Anomalies in DBMS

What is Anomaly?

Anomaly means inconsistency in the pattern from the normal form. In Database Management System (DBMS), anomaly means the inconsistency occurred in the relational table during the operations performed on the relational table.

There can be various reasons for anomalies to occur in the database. For example, if there is a lot of redundant data present in our database then DBMS anomalies can occur. If a table is constructed in a very poor manner then there is a chance of database anomaly. Due to database anomalies, the integrity of the database suffers.

The other reason for the database anomalies is that all the data is stored in a single table. So, to remove the anomalies of the database, normalization is the process which is done where the splitting of the table and joining of the table (different types of join) occurs.

We will see the anomalies present in a table by the different examples.

Example 1:

Worker_id	Worker_name	Worker_dept	Worker_address
65	Ramesh	ECT001	Jaipur
65	Ramesh	ECT002	Jaipur
73	Amit	ECT002	Delhi
76	Vikas	ECT501	Pune
76	Vikas	ECT502	Pune
79	Rajesh	ECT669	Mumbai

In the above table, we have four columns that describe the details about the workers like their name, address, department and their id. The above table is not normalized and there is definitely a chance of anomalies present in the table.

There can be three types of an anomaly in the database:

Updation / Update Anomaly

When we update some rows in the table, and if it leads to the inconsistency of the table then this anomaly occurs. This type of anomaly is known as an updation anomaly. In the above table, if we want to update the address of Ramesh then we will have to update all the rows where Ramesh is present. If during the update we miss any single row, then there will be two addresses of Ramesh, which will lead to inconsistent and wrong databases.

Insertion Anomaly

If there is a new row inserted in the table and it creates the inconsistency in the table then it is called the insertion anomaly. For example, if in the above table, we create a new row of a worker, and if it is not allocated to any department then we cannot insert it in the table so, it will create an insertion anomaly.

Deletion Anomaly

If we delete some rows from the table and if any other information or data that is required is also deleted from the database, this is called the deletion anomaly in the database. For example, in the above table, if we want to delete the department number ECT669 then the details of Rajesh will also be deleted since Rajesh's details are dependent on the row of ECT669. So, there will be deletion anomalies in the table.

To remove this type of anomalies, we will normalize the table or split the table or join the tables. There can be various normalized forms of a table like 1NF, 2NF, 3NF, BCNF etc. we will apply the different normalization schemes according to the current form of the table.

Example 2:

Stu_id	Stu_name	Stu_branch	Stu_club
2018nk01	Shivani	Computer science	literature
2018nk01	Shivani	Computer science	dancing
2018nk02	Ayush	Electronics	Videography
2018nk03	Mansi	Electrical	dancing
2018nk03	Mansi	Electrical	singing
2018nk04	Gopal	Mechanical	Photography

In the above table, we have listed students with their name, id, branch and their respective clubs.

Updation / Update Anomaly

In the above table, if Shivani changes her branch from Computer Science to Electronics, then we will have to update all the rows. If we miss any row, then Shivani will have more than one branch, which will create the update anomaly in the table.

Insertion Anomaly

If we add a new row for student Ankit who is not a part of any club, we cannot insert the row into the table as we cannot insert null in the column of **stu_club**. This is called insertion anomaly.

Deletion Anomaly

If we remove the photography club from the college, then we will have to delete its row from the table. But it will also delete the table of Gopal and his details. So, this is called deletion anomaly and it will make the database inconsistent.