CS631-103 Term Project

Car Rental System

Phase 3

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Table of Contents

PART 1 – Business Requirements:

The Following are the business requirements for the Car Rental system. These requirements will be grouped into sections to provide a better understanding from each component.

Customer requirements:
A. A customer must make a reservation prior to rent a car.
B. If customer decides to proceed with the rental, she/he will get a rental agreement.
C. The customer must provide name, address, and phone at reservation time.
D. Lastly, the customer must provide a valid driver's License and credit card if she/he gets a rental agreement.

Reservation requirements:
A. The reservation must specify a type of class car.
B. The reservation will be made for a specific pick-up and drop-off location.
C. Pick-up and drop-off location do not have to be the same but can.
D. The reservation will include a rental period. This period consists of the start date and time and end date and time.
E. Reservation will have a type. To know if customer reserved by phone, walk-in or online. *
F. The reservation will have a status. *
G. Status will be active if customer shows up at pick-up location on start date.
H. Reservation will be cancelled if customer does not appear on start date and/or calls to cancel.

Location requirements:
A. A location can hold several cars.
B. Not all locations will have the same number of cars or classes of cars.
C. Each location is associated with a reservation either in pick-up or drop-off form.

Car requirements:
A. A car must be either at a location or with a customer (under a rental agreement).
B. If a car is rented it must be associated with a rental agreement.
C. Once a car is returned it becomes available for a new rental agreement.
D. A car is associated with a specific model

Model Requirements:
A. A model has several cars associated to it.
B. A model is associated with a single car class.

Car Class Requirements:
A. A class car has several models associated to it.
B. A class car has several cars associated to it.
C. Each reservation has a car class specified.

Agreement Requirements:
A. Getting a rental agreement is only possible if there is a reservation.
B. Agreements can only be made to one person.
C. Agreements can only be associated with one specific car.
D. An agreement's rental period is based on reservation rental period.
E. If a car is returned earlier, the Agreement will still base its rental period of the reservation.
F. If a car is returned late (after reservation rental period) the Agreement will save its new return date and time.
G. The agreement specifies the car's initial odometer reading.
H. Once the car is return the agreement will store the ending or returning odometer reading.

Invoice Requirements:
- A. An invoice must be associated with a rental agreement.
- B. Invoices will have a status. This indicate if it has been paid or not.
- C. The invoice will calculate its amount due based on:
    - a. Comparing Reservation's rental period and Agreement's return date.
        - i. If return dates are equal no extra fees are applied
        - ii. If Agreement's return date is less than Reservation's, amount is based on Reservation's period.
        - iii. If Agreement's return date is older than Reservation's, amount is based on Reservation's period, extra days, and late fees.
    - b. Extra days:
        - i. Extra days are solely charge on daily rate
    - c. Rates:
        - i. Car rates are based on the car class selected
        - ii. If a reservation period is a week period, the weekly rate is applied.
        - iii. If a reservation period is less than a week period, the daily rate is applied.
        - iv. If a reservation period is more than a week period:
            - 1. A 7-day period will have a weekly rate
            - 2. Days outside of a week period will be charge with a daily rate.
    - d. Late Fee:
        - i. A late fee is 15% of a daily rate for a type of class car.
        - ii. A late fee will be applied to every single extra day.

