

NAME : AMAN LATHA

ENROLLMENT NO: 0801IT221015

Section "A"

Branch : Information Tech.

Subject : Database Management System.

Ques: Explain the distinction among the terms primary key, Candidate key, & super key with an example.

Ans-1 • Super key :- A Super key is a set of one or more attributes that can uniquely identify a tuple in a relation. It may contain extra attribute that are not necessary for uniqueness.

Ex { Employee-ID }, { Employee-ID, Name },
{ Employee-ID, Email }

All these sets uniquely identify a record, so they are super keys.

• Candidate key :- A minimal super key, meaning it is the smallest set of attributes that uniquely identifies a record. Removing any attribute from it will make it non-unique.

Ex : { Employee-ID }, { Email } (Both uniquely identify records and contain no unnecessary attributes)

• Primary key :- One of the candidate keys chosen by the database administrator to uniquely

identify records in a table, it must be unique and not NULL.

ex

{Employee-ID}

Ques. 2 What are the advantages of RDBMS over conventional file system? Explain with ex.

Ans-2 • Advantages.

1. Data redundancy & consistency :- It used to be duplicated across multiple files and change in one didn't update others this led to redundancy & inconsistency. RDBMS eliminates redundancy using normalization & consistency using integrity constraints.

ex

Student data may be stored in multiple files, email is updated in one file, other files still hold the older data, but in RDBMS, a student relation hold all the data and other relation uses foreign key to access it.

then updating one is sufficient and avoids redundancy & inconsistency.

e. Data Integrity :- File system doesn't provide built in constraint, allowing invalid entries, but RDBMS uses the concept of keys and constraints like NOT NULL, UNIQUE, DEFAULT etc to maintain data integrity.

Ex In file system name of book author may not be assigned but in RDBMS we can add the constraint of NOT NULL.

3. Security & Access Control :- File system provide basic access control difficult to manage mult user access securely, but RDBMS provides role based access control using GRANT and REVOKE commands.

Ex A librarian can access to issue books but not modify the student records.

4. Convert Access & Transaction. :-

In file system, simultaneous access may lead to data corruption, RDBMS on the other hand uses ACID properties to ensure safe transaction.

Ex Simultaneous write to same file may result in loss of data, RDBMS ensure transaction occur in a controlled manner.

5. Efficient data retrieval :-

File system requires scanning the entire file for searching while we can use indexes & queries in RDBMS for fast retrieval.

Ex To find student with CGPA > 8.5 instead of manual scanning query can be used

```
SELECT * FROM Students WHERE CGPA > 8.5;
```

Que

Ques 3 How to convert an ER Model into a RDBMS model? Explain all rules with an Example?

Ans 1 Conversion rules are:

- * Entity set - 1. Convert every strong entity into separate table.
- 2. Convert every weak entity set into a separate table by making it dependent into one strong entity set.
- * Unary Relationship - no separate table, add a new column as the foreign key depending to the primary key of same table.
- * Binary Relationship
 - 1:1 \div no separate table, primary key of one side is used as foreign key on other side.
 - priority is given to side having total participation.

Ques 4 We can convert any weak entity set to a strong entity set by simply adding appropriate attributes. Why then, do we have weak entity set?

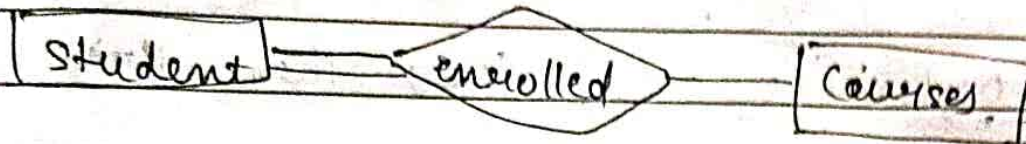
Ans-4 Reason to have weak entity set -

1. They reflect logical structure of an entity being dependent on another.
2. without weak entity set it will lead to duplication consequent possible inconsistency.
3. Many real world scenarios involve dependent entities that do not have a attendance identity.
4. Keeping weak entities separate from strong follow normalization & provides data anomalies & ensure efficient storage.

Que-5 Explain the distinction b/w total and Partial constraints with ex n

Ans-5 Total constraint - Every entity in the entity set must participate in a relationship.

Partial constraint - An entity in the entity set can exist without being a part of the relationship.

Example

Here student entity set is involved in Total Participation, i.e. no student can exist without a course. A course is in partial participation i.e. a course may exist without any student.

