# Application Constraints

## Data

### Customers

* **Key attributes:** email address (EmailAddr)
* **Other attributes:** full name (Name), phone number (phone), date of birth (BirthDate), home address (HomeAddr)
* **Derived attributes:** age (Age) [*derived from date of birth*]
* Full name (Name) is composed of first name (FirstName) and last name (LastName)
* Home address (**HomeAddr**) is composed of street (**Street**), block (**Block**) and ZIP code (**ZIP**)
* Date of Birth (**BirthDate**) is composed of year (**Year**), month (**Month**) and day (**Day**)

### Bookings

* **Key attributes:** booking id (BookingID)
* **Other attributes:** booking date (BookingDate), start date (StartDate), number of days (Duration), pickup location (PickUpLoc), credit card (CredCardNum)
* **Derived attributes:** end date (EndDate) [*derived from start date and number of days*]

### Employees

* **Key attributes:** employee ID (EmployeeID)
* **Other attributes:** full name (Name), phone number (Phone), office ZIP (LocZIP), office name (LocName)
* Full name (Name) is composed of first name (FirstName) and last name (LastName)

### Drivers

* This class is a subclass of Employees
* **Other attributes:** PDVL number (PDVL)

### CarModels

* **Key attributes:** car brand (Brand), car model (Model)
* **Other attributes:** car capacity (Capacity), rent information (rentinfo)
* Rent information (rentinfo) is composed of daily rent price (DailyRentPrice) and deposit amount (DepositAmount)

### SpecificCar

* **Key attributes:** License Plate Number (LicensePlateNum)
* **Other attributes:** car colour (Colour), location (Loc), year of produced (ProducedYear), car condition (Condition)
* Car condition (Condition) is composed of damage condition (IsDamaged) and availability (IsAssigned)

### CarReport

* **This is a weak entity.**
* **Other attributes:** car colour (Colour), location (Loc), damage condition (IsDamaged), year of produced (ProducedYear)

## Relations

### Made

* *No additional attributes*
* A customer may initiate 0 or more bookings
* A booking must be initiated by *at exactly 1* customer
* A booking may be initiated by *at most one* customer (*i.e., the same booking id cannot be made by different customers*)
* **[Unenforced]** A booking initiated by a customer may be cancelled if no car is available after 2 days

### Hire

* *Additional attributes: hire start date (HireStartDate), number of days (Duration)*
* **Derived attributes:** hire end date (HireEndDate) [*derived from hire start date and number of days*]
* A booking may hire most 1 driver
* A booking may hire *at most one* driver as a driver is uniquely identified by PDVL
* A driver must be hired by *at 0 or more* customer
* A booking must have at most 1 driver
* **[Unenforced]** Booking can have a driver after there is a car assigned to this booking

### Assign

* *No additional attributes*
* A booking may assign exactly 1 car model
* A car model must be assigned by 0 or more bookings

### Contain

* *No additional attributes*
* A car model may contain 0 or more specific cars
* A specific car must be contained by exactly 1 car model

### Have

* *No additional attributes*
* A specific car may have 0 or more car reports
* A car report must be had by exactly 1 car model

### Create

* *No additional attributes*
* A employee can create 0 or more car reports
* A car report must be created by exactly 1 employee
* **[Unenforced]** A car report must be created by the employee who get the returned key from customer

### Certificate

* *No additional attributes*
* A employee can certificate 0 or more cars
* A car must be certificated by exactly 1 employee
* **[Unenforced]** A car must be certificated by the employee who has the same location with the car

### KeyPass

* *This is a Ternary Relation Set (Aggregation)*
* *Additional attributes: key return location (KeyReturnLoc), key return date (KeyReturnDate)*
* *A booking must have exactly 1 key of a specific car*
* *A car may pass key to 0 or more bookings*
* *A booking must pass exactly 1 key of a specific car to exactly 1 employee*
* *An employee must pass exactly 1 key of a specific car to a booking*
* **[Unenforced]** A booking must have a key if a specific car is available in the pick up location

### ISA

* *The attribute Drivers is a subclass of Employees*
* *Employee type can be overlapped, which means an employee can be an object of multiple instances*
* *Employee type cannot be covered, which means an employee can not belongs to subclass “drivers”*
* **[Unenforced]** Driver must have PDVL

# ER Diagram

*图示

描述已自动生成*