Decision Design

As mentioned before the business requirements for the Car Rental System are grouped into sections or categories. This decision was taken to portrait a better understanding of what is required from each business component. This saved us time and clarify the path for the creation of the database specially when wrijating the SQL statements.
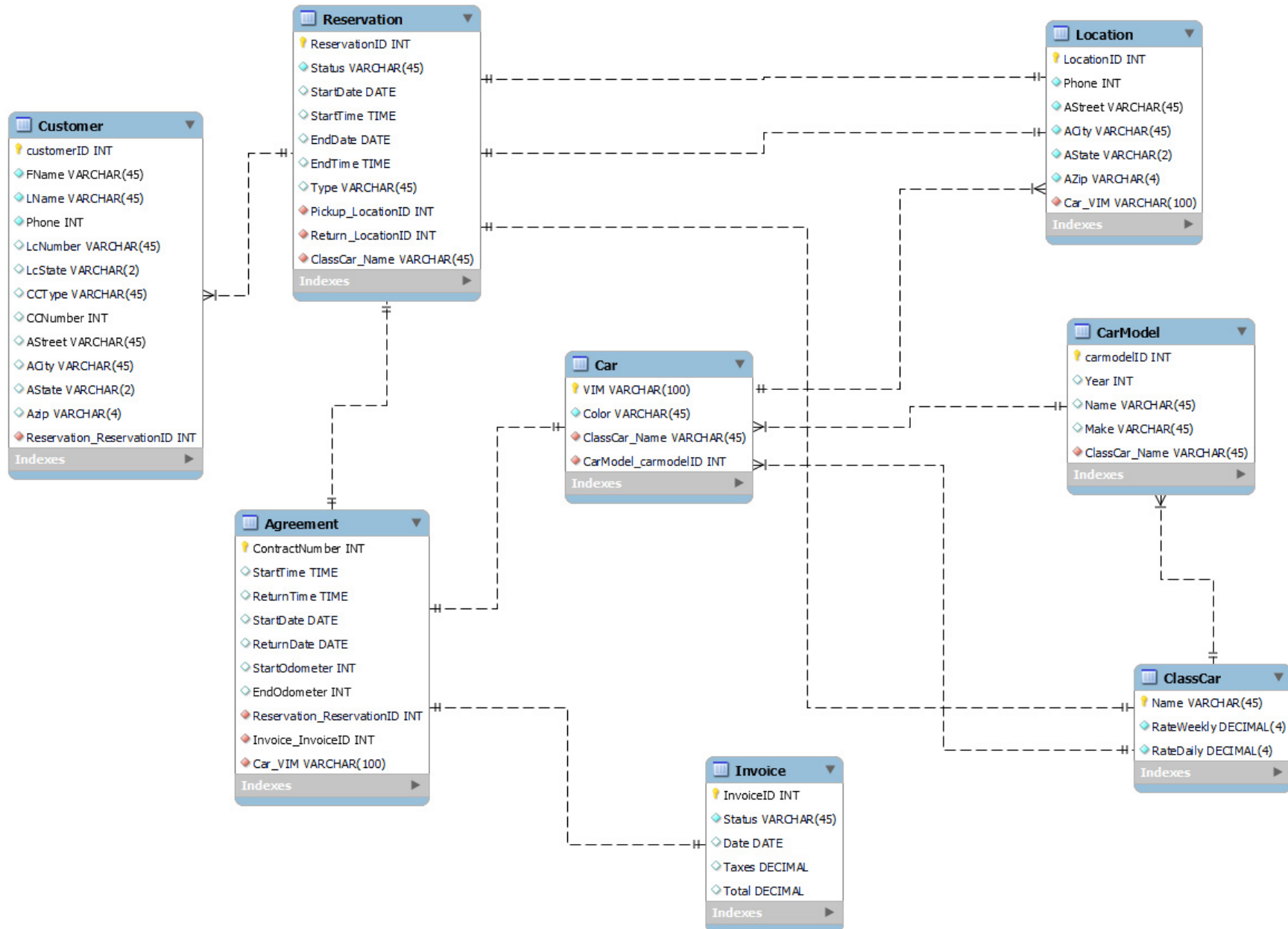
PART 2 – ER Diagram:

Below you can find the Entity Relationship diagram based on the business requirements.
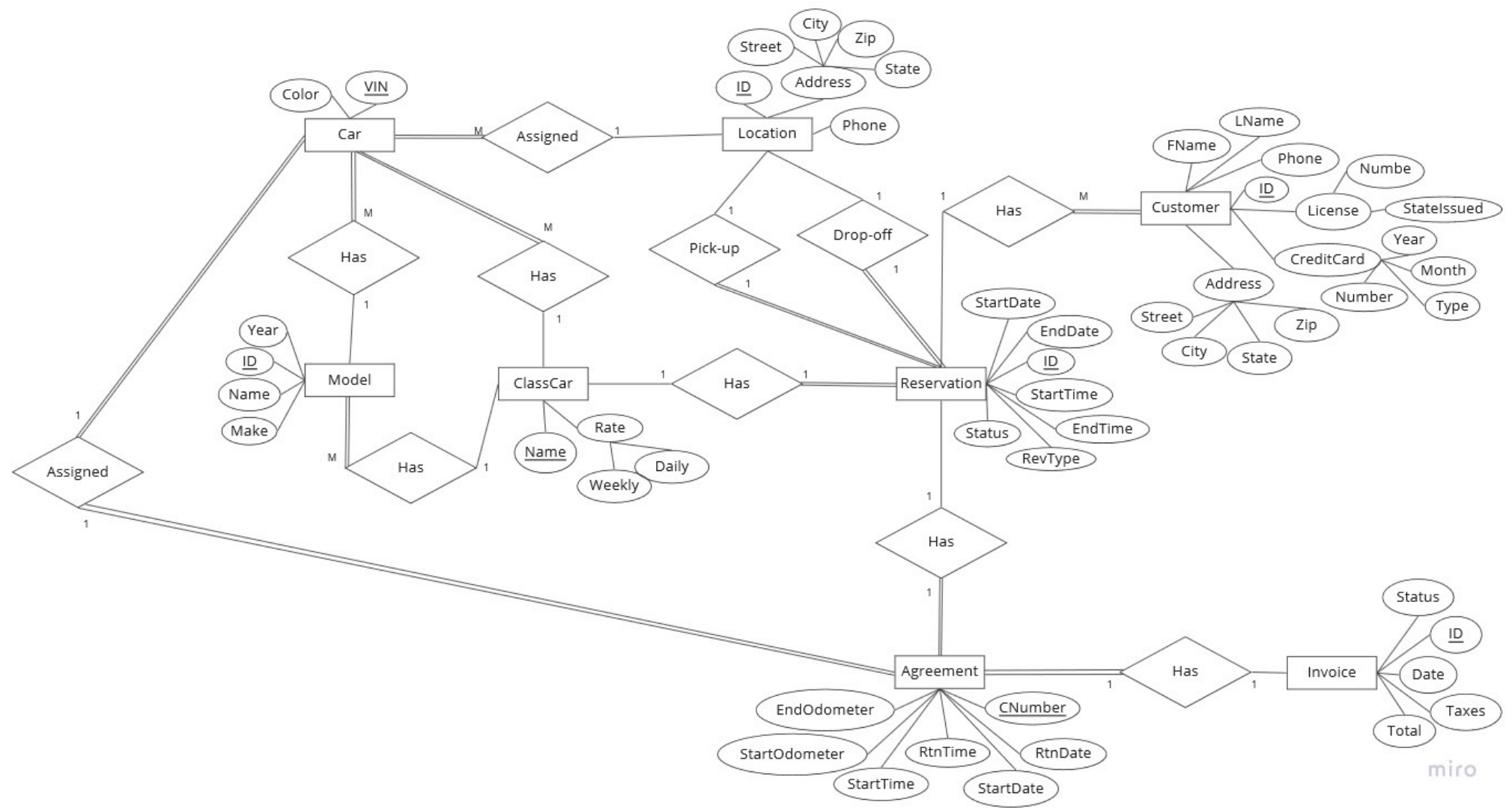
PART 3 – Rational Schema Diagram:

Below you can find the Relational Schema based on the ER diagram.

Reservation
- ReservationID INT
- Status VARCHAR(45)
- StartDate DATE
- StartTime TIME
- EndDate DATE
- EndTime TIME
- Type VARCHAR(45)
- Pickup_LocationID INT
- Return_LocationID INT
- ClassCar_Name VARCHAR(45)
- Indexes

Location
- LocationID INT
- Phone INT
- AStreet VARCHAR(45)
- ACity VARCHAR(45)
- AState VARCHAR(2)
- AZip VARCHAR(4)
- Car_VIM VARCHAR(100)
- Indexes

Customer
- customerID INT
- FName VARCHAR(45)
- LName VARCHAR(45)
- Phone INT
- LcNumber VARCHAR(45)
- LcState VARCHAR(2)
- CCType VARCHAR(45)
- CCNumber INT
- AStreet VARCHAR(45)
- ACity VARCHAR(45)
- AState VARCHAR(2)
- Azip VARCHAR(4)
- Reservation_ReservationID INT
- Indexes

Car
- VIM VARCHAR(100)
- Color VARCHAR(45)
- ClassCar_Name VARCHAR(45)
- CarModel_carmodelID INT
- Indexes

CarModel
- carmodelID INT
- Year INT
- Name VARCHAR(45)
- Make VARCHAR(45)
- ClassCar_Name VARCHAR(45)
- Indexes

