Shivi Bhatt | Spring 2020 |Information System |INFO 6210 Sec 09 |Professor: Manuel Montrod

Readings:

Skim through chapter 1 “The Database Environment and Development Process” (Hoffer, Ramesh, & Topi)

Read chapter 2: “Modeling Data in the Organization” (Hoffer, Ramesh, & Topi) – **Done**

Read chapter 3: “The enhanced E-R Model” (Hoffer, Ramesh, & Topi) - **Done**

Homework Assignment:

Chapter 2 (Hoffer, Ramesh, & Topi)

Problems and Exercises 1 (a, b,c,d,e,f), 2,4,5,6,11 (a,b,c,)

Chapter 3 (Hoffer, Ramesh, & Topi)

Problems and Exercises 1,2,12

1.
A). Where is a unary relationship, what does it mean, and for what reasons might the cardinalities on it be different in other organizations?

Answer:
- In the diagram 2-22 of Pine Valley Furniture Company, An Entity EMPLOYEE shows unary relationship, it means that a relationship between instances of single entity type.
-Unary relationship is also called recursive relationships.
-Each employee may have one supervisor.
-An employee (1) may supervise employees (Many) which is one to many relationships. Manager is not supervised. Also, all employees are not supervisors (Managers)
-Optional one to optional many cardinality is used for this Employee entity relationship.
-In other organization cardinalities can be different because every organization can have their own business rules or policy defined.
-Other organization can have different relationships and cardinalities defined such as a mandatory employee or many supervisors to an employee or may be no supervisors etc.

B). Why is Includes a one-to many relationships, and why might this ever be different in some other organization?

Answer:
-As per the diagram of Pine Valley Furniture company has defined a business rule which states that PRODUCT LINE includes PRODUCT which is one to many relationship that means a product lines has many products but should have at least a product because it has mandatory cardinality means one product line must have a product.

- Another organization may have different business rule or policies established where a product can have many product lines which is many to many relationships.
- Another organization can also have one (Product Lines) to many (Product) relationship but cardinality may have minimal optional that is zero means many products is not associated with a product line.

C). Does Includes allow for a product to be represented in the database before it is assigned to a product line (e.g.,
while the product is in research and development)?

Answer:
No, the cardinality in the figure shown is mandatory cardinality which means a product line must have the products. which is "at least" scenario in other words, at least one product line must have the product.
In case of optional cardinality, the product can be in research and development before it is assigned to a product line in the Database.

D). If there is a rating of the competency for each skill an employee possesses, where in the data model would we
place this rating?

Answer:
Employee rating comes from the competency in the skill he possesses, so rating will be placed with Has Skill Associative Entity. because it will associate an instance of skill to an instance of an employee.

E). What is the meaning of the DOES BUSINESS IN associative entity, and why does each DOES BUSINESS IN instance have to be associated with exactly one TERRITORY and one CUSTOMER?

Answer:

- The meaning of Does BUSINESS in associative entity means an instance of a customer is associated with an instance of territory.
-Each customer may do a business in any of the territory or may not do business in any of the territory.
-A sales territory has one to many customer relationship
-Each DOES BUSINESS IN instance have to be associated with exactly one territory and one customer because as per the Entity Relation diagram of the Pine Valley Furniture company they have business rules
or policy defined for sales entity, associative territory entity and customer entity with mandatory cardinality 1.

F) In what way might Pine Valley change the way it does business that would cause the Supplies associative entity to be eliminated and the relationships around it to
change?

Answer:

To Eliminate Supplies associative entity from the Pine Valley furniture company diagram we need to create one to many relationships between RAW MATERIAL ENTITY (one) to VENDOR ENTITY (Many) and adding Supply Unit Price attribute to RAW MATERIAL entity because particular vendor will supply unit price applicable.

