Hirarchical model ✗
Network model ✗
Relational Model

10
20
30
40

10 | 1 | 900
20 | 2 | 30
30 | 3 | 400
20 | 4

1 | 800 | 1000
2 | 1001 | 5000
3

accid	custid	cname	mobile	address	balance	type	Date of opening
12	100	Kishori	44444	Baner	566778	saving	1 Jan 1998
13	100	Kishori	44444	Baner	8475749	current	1 Jan 1999
14	100	Kishori	44444	Baner	356464	demat	1 Jan 1999
15	101	Rajan	55565	Aundh	345345	saving	1 Jan 2022
	102	Revati	34534635	Baner			

1. Insertion anamoly----→ if any customer doesnot open the account, then we will not be able to store the information in the table, because primary key accid cannot be blank
2. Updation anamoly-→Since there is redundancy in the data, change of data may not happen at all places, hence the information may become wrong
3. Deletion anamoly-→if any customer closes the account, and if that is only account, then along with account details we are loosing customer details also.

account

accid	custid	balance	type	Date of opening
12	100	566778	saving	1 Jan 1998
13	100	8475749	current	1 Jan 1999
14	100	356464	demat	1 Jan 1999
15	101	345345	saving	1 Jan 2022

customer

custid	cname	mobile	address
100	Kishori	55555	aundh
101	Rajan	55565	Aundh
102	Revati	34534635	Baner

1NF, 2NF, 3NF, BCNF

1 NF---→ every column in the table should contain atomic value.

studid	sname	Emailid	Marks
1	Xxxx	xxx@gmail.com,yyy@rediff.com,zzz@google.com	98,97,99
2	hdkfjhhdf	xxxww@gmail.com,yyyww@rediff.com,zzzww@google.com	95,97,99

studid	sname	Emailid	coursename	Marks
1	Xxxx	xxx@gmail.com	java	98
1	Xxxx	yyy@rediff.com	C++	97
1	Xxxx	zzz@google.com	DBMS	99
2	hdkfjhhdf	xxxww@gmail.com	java	95
2	hdkfjhhdf	yyyww@rediff.com	C++	97
2	hdkfjhhdf	null	DBMS	99

2NF→No partial functional dependency should be there.

2NF --→ If in the table , there is no partial dependency, then the table is in 2NF.

According to the E.F. Codd, a relation is in 2NF, if it satisfies the following conditions:

- A relation must be in 1NF.
- And the candidate key in a relation should determine all non-prime attributes or no partial dependency should exist in the relation.

studid	sname	Emailid	coursename	Marks
1	Xxxx	xxx@gmail.com	java	98
1	Xxxx	yyy@rediff.com	C++	97
1	Xxxx	zzz@google.com	DBMS	99
2	hdkfjhhdf	xxxww@gmail.com	java	95
2	hdkfjhhdf	yyyww@rediff.com	C++	97
2	hdkfjhhdf	null	DBMS	99

Prime attribute--→ all the attributes which forms the primary key are called as prime attributes

Non Prime attribute--→ all the attributes which does not forms the primary key are called as non prime attributes

Prime attribute --→studid, courseid
Nonprime attributes-→ email,marks,sname
Studid-→email,sname
Courseid-→
Studid+courseid-→marks

studid	sname	Emailid
1	Xxxx	xxx@gmail.com
1	Xxxx	yyy@rediff.com
1	Xxxx	zzz@google.com
2	hdkfjhhdf	xxxww@gmail.com
2	hdkfjhhdf	yyyww@rediff.com

studid	coursename	Marks
1	java	98
1	C++	97
1	DBMS	99
2	java	95
2	C++	97
2	DBMS	99

3NF--→ No transitive dependency should be there, x→y→z   so x→z

- o A relation will be in 3NF if it is in 2NF and not contain any transitive partial dependency.
- o 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.

A relation is in third normal form if it holds atleast one of the following conditions for every non-trivial function dependency X → Y.

1. X is a super key.
2. Y is a prime attribute, i.e., each element of Y is part of some candidate key.

Oid	Itemid	Iname	Qty	Buying price	Custid	cname	orderdate
1	10	bags	2	3456	100	Rajan	21 oct
1	11	tshirt	3	4567	100	Rajan	21 oct
1	12	shoes	2	8907	100	Rajan	21 oct
2	10	Bags	1	2000	200	Revati	20 oct

Prime attribute →oid, itemid

Non prime attribute→itemname, qty, buying price, custid, cname, orderdate

Oid-→

Itemid→ itemname

Oid+itemid→ qty,buying price,custid , cname ,orderdate

Order-item

Oid	Itemid	Qty	Buying price	Custid	cname	orderdate
1	10	2	3456	100	Rajan	21 oct
1	11	3	4567	100	Rajan	21 oct

1	12	2	8907	100	Rajan	21 oct
2	10	1	2000	200	Revati	20 oct

Itemid	Iname
10	bags
11	tshirt
12	shoes

The following order-item table is not in 3NF because transitive dependency is there