Ques Use the definition of f.d to argue that each of Armstrong's axioms (Reflexivity, augmentation and transitivity) is ...

Ans functional dependency can be defined as: for all pairs of tuples t_1 & t_2 in R such that if $t_1[A] = t_2[A]$ then

$t_1[B] = t_2[B]$ where R is a relation.

Thus we say α & β are functionally dependent $\alpha \rightarrow \beta$

8. Armstrong Axioms -

1. Reflexivity - If $Y \subseteq X$ then $X \rightarrow Y$

Since Y is a subset of X , the values of Y are already known when X is known, thus this functional dependency is trivial & sound.

2. Augmentation - If $X \rightarrow Y$ then $XZ \rightarrow YZ$

given $X \rightarrow Y$ it means if $t_1[X] = t_2[X]$ then $t_1[Y] = t_2[Y]$. adding Z to the relation.

if $t_1[XZ] = t_2[XZ]$, then $t_1[X] = t_2[X]$ and $t_1[Z] = t_2[Z]$

since $X \rightarrow Y$ $t_1[Y] = t_2[Y]$ so $t_1[YZ] = t_2[YZ]$

hence we can say $XZ \rightarrow YZ$

Thus proving this axiom sound.

3. Transitive - If $X \rightarrow Y$ & $Y \rightarrow Z$ then $X \rightarrow Z$

given $X \rightarrow Y$

if $t_1[X] = t_2[X]$

then $t_1[Y] = t_2[Y]$

8 $Y \rightarrow Z$

if $t_1[Y] = t_2[Y]$

then $t_1[Z] = t_2[Z]$

Combining them we infer that

if $t_1[X] = t_2[X]$

then $t_1[Z] = t_2[Z]$, $X \rightarrow Z$

Thus proving this axiom sound.

Ques-7 Compute the closure of the following set F of FD for relation $R(ABCDE)$

$A \rightarrow BC$

$CD \rightarrow E$

$B \rightarrow D$

$E \rightarrow A$

Find the candidate key for R ,
find the highest normal form
and decompose the relation up to 3NF

Ans-7 Closure $A^+ = ABCDE$

$CD^+ = CDEAB$

$B^+ = BD$

$E^+ = EABCD$

Candidate key or minimal set of super key.
Here A & E are candidate key.

→ The relation is in 1NF since it has atomic attributes

→ The relation is in 2NF if it is 1NF and has no partial functional dependency and the single attributes are candidate key.

Then it holds the 2NF

→ For the relation to be in 3NF, it should be in 2NF and free from transitive functional dependency.

But the given FD have TFD

∴ Highest Normal form is 2NF

Decomposing relation to 3NF

$R_1(ABC) \quad \{A \rightarrow BC\}$

$R_2(CDE) \quad \{CD \rightarrow E\}$

$R_3(BDEA) \quad \{B \rightarrow D, E \rightarrow A\}$

Ques 8 An organization collecting car renters' information considers the following relation

Ans-8 $\pi_{\text{contact}} (\sigma_{\text{car_number} \neq \text{NULL}} (\text{Renter} \bowtie \text{Renting}))$
 $\text{Renter, Renter ID} = \text{Renting, renter ID}$

Ques 9 Choose the correct answer.

Ans-9 Op₁ 'C' returns the 2 tuple that are present in paragraph.

It returns the intersecting of Paragraph and Union of chapter and Paragraph that Chapter itself projecting only Page No, topic
 Intersection returns paragraph itself.

Ques 10

Ans-10a) $\pi_{\text{branch-name}} (\sigma_{\text{branch-city} = \text{"chennai"}} (\text{branch}))$

- $\sigma_{\text{branch-city} = \text{"chennai"}} (\text{branch})$ filters branches in Chennai
- $\pi_{\text{branch-name}}$ projects only the branch names.

(ii) $\pi_{\text{customer-name}} (\sigma_{\text{branch-name} = \text{"ABC"}} (\text{newrow} \bowtie \text{loan}))$

Ques. 11

Ans. 11 (i) $\pi_{\text{person-name}} (\sigma_{\text{company-name} = \text{"first Bank Corporation"}} (\text{works}))$

Ans. (ii) $\pi_{\text{person-name}, \text{street-city}} (\sigma_{\text{company-name} = \text{"first Bank"}} (\text{employee} \bowtie \text{works}))$
 $A \text{ salary} > 200000$

Ans. (iii)

$\pi_{\text{person-name}} (\sigma_{\text{employee-city} = \text{company-city}} (\text{employee} \bowtie \text{works} \bowtie \text{company}))$