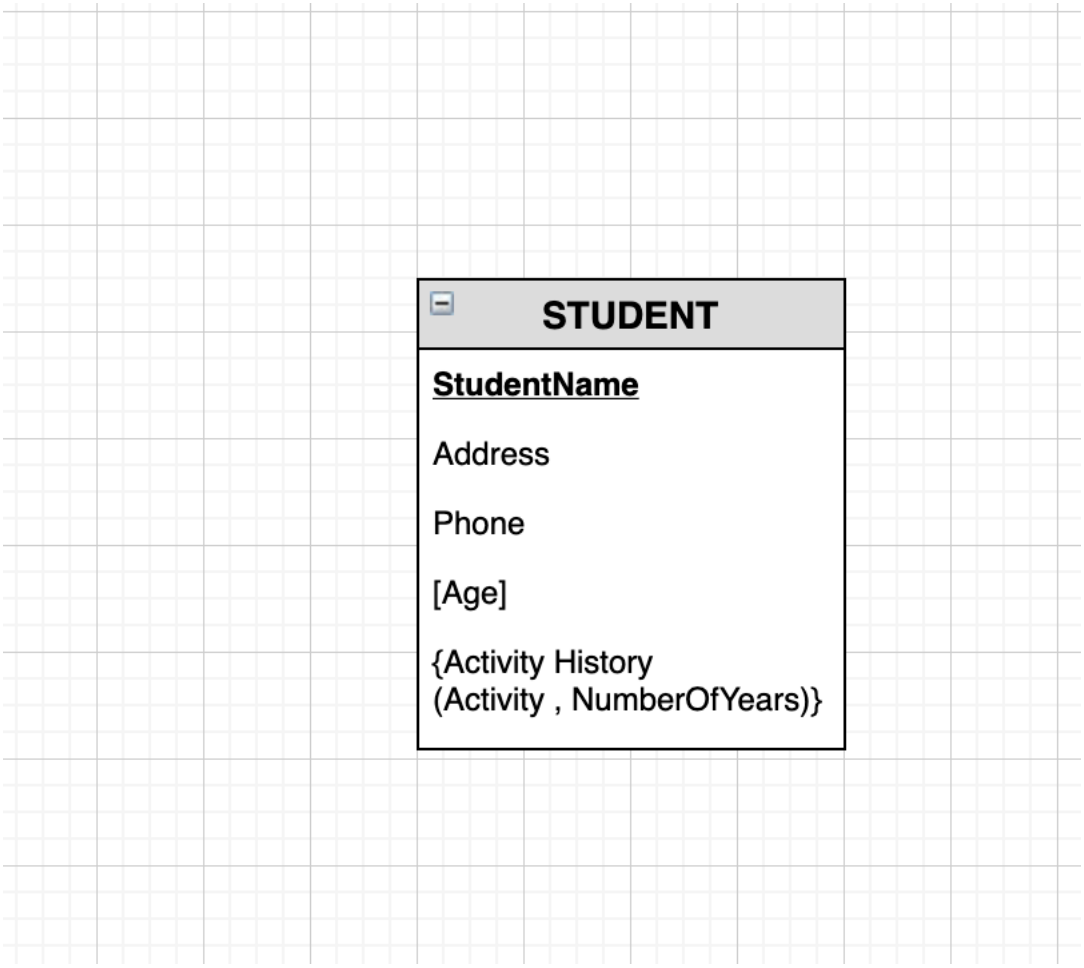
2. There is a bulleted list associated with Figure 2-22 that
describes the entities and their relationships in Pine Valley Furniture. For each of the 10 points in the list, identify the subset of Figure 2-22 described by that point.

a) PRODUCTS and PRODUCT LINES - Entity, RELATIONSHIP - INCLUDES, Mandatory one to Mandatory Many.
b) CUSTOMER and ORDER - ENTITY, RELATIONSHIP - SUBMITS, Mandatory one to Many.
c) ORDERS and PRODUCTS - ENTITY, ORDER LINE - ASSOCIATIVE ENTITY.
d) CUSTOMERS and TERRITORY- ENTITY, DOES BUSINESS IN - ASSOCIATIVE ENTITY.
e) SALESPERSON and TERRITORY- ENTITY, RELATIONSHIP - SERVES, Mandatory many to Mandatory one
f) PRODUCT and RAW MATERIAL - ENTITY, USES- ASSOCIATIVE ENTITY.
g) VENDOR and RAW MATERIAL - ENTITY, SUPPLIES - ASSOCIATIVE ENTITY.
h) PRODUCT and WORK CENTER - ENTITY, PRODUCED IN- ASSOCIATIVE ENTITY
i) EMPLOYEE, WORK CENTER- ENTITY, WORKS IN - ASSOCIATIVE ENTITY
j) EMPLOYEE - ENTITY, RELATIONSHIP- SUPERVISES, Many to one

