



BITS, PILANI – K. K. BIRLA GOA CAMPUS

Database Systems

(CS F212)

by

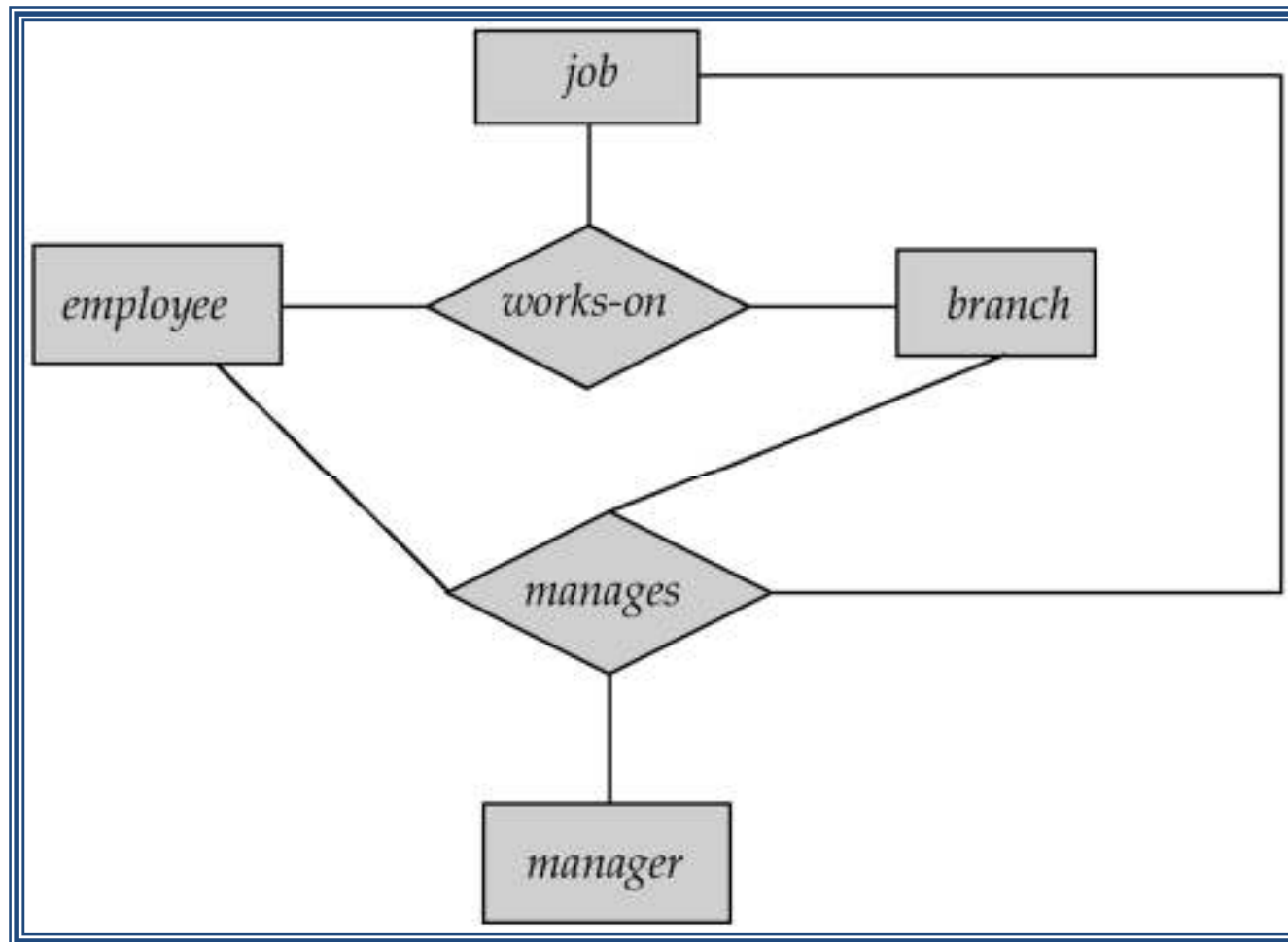
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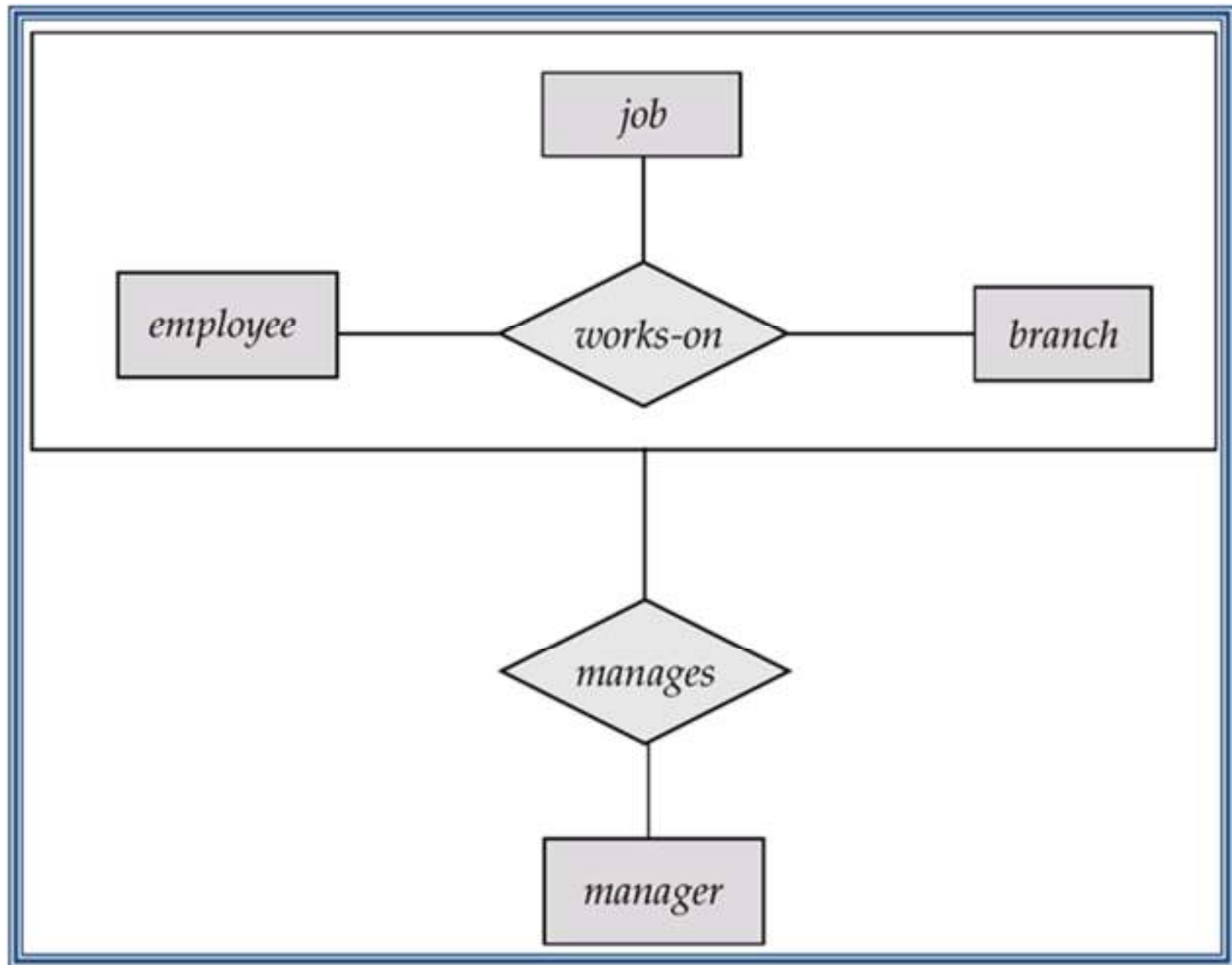


Aggregation

- Consider the ternary relationship works-on, which we saw earlier
- Suppose we want to record managers for tasks performed by an employee at a branch

