20:43

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lossless decomposition ch...

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dbms মধ্যে ক্ষতিহীন পচন চেক

বাংলায় In English

What is Lossless Decomposition in DBMS? The decomposition of a given relation X is known as a lossless decomposition when the X decomposes into two relations X1 and X2 in a way that the natural joining of X1 and X2 gives us the original relation X in return.

https://byjus.com › gate › lossless-d...

Lossless Decomposition in DBMS | GATE Notes - BYJU'S

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R1 (AB) R

Then $R_1 \cap R_2 \neq \phi$

No common attribute. If at **natural join no common attribute present** then

$R_1 \bowtie R_2 = R_1 \text{ X } R_2$ then it is **lossy**.

Condition 3:

$\mathbf{R_1 \cap R_2}$ should be **Super Key** of either

$\mathbf{R_1 \cap R_2 \rightarrow R_1}$ **(Super key of $\mathbf{R_1}$)**

Or

$\mathbf{R_1 \cap R_2 \rightarrow R_2}$ **(Super key of $\mathbf{R_2}$)**

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Contributed by

Debashis Faculty of Computer Science Department, ICC College

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Stable storage in DBMS

বাংলায় In English

Stable storage is **storage which theoretically survives any kind of failure**. This type of storage can only be approximated by replicating data. In terms of I/O, volatile memory is the fastest and non-volatile storage is typically several times slower.

https://homes.cs.aau.dk › exer13

Database Systems Course, Solutions for Exercise no. 13

Stable storage in DBMS

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conflict in transactions in d...

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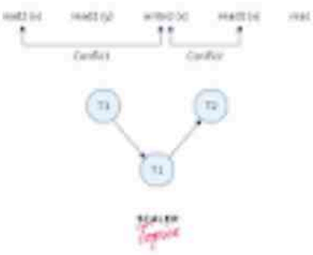
বাংলায় In English



Two operations are said to conflict if they are part of different transactions working on the same data item, and one must be a write operation. Conflict equivalent schedules can convert from one to another by swapping the non-conflicting operations.

https://www.scaler.com › topics › c...

Conflict Serializability in DBMS - Scaler Topics

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conflict in transactions in d...

Conflict serializability is **a property of a schedule that guarantees that the outcome of the concurrent transactions is equivalent to some serial order of the same transactions**. This means that the concurrent schedule does not violate any data dependencies or constraints that would be enforced by the serial order. Mar 7, 2023

https://www.linkedin.com › advice

Conflict and View Serializability in Database Transactions - LinkedIn

MORE RESULTS

What is the condition for occurrence of conflicting operations in transactions?

What is a conflict equivalent in DBMS?

Two schedules are said to be conflict equivalent **if the order of any two conflicting operations are the same in both the schedules**. The two conflicting operations should belong to two different transactions. They should be acting over the same database or variable say x. Jul 6, 2021

https://www.tutorialspoint.com › wh...

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conflict dirty value in trans...

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বাংলায় In English

Dirty Read Problems (W-R Conflict)

The dirty read problem occurs when one transaction updates an item of the database, and somehow the transaction fails, and before the data gets rollback, the updated database item is accessed by another transaction. There comes the Read-Write Conflict between both transactions.

https://www.javatpoint.com › dbms-...

DBMS Concurrency Control - Javatpoint

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conflict dirty value in trans...

MORE RESULTS

What is the dirty problem in the transaction known as?

Temporary update or dirty read problem occurs when one transaction updates an item and fails. But the updated item is used by another transaction before the item is changed or reverted back to its last value. May 11, 2023

https://www.geeksforgeeks.org › co...

Concurrency problems in DBMS Transactions - GeeksforGeeks

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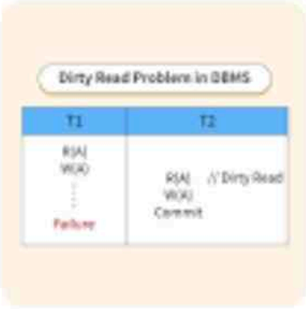
What is the problem of dirty data in DBMS?



A dirty read problem **may arise when the number of transactions (that perform on shared data) executes simultaneously**. It occurs when a transaction reads the data that has been updated by another transaction that is still uncommitted.

https://www.scaler.com › topics › di...

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2. Boyce-Codd Normal Form (BCNF) :

BCNF stands for Boyce-Codd normal form and was made by R.F Boyce and E.F Codd in 1974.A functional dependency is said to be in BCNF if these properties hold:

- It should already be in 3NF.
- For a functional dependency say P->Q, P should be a super key.

BCNF is an extension of 3NF and it is has more strict rules than 3NF. Also, it is considered to be more stronger than 3NF.

Example: for the relation R(A, B, C, D) with functional dependencies as {A->B, A->C, C->D, C->A}:

```
The candidate keys will be : {A, C}
      as the closure of A = {A, B, C, D}
                closure of C = {A, B, C, D}
```

This relation is in BCNF as it is already in 3Nf (there is no non-prime attribute deriving

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Difference between 3...
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3NF.

Example: for the relation R(A, B, C, D) with functional dependencies as {A->B, A->C, C->D, C->A}:

```
The candidate keys will be : {A, C}
      as the closure of A = {A, B, C, D}
              closure of C = {A, B, C, D}
```

This relation is in BCNF as it is already in 3Nf (there is no prime attribute deriving no prime attribute) and on the left hand side of the functional dependency there is a candidate key.

Difference between 3NF and BCNF :

S.NO.	3NF	BCNF
1.	3NF stands for Third Normal Form	BCNF st for Boyce Codd Normal Form.

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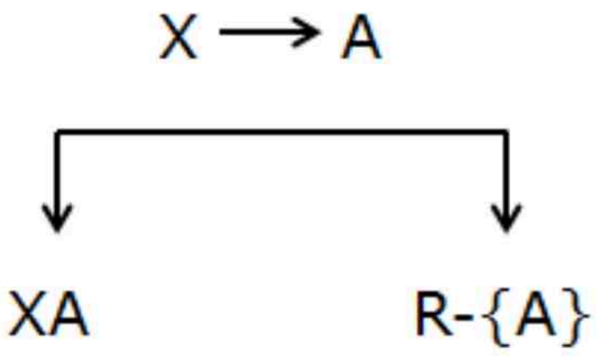
Steps:

1. Identify the dependencies which violates the BCNF definition and consider that as X->A
2. Decompose the relation R into XA & R-{A} (R minus A).
3. Validate if both the decomposition are in BCNF or not. If not re-apply the algorithm on the decomposition that is not in BCNF.



All the decomposition resulted by this algorithm would be in BCNF and they would be lossless however some of the decomposition will preserved the dependencies and rest not.

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R(A,B,C,D,E) { AB->CD, D->E, A->C, B->D}

Find the BCNF decomposition of the above relation.

Solution:

Given Relation is R(A,B,C,D,E) with dependencies as {AB->CD, D->E, A->C, B->D}

Candidate Key for this relation is AB.

[Here I am not going to explain how to get dependency closure and determine candidate key, for this you please refer another article as below:

How to determine Candidate Key using dependency closure.]

Hence Prime Attributes: A, B.

Non Prime Attributes: C, D, E.

using the dependency definition:

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Non Prime Attributes: C, D, E.

using the dependency definition:

AB -> CD (Full Dependency – CD is dependent on candidate key)

D -> E (Transitive Dependency : non prime derives non prime)

A -> C (Partial Dependency : Prime derives non prime)

B -> D (Partial Dependency : Prime derives non prime)

Hence the dependency which violates BCNF are D -> E, A -> C, B -> D.

so will take one by one the dependencies which violates the BCNF definition.

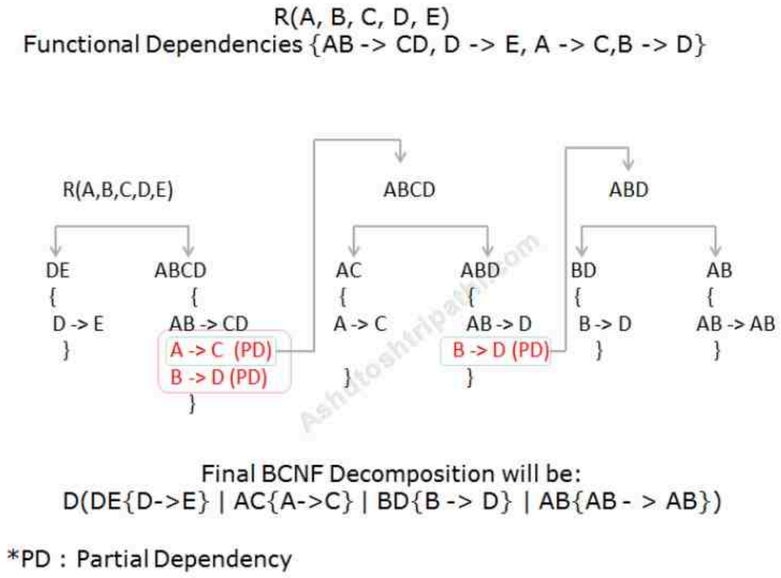
so will take D -> E first as X -> 'A' {not the A listed in relation as attributes}

So X = D & 'A' = E.

X'A' will be DE and R-{'A'} will be ABCD

R(A, B, C, D, E)
Functional Dependencies {AB -> CD, D -> E, A -> C,B -> D}

18:52



in above decomposition AB->CD is missing which is in the original relation. however we can derive AB->CD as below:

AB->AB =>AB->A and AB->B

now AB->A and A->C => AB->C ———1

also AB->B and B->D => AB ->D ——–2

combining 1 & 2 => AB->CD

hence we can derive missing AB->CD from the decomposed relation. hence in the decomposition dependency also preserved.

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bcnf in DBMS

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Is BCNF always lossless?

The BCNF decomposition always satisfies the lossless-join criterion! There may not exist any BCNF decomposition that is FD preserving!

https://pages.cs.wisc.edu › lecture-07

DECOMPOSITION & SCHEMA NORMALIZATION - cs.wisc.edu

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What are advantages of normalization?

Benefits of Data Normalization

Provides data consistency within the database. More flexible database design. Higher database security. Better and quicker execution. Greater overall database organization. Feb 20, 2023

https://www.simplilearn.com › auto...

What is Normalization of Data in Database? - Simplilearn.com

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কেন আমাদের dbms-এ স্বাভাবি.

বাংলায় In English

The main objective of database normalization is **to eliminate redundant data, minimize data modification errors, and simplify the query process**. Ultimately, normalization goes beyond simply standardizing data, and can even improve workflow, increase security, and lessen costs.

https://coresignal.com › Blog

Data Normalization: Definition, Importance, and Advantages

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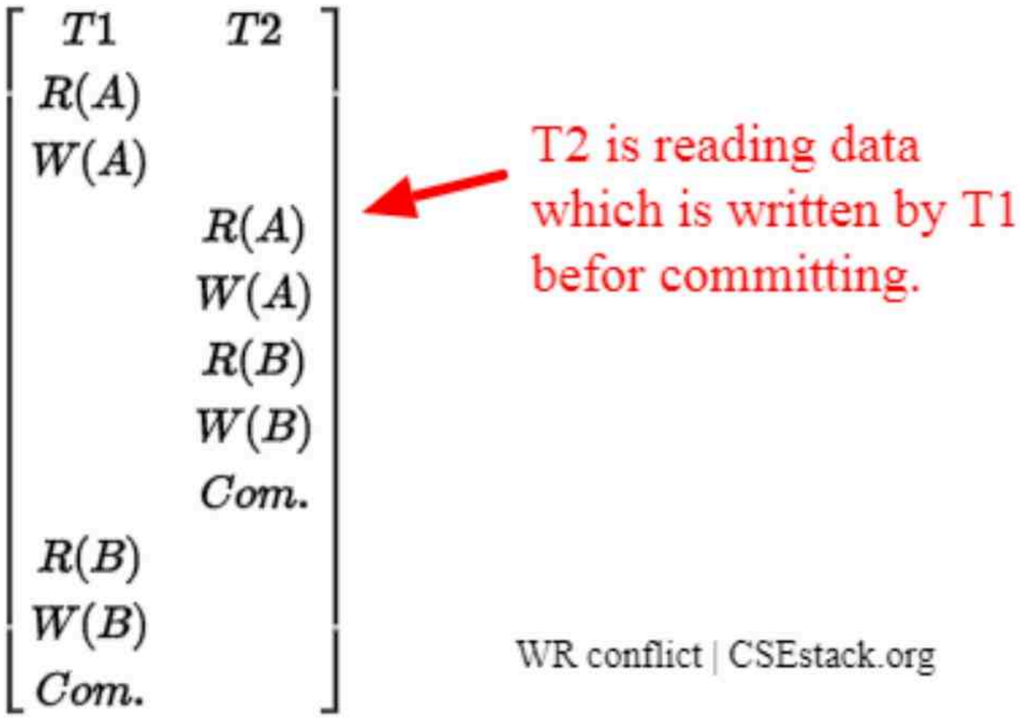
A, B - two different data objects from database

T1, T2 - two different transactions

R(A) - reading data A

W(A) - Writing data A

Com. - committing transaction



Here, the transaction T2 is reading the data which is written by the T1 before T2 commits. It is also called as **Dirty Read**.

It violates the ACID property of data consistency rule.

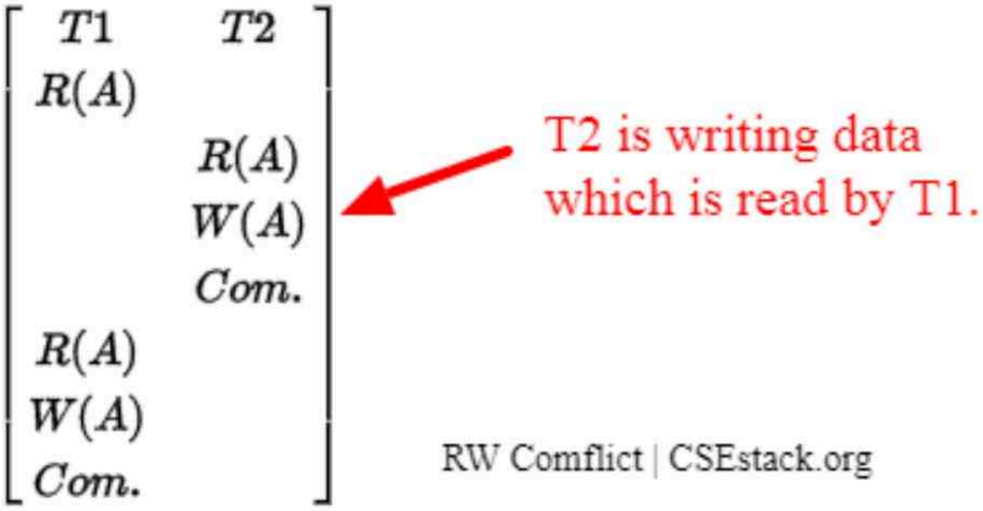
Expected behavior:

The new transaction (says T2) should not read the value if any other another transaction (say T1) already has written the data and has not committed

0:53 98

the value if any other another transaction (say T1) already has written the data and has not committed.

What is Read-Write (RW) conflict?



Transaction T2 is Writing data which is previously read by transaction T1.

Here if you look at the diagram above, data read by transaction T1 before and after T2 commits is different.

Example:

Suppose Alice and Bob want to book the flight for their vacation. Alice open airlines website to check the availability and cost of the ticket. There is only one ticket is available. Alice finds it expensive and looks for other airlines fares if she gets any offers.

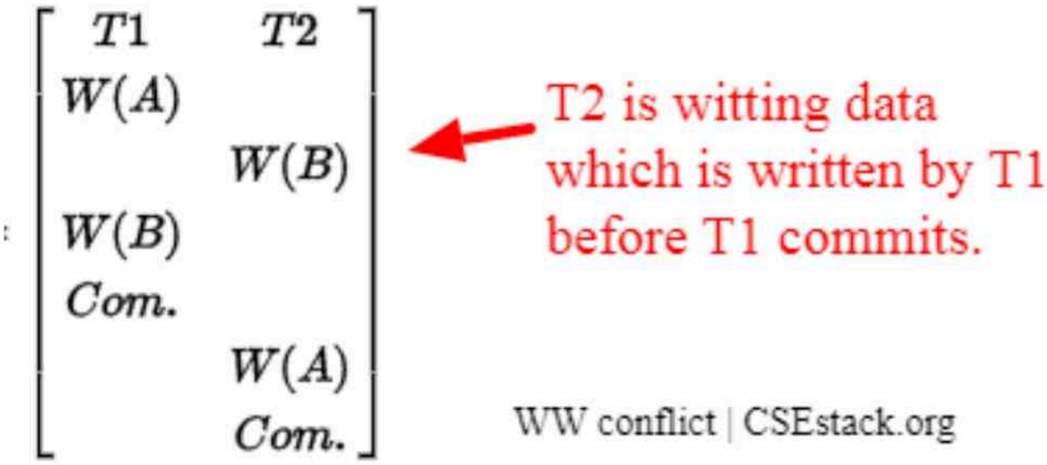
Meanwhile, Bob logins to the same airline portal and book the ticket. Now, there is no more flight ticket available.

Alice does not find any good offer on other

0:55 98

it is not available. Its Conflict, Read-Write (WR) conflict.

What is Write-Write (WW) conflict?



Here Transaction T2 is writing data which is already written by other transaction T1. T2 overwrites the data written by T1. It is also called as a **blind write operation**.

Data written by T1 has vanished. So it is **data update loss**.

Example:

Alice and Bob share common Google-sheet online. Both read the file. Alice updates the document and forgets to save the file. On another end, Bob updates the Google sheet and save the file.

The content updated by Alice is overwritten by Bob. The data updated by Alice is lost. It is called as Write-Write (WW) conflict.

This is all about different types of read write conflict in DBMS. If you have any doubt or any thought about this article, write a comment

1:10 ...
Write–read conflict - ...
en.m.wikipedia.org

This article does not cite any sources. *(August 2009)* Learn more

In computer science, in the field of databases, **write–read conflict**, also known as **reading uncommitted data**, is a computational anomaly associated with interleaved execution of transactions.

Given a schedule S

$$S = \begin{bmatrix} T1 & T2 \\ R(A) & \\ W(A) & \\ & R(A) \\ & W(A) \\ & R(B) \\ & W(B) \\ & Com. \\ R(B) & \\ W(B) & \\ Com. & \end{bmatrix}$$

T2 could read a database object A, modified by T1 which hasn't committed. This is a *dirty* or *inconsistent* read.

Related insights

Dirty Read Problem ll DBMS ll
WRITE-READ Conflict Explained with Exa

1:10 97

$$S = \begin{bmatrix} W(A) & \\ & R(A) \\ & W(A) \\ & R(B) \\ & W(B) \\ & Com. \\ R(B) & \\ W(B) & \\ Com. & \end{bmatrix}$$

T2 could read a database object A, modified by T1 which hasn't committed. This is a *dirty* or *inconsistent* read.

T1 may write some value into A which makes the database inconsistent. It is possible that interleaved execution can expose this inconsistency and lead to an inconsistent final database state, violating ACID rules.

Strict 2PL overcomes this inconsistency by locking T2 out from performing a Read/Write on A. Note however that Strict 2PL can have a number of drawbacks, such as the possibility of deadlocks.

See also

References

S.NO.	3NF	BCNF
1.	3NF stands for Third Normal Form.	BCNF stands for Boyce Codd Normal Form.
2.	In 3NF there should be no transitive dependency that is no non prime attribute should be transitively dependent on the candidate key.	In BCNF for any relation A->B, A should be a super key of relation.
3.	It is less stronger than BCNF.	It is comparatively more stronger than 3NF.
4.	In 3NF the functional dependencies	In BCNF the functional dependencies

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4.	In 3NF the functional dependencies are already in 1NF and 2NF.	In BCNF the functional dependencies are already in 1NF, 2NF and 3NF.
5.	The redundancy is high in 3NF.	The redundancy is comparatively low in BCNF.
6.	In 3NF there is preservation of all functional dependencies.	In BCNF there may or may not be preservation of all functional dependencies.
7.	It is comparatively easier to achieve.	It is difficult to achieve.
	Lossless decomposition	Lossless decomposition

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8.	Lossless decomposition can be achieved by 3NF.	Lossless decomposition is hard to achieve in BCNF.
9.	The table is in 3NF if it is in 2NF and for each functional dependency X->Y at least following condition hold: (i) X is a super key, (ii) Y is prime attribute of table.	The table is in BCNF if it is in 3rd normal form and for each relation X->Y X should be super key.
10.	3NF can be obtained without sacrificing all dependencies.	Dependencies may not preserv BCNF.

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9.	following condition hold: (i) X is a super key, (ii) Y is prime attribute of table.	form and for each relation X->Y X should be super key.
10.	3NF can be obtained without sacrificing all dependencies.	Dependencies may not be preserved in BCNF.
11.	3NF can be achieved without losing any information from the old table.	For obtaining BCNF we may lose some information from old table.

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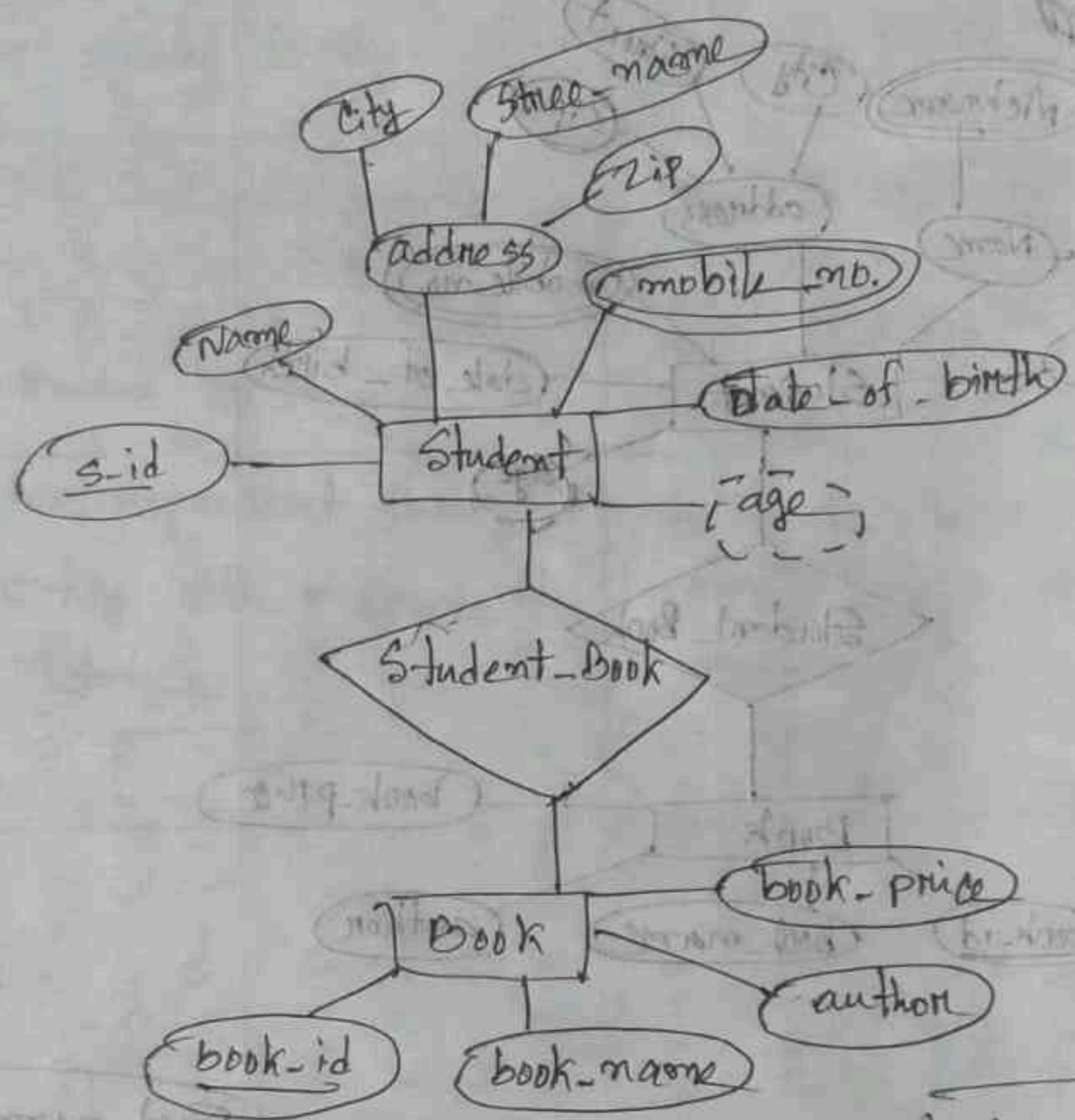

S_id , book_id → primary key
address → composite
mobile_no. → multivalued
date_of_birth → stored
age → derived

City
Street_name
Zip এগুলো
Condition বিশ্লেষণের
জন্য বিশ্লেষিত

- Name → stored, it can't be complex attribute, because, a person can't have multiple name. As a result, it can't be multivalued. We know, an attribute is called complex when it is both composite and multivalued. Name can be composite but not multivalued.

0:13 85

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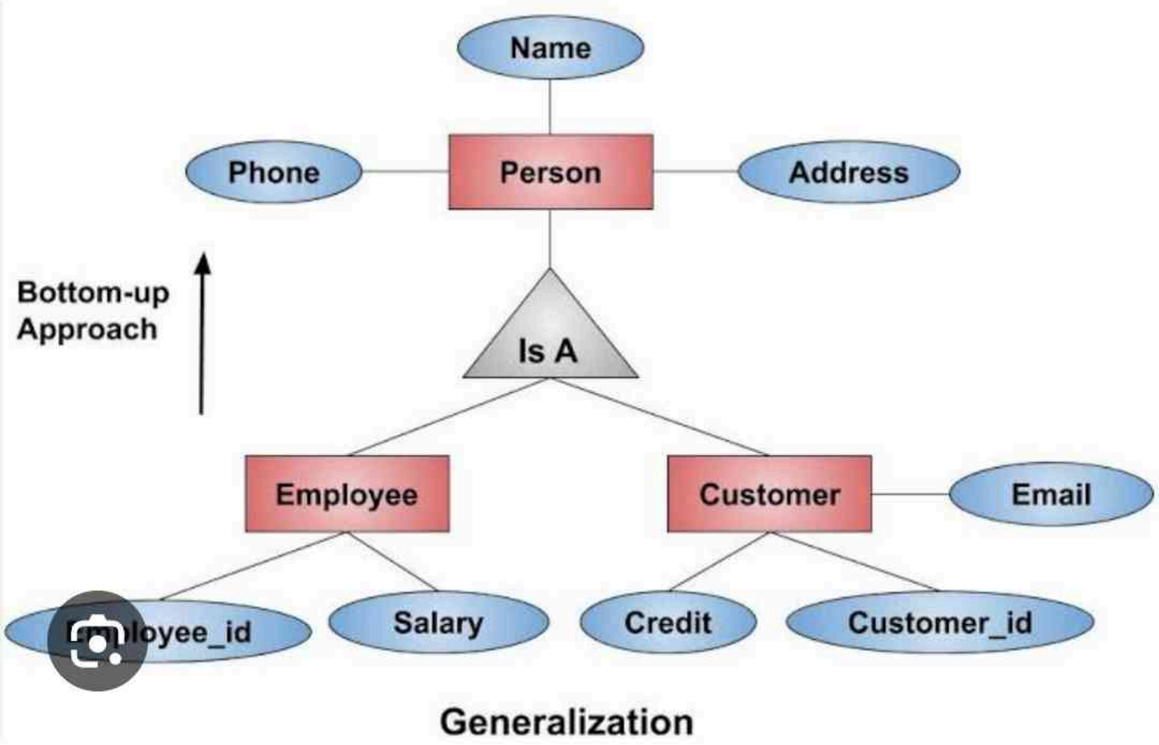

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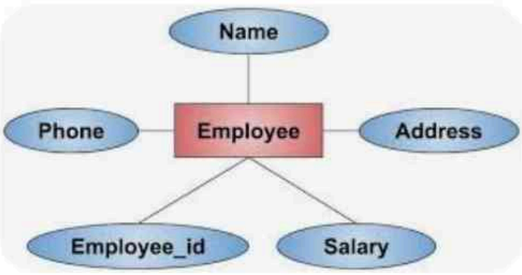

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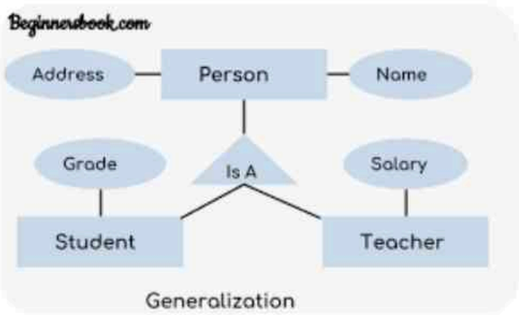

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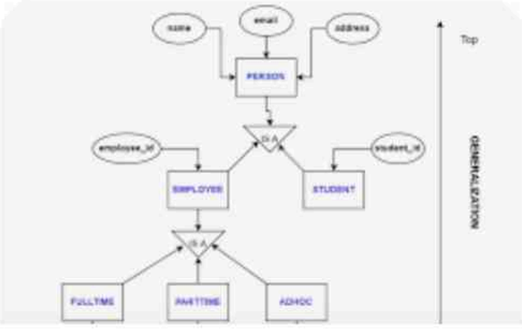

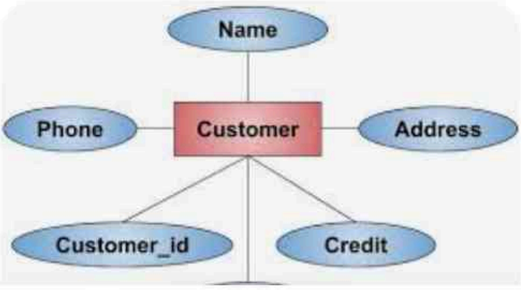

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specialization with exampl...