4. Consider the two E-R diagrams in Figure 2-24, which represent a database of community service agencies and volunteers in two different cities (A and B). For each of the following three questions, place a check mark under City A, City B, or Can't Tell for the choice that is the best answer.
Answer:

a) **Can't Tell - As per the diagram of City A and City B there is no business rule defined to state how they are maintaining the data who currently assisting agencies, maintaining data here means- volunteer working hours.**
b) **City A - as per the diagram of City A shows that a volunteer can assist many agencies, 1 mandatory to Many optional relationships means there can be 0 to many volunteers.**
c) **Can't Tell - There is no business rule can be seen in the both ERD diagram where cardinality or relationship defined and ERD diagram does not states that a volunteer can change the agency which he/she assists.**

5. The entity type STUDENT has the following attributes: Student Name, Address, Phone, Age, Activity, and No of Years. Activity represents some campus-based student activity, and No of Years represents the number of years the student has engaged in this activity. A given student may engage in more than one activity. Draw an ERD for this situation. What attribute or attributes did you designate as the identifier for the STUDENT entity? Why?



Student Name: Key Attribute
Phone: Simple Attribute
Address: Simple Attribute
Age: Derived Attribute
Activity History: Multi-Valued Attribute
Activity, NumberOfYears: Composite Attribute

StudentName is designated as the identifier for the STUDENT entity because there is no StudentID attribute defined as per the business rule so to identify student uniquely

StudentName is set to key Attribute while Activity an NumberOfYeards is kept Composite Attribute (combination of two).

6. Are associative entities also weak entities? Why or why not? If yes, is there anything special about their "weakness"?

Answer:

No, Associative Entities are not considered as weak entities.

Associative Entities:

- Associate Entity types have their own simple identifier.

-It is an Entity type that associates the instances of one or more entity types and contains attributes that are peculiar to the relationship between those entity instances.

- Associative entities are sometimes referred to as gerunds, because the relationship name (a verb) is usually converted to an entity name that is noun.

-The resulting associative entity type has independent meaning to end users and, preferably, can be identified with a single-attribute identifier.

- The associative entity has one or more attributes in addition to the identifier.

- The associative entity participates in one or more relationships independent of the entities related in the associated relationship

If an associative entity meets above conditions, then it cannot be called/considered as weak entity. While weak entity has following meaning and characteristics.

Weak Entities:

- A weak entity type is an entity type whose existence depends on some other entity type.

- A weak entity type has no business meaning in the E-R diagram without the entity on which it depends.

- The entity type on which the weak entity type depends is called identifying owner, A weak entity type does not typically have its own identifier.