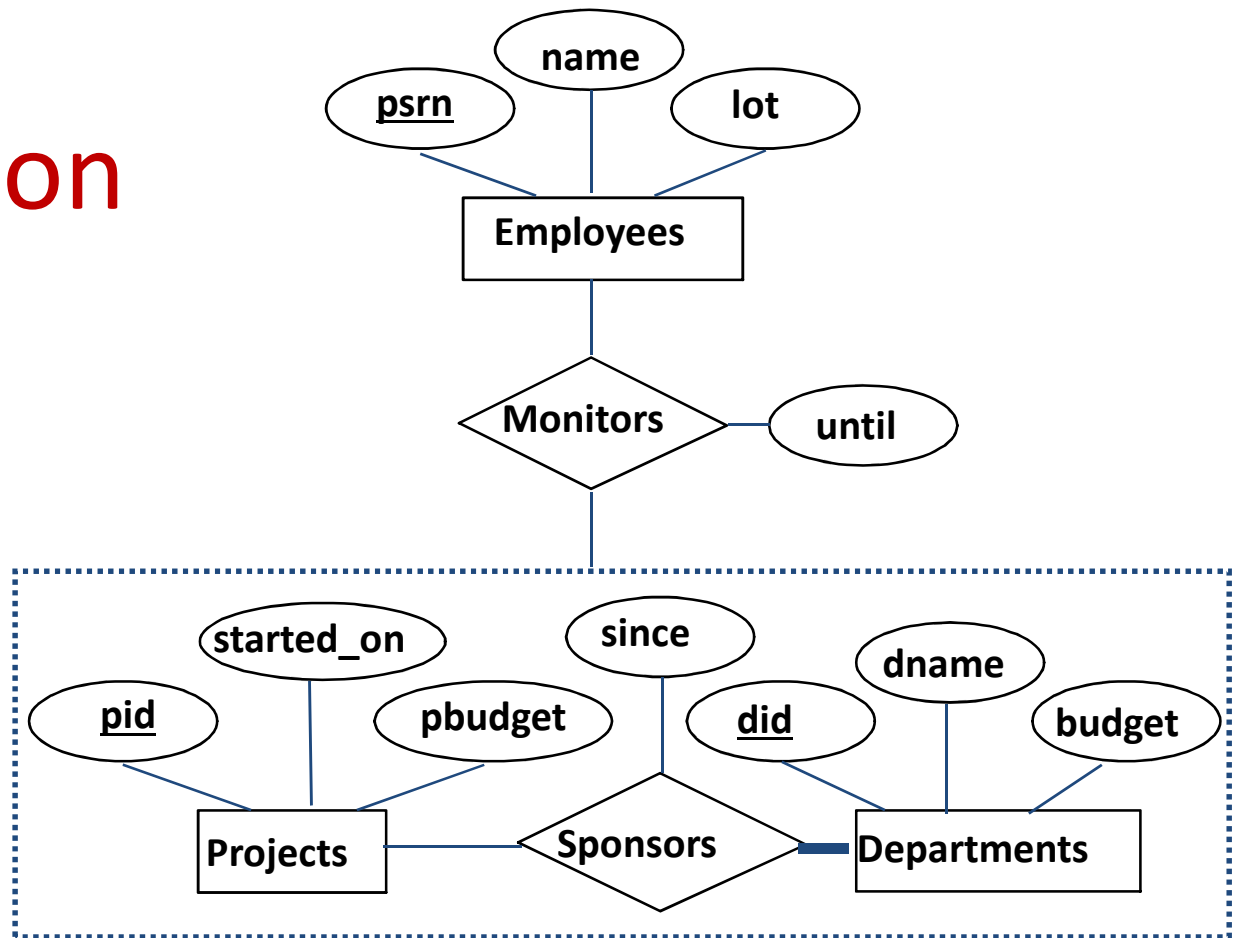


E-R Diagram With Aggregation



Aggregation

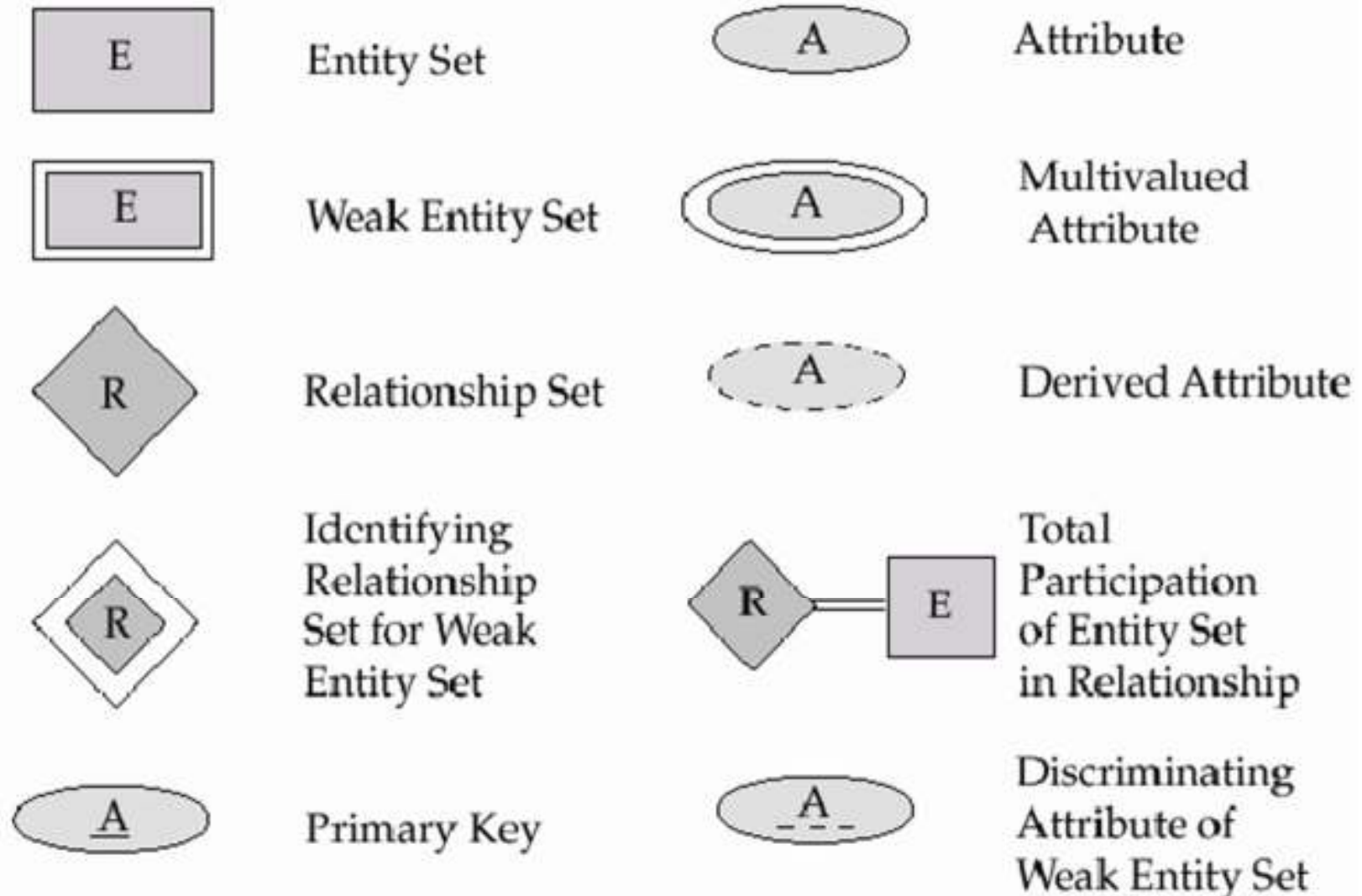
- Used when we have to model a relationship involving (entity sets and) a *relationship set*.
 - Aggregation* allows us to treat a relationship set as an entity set for purposes of participation in (other) relationships.



