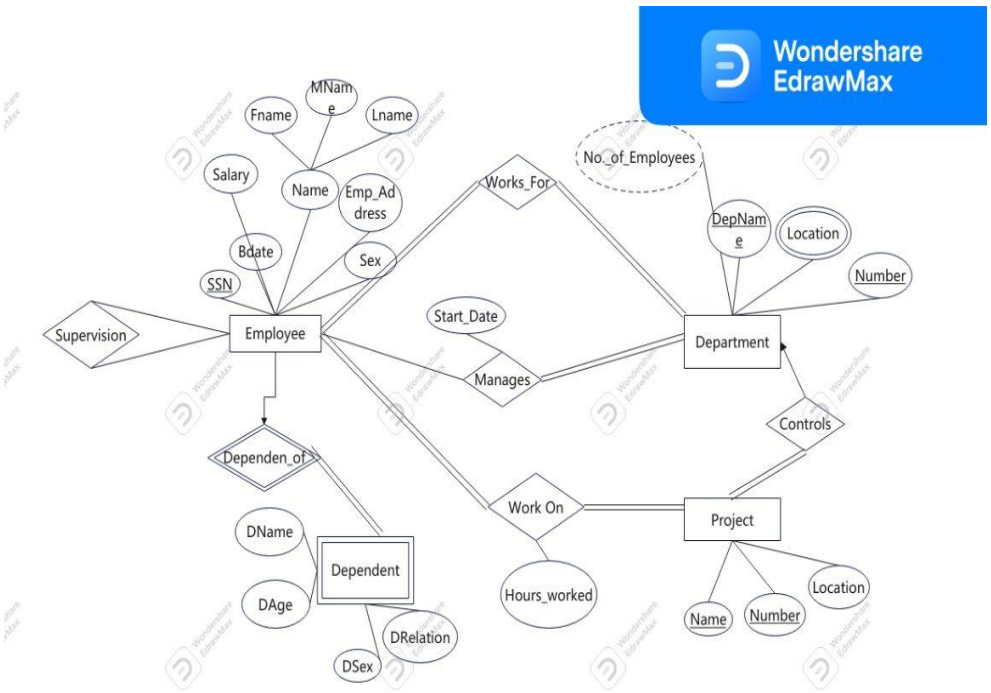
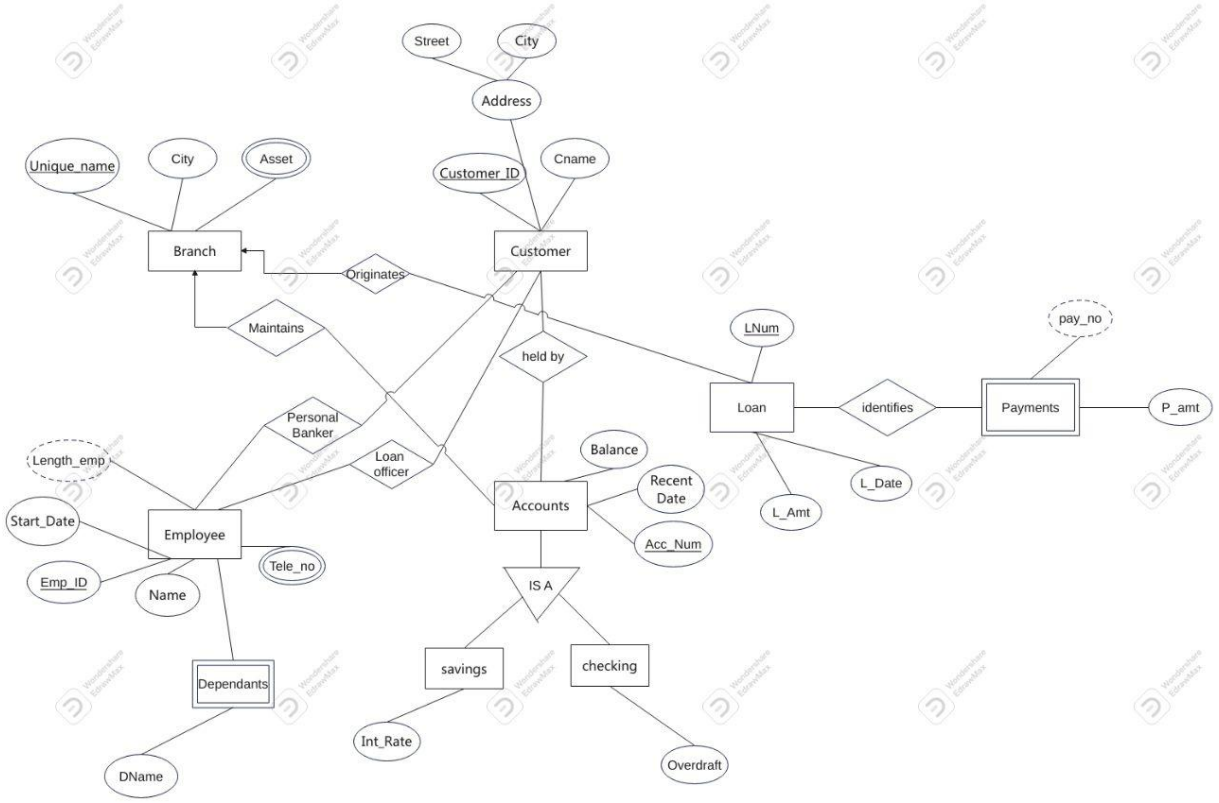
COMPANY DATABASE
Requirements of the Company
The company is organized into
– DEPARTMENTs. Each department has a name, number and an employee who manages
the department. We keep track of the start date of the department manager.
– Each department controls a number of PROJECTs. Each project has a name, numberand is
located at a single location.
– We store each EMPLOYEE’s social security number, address, salary, sex, and birthdate.
Each employee works for one department but may work on several projects. We keep
track of the number of hours per week that an employee currently works on each
project. We also keep track of the direct supervisor of each employee.
– Each employee may have a number of DEPENDENTs. For each dependent, we keep track
of their name, sex, birthdate, and relationship to employee.



