**CAR RENTAL SYSTEM**

In this project a database design for car rental system is shown. This is the system for car rental office, so the database design is made accordingly. This project is divided into three sections; 1. Logical Design, 2. Normalization/Constraints and 3. Physical Database Design. In this car rental system, customer can rent a car based on the model. Customer can choose the car from different location for pick up and drop. Customer can confirm this with the employees working in that office. The rented car can also have insurance which customer can buy based on their convenience. One of the assumption is that all the car belongs to rental office itself. The entities and relation associated with the entities are described in details in the sections below.

1. Logical Design
2. Entities
3. Customer

Customer will be the one who will be using car rental system to rent a car. Customer can be member or non-member. Attributes like firstName, lastName, memberId, address, drivingLicense, etc will be for customer.

1. Car

The next entity will be Car. It keeps the information of cars. Car types, model and any other information related to the Car will be the attributes of this entity. It can have one attribute named isAvailable which can indicate whether the car is available to rent.

1. Insurance

Insurance here represents car rental insurance. Customer can already have insurance or can buy one while signing the contract during renting process.

1. Location

Location represents the pickup and drop location while renting the car.

1. Office

Office can be where customer makes deal for renting the car.

1. Employee

Employee is the one with whom the customer is making deal

1. Payment

Depending on the nature of contract the payment is done by customer

1. Contract

The contract while renting the car. It is between office and customer. It also includes billing method.

1. Assumptions

* Car should be rented only by car rental office (Not individual)
* The driver license is required for customer in order to rent car

The possible attributes for above entities with the primary key is shown below.

1. Attributes
2. Customer

|  |  |
| --- | --- |
| Mandatory Attributes | Optional Attributes |
| Driver\_License | Member\_ID |
| First\_Name | Gender |
| Last\_Name |  |
| Street |  |
| City |  |
| Postal\_Code |  |
| Province |  |
| Phone |  |
| Email |  |

1. Car

|  |  |
| --- | --- |
| Mandatory Attributes | Optional Attributes |
| Chassis\_Number | Make |
| Model | Condition |
| Model\_Number |  |
| Is\_Available |  |
| Mileage |  |
| No\_Of\_Person |  |
| Price\_Per\_Day |  |
| Late\_Fee\_Per\_Hour |  |
| No\_Of\_Luggage |  |
| Insurance\_Code |  |

1. Insurance

|  |  |
| --- | --- |
| Mandatory Attributes | Optional Attributes |
| Insurance\_Code | Name |
| Coverage\_Type |  |
| Cost\_Per\_Day |  |

1. Location

|  |  |
| --- | --- |
| Mandatory Attributes | Optional Attributes |
| Location\_ID |  |
| Street |  |
| City |  |
| Postal\_Code |  |
| Province |  |

1. Office

|  |  |
| --- | --- |
| Mandatory Attributes | Optional Attributes |
| Office\_ID | Province |
| Name |  |
| Address |  |
| Postal\_Code |  |

1. Employee

|  |  |
| --- | --- |
| Mandatory Attributes | Optional Attributes |
| Employee\_ID | Gender |
| First\_Name | Age |
| Last\_Name |  |
| Address |  |
| Office\_ID |  |

1. Payment

|  |  |
| --- | --- |
| Mandatory Attributes | Optional Attributes |
| Payment\_ID | Advance\_Amount |
| Payment\_Type | Cancelation\_Charge |
| Payment\_Due\_Date |  |
| Total\_Amount |  |
| Tax\_Amount |  |
| Late\_Fee |  |
| Payment\_Status |  |
| Driving\_License |  |
| Contract\_ID |  |

1. Contract

|  |  |
| --- | --- |
| Mandatory Attributes | Optional Attributes |
| Contract\_ID |  |
| Start\_Date |  |
| End\_Date |  |
| Contract\_Status |  |
| Return\_Date |  |
| Amount |  |
| Chassis\_Number |  |
| Driving\_License |  |
| Office\_ID |  |

1. Relations
2. Customer to Car to Contract

Customer will rent a car as per the desire. Customer have to rent a car via contract, so customer will be related to both car and contract. So the relation between Customer to Car is named as “Rents” and relation between Car to Contract is named as “Choose”.

1. Car to Insurance

Car to be rented must have insurance. Car can have many type of insurance, like full coverage, partial, third party, etc. So the relation between Car and Insurance can be named as “Has”.

1. Car to Location

Customer can rent a car from the desire location. They can mention pickup and drop location. So Car “Belongs To” Location.

1. Employee to Office

Employee “Works On” office which rents car to the customer.

1. Customer to Payment to Contract

Customer should make the payment on the basis of contract. If contract is cancelled before payment, payment is not done. The relation between Customer and Payment can be named as “Gives”. The relation between Payment and Contract can be named as “Based On”. If contract is canceled after advance payed certain charge will be deducted.

1. Cardinality

To determine the cardinality between above defined tables, we need to understand the relationship between them. Based on the attribute mentioned in above table description, the cardinality between the tables can be as follows.

* Customer:

Customer must have 1 Driver\_License.

* Car:

Car must have 1 Chassis\_Number.

Car can have 0 or 1 Insurance\_Code

* Insurance:

Insurance must have 1 Insurance\_Code.

* Location:

Location must have 1 Location\_ID.

* Office:

Office must have 1 Office\_ID.

* Employee:

Employee must have 1 Employee\_ID.

Employee must have 1 Office\_ID.

* Payment:

Payment must have 1 Payment\_ID.

Payment can have 0 or 1 Driving\_License.

Payment can have 0 or 1 Contract\_ID.

* Contract:

Contract must have 1 Contract\_ID.

Contract can have 0 or 1 Chassis\_Number.

Contract can have 0 or 1 Driving\_License.

Contract can have 0 or 1 Office\_ID.

This can be shown in table below.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Customer | Car | Insurance | Location | Office | Employee | Payment | Contract |
| Customer |  | 1 |  |  |  |  | N | N |
| Car | 1 |  | N | 1 |  |  |  | N |
| Insurance |  | 1 |  |  |  |  |  |  |
| Location |  | N |  |  |  |  |  |  |
| Office |  |  |  |  |  | N |  | N |
| Employee |  |  |  |  | 1 |  |  |  |
| Payment | 1 |  |  |  |  |  |  | 1 |
| Contract | 1 | 1 |  |  | 1 |  | 1 |  |

1. Relation Matrix

The following table shows the relationship matrix

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Customer | Car | Insurance | Location | Office | Employee | Payment | Contract |
| Customer |  | Rents |  |  |  |  | Gives |  |
| Car |  |  | Has | Belongs To |  |  |  | Choose |
| Insurance |  |  |  |  |  |  |  |  |
| Location |  |  |  |  |  |  |  |  |
| Office |  |  |  |  |  |  |  |  |
| Employee |  |  |  |  | Works On |  |  |  |
| Payment |  |  |  |  |  |  |  | Based On |
| Contract |  |  |  |  |  |  |  |  |

1. Entity Relationship Diagram (ERD)