Answer Database Management System
Year 2, Semester 2
2022

1-   Data Discuss the meaning of each of the following terms:

     a. Database

     b. DBMS

     c. Application program

     d. Database System

     e. Data independence

     f. Views

     g. Meta-data

Answer

1.   - Data Discuss the meaning of each of the following terms:

- ❖ **DATABASE** Database organized collection of logically related data.
- ❖ **DBMS** is a software system that is used to create, maintain, and provide controlled access to user databases
- ❖ **DBMS** ប្រព័ន្ធកម្មវិធីដែលត្រូវបានបង្កើតឡើង
- ❖ **Application program** A software program that interacts with the database by issuing an appropriate request (typically an SQL statement) to the DBMS.
- ❖
- ❖ **DATABASE SYSTEM:**

Database System =DBMS+Database
The DBMS software together with the data itself. Sometimes, the applications are also included:
- • Oracle Corporation- Oracle, MySQL
- • Microsoft - Access, SQL Server
- • IBM – DB2,
- • MangoDB,
- • PostgreSQ,…

- ❖ **Meta-data:** Description of fields Display and format instructions Structure of files and tables Security and access rules Triggers and operational rules.
.Descriptions of the properties or characteristics of the data, including data types, field sizes, allowable values, and data context.

2. List some advantages of DBMS

Answer

Using DBMS to manage data has many advantages

- • Unlimited Data Storage

- Provide Multiple users can concurrently access
- Data integrity
- Data administration
- Reduced application development time
- Backup and crush recovery

3. Describe the five components of the Database System environment and discuss how they relate to each other.

<p align="center">Answer</p>

Five components of Database

- hardware: can range from a pc to a network of computer
- Software: DBMS, operating system, network software (if necessary) and also the application programs
- Data: used by the organization and a description of this data called the schema.
- User: include database designers, DBMS, application programmers, and end-users
- procedure: instructions and rules that should be applied to the design and use of the database and DBMS.

4. Explain the three type of database architecture as below:

    a. Single-tier architecture(all called Desktop application)

    b. Two-tier architecture(all called Client/server application)

    c. Three-tier architecture(all called Distributed database system)

<p align="center">Answer</p>

Explain the three type of database architecture

✓ single -tier: all on one machine access by terminal

✓ two-tier: server with many client

✓ three -tier: two king o DBMS connected by Middleware.

5. What is distributed database? Descript the reason why use the distributed database

<p align="center">Answer</p>

A distributed database is a database that consists of two or more files located in different sites either on the same network or on entirely different networks.
- Distributed databases offer location transparency of data with local autonomy.

6- Describe the main phases involved in database design.

<p align="center">Answer</p>

Two main phrases: logical and physical database design.

- Logical database design is the process of constructing a model of data used in an organization based on a specific data model, but independent of a particular DBMS and other physical considerations.
- Physical database design is the process of producing a description of the implementation of the database on the secondary storage; it describes the base tables, file organizations, and indexes used to achieve efficient access to the data, and any associated integrity constraints and security restrictions.

7-   Identify important factors in the success of database design.

Answer

The important factors in the success of database design are work interactively with the users as much as possible. Follow a structured methodology throughout the data modeling process. Employ a data-driven approach. Incorporate structural and integrity considerations into the data models.

8-   Discuss the main activities associated with each step of the logical database design methodology.

Answer

There are 8 main activities associated steps of the logical database design methodology.
- Step 1: Create and check ER model
- Step 2: Map ER model to tables
- Step 3: Translate logical database design for target DBMS
- Step 4: Choose file organizations and indexes
- Step 5: Design user views
- Step 6: Design security mechanisms
- Step 7: Consider the introduction of controlled redundancy
- Step 8: Monitor and tune the operational system.

9-   What are five main functions of a database administrator?

Answer

Five main functions of a database administrator are:
- To create the scheme definition
- To define the storage structure and access methods
- To modify the scheme and/or physical organization when necessary
- To grant authorization for data access
- To specify integrity constraints

10-   What is data modeling? Why is it important?

Answer

Data modeling is the analysis of data objects that are used in a business.
- Because Data modeling focuses on representing the data as the user actually sees it, bridging between the concepts that make up real-world events.

11-   Describe the definition of words that are used in relation database below:
   a. Foreign key

b. Key attribute
c. Composite Key
d. Candidate Key
e. Atomic/simple attribute
f. Composite attribute
g. Multivalued attribute
h. Single Valued attribute
i. Derived attribute
j. Stored attribute

<u>Answer</u>

Foreign Key: A foreign key is a set of attributes in a table that refers to the primary key of another table.

- Key attribute: An attribute of an entity types for which each entity must have a unique value is called a key attribute of the entity type.
- Composite Key: is a candidate key that consists of two or more attributes (table columns) that together uniquely identify an entity occurrence (table row).
- Candidate key: is any field that could serve as a primary key.
- Atomic/simple attribute: is attribute that are not divisible are called simple or atomic attributes.
- Composite attribute: Composite attribute is an attribute where the values of that attribute can be further subdivided into meaningful sub-parts.
- Multivalued attribute: is an attribute that can have more than one value associated with the key of the entity.
- Single valued attribute: is an attribute that can have only a single value.
- Derived Attribute: the attributes that do not exist in the physical database, but their values are derived from other attributes present in the database.
- Stored Attribute: is an attribute which are physically stored in the database.

12-   Explain and show example the following terms briefly:

- Attribute
- Domain
- Entity type
- Strong entity type
- Weak entity type

- Participation constraint
- Relationship
- One-to-One relationship
- One-to-many relationship
- Many-to-many relationship

❖ **Attribute:** Each entity has a set of associated properties that describes the entity. These properties are known as attributes.
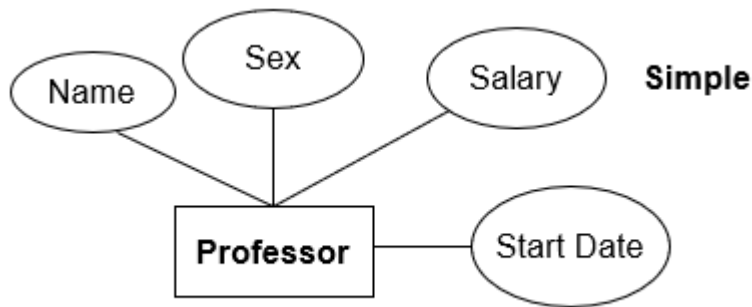
❖ **Domain:**
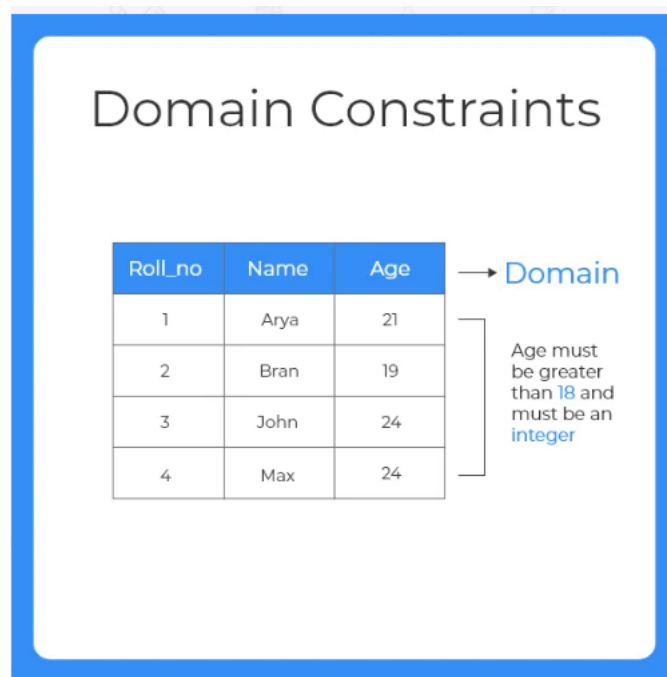
❖ **Entity type:** Entities with the same basic attributes are grouped or typed into an entity type.

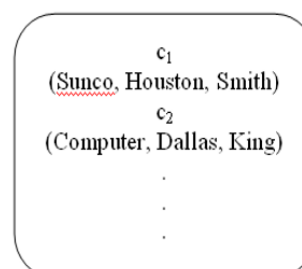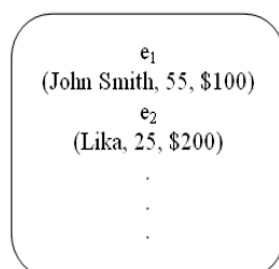- For example, the entity type EMPLOYEE and COMPANY.

