in DBMS: 1NF, 2NF, 3NF
tabase

R: DBMS

f organizing the data in database to avoid data
y, update anomaly & deletion anomaly. Let's discuss
will discuss normal forms with examples.

S

nalies that occur when the database is not
tion, update and deletion anomaly. Let's take an

cturing company stores the employee details in a
as four attributes: emp_id for storing employee's id,
ee's name, emp_address for storing employee's
ring the department details in which the employee
he table looks like this:

	emp_address	emp_dept
	Delhi	D001
	Delhi	D002
	Agra	D890
	Chennai	D900

	Chennai	D004

ized. We will see the problems that we face when a

e table we have two rows for employee Rick as he
f the company. If we want to update the address of
he same in two rows or the data will become
correct address gets updated in one department but
atabase, Rick would be having two different
ct and would lead to inconsistent data.

ew employee joins the company, who is under
gned to any department then we would not be able
e if emp_dept field doesn't allow nulls.

at a point of time the company closes the
g the rows that are having emp_dept as D890
tion of employee Maggie since she is assigned only

we need to normalize the data. In the next section
zation.

used normal forms:

F)

rm (BCNF)

(1NF)

form, an attribute (column) of a table cannot hold only atomic values.

y wants to store the names and contact details of le that looks like this:

	emp_address	emp_mobile
	New Delhi	8912312390
	Kanpur	8812121212 9900012222
	Chennai	7778881212
	Bangalore	9990000123 8123450987

) are having two mobile numbers so the company as you can see in the table above.

e rule says “each attribute of a table must have np_mobile values for employees Jon & Lester

ith 1NF we should have the data like this:

	emp_address	emp_mobile
	New Delhi	8912312390
	Kanpur	8812121212

	Kanpur	9900012222
	Chennai	7778881212
	Bangalore	9990000123
	Bangalore	8123450987

rm (2NF)

both the following conditions hold:

rmal form)
s dependent on the proper subset of any candidate

any candidate key is known as non-prime attribute.

wants to store the data of teachers and the subjects
e that looks like this: Since a teacher can teach
able can have multiple rows for a same teacher.

ject	teacher_age
hs	38
sics	38
ogy	38
sics	40
emistry	40

, subject}
_age

each attribute has atomic values. However, it is not
ribute teacher_age is dependent on teacher_id
t of candidate key. This violates the rule for 2NF as
ttribute is dependent on the proper subset of any

ith 2NF we can break it in two tables like this:

	teacher_age
	38
	38
	40

	subject
	Maths
	Physics
	Biology
	Physics
	Chemistry

econd normal form (2NF).

n (3NF)

3NF if both the following conditions hold:

endency of non-prime attribute on any super key

any candidate key is known as non-prime attribute.

plained like this: A table is in 3NF if it is in 2NF and
y X-> Y at least one of the following conditions

table

ne of the candidate keys is known as prime attribute.

y wants to store the complete address of each
named employee_details that looks like this:

_zip	emp_state	emp_city	emp_district
005	UP	Agra	Dayal Bagh
008	TN	Chennai	M-City
007	TN	Chennai	Urrapakkam
008	UK	Pauri	Bhagwan
999	MP	Gwalior	Ratan

id, emp_name}, {emp_id, emp_name, emp_zip}…

ibutes except emp_id are non-prime as they are not

emp_district dependent on emp_zip. And, emp_zip
nakes non-prime attributes (emp_state, emp_city &
ndent on super key (emp_id). This violates the rule

ith 3NF we have to break the table into two tables
ndency:

ame	emp_zip
	282005
	222008
	282007
	292008
	222999

	emp_city	emp_district
	Agra	Dayal Bagh
	Chennai	M-City
	Chennai	Urrapakkam
	Pauri	Bhagwan
	Gwalior	Ratan

al form (BCNF)

F that's why it is also referred as 3.5NF. BCNF is
plies with BCNF if it is in 3NF and for every
X should be the super key of the table.

company wherein employees work in **more than**
the data like this:

dept	dept_type	dept_no_of_emp
uction and planning	D001	200
s	D001	250
n and technical support	D134	100
asing department	D134	600

the table above:

_no_of_emp}

_dept}

either emp_id nor emp_dept alone are keys.