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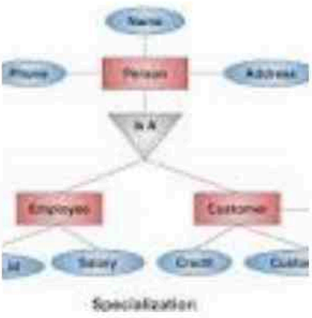
বাংলায় In English



It is a top-down approach in which a higher-level entity is broken into smaller entities . For example , **Animals can be mammals or reptiles. Then these mammals can either be tiger, elephant or humans. The reptiles can be snakes or lizards.** Jan 19, 2020

https://afteracademy.com › blog

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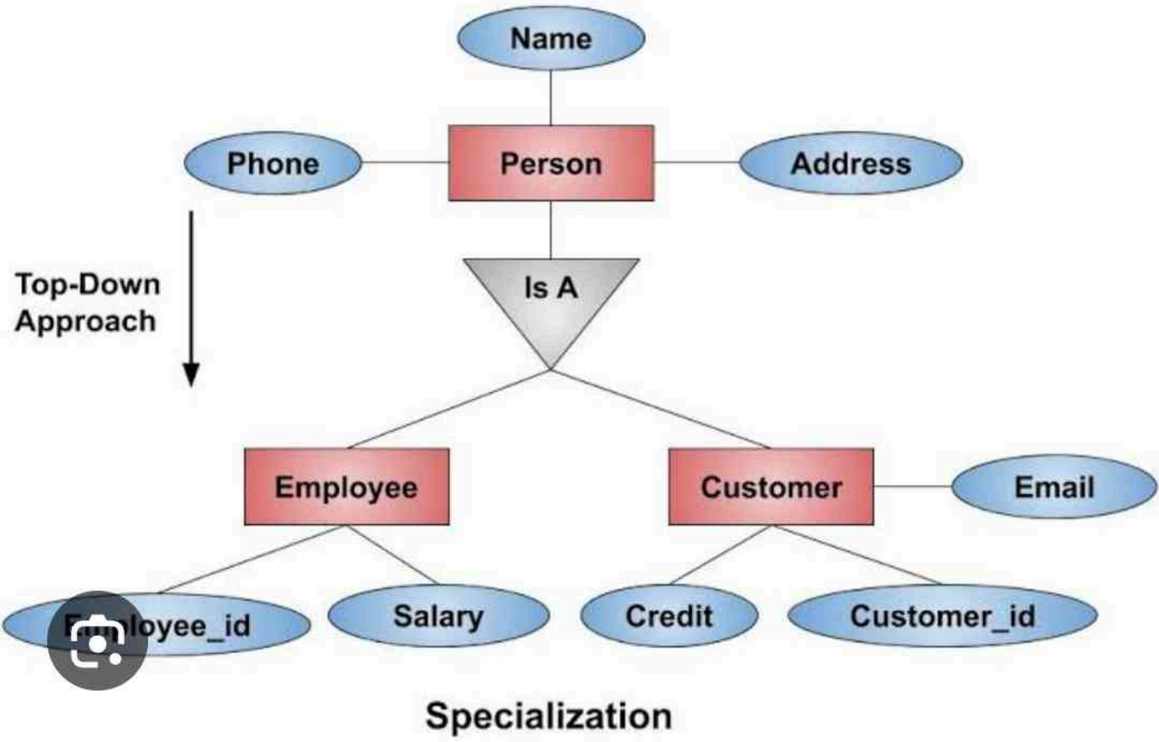

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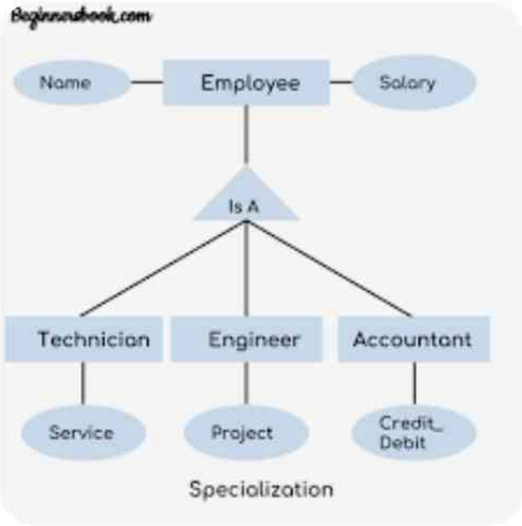

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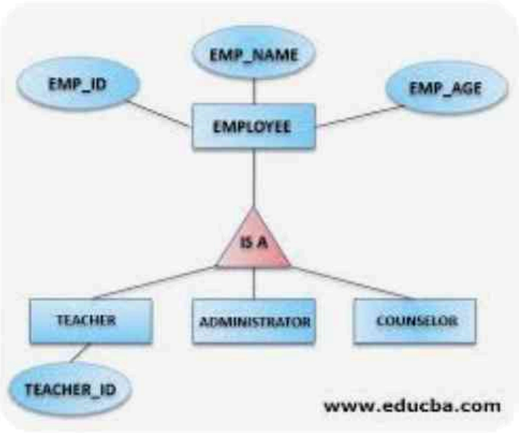

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constraints in dbms

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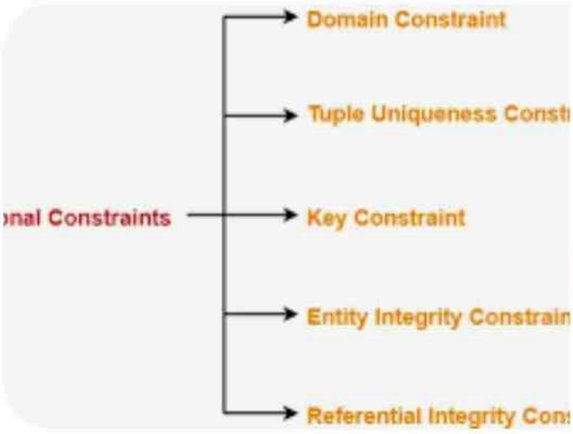

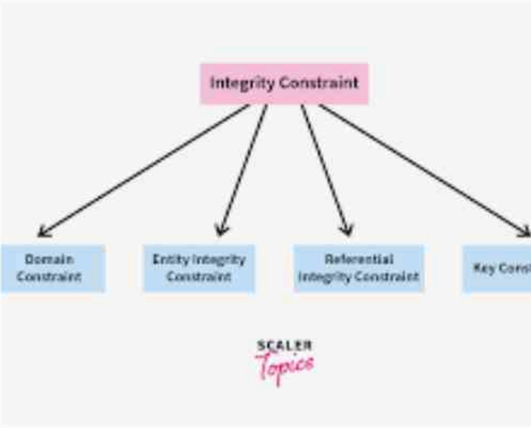

বাংলায়

In English

In DBMS (Database Management Systems), constraints are **guidelines or limitations imposed on database tables to maintain the integrity, correctness, and consistency of the data**. Constraints can be used to enforce data linkages across tables, verify that data is unique, and stop the insertion of erroneous data. Sep 12, 2023

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Constraints in DBMS - Tutorialspoint

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Department of Information and Communication Engineering

Class Test-2 (Database Management Systems)

Marks: 25 Time: 40 mins

1. Briefly describe the design phases of database. 5
2. What are the major pitfalls must be avoided to design database scheme? Explain. 3
3. Define mapping cardinalities. Explain the difference between a weak and a strong entity set. 1+3
4. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examination conducted. 5
5. Mention the diagrammatic representation of an entity set and its different types of attributes both in Crow's feet and Chen's notation. 4
6. What do you mean by database normalization? Write all the conditions that must be satisfied to complete 1NF, 2NF, 3NF. 1+3

16:20
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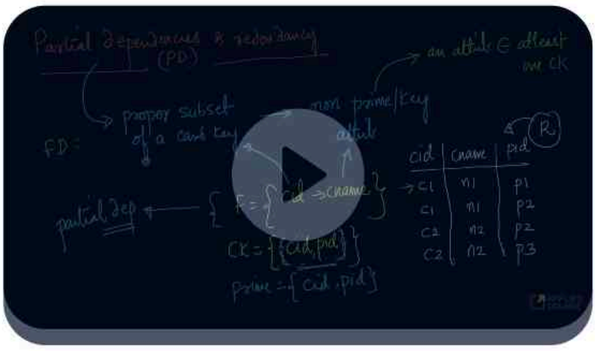
method to remov
the database and
state:



A database anom
occurs because o
redundancy.

1. **Insertion anomalies**: This occurs when we are not able to insert data into a database because some attributes may be missing at the time of insertion.

2. **Updation anomalies:** This occurs when the same data items are repeated with the same values and are not linked to each other.

3. **Deletion anomalies:** This occurs when deleting one part of the data deletes the other necessary information from the database.

In the next section, we'll see the types of normal forms in the database.

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dbms-এ 3nf-এর সুবিধা এবং অ

বাংলায় In English

Benefits include **reduced data redundancy and storage space, prevention of data anomalies and improved query performance**. However, drawbacks include increased complexity in database design, more joins and subqueries to retrieve data, and a lack of reflection of business logic or real-world scenarios.

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3NF Database Design: Benefits and Drawbacks - LinkedIn

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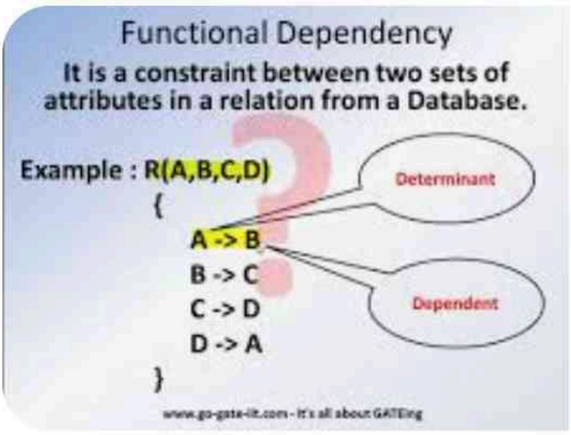
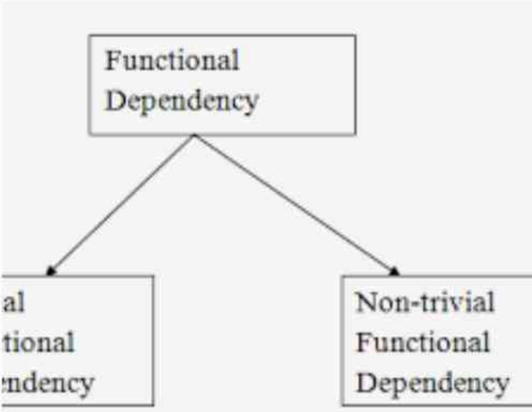
functional dependency in...





বাংলায় In English

Functional dependency **defines how the attributes of a relation are related to each other**. It helps in maintaining the quality of data in the database. It is denoted by an arrow "⟶". There are four types of functional dependency in DBMS - Trivial, Non-Trivial, Multivalued and Transitive functional dependency.

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Functional Dependency in DBMS - Scaler Topics

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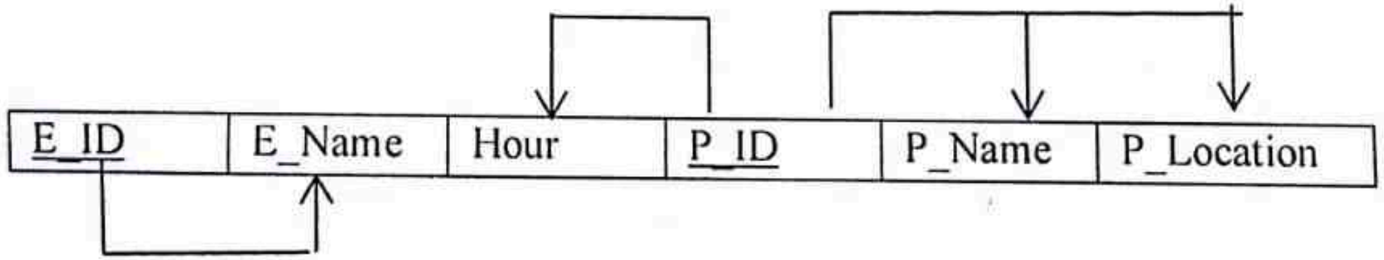
Information and Communication Engineering

Database Management System (Class Test-2)

Marks: 25 Time: 35mins

1. Define E-R model. Briefly describe the basic concepts of ER data model with example. 1+3
2. What is mapping cardinality? Explain different types of mapping cardinalities with diagram. 1+4
3. The main entities of the NSTU Library Management System for the (E-R) entity-relationship model are Student (name, s_id, address, mobile_no, date_of_birth, age), Book (book_id, book_name, author, book_price) each entity must have one primary key, the attribute name is complex, the attribute address is composite, the attribute mobile_no is multi-valued, the attribute date_of_birth is stored and the attribute age is derived etc. From the above description construct the E-R diagram. 6
4. How can you convert a non-binary relationship to binary relationship? Elaborate with an example. 4
5. Make use of the normalization process for the following relation up to BCNF 6



Code: ICE-2207 Course Title: Database Management Systems Class Test-02, 2019

e: 20 Minute Set: A Marks: 12.5

a. Explain the difference between a weak and strong entity set. 3

b. Explain generalization with example. 3

c. How can we represent entity sets with composite attributes? Explain with an example. 3.5

d. Delete all instructors whose salary is less than the average salary of instructors. 3

Course Title: Database Management Systems Class Test-02, 2019

Marks: 12.5

se Code: ICE-2207 Course Title: Database Management Systems

e: 20 Minute Set: B Class Test-02, 2019

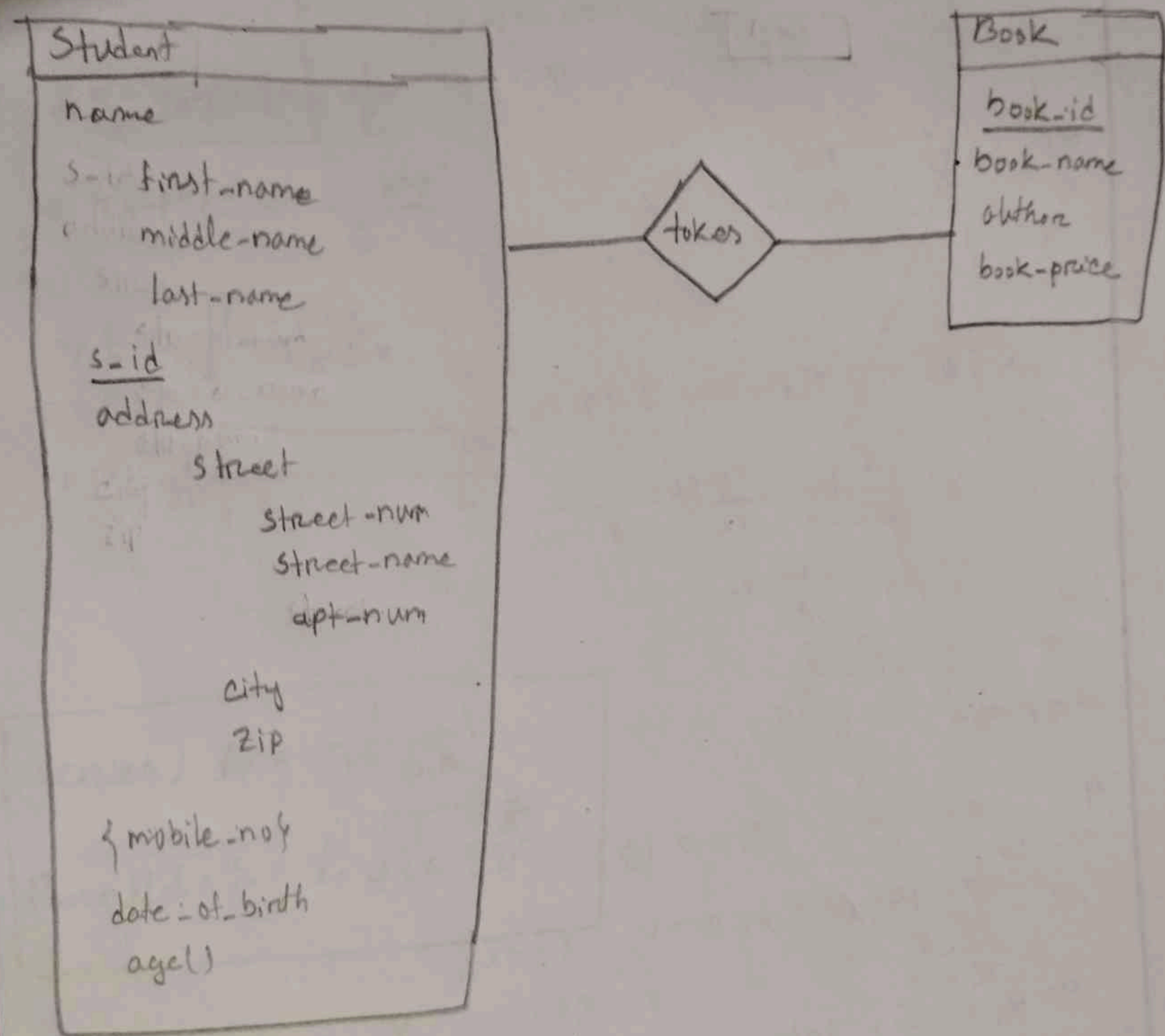
Marks: 12.5

a. Explain the difference between partial and total constraints. 3

b. Explain specialization with example. 3

c. How can we represent entity sets with multivalued attributes? Explain with an example. 3.5

d. List all departments along with the number of instructors in each department. 3


Student
name
first-name
middle-name
last-name
s-id
address
street
street-num
street-name
apt-num
city
zip
{mobile-no}
date-of-birth
age()
takes
Book
book-id
book-name
author
book-price

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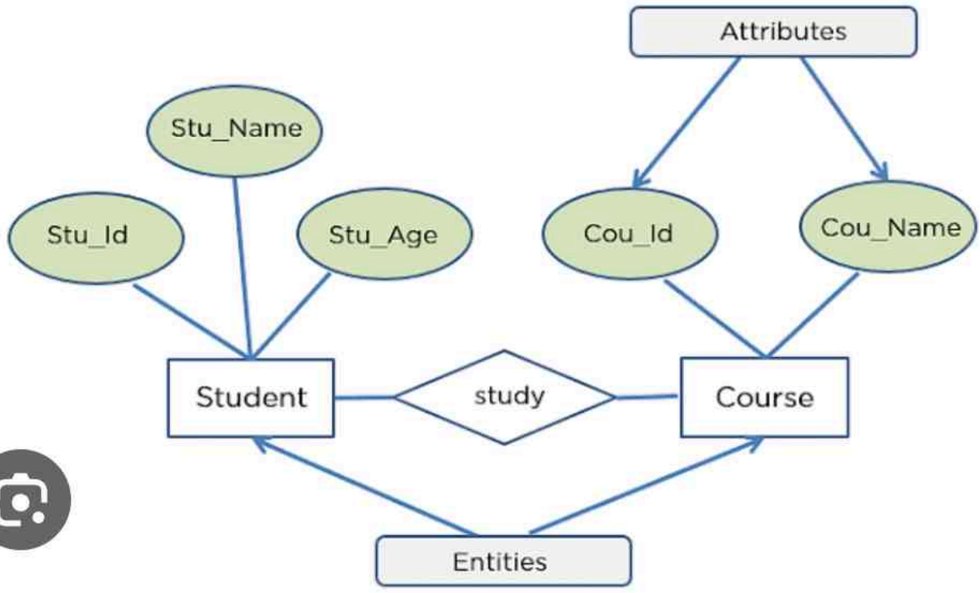

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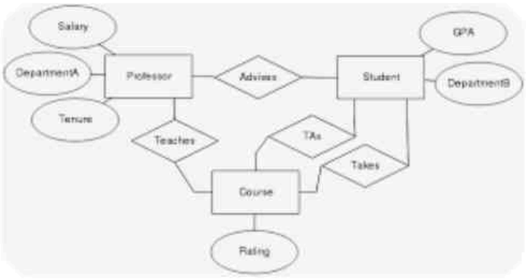

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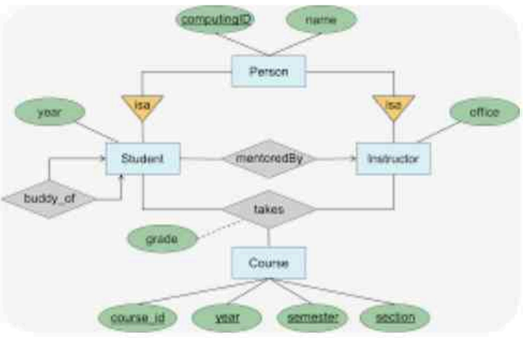

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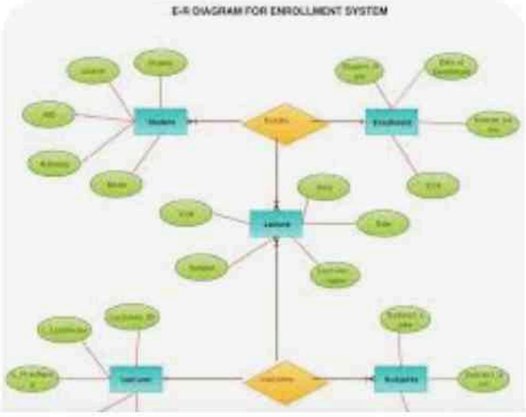

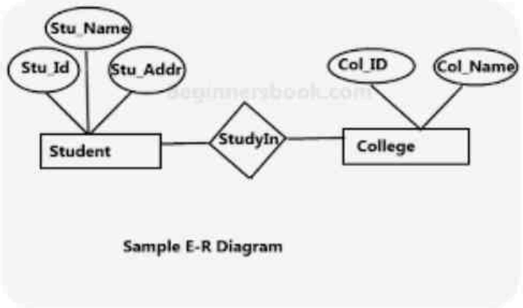

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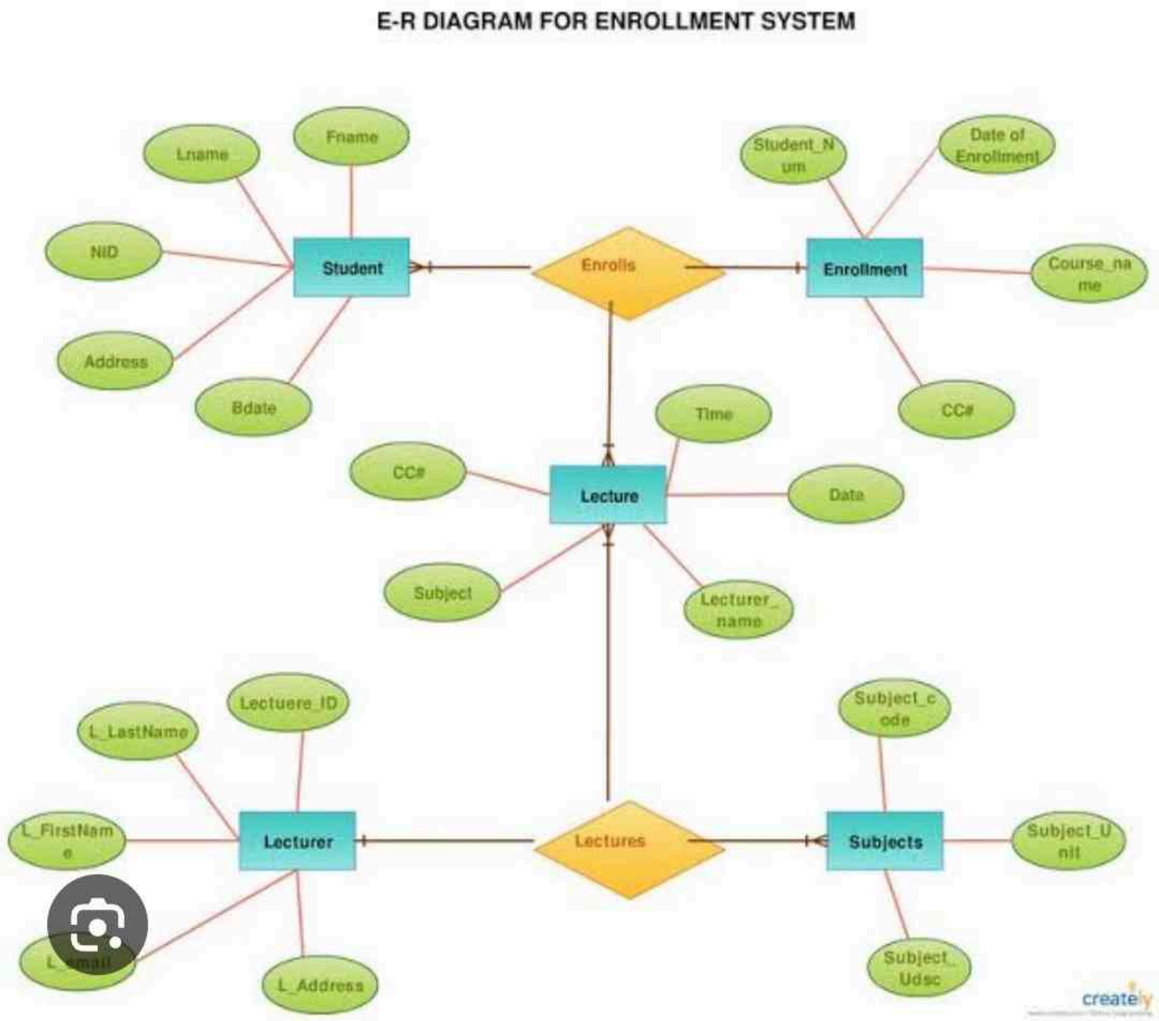

What is an Entity Relationship (ER) Diagram | Learn How to...

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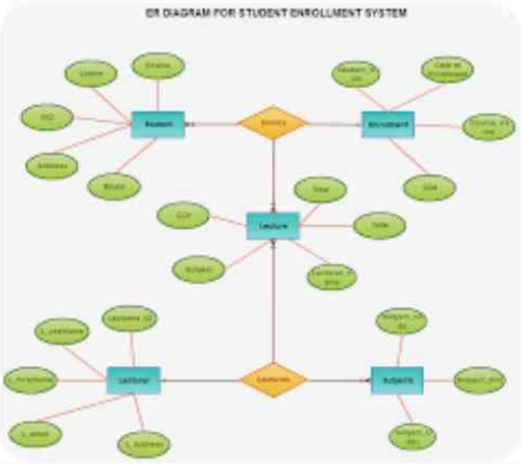

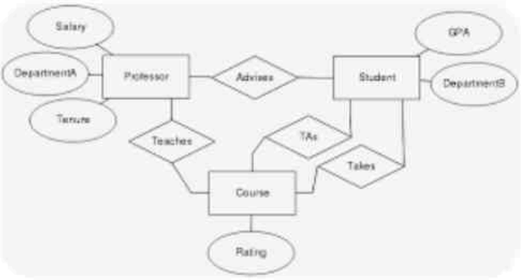

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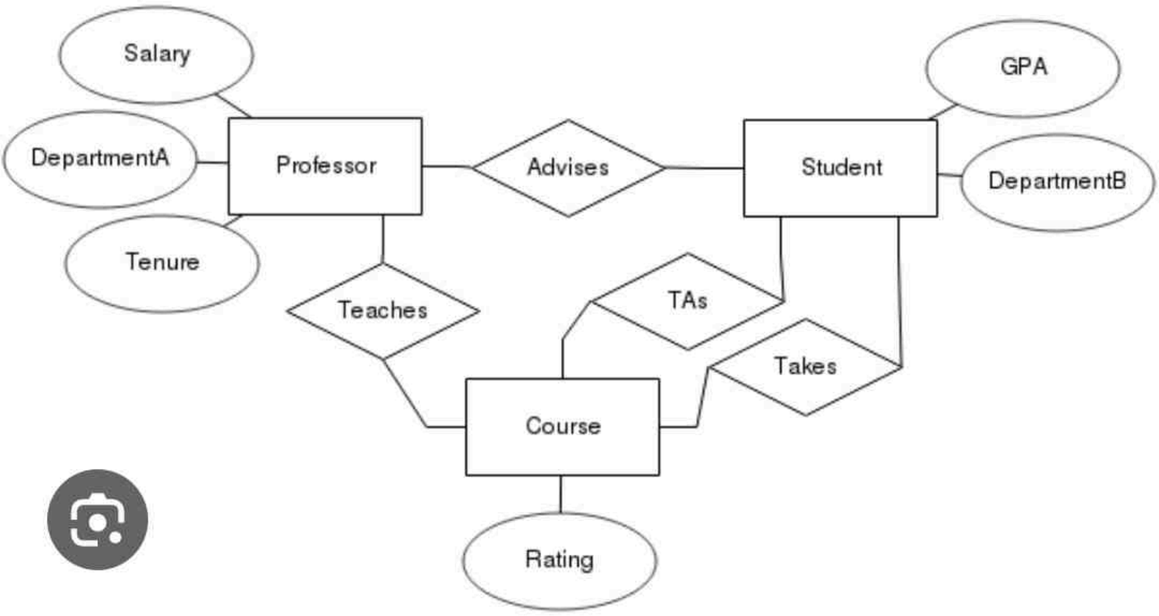

An ER-Diagram illustrating 3 entities, Professors, Students,...