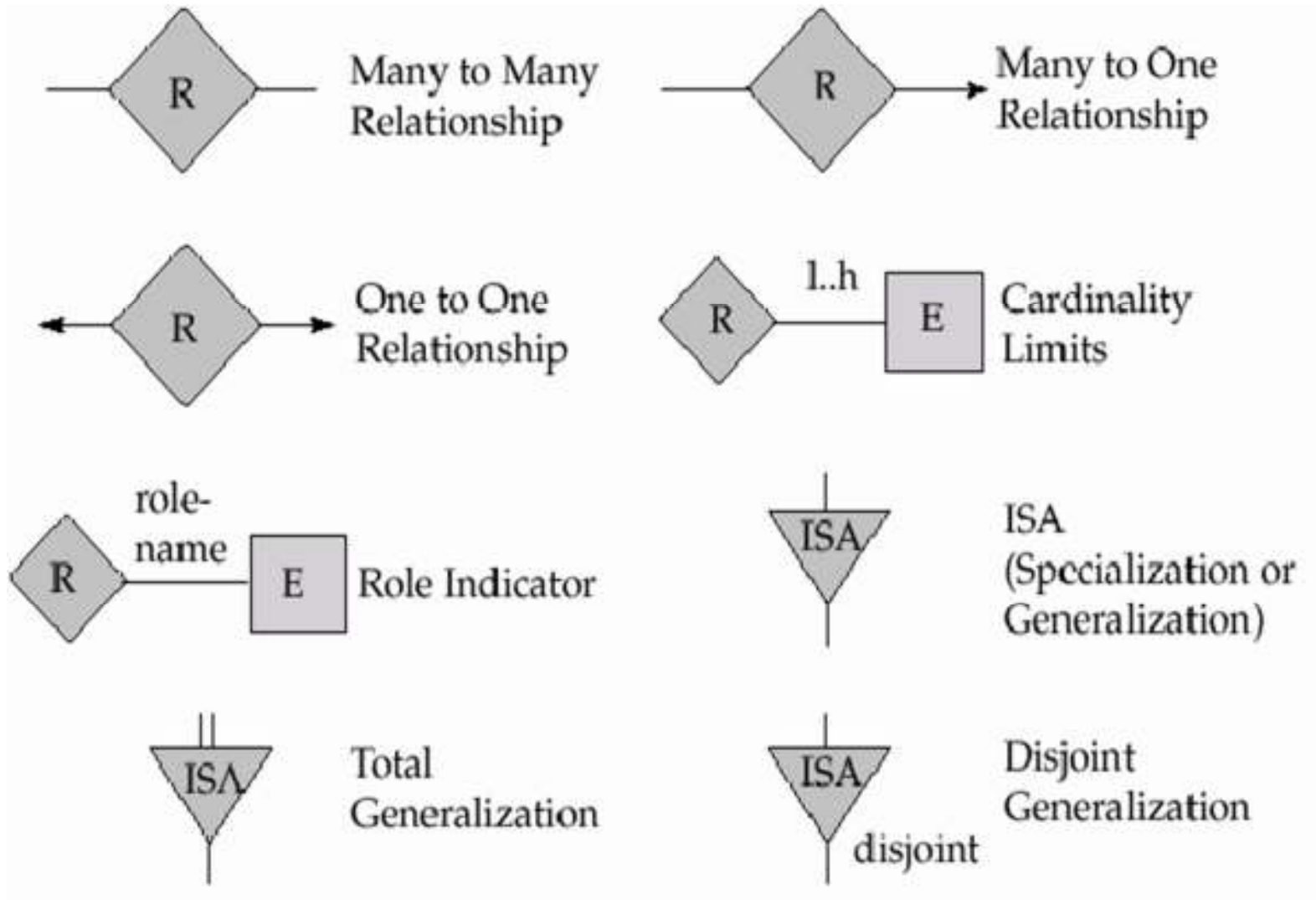
Aggregation vs. ternary relationship:

- ❖ Monitors is a distinct relationship, with a descriptive attribute. (i.e., until)
- ❖ Also, can say that each sponsorship is monitored by at most one employee.

Symbols used in ER diagram

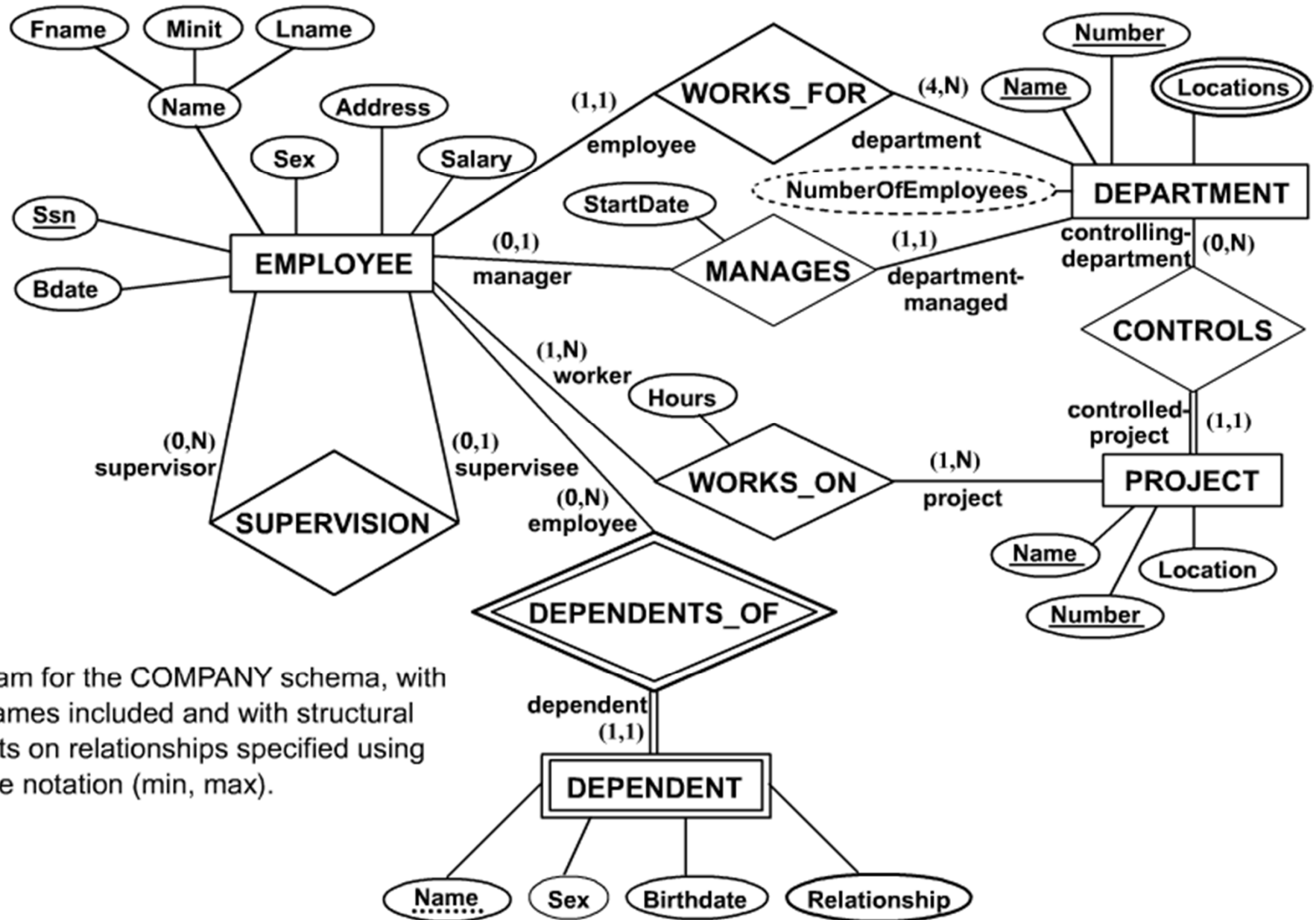


Symbols used in ER diagram



COMPANY ER Schema Diagram using (min, max)

Alternative ER Notations



ER diagram for the COMPANY schema, with all role names included and with structural constraints on relationships specified using alternative notation (min, max).

Entity Relationship (ER) modelling

Entity Relationship (ER) modelling

- a way of representing data and relationship among data
- is a tool for communication between requirement analysts and DB designer
- is a graphical representation of the database system
- provides a high-level conceptual data model
- supports the user's perception of the data
- is DBMS and hardware independent
- had many variants
- is composed of entities, attributes, and relationships and constraints(mapping and participation)

BANKING ENTERPRISE DATA REQUIREMENTS:

- DB user says: The name of our bank is Dena bank. We have few branches. Each located in a particular city and is identified by unique name. Basically the bank monitors the assets of each branch.
- DB user says: We have many customers. So its difficult for us to manage details of all in file system. It will be better if you design something good for us. The customers are identified by their account number. Also we need to know their name, street and city where they live. Customers may have accounts and may take loans. A customer may be associated with a particular banker, who may act a loan officer or a personal banker for that customer.

