# INF271 2021 Semester Test 2 Memo

Informatics 271 (University of Pretoria)

Faculty of Engineering, Built Environment and Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en Inligtingtegnologie / Lefapha la Boetšenere, Tikologo ya Kago le Theknolotši ya Tshedimošo

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

## DEPARTMENT OF INFORMATICS

# INFORMATICS 271

**SEMESTER TEST 1** **DATE: 7 and 8 September 2021**

| | | | | | |
|---|---|---|---|---|---|
| **Examiners** | : | Dr MJ Hattingh<br>Dr K Pillay | **Time** | : | 120 min |
| **Moderator / External Examiner** | : | Dr L Weilbach | **Marks** | : | 50 |

| Student Number | | | | | | | | Surname | Initials |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

| Question / Section | Module outcomes (as in Study Guide) | | | | | Marks allocated | Maximum mark |
|---|---|---|---|---|---|---|---|
| | MO1 | MO2 | MO3 | MO4 | MO5 | | |
| 1 | | | 5 | | | | 5 |
| 2 | | | | | 5 | | 5 |
| 3 | | | | 13 | | | 13 |
| 4 | | | | 14 | | | 14 |
| 5 | | | | 3 | 10 | | 13 |

| **Total** | | 50 |
|---|---|---|

**Instructions for Moderator**

1. This paper consists of 5 questions with two options for each question.
2. Both options have the same level of complexity.
3. Students will be divided into 2 Groups, one group on Tuesday and one group on Wednesday.
4. Each group will have different question option assigned to them.
5. The test will be completed on ClickUP.
6. Students that can upload, can use any software or draw the models by hand.
7. Students are allowed to move back on their questions.
8. The following statement will be provided at the start of the test:

***"The University of Pretoria commits itself to produce academic work of integrity. I affirm that I am aware of and have read the Rules and Policies of the University, more specifically the Disciplinary Procedure and the Tests and Examinations Rules, which prohibit any unethical, dishonest or improper conduct during tests, assignments, examinations and/or any other forms of assessment. I am aware that no student or any other person may assist or attempt to assist another student, or obtain help, or attempt to obtain help from another student or any other person during tests, assessments, assignments, examinations and/or any other forms of assessment."***

Process for students to report issues during tests

The following process will be communicated to students:
You have 2 hours to complete your test. You can exit and enter the test during this time. That means that if you experience a power cut, you can join the test within that time. If you experience problems:

a. Email marie.hattingh@up.ac.za AND lecturer: komla.pillay@up.ac.za (email both lecturers, in case one miss your message)
b. Follow further instruction from your lecturer.

## Question 1: Project management (5 marks – 1 option)

If you were assigned as the project manager of your INF271 project team. Discuss your role in ensuring that “proper planning” is undertaken. (5)

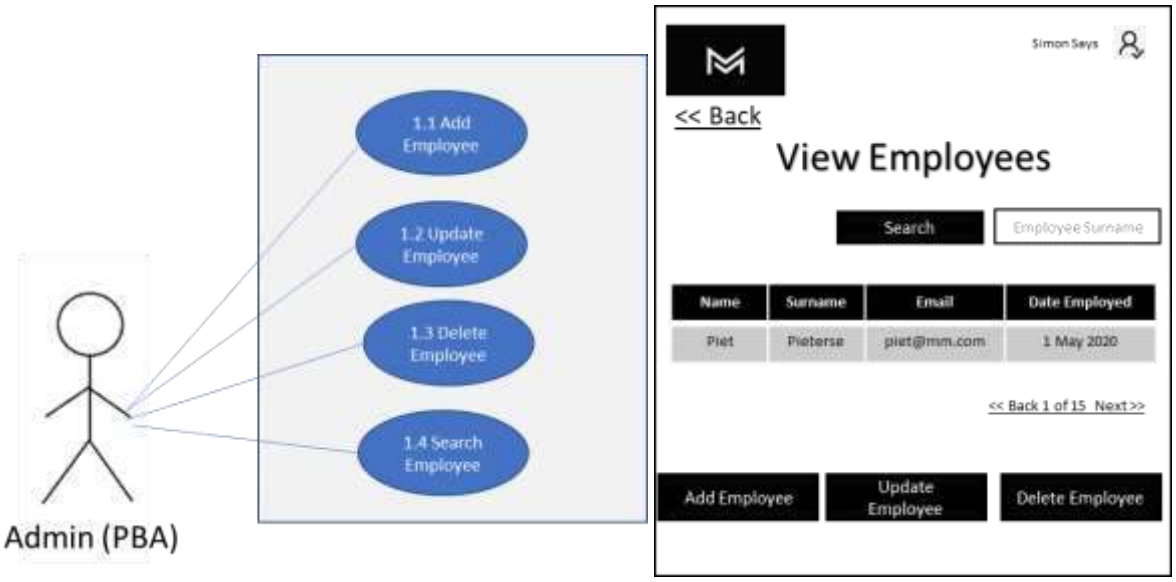
Various accepted answers combining the PM skills and the “proper planning” questions below.

- What are we going to do?
- How are we going to do it?
- How to know when the project is done?

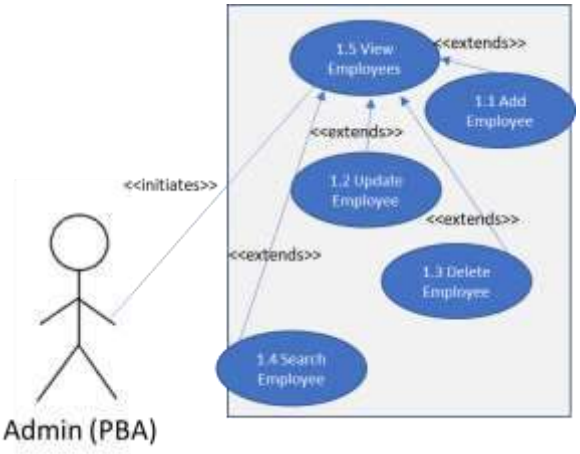
## Question 2: Technical use case design

### Option 2A (5 Marks)

Consider the following logical use case diagram extract and screen. Draw the Technical Use case diagram based on the given screen design.




