1. The system will be used only by employees of the car rental company.
2. Each user signs in with an assigned user id and password. Each user can inquire own personal details as well as change own password.
3. A user with ADMIN Privilege will be initialized in the database and the access given to the system owner. Only users assigned ADMIN Privilege can create, modify users, grant and revoke user Privileges. A user can be assigned zero, one, or more Privileges.
4. Each business operation requires specific Privileges. Only users granted those Privileges can perform the business operation.
5. Creation and deletion of Privileges, as well as association of Privileges to specific business operations is an application program maintenance task. Association of Privileges to specific users is however a business operation that requires ADMIN Privilege.
6. Access to record deletion is granted only to user with ADMIN or MANAGER Privilege. User deletion is only allowed for ADMIN. The physical deletion however will always be subject to referential integrity constraints in the database. In real world practice, deletions should be carried out in a more structured manner called Archiving.
7. Business Operations by Privileges:
   1. ALL: for all users.
      1. Log-in
      2. View non-sensitive own personal details.
      3. Change own password.
   2. ADMIN: for administrators
      1. Create, modify, suspend users. Suspended users are barred from log-in.
      2. Grant/Revoke Privileges to users.
   3. MANAGER :
      1. Create Car into NEW status.
      2. Maintain daily flat rate for Cars.
      3. Maintain fee schedule.
      4. Monitor Cars utilization. Especially those not generating income for last <x> days, or utilization below <y>% for the last <z> days.
      5. Delete RETIRED Car.
   4. FRONT: for front desk who serve customers
      1. Create, Modify customers.
      2. Search for available cars base on customer specifications. Because there is no forward booking, candidate cars are always retrieved from current READY status cars.
      3. All hiring starts from now. Customer will provide an expected return date/time. Hire fee is computed for each candidate car.
      4. Conclusion and creation of an hire. While a hiring contract is being finalized between FRONT and Customer, Car status is set to HOLD. Car status is updated to BOOKED upon conclusion of the rental.
      5. HOLD status is automatically returned to READY if not updated to BOOKED in 15 minutes.
      6. Hiring extension: a customer can call in to extend the current rental before expiry. Early extensions are charged at normal rate.
      7. Late extension: a customer can call in to extend the current rental after expiry. In that case, the period from original expiry to current time will be charged at LATE penalty rate. The period from current time to new expiry will be charged normal rate.
      8. Return of car. A car can be returned:
         1. On-time:
         2. Ahead of time: There will be no refund.
         3. Late: Late return will attract additional changes. This is handled by adding a hire record starting from the original end date/time at LATE penalty rate.

In all cases, the hire records will be created/updated and an invoice generated on web page. As a result, one Invoice may be associated with one or more Hiring records.

A Car must be returned to the MECHANIC for status change from HIRED to DEPOT, before FRONT can process the car return.

* + 1. Each hiring record must register the date time and staff id who serves the customer, for the renting out as well as the returning/renewal.
  1. MECHANIC: back office, who looks after the fleet.
     1. Release Car at status BOOKED to Customer and set status to HIRED.
     2. Take back a returned car from Customer, set status from HIRED to DEPOT.
     3. Take back a returned car from Customer, set status from HIRED to DEPOT.
     4. Setting NEW cars to status READY for rental.
     5. When a car is returned, the status is changed from HIRED to DEPOT.
     6. Inspect cars of DEPOT and REPAIR status, and set the status to READY after inspection. Back office can also set DEPOT status to REPAIR if more time is required to service the car.
     7. Back office can also RETIRE a car that is not fit for rented out. Records of RETIRED cars will be archived after a certain period of time.
     8. All the status changes are journaled.

1. Cars:
   1. There should be feature for upload of multiple pictures for each car. Pictures can be added and deleted and reordered. Pictures can be shown to aid choosing.
   2. Besides basic Car details, Car Activities History is maintained to keep track of the begin-end time of each status change. It can therefore generate the start-end date/time of rental, start-end date/time of a DEPOT, start-end date/time of READY (or IDLE), start-end date/time of REPAIR, and start-end date/time of RETIRE (no end time). It will be used to compute the fleet utilization efficiency.
2. Creation and deletion of car Statuses, as well as association of car Status to business operations is an application program maintenance task. Association of car Statuses to specific Car is however a business operation that requires relevant Privileges.
3. Testability and the use of system clock:
   1. The application should refer to the clock whenever necessary, and especially for starting and ending time for each hiring.
   2. To make test more efficient, the application should be able to run in test mode, where a user maintained offset (in positive or negative number of days and hours) is applied to the clock before returning to the application. This allows the clock to be manipulated manually by the tester in a manner to fast track the time.
   3. Due to the nature of the business, the user should be allowed to adjust the start time and return time up to <zz> minutes ahead or behind the clock.
4. Keep these future enhancements in view.
5. Creation of new branches, cars can be rented and returned at different branches.
6. New fee schedules.
7. Customer self service, registration and car booking.

Fee Schedule:

Hiring Fee computation:

1. Each car is assigned a flat daily and flat hourly rate by MANAGER.
2. Phase 1: cars are hired on a daily basis similar to hotels:
3. Cars can be hired “daily” or “hourly” or a combination of both.
4. Daily rated: similar to hotel rooms. There is a specific start time of 14:00 and end time of 12:00.
5. Hourly rated: for hire periods that cover less than 24 hours. Each day is divided into certain segments: 08:00-10:00, 10:00-12:00, 12:00-14:00, 14:00-16:00, 16:00 to 18:00. 18:00 – 08:00. Each segment is assigned a percentage which is applied to the daily rate. A hiring from 11:00 on day 1, to 15:00 on day 3, will be charged as below:
   1. Two hourly segments: Day 1 10:00-12:00, 12:00 -14:00
   2. Two days: Day 1 14:00 to Day 3 12:00.
   3. Two hourly segments: Day 3 12:00 to 14:00, 14:0 to 16:00.
6. If hour rate computation result in a fee higher than daily rate, daily rate will be used. For example: A hiring from 11:00 on day 1, to 09:00 on day 4, will be charged as below:
   1. Two hourly segments: Day 1 10:00-12:00, 12:00 -14:00
   2. Two days: Day 1 14:00 to Day 3 12:00.
   3. Five hourly segments: Day 3 12:00 to 14:00, 14:0 to 16:00, 16:00-18:00, 18:00-08:00, Day 4 08:00-10:00.

The last five hourly segments are likely to cost more than one daily rate, and the hiring is likely to be changed as below instead:

1. Two hourly segments: Day 1 10:00-12:00, 12:00 -14:00
2. Three days: Day 1 14:00 to Day 4 12:00.
3. Week-end factor: there is a percentage mark-up for weekend rentals, weekend period refer to Friday 14:00 to Monday 12:00.
4. Penalty factor: cars returned late will be subject to penalty markup base on percentage.
5. The fee module should be developed such that it can be changed.