- RA asks: Is the customer_id same as account number?
- DB user says: Yes. One customer can have many accounts or some can have joint account.
- RA asks: If a customer wants a loan, is it necessary to have an account with the bank?
- DB user: No. not so necessary.
- DB user says: We also find difficult to manage employee details because many time new people joins and old people retires or some leaves job. So it will be good if you give us some structure where employee data can be stored in an organized way.

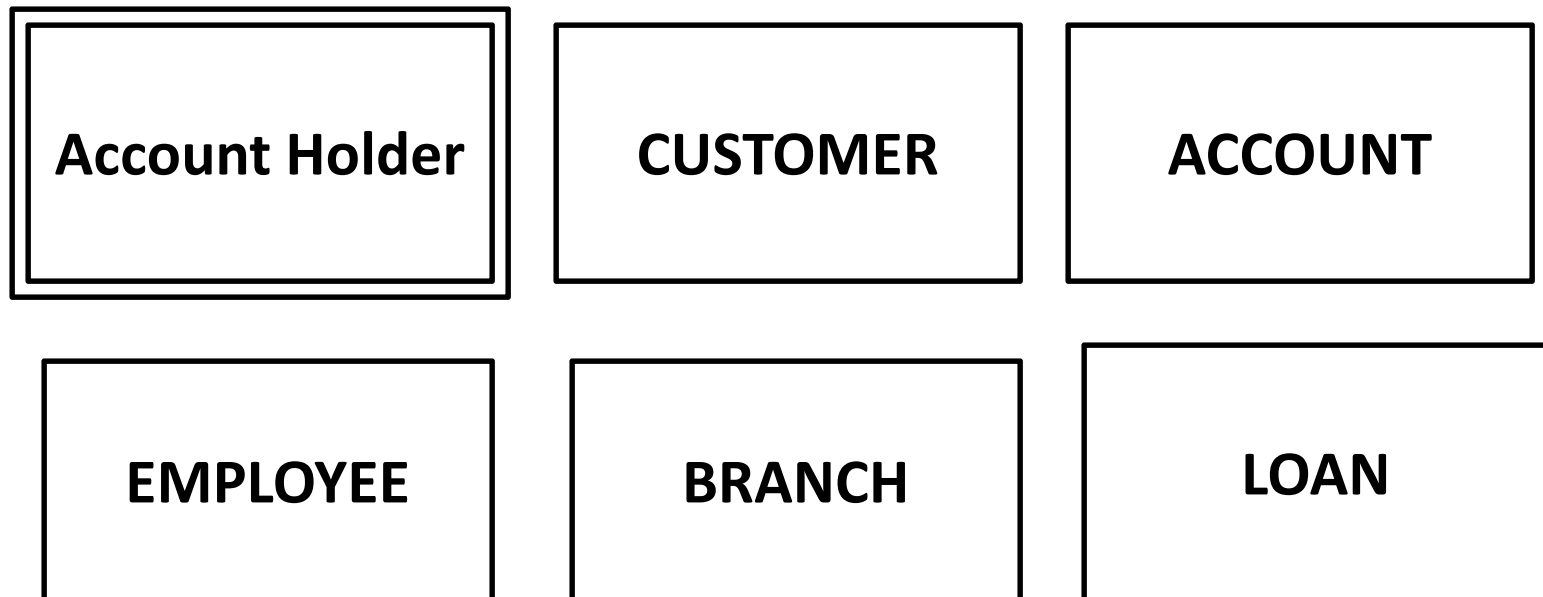
- DB user says: Bank employees are identified by their employee_id values. The bank administration need name, telephone number and the employee's dependents, and the employee_id of employee's manager. The bank also keeps track of the employee's start date and, thus, length of employment.

- DB user says: The bank offers two types of accounts-Savings and Checking account. Each account has unique account number. The bank maintains 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 saving account has an interest rate, and overdrafts are recorded for each checking account.

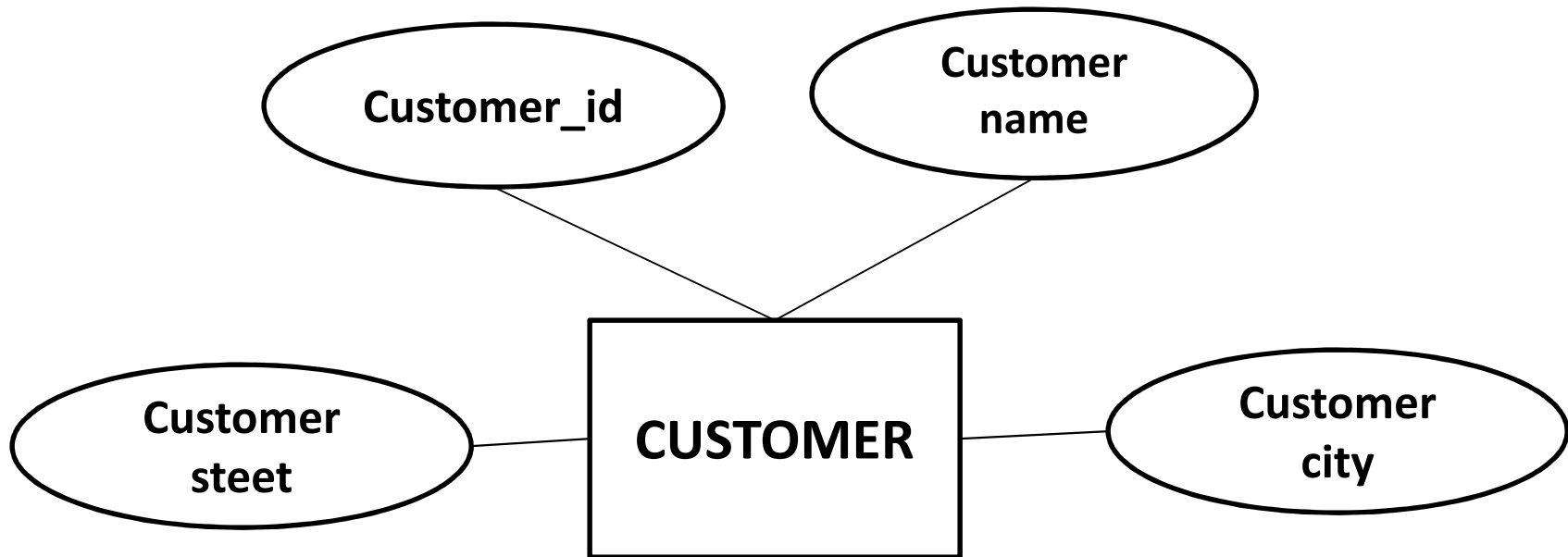
- DB user says: A loan originates at a particular branch and can be held by one or more customers. A loan is identified by a unique loan number. For each loan, the bank keeps track of the loan amount and loan payments. Although a loan payment number does not uniquely identify a particular payment among those for all bank's loans, a payment number does identify a particular payment for a specific loan. The date and amount are recorded for each payment.