Solution

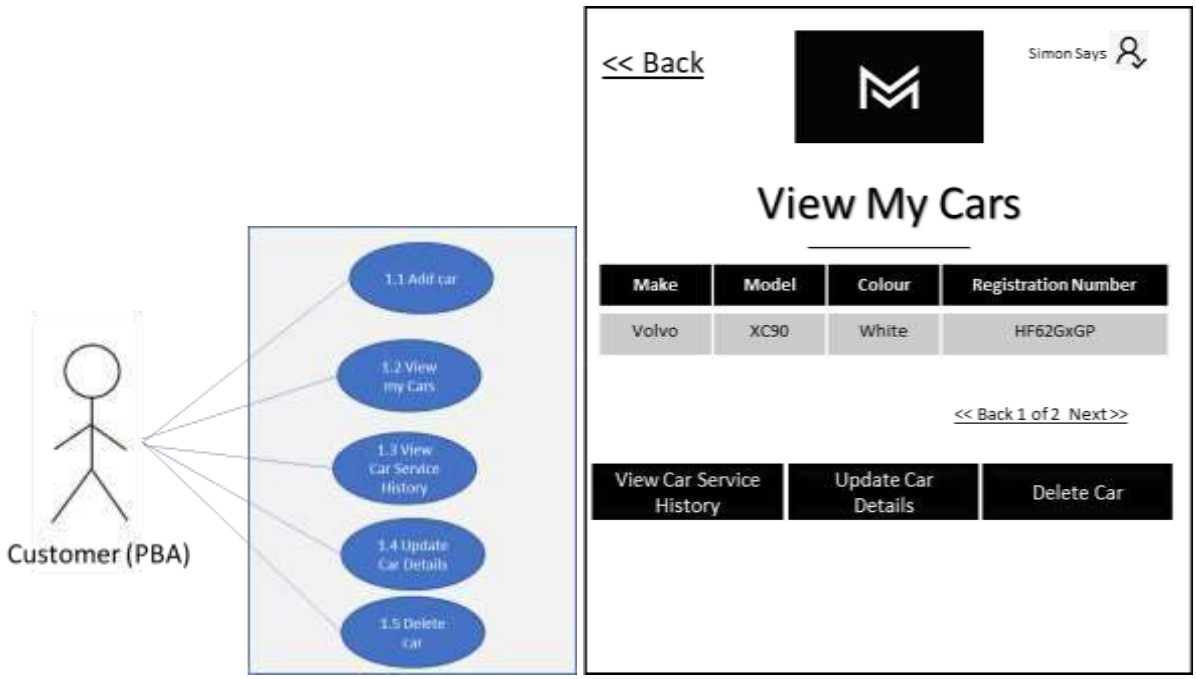



1 mark per extends, 1 mark for view employees use case

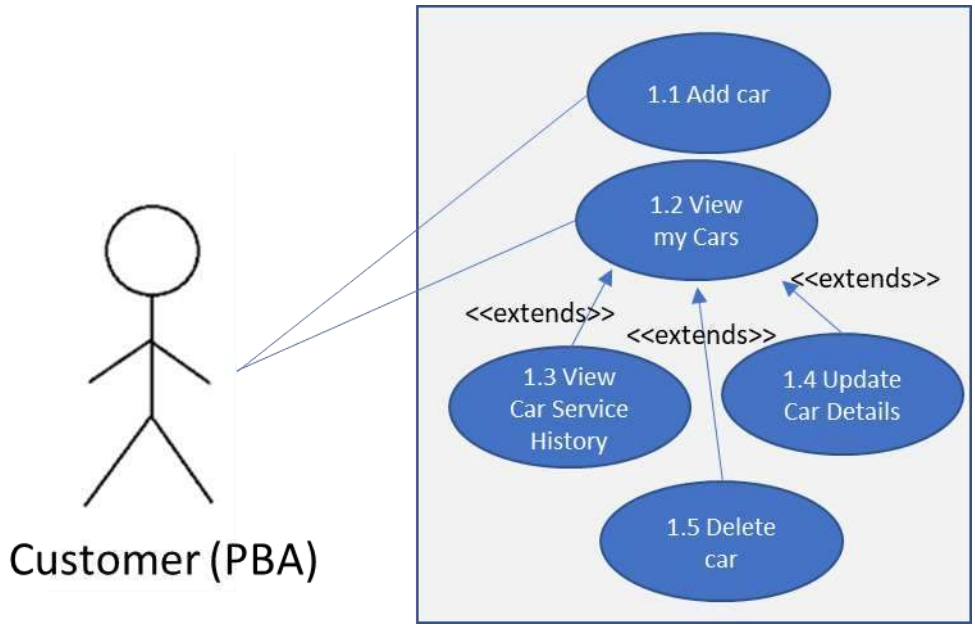
Marker need to consider student submission, even if it is different, but is still logical, then marks can be awarded.

## Option 2 B

Consider the following logical use case diagram extract and screen. Draw the Technical Use case diagram based on the given screen design.




Solution




1 mark for leaving add car as is, 1 mark for initiating view my cars and 1 mark per extend

Marker need to consider student submission, even if it is different, but is still logical, then marks can be awarded.