Oid+itemid-→ custid---→ cname

Order-item

Oid	Itemid	Qty	Buying price	Custid	cname	orderdate
1	10	2	3456	100	Rajan	21 oct
1	11	3	4567	100	Rajan	21 oct
1	12	2	8907	100	Rajan	21 oct
2	10	1	2000	200	Revati	20 oct

Custid	cname	address	mobile	email
100	Rajan			
200	Revati			

Oid	Itemid	Qty	Buying price	Custid	orderdate
1	10	2	3456	100	21 oct
1	11	3	4567	100	21 oct
1	12	2	8907	100	21 oct
2	10	1	2000	200	20 oct

BCNF

BCNF -→ 3.5 NF

- BCNF is the advance version of 3NF. It is stricter than 3NF. Also called as 3.5 NF
- A table is in BCNF if every functional dependency X → Y, X is the super key of the table.
- For BCNF, the table should be in 3NF, and for every FD, LHS is super key.

Boyce-Codd Normal Form

Student	Course	Teacher
Aman	DBMS	AYUSH
Adithya	DBMS	RAJ
Abhinav	E-COMM	RAHUL
Aman	E-COMM	RAHUL
abhinav	DBMS	RAJ

> KEY: {Student, Course}

> Functional dependency:

{student, course} -> Teacher
Teacher-> Course

> **Problem:** teacher is not superkey but determines course.

In the above table, one student can learn many courses, but one teacher teaches only one course.

student	teacher
Aman	Ayush
Aditya	Raj
Abhinav	Rahul
Abinav	raj

teacher	course
ayush	DBMS
Raj	DBMS
Rahul	E-Comm

Example 1

Using noramlization design the tables

Proj Code	Proj Type	Proj Desc	Empno	Ename	Grade	Sal scale	Proj Join Date	Alloc Time
001	APP	LNG	46	JONES	A1	5	12/1/1998	24
001	APP	LNG	92	SMITH	A2	4	2/1/1999	24
001	APP	LNG	96	BLACK	B1	9	2/1/1999	18
004	MAI	SHO	72	JACK	A2	4	2/4/1999	6
004	MAI	SHO	92	SMITH	A2	4	5/5/1999	16

1 NF --- yes

2NF

Prime attribute-→ proj code, empno

Non prime-→proj type, proj desc, ename,grade,sal scale, proj joining date, allocation time

Proj code-→proj type, proj desc

Empno→ename,grade,sal scale

Projcode+empno-→proj joining date, alloc time

Since partial dependency is ther hence it is not in 2NF

Proj Code	Proj Type	Proj Desc
001	APP	LNG
004	MAI	SHO

employee

Empno	Ename	Grade	Sal scale
46	JONES	A1	5
92	SMITH	A2	4
96	BLACK	B1	9
72	JACK	A2	4
92	SMITH	A2	4

Employee-project

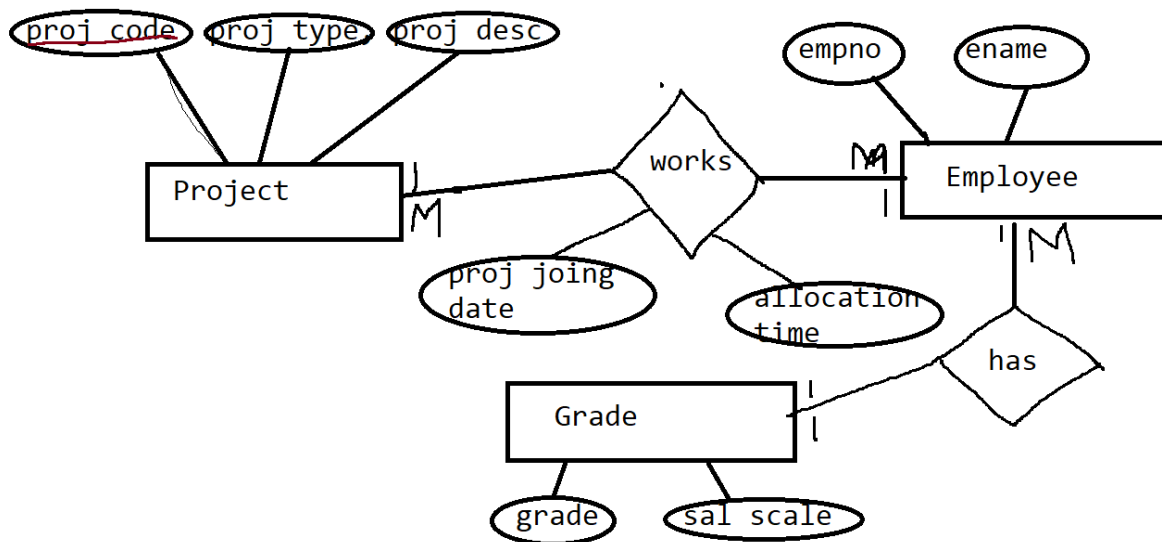| Proj Code	Empno	Proj Join Date	Alloc Time
001	46	12/1/1998	24
001	92	2/1/1999	24
001	96	2/1/1999	18
004	72	2/4/1999	6
004	92	5/5/1999	16

