

DBMS Assignment — Unit 4 (Solved)

Prepared by: ChatGPT (answers based on the uploaded assignment).

Fill in the blanks

Q: 1. An entity set attributes that does not have a primary key within them, is termed as a _____.

A: weak entity set

Q: 2. The ER model is important for its role in _____.

A: database design

Q: 3. _____ represent entity sets.

A: Rectangles

Q: 4. _____ allows us to indicate that a relationship set participates in another relationship set.

A: Aggregation

1. Explain the following terms:

(i) Aggregation

Aggregation is a conceptual modeling construct in the ER model that treats a relationship set between entity sets as a higher-level entity. It allows you to model a situation where a relationship itself participates in another relationship. Aggregation is useful for representing complex relationships and for simplifying ER diagrams when relationships need to be related to other entities or relationships.

(ii) Generalization

Generalization is a top-down abstraction process in which two or more entity types with common features are combined into a higher-level (super) entity type. It captures 'is-a' relationships (inheritance). For example, if 'Teacher' and 'Student' share common attributes, they can be generalized into a 'Person' entity type. Generalization provides attribute and relationship inheritance from the parent to the subclasses.

(iii) Super key

A super key is a set of one or more attributes that, taken collectively, can uniquely identify a tuple (row) in a relation. A super key may contain extra attributes that are not necessary for uniqueness.

(iv) Candidate keys

Candidate keys are minimal super keys — that is, super keys from which no attribute can be removed without losing the uniqueness property. There can be multiple candidate keys for a relation; one of them is chosen as the primary key.

2. Explain the following terms briefly:

(i) Attribute

An attribute is a property or characteristic of an entity type. For example, Student entity may have attributes: RollNo, Name, DOB.

(ii) Domain

Domain is the set of allowable values for an attribute. For example, the domain of 'Age' might be the integers from 0 to 120.

(iii) Entity

An entity is a real-world object or concept that can be distinctly identified. For example, a particular student or a specific book.

(iv) Relationship

A relationship is an association among two or more entities. For example, 'Enrolls' between Student and Course.

(v) Entity set

An entity set is a collection of similar entities. For example, the set of all Students.

(vi) One-to-many relationship

A one-to-many (1:N) relationship means a single entity in set A can be associated with many entities in set B, but each entity in B is associated with at most one entity in A. Example: Department (1) to Employees (N).

(vii) Participation constraint

Participation constraint indicates whether all or only some entity occurrences participate in a relationship. It is either total (every entity must participate) or partial (some entities may not participate).

(viii) Weak entity set

A weak entity set is an entity set that does not have a primary key of its own and depends on a 'owner' (or identifying) entity set. A weak entity is identified by being associated with its owner via an identifying relationship and typically uses a partial key together with the owner's primary key.

(x) Composite key

A composite key is a key that consists of two or more attributes that together uniquely identify an entity instance. For example, (OrderID, ProductID) in an order-line relation.

3. Explain the distinction among the terms—primary key, candidate key and the super key.

A **super key** is any set of attributes that uniquely identifies tuples in a relation. A **candidate key** is a minimal super key: it has no redundant attributes (removing any attribute breaks uniqueness). A **primary key** is a candidate key chosen by the database designer to be the main means of identifying tuples. In short: every primary key is a candidate key, every candidate key is a super key, but not every super key is a candidate key. Example: For a Student relation, {RollNo, Name} might be a super key if RollNo alone is unique; {RollNo} is a candidate key; if {RollNo} is selected as the main identifier, it becomes the primary key.

4. What is entity, entity type, entity sets and attribute? What is mapping cardinalities? Explain different cardinalities.

Entity: A real-world object with distinct existence (e.g., a particular student). **Entity type:** A collection of entities that share the same attributes (e.g., Student is an entity type). **Entity set:** The set of all entities of a particular entity type at a given time (e.g., all students currently in the database). **Attribute:** A property or characteristic of an entity type (e.g., Name, DOB).

Mapping cardinalities: They specify the numerical relationships between entity sets participating in a relationship. Common cardinalities are: **One-to-One (1:1):** One entity in A relates to at most one in B, and vice versa. **One-to-Many (1:N):** One in A can relate to many in B, but each in B to at most one in A. **Many-to-One (N:1):** The inverse of 1:N. **Many-to-Many (M:N):** Many in A relate to many in B.

5. Explain the difference between a weak and a strong entity set.

Strong (regular) entity set: Each entity has a primary key that uniquely identifies it, independent of other entities. Strong entities do not require an identifying relationship to be uniquely identified. Example: Employee with EmployeeID. **Weak entity set:** Does not possess a complete primary key of its own and depends on an owner (identifying) entity set. A weak entity is identified by a combination of its partial key and the primary key of its owner via an identifying relationship. Weak entities are often shown with double rectangles; identifying relationships are shown with double diamonds. Example: A 'Dependent' of an Employee where DependentName + EmployeeID identifies a dependent.

References:

Source: Assignment Unit 4 uploaded by user. (See attached file).