❖ **Strong entity type :**A strong entity is not dependent on any other entity in the schema.
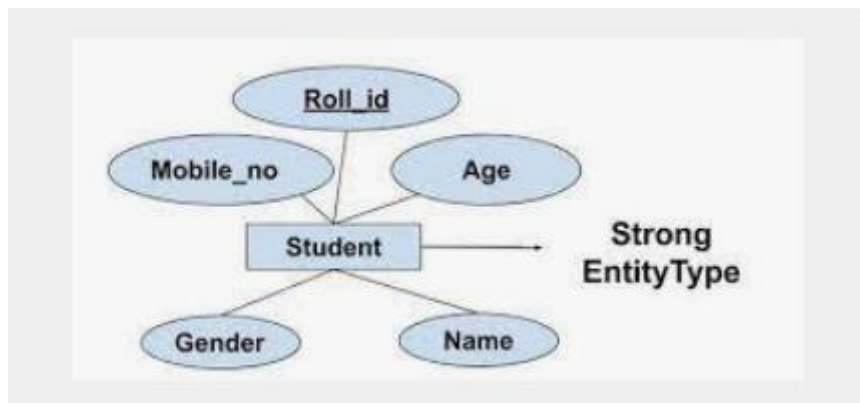
❖ **Weak entity type**: Weak entity types are those whose existence depends on the existence of other entity type. The weak entity type does not have key attributes of their own. The keys of this type totally derived from strong entity types.
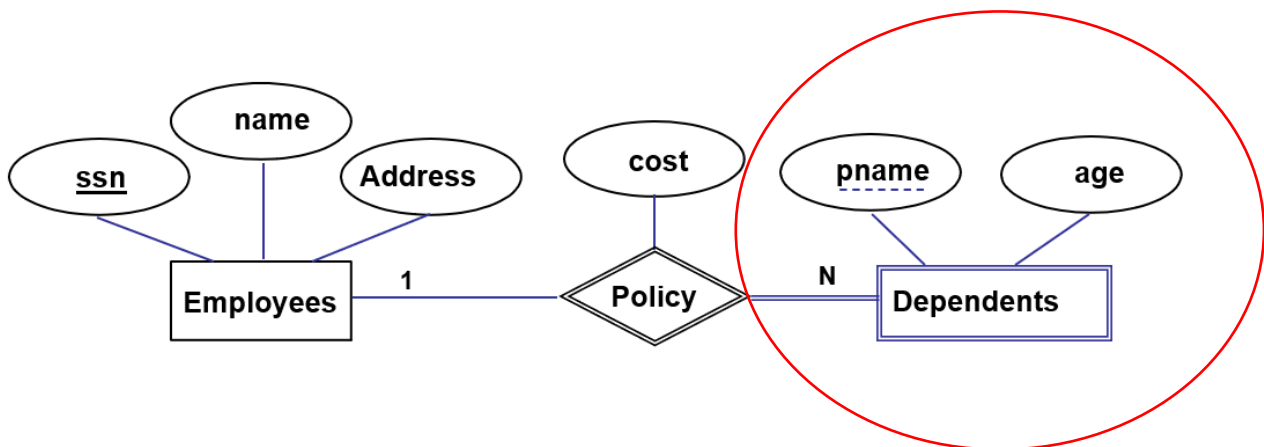
❖ **Participation constraint:** The participation constraint specifies the number of instances of an entity can participate in a relationship set.
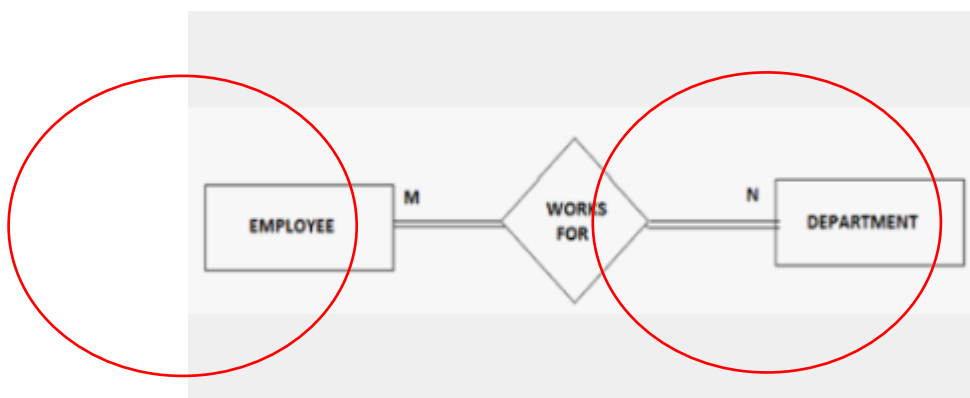
❖ **Relationship:** A relationship relates two or more distinct entities with a specific meaning.
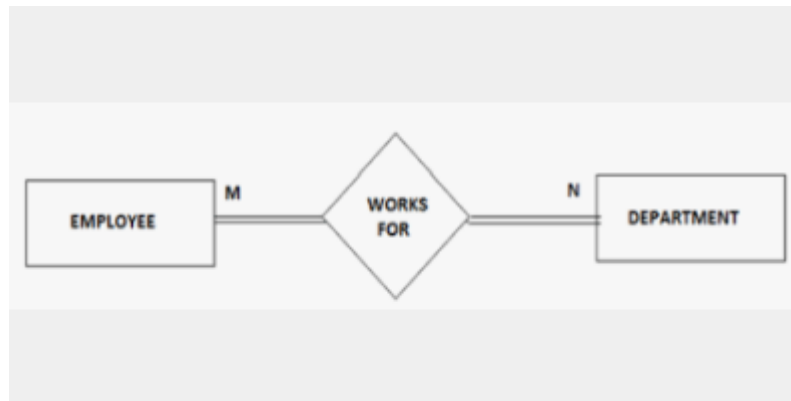
❖ **One-to-One relationship**
 In a one-to-one relationship, one <u>record</u> in a <u>table</u> is associated with one and only one record in another table.

Example: An employee if is a manager then can manage one department and a department can have only one manager.

❖ **One-to-many relationship**
 In a one-to-many relationship, one <u>record</u> in a <u>table</u> can be associated with one or more records in another table.

Example: There are many employees work in a department, A department there are many employee work in.

❖ **Many to many relationships:**

A many-to-many relationship exists when one or more items in one table can have a relationship to one or more items in another table

Example: An employee can join in several projects and a project can have several employees.

13- Discuss the differences between the candidate keys and the primary key of a table. Give examples to illustrate your answer.

<div align="center">Answer</div>

Primary Key is a unique and non-null key which identify a record uniquely in table. A table can have only one primary key. Candidate key is also a unique key to identify a record uniquely in a table but a table can have multiple candidate keys. Primary key column value cannot be null.
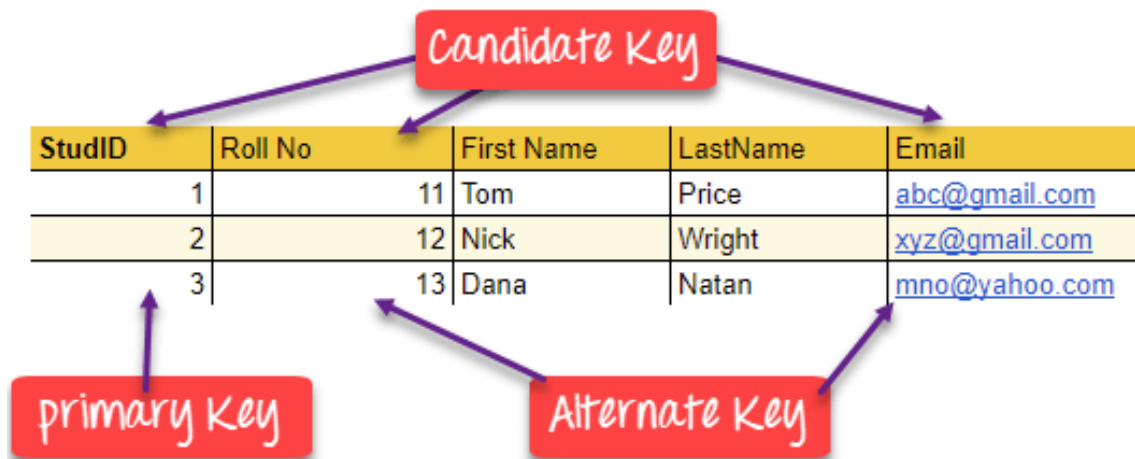
14- Describe what relationships represent in an ER model and provide examples of unary, binary, and ternary relationships.

<div align="center">Answer</div>

Describe what relationships represent in an ER model and provide examples of unary, binary, and ternary relationships.

- A unary relationship is when both participants in the relationship are the same entity.
  For Example:
  Subjects may be prerequisites for other subjects.
- A binary relationship is when two entities participate and is the most common relationship degree.
  For Example: teacher and subject
- A ternary relationship is when three entities participate in the relationship.
  For Example:
  The University might need to record which teachers taught which subjects in which courses.

15- Identify important factors in the success of database design.

<div align="center">Answer</div>

The important factors in the success of database design:
- Work interactively with user as much as possible.
- Follow a structured methodology throughout the date modeling process.

- Employ a data-driven approach.
- Incorporate structural and integrity.
- Combine conceptualization, normalization, and transaction validation techniques into the data modeling methodology.

Suppose that we have sample ERD (Entity Relationship Diagram) as picture below:
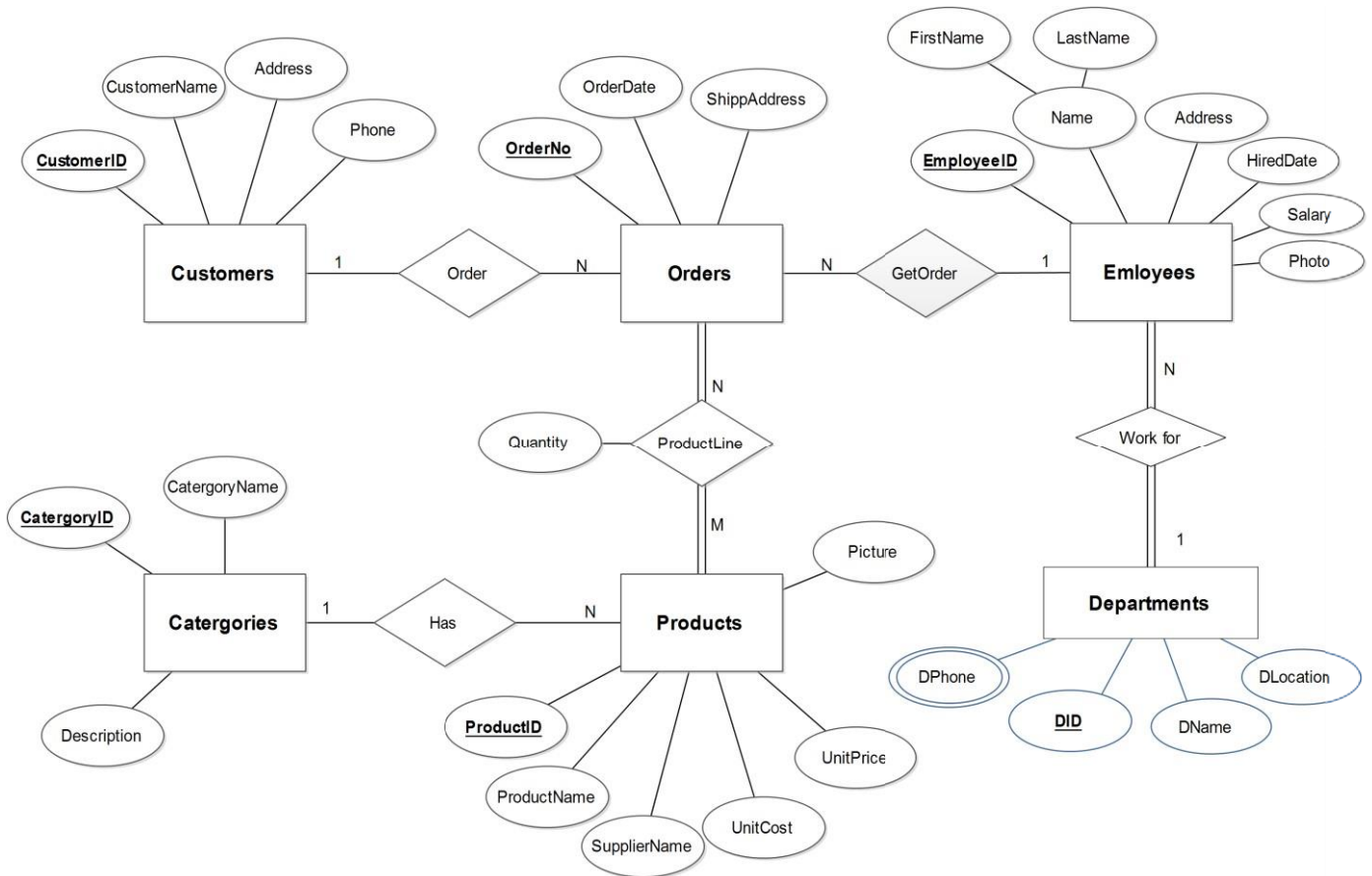
Problem