Agreement
- ContractNumber INT
- StartTime TIME
- ReturnTime TIME
- StartDate DATE
- ReturnDate DATE
- StartOdometer INT
- EndOdometer INT
- Reservation_ReservationID INT
- Invoice_InvoiceID INT
- Car_VIM VARCHAR(100)
- Indexes

Invoice
- InvoiceID INT
- Status VARCHAR(45)
- Date DATE
- Taxes DECIMAL
- Total DECIMAL
- Indexes

ClassCar
- Name VARCHAR(45)
- RateWeekly DECIMAL(4)
- RateDaily DECIMAL(4)
- Indexes

PART 4 – Application Program Design
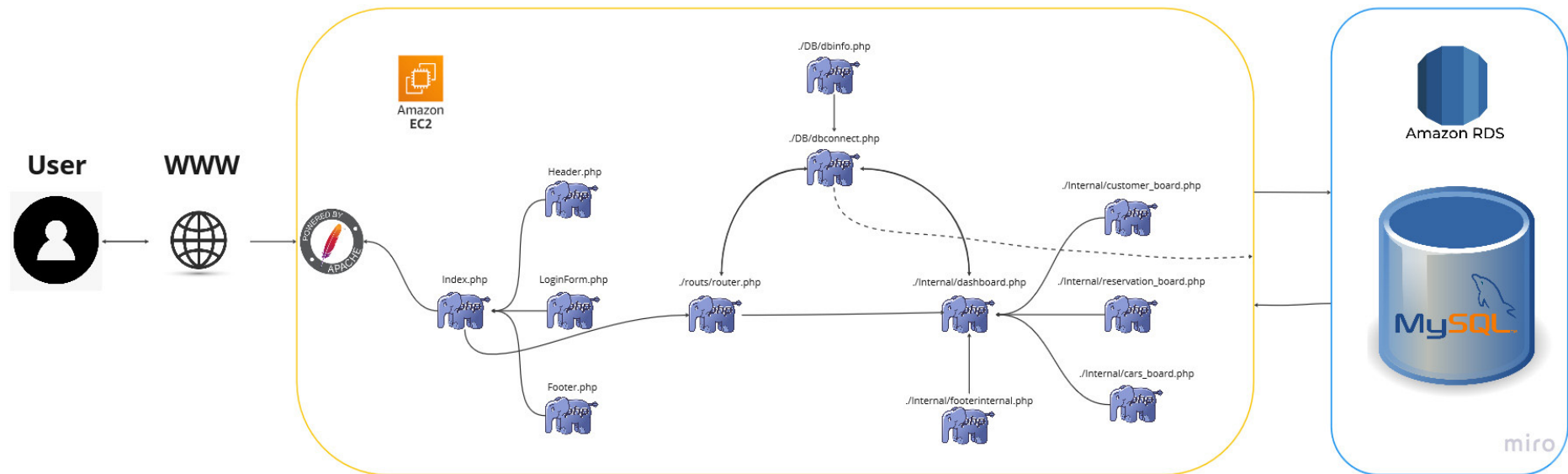
Top: Overview of mini-app architecture.

Right: App folder structure.

Source Code: You can find the entire source code for the
application in Annex A, at the bottom of
this document.


```
[anthophila@beehive html2]$ tree
.
├── DB
│   ├── dbconnect.php
│   └── dbinfo.php
├── footerSection.php
├── graphics
│   ├── njit_logo.ai
│   ├── njit_logo.svg
│   └── njit.png
├── index.php
├── Internal
│   ├── cars_board.php
│   ├── customer_board.php
│   ├── dashbord.php
│   ├── footerInternal.php
│   └── reservations_board.php
├── loginForm.php
├── navSection.php
├── routs
│   └── router.php
├── titleSection.php
└── utils
    └── utils.php

5 directories, 17 files
[anthophila@beehive html2]$ 
```

PART 5 - SQL Queries

SQL Queries:

a. Group By

| Get a count of the classes of cars being rented out. | SELECT COUNT(ReservationID) AS Count , ClassCar_Name FROM Reservation GROUP BY ClassCar_Name; |

```
15 •  SELECT COUNT(ReservationID) AS Count , ClassCar_Name
16     FROM Reservation
17     GROUP BY ClassCar_Name;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Cont

Count	ClassCar_Name
3	Luxury
1	Minivan
1	Pickup
1	Sedan

b. Group By & Having

| Get all reservations that have only 1 class of car reserved. | SELECT COUNT(ReservationID) AS Count , ClassCar_Name FROM Reservation GROUP BY ClassCar_Name HAVING COUNT(ReservationID) < 2; |

