**CS 31 Database Management Programming Lecture 4**

**Normalization**

**Objectives:**

1. Make it feasible to represent any relation in the database
2. To make use of powerful relational retrieval algorithms based on a collection of primitive relational operators – **SELECT**, **PROJECT**, **JOIN**, **PRODUCT**, **UNION**, **INTERSECT**, **DIFFERENCE**, **DIVIDE**
3. To free relations from undesirable insertion, update and deletion anomalies

**Deletion Anomaly** – the situation in which the removal of one row of a table deletes facts about two or more themes

**Insertion Anomaly** – the condition that exists when, to add a complete row to a table, one must add facts about two or more logically different themes

**Update Anomaly** – a data error created in a non-normalized table when an update action modifies one data value without modifying another occurrence of the same data value in the table

**Lab Lecture 4**

We have discussed the following clauses. They must appear in the order shown below.

**SELECT DISTINCT**

**FROM**

**WHERE**

**ORDER BY**

**LIMIT**

**Operator Precedence**

1. **\*, /, DIV, %, MOD**
2. **+, -**
3. **=, <=>, >, >=, <, <=, IS, IN**
4. **BETWEEN**
5. **NOT**
6. **AND, &&**
7. **OR, ||**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **AND** | TRUE | FALSE | NULL |  | **OR** | TRUE | FALSE | NULL |
| TRUE | TRUE | FALSE | NULL |  | TRUE | TRUE | TRUE | TRUE |
| FALSE | FALSE | FALSE | FALSE |  | FALSE | TRUE | FALSE | NULL |
| NULL | NULL | FALSE | NULL |  | NULL | TRUE | NULL | NULL |
|  |  |  |  |  |  |  |  |  |
| **NOT** |  |  |  |  |  |  |  |  |
| TRUE | FALSE |  |  |  |  |  |  |  |
| FALSE | TRUE |  |  |  |  |  |  |  |
| NULL | NULL |  |  |  |  |  |  |  |