Introduction

This assignment allows students to demonstrate their skills in designing relational databases to satisfy specific business rules and requirements. The deliverables for this assignment include an Entity Relationship Diagram and detailed documentation describing the database design and structure.

In this assignment, you will be provided with a description of an application below to create a properly formatted entity-relationship diagram (ERD) and design accompanying table layout using sound relational modeling concepts and practices. The relationships between the entities and the attributes for the entities will be identified and described. This database will provide the foundation for the follow-on assignment. The following paragraphs provide the background and summary of the business requirements.

Scenario

You are a database consultant with Ace Software, Inc. and have been assigned to develop a database for the Acme video store here in town. The owners have been keeping their records of VHS tapes and DVDs purchased from distributors and rented to customers in stacks of invoices and piles of rental forms for years. They have finally decided to automate their record keeping with a relational database. You sit down with the owners to discuss their business, and watch their operation for about a week. You discover quickly that a VHS and a DVD are both copies of a movie kept in a separate plastic case that is rented out. They have several copies of each movie they rent therefore there are several VHSs and DVDs for each movie title. You learn that in their inventory they have several thousand VHSs and DVDs, which they get wholesale from about a half dozen distributors. The VHS and DVD prices to them are based on the quantity of their shipment and the past business they have done with each company.

The price of a DVD for a movie might be different than the price of a VHS for the same movie, even from the same distributor. Each distributor provides different types of movies (e.g., suspense, horror,

mystery, comedy, etc.). A single distributor may provide several different types of movies in both VHS and DVD format. It is possible to obtain the same movie from multiple distributors, and at different wholesale prices.

Each VHS and DVD has a unique identification number that the owners assign in their inventory, in addition to the distributor's serial number for the item. Each movie also has a unique identification number the owners assign in addition to the title, and any movie IDs the distributors use in their electronic catalogs. Distributors provide electronic catalogs to the owners and the information from these catalogs must be included in the database.

The owners need to record when a VHS or DVD is rented, when a VHS or DVD is returned, and all customer charges such as late and damaged fees, failure to rewind fees, and taxes. They need a report of which videos are returned late because there are standard and late charges. On occasion there are discount prices for certain movies or types of movies. Customers may want to rent movies based on actors or actresses, running length, type of movie, rating, year released, the director, and the academy awards won (by the movie, the actors, the actresses and/or the directors). Customers also want to know how many videos they have rented in the last month, year, and so forth. The owners need to keep only basic information on customers in their database, such as name, address, telephone numbers, etc.

There must be no limit to the number of VHS and/or DVD copies of a movie that the owners can have in their inventory. VHS/DVD ID numbers, movie ID numbers, and distributor ID numbers for VHSs, DVDs, and movies are all different. Also, each movie must be able to have an unlimited number of actors, actresses, directors, and academy awards (i.e., Oscars). Other types of awards (e.g., Golden Globe, People's Choice, etc.) are not of interest for this application. The rental of equipment, sale of VHSs, DVDs, popcorn, etc., is not to be kept in the database.

Directions:

Using this information, you should:

1. Review the course content that contains information about:

   a. Review the differences between a Conceptual Model, a Logical Model and a Physical Model (keep in mind that for this assignment, we are addressing a Physical Model).

   b. Review the readings about entities (later to become tables), their attributes (later to become fields), and the relationships that provide the linkage between pairs of entities.

   c. Review what a key attribute is for an entity, as this is the main mechanism that can associate one entity to another, as a primary way of doing this in an RDBMS.

   d. Briefly describe the new database system and how all of these details will come together.

2. For your data model:

   a. First, determine a list of entities needed for the Acme video store database.

   b. Second, determine a list of 'preliminary' or identifying attributes for each of your entities. These are noted as 'preliminary' as you may decide to later change/modify the list of attributes in each entity. Be sure to also identify a key field for each entity.

   c. Third, create relationship sentence pairs between those entities that are related. You should not have any many-to-many relationships. Hint: If you do have many-to-many relationships in your preliminary design, you will need to break these down and use an association/intersection/bridge entity.