a. indicate which one is Strong, and weak entity, Explain why
b. Indicate which one is Key attribute, Simple, composite, multies value
c. Map this ERD to Relational Schema

a. indicate which one is strong, and weak entity, Explain, Why.

⇒. Customers, Orders, Employees, Categories, Products, Departments are strong entity.

+ ក្រុម entity ទាំងនេះ ជា strong entity ព្រោះវា ក្នុងក្រុម entity នីមួយៗ សុទ្ធតែមាន Primary key or key Attribute ជាវិធីម្យ៉ាង ។

b. Indicate which one is key attribute, Simple, composite, multies value

+ ចូលក្នុង ERD ទាំងនេះ key attribute មានដូច:
- CustumerID
- OrderND
- EmployeeID
- Category ID
- Product ID
- DID

+ ចូលក្នុង ERD simple មានដូច:
- Custumername
- Address
- Phone
- OrderDate
- Shippaddress
- Firstname
- Lastname
- Address
- Hiredate
- Salary
- Photo
- CategoryName
- Description
- Quantity
- ProductName
- SupplierName
- UnitCost
- UnitPrice
- Picture
-)Name   )Location

+ ចូលក្នុង ERD ទាំងនេះ composite មាន:
- Name

+ ចូលក្នុង ERD ទាំងនេះ multies value មាន:
-)Phone

C. Map this ERD to Relational Schema =
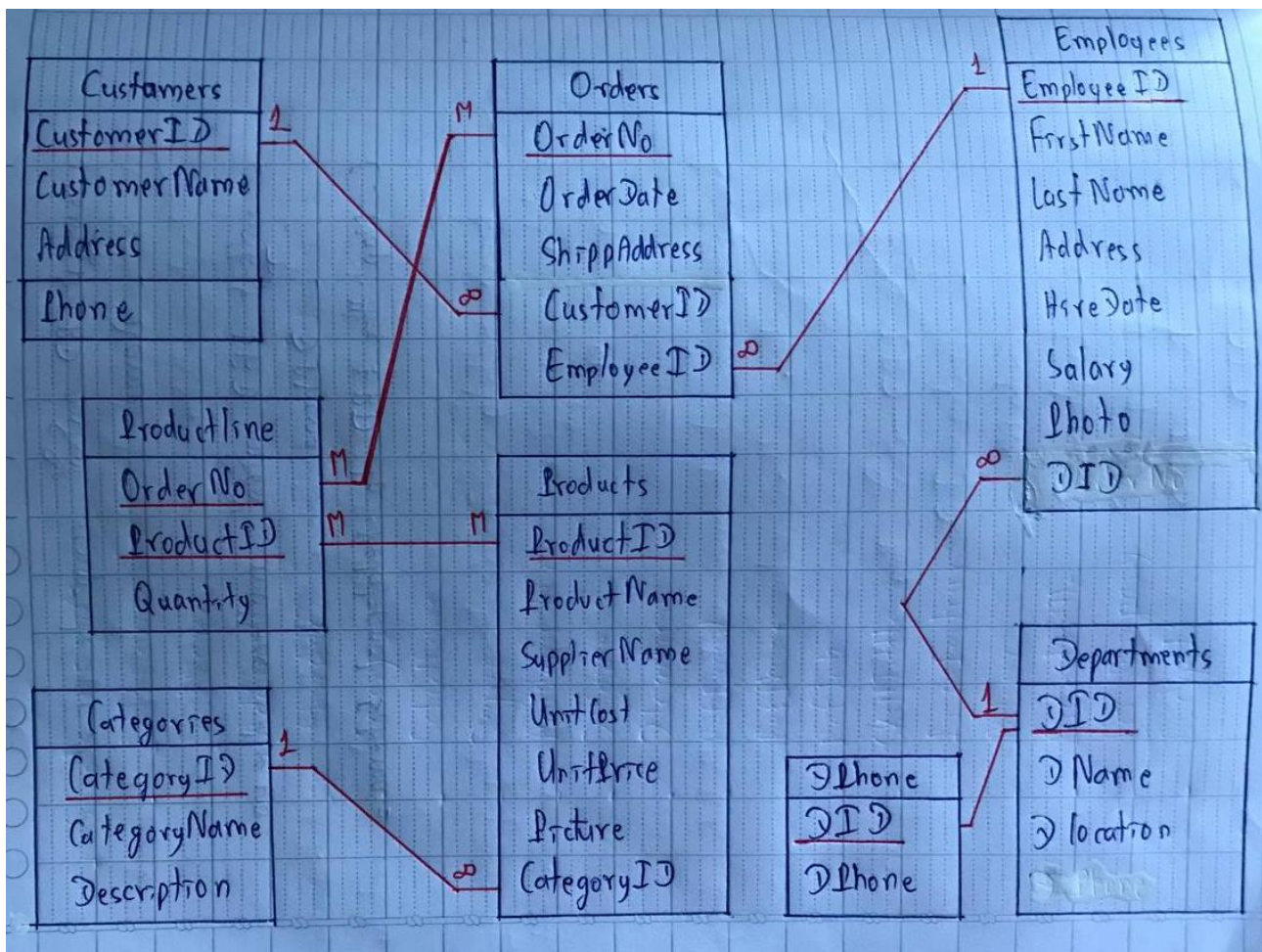
Customers
- CustomerID
- Customer Name
- Address
- Phone

Orders
- Order No
- Order Date
- Shipp Address
- CustomerID
- Employee ID

Employees
- Employee ID
- First Name
- Last Name
- Address
- Hire Date
- Salary
- Photo
- DID

Product line
- Order No
- ProductID
- Quantity

Products
- ProductID
- Product Name
- Supplier Name
- Unit Cost
- Unit Price
- Picture
- CategoryID

Categories
- Category ID
- Category Name
- Description

Departments
- DID
- D Name
- D location

- D Phone
- DID
- D Phone

17-Suppose that we have sample ERD (Entity Relationship Diagram) as picture below:

Problem

a. indicate which one is Strong, and weak entity, Explain why

b. Indicate which one is Key attribute, Simple, composite, single value, multies value Attribute

c. c. Map this ERD to Relational Schema

17. Suppose that we have sample ERD a picture below:

a. Indicate which one is strong, and weak entity, Explain:

- នៅ ERD ខាងលើ strong មានដូចជា:
    - Employees
    - Skills
    - Departments
    - Projects

- នៅ ERD ខាងលើ weak មានដូចជា:
    - References
    - Education

b. Indicate which one is key attribute
    + Key attribute
        - Employee ID
        - Skill code
        - Project ID
        - DID

Simple មានដូចជា:
    - First Name
    - Last Name
    - Address
    - Gender
    - Salary
    - School Name
    - Degree
    - Academic Year
    - DName
    - Dlocation
    - RefEmail
    - RefPhone
    - RefJob
    - SkillTittle
    - PricePerhour
    - NHour
    - Projecttittle
    - For_Company
    - Budget

Composite အချက် (composite)
- Name

Single value အချက် (single value)
- FirstName
- Last Name
- Address
- Gender
- Salary
- SchoolName
- Degree
- Academic Year
- DName
- DLocation
- RefEmail
- RefJob
- SkillTittle
- Price Perhour
- NHour
- Project tittle
- For Company   - Budget

+ multies value
- Phone
- 7Phone

C. Map this RED to Relational Schema

Education
- EMPID
- Major
- School Name
- Degree
- Academic Year

Employees
- Employee ID
- FirstName
- LastName
- Address
- Gender
- Salary
- DID

Departments
- DID
- DName
- Dlocation

Phone
- Employee ID
- Phone

Phone
- Phone
- DID
- Phone

References
- EID
- RefName
- RefPhone
- RefJob
- RefEmail

Apply
- EMPID
- Skillcode

Skill
- Skillcode
- SkillTittle
- PriceperHour

Work On
- Employee ID
- Project ID
- Skillcode
- NHour

Projects
- ProjectID
- ProjectTittle
- For_Company
- Budget
- DID

18- Suppose that we have sample ERD (Entity Relationship Diagram) as picture below:

Problem

  a. indicate which one is Strong, and weak entity, Explain why
  b. Indicate which one is Key attribute, Simple, and composite attribute
  c. Map this ERD to Relational Schema

Answer

(18) (ERD)

a. Indicate strong & weak entity:
+ Strong Entity : Bank, Account, Loan, and customer
    -reason : Because these entities set have a key attribute or a table's primary key in the column and it does not depends on the existence of any other entity.
+ Weak Entity : BANK_BRANCH
    - reason : Because this entity depends on the existence of other entity type. Meaning it doesn't have key attribute of their own, the keys of this type totally derived from strong entity type.

