



**2017 Fall Term**

**COP 5725 Principles of DBMS**

**Exercise set 1**

**Student: Yezehao Huai**

**E-mail: [yhuai001@fiu.edu](mailto:yhuai001@fiu.edu)**

**PID: 5965823**

### **3.5. Explain the difference between an attribute and a value set.**

Attribute: Entities have certain properties in the mini-world that are represented in the database. Attributes are the properties used to describe an entity.

A value set: A specific entity will have a value for each of its attributes, each attribute has a value set (similar to data types) associated with it. The set of all values that an attribute can associate is a value set.

In conclusion, the value set is a group of values that could be taken by an attribute when it is describing the entity.

For example, a teacher of a school has an attribute---name, and a value set associated with it is a string in any combination of characters.

### **3.11. What is meant by a recursive relationship type? Give some examples of recursive relationship types.**

A recursive relationship type is a relationship type between the same participating entity types in distinct roles.

For example, in the TA relationship, a teacher assistant could participate in two distinct roles: teacher role and student role. Each relationship has two distinct teacher assistant entities: a teacher of students and a student of a professor.

For another example, the relationship for a person in his family, he could participate in two distinct roles: father and son. Each one has two distinct entities: a man in father role and a man in son role.

### **3.12. When is the concept of a weak entity used in data modeling? Define the terms owner entity type, weak entity type, identifying relationship type, and partial key.**

Concept of a weak entity is used in conceptual data modeling when an entity that does not have a key attribute of its own. Owner entity type: A strong entity type with key attributes. The weak entity must be identified by being associated with specific entities from owner entity type.

Weak entity type: An entity type that an entity has no key attribute and is identification-dependent on another entity type.

Identifying relationship type: A relationship type relates a weak entity to the owner entity type of it.

Partial Key: Weak entities are identified by the combination of a partial key of the weak entity type. It is an attribute of the weak entity that differentiates cases of weak entity set relative to a strong entity.

For example, a CLASS entity is identified by the class number, and the specific STUDENT with whom the class is related. The class number of CLASS is the partial key. CLASS is a weak entity type. Student is its identifying entity type via the identifying relationship type CLASS\_OF.

**3.17. Composite and multivalued attributes can be nested to any number of levels.**

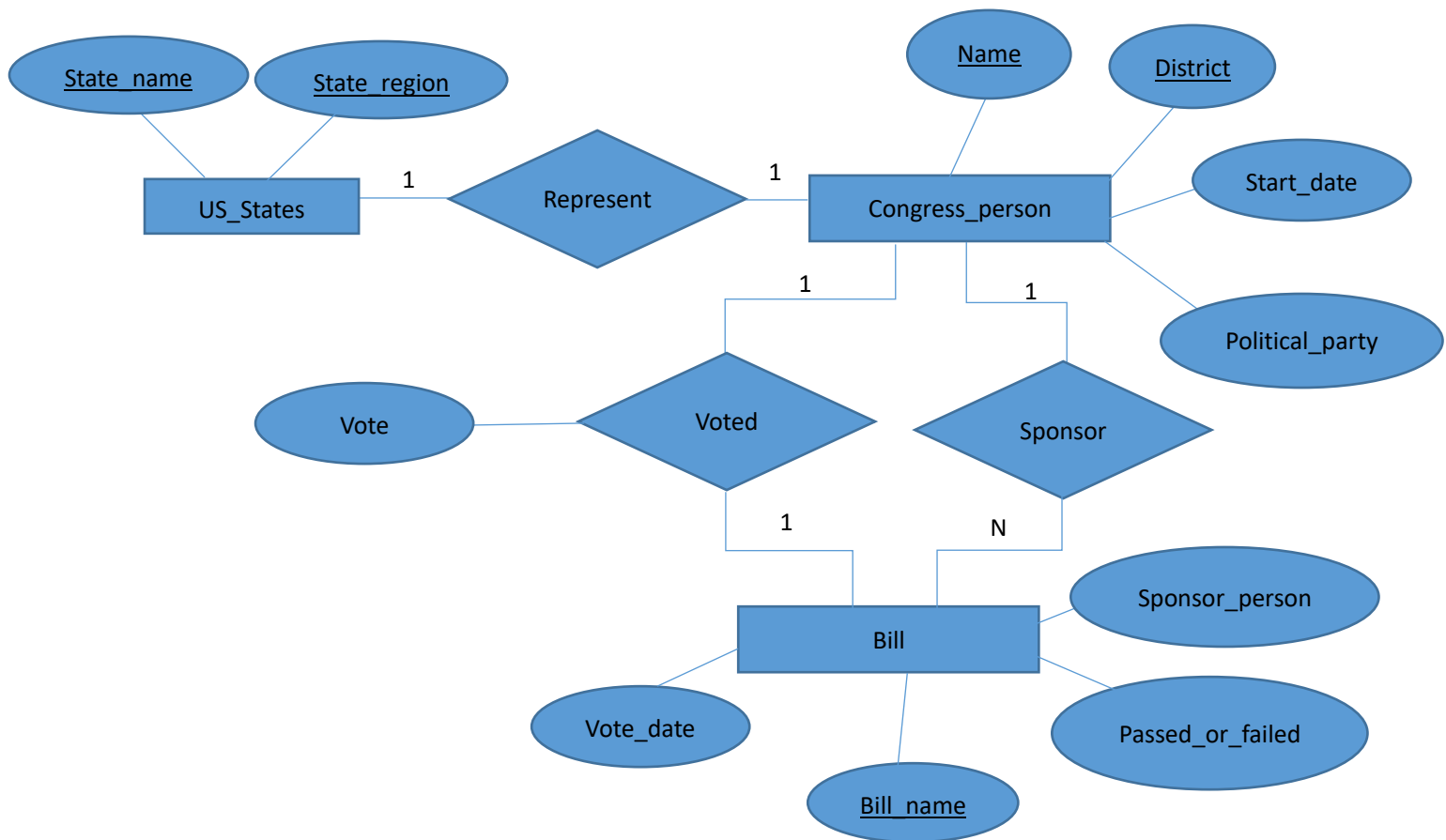
**Suppose we want to design an attribute for a STUDENT entity type to keep track of previous college education. Such an attribute will have one entry for each college previously attended, and each such entry will be composed of college name, start and end dates, degree entries (degrees awarded at that college, if any), and transcript entries (courses completed at that college, if any). Each degree entry contains the degree name and the month and year the degree was awarded, and each transcript entry contains a course name, semester, year, and grade. Design an attribute to hold this information.**