Banking System:

The bank is organised into branches. Each branch is located in a particular city and is identified by a unique name. The bank monitors the assets of each branch.
• Bank customers are identified by their customer_id value. The bank stores each customer's name, and the street and the city where thecustomer lives. Customers may have accounts and can take out loans. A customer may be associated with a particular banker; who may act as a loan officer or personal banker for that customer.
• The bank offers two types of accounts: savings and checking accounts. Accounts can be held by more than one customer, and a customer can have more than one account. Each account is assigned a unique account number. The bank mantains a record of each account's balance and the most recent date on which the account was accessed by each customer holding the account. In addition each savings account has an interest rate, and overdrafts are recorded for each checking account.
• The bank provides its customers with loans. A loan originates at a particular branch and can be held by one or more customers. A loan is identified by unique loan number. For each loan, the bank keeps track of loan amount and the loan payments. Although a loan-payment number does not uniquely identify a particular payment among those for all the bank's loans, a payment number does identify a particular payment for a specific loan. The date and the amount are recorded for each payment.
• Bank employees are identified by their employee_id values. The bank administration stores the name and telephone number of each employee, the names of the employee's dependents, and the employee_id number of the employee's manager. The bank also keeps track of the employee's start date and, thus, length of employment.


Street
City
Address
Unique_name
City
Asset
Customer_ID
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identifies
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Page No.
Date

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Assignment - 1

Aim: Design an ER diagram for different case studies

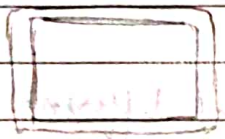
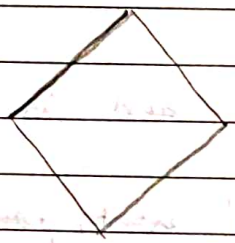
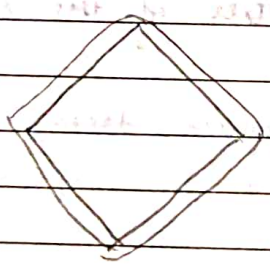
Objective: To study concepts of an ER diagram and draw ERD for real-world problem statements.

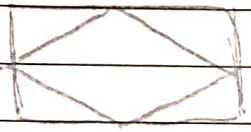
Theory:

Entity:
An entity is an object that exists and is distinguishable from other objects.
Example: specific person, company, event, plant

Entity set:
An entity set is a set of entities of the same type that share the same properties.
Example: set of all persons, companies, trees, holidays

Relationship set:
- A relationship is an association among several entities.
- A relationship set is a mathematical relation among $n \geq 2$ entities, each taken from entity sets.
- An attribute can also be property of a relationship set.

