

# 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 1
201	Saghir	R288	033255
202	Harris	G25 Yorkshire	033543
203	Maxwell	K87 Surrey	035872
204	Andy	Y78 NewCastle	038896
205	Simon	R288 London	038745
206	Sam	F7 Manchester	031210
207	Jim	R88 London	031247
208	Taylor	A4 Manchester	033351

Primary  
key

**EMPLOYEES have more than one phone numbers**

## Employee

EmployeeId	Name	Address	Phone
201	Saghir	R288	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	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
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

# 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

**Marks of 201**

## 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

**now you can fetch the record by two entities**

## 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

**When there are more than one primary keys they are called CompositeKEY**



## 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

TEACHER  
partially  
depends on  
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

COMPOSITE KEY

Non Key Columns

**TEACHER is only depended on one of the composite key,  
means partially dependent**

## 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

Non Key Columns

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

## 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

now this is in  
2NF

Both tables have no  
partial dependecny

Teacher

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

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 column

## 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

**we can Guess value of MaxMarks from ExamType**

VIVA = 20

THERORY=100

PRACTICAL=50

## 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
209	NEW	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

## Match

Match#	Teams	Ground	Capacity
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	Aus v Ind	Perth	45000
07	Pak v Ind	Canberra	10000
08	Eng v Sl	MCG	80000

Capacity  
transitively  
depends on  
Ground



## Match

Match#	Teams	Ground	Capacity
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

**violating 3NF**

## 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	Canbera
08	Eng v Sl	MCG

## Capacity

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

## Employee

EmployeeId	Name	Designation
201	Saghir	Manager
202	Harris	Leturer
203	Maxwell	Manager
204	Andy	Lecturer
205	Simon	Worker
206	Sam	Worker
207	Jim	Lecturer
208	Taylor	Lab Assistant

## Salary

Designation	Salary
Manager	80000
Leturer	40000
Worker	10000
Lab Assistant	25000

## 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