|  |
| --- |
| ***Field*** |
| Club ID |
| club name |
| club description |
| club\_email |
| club type |
| meeting day |
| meeting location |
| meeting time |
| application |
| major requirement |
| gpa requirement |
| student 1 first name |
| student 1 last name |
| student 1 class |
| student 1 role |
| student 2 first name |
| student 2 last name |
| student 2 class |
| student 2 role |
| student 3 first name |
| student 3 last name |
| student 3 class |
| student 3 role |

<<<<< Given Table with Field listed.

First Normalization (1NF) – Functional Dependencies, removing duplicates.

Duplicate Attribute:

* Student’s first name (first\_name)
* Student’s last name (last\_name)
* Student’s class (class)
* Student’s role (role)

Multi-valued Attribute:

* club\_type = educational, professional, social

Entities/Tables after 1NF:

* club Entity/Table
  + Primary Key PK: club\_id
* club\_type Entity/Table
  + Composite Primary Key CPK
    - Primary Key PK/CPK: type\_id
    - Foreign Key FK/CPK: club\_id
  + Other Attributes/Column
    - type\_educational
    - type\_professional
    - type\_social
* student Entity/Table
  + Composite Primary Key CPK
    - Primary Key PK/CPK: student\_id
    - Foreign Key FK/CPK: club\_id
  + Other Attributes/Columns
    - student\_first\_name
    - student\_last\_name
    - student\_class
    - student\_role

|  |  |  |  |
| --- | --- | --- | --- |
| **Entity/Table Name** | **Club** | **student** | **club\_type** |
| Attribute/Column Names | club\_id PK | club\_id FK/CPK | club\_id FK/CPK |
| club\_name | student\_id PK/CPK | type\_id PK/CPK |
| description | student\_first\_name | type\_educational |
| club\_email | student\_last\_name | type\_professional |
| meeting\_day | student\_class | type\_social |
| meeting\_location | student\_role |  |
| meeting\_time |  |  |
| application |  |  |
| major\_requirement |  |  |
| gpa\_requirement |  |  |

Table after 1NF – 1st Normalization Step



Second Normalization (2NF)

* Partial Dependencies
  + club\_student Entity/Table
    - Composite Primary Key CPK
      * Foreign Key FK/CPK: club\_id
      * Foreign Key FK/CPK: student\_id
    - Other Attributes/Columns
      * student\_role
  + club\_type Entity/Table
    - Composite Primary Key CPK
      * Foreign Key FK/CPK: club\_id
      * Foreign Key FK/CPK: type\_id
  + student Entity/Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Entity/Table Name** | **club** | **club\_student** | **student** | **club\_type** | **type** |
| Attribute/Column Names | club\_id PK | club\_id FK/CPK | student\_id PK | club\_id FK/CPK | type\_id PK |
| club\_name | student\_id FK/CPK | student\_first\_name | type\_id FK/CPK | type\_educational |
| description | student\_role | student\_last\_name |  | type\_professional |
| club\_email |  | student\_class |  | type\_social |
| meeting\_day |  |  |  |  |
| meeting\_location |  |  |  |  |
| meeting\_time |  |  |  |  |
| application |  |  |  |  |
| major\_requirement |  |  |  |  |
| gpa\_requirement |  |  |  |  |

* + - Not a composite primary key anymore.
      * Primary Key PK: student\_id
  + type Entity/Table
    - Not a composite primary key anymore.
      * Primary Key PK: type\_id

Table after 2NF – 2nd Normalization Step

Third Normalization (3NF)

* Transitive Dependencies
  + meeting Entity/Table
    - Primary Key PK: meeting\_id
  + requirement Entity/Table
    - Primary Key PK: requirement\_id
  + club Entity/Table
    - Foreign Key (FK): requirement\_id
    - Foreign KEY (FK): meeting\_id

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Entity / Table Name** | **meeting** | **requirement** | **club** | **club\_student** | **student** | **club\_type** | **type** |
| Attribute/ Column Names | meeting\_id PK | requirement\_id PK | club\_id PK | student\_id FK/CPK | student\_id PK | type\_id FK/CPK | type\_id PK |
| meeting\_location | gpa\_requirement | requirement\_id  (FK) | club\_id FK/CPK | student\_first\_name | club\_id FK/CPK | type\_educational |
| meeting\_day | major\_requirement | meeting\_id  (FK) | student\_role | student\_last\_name |  | type\_professional |
| meeting\_time |  | club\_email |  | student\_class |  | type\_social |
|  |  | application |  |  |  |  |
|  |  |  | club\_name |  |  |  |  |
|  |  |  | description |  |  |  |  |

Table after 3NF – 3rd Normalization Step