Project 02: Schema

Group #47

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Application Constraints

Customers

✔	Uniquely identified by **`email`**
✔	Have the required attributes **`address`**, **`dob`**, and **`phone`**
✘	Have the attribute **`name`** composed of the optional **`fsname`** and the required **`lsname`** – not possible to represent composite attributes, but possible to represent and enforce **`fsname`** and **`lsname`** individually (i.e. **`name`** is represented by **`fsname`** and **`lsname`** together)
✘	Have the derived attribute **`age`** – not possible to represent derived attributes (i.e. age can be derived from **`dob`** and **`current_date`**)
✔	May initiate 0 bookings
✔	May initiate more than 1 bookings
✔	May book more than 1 car with the same car model for the same date, and from the same location - – -- Not enforced under Customers but under Bookings. The same **`email`** can be in multiple Bookings entries with different **`bid`** values but same **`sdate`**, (**`model`**, **`brand`**) and **`zip`**
✔	Date of birth (**`dob`**) must be before today (*i.e.,* **`NOW()`**)

Locations

✔	Uniquely identified by **`zip`**
✔	Uniquely identified by location name (**`lname`**)
✔	Have the required attribute **`laddr`**
✔	May be for at least 0 bookings
✔	May be for more than 1 bookings
✔	May have 0 employee working
✔	May have more than employees working
✔	May have 0 car (*i.e., car details*) parked
✔	May have more than 1 cars (*i.e., car details*) parked

Employees

✔	Uniquely identified by **`eid`**
✔	Have the required attribute **`ename`** (*i.e., employee name*)
✔	Have the required attribute **`ephone`** (*i.e., employee phone number*)
✔	May handover the key for at least 0 booking
✔	May handover the key for more than 1 booking
✔	May receive returned key for at least 0 booking
✔	May receive returned key for more than 1 booking
✔	Must work in at least 1 location
✔	Must work in at most 1 location
✔	May be a driver – enforced under Drivers table, where each driver has an **`eid`** referenced to Employees' **`eid`**

Drivers

✔	Uniquely identified by **`eid`**
✔	Uniquely identified by **`pdvl`**
✔	May be hired by at least 0 bookings
✔	May be hired by more than 1 bookings
╳	Cannot be double-booked (*i.e., booked for two different bookings on overlapping date*) where overlapping date is computed from **`fromdate`** to **`todate`** (*of hires*) – requires check of **`fromdate`** and **`todate`** across multiple rows of the same table (Hires)
✔	Can only be hired for assigned bookings (*i.e., bookings with assigned car details*)
✔	When hired, the attribute **`ccnum`** must be recorded

CarModels

✔	Uniquely identified by **`brand`** and **`model`**
✔	Have the required attributes **`capacity`**, **`deposit`**, and **`daily`**
✔	May be rented by at least 0 bookings
✔	May be rented by more than 1 bookings
✔	May have at least 0 car details
✔	May have more than 1 car details

CarDetails

✔	Uniquely identified by **`plate`** (*i.e., license plate number*)
✔	Have the required attributes **`color`** and **`pyear`** (*i.e., production year*)
✔	Must be a detail for at least 1 car model
✔	Must be a detail for at most 1 car model
✔	Must be parked in at least 1 location (*i.e., when not being rented*)
✔	Must be parked in at most 1 location (*i.e., when not being rented*)
✔	May be assigned to at least 0 booking
✔	May be assigned to more than 1 bookings
╳	Cannot be double-booked (*i.e., booked for two different bookings on overlapping date*) where overlapping date is computed from **`sdate`** to **`edate`** (*of bookings*) – requires check of **`sdate`** and (derived) **`edate`** across multiple rows of the same table (Assigns)
✔	Car details handover must be during or after the car is assigned (*i.e., no entry in handover before assigns*) – possible as a booking must be made before a car can be assigned to a booking, an entry in handover can only be made when a booking is assigned a car.
✔	Car details return must be during or after the car is assigned (*i.e., no entry in returned before assigns*) – similar to above, possible as booking must be made before returning of car details
╳	Car details return must be during or after the car handover (*i.e., no entry in returned before handover*) – requires check across two different tables (Returned and Handover). Since the ER diagram does not capture the return date of the returned event, we cannot compare based on date. Alternatively, we can compare based on the existence of the corresponding **`bid`** in handover to determine if the "return must be during or after the car handover". In both cases, we would be checking across two tables, which cannot be enforced.
╳	Car details handover must be by the same employee working in the same location as specified in bookings – requires check of **`zip`** across two different tables (Bookings and Employees)
✔	The **`ccnum`** used to initiate booking may be different **`ccnum`** used to pay excess for return – **`ccnum`** in Bookings and in Returned are separate variables in different tables that are not related to one another. Therefore, it is possible for both instances to be different
╳	The car (*i.e., car details*) assigned to the booking must be for the car models rented by the booking

	– requires check of (**`model`**, **`brand`**) across two different tables (CarDetails and Bookings)
╳	The car (*i.e., car details*) assigned to the booking must be park in the same location as the booking – requires check of **`zip`** across two different tables (CarDetails and Bookings)

Bookings

✔	Uniquely identified by **`bid`**
✔	Have the required attributes **`sdate`** and **`days`**
✔	Have the required attribute **`ccnum`** and **`bdate`** (*booking date*) when initiated by a customer
✔	Have the attribute **`ccnum`** and **`cost`** (*required*) when returned by a customer
╳	Have the derived attribute **`edate`** – not possible to represent derived attributes (i.e. edate can be derived from **`sdate`** and **`days`**)
✔	Must be initiated by at least 1 customer
✔	Must be initiated by at most 1 customer
✔	Must rent at least 1 car model
✔	Must rent at most 1 car model
✔	Must be for least at 1 location
✔	Must be for most at 1 location
✔	May be handovered by at least 0 employee
✔	Must be handovered by at most 1 employee
✔	May be returned to at least 0 employee
✔	Must be returned to at most 1 employee
✔	May be assigned at least 0 car (*i.e., car details*)
✔	Must be assigned at most 1 car (*i.e., car details*)
✔	May hire at least 0 driver
✔	Must hire at most 1 driver
✔	**`ccnum`** is required in return if the cost is positive (*i.e., more than 0*)
✔	The **`fromdate`** and **`todate`** for the hiring of driver (*if any*) must be within **`sdate`** and **`edate`**
✔	The booking date (**`bdate`**) must be before **`sdate`**