**ARINDA HILLARY**

**DBMS**

**ASSIGNMENT 4: ERM**

**3/3/2024**

1. [5] **Gains, Inc. is a LLC that owns many companies.  Create an ER diagram for each of the following descriptions:**  
   1. Each company operates with four departments, and each department belongs to one company.  
      ANS:

A black screen with white text

Description automatically generated

1. Each department in part (a) employs one or more employees, and each employee works for one department.  
   ANS:

A black and white text on a black background

Description automatically generated

1. Each of the employees in part (b) may or may not have one or more dependents, and each dependent belongs to one employee.  
   ANS:

A black screen with white text

Description automatically generated

1. Each employee in part (c) may or may not have an employment history.  
   ANS:

A black screen with white text

Description automatically generated

1. Represent all the ER diagrams described in (a), (b), (c), and (d) as a single ER diagram.  
   ANS:

A computer screen shot of a diagram

Description automatically generated

**2.**[5] **Create an ER model based on the following descriptions.**

1. A patient can make many appointments with one or more doctors in the clinic and a doctor can accept appointments with many patients. However, each appointment is for a patient and is with one doctor.
2. If kept, an appointment yields a visit with the doctor specified in the appointment and that in turn results in a diagnosis and, when appropriate, treatment.
3. Each visit updates the patient’s medical history.
4. Each visit creates a bill.
5. A bill may be paid in many installments. However, each payment is properly recorded.
6. A patient can make payment by himself or through the insurance company. If the insurance company pays, the patient is responsible for the deductibles only.

ANS:

A paper with writing on it

Description automatically generated

1. [5] **Solve exercise 12.12 from the 6th edition (page 383)(431).  If time permits, solve from a-f. Otherwise, it’s ok if you just solve f.**  
   ANS:

**﻿**Read the following case study, which describes the data requirements for a DVD rental company. The DVD

rental company has several branches throughout the United States. The data held on each branch is the branch

address made up of street, city, state, and zip code, and the telephone number. Each branch is given a branch

number, which is unique throughout the company. Each branch is allocated staff, which includes a Manager. The

Manager is responsible for the day-to-day running of a given branch. The data held on a member of staff is his

or her name, position, and salary. Each member of staff is given a staff number, which is unique throughout the

company. Each branch has a stock of DVDs. The data held on a DVD is the catalog number, DVD number,

title, category, daily rental, cost, status, and the names of the main actors and the director. The catalog number

uniquely identifies each DVD. However, in most cases, there are several copies of each DVD at a branch, and

the individual copies are identified using the DVD number. A DVD is given a category such as Action, Adult, Children, Drama, Horror, or Sci-Fi. The status indicates whether a specific copy of a DVD is available for rent. Before

borrowing a DVD from the company, a customer must first register as a member of a local branch. The data

held on a member is the first and last name, address, and the date that the member registered at a branch. Each

member is given a member number**, which is unique throughout all branches of the company**. Once registered,

a member is free to rent DVDs, up to a maximum of ten at any one time. The data held on each DVD rented

is the rental number, the full name and number of the member, the DVD number, title, and daily rental, and the

dates the DVD is rented out and returned. The DVD number is unique throughout the company.

1. Identify the main entity types of the DVD rental company.

* **Branch**
* **Staff (including Manager)**
* **DVD**
* **Member (Customer)**
* **DVD Rental (weak entity)**

(b) Identify the main relationship types between the entity types described in part (a) and represent each

relationship as an ER diagram.

* Branch - Staff (including Manager): A branch is associated with multiple staff members, and a staff member works at one branch.

A diagram of a company

Description automatically generated

* Branch - DVD: A branch has multiple DVDs, and a DVD is available at one branch.

A diagram of a company

Description automatically generated

* Member – DVD : A member can rent up to 10 DVDs at a time and this relationship derives a DVD rental relationship

A diagram of a company

Description automatically generated

* Branch - Member: A branch has multiple members registered, and a member is registered at one branch.

A paper with text on it

Description automatically generated

﻿(c) Determine the multiplicity constraints for each relationships described in part (b). Represent the multiplicity

for each relationship in the ER diagrams created in part (b).

* **Branch - Staff (including Manager): One branch to many staff members (1:\*)**
* **Branch - DVD: One branch to many DVDs (1:\*)**
* **Member - DVD Rental: One member to many DVD rentals (1:10) with the constraint that a member can have up to a maximum of ten active rentals at any one time.**
* **DVD - DVD Rental: One DVD to many DVD rentals (1:\*)**
* **Branch - Member: One branch to many members (1:\*)**

(d) Identify attributes and associate them with entity or relationship types. Represent each attribute in the ER

diagrams created in (c).

* **Branch (BranchNumber, Address (Street, City, State, ZipCode), TelephoneNumber)**
* **Staff (StaffNumber, Name, Position, Salary)**
* **DVD (CatalogNumber, DVDNumber, Title, Category, DailyRental, Cost, Status, MainActors, Director)**
* **Member (MemberNumber, FirstName, LastName, Address, RegistrationDate, RegisteredBranchNumber)**
* **DVD Rental (RentalNumber, MemberFullName, MemberNumber, DVDNumber, DVDTitle, DailyRental, RentedOutDate, ReturnedDate)**

(e) Determine candidate and primary key attributes for each (strong) entity type.

* **Branch: BranchNumber (Primary Key)**
* **Staff: StaffNumber (Primary Key)**
* **DVD: CatalogNumber, DVDNumber (Composite Primary Key)**
* **Member: MemberNumber (Primary Key), RegisteredBranchNumber (Foreign Key)**
* **DVD Rental: RentalNumber (Primary Key), MemberNumber (Partial Key), DVDNumber (Partial Key)**

(f) Using your answers to parts (a) to (e), attempt to represent the data requirements of the DVD rental company as a single ER diagram. State any assumptions necessary to support your design.

A diagram of a company

Description automatically generated

**Assumptions**

* **A manager is considered a staff member with a specific position (e.g., "Manager" is one of the possible values for the "Position" attribute in the Staff entity).**
* **A DVD can belong to only one category (e.g., "Action", "Adult", "Children", "Drama", "Horror", or "Sci-Fi").**
* **The status of a DVD (available or not available) is stored as an attribute in the DVD entity and is updated based on the DVD Rental information.**
* **The registered branch for a member is stored as a foreign key (RegisteredBranchNumber) in the Member entity, linking it to the Branch entity.**
* **The DVD Rental entity is a weak entity, dependent on both the Member and DVD entities, and its partial keys are MemberNumber and DVDNumber.**
* **The RentalNumber attribute in the DVD Rental entity is unique for each rental transaction and serves as its primary key.**