b. Indicate :
- Key attribute: Code, Acct_no, Ssn, Branch_no, Loan_no
- Simple attribute: Name, Addr, Balance, Type, Phone, Name, Addr Addr, Amount, Type,
- Composite Attribute: No have.
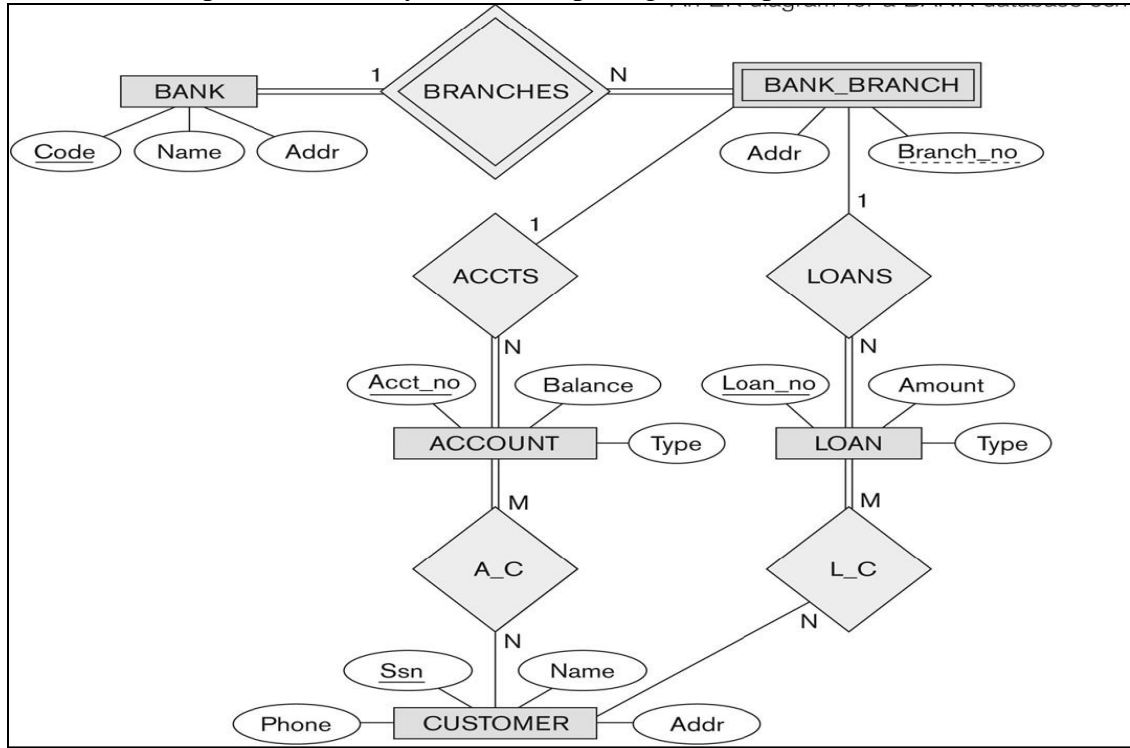
C. Map this ERD to Relational Schema
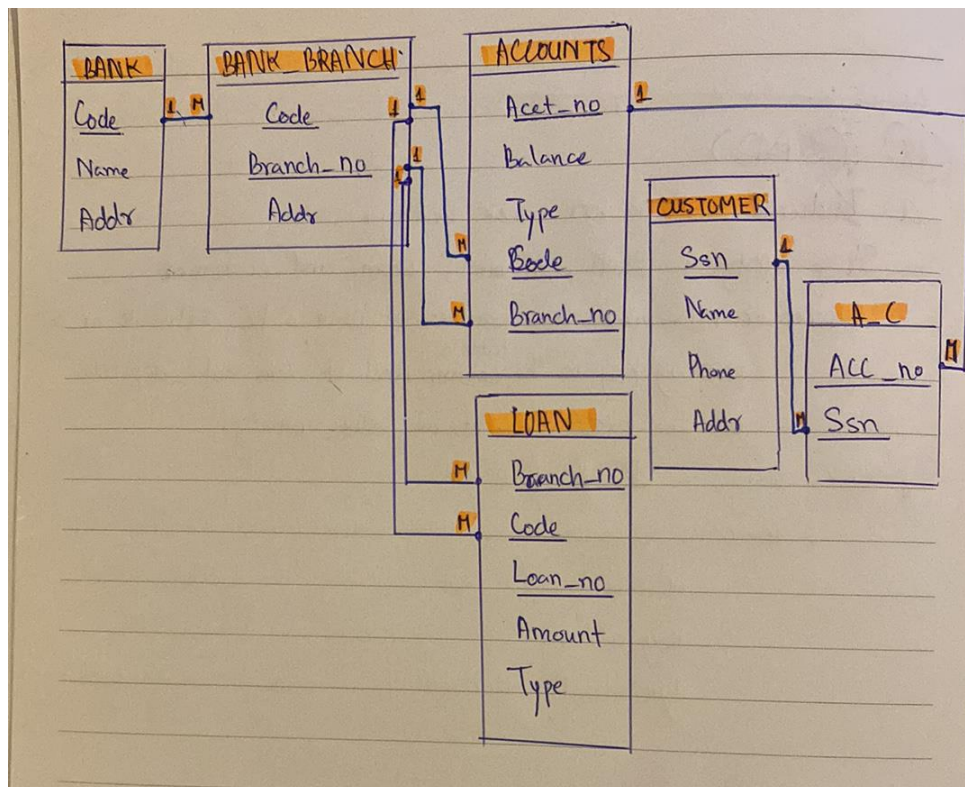
19-Suppose that we have sample ERD (Entity Relationship Diagram) as picture below:
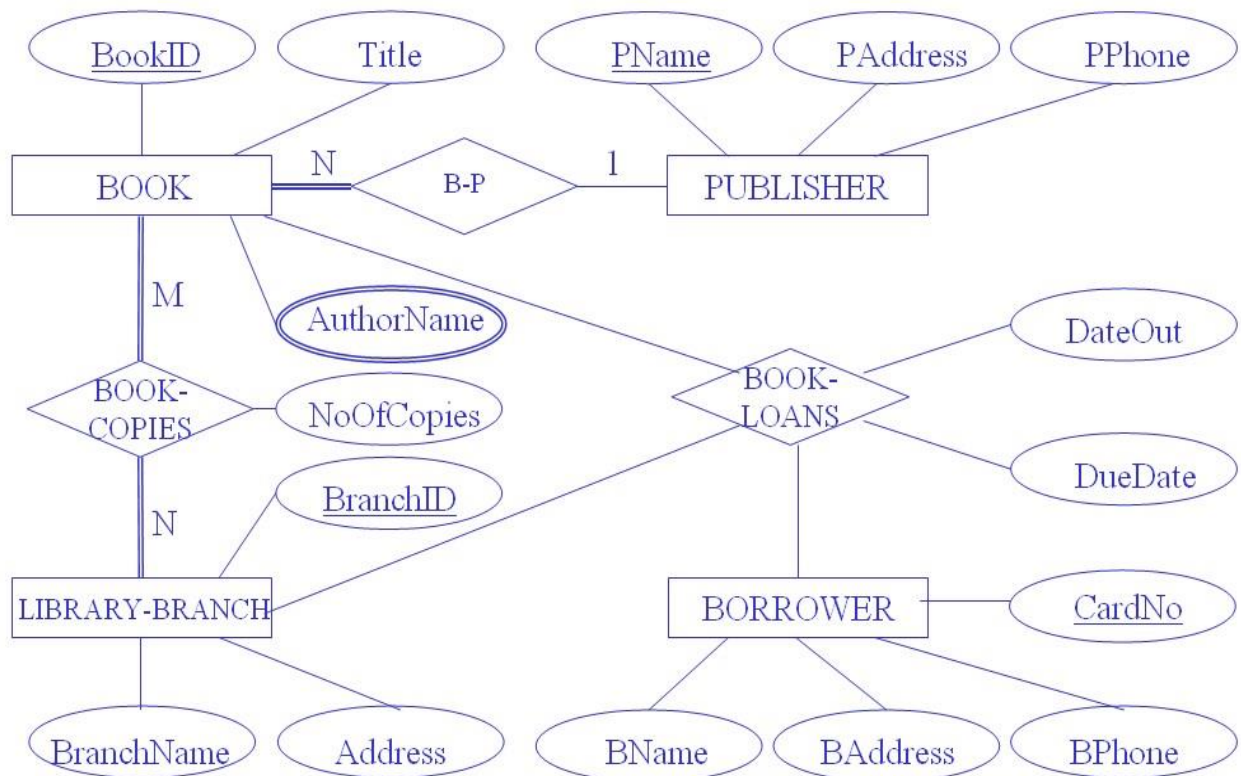
Problem

  a.   indicate which one is Strong, and weak entity, Explain why
  b.   Indicate which one is Key attribute, Simple, composite, multies value
  c.   Map this ERD to Relational Schema

19. (ERD).

a. Indicate Entity :

+ Strong Entity : Book, LIBRARY_BRANCH, PUBLISHER, BORROWER.

    – reason : Because these entities set having a primary key attribute or a table that consisted of a primary key column, and it does not depend on the existence of any other entity.