**Use the conventions in Figure 3.5.**

At first, the attribute have multiple values in name, date, degrees, and transcript. Then the degrees composite name, month and year. The transcript composite name, semester, year and grade. So here is the design:

Precollege\_edu{College\_name, Start\_date, End\_date, {Degrees(Degree\_name, month, year)}, {Transcript(Transcript\_name, Semester, Year, Grade)}}}

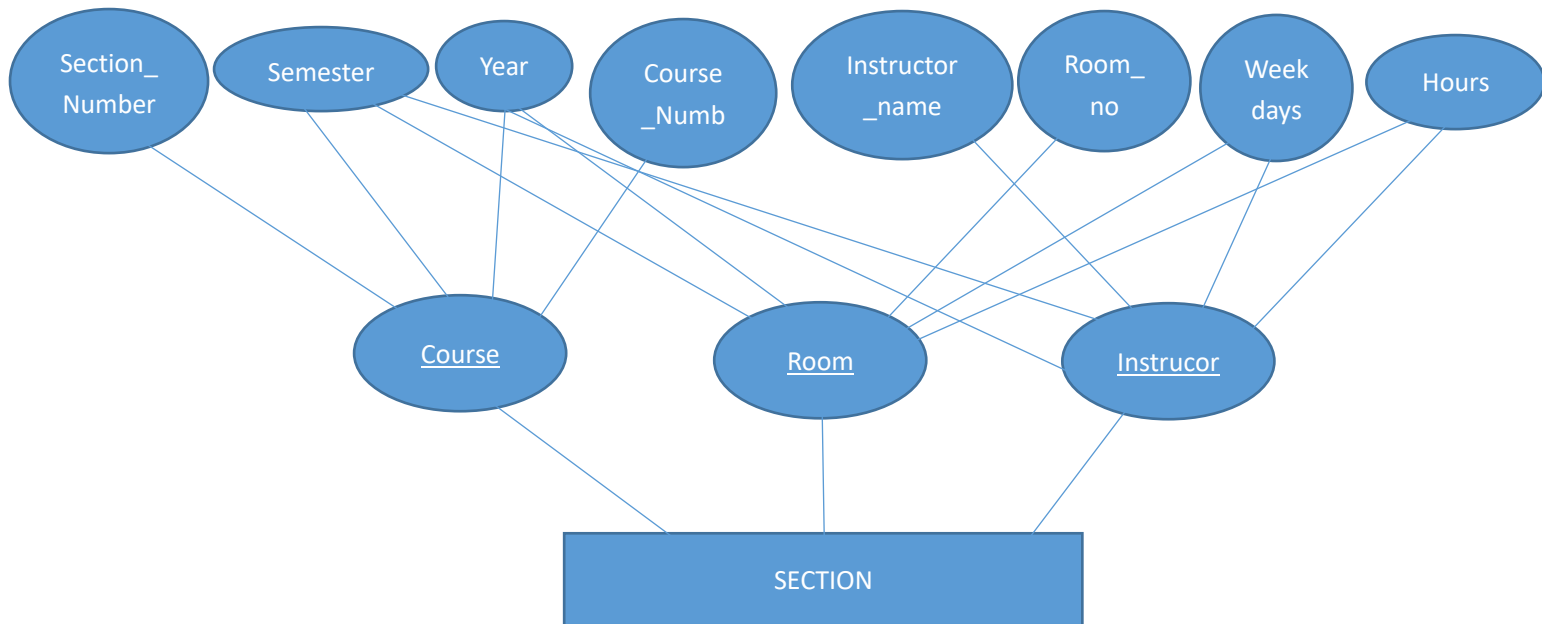
**3.21. Design an ER schema for keeping track of information about votes taken in the U.S. House of Representatives during the current two-year congressional session. The database needs to keep track of each U.S. STATE's Name (e.g., 'Texas', 'New York', 'California') and include the Region of the state (whose domain is {'Northeast', 'Midwest', 'Southeast', 'Southwest', 'West'}). Each CONGRESS\_PERSON in the House of Representatives is described by his or her Name, plus the District represented, the Start\_date when the congressperson was first elected, and the political Party to which he or she belongs (whose domain is {'Republican', 'Democrat', 'Independent', 'Other'}). The database keeps track of each BILL (i.e., proposed law), including the Bill\_name, the Date\_of\_vote on the bill, whether the bill Passed\_or\_failed (whose domain is {'Yes', 'No'}), and the Sponsor (the congressperson(s) who sponsored—that is, proposed—the bill). The database also keeps track of how each congressperson voted on each bill (domain of Vote attribute is {'Yes', 'No', 'Abstain', 'Absent'})). Draw an ER schema diagram for this application. State clearly any assumptions you make.**



Assumptions:

- Each Congress\_person can sponsor any bills..
- Each Congress\_perosn can vote for one bill.
- Each Congress\_person can only represent one state

