**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**19CST202-DATABASE MANAGEMENT SYSTEM**

# UNIT-III

# Database Design

### Topic: BCNF

## Boyce Codd normal form (BCNF)

- o BCNF is the advance version of 3NF. It is stricter than 3NF.
- o A table is in BCNF if every functional dependency $X \rightarrow Y$, X is the super key of the table.
- o For BCNF, the table should be in 3NF, and for every FD, LHS is super key.

**Example:** Let's assume there is a company where employees work in more than one department.

**EMPLOYEE table:**

| EMP_ID | EMP_COUNTRY | EMP_DEPT | DEPT_TYPE | EMP_DEPT_NO |
|--------|-------------|----------|-----------|-------------|
| 264 | India | Designing | D394 | 283 |
| 264 | India | Testing | D394 | 300 |
| 364 | UK | Stores | D283 | 232 |
| 364 | UK | Developing | D283 | 549 |

**In the above table Functional dependencies are as follows:**

1. EMP_ID → EMP_COUNTRY
2. EMP_DEPT → {DEPT_TYPE, EMP_DEPT_NO}

**Candidate key: {EMP-ID, EMP-DEPT}**

The table is not in BCNF because neither EMP_DEPT nor EMP_ID alone are keys.

To convert the given table into BCNF, we decompose it into three tables:

**EMP_COUNTRY table:**

| EMP_ID | EMP_COUNTRY |
|---|---|
| 264 | India |
| 264 | India |

**EMP_DEPT table:**

| EMP_DEPT | DEPT_TYPE | EMP_DEPT_NO |
|---|---|---|
| Designing | D394 | 283 |
| Testing | D394 | 300 |
| Stores | D283 | 232 |
| Developing | D283 | 549 |

**EMP_DEPT_MAPPING table:**

| EMP_ID | EMP_DEPT |
|---|---|
| D394 | 283 |
| D394 | 300 |
| D283 | 232 |

| D283 | 549 |
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**Functional dependencies:**

1. EMP_ID $\rightarrow$ EMP_COUNTRY
2. EMP_DEPT $\rightarrow$ {DEPT_TYPE, EMP_DEPT_NO}