Sr. No.	Component set	Pictorial Representation	Description	Example
1.	Entity set		set of entities of the same type that share the same properties	set of all persons, companies trees, holidays
2.	Weak entity set		An entity set that does not have a primary key is referred to as a weak entity set	Payment of Loan
3.	Relationship		An association among several entities under a mathematical relation $n \geq 2$ entities	Manages
4.	Weak Relationship		Relationship when the primary key of related entity doesn't contain primary key components of other entities	Customer and Loan

Sr. No.	Component Set	Pictorial Representation	Description	Example
5.	Attributes		Properties that define the entity type	Name
6.	Multivalued attribute		An attribute that can hold multiple values	Phone no.
7.	Derived attribute		An attribute that has been derived using other attributes in database.	No. of days worked
8.	Associative Entity		Connections that describe a relationship between two different entities have some many-to-many relationships	Enrolment of course by student

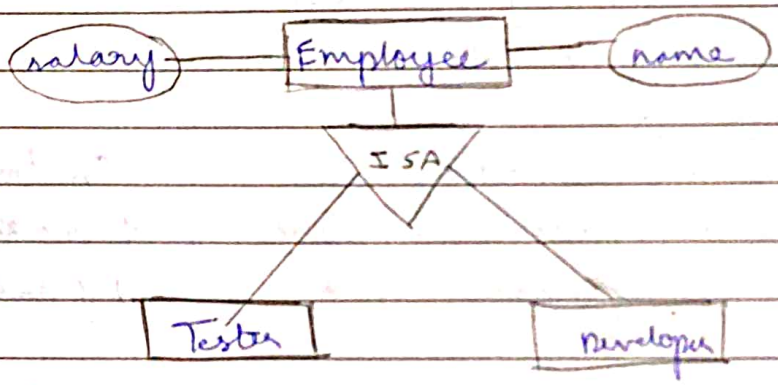
Page No.
Date / /

Extended Entity Relationship

Specialization:

- Top down design process, we designate subgroupings within an entity set that are distinctive from other entities in the set.
- These subgroupings become lower-level entity sets that have attributes or participate in relationships that do not apply to higher-level entity set.
- Depicted as triangle component labeled I S A

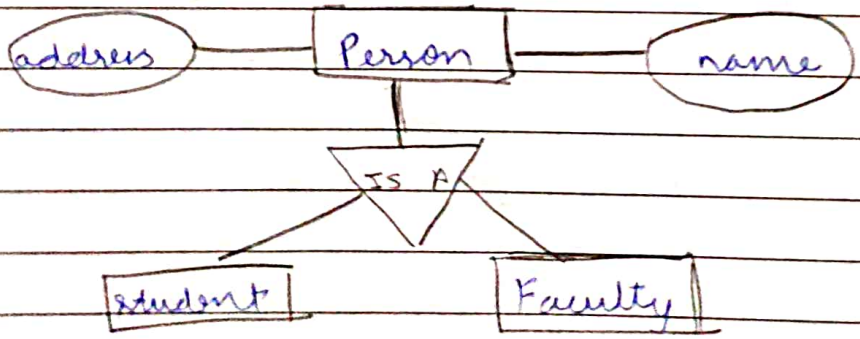
Eg:



Top-Down Approach

Generalization:

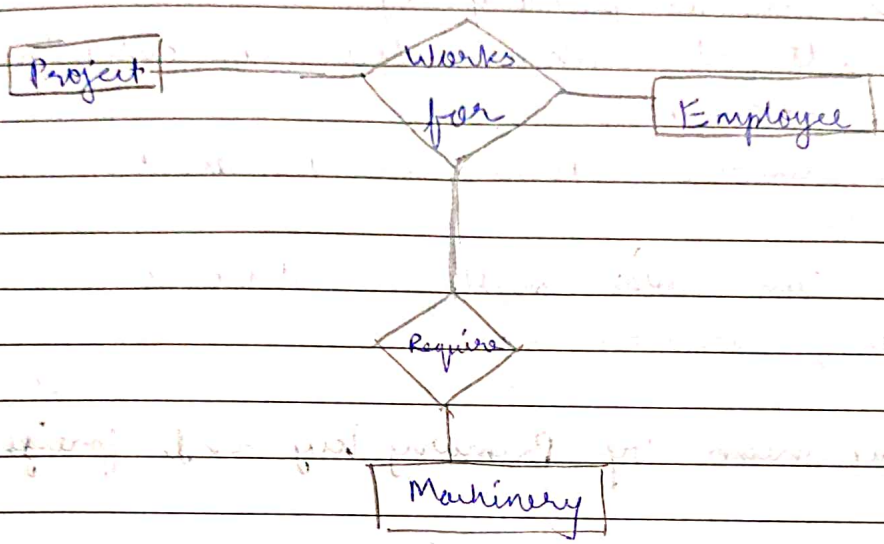
It is a technique used to identify common attributes and relationships between entities. Two or more entities are combined to form a high-level entity called generalization, and the lower-level entities are called as specializations



Page No.
Date

Aggregation

An ER diagram is not capable of representing the relationship between an entity and a relationship which may be required in some scenarios. In these cases, a relationship with its corresponding entities is aggregated into a high-level entity



Input: Problem statement batch wise (attached).
Output: ER Diagram.

