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Assignment Feedback Form
Object Oriented Analysis and Design

Criteria	Marks	Comments
Construct the design steps	/ 30	
Design the Diagram	/ 60	
Format Report	/ 10	
	Total	(/ 100) * 20 =

General Comments:	
Assessor's Signature:	Date:
Name: Kwan Lee	

Section: Documentation		Ex ce lle nt	G oo d	Sa tis fa ct or y	M ar gi na l	Po or	Comments
(Out of 30)	Construct the design steps						
(Out of 60)	Design the Diagram						
(Out of 10)	Format Report						

General Instructions

Use the following format for the preparation of the *assignment submission*.

- Paper size : A4
- Margins: left = 1.5", right, top and bottom = 1"
- Font size : 12 , Times New Roman/Arial
- Line spacing : 1.5
- Text alignment : Full Justify
- Number all pages sequentially
- Number all Figures and Tables sequentially and refer them in the text
- Binding: **staple at top left corner** of assignment submission
- Reference format: Harvard or IEEE

WARNING

- Assignments submitted after the due date will be considered late.
- Assignments submitted not later than two weeks after the due date will be marked, but the marks will be capped to a maximum of 10%.
- Assignments submitted later than two weeks will be marked, but carry zero mark.
- First City University College takes allegations of plagiarism very seriously. Submissions involving plagiarism will be marked, but given zero mark. Plagiarism is the attempt to pass off the work of another as your own. Information taken from the work of others should be acknowledged by reference to obviate the charge of copying.
- Collusion is an academic irregularity within the First City University College assessment regulations. Any student found colluding in the production of any assessment will be subject to an investigation with the imposition of any penalty deemed appropriate. Students must ensure they are familiar with the definition of collusion.

I. Assignment

This is an individual assignment and it contributes **20%** of the assessment.

In this assignment, you are required to prepare UML design notation diagram: sequence and activity design based on the given case study:

- a. Restaurant Management System

This assignment consists of **TWO (2)** tasks as listed below:

Task 1 – Construct the Design Steps

From the case study given, construct the design steps for sequence and activity diagram.

Following are the steps:

- a. Sequence

Sequence Diagram Step

1. Decide on the context of the interaction: system, subsystem, use case or operation
2. Identify the structural elements (classes or objects) necessary to carry out the functionality of the use case or operation
3. Consider the alternative scenarios that may be required

Instance sequence diagram steps

1. Lay out the objects from left to right
2. Starting with the message that starts the interaction, lay out the messages down the page from top to bottom. show the properties of the messages necessary to explain the semantics of the interaction
3. Add the focus of control if it is necessary to visualize nesting or the point in time where an activation is taking place
4. Add timing constraints if necessary
5. Attach annotations to the diagram if required, for example pre- and post-conditions

b. Activity

Activity Diagram for Business Modelling Steps

1. Identify business actors and business use cases
2. identifying key scenarios of business use cases, using primary and alternative paths
3. Combining the scenarios to produce comprehensive workflows described using activity diagrams
4. Where significant object behaviours is triggered by a workflow, adding object flows to the diagram
5. Where appropriate, mapping activities to business areas and recoding this using swimlanes
6. Refining complicated high level activities in a similar fashion

Activity Diagram for Use Case Modelling Steps

1. Identifying key scenarios of system use cases, using primary and alternative paths
2. combining the scenarios to produce comprehensive workflows describe using activity diagrams
3. where significant object behaviour is triggered by a workflow, adding object flows to the diagram
4. where workflow cross technology boundaries, using swimlanes to map the activities
5. refining complicated high level activities in a similar fashion

Task 2 – Design the Diagram

Upon completion on Task 1, design the sequence and activity diagram.

Submission Requirements

1. Submit a soft copy and a hard copy of your report, following the general instructions described above.
2. Submit a copy of TurnItIn report.

Details of TurnItIn

Class Id : 22698908

Enrollment Key: 1234

3. Submit a copy of your works into GitHub repository.
4. Minimum number of report pages is 7, and maximum number of report pages is 40 pages (excluding the front cover, table of content pages and appendix).

II. Case Study

A restaurant management system (RMS) is a type of point-of-sale (POS) software specifically designed for restaurants, bars, food tracks and others in the food service industry. Unlike a POS system, and RMS encompasses all back-end needs, such as inventory to staff management. The project aims to create a system for a restaurant that allows the customers to place their order by choosing items from the displayed menu and wait till the food is ready.

List of the system features:

Stakeholder	Features
Manager	<ul style="list-style-type: none">• Add, delete, edit menu: item, price, promotion
Customers	<ul style="list-style-type: none">• Open/renew membership account• Add food items• Generate bill• Make payment• Reserve/cancel table

III. Learning Outcomes

Learning Outcomes	Assessment Question
I. Explain the UML design notation and apply it to describe a design	Task 1, 2
II. Analyse, design and develop an object oriented system taking into account requirements derived from the problem specification	-
III. Produce a detailed rationale for design decisions made and for choosing some methods/tools/techniques rather than others for a given problem	-
IV. Critically evaluate and/or perform software development /testing the product in terms of its design and final functionality and critically evaluate the process used to build the product	-

IV. Assessment Marking Criteria

Area of concern	Excellent	Good	Satisfactory	Marginal	Poor
Construct the design steps (30%)	Excellent quality of the design steps explanation.	Well quality of the design steps explanation.	Average quality of the design steps explanation.	Fairly quality of the design steps explanation.	Low quality of the design steps explanation.
Design the Diagram (60%)	UML class diagram, overall is clear and complete Uses UML notation overall are correct	UML class diagram, is clear and complete Uses UML notation are correct	UML class diagram, average clear and complete Uses UML notation are somehow correct	UML class diagram, somehow clear and missing some class Uses UML notation some is incorrect	UML class diagram, is not clear and complete Uses UML notation are wrong
Format Report (10%)	Closely adheres to all formatting requirements. Clear and concise. Good grammar and spelling. Clear structure. About the right length. Several references, done correctly.	Generally adheres to the specified formatting. Clear and concise but some grammar/spelling errors. Un-numbered sections/ too informal in places/ too verbose. Some references/ some referencing errors.	Deviates from the formatting requirements. English is generally: too informal/ not precise/ too glib. Structure not very clear. Possibly not enough info - too short. Hardly any references/ not done correctly.	Significantly deviates from the formatting requirements. A lot of grammar errors. Not structured as per the spec. Vague and waffle style. No references. badly done references.	Guidelines /requirements of the formatting are largely ignored. Illiterate. Unable to understand what is meant.

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Sequence Diagram

Sequence diagrams are interaction diagram that are used to note how operations are carried out and the interaction between objects or actors in a scenario [1]. This section of the document will explain the process and steps to construct Sequence diagrams for a Restaurant Management System (RMS).

Sequence Diagram Steps

1. Context of Interaction

Among the context of interaction that exist to be used to categorize the diagrams, namely System, Subsystem, Use Case or Operation, the context of interaction of the Restaurant Management System (RMS) is a System. Thus, the Sequence diagram will be produced in the context of collaboration that realized this system.

2. Structural Elements (Classes or Objects) necessary to carry out the functionality of the system

This collaboration scenario involves 2 main objects, which are the Manager and the Customers. A Manager is able to add, delete or edit menu in the system. The system allows Customers to create a new membership account or renew an existing membership account. It also involves Order object to allow Customers to place their orders from the Menu object. Once an Order is placed, the PaymentCounter object will generate a bill and Customers can use that bill to make payment. Customers are also allowed to make Table Reservations for dining or Cancel previously made Reservations.

3. Alternative Scenarios

There are a few alternative scenarios for the Manager, Customers and PaymentCounter objects.

The alternative scenarios for Manager object would be:

- a. Manager can only add a new menu if there are no same menu item on the menu list
- b. Manager can only delete and edit menu items that reside in the menu list
- c. Any reservation changes (creation or cancellation) has to be approved by the Manager after verifying its availability

The alternative scenarios for Customers object would be:

- a. Customers will be able to use promotional discount if they sign up for a membership in RMS
- b. Customers will be allowed to add food items to their order list without limitations. Once the Customers has finished added their order, the bill will be generated
- c. Customers will be able to make payments for the bill via Cash, Credit Card or E-Wallet.

The alternative scenarios for PaymentCounter object would be:

- a. PaymentCounter has to ensure before a membership account is created, the Customer has no existing active membership account
- b. PaymentCounter should remind Customers to renew their membership if it has expired
- c. Payment validation:
 - a. If Credit Card is used by a Customer, the expiry and credit balance of the card has to be validated
 - b. If E-Wallet is used by a Customer, the balance amount of it has to be validated
- d. Before a Reservation can be made, the Reservation slots availability has to be checked

Instance Sequence Diagram Steps

1. Objects

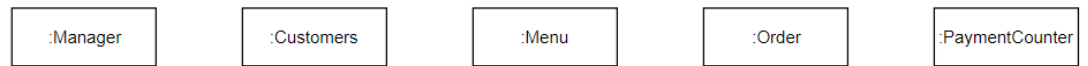


Figure 1: Objects involved in the Restaurant Management System (RMS)

Figure 1 shows the objects that are involved in this sequence diagram. The objects will be arranged according to their roles, functions and relationships in the sequence diagrams that will be produced.

2. Sequence and Properties of Messages to show the Semantics of the Interaction

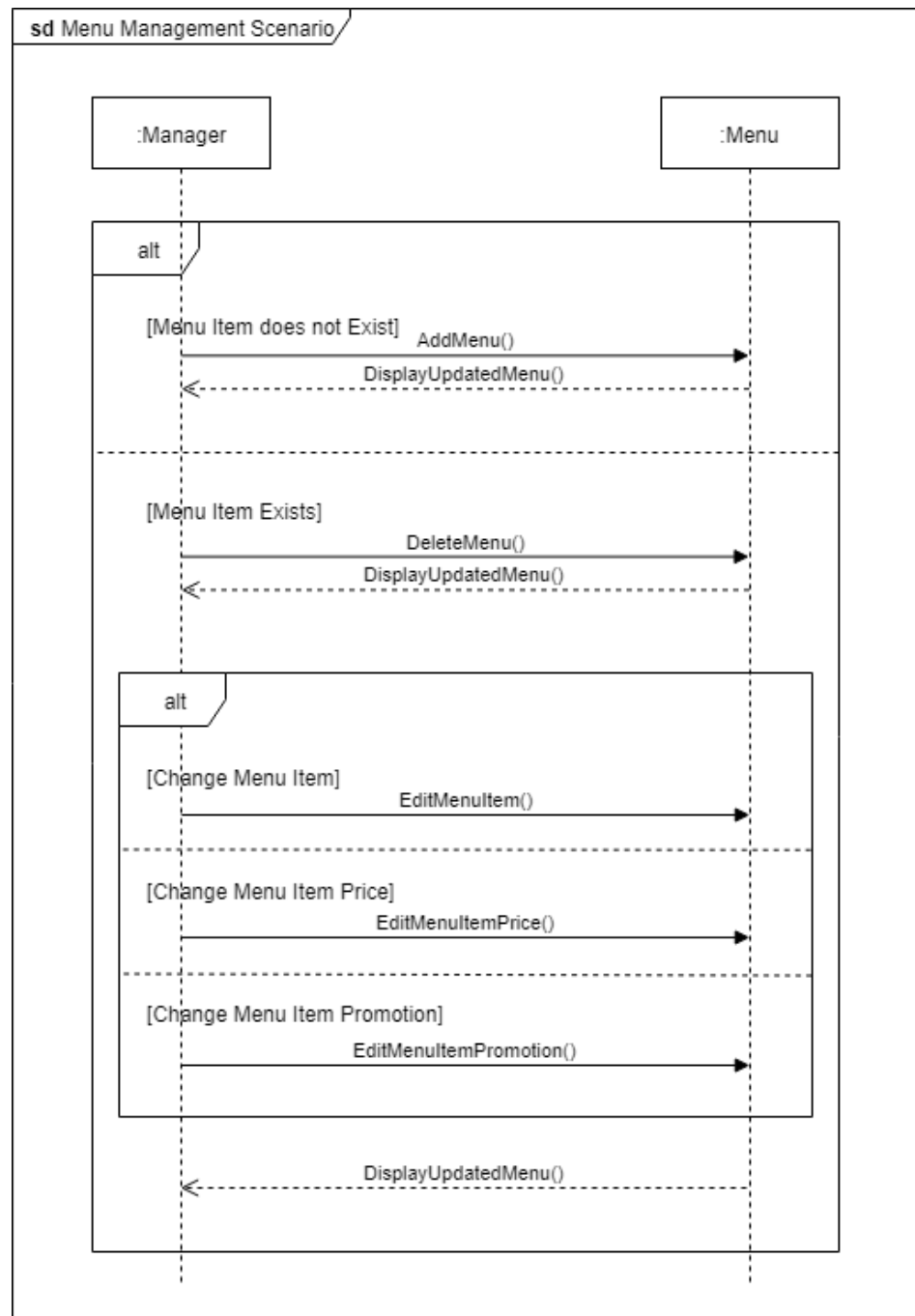


Figure 2: Sequence Diagram - Menu Management

Figure 2 shows the Menu Management in RMS. A Manager can only add a new Menu if that Menu is not existing in the current Menu List. A Manager can delete or edit a Menu item only if the Menu already exists in the Menu List. Once any changes have been made to the Menu, the Manager can verify the changes by viewing the updated Menu displayed.

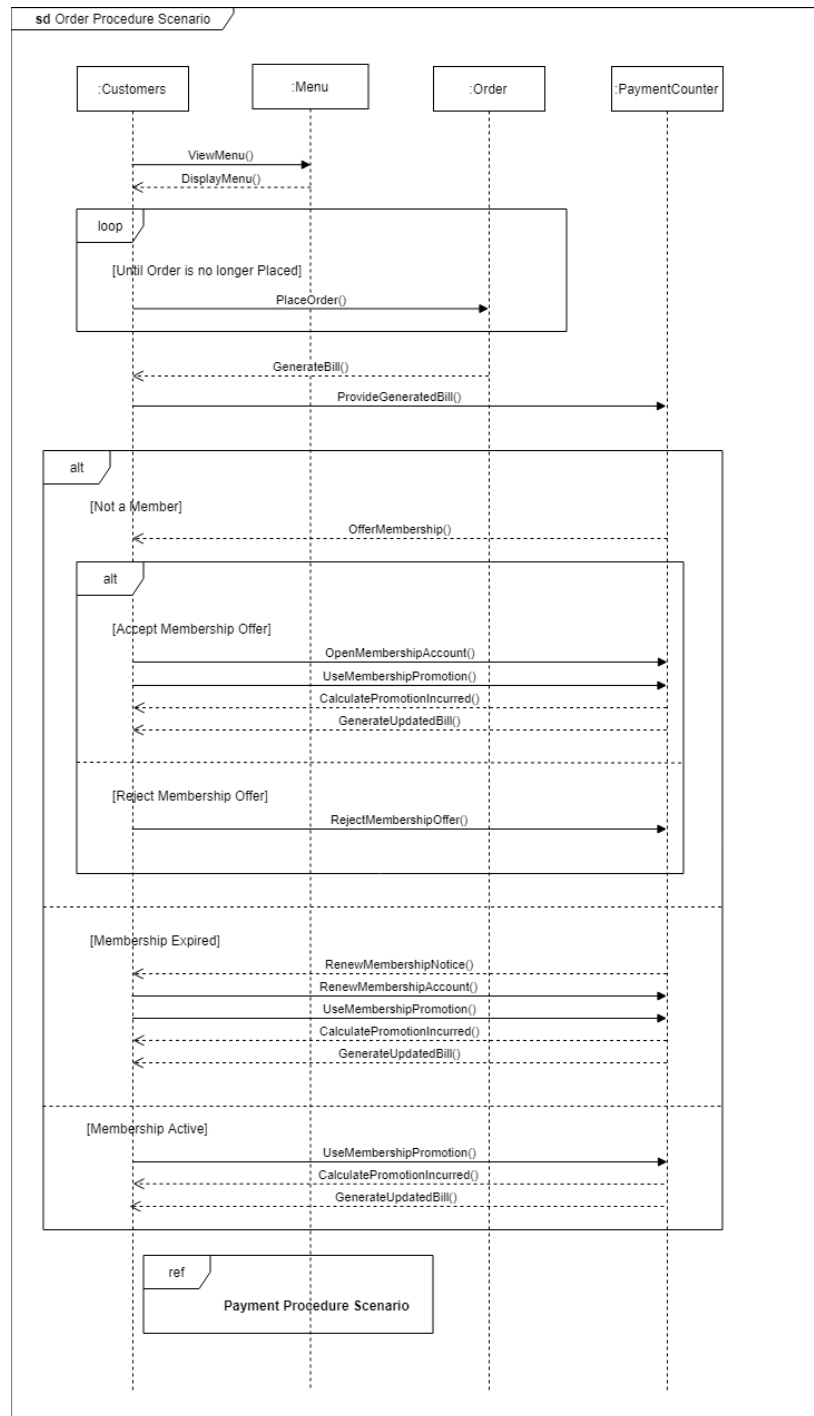


Figure 3: Sequence Diagram - Order Procedure

Figure 3 shows the Order Procedure in RMS. Customers will be able to view the Menu and place their Orders. Once they have completed the Order, a bill will be generated. When the Customers want to make the payment, their membership status will be verified to see if they are eligible for a membership discount on their payment. After the verification, the system will proceed to the Payment Procedure.

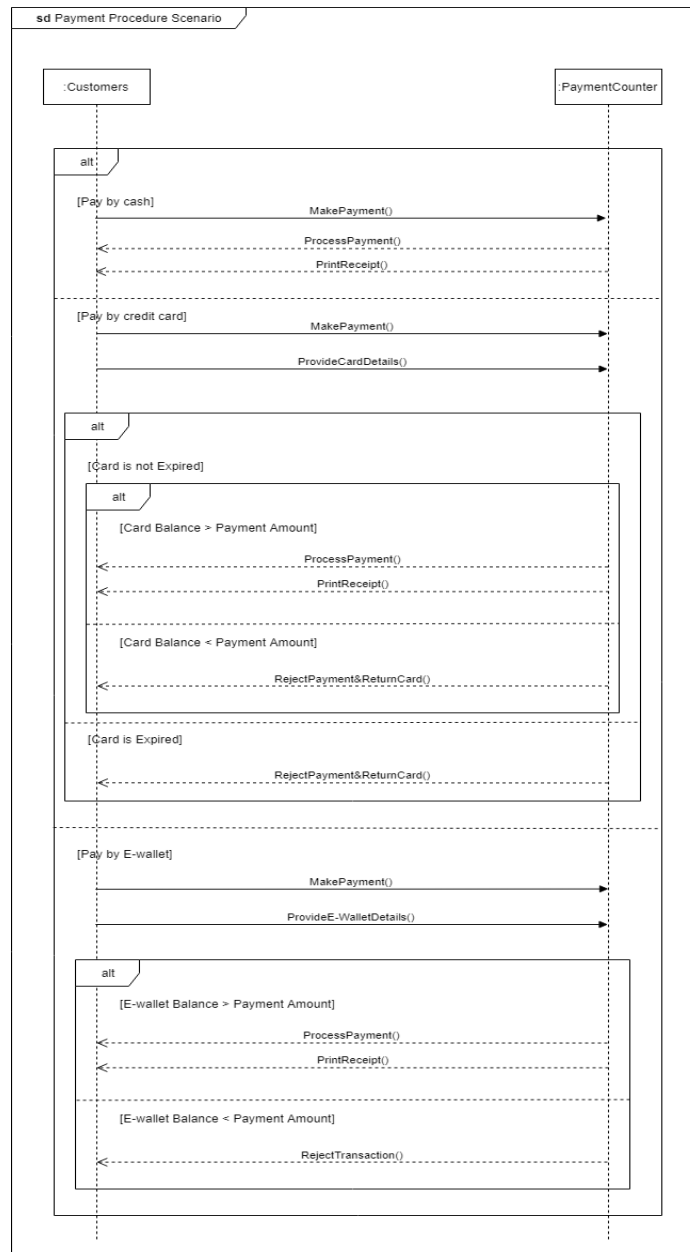


Figure 4: Sequence Diagram - Payment Procedure

Figure 4 shows the Payment Procedure in RMS. Customers will provide the generated bill from the Order Procedure and make the payment. If the Customers pay by Credit Card, the card holder name, bank issued, expiry date and card balance will be retrieved and validated to proceed with the payment. If the payment failed, the card will be returned to the Customers. If the Customers pay by E-wallet, the holder name and wallet balance will be checked to ensure that it can pay for the bill amount. If the E-wallet payment failed, Customers will be informed on the failed transaction. Once the payment has been successfully processed, the PaymentCounter will provide a receipt to the Customers.

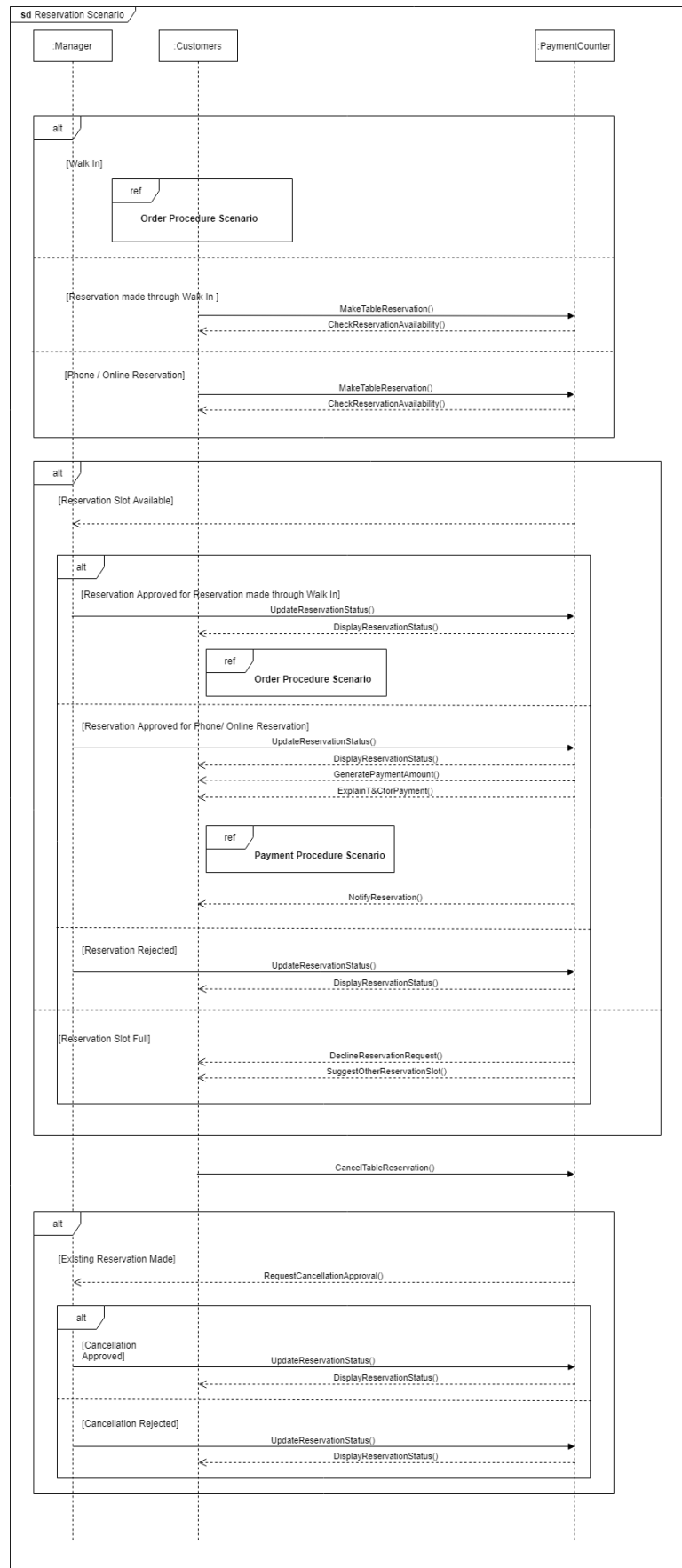


Figure 5: Sequence Diagram – Reservation

Figure 5 shows the Reservation process in RMS. If Customers walk in the restaurant without prior reservation, they can proceed to make their Order as stated in Figure 3. If Reservation is made through walk-ins, then the Customers have to inform on the time of the Reservation and the number of persons involved in the Reservation. If Reservation is made through Phone or Online, then the Customers have to inform on the date of the Reservation, time of the Reservation and the number of persons involved in the Reservation. After that, the availability of the Reservation slot will be checked. If it is not available, the PaymentCounter will notify the Customers on the failed Reservation. If it is available, then the Reservation has to be approved by the Manager. If it is not approved, then the PaymentCounter will notify the Customers on the failed Reservation. If the Manager approves, then the PaymentCounter will notify the Customers on the success of the Reservation.

If Customers wish to cancel a Reservation, it must first be an active Reservation. Then, once it is approved by the Manager, the status of the cancellation will be informed by the PaymentCounter to the Customers.

3. Focus of Control to Visualize Nesting or Point in Time of Activation

The figures below will show the activation or execution occurrences for the Objects and their actions to show the length of activation of a particular interaction for the scenarios shown.

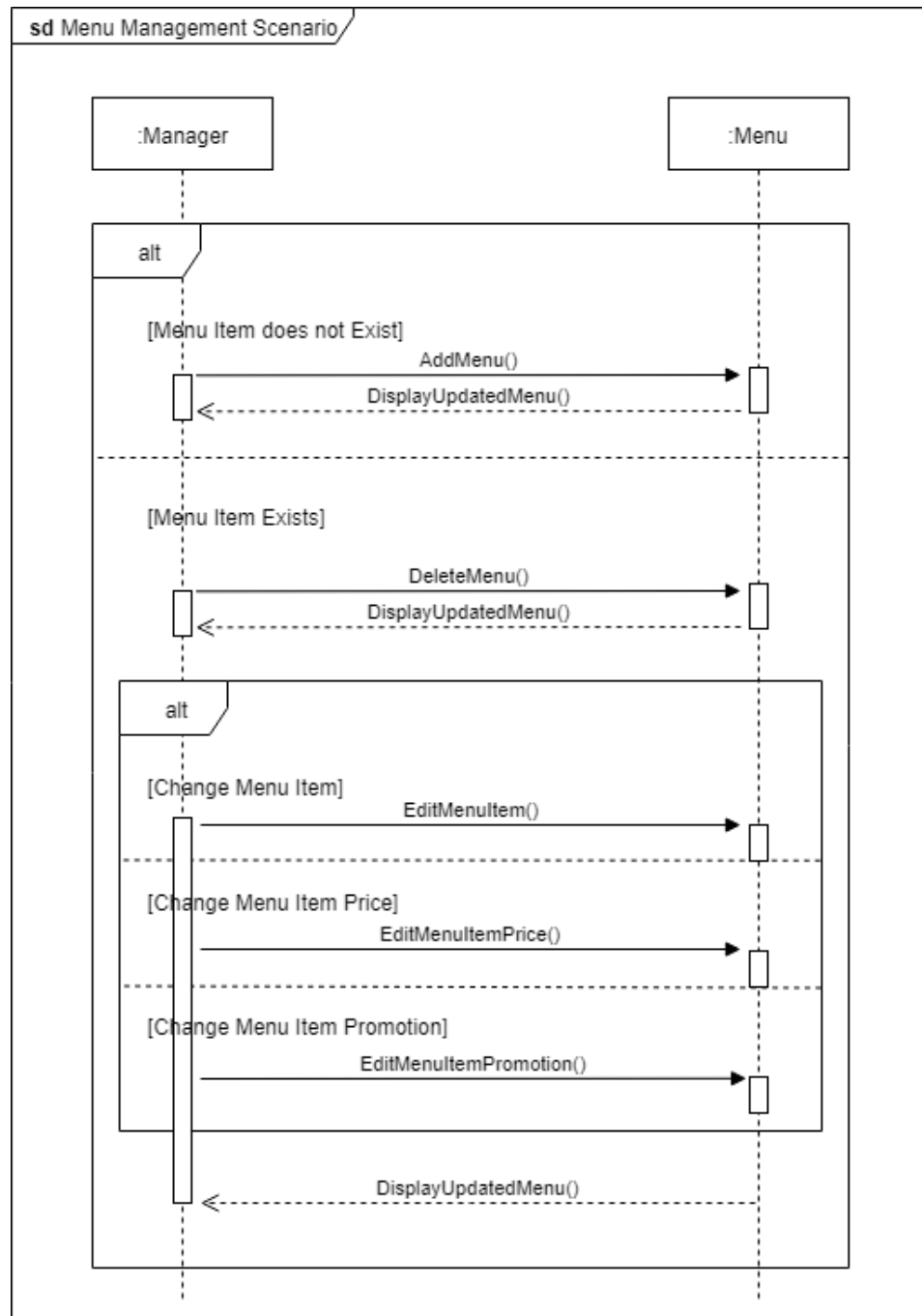


Figure 6: Sequence Diagram – Menu Management (With Execution Occurrences)

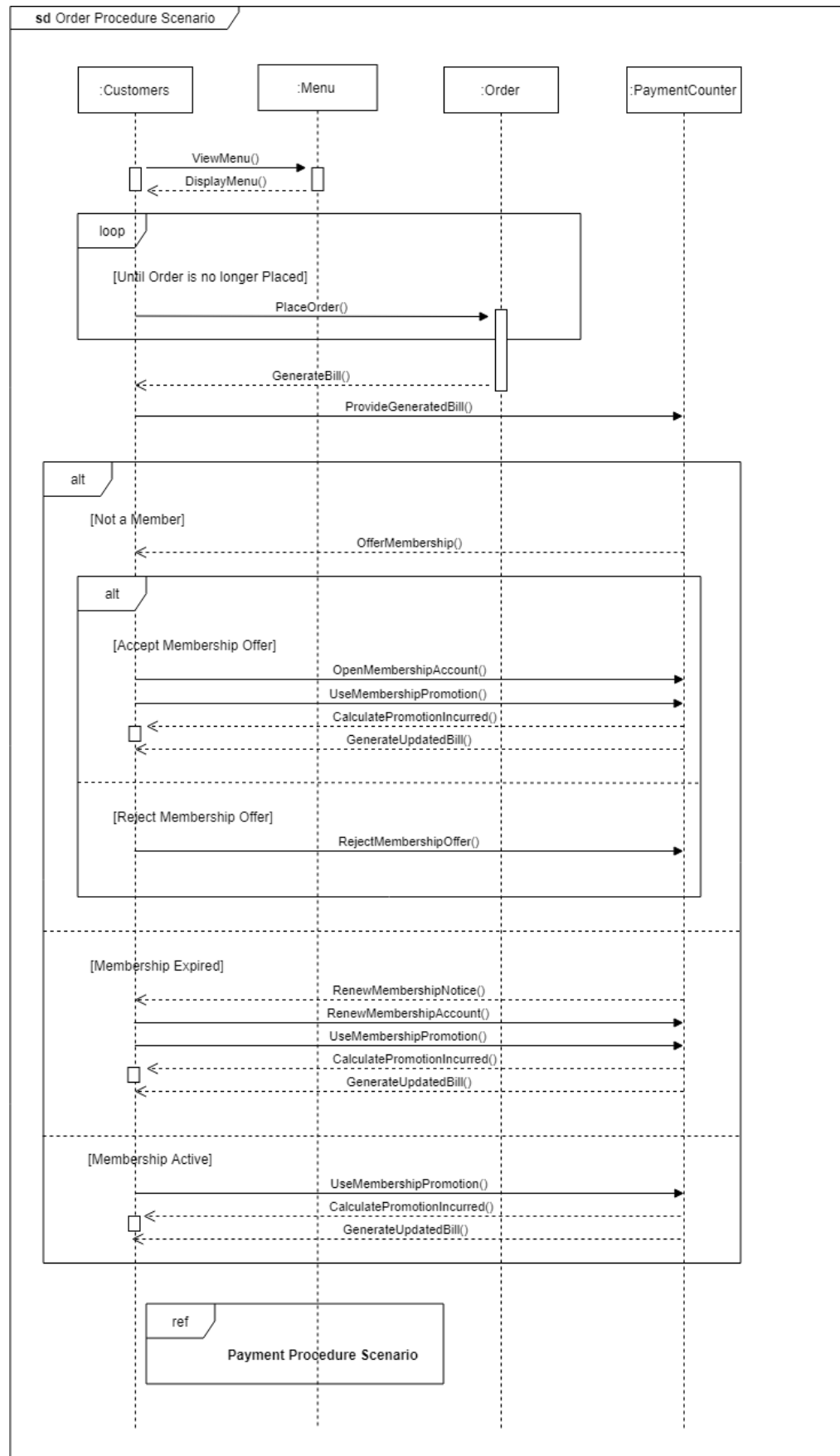


Figure 7: Sequence Diagram – Order Procedure (With Execution Occurrences)

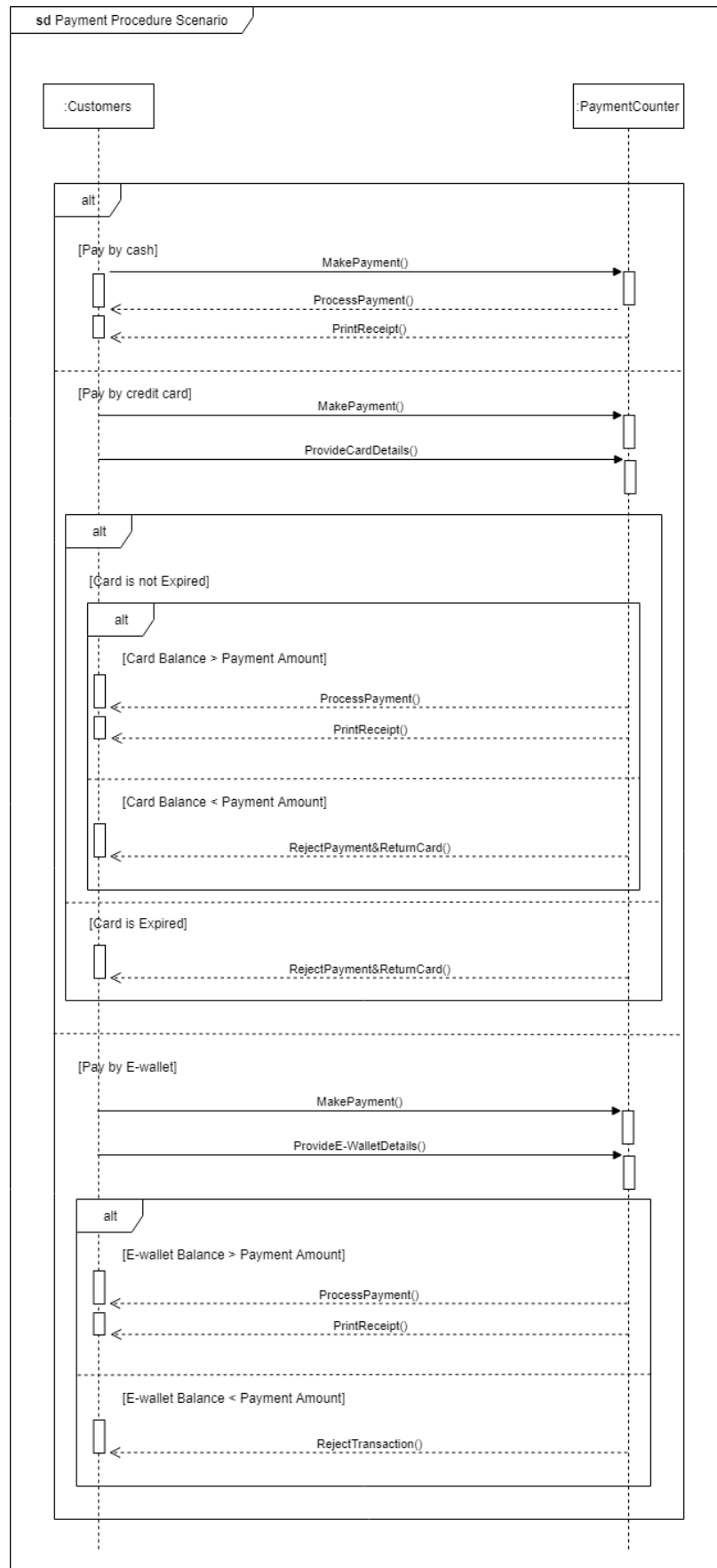


Figure 8: Sequence Diagram – Payment Procedure (With Execution Occurrences)

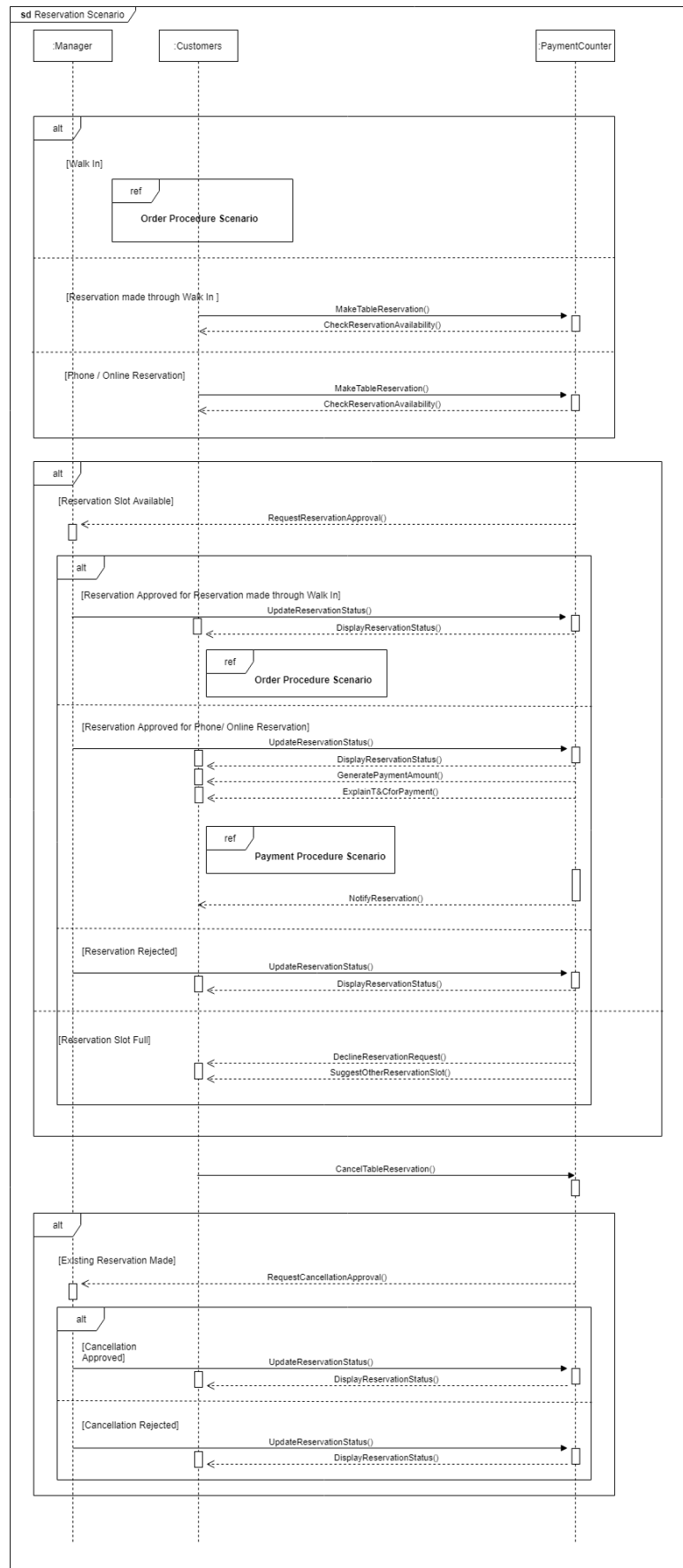


Figure 9: Sequence Diagram – Reservation (With Execution Occurrences)

4. Timing Constraints

For Phone or Online Reservations, there will be a time constraint factor of 5 days prior to remind the Customers for their coming Reservation.

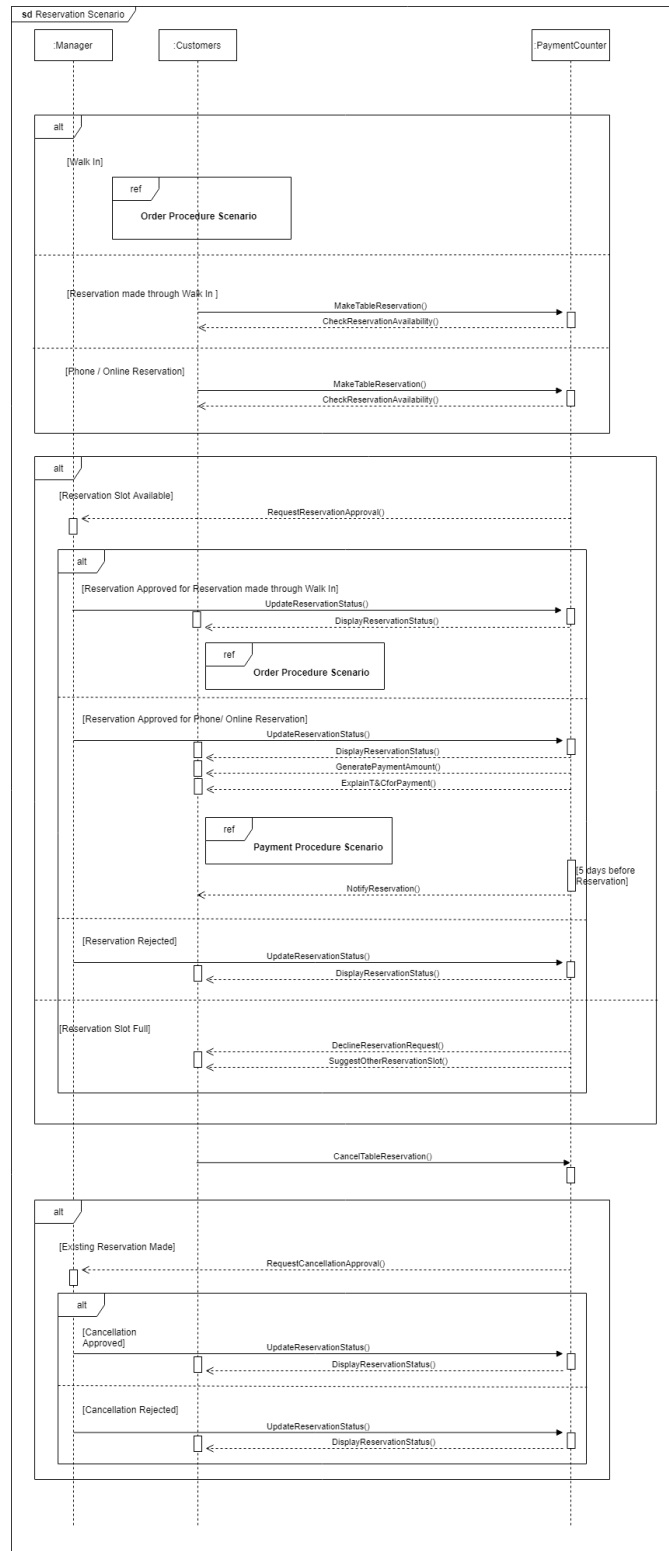


Figure 10: Sequence Diagram – Reservation (With Time Constraint)

5. Annotations for Sequence Diagram

There are no annotations required to be attached for the Sequence diagram of this system.

6. Complete Sequence Diagrams

The complete Sequence diagrams with legends and comments for respective diagrams for RMS will be attached in the Appendix of this document in Appendix A – Complete Sequence Diagrams.

Activity Diagram

Activity diagrams are interaction diagram that are used to graphically represent a series of actions or flow of control in a system [2]. This section of the document will explain the process and steps to construct Activity diagrams for a Restaurant Management System (RMS).

Activity Diagram for Business Modeling and Use Case Modeling Steps

1. Identification of Business Actors and Business Use Cases (Business Modeling)

This step is important before constructing Activity diagrams as it is used to unify and determine the actors that are involved in RMS. The actors in the system range from Manager, Customers, Orders, Menu and PaymentCounter. Each of these will invoke a set of business use cases.

2. Identification of Key Scenarios of Business & System Use Cases, Using Primary and Alternative Paths

A business use case contains the activity flow of the paths that is implemented. After the identification of the business use case, key scenarios can then be extracted from it to depict the flow of all actions and paths required to fulfill that scenario.

The following section will list the use cases and the primary paths to implement the actions to complete the use case scenario.

- a. Manager can add a new Menu with the attributes such as menu item, menu price as well as menu promotion rate

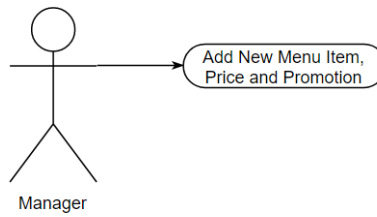


Figure 11: Use Case – Add a New Menu

- b. Manager can delete an existing Menu

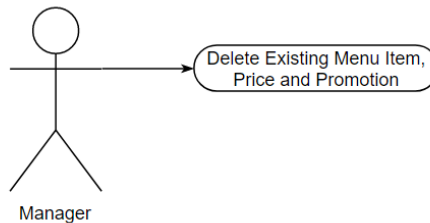


Figure 12: Use Case – Delete a Menu

- c. Manager can edit the attributes of an existing Menu such as Menu item, Menu price as well as Menu promotional rate

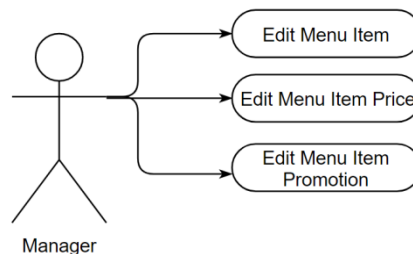


Figure 13: Use Case – Edit Attributes of a Menu

- d. Customer can open or renew membership account to enjoy promotional benefit

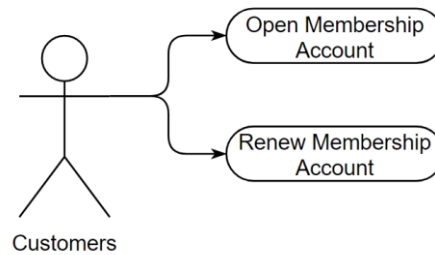


Figure 14: Use Case – Open/ Renew Membership Account

- e. Customer can add food items to order

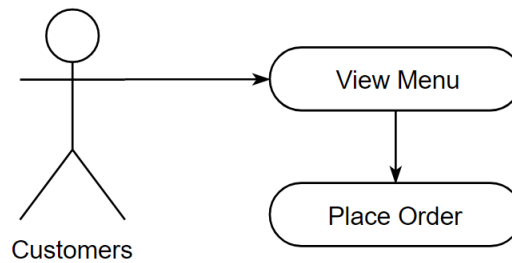


Figure 15: Use Case – Order Food

- f. Customer can get generated bill for their Order

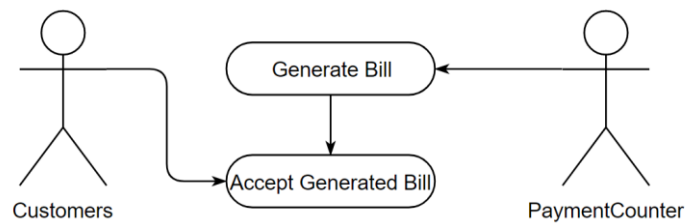


Figure 16: Use Case – Bill Generated from Order

- g. Customer can make payment with the bill generated

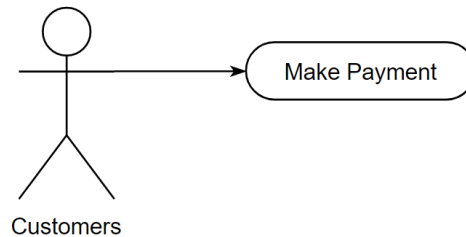


Figure 17: Use Case – Make Payment

- h. Customer can reserve or cancel a table

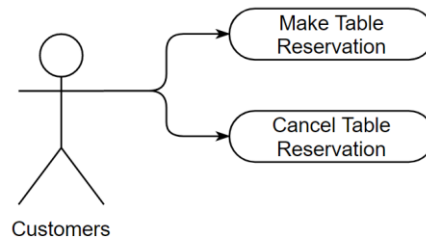


Figure 18: Use Case – Make / Cancel a Table Reservation

After all the primary paths are identified, the alternative paths for each of the primary path can be identified to cater for any changes or factors that might occur in RMS. The following section lists the use cases and the alternative paths to implement the actions to complete the use case scenario.

- a.1: Before a new Menu is added, must ensure that there are no Menu with the same Menu item name to avoid duplicated Menus
- b.1: Before a Menu is deleted, ensure that the Menu exists in the Menu list
- c.1: Before a Menu is edited, ensure that the Menu exists in the Menu list
- d.1: Before offering membership to Customers, ensure that they do not have an active membership account
- d.2: If Customers are already a member, check if their membership is still valid. If it is expired, request Customers to make renewal

- e.1: Customers can add food items to order until they are satisfied
- f.1: Bill will only be generated after the Customers have finalized their order
- g.1: Customers can make payment using Cash, Credit Card or E-wallet
- g.2: If Customers use Credit Card to make payment, validation is required to check the expiry and the balance of the Credit Card
- g.3: If Customers use E-wallet to make payment, validation is required to check the balance of the E-wallet
- h.1: Before a Reservation can be made, check the availability of the Reservation slot
- h.2: If it is not available, then the Reservation booking is a fail.
- h.3: If the reservation slot is available, then the staff at the PaymentCounter has to get the approval from the Manager to secure the Reservation.
- h.4: If the Manager does not approve Reservation, then the Reservation booking is a fail.
- h.5: If the Manager does not approve Reservation, then the Reservation booking is a success.
- h.6: If the Manager does not approve cancellation of a Reservation, then the Reservation cancellation is a fail.
- h.7: If the Manager does not approve cancellation of a Reservation, then the Reservation cancellation is a success.

3. Merging Scenarios to Produce Comprehensive Workflows using Activity Diagrams

After the primary paths and alternative paths have been identified, the diagram can now be constructed.

In stage (a), stage (b) and stage (c), 1 alternative path for each stage is identified as shown in Figure 19 and listed below.

a.1: Before a new Menu is added, must ensure that there are no Menu with the same Menu item name to avoid duplicated Menus

b.1: Before a Menu is deleted, ensure that the Menu exists in the Menu list

c.1: Before a Menu is edited, ensure that the Menu exists in the Menu list

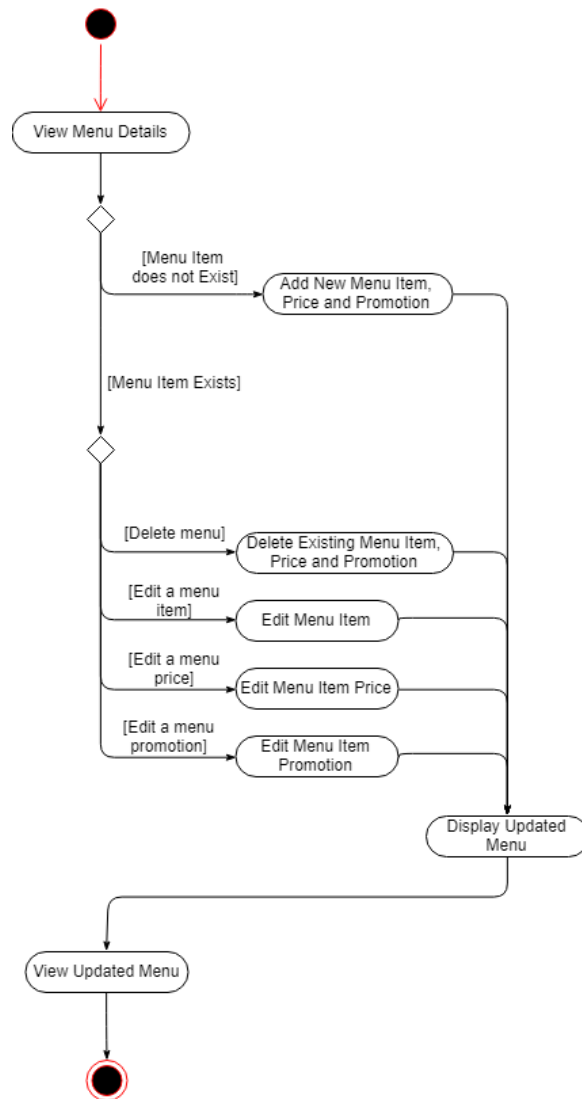


Figure 19: Alternative Path – Menu Management

In stage (d), stage (e) and stage (f), the alternative paths are identified as shown in Figure 20 and listed below.

d.1: Before offering membership to Customers, ensure that they do not have an active membership account

d.2: If Customers are already a member, check if their membership is still valid. If it is expired, request Customers to make renewal

e.1: Customers can add food items to order until they are satisfied

f.1: Bill will only be generated after the Customers have finalized their order

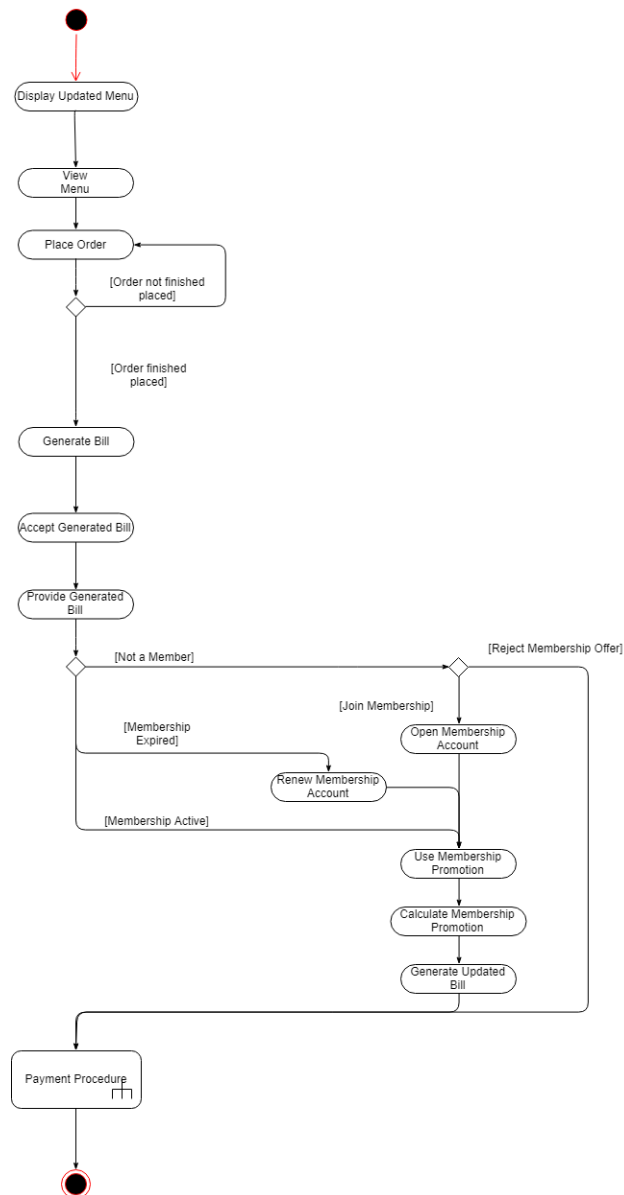


Figure 20: Alternative Path – Order Procedure

In stage (g), the alternative paths are identified as shown in Figure 21 and listed below.

g.1: Customers can make payment using Cash, Credit Card or E-wallet

g.2: If Customers use Credit Card to make payment, validation is required to check the expiry and the balance of the Credit Card

g.3: If Customers use E-wallet to make payment, validation is required to check the balance of the E-wallet

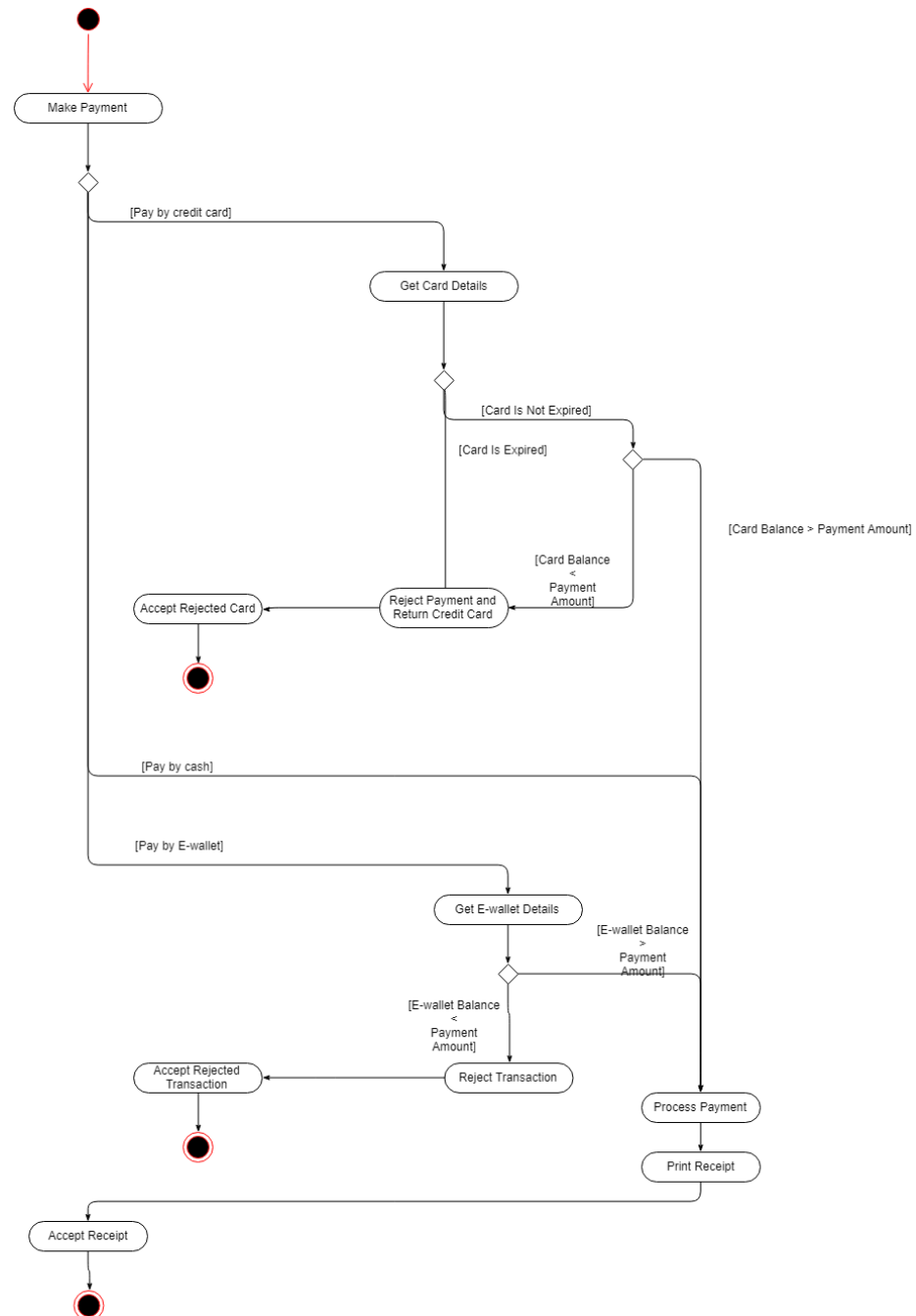


Figure 21: Alternative Path – Payment Procedure

In stage (h), the alternative paths are identified as shown in Figure 22 and Figure 23 as well as listed below.

- h.1: Before a Reservation can be made, check the availability of the Reservation slot
- h.2: If it is not available, then the Reservation booking is a fail.
- h.3: If the reservation slot is available, then the staff at the PaymentCounter has to get the approval from the Manager to secure the Reservation.
- h.4: If the Manager does not approve Reservation, then the Reservation booking is a fail.
- h.5: If the Manager does not approve Reservation, then the Reservation booking is a success.
- h.6: If the Manager does not approve cancellation of a Reservation, then the Reservation cancellation is a fail.
- h.7: If the Manager does not approve cancellation of a Reservation, then the Reservation cancellation is a success.

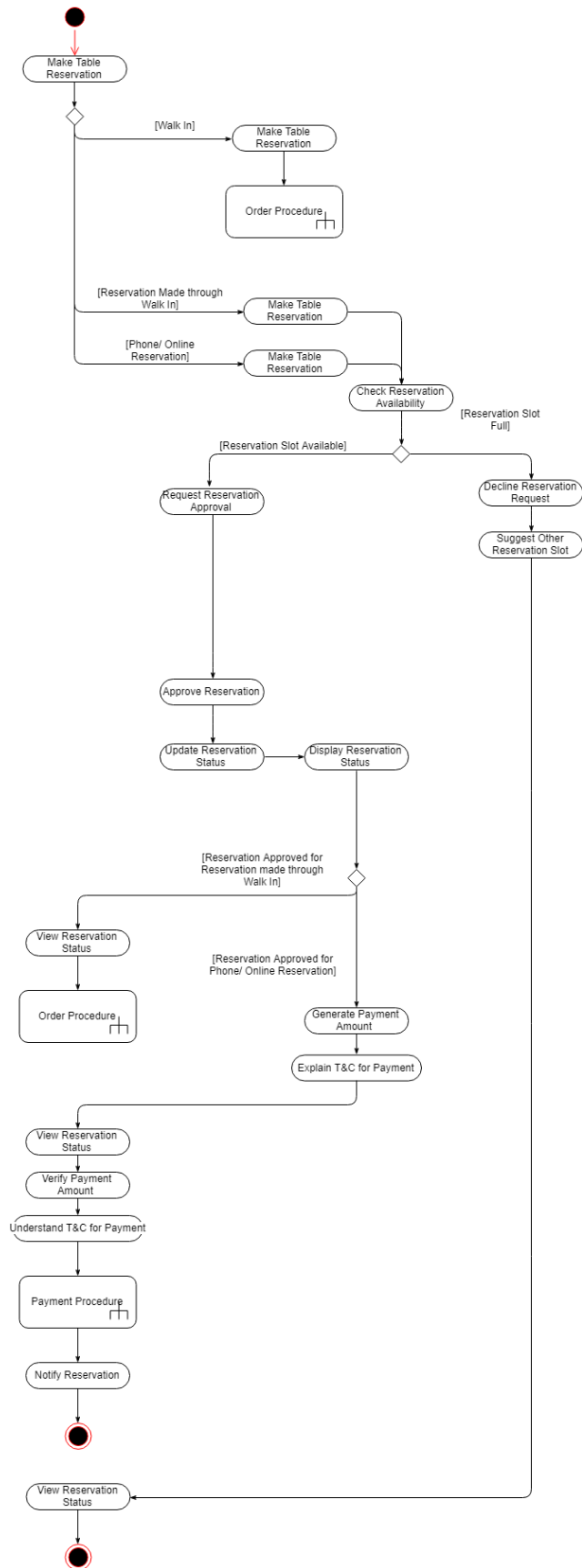


Figure 22: Alternative Path – Make Reservation

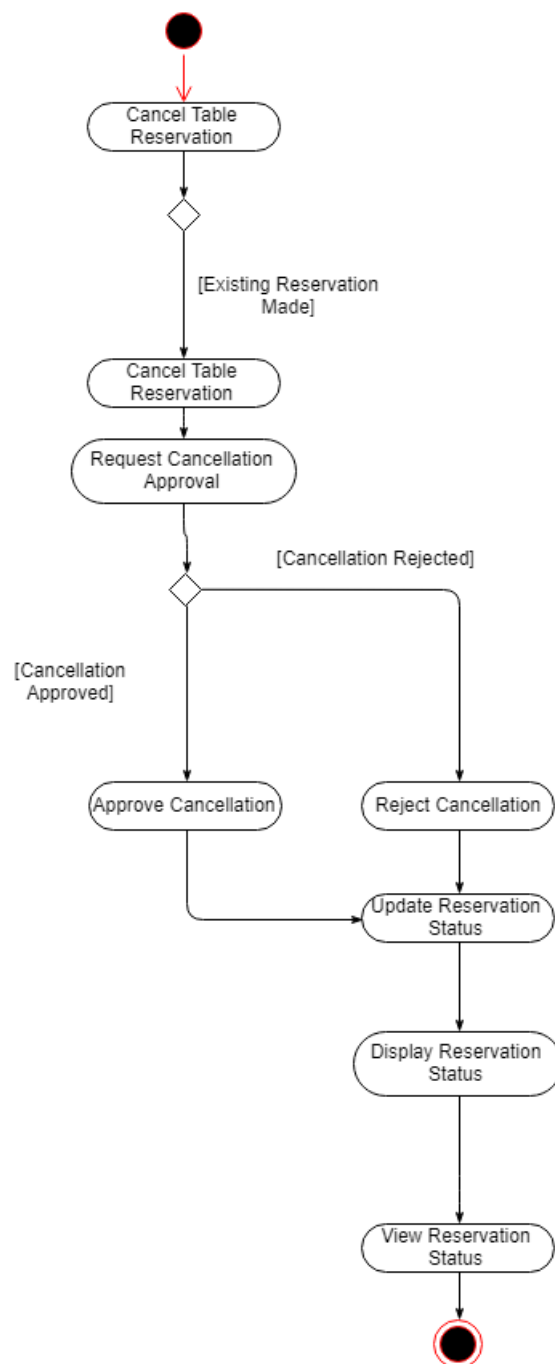


Figure 23: Alternative Path – Cancel Reservation

4. Object Behaviors triggered by Workflow

No object flows are used in RMS.

5. Mapping Activities to Business Areas and Recoding Using Swim lanes

The figures below show the Activity Diagrams for RMS with swim lanes to differentiate the activities implemented by their respective actors.

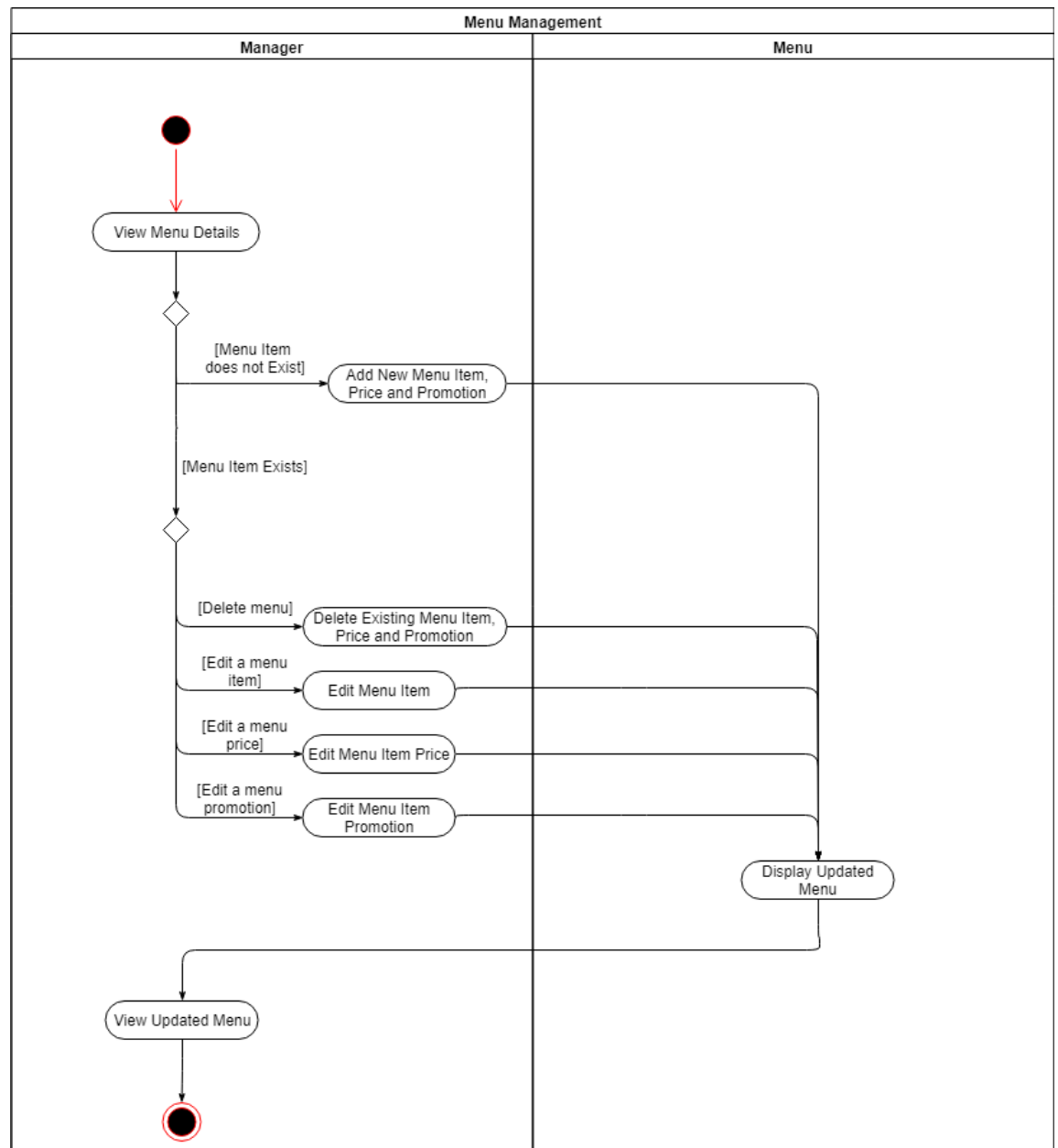


Figure 24: Menu Management (With Swim lane)

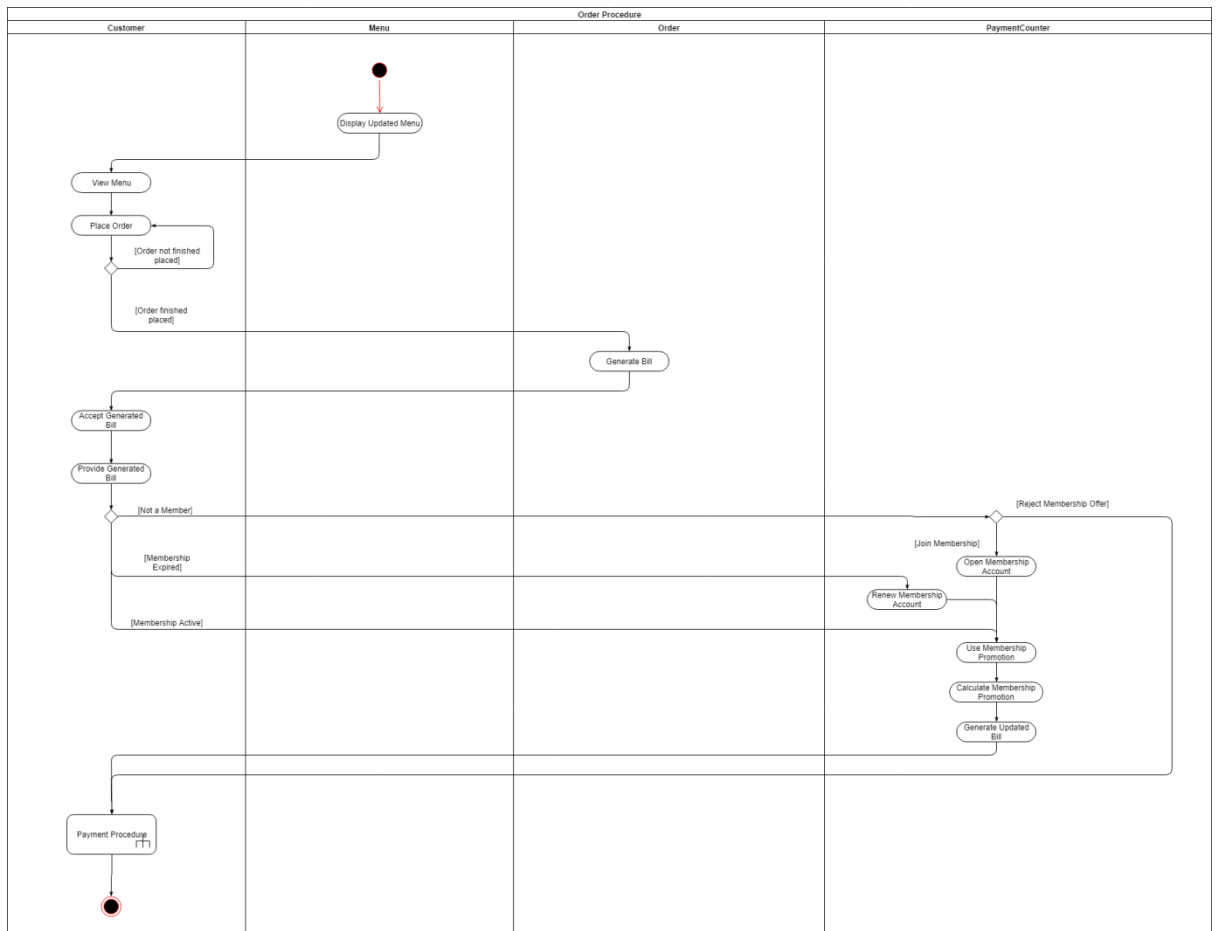


Figure 25: Order Procedure (With Swim lane)

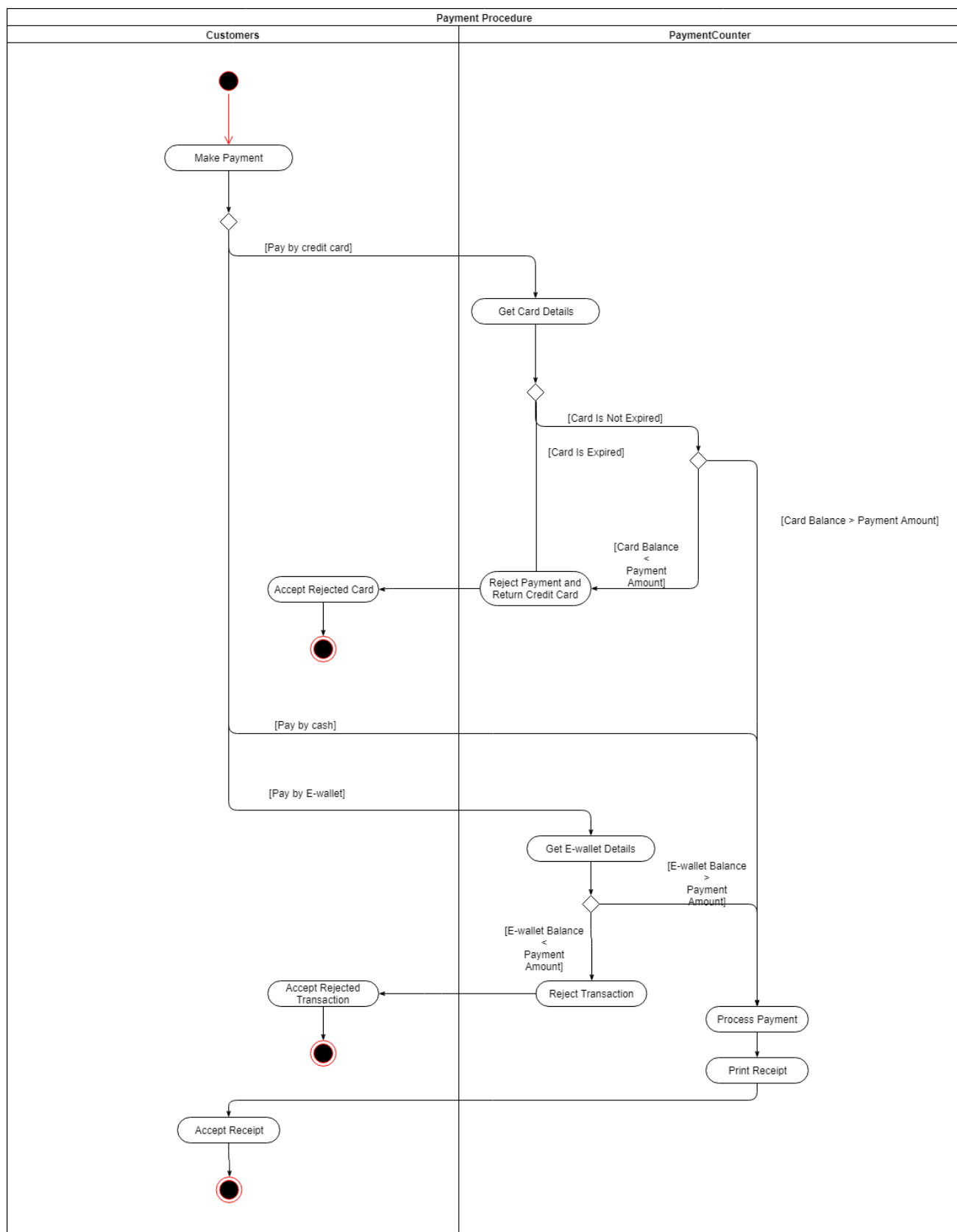


Figure 26: Payment Procedure (With Swim lane)

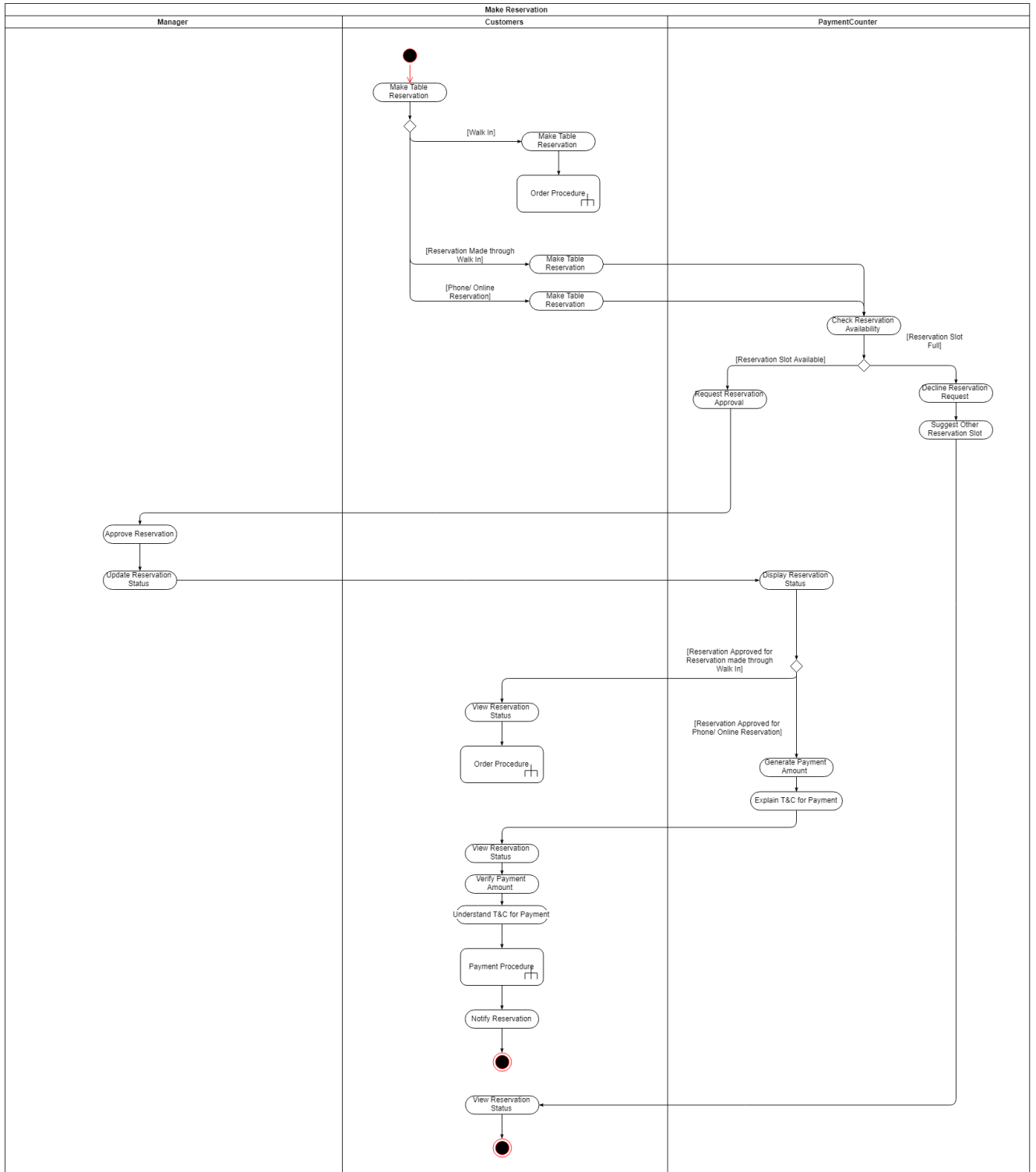


Figure 27: Make Reservation (With Swim lane)

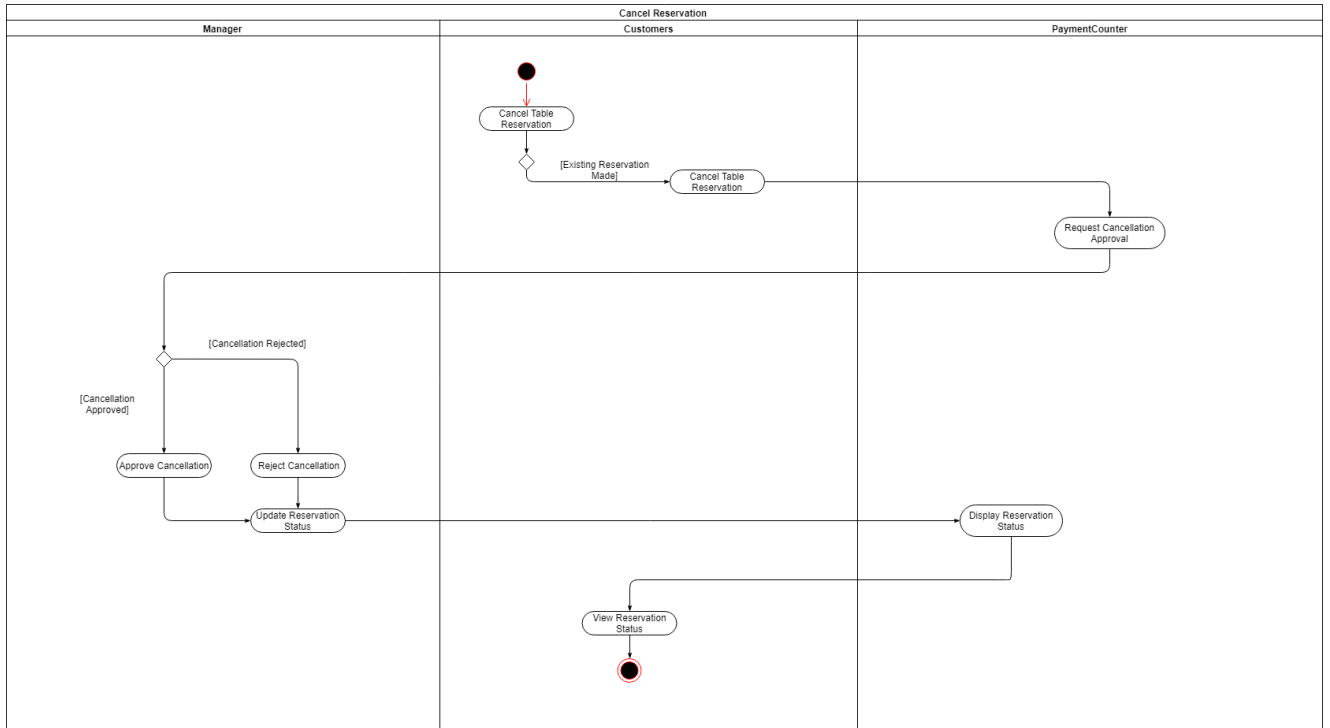


Figure 28: Cancel Reservation (With Swim lane)

6. Refining Complicated High Level Activities

The complete Activity diagrams with legends and comments for respective diagrams for RMS will be attached in the Appendix of this document in Appendix B – Complete Activity Diagrams.

References

Citations

- [1] V. Paradigm, “What is Sequence Diagram?” [Online]. Available: <https://www.visual-paradigm.com/guide/uml-unified-modeling-language/what-is-sequence-diagram/>. [Accessed: 13-Nov-2019].
- [2] Smartdraw, “Activity Diagram.” [Online]. Available: <https://www.smartdraw.com/activity-diagram/>. [Accessed: 13-Nov-2019].

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- [1] V. Paradigm, “What is Sequence Diagram?” [Online]. Available: <https://www.visual-paradigm.com/guide/uml-unified-modeling-language/what-is-sequence-diagram/>. [Accessed: 13-Nov-2019].
- [2] Smartdraw, “Activity Diagram.” [Online]. Available: <https://www.smartdraw.com/activity-diagram/>. [Accessed: 13-Nov-2019].
- [3] Uml-diagrams, “Sequence Diagrams Reference.” [Online]. Available: <https://www.uml-diagrams.org/sequence-diagrams-reference.html>. [Accessed: 13-Nov-2019].
- [4] S. Making, “Activity Diagrams.” [Online]. Available: <https://sourcemaking.com/uml/modeling-business-systems/external-view/activity-diagrams>. [Accessed: 13-Nov-2019].

Appendix

All figures attached are of PDF format. For detailed viewing, right-click in the diagram and open in any PDF viewing software.

Appendix A – Complete Sequence Diagrams

The PDF files attached display the complete Sequence diagrams for RMS.

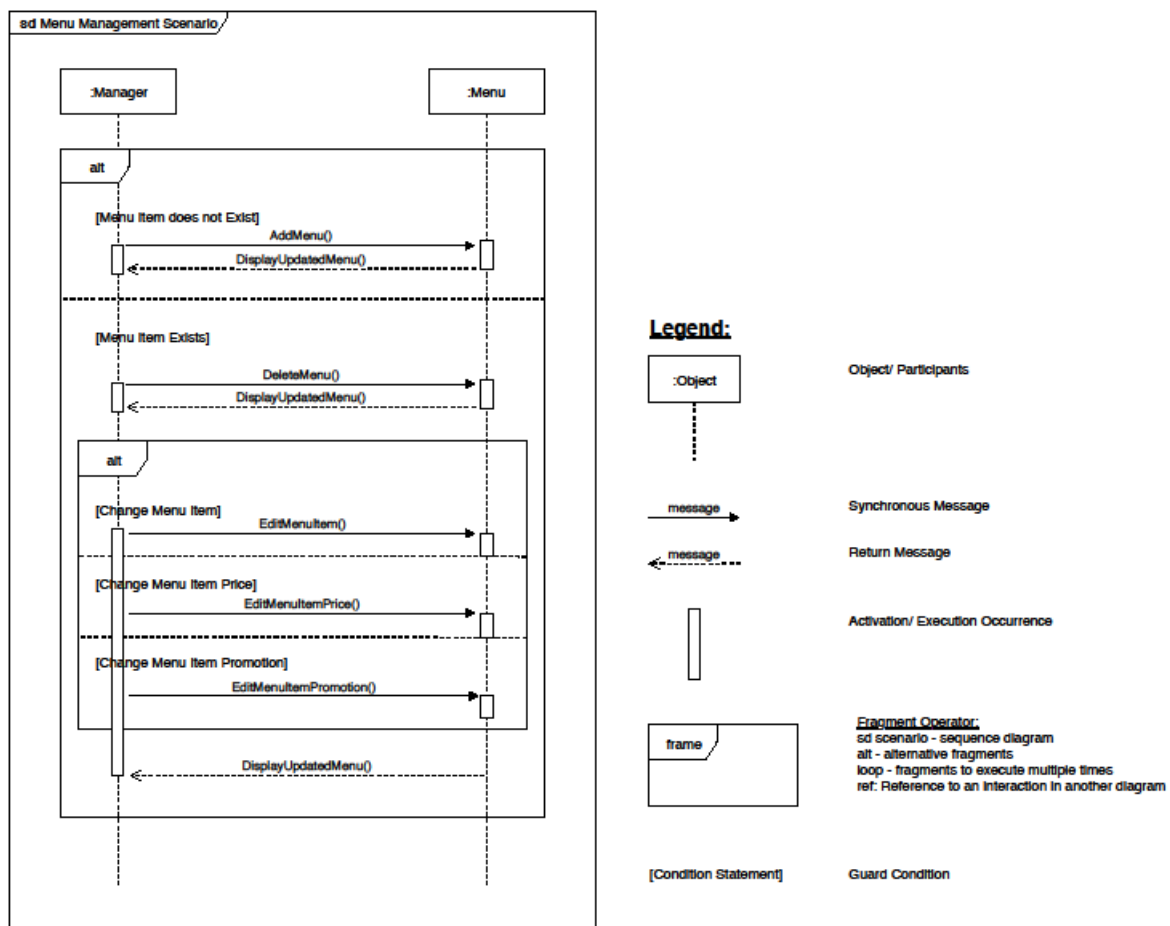


Figure 29: Complete Sequence Diagram – Menu Management

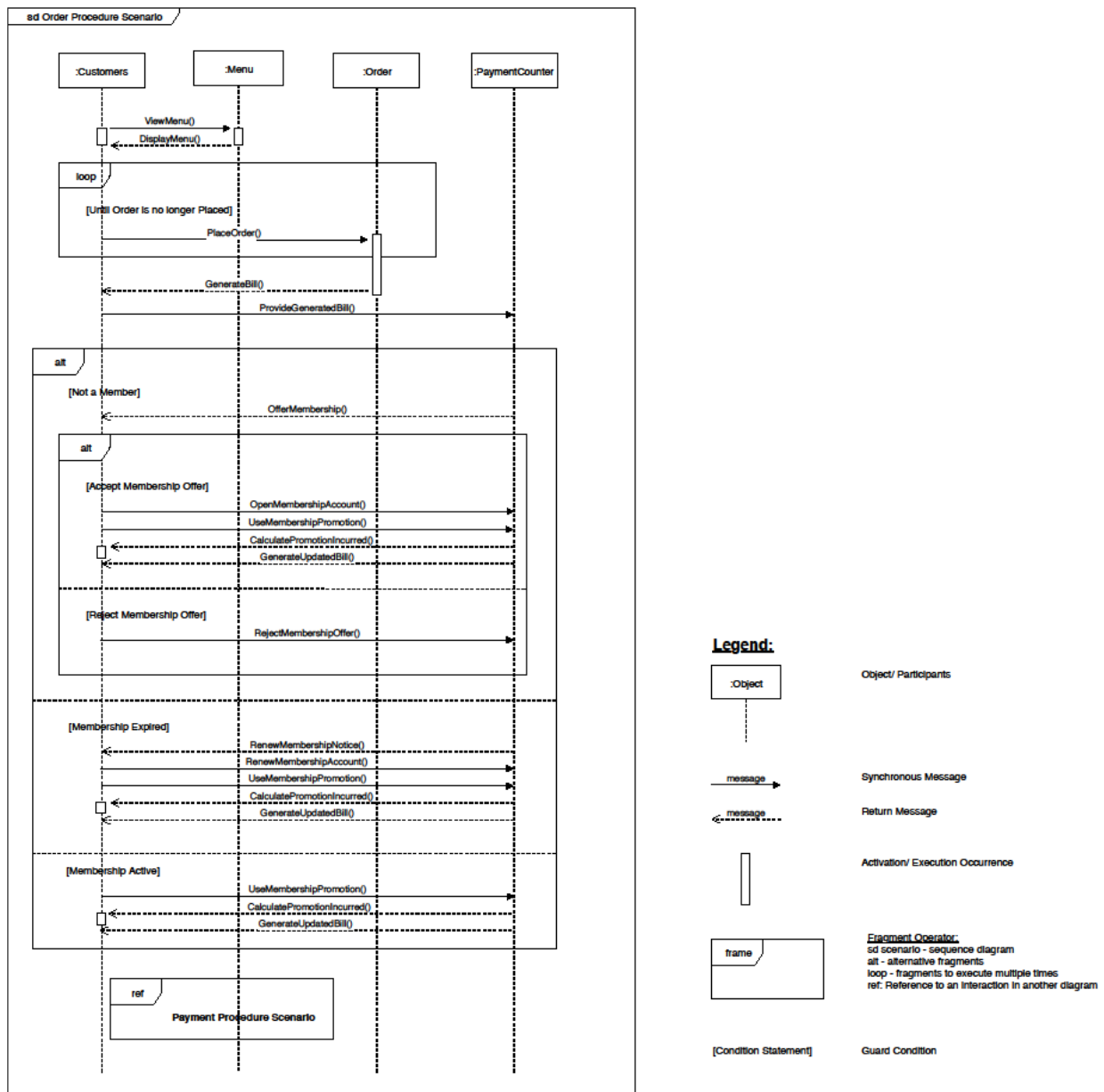


Figure 30: Complete Sequence Diagram – Order Procedure

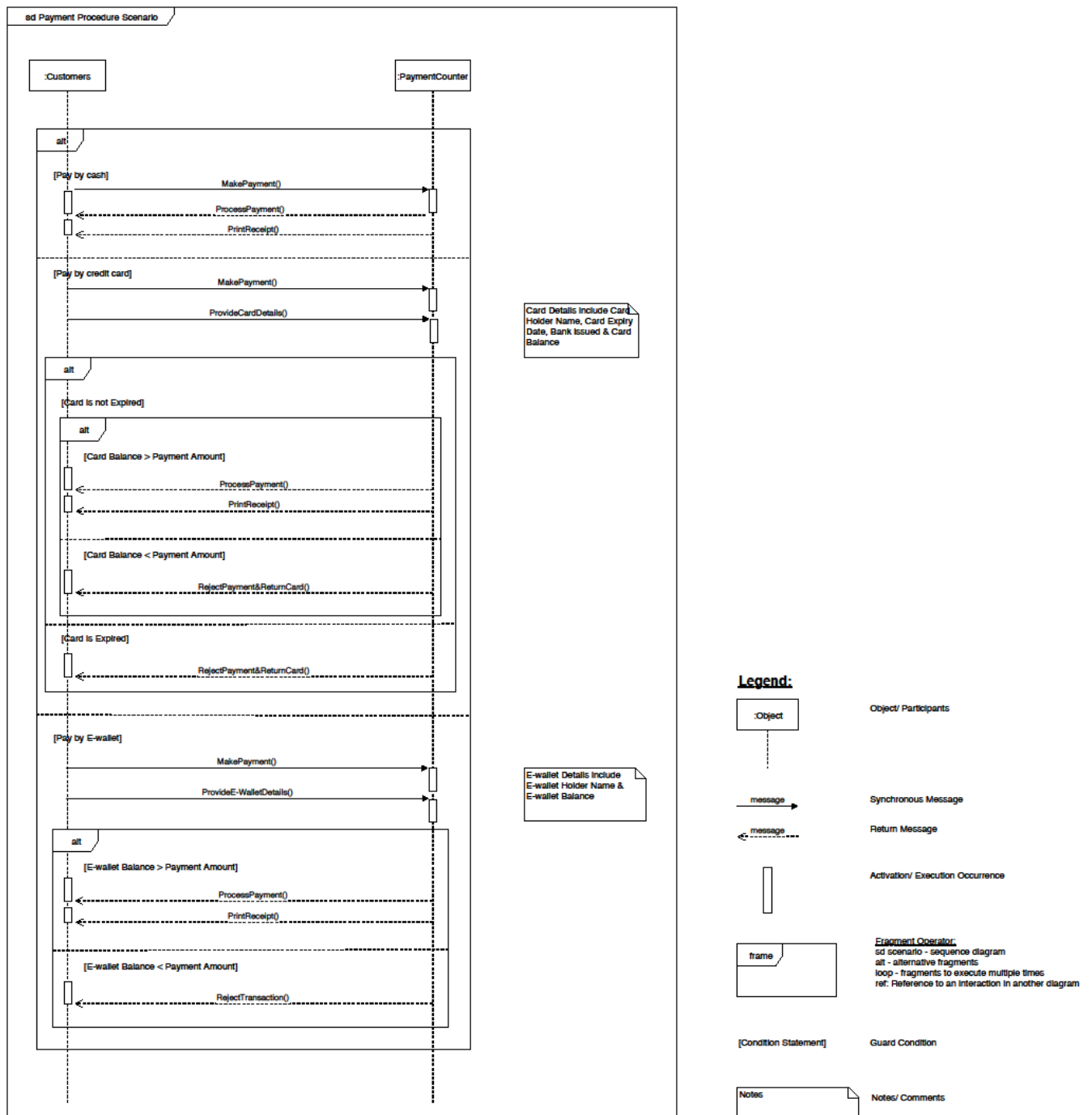


Figure 31: Complete Sequence Diagram – Payment Procedure

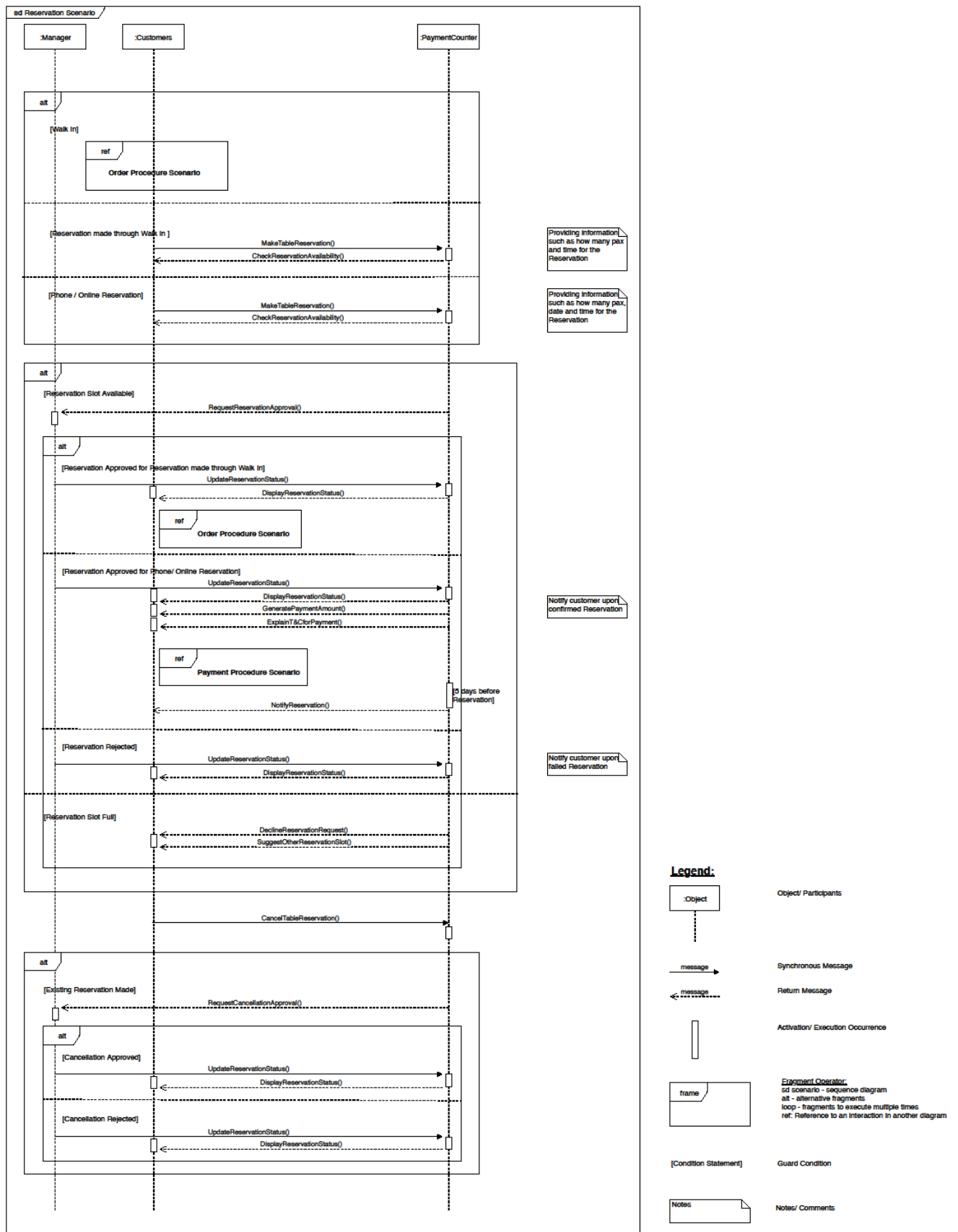


Figure 32: Complete Sequence Diagram – Reservation

Appendix B– Complete Activity Diagrams

The PDF files attached display the complete Activity diagrams for RMS.

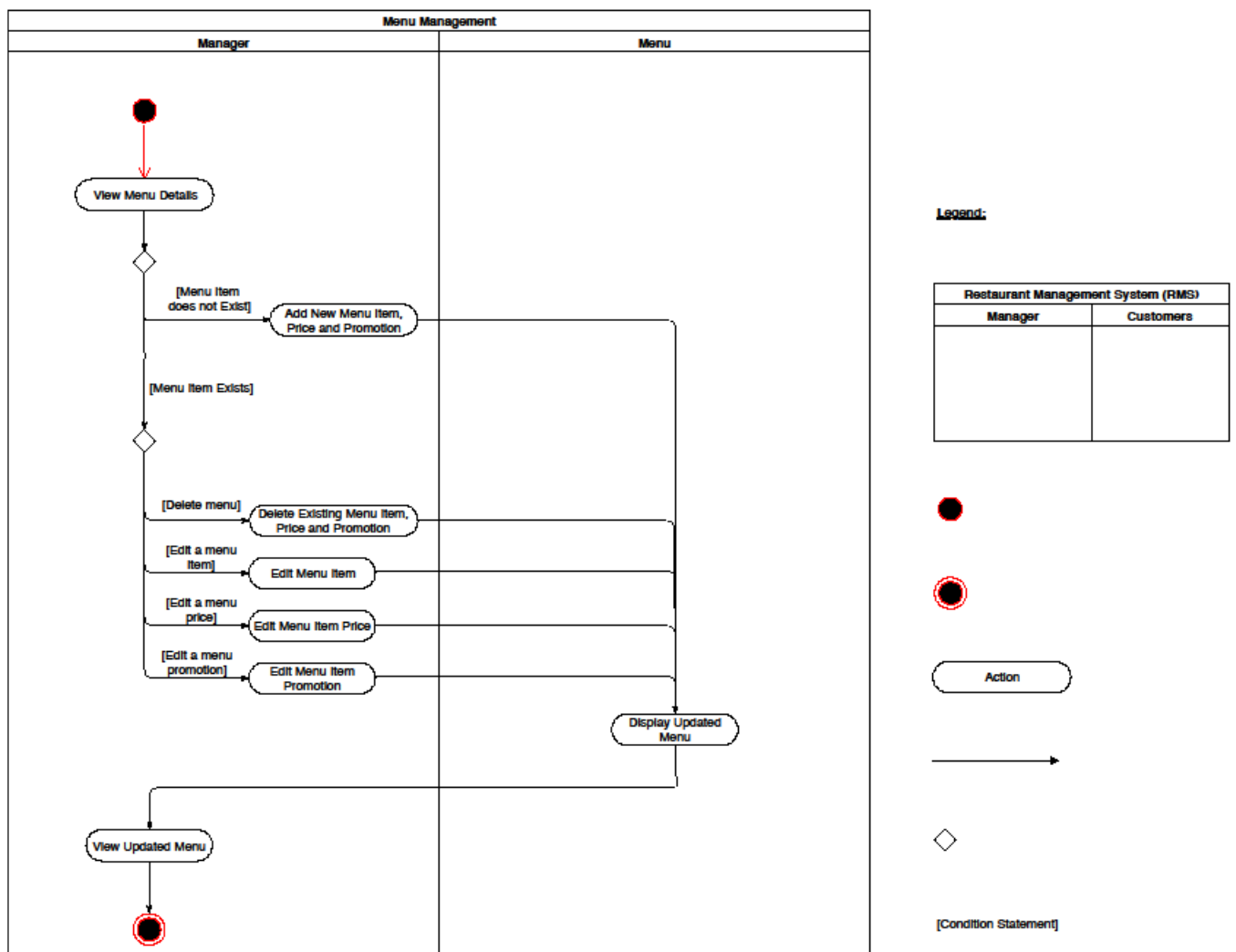


Figure 33: Complete Activity Diagram – Menu Management

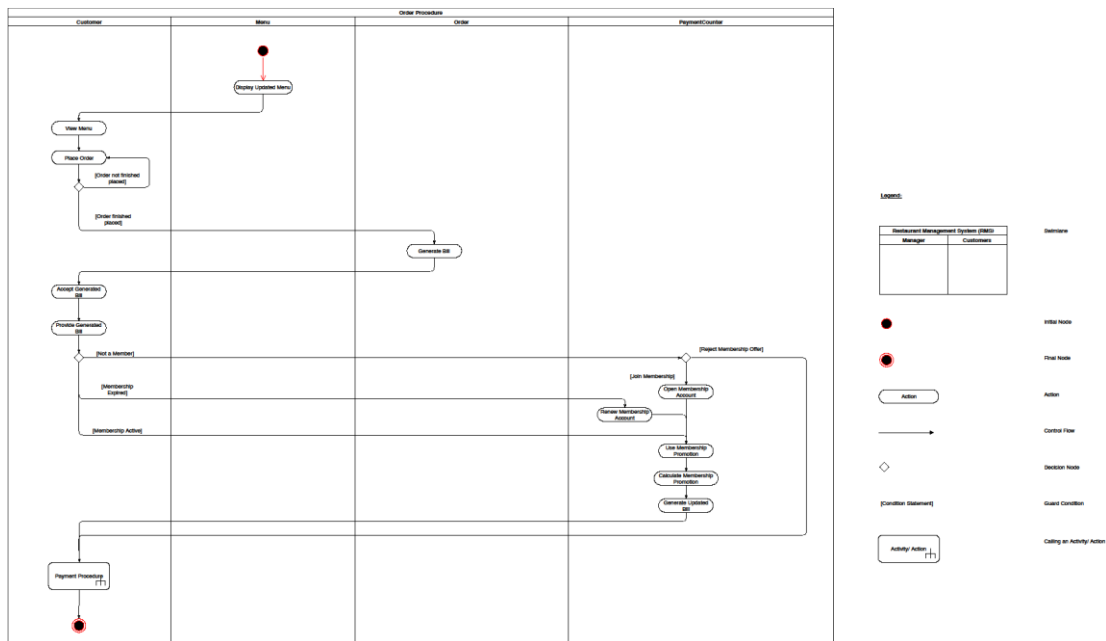


Figure 34: Complete Activity Diagram – Order Procedure

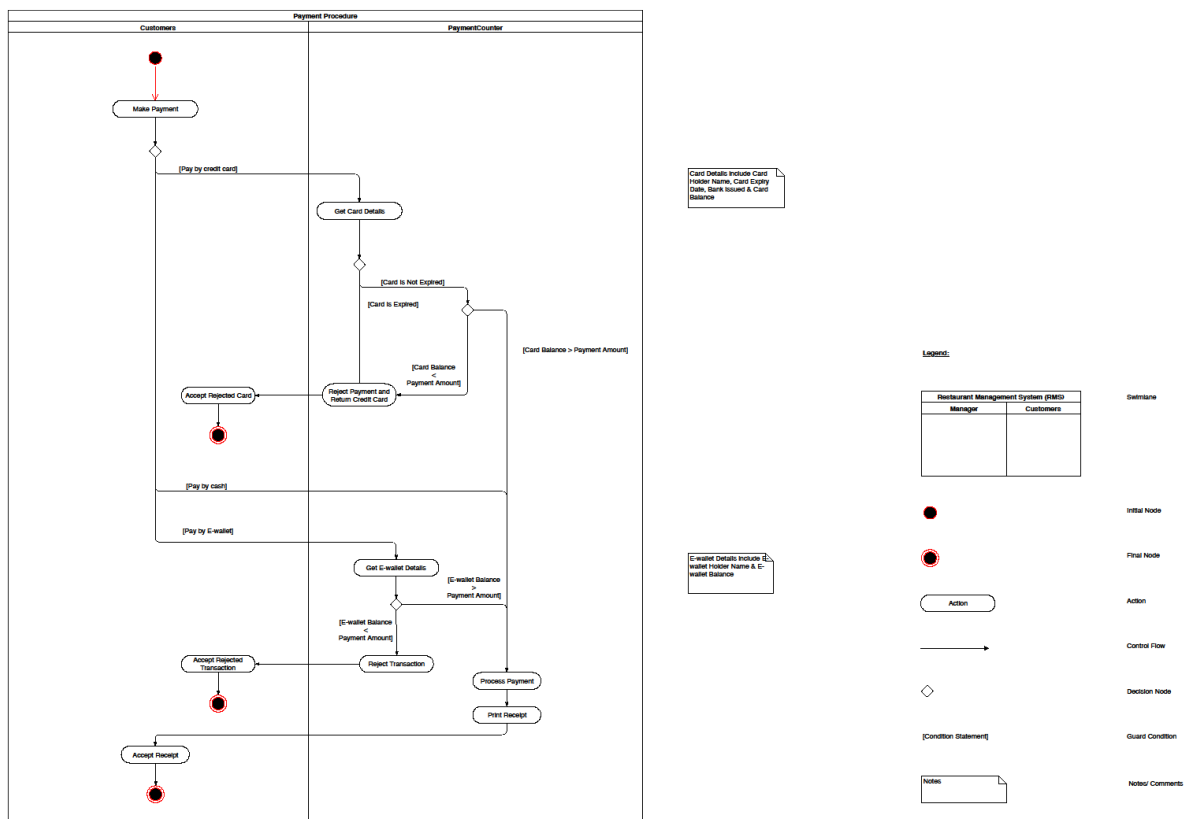


Figure 35: Complete Activity Diagram – Payment Procedure

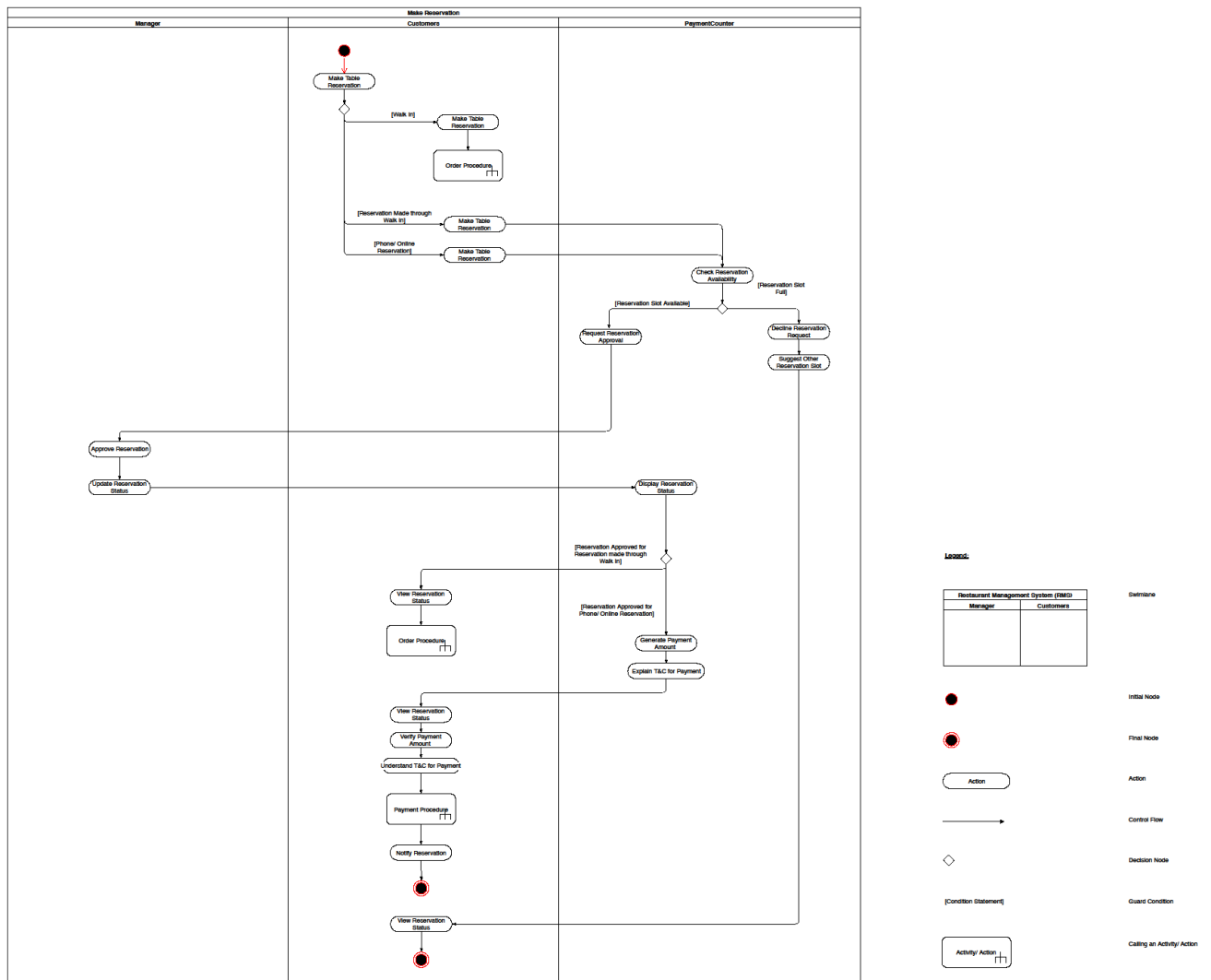


Figure 36: Complete Activity Diagram – Make Reservation

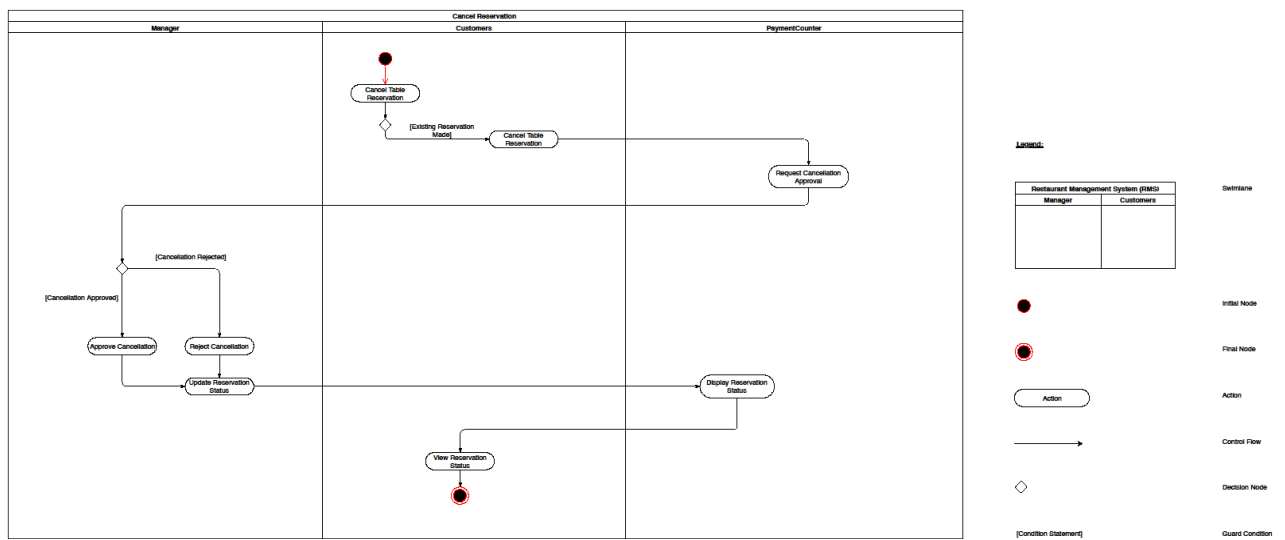


Figure 37: Complete Activity Diagram – Cancel Reservation