Let us draw an ER diagram for a Banking system

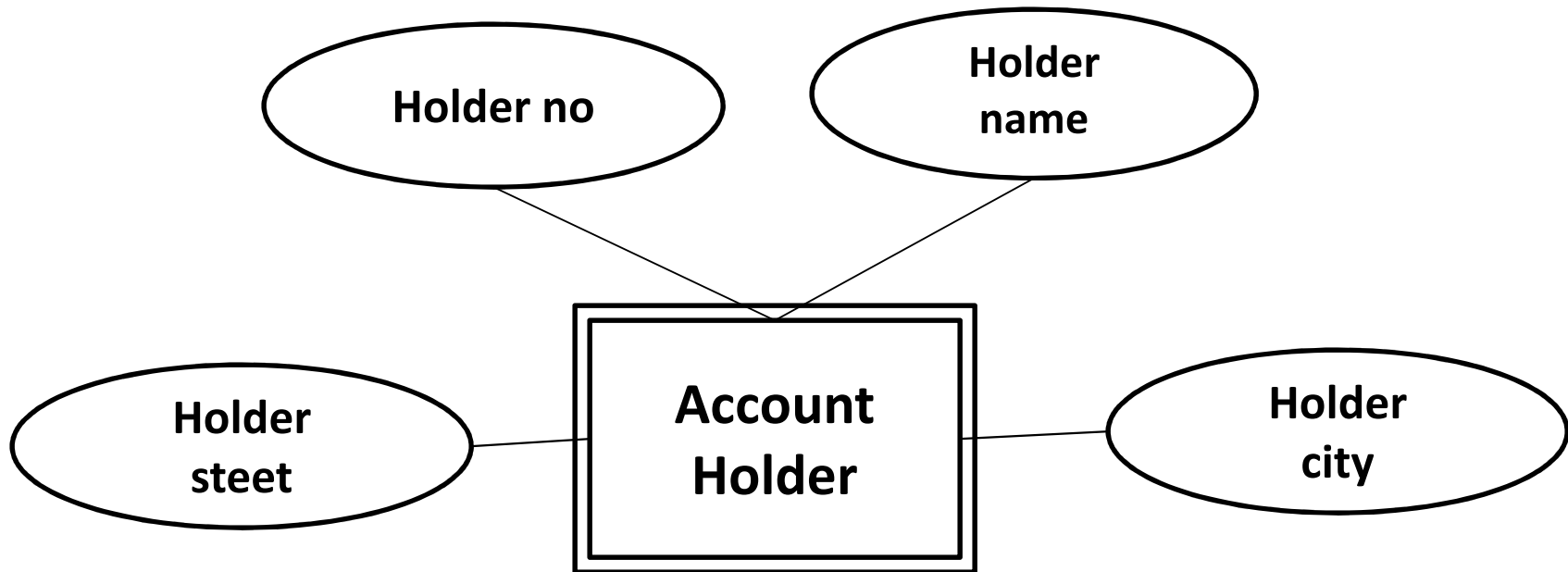
ENTITY AND ENTITY SETS



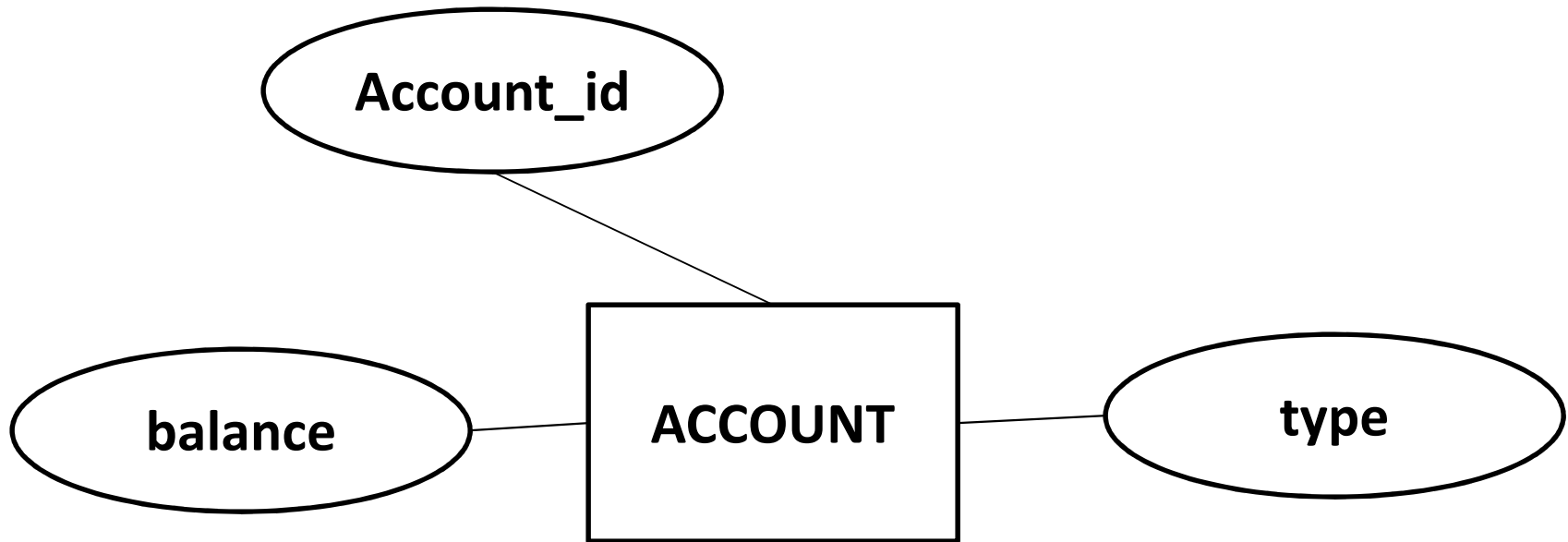
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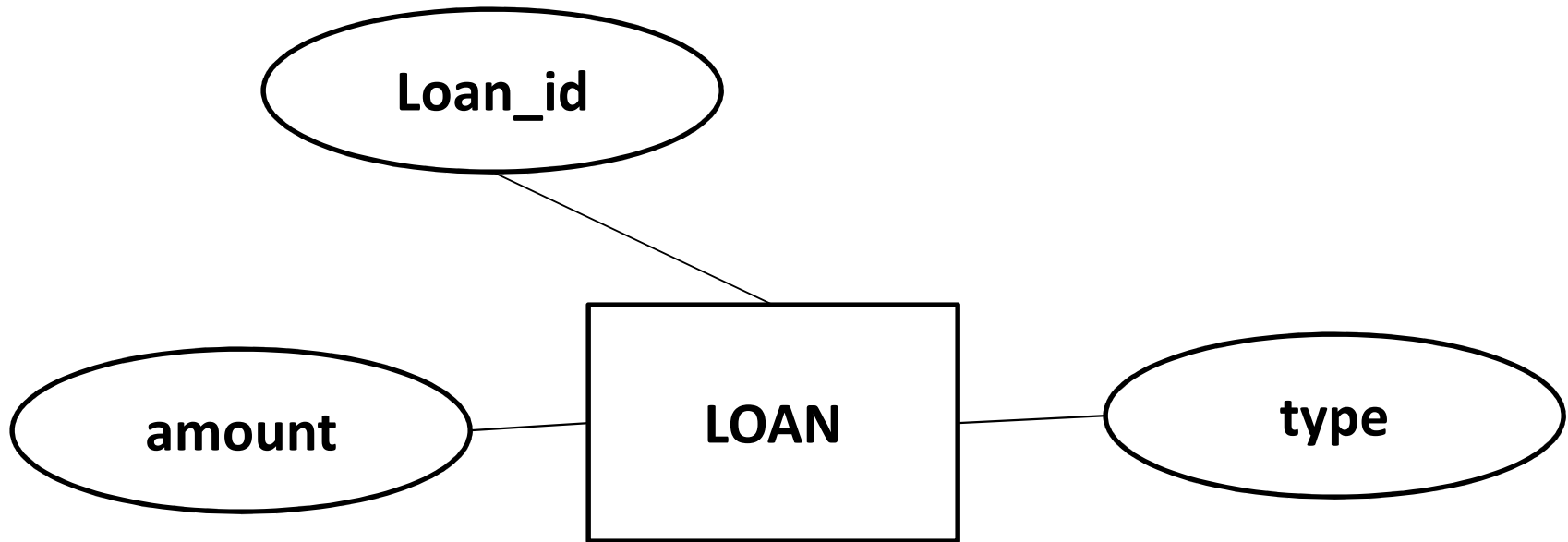
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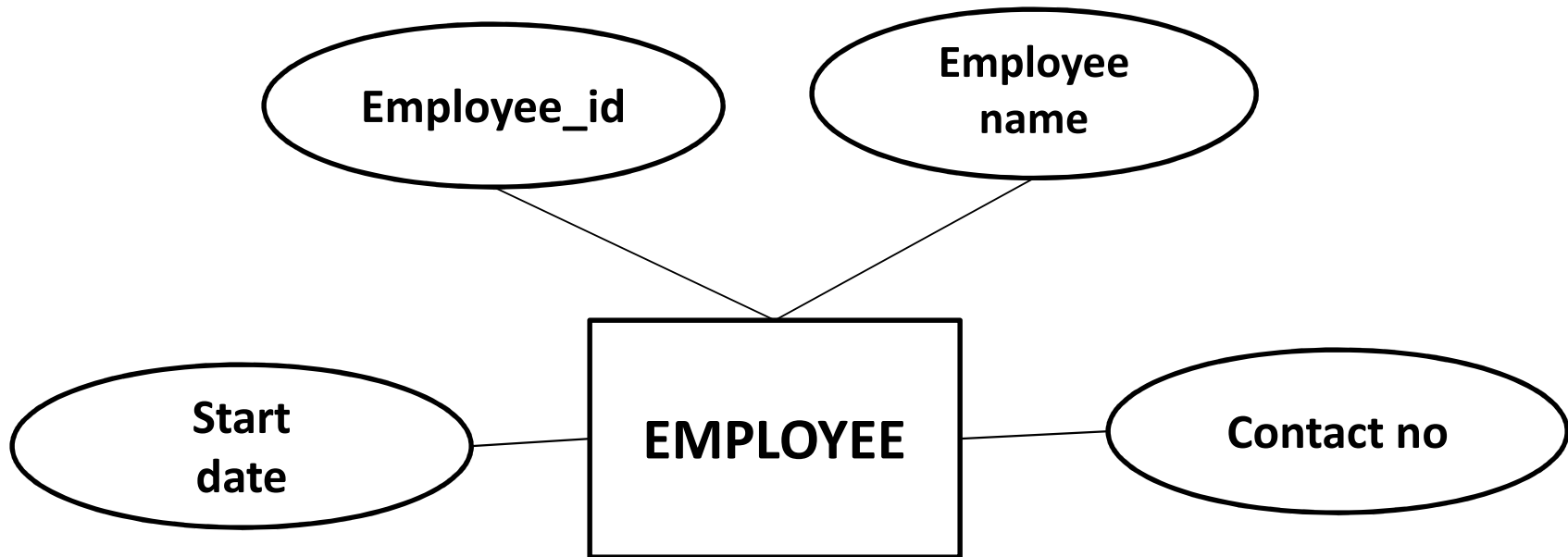
