

EECE 4/6273 Database Engineering

HW #4

1. A molecule contains many atoms, and it is important to record the number of each kind of atom in the molecule. For example, methane, CH_4 , contains one carbon and four hydrogen atoms. Atoms appear in many different molecules. An atom has an ANO key attribute and an ANAME value; a molecule has an MNO key and an MNAME value. **Design an ER diagram** that shows the relationship between molecules and atoms. The diagram should express the number of atoms of a particular type in a molecule, but it shouldn't display any additional entities.
2. An art collector's society keeps records of owners of paintings. Each owner is represented. The data about an owner is his/her name, address, membership number and the paintings he/she owns. Allow for the fact that an owner may buy the same painting on more than one date. The cost paid for each painting is also maintained. Each painting is represented. The data about a painting are its name, registration number, completion date, painter, and its owners. **Design an ER diagram** for the art collector's database. Indicate the primary key for each regular entity set and any partial keys for each weak entity set. Add the minimum and maximum cardinality, indicate all weak entity sets and weak relationship sets. Add roles if needed to the ER.
3. Suppose we define the data in a petro-resource database as follows. Each petrofirm (PETROFIRM) is represented. The data about a petrofirm are its company name (CONAME), its headquarters (HQ), its chief (PCHIEF), and its full-owned subsidiaries that are also petrofirms.

Each government granting agency (GOVAGENCY) is represented. The data about a government agency are its name (AGENCYNAME), the state supporting the agency (STATE), and the head of the agency (ACHIEF).

Each drilling concession (CONCESSION) is represented. The data about a drilling concession are its concession number (CONCESSNO), the cost paid for the concession (CCOST), the area of the concession (SIZE), the state or region containing the concession (CLOC), the petrofirm holding the concession at present, the petrofirm that owned the concession immediately prior to the present owner, and the government agency granting the concession.

Each registered property (PROPERTY) is represented. The data about a property are its property number (PROPNO), its owner (OWNER) which may be a person identified by their (SSN), or a company identified by its (COMPNAME), or government identified by its (COUNTRYCODE), and the drilling concession to which the property is assigned.

Each drilling firm (DRILLER) is represented. The data about a drilling firm are its name (DRILLFIRM), and the state in which it is registered (REGIST).

Each drill or bore hole (DRILLHOLE) is represented. The data about a drill hole are the hole number (HOLENO, which is unique only within a CONCESSION) the cost of drilling the hole (HCOST), the location of the hole relative to the property limits (HLOC), the petrofirm that owns the hole, the drilling concession which covers the hole, the property containing the hole, and the drilling firm which drilled the hole.

Design an ER diagram for the petro-resource database. Indicate the primary key for each regular entity set and any partial keys for each weak entity set. Add the minimum and maximum cardinality, indicate all weak entity sets and weak relationship sets. Add roles if needed to the ER.