

3.1 Figure A3.1 shows a class diagram for international borders.

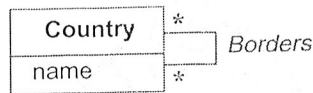


Figure A3.1 Class diagram for international borders

3.2 Figure A3.2 shows a class diagram for polygons and points. The smallest number of points required to construct a polygon is three.

The multiplicity of the association depends on how points are identified. If a point is identified by its location, then points are shared and the association is many-to-many. On the other hand, if each point belongs to exactly one polygon then several points may have the same coordinates. The next answer clarifies this distinction.

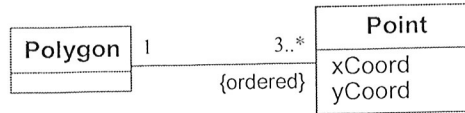


Figure A3.2 Class diagram for polygon and points

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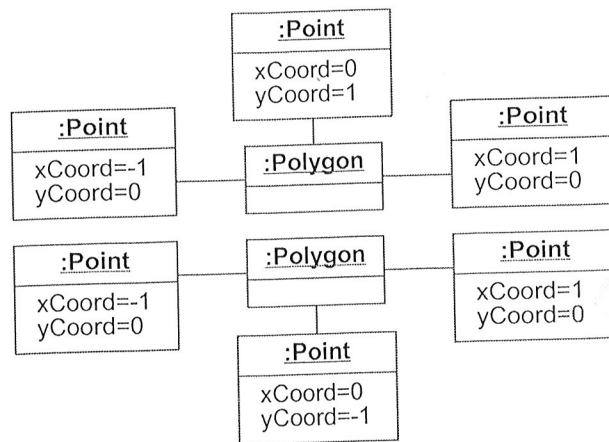


Figure A3.3 Object diagram where each point belongs to exactly one polygon

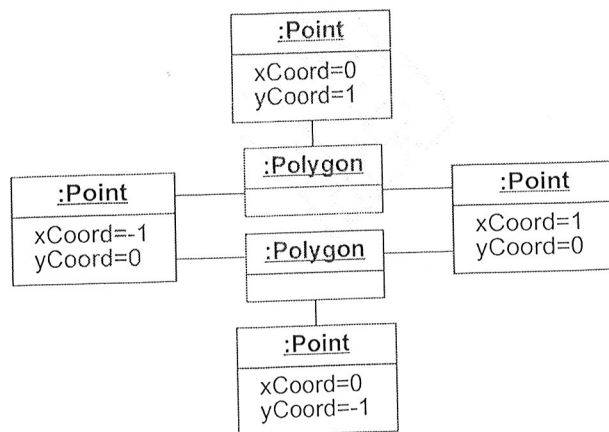


Figure A3.4 Object diagram where each point can belong to multiple polygons

3.6 Figure A3.6 shows a class diagram for a family tree consistent with the exercise. Other models are also possible such as those showing divorce and remarriage. The cousin and sibling associations are logically redundant and can be derived. Chapter 4 discusses derived information.

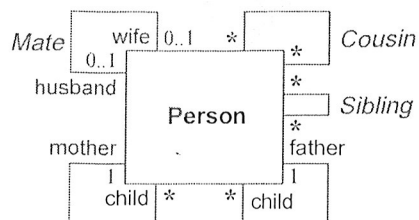


Figure A3.6 Class diagram for family trees

We used our semantic understanding of the exercise to determine multiplicity in our answer. In general, you can only partially infer multiplicity from examples. Examples can establish the need for many multiplicity but does not permit you to conclude that exactly 1 or 0..1 multiplicity applies.

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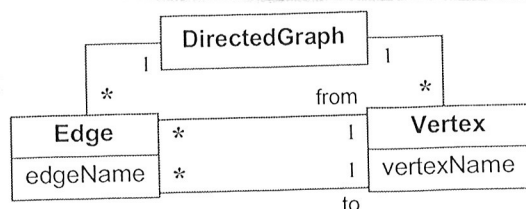


Figure A3.28 Class diagram for directed graphs using two associations

The advantage of the qualified association is that only one association must be queried to find one or both vertices that a given edge is connected to. If the qualifier is not

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