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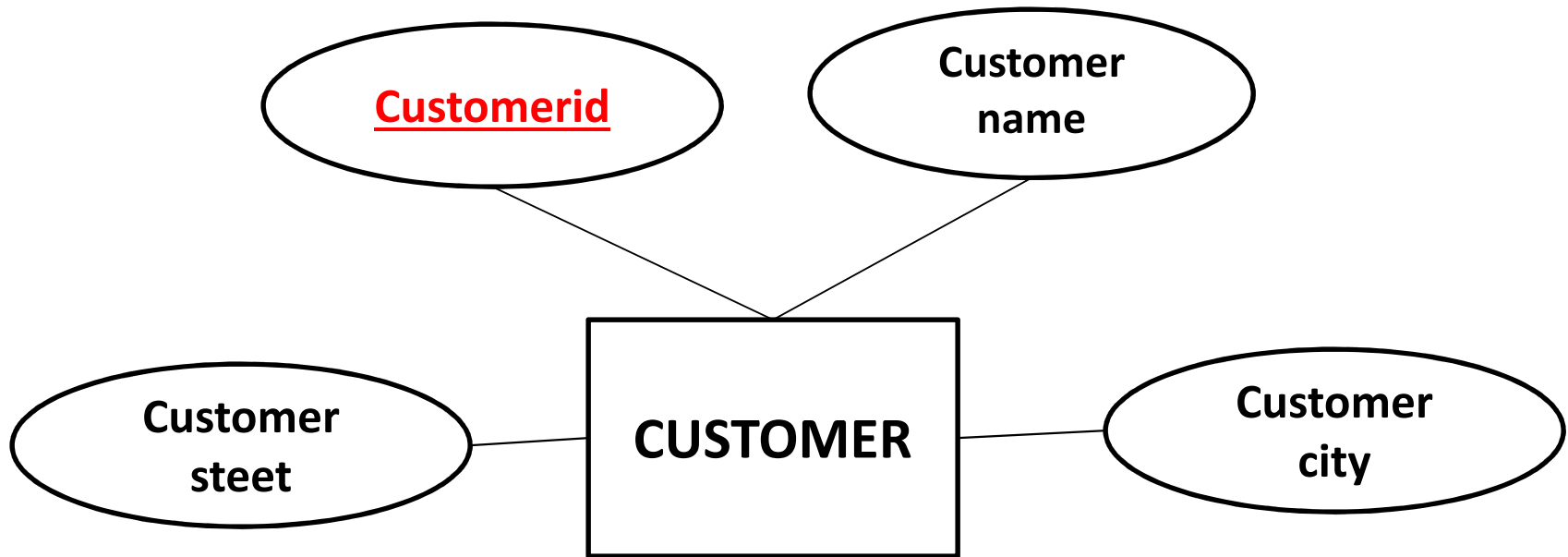
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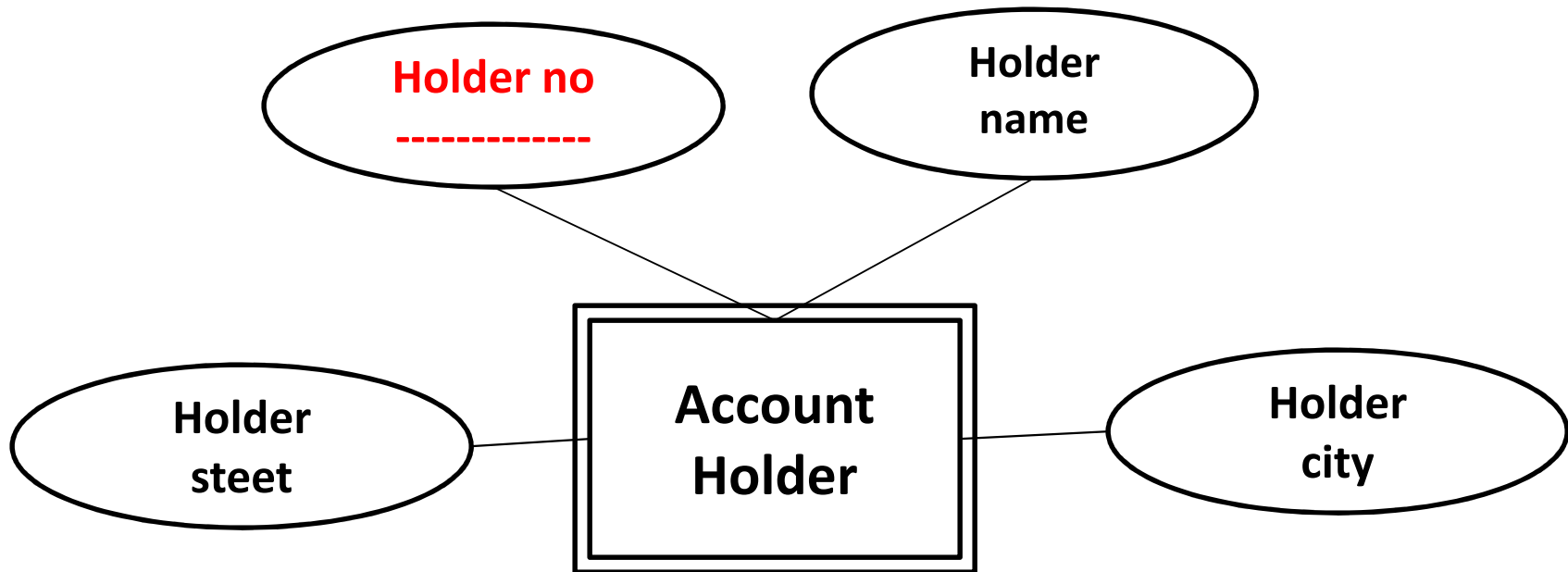
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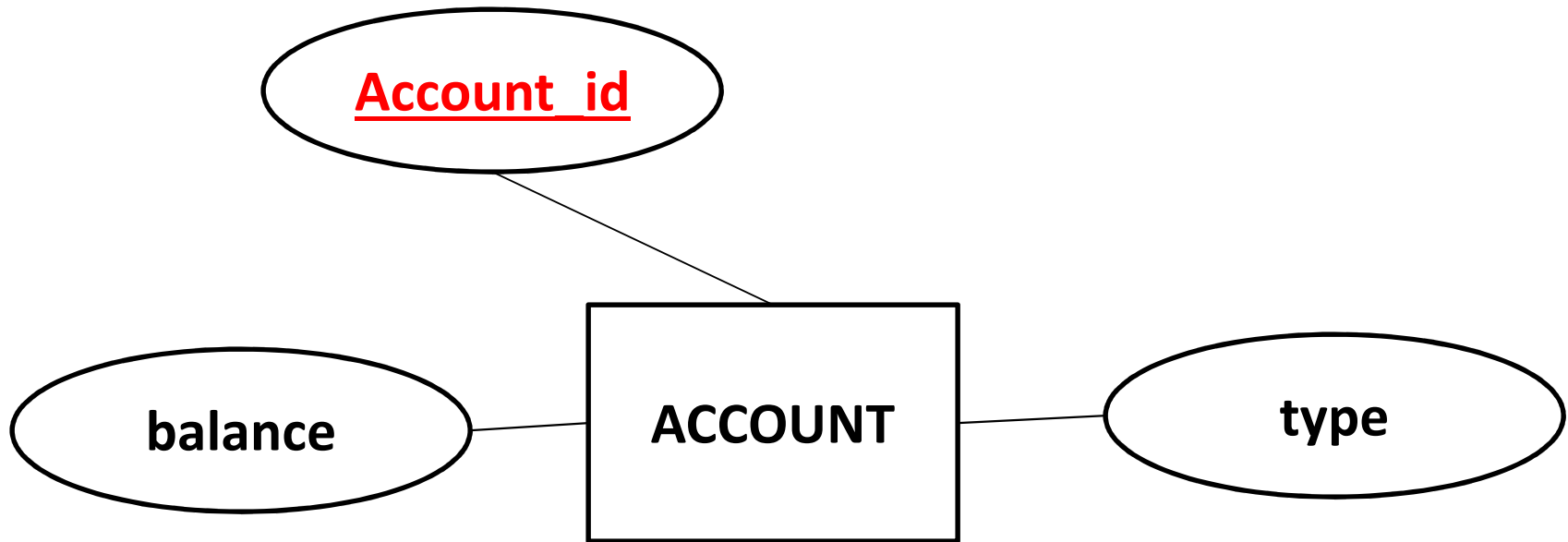
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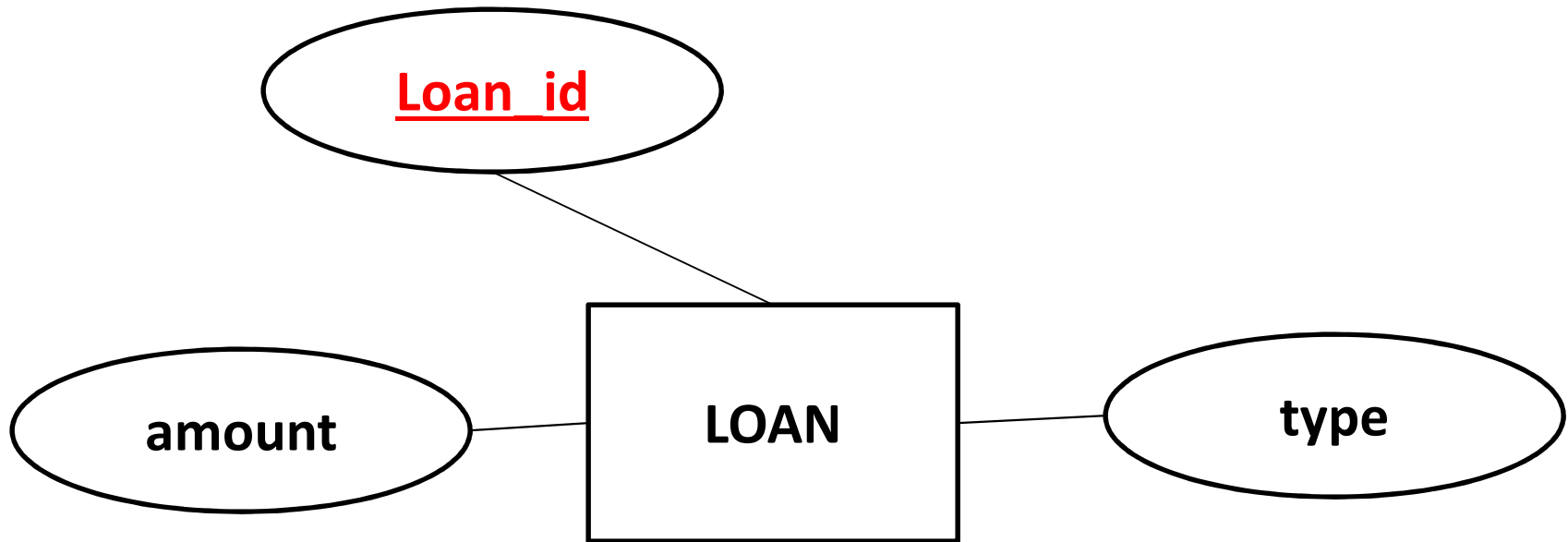