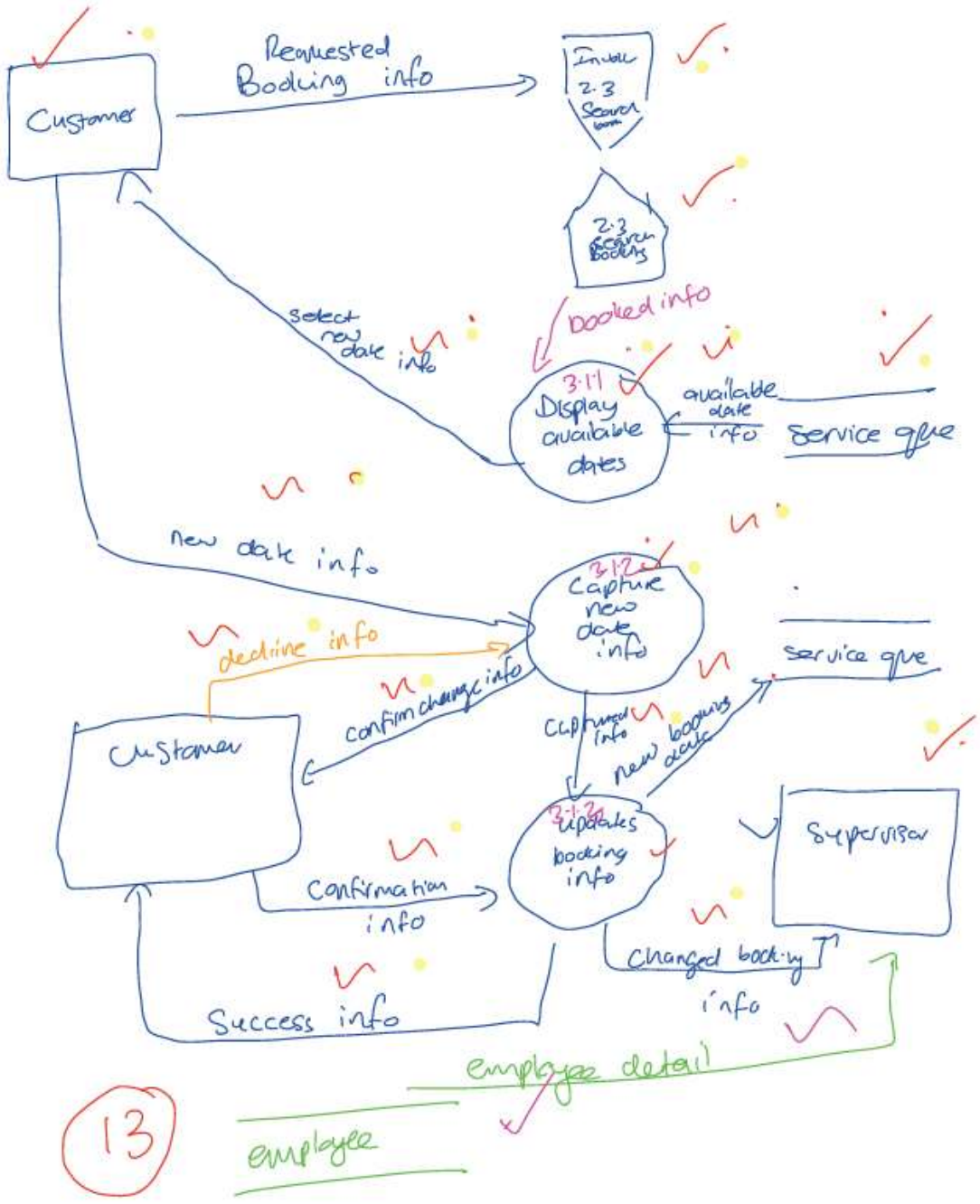
## Question 3: Logical Primitive Diagram

### Option 3A (13 Marks)

Draw the logical primitive diagram for the given use case narrative

| | | | |
|---|---|---|---|
| **USE CASE NAME:** | Reschedule booking | **USE CASE TYPE** | |
| **USE CASE ID:** | 3.1 | Business Requirements: | ☐ |
| **PRIORITY:** | High | Systems Analysis: | x |
| **SOURCE:** | Mike and The Mechanics (MTM) requirements list | System Design: | ☐ |
| **PRIMARY BUSINESS ACTOR** | Customer (PBA) | | |
| **PRIMARY SYSTEM ACTOR** | None | | |
| **OTHER PARTICIPATING ACTORS:** | Supervisor (ERA) | | |
| **OTHER INTERESTED STAKEHOLDERS:** | • None / *Geen* | | |
| **DESCRIPTION:** | This use case describes the process of a customer rescheduling a booking that they have previously made. The use case starts with the customer selecting to reschedule the booking, runs through the process of selecting a new date and concludes when the change is confirmed, and the booking is added to the new queue. | | |
| **PRE-CONDITION:** | The customer must be registered and logged in to the system. A booking must be already made and paid for. | | |
| **TRIGGER:** | The customer selects the option to reschedule a booking. | | |
| **TYPICAL COURSE OF EVENTS:** | **Actor Action** | **System Response** | |
| | Step 1: The customer selects the option to reschedule a booking and request booking information. | Step 2: Invoke UC 2.3 “Search Booking”. | |
| | | Step 3: The system retrieves available dates from the SERVICE_QUEUE table and prompts the user to select a new date. | |
| | Step 4: The customer selects the new date they want to get their car washed. | Step 5: The system captures the new date and prompts the customer to confirm the rescheduled date. | |
| | Step 6: The customer confirms the rescheduled data change. [alt] | Step 7: The system removes the booking from the original queue<br>and adds the booking to the new queue.<br>• • Service queue [Queue_ID]<br><br>From SERVICE_QUEUE table is updated. | |
| | | Step 8: The system displays a message saying that the booking change is successful. | |
| | | Step 9: The system sends a new notification to the supervisor regarding the change of date. | |
| **ALTERNATE COURSES:** | Alt step 6: The customer declines the rescheduled date. Return to step 4. | | |

| | |
|---|---|
| **CONCLUSION:** | The use case concludes when the booking date is successfully changed, and the booking is added to the new queue. The customer receives a notification of the changed booking information. |
| **POST-CONDITION:** | • The booking is rescheduled, the date is updated in the database. and the booking is added to the new queue. |
| **BUSINESS RULES** | Bookings cannot be cancelled only rescheduled. |
| **IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS** | • None<br>• |
| **ASSUMPTIONS:** | • None |
| **OPEN ISSUES:** | |