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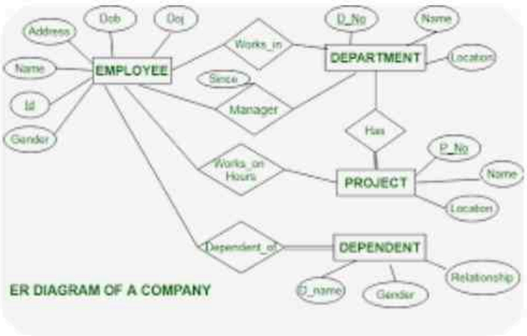

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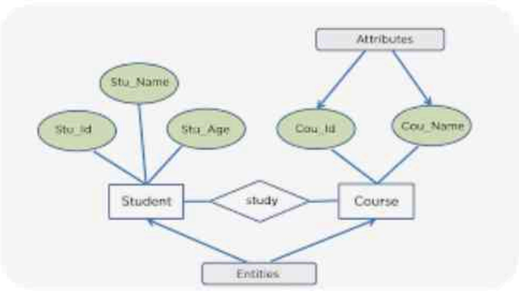

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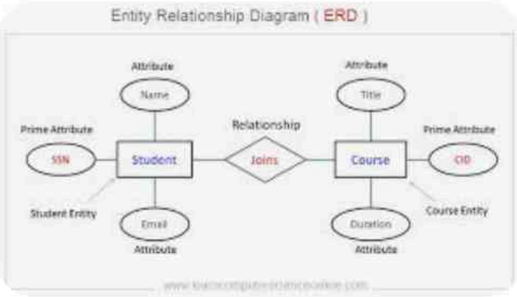

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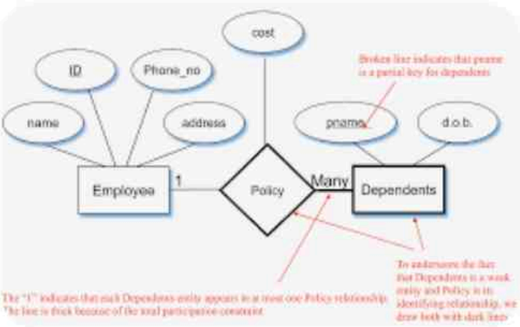

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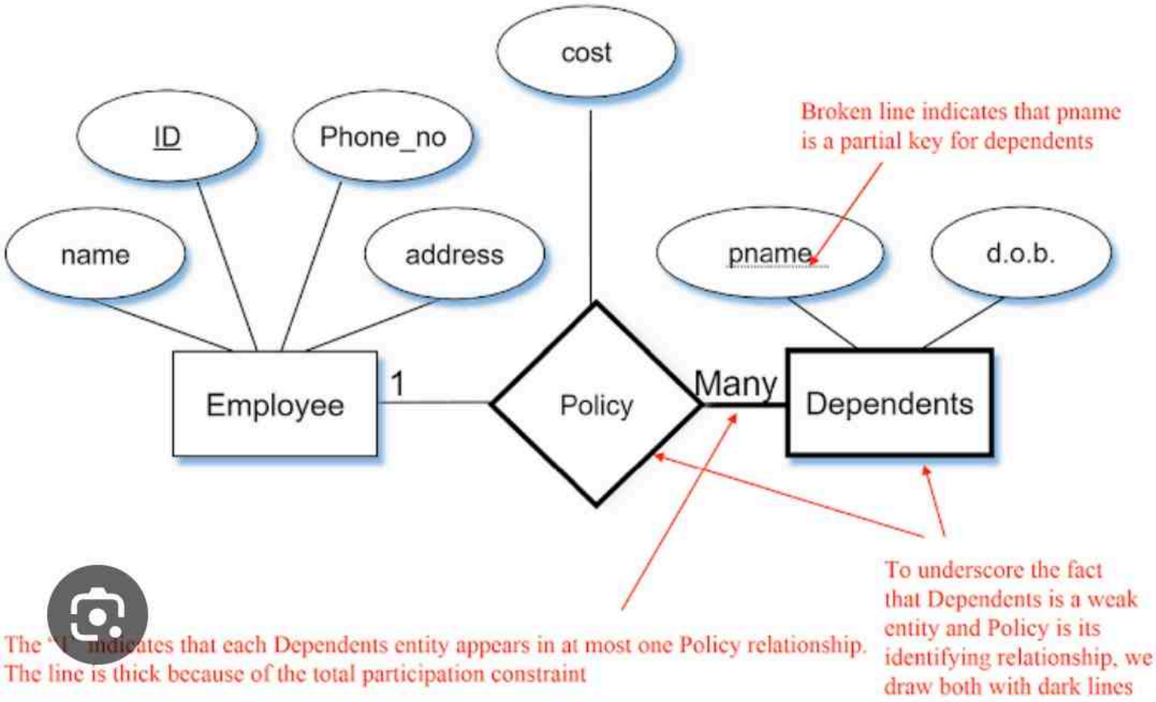

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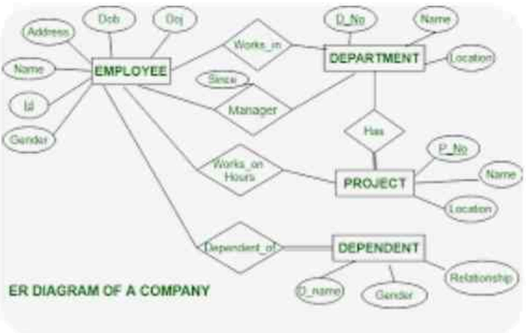

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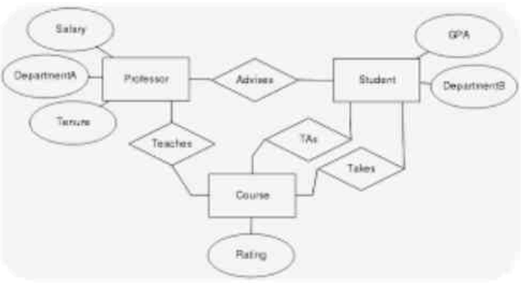

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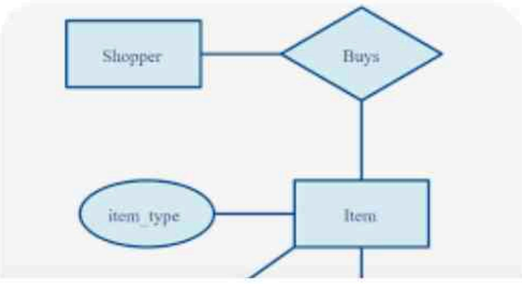

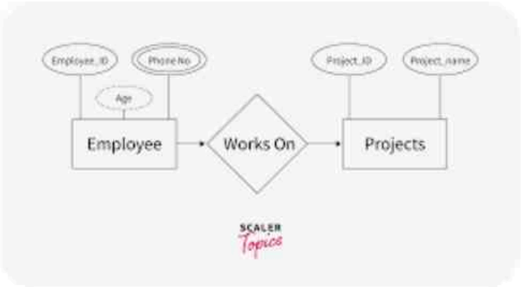

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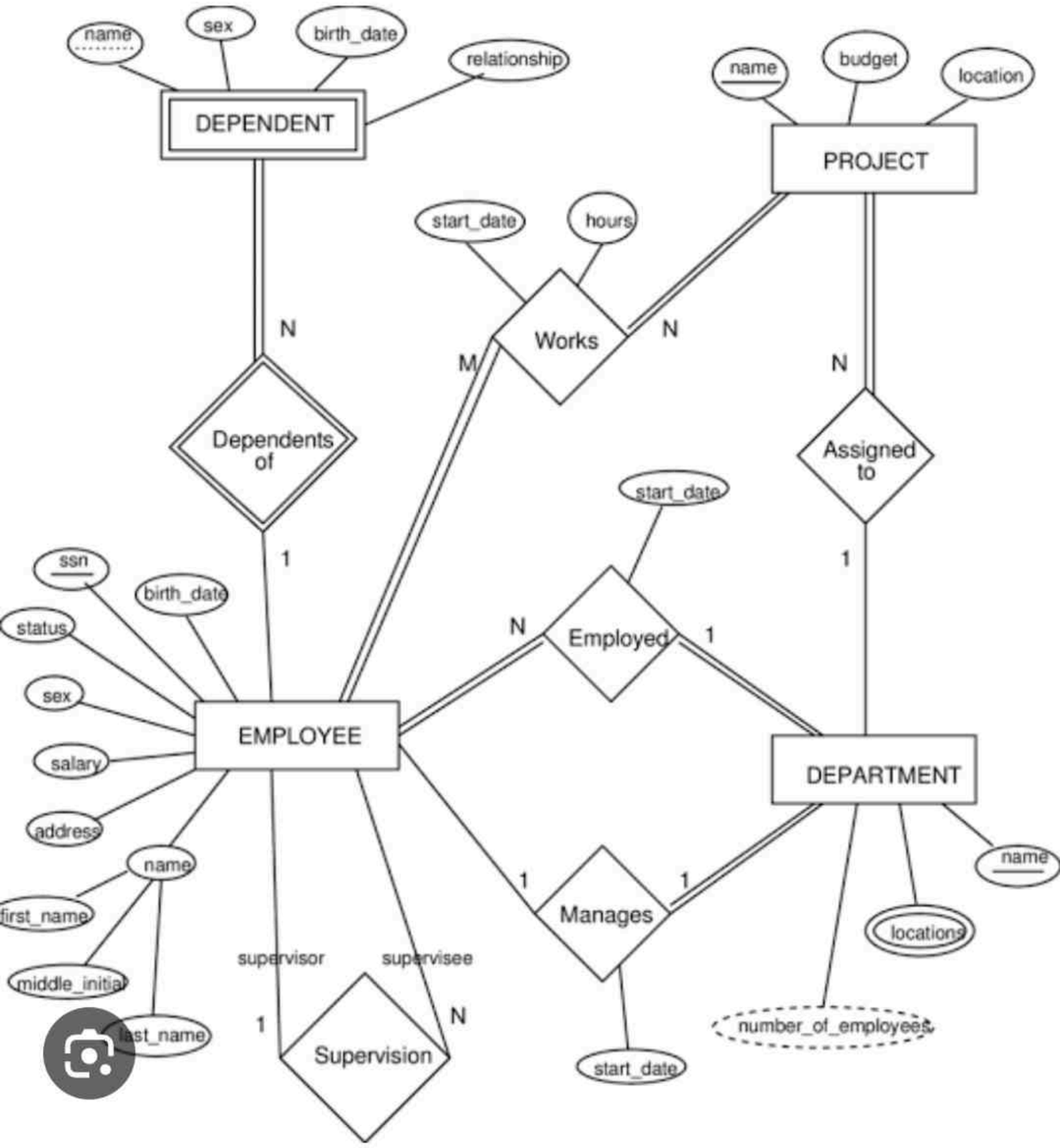

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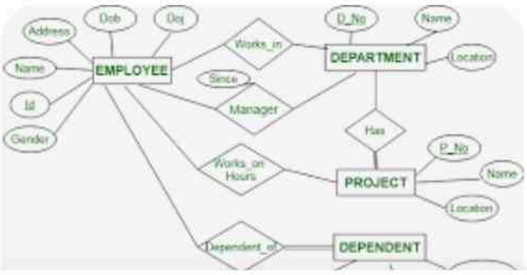

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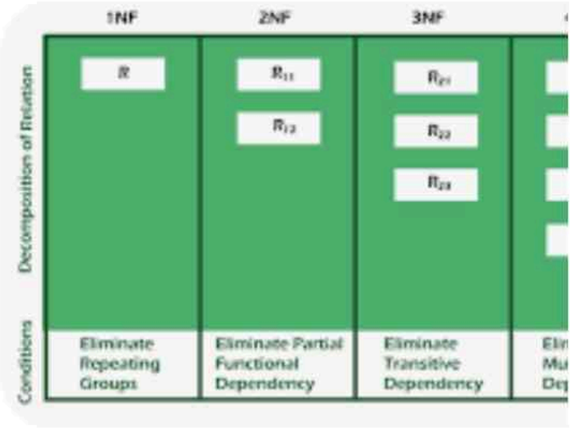

STUD_NAME	STUD_PHONE	STUD_STATE
RAM	9716271721, 9871717178	HARYANA
RAM	9898297281	PUNJAB
SURESH		PUNJAB

Table 1

Conversion to first normal form

STUD_NAME	STUD_PHONE	STUD_STATE
RAM	9716271721	HARYANA
RAM	9871717178	HARYANA
RAM	9898297281	PUNJAB
SURESH		PUNJAB

Table 2

বাংলায় In English

Normalization is **the process of organizing data in a database**. It includes creating tables and establishing relationships between those tables according to rules designed both to protect the data and to make the database more flexible by eliminating redundancy and inconsistent dependency. Jul 13, 2023

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to make the database more flexible by eliminating redundancy and inconsistent dependency. Jul 13, 2023

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What is 1NF 2NF and 3NF in DBMS?

Normal forms are a mechanism to remove redundancy and optimize database storage. In 1NF, we check for atomicity of the attributes of a relation. In 2NF, we check for partial dependencies in a relation. In 3NF, we check for transitive dependencies in a relation.

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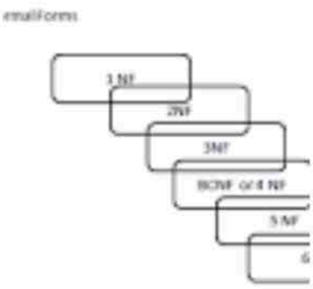
First Normal Form (1 NF) Second Normal Form (2 NF) Third Normal Form (3 NF) Boyce Codd Normal Form or Fourth Normal Form (BCNF or 4 NF) Nov 27, 2018



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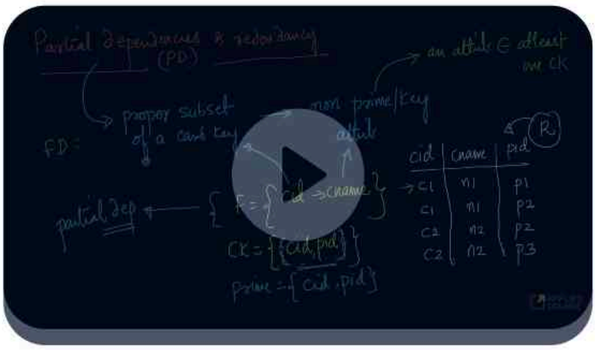
having the same d

necessary to rem

causes anomalies

very hard for a da

maintain it.



Why Do We Need Normalization?

As we have discussed above, normalization is used to reduce data redundancy. It provides a method to remove the following anomalies from the database and bring it to a more consistent state:

A database anomaly is a flaw in the database that occurs because of poor planning and redundancy.

1. **Insertion anomalies**: This occurs when we are not able to insert data into a database because some attributes may be missing at the time of insertion.

2. **Updation anomalies:** This occurs when the same data items are repeated with the same values and are not linked to each other.

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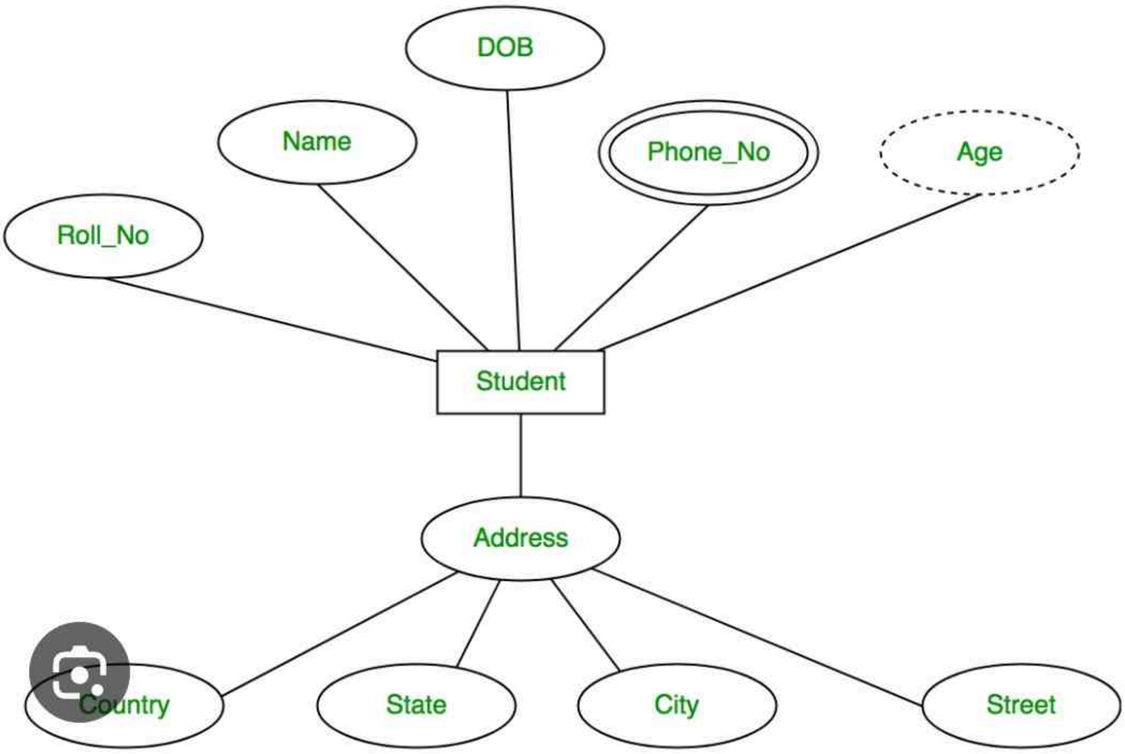

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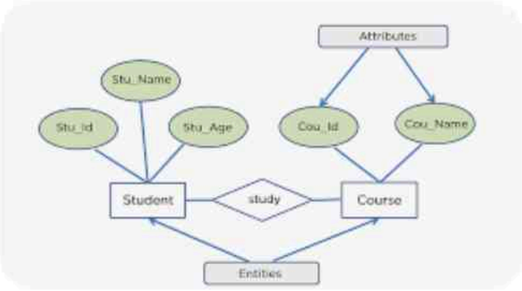

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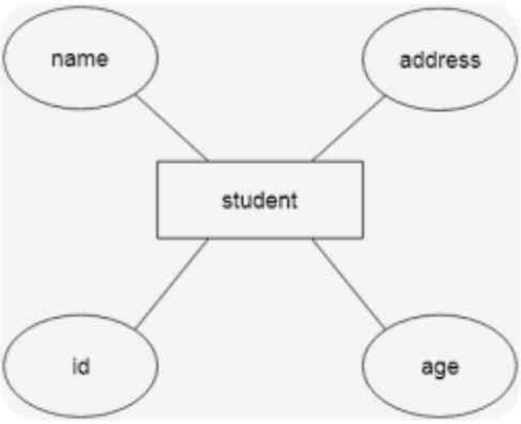

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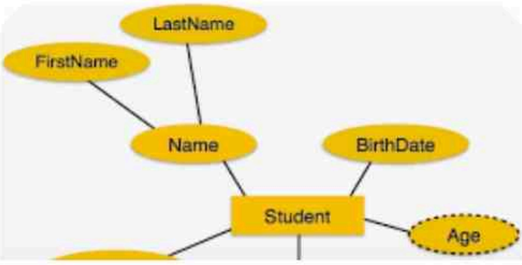

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$\sigma_{dept='ICE'}$ (NSTU)

$\sigma_{dept='ICE' \wedge salary \geq 20000 \wedge salary \leq 40000}$ (NSTU)

$\sigma_{dept_name, Avgs}$ ($_{dept_name}\mathcal{G}_{avg(salary)\ as\ avgs}$ (NSTU)) $_{(Avgs > 3000)}$

$\sigma_{distinct_id}$ (σ

$\mathcal{G}_{count\ distinct(ID)}$ ($\sigma_{institution_id = "1801ZOM}$ (NSTU))

Atomicity problem: Atomicity in dbms, ensures that the transaction is either fully completed or fully rolled back to the state it was in before the transaction began. Example: Bank transactions.

concurrent-access anomalies: concurrent access to data means more than one user is accessing the same data at the same time. Anomalies occur when changes made by one user get lost because of changes made by another user.

security problem: file processing system does not provide adequate security (→ rating) on data. For example, a data entry

Join

- → Natural Join ($\bowtie$)
- → Cartesian Join ($\times$)
- → Outer Join
  - → Left outer Join ($\bowtie$)
  - → Right " " ($\bowtie$)
  - → Full " " ($\bowtie$)

* 'Projection' show unique value if it have duplicate value

⇒ Outer Join = Natural output + Reference table remain value

t1

ID1	Name
1	A
2	B

t2

ID2	CGPA
1	3.5
3	2.5

Left outer join :

ID1	Name	ID2	CGPA
1	A	1	3.5
2	B	—	—

Null Value

Right Outer Join :

ID1	Name	ID2	CGPA
1	A	1	3.75
–	–	3	2.5

Full Outer Join :

ID1	Name	ID2	CGPA
1	A	1	3.5
2	B	–	–
–	–	3	2.5

$\Pi_{id_2, Name, CGPA} (t1 \bowtie t2)$ — Full outer join

Renaming :

→ Different table-গুলোর attribute একই হলে Renaming করতে হয়।

example :

t1.id , t2.id } t1 ও t2 table-এর একই attribute 'id' হলে।

→

T_1

ID	Marks
1	100
2	150

Virtual T_2

ID	Marks
1	100
2	150

$T_1 \times T_1$

ID	Marks	ID	Marks
1	100	1	100
1	100	2	150
2	150	1	100
2	150	2	150

100 < 150

— Get maximum value from T_1

↑

Ref. table – Min value

$T_1.Marks < ICE.Marks$

↑

$\rho_{ICE}(T_1)$

→ Renaming for same table :—

ρ_x (Relation)

ρ_{ICS} (T_1) — Virtual name

$\rho_{x(Column, Column)}$ (Relation) → for renaming Column

25-09-23

CT-1

Chapter - 1, 2

Chapter — 6.1 (Algebric expression)

— Relation Algebra নিয়ে

— মূল বের করা

$\pi_{id, name, c_{\mathcal{G}_1 \mathcal{G}_2}}(t_1 \times t_2)$

Renaming: same table + Different table এর মধ্যে operation চালানোর,

Diff — stud_ID, std_CG.

π [Std_int.ID, Name, Std_CGPA.ID]

same — একই table এর উপর multiple operation

T_1

ID	Marks
1	100
2	150

×

ID	M
1	100
2	150

Ref — Min

Highest

cartesian

$T_1 \times T_1$

ID	M	I	M
1	100	1	100
1	100	2	1500
2	150	1	100
2	150	2	150

Mark < Mark

R V

1 100 2 150

Renaming for same table

ρ_x (relation)

reference table এর নাম

$\rho_x(T_1)$

variable name

Best

$\rho_{ICE}(T_1)$ virt

virtual table এর name

Rename

$T_1.Mark < ICE.Mark$

Sorven of Shell

$\rho_{x}(A_1, A_2, \ldots)$ (Relation)

← ρ_{x}(Roll, Num) (Relation)

column
Rel name
কে বোঝায়

Mark < Num

CT-① — Chap 1, chap-2,
Ch-6.1

(25) তারিখ
2 টার সময়
201

library
building

Department of Information and Communication Engineering
Noakhali Science and Technology University
Class Test-01, 2019

A

Course Code: ICE-2207 **Course Title: Database Management Systems**
Time: 30 Minute **Marks: 25**

a. Define instance and schema. Describe about the drawbacks of using file systems to store data. 5

b. Define query processing. Why do we need transaction management in DMBS? 5

c. What is primary key? Explain about the natural join with example. 5

d. i. Retrieve all employees in department ICE whose salary is between Tk. 20000 and 40000. 3

ii. Find the names and average salaries of all departments whose average salary is greater than Tk. 30000 3

iii. Find the total number of (distinct) students who have taken course sections taught by the instructor with *ID 180*120M. 4

Information and Communication Engineering

Class Test-1

Marks: 25 Time: 35mins

1. Define Database. Briefly explain what are the drawbacks of using a file system over database system? 1+6
2. Suppose you want to design a database for your department. Now write down and elaborate on the process to design the general structure of your database. 8
3. How a query is processed? Explain with an appropriate diagram. 4
4. Differentiate between the Primary key and the Candidate key. 2
5. Suppose a relation (r) is given below- 4

A	B	C	D
α	α	1	7
α	β	5	7
β	β	12	3
β	β	23	10

Now find out

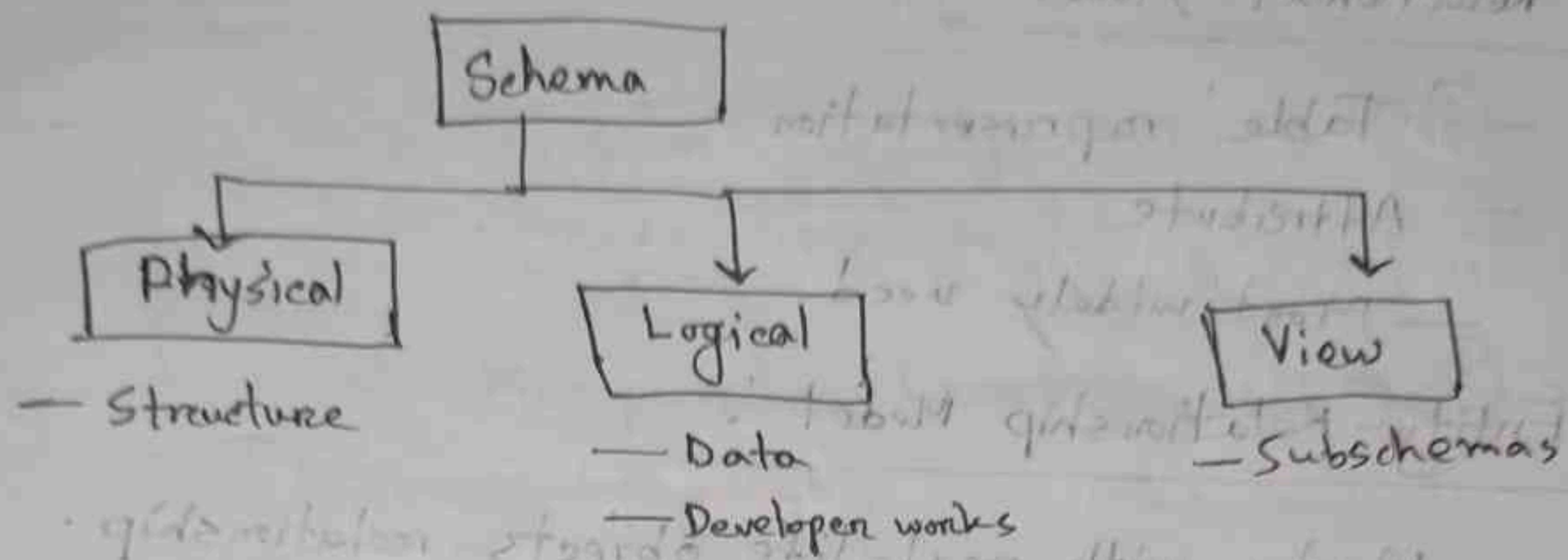
(i) $\sigma_{A=B \wedge C \leq 5}(r)$

(ii) $\Pi_{A,B}(r)$

Lecture-2

DBMS

07-09-23



⇒ Physical independence — (logical level এর কোনো Change Physical level-এ ইফেক্ট করবে না।)

Logical level can accessed physical level but can't modified it.

Data Model

Conceptual structure of db

Data Model

- → Relational Model
- → Entity-Relationship "
- → Object-based "
- → Semi-structured "

→ Network Model, Hierarchical Model

Relational Model :

- 'Table' representation
- Attribute
- Most widely used

* Entity-Relationship Model :

- Works with real-life objects relationship
- Objects are known as "Entity"
- 'Entity' can have — attributes
- E-R Diagram

Object-based Model :

- Data abstraction, Encapsulation, Polymorphism
- Java, C++, C# — (object oriented data model)

Semi-structured Model :

- Single type, multiple attributes
- Extensible Markup Language (XML)

gsebwhj

Database Language

- → Data Definition Language (DDL)
  (Data storage Language)
- → Data Manipulation Language (DML)
  (Query Language)

⇒ 2 types of DML
- → Procedural
  (which 'data' needed and How) — Process given
- → Declarative
  (Only data info given what data needed)

⇒ DDL

— Data-storage language

— Can add integrity constant (predefined constant)

Integrity ~~constant~~ Constraints

- → Domain — Data types are defined
- → Referential integrity — Integrity from another database
- → Assertion — New constraints can be added
- → Authorization — Specific access

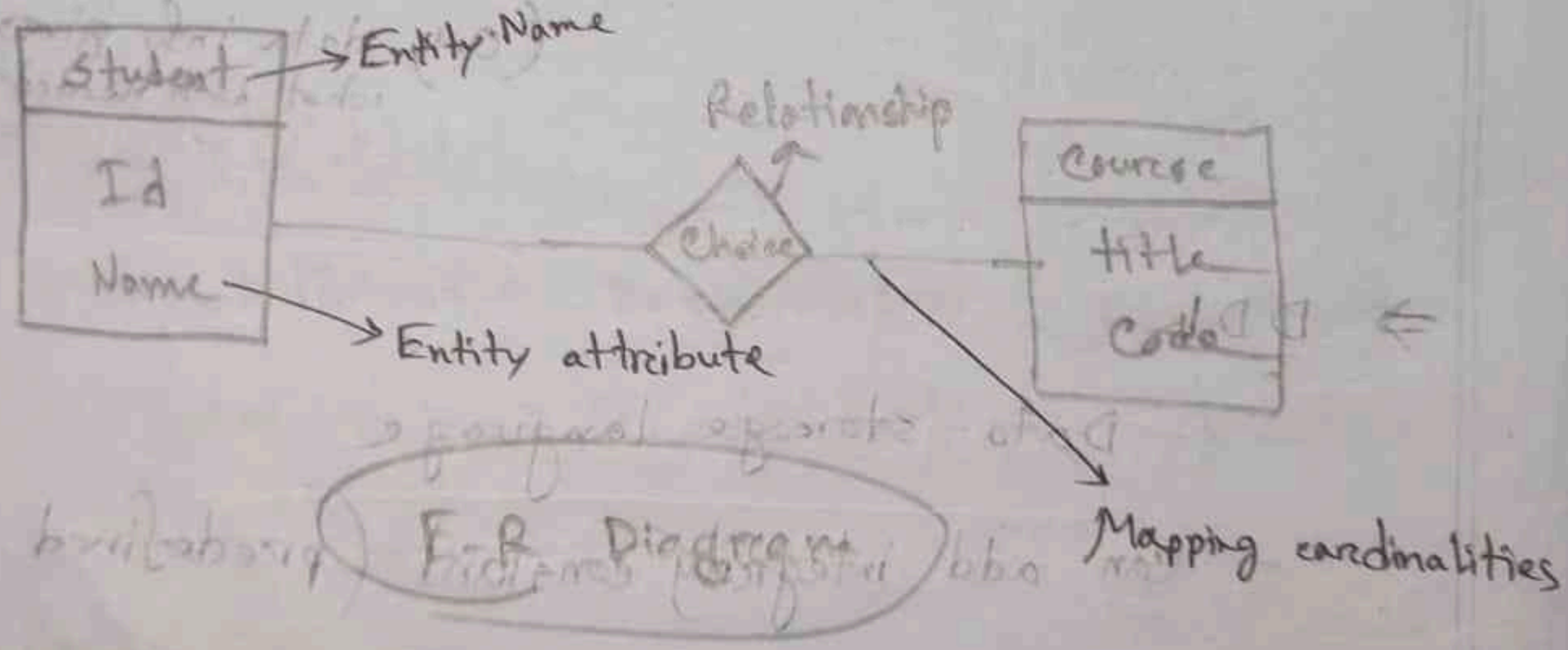
Development Process :

(i) Requirement analysis

(ii) Conceptual view (Model)

(iii) Implementation

E-R Model



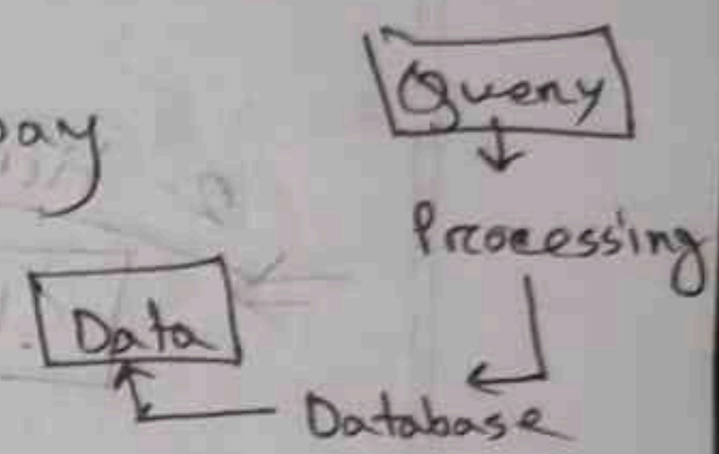
Normalization :

— Storing data in an effective way in DBMS

Data storage and querying

— Data storing way → RAID

— Querying → Data processing way



Transaction Management

— controlling transaction data

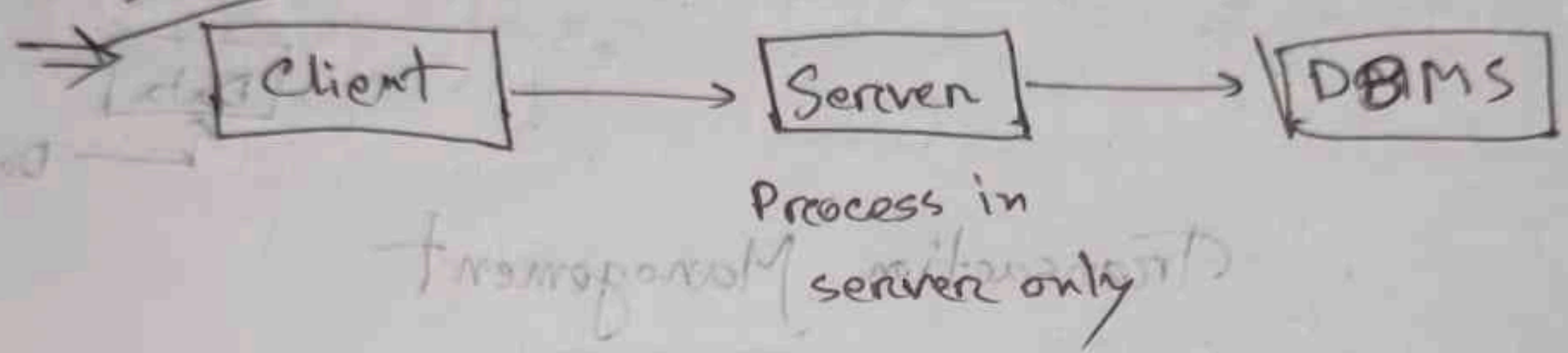
— Log file (info of transaction data)

Data Administrator

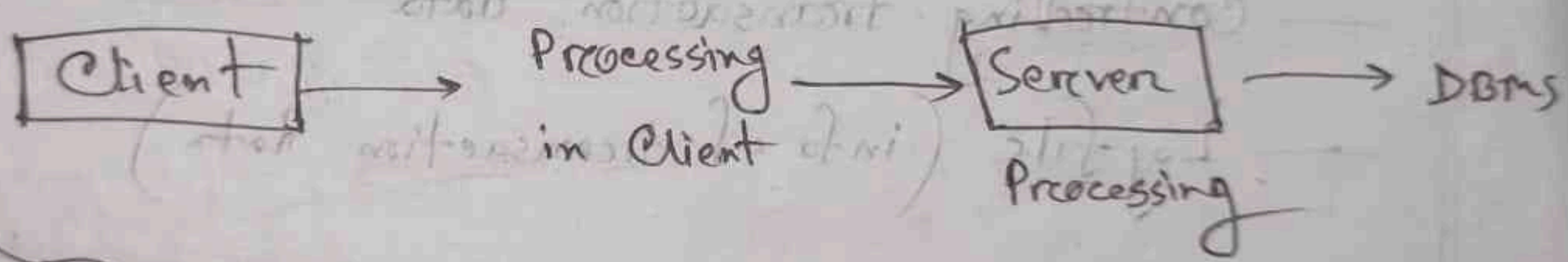
Database Architecture

- → 2-tier architecture
- → 3-tier architecture

⇒ 2-tier



⇒ 3-tier



→ Processing in both client, server

Relational Table Language

14.9.23

DDL, DML

Relational operation

- Select/view (Select tuples & show) → δ
- Projection (Select Attribute & show) → π
- Join (Merge table) → $\times$, $\bowtie$, α
- Logical Set Op. (Union or Intersection like operation) → $\wedge$, $\vee$

Relational Algebra

Join
- Cartesian → $\times$
- Natural → $\bowtie$
- Inner
- Outer

st_info

ID	Name
1	A
2	B
3	C

Get data where id < 3

$\delta_{(id<3)}$ (st_info)

$\boxed{\text{Op_name}_{(condition)} (\text{Relation name})}$

Only show id from table

π_{id} (st_info)

for multiple attribute

$\pi_{id,name}$ (st_info)

Join Operation

TA

id	Name
1	A
2	B

RA

id	Cgpa
1	2.75
2	3.75

Cartesian

id	Name	id	Cgpa
1	A	1	2.75
1	A	2	3.75
2	B	2	2.75
2	B	1	3.75

$\Pi_{name, cgpa}(TA \times RA)$

Natural

id	name	id	Cgpa
1	A	1	2.75
2	B	2	3.75

$\Pi_{id, name}(\sigma_{id = id}(TA \bowtie RA))$

$TA.id = RA.id$

$\pi_{id}(TA \bowtie RA)$

Set operation

$\delta_{id}(TA) \cup \delta_{cgpa}(RA)$

$\delta_{id}(TA) \cap \delta_{cgpa}(RA)$

$\delta_{id}(TA) - \delta_{cgpa}(RA)$

chapter - 6 (6.1, 6.2)

chapter-3

- → SQL Query part (3.1)
- → DDL (3.2)
- → 3.2.1
- → Basic Schema Defition

9th class 14.09.23

Relational Table Language

Relational operation

↓

table

↓

selection operation / view → σ (Data show) → এক একটা tuple কে show করা

সবচেয়ে বেশি

↓

Projection → π (Attribute কে দেখানো)

repeated value আসে না,

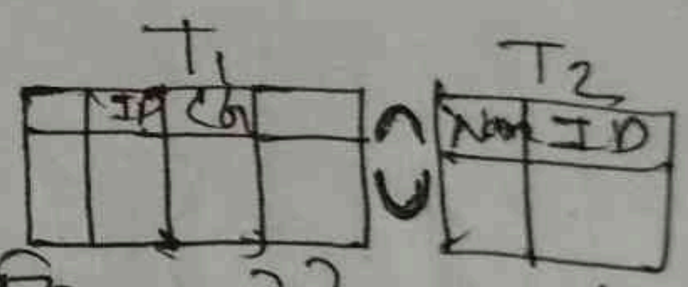
Outer

Natural

Inner

Cartesian

Join → ×, ⋈, ⟕ (merge করি, দুইটা table / একাধিক table এর উপর operation)



~~Logical~~

Set operation – (∪, ∩, –) (একাধিক table এর উপর set operation highlight করা)

∩ → Intersection

∪ – union

– – difference

Relational Algebra → Relation, operation - কে mathematics এ apply করা।

cartesian × (যতগুলো combination করা যায় সব output দেখাবে)

Natural ⋈

(03) → (symbol এর subscript হিসেবে condition থাকবে)

(valid/matching Information show করবে)

projection

ID	Name
01	A
02	B
03	C

$\delta_{id<3}$ (std_info)

Syntax: open-Nam condition (Relation Name)

syntax: π_{id} (std_info)

$\pi_{id, name}$ (std_info)

TA

ID	Name
1	A
2	B

RA

ID	CGPA
1	2.75
2	3.75

Natural

ID	Name	ID	CGPA
1	A	1	2.75
2	B	2	3.75

Cartesian

ID	Name	ID	CGPA
1	A	1	2.75
1	A	2	3.75
2	B	1	2.75
2	B	2	3.75

কলাম বেশি (দেখানো হয়)

Cart : $\Pi_{name,\ cg}(TA \times RA)$

Natual : $\Pi_{ID,\ name}\left(\delta_{TA.ID=RA.ID}(TA \bowtie RA)\right)$

কাজে show করার জন্য

$\Pi_{ID,\ Name}(TA \bowtie RA)$ → full table

Set operation → code এ use করবো

$\delta_{id}(TA) \cup \delta_{CGPA}(RA)$

$\left(\delta_{id}(TA) - \delta_{CGPA}(RA)\right) \cap \left(\delta_{id}(TA) \cup \delta_{CGPA}(RA)\right)$

বইয়ের Example

Chp 6.1 → 6 section

Join → next class

Rename operation

24.09.23

LAB — CHAP-3

SQL - Query → কী কী Part আছে। (3.1)

(3.2) DDL এর characteristic

(3.2.1) Basic datatype

(3.2) → Basic schema defination

Not null in sql

In SQL, the "NOT NULL" constraint is used to ensure that a column in a table cannot contain a NULL value, meaning it must always have a value. When you define a column with the "NOT NULL" constraint, it enforces the requirement that every row in the table must have a value for that column. If you try to insert a row without providing a value for a "NOT NULL" column, you will get a constraint violation error.

For example, when creating a table, you can specify a "NOT NULL" constraint like this:

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this:

sql Copy code

```sql
CREATE TABLE employees (
  employee_id INT NOT NULL,
  first_name VARCHAR(50) NOT NULL,
  last_name VARCHAR(50) NOT NULL
);
```

In this example, the "employee_id," "first_name," and "last_name" columns are defined as "NOT NULL," so every row inserted into the "employees" table must provide values for these columns.

If you have any specific questions or need further information about the "NOT NULL" constraint in SQL, please let me know!

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6. **INSERT INTO**: The INSERT INTO statement is used to add new rows of data into a table. You specify the table and provide the values you want to insert into each column.
7. **SELECT**: The SELECT statement is used to retrieve data from a database. You can use it to query one or more tables and specify the columns you want to retrieve.

Here's an example of using these concepts together:

Suppose you have two tables, "Employees" and "Departments." The "Employees" table has a foreign key column "DepartmentID" that references the primary key "DepartmentID" in the "Departments" table. You want to insert a new employee into the "Employees" table:

sql Copy code

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SQL Concepts & Statements

```sql
INSERT INTO Employees (FirstName,
VALUES ('John', 'Doe', 2, '1990-05
```

In this example, we're inserting a new employee with a first name, last name, department ID, and birthdate. The "DepartmentID" is a foreign key that references the "Departments" table, and the "BirthDate" is of DATE data type. Additionally, you can use a CHECK constraint to ensure that the "BirthDate" is in a valid date format.

I hope this helps clarify these SQL concepts and statements! If you have more specific questions or need further clarification, feel free to ask.

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SQL PRIMARY KEY Co...
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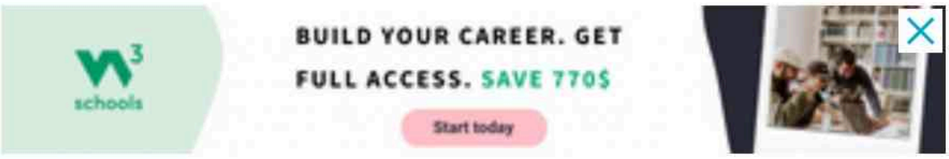

SQL PRIMARY KEY Constraint

❮ Previous
Next ❯

SQL PRIMARY KEY Constraint

The `PRIMARY KEY` constraint uniquely identifies each record in a table.

Primary keys must contain UNIQUE values, and cannot contain NULL values.

A table can have only ONE primary key; and in the table, this primary key can consist of single or multiple columns (fields).

SQL PRIMARY KEY on CREATE TABLE

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SQL FOREIGN KEY Co...
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SQL FOREIGN KEY Constraint

❮ Previous
Next ❯

SQL FOREIGN KEY Constraint

The `FOREIGN KEY` constraint is used to prevent actions that would destroy links between tables.

A `FOREIGN KEY` is a field (or collection of fields) in one table, that refers to the `PRIMARY KEY` in another table.

The table with the foreign key is called the child table, and the table with the primary key is called the referenced or parent table.

Look at the following two tables:

Persons Table

SQL CHECK Constraint

SQL CHECK Constraint

The `CHECK` constraint is used to limit the value range that can be placed in a column.

If you define a `CHECK` constraint on a column it will allow only certain values for this column.

If you define a `CHECK` constraint on a table it can limit the values in certain columns based on values in other columns in the row.

SQL CHECK on CREATE TABLE

The following SQL creates a `CHECK` constraint on the "Age" column when the "Persons" table is created. The `CHECK` constraint ensures that the age of a person must be 18, or older:

MySQL:

0:40
SQL DEFAULT Constra...
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SQL DEFAULT Constraint

SQL DEFAULT Constraint

The `DEFAULT` constraint is used to set a default value for a column.

The default value will be added to all new records, if no other value is specified.

SQL DEFAULT on CREATE TABLE

The following SQL sets a `DEFAULT` value for the "City" column when the "Persons" table is created:

My SQL / SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons (
    ID int NOT NULL,
    LastName varchar(255) NOT NULL,
```

0:40
SQL NOT NULL Constr...
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SQL NOT NULL Constraint

SQL NOT NULL Constraint

By default, a column can hold NULL values.

The `NOT NULL` constraint enforces a column to NOT accept NULL values.

This enforces a field to always contain a value, which means that you cannot insert a new record, or update a record without adding a value to this field.

SQL NOT NULL on CREATE TABLE

The following SQL ensures that the "ID", "LastName", and "FirstName" columns will NOT accept NULL values when the "Persons" table is created:

Example

Get your own SQL Server

0:41
SQL INSERT INTO SEL...
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SQL INSERT INTO SELECT Statement

❮ Previous
Next ❯

The SQL INSERT INTO SELECT Statement

The `INSERT INTO SELECT` statement copies data from one table and inserts it into another table.

The `INSERT INTO SELECT` statement requires that the data types in source and target tables match.

Note: The existing records in the target table are unaffected.

INSERT INTO SELECT Syntax

Copy all columns from one table to another table:

```
INSERT INTO table2
```

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SQL Concepts & Statements

Default (GPT-3.5)

Primary key, foreign key,default,date,check,insert into select SQL discussion

Certainly! Let's discuss some common SQL concepts and statements:

1. **Primary Key**: A primary key is a unique identifier for a record in a database table. It ensures that each row in the table is unique and can be used to establish relationships with other tables.
2. **Foreign Key**: A foreign key is a field in a table that is used to establish a link between the data in two tables. It creates a relationship between the tables, typically by referencing the primary key in another table.

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3. **Default**: The DEFAULT constraint is used to provide a default value for a column when no value is specified during an INSERT statement. For example, you can set a default value of 0 for an "age" column.
4. **Date**: The DATE data type is used to store date values in SQL. It can be used to represent dates in various formats and perform operations on dates.
5. **CHECK Constraint**: The CHECK constraint is used to limit the range of values that can be inserted into a column. For example, you can use a CHECK constraint to ensure that the "age" column only contains values between 18 and 100.
6. **INSERT INTO**: The INSERT INTO statement is used to add new rows of data into a table. You specify the table and provide the values you want to insert into

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0:13

- Generalization is like a bottom-up approach in which two or more entities of lower level combine to form a higher level entity if they have some attributes in common.
- In generalization, an entity of a higher level can also combine with the entities of the lower level to form a further higher level entity.
- Generalization is more like subclass and superclass system, but the only difference is the approach. Generalization uses the bottom-up approach.
- In generalization, entities are combined to form a more generalized entity, i.e., subclasses are combined to make a superclass.

For example, Faculty and Student entities can be generalized and create a higher level entity Person.

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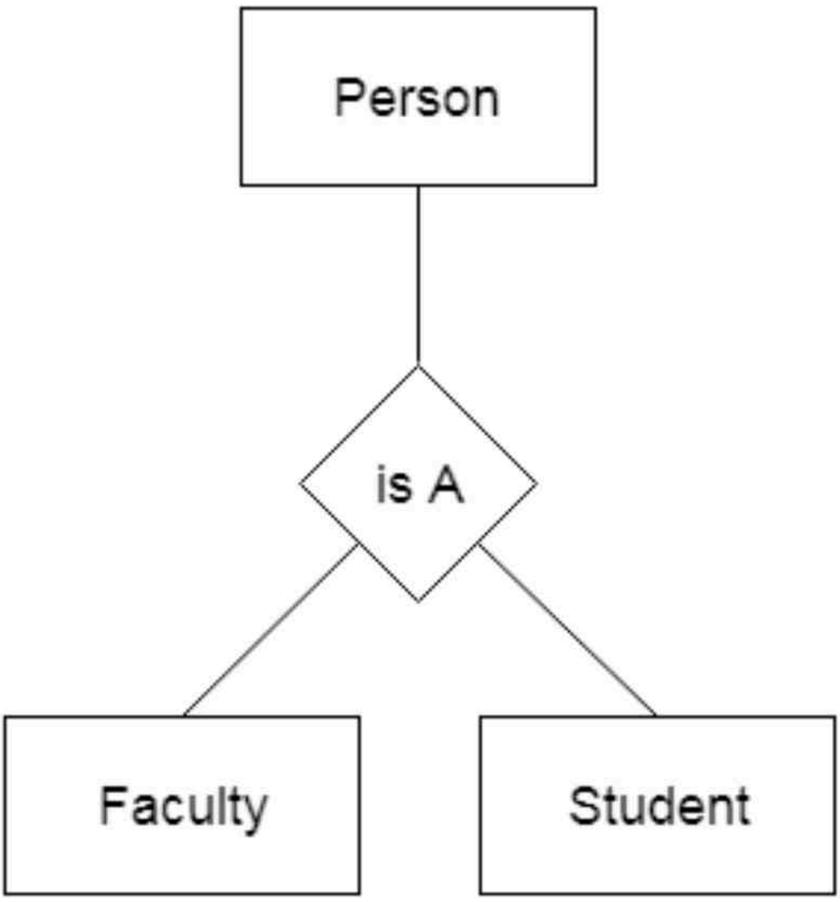

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Specialization

- Specialization is a top-down approach, and it is opposite to Generalization. In specialization, one higher level entity can be broken down into two lower level entities.
- Specialization is used to identify the subset of an entity set that shares some distinguishing characteristics.
- Normally, the superclass is defined first, the subclass and its related attributes are defined next, and relationship set are then added.

For example: In an Employee management system, EMPLOYEE entity can be specialized as TESTER or DEVELOPER based on what role they play in the company.

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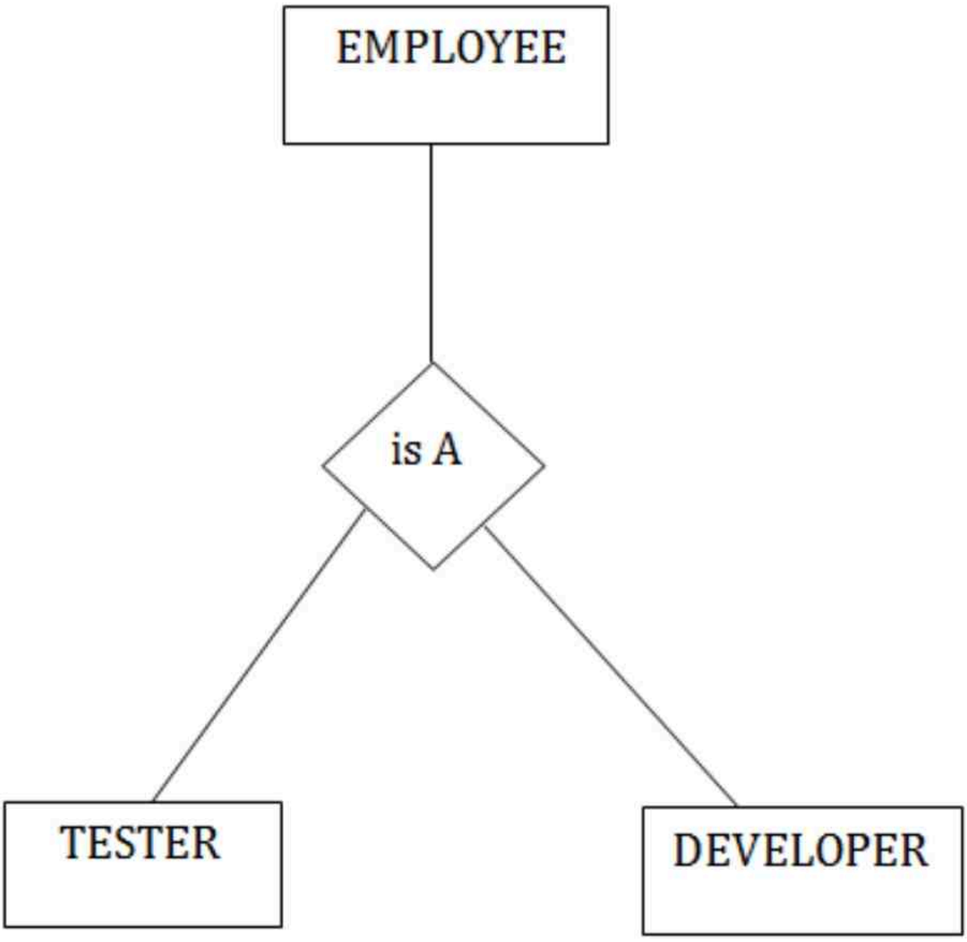

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Difference between Generalization and Specialization :

GENERALIZATION	SPECIALIZATION
Generalization works in Bottom-Up approach.	Specialization works in top-down approach.
In Generalization, size of schema gets reduced.	In Specialization, size of schema gets increased.
Generalization is normally applied to group of entities.	We can apply Specialization to a single entity.
Generalization can be defined as a process of creating groupings from various entity sets	Specialization can be defined as process of creating subgrouping within an entity set
In Generalization process, what actually happens is that it takes the union of two or more lower-level entity sets to produce a higher-level entity	Specialization is reverse of Generalization. Specialization is a process of taking a subset of a higher level entity set to form a lower level

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In Generalization process, what actually happens is that it takes the union of two or more lower-level entity sets to produce a higher-level entity sets.	reverse of Generalization. Specialization is a process of taking a subset of a higher level entity set to form a lower-level entity set.
Generalization process starts with the number of entity sets and it creates high-level entity with the help of some common features.	Specialization process starts from a single entity set and it creates a different entity set by using some different features.
In Generalization, the difference and similarities between lower entities are ignored to form a higher entity.	In Specialization, a higher entity is split to form lower entities.
There is no inheritance in Generalization.	There is inheritance in Specialization.

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Article Tags : DBMS | Difference Between | GATE CS

19:58

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Exercises

- (1)R(ABCDE),F{AB->C,C->D,D->E} decompose to R1(ABC),R2(CD),R3(DE) is it lossless decomposition?
- the answer is yes.
- (2) R(ABC),F{A->B,C->B}
- decomposition1{R1(AB),R2(AC)}
- decomposition2{R1(AB),R2(BC)}
- ARE THEY DECOMPOSITION?
- THE SECOND IS NOT.

Functional Dependencies and Normalization for Relational...

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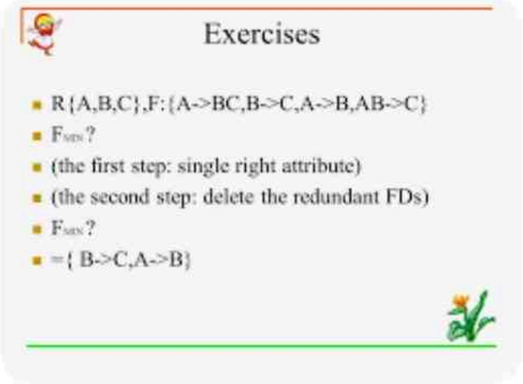

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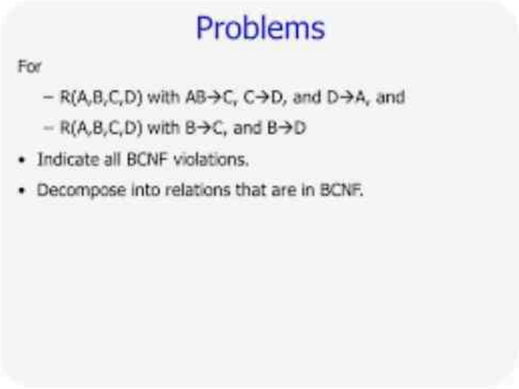
Functional Dependencies...



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Functional Dependencies...

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Example

Given this FD for this R(A,B,C,D,E,F)
AB→ C
AD→ E
B→D
AF→B
Check if AB+ is a key for this relation?
AB+ is key if AB+ can find all the attribute of R

AB→AB
B→D so B ⊆AB → AB+→ABD
AD→E so AD ⊆ABD→AB+→ABDE
AB→C so AB ⊆ABDE →AB+→ABCDE
AF→B so AF Not ⊆ABDE → AB+→ABCDE
AB not a key because it does not contain all attributes such as F

Slide 10- 36

Functional Dependencies and Normalization for Relational...

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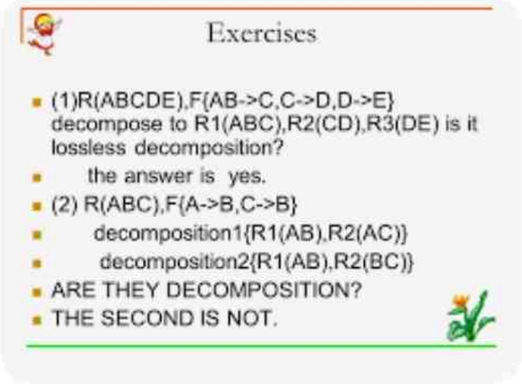

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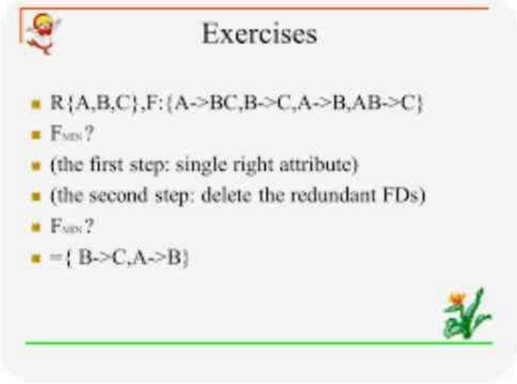

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multivalued dependency i...

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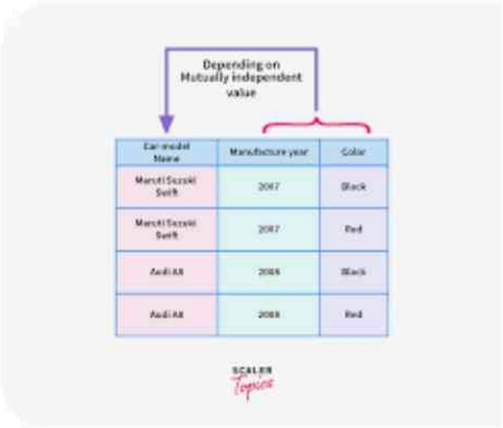
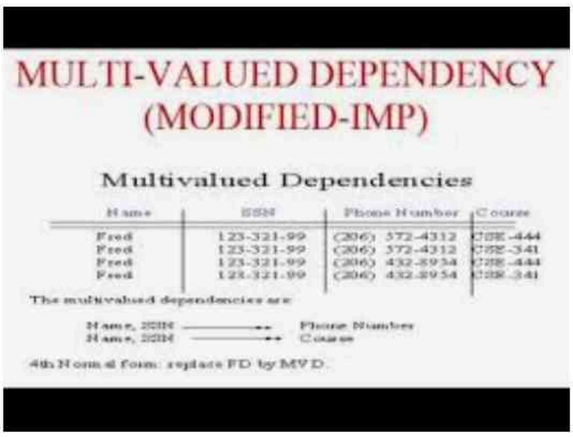
ডিবিএমএসে বহুমূল্য নির্ভরতা





বাংলায় In English

Multivalued dependency (MVD) is **having the presence of one or more rows in a table**. It implies the presence of one or more other rows in that same table. A multivalued dependency prevents fourth normal form. A multivalued dependency involves at least three attributes of a table. Jul 6, 2021

https://www.tutorialspoint.com › wh...

What is multivalued dependency in DBMS? - Tutorialspoint

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Scaler

Depending on Mutually independent value

Car-model Name	Manufacture year	Color
Maruti Suzuki Swift	2007	Black
Maruti Suzuki Swift	2007	Red
Audi A8	2008	Black
Audi A8	2008	Red

SCALER Topics

Multivalued Dependency - Scaler Topics

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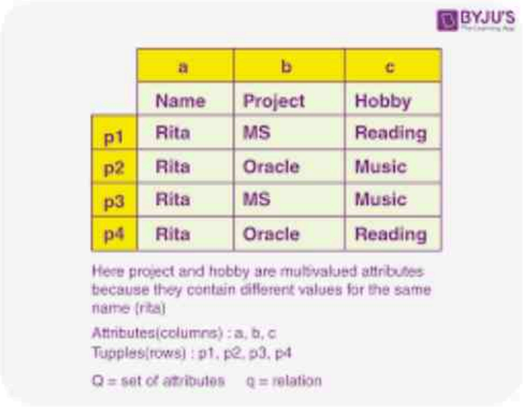

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	a	b	c
	Name	Project	Hobby
p1	Rita	MS	Reading
p2	Rita	Oracle	Music
p3	Rita	MS	Music
p4	Rita	Oracle	Reading

Here project and hobby are multivalued attributes because they contain different values for the same name (rita)

Attributes(columns) : a, b, c
Tupples(rows) : p1, p2, p3, p4

Q = set of attributes q = relation

	a	b	c
	NAME	PROJECT	HOBBY
t1	Geeks	MS	Reading
t2	Geeks	Oracle	Music
t3	Geeks	MS	Music
t4	Geeks	Oracle	Reading

Here project and hobby are multivalued attributes because they contain different values for the same name(Geeks)

Attributes(columns): a,b,c
Tupples(rows):t1,t2,t3,t4

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Multivalued Dependency i...

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GeeksforGeeks

	a	b	c
	NAME	PROJECT	HOBBY
t1	Geeks	MS	Reading
t2	Geeks	Oracle	Music
t3	Geeks	MS	Music
t4	Geeks	Oracle	Reading

Here project and hobby are multivalued attributes because they contain different values for the same name(Geeks)

Attributes(columns): a,b,c
Tupples(rows):t1,t2,t3,t4

R=set of attributes r=relation

Multivalued Dependency (MVD) in DBMS -...

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prime attribute vs non pri...

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বাঙলায় অনুসন্ধান করুন

প্রাইম অ্যাট্রিবিউট বনাম নন প্রাই.

বাংলায় In English

Please note: **prime attribute is an attribute that is part of any candidate key. Non prime attribute is an attribute that is not part of any candidate key**. So, its advisable that you find out all possible candidate keys from the given functional dependencies and mark the prime and non prime attributes.

May 18, 2021

https://www.geeksforgeeks.org › all...

Allowed Functional Dependencies (FD) in Various Normal Forms (NF)

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prime attribute vs non pri...

Allowed Functional Dependencies (FD) in Various Normal Forms (NF)

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People also ask

What is a prime attribute example?

What is the difference between key attribute and non key attribute?

You could consider the dimension much like a relational table, and **key attribute is able to be compared to a primary key which should be identical, and Non-Key Attribute which could is allowed to have same data for different rows**.
Mar 3, 2021

https://learn.microsoft.com › answers

What is the difference between a key attribute and non ... - Microsoft Learn

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Can a non prime attribute determine prime attribute in DBMS?

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complex and composite a...

one simple attribute. For example, a student's complete name may have first_name and last_name.

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What is the difference between composite attribute and multivalued attribute?

What is a complex attribute?

For example, if a person has more than one office and each office has an address made from a street number and city. So the address is a composite attribute, and offices are multi valued attributes, So combing them is called complex attributes.

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Attributes in DBMS - Javatpoint

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What is an example of a complex attribute?

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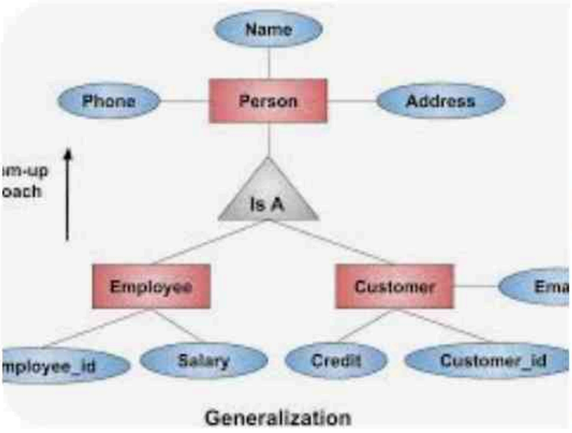
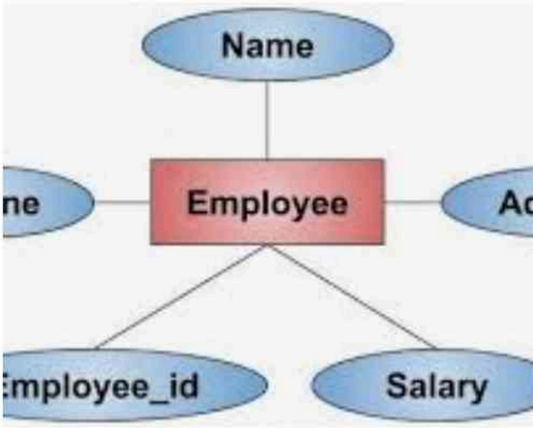
generalization with exampl...





বাংলায়

In English

It is the reverse process of Specialization. For example, **Whales, Sharks, and Dolphins can be generalized as Fish**. Similarly, Bicycle, Bike, and Car can be generalized as Vehicles. Example: Suppose we have two entity types, Employee and Customer. Jan 19, 2020

https://afteracademy.com › blog

What is Generalization in DBMS? - AfterAcademy

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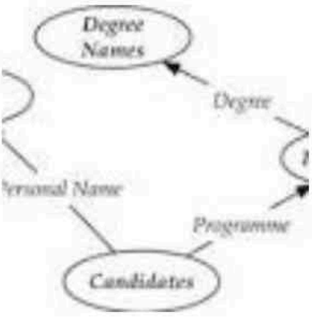
transitive dependency in d...

What is transitive dependency in database?



A transitive dependency **occurs when one non-prime attribute is dependent on another non-prime attribute**. If a table schema T (X ¯ , Y , Z) contains a dependency f : Y ⟶ Z , where Y and Z are non-prime attributes, we say it contains a transitive dependency from X to Z .

https://www.sciencedirect.com › tra...

Transitive Dependency - an overview | ScienceDirect Topics

MORE RESULTS

What is a transitive dependency example?

Transitive Dependency Example

Book ⟶ Author: Here, the Book attribute determines the Author attribute. If you know the book name, you can learn the author's name.

Jun 2, 2021

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transitive dependency in d...

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What is 3NF and transitive dependency?

A relation that is in First and Second Normal Form and in which no non-primary-key attribute is transitively dependent on the primary key, then it is in Third Normal Form (3NF). Note – If A->B and B->C are two FDs then A->C is called transitive dependency. Jul 31, 2019

https://www.geeksforgeeks.org › ...

Third Normal Form (3NF) - GeeksforGeeks

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Why transitive dependency is important in DBMS?

Transitive dependency can easily occur in a given relation with three or more attributes. Such dependencies play a vital role in normalizing the database into its 3rd Normal Form (3NF). Jul 31, 2023

https://testbook.com › gate › transiti...

Transitive Dependency in DBMS - A Comprehensive Guide | Testbook

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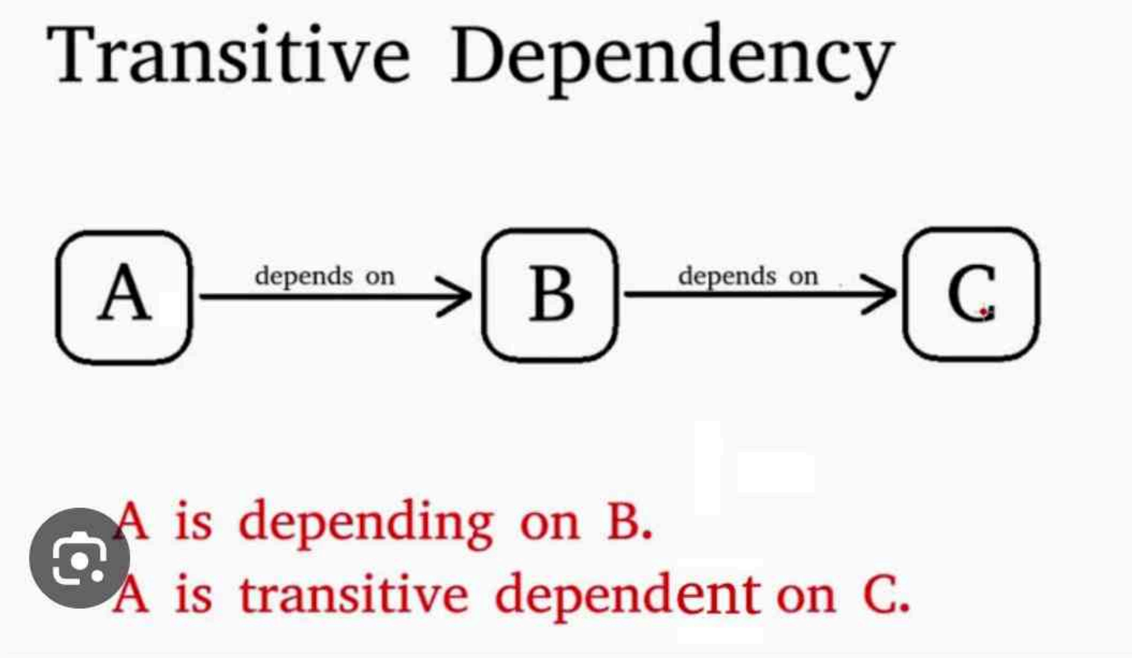
LernenInVerschiedenenFormen · 0:27



What is Transitive Dependency ?

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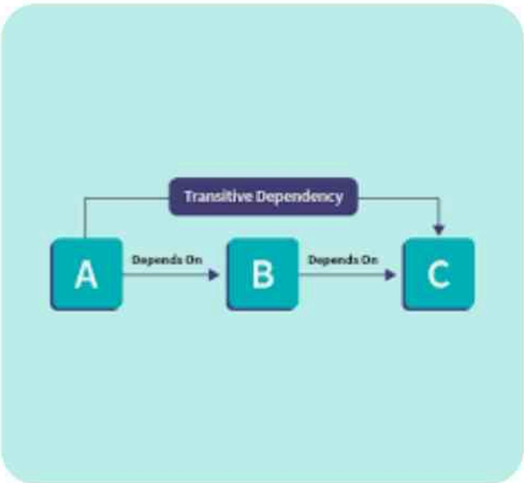

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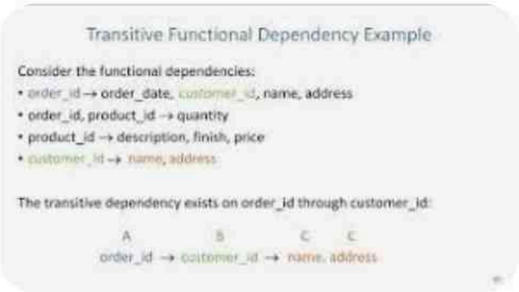
Transitive Dependency in ...



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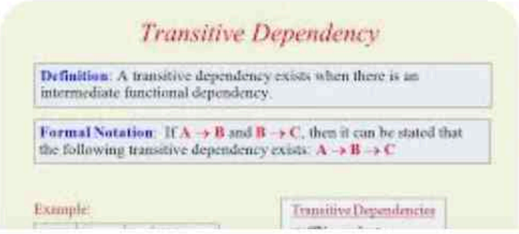
Normalization: Transitive ...



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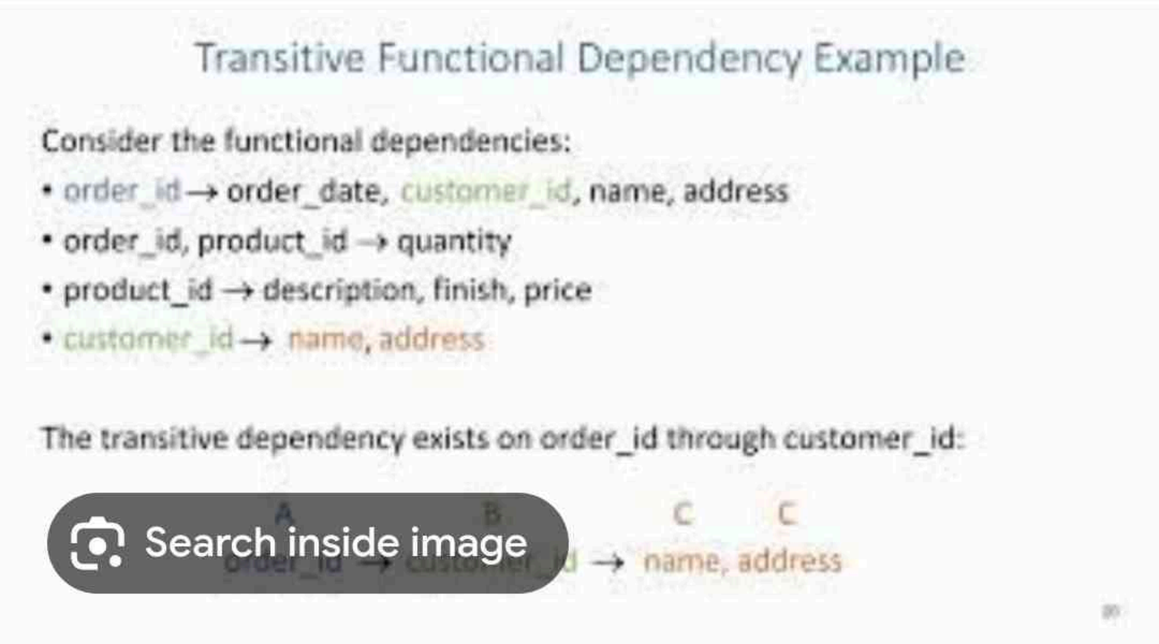

Normalization: Transitive Functional Dependencies -...

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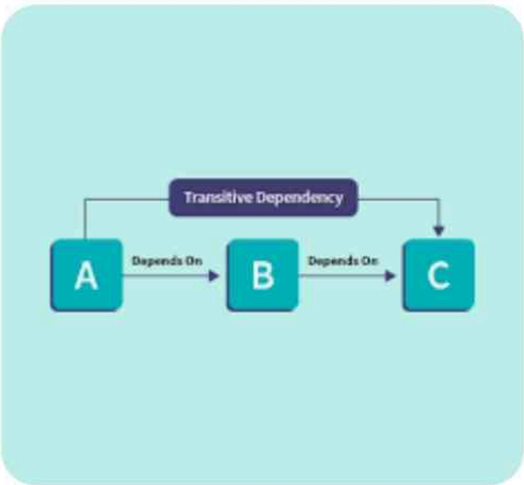

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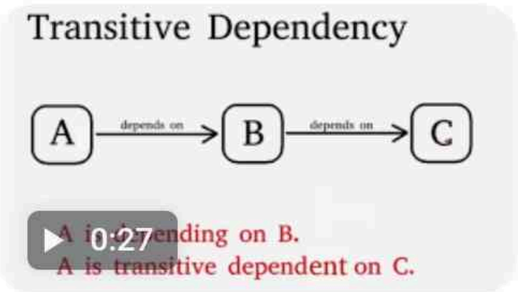

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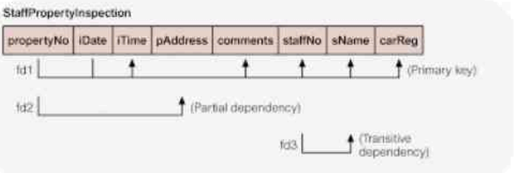

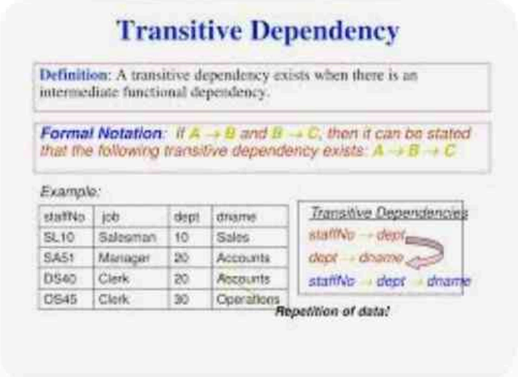

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partial dependency in dbms

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ডিবিএমএসে আংশিক নির্ভরতা

বাংলায়

In English

A partial dependency in DBMS **occurs between a prime attribute and a non-prime attribute**. A partial dependency exists if a non-prime attribute is dependent on a proper subset of a candidate key. Example A→B, where B is some non-prime attribute, and A is the proper subset of a candidate key, say X.

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Partial Dependency in DBMS: Definition, Examples

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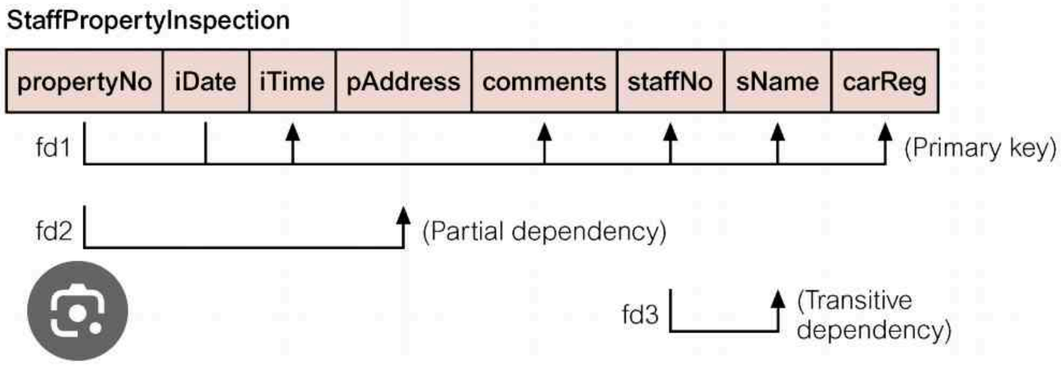

database - Normalization Dependencies - Stack Overflow

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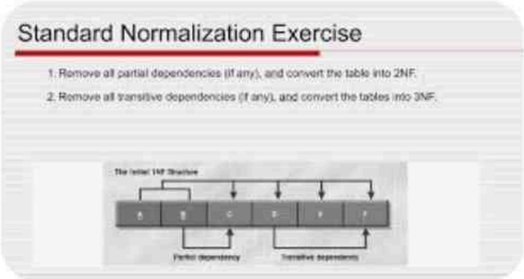

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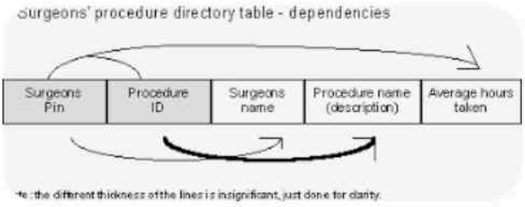
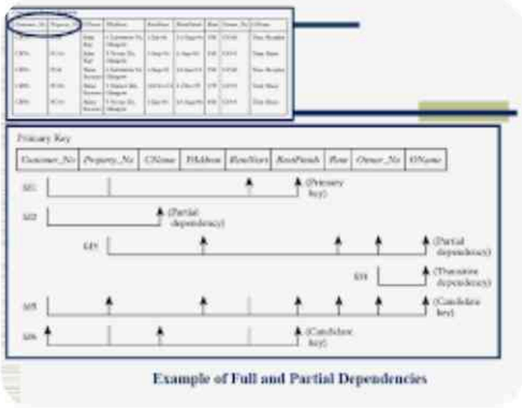
What Is Transitive Depen...



L Hong To Rtai

Are Partial Dependency A...



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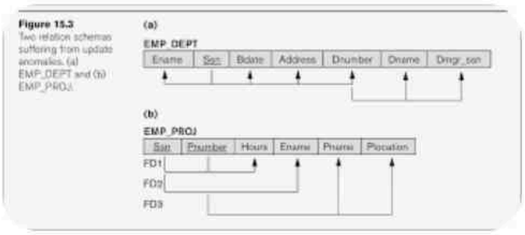

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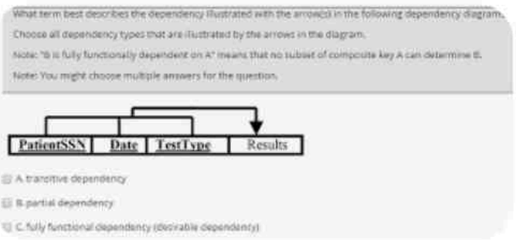

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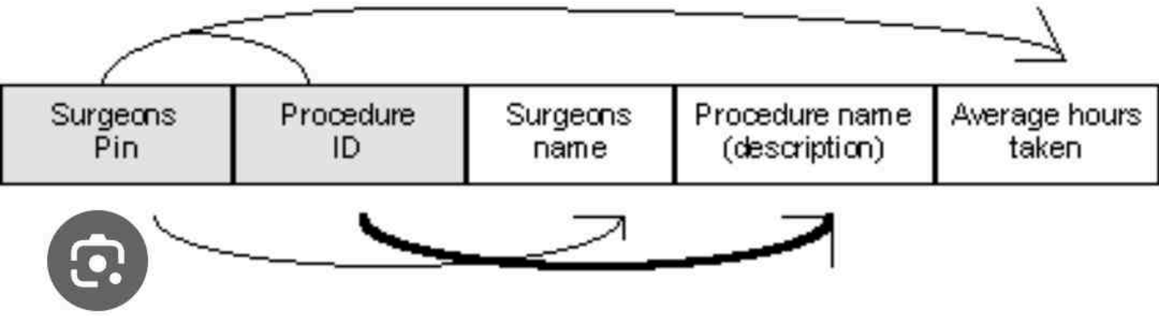
Surgeons' procedure directory table - dependencies



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Are Partial Dependency And Transitive Dependency The...

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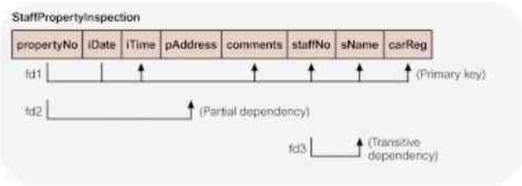

Stack Overflow

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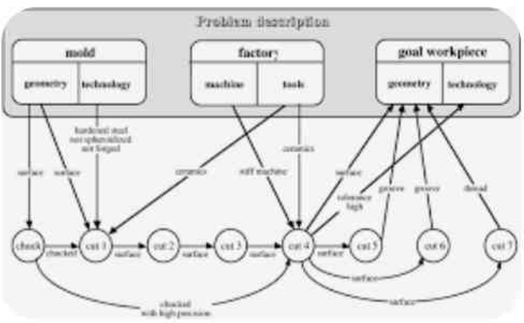

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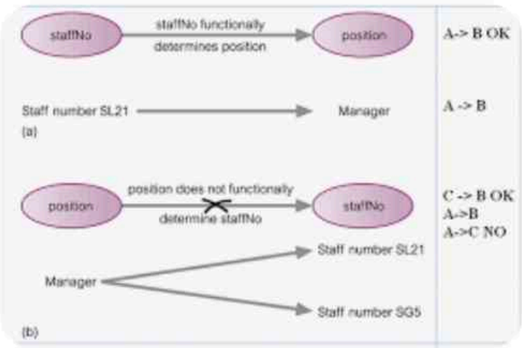
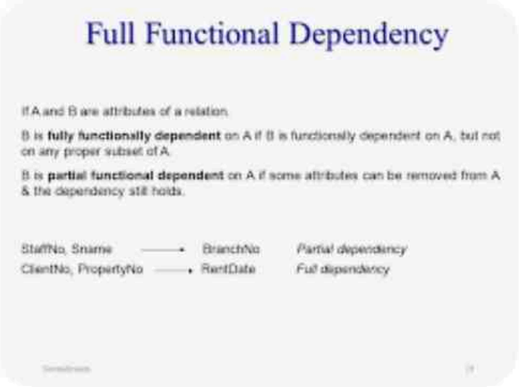


Girfa : Student Help

Girfa : Student Help: Func...



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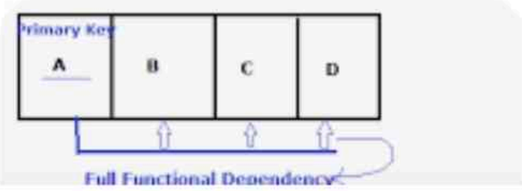
Differentiate Between Pa...



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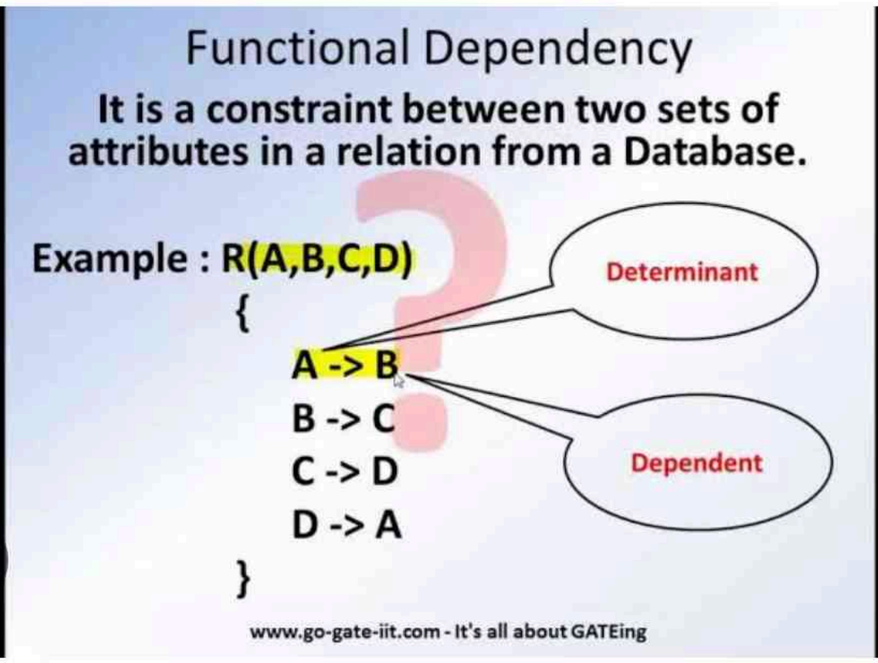

Basics of RDBMS : Relations and Functional Dependency

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We have discussed about the Relations and Functional Dependencies in RDBMS. These topics are the foundation for the Normalization concept., We have quoted small example to explain all the terms. ...

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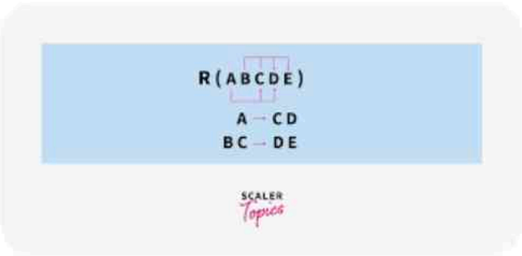

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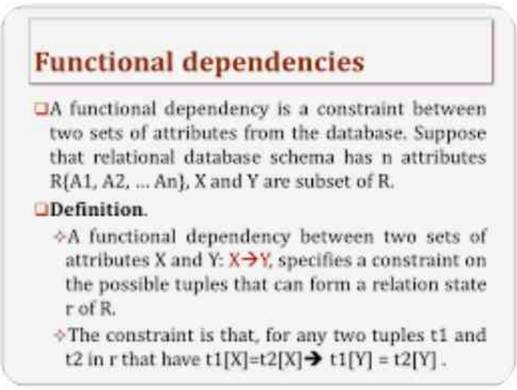
Functional Dependency i...



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17:19

Second Normal Form ...
relationaldbdesign.com

ord of that category. To prevent these problems, you
ompose your tables to *third normal form*[2], which w
n the next module.

le second normal form (2NF) is a valuable step in th
malization process, it does have some limitations:

1. Redundancy can still exist: Even if a table is in 2N
still contain redundant data. For example, if two
tables have a foreign key relationship with a com
third table, data duplication can still occur.
2. Dependencies between non-key attributes: 2NF c
considers functional dependencies between attr
and the primary key. It does not consider depend
between non-key attributes. If non-key attributes
on each other, this can lead to data anomalies.
3. Does not guarantee absence of anomalies: While
help eliminate certain types of data anomalies, it
not guarantee that all anomalies will be eliminat
Anomalies can still occur due to complex relatio
between data elements.
4. Can lead to excessive table splitting: In some ca
applying 2NF can lead to an excessive number o
which can make the database more complex and
to manage.
5. Can be difficult to achieve in practice: Achieving
be difficult in practice, particularly in complex da
with many interrelated tables. It may require sign
effort to properly analyze and decompose the da
way that satisfies 2NF.

blems with 2NF Relations

17:20

database design - Wh...
dba.stackexchange.com

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Normalization splits a entity into a smaller number of entities, so you will have more smaller tables, so it is easier for sorting, indexing and searching.

Since there are many smaller tables, you will have many clustered indexes, it will help you in query tuning.

A normalized data model can be easier to modify and maintain.

Disadvantages

With many number tables and joins in between those tables slow down the performance of the database.

Having a large number of tables consumes more development time for implementation.

A completely normalized database needs clear and broad understanding of the business, it takes more time to analyse and understand the business. I hope this will help you. Thank you.

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edited May 17, 2018 at 5:47

17:20

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Advantages of normalization:

Reduced data redundancy:

In each level of normalization a type of data redundancy (same data present in more than once) removed from the model. Once the redundancy is removed, it is easy to change the data since data is present in only one place.

Increased data quality:

By applying business rules, there is a smaller chance in storing unwanted data in the table. Also there is less need for storing `null` values.

Capturing complete business requirements:

In normalization we have to ask a lot of questions to business people, so our understanding of the business becomes stronger and requirements of the business are easy to capture.

Data **modification anomalies** (Insert, delete and update) are reduced.

Normalization splits a entity into a smaller number of entities, so you will have more smaller tables, so it is easier for sorting, indexing and searching.

17:20

advantages and disadvant...

What are the disadvantages of normalization in DBMS?

Why we use 3NF in DBMS?

What are the characteristics of 3NF in DBMS?

Third Normal Form (3NF)

- A relation will be in 3NF if it is in 2NF and not contain any transitive partial dependency.
- 3NF is used to reduce the data duplication. It is also used to achieve the data integrity.
- If there is no transitive dependency for non-prime attributes, then the relation must be in third normal form.

https://www.javatpoint.com › dbms-...

3NF in DBMS | Third Normal Form - javatpoint

MORE RESULTS

Can 3NF have two primary keys?

What does 3NF depend on?

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Chapter-8

Design alternative

→ Larger schemas (Null value, redundant problem)

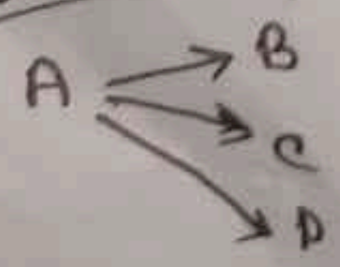
→ Small schemas (Lossy decomposition → unnecessary information)

Data Normalization

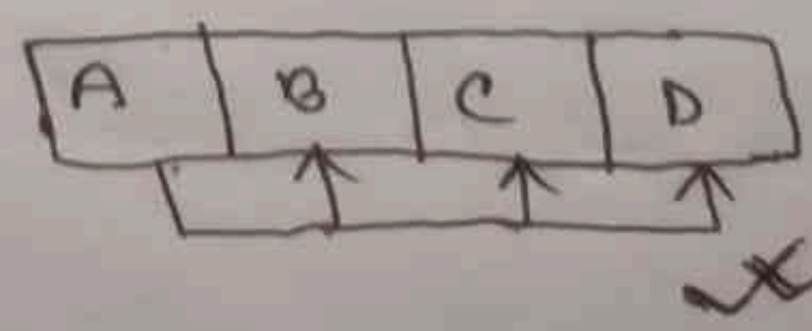
→ To avoid $\underbrace{\text{'Insertion', 'Deletion', 'Update'}}_{\text{Anomalies}}$ problem

⇒ Functional Dependency:

3 ways to represent



or,



or,

$A \rightarrow B$

$A \rightarrow C$

$A \rightarrow D$

⇒ Transitive Dependency :

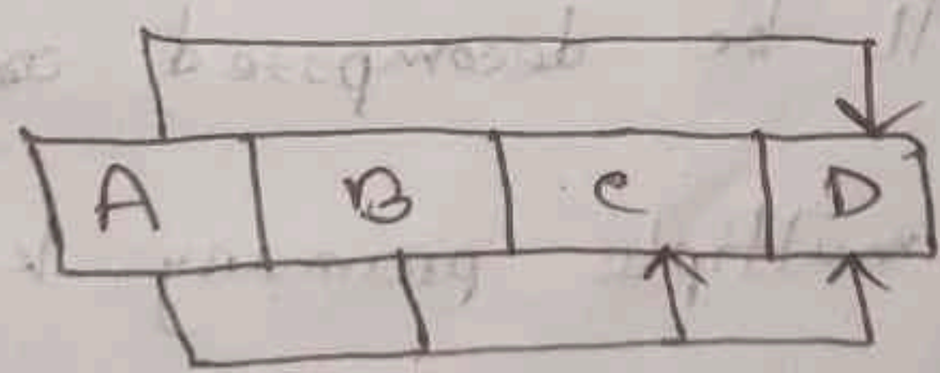
If, $A \rightarrow B$ and $B \rightarrow C$, then $A \rightarrow C$
(transitive)

~~⇒ Proper subset~~

⇒ Partial Dependency :

If a non-primary key is dependent on a proper subset, partially.

combination of primary key



First Normal Form (1 NF)

— All values will be single and atomic, (multi-valued field will be removed into single field)

Second Normal Form (2NF)

— Partial dependency will be removed (table will be decomposed by dividing multiple primary key)

3rd Normal Form (3NF)

— Transitive dependency will be removed

19:51

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functional dependency is in the database management system (DBMS).

Functional Dependency

Functional dependency refers to the relation of one attribute of the database to another. With the help of functional dependency, the quality of the data in the database can be maintained.

The symbol for representing functional dependency is -> (arrow).

Example of Functional Dependency

Consider the following table.

Employee Number	Name	City	Salary
1	bob	Bangalore	25000
2	Lucky	Delhi	40000

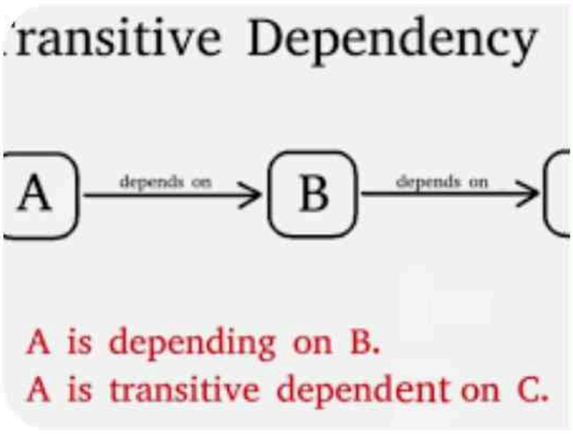
The details of the name of the employee, salary and city are obtained by the value of the number of Employee (or id of an employee). So, it can be said that the city, salary and the name attributes are functionally dependent on the attribute Employee Number.

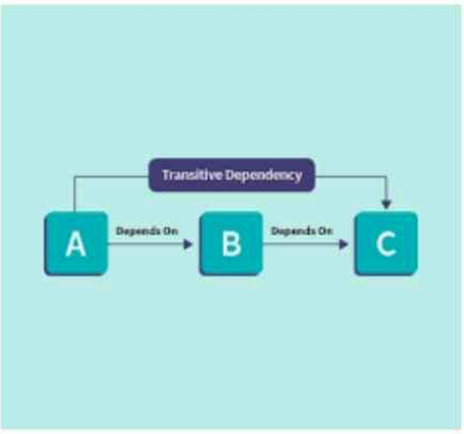
Example

```
SSN->ENAME read as SSN function
```

19:52

transitive dependency in d...





বাংলায় In English

A Transitive dependency in a database is **an indirect relationship between values in the same table that causes a functional dependency**. By nature, a transitive dependency requires three or more attributes. To achieve the normalization standard of Third Normal Form (3NF), any transitive dependency must be eliminated.

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Transitive Dependency in DBMS - Scaler Topics

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- As the typical structure type advances, the exhibition turns out to be increasingly slow.
- Proper information is needed on the different ordinary structures to execute the standardization cycle effectively. Reckless use may prompt awful plan loaded up with significant peculiarities and information irregularity.
- Increased complexity: Normalization can increase the complexity of a database design, especially if the data model is not well understood or if the normalization process is not carried out correctly. This can lead to difficulty in maintaining and updating the database over time.
- Reduced flexibility: Normalization can limit the flexibility of a database, as it requires data to be organized in a specific way. This can make it difficult to accommodate changes in the data or to create new reports or applications that require different data structures.
- Increased storage requirements: Normalization can increase the storage requirements of a database, as it may require more tables and additional join operations to access the data. This can also increase the complexity and cost of the hardware required to support the database.

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of the hardware required to support the database.

- Performance overhead: Normalization can result in increased performance overhead due to the need for additional join operations and the potential for slower query execution times.
- Loss of data context: Normalization can result in the loss of data context, as data may be split across multiple tables and require additional joins to retrieve. This can make it harder to understand the relationships between different pieces of data.
- Potential for data update anomalies: Normalization can introduce the potential for data update anomalies, such as insert, update, and delete anomalies, if the database is not properly designed and maintained.
- Need for expert knowledge: Proper implementation of normalization requires expert knowledge of database design and the normalization process. Without this knowledge, the database may not be optimized for performance, and data consistency may be compromised.

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Advantages of Normalizing Process

Some of the advantages of normalizing are:

- It increases the microstructure's homogeneity and refines the grain size.
- It decreases the possibility of distortion or fracture by releasing internal stresses.
- It improves the metal's ductility and hardness.
- The metal becomes stronger and harder as a result.
- It eliminates any remaining dendritic segregation from the casting process.

Disadvantages of Normalizing Process

Some possible disadvantages of normalizing are:

- It may overcomplicate the metal structure by breaking it into too many tables.
- It may reduce the strength of some alloys and metals.
- It may require subsequent machining or surface finishing to remove scale or decarburized layers

Application rocess

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- It may reduce the strength of some alloys and metals.
- It may require subsequent machining or surface finishing to remove scale or decarburized layers

Applications of Normalizing Process

Some applications of normalizing are:

- It is used in some plate mills in the production of large forging such as railroad wheels and axles and some bar products.
- It is utilised for both brackets and sheet metal forging.
- Castings' internal stress is relieved with it.
- It is employed to restore the initial mechanical characteristics of cold-worked or forged steel.
- In order to lessen the hardness that develops during the forming process, it is utilised for ferritic stainless steel stampings in the automotive industry.

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Advantages of First Normal Form

Below given are some of the advantages of the First Normal Form (1NF):

- One of the primary advantages of 1NF is that it removes the unnecessary repeating values by creating a separate table and hence does not create any issues while inserting, deleting, and updating the values in the database.
- Working with tables with columns with multiple values separated by ‘,’ is very difficult while searching for a specific value in the database by splitting all the values of a column and converting them in a particular format, wasting time and memory. 1N

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values in the database.

- Working with tables with columns with multiple values separated by ‘,’ is very difficult while searching for a specific value in the database by splitting all the values of a column and converting them in a particular format, wasting time and memory. 1NF makes it easy by creating different rows for different values.
- 1NF forms the basis and is the foremost principle that is followed while creating a database and hence is the most important Normal Form for the tables to proceed further to be normalized with 2NF and 3NF.
- 1NF is important as it creates a Functional dependency between the two tables using the Primary Key and For cial role ase

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is the most important Normal Form for the tables to proceed further to be normalized with 2NF and 3NF.

- 1NF is important as it creates a Functional dependency between the two tables using the Primary Key and Foreign Key, which plays a crucial role while working with database tables.
- 1NF allows users to use the database queries effectively as it removes ambiguity by removing the null and multiple values of a column which creates major issues in the future while updating and extracting the database.

Conclusion

While working with the databases and creating

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Limitations of First No...
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ormal form during the normalization process? Vhile first normal form (1NF) is an important tep in the normalization process, it does have ome limitations. Some of these limitations nclude:

1. Data redundancy: When a table is in 1NF, there may still be some redundant data, especially if multiple tables contain the same data. This can make it difficult to update data and can cause inconsistencies in the database.
2. Difficulty with complex queries: In 1NF, data is split into separate tables, which can make it more difficult to perform complex queries that require data from multiple tables.
3. Poor performance: Having data split across multiple tables can result in slower database performance, especially when joining tables to retrieve information.
4. Increased complexity: As more tables are created during the normalization process, the database structure can become more complex and difficult to manage.
5. Over-normalization: There is a risk of over-normalizing the database, which can result in tables becoming too small and creating excessive joins.

t's important to keep these limitations in mind

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Below are a few of the advantages of using the second normal form.

1. Redundant data is reduced more effectively.
2. Data is consistent in the database.
3. It improves the flexibility in designing a Database.
4. It also improves the overall organization of data in the database.
5. It also improves the security of the database.

Conclusion

- For the successful implementation of a Database Management System, which meets the requirements of dat the

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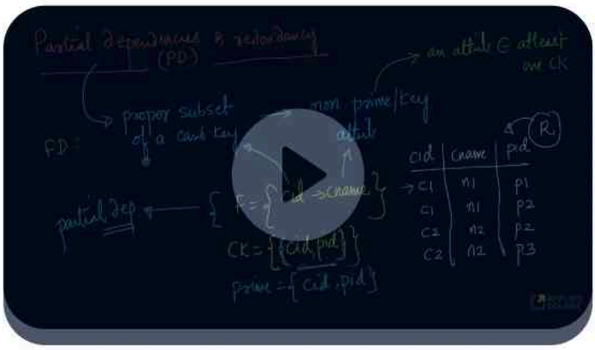

<EmployeeProjec

Employee Code	Pro II		
101	P03	John	Project10
101	P01	John	Project10
102	P04	Ryan	Project10
103	P02	Stephanie	Project10

In the above table, the prime attributes of the table are Employee Code and Project ID. We have partial dependencies in this table because Employee Name can be determined by Employee Code and Project Name can be determined by Project ID. Thus, the above relational table violates the rule of 2NF.

The prime attributes in DBMS are those which are part of one or more candidate keys.

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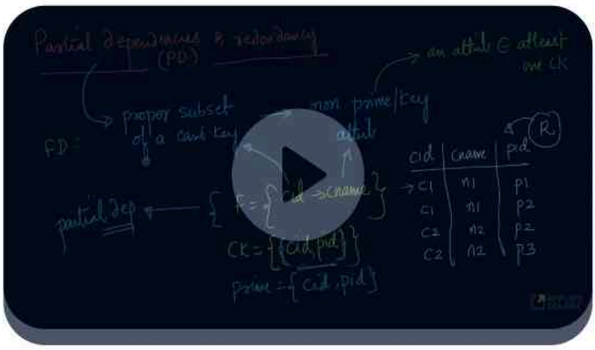

<EmployeeLocati

Employee Zipcode	Employee City
110033	Model Town
110044	Badarpur
110028	Naraina
110064	Hari Nagar

Thus, we've converted the <EmployeeDetail> table into 3NF by decomposing it into <EmployeeDetail> and <EmployeeLocation> tables as they are in 2NF and they don't have any transitive dependency.

The 2NF and 3NF impose some extra conditions

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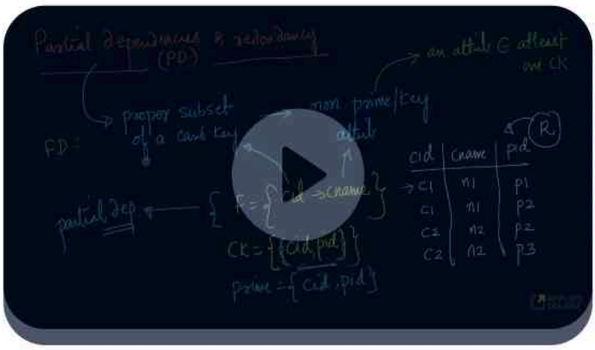

Thus, we've conve
table into 3NF by
<EmployeeDetail> and <EmployeeLocation> tables as they are in 2NF and they don't have any transitive dependency.

The 2NF and 3NF impose some extra conditions on dependencies on candidate keys and remove redundancy caused by that. However, there may still exist some dependencies that cause redundancy in the database. These redundancies are removed by a more strict normal form known as BCNF.

Boyce-Codd Normal Form (BCNF)

Boyce-Codd Normal Form(BCNF) is an advanced version of 3NF as it contains additional constraints compared to 3NF.

For a relational table to be in Boyce-Codd normal form, it must satisfy the following rules:

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extending levels of Normalization as follows:

1. **First Normal Form (1 NF) –** Each field in a table holds particular information. For example, in a specialist overview, every one table may hold stand apart origination date field.
2. **Second Normal Form (2 NF) –** Each field in a table that isn't a determiner of the substance of a substitute field must itself be a limit of substitute fields in the table.
3. **Third Normal Form (3 NF) –** No twofold information is permitted. Consequently, for example, if two tables both oblige an origination date field, the origination date information may be isolated into a different table, and the two distinct tables may then get to the origination date information by methods for a list field in the origination date table. Any change to an origination date would normally be reflecting in all tables that association with the origination date table.

Note – There are additional standardization levels, for instance, Boyce Codd Normal Form (BCNF), fourth customary structure (4nf) and fifth commonplace structure (5nf). While standardization makes data sets more capable to help, they can in like manner make them more

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Advantages of Normalization : Here we can perceive any reason why Normalization is an alluring possibility in RDBMS ideas.

- A more modest information base can be kept up as standardization disposes of the copy information. Generally speaking size of the information base is diminished thus.
- Better execution is guaranteed which can be connected to the above point. As information bases become lesser in size, the goes through the information turns out to be quicker and more limited in this way improving reaction time and speed.
- Narrower tables are conceivable as standardized tables will be tweaked and will have lesser segments which considers more information records per page.
- Fewer files per table guarantees quicker support assignments (file modifies).
- Also understands the choice of joining just the tables that are required.
- Reduces data redundancy and inconsistency: Normalization eliminates data redundancy and ensures that each piece of data is stored in only one place, reducing the risk of data inconsistency and making it easier to maintain data accuracy.

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Advantages and Disad...
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- Reduces data redundancy and inconsistency: Normalization eliminates data redundancy and ensures that each piece of data is stored in only one place, reducing the risk of data inconsistency and making it easier to maintain data accuracy.
- Improves data integrity: By breaking down data into smaller, more specific tables, normalization helps ensure that each table stores only relevant data, which improves the overall data integrity of the database.
- Facilitates data updates: Normalization simplifies the process of updating data, as it only needs to be changed in one place rather than in multiple places throughout the database.
- Simplifies database design: Normalization provides a systematic approach to database design that can simplify the process and make it easier to develop and maintain the database over time.
- Supports flexible queries: Normalization enables users to query the database using a variety of different criteria, as the data is organized into smaller, more specific tables that can be joined together as needed.
- Helps ensure database scalability: Normalization helps ensure that the database

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- Supports data consistency across applications: Normalization can help ensure that data is consistent across different applications that use the same database, making it easier to integrate different applications and ensuring that all users have access to accurate and consistent data.

Disadvantages of Normalization :

- More tables to join as by spreading out information into more tables, the need to join table's increments and the undertaking turns out to be more dreary. The information base gets more enthusiastically to acknowledge too.
- Tables will contain codes as opposed to genuine information as the rehashed information will be put away as lines of codes instead of the genuine information. Thusly, there is consistently a need to go to the query table.
- Data model turns out to be incredibly hard to question against as the information model is advanced for applications, not for impromptu questioning. (Impromptu question is an inquiry that can't be resolved before the issuance of the question. It comprises of a SQL that is developed progressively and is typically built by work area cordial question devices.).
Subsequently it is difficult to display the

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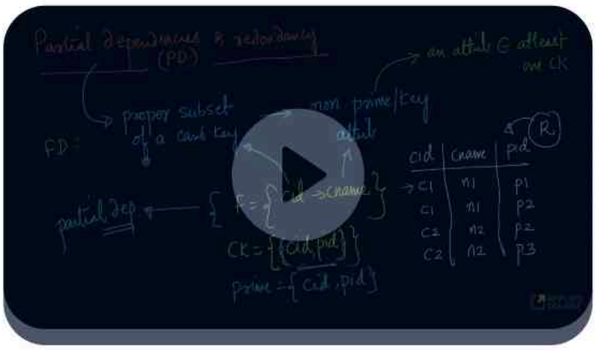
102	
103	

<EmployeeProject>

Employee Code	Project ID
101	P03
101	P01
102	P04
103	P02

<ProjectDetail>

Project ID	Project Name
P03	Project103

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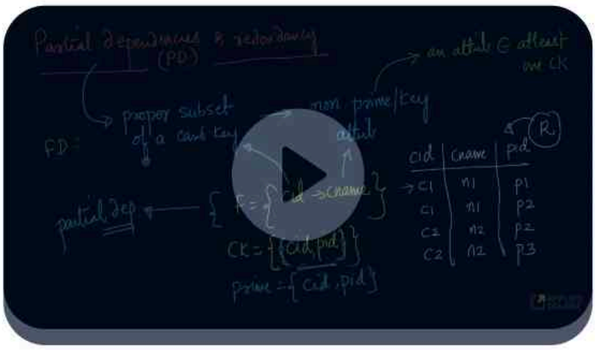

<ProjectDetail>

Project ID	Project Name
P03	Project103
P01	Project101
P04	Project104
P02	Project102

Thus, we've converted the <EmployeeProjectDetail> table into 2NF by decomposing it into <EmployeeDetail>, <ProjectDetail> and <EmployeeProject> tables. As you can see, the above tables satisfy the following two rules of 2NF as they are in 1NF and

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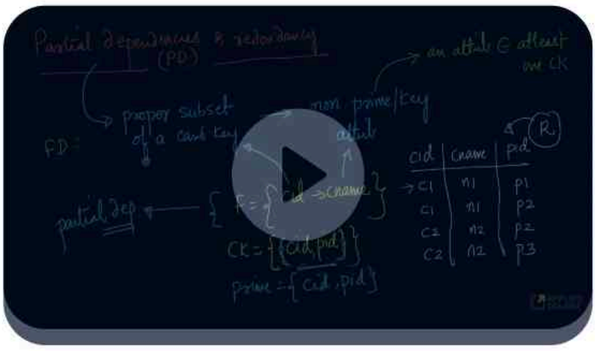
P04	
P02	

Thus, we've converted the <EmployeeProjectDetail> table into 2NF by decomposing it into <EmployeeDetail>, <ProjectDetail> and <EmployeeProject> tables. As you can see, the above tables satisfy the following two rules of 2NF as they are in 1NF and every non-prime attribute is fully dependent on the primary key.

The relations in 2NF are clearly less redundant than relations in 1NF. However, the decomposed relations may still suffer from one or more anomalies due to the transitive dependency. We will remove the transitive dependencies in the Third Normal Form.

Third Normal Form (3NF)

The normalization of 2NF relations to 3NF involves the elimination of transitive

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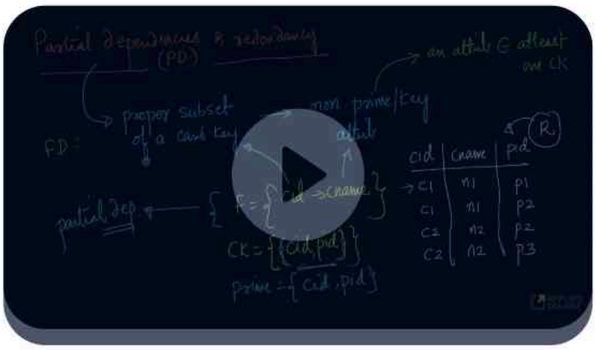

Third Normal Form (3NF)

The normalization of 2NF relations to 3NF involves the elimination of transitive dependencies in DBMS.

A functional dependency X -> Z is said to be transitive if the following three functional dependencies hold:

- X -> Y
- Y does not -> X
- Y -> Z

For a relational table to be in third normal form, it must satisfy the following rules:

1. The table must be in the second normal form.
2. No non-prime attribute is transitively dependent on the primary key.

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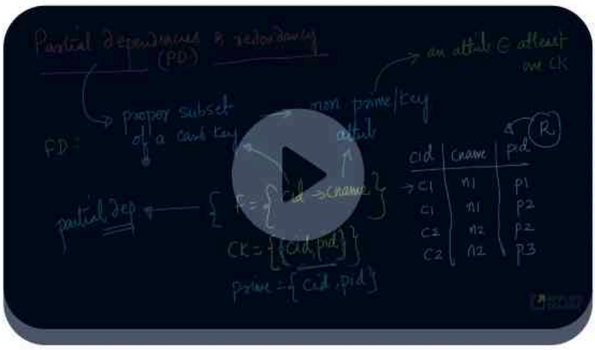
- X -> Y
- Y does not -> X
- Y -> Z



For a relational table to be in third normal form, it must satisfy the following rules:

1. The table must be in the second normal form.
2. No non-prime attribute is transitively dependent on the primary key.
3. For each functional dependency X -> Z at least one of the following conditions hold:

- X is a super key of the table.
- Z is a prime attribute of the table.

If a transitive dependency exists, we can divide the table to remove the transitively dependent attributes and place them to a new table along with a copy of the determinant.

Let us take an example of the following <EmployeeDetail> table to understand what is transitive dependency and how to normalize the table to the third normal form.

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- Z is a prime att

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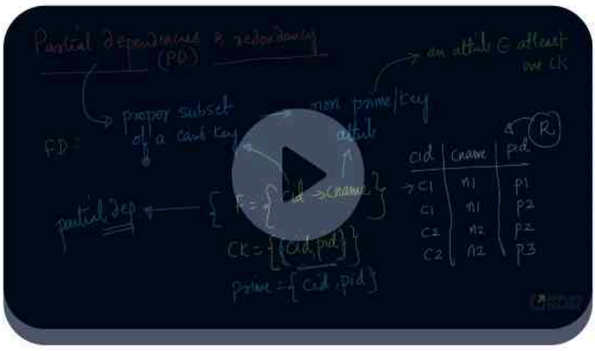

Let us take an example of the following <EmployeeDetail> table to understand what is transitive dependency and how to normalize the table to the third normal form:

<EmployeeDetail>

mployee Code	Employee Name	Employee Zipcode	Employ City
101	John	110033	Model Town
101	John	110044	Badarpu
102	Ryan	110028	Narain
103	Stephanie	110064	Hari Nagar

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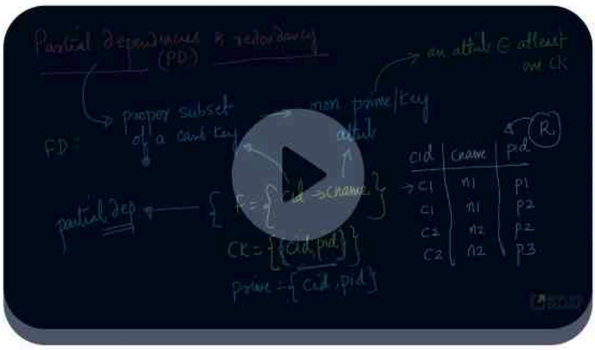

The above table is not in 3NF because it has Employee Code -> Employee City transitive dependency because:

- Employee Code -> Employee Zipcode
- Employee Zipcode -> Employee City

Also, Employee Zipcode is not a super key and Employee City is not a prime attribute.

To remove transitive dependency from this table and normalize it into the third normal form, we can decompose the <EmployeeDetail> table into the following two tables:

<EmployeeDetail>

Employee Code	Employee Name	Employee Zipcode
101	John	110033

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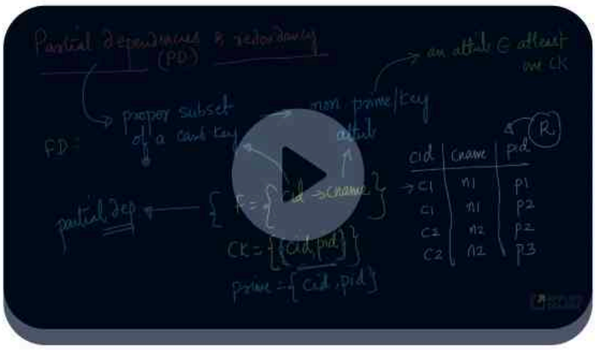

<EmployeeDetail

Employee Code	Employee Name	Employee Zipcode
101	John	110033
101	John	110044
102	Ryan	110028
103	Stephanie	110064

<EmployeeLocation>

Employee Zipcode	Employee City
110033	Model Town

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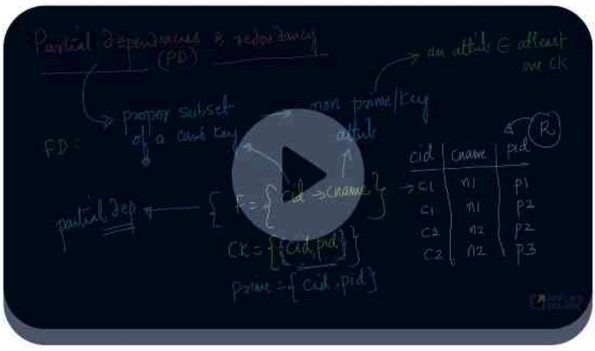

<EmployeeDetail

employees of the

<EmployeeDetail

Employee Code	Employee Name	Employee Phone Number
101	John	98765623,99823412
101	John	89023467
102	Ryan	76213908
103	Stephanie	98132452

Here, the Employee Phone Number is a multi-valued attribute. So, this relation is not in 1NF.

To convert this table into 1NF, we make new rows with each Employee Phone Number as a new row as shown below:

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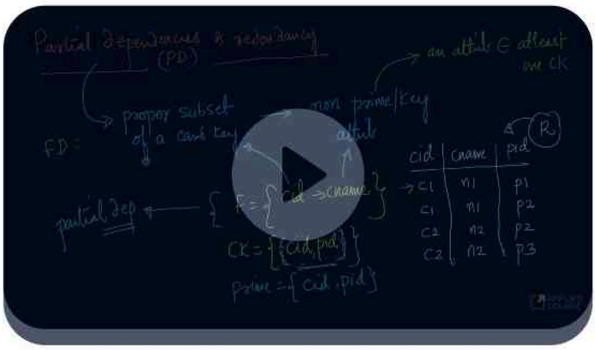

<EmployeeDetail-

Employee Code	Employee Name	Employee Phone Number
101	John	998234123
101	John	98765623
101	John	89023467
102	Ryan	76213908
103	Stephanie	98132452

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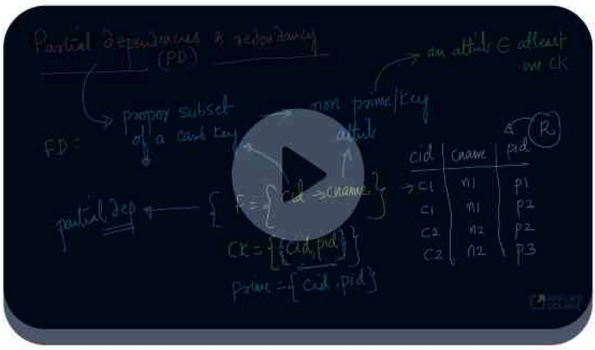

Second Normal Form (2NF)

The normalization of 1NF relations to 2NF involves the elimination of partial dependencies. A partial dependency in DBMS exists when any non-prime attributes, i.e., an attribute not a part of the candidate key, is not fully functionally dependent on one of the candidate keys.

For a relational table to be in second normal form, it must satisfy the following rules:

1. The table must be in first normal form.
2. It must not contain any partial dependency, i.e., all non-prime attributes are fully functionally dependent on the primary key.

If a partial dependency exists, we can divide the table to remove the partially dependent attributes and move them to some other table

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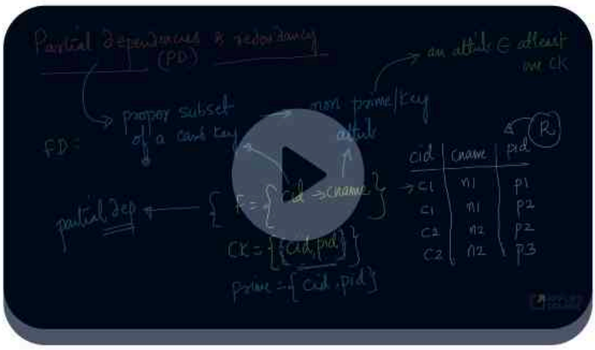

The normalizatio
involves the elimi
A partial depende
non-prime attribu
of the candidate k
dependent on one of the candidate keys.

For a relational table to be in second normal form, it must satisfy the following rules:

1. The table must be in first normal form.
2. It must not contain any partial dependency, i.e., all non-prime attributes are fully functionally dependent on the primary key.

If a partial dependency exists, we can divide the table to remove the partially dependent attributes and move them to some other table where they fit in well.

Let us take an example of the following <EmployeeProjectDetail> table to understand what is partial dependency and how to normalize the table to the second normal form:

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Let us take an exa
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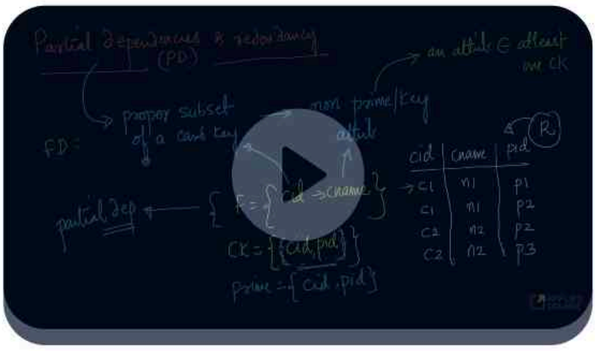
the table to the se



<EmployeeProjectDetail>

Employee Code	Project ID	Employee Name	Project Name
101	P03	John	Project10
101	P01	John	Project10
102	P04	Ryan	Project10
103	P02	Stephanie	Project10

In the above table, the prime attributes of the table are Employee Code and Project ID. We have partial dependencies in this table because Employee Name can be determined by Employee Code and Project Name can be determined by Project ID. Thus, the above relational table

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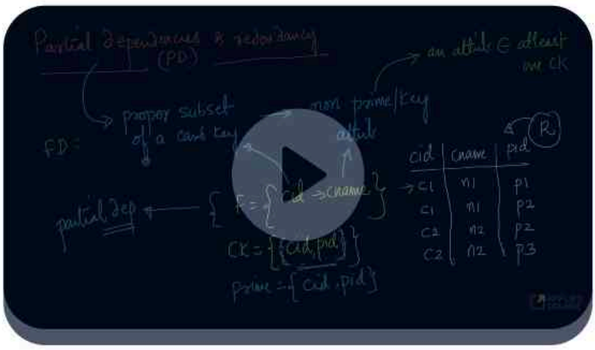
101	PC
102	PC
103	PC



In the above table, the prime attributes of the table are Employee Code and Project ID. We have partial dependencies in this table because Employee Name can be determined by Employee Code and Project Name can be determined by Project ID. Thus, the above relational table violates the rule of 2NF.

> The prime attributes in DBMS are those which are part of one or more candidate keys.

To remove partial dependencies from this table and normalize it into second normal form, we can decompose the <EmployeeProjectDetail> table into the following three tables:

<EmployeeDetail>

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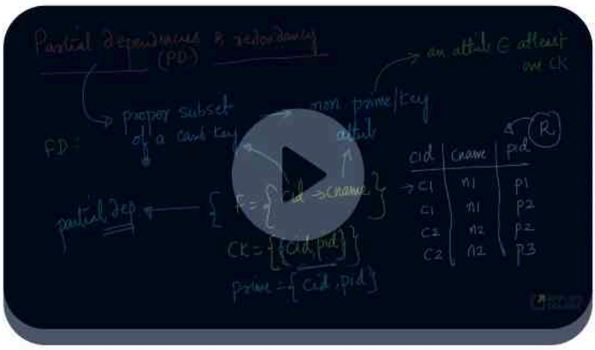
and normalize it i

decompose the <

into the following



<EmployeeDetail

Employee Code	Employee Name
101	John
101	John
102	Ryan
103	Stephanie

<EmployeeProject>

Employee Code	Project ID
101	P03
101	P01

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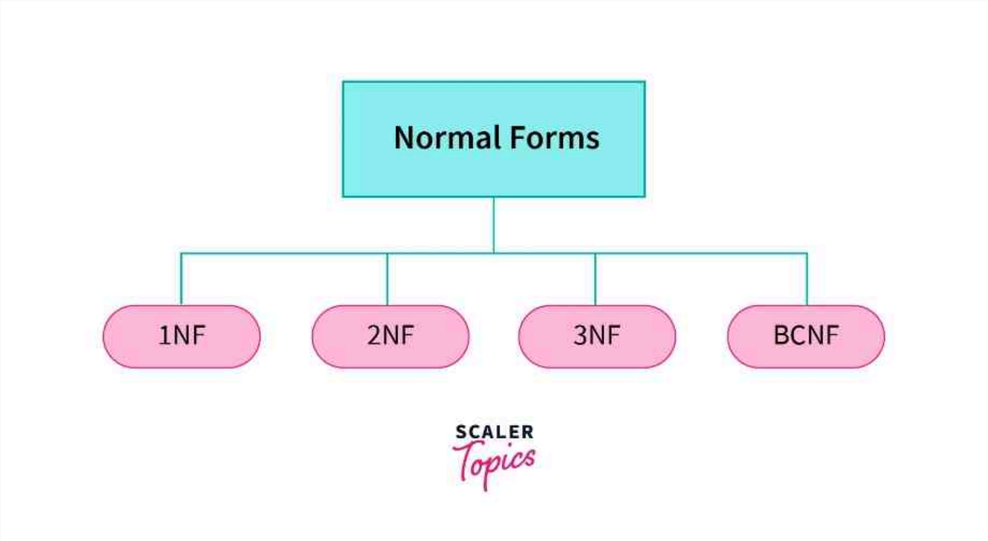
Normal Forms

There are four types of normal forms that are usually used in relational databases as you can see in the following figure:



1. **1NF:** A relation is in 1NF if all its attributes have an atomic value.
2. **2NF:** A relation is in 2NF if it is in 1NF and all non-key attributes are fully functional dependent on the candidate key in 1NF.

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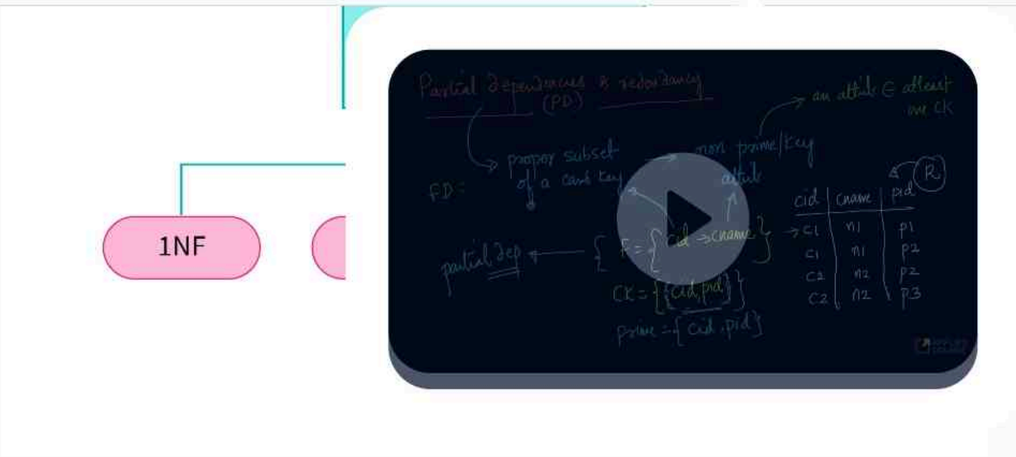

1. **1NF:** A relation is in 1NF if all its attributes have an atomic value.
2. **2NF:** A relation is in 2NF if it is in 1NF and all non-key attributes are fully functional dependent on the candidate key in DBMS.
3. **3NF:** A relation is in 3NF if it is in 2NF and there is no transitive dependency.
4. **BCNF:** A relation is in BCNF if it is in 3NF and for every Functional Dependency, LHS is the super key.

To understand the above-mentioned normal forms, we first need to have an understanding of the functional dependencies.

Functional dependency is a relationship that exists between two sets of attributes of a

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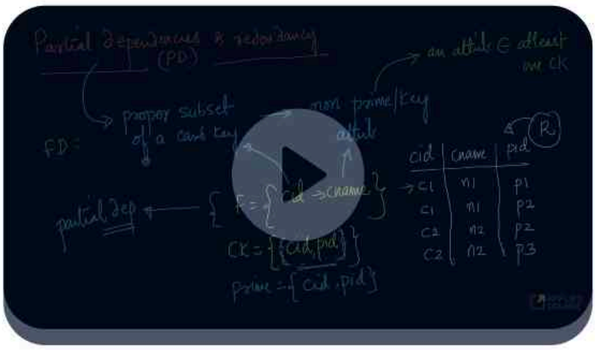

Functional dependency is a relationship that exists between two sets of attributes of a relational table where one set of attributes can determine the value of the other set of attributes. It is denoted by X -> Y, where X is called a determinant and Y is called dependent.

There are various levels of normalizations. Let's go through them one by one:

First Normal Form (1NF)

A relation is in 1NF if every attribute is a single-valued attribute or it does not contain any multi-valued or composite attribute, i.e., every attribute is an atomic attribute. If there is a composite or multi-valued attribute, it violates the 1NF. To solve this, we can create a new row for each of the values of the multi-valued attribute to convert the table into the 1NF.

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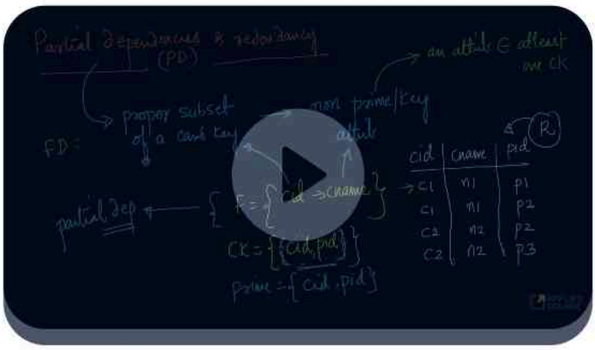
It is denoted by X determinant and

There are various go through them



First Normal Form (1NF)

A relation is in 1NF if every attribute is a single-valued attribute or it does not contain any multi-valued or composite attribute, i.e., every attribute is an atomic attribute. If there is a composite or multi-valued attribute, it violates the 1NF. To solve this, we can create a new row for each of the values of the multi-valued attribute to convert the table into the 1NF.

Let's take an example of a relational table <EmployeeDetail> that contains the details of the employees of the company.

Copy Share Select all Web search

Employee Code	Employee Name	Employee Phone Number

Employee
Tap to see search results

Sample Input:

select * from STUDENT_INFO where name not in('jarir');

select * from STUDENT_INFO where roll not in(39);

Sample Output:

BEFORE:

Result Grid | Filter Rows:

name	roll	session	course	marks
Shifa	39	2020-21	DC	76
Jemi	40	2020-21	ITF	80
Jarir	1	2020-21	DC	90
Jarir	2	2020-21	IPE	86
Jarir	3	2020-21	DBMS	85

AFTER (Not In):

Result Grid | Filter Rows:

name	roll	session	course	marks
Shifa	39	2020-21	DC	76
Jemi	40	2020-21	ITF	80

Result Grid | Filter Rows:

name	roll	session	course	marks
Jemi	40	2020-21	ITF	80
Jarir	1	2020-21	DC	90
Jarir	2	2020-21	IPE	86
Jarir	3	2020-21	DBMS	85

Discussion: This lab report provide a concise overview of fundamental database operation. These operation are crucial for efficiency managing dat with database for various application. Understanding these concepts is essential for maintaining data integrity and optimizing database performance.

Problem Name: Create Aggregate (Numeric) Function

Solution: The create Aggregate (Numeric) Fuction is used to Max(), Min(), Avg(), Power(), sqrt() function.

Sample Input:

Max():

```
select Max(marks) from STUDENT-INFO;
```

Min():

```
select Min(marks) from STUDENT-INFO;
```

Avg():

```
select Avg(marks) from STUDENT-INFO;
```

Power():

```
select power(marks, 2) from STUDENT-INFO;
```

sqrt():

```
select sqrt(marks) from STUDENT_INFO;
```

Sample Output:

BEFORE:

Result Grid | Filter Rows:

	name	roll	session	course	marks
▸	Shifa	39	2020-21	DC	76
	Jem	40	2020-21	ITF	80
	Jam	1	2020-21	DC	90
	Jam	2	2020-21	IPE	86
	Jam	3	2020-21	DBMS	85

AFTER (Numeric function):

Result Grid | Filter Rows:

	Max(marks)
▸	90

Result Grid | Filter Rows:

	Min(marks)
▸	76

Result Grid | Filter Rows:

	Avg(marks)
▸	83.4

Result Grid | Filter Rows:

	power(marks,2)
▸	5776
	6400
	8100
	7396
	7225

Result Grid | Filter Rows:

	sqrt(marks)
▸	8.717797887081348
	8.94427190999916
	9.486832980505138
	9.273618495495704
	9.219544457292887

Problem Name: Create Aggregate (String) Function

Solution: The create Aggregate (String) Function is used to Upper(), Lower() function.

Sample Input:

Lower():

```
select lower(name) from STUDENT_INFO;
```

Upper():

```
select upper(name) from STUDENT_INFO;
```

Sample Output:

BEFORE:

Result Grid | Filter Rows:

name	roll	session	course	marks
Shifa	39	2020-21	DC	76
Jemi	40	2020-21	ITF	80
Jarir	1	2020-21	DC	90
Jarir	2	2020-21	IPE	86
Jarir	3	2020-21	DBMS	85

AFTER (String function):

Result Grid | Filter Rows:

upper(name)
SHIFA
JEMI
JARIR
JARIR
JARIR

Result Grid | Filter Rows:

lower(name)
shifa
jemi
jarir
jarir
jarir

Problem Name: Dual table creation

Solution: The Dual table creation is used to 'Dual' keyword.

Sample Input:

```
select 2*2 from dual;
select 2*2, 5+8 from dual;
```

Sample Output:

BEFORE:

Result Grid | Filter Rows:

	name	roll	session	course	marks
▸	Shifa	39	2020-21	DC	76
	Jemi	40	2020-21	ITF	80
	Jarir	1	2020-21	DC	90
	Jarir	2	2020-21	IPE	86
	Jarir	3	2020-21	DBMS	85

AFTER (dual):

Result Grid | Filter Rows:

	2*2
▸	4

Result Grid | Filter Rows:

	2*2	5+8
▸	4	13

Problem Name: Aliases creation

Solution: Aliases creation is used to as keyword.

Sample Input:

```
select 2*2 as result from dual;
select 2*2 as result, 2+1 as Credit from dual;
```

Sample Output:

BEFORE:

Result Grid | Filter Rows:

	name	roll	session	course	marks
▸	Shifa	39	2020-21	DC	76
	Jemi	40	2020-21	ITF	80
	Jarir	1	2020-21	DC	90
	Jarir	2	2020-21	IPE	86
	Jarir	3	2020-21	DBMS	85

AFTER (Aliasing):

Result Grid | Filter Rows:

	result
▸	4

Result Grid | Filter Rows:

	result	Credit
▸	4	3

Problem Name: Like operator creation

Solution: Like operator creation is used to like operator starts with, Ends with and both before and after the letter or phrase.

Sample Input:

```
Select * from STUDENT-INFO where name like '%a';
Select * from STUDENT-INFO where name like 'J%';
Select * from STUDENT-INFO where name like '%e%';
Select * from STUDENT-INFO where name like '_a%';
Select * from STUDENT-INFO where name like '__i%';
Select * from STUDENT-INFO where name like '_e%';
```

Sample Output:

BEFORE:

Result Grid | Filter Rows:

name	roll	session	course	marks
Shifa	39	2020-21	DC	76
Jemi	40	2020-21	ITF	80
Jarir	1	2020-21	DC	90
Jarir	2	2020-21	IPE	86
Jarir	3	2020-21	DBMS	85

AFTER(Like):

Result Grid | Filter Rows:

name	roll	session	course	marks
Shifa	39	2020-21	DC	76

Result Grid | Filter Rows:

name	roll	session	course	marks
Jemi	40	2020-21	ITF	80
Jarir	1	2020-21	DC	90
Jarir	2	2020-21	IPE	86
Jarir	3	2020-21	DBMS	85

Result Grid | Filter Rows:

name	roll	session	course	marks
Jemi	40	2020-21	ITF	80

Result Grid | Filter Rows:

name	roll	session	course	marks
Jarir	1	2020-21	DC	90
Jarir	2	2020-21	IPE	86
Jarir	3	2020-21	DBMS	85

Result Grid | Filter Rows:

name	roll	session	course	marks
Shifa	39	2020-21	DC	76

Result Grid | Filter Rows:

name	roll	session	course	marks
Jemi	40	2020-21	ITF	80

Problem Name: In Operator Creation

Solution: In operator creation is used to where clause.

Sample Input:

Select * from STUDENT-INFO where name in('jarir');

select * from STUDENT-INFO where ~~name~~ roll in (39, 40);

Sample Output:

BEFORE:

Result Grid | Filter Rows:

name	roll	session	course	marks
Shifa	39	2020-21	DC	76
Jemi	40	2020-21	ITF	80
Jarir	1	2020-21	DC	90
Jarir	2	2020-21	IPE	86
Jarir	3	2020-21	DBMS	85

AFTER(In):

Result Grid | Filter Rows:

name	roll	session	course	marks
Jarir	1	2020-21	DC	90
Jarir	2	2020-21	IPE	86
Jarir	3	2020-21	DBMS	85

Result Grid | Filter Rows:

name	roll	session	course	marks
Shifa	39	2020-21	DC	76
Jemi	40	2020-21	ITF	80

Problem Name: Not In Operator Creation

Solution: Not In operator creation is used to where clause.

Information and Communication Engineering

Noakhali-3814

Lab Report

Course Title: Database Management System Lab

Course Code: ICE 2208

Report No.: 02

Submission Date: 11-10-2023

Remarks

Submitted To:	**Submitted By:**
Md. Sabbir Ejaz	Name: Habiba Akter
Lecturer	Roll No: BKH2111039F
Department of ICE	Session: 2020-2021
Noakhali Science and Technology University	Year: 2 Term: II

Theory: SQL is a standard language for sorting, manipulating and retrieving data in databases. In this lab, we will work as fundamental database operation including aggregate function (Numeric function - Max, Min, Avg, power, sqrt, etc. and string fuction - upper, lower), Dual, Aliasing, Like(-, %), In and Non In operator.

Aggregate Function Creation: An aggregate function performs a calculation on a set of values, and returns a single value.

Numeric Function:

Max(): The Max() function returns the largest value of the selected column.

Syntax: select Max(col-name) from table-name;

Min(): The Min() function returns the ~~largest~~ smallest value of the selected column.

Syntax: select Min(col-name) from table-name;

Avg(): The Avg() function returns the average value of the numerical column.

Syntax: select Avg(col-name) from table-name;

POWER(): The POWER () functions returns the value of a number raised to the power of another number.

Syntax: select power(col-name, a) from table-name;

sqrt(): The sqrt() function returns the square root of a number.

Syntax: select sqrt(col-name) from table-name;

String Function:

Upper(): The upper() function converts the text to upper-case.

Syntax: select upper(col-name) from table-name;

Lower(): The Lower() function convert the text to Lower-case.

Syntax: select lower(col-name) from table-name;

Dual Table Creation: There may be a situation where we want to query something that is not from a table. It is a table that is automatically created by Oracle Database along with the data dictionary.

Syntax: select * from Dual;

Aliases Creation: SQL aliases are used to give a table, or a column in a table, a temporary name. Aliases are often used to make column names more readable. An alias only exists for the duration of that query. An alias is created with the 'As' keyword.

Syntax: select col-name As alias-name from table-name;

Like operator creation: The Like operator is used in a where clause to search for a specified pattern in a column.

%: The percent sign % represents zero, one or multiple characters.

_: The underscore sign _ represents one, single character.

Syntax: select col-name from table-name where pattern;

Starts with: To return records that starts with a specific letter or phrase, add the % at the end of the letter or phrase.

Ends with: To return records that ends with a specific letter or phrase, add the % at the beginning of the letter or phrase.

Contains: To return records that contains a specific letter or phrase, add the % both before and after the letter or phrase.

In Operator Creation: The In operator allows we to specify multiple values in a where clause.

The In operator is a shorthand for multiple or conditions.

Syntax: select col-name from table-name where col-name In (value1, value2, ...);

Not In Operator Creation: By using the Not keyword in front of the In operator, we return all records that are Not any of the values in the list.

Syntax: select col-name from table-name where col-name Not In (value1, value2, ...);

If $A \rightarrow MVD$

1 — M_1	1 — M_1
1 — M_2	1 — M_2
2 — M_1	2 — M_1
2 — M_2	
3 — M_1	3 — M_1
3 — M_2	3 — M_2

4NF — multivalue

2NF — Partial dependancy থেকে আসে,

CWS	Store

Store	Location

line_no
↓
Assembly

3NF — Transitive dependancy থেকে আসে।

BOOK	Genre id	Price

Genre id	Genre type

$\{A, B\} \rightarrow C$

$A \rightarrow B \rightarrow C$

Name	CID	Number	Name

7.9 → class diagram
7.9.2 → UML
E-R (ERD) updated

8th class 09.10.23

UML — Unified Model Language

- → class diagram
- → Activity diagram
- → use case "
- → Implementation "
- → component, data, table

Addition হয়ে design করা হয়।

E-R Relation এর মাধ্যমে

কাজ use করে তা draw করা হয়।

task এর flow draw করা হয়।

বড় table generate করলে repeate value and null value হওয়ার ~~Porabiab~~ probability থাকে বেশি table এ unnessesary value চলে আসে, তাই normalization করতে হয়, কেননা Anomalies তৈরি হয়,

Insertion
Deletion
Updation

Decompotion এর জন্য Low থেকে up যেতে হবে,

যে table কে ছোট করবে, তার dependant কে modify করতে হবে,

ID - Name → functional dependancy [Attribute কার উপর dependant

EmpNum → EmpEmail — transitive, partial

EmpNum ↓ কার উপর dependant

EmpEmail ↓ dependant

delete nominal dependant.

Emp Num	Emp Email	Emp Name	Emp name

A → B

B → C

A → C

transitive dependancy

ID - Name → ZIP - City

ID → City

composite primary key

Prim ID	Name	CGPA	Course
1			c_1
1			c_2

{ID, Name} → CG

ID ⇐ CG

প্রাইমারি অনুকাগুলো key এর একটার উপর dependant key এর যেকোনো তাকে Partial dependancy.

InvNum	LineNum	Qty	InDate

Table create syntax:

```
create table table_name (
    column_name1 datatype(size),
    column_name2 data_type(size),
    ...
);
```

Value Insert:

```
INSERT INTO table_name (col_name,....) VALUES('values',....);
```

Viewing Data:

```
select col_name,... from table_name;
```

Distinct syntax:

```
select distinct col_name,..... from table_name;
```

Order by syntax:

```
select col_name,.... from table_name order by col_name,.. ASC/DESC
```

Where syntax:

```
select col_name,... from table_name where condition;
```

And/OR syntax:

select col-name,..... from table-name where cond1 AND/OR cond2

Alter syntax:

alter table table-name Add column col-name data-type(size);

alter table table-name Drop column col-name;

alter table table-name Rename column old-col-name to New-col-name;

alter table table-name Modify col-name data-type(size);

Update syntax:

Update table-name set col-name = 'value' where condition;

Delete syntax:

delete from table-name where condition;

Drop table syntax:

Drop table table-name;

Drop Database syntax:

Drop database database-name;

Lab Report

→ Theory

→ Problem Name

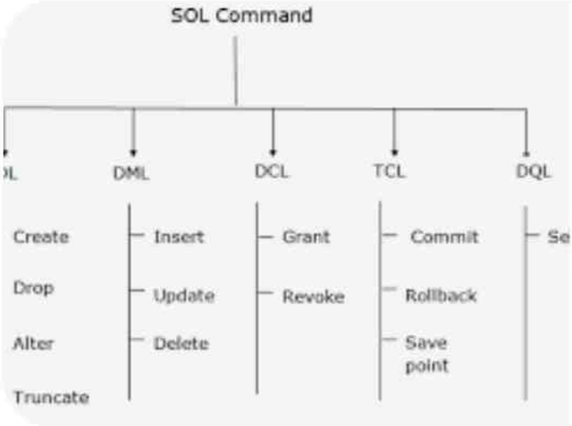
→ Solution

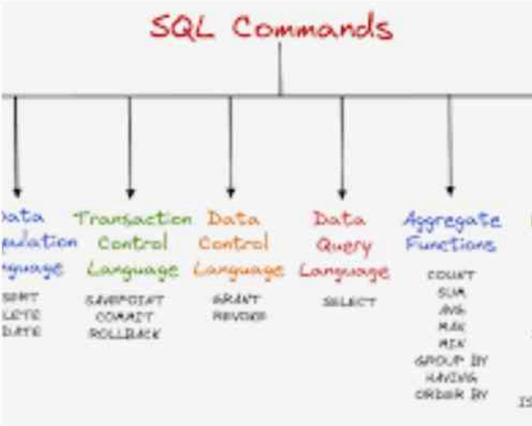
→ Sample I/O

→ Discussion

19:14

sql commands





Some of The Most Important SQL Commands

- SELECT - extracts data from a database.
- UPDATE - updates data in a database.
- DELETE - deletes data from a database.
- INSERT INTO - inserts new data into a database.
- CREATE DATABASE - creates a new database.
- ALTER DATABASE - modifies a database.
- CREATE TABLE - creates a new table.

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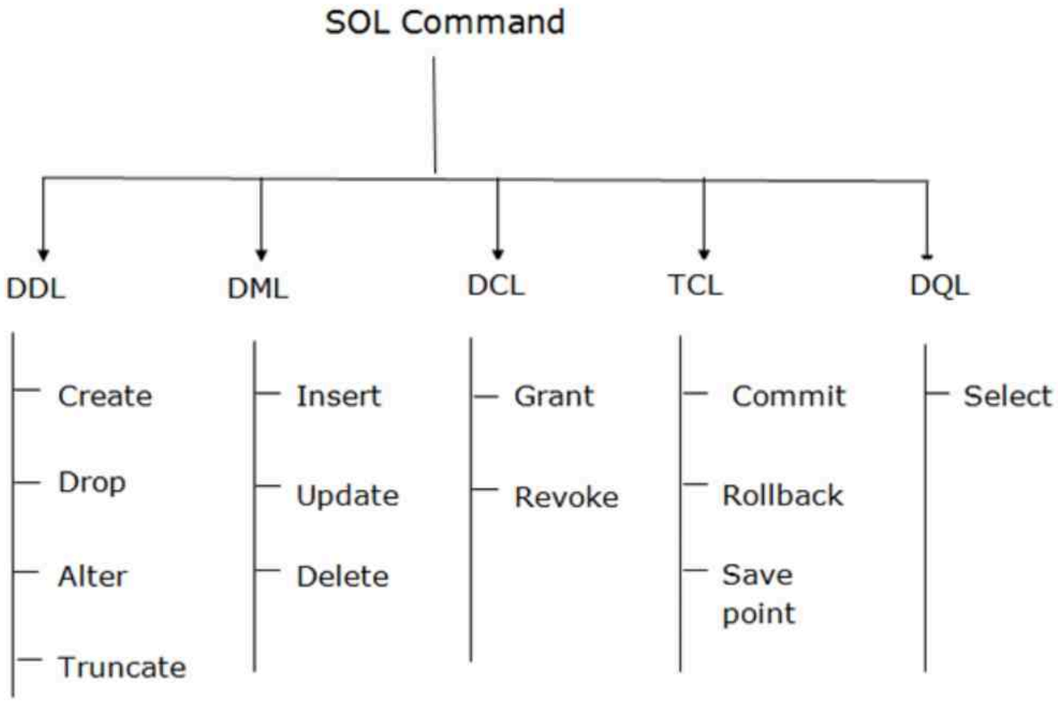

1. Data Definition Language (DDL)

ADVERTISEMENT

Objective: To understand the different commands used in SQL.

Theory: A Database Management System (DBMS) is system software for creating and managing databases. A DBMS makes it possible for end users to create, protect, read, update and delete data in a database.

SQL stands for Structured Query Language. There are 3 main types of commands. DDL (Data Definition Language), commands, DML (Data Manipulation Language) commands, and DCL (Data Control Language) commands. SQL is a programming language for sorting and processing information in a relational database. A relational database stores information in tabular form, with rows and columns representing different data attributes and the various relationships between in data values. DDL commands are create, alter, drop. DML commands are insert, delete, update, select.

Database create syntax:

create DATABASE database_name;

1:22
DBMS LAB Report For...
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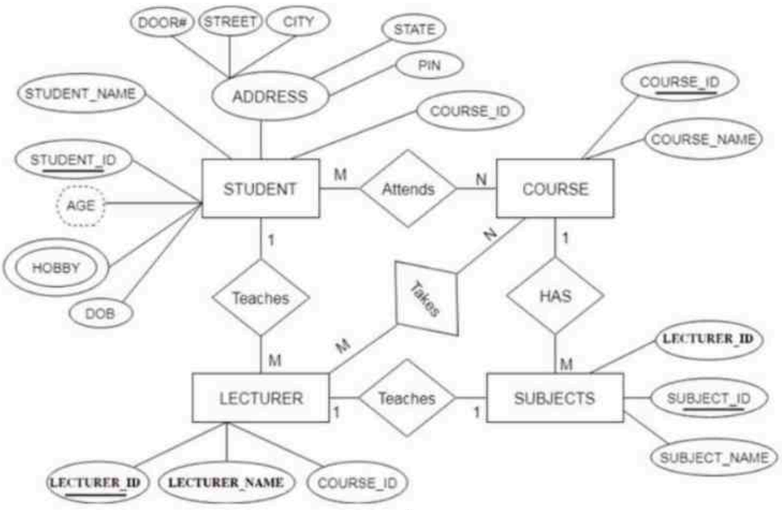
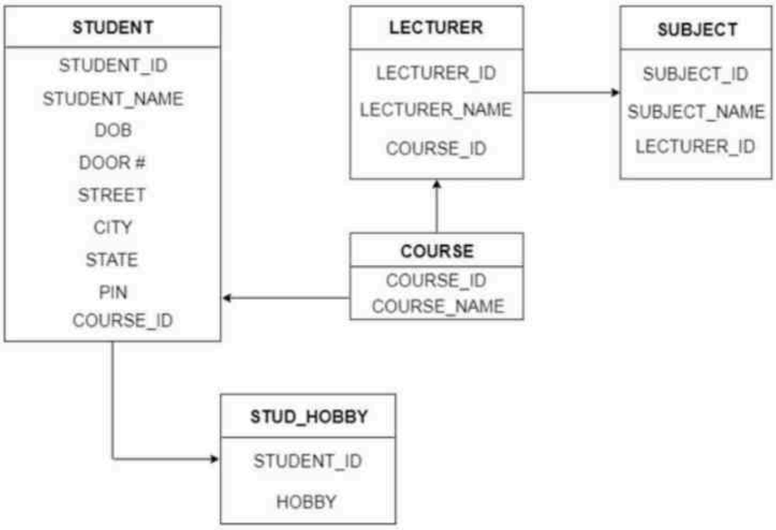
DBMS LAB Report Format



1.2 Reducing ER into table.



21:07

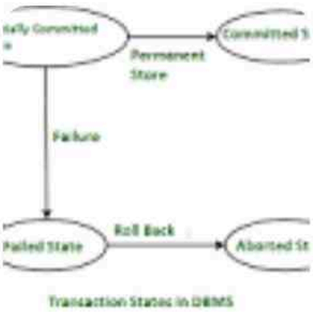
why do we need transacti...

বাঙলায় অনুসন্ধান করুন

কেন আমাদের dbms-এ লেনদে..

বাংলায়

In English



Uses of Transaction Management

It means that **the user can access multiple data from the database without being interfered with by each other**. Transactions are used to manage concurrency. It is also used to satisfy ACID properties. It is used to solve Read/Write Conflicts. May 31, 2023

https://www.geeksforgeeks.org › tra...

Transaction Management - GeeksforGeeks

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What is the purpose of transaction management?

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What is the purpose of transaction management?

What is the need for transaction processing in database?

Transaction processing **ensures that related data is added to or deleted from the database simultaneously, thus preserving data integrity in your application**. In transaction processing, data is not written to the database until a commit command is issued. When this happens, data is permanently written to the database.

https://docs.oracle.com › doc.898

5 Working with Transaction Processing

MORE RESULTS

What is the role of transaction manager in DBMS architecture?

What is the advantage of transaction in database?

What is the importance of transaction

7	(a)	6	0	3	4	5	6	a)	3
12		12	A	B	C		C		A
11		12							
		14	0	2	0		C		
		144 | 2							

Deadlock resource এর সাথে related. T1 এর resource use করছে এই time এ আর একজনের same resource access করতে পারবে না।

problem waiting time বেশি।

Resource proper use হয় না।

Hard to predict.

T1	T2
x(A)	
	x(B)
	S(A)

Deadlock

- Prevention
- Detect & Recover

col Projection → π

row selection → δ

join → $\bowtie$

$\pi_{Name}(\delta_{roll=1}(T1))$

Projection by default distinct এ রাখে।

1. $\pi_{CourseTitle}(\delta_{D_C \cap C=3}(course))$

2. i instructor (ID, Name, dept_name salary)

student (ID, name, dep_name, total course)

advisor (S_ID, I_ID)

ins ⋈ Ad ⋈ st

$\pi_{St.ID}(\delta_{ins.Name = Einstine}(ins \bowtie Adv \bowtie stu))$

3. 6.12

$G_{max(cotl)}(T2)$ 6.1.4.2

Highest, lowest বাদে বাকিগুলো দেখাব

$\uparrow$ col $(T1 - (G_{max}(col) + G_{min}(col)))$

1:39 ...

stable storage in transacti...

Disk is a storage device and does not ensure durability for a system. **A stable storage may be represented as a set of disk, each having a copy of the system data**. Disk contains only one copy of the system data. When a disk failure occurs it is difficult to retrieve data.

https://www.chegg.com › homewor...

Chapter 18 Solutions | Database Management Systems 3rd Edition

MORE RESULTS

What is storage system in DBMS?

What is stable storage how it plays role in recovery of DS?

Stable Storage :

A pair of regular discs can be used to implement stable storage. Each block on drive 2 is a duplicate of the corresponding block on drive 1, with no differences. The block on drive 1 is updated and confirmed first whenever a block is updated. then the identical block on drive 2 is finished. Nov 22, 2022

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18:49 ···

bcnf in DBMS

What are BCNF conditions?

BCNF rules

To check if the table satisfies the conditions of BCNF, the following two conditions should exist: **The table must be in 3NF form**. For any dependency X ⟶ Y, X must be a candidate key or super key. In other words, for dependency X ⟶ Y, if Y is a prime attribute, X cannot be a non-prime attribute.

https://www.educative.io › answers

What is BCNF? - Educative.io

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Why is BCNF useful?

The main advantage of BCNF is that it **ensures data integrity and avoids redundancy**. By eliminating partial and transitive dependencies, you reduce the risk of anomalies and inconsistencies in the data. Sep 29, 2023

https://www.linkedin.com › advice

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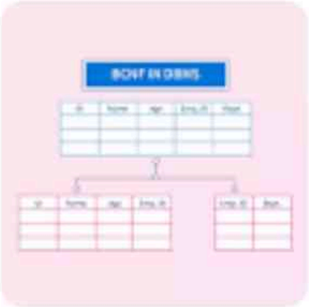
18:54

bcnf in DBMS

normalization?

What is the example of BCNF?



Example 2:

Clearly, {AB->C} and {AB->B} are in BCNF because AB is the candidate key present on the LHS of both dependencies. The second dependency, {C->B}, however, is not in BCNF because C is neither a super key nor a candidate key.

https://www.scaler.com › topics › b...

BCNF in DBMS | Scaler Topics

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What is a BCNF violation?

BCNF violations. • We say that a FD X → A violates BCNF with respect to relation R if X → A holds on R, but X is not a superkey or R. Example: code → name violates BCNF for. the relation.

https://www.cse.chalmers.se › course

TDA357 (05) BCNF-3NF

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20:49

R1 R2

Condition 1: $\mathbf{R_1 \cup R_2 = R}$ (**Original relat**

For **example**:

R(ABCD)

R1 (AB) R2 (

Then $R_1 \cup R_2 \neq R$, D is missing so it is **loss**

Condition 2: $\mathbf{R_1 \cap R_2 \neq \phi}$

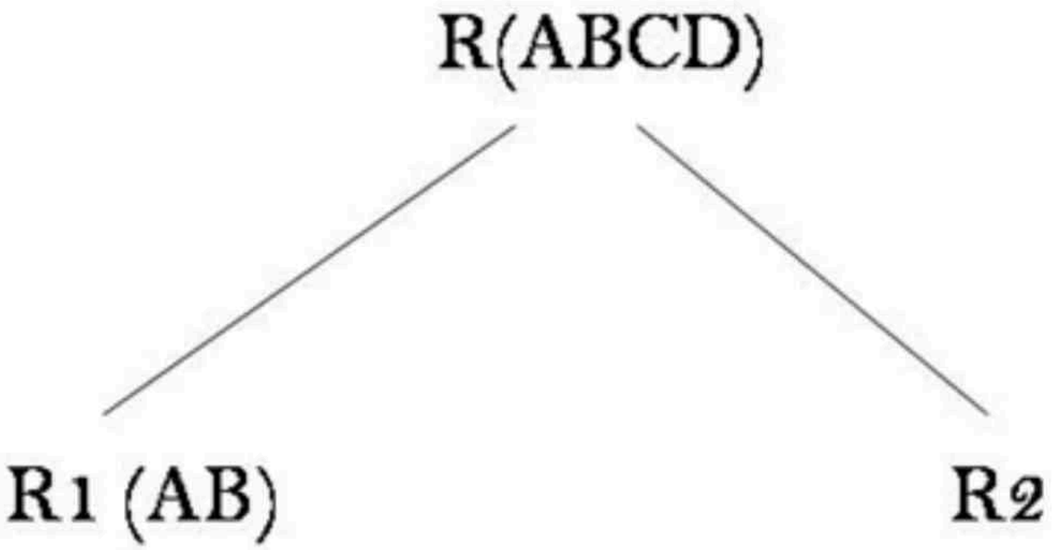
R(ABCD)

R1 (AB) R2

Then $R_1 \cap R_2 \neq \phi$

Then $R_1 \cup R_2 \neq R$, D is missing so it is **loss**

Condition 2: $\mathbf{R_1 \cap R_2 \neq \phi}$



Then $R_1 \cap R_2 \neq \phi$

No common attribute. If at **natural join no common attribute present** then

$R_1 \bowtie R_2 = R_1 \times R_2$ then it is **lossy**.

Condition 3:

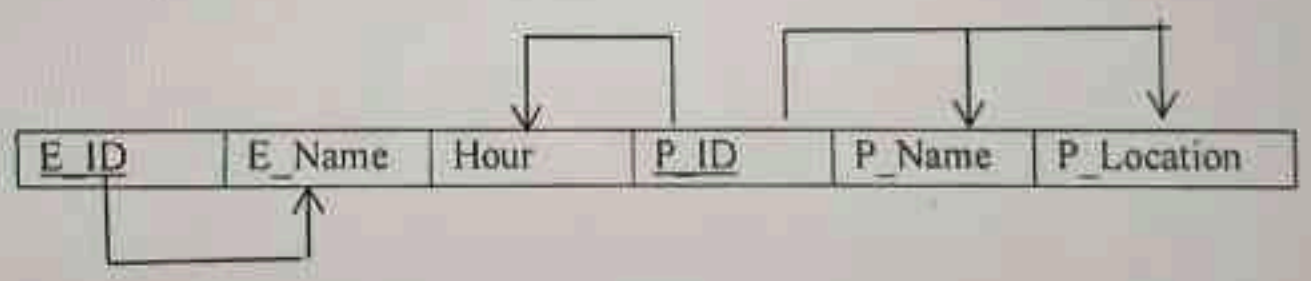
$\mathbf{R_1 \cap R_2}$ should be **Super Key** of either $\mathbf{R_1}$

$\mathbf{R_1 \cap R_2 \rightarrow R_1}$(**Super key of $\mathbf{R_1}$**)

Or

Marks: 25 Time: 35mins

1. Define E-R model. Briefly describe the basic concepts of ER data model with example. 1+3
2. What is mapping cardinality? Explain different types of mapping cardinalities with diagram. 1+4
3. The main entities of the NSTU Library Management System for the (E-R) entity-relationship model are Student (name, s_id, address, mobile_no, date_of_birth, age), Book (book_id, book_name, author, book_price) each entity must have one primary key, the attribute name is complex, the attribute address is composite, the attribute mobile_no is multi-valued, the attribute date_of_birth is stored and the attribute age is derived etc. From the above description construct the E-R diagram. 6
4. How can you convert a non-binary relationship to binary relationship? Elaborate with an example. 4
5. Make use of the normalization process for the following relation up to BCNF 5



b) Using Chen and Crows feet notation, draw all the alternative ER notations. 3

a) Consider a relation scheme R=(A,B,C,D,E,H) on which the following functional dependency hold: {A→B, BC→D, E→C, D→A}. Identify the candidate keys of R. 4

6.) a) Explain the following. 2

i) 2-phase locking

ii) Time-stamp ordering

b) Apply the serializability technique(s) to prove whether the following schedule is serializable or not. 3

T_1	T_2
read(A)	
write(A)	
	read(B)
read(A)	
	write(A)
	read(B)

c) Explain various types of failure that may occur in a system and also write the basic recovery concept. 2

d) List the ACID properties. Explain the usefulness of each. 3

Answer any seven of the following questions.

1. a) What is database management system? Discuss the significant application of database management systems. 1+2

   b) Explain the advantages of database system over file processing system. 3

   c) What is the concept of physical data independence and its importance in database systems? 2

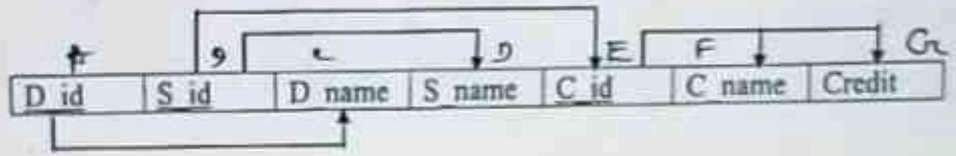
   d) Discuss the level of database abstraction. 2

2. a) Explain the following with example: 4

   i) Primary key
   ii) Candidate key
   iii) Super key and
   iv) Foreign key.

   [illegible] 2

   c) Using normalization process to decompose the relation up to BCNF. Also elaborate all the outputs. 4



3. a) Define E-R model. Describe the basic concepts of ER model with appropriate example. 1+3

   b) Explain all the types of mapping cardinality that are useful in describing binary relationship sets. 4

   c) Compare between the complex attribute and derived attribute. 2

4. a) Briefly describe the database design issues with example. Also explain how you can minimize those issues. 6

   b) The main entities of the ICE Library Management system for the Entity-Relationship Model is Student (name, s_id, address, mobile_no, date_of_birth, age), Book (book_id, book_name, author, book_price) each entity must have one primary key, the attribute name is complex, the attribute address is composite, the attribute mobile_no is multi-valued, the attribute date_of_birth 4

5. (a) Define Data Models and [illegible]
(b) Explain the difference between a weak and strong entity set with example 2
(c) How can we represent entity sets with composite attributes? Explain with an example 4
(d) Explain generalization and specialization with example. 2

6. (a) What do you mean by redundancy? How this can be avoided? 5
(b) Draw an E – R Diagram for Banking System. 3
(c) [illegible] and total participation constraints with example. 3

7. (a) Explain the converting procedure of Non-Binary Relationships to Binary Form. 2
(b) Explain Closure of Set of Functional dependency and Closure of Attribute sets 3
(c) Consider the universal relation R = {A,B,C,D,E}. F = {A→BC, CD →E, B →D, E→A}. Is the above decomposition a lossless join or not? 2
(d) What is transitive dependency?

8. (a) What is the need of the normalization? Explain the first three steps involed in the normalization. 2
(b) Consider the universal relation R = (A, B, C, D) and the set of functional Dependencies F = {AB→C, AB→D, C→A, D→B}. 4
i) Is R in 3NF, why? If it is not, decompose it into 3NF.
ii) Is R in BCNF, why? If it is not, decompose it into BCNF
(c) What is lossy and lossless decomposition? Explain with example 4

9. (a) Between SAN and NAS, explain which one is comparatively better. 2
(b) Is there any algorithm to optimize Disk-Block Access? If yes, explain the algorithm. 3
(c) Define RAID and describe its all level from 0 to 6. 5

20:36

calonical in dbms

বাংলায় | In English

In DBMS, a canonical cover is **a set of functional dependencies that is equivalent to a given set of functional dependencies but is minimal in terms of the number of dependencies**.

Jul 14, 2023

https://www.geeksforgeeks.org › ca...

Canonical Cover of Functional Dependencies in DBMS

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Why is canonical cover important?

In the case of updating the database, the responsibility of the system is **to check whether the existing functional dependencies are getting violated during the process of updating**. In case of a violation of functional dependencies in the new database state, the rollback of the system must take place.

https://www.javatpoint.com › dbms-...

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20:37

calonical in dbms

What is closure in DBMS?

The set of all those attributes which can be functionally determined from an attribute set is called as a closure of that attribute set.

https://littleflowercollege.edu.in › files

Subject : DBMS Topic:Closure properties

MORE RESULTS

What is extraneous attributes in DBMS?

What is decomposition in DBMS?

Why is it called canonical?

The word canonical is from the root canon, with both evolving from the Latin cononicus, or "according to rule," a meaning applied to religion during the Middle Ages. However, the definition of "rules" also applies in other areas as well.

https://www.vocabulary.com › cano...

Canonical - Definition, Meaning & Synonyms -

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schatz_A_databases_6th_ed - PDF-XChange Editor
Hand Tool
Quick Launch
Convert Share Review Accessibility Bookmarks Help Format
Add Selection Objects
Typewriter Sticky Note Highlight Arrow Underline Rectangle Comment
Stamp
Web Links Add/Edit Links Add Bookmark Links
Sign Document Protect

T_1	T_2
read(A)	
$A := A - 50$	
	read(A)
	$temp := A * 0.1$
	$A := A - temp$
	write(A)
	read(B)
write(A)	
read(B)	
$B := B + 50$	
write(B)	
commit	
	$B := B + temp$
	write(B)
	commit

R-W

Figure 14.5 Schedule 4 — a concurrent schedule resulting in an inconsistent state.

Timing AFTER

7. **insert data on student table to show the working process of trigger**

Before Insert	After Insert
id type change_at	id type change_at 7 Insert 2023-11-05

8. **Create a trigger which store id and type after update on student table**

Trigger:
after_student_update

Definition:

Event UPDATE
Timing AFTER

9. **update data on student table to show the working process of trigger**

Before Update	After Update
id type change_at 7 Insert 2023-11-05	id type change_at 7 Insert 2023-11-05 5 Update 2023-11-05

19:11 93
DB Lab 5
docs.google.com

DB Lab 5

Problem Name : Create a view student_ice with the student whos department is ICE
Solution :
create view student_ice as SELECT * FROM student where dept_id=2;

Problem Name : Create a view student_dept with the student with their department name
Solution :
create view student_dept as SELECT s.id as id,s.name as name,d.name as dept_name FROM student as s join dept as d on s.dept_id=d.id;

Problem Name : Update student dept name ICE who's id is 1
Solution :
update student_dept set dept_name='ICE' where id=1;

Problem Name : Join 2 view student_ice & student_dept
Solution :
select si.id,si.name,sd.dept_name from student_ice as si join student_dept as sd on si.id=sd.id;

Problem Name : delete from student_ice where id =2
Solution :
delete from student_ice where id=2;

Problem Name : Create a trigger which store id and type after insert on student table
Solution :

```
CREATE
   TRIGGER  after_student_add
 AFTER insert ON student FOR EACH ROW
   INSERT INTO af_student values(new.id ,'Insert',
NOW());
```

Problem Name : insert data on student table to show the working process of trigger

DB Lab 5

```
   INSERT INTO af_student values(new.id ,'Insert',
NOW());
```

Problem Name : insert data on student table to show the working process of trigger
Solution :
Insert into student(id,name,dept_id) values(7,'G',1);

Problem Name : Create a trigger which store id and type after update on student table
Solution :

```
CREATE
   TRIGGER  after_student_update
 AFTER update ON student FOR EACH ROW
   INSERT INTO af_student values(new.id ,'Update',
NOW());
```

Problem Name : update data on student table to show the working process of trigger
Solution :
update student set dept_id=3 where id=5;

Problem Name : Create a trigger which store id and type before delete on student table
Solution :

```
CREATE
   TRIGGER  after_student_delete
 BEFORE delete ON student FOR EACH ROW
   INSERT INTO af_student values(old.id ,'Delete', NOW());
```

Problem Name : delete data on student table to show the working process of trigger
Solution :

delete from student where id=7;

19:20 93
DB Lab 5
docs.google.com

DB Lab 5

Problem Name : Create a trigger which store id and type after insert on student table
Solution :

```
CREATE
   TRIGGER  after_student_add
 AFTER insert ON student FOR EACH ROW
   INSERT INTO af_student values(new.id ,'Insert',
NOW());
```

Problem Name : insert data on student table to show the working process of trigger
Solution :

```
Insert into student(id,name,dept_id) values(7,'G',1);
```

Problem Name : Create a trigger which store id and type after update on student table
Solution :

```
CREATE
   TRIGGER  after_student_update
 AFTER update ON student FOR EACH ROW
   INSERT INTO af_student values(new.id ,'Update',
NOW());
```

Problem Name : update data on student table to show the working process of trigger
Solution :

```
update student set dept_id=3 where id=5;
```

Problem Name : Create a trigger which store id and type before delete on student table
Solution :

```
CREATE
   TRIGGER  after_student_delete
 BEFORE delete ON student FOR EACH ROW
   INSERT INTO af_student values(old.id ,'Delete', NOW());
```

20:26

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বাঙলায় অনুসন্ধান করুন

হোয়াট ইস টি বেস্ট নরমাল ফর্ম ..

বাংলায় In English

Boyce-Codd Normal Form is an advanced version of the third normal form in database normalization. It is the strictest, highest and most efficient form of Normalization since it eliminates the condition that allowed the right side of the functional dependency to be a prime attribute in 3NF. Sep 27, 2023

https://www.codingninjas.com › hig...

Highest Normal Form of a Relation - Coding Ninjas

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I → set trigger

II → Do the operation

III → Show the update