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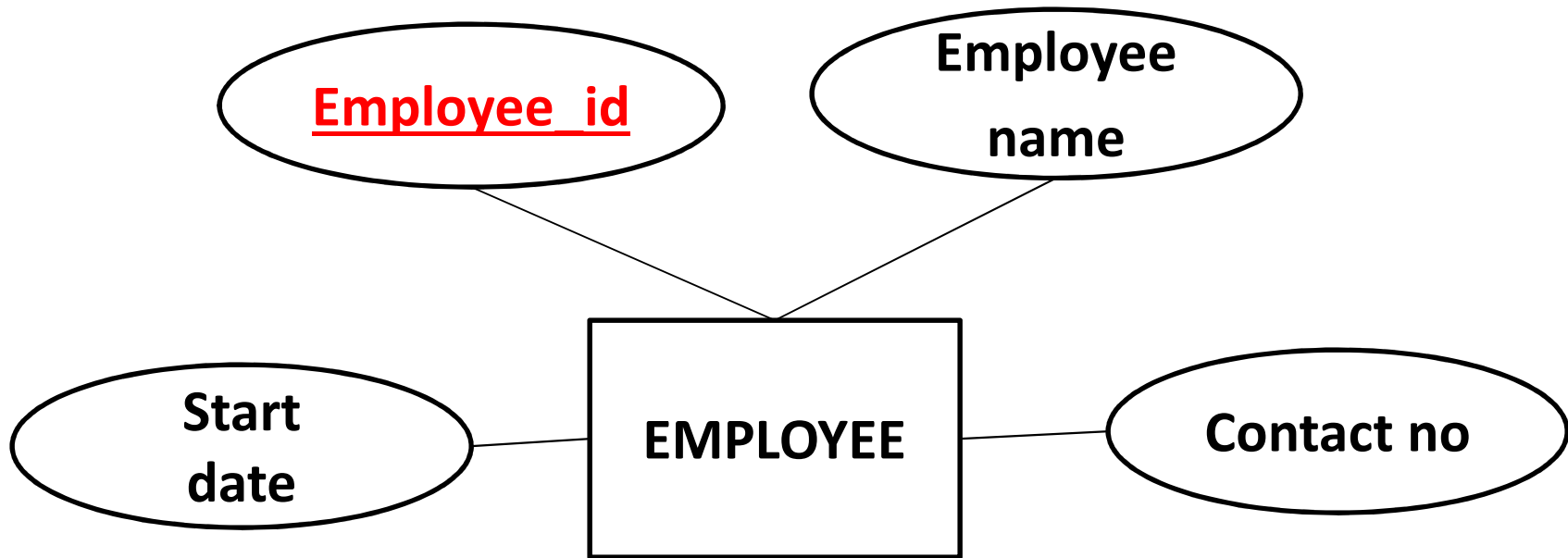
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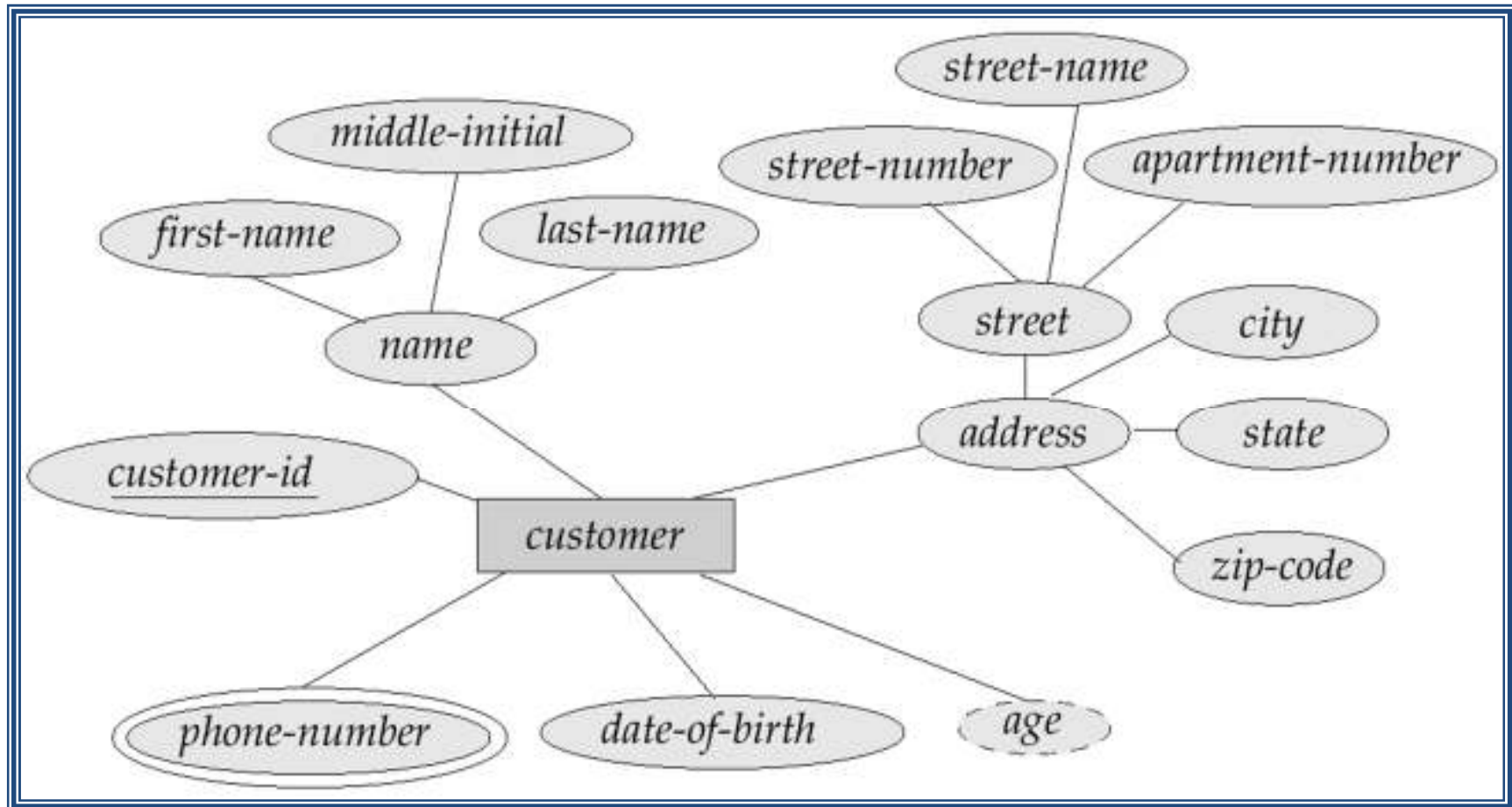
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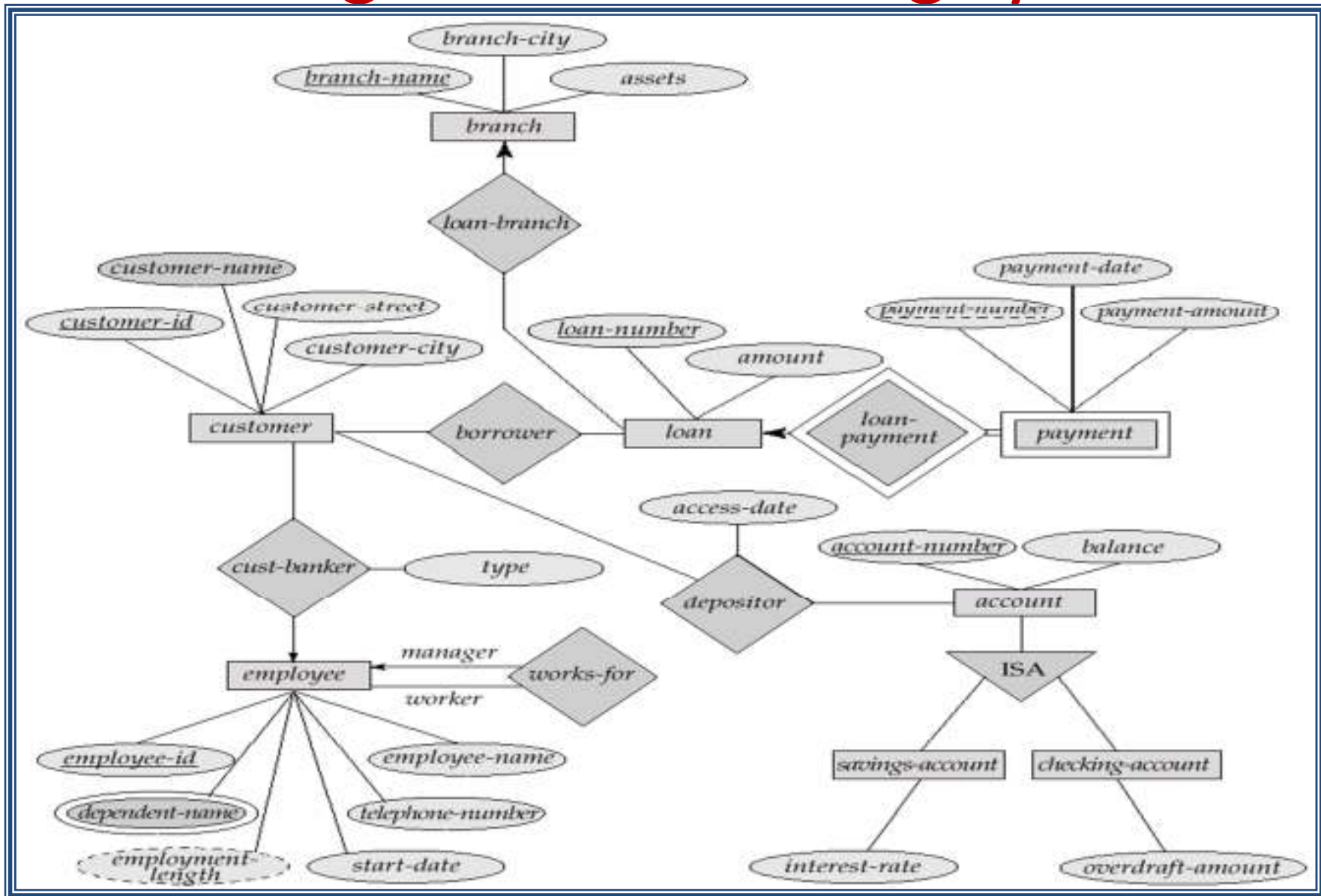
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E-R Diagram With Composite, Multivalued, and Derived Attributes