```
15 •  SELECT COUNT(ReservationID) AS Count , ClassCar_Name
16     FROM Reservation
17     GROUP BY ClassCar_Name
18     HAVING COUNT(ReservationID) < 2;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Count	ClassCar_Name
1	Minivan
1	Pickup
1	Sedan

c. In

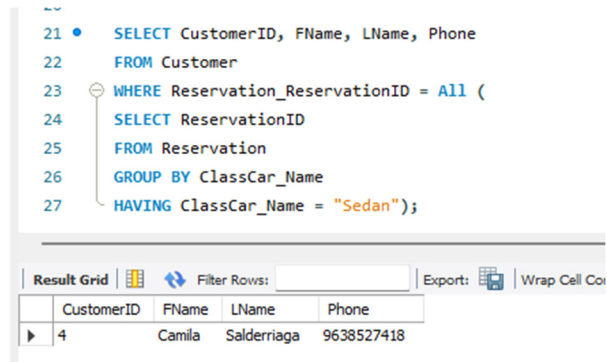| Get all the customer who have a current reservation with a luxury car. | SELECT * FROM Customer WHERE Reservation_ReservationID IN (SELECT ReservationID FROM Reservation WHERE ClassCar_Name="Luxury"); |

```
21 •  SELECT *
22     FROM Customer
23   ⊖ WHERE Reservation_ReservationID IN (
24     SELECT ReservationID
25     FROM Reservation
26     WHERE ClassCar_Name="Luxury");
27
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

customerID	FName	LName	Phone	LcNumber	LcState	CCType	CCNumber	AStreet	ACity	AState	Azip	Reservation_ReservationID
1	Jairo	Perez	1234567890	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	16
5	James	Gosling	18002255889	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	17
7	Guido van	Rossum	1112223330	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	18
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	

d. All

Get all the customer who have a current reservation with a luxury car.

