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Task 3.1: Scenario Analysis

Scenario #1: Book a Flight Ticket Online [Diaa]

Initial Assumption

The customer is a registered user of the airline online booking system and is successfully logged in. The system is operational, connected to the external airline system and payment services, and there are scheduled flights available for booking. The customer has access to the internet and possesses valid personal and travel information required for booking.

Normal

The customer books a flight ticket online through the airline booking system. The customer searches for available flights by entering the departure city, destination, travel date, and number of passengers. The system retrieves and displays a list of available flights along with schedules, prices, and ticket classes. The customer selects a suitable flight, chooses a ticket class (Economy, Business, or VIP), and proceeds to enter passenger details such as name, identification information, and contact details. The customer then selects optional services such as seat selection and baggage options. After reviewing the booking summary, the customer chooses to pay online using a valid card. The system securely processes the payment through the bank gateway, confirms the transaction, finalizes the booking, generates a reservation reference number, and issues an electronic ticket (e-ticket) to the customer via the system and email. The booking is stored in the system database successfully.

Alternative

The customer books a flight ticket online but chooses a different business process to complete the booking. After selecting the flight, ticket class, and entering passenger details, the customer selects the "pay later / cash payment" option instead of online card payment. The system temporarily reserves the selected seats and generates a booking reference with a pending payment status. The customer is instructed to visit the airline office or authorized agent within a specified time period to complete the payment in cash. Once the payment is confirmed by the staff, the system updates the booking status to confirmed and issues the electronic ticket to the customer. The reservation is successfully completed without online payment.

Error

The customer attempts to book a flight ticket online and proceeds to the payment stage using a card. After entering valid card details, the system sends the payment request to the bank authorization service, but the transaction is declined due to insufficient funds or bank authorization failure. The system displays an error message indicating that the payment could not be completed, and the booking is not finalized. The selected seats are released after a timeout period, and no reservation reference or ticket is issued.

Error

The customer books a flight ticket online and completes all booking steps successfully, but during the final confirmation stage, the system fails to save the booking due to a database or system connectivity error. The system notifies the customer that the booking process could not

be completed and advises them to retry later or contact customer support. No ticket is issued, and the transaction is rolled back to prevent inconsistent data.

Scenario #2: Change Flight Date [Nasri]

Initial Assumption

A registered customer is logged into the flight booking system and already has a confirmed, paid booking with a valid reservation reference (PNR). The ticket is within the allowed change window and its fare rules allow date changes (or allow changes only in critical cases). The customer has a critical reason (medical emergency) and can provide supporting documentation if required by policy. The system is online and connected to the airline inventory and payment gateway services.

Normal

The customer opens "My Bookings", selects the confirmed reservation, and clicks "Change Flight Date." The system first displays the ticket's change policy (change window, possible fees, and fare difference rules) and asks the customer to select a critical-case reason and upload proof (medical report) if required. After the customer submits the reason, the system validates eligibility and temporarily locks the booking to prevent parallel modifications. The customer selects a new travel date, and the system lists available flights for the same route showing departure/arrival time, remaining seats, and available classes (VIP/Business/Economy), along with baggage and seat options. The customer chooses a replacement flight in the same class, and the system re-checks availability in real time, validates fare rules, and calculates any change fee plus the fare difference. A clear summary is shown (old itinerary, new itinerary, fees, total difference, and refund/charge direction). The customer pays the difference by card, and once the payment is authorized successfully, the system commits the change: it releases the old seat inventory, reserves the new seat, updates the booking record, and issues an updated e-ticket/itinerary. Finally, the system sends confirmation on-screen and by email/SMS, and updates the financial records (invoice/receipt) to reflect the additional payment and the modification history for audit purposes.

Alternative

Instead of changing the date online, the customer contacts customer support (or visits the agency office) and provides the reservation reference and identification details. The staff verifies the customer identity, checks the booking's fare rules and the airline's critical-case policy, and requests the necessary supporting proof if it was not already provided. The staff searches for alternative flights that match the route and the customer preferences (time, class, baggage needs, special services) and proposes one or more valid options. After the customer confirms the preferred option, the staff informs the customer of the exact change fee and fare difference and collects payment using an offline method such as cash at the office or bank transfer confirmation. Once payment is confirmed, the staff completes the modification in the system, which updates the reservation, reserves the new seat, issues the updated e-ticket, and sends the new itinerary to the customer, while ensuring all financial records and modification logs are updated correctly.

Error

The customer selects a new flight date and the system calculates the change fee and fare difference. The customer proceeds to pay the required amount by Visa/card, but the bank/payment gateway rejects the transaction (for example, insufficient balance, incorrect card

verification, or gateway timeout). As a result, the system does not confirm the modification and keeps the original booking unchanged. The system displays a clear message that payment failed, records the failed attempt, and offers the customer realistic next actions such as retrying the payment, using another payment method, or contacting customer support to complete the change through an alternative process.

Error

The customer selects the new flight and successfully completes payment for the fare difference. After payment confirmation, the system attempts to update the reservation and reserve the new seat in the airline inventory, but a system failure occurs (for example, failure to retrieve/update booking data from the database, or temporary unavailability of the airline inventory service). The modification is not completed, and the system prevents inconsistent results by keeping the original booking active and marking the change request as "failed" or "pending verification" based on policy. The system notifies the customer that the change could not be finalized due to a technical issue, provides a support reference number, and automatically alerts customer support/finance to verify the booking status and ensure the customer is not charged without receiving an updated ticket.

Scenario #3: Complete Pending Booking (Pay Later / Cash Payment at Office)
[Omar]

Initial Assumption

The customer is a registered user of the airline online booking system and is successfully logged in. The customer has already created a booking using the "Pay Later / Cash Payment" option, so the booking exists in the system with status Pending Payment and has a valid reservation reference (PNR). The pending booking is still within the allowed payment time window (before it expires). The system is operational and connected to the booking database. The airline office/authorized agent staff can access the system to confirm cash payments and update booking status. The customer has valid identification and booking information.

Normal

The customer completes a pending booking through cash payment at the airline office or authorized agent. The customer visits the office and provides the reservation reference (PNR) and identification details. The staff retrieves the pending booking in the system and displays booking details including flight information, ticket class, passenger details, total amount due, and the payment deadline. The staff verifies the customer identity and confirms that the booking is still valid and not expired. The customer pays the required amount in cash. The staff records the cash payment in the system and confirms the payment. The system updates the booking status from Pending Payment to Confirmed, issues the electronic ticket (e-ticket), generates the final invoice/receipt, and stores the completed booking in the system database. The system sends booking confirmation and the e-ticket to the customer via the system and email/SMS. The reservation is successfully completed.

Alternative

The customer completes the pending booking but follows an alternative confirmation process. Instead of paying directly at the office, the customer pays through bank transfer (or presents a transfer receipt) and provides the proof to the staff. The staff retrieves the pending booking and reviews the transfer proof. After verifying the transfer details (amount, reference, date) and confirming it with the finance/manager account if required, the staff marks the payment as confirmed in the system. The system updates the booking status to Confirmed, issues the e-ticket, generates the final receipt, and sends confirmation to the customer. The booking is completed successfully without direct cash payment at the counter.

Error

The customer attempts to complete the pending booking, but the booking has expired because the payment deadline has passed. The staff searches the PNR and the system shows that the booking status is Expired/Cancelled and the temporary seat hold has been released. The system displays an error message indicating that the booking can no longer be completed. No payment is accepted, no ticket is issued, and the customer is instructed to create a new booking using the online system.

Error

The customer pays in cash and the staff attempts to confirm the payment, but the system fails to update the booking due to a database or connectivity error. The system notifies the staff that the confirmation process could not be completed and prevents issuing an e-ticket to avoid inconsistent data. The staff provides the customer with a manual payment receipt/reference and advises them to retry shortly or contact support. The system logs the failure for follow-up, and the booking remains Pending Payment until the issue is resolved (or the transaction is verified and completed).

Scenario #4: Search for Available Flights [Sameer]

Initial Assumption

The customer is a registered user of the airline online booking system and has access to the system through the internet. The system is operational, connected to the flight database, and contains scheduled flights with up-to-date schedules and prices. The customer has the necessary travel information such as departure city, destination, and preferred travel date to perform a flight search.

Normal

The customer searches for available flights through the airline booking system. The customer enters the departure city, destination city, travel date, and number of passengers in the search form. The system validates the entered search criteria and retrieves matching flights from the flight database. The system then displays a list of available flights including airline name, departure and arrival times, ticket classes, and prices. The customer reviews the search results and selects a preferred flight to view its detailed information. The search process is completed successfully, and the available flights are presented to the customer.

Alternative

The customer searches for available flights but follows an alternative search process. After viewing the initial search results, the customer refines the search by applying filters such as ticket class, price range, airline, or departure time. The system updates the search results dynamically based on the selected filters. The customer may also modify the search criteria, such as changing the travel date or destination, and perform the search again. The system retrieves and displays the updated list of available flights according to the new criteria, allowing the customer to continue browsing flight options.

Error

The customer searches for available flights by entering valid search criteria, but the system does not find any matching flights for the selected date or route. The system displays an error message indicating that no flights are available and suggests searching with alternative dates or destinations. The search process ends without displaying any available flight results.

Error

The customer attempts to search for available flights, but the system fails to retrieve flight information due to a database connection or system service failure. The system displays an error message informing the customer that the service is temporarily unavailable and advises them to try again later. No flight data is displayed, and the search request is not completed successfully.

Scenario #5: Cancel Flight Booking and Process Refund [Ayham]

Initial Assumption

The customer is a registered user of the airline online booking system and is successfully logged in. The customer has an existing confirmed booking with a valid reservation reference (PNR). The ticket is within the allowed cancellation period according to airline policies. The system is operational and connected to the airline reservation system and financial/payment services. The customer has access to the internet and valid booking information.

Normal

The customer cancels a flight booking through the airline online booking system. The customer accesses the "My Bookings" section and enters the reservation reference (PNR) to retrieve the booking details. The system displays the flight information, ticket class, payment status, and applicable cancellation policy. The customer selects the cancel booking option and confirms the cancellation request. The system verifies the cancellation eligibility, calculates the refundable amount according to airline rules, and processes the cancellation. The booking status is updated to cancelled, and the refundable amount is returned to the customer through the original payment method. The system sends a cancellation confirmation and refund details to the customer via the system and email. The cancellation is successfully stored in the system database.

Alternative

The customer cancels a flight booking, but the ticket is partially refundable according to the airline policy. After confirming the cancellation request, the system calculates a cancellation penalty or service fee and displays the reduced refundable amount. The customer accepts the refund conditions and confirms the cancellation. The system processes the cancellation, updates the booking status to cancelled, and issues a partial refund to the customer. A cancellation confirmation with refund details is sent to the customer, and the transaction is completed successfully.

Error

The customer attempts to cancel a flight booking, but the ticket is not eligible for cancellation according to airline policy (e.g., non-refundable ticket or cancellation deadline passed). The system displays an error message indicating that the booking cannot be cancelled and provides the reason for rejection. The booking remains unchanged, no refund is issued, and the cancellation process is terminated.

Error

The customer submits a valid cancellation request, but during the refund processing stage, the system fails to complete the transaction due to a payment gateway or system connectivity error. The system notifies the customer that the cancellation could not be completed successfully and advises them to retry later or contact customer support. The booking status is not updated, no refund is issued, and the transaction is rolled back to maintain data consistency.
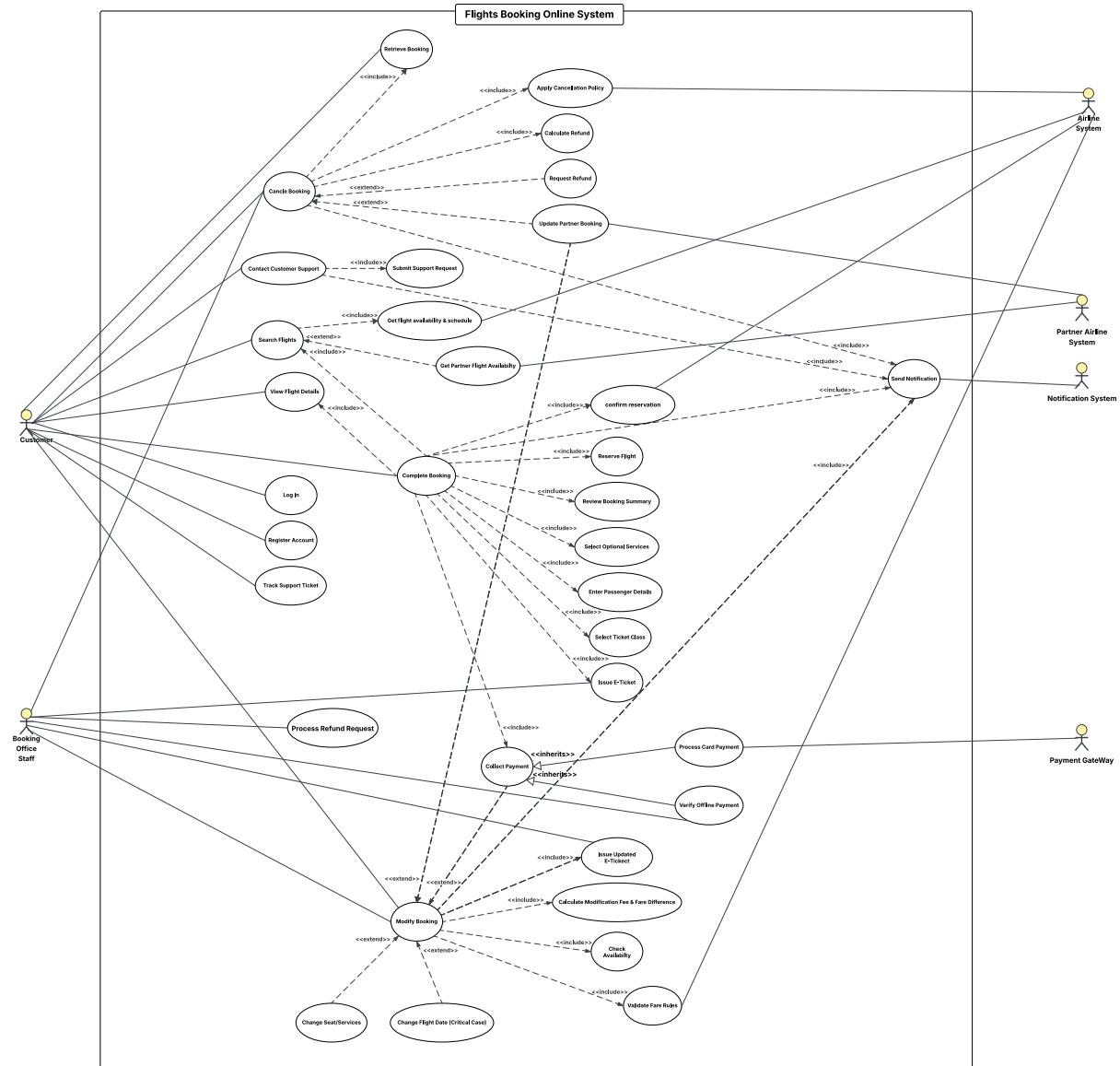
Task 3.2: Actor Analysis

[Leader: Omar, Reviewing: Sameer, Discussing: Ayham, Finalizing: Diaa, Re-drawing: Nasri]

Actor	Semantics / Description
Customer	Represents an end user of the airline online booking system who must be registered and logged in. The Customer can search for available flights, view schedules, prices, and ticket classes, select flights, enter passenger details, choose optional services (seat selection, baggage, special assistance), complete bookings using online card payment or pay-later options, receive electronic tickets, view booking history and status, request flight modifications in critical cases, submit ticket cancellations according to airline policies, and contact customer support through the system.
Airline System	An external airline management system that provides core airline data and business rules to the booking system. It supplies flight schedules, seat availability, pricing information, and ticket class details. It also enforces booking policies including cancellation rules, modification policies, and fare regulations. The system manages seat inventory, generates booking references, confirms reservations, and handles booking state changes such as reservation holds and cancellations.
Booking Office Staff	Represents airline employees responsible for supporting customers and managing booking and ticketing operations. Airline Staff can review, modify, and cancel reservations, confirm offline (cash) payments made at airline offices or authorized agents, issue and reissue electronic tickets, process flight date changes, calculate applicable penalties or refunds according to airline policies, update booking statuses, and coordinate with partner airline systems when bookings involve shared or partner-operated flights.
Payment Gateway	An external financial system that securely processes online card payments. It validates payment details, authorizes or rejects transactions, and returns payment status to the airline booking system.
Partner Airline System	An external airline system that interacts with the booking system when flights are operated or shared with other airlines. It provides flight availability, pricing, and booking confirmation, and supports booking modifications or cancellations when required.
Notification System	An external system responsible for sending automated notifications. It delivers booking confirmations, electronic tickets, payment confirmations, cancellation notices, and reminder messages to customers and relevant staff.

Task 3.3: Use-Case Modelling
[Leader: Nasri, Reviewing: Diaa, Discussing: Sameer, Finalizing: Ayham, Re-drawing: Omar]

Task 3.4: Use-Case Specifications

Use-Case #1: Book a Flight Ticket Online [Diaa]

Use Case Title	**Book a Flight Ticket Online**
Description	This use case describes how a registered Customer books a flight ticket online through the airline booking system. The Customer searches for available flights, selects a suitable flight and ticket class (VIP, Business, or Economy), enters passenger details, chooses optional services such as seat selection and baggage options, reviews the booking summary, and completes payment. If payment is successful, the system confirms the reservation, generates a booking reference, and issues an electronic ticket (e-ticket). The system also supports a pay-later option using cash payment through an airline office or authorized agent.
Actors	Primary Actor: Customer Secondary Actors: Payment Gateway, Notification System
Data	Flight search criteria (departure city, destination, travel date, number of passengers); Flight details (schedule, price, ticket class, seat availability); Passenger information (name, ID/passport, contact details); Optional services (seat selection, baggage options); Payment information (payment method, transaction status); Booking record (reservation reference, booking status, ticket status).
Stimulus / Trigger	The Customer selects the **"Book / Reserve"** option for a chosen flight after viewing available flight search results.
Pre-conditions	1. The Customer is registered and successfully logged in to the system. 2. The system is operational and connected to the flight database and payment services. 3. There are scheduled flights available for booking. 4. The Customer has valid personal and travel information required by airline policies.
Sequence / Flow of Events	**Normal Flow (Successful):** 1. The Customer enters flight search details (departure city, destination, travel date, number of passengers). 2. The system retrieves and displays available flights with schedules, prices, and ticket classes. 3. The Customer selects a flight and chooses a ticket class (Economy, Business, or VIP). 4. The system prompts the Customer to enter passenger details and select optional services. 5. The Customer enters passenger information and selects optional services such as seat selection and baggage options.

	6. The system validates the entered information and checks seat and service availability. 7. The system calculates the total price and displays the booking summary. 8. The Customer confirms the booking summary and selects **online card payment**. 9. The system sends the payment request to the Payment Gateway. 10. The Payment Gateway authorizes the transaction. 11. The system finalizes the booking, generates a reservation reference number, and issues the electronic ticket. 12. The system stores the booking with status **Confirmed** and ticket status **Issued**. 13. The system sends booking confirmation and e-ticket to the Customer via the Notification System. **Alternative Flow (Successful – Pay Later):** • **8A1.** At step 8, the Customer selects **pay later / cash payment**. • **9A1.** The system temporarily reserves the seats and creates a booking with status **Pending Payment**. • **10A1.** The system displays instructions for completing payment at an airline office or authorized agent. • **11A1.** After payment is confirmed by staff, the system updates the booking to **Confirmed** and issues the e-ticket. **Error Flow 1 (Payment Failure):** • **9E1.** The Payment Gateway rejects the transaction due to authorization failure or insufficient funds. • **10E1**. The system displays a payment failure message and does not finalize the booking. • **11E1**. The system releases reserved seats after a timeout and no ticket is issued. **Error Flow 2 (System Failure):** • **11E2**. The system fails to save the booking due to a database or connectivity error. • **12E2**. The system notifies the Customer and rolls back the transaction to prevent inconsistent data.
Post-conditions / Response	**Successful**: A booking record exists with a unique reservation reference. Booking status is Confirmed (or Pending Payment until paid in the alternative flow); ticket status is Issued once payment is confirmed; selected services are stored; confirmation and e-ticket are sent to the Customer. **Unsuccessful**: No confirmed booking exists; no e-ticket is issued; any temporary seat reservations are released; failure details are logged by the system.
Comments	Online payments must be processed through a secure payment gateway. Cash payments are confirmed by airline staff. Booking finalization must be atomic to avoid partial or inconsistent reservations.

Use-Case #2: Change Flight Date [Nasri]

Use Case Title	Change Flight Date
Description	This use case describes how a registered Customer changes the travel date of an already Confirmed (paid) booking due to a critical case (medical emergency). The Customer selects a booking, submits the critical-case reason and supporting document if required, chooses a replacement flight on the same route/class, pays any fees/fare difference, and receives an updated e-ticket/itinerary. The system updates booking and seat inventory atomically and notifies the Customer.
Actors	Primary Actor: Customer Secondary Actors: Payment Gateway, Notification System, Sales Staff
Data	Booking reference (PNR) and passenger last name, booking status, fare rules/change window, critical-case reason and proof document, available flights (schedule, class, seats), change fee and fare difference, payment transaction status, updated itinerary/e-ticket, audit/modification log, notification messages.
Stimulus / Trigger	The Customer selects a confirmed booking in "My Bookings" and clicks "Change Flight Date."
Pre-conditions	1. The Customer is registered and successfully logged in to the system. 2. A valid booking exists with status Confirmed (Paid) and has a valid booking reference (PNR). 3. The booking is within the allowed change window, and fare rules allow date change (critical cases permitted). 4. The system is operational and connected to the flight database/inventory subsystem and payment services. 5. No other modification request is currently in progress for the same booking (booking is not locked).
Sequence / Flow of Events	**Normal Flow (Successful - Card Payment):** 1. The Customer opens "My Bookings" and selects the booking to modify. 2. The system retrieves booking details and displays the change policy (window, fees, fare difference rules). 3. The Customer selects "Critical Case", enters the reason, and uploads proof (if required). 4. The system validates eligibility and locks the booking to prevent parallel modifications. 5. The Customer selects the new travel date. 6. The system displays available replacement flights for the same route with schedules, classes (Economy/Business/VIP), and seat availability. 7. The Customer selects a replacement flight (same class by default). 8. The system re-checks availability and validates fare rules for the requested change.

	9. The system calculates the change fee and fare difference and displays a summary (old/new itinerary, total amount due). 10. The Customer confirms and selects card payment. 11. The system sends the payment request to the Payment Gateway/Bank. 12. The Payment Gateway authorizes the transaction successfully. 13. The system finalizes the modification: releases old seat, reserves new seat, updates the booking record, stores a modification log, issues the updated e-ticket, and notifies the Customer (email/SMS). **Alternative Flow (Successful - Pay Later / Cash or Bank Transfer at Agency):** • 8A1. After step 9 in the normal flow, the Customer selects Pay Later (Cash at Agency / Bank Transfer) instead of card payment. • 9A1. The system places a temporary hold on the selected new seat and creates a change request with status Pending Payment. • 10A1. The system displays instructions to pay at the airline office/authorized agent or upload bank transfer proof within the allowed time window. • 11A1. Customer Support Staff verifies the payment and records confirmation in the system. • 12A1. The system confirms the modification, updates booking and seat inventory, issues the updated e-ticket, and notifies the Customer. **Error Flow 1 (Payment Failure):** • 11E1. The Payment Gateway/Bank rejects the card transaction (authorization failure, insufficient funds, or timeout). • 12E1. The system displays a payment failure message and records the failed attempt; the modification is not confirmed. • 13E1. The original booking remains unchanged; any temporary seat holds are released after timeout; the Customer may retry or choose another payment method or contact support. **Error Flow 2 (System Failure - DB/Inventory Update Failure):** • 13E2. Payment is successful, but the system fails to save/update the booking or seat inventory due to a database/connectivity error or inventory service unavailability. • 14E2. The system prevents inconsistent data by rolling back the update or marking the request as Pending Verification; no updated ticket is issued until resolved. • 15E2. The system notifies the Customer with a support reference number and alerts support/finance to verify booking and payment status.
Post-conditions / Response	**Successful:** Booking itinerary is updated; new seat is reserved and old seat is released; modification log is stored; updated e-ticket/itinerary is issued and sent to the Customer. **Unsuccessful:** Booking remains unchanged (or marked Pending Verification in system failure cases); no updated e-ticket is issued; holds are released; failures are logged; Customer is notified with next actions.

| Comments | Booking modification should be atomic to avoid partial updates. The system should lock the booking during the change process. Payment status must be verified to avoid duplicate charges. Critical-case documents must be stored securely and accessed only by authorized staff. |

Use-Case #3: Complete Pending Booking (Pay Later / Cash Payment at Office) [Omar]

Use Case Title	**Complete Pending Booking (Cash Payment Confirmation)**
Description	This use case describes how a registered Customer completes an already-created booking that is in Pending Payment status by paying at the airline office/authorized agent. The Customer provides the reservation reference (PNR) and identification, the Staff retrieves and verifies the booking, collects cash payment (or verifies bank transfer proof), confirms payment in the system, and the system updates the booking to Confirmed, issues an electronic ticket (e-ticket), generates the invoice/receipt, stores the transaction, and notifies the Customer.
Actors	Primary Actor: Sales Staff (Office/Agent) Secondary Actors: Customer, Notification System, (optional) Finance/Manager
Data	Reservation reference (PNR); Booking record (status, deadline, flight details, ticket class); Passenger identification details; Amount due; Payment method (cash / bank transfer); Payment confirmation record; Booking status update (Pending Payment → Confirmed); E-ticket/itinerary; Invoice/receipt; System logs; Notification message details.
Stimulus / Trigger	The Customer visits the airline office/authorized agent and requests to complete payment for a Pending Payment booking by providing the PNR.
Pre-conditions	1. The Customer is registered and has a valid booking in the system with status Pending Payment. 2. The booking is within the allowed payment time window (not expired). 3. Sales Staff is authenticated and authorized to confirm payments and update booking status. 4. The system is operational and connected to the booking database and notification service.
Sequence / Flow of Events	**Normal Flow (Successful – Cash Payment)** 1. The Sales Staff opens the "Pending Bookings / Retrieve Booking" function. 2. The Customer provides the reservation reference (PNR) and identification. 3. The system retrieves the booking and displays booking details, total amount due, and payment deadline. 4. The Sales Staff verifies customer identity and checks booking validity (status Pending Payment, not expired). 5. The Customer pays the required amount in cash. 6. The Sales Staff records the cash payment and confirms it in the system. 7. The system updates booking status to Confirmed and stores the payment transaction.

	8. The system issues the electronic ticket (e-ticket) and generates invoice/receipt.
	9. The system sends booking confirmation and e-ticket to the Customer via the Notification System (email/SMS).
	10. The system logs the completion for audit purposes.

Alternative Flow (Successful – Bank Transfer Proof)
5A1. At step 5, the Customer pays via bank transfer and provides proof/receipt.
6A1. The Sales Staff verifies the transfer details (amount, reference, date) and confirms it (with Finance/Manager if required).
7A1. The system records the payment and updates booking status to Confirmed.
8A1. The system issues the e-ticket and sends confirmation notifications.
Error Flow 1 (Booking Expired)
3E1. At step 3, the system finds the booking status is Expired/Cancelled (deadline   passed).
4E1. The system displays an error message and prevents payment confirmation.
5E1. No ticket is issued; the Customer is instructed to create a new booking.
Error Flow 2 (System/Database Failure)
6E2. At step 6, the system fails to save/update the booking due to database/connectivity   error.
7E2. The system shows failure message and does not issue an e-ticket.
8E2. The system logs the error; booking remains Pending Payment until resolved (or verified and completed by staff).

Post-conditions / Response	**Successful**: Booking status becomes Confirmed; payment transaction is stored; e-ticket is issued; receipt is generated; notification is sent to Customer; audit log is updated.
	Unsuccessful: Booking remains Pending Payment or is Expired/Cancelled; no e-ticket is issued; any failure is logged and Customer is informed of next steps.
Comments	Payment confirmation must be performed only by authorized staff. The system must prevent issuing tickets before successful status update to avoid inconsistent reservations. Booking completion should be atomic and fully logged for auditing and dispute handling.

Use-Case #4: Search for Available Flights [Sameer]

Use Case Title	Search for Available Flights
Description	This use case describes how a registered Customer searches for available flights through the airline online booking system. The Customer enters flight search criteria (departure city, destination, travel date, and number of passengers). The system validates the input, retrieves matching flights from the flight database, and displays available options including schedules, prices, and ticket classes. The system also supports refining results using filters (e.g., class, price range, airline, departure time).
Actors	Primary Actor: Customer Secondary Actors: Airline online booking gateway, Notification gateway
Data	• Flight search criteria (departure city, destination city, travel date, number of passengers) • Filter/sort criteria (ticket class, price range, airline, departure time) • Flight results data (flight number, airline, schedule, availability, price, ticket classes)
Stimulus / Trigger	The Customer selects the "Search Flights" option and submits the search form.
Pre-conditions	1. The Customer is registered and can access the system (logged in). 2. The system is operational and connected to the airline booking gateway. 3. Flight schedules, availability, and prices are stored and up-to-date in the airline booking gateway. 4. The Customer has valid travel search information (route, date, passengers).
Sequence / Flow of Events	**Normal Flow (Successful):** 1. The Customer opens the flight search page. 2. The Customer enters flight search details (departure city, destination, travel date, number of passengers). 3. The Customer clicks Search. 4. The system validates the search input (required fields and date validity). 5. The system queries the Flight Database for matching flights. 6. The Flight booking gateway returns available flights with schedules, prices, and ticket classes. 7. The system displays the search results list to the Customer. 8. The Customer reviews the results and may open a selected flight to view details. **Alternative Flow (Successful – Refine Results):** • **7A1.** At step 7, the Customer applies filters (ticket class, price range, airline, departure time).

	• **8A1.** The system re-filters/re-sorts the results and displays the updated list **Alternative Flow (Successful – Modify Search Criteria):** • **2A2.** At step 2, the Customer changes one or more search fields (e.g., date or destination). • **3A2.** The Customer submits the updated search request. • **4A2.** The system repeats steps 4–7 and displays new results. **Error Flow 1 (No Results Found):** • **5E1.** At step 5, the Flight booking gateway returns no matching flights for the entered criteria. • **6E1.** The notification gateway displays a message "No flights found" and suggests trying different dates or destinations. **Error Flow 2 (booking gateway Failure):** • **5E2.** At step 5, the system fails to retrieve flight results due to a flight booking gateway connectivity issue. • **6E2.** The notification gateway displays an error message indicating the service is temporarily unavailable and logs the failure.
Post-conditions / Response	**Successful:** A flight search result list is displayed containing available flights matching the criteria (and refined filters if applied). No booking is created, and the system is ready for the Customer to proceed to flight selection/booking. **Unsuccessful:** No flight results are displayed (either no matches or system failure). The system does not create any booking, and the Customer is prompted to retry or modify criteria. Any failure details are logged by the system.
Comments	Search input must be validated (e.g., travel date cannot be in the past). Flight results should be retrieved efficiently to ensure good performance under high search volume. Results must reflect real-time seat availability and updated pricing to avoid inconsistencies during later booking steps.
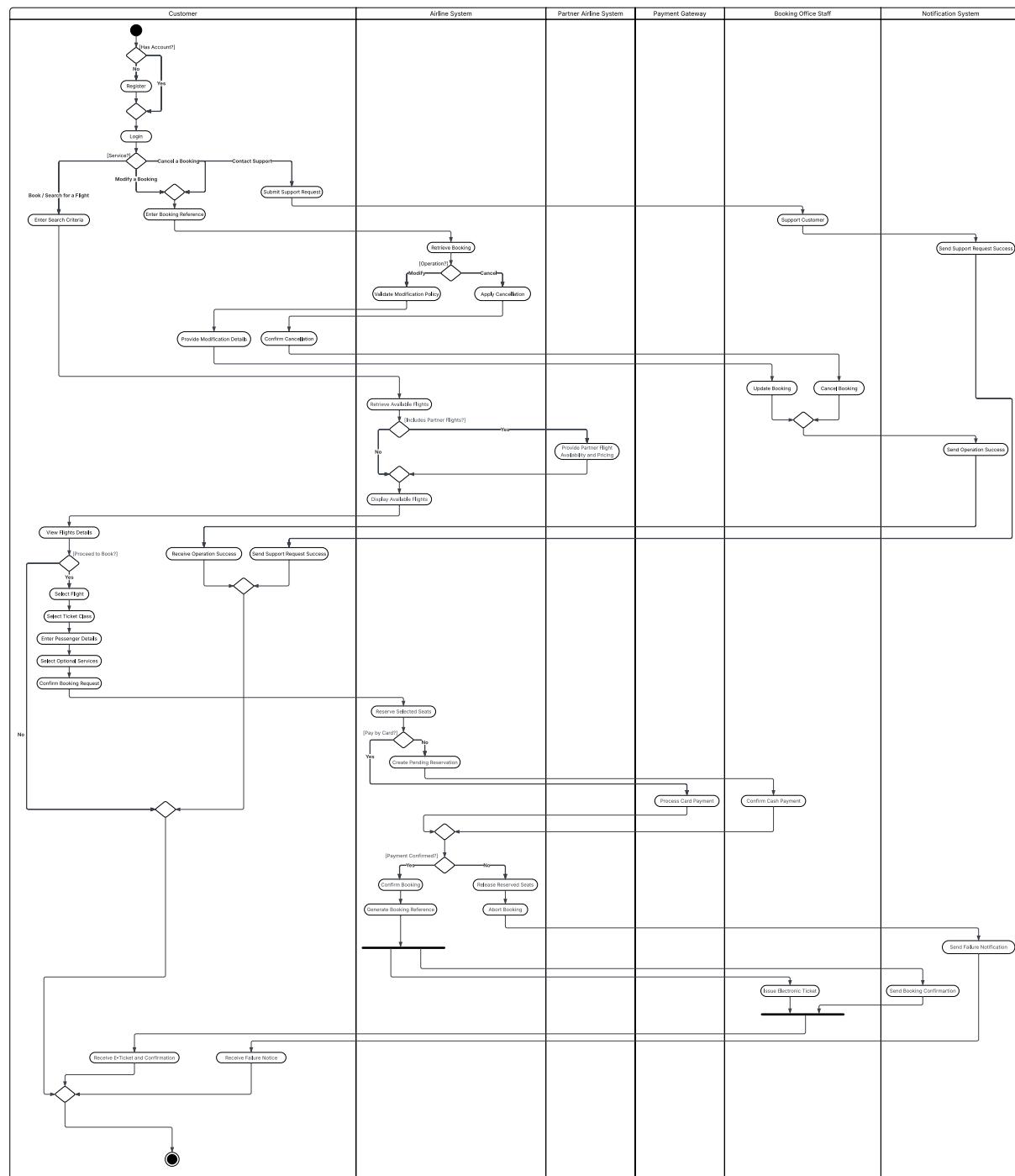
Use-Case #5: Cancel Flight Booking and Process Refund [Ayham]

Use Case Title	**Cancel Flight Booking and Process Refund**
Description	This use case describes how a registered Customer cancels an existing flight booking through the airline online booking system. The Customer retrieves the booking using a reservation reference (PNR), reviews the applicable cancellation policy, and submits a cancellation request. If eligible, the system processes the cancellation, calculates the refundable amount, updates the booking status, and issues a refund through the original payment method. A cancellation confirmation is then sent to the Customer.
Actors	**Primary Actor:** Customer **Secondary Actors:** Payment Gateway, Airline System, Notification System
Data	Booking reference (PNR); Flight details; Ticket class; Payment information; Cancellation policy rules; Refund amount; Booking status; Transaction status; Notification details
Stimulus / Trigger	The Customer selects the "Cancel Booking" option for an existing confirmed reservation.
Pre-conditions	1. The Customer is registered and successfully logged in to the system. 2. The Customer has a valid confirmed booking with a reservation reference (PNR). 3. The system is operational and connected to airline reservation and payment services. 4. The booking is within the allowed cancellation period according to airline policy.
Sequence / Flow of Events	**Normal Flow (Successful Cancellation):** 1. The Customer accesses the *My Bookings* section. 2. The Customer enters the reservation reference (PNR). 3. The system retrieves and displays booking details and cancellation policy. 4. The Customer selects *Cancel Booking*. 5. The system validates cancellation eligibility. 6. The system calculates the refundable amount. 7. The Customer confirms the cancellation request. 8. The system updates the booking status to **Cancelled**. 9. The system processes the refund through the original payment method. 10. The system records the cancellation and refund transaction. 11. The system sends cancellation confirmation and refund details to the Customer.

Alternative Flow	**Partial Refund:** 7A1. The system determines that a cancellation penalty applies. 8A1. The system displays the reduced refundable amount. 9A1. The Customer accepts the refund conditions. 10A1. The system processes the cancellation and issues a partial refund. 11A1. The system sends updated cancellation confirmation.
Error Flow 1	**Cancellation Not Allowed:** 5E1. The system determines the ticket is non-refundable or outside the cancellation period. 6E1. The system displays an error message explaining the rejection. 7E1. The booking remains unchanged and no refund is issued.
Error Flow 2	**Refund Processing Failure:** 9E2. The payment gateway fails to process the refund. 10E2. The system notifies the Customer of the failure. 11E2. The system rolls back the transaction and logs the error.
Post-conditions / Response	**Successful:** Booking status is **Cancelled**; refund (full or partial) is issued; confirmation is sent to the Customer. **Unsuccessful:** Booking remains unchanged; no refund is issued; error details are logged and the Customer is notified.
Comments	Refund processing must comply with airline cancellation policies. Cancellation and refund operations must be atomic to avoid inconsistent booking or payment records.
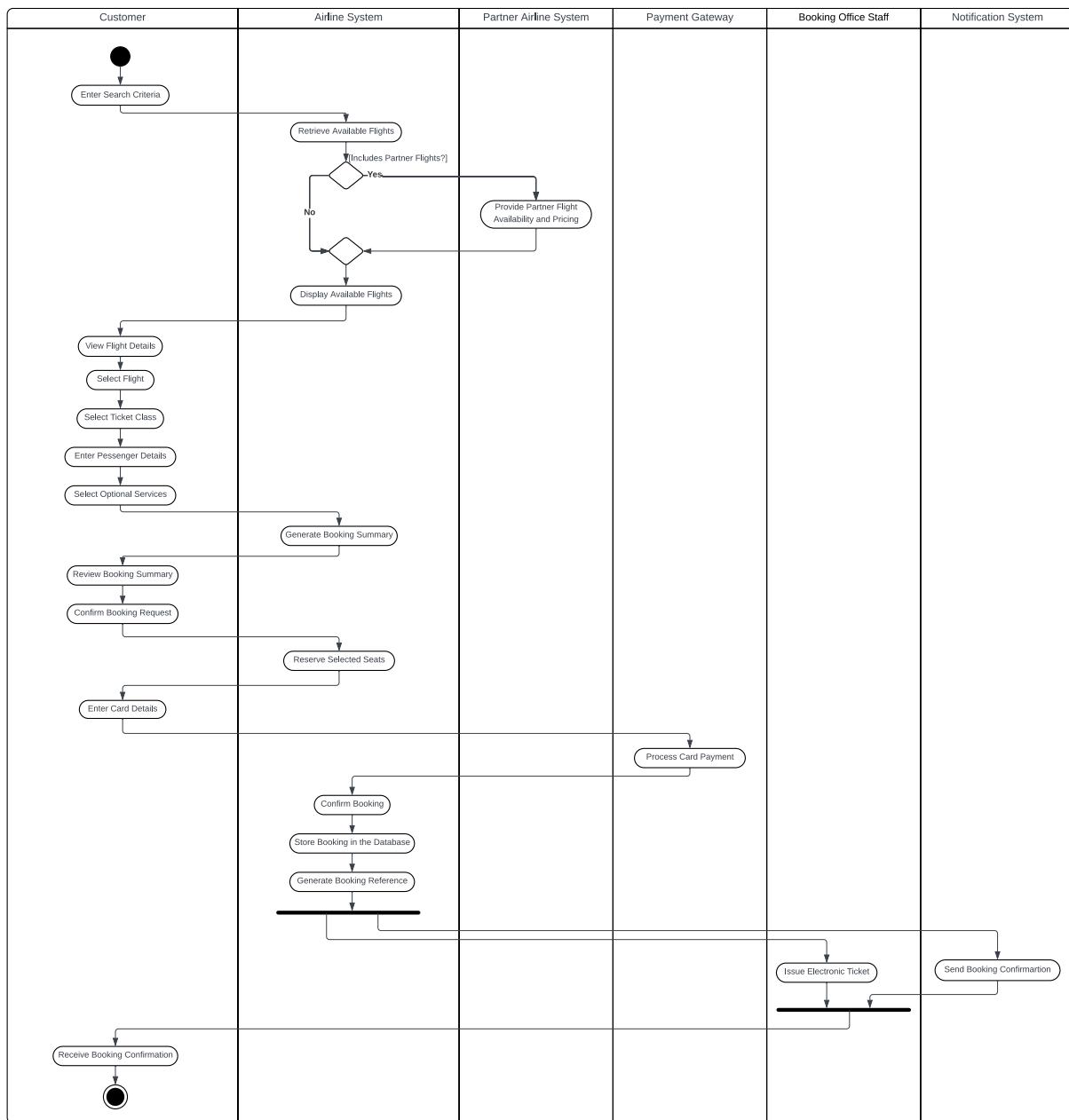
Task 3.5: Activity Modelling

[Leader: Diaa, Reviewing: Nasri, Discussing: Ayham, Finalizing: Omar, Re-drawing: Sameer]
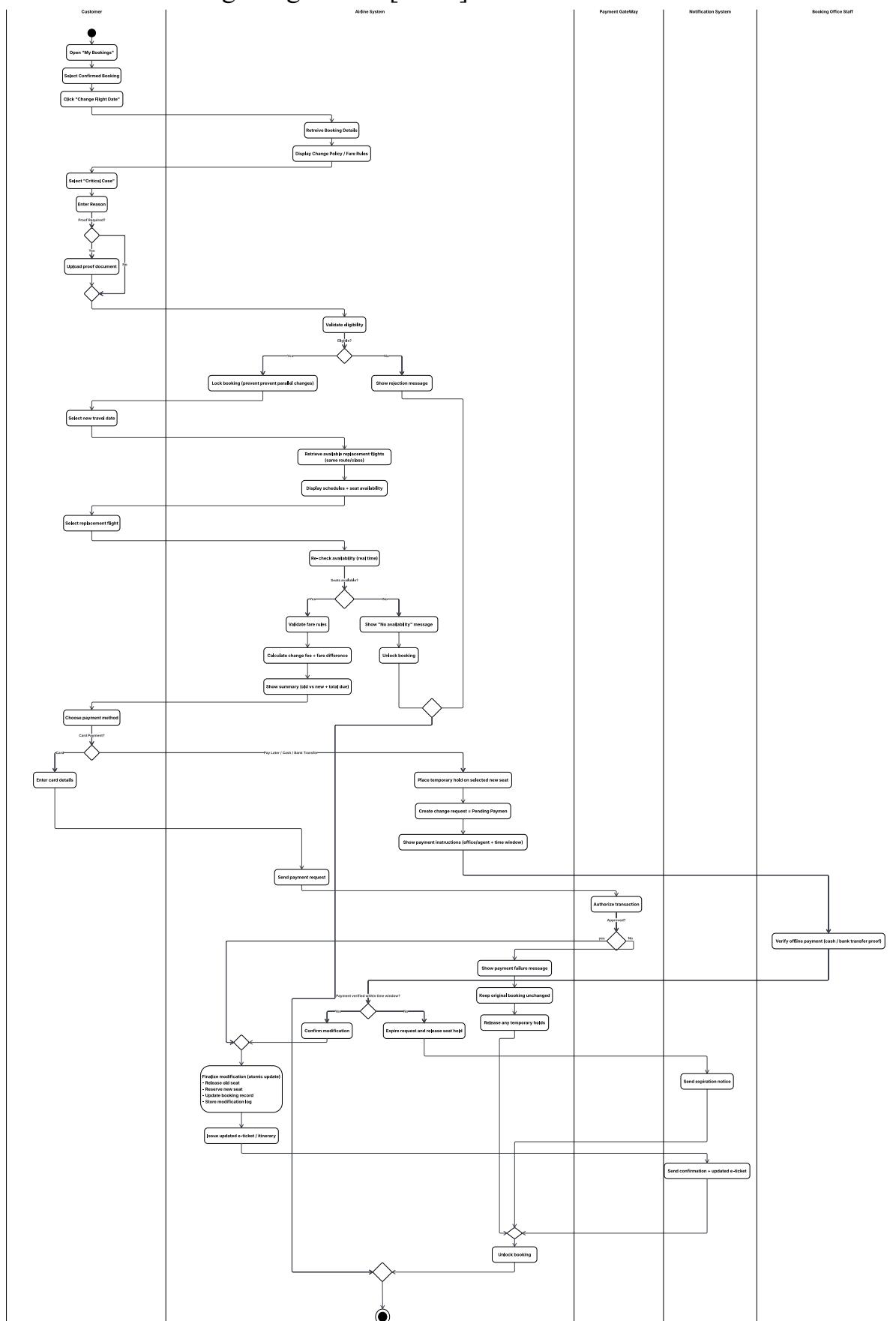
Task 3.6: Use-Case Activity Modelling
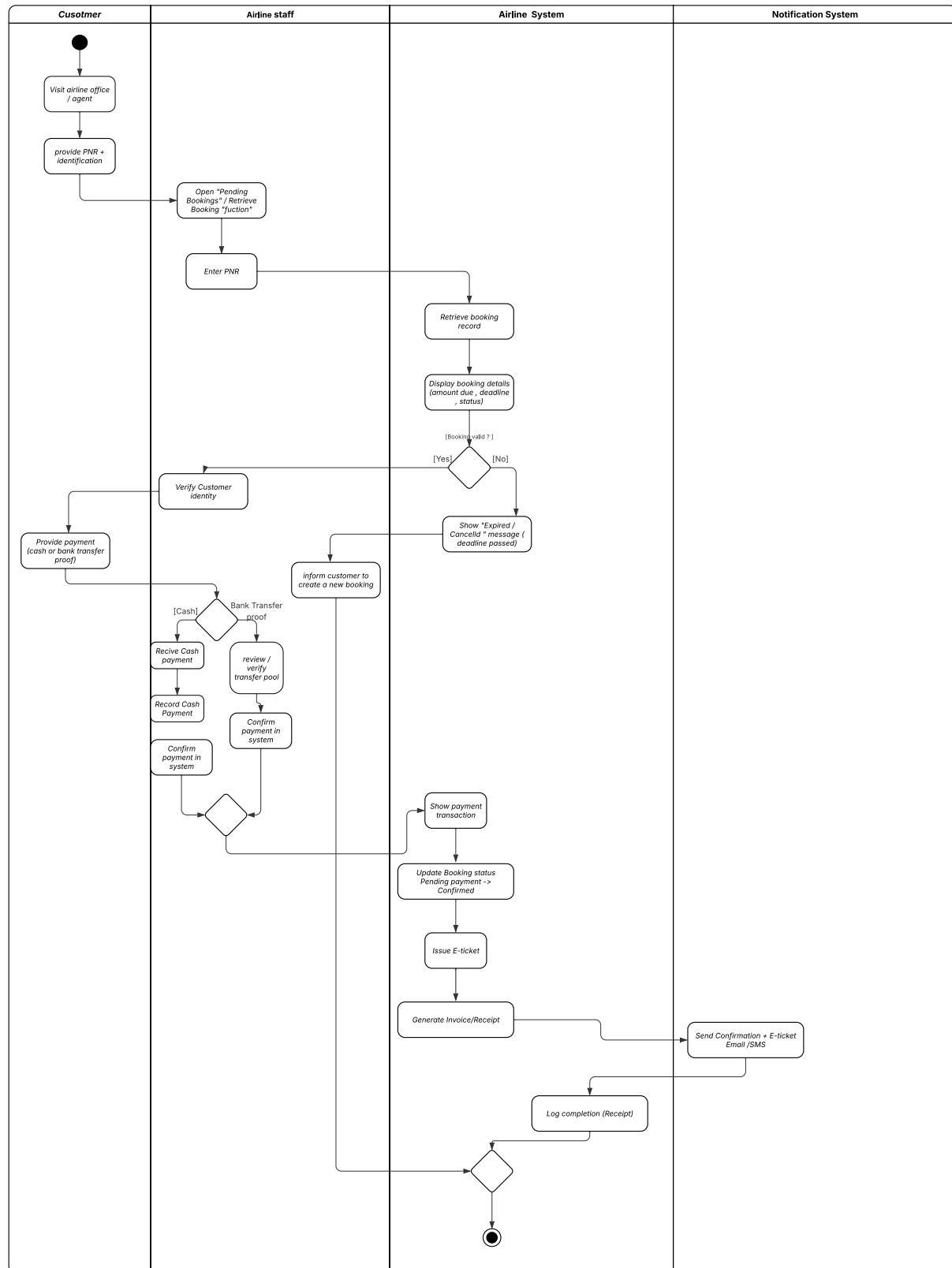
Use-Case #1: Book a Flight Ticket Online [Diaa]

Use-Case #2: Change Flight Date [Nasri]

Customer	Airline System	Payment GateWay	Notification System	Booking Office Staff

● (start)

Customer:
- Open "My Bookings"
- Select Confirmed Booking
- Click "Change Flight Date"

Airline System:
- Retreive Booking Details
- Display Change Policy / Fare Rules

Customer:
- Select "Critical Case"
- Enter Reason
- ◇ Proof Required?
- Upload proof document
- ◇

Airline System:
- Validate eligibility
- ◇ Eligible?
  - Lock booking (prevent prevent parallel changes)
  - Show rejection message

Customer:
- Select new travel date

Airline System:
- Retrieve available replacement flights (same route/class)
- Display schedules + seat availability

Customer:
- Select replacement flight

Airline System:
- Re-check availability (real time)
- ◇ Seats available?
  - Validate fare rules
  - Show "No availability" message
- Calculate change fee + fare difference
- Unlock booking
- Show summary (old vs new + total due)
- ◇

Customer:
- Choose payment method
- ◇ Card Payment?
  - Enter card details (Card)
  - Pay Later / Cash / Bank Transfer

Airline System:
- Place temporary hold on selected new seat
- Create change request = Pending Paymen
- Show payment instructions (office/agent + time window)

Customer:
- Send payment request

Payment GateWay:
- Authorize transaction
- ◇ Approved?
  - yes / No

Booking Office Staff:
- Verify offline payment (cash / bank transfer proof)

Airline System:
- Show payment failure message
- Keep original booking unchanged
- Release any temporary holds
- ◇ Payment verified within time window?
  - Confirm modification
  - Expire request and release seat hold
- ◇

Customer:
- Finalize modification (atomic update)
  - • Release old seat
  - • Reserve new seat
  - • Update booking record
  - • Store modification log
- Issue updated e-ticket / itinerary

Notification System:
- Send expiration notice
- Send confirmation + updated e-ticket

Airline System:
- ◇
- Unlock booking
- ◇

◉ (end)

Use-Case #3: Complete Pending Booking (Pay Later / Cash Payment at Office) [Omar]

Cusotmer	Airline staff	Airline System	Notification System

Cusotmer lane:
- (start)
- Visit airline office / agent
- provide PNR + identification
- Verify Customer identity
- Provide payment (cash or bank transfer proof)
- Confirm payment in system

Airline staff lane:
- Open "Pending Bookings" / Retrieve Booking "fuction"
- Enter PNR
- inform customer to create a new booking
- [Cash] / Bank Transfer proof
- Recive Cash payment
- Record Cash Payment
- Confirm payment in system
- review / verify transfer pool
- Confirm payment in system

Airline System lane:
- Retrieve booking record
- Display booking details (amount due , deadline , status)
- [Booking valid ?]
- [Yes] / [No]
- Show "Expired / Cancelld " message (deadline passed)
- Show payment transaction
- Update Booking status Pending payment -> Confirmed
- Issue E-ticket
- Generate Invoice/Receipt
- Log completion (Receipt)
- (end)

Notification System lane:
- Send Confirmation + E-ticket Email /SMS

Use-Case #4: Search for Available Flights [Sameer]

Customer	Airline booking system	Notification system

Customer column:

● (start)

{Have account}
◇ — yes
no

Register

◇

login

Search Flight page

Enter travel route

Enter travel date

{modified}
◇ — Yes
No

submit search information

Display available flights

◉ (end)

Airline booking system column:

{Valid}
◇ — NO
yes

Search

{Found}
◇ — No
Yes

{booking system failure}
◇ — yes
No

Notification system column:

show "Enter valid data" meesege

show "Flight not found" messege

show "Service is temporarily unavailable" messege

Use-Case #5: Cancel Flight Booking and Process Refund [Ayham]