# Background

This section describes the business to which the software solution is built for.

It is a one branch car rental shop. The owner sources cars and introduce to the fleet for rental. Customers come to the counter for on the spot rental. The shop opens from 09:00 to 21:00. The fare model is similar to hotel room, and is charged by the day from 14:00 to 12:00 next day. Car collection from 09:00 to 14:00, if available, will be charged extra 25% to 50% of daily rate. Cars returned late between 12:00 to and 21:00 will be charged extra 25% to 50% of daily rate.

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The future of the company. How the business owner envisage the business will expand. Those will affect the future enhancement that may be needed for the system.

# Proposed solution

1. The system will be accessed only by Employees of the car rental company.
2. Each Employee signs in with an assigned UserName and password. Each Employee can inquire own personal details as well as change own password.
3. An Employee with ADMIN Role will be initialized in the database and the access given to the system owner. Only Employees assigned ADMIN Role can create, modify Employee records, reset passwords, grant and revoke Employee Roles. An Employee can be assigned zero, one, or more Roles.
4. Each business operation requires specific Roles. Only Employees granted those Roles can perform the business operation.
5. Creation and deletion of Roles, as well as association of Roles to specific business operations is an application program maintenance task. Association of Roles to specific Employees is however a business operation that requires ADMIN Role.
6. Access to record deletion is granted only to Employees with ADMIN or MANAGER Roles. Employee deletion is only allowed for ADMIN. The physical deletion however will always be subject to referential integrity constraints in the database.
7. Business Operations by Roles:
   1. ALL: for all users.
      1. Log-in
      2. View non-sensitive own Employee details.
      3. Change own password.
   2. ADMIN: for administrators
      1. Maintain system configuration parameters, such as:
         1. Car return grace period in number of minutes.
      2. Create, modify, suspend Employees. Suspended Employees are barred from log-in.
      3. Reset Employee passwords, Unsuspended Employees.
      4. Grant/Revoke Roles to Employees.
   3. MANAGER :
      1. Create Car into FREE status.
      2. Maintain daily base rate for Cars, and other Car details.
      3. Upload of multiple pictures for each car. Pictures can be added, deleted, and reordered. Pictures can be shown to aid choosing.
      4. Maintain fare schedule.
      5. Monitor Cars utilization. Especially those not generating income for last <x> days, or utilization below <y>% for the last <z> days.
      6. Set Car status to RETIRED. Retired Cars cannot be hired.
      7. Suspend/Unsuspend Customers.
   4. USER: for front desk who serve customers
      1. Create, Modify Customers. Suspend Customers.
      2. When Customers are created by USER, they are created with status Suspended. Such Customer has to be Unsuspended by MANAGER before allowed to hire Vehicles.
      3. Search for available Cars base on Customer specifications (filters). Because there is no forward booking, candidate cars are always retrieved from current READY status cars.
      4. All Hire starts from now. Customer will provide an expected return date/time. Hire fee is computed for each candidate car.
         1. When Car hire starts before 14:00, there is an early start fee of 25% of daily rate.
         2. If expected Car return is after 12:00, there is a late return fee of 25% of daily rate.
      5. Conclusion and creation of a Hire. Car status is updated to HIRED upon conclusion of the rental.
      6. There has to be mechanism to prevent double booking of the same Car/Customer due to concurrent access.
      7. Return of car. A car can be returned:
         1. On-time:
         2. Ahead of time: There will be no refund.
         3. Late: When a Car is returned after expected date/time, the extra period is charged separately as if it is a new hire from original return date/time.

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 Hire records.

* + 1. Each Hire record must register the date time and staff id who serves the customer, for the renting out as well as the returning, and any late returns.

1. From the Hire records, a fleet utilization efficiency statistics will be generated and presented graphically.
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 Roles.
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.

# Fare Schedule

Hiring Fare computation:

1. Each car is assigned a base daily rate by MANAGER.
2. Phase 1: cars are hired on a daily basis similar to hotels. There is a specific start time of 14:00 and end time of 12:00.
3. Same day early dispatch and late return will each attract quarter day to half day rate.
4. Week-end factor: there is a percentage mark-up for weekend rentals, weekend period refers to Friday 14:00 to Monday 12:00.
5. Penalty factor: For cars returned late, the period from original return date/time to actual return date/time will be subject to separated billing with a percentage based penalty markup.
6. The fee module should be developed such that it can be easily changed.

# Out of Scope

The following are out of scope:

1. The solution is to be deployed in company intra-net, and not meant for internet. It is to be used by company staff.
2. User authentication is performed using Spring Framework base on user name and passwords stored in Oracle database. There is no Oauth2 authentication.
3. Customers have no direct access to the application. They are served by the company staff. Customer cannot make booking on their own.
4. This is not a Human Resources system. It does not handle staff attendance, performance appraisal, nor payroll.
5. This is not an accounts receivable system. It does not handle invoicing nor payments.

# Technology

The system should be developed on these technology:

1. Use Oracle database to start all busines data.
2. The application is to be built using Spring Framework.
3. The users access the application with regular internet browsers.
4. CSS and Bootstrap can be used for web page styling.
5. Thymeleaf can be used for presentation of business data on web pages.
6. Javascript and JQuery can be used to enrich user interaction.

# Future Enhancement

While building the solution, developer should keep these future enhancements in view, to avoid designs that may hinder the introduction of the following enhancements.

1. Hiring extension: a customer can call in to extend the current Hire before expiry. Early extensions are charged at normal rate.
2. Late extension: a customer can call in to extend the current Hire 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.
3. Change to more responsive and faire fee schedules.
4. Allow ADMIN to maintain association of Business Operations to Roles, so that tasks can be assigned to different Roles instead of as defined in original user requirements.
5. Creation of new branches, cars can be rented and returned at different branches.
6. Creation of new Role MECHANIC, who looks after the fleet. Tracking of cars sent for service and repair.
7. Customer self-service for registration and forward booking.