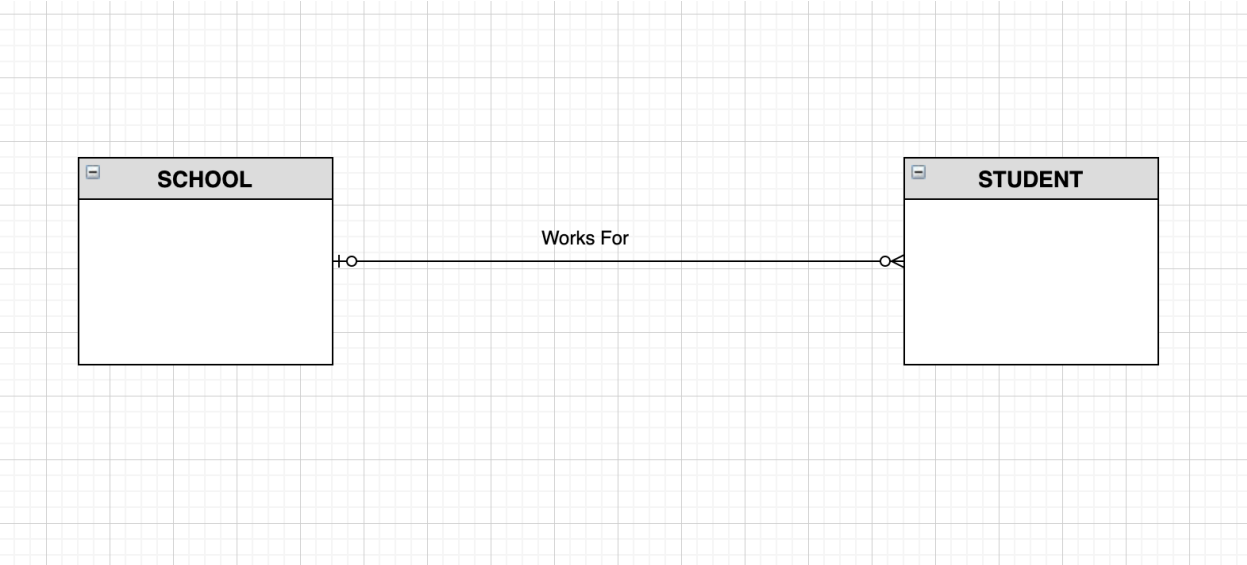
- A weak entity type has an attribute that serves a partial identifier.

-A weak entity type is denoted as double lined rectangle; double underlined attribute is partial identifier which will be combined with the identifier of the owner to form a full identifier for weak entity.

11. Figure 2-26 represents a situation of students who attend and work in schools and who also belong to certain clubs that are located in different schools. Study this diagram care- fully to try to discern what business rules are represented.

a. You will notice that cardinalities are not included on the
Works For relationship. State a business rule for this relationship and then represent this rule with the cardinalities that match your rule.

Answer:



Optional 1 (School) to Optional Many Cardinality (Student)
Student Works for School 0:1 optional Minimum Cardinality to optional 1 Cardinality
School hires/employs many students for work 0:M optional 1 to optional Many

Student: Minimum Cardinality = 0, Max Cardinality = Many
School: Minimum Cardinality = 0, Max Cardinality = 1

b. State a business rule that would make the Located In relationship redundant (i.e., where the school in which a club is located can be surmised or derived in some way from other relationships).

Answer:
To make Located In relationship redundant, we need to have club in the school and student may belong to that club only. In other words, student goes to that club only which is inside the school.

c. Suppose a student could work for only a school that student attends but might not work. Would the Works For relationship still be necessary, or could you represent whether a student works for the school she attends in some other way (if so, how)?

Answer:
-Student works for a school which he/she attends, work is optional here.
- The Works for relationship is necessary for the diagram since there is students who might work for the school. However, this policy will be complex to implement in database because it will be difficult to define such constraint.
-Other way to design this business rule is that we can eliminate Works for relationship and place Works attribute in Student entity with Boolean value Yes/No, this will ensure whether student is working in that school or not Or he/she works for a school which he/she not attending.

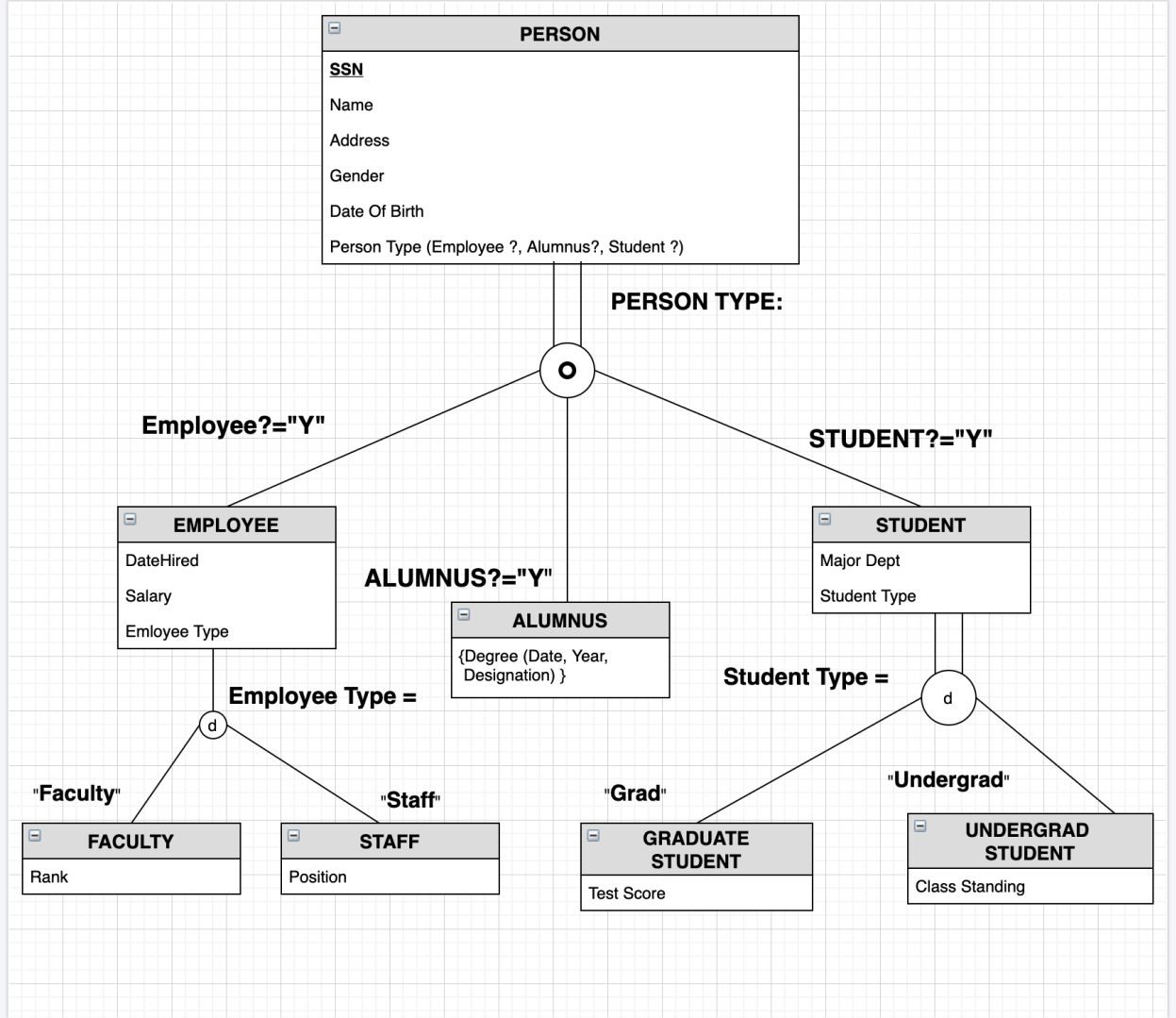
Chapter 3 Answers:

1. Examine the hierarchy for the university EER diagram (Figure 3-10). As a student, you are an instance of one of the subtypes: either UNDERGRAD STUDENT or GRADUATE STUDENT. List the names of all the attributes that apply to you. For each attribute, record the data value that applies to you.

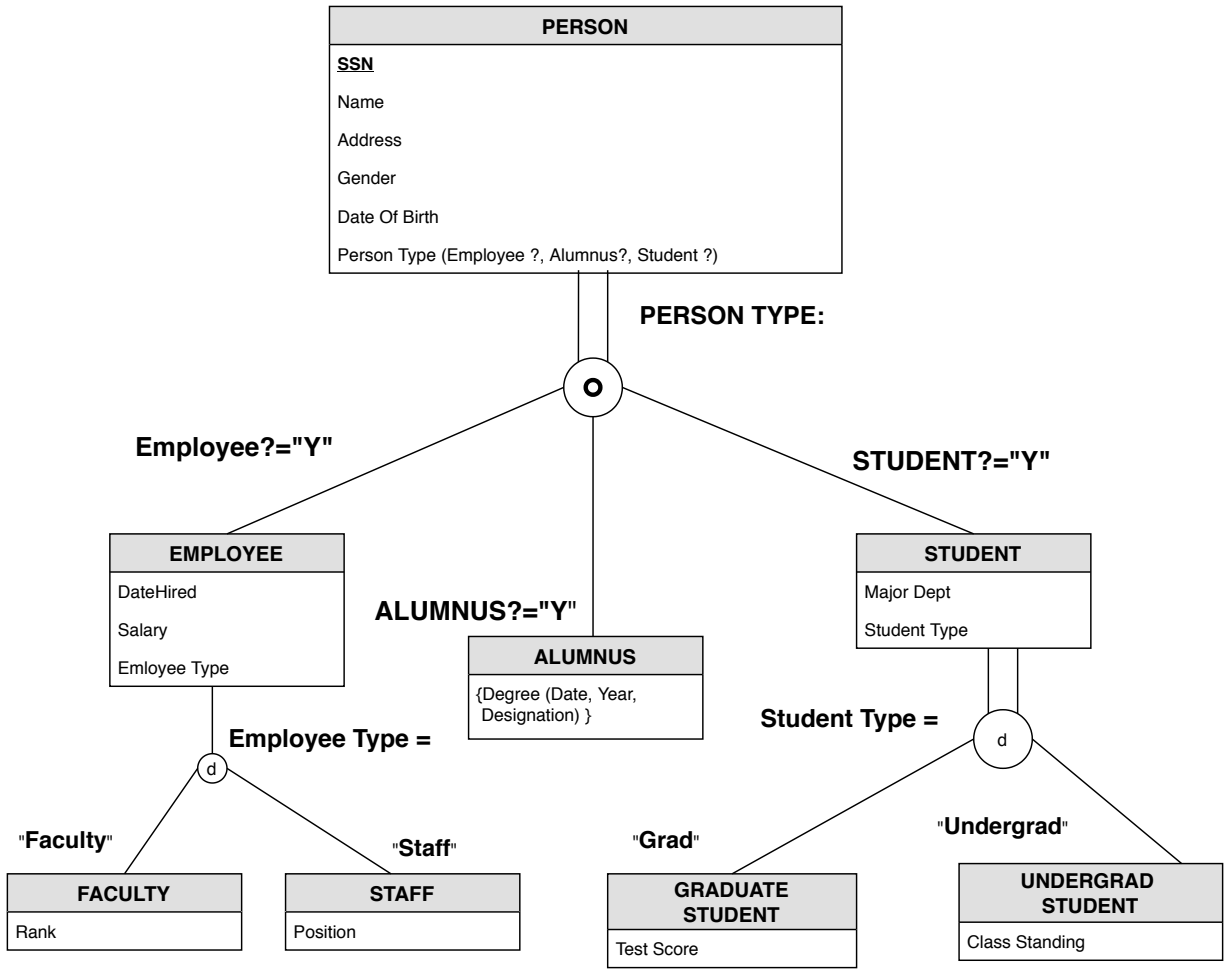
GRADUATE STUDENT

ATTRIBUTE NAME	**DATA VALUE**
SSN	9916-47-158
NAME	SHIVI BHATT
ADDRESS	29, Queensberry St., 02215
GENDER	FEMALE
DATE OF BIRTH	APR 15, 1992
MAJOR DEPT	INFORMATION SYSTEMS
TEST SCORE	320

2. Add a subtype discriminator for each of the supertypes shown in Figure 3-10. Show the discriminator values that assign instances to each subtype. Use the following subtype discriminator names and values:
a. PERSON: Person Type (Employee? Alumnus? Student?)
b. EMPLOYEE: Employee Type (Faculty, Staff)
c. STUDENT: Student Type (Grad, Undergrad)

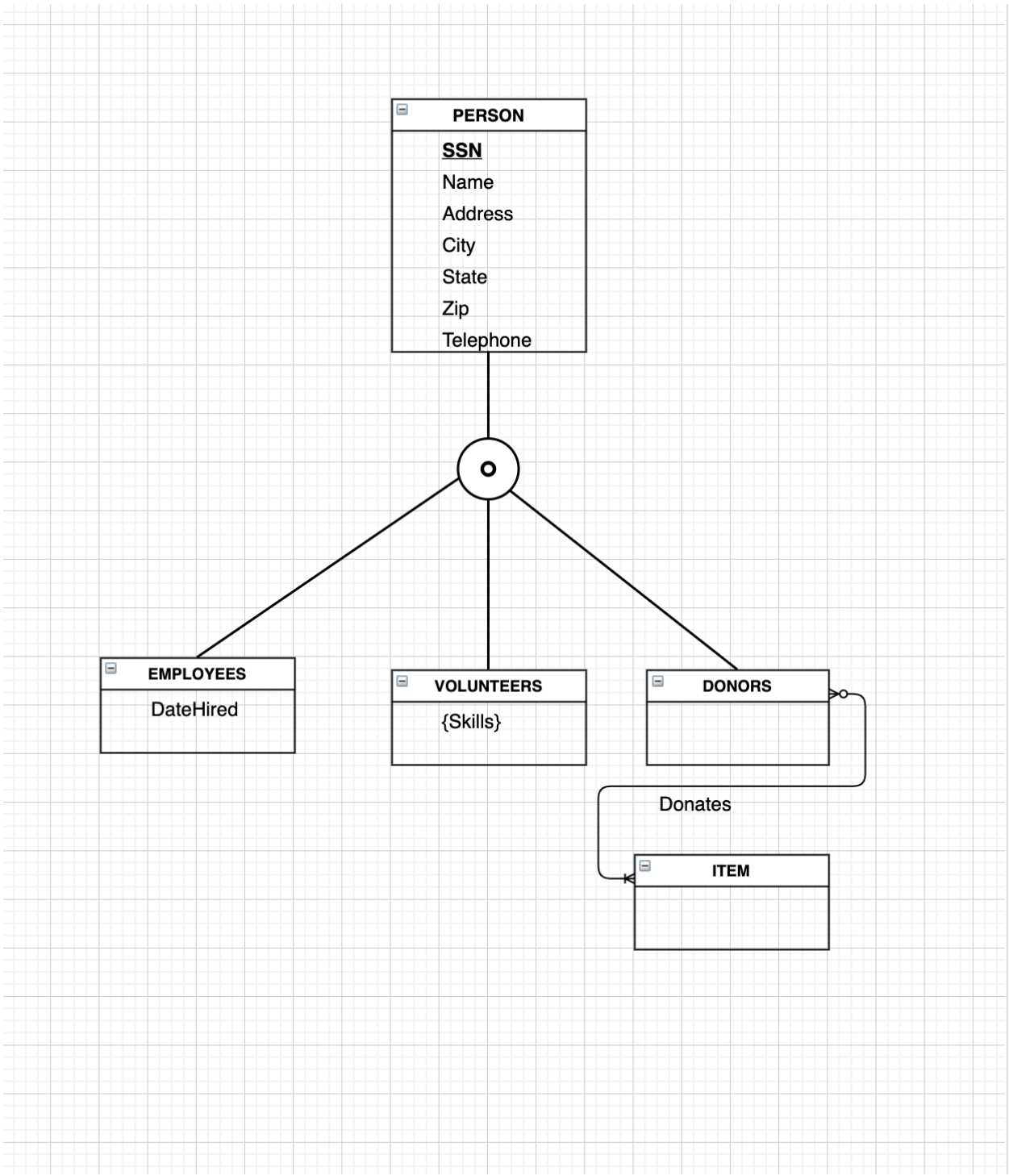

PERSON
SSN
Name
Address
Gender
Date Of Birth
Person Type (Employee ?, Alumnus?, Student ?)
PERSON TYPE:
O
Employee?="Y"
STUDENT?="Y"
ALUMNUS?="Y"
EMPLOYEE
DateHired
Salary
Emloyee Type
ALUMNUS
{Degree (Date, Year, Designation) }
STUDENT
Major Dept
Student Type
Employee Type =
Student Type =
d
d
"Faculty"
"Staff"
"Grad"
"Undergrad"
FACULTY
Rank
STAFF
Position
GRADUATE STUDENT
Test Score
UNDERGRAD STUDENT
Class Standing

Below is exported PDF from draw.io diagram which I have created.

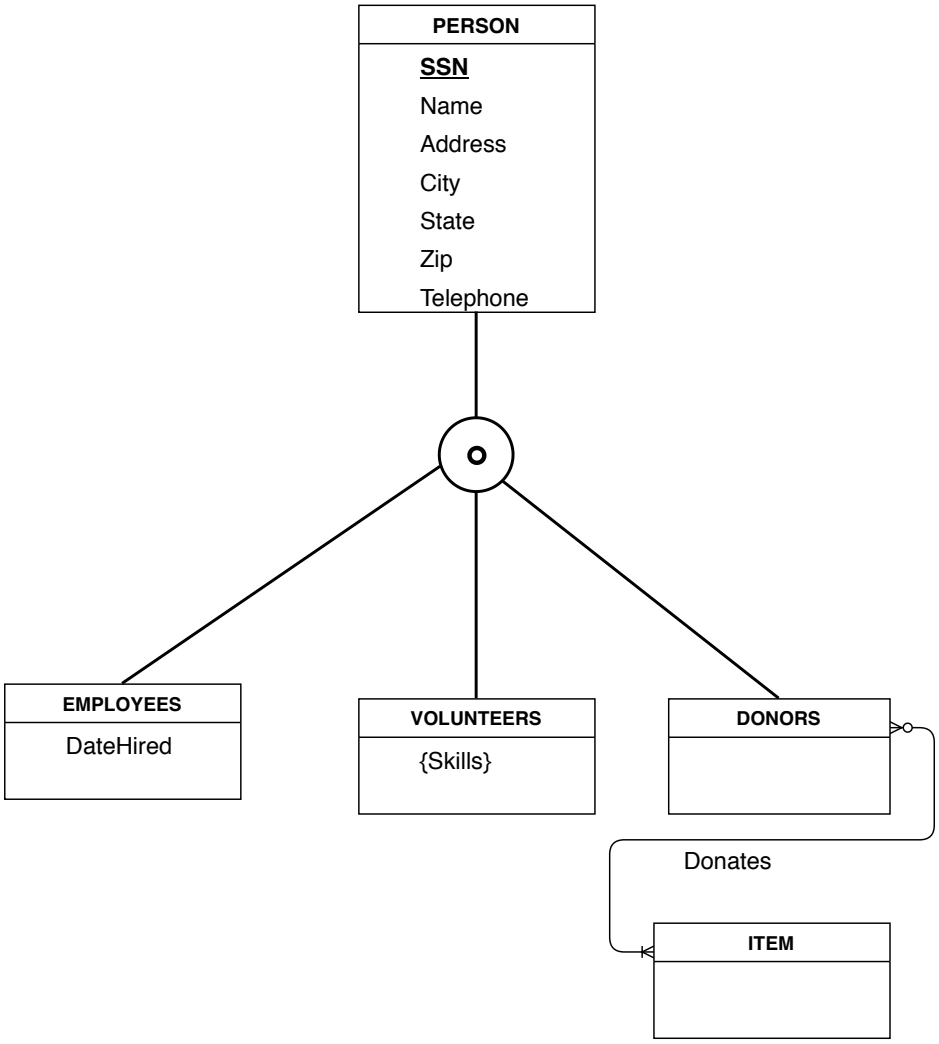


12. A nonprofit organization depends on a number of different types of persons for its successful operation. The organization is interested in the following attributes for all of these persons: SSN, Name, Address, City/State/Zip, and Telephone. Three types of persons are of greatest interest: employees, volunteers, and donors. Employees have only a Date Hired attribute, and volunteers have only a Skill attribute. Donors have only a relationship (named Donates) with an Item entity type. A donor must have donated one or more items, and an item may have no donors, or one or more donors.
There are persons other than employees, volunteers, and donors who are of interest to the organization, so that a person need not belong to any of these three groups. On the other hand, at a given time a person may belong to two or more of these groups (e.g., employee and donor).

Answer is below:



Below I have added same diagram as object PDF which I have created and exported from draw.io application


PERSON
SSN
Name
Address
City
State
Zip
Telephone
EMPLOYEES
DateHired
VOLUNTEERS
{Skills}
DONORS
Donates
ITEM