07-04-2020

Computer Science 2nd Year

Subject - DBMS

Boyce - Codd Normal form (BCNF)

Boyce - codd normal form is an extension of the third Normal form, and is also known as 3.5 Normal form.

Rules for BCNF

For a table to satisfy the Boyce - codd Normal form, it should satisfy the following two conditions :

1) It should be in the Third Normal form
2) and, for the dependency $A \rightarrow B$, A should be a super key. (It means that for a dependency $A \rightarrow B$, A cannot be a non Prime attribute, if B is a prime attribute)

Example :

We have a college enrolment table with Columns Student_Id, Subject and professor.

Student Id	Subject	Professor
101	Java	P.Java
101	C++	P.Cpp
102	Java	P.Java2
103	C#	P.C Hash
104	Java	P.Java

In the above table

⇒ One student can enroll for multiple subject for example, Student with Student_Id 101, has opted for subject Java and C++.

⇒ For each subject, a professor is assigned to the student.

⇒ And there can be multiple professors Teaching one subject like we have for Java

What do you think should be the primary key?

In the above table

Student_Id, Subject together form the primary key, because using Student_Id and Subject we can find all the columns of the table

One more point to note: there is one professor teaches only one subject but one subject may have two different professors.

Hence, there is a dependency between subject and professor here, where Subject depends on the professor name

This table satisfies the 1st Normal form because all the values are atomic, column name are

unique and all the values stored in a particular column are of same domain

This table also satisfy the 2nd Normal form as their is no partial dependency.

and their is no Transitive dependency hence the table also satisfies the 3rd Normal form But this table is not in Boyce - Codd Normal form.

But this table is not in BCNF ?

In the above table, Student-Id, Subject form Primary Key, which means subject column is a prime attribute.

But there is one more dependency

Professor → Subject.

and while Subject is a prime attribute, Professor is a non Prime attribute which is not allowed by BCNF.

How to satisfy BCNF ?

To make the relation (Table) satisfy BCNF, we will decompose this table into two tables Student table and Professor table

Below we have the structure for Both the Table

Student table

Student_Id	P_Id
101	1
101	2
and so on	

and Professor Table

P_Id	Professor	Subject
1	P. Java	Java
2	P. CPP	C++
and	so on	

and now this relation satisfy Boyce-Codd normal form.

7/04/2020

Shardha Vaish