**Lab-5 - NORMALIZATION WORKSHEET #2**

**Professors’ Activity Reporting System**: Shows which students each professor advised, which committees the professor served on, and which journals the professed edited.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Emp#** | **Prof**  **Rank** | **Emp**  **Name** | **DeptCode** | **Dept**  **Name** | **Prof**  **Office** | **Advisee#** | **Advisee**  **Name** | **Committee**  **Code** | **Committee**  **Name** | **Journal**  **Code** | **Journal**  **Name** |
| 123 | Prof | Fenstein | CS | Computer Sci | ECS-220 | 1488 | Smith, John | REC | Recruitment | ACM-1 | ACM Communications |
|  |  |  |  |  |  | 1845 | Sanchez, Roberto | CUR | Curriculum | IEEE-1 | IEEE Potentials |
|  |  |  |  |  |  | 1398 | Childers, Ann |  |  |  |  |
| 314 | Asst Prof | Harmon | CS | Computer Sci | ECS 218 | 1566 | Rondell, James | LIB | Library | ACM-1 | ACM Communications |
|  |  |  |  |  |  | 2351 | Jones, Earl | FACC | Faculty Council |  |  |
| 647 | Asst Prof | Chen | EE | Elec Eng | EC-1433 | 6477 | Robles, Ryan | FACC | Faculty Council | IEEE-2 | IEEE Transactions in EE |
|  |  |  |  |  |  | 3748 | Singh, Jayan | CUR | Curriculum |  |  |

**Assumptions:**

1. **Unique: Emp#, Advisee#, Committee Code, Journal Code**
2. **Professor advises 0 to many students**
3. **1 student can only have 1 advisor**
4. **1 professor can only belong to only 1 department**
5. **Department can have 1 to many professors (emps)**
6. **Professor can serve 0 to many committees**
7. **Committees has 1 to many profs(emps)**
8. **Professor can edit 0 to many journals**
9. **Journals can be edited by 0 to many profs**
10. **Prof has only 1 office**
11. **Office belongs to only 1 prof**

**Step 2: Convert to 1NF. Identify repeating groups by underlining the fields that will be part of the primary key:**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Emp#** | **Prof**  **Rank** | **Emp**  **Name** | **DeptCode** | **Dept**  **Name** | **Prof**  **Office** | **Advisee#** | **Advisee**  **Name** | **Committee**  **Code** | **Committee**  **Name** | **Journal**  **Code** | **Journal**  **Name** |

**Step 3: Convert to 2NF. List all possible combinations of keys, and match up the fields where appropriate (identify functional dependencies):**

**STEP 1:**

1. **Emp# 🡪 Emp Name, Prof Rank, Dept Code, Dept Name, Prof Office, Committee Code, Committee Name, Journal Code, Journal Name**
2. **Advisee# 🡪 Advisee Name**
3. **Emp#, Advisee# 🡪 ?**

**Advicy Table is in 2NF**

**The Emp-Advisee Table is in 2NF**

**The Emp Table is not in 2NF because it still has repeating groups**

**STEP 2:**

1. **Emp# 🡪 Emp Name, Prof Rank, Dept Code, Dept Name, Prof Office, Journal Code, Journal Name**
2. **Committee Code 🡪 Committee Name**
3. **Emp#, Committee Code 🡪 ?**

**Committee Code is in 2NF**

**The Emp-Committee Table is in 2NF**

**The Emp Table is not in 2NF because it still has repeating groups**

**STEP 3:**

1. **Emp# 🡪 Emp Name, Prof Rank, Dept Code, Dept Name, Prof Office**
2. **Journal Code 🡪 Journal Name**
3. **Emp#, Journal Code 🡪 ?**

**Journal Code is in 2NF**

**The Emp-Journal Table is in 2NF**

**The Emp Table is in 2NF**

**Step 4: Create the new tables using the results from Step 3:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **EMP TABLE:** | **Emp#** | **Prof**  **Rank** | **Emp**  **Name** | **DeptCode** | **Dept**  **Name** | **Prof**  **Office** |

|  |  |  |
| --- | --- | --- |
| **JOURNAL TABLE:** | **Journal**  **Code** | **Journal**  **Name** |

|  |  |  |
| --- | --- | --- |
| **ADVISEE TABLE:** | **Advisee#** | **Advisee**  **Name** |

|  |  |  |
| --- | --- | --- |
| **COMMITTEE TABLE:** | **Committee Code** | **Committee Name** |

|  |  |  |
| --- | --- | --- |
| **EMP-ADVISEE TABLE:** | **Emp#** | **Advisee#** |

|  |  |  |
| --- | --- | --- |
| **EMP-COMMITTEE TABLE:** | **Emp#** | **Committee Code** |

|  |  |  |
| --- | --- | --- |
| **EMP-JOURNAL TABLE:** | **Emp#** | **Journal Code** |