Employee table is not in 3NF

Empno-→ grade--→ sal scale, which is transitive dependency, hence it is not in 3 NF

Empno	Ename	Grade

46	JONES	A1
92	SMITH	A2
96	BLACK	B1
72	JACK	A2
92	SMITH	A2

Grade

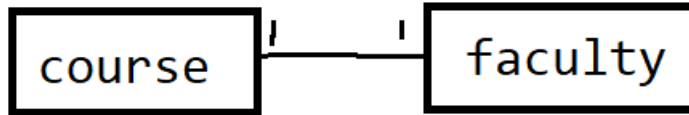| Grade	Sal scale
A1	5
A2	4
B1	9
A2	4
A2	4

Rules for ER diagram

1. one-one

any one side key will be the foreign key   in another table.

2.   one-many--> then one side key will become foreign key in many side table

3. many-many-> then a new table will be generated and keys from both sides will be in the table and all relation attribute also will be in the table

Course(cid,cname,duration, fees,fid)

Faculty(fid,fname, skill)

Example

Roomno , Rname ,booking amount, Booking date, Custid ,Cname ,Emailid ,Mgrno, Mname

Email id-- one customer has many email stored in one column   aaa@xyz.com,vvv@ssd.com,

Rules

One customer can book many rooms on a particular day.

One room can be booked by many customers on diff dates.

One room will be managed by one manager, but one manager can manage many rooms.

Add multiple rows to separate email

2 NF--→ roomno+booking date

Roome no-→ rname,mgrno,mname

Booking date-→

roomno+booking date-→ booking amount,custid, cname

room(roomno,rname,mgno,mname)

room_booking(rom no, bokking date,booing amount,custid,cname)

room no+booking date->custno→ cname

room_booking(rom no, bokking date,booing amount,custid)
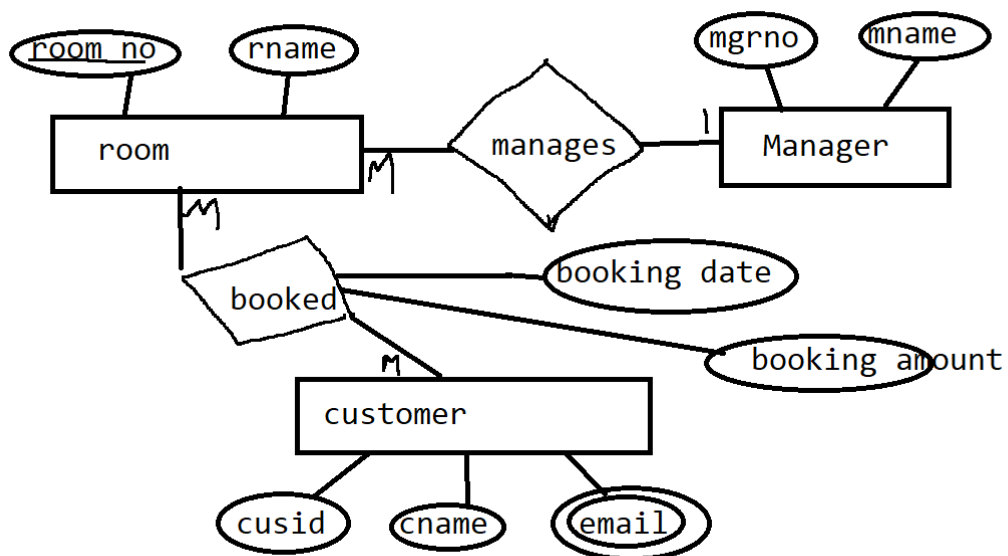
customer(custid,cname,email)

email(custid,email)

room(roomno,rname,mgno,mname)

roomno→ mgrno-→ mname

room(roomno,rname,mgrno)

mgr(mgrno,mname)

Movie management system

Screen num   movie id show time

Screen num	movie id	show time		
1	100	m	1	bk dt
1	100	m	2	

Movieid,mname,actor,actoress,ticket price,screen no,screen name, booking dt,
,showtime,seatno,seatrownum,cname,ticketid,securitynum,security name,capacity of screen

One movie will be there for one screen , then all shows are booked only for that movie

Security may be different on different dates at different screen , for one screen there will min 3
security guard

Movie

Movieid-→ mame,actor,actoress

Screens

Screen num→ screen name,capacity of screen

Scrrennum+bk-date→ securitynum,sname

Movieno, screennum,bk dt,showtime,seatnum,seatrownum -→ cname,ticketprice,ticketid

Showtime

9 to 12 M

3 to 6   A

7 to 10 E

11 onward N

Scrrennum+bk-date→ securitynum,sname

Screen-security

Scrrennum+bk-date→ securitynum

Securitynum→ sname

movie id   mname   Chare   sno   showid showtime

Movie   d+   you   shows

date

security

screen   security num , sname

screeid, sname