Unit 3

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DATABASE DESIGN

- Requirement Analysis — user's needs
- ↓
- Conceptual Design — high level (ER)
- ↓
- Logical Design — tables
- ↓
- Schema Refinement — normalization
- ↓
- Physical Design — indices
- ↓
- Security Design — access control

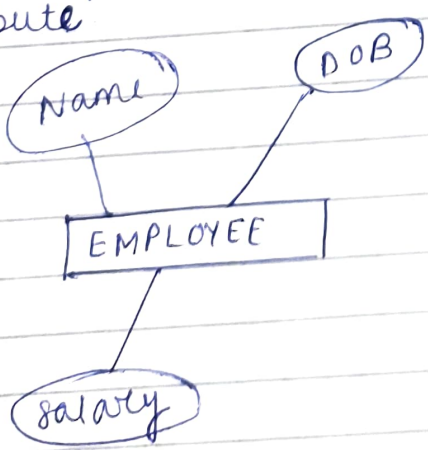
Entity: an object in the real world that is distinguishable from other objects.

- May be — physical (car, ball)
  conceptual (job)
- Collection of similar entities is called an entity set.

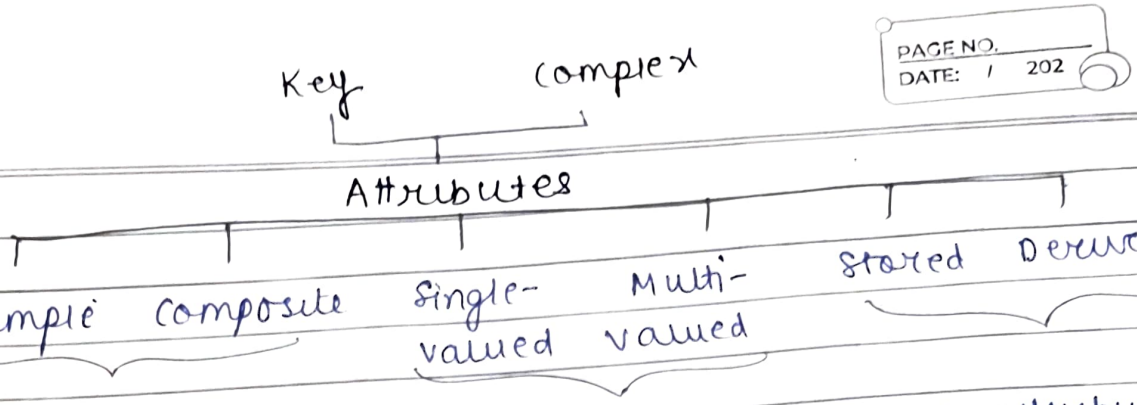
ATTRIBUTES

- An entity is described using a set of attributes
- Each entity in an entity set has the same attributes
- We must identify a domain of possible values for each attribute

Eg



Domain for Name : set of 20 char. strings



1. Simple: cannot be further divided into sub-attributes
Eg student roll no, employee id

2. Composite: made up of ≥ 2 simple attributes
Eg address
- street number
- city
- zip code

3. Single-valued: can have only one value
Eg adhaar number. Provide a unique identifier

4. Multivalued: >1 values.
Eg. books written by an author

5. Derived: based on other attributes & are not stored directly in the DB. Eg age (from DOB)

6. Stored: remain constant for an entity instance.
Eg DOB

7. Complex: multivalued + composite.
Eg ~~address~~ street — house no, street no.

8. Key: used to uniquely identify each row in a table
Eg employee id - PK
manager id - FK

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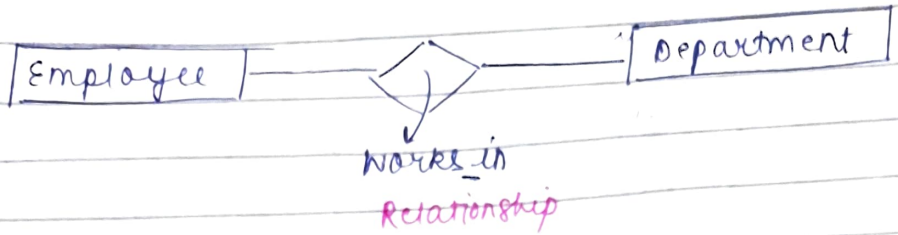
RELATIONSHIPS: association among 2 or more entities.

Eg

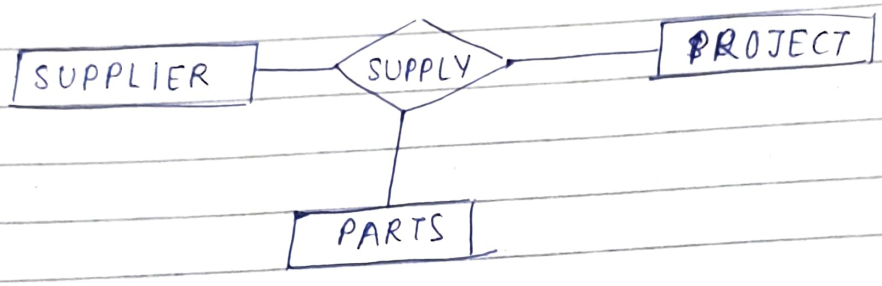


Relationship

Types:

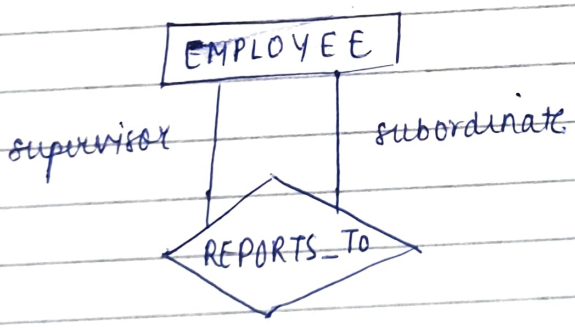
→ Ternary: we must record an association b/w suppliers, parts & project

Eg



→ Recursive: employees report to other employees.

Eg.



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Cardinalities: expresses the no. of entities that can be associated w/ another entity via a relationship set.

1. One-to-one: any single row of table 1 can be related to only one record of ~~the~~ table 2, & vice versa

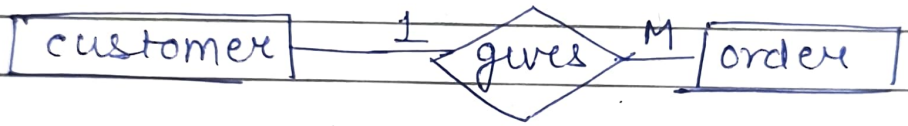
eg

~~One~~ employee will work in one ~~emp~~ dept only
Each dept has a single employee.

2. One-to-many: -

- - - one or more rows of table 2, but ~~the~~ a rows of table 2 can only relate to a single row of table 1.

Eg



many to one:

3. many-to-many:

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Weak entity set: does not have sufficient attributes to form a primary key.

- It must be associated w/ an identifying ~~key~~ set, which is said to own the weak entity set. ~~(Id)~~
- Normally has a partial key which can ~~id~~ uniquely id weak entities related to the same owner entity.
- Worst case: a composite attribute of all the weak entity's attributes will be primary key.
- PK (WE) = PK (Id. set) + ~~WE Part~~ Partial key (WE)
- Owner & weak entity set: one-to-many
- WE must have total participation in the identifying relationship set. (IRS)
- IRS should not have descriptive attributes
- WE set may have >1 identifying entity set.

Eg.