

Airline Reservation System

COMPUTER SCIENCE AND ENGINEERING

UCS1617-MINIPROJECT

AIRLINE RESERVATION SYSTEM

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PROBLEM STATEMENT:

The Airline Reservation System is an online flight ticket booking system which enables to book and cancel tickets online. The customers can view all the available flights for the required source and destination. This system allows the customer to view the list of flights available with their date and time of departure and the date and time of arrival. The customers can reserve their tickets for travel. They can pay for the tickets online through online transactions. They can view the status of their ticket at any time.

The customers can also cancel their tickets and get the refund amount. The cancellation should be at least 48 hours prior to boarding time. The customers will not receive their refund if the cancellation is late. This will be specified in the terms and conditions while booking tickets.

Booking tickets through agents is also enabled in this platform. A log of all bookings made by agents is maintained for reference.

This platform offers travel points for all customers. These points are offered on the basis of the number of tickets booked by a customer. The points may vary depending on the class of travel (economy - 50 pts / ticket , business - 100 pts /

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ticket). This travel point feature benefits the customers in various scenarios (priority during reservation, bumping to business class if the customer has 100,000 points). This will be specified in the terms and conditions during the registration.

The customers are ensured that the online transactions are completely secure and are made aware of the system's privacy policy.



Software Requirements Specification

Version - 1.0

Airline Reservation System



Airline Reservation System	Version : 1.0
Software Requirements Specification	Date : 2/2/2021

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REQUIREMENTS VERSION CONTROL

DATE	CHANGES	NEW VERSION	PREVIOUS VERSION

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SOFTWARE REQUIREMENTS SPECIFICATION

1. INTRODUCTION

The Airline Reservation System is an online flight ticket booking system which enables to book and cancel tickets online. The customers can reserve their tickets for travel. They can pay for the tickets online through online transactions. This project aims for the customers' satisfaction.

1.1 Purpose

This document lists the requirement specifications for an Airline Reservation System (ARS). The document is subject the change as the project progresses. The given version of the document is the initial one. Further changes of the project will be recorded to the document.

1.2 Document Convention

This document uses the following conventions.

ARS	Airline Reservation System
DB	Database
ER	Entity Relationship

1.3 Project Scope

The ARS that is to be developed provides people information about the flights available to specific routes, online booking of flight tickets and other facilities. The features of ARS are as follows:

- ❖ The system allows the customers to register and create an account. All booking details of the customer will be available on their timeline.
- ❖ The customers can view the list of all flights from major cities around the world, and flights from many airline companies.
- ❖ The customers can search for flights for required source and destination.
- ❖ The customers can book and cancel flights at any time, the system functions 24*7.

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- ❖ The customers can pay for their tickets using ATM card, Paytm (KYC reg.). They can view the status of their booking any time.
- ❖ The customers are awarded with travel points for each ticket (economy -50 pts, business - 100 pts).
- ❖ People can book flights through agents (note that travel points are not available for booking via agents).
- ❖ The System enables the customers to bump from economy to business if they have 100,000 travel points.
- ❖ In case of simultaneous booking the system gives priority to customers with more travel points.

1.4 References

The following were used as references for this SRS document:

1.5 Overview

The remaining part of the specification document is organized as follows.

- ❖ **Section 2** defines overall description of the system which defines product perspectives and functions, use-case diagrams, classes and characteristics of involved users, the environment that the system is going to be deployed, constraints on design and implementation of the system, user documentation, assumptions and dependencies.
- ❖ **Section 3** contains all the specific requirements such as functional requirements, performance requirements and external interface requirements, which in turn includes user, software, hardware and communication interface requirements. Attributes of the software system and non-functional requirements are also specified in this section.

2. OVERALL DESCRIPTION

2.1 Product Perspective

The manual flight ticket booking system requires the customers to visit the airline office. ARS is a digitized version of that system. The customers need not wait in queues to book their flight tickets. They can book their tickets from any place at any time. This is a great aid to people as it saves a lot of time. Furthermore, it will reduce the workload of the employees who are responsible to make reservations at the office.

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The system allows customers to check the availability of flights for specific dates and routes, get information about durations of available flights. Administrator can modify, remove existing flights, and also add new flights to the system. The administrator can also deny late cancel requests.

2.2 Product Functions

The system has the following functionalities:

- ❖ **User Login:** Both customers and Admin can log into the system.
- ❖ **Registration:** People who don't have an account can register and create a profile.
- ❖ **Search for flights:** The customers can book flights (point-to-point or multi-point) based on the source, destination and date.
- ❖ **Sort flights:** The customers can sort flights based on price or duration of travel.
- ❖ **Book flights:** The customers can select the class of travel and book tickets through online payment.
- ❖ **Request cancellation:** The customers can cancel their booking 48 hours prior to boarding time. This request must be approved by the Admin.
- ❖ **Adding new flights:** The Admin can add new flights to the system.
- ❖ **Removing flights:** The Admin can remove flights from the system.
- ❖ **View cancel requests:** The Admin can view all the cancellation requests made by customers.
- ❖ **Approving cancellation:** The Admin can approve cancellation of flight tickets based on certain conditions.
- ❖ **Modification:** The Admin can modify details of any flight in the system.
- ❖ **View booking details:** The Admin can view all the bookings made by customers.
- ❖ **View Agent bookings log:** The Admin can view the list of bookings made by agents.

2.3 User class and characteristics

The users of the system are customers, agents and Admin. The users of the system should be able to retrieve any flight information given the cities and date, from the database. The system supports two types of user privileges, Customer, and Admin. Customers (and Agents) will have access to customer functions, and the Admin will have access to both customer and flight management functions.

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Customer Functions:

- ❖ Login
- ❖ Register
- ❖ Search for flights
- ❖ Sort flights
- ❖ Book flight tickets
- ❖ Request cancellation

Admin Functions:

- ❖ Add flights
- ❖ Remove flights
- ❖ View cancel requests
- ❖ Approve cancellation
- ❖ Modify flight details
- ❖ View booking details
- ❖ View agent booking details

2.4 Operating Environment

Operating Environment for ARS is as follows:

- ❖ client/server system
- ❖ Operating System : Windows
- ❖ DB :
- ❖ Platform : JavaScript

2.5 Constraints

- ❖ The information about all users and flights are stored in a DB which is accessed by the ARS.
- ❖ The ARS system runs 24*7.
- ❖ The customers can access the ARS from any system with browsing capabilities and Internet connection.
- ❖ The users must have registered in order to use the ARS.
- ❖ The users must enter the correct user name and password while logging in.
- ❖ Flight dates and hours should be displayed according to the city of departure and destinations' time zones.

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2.6 Assumptions and Dependencies:

- ❖ The users have a computer or mobile with internet connection.
- ❖ The users have English knowledge; the UI is given in English.
- ❖ Information about any changes that are made in the database will be displayed with no delay.
- ❖ The users have a Bank account.

3. SPECIFIC REQUIREMENTS:

3.1 Functionality:

3.1.1 Login capabilities:

The system provides both the customers and Admin with login capabilities.

3.1.2 Mobile devices:

The ARS system is also supported on mobile devices.

3.1.3 Alerts:

The system can alert the users in case there is any change in the booking details.

3.2 Usability:

- ❖ The system is supported by all browsers.
- ❖ The UI is user friendly and easy to understand.

❖ FAQ!!

3.3 Reliability:

The system is very reliable by protecting the users' data and providing accurate and optimal information.

3.3.1 Availability:

The system is available to the customers 24 hours a day and 7 days a week. So the customers can book tickets at any time anywhere.

3.3.2 Accuracy:

The system provides accurate information to the customers by referring the DB. If there are any changes they are updated in the system too.

3.3.3 Defect Rate:

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3.3.4 Access Reliability:

The system guarantees 100% access reliability.

3.4 Performance:

The performance of the system is measured by the following factors.

3.4.1 Response time:

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USE CASES AND USE CASE MODELS

AIM:

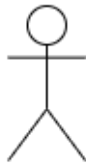
Creation of an UML Use case model for a ARS.

NOTATIONS:



Use case

Use cases: Horizontally shaped ovals that represent the different uses that a user might have



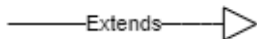
Actor

Actor: Stick figures that represent the people actually employing the use cases.

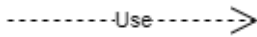


Association

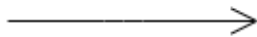
Associations: A line between actors and use cases. It is important to know which actors are associated with which use cases.



Extend: is used when a use case adds steps to the base use case.



Use: is a relationship in which the base **use case includes** the functionality of another **use case**



Generalization

Generalization: one actor can inherit the role of the other actor. The descendant inherits all the use cases of the ancestor

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IDENTIFICATION OF ACTORS:

User: User can either be a customer or an agent. Both customer and agent inherit the functions of user and have their separate functions as well.

- **Customer:** The customer can register and book flight tickets. The customer is awarded travel points accordingly. The customer can also request cancellation prior to 48 hours from boarding time.
- **Agent:** The agent can register and book flight tickets. The agents are not given travel points but are given priority during concurrent bookings. The agents cannot request cancellation.