3. Draw an ER model in **crow's foot notation** using an ER tool.

   a. Be sure to create this model using some automated tool for that purpose, preferably one of those provided in the content area. Please do not draw this model by hand.

   b. This model should show all your entities, attributes, datatypes, and relationships.

c. Keep in mind that all entities should be related to at least one other entity demonstrating referential integrity.

d. Your ERD should have all one-to-many relationships and must not have any many-to-many relationships.

e. Develop the ERD and save your work. This may take a few revisions before you get the model to your perfection. Shown below is an Example ERD using the crow's foot notation. Please note that the following model DOES NOT FULLY represent the Acme video store. This example demonstrates a model that contains (a) entities, (b) attributes, (c) key fields/attributes for each entity, and (d) the relationships that exist between each pair of entities. For this assignment, create either a model that represents YOUR Acme video store. Note that the model below does not show the Foreign Keys. For your model, be sure to include the FKs in the related entity.
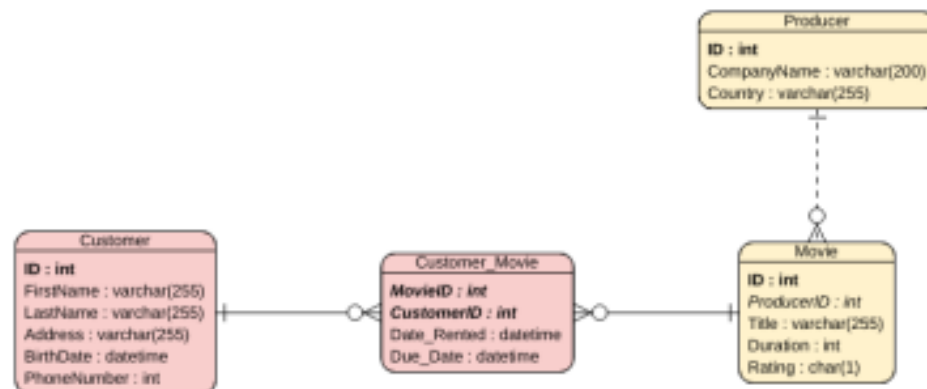

Figure 1: Example ERD

4. Create 'metadata' (e.g., data about data) that describes each entity along with the attributes in the ERD. This should be done in a charted format that identifies the entity name, each of its attributes, attributes that are Primary Keys or Foreign Keys, the data types, and a description of each. Keep in mind that metadata is typically kept in a "data dictionary" for a given project in

the organization, but we'll simply use a spreadsheet for this assignment. Please pay particular

attention to the description of all primary key (via "PK") and foreign key (via "FK") columns, as

these support the relationships that are designed between tables. A 'starter' example of the

metadata is shown below. EXPAND on this example to fully describe the entities, attributes, and

relationships in your database. (See the readings for this week).

Acme Video Rental				
Entity Name	Attributes	PK/FK?	Data Types	Description
Producer	ProducerID	PK	NUMBER	Primary Key for Producer Entity
	Producer Name		VARCHAR2(50)	Producer Name
	Production Company		VARCHAR2(50)	Production company name
Movie	MovieID	PK	NUMBER	Primary Key for Movie entity
	ProducerID	FK	NUMBER	FK for Movie Producer
	Title		VARCHAR2(250)	Movie Title
	Duration		NUMBER	Movie length
	Rating		CHAR(1)	Movie Rating
Customer	CustomerID	PK	NUMBER	PK for Customer entity

5. Submit a *single* Word document containing two parts:

   a. A detailed description of this designed database system

   b. An embedded screenshot of the ERD

   c. Do not upload separate image files to the assignment folder. There should be only one

      document submitted.

6. Do not upload individual images or Excel files.

Grading Rubric

Attribute	Meets	Does not meet
Entities/Attributes Database description	20 points Student identifies a large potential set of entities and their attributes for the application and the description	0 points Major problems with identification of entities and their attributes and description
Relationship Sentence Pairs	20 points Student properly formats all required relationship sentence pairs to describe one-to-many relationships	0 points Major problem with development of relationship sentences
ERD	40 points ERD properly includes and depicts all entities, attributes and relationships identified	0 points ERD is missing many items and/or has major problems with relationships
Metadata	20 points Spreadsheet of table specification metadata properly includes all tables, their columns, and all required details for the columns	0 points Major omissions for table specification metadata