1.MODEL OF ENTITIES -RELATIONSHIPS

SETS OF ENTITIES

STORES*(*BRANCHES)

The stores that belong to the company. Each store has a ***BranchID***[primary key] code and as a composite feature the Address, which consists of the City (**City**, the Street (**Street**), the Number (**Number**) and the postal code (**TK**). It is also characterized by the complex mode of communication (**Communication**), which consists of mobile (**Mobile**), email (**Email**), fax (Fax) and fixed (**Landline**).

EMPLOYEES

The employees who work for the company. Each employee has a unique code ***EMPLOYEE ID*** [primary key] and as a composite feature the name (**FullName**) which consists of the name (**FirstName**), the surname (**LastName**) and the patronymic (**FatherName**).also has the compound address of the residence which consists of the City (**City**), the street (**StreetName**), the number (**Number**) and the postal code**(** the compound attribute way**Communication**, which consists of mobile (**Mobile**), email (**Email**) and landline (**Landline**). Finally, it is characterized by the features of date of birth (**BirthDate**), TIN (**AFM** IDT**(** and driving license (**DriversLicenceNum**).

VEHICLES(*CARS)*

The vehicles used by the company. Each vehicle will have a unique ID code***CAR*** [primary key] and as a feature the (**type**Model), the model (**MODEL**), the manufacturer (**Maker**), the cubic capacity (**Cubism**, the horsepower (**HorsePower**), the registration number (**LicensePlate**), the year of purchase (**YearOfPurchase**), the kilometers (**Kilometers**) it has done so far, the complex service feature (**Service** which consists of from the last service **(LastServiceDate)**, the kilometers that the last service was done **(LastServiseKMs)** and the kilometers that should be done the next**(** as well as the complex insurance feature (**Insurance**), which consists of the date expiration date (**InsuranceEnd**), the insurance company (**Company**) and the contract number (**AgreementNum**).

CLIENTS

Each customer has a unique ***CLIENT*** [primary key]. The general features are the **AFM**, driving license (**DRIVER LICENSE**) and the date they became customers of the company (**EntryDate**). It also has the compound address of the residence which consists of the city (**City**), the street (**StreetName**), the number (**Number**) and the postal code**(** the compound attribute way **Communication**, which consists of mobile (**Mobile**), email (**Email**) and landline (**Landline**).

INDIVIDUALS

a specialization of the clients and has as a composite feature a name (**FullName**) which consists of the name (**FirstName**), father name (**FatherName**) and the adjective (**Last**). Also, it has as a complex feature the residential address which consists of the city (**Town**), the street (**StreetName**), the number (**Number**) and the postal code (**Postal**), the simple feature (**Occupation)** and identity number (**ADT**) and date of birth (**BirthDate**).

RESIDENT ABROAD

It is a specialty of the Individual and has as a feature the country of origin (**OriginCountry**), the passport number (**PassportID**), the passport validity date (**PassportEffectiveDate**) and the passport expiration date (**PassportEndDate**) .

ORGANIZATIONS

These are the companies - clients and is a specialization of the customers, while it has as its only feature its name (**NAME**), the date of establishment (**EstablishmentDate**), its license number**()** , the type of company (**TYPE**) and finally the compound attribute name of the company representative (**OwnerName**) consisting of the name (**FirstName**), father name (**FatherName**) and the last name (**LastName**).

RESERVATIONS

The reservations of customers with ***RESERVATION ID***[primary key]. Features include **ReservationDate**, **StartDate, EndDate** and also if the rent is prepaid (**Payment**).

RENTALS

Rents that are in progress or recorded in the history and are a specialty of the booking entity. It has no features but we chose to make it an entity because of its importance in business.

DAMAGES

The damage that a vehicle can have. Each damage is dependent on the strong set of entities**VEHICLES** , so it is modeled as a weak set of entities.characterized by the simple attributes Description (**Description**), kilometers (**Kilometers**) which are the kilometers in which the damage occurred and date of entry (**EntryDate**).

RELATIONAL SETS

WORKS-FOR

The association **WORKS-FOR** an employee with the store in which he works. We assume that each store has at least one employee and that each employee works in a single store. This is an correlation **N:1.** So the association has the full participation of both employees and stores, since it does not mean a store without employees and of course every employee must work in a store. It has the following features (**Duration)** and (**Position)**.

HAS

Inform us about whether there are defects or damage to a vehicle. Attaches a vehicle to one damage. A vehicle can have multiple damages but one damage can occur to a single vehicle. Therefore the correlation is **N:1.** Also a vehicle may have no damage. So we have a **partial** participation of the vehicles and a total participation of the damages. It is noted that the correlation is the determinant of the patient set of DAMAGES entities.

RECEIVE

The association ***RECEIVE*** connects an employee to a hire. Characterized by the Car Status feature (**CarConditionGrade**). An employee can pick up vehicles from multiple rentals but each rental is picked up by only one employee. Hence the

correlation is **N:1**. Also, an employee may not have received a rental but each rental will have to be picked up by an employee. Thus, we have a **partial** participation of the employees but a **total** participation of the rentals.

DELIVER

association links an employee to a hire. An employee can deliver multiple rentals but each rental is delivered by only one employee. Therefore, the correlation is **N:1**.Also, an employee may not have delivered a rental but each rental will have to be delivered by an employee. Thus, we have a **partial** participation of the employees but a **tota l**participation of the rentals.

WHAT RESERVE

The association **BELONG** links a vehicle to a booking. Each booking binds only one vehicle but one vehicle may not be bound or has been bound for many bookings so the correlation is **1:N** and also the correlation consists of the **total** participation of Reservations and **part** of the vehicles.

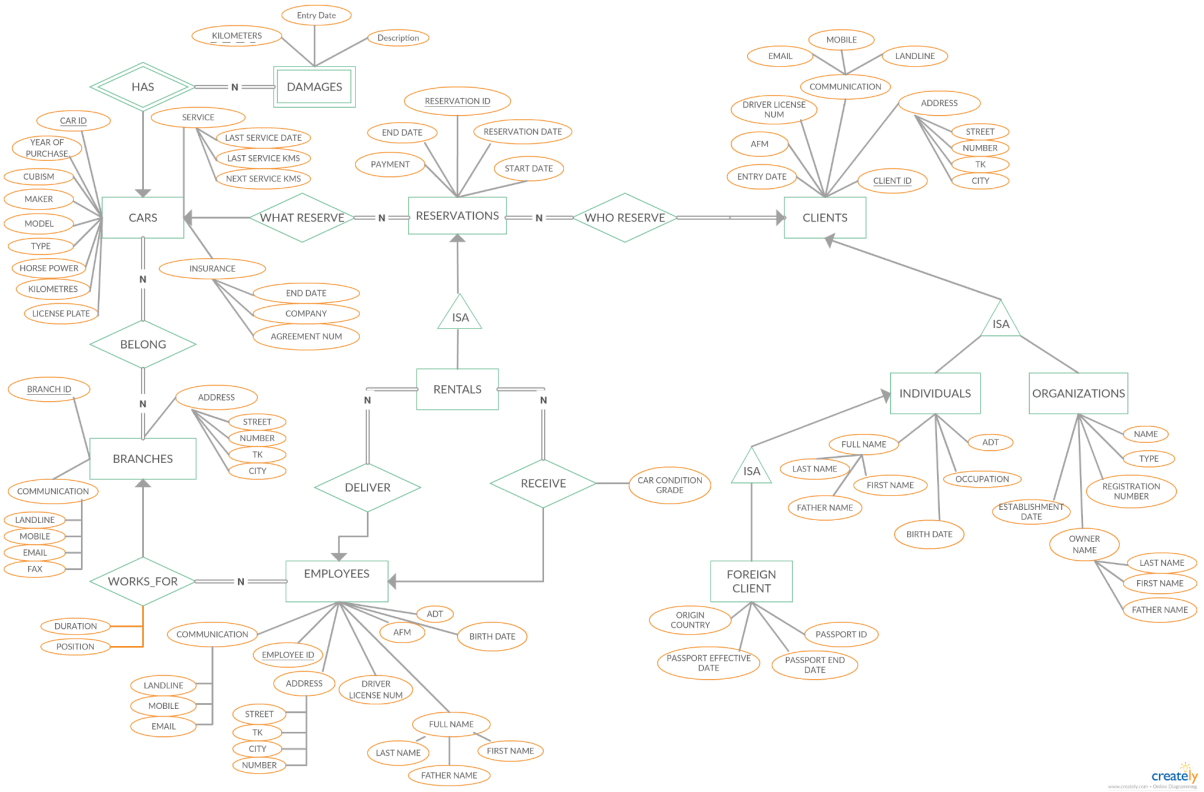
BELONG

The correlation **BELONG** connects cars with shops. A store can have many vehicles but each vehicle belongs to only one store, ie the correlation is**N**. Also every store has at least one vehicle that belongs to it and every vehicle should belong to a store. So we have **a total**participation of shops and vehicles.

WHO RESERVE

booking with a customer. Each customer may have made more than one booking but each booking will have been made by a single customer. Thus the correlation will be **N:1**. Also a customer must have made at least one reservation and every reservation will have definitely been made by a customer so we have total involvement of customers and reservations.

Below is the overall Entity - Relationships diagram (ER diagram).