Admin: Admin can monitor bookings made by users and approve cancel requests, make modifications.

IDENTIFICATION OF SCENARIOS:

1. Registration

Main Success Scenario:

The user enters details like Name, contact information, City, SSN, email-id for registration. In case of agent, details about the agency are also required. The user agrees to the terms and conditions and clicks on Register. The customer gets a verification email and the authentication process is completed successfully. Upon authentication the details about the user is stored in the database and an account for the user is created successfully.

Alternate Scenarios:

If the user enters the wrong mail id the authentication process fails and an error message is displayed to the user.

If the user doesn't receive a verification email after clicking register, another verification mail is sent to the same mail id after 60 seconds.

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2. Booking a flight ticket

Main Success Scenario:

The user searches for a flight and checks for seats available. He locks the required seats. The user checks on the terms and conditions and clicks on confirm booking. Now he enters the credit card number and then enters the otp sent to his mobile number. Then he receives a verification message about the transaction. The user also receives an email about the booking. The user can either print the email or download e-tickets from the website. This e-ticket can be used to get the boarding pass in the Airport.

Alternate Scenarios:

If the customer enters the wrong otp while making transaction, the booking gets cancelled and warning message is sent to the user. No money is withdrawn until the transaction is secure and successful.

The user doesn't receive an otp because of problems in the bank system. In this case the customer can cancel the booking and try again.

In case the seats locked by the user is locked simultaneously by a customer with more travel points or an agent, priority is given to the latter. An error message saying the seats are unavailable is displayed to the user.

3. Cancellation (customer)

Main Success Scenario:

The customer can make a request to cancel the tickets 48 hours prior to the boarding. The approval of the cancellation is totally up to the Admin. The customer is made aware of this by the terms and conditions while booking. The Admin views all the cancel requests made by customers and approves the request based on the situation.

The customer is made aware of whether the request has been approved or declined. The refund is made immediately after approving the request. The amount is sent to the account through which the customer booked the tickets. The customer gets a message to his number about the refund.

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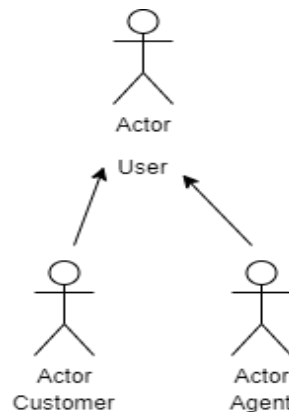
Alternate Scenarios:

Although the tickets were cancelled prior 48 hours from boarding time, the Admin denies the request due to some booking conditions. The customer is sent a mail regarding the denial of cancellation and the status is also updated in the customer's profile.

If the system has trouble connecting with the bank account of the customer, the customer is notified about the issues and guaranteed that the refund will be done as soon as possible. If the transaction doesn't happen even after several attempts a the customer is requested to collect the cash from any nearby office.

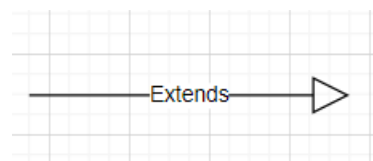
RELATING USECASES:

Generalization: The Actors customer and agent inherit all properties from the actor User (parent). The child nodes can have separate use cases too. In this case the customer is associated to the use case request cancellation while the agent isn't.



Associations:

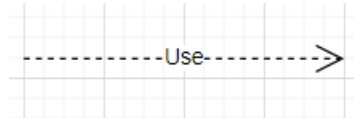
1. Extends: The extended use case is used to add steps to the base use case (optional). the push to business class use case is extended from the book tickets use case as it adds additional steps.



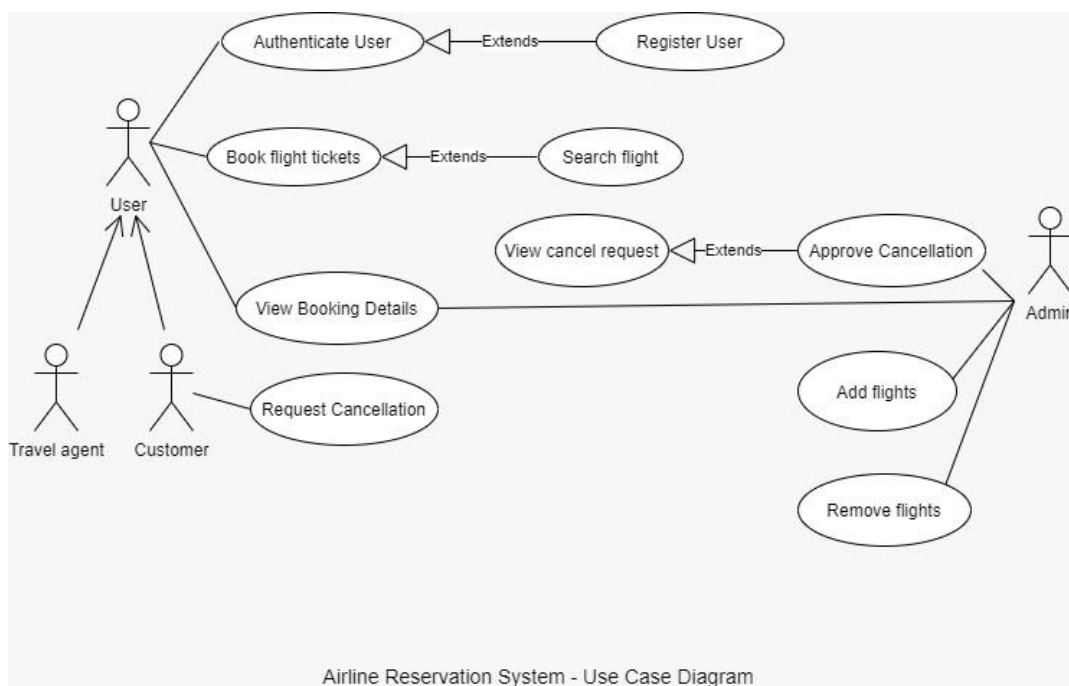
2. Use: The base use case uses the functionality of the other use case. For instance, the booking function uses the check seat availability, make transaction

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and other use cases. The book tickets use case uses the functionality of the other given use cases.



USE CASE DIAGRAMS:

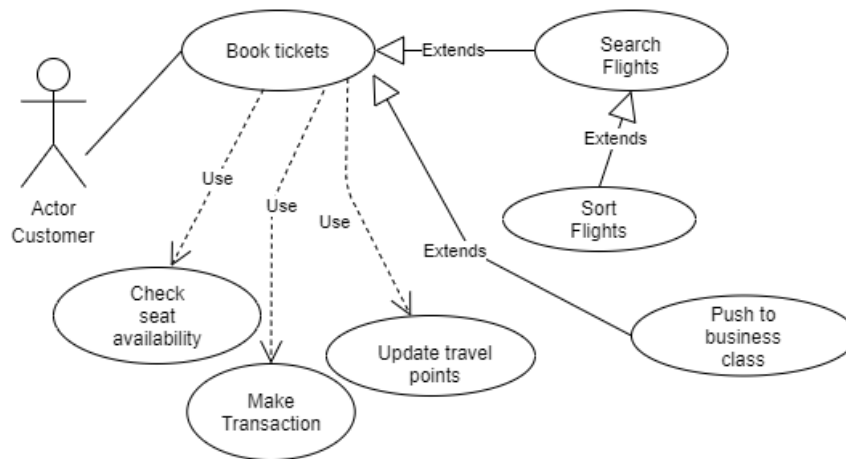


ARS - main use case diagram

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Booking

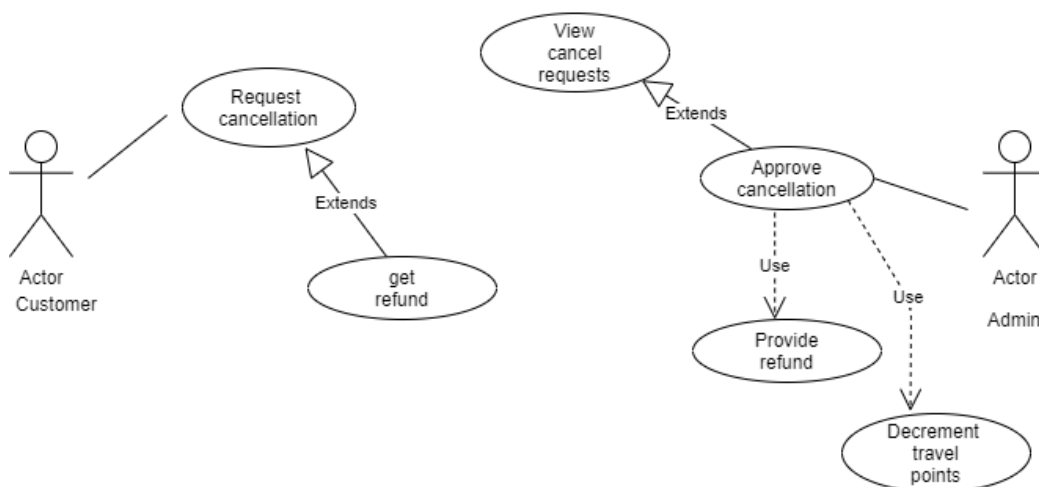
The customer can search for flights and sort them according to price and dates. The customer can check the seat availability and book tickets by making an online deposit.



ARS- Booking use case diagram

Cancellation

The customer can request cancellation which can be approved or denied by the Admin.



ARS - Cancellation use case diagram

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FULLY DRESSED USE CASE DESCRIPTION:

Use case: Book tickets

Scope: ARS

Level: User goal

Primary actor: User (customer or agent)

Stakeholders and interests:

Customers: Wants fast and accurate booking and no payment errors during transaction. The customer wants a safe and secure transaction.

Payment authorization service: Wants the customer to provide the correct otp while making online transaction.

Preconditions: The customer is identified and authenticated.

Success guarantee (Post condition): The online transaction is done securely. The booking is saved. The flight details are updated in the customer's profile. The e-ticket is made available for the user to print.

Main Success Scenario:

1. The customer searches for flight and selects the required one.
2. He then looks for the seat availability and locks the required seats.
3. He then checks on the terms and conditions and clicks on confirm booking.
4. The customer has more than 100,000 travel points ; he/she will be bumped from economy to business class (1 ticket alone).
5. The customer then enters his credit card number.
6. He receives an otp through his mobile.
7. The customer enters the correct otp number and clicks on confirm.
8. The flight tickets are booked.

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9. The e-ticket is available for the customer to print, and it is also sent to his mail.
 10. The customer can check the flight details anytime on his profile.
 11. The customers can get their boarding passes by providing their e-tickets at the airport.

Extensions:

*a. At any time system fails:

1. The user log into the system.

1.a Invalid user id:

1. Error message is displayed.
2. User can login again entering the correct user id.

1.b Incorrect password:

1. Error message is displayed, ask if the user forgot password.
2. User can login again entering the correct user id, or click on forgot password to change password.

2. User searches for the required flight.

3. User Books flight ticket through online payment.

4. User enters the Card number and receives the otp on his/her mobile.

4.a Incorrect otp:

1. Error message is displayed.
2. Resend otp after 30 seconds.
3. After 3 incorrect opt entries send warning mail to the user.

5. User enters the otp.

5.a The transaction is incomplete.

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1. The transaction stops immediately.
 2. The user is notified about the failure.
 3. Request the user to try again later.
6. User requests for cancellation.
- 6.a The Admin declines the request.
1. The user is notified about the decline.

SUBFUNCTION - SEARCH FLIGHTS:

- The user clicks on the book flights tab.
- The user searches for the required flight.
- The user enters the source, destination and date of travel.
- The user selects the class of travel.
- The system displays a list of flights meeting the specified data.
- The customers can sort flights using price, dates, etc.
- When the user clicks on a flight from the results, details about the flight like price, available seats are displayed for the user.

DOCUMENTATION:

The main purpose of this document is to demonstrate the functionalities of the system. The use cases elaborate the various functions and their sub functions involved. The use cases give a better understanding on how the uses cases are related. The main success scenarios and alternate scenarios explain how the system works under various circumstances.

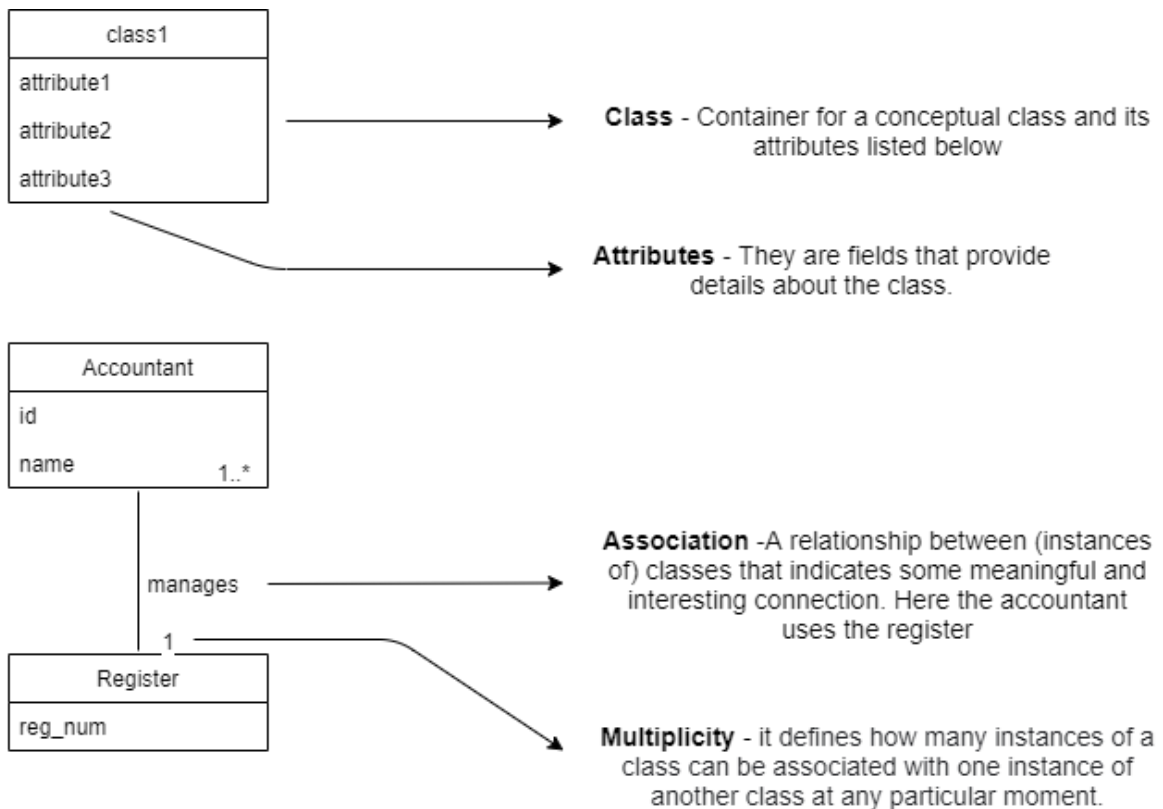
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DOMAIN MODEL AND CLASS DIAGRAM

AIM:

To create a domain model and class diagram for ARS.

UML NOTATIONS FOR DOMAIN MODEL:



Multiplicity

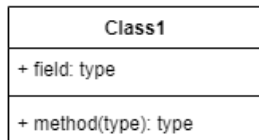
1 (number) - Indicates a specific value (1 in this example).

*** (asterisk)** - Indicates any number (even 0).

*** (asterisk)** - Indicates any number (even 0).

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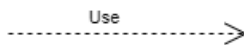
UML NOTATIONS FOR CLASS DIAGRAM:



Class - The top section is used to name the class.

The second one is used to show the attributes of the class.

The third section is used to describe the operations performed by the class.



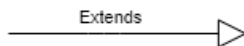
Dependency - used to represent the

dependency between two elements of a system



Association - used to represent the

relationship between two elements of a system.



Generalization - used to describe parent-

child relationship of two elements of a system.



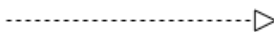
Aggregation - implies a relationship where

the child can exist independently of the parent



Composition - implies a relationship

where the child cannot exist independent of the parent.



Implementation - The class implements

the operations and attributes defined by the interface.

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IDENTIFICATION OF CLASSES:

a) Conceptual class category list:

Conceptual class category	Identified classes
Physical or tangible objects	Flight
Specification or description of things	FlightDescription, AgentDetails, CustomerDetails. route
transactions	Sale, Cancellation
Roles of people	Agent, Admin
Containers of things	Flight
Things in a container	Customer
events	Sale, Cancellation
process	Booking, OnlineTransaction, Authentication
Records of finance, work, legal matter.	Eticket, BookingsLog, CancellationLog

b) Identification of Noun phrases:

Main Success Scenario:

1. The **customer** searches for **flight** and selects the required one.
2. He then looks for the **seat** availability and locks the required seats.
3. He then checks on the terms and conditions and clicks on confirm booking.
4. The **customer** has more than 100,000 **travel points** ; he/she will be bumped from economy to business class (1 ticket alone).

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-
5. The **customer** makes **online transaction**. He enters his credit card number.
 6. He receives an otp through his mobile.
 7. The customer enters the correct otp number and clicks on confirm.
 8. The **Booking** is made after **authentication**.
 9. The **e-ticket** is available for the customer to print, and it is also sent to his mail.
 10. The customer can check the **flight details** anytime on his profile.
 11. The customers can get their **boarding passes** by providing their e-tickets at the airport.

Extensions:

*a. At any time system fails:

1. The user log into the system.

1.a Invalid **user id**:

1. Error message is displayed.
2. User can login again entering the correct user id.

1.b Incorrect password:

1. Error message is displayed, ask if the user forgot password.
2. User can login again entering the correct user id, or click on forgot password to change password.

2. User searches for the required flight.
3. User Books flight ticket through **online payment**.
4. User enters the Card number and receives the otp on his/her mobile.

4.a Incorrect otp:

1. Error message is displayed.

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2. Resend otp after 30 seconds.
3. After 3 incorrect opt entries send warning mail to the user.
5. User enters the otp.
 - 5.a The transaction is incomplete.
 1. The transaction stops immediately.
 2. The user is notified about the failure.
 3. Request the user to try again later.
6. User requests for **cancellation**.
 - 6.a The **Admin** declines the request.
 1. The user is notified about the decline.

IDENTIFICATION OF CLASSES AND ATTRIBUTES (class diagram) :

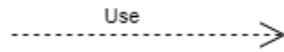
- **User**
 - Name
 - Phone number
 - Email
 - Age
- **Customer**
 - Customer id
 - Password
 - Travel points
- **Agent**
 - Agent id
 - Password
 - Agency name

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- **Flight**
 - Flight id
 - Route
 - Timestamp
 - Business tickets
 - Economy tickets
- **Route**
 - Source city
 - Source airport
 - Destination airport
 - Destination city
 - Distance
- **Ticket**
 - Seat number
 - Class
 - Price
 - Flight id
- **Admin**
 - Username
 - Password
 - Email
 - Phone number
- **Transaction**
 - Transaction id
 - Customer id
 - Timestamp
 - amount
- **Authentication**
 - otp

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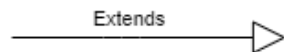
IDENTIFICATION OF ASSOCIATIONS:



Dependency - used to represent the dependency between two elements of a system



Association - used to represent the relationship between two elements of a system.



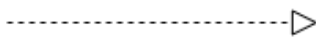
Generalization - used to describe parent-child relationship of two elements of a system.



Aggregation - implies a relationship where the child can exist independently of the parent



Composition - implies a relationship where the child cannot exist independent of the parent.



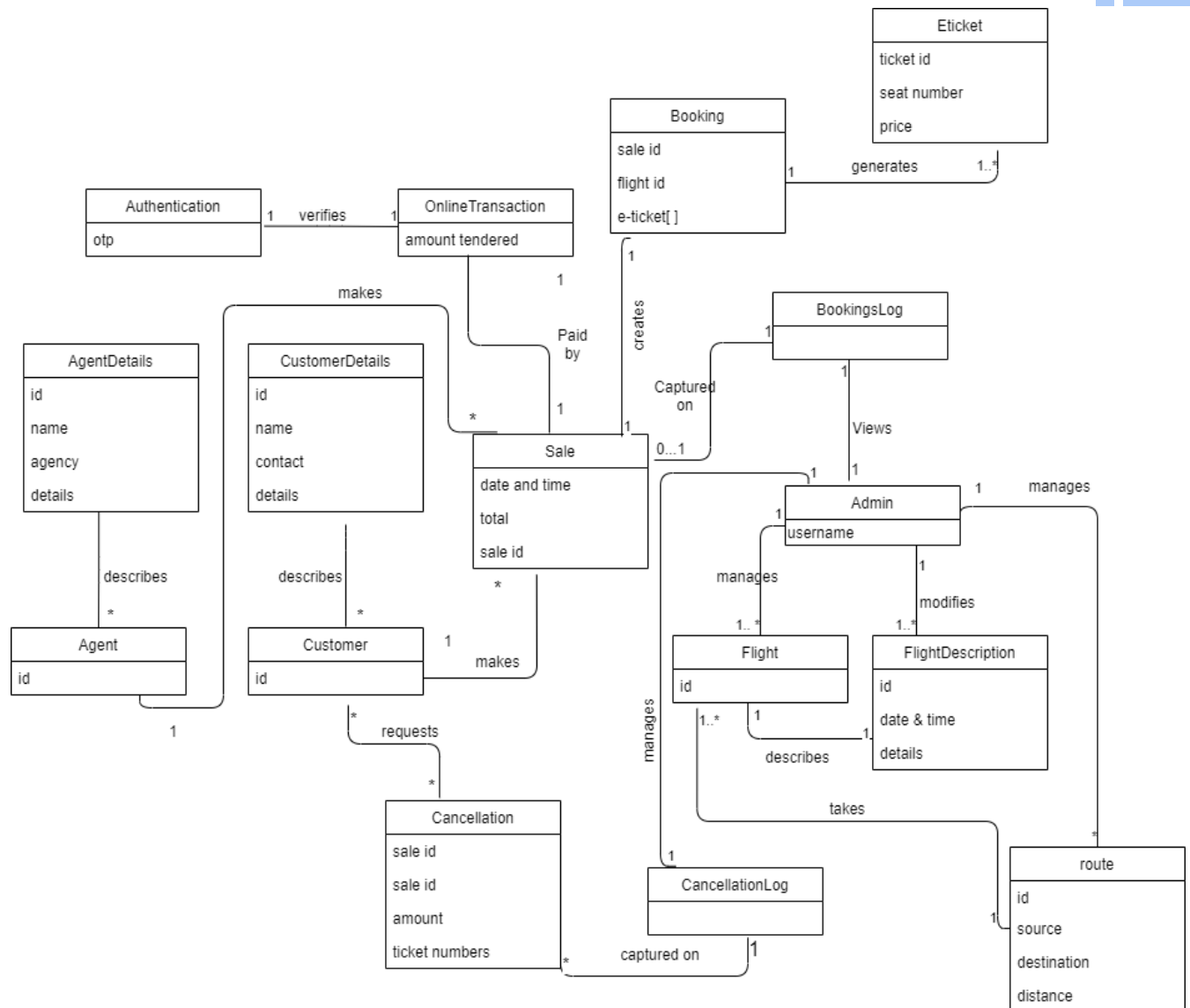
Implementation - The class implements the operations and attributes defined by the interface.

Multiplicity:



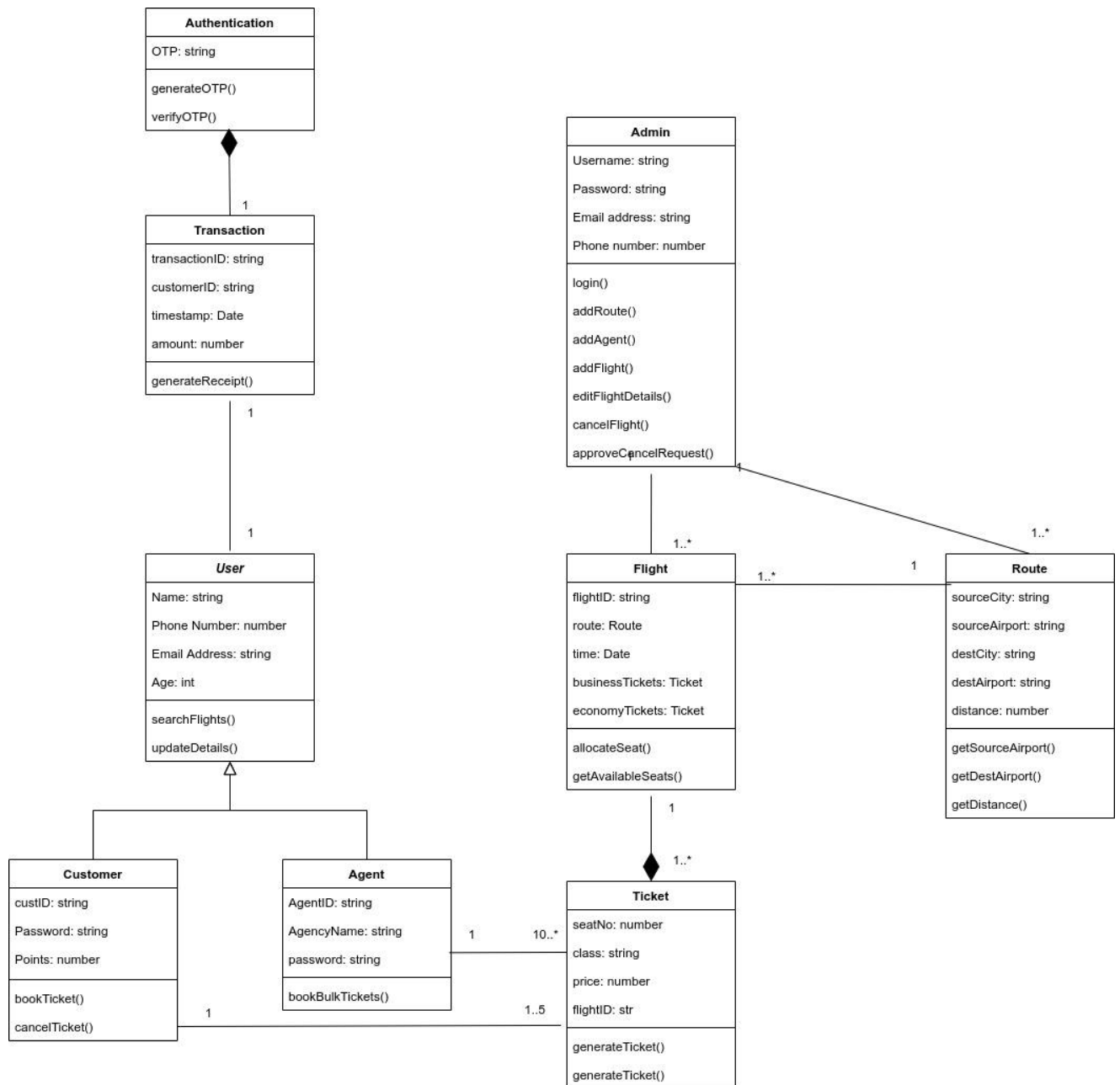
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DOMAIN MODEL DIAGRAM:



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CLASS DIAGRAM:



DOCUMENTATION:

The main purpose of this document is to identify the main classes of the system.

The domain model is used to identify the various classes and the associations between classes.

The class diagram is used to identify the classes, their attributes and their functions. The associations between the classes are also identified.

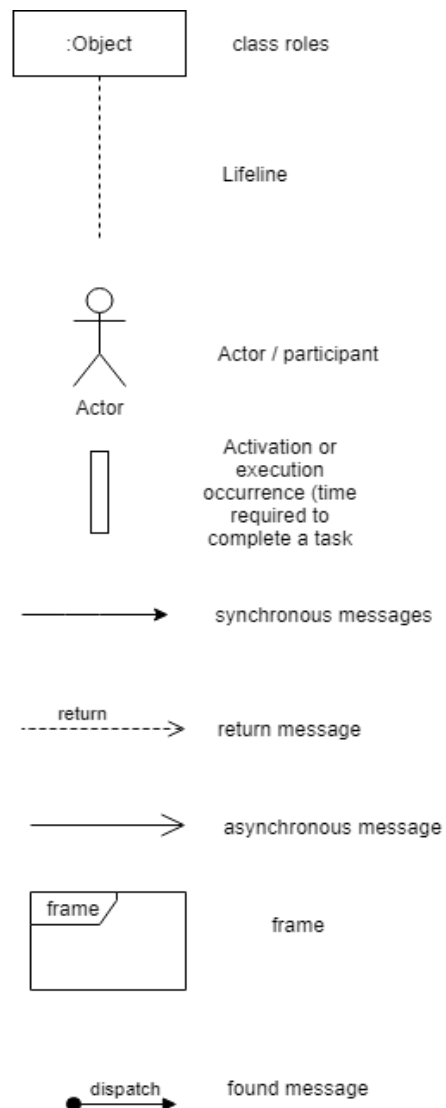
These models give a better understanding of various the domains of the ARS system and its features.

SEQUENCE DIAGRAM

AIM:

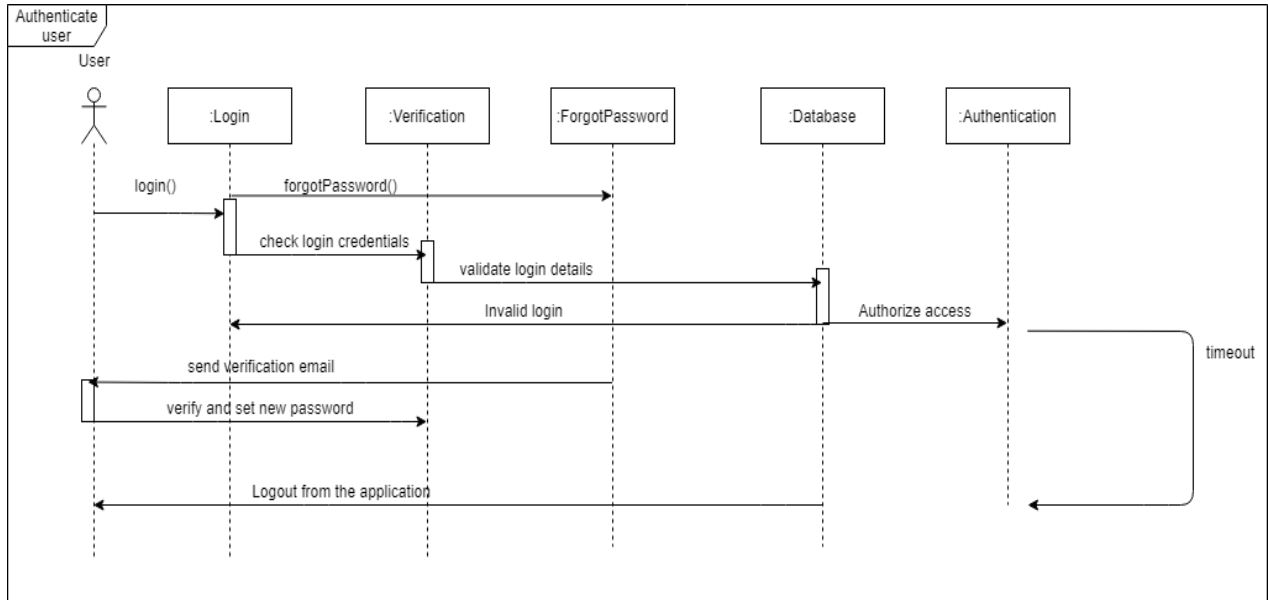
To create sequence diagram for ARS.

NOTATIONS:

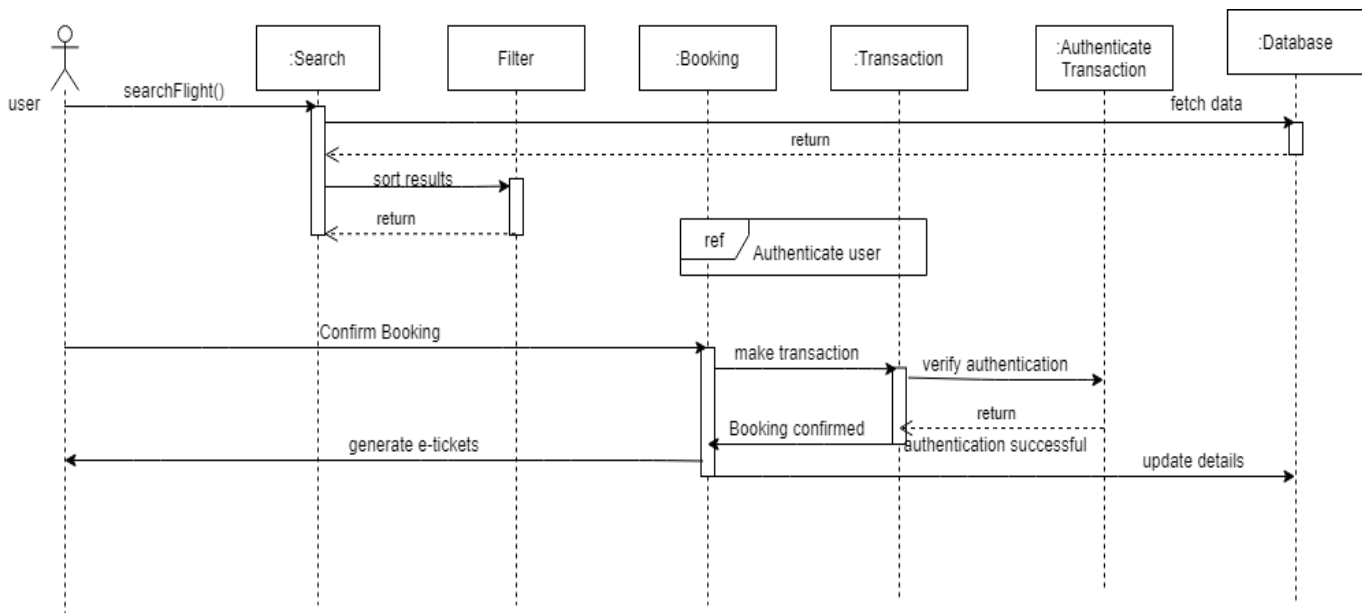


Airline Reservation System

SEQUENCE DIAGRAM:

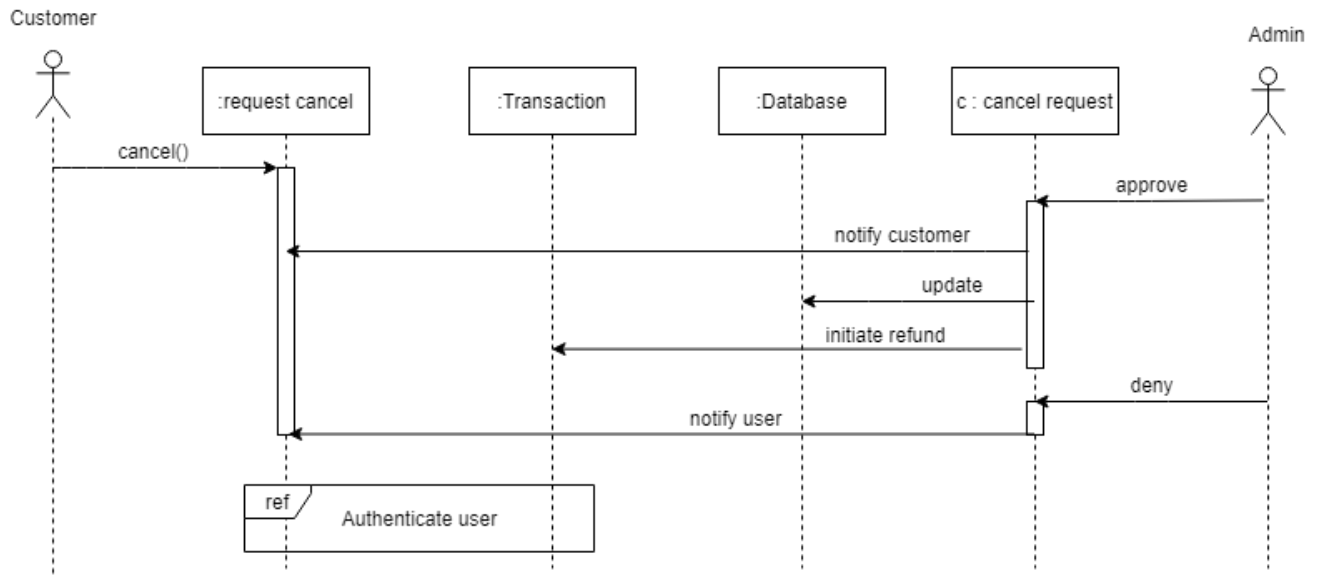


Login – sequence diagram

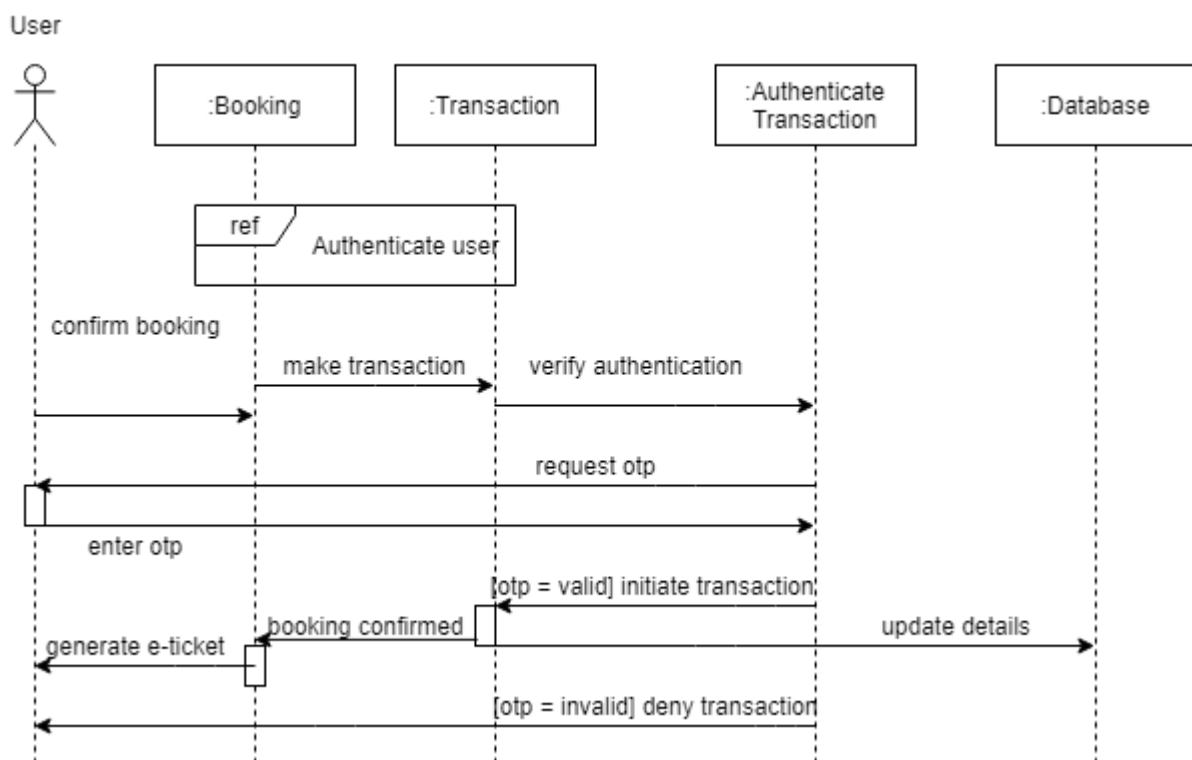


Booking – sequence diagram

Airline Reservation System



Cancellation – sequence diagram



Failure case – sequence diagram

DOCUMENTATION:

The main purpose of sequence diagram is to understand how the objects in a system interact with each other.

The objects in the system interact with one and another by passing messages.

Sequence diagram emphasizes time ordering of messages.

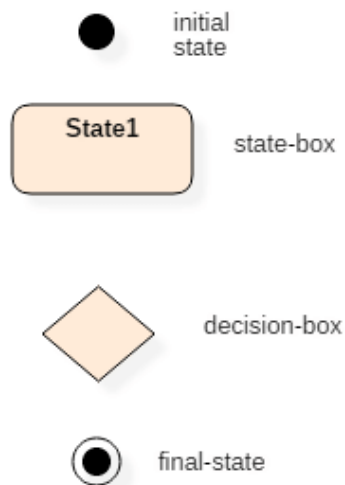
It gives us a better understanding of the interaction between objects, so it will be helpful while implementing the program.

STATE MACHINE DIAGRAM AND ACTIVITY DIAGRAM

AIM:

To create state diagram and activity diagram for ARS.

UML NOTATIONS FOR STATE DIAGRAM:



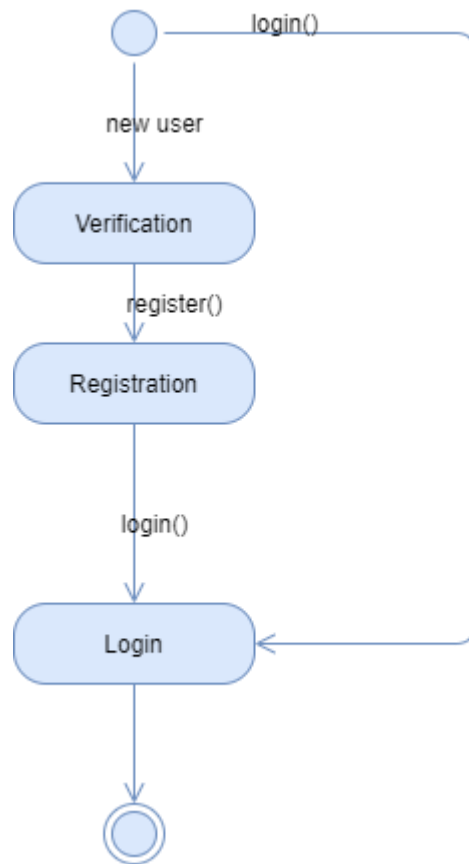
UML state diagram notations

IDENTIFICATION OF STATES:

- Verification
- Login
- Registration
- Searching
- Filter
- Booking
- Transaction
- Generate tickets
- View cancel requests
- Approve request
- Deny request
- Initiate refund

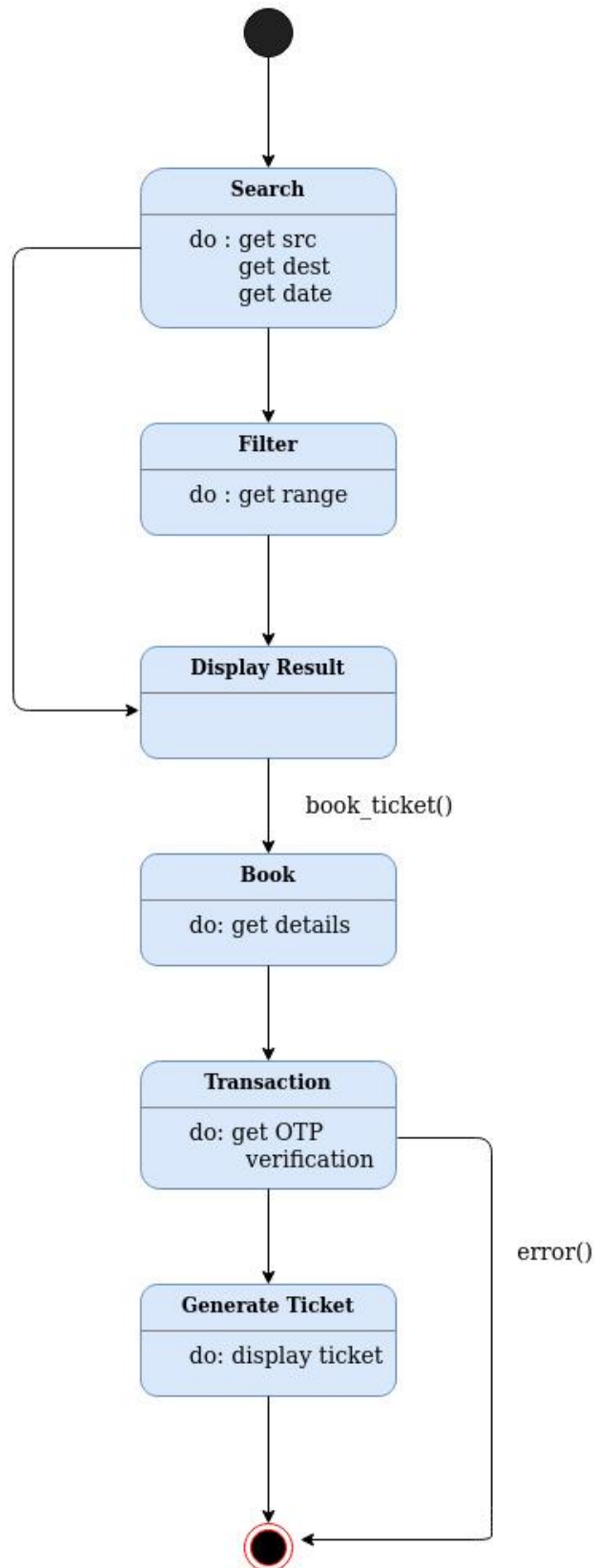
Airline Reservation System

STATE DIAGRAM:



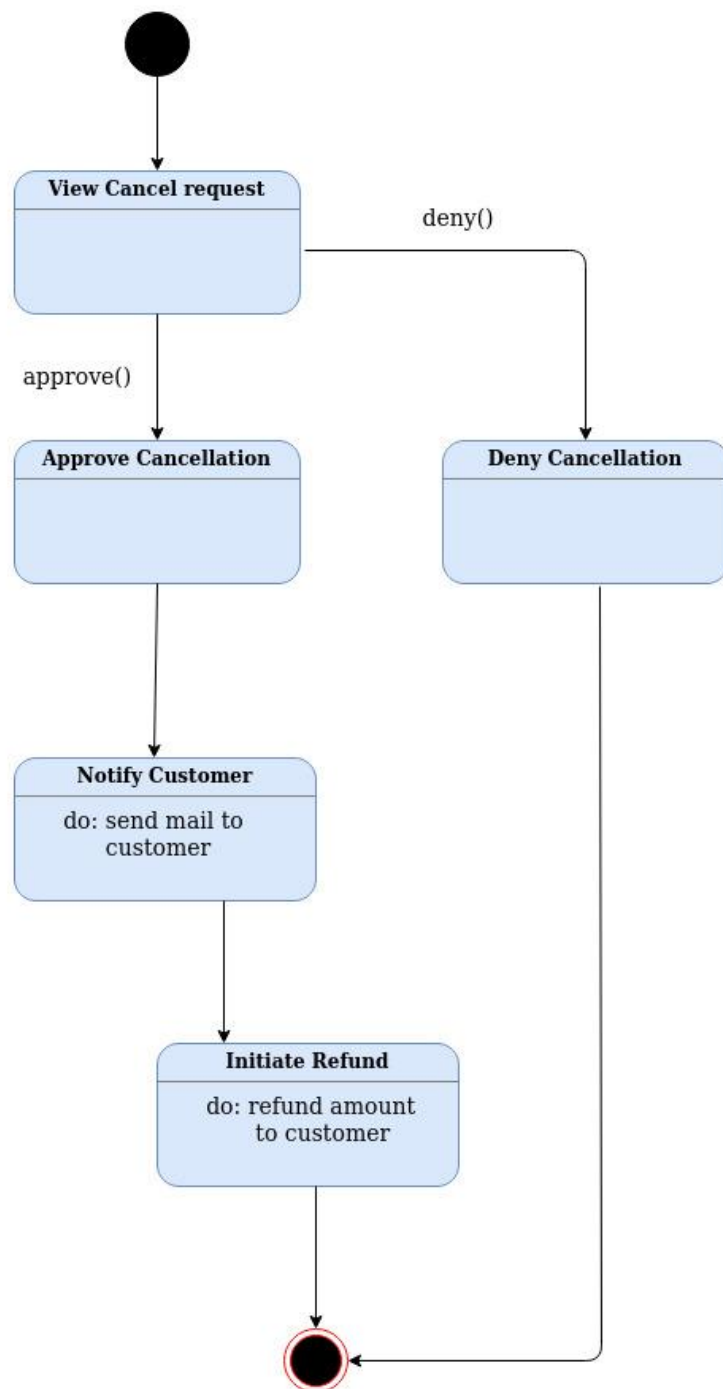
Login – state diagram

Airline Reservation System



Booking – state diagram

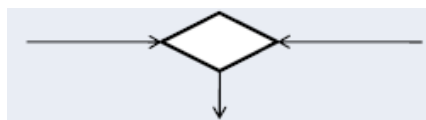
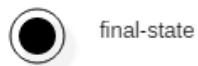
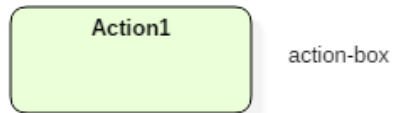
Airline Reservation System



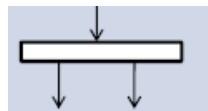
Cancellation – state diagram

Airline Reservation System

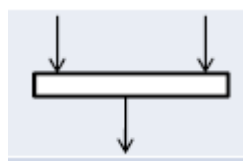
ACTIVITY DIAGRAM UML NOTATIONS:



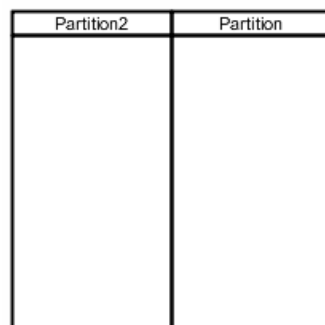
merge node



fork node



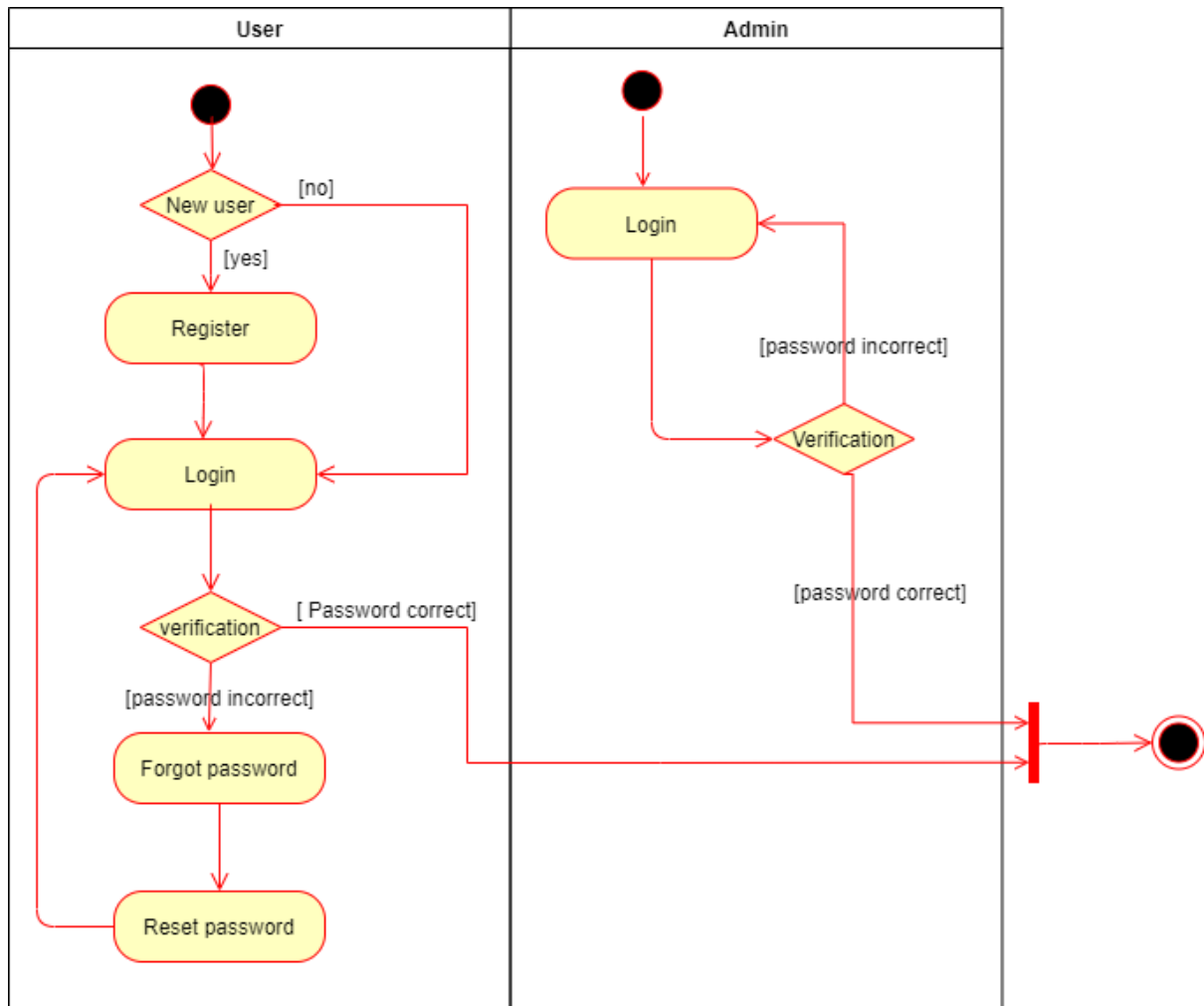
join node



Swimlane

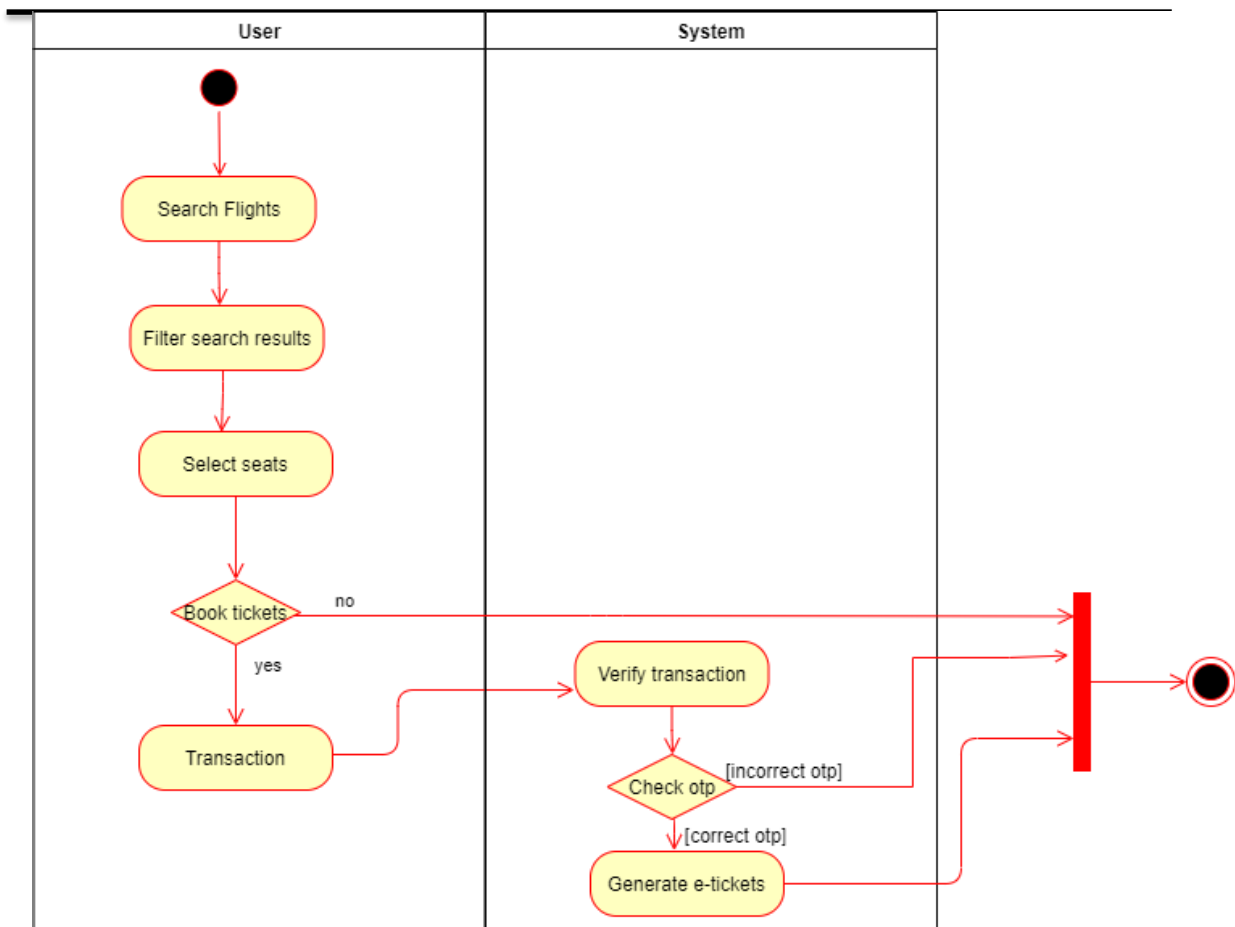
Airline Reservation System

ACTIVITY DIAGRAM:



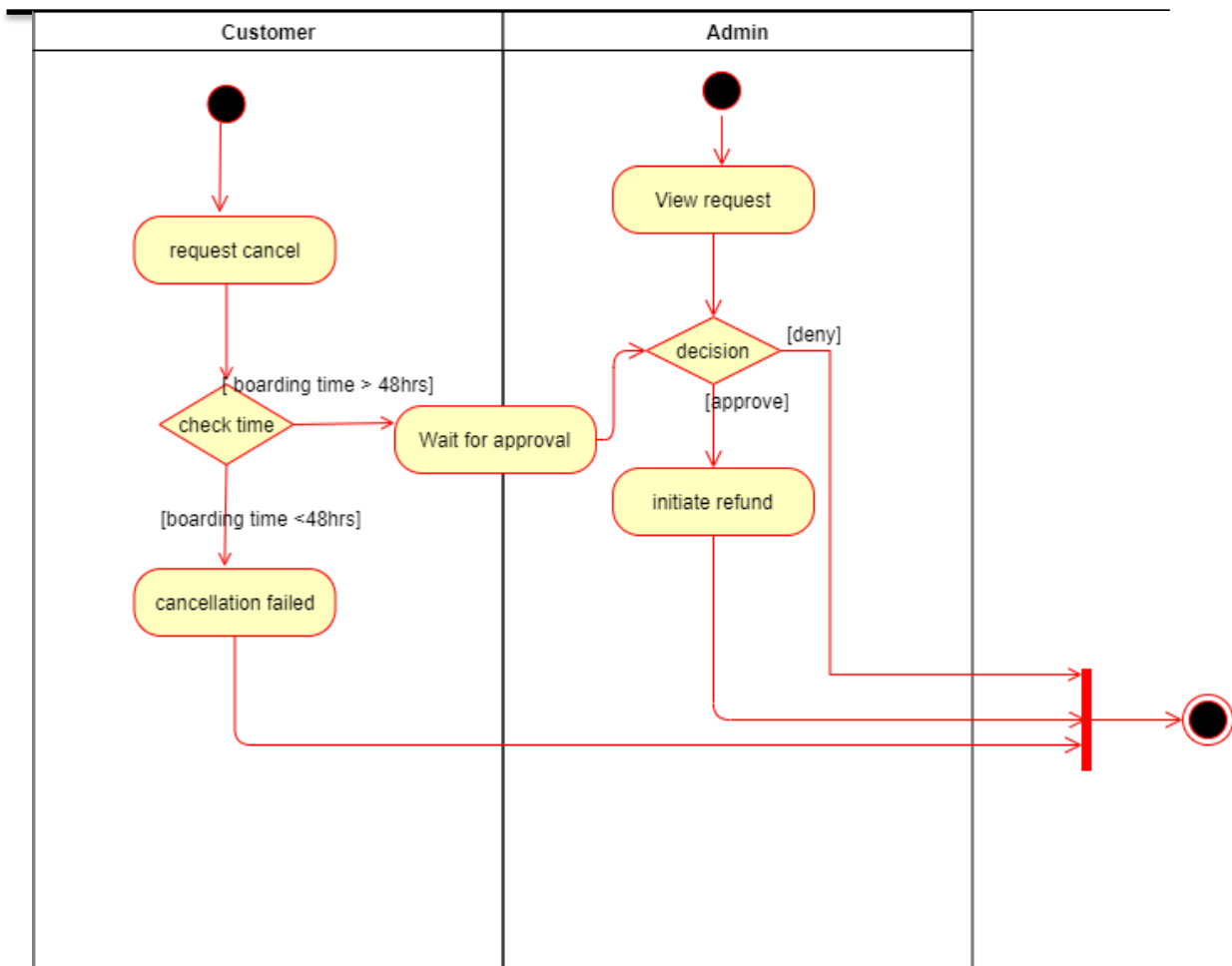
Login – activity diagram

Airline Reservation System



Booking – activity diagram

Airline Reservation System



Cancellation – activity diagram

DOCUMENTATION:

Both state machine diagram and activity diagram are behavioural diagrams. The main purpose of this document is to explain the behaviour of the ARS system under various circumstances.

The state machine diagram shows the various states the encountered and how the transition from one state to another state happens.

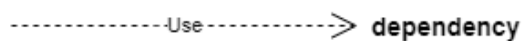
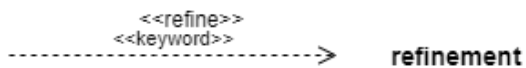
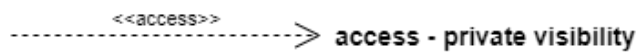
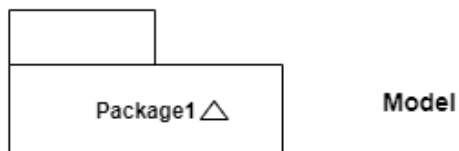
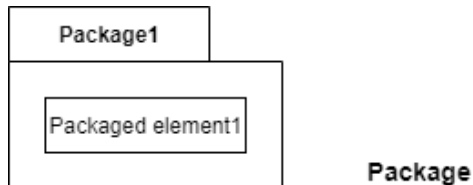
The activity diagram describes the workflow behaviour of the system. The process flow within the system is captured in activity diagram. This diagram depicts the dynamic nature of the system by modelling the flow of control from one activity to another.

PACKAGE DIAGRAM

AIM:

To create a package diagram for ARS system.

UML NOTATIONS FOR PACKAGE DIAGRAM:

