201155

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

Figure-1

Diagram:



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.

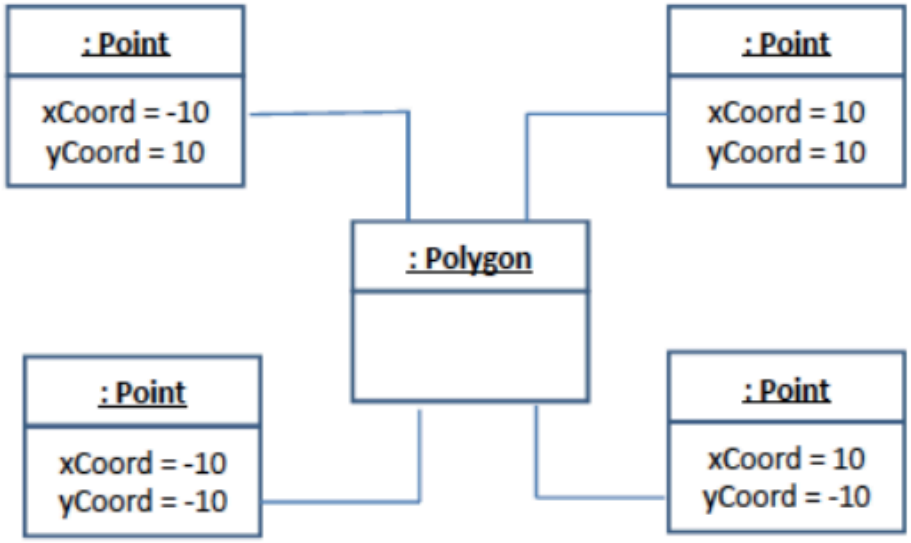
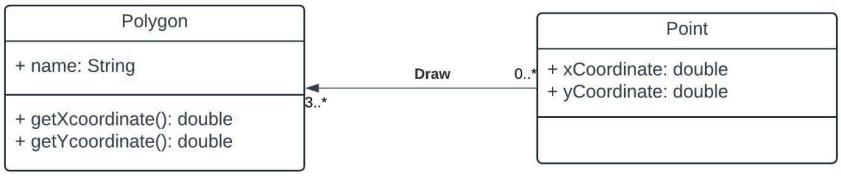


Figure - 2

Diagram:



Multiplicity Decision:

- Polygon to Point (3..*):
    1. A polygon is defined by a sequence of points, and you need at least 3 points to define a polygon (a triangle). Therefore, the multiplicity from polygon to point is 3..*.
    2. This means that every polygon must have at least 3 points, but it can have more.

- Point to Polygon (0..*):
    1. A point can be part of multiple polygons.
    2. This means that a point doesn't have to belong to any polygon (in the case of isolated points), but it can be shared across several polygons.
    3. Therefore, the multiplicity from point to polygon is 0..*.

Minimum # of points required to form a polygon: We will need at least 3 points to form a closed structure(i.e. triangle) called polygon. With smaller # of points we can never form a polygon.

Shared Points between Polygons: Yes, It is possible that two different polygons are sharing the same points. (Ex- Two triangles/squares can share the same vertices). This does not affect the validity of a polygon.

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.

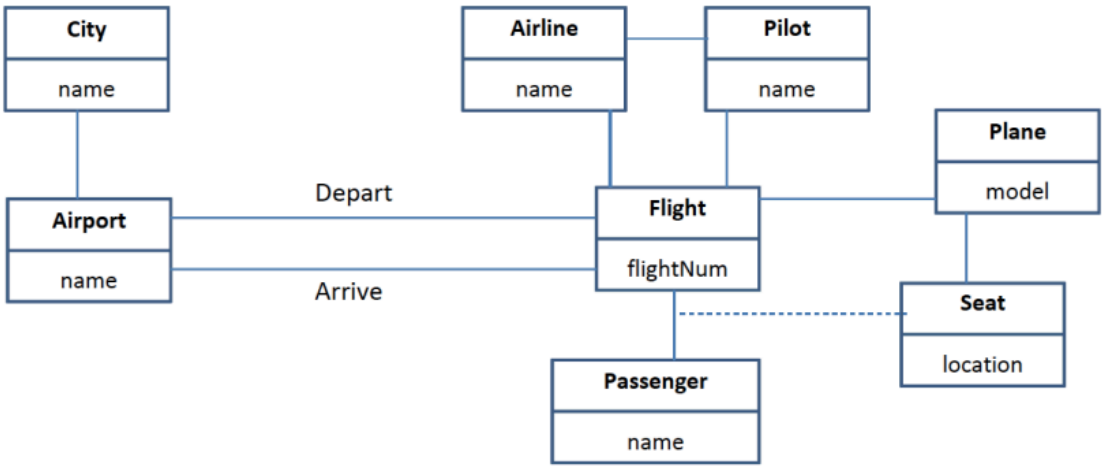
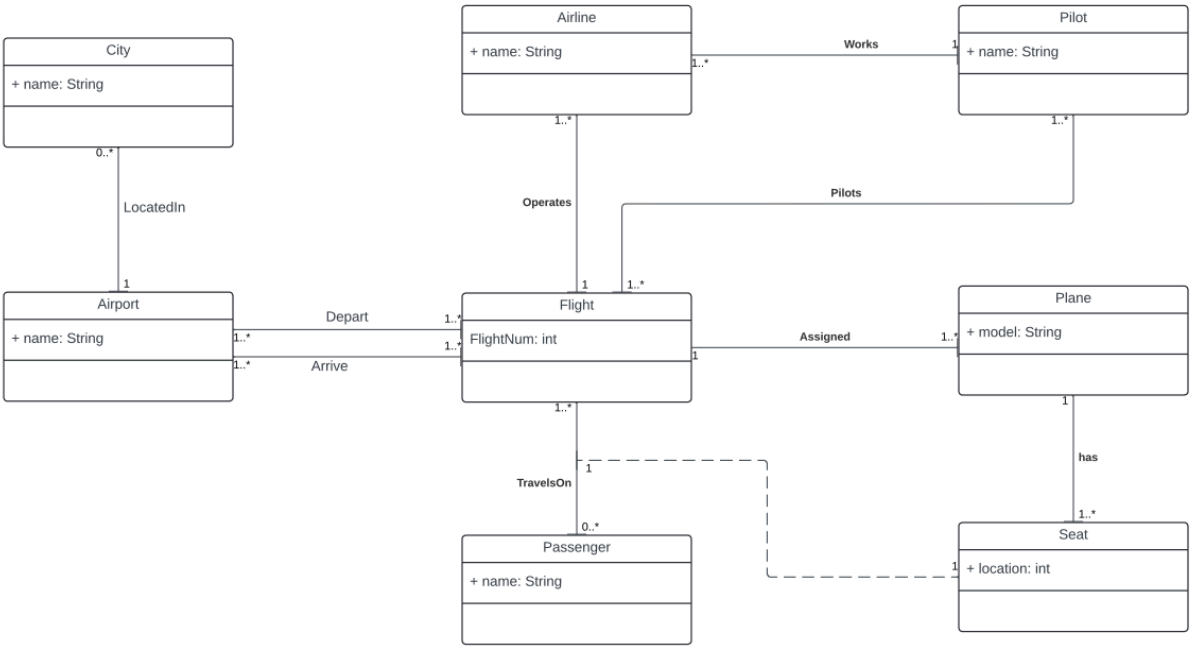


Diagram:



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.

<u>Diagram</u>: