

Module III
Relational DB design

=> Anomalies in DBMS =

Anomalies → faults.

- 1) Ins anomaly
- 2) Deletion anomaly
- 3) updation anomaly.

stid	stname	stage	Dept ID	Deptname	
1	A	10	3	CS	reg - ①
2	B	20	4	CS	
3	C	30	5	maths	

- (1) ins { At we want to ins economics. dept. bt no. of students, flat error
- (2) delt { If we want to delt c stnt. it will delt entirely that
- (3) update { update entirely that errors.

remove from RDBN → normalization.
(errors are removed).

~~ANOMALIES~~

1) Ins anomaly =

It may not be possible to store certain info unless some other unrelated info is stored as well.

2) deletion anomaly =

It may not be possible to delt certain info without losing some other unrelated info as well.

3) update anomaly =
If 1 copy of a related data is updated it inconsistency is created unless all copies are similarly updated.

updated.

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\Rightarrow Functional Dependency = (FD)

* relationship by 1 attribute or
another in a table.

$$\begin{array}{r} * \\ \text{denoted as} \\ \text{eg} - \end{array} \quad \begin{array}{r} \rightarrow \\ \times \quad 4 \\ \hline \end{array}$$

20
10
5
2.5
1.0
0.5
0.25
0.125

+ staples.

$$x_1 = x_2$$

$$10 \equiv 0$$

other

$$h \cdot g = h \cdot y \quad \text{and} \quad g = y$$

* X₄ are attributes.

$\begin{matrix} x & + & y \\ + & y & \end{matrix}$ (Determinant
+ y (dependent))
 $x \rightarrow y$.

→ Types of FD =

① Trivial FD = | (2) Non-trivial FD =

NF \rightarrow normalized form

WZP

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→ remove partial dependency

Un normalized data → remove repeating grp.

\Rightarrow Normalization =

By any of subjects of x

4 is said to be fully
FD determined if it

Fully ED =

eg → Rollno → name, age

$$eg \rightarrow x \rightarrow y, y \rightarrow z$$

not dependent on each other.

dependent on determinant

e.g. → Roll no. → name, age

A dependent is strictly
not a subject of determinism

$A \rightarrow C \rightarrow Y$
 fullerenes (C_60)
 dependency rule
 (dependency rule → Hally fd.)

(6) $\text{Set} \rightarrow \text{Set B.C.} \rightarrow Y$

(7) $\text{Subset} \rightarrow \text{Subset B.C.}$

Dependency rule → Practical fd.

BCNF

→ remove multi valued dependencies

4NF

→ remove join dependencies

5NF

Normalized data ✓

def

* Normalization is a database design technique that reduce data redundancy & dependency & eliminates undesirable characteristics like inserting, updating & deleting anomalies. Normalization rules divides large tables into smaller tables.

uses them using relationship & purpose of normalisation is to eliminate redundancy & ensure data is stored logically.

* 1 Normal form (1NF) =

Input - unnormalized data.
Output - relation with 1NF.

conditions =

- 1) Attributes should not have multi values, composite attributes.
- 2) Attribute values should be atomic (single).

eg →

Sid	Sname	course
101	ak	C, C++, JAVA
102	bk	Python, C++
103	ck	JAVA.

→ multi valued dependencies

Sid	Sname	course
101	akshaya	C
101	akshaya	C++, JAVA
102	bk shaya	Python
103	bk shaya	C++, JAVA.

* 2 Normal form =

Input → Relation with 1NF
Output → Relation with 2NF.

conditions =

- * Relation should be in 1NF
- * Relation should not have partial FD (PFD)
- * It is in PFD then decompose the table.

↳ split the table

R_id	c_id	c_fec.
101	Java	10,000
102	Py	20,000
101	C++	30,000
103	C	40,000
103	JAVA	50,000
102	JS	60,000

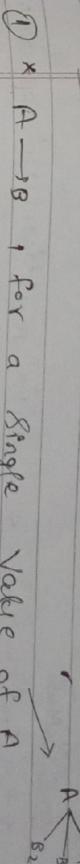
Decompose

S_id	course	course	fee
101	Tava	Tava	\$0,1000
102	C	C	10,000
103	C++	C++	15,000
104	Py	Py	25,000
105	Tava	Tava	20,000
106	Py	Py	25,000

classmate
Date _____
Page _____

4 Normal form =

- * It should be at least 3 columns.
- * For two table AB, C columns B & C should be independent.



② Boyce Codd Normal Form =
3.5 normal form. (B_1, B_2 3NF & 4NF)

- ③ * Table should be at least 3 columns.
- ④ For two table AB, C columns B & C should be independent.

S_id	course	hobby
1	Sci	fb
2	Martag	cc
2	C++	ab
2	PHP	cc

⑤ $B \rightarrow C$ \rightarrow Input (no C dependency)

- ⑥ $\{$ \rightarrow 3 condition satisfy separately.
- ⑦ $\} \rightarrow$ we can decompose.

Decompose

Rollno	name	voter_id	age
1	AK	0123	20
2	BK	034	21
3	CK	036	23

eg \rightarrow Rollno, voter_id

- x \rightarrow Y
- Rollno \rightarrow name
- voter_id \rightarrow age
- voter_id \rightarrow Rollno.

all they condition satisfy.

S_id	course	course	hobby
1	Sci	Sci	fb
2	Maths	Maths	cc

- all they condition satisfy.
- they take BCNF \checkmark

(VJ)

5th Normal Form

- * Also \rightarrow project normal form (PJNF).
- * Similar to BCNF & 4NF except that joins dependencies are used.

conditions

- * $(R_1, R_2 \dots R_n)$ is a trivial multivalued dependency.
- * Every R_i is a superkey for schema R.

eg \rightarrow

SPC

S	Product	cup
AK	ABC	DK
BK	DEF	EK
CK	GHI	HIC

decomposition

$$SPC \rightarrow SP, SC, PC$$

SP	SC	PC
Product	S cup	Product cup
AK	ABC	ABC
BK	DEF	DEF
CK	GHI	GHI

odd/even

df

20

df

20

odd/even

df

20

df

20