```
SELECT CustomerID, FName, LName, Phone
FROM Customer
WHERE Reservation_ReservationID = All (
SELECT ReservationID
FROM Reservation
GROUP BY ClassCar_Name
HAVING ClassCar_Name = "Sedan");
```

PART 6 – Narrative Conclusion

a) The group's experience with the project.
   - I like the idea that the scenarios proposed for the project were geared towards real life situations. As a student and a person with some field experience, I can see how these situations could come up. The project prepares us for the different caveats we can encounter.

b) Which steps were the most difficult?
   - The most difficult step was simplifying the business requirements. It's the part which takes the most attention and time to get down. Since understanding the requirements in a wrong way signifies that any work done from that point on will be wasted. To that end, the part with more time invested was on the analysis of the project.

c) Which were the easiest?
   - Creating and running the SQL statements and coding the application.

d) What did you learn that you did not imagine you would have?
   - Project management. I enjoyed the idea of being team lead. Laying out the different components we needed to accomplish the project.

e) If you had to do it all over again, what would you have done differently?
   - Set a task chart. Be more organized with the team.

PART 7 – Version Control

Version	Amendment Number	Date	Requestor	Comment	Results
1	1.1	11/2/2022	Prof. Canan	MODEL is a separate entity, not just an attribute. CAR has MODEL, MODEL is associated with CLASS. Please revise your diagram.	ER diagram has been modified to reflect changes. Entity MODEL has been added. Changes reflected on: Part 2, page 5.
2	2.1	11/16/2022	Jairo A. Perez	Current "Relational Schema" diagram is difficult to read. Arrows are difficult to follow.	Switched from Microsoft Word to MySQL Workbench for relational schema diagram creation.

PART 8 – Annex A: Source Code

Index.php	```html
	<!doctype html>
	<html lang="en" style="height:100%;">
	  <head>
	    <!-- Required meta tags -->
	    <meta charset="utf-8">
	    <meta name="viewport" content="width=device-width, initial-scale=1">
	
	    <!-- Bootstrap CSS -->
	    <link
	href="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/css/bootstrap.min.css"
	rel="stylesheet" integrity="sha384-
	EVSTQN3/azprG1Anm3QDgpJLIm9Nao0Yz1ztcQTwFspd3yD65VohhpuuCOmLASjC"
	crossorigin="anonymous">
	
	    <title>Car Rental</title>
	    </head>
	    <body style="height:100%;">
	
	      <?php
	        include_once "./titleSection.php";
	        echo " ";
	        include_once "./loginForm.php";
	        echo " ";
	        include_once "./footerSection.php"
	      ?>
	
	      <!-- Option 1: Bootstrap Bundle with Popper -->
	      <script
	src="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/js/bootstrap.bundle.min.j
	s" integrity="sha384-
	MrcW6ZMFYlzcLA8Nl+NtUVF0sA7MsXsP1UyJoMp4YLEuNSfAP+JcXn/tWtIaxVXM"
	crossorigin="anonymous"></script>
	    </body>
	    </html>
	``

LoginForm.php	```php
	<?php
	
	?>
	
	<div class="container" style="height:70%; border-style:solid">
	  <div class="row">
	  <div class="col" style="display: flex; justify-content: center;"></div>
	    <div class="col" style="display: flex; justify-content: center;">
	    <form id="loginForm" action="./routs/router.php" method="POST">
	      <label for="loginID"> ID: </lable>
	
	      <input type="text" name="loginID" id="loginID">
	
	      <label for="passwdID"> Password:</label>
	
	      <input type="password" name="loginPWD" id="loginPWD">
	      <input type="hidden" name="pageID" value="1">
	
	``

	``html
	      <input type="submit">
	    </form>
	    </div>
	  <div class="col" style="display: flex; justify-content: center;"></div>
	  </div>
	</div>
	``

Utils.php	```php
	<?php
	
	require_once "/var/www/html2/DB/dbconnect.php";
	
	function vettUser($user, $password){
	    $conn = new mysqli($databasehost, $user, $password, $databasename);
	    $connStatus = mysqli_connect_errno();
	
	    if ($connStatus){
	        //die("Connection failed: " . mysqli_connect_error());
	        return "F";
	    }
	    $conn->close();
	    return "T";
	}
	?>
	``

Router.php	```php
	<?php
	
	$user=$_POST["loginID"];
	$pwd=$_POST["loginPWD"];
	$idPage=$_POST["pageID"];
	
	require_once "/var/www/html2/DB/dbconnect.php";
	require_once "/var/www/html2/utils/utils.php";
	
	switch ($idPage) {
	  case "1":
	    //echo vettUser($user,$pwd);
	    if(vettUser($user,$pwd) == 0){
	      header("Location: http://63.209.35.111/Internal/dashbord.php");
	    }
	    else{
	      header("Location: http://63.209.35.111/");
	    }
	    break;
	  default:
	    //header("Location: http://63.209.35.111/");
	}
	?>
	``

Dbconnect.php	```php
	<?php
	
	require_once "dbinfo.php";
	``

	``php
	function connect($user, $password){
	    $conn = new mysqli($databasehost, $user, $password, $databasename);
	    if (!$conn){
	        return false;
	    }
	    return $conn;
	}
	?>
	``

Dbinfo.php	```php
	<?php
	
	$username="carappuser";
	$userpasswd="Th0th60DSc1ence*";
	$databasename="NJIT_cs631103_carproject";
	$databasehost="njit-cs631-database-carproject.cjr2sl238paw.us-east-
	1.rds.amazonaws.com";
	$databaseport=3306;
	
	?>
	``

Dashboard.php	```php
	<!doctype html>
	<html lang="en" style="height:100%;">
	  <head>
	    <!-- Required meta tags -->
	    <meta charset="utf-8">
	    <meta name="viewport" content="width=device-width, initial-scale=1">
	    <!-- Bootstrap CSS -->
	    <link
	href="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/css/bootstrap.min.css"
	rel="stylesheet" integrity="sha384-
	EVSTQN3/azprG1Anm3QDgpJLIm9Nao0Yz1ztcQTwFspd3yD65VohhpuuCOmLASjC"
	crossorigin="anonymous">
	
	    <title>Router</title>
	  </head>
	  <body style="height:100%;">
	
	    <div class="container" style="height:5%; border-style:solid">
	        <div class="row">
	                <div class="col" style="display: flex; justify-content:
	center;">
	                    <?php
	                    echo "<H3> ADMIN DASHBOARD </H3>";
	                    ?>
	                </div>
	        </div>
	    </div>
	
	    <?php
	        echo "<p> </p>";
	        include_once "customer_board.php";
	        echo "<p> </p>";
	        include_once "reservations_board.php";
	        echo "<p> </p>";
	        include_once "cars_board.php";
	``

| | ```php
        echo "<p>&nbsp</p>";
        include_once "../Internal/footerInternal.php";

    ?>

    <!-- Option 1: Bootstrap Bundle with Popper -->
    <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.0.2/dist/js/bootstrap.bundle.min.js" integrity="sha384-
MrcW6ZMFYlzcLA8Nl+NtUVF0sA7MsXsP1UyJoMp4YLEuNSfAP+JcXn/tWtIaxVXM"
crossorigin="anonymous"></script>
  </body>
  </html>
``` |
| **Customer_board.php** | ```php
<?php