Entry Date
KILOMETERS
Description
HAS
N
DAMAGES
CAR ID
SERVICE
LAST SERVICE DATE
LAST SERVICE KMS
NEXT SERVICE KMS
YEAR OF PURCHASE
CUBISM
MAKER
MODEL
TYPE
HORSE POWER
KILOMETRES
LICENSE PLATE
CARS
WHAT RESERVE
N
RESERVATIONS
N
WHO RESERVE
CLIENTS
RESERVATION ID
END DATE
RESERVATION DATE
PAYMENT
START DATE
EMAIL
MOBILE
LANDLINE
COMMUNICATION
DRIVER LICENSE NUM
ADDRESS
AFM
ENTRY DATE
CLIENT ID
STREET
NUMBER
TK
CITY
INSURANCE
END DATE
COMPANY
AGREEMENT NUM
N
BELONG
ISA
ISA
BRANCH ID
ADDRESS
STREET
NUMBER
TK
CITY
BRANCHES
N
RENTALS
N
INDIVIDUALS
ORGANIZATIONS
COMMUNICATION
LANDLINE
MOBILE
EMAIL
FAX
DELIVER
RECEIVE
CAR CONDITION GRADE
ISA
FULL NAME
ADT
LAST NAME
FIRST NAME
OCCUPATION
FATHER NAME
BIRTH DATE
NAME
TYPE
REGISTRATION NUMBER
ESTABLISHMENT DATE
OWNER NAME
LAST NAME
FIRST NAME
FATHER NAME
WORKS_FOR
N
EMPLOYEES
FOREIGN CLIENT
DURATION
POSITION
COMMUNICATION
ADT
AFM
BIRTH DATE
EMPLOYEE ID
ADDRESS
DRIVER LICENSE NUM
LANDLINE
MOBILE
EMAIL
STREET
TK
CITY
NUMBER
FULL NAME
LAST NAME
FIRST NAME
FATHER NAME
ORIGIN COUNTRY
PASSPORT ID
PASSPORT EFFECTIVE DATE
PASSPORT END DATE
creately
www.creately.com • Online Diagramming

2.RELATIONAL MODEL

Next we convert the previous entity-correlation diagram into the corresponding relational model. The primary key of each relationship has a colored key symbol, while the foreign keys are marked with the corresponding symbol in gray.

Initially, each powerful set of entities is converted directly into a relation.*(Keys are underlined*)

- **RESERVATIONS** (ReservationID, ReservationDate, StartDate, EndDate, Payment)
- **RENTALS**(ReservationID)
- **EMPLOYEES** (EmployeeID, LastName, FirstName , FatherName, ADT, AFM,DriverLicenseNum, BirthDate, AddressStreet, AddressNumber and AddressTK, AddressCity, Landline, Mobile, Email)
- **CLIENTS** (ID, EntryDate, LastName, FirstName, FatherName, ADT , AFM, AddressCity, AddressStreet, AddressNumber, AddressTK, Landline, Mobile, Email)
- **INDIVIDUALS**(ClientID, Occupation)
- ORGANIZATIONS **(**ClientID, Name, Type, EstablishmentDate, RegistrationNumber)
- **FOREIGN CLIENT** (ClientID, OriginCountry, PassportNumber, Passport EffectiveDate, PassportEndDate)
- **DAMAGES**, EntryDate, Description)
  Kilometers
- **CARS** (ID, Maker, Model, Type, Cubism, Horsepower, LicensePlate, YearOfPurchase, Kilometers, LastServiceDate, LastServiceKMs, NextServiceKMs, InsuranceEndDate , InsuranceCompany, InsuranceAgreementNumber)
- **BRANCHES** (ID, AddressStreet, AddressNumber, AddressTK, City, Landline, Mobile, Email, Fax)

Note that each **ADDRESS** and **FULL** is replaced by its components. As well as the **COMMUNICATION, INSURANCE** and **SERVICE**

Due to the population of the following relations (1: N), a relation is created with a primary key that of the set of entities that participates in the correlation with population degree N. So the following keys appear in Correlations:

1. **BELONG**(CarID, BranchID)

2. **WORKS_FOR**(EmployeeID, BranchID)

3. **RECEIVE**(ReservationId, EmployeeId)

4. **DELIVER**(ReservationId, EmployeeId)

5. **WHATRESERVE**(ReservationId, ClientId)

6. **WHORESERVE**(ReservationId, CarId)

According to the above we can combine The following sets:

EMPLOYEES with **WORK_FOR**

BRANCHES with **BELONG**

RENTALS with **RECEIVER** and **DELIVER**

RESERVATIONS with **WHATRESERVE** and **WHORESERVE**

The new relationships will contain all fields from the entities and in addition the foreign keys (FK) and any attributes from The correlations.

