# Application Constraints

## Data

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| Customers | | |
| ✓ | email address (email) | Key attributes |
| ✓ | phone number (phone)  date of birth (dob)  home address (address) | Attributes |
| ✓ | age (age) | Derived from *date of birth* |
| ✓ | full name (name) | Composed of first name (fsname) and last name (lsname) |

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| Locations | | |
| ✓ | zip code (zip) | Key attributes |
| ✓ | location name (lname) | Candidate key |
| ✓ | location address (laddr) | Attributes |

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| Employees | | Superclass of Drivers |
| ✓ | employee id (eid) | Key attributes |
| ✓ | full name (ename)  phone number (ephone) | Attributes  ***Note:*** *location comes from relationship set* |

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| Drivers | | Subclass of Employees  Covering is False ; Overlap is True (*but irrelevant*) |
| ✓ | private hire license (pdvl) | Candidate key |

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| CarModels | | |
| ✓ | car brand (brand)  car model (model) | Key attributes |
| ✓ | capacity (cap)  deposit (deposit)  daily rental price (daily) | Attributes  ***Note:***deposit *+* daily *can also be composite attributes* |

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| CarDetails | | This is not a Weak Entity set because license plate is not a partial key |
| ✓ | license place number (carNum) | Key attributes |
| ✓ | car color (color)  year produced (pyear)  car condition (condition) | Attributes  ***Note***: *location comes from relationship set* |

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| Bookings | | |
| ✓ | booking id (bid) | Key attributes |
| ✓ | booking date (bdate)  start date (sdate)  number of days (days)  pickup location (zip) | Attributes  ***Note:*** *customer, car model, car details, driver, etc comes from relationship set* |
| ✓ | end date (edate) | Derived from (*start date + number of days*) |

A booking is uniquely identified by the booking id. Additional information that needs to be recorded are the start date, the number of days, the pickup location, the credit card number used to make the payment, as well as the booking date.

## Relations

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| Initiates | |
| ✓ | **Binary relationship involving customers and bookings** |
| ✓ | *Attribute: Credit Card number (*ccnum*)* |
| ✓ | A customer may initiate 0 bookings |
| ✓ | A customer may initiate more than 1 bookings |
| ✓ | A booking must be initiated by at least 1 customer |
| ✓ | A booking may be initiated by at most 1 customer (*i.e., f*or *the same booking id*) |
| ✓ | A booking initiated by a customer may be cancelled if no car is available after 2 days |

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| Hires | |
| ✓ | **Binary relationship involving drivers and bookings** |
| ✓ | *Attribute: Credit Card number (*ccnum*)* |
| ✓ | A booking may involve 0 drivers |
| ✓ | A booking may involve at most 1 driver |
| ✓ | A driver may involve in 0 bookings |
| ✓ | A driver may involve in more than 1 bookings |
| ✗ | A driver is only hired if there is a car allocated to the booking |

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| Rents | |
| ✓ | **Binary relationship involving car model and bookings** |
| ✓ | *No additional attributes* |
| ✓ | A booking must involve at least 1 car model |
| ✓ | A booking may involve at most 1 car model |
| ✓ | A car model may be involved in 0 booking |
| ✓ | A car model may be involved in more than 1 bookings |
| ✗ | A car belonging to such model must be available for the booking in the location |

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| Allocates | |
| ✓ | **Binary relationship involving car details (*i.e., car*) and bookings** |
| ✓ | *No additional attributes* |
| ✓ | A booking may involve 0 car |
| ✓ | A booking may involve at most 1 car |
| ✓ | A car may be involved in 0 booking |
| ✓ | A car may be involved in more than 1 bookings |
| ✗ | A car is only allocated if it is available, not damaged, and before a driver is assigned |
| ✓ | A car must match the car model booked |

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| Works | |
| ✓ | **Binary relationship involving employees and locations** |
| ✓ | *No additional attributes* |
| ✓ | An employee must work in at least 1 location |
| ✓ | An employee may work in at most 1 location |
| ✓ | A location may have 0 employee |
| ✓ | A location may have more than 1 employee |

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| Parks | |
| ✓ | **Binary relationship involving car details (*i.e., car*) and locations** |
| ✓ | *No additional attributes* |
| ✓ | A car must be parked in at least 1 location |
| ✓ | A car may be parked in at most 1 location |
| ✓ | A location may have 0 car parked |
| ✓ | A location may have more than 1 cars parked |

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| DetailsFor | |
| ✓ | **Binary relationship involving car details (*i.e., car*) and car model** |
| ✓ | *No additional attributes* |
| ✓ | A car must be a detail info for at least 1 car model |
| ✓ | A car may be a detail info in at most 1 car model |
| ✓ | A car model may have detail info for 0 car |
| ✓ | A car model may have detail info for more than 1 cars |

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| Handovers | |
| ✓ | **Binary relationship involving employee and bookings** |
| ✓ | *No additional attributes* |
| ✓ | An employee may handover for 0 bookings |
| ✓ | An employee may handover for more than 1 bookings |
| ✓ | The key to a booking may be hand given by 0 employees (*i.e., not yet given*) |
| ✓ | The key to a booking may be given by at most 1 employee |
| ✗ | Booking location and employee location must be the same |

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| Receives | |
| ✓ | **Binary relationship involving employee and bookings** |
| ✓ | *Attribute: damage report (*report*), repair cost (*cost*), and Credit Card number (*ccnum*)* |
| ✓ | An employee may receive back for 0 bookings |
| ✓ | An employee may receive back for more than 1 bookings |
| ✓ | The key to a booking may be received by 0 employees (*i.e., not yet given*) |
| ✓ | The key to a booking may be received by at most 1 employee |
| ✗ | Repair cost should not exceed deposit |
| ✗ | Entries to Receives must come after entries to Handovers |