require_once "/var/www/html2/DB/dbinfo.php";

$Custoemr_conn = new mysqli($databasehost, $username, $userpasswd,
$databasename);

    // SQL QUERIES

    $numCostumers = "SELECT count(*) FROM Customer";
    $CostumerWreservation ="SELECT count(*) FROM Customer WHERE
Reservation_ReservationID IS NOT NULL";
    $CostumerWOreservation ="SELECT count(*) FROM Customer WHERE
Reservation_ReservationID IS NULL";

?>


<div class="container" style="height:20%; border-style:solid">
    <div class="row">
        <div class="col" style="display: flex; justify-content: center;">
</div>
            <div class="col" style="display: flex; justify-content:
center;">
                <?php
                echo "<H3> Customers </H3>";
                ?>
            </div>
        <div class="col" style="display: flex; justify-content: center;">
</div>
    </div>
    <div class="row">
        <div class="col" style="display: flex; justify-content: center; ">
Number of Customers </div>
        <div class="col" style="display: flex; justify-content: center; ">
Customers with Reservartion </div>
        <div class="col" style="display: flex; justify-content: center; ">
Customers without a Reservation </div>
    </div>
    <div class="row">
        <div class="col" style="display: flex; justify-content: center;
background-color:lightblue">
            <?php
``` |

```php
                    if ($r1 = $Custoemr_conn->query($numCostumers)){
                        echo "<h2>".$r1->fetch_row()[0]."</h2>";
                    }
                    $r1->free_result();

                ?>
            </div>
            <div class="col" style="display: flex; justify-content: center;
background-color:lightblue">
                <?php
                    if ($r2 = $Custoemr_conn->query($CostumerWreservation)){
                        echo "<h2>".$r2->fetch_row()[0]."</h2>";
                    }
                    $r2->free_result();
                ?>
            </div>
            <div class="col" style="display: flex; justify-content: center;
background-color:lightblue">
                <?php
                    if ($r3 = $Custoemr_conn->query($CostumerWOreservation)){
                        echo "<h2>".$r3->fetch_row()[0]."</h2>";
                    }
                    $r3->free_result();
                ?>
            </div>
        </div>
</div>