+ Weak Entity : No have.

b. Indicate :

- Key attribute : BookID, BranchID, PName, CardNo
- Simple : Title, NoOfCopies, BranchName, Address, PAddress PPhone, DateOut, DueDate, BName, BAddress, BPhone.
- Composite : No have.
- Multi Value : AuthorName.
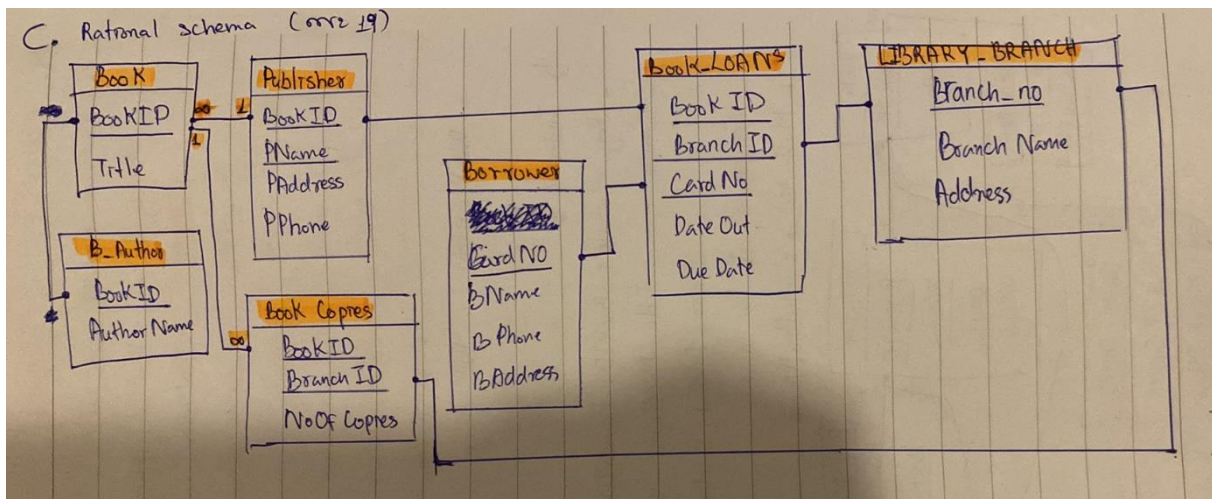
C. Rational schema (cou 19)
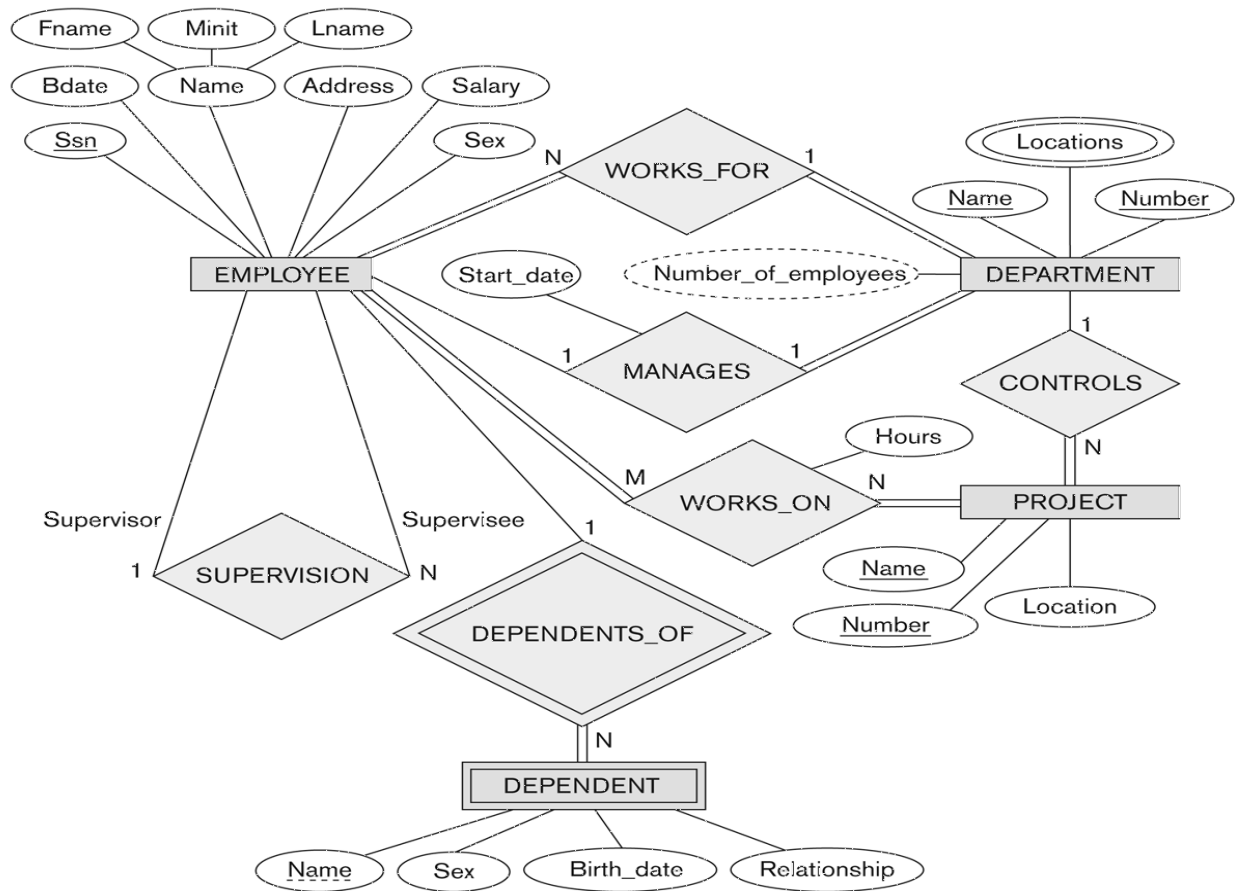
Problem

a. indicate which one is Strong, and weak entity, Explain why

b. Indicate which one is Key attribute, Candidate Key attribute, Simple, composite, single value, multies value, stored valued and Derived Attribute.

c. Map this ERD to Relational Schema

Answer

21- What is stand for SQL? Indicate the function of SQL.

Answer

- SQL stand for Structure Query Language.

- Indicate the function of SQL: SQL has many built-in functions for performing calculations on data.

22- What is the difference between a subquery and a join? Under what circumstances would you not be able to use a subquery?

SQL Joins and Subqueries. An SQL Join statement is used to combine data or rows from two or more tables based on a common field between them. A subquery is a query that is nested inside a SELECT , INSERT , UPDATE , or DELETE statement, or inside another subquery.

23- Why do study Normalization data?

Answer

Because improves data integrity, reduces disk space, and improves performance.

Answer

- Describe the characteristics of a table that violates first normal form (1NF) and then describe how such a table is converted to 1NF. Provide an example to illustrate your answer.

➔ *First Normal Form (1NF) says that all column values not* **contains multi value and not allow repeating group.**
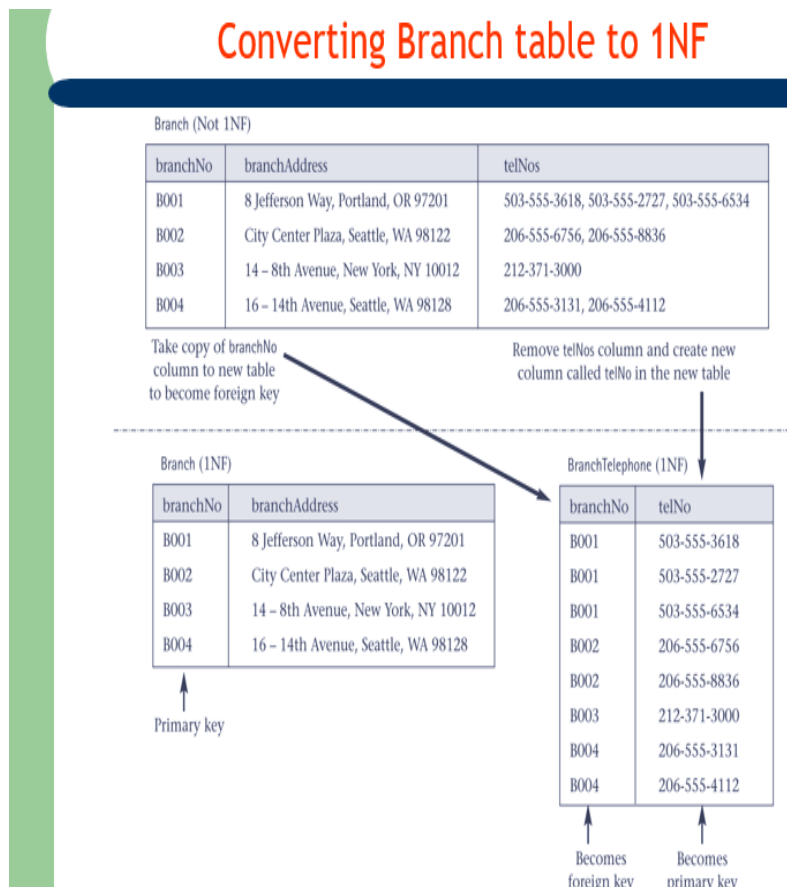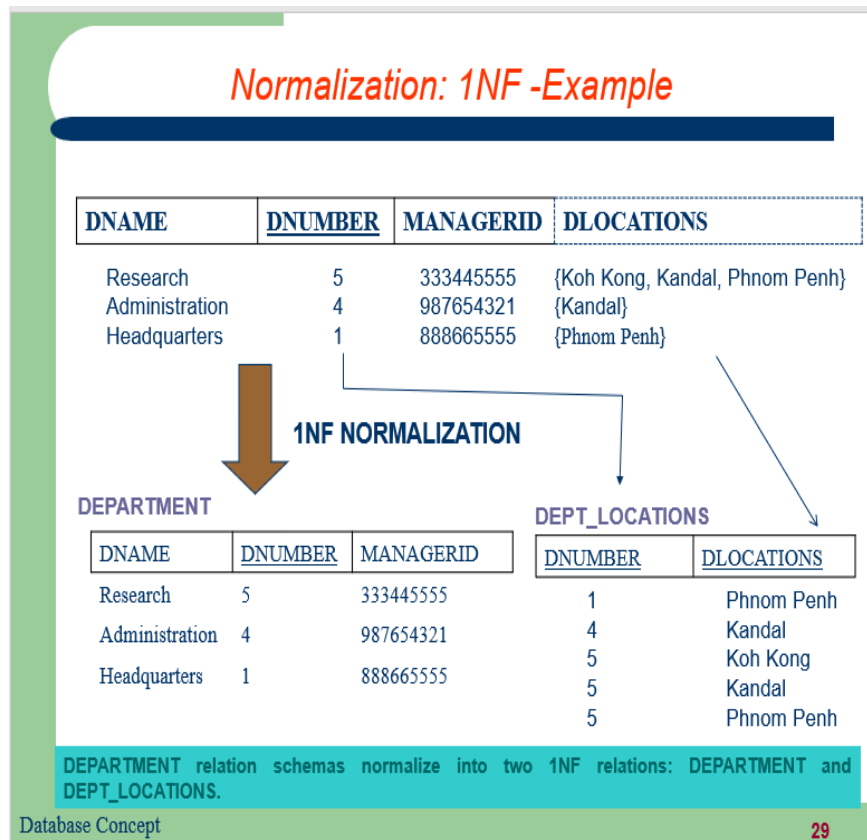
Describe the characteristics of a table in second normal form (2NF). Describe an approach to converting a first normal form (1NF) table to second normal form (2NF) table(s). Provide an example to illustrate your answer.

