

Normalization

Process of organizing the tables in a way to reduce data redundancy ,
Normalization divides tables and there is a relation between them.

Flexible database design

Database security

Reduce data redundancy

Organized database

Normalization Type

First Normal Form

Second Normal Form

Third Normal Form

First Normal Form 1NF

Table is in 1NF when it follows these

- 1 - No repeating values in a group
- 2 - No repeating groups

Employee

EmployeeId	Name	Address	Phone
201	Saghir	R288 Karachi	033255,033674
202	Harris	G25 Yorkshire	033543
203	Maxwell	K87 Surrey	035872,036536,035972
204	Andy	Y78 NewCastle	038896
205	Simon	R288 London	038745
206	Sam	F7 Manchester	031210,033825
207	Jim	R88 London	031247,033111,033755
208	Taylor	A4 Manchester	033351,033751

Repeating values

violating 1NF

Employee

EmployeeId	Name	Address	Phone 1	Phone 2	Phone 3
201	Saghir	R288 Karachi	033255	033674	
202	Harris	G25 Yorkshire	033543		
203	Maxwell	K87 Surrey	035872	036536	035972
204	Andy	Y78 NewCastle	038896		
205	Simon	R288 London	038745		
206	Sam	F7 Manchester	031210	033825	
207	Jim	R88 London	031247	033111	033755
208	Taylor	A4 Manchester	033351	033751	

Primary
key

Repeating Columns

Employee

EmployeeId	Name	Address
201	Saghir	R288 Karachi
202	Harris	G25 Yorkshire
203	Maxwell	K87 Surrey
204	Andy	Y78 NewCastle
205	Simon	R288 London
206	Sam	F7 Manchester
207	Jim	R88 London
208	Taylor	A4 Manchester

Phone

Phone	Name
033255	Saghir
033674	Saghir
033543	Harris
035872	Maxwell
036536	Maxwell
035972	Maxwell
038896	Andy
038745	Simon
031210	Sam
033825	Sam
031247	Jim
033111	Jim
033755	Jim
033351	Taylor
033751	Taylor

Both tables are connected by Name Column

Second Normal Form 2NF

Any non key field should entirely depend on its primary key

1 - Should be in 1NF

2 - No PARTIAL DEPENDENCY

3 - Occurs when there is composite key

Result

StudentId	Course	Name	Marks	Teacher
201	Software Architecture	Saghir	85	A
202	Software Design	Harris	90	B
201	Quality Assurance	Saghir	75	G
204	Enlish Language	Andy	63	O
205	History	Simon	74	L
206	Project Managent	Sam	93	G
205	Software Architecture	Simon	70	A
208	Quality Assurance	Taylor	61	G

Primary
key

Result

StudentId	Course	Name	Marks	Teacher
201	Software Architecture	Saghir	85	A
202	Software Design	Harris	90	B
201	Quality Assurance	Saghir	75	G
204	Enlish Language	Andy	63	O
205	History	Simon	74	L
206	Project Managent	Sam	93	G
205	Software Architecture	Simon	70	A
208	Quality Assurance	Taylor	61	G

Primary
key

Primary
key

Fetch marks of StudetnId=201 + Course=Software Architecure

Result

StudentId	Course	Name	Marks	Teacher
201	Software Architecture	Saghir	85	A
202	Software Design	Harris	90	B
201	Quality Assurance	Saghir	75	G
204	Enlish Language	Andy	63	O
205	History	Simon	74	L
206	Project Managent	Sam	93	G
205	Software Architecture	Simon	70	A
208	Quality Assurance	Taylor	61	G

COMPOSITE KEY

Fetch marks of StudetnId=201 + Course=Software Architecure

Result

StudentId	Course	Name	Marks	Teacher
201	Software Architecture	Saghir	85	A
202	Software Design	Harris	90	B
201	Quality Assurance	Saghir	75	G
204	Enlish Language	Andy	63	O
205	History	Simon	74	L
206	Project Managent	Sam	93	G
205	Software Architecture	Simon	70	A
208	Quality Assurance	Taylor	61	G

COMPOSITE KEY

Non Key Columns

violating 2NF

Result

StudentId	Course	Name	Marks
201	Software Architecture	Saghir	85
202	Software Design	Harris	90
201	Quality Assurance	Saghir	75
204	Enlish Language	Andy	63
205	History	Simon	74
206	Project Managent	Sam	93
205	Software Architecture	Simon	70
208	Quality Assurance	Taylor	61

Teacher

Course	Teacher
Software Architecture	A
Software Design	B
Quality Assurance	G
Enlish Language	O
History	L
Project Managent	G

now this is in
2NF

Both tables have no
partial dependecny

take away partailly dependent to new table

Third Normal Form 3NF

Any non key field dependent on other non key field

1 - Should be in 1NF,2NF

2 - No TRANSITIVE DEPENDENCY

3 - Occurs when you can guess value of any column from non key colum

Exam

StudentId	Name	ExamType	MaxMarks
201	Saghir	Viva	20
202	Harris	Theroy	100
203	Maxwell	Practical	50
204	Andy	Practical	50
205	Simon	Viva	20
206	Sam	Theroy	100
207	Jim	Theroy	100
208	Taylor	Practical	50

Primary
key

violating 3NF

MaxMarks
transitively
depends on
Examtype

we can Guess value of MaxMarks from ExamType

VIVA = 20

THERORY=100

PRACTICAL=50

Exam

StudentId	Name	ExamType
201	Saghir	Viva
202	Harris	Theroy
203	Maxwell	Practical
204	Andy	Practical
205	Simon	Viva
206	Sam	Theroy
207	Jim	Theroy
208	Taylor	Practical

Marks

ExamType	MaxMarks
Viva	20
Theroy	100
Practical	50

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Match

Match#	Teams	Ground	Capicity
01	Aus v Eng	MCG	80000
02	Zim v Eng	Hobart	30000
03	Sl v Ind	SCG	65000
04	Pak v Wi	MCG	80000
05	SA v NZ	Hobart	30000
06	Ausv Ind	Perth	45000
07	Pak v Ind	Canbera	10000
08	Eng v Sl	MCG	80000

Capicity
transitively
depends on
Ground

Match

Match#	Teams	Ground
01	Aus v Eng	MCG
02	Zim v Eng	Hobart
03	Sl v Ind	SCG
04	Pak v Wi	MCG
05	SA v NZ	Hobart
06	Ausv Ind	Perth
07	Pak v Ind	Canberra
08	Eng v Sl	MCG

Capacity

Ground	Capacity
MCG	80000
Hobart	30000
SCG	65000
Perth	45000
Canberra	10000

Matches

Match#	Teams	Tickets	PerTicket	Earning
01	Aus v Eng	1000	200	200000
02	Zim v Eng	1500	200	300000
03	Sl v Ind	2000	200	400000
04	Pak v Wi	1000	200	200000
05	SA v NZ	1500	200	300000
06	Ausv Ind	2000	200	400000
07	Pak v Ind	1000	200	200000
08	Eng v Sl	1200	200	240000