<?php
    $Custoemr_conn->close();
?>
```

| **Reservartions_board.php** | ```php
<?php
require_once "/var/www/html2/DB/dbinfo.php";
$Reservation_conn = new mysqli($databasehost, $username, $userpasswd,
$databasename);
// SQL QUERIES
$resWalkin = "SELECT COUNT(*) FROM Reservation WHERE Type='walkin'";
$resPhone = "SELECT COUNT(*) FROM Reservation WHERE Type='Phone'";
$groupsOfCarsinResv ="SELECT ClassCar_Name, Count(*) AS Num from Reservation
GROUP BY ClassCar_Name";

$CostumerWreservation ="SELECT count(*) FROM Customer WHERE
Reservation_ReservationID IS NOT NULL";
$CostumerWOreservation ="SELECT count(*) FROM Customer WHERE
Reservation_ReservationID IS NULL";
?>
<div class="container" style="height:25%; border-style:solid;">
    <div class="row">
        <div class="col" style="display: flex; justify-content: center;">
</div>
            <div class="col" style="display: flex; justify-content:
center;">
                <?php
                echo "<H3> Reservations </H3>";
                ?>
            </div>
``` |

```html
            <div class="col" style="display: flex; justify-content: center;">
</div>
    </div>
    <div class="row">
        <div class="col" style="display: flex; justify-content: center; ">
Type of Reservation </div>
        <div class="col" style="display: flex; justify-content: center; ">
Class of Cars in active Reservation </div>
        <div class="col" style="display: flex; justify-content: center; ">
Customers without a Reservation </div>
    </div>
    <div class="row">
        <div class="col" style="display: flex; justify-content: center;
background-color:pink">

            <div class="row">
                <div class="row">
                    <div class="col" style="display: flex; justify-content:
center;"> Walkins </div>
                    <div class="col" style="display: flex; justify-content:
center;"> Phone </div>
                </div>
                <div class="col" style="display: flex; justify-content:
center;">
                    <?php
                        if ($r1 = $Reservation_conn->query($resWalkin)){
                            echo "<h2>".$r1->fetch_row()[0]."</h2>";
                        }
                        $r1->free_result();
                    ?>
                </div>
                <div class="col" style="display: flex; justify-content:
center;">
                    <?php
                        if ($r2 = $Reservation_conn->query($resPhone)){
                            echo "<h2>".$r2->fetch_row()[0]."</h2>";
                        }
                        $r2->free_result();
                    ?>
                </div>
            </div>

        </div>
        <div class="col" style="display: flex; justify-content: center;
background-color:pink">

            <table>
                <tr>
                    <th> Class Car</th>
                    <th>           </td>
                    <th> Count </th>
                </tr>
            <?php
                if ($r3 = $Reservation_conn->query($groupsOfCarsinResv)){
                    while($gcars = $r3->fetch_assoc()){
                        echo "
                            <tr> <td>".$gcars['ClassCar_Name']."</td>
```

	<th> </td> `<td>".$gcars['Num']."</td> </tr>";`

```php
                                <th>           </td>
                                <td>".$gcars['Num']."</td> </tr>";
                        }
                    }

                    $r3->free_result();
                ?>
                </table>
            </div>
            <div class="col" style="display: flex; justify-content: center;
background-color:pink">
                <?php
                    if ($r3 = $Reservation_conn->query($CostumerWOreservation)){
                        echo "<h2>".$r3->fetch_row()[0]."</h2>";
                    }
                    $r3->free_result();
                ?>
            </div>
        </div>
    </div>
    <?php
        $Reservation_conn->close();?>
```

Cars_baord.php	

```php
<?php
require_once "/var/www/html2/DB/dbinfo.php";
$Car_conn = new mysqli($databasehost, $username, $userpasswd,
$databasename);
// SQL QUERIES
$numCar = "SELECT COUNT(*) FROM Car";
$CarsWcustomer ="SELECT ContractNumber AS AgreementID, Car_VIM AS VIM from
Agreement";
?>
<div class="container" style="height:20%; border-style:solid">
    <div class="row">
        <div class="col" style="display: flex; justify-content: center;">
</div>
            <div class="col" style="display: flex; justify-content:
center;">
                <?php
                echo "<H3> Cars </H3>";
                ?>
            </div>
        <div class="col" style="display: flex; justify-content: center;">
</div>
    </div>
    <div class="row">
        <div class="col" style="display: flex; justify-content: center; ">
Total number of Cars </div>
        <div class="col" style="display: flex; justify-content: center; ">
Cars in a Reservartion </div>
        <!-- <div class="col" style="display: flex; justify-content: center;
"> Cars in Customer Hands </div> -->
    </div>
    <div class="row">
        <div class="col" style="display: flex; justify-content: center;
background-color:lightgreen">
            <?php
```

```php
                if ($r1 = $Car_conn->query($numCar)){
                    echo "<h2>".$r1->fetch_row()[0]."</h2>";
                }
                $r1->free_result();

            ?>
        </div>
        <!-- <div class="col" style="display: flex; justify-content: center;
background-color:lightgreen">

        </div> -->
        <div class="col" style="display: flex; justify-content: center;
background-color:lightgreen">
            <table>
                <tr>
                    <th> ID </th>
                    <th>           </td>
                    <th> Car </th>
                </tr>

                <?php

                if ($r3 = $Car_conn->query($CarsWcustomer)){
                    while($gcars = $r3->fetch_assoc()){
                        echo "
                            <tr> <td>".$gcars['AgreementID']."</td>
                            <th>           </td>
                            <td>".$gcars['VIM']."</td> </tr>";
                    }
                }
                $r3->free_result();
            ?>
            </table>
        </div>
    </div>
</div>

<?php
    $Custoemr_conn->close();
?>
```