<div align="center">Answer</div>

Describe the characteristics of a table in second normal form (2NF). Describe an approach to converting a first normal form (1NF) table to second normal form (2NF) table(s). Provide an example to illustrate your answer.

➔ **2NF only applies to tables with composite primary keys.**

– **And**, it should not have Partial Dependency.

– Every non key attribute is fully dependent on the Composite primary key.
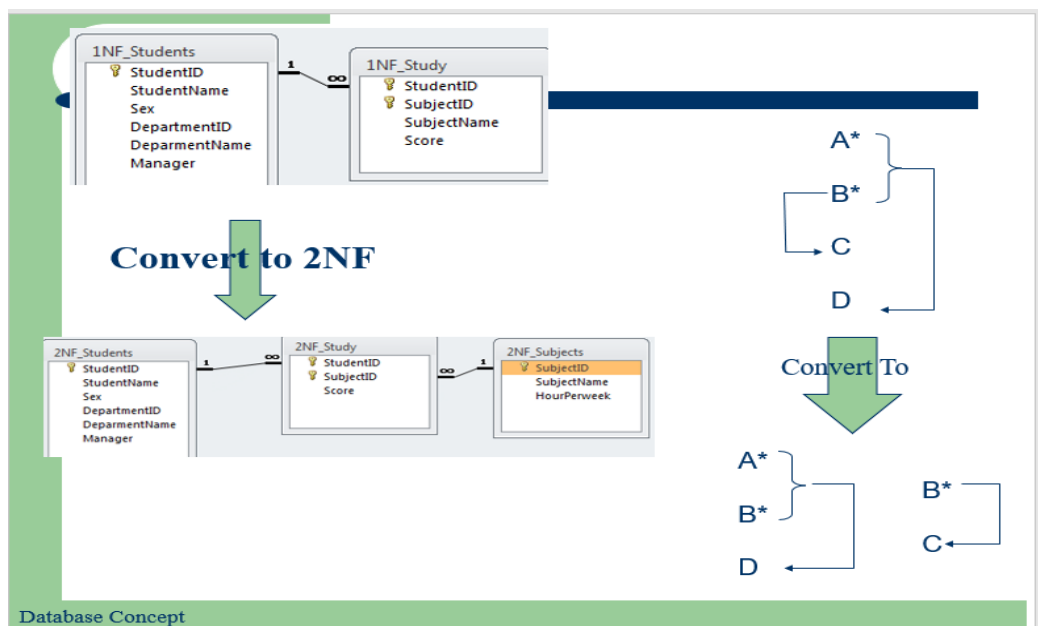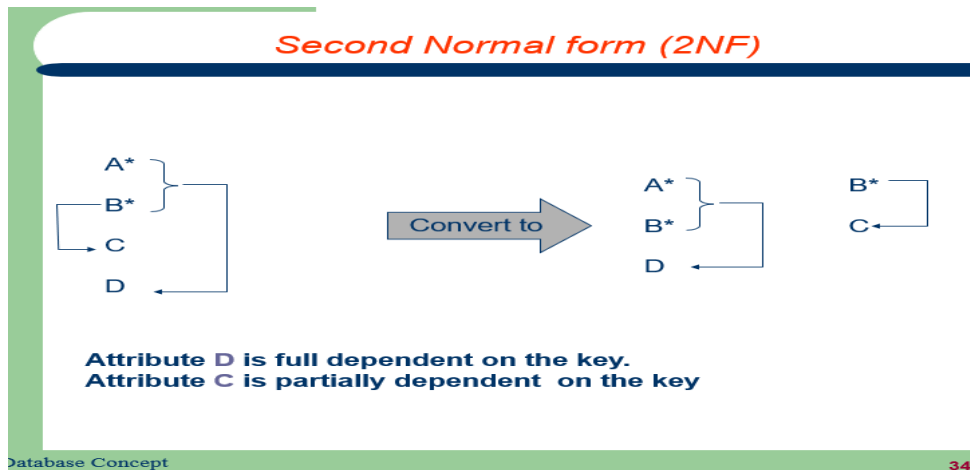
26- Describe the characteristics of a table in third normal form (3NF). Provide an example to illustrate your answer.

Answer

Describe the characteristics of a table in third normal form (3NF). Provide an example to illustrate your answer.
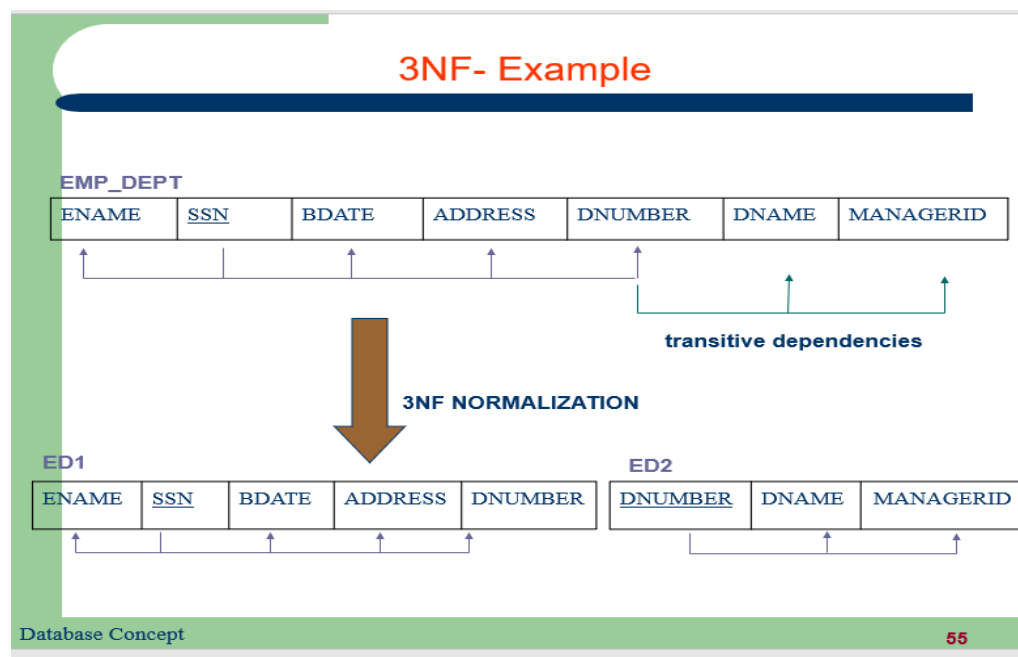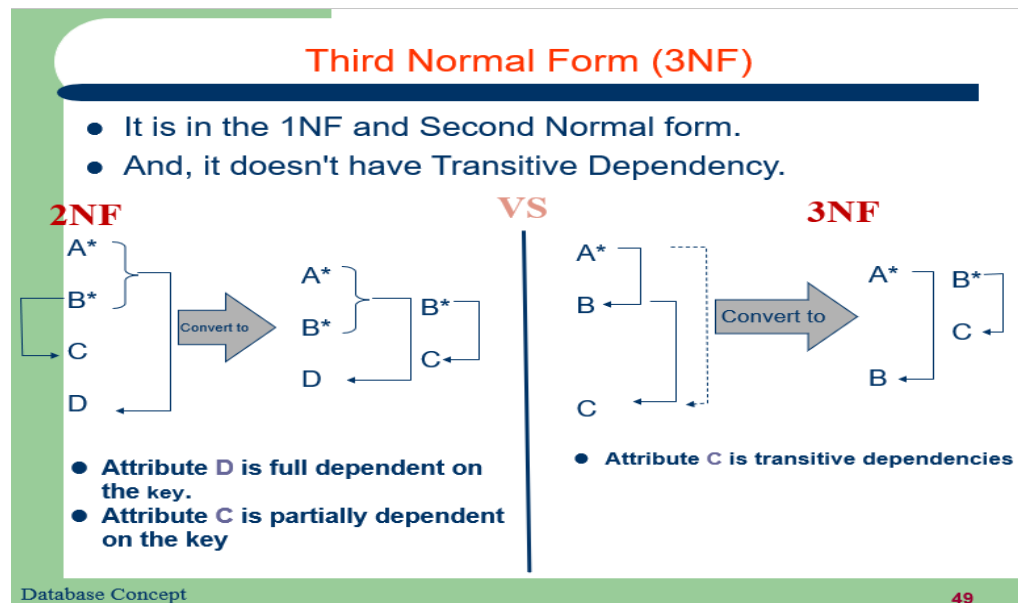
27- Suppose that you have table StudentScore that does not in Normalization as figure Fig. 1.1.

StudentID	StudentName	Sex	Address	DepartmentID	DepartmentName	Manager	SubjectName	Score
1	dara	M	# PP	10	Information Tech	Bunsour	C100-Website	48
1	dara	M	# PP	10	Information Tech	Bunsour	C102-Network	84
1	dara	M	# PP	10	Information Tech	Bunsour	C103-C++	87
1	dara	M	# PP	10	Information Tech	Bunsour	C104-Database	90
2	Reaksmey	F	# 99, tk	10	Information Tech	Bunsour	C100-Website	98
2	Reaksmey	F	# 99, tk	10	Information Tech	Bunsour	C102-Network	87
2	Reaksmey	F	# 99, tk	10	Information Tech	Bunsour	C103-C++	57
2	Reaksmey	F	# 99, tk	10	Information Tech	Bunsour	C104-Database	84
3	ya	F	tk	20	Business	Rithy	B200-Principal Account	78
3	ya	F	tk	20	Business	Rithy	B200-Marketting	90

Fig. 1.1 **StudentScore** table.