Invoke 2 marks – need to have two connectors

½ mark per flow

2 marks for EA

1 mark for Data store (supervisor, service queue)

1 mark per correct process

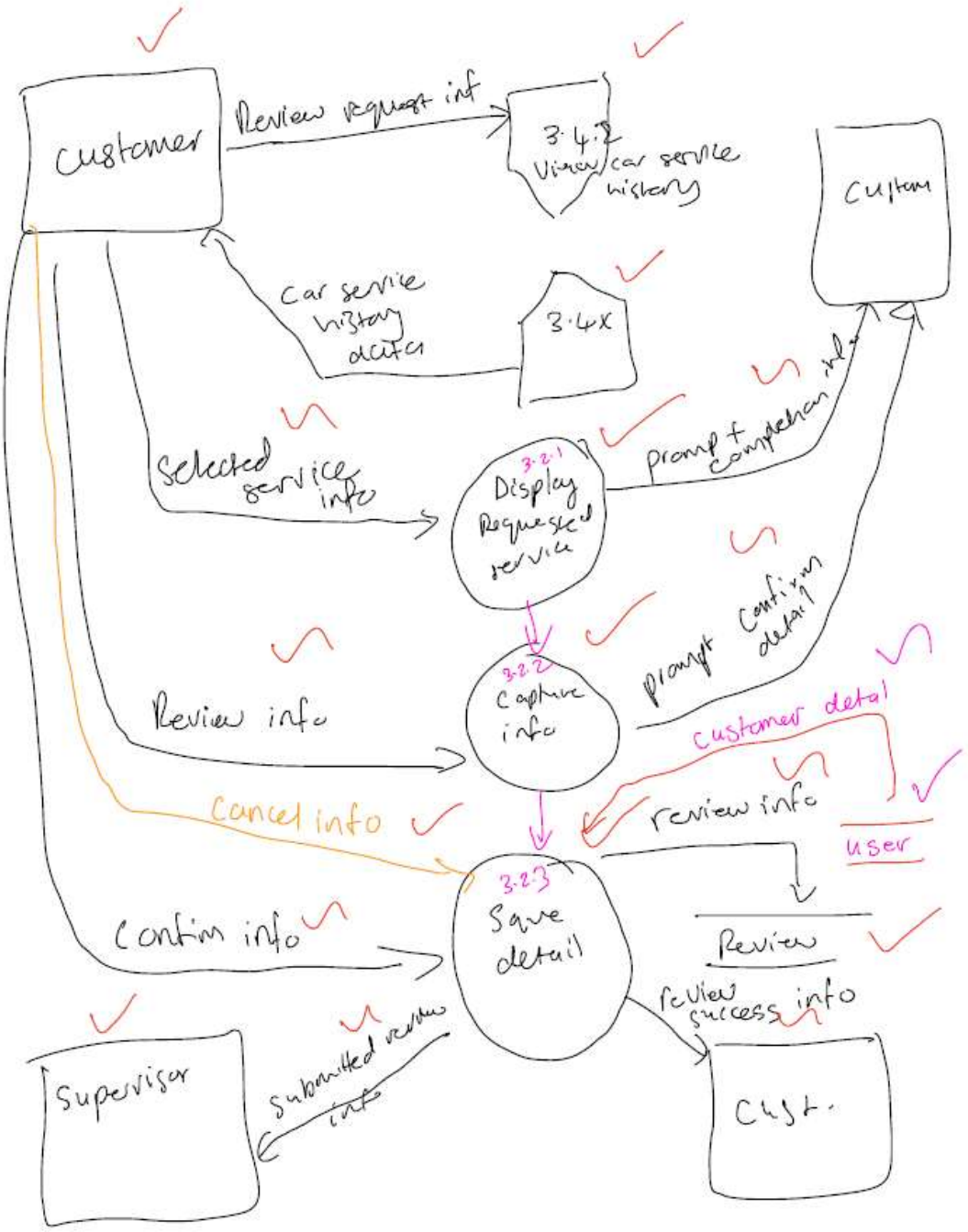
Up to 2 marks are deducted if the flows are not data

## Option 3B (13 Marks)

Draw the logical primitive diagram for the given use case narrative

| | | |
|---|---|---|
| **USE CASE NAME:** | Review car service history | **USE CASE TYPE** |
| **USE CASE ID:** | 3.2 | Business Requirements: ☐ |
| **PRIORITY:** | High | Systems Analysis: x |
| **SOURCE:** | Mike and The Mechanics (MTM) requirements list | System Design: ☐ |
| **PRIMARY BUSINESS ACTOR** | Customer (PBA) | |
| **PRIMARY SYSTEM ACTOR** | None | |
| **OTHER PARTICIPATING ACTORS:** | Supervisor (ERA) | |
| **OTHER INTERESTED STAKEHOLDERS:** | • None / *Geen* | |
| **DESCRIPTION:** | This use case describes the event where the customer rates and reviews the wash of their car(s). After the customer's wash is finished the system prompts the customer to rate their wash. The system takes them to their car wash history page, and the customer selects the car wash they want to review and enters their review. The use case ends when the car wash has been reviewed by the customer and the system sends the supervisor a notification. | |
| **PRE-CONDITION:** | The customer must be registered and logged onto the system. The customer must have had at least one wash. | |
| **TRIGGER:** | The customer wants to review a service wash. | |
| **TYPICAL COURSE OF EVENTS:** | **Actor Action** | **System Response** |
| | Step 1: The customer wants to review a service. | Step 2: The system invokes UC 3.4 "View Car Service History". |

