**Normalization**

Normalization is the process of organizing data into tables in such a way that the results of using the database are always unambiguous and as intended. Normalization may have the effect of duplicating data within the database and often results in the creation of additional tables. (While normalization tends to increase the duplication of data, it does not introduce redundancy, which is unnecessary duplication.) Normalization is typically a refinement process after the initial exercise of identifying the data objects that should be in the database, identifying their relationships, and defining the tables required and the columns within each table.

***Reminder: We follow Object oriented design so no need of drawing Entity Relation diagram***

1. **Mapping Administrator entity**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AdID | First name | Middle name | Last name | Age | Sex | Birth date | address | AccID |

* Full fill First, Second and Third normalization

1. **Mapping Account entity**

|  |  |  |
| --- | --- | --- |
| AccID | User name | password |

* Full fill First, Second and Third normalization.

1. **Mapping Employee entity**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EmId | First name | Middle name | Last name | Age | Sex | Birth date | Address | Registration date | AdID | AccID |

* Full fill First, Second and Third normalization.

1. **Mapping Vehicle entity**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| plate number | Brand | Model | Made in | Motor number | Fuel type | Type | Owner name | Owner sex | Owner address | EmpID | DrID |

1. **Mapping Driver entity**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Driver License number | name | sex | Region | Level | Address | Registration date | EmpID | AccID |

* Full fill First, Second and Third normalization.

1. **Mapping TPA entity**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TPAID | First Name | Middle Name | Last Name | Age | Sex | Birth date | Phone number | Address | AccID |

* Full fill First, Second and Third normalization.

1. **Traffic police entity**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TpID | First name | Middle name | Last name | Age | Sex | Birth date | Address | TPAID | AccID |

* Full fill First, Second and Third normalization.

1. **Mapping Punishment relation ship**

|  |  |  |
| --- | --- | --- |
| TpID | DLnumber | Date |

* Full fill First, Second and Third normalization

1. **Mapping Report entity**

|  |  |  |
| --- | --- | --- |
| ReID | Report date | Report type |

* Full fill First, Second and Third normal form

1. **Mapping Administrator-Report Relation ship**

|  |  |
| --- | --- |
| AdminId | ReID |

* Full fill First, Second and Third normal form

1. **Mapping TPA-Report relation ship**

|  |  |
| --- | --- |
| TPAID | ReID |

* Full fill First, Second and Third normal form

1. **Mapping Employee-Report Relation ship**

|  |  |
| --- | --- |
| EmID | ReID |

* Full fill First, Second and Third normal form

1. **Mapping Accident/Crime entity**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DrID | Vehicle Plate number | Vehicle owner name | Driver name | From | To | Vehicle type | Date | Place |

* Full fill First Normal Form
* Requires Second Normal Form because they do not fully functional dependent

**2NF**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DrID | Vehicle Plate number | From | To | Date | Place |

|  |  |  |
| --- | --- | --- |
| Vehicle plate number | Vehicle owner name | Vehicle type |

|  |  |
| --- | --- |
| DrID | Driver Name |

* Full fill Third normal form.

Access control and security Access control

Here we will describe the privileges or authorities of actors over the functionalities. In this system there are three actors Administrator, Employee, Traffic Police, Traffic police Administrator and Driver. Each has their own privileges to gain access of the system.

Below is the description of access control using access control matrix.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Administrator | Employee | Driver | TPA | Traffic police |
| Login |  |  |  |  |  |
| Register Employee |  |  |  |  |  |
| Register Driver |  |  |  |  |  |
| Register Traffic police |  |  |  |  |  |
| Register Vehicle |  |  |  |  |  |
| View self- profile |  |  |  |  |  |
| View Employee profile |  |  |  |  |  |
| View Driver profile |  |  |  |  |  |
| View Vehicle Profile |  |  |  |  |  |
| View Traffic police profile |  |  |  |  |  |
| Change password |  |  |  |  |  |
| Enable/Disable Account |  |  |  |  |  |
| Generate report |  |  |  |  |  |
| Punish Driver |  |  |  |  |  |
| Logout |  |  |  |  |  |

**Security**

Here are some security issues taken in the system

* S All users of the system must first login to perform operation and get services.
* S When Employee, Driver and Traffic Police Registered, the will get user name and password.
* S The user name and password of the users are encrypted and store in the database.