Conclusion: We understood components of ER diagram in detail. Thus ER diagram is helpful in demonstrating snapshot of a complex database system.

Page No.
Date

FAQs

1. What are different types of attributes?

Ans- Simple Attribute :
simple, Composite, Primary, derived, complex, multivalued

- Primary : An attribute that uniquely identifies an entity and is used as primary key.
- Derived : An attribute whose value is calculated based on other attributes
- Composite : An attribute that can be divided into smaller subparts.
- Multi-valued : Can hold multiple values of a single entity occurrence.

2) What do you mean by Primary key and foreign key?

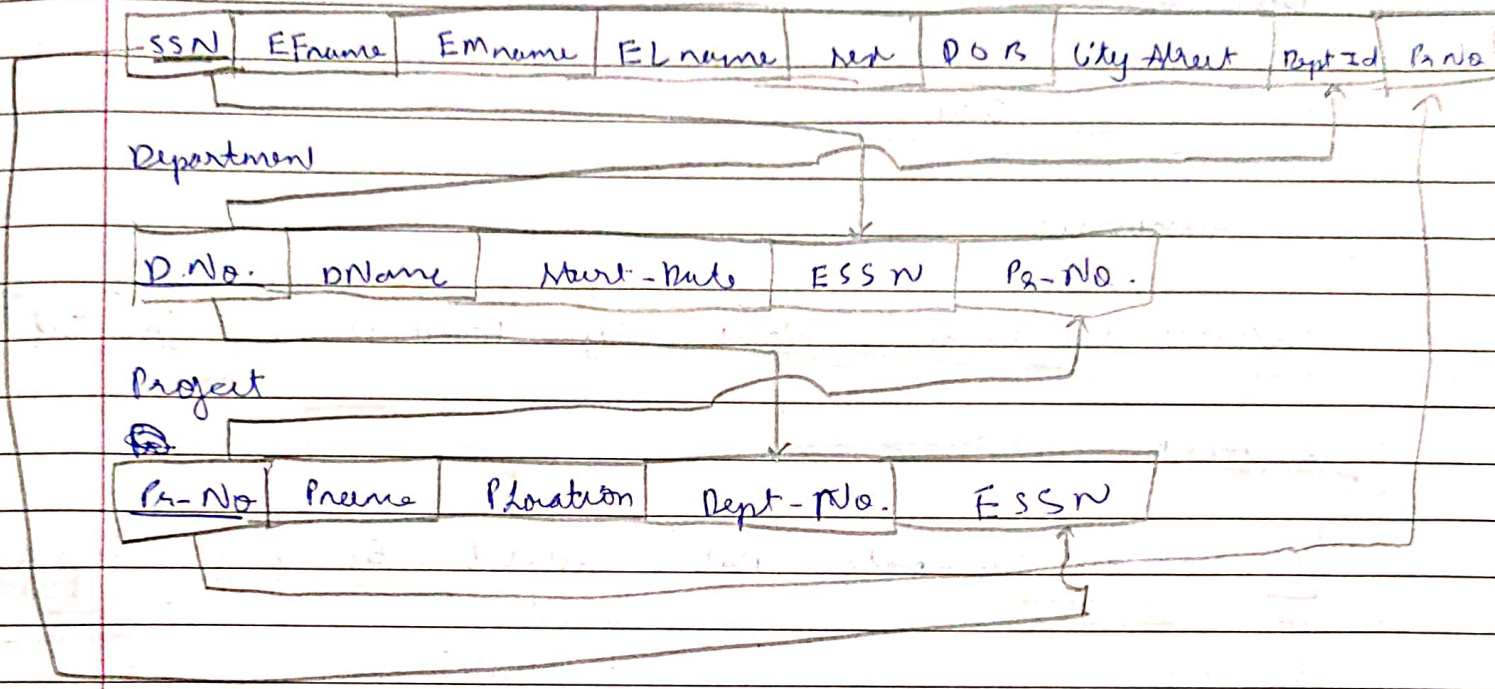
Ans- - A primary key is a unique identifier for each record in a database table, ensuring data integrity and enabling efficient data retrieval.
- A foreign key is an attribute in one table that refers to the primary key in another table, establishing a relationship between the two tables

3) What is a weak entity?

An entity set that does not have a primary key is ~~a~~ refered to as a weak entity set.

Company - DB

Employee



Page No.
Date

Banking system: