Consider the un-normalized data presented in the below table having the following entity:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **USERMASTER** | | | | | | | | | | | | | |
| **username(pk)** | **password** | **name** | **dateOfBirth** | **emailAddress** | **mobile** | **role** | **status** | **photo** | **dateOfJoining** | **designation** | **Salary** | **guardianName** | **guardianMobile** |
| d001 | pass | Raj Das | 1991-05-11 | raj@gmail.com | 9876543210 | Admin | pending | Image.jpg | 2015-05-11 | DBA | 25000 | - | - |
| d002 | Pass1 | Rup  Roy | 1999-07-23 | rup@gmail.com | 7982135687 | Student | Pending | Image1.jpg | - | - |  | Kal  K | 9874562139 |
| d003 | Paas3 | Ayan Das | 1990-06-15 | ayan@gmail.com | 65498732154 | staff | pending | Image2.jpg | 2015-05-11 | DBA | 25000 | - | - |

**Problem Statement 1:** Inspect the above un-normalized USERMASTER table, what do we notice about the attributes and the data values?

If the role is, Admin/Staff then no need of guardianName and guardianMobile.

If the role is student then no need of dateOfJoining, designation and salary.

In the table the name and guardianName columns consists of both first name and last name. So we need to break the above both columns into firstName, lastName and guardianFirstName, guardianLastName

**Problem Statement 2:** Identify the Non-Repeating group (Group in which there is only one row in the given scenario)

userName,password,name,dateOfBirth,emailAddress,mobile,role,status,photo.

**Problem Statement 3:** Identify the Repeating group (Group in which there are more than one row in the given scenario)

### userName, dateOfJoining, designation, salary. These four columns will create a new table called Staff where staffId will be the primary key and username will be the foreign key.

### userName, guardianName, guardianMobile. These three columns will create a new table called student where studentId will be the primary key and userName will be the foreign key.

### **Problem Statement 4: Create the tables in First Normal Form 1NF by removing the repeating groups**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **USERMASTER** | | | | | | | | | | | | | | | | | |
| **username(pk)** | **password** | **firstName** | **lastName** | **dateOfBirth** | **emailAddress** | **mobile** | **role** | **status** | **photo** | **staffId** | **dateOfJoining** | **designation** | **Salary** | **studentId** | **guardianFirstName** | **guardianLastName** | **guardianMobile** |
| d001 | pass | Raj | Das | 1991-05-11 | raj@gmail.com | 9876543210 | Admin | pending | Image.jpg | 1201 | 2015-05-11 | DBA | 25000 | - | - | - | - |
| d002 | Pass1 | Rup | Roy | 1999-07-23 | rup@gmail.com | 7982135687 | Student | Pending | Image1.jpg | - | - | - | - | 5001 | Kal | K | 9874562139 |
| d003 | Paas3 | Ayan | Das | 1990-06-15 | ayan@gmail.com | 65498732154 | staff | pending | Image2.jpg | 1211 | 2015-05-11 | DBA | 25000 | - | - | - | - |
| d004 | Pass4 | Hari | Das | 1997-08-10 | hari@gmail.com | 5588446622 | student | pending | Image24.jpg | - | - | - | - | 5002 | Kal | K | 9874562139 |

This table is in 1NF.

### **Problem Statement 5: Create the tables in Second Normal Form 2NF and remove the partial dependency**

In the 1NF table the dateOfJoining, designation, salary is dependent on the primary key userName as well as it is dependent on the staffId also.

In the 1NF table the guardianFirstName, guardianLastName, guardianMobile is dependent on the primary key userName as well as it is dependent on the studentId also.

So the above table is not in 2NF, since there exist partial dependency between non primary key attributes.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **USERMASTER** | | | | | | | | | |
| **username(pk)** | **password** | **firstName** | **lastName** | **dateOfBirth** | **emailAddress** | **mobile** | **role** | **status** | **photo** |
| d001 | pass | Raj | Das | 1991-05-11 | raj@gmail.com | 9876543210 | Admin | pending | Image.jpg |
| d002 | Pass1 | Rup | Roy | 1999-07-23 | rup@gmail.com | 7982135687 | Student | Pending | Image1.jpg |
| d003 | Paas3 | Ayan | Das | 1990-06-15 | ayan@gmail.com | 65498732154 | staff | pending | Image2.jpg |
| d004 | Pass4 | Hari | Das | 1997-08-10 | hari@gmail.com | 5588446622 | student | pending | Image24.jpg |

|  |  |  |  |
| --- | --- | --- | --- |
| **STAFF** | | | |
| **staffId** | **dateOfJoining** | **designation** | **Salary** |
| 1201 | 2015-05-11 | DBA | 25000 |
| 1211 | 2015-05-11 | DBA | 25000 |

|  |  |  |  |
| --- | --- | --- | --- |
| **STUDENT** | | | |
| **studentId** | **guardianFirstName** | **guardianLastName** | **guardianMobile** |
| 5001 | Kal | K | 9874562139 |
| 5002 | Kal | K | 9874562139 |

### **Problem Statement 6: Create the tables in Third Normal Form 3NF and remove the transitive dependency**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **USERMASTER** | | | | | | | | | |
| **username(pk)** | **password** | **firstName** | **lastName** | **dateOfBirth** | **emailAddress** | **mobile** | **role** | **status** | **photo** |
| d001 | pass | Raj | Das | 1991-05-11 | raj@gmail.com | 9876543210 | Admin | pending | Image.jpg |
| d002 | Pass1 | Rup | Roy | 1999-07-23 | rup@gmail.com | 7982135687 | Student | Pending | Image1.jpg |
| d003 | Paas3 | Ayan | Das | 1990-06-15 | ayan@gmail.com | 65498732154 | staff | pending | Image2.jpg |
| d004 | Pass4 | Hari | Das | 1997-08-10 | hari@gmail.com | 5588446622 | student | pending | Image24.jpg |

|  |  |  |  |
| --- | --- | --- | --- |
| **STAFF** | | | |
| **staffId** | **dateOfJoining** | **designation** | **Salary** |
| 1201 | 2015-05-11 | DBA | 25000 |
| 1211 | 2015-05-11 | DBA | 25000 |

|  |  |  |  |
| --- | --- | --- | --- |
| **STUDENT** | | | |
| **studentId** | **guardianFirstName** | **guardianLastName** | **guardianMobile** |
| 5001 | Kal | K | 9874562139 |
| 5002 | Kal | K | 9874562139 |

So the tables are in the 3NF, Since there exist no transitive dependency between non primary key attributes.