In the following relational diagram it is not possible to depict some structural constraints, but obvious in the entity-correlation diagram:

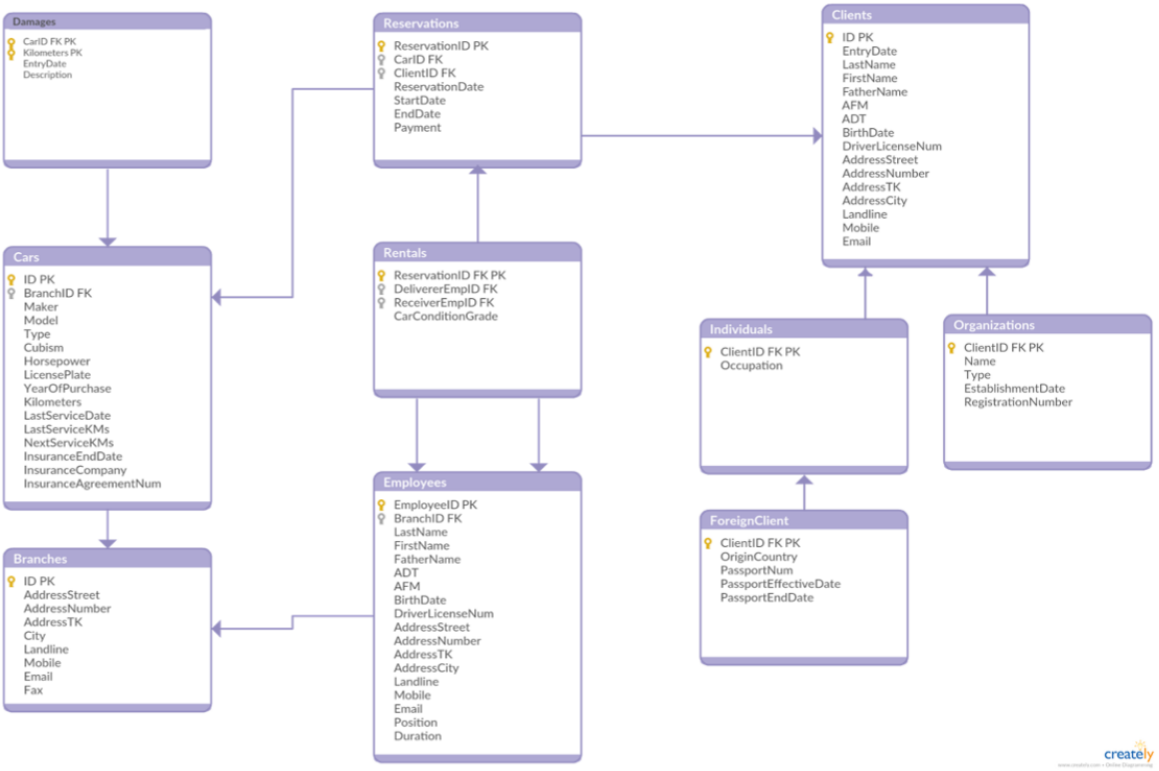
• The degree of representation, ie how many entities are interconnected with others in a correlation.

• The constraints of an entity's participation in a correlation (eg total participation).

• Any specializations or generalizations of entities (class-subclass) and the corresponding coverage (full, partial).

Weak sets of entities.

On the other hand, reference keys with foreign keys can be declared in the relational schema, provided that a diagrammatic format is used for the schema, like the one listed on the next page.


Damages
CarID FK PK
Kilometers PK
EntryDate
Description
Reservations
ReservationID PK
CarID FK
ClientID FK
ReservationDate
StartDate
EndDate
Payment
Clients
ID PK
EntryDate
LastName
FirstName
FatherName
AFM
ADT
BirthDate
DriverLicenseNum
AddressStreet
AddressNumber
AddressTK
AddressCity
Landline
Mobile
Email
Cars
ID PK
BranchID FK
Maker
Model
Type
Cubism
Horsepower
LicensePlate
YearOfPurchase
Kilometers
LastServiceDate
LastServiceKMs
NextServiceKMs
InsuranceEndDate
InsuranceCompany
InsuranceAgreementNum
Rentals
ReservationID FK PK
DelivererEmpID FK
ReceiverEmpID FK
CarConditionGrade
Individuals
ClientID FK PK
Occupation
Organizations
ClientID FK PK
Name
Type
EstablishmentDate
RegistrationNumber
Employees
EmployeeID PK
BranchID FK
LastName
FirstName
FatherName
ADT
AFM
BirthDate
DriverLicenseNum
AddressStreet
AddressNumber
AddressTK
AddressCity
Landline
Mobile
Email
Position
Duration
ForeignClient
ClientID FK PK
OriginCountry
PassportNum
PassportEffectiveDate
PassportEndDate
Branches
ID PK
AddressStreet
AddressNumber
AddressTK
City
Landline
Mobile
Email
Fax
creately