**3.26. Consider an entity type SECTION in a UNIVERSITY database, which describes the section offerings of courses. The attributes of SECTION are Section\_number, Semester, Year, Course\_number, Instructor, Room\_no (where section is taught), Building (where section is taught), Weekdays (domain is the possible combinations of weekdays in which a section can be offered {'MWF', 'MW', 'TT', and so on}), and Hours (domain is all possible time periods during which sections are offered {'9–9:50 a.m.', '10–10:50 a.m.', . . . , '3:30–4:50 p.m.', '5:30–6:20 p.m.', and so on}). Assume that Section\_number is unique for each course within a particular semester/ year combination (that is, if a course is offered multiple times during a particular semester, its section offerings are numbered 1, 2, 3, and so on). There are several composite keys for section, and some attributes are components of more than one key. Identify three composite keys, and show how they can be represented in an ER schema diagram.**



**3.27. Cardinality ratios often dictate the detailed design of a database. The cardinality ratio depends on the real-world meaning of the entity types involved and is defined by the specific application. For the following binary relationships, suggest cardinality ratios based on the common-sense meaning of the entity types. Clearly state any assumptions you make.**

Entity 1	Cardinality Ratio	Entity 2	Assumptions
STUDENT	1:1	SOCIAL_SECURITY_CARD	A student only have one SSC
STUDENT	N:M	TEACHER	Student are taught by many teachers
CLASSROOM	1:N	WALL	A classroom have many walls.
COUNTRY	1:1	CURRENT_PRESIDENT	One country only have one president.
COURSE	N:M	TEXTBOOK	One course can have many textbooks and a textbooks can be used in many course.
ITEM (that can be found in an order)	N:1	ORDER	Items can only be in one order.
STUDENT	N:M	CLASS	A student may take many classes and a class have many students

CLASS	1:N	INSTRUCTOR	One class has many instructor
INSTRUCTOR	1:1	OFFICE	Every instructor has his/her own office and not shared
EBAY_AUCTION_ITEM	1:N	EBAY_BID	One item may has many bids for it.