Problem: a- Describe and illustrate the process of normalizing the data from information requirement above to First Normal Form (1NF), Second normal form (2NF), and third Normal Form(3NF).
b- Transform your result in 3NF to ERD

28- Suppose that you have table **ProjectEmp** that does not in Normalization as figure Fig. 1.1.

ProjID	ProjName	ProjMgrID	EmpID	EmpName	EmpDept	DeptRate	TotalHour
100	E-commerce	789487453	123423479	Vichet	MIS	65	10
			980808980	Dara	TechSupport	45	6
			234809000	Danith	TechSupport	45	6
			542298973	Rithy	TechDoc	30	12
110	Payroll System	820972445	432329700	Sokun	MIS	65	5
			689231199	Kunthea	TechSupport	45	12
			712093093	Sokein	TechDoc	30	8
120	POS	980212343	834920043	Vutha	Engineering	80	4
			380802233	Manith	TechSupport	45	11
			553208932	Dyna	TechDoc	30	12
			123423479	Vichet	MIS	65	07
130	Loan System	550227043	432329700	Sokun	MIS	65	07
			834920043	Vutha	Engineering	80	15
			712093093	Sokein	TechDoc	30	10

Fig. 1.1 **ProjectEmp** table.

Problem: a- Describe and illustrate the process of normalizing the data from information requirement above to First Normal Form (1NF), Second normal form (2NF), and third Normal Form(3NF).
b- Transform your result in 3NF to ERD

Answer

29- Suppose that you have table Project that does not in Normalization as figure Fig below.
Relation: **EmployeeTraining**

EmployeeID	Name	Salary	Department	Manager	Phone	Course	Price	Date Completed
AC-201	SAMPHORS	500	Accounting	Rithy	023888999	01-Ms Office	150	01-02-2013
IT-101	SAMEDY	600	Computer	Bunsour	012366877	03-Oralce	400	02-02-2013
MK-301	AMRONG	350	Marketing	Sokun	012577799	05-SPSS	250	02-02-2013
AC-202	CHENDA	380	Accounting	Rithy	023888999	01-Ms Office	150	03-03-2013
IT-101	SAMEDY	600	Computer	Bunsour	012366877	02-Visual Basic	350	03-05-2013
IT-101	SAMEDY	600	Computer	Bunsour	012366877	04-Web Development	300	03-05-2013
AC-201	SAMPHORS	500	Accounting	Rithy	023888999	08-Quick Book Pro	200	04-04-2013
IT-102	BUSURE	700	Computer	Bunsour	012366877	02-Visual Basic	350	04-05-2013

Note: - An employee can study in several Course and a Course can have several employees.   **-**A Department can have many employees work for.

Problem: a- Describe and illustrate the process of normalizing the data from information requirement above to First Normal Form (1NF), Second normal form (2NF), and third Normal Form(3NF).
b- Transform your result in 3NF to ERD

<p align="center">Answer</p>

30-   You are hired to implement an object-relational database schema of **Phnom Penh Mall**. The database schema consist of requriement and need to record information as below:

A new mall, Cambodia Mall, just had its grand opening 15 year ago in Phnom Penh, Cambodia. This new mall is attracting a lot of customers and stores. Phnom Penh Mall, which is part of a series of malls owned by a parent company, now needs a database to keep track of the management of the mall in terms of keeping track of all its stores as well as the owners and workers of the stores. Before we build a database for this system of malls, the first step will be to design an ER diagram for the mall owner. you gathered the following initial user specifications about the malls, with which we can start creating your ER diagram:

- We need to record information about the mall and each store in the mall. We will need to record the mall's name, address, Phone. A mall, at any point in time, must contain one or more stores.
- For each store, we will need to keep the following information: store number (which will be unique), the name of the store, the location of the store (room number), departments, the owner of the store, and manager of the store. Each store will have only one store manager. Each store is owned by only one owner. Each store is located in one and only one mall.
- A store manager can manage only one store. We have to record information on the store manager: the name, Identification card (the manager's Identification card is unique), which store he or she is working for, phone, and salary.
- The store owner is a person. We have to record information about the store owner, such as name, Identification card (will be unique), address, and office phone number. A store owner has to own at least one store, and may own more than one store.

Problem:

a- Create an **Entity–Relationship (ER) model** of the data requirements for the **Phnom Penh Mall** case study using Chen-style ER notation. State any assumptions necessary to support your design.
b- Derive a **relational schema** from your ER model that represents the entities and relationships. Identify primary and foreign keys.

<p align="center">Answer</p>

31-   You are hired to implement an object-relational database schema of **movie distribution center**. The database schema consist of requriement and need to record information as below:
- Theaters that specifies the theaterNo (integer) is unique, theaterName(text), Address(text) of all theaters, and phone number,
- Movie that specifies the MovieNo (Integer) is unique, MovieTitlem (Text), Set of stars(text), Director(Text), Budget (Number), and Date publish (Date) of each movie.
    - Each film is now showing is serveral theaters. Each theater may show different films.
    - The Showing relationship specified, Startdate (Date), and EndDate (date).

- Manager that specifies the managerID (number) is unigue, manageName (Text), Address (Text), Phone (text), and email. Each theater is manage by one manager and a manager can only manage one theater.
- Producer that specifies the producerNo(number), producerName (Text), from company(Text), Address (Text), phone (Text), and Email address. Each movie is mad by one movie producer and one movie producer can make multiple movies.

Problem:

a- Create an **Entity–Relationship (ER) model** of the data requirements for the **movie distribution center** case study using Chenstyle ER notation. State any assumptions necessary to support your design.

b- Derive a **relational schema** from your ER model that represents the entities and relationships. Identify primary and foreign keys.

<p style="text-align:center">Answer</p>

32- Suppose that you have SampleData1 in Microsoft SQL Server as following schema:

Customers

client_no	ClientName	Address	City	AreaCode	Shankat	bal_due
C00001	Pich Samphors	NULL	Phnom Penh	400054	7 makara	15000.00
C00002	Chea Rithy	NULL	Sihanouk	780001	Phsar Lour	0.00
C00003	Keo oudam	NULL	Phnom Penh	400057	7 makara	5000.00
C00004	Ly Meng	NULL	Phnom Penh	400056	Daun Penh	0.00
C00005	Pich Dara	NULL	Siam Reap	100001	Dam Dek	2000.00
C00006	Pen Socheat	NULL	Phnom Penh	400050	7 makara	0.00
C00007	RATH	NULL	Phnom Penh	344	Daun Penh	6000.00

Orders

order_no	order_date	client_no	dely_addr	salesman_no	dely_type	billed_yn	dely_date	order_stat
O19001	2008-01-12 ...	C00006	NULL	S00001	F	N	2008-01-20 ...	In Process
O19002	2008-01-25 ...	C00001	NULL	S00002	P	N	2008-09-27 ...	Cancelled
O19003	2008-04-03 ...	C00006	NULL	S00001	F	Y	2008-04-07 ...	Fulfilled
O19008	2008-05-24 ...	C00005	NULL	S00004	F	N	2008-05-26 ...	In Process
O46865	2008-02-18 ...	C00003	NULL	S00003	F	Y	2008-02-20 ...	Fulfilled
O46866	2009-05-20 ...	C00001	NULL	S00002	F	N	2008-05-22 ...	Cancelled

Products

product_no	description	profit_percent	unit_measure	qty_on_hand	reorder_lvl	sell_price	cost_price
P00001	USB 2G	5.00	Piece	100	20	10.00	8.00
P00002	PEN	10.00	15	15	50	50.00	52.00
P00005	MARKER	NULL	50	200	10	50.00	400.00
P03453	Monitors	6.00	Piece	10	3	90.00	85.00
P06734	Mouse	5.00	Piece	20	5	20.00	15.00
P07865	USB 4G	5.00	Piece	100	20	18.00	15.00
P07868	Keyboard	2.00	Piece	10	3	6.00	4.00
P07885	CD Drive	2.50	Piece	10	3	15.00	12.00
P07965	500 HDD	4.00	Piece	10	3	100.00	95.00
P07975	CPU	5.00	Piece	10	3	140.00	125.00
P08865	RAM	5.00	Piece	2	3	35.00	30.00
P10000	Moderm	NULL	20	50	20	50.00	50.00

Order_Details

order_no	product_no	Qty	Price
O19001	P00001	4	4.0000
O19001	P07885	2	1.0000
O19002	P00001	10	0.0000
O19002	p00002	20	2.0000
O19003	P03453	2	2.0000
O19003	P06734	1	1.0000
O19008	P00001	10	3.0000
O19008	P07975	5	3.0000
O46865	P00001	10	10.0000
O46865	P03453	4	4.0000
O46865	P07868	3	3.0000
O46865	P07885	3	1.0000
O46866	P07865	10	50.0000
O46866	P07965	5	15.0000
O46866	P07975	1	0.0000

1. **Exercise on computations on table data:**
   a. Find the names of all clients having 'i' as the second letter in their names.
   b. Find out the clients who stay in a city whose second letter is 'h'.
   c. Find the list of all clients who stay in 'Phnom Penh' and 'Siam Reap'.
   d. Print the list of clients whose bal_due is greater than value 5000.
   e. Print the information from sales_order table for orders places in the month of January.

  f. Display the order information for client_no 'C00002' and 'C00005'.
  g. Find products whose selling price is greater than or equal to 50.
  h. Find products whose selling price is more than 1500. calculate a new selling price as, original selling price * .15 rename the new column in the above query as new_price.
  i. Count the total number of orders.
  j. Calculate the average price of all the products
  k. Find all the products whose qty_on_hand is less than reorder level

2. Exercise on Joins and Correlation:
  a. Find out the name of products, which have been sold to 'Pen Socheat'
  b. Find out the products and their quantities that will have to be delivered in the current month.
  c. Find the name of clients who have purchase 'CD Drive'.
  d. Find the products and their quantities for the orders place by client_no 'C00002' and 'C00005'.