| | | |
|---|---|---|
| | Step 3: The customer selects the service that they want to give a rating/review for. | Step 4: The system prompts the customer to enter the following details:<br>• Give a rating [Rating]; and<br>• Any optional comments [Description] |
| | Step 5: The customer enters the review details. | Step 6: The system captures the review details as specified in step 4 and prompt the customer to confirm whether they want to submit the review.<br>• |
| | Step 7: The customer submits the review [alt] | Step 7: The system saves the review details in the review table and links the logged in customerID retrieved from the customer table as a FK to the review table.<br><br>Step 8: The system notifies the customer that their review has been successfully submitted. |
| | | Step 9: The system sends a new notification to the supervisor regarding the new review received. |
| **ALTERNATE COURSES:** | [ALT] Step 5: The customer cancels the review. System gives an appropriate message to confirm that the review has been cancelled. | |
| **CONCLUSION:** | The system sends a new notification to the supervisor regarding the new review received. | |
| **POST-CONDITION:** | The customer located the review option on the system, associated with the service that the customer wanted to review and has successfully left a rating and review. | |
| **BUSINESS RULES** | Customer cannot review a booking that has not been completed. | |
| **IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS** | None | |
| **ASSUMPTIONS:** | None | |
| **OPEN ISSUES:** | None | |




½ mark per flow

2 marks for EA

1 mark for Data store

1 mark per correct process

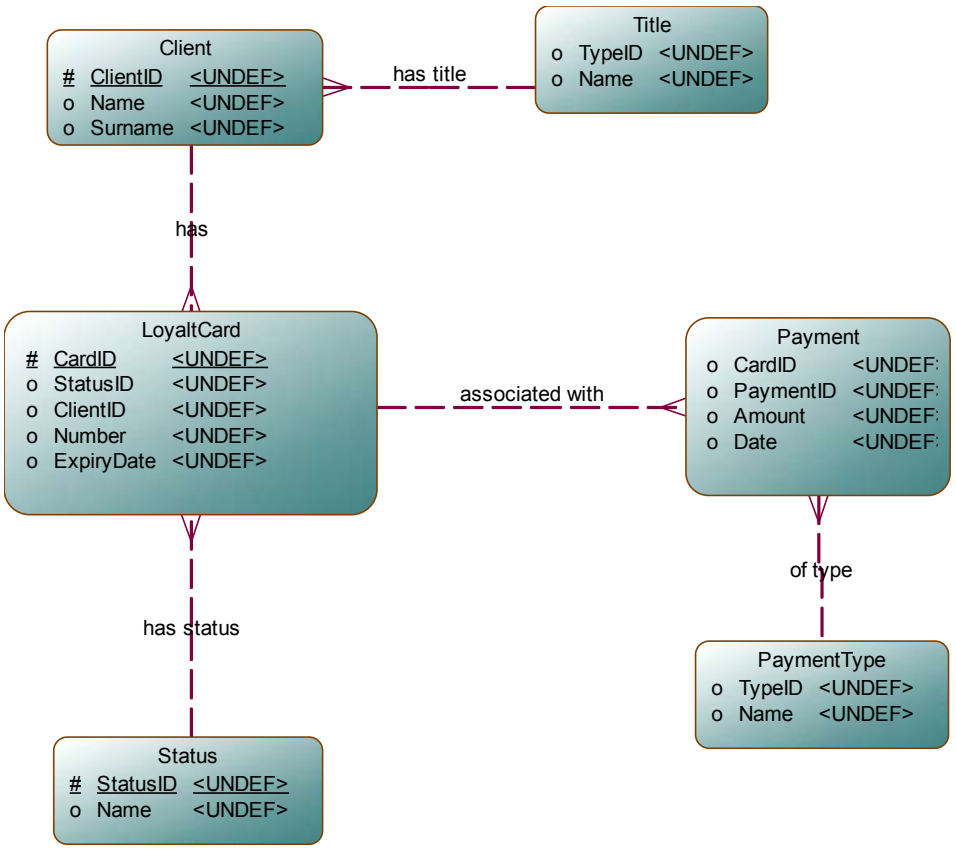
Up to 2 marks are deducted if the flows are not data

## Question 4: Logical ERD

Draw the logical ERD in 3NF for the given scenario,

## Option 4A (14 Marks)

- A client has a name and surname
- A client has a title
- Many different titles exist (Mr, Ms, Mx, Dr, Prof)
- A client can have one to many loyalty cards
- A loyalty card has a number
- A loyalty card is only associated with one client
- A loyalty card has a specific status (valid, expired)
- There are many different types of loyalty card statuses
- A loyalty card has an expiry date
- A loyalty card can be associated with many payments over time
- Payments are of a specific type (cash, card, EFT)
- Payments happen on a specific date for a specific amount

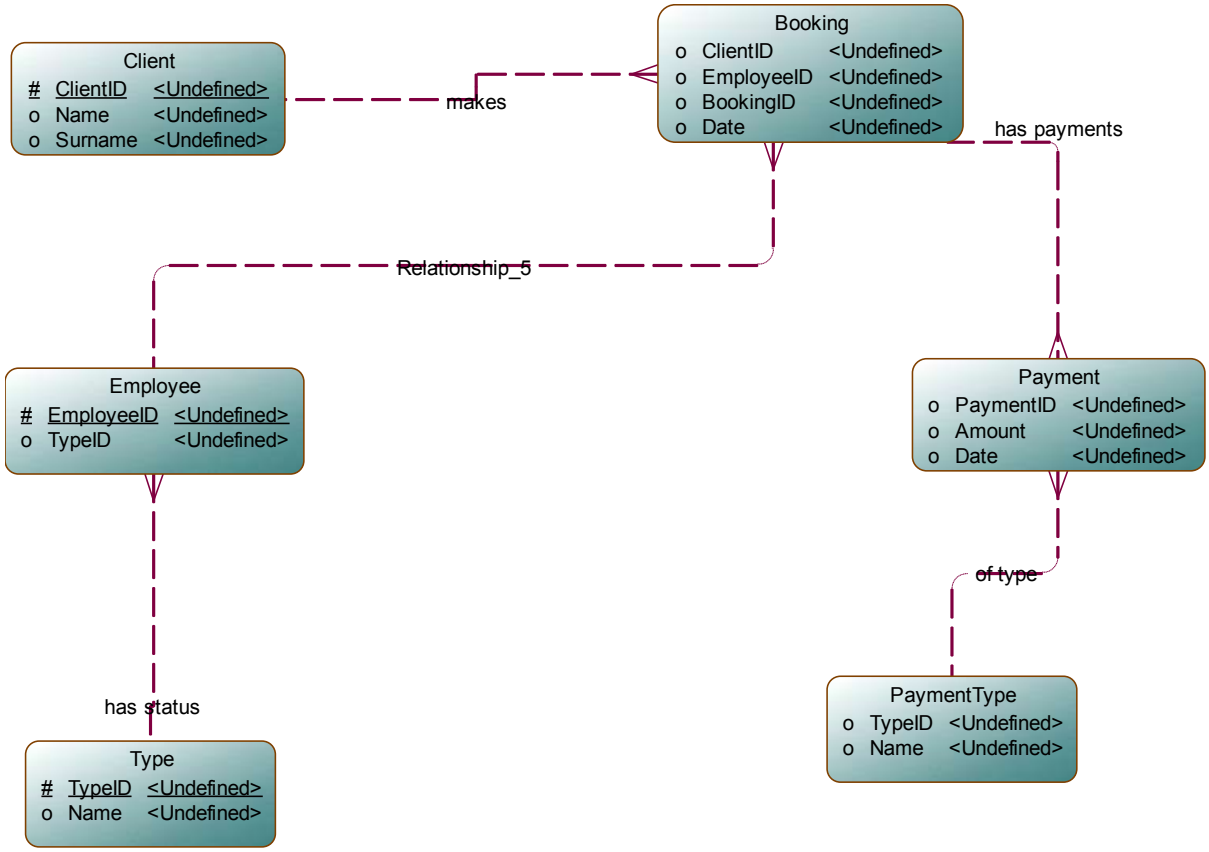



1 Mark per PK
1 Mark per correct relationship with FK
1 Mark for mentioned attributes: Loyalty card expiry date, payment amount, payment date, booking date

## Option 4B (14 Marks)

- A client has a name and surname
- A client can make one to many bookings
- A booking is associated with many payments over time
- Payments are of a specific type (50%, Full)
- Payments happen on a specific date for a specific amount

- An employee can be associated with many bookings
- An employee is of a specific type (Admin, Driver, Cook)
- Many different employee types exist
- A booking is only associated with one employee




1 Mark per PK
1 Mark per correct relationship with FK
1 Mark for mentioned attributes: Booking date, payment amount, payment date, booking date

## Question 5: Technical Narrative

### Option 5A (13 Marks)

Use the following screens and logical narrative and complete the systems response part of the technical narrative. Please note you also have to complete the ALT steps (if any).

### Screens


**Login Screen**


**Error message**


**User Home Screen**

## Logical Narrative

<table>
<tr><td>USE CASE NAME:</td><td colspan="2">Login</td><td>USE CASE TYPE</td></tr>
<tr><td>USE CASE ID:</td><td colspan="2">2.1</td><td rowspan="3">Business Requirements: ☐<br>System Analysis: ☑<br>System Design: ☐</td></tr>
<tr><td>PRIORITY:</td><td colspan="2">High</td></tr>
<tr><td>SOURCE:</td><td colspan="2">Mike and The Mechanics Requirements</td></tr>
<tr><td>PRIMARY BUSINESS ACTOR:</td><td colspan="3">User</td></tr>
<tr><td>PRIMARY THE SYSTEM ACTOR:</td><td colspan="3">None</td></tr>
<tr><td>OTHER PARTICIPATING ACTORS:</td><td colspan="3">None</td></tr>
<tr><td>OTHER INTERESTED STAKEHOLDERS:</td><td colspan="3">None</td></tr>
<tr><td>DESCRIPTION:</td><td colspan="3">This use case describes the process of an user logging in to the system. It starts with the system displays the login screen, the user enters their login information, and clicks on the ‘Login’ button. The use case concludes once the end-user is granted access to the system.</td></tr>
<tr><td>PRE-CONDITION:</td><td colspan="3">User has previously registered on the system such that their details have been stored in the database, to be able to log in. User is not yet logged into the system.</td></tr>
<tr><td>TRIGGER:</td><td colspan="3">The end-user wants to log in to the system to make use of it.</td></tr>
<tr><td rowspan="5">TYPICAL COURSE OF EVENTS:</td><td>ACTOR ACTION:</td><td colspan="2">SYSTEM RESPONSE:</td></tr>
<tr><td>Step 1: The end-user navigates to the MM website and selects the login to log in.</td><td colspan="2">Step 2: The system prompts the user to enter their username and password.</td></tr>
<tr><td>Step 3: The end-user enters their username and password.<br>.</td><td colspan="2">Step 4: The system validates the provided username and password by checking that it matches an existing username and password combination in the USER table in the database and retrieves the end-user’s [User_ID].</td></tr>
<tr><td></td><td colspan="2">Step 5: The system retrieve the [User_Role_ID] from the USER_ROLE table based on the [User_ID] that was retrieved in step 4. The system provides the end-user access to system functionality based on the [User_Role_ID] that was retrieved from the USER_ROLE table.</td></tr>
<tr><td></td><td colspan="2">Step 6: The system logs the user into the system</td></tr>
<tr><td>ALTERNATE COURSES:</td><td colspan="3">[ALT] Step 4a: The captured username could not be found in the USER table. The system displays an error notification and the system returns to step 2.</td></tr>
<tr><td>CONCLUSION:</td><td colspan="3">The use case concludes when the end-user has been provided access to the system.</td></tr>
<tr><td>POST-CONDITION:</td><td colspan="3">• A successful login has taken place and the end-user has access to the system and the home screen is loaded.</td></tr>
<tr><td>BUSINESS RULES:</td><td colspan="3">• The end-user’s password must be encrypted and decrypted.</td></tr>
</table>

| | |
|---|---|
| **IMPLEMENTATION CONSTRAINTS AND SPECIFICATIONS:** | None |
| **ASSUMPTIONS:** | None |
| **OPEN ISSUES:** | None |

## Technical Narrative

<table>
<tr><td>USE CASE NAME:</td><td colspan="2">Login</td><td>USE CASE TYPE</td></tr>
<tr><td>USE CASE ID:</td><td colspan="2">2.1</td><td rowspan="3">Business Requirements: ☐<br>System Analysis: ☐<br>System Design: ☑</td></tr>
<tr><td>PRIORITY:</td><td colspan="2">High</td></tr>
<tr><td>SOURCE:</td><td colspan="2">Mike and The Mechanics Requirements</td></tr>
<tr><td>PRIMARY BUSINESS ACTOR:</td><td colspan="3">User</td></tr>
<tr><td>PRIMARY THE SYSTEM ACTOR:</td><td colspan="3">None</td></tr>
<tr><td>OTHER PARTICIPATING ACTORS:</td><td colspan="3">None</td></tr>
<tr><td>OTHER INTERESTED STAKEHOLDERS:</td><td colspan="3">None</td></tr>
<tr><td>DESCRIPTION:</td><td colspan="3">This use case describes the process of an user logging in to the system. It starts with the user navigating to the MTM website. The system displays the login screen, the end-user enters their login information, and clicks on the ‘Login’ button. The use case concludes once the end-user is granted access to the system and the user home screen is loaded.</td></tr>
<tr><td>PRE-CONDITION:</td><td colspan="3">End-user has previously registered on the system such that their details have been stored in the database, to be able to log in. End-user is not yet logged into the system.</td></tr>
<tr><td>TRIGGER:</td><td colspan="3">The end-user wants to log in to the system to make use of it.</td></tr>
<tr><td rowspan="4">TYPICAL COURSE OF EVENTS:</td><td rowspan="2">ACTOR ACTION:</td><td colspan="2">SYSTEM RESPONSE:</td></tr>
<tr><td>MANUAL ACTION:</td><td>AUTOMATED ACTION:</td></tr>
<tr><td>Step 1: The end-user navigates to the MM website and selects the login to log in..</td><td></td><td>Step 2: The system displays the ‘Log In’ page with the following controls and layouts:<br>• ‘MM Logo<br>• ‘Log In’ Label;<br>• ‘Username’ Label;<br>• Username Textbox;<br>• ‘Password’ Label;<br>• Password Textbox;<br>• ‘Reset password?’ Link text; and<br>• Forgot password? Link text; and<br>• ‘Login” Button. ✓ ✓ ✓</td></tr>
<tr><td>Step 3: The end-user enters their username and password. And clicks on the ‘Login’ button.</td><td></td><td>Step 4: The system validates the provided username and password by checking that it matches an existing username and password combination in the USER table in the database and retrieves the end-user’s [User_ID]. ✓</td></tr>
<tr><td></td><td></td><td>Step 5: The system uses a SQL Read query to retrieve the [User_Role_ID] from the USER_ROLE table based on the [User_ID] that was retrieved in step 4. The system</td></tr>
</table>

| | | | |
|---|---|---|---|
| | | | provides the end-user access to system functionality based on the [User_Role_ID] that was retrieved from the USER_ROLE table. ✓ ✓ |
| | | | Step 6: The system logs the user into the system and loads the home screen<br>• MM Logo<br>• Label: Welcome username retrieved from the user table ✓<br>• Label "what would you like to do?"<br>• Make booking button<br>• View my cars button<br>• View profile button<br>• Add car button ✓ ✓ ✓ |
| **ALTERNATE COURSES:** | [ALT] Step 4a: The captured username could not be found in the USER table. The system displays a Modal Pop-Up to notify the end-user that the username that was entered does not exist, with the following properties:<br>• 'Warning' Heading; ✓<br>• 'The username and password combination entered does not exist.' Message Text; and ✓<br>• 'Ok': Button. ✓<br>The user clicks on the "ok" button and the system returns to step 2. | | |
| **CONCLUSION:** | The use case concludes when the end-user has been provided access to the system. | | |
| **POST-CONDITION:** | • A successful login has taken place and the end-user has access to the system and the home screen is loaded. | | |
| **BUSINESS RULES:** | • The end-user's password must be encrypted and decrypted. | | |
| **IMPLEMENTATION CONSTRAINTS AND SPECIFICATIONS:** | None | | |
| **ASSUMPTIONS:** | None | | |
| **OPEN ISSUES:** | None | | |

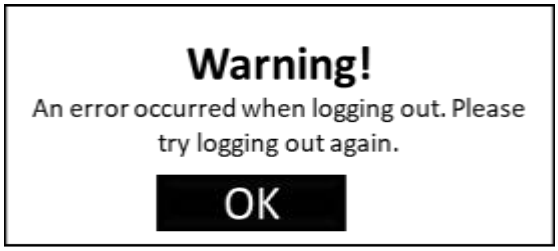
## Option 5B (13 Marks)

Use the following screens and logical narrative and complete the systems response part of the technical narrative. Please note you also have to complete the ALT steps (if any).

### Screens


Left Hand Navigation Bar


Error Message: Logging out warning




Error Message: Log out error warning


Log in Screen

## Logical Narrative

| USE CASE NAME: | Logout | USE CASE TYPE |
|---|---|---|
| USE CASE ID: | 2.2 | Business Requirements: ☐ |
| PRIORITY: | High | System Analysis: ☑ |
| SOURCE: | Mike and The Mechanics Requirements | System Design: ☐ |

| | | |
|---|---|---|
| **PRIMARY BUSINESS ACTOR:** | User | |
| **PRIMARY THE SYSTEM ACTOR:** | None | |
| **OTHER PARTICIPATING ACTORS:** | None | |
| **OTHER INTERESTED STAKEHOLDERS:** | None | |
| **DESCRIPTION:** | This use case describes the process of an end-user logging out of the MTM system. The user will select to log out by clicking on the 'Sign Out' button in the navigation bar. The system will then return to the default Log In screen. | |
| **PRE-CONDITION:** | The user must be logged in to the system | |
| **TRIGGER:** | The end-user wants to log out of the system. | |
| **TYPICAL COURSE OF EVENTS:** | **ACTOR ACTION:** | **SYSTEM RESPONSE:** |
| | Step 1: The user wants to log out of the system. | Step 2: The system prompts the user to confirm that they want to log out of the system. |
| | Step 3: The end-user clicks on the 'Yes' button. [ALT] | Step 4: The system deletes the entry from the ACTIVE_LOGIN table that relates to the currently logged in user. |
| | | Step 5: The system displays a successful log out message. [ALT] |
| | | Step 6: The system returns the end-user to the 'Log In' screen. |
| **ALTERNATE COURSES:** | [ALT] Step 3: The end-user declines the log out, and the use case is terminated.<br>ALT] Step 5: The system occurred an error while logging out of the system. The system displays the log out failure message and asks the end-user if it should try to log out again. If the end-user chooses to retry, return to step 1, otherwise the use case is terminated. | |
| **CONCLUSION:** | The end-user is logged out of the system and the login screen is shown. | |
| **POST-CONDITION:** | • The end-user is logged out of the system and does not have access to the system functionality. | |
| **BUSINESS RULES:** | All data must be saved if the user logs out of the system. | |
| **IMPLEMENTATION CONSTRAINTS AND SPECIFICATIONS:** | None | |
| **ASSUMPTIONS:** | None | |
| **OPEN ISSUES:** | None | |

## Technical Narrative

| | | | |
|---|---|---|---|
| **USE CASE NAME:** | **Logout** | **USE CASE TYPE** | |
| **USE CASE ID:** | **2.2** | **Business Requirements:** | ☐ |
| **PRIORITY:** | High | **System Analysis:** | ☐ |

| | | | |
|---|---|---|---|
| **SOURCE:** | Mike and The Mechanics Requirements | **System Design:** | ☑ |
| **PRIMARY BUSINESS ACTOR:** | User | | |
| **PRIMARY THE SYSTEM ACTOR:** | None | | |
| **OTHER PARTICIPATING ACTORS:** | None | | |
| **OTHER INTERESTED STAKEHOLDERS:** | None | | |
| **DESCRIPTION:** | This use case describes the process of an end-user logging out of the MTM system. The end-user will select to log out by clicking on the 'Sign Out' button in the navigation bar. The system will then return to the default Log In screen. | | |
| **PRE-CONDITION:** | The user must be logged in to the system | | |
| **TRIGGER:** | The end-user wants to log out of the system. | | |
| **TYPICAL COURSE OF EVENTS:** | **ACTOR ACTION:** | **SYSTEM RESPONSE:** | |
| | | **MANUAL ACTION:** | **AUTOMATED ACTION:** |
| | Step 1: The end-user navigates to and clicks on the 'Sign Out' button in the left hand navigation bar where the user's name is displayed in the navigation bar. | | Step 2: The system displays a Modal Pop-Up to request the end-user to continue with the log out, with the following properties:<br>• 'Warning' Heading; ✓<br>• 'Are you sure you want to log out?' Message Text; ✓<br>• 'Yes': Button; and ✓<br>• 'No': Button. ✓ |
| | Step 3: The end-user clicks on the 'Yes' button. [ALT] | | Step 4: The system uses an SQL Insert query to create a new [LastActionTimestamp] entry in the ACTIVE_LOGIN table for the currently logged in User ✓ |
| | | | Step 5: The system uses an SQL Insert query to create and save an entry in the AUDIT_LOG table with the following details:<br>• The ID of the end-user logging out [User_ID];<br>• The role ID of the end-user [User_Role_ID]; and the time of the log out [Time_Stamp]. ✓ |
| | | | Step 6: The system successfully logs the user out [alt] returns the end-user to the 'Log In' screen, with the following controls and layouts:<br>• 'Log In' Label;<br>• 'Username:' Label;<br>• 'Username' Textbox; |

| | | | |
|---|---|---|---|
| | | | • 'Password:' Label;<br>• Password Textbox;<br>• 'Forgot password?' Link text; and<br>• 'Submit' Button. ✓ ✓ ✓ |
| **ALTERNATE COURSES:** | [ALT] Step 3: The end-user clicks on the 'No button. The use case is terminated. ✓ | | |
| | [ALT step 6]: An error occurred when the user logged out. The system displays the following error message.<br>• 'Warning' Heading; ✓<br>• 'An error occurred when logging out. Please try logging out again' Message Text; ✓<br>• 'OK': Button; and ✓ | | |
| | | | |
| **CONCLUSION:** | The use case concludes when the end-user has been successfully logged out of the system. | | |
| **POST-CONDITION:** | | | |
| **BUSINESS RULES:** | | | |
| **IMPLEMENTATION CONSTRAINTS AND SPECIFICATIONS:** | | | |
| **ASSUMPTIONS:** | None | | |
| **OPEN ISSUES:** | None | | |