ER Diagram for banking system



Constructing an ER model

Before beginning to draw the ER model, read the requirements specification carefully. Document any assumptions you need to make.

- Identify entities - list all potential entity types. These are the object of interest in the system. It is better to put too many entities in at this stage and then discard them later if necessary.
- Remove duplicate entities - Ensure that they really separate entity types or just two names for the same thing.
- Also do not include the system as an entity type

Constructing an ER model...

- List the attributes of each entity (all properties to describe the entity which are relevant to the application).
 - Ensure that the entity types are really needed.
 - are any of them just attributes of another entity type?
 - if so keep them as attributes and cross them off the entity list.
 - Do not have attributes of one entity as attributes of another entity!
- Mark the primary keys.
 - Which attributes uniquely identify instances of that entity type?
 - This may not be possible for some weak entities.
- Define the relationships
 - Examine each entity type to see its relationship to the others.

Constructing an ER model...

- Describe the cardinality of the relationships
 - Examine the constraints between participating entities.
- ER modelling is an iterative process, so draw several versions, refining each one until you are happy with it. Note that there is no one right answer to the problem, but some solutions are better than others!

How about doing an ER design
interactively on the paper?

Problem statement

Design a database that manages information about publishers, authors, and books. A publisher has a name and address for the headquarters. Each publisher also has a set of branches, each branch having an address and two phone numbers. An author has a name and an address. A book is published by a publisher and has a list of authors associated with it. An author can write several books & a book can be published by only one publisher. Draw an E-R diagram for the given system.