BCNF we can break the table in three tables like

_nationality
strian
erican

	dept_type	dept_no_of_emp
	D001	200
	D001	250
	D134	100
	D134	600

nd planning
echnical support
department

_no_of_emp}

_dept}

h the functional dependencies left side part is a key.

ry these related posts

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IS

IS? – Definition and explanation

DBMS

s

', 2015 AT 8:14 AM

e example you given for Third Normal form (3NF)
bt, In the employee table and employee_zip
n both tables but what If two employes having
ecord will be fetched from the employee_zip

Luse says

ER 7, 2015 AT 3:04 AM

s have the same zip, they will share the row in
ere does not need to be two rows in the zip table
e should not be two rows in the zip table.

rshal davane says
RIL 5, 2017 AT 6:51 PM

WE CREATE NEW ZIP TABLE THEN WE CAN
HERE ZIP BYE NAME ALSO ..

amit says
APRIL 22, 2017 AT 8:13 PM

s not a prime attribute because multiple students
ve same name and each student may have a
ıt zip
441124
345632

SSIR AHMED says
ER 11, 2015 AT 6:47 AM

le there will be 2 employees with same zip code
_zip table there will be 1 record related to that

›les are related by zip code.So only 1 record will
employee_zip table. Hope you get the answer.

ı says

ER 14, 2015 AT 10:41 AM

're is only one record for every ZIP.

complete address.

says

ER 16, 2015 AT 10:30 PM

he point they are trying to make is that many
d be related to 1 Zip record. There would only be
› table per zip, since that's the key. That is the
o denormalize the duplicate data in the
Good luck!

shChaudhari says

R 30, 2016 AT 6:52 AM

› issue related to emp_zip……
wo employee have same emp_zip then it it
employee live's in same area and so then in

ible there is one row of that zip……..
fetched from single row…….

e says
2015 AT 3:08 AM

ion, there will be only one row for the the zip, not
s have the same zip, they will both use the
ip in the zip table.

esa says
, 2017 AT 1:04 PM

ine a case scenario where two employees have
de but different emp districts or emp city, which
ched in such a scenario.

AHMED says
, 2015 AT 6:40 AM

f_emp” is also candidate key.

ys
6 AT 6:40 AM

icle of Normalization and I must say, it a best
mples.
seful for better understating the concept. I am
› you for the blog.

ys
7:48 AM

alization with example explained is very helpful.
rstand it clearly.

AT 7:18 PM

derstandable from book .after reading this I

.

AT 5:42 PM

ubject be the candidate key? Subject is
eacher I'd shld be sufficient.

Rohila says

2016 AT 3:43 PM

r_id 111, it is having two different subjects maths
only teacher_id cannot determine the complete
ubject is also required.

der says

ER 12, 2016 AT 6:52 AM

e cannot be the Candidate key because there
ries for a particular teacher as teacher can teach
s .And to fulfill criteria of becoming candidate key
unique values.

d Kidd says

ER 28, 2016 AT 7:51 PM

should be able to UNIQUELY IDENTIFY a row
case of the teacher table, their are two rows in
n be identified with the teacher_id 111. If we are
l 111, we cannot discern if we need the record for
or the record for subject ‘physics’. Therefore,
t sufficient to uniquely identify a row. Likewise, as
ws with the teacher_id 111 and the teacher_age
so insufficient. The only minimal combination of
niquely identify a given row is {teacher_id,

nar Sunku says

AT 5:48 AM

Thank you for this valuable information

ys

016 AT 11:49 AM

ngle table to partition into different tables so it is
ut my doubt is to how to partition those tables so
information about how to partition a table

efore using those keys it is better to briefly
/s so it is easy to understand

says
016 AT 12:22 PM

on. Thank you for this article. I read the textbook
id. Now I understand 1NF and 2NF. I'm still not
NF and the BCNF though. Pls anyone with more

haudhari says
2016 AT 7:14 PM

orever……love it

ys
·, 2016 AT 7:16 AM

on.
dosen't the example you gave on the
NF solution) also break the second rule?
ttributes depends on only subset of the
n example: the dept_type and dept_no_of_emp

n a subset of the candidate key which is

ays

, 2017 AT 8:29 PM

/ are dependent, that is the violation of the 3NF.
ecomposed the table and in second table
ɔer key or candidate key not a subset of

key concept

's

, 2016 AT 10:19 AM

me understand the concept of normalization.

ays

:017 AT 5:23 AM

ɔ_zip also a candidate key(3NF example)? If yes
e the 3NF rule in the next table?

says
2017 AT 12:47 PM

e example in BCNF. There are 2 primary keys,
pt. This violates 2NF rules, emp_nationality can
ly emp_id. So in the first place, it is not in 2nf,
process?

plain/correct me please(if i'm wrong)

, 2017 AT 9:08 AM

row is my exam and this post really helped me..

cis says
AT 9:15 AM

vo primary keys in a relationship table?

AT 10:12 AM

lain ,candidate key ,and super key.

ıd

ɔt be published. Required fields are marked *

an Being

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Founder of beginnersBook.com, loves Java and open source stuff. BeginnersBook.com is a tech blog where he shares tutorials on programming (Java, C, CPP), WordPress, SEO and web development.