DatDat Øving 2

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Task 1: Constraints and syntax with specialization

a)

The disjointness constraint forces subclasses to have disjoint sets of entities. The completeness constraint demands that every entity in the superclass belong to some subclass belongs to some subclass.

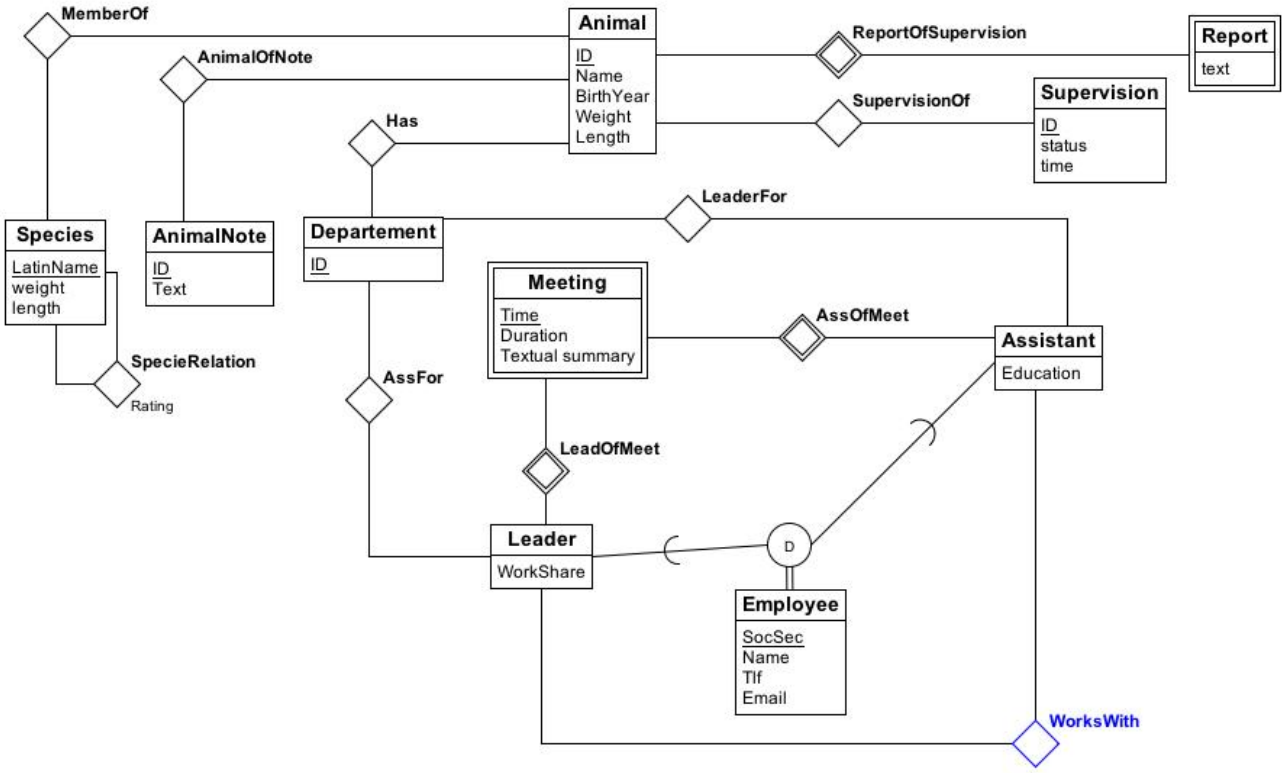
b)

Disjoint and total: In the miniworld of cars, a car must be of some type, but cannot be of several types.
Disjoint and partial: In a miniworld of a car shop which sells cars and trucks, they both subclass of Vehicle. A specific vehicle must not be of either a car or truck, and cannot be of both.
Overlapping and total: In a miniworld of pet owners, a pet owner must be a type of pet owner, however a pet owner can be of several types, as in it can be a owner of a dog and a cat simultaneously.
Overlapping and partial: In a miniworld of a cinema which plays movies of the types comedies, amateur and foreign. In this case, a movie might be several types; e.g. a foreign comedy film. A movie can also not be constrained to these types; e.g. a drama.

c)

i:) Syntactically invalid, since the superclass is related to its subclasses. It should rather be a member of iits subclasses.
ii:) Syntactically Valid.
iii:) Syntactically Valid.
iv:) Syntactically invalid, as there is no superclass of the subclasses.

Task 2: ER model of a zoo



Task 3: Important terms in the relational data model

Entity integrty is demand that each row in a table has unique identifier. A primary key of an entity class must be unique for each instance of an entity class, so that instances can be seperated despite having similar values in other attributes.
Referential integrity concerns itself with keeping all of its references valid. It requires all referenced attributes to exist. For referential integrity to hold in a relational database, any attribute designated as foreign key must contain only values from a primary or candidate key of another table.

Task 4: Conversion between models and relational algebra

4.a

Exam(ExamNo, CourseCode, ExaminationAids)
Student(studentNo, Name)
ExaminationLocation(RoomNo, Name, Capacity)
Table(TableNo, Type)
Chair(ChairNo, Type)
SetUp(StudentNo, ExamNo, RoomNo, Date, StudentPlacement)

4.b

$$\Pi_{HotelNo,Name}$$

$$\Pi_{HotelNo,Name}(\sigma_{Area="Barcelona"}(Hotel))$$

$$\Pi_{RoomNo,Name}(Hotel \underset{HotelNo=HotelNo}{\bowtie} \sigma_{SquareMeterSize>100}(HotelRoom))$$

$$F_{Count(OrderNo)}(\sigma_{SquareMeterSize>8 \wedge Duration>7}(HotelRoom \underset{RoomNo=RoomNo}{\bowtie} Order))$$

$$\Pi_{FirstName,LastName}(\sigma_{Area="Madrid"}(Hotel) \underset{HotelNo}{\bowtie} (HotelRoom \underset{RoomNo}{\bowtie} Order) \underset{CustomerNo}{\bowtie} Customer)$$

$$[Sort]_{DurationAsc}(\Pi_{Duration}(\sigma_{FirstName="Ole" \wedge LastName="Hansen"}(Customer) \underset{CustomerNo=CustomerNo}{\bowtie} Order))$$