**Step 5: Convert to 3NF. Identify fields dependent on non-key fields (determinants):**

**Pull out the non-key fields department code and department name from the Emp Table.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **EMP TABLE:** | **Emp#** | **Prof**  **Rank** | **Emp**  **Name** | **Prof**  **Office** |

**Step 6: Create new tables to remove non-key dependencies**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EMP TABLE:** | **Emp#** | **Prof**  **Rank** | **Emp**  **Name** | ***DeptCode*** | **Prof**  **Office** |

|  |  |  |
| --- | --- | --- |
| **JOURNAL TABLE:** | **Journal**  **Code** | **Journal**  **Name** |

|  |  |  |
| --- | --- | --- |
| **ADVISEE TABLE:** | **Advisee#** | **Advisee**  **Name** |

|  |  |  |
| --- | --- | --- |
| **COMMITTEE TABLE:** | **Committee Code** | **Committee Name** |

|  |  |  |
| --- | --- | --- |
| **DEPT TABLE:** | **Dept Code** | **Dept Name** |

|  |  |  |
| --- | --- | --- |
| **EMP-ADVISEE TABLE:** | **Emp#** | **Advisee#** |

|  |  |  |
| --- | --- | --- |
| **EMP-COMMITTEE TABLE:** | **Emp#** | **Committee Code** |

|  |  |  |
| --- | --- | --- |
| **EMP-JOURNAL TABLE:** | **Emp#** | **Journal Code** |

**Step 7: Are assumptions met?**

1. **Unique: Emp#, Advisee#, Committee Code, Journal Code**

**Emp#**

**Advisee#**

**Committee Code**

**Journal Code**

**All these are met as they are the primary keys of their own tables**

1. **Professor advises 0 to many students**

**Is met through the emp-advisee table**

1. **1 student can only have 1 advisor**

**Is not met because the emp-advisee table allows the students to have multiple advisors. To fix, make emp# a foreign key of advisee table and remove completely emp-advisee table.**

1. **1 professor can only belong to only 1 department**

**Is met since department code is a foreign key in emp table**

1. **Department can have 1 to many professors (emps)**

**Is met since the department code is a foreign key in the emp table**

1. **Professor can serve 0 to many committees**

**Is met because of the emp-committee table**

1. **Committees has 1 to many profs(emps)**

**Is met because of the emp-committee table**

1. **Professor can edit 0 to many journals**

**Is met because of the emp-journal table**

1. **Journals can be edited by 0 to many profs**

**Is met because of the emp-journal table**

1. **Prof has only 1 office**

**Is met because of the emp table**

1. **Office belongs to only 1 prof**

**Is met because of the emp table**

**STEP 8: Final Database Design**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EMP TABLE:** | **Emp#** | **Prof**  **Rank** | **Emp**  **Name** | ***DeptCode*** | **Prof**  **Office** |

|  |  |  |
| --- | --- | --- |
| **JOURNAL TABLE:** | **Journal**  **Code** | **Journal**  **Name** |

|  |  |  |  |
| --- | --- | --- | --- |
| **ADVISEE TABLE:** | **Advisee#** | **Advisee**  **Name** | ***Emp#*** |

|  |  |  |
| --- | --- | --- |
| **COMMITTEE TABLE:** | **Committee Code** | **Committee Name** |

|  |  |  |
| --- | --- | --- |
| **DEPT TABLE:** | **Dept Code** | **Dept Name** |

|  |  |  |
| --- | --- | --- |
| **EMP-COMMITTEE TABLE:** | **Emp#** | **Committee Code** |

|  |  |  |
| --- | --- | --- |
| **EMP-JOURNAL TABLE:** | **Emp#** | **Journal Code** |