3. Exercise on sub-queries:
  a. Find the product_no and description of non-moving products i.e products not being sold
  b. Find the customer name, address1, address2 for clients who has placed order no 'O190001'.
  c. Find the client name who have place orders before the month of May

<div align="center">Answer</div>

❖ **Suppose that you have SampleData1 in Microsoft SQL Server as following schema:**

1. Exercise on computations on table data

➢ Find the information of all clients having 'i' as the second letter in their names.
SELECT * FROM Clients WHERE name LIKE '_i%';

➢ Find out the clients who stay in a city whose second letter is 'i'.
SELECT * FROM Clients WHERE city LIKE '_i%';

➢ Find the information of all clients who stay in 'Phnom Penh' and 'Siem Reap'.
SELECT * FROM Clients WHERE city='Phnom Penh' OR city='Siem Reap';

➢ d. Print the information of clients whose bal_due is greater than value 2000.
SELECT * FROM Clients WHERE bal_due>2000;

➢ e. Print the information from sales_order table for orders places in the month of January.
SELECT * FROM dbo.Sale_Order1 WHERE MONTH(Order_date)=1;

➢ f. Display the order information for client_no 'C00001' and 'C00002'.
SELECT * FROM Sale_Order1 WHERE Client_no='C0001' OR Client_no='C0002';

➢ g. Find products whose selling price is greater than or equal to 50.
SELECT * FROM Product WHERE sell_price>=50;

➢ h. Find products whose selling price is more than 15.00. calculate a new selling price as, original selling price * .15 rename the new column in the above query as new_price.
SELECT *,(sell_price*0.15) as [New Price] FROM Product WHERE sell_price>15;

➢ Count the total numeric of orders.
SELECT COUNT(*) as 'Total' FROM sale_order1;--total smer column name de make tmei

➢ j. Calculate the average price of all the products

SELECT AVG(sell_price) as 'Average' FROM Product;--Average smer column name de make tmei

> k. Find all the products whose qty_on_hand is less than reorder level

SELECT * FROM Product WHERE qty_on_hand<Reorder_lvl;

2.   Exercise on Joins and Correlation:

> Find out the information of products, which have been sold to 'Pich Samphors';

SELECT C.*,O.orderno,P.ProductionName FROM Clients C
INNER JOIN sale_order O On C.clientno=O.clientno

INNER JOIN sale_order_detail OD on O.orderno=OD.orderno
INNER JOIN Product P on OD.productno=P.productno
WHERE C.name='Chea Rithy';

> b. Find out the products and their quantities that will have to be delivered in the current month.

SELECT P.ProductionName,OD.qty_order,O.dely_date FROM sale_order O
INNER JOIN sale_order_detail OD On O.orderno=OD.orderno
INNER JOIN Product P On OD.productno=P.productno
WHERE MONTH(O.dely_date)=MONTH(GETDATE());

> c. Find the information of clients who have purchase 'CD Drive'.

SELECT C.*,P.ProductionName FROM Clients C
INNER JOIN sale_order O On C.clientno=O.clientno
INNER JOIN sale_order_detail OD On O.orderno=OD.orderno
INNER JOIN Product P On OD.productno=P.productno
WHERE P.ProductionName='CD Drive';

> d. Find the products and their quantities for the orders place by client_no 'C00002' and 'C00005'.

SELECT P.ProductionName,P.qty_on_hand,C.clientno,C.name FROM Clients C
INNER JOIN sale_order O On C.clientno=O.clientno
INNER JOIN sale_order_detail OD On O.orderno=OD.orderno
INNER JOIN Product P On OD.productno=P.productno
WHERE C.clientno='C00002' OR C.clientno='C00005'
ORDER BY C.clientno;

3.   Exercise on sub-queries:
> Find the product_no and description of non-moving products i.e products not being sold

SELECT productno,ProductionName FROM Product WHERE productno NOT IN(SELECT productno FROM sale_order_detail);

> b. Find the customer name, address1, address2 for clients who has placed order no 'O190001'.

SELECT name,address1,address1 FROM Clients WHERE clientno IN(SELECT clientno FROM sale_order WHERE orderno='O19001');

> c. Find the client name who have place orders before the month of May

SELECT * FROM Clients WHERE clientno IN(SELECT clientno FROM sale_order WHERE MONTH(orderdate)<5);

Grade

Grade	LowScore	HighScore
A	96	100
B	86	95
C	76	85
D	66	75
E	50	65
F	0	49

Departments

DID	DNAME	MANAGER	PHONE	LOCATION
10	IT	NGUOUN BUN...	012622626	BUILDING A
20	BUSINESS	TRY SOTHEARI...	012 456-888	BUILDING B
30	CIVIL ENGINEE...	SOK TAI	016 7567-999	BUILDING A
40	ENGLISH	ROBERT	011 888-777	BUILDING B

StudentScore

StID	StName	Gender	DID	Score
1	Samphors	F	10	92
2	Samedy	M	20	99
3	AMRONG	M	20	97
4	RITHY	M	10	80
5	KUNTHEA	F	20	56
6	ROTHA	M	10	48
7	ODAM	M	10	75
8	CHENDA	F	20	58
9	Sochhorn	M	10	83
10	Sotheary	F	20	76

Problem: Please write the SQL Statement to show answer as picture following:

Problem1:   Use   inner Join to retrieve the answer as picture below:

StID	StName	Gender	DID	DNAME
1	Samphors	F	10	IT
2	Samedy	M	20	BUSINESS
3	AMRONG	M	20	BUSINESS
4	RITHY	M	10	IT
5	KUNTHEA	F	20	BUSINESS
6	ROTHA	M	10	IT
7	ODAM	M	10	IT
8	CHENDA	F	20	BUSINESS
9	Sochhorn	M	10	IT
10	Sotheary	F	20	BUSINESS

Problem2:   U se   Outer Join to retrieve the answer as picture below:

StID	StName	Gender	DID	DNAME
1	Samphors	F	10	IT
4	RITHY	M	10	IT
6	ROTHA	M	10	IT
7	ODAM	M	10	IT
9	Sochhorn	M	10	IT
2	Samedy	M	20	BUSINESS
3	AMRONG	M	20	BUSINESS
5	KUNTHEA	F	20	BUSINESS
8	CHENDA	F	20	BUSINESS
10	Sotheary	F	20	BUSINESS
NULL	NULL	NULL	30	CIVIL ENGINEE...
NULL	NULL	NULL	40	ENGLISH

Problem3: Use Non inner Join to retrieve the an picture below: swer as

StID	StName	Gender	DID	Score	Grade
1	Samphors	F	10	92	B
4	RITHY	M	10	80	C
9	Sochhom	M	10	83	C
7	ODAM	M	10	75	D
6	ROTHA	M	10	48	F
2	Samedy	M	20	99	A
3	AMRONG	M	20	97	A
10	Sotheary	F	20	76	C
5	KUNTHEA	F	20	56	E
8	CHENDA	F	20	58	E

Problem4: Use Sub Query to take Department, Students did not come for exams as picture below:

DID	DNAME	MANAGER	PHONE	LOCATION
30	CIVIL ENGINEERING	SOK TAI	016 7567-999	BUILDING A
40	ENGLISH	ROBERT	011 888-777	BUILDING B

33.)
→ Prob 1)
     SELECT   S.SID, S.StName, S.Gender
              D.DID, D.DName
     FROM   Departments D - INNER JOIN
            StudentScore - S
     ON   D.DID = S.DID

→ Prob 2)
     SELECT   S.SID, S.StName, S.Gender
              D.DID, D.Name
     FROM Department D LEFT OUTER JOIN
          Student Score S
     ON   D.DID = S.DID

→ Prob 3) (OR) SELECT S.*, G.Grade
     [SELECT S.SID, S.StName, S.Gender
              S.DID, S.Score, G.Grade
     FROM Grade G , StudenScore S
     WHERE S.Score BETWEEN
              G.LowScore AND G.HighScore

→ Prob 4
     SELECT   * FROM Department
     WHERE   DID NOT IN (SELECT DID FROM
                                StudentScore)

Customers

CUSTID	CUSTNAME
1	lucky
2	Star
3	dragon

Invoice

INVNO	INVDATE	CUSTID	AMOUNT
1	02-FEB-15	1	1500
2	02-FEB-15	2	800
3	02-FEB-15	(null)	600
4	02-FEB-15	1	900

Problem: Please write the SQL Statement to show answer as picture following:

Problem1: Use inner Join to retrieve the answer as picture below:

InvNo	INVDate	CustID	CustName	Amount
1	2015-02-02	1	Lucky	1500.0000
2	2015-02-02	2	Start shop	800.0000
4	2015-02-06	1	Lucky	500.0000

Problem2:   Use Outer Join to retrieve the answer as picture below:

InvNo	INVDate	CustID	CustName	Amount
1	2015-02-02	1	Lucky	1500.0000
2	2015-02-02	2	Start shop	800.0000
3	2015-02-02	NULL	NULL	600.0000
4	2015-02-06	1	Lucky	500.0000

Problem3:   Use Outer Join to retrieve the answer as picture below:

InvNo	INVDate	CustID	CustName	Amount
1	2015-02-02	1	Lucky	1500.0000
4	2015-02-06	1	Lucky	500.0000
2	2015-02-02	2	Start shop	800.0000
NULL	NULL	NULL	gragon	NULL
3	2015-02-02	NULL	NULL	600.0000

34)

→Prob1

```
SELECT   I.InvNo, I.INVDate, C.CustID
         C.CustName
FROM     Customer C  INNER JOIN Invoice I
ON       C.CustID = I.CustID
```

→ Prob2

```
SELECT   I.InvNo, I.INVDate, C.CustID
         C.CustName, I.Amount
FROM     Customer C RIGHT OUTER JOIN
         Invoice I
ON       I.CustID = C.CustID
```

→ Prob 3

```
SELECT   I.InvNo, I.INVDate, C.CustID
         C.CustName, I.Amount
FROM     Customer C FULL OUTER JOIN
         Invoice I
ON       I.CustID = C.CustID
```

*onlivo