

## IS 475/675 – HW #1

---

Answer the questions below. Bring two paper copies of your homework answers to class – one to turn in for grading and one to use for notes during class. You will turn in the grading copy at the beginning of class and then use the other copy as a reference during class. This assignment should be turned in on paper.

1. Refer to the data model for the Pine Valley Furniture Company in your Modern Database Management text. That data model is Figure 2-22 on pg. 94 of the 11<sup>th</sup> edition of the text. If you don't have your book yet, the data model is available on the link "Pine Valley Data Model" in the same cell on the schedule where you found this assignment. Answer the questions below about that data model.
  - a. Identify a strong entity on the data model. Provide one reason why you think it is a strong entity.
  - b. Identify a weak entity on the data model. Provide one reason why you think it is a weak entity.
  - c. What is the purpose of the Works In entity?
  - d. The Works In entity has two binary relationships – one with the WORK CENTER entity and one with the EMPLOYEE entity. Look at the cardinalities of those two relationships and explain in words the meaning (business relationship) of those two binary relationships.
  - e. All entities should have a primary key, even though this diagram shows many entities without primary keys. What would be an appropriate primary key for the Works In entity? Explain why you chose that primary key for the Works In entity.
  - f. The Works In entity has no attributes on the data model. Name at least one non-key attribute that you believe might be stored in that entity.
  - g. Make up three sample rows of data each for the WORK CENTER, EMPLOYEE and Works In entities. If you don't understand what I mean by "sample data," refer to the first week exercise, questions 8, 9, 10 that we completed in class. If you weren't in class, then look at figure 1-16 of your text.
  - h. Identify a composite attribute on the diagram. Explain why you think it is a composite attribute.
2. Use the business rules below to complete the entity-relationship diagram shown on the next page. Identify and write all attributes in the entities as well as the relationships between the entities, the relationship cardinalities, and the foreign keys. Do NOT add any entities to the diagram. Decide which attributes should be primary keys and foreign keys for each entity and put those in the correct place on the diagram. Remember to include relationship verbs for all relationships. The database will be used to store donations made to multiple charitable organizations. Each donation is of a given type such as cash, clothes, household goods, stocks, or real estate. The database will be owned by an organization hired to keep track of donations and donors for many different charitable organizations. If you need to make assumptions about business rules other than the ones provided below, be sure to write those assumptions on your answer.
  - A charitable organization is uniquely identified by an OrganizationID. For each charitable organization, the database should keep track of the name of the organization and its address. The address is in the U.S. so it should include the common attributes of a U.S. address.
  - A donor is uniquely identified by a DonorID. For each donor, the database should keep track of the donor name and phone number.
  - A donation type is uniquely identified by a TypeID. The database should keep track of the name and description for each donation type.
  - A donation is of one donation type, made by one donor, and received by one charitable organization. A donor could potentially make multiple donations, and a donor must have made at least one donation to be included in the database. A charitable organization could potentially receive multiple donations, and a charitable organization must have received at least one donation to be included in the database. A donation type could potentially be related to multiple donations, but a donation type does not have to be related to any donations to be included in the database.
  - Each donation has a unique donationID. For each donation, the database should store the date of the donation and the donated dollar value of the donation.

CharitableOrganization	
PK	

Donor	
PK	

Donation	
PK	

DonationType	
PK	

Create a logical ERD for the two problems below (#3-#4) using the crow'sfoot notation discussed in class. Be sure that each entity is a box with the name of the entity at the top of the box, the primary key attribute or attributes in the middle of the box, and the non-primary key attributes and foreign keys in the bottom of the box. Lines should separate each part of the entity box. Each entity must have a primary key defined. A primary key may consist of one or more attributes.

The final ERD submitted for grading should not include any M:N relationships and all attributes should be placed within an entity. Each relationship should have at least one relationship verb or verb phrase. Please include all required foreign keys and denote the foreign key(s) with the notation (FK) on the ERD.

Do not use Visio for this assignment, but please make sure the ERDs are readable. I provide some sample data to help you understand the type of data that would be stored in the database.

3. Design a database for a landscaping company to help keep track of their contracts. Each contract has a unique contract number, a date that the contract was signed, and a contract amount. Each contract is also of a given type. A contract can only be of one type. Each contract is with only one customer. A contract must have a customer and a contract type. A customer has an identifier, a CustomerName, a phone number, a city and a state. A customer may be stored in the database even if the customer does not currently have a contract. A contract type may be stored in the database even if the contract type is not currently related to a contract. Sample data for this database is provided below.

Contract Number	Contract Amount	Signing Date	Contract TypeID	Contract Type	Customer ID	CustomerName	Phone	City	State
3020	\$6,500.00	1/19/2016	A100	Landscape Design	11055	Fox and Hound Grille	269-979-2004	Battle Creek	MI
3048	\$7,500.00	9/23/2015	A120	Playground Design	11030	Finn's on the Waterfront	616-393-1228	Holland	MI
3065	\$38,000.00	1/3/2016	A120	Playground Design	11079	Dept. of Neighborhood Development	616-940-3380	East Grand Rapids	MI
3069	\$15,750.00	2/24/2015	A100	Landscape Design	11030	Finn's on the Waterfront	616-393-1228	Holland	MI
3070	\$35,000.00	3/3/2015	A100	Landscape Design	11079	Pleasant Development	616-940-3380	Flint	MI
3071	\$37,000.00	12/11/2015	C200	Landscape Maintenance	11059	G.R. Neighborhood Development	616-392-0015	Grand Rapids	MI
3072	\$46,000.00	1/11/2016	B610	Landscape Renovation	11059	G.R. Neighborhood Development	616-392-0015	Grand Rapids	MI
3075	\$16,500.00	1/8/2016	A120	Playground design	11067	Blossom Day Care Center	269-985-1992	Saint Joseph	MI
3077	\$6,500.00	5/17/2015	A100	Landscape design	11058	Cherrywood Senior Center	269-857-1771	Saugatuck	MI
3078	\$13,750.00	9/25/2015	A100	Landscape design	11020	Battle Creek Dental Partners	269-963-0808	Battle Creek	MI
3080	\$22,800.00	4/14/2015	A100	Landscape Design	11030	Finn's on the Waterfront	616-393-1228	Holland	MI
3081	\$21,000.00	10/10/2015	A100	Landscape design	11071	Blue Star Mini Golf	269-857-4424	Saugatuck	MI
3090	\$25,500.00	6/14/2015	B720	Playground renovation	11079	Dept. of Neighborhood Development	616-940-3380	East Grand Rapids	MI
3099	\$6,500.00	7/25/2015	A100	landscape design	11067	Blossom Day Care Center	269-985-1992	Saint Joseph	MI
3101	\$9,500.00	8/24/2015	C200	Landscape Maintenance	11030	Finn's on the Waterfront	616-393-1228	Holland	MI
3109	\$41,000.00	1/18/2016	A100	Landscape Design	11059	G.R. Neighborhood Development .	616-392-0015	Grand Rapids	MI
3110	\$38,000.00	8/25/2015	B720	Playground renovation	11079	Pleasant Development	616-940-3380	Flint	MI

4. Design a database to keep track of the room assignments and instructors for courses scheduled at a university. A college course (like IS201) could be taught by many instructors and an instructor could teach many courses. A section of a course, however, is taught by one instructor. A course may have one or more scheduled sections, or may not have a scheduled section. Attributes of COURSE include courseID, coursename, and credits. A courseID is a unique value for a given course. Attributes of a SECTION of a course include courseID, sectionID, semester, and year. A given section of a course is taught by only one instructor. An INSTRUCTOR is identified by an instructorID. Additional information we want to store about an instructor includes the lastname, firstname, and officenumber of the instructor. We want to store the roomID where a section of a course will be taught.

Sample data for this application system is provided below.

CourseID	Course Name	Credits	SectionID	Semester	Year	Instructor ID	Last Name	First Name	Office	RoomID
IS201	Computer Applications	3	1	SP	2016	4902	Smith	James	AB222C	AB109
IS201	Computer Applications	3	2	SP	2016	4902	Smith	James	AB222C	AB205
IS201	Computer Applications	3	3	SP	2016	6531	Ng	Ngyuen	AB231	WRB2033
IS201	Computer Applications	3	1	SU	2016	4902	Smith	James	AB222C	AB212
IS201	Computer Applications	3	2	SU	2016	4902	Smith	James	AB222C	AB109
IS475	Database Design	3	1	FA	2015	7811	Edberg	Dana	AB314D	AB109
IS201	Computer Applications	3	4	SP	2016	7811	Edberg	Dana	AB314D	SEM234
IS482	Data Resource Mgmt	3	1	SP	2016	7811	Edberg	Dana	AB314D	CFA14