

Normalization Examples

Consider Student Table / Relation

| Sid | Sname | Credits | Dept | Bldg | Roomno |
|-----|---------|---------|-------|------|--------|
| 1 | Harsh | 5 | CSE | 1 | 101 |
| 2 | Raj | 6 | CSE | 1 | 101 |
| 3 | Kunj | 7 | IT | 2 | 201 |
| 4 | Diya | 4 | EE | 2 | 301 |
| 5 | Rahul | 5 | EXTC | 3 | 401 |
| 6 | Rajiv | 6 | CIVIL | 2 | 501 |
| 7 | Preksha | 7 | CSE | 1 | 101 |
| 8 | Kajal | 8 | IT | 2 | 201 |

Redundant data:

| Sid | Sname | Credits | Dept | Bldg | Roomno |
|-----|---------|---------|-------|------|--------|
| 1 | Harsh | 5 | CSE | 1 | 101 |
| 2 | Raj | 6 | CSE | 1 | 101 |
| 3 | Kunj | 7 | IT | 2 | 201 |
| 4 | Diya | 4 | EE | 2 | 301 |
| 5 | Rahul | 5 | EXTC | 3 | 401 |
| 6 | Rajiv | 6 | CIVIL | 2 | 501 |
| 7 | Preksha | 7 | CSE | 1 | 101 |
| 8 | Kajal | 8 | IT | 2 | 201 |

To remove redundancy from database, We use Normalization.

Insertion Anomaly:

We want to insert ME department in the table, still students are not enrolled in the department. Sid is PK, that can not be NULL.

We should have atleast one student enrolled in ME department.

| Sid | Sname | Credits | Dept | Bldg | Roomno |
|-----|---------|---------|-------|------|--------|
| 1 | Harsh | 5 | CSE | 1 | 101 |
| 2 | Raj | 6 | CSE | 1 | 101 |
| 3 | Kunj | 7 | IT | 2 | 201 |
| 4 | Diya | 4 | EE | 2 | 301 |
| 5 | Rahul | 5 | EXTC | 3 | 401 |
| 6 | Rajiv | 6 | CIVIL | 2 | 501 |
| 7 | Preksha | 7 | CSE | 1 | 101 |
| 8 | Kajal | 8 | IT | 2 | 201 |
| | | | ME | 1 | 201 |

Updation Anomaly:

We want to update CSE departments building to 3 and Roomno to 201. So in every CSE department, we need to update these things. So if update the data in some rows and forget to update in remaining row. Then it is inconsistent. This is called as Updation Anomaly.

Deletion Anomaly:

If we delete Sid 4, then we are losing deptment details as only one student is present in EE department. So data loss is occurring. This is called as Deletion Anomaly.

| Sid | Sname | Credits | Dept | Bldg | Roomno |
|-----|---------|---------|-------|------|--------|
| 1 | Harsh | 5 | CSE | 1 | 101 |
| 2 | Raj | 6 | CSE | 1 | 101 |
| 3 | Kunj | 7 | IT | 2 | 201 |
| 4 | Diya | 4 | EE | 2 | 301 |
| 5 | Rahul | 5 | EXTC | 3 | 401 |
| 6 | Rajiv | 6 | CIVIL | 2 | 501 |
| 7 | Preksha | 7 | CSE | 1 | 101 |
| 8 | Kajal | 8 | IT | 2 | 201 |

Solution is to decompose the relation into multiple relations.

Student:

| Sid | Sname | Credits | Dept |
|------------|--------------|----------------|-------------|
| 1 | Harsh | 5 | CSE |
| 2 | Raj | 6 | CSE |
| 3 | Kunj | 7 | IT |
| 4 | Diya | 4 | EE |
| 5 | Rahul | 5 | EXTC |
| 6 | Rajiv | 6 | CIVIL |
| 7 | Preksha | 7 | CSE |
| 8 | Kajal | 8 | IT |

Department:

| Dept | Bldg | Roomno |
|-------------|-------------|---------------|
| CSE | 1 | 101 |
| IT | 2 | 201 |
| EE | 2 | 301 |
| EXTC | 3 | 401 |
| CIVIL | 2 | 501 |