IT314
LAB-4

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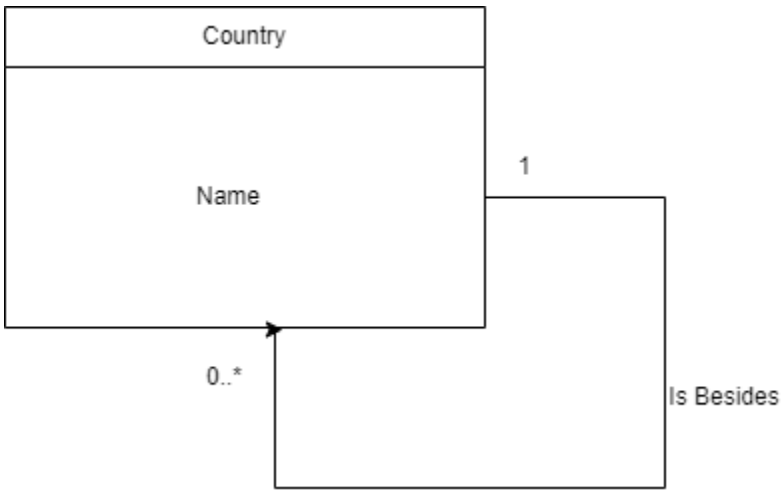
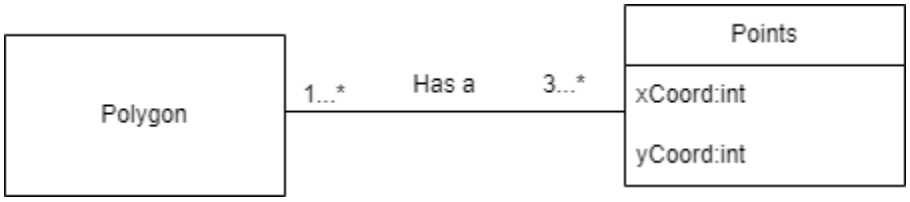
Q1)Prepare a class diagram for the following object diagram that shows a portion of Europe.

Answer:



Q2)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.

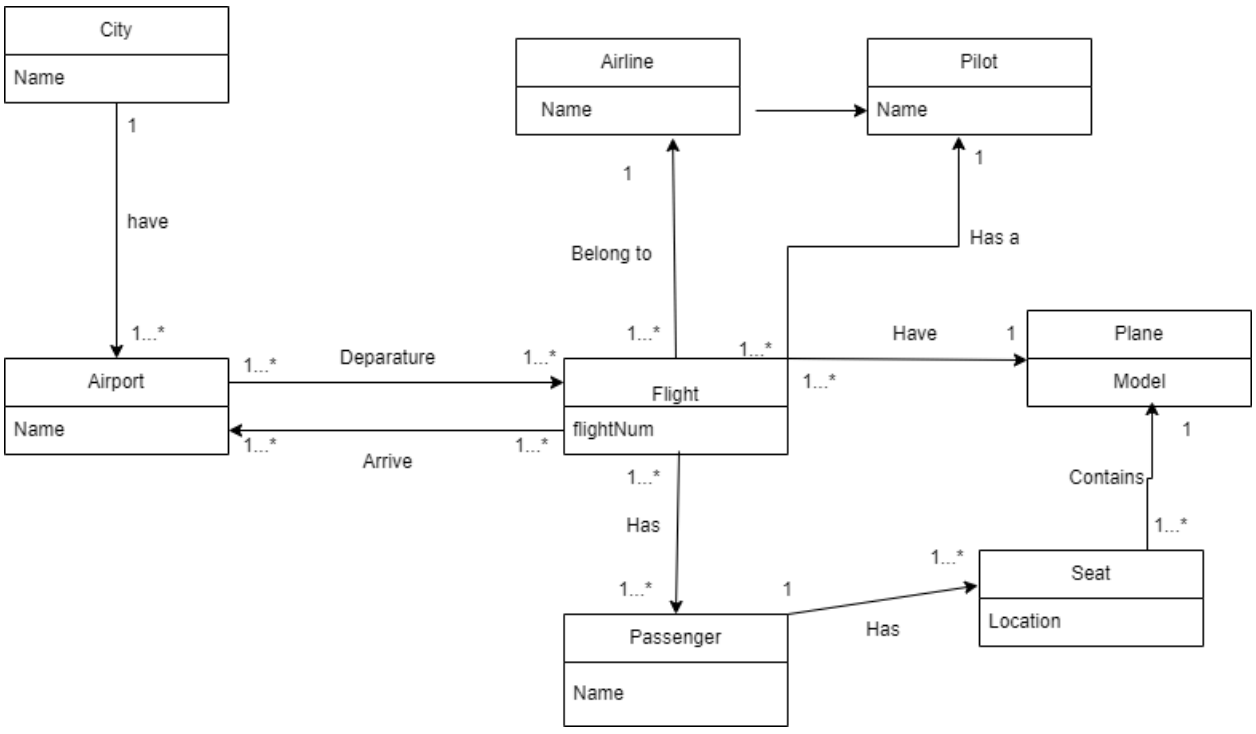
Answer:
The smallest number of points required to construct a polygon is 3. This is because a polygon is a closed shape made up of straight line segments, and the simplest closed shape is a triangle, which has three sides and three vertices (points).



Q3)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:



Q4)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:

To model a system for the management of flights and pilots, the entities involved and their relationships need to be clearly defined. Below is a high-level Entity-Relationship (ER) model of the system:

Entities:

1. Airline:
    - ID
    - Name
    - Fleet
2. Flight:
    - ID
    - Departure Airport
    - Arrival Airport
    - Departure Time
    - Arrival Time
    - Aircraft
    - Pilot
    - Co-pilot

3. Airport:
    - ID
    - Name
    - Location
4. Aircraft:
    - ID
    - Type
    - Airline
    - Status
    - State
5. Pilot:
    - ID
    - Name
    - Experience Level
    - Role
    - Flight
6. Aircraft Type:
    - Type ID
    - Number of Pilots Required
    - Roles Required (At least one captain with level 3, one co-pilot)

Relationships:

- Airline-Owns-Aircrafts: One-to-Many relationship between an Airline and Aircraft.
- Flight-Uses-Aircraft: A flight uses one aircraft, and the aircraft can be used for multiple flights over time.
- Flight-Assigned-Pilots**:** Each flight is assigned a captain (level 3) and a co-pilot.
- Aircraft-Has-Status: An aircraft can be in a working or under-repair status. At a specific moment, it can be airborne or landed.

- Pilot-Assigned-to-Flight: Pilots are assigned to flights based on the aircraft type requirements.