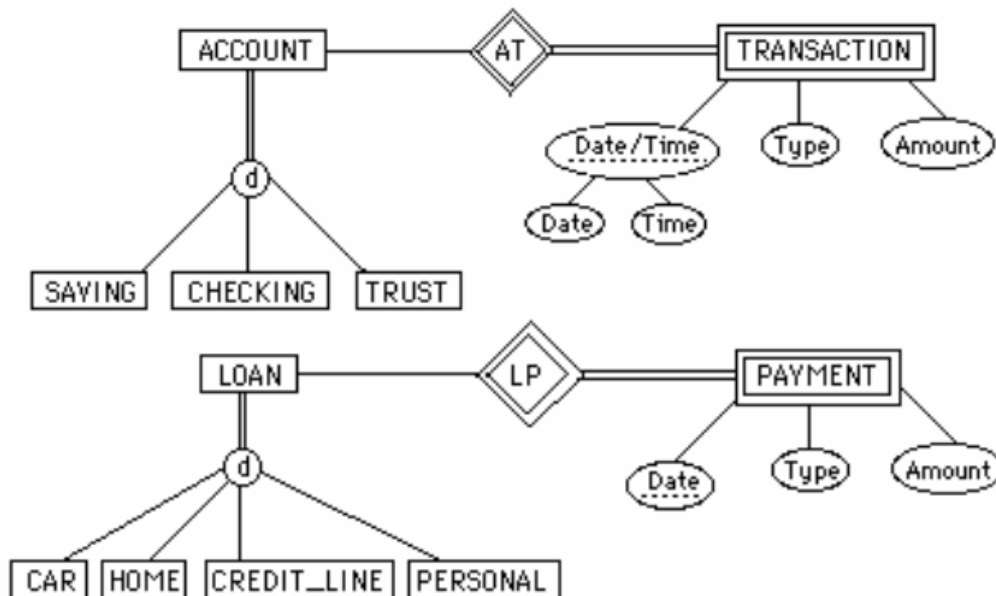## CHAPTER 4: ENHANCED ENTITY-RELATIONSHIP AND UML MODELING

Answers to Selected Exercises

4.18 Consider a bank, and model the following two aspects:
- There are three different kinds of ACCOUNTs, namely SAVINGS_ACCTs, CHECKING_ACCTs and TRUSts. For each ACCOUNT we have to take care of its TRANSACTIONs. Each TRANSACTION has a *type* such as "deposit", "withdrawal" or "check". Furthermore, each transaction has a *date/time* (consisting of a *date* and a *time*) and an *amount*.
- There are different kinds of LOANS, namely CAR_LOANS, HOME_LOANS, CREDIT_LINE and PERSONAL ones. For each LOAN we have to take care of its PAYMENTs. Each PAYMENT has a *type*, *date* and *amount*
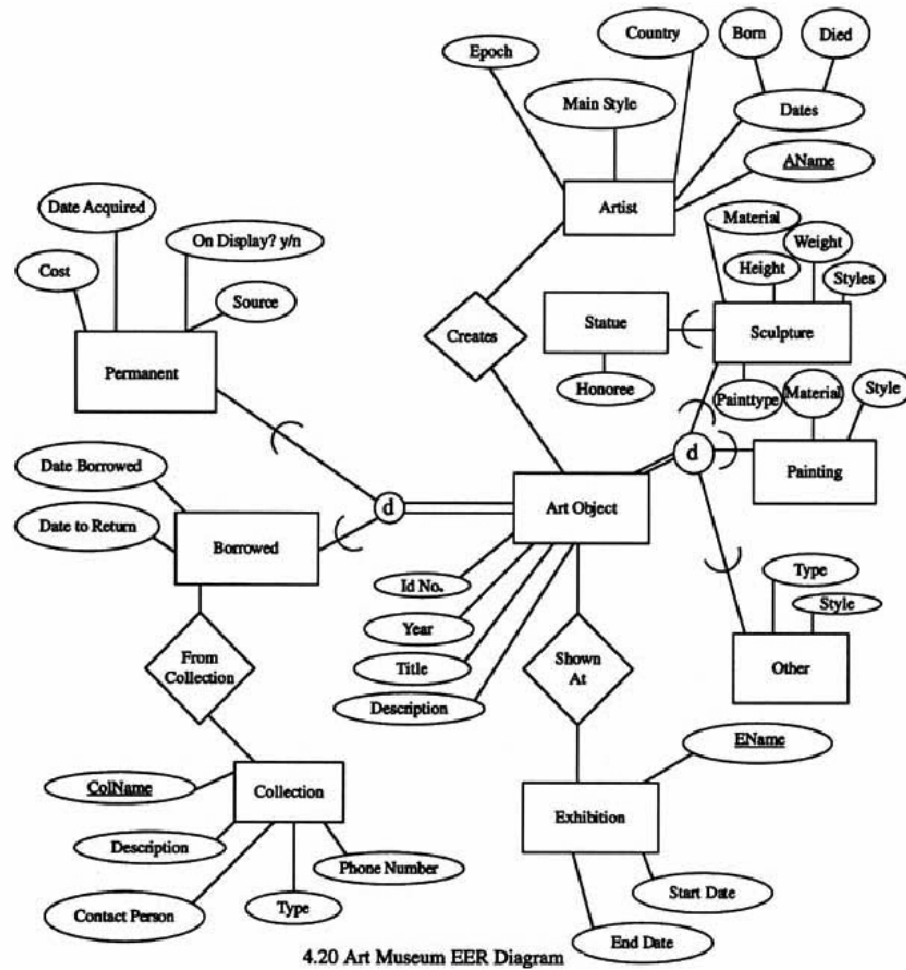
Answer:

4.21

Design a database to keep track of information for an art museum. Assume that the following requirements were collected:

- The museum has a collection of ART_OBJECTS. Each ART_OBJECT has a unique IdNo, an Artist (if known), a Year (when it was created, if known), a Title, and a Description. The art objects are categorized in several ways, as discussed below.
- ART_OBJECTs are categorized based on their type. There are three main types: PAINTING, SCULPTURE, and STATUE, plus another type called OTHER to accommodate objects that do not fall into one of the three main types.
- A PAINTING has a PaintType (like "oil", "watercolor", etc), material on which it is DrawnOn (like "paper", "canvas", woord", etc), and Style (like "modern", "abstract", etc.).
- A SCULPTURE or a STATUE has a Material from which it was created (like "wood", "stone", etc.) Height, Weight and Styles. A STATUE may have an Honoree, the person that is honored.
- An art object in the OTHER category has only a Type (like "print", "photo", etc.) and Style.
- ART_OBJECTs are also categorized as PERMANENT_COLLECTION, which are owned by the museum (these have information on the DateAcquired, whether it is OnDisplay or stored, and Cost) or BORROWED, which has information on the Collection (from which it is borrowed), DateBorrowed, and DateReturned.
- ART_OBJECTs also have information desribing their Origin (like "Italian", "Egyptian", etc.) and Epoch (like "Renaissance", "modern", etc.)
- The museum keeps track of ARTISTs information, if known: Name, DateBorn, DateDied, CountryOfOrigin, Epoch, MainStyle, and Description. The Name is assum,ed to be unique.
- Different EXHIBITIONs occur, each having a Name, StartDate, and EndDate. EXHIBITIONs are related to all the art objects that were on display during the exhibition.
- Information is kept on other COLLECTIONs with which the musuem interacts, including Name (unique), Type (like "museum", "personal", etc.), Description, Address, Phone, and current ContactPerson.

Answer:

4.20 Art Museum EER Diagram

Remarks:
- The attribute Painttype of the entity SCULPTURE is **wrong,** it must be an attribute of PAINTING.
- We have actually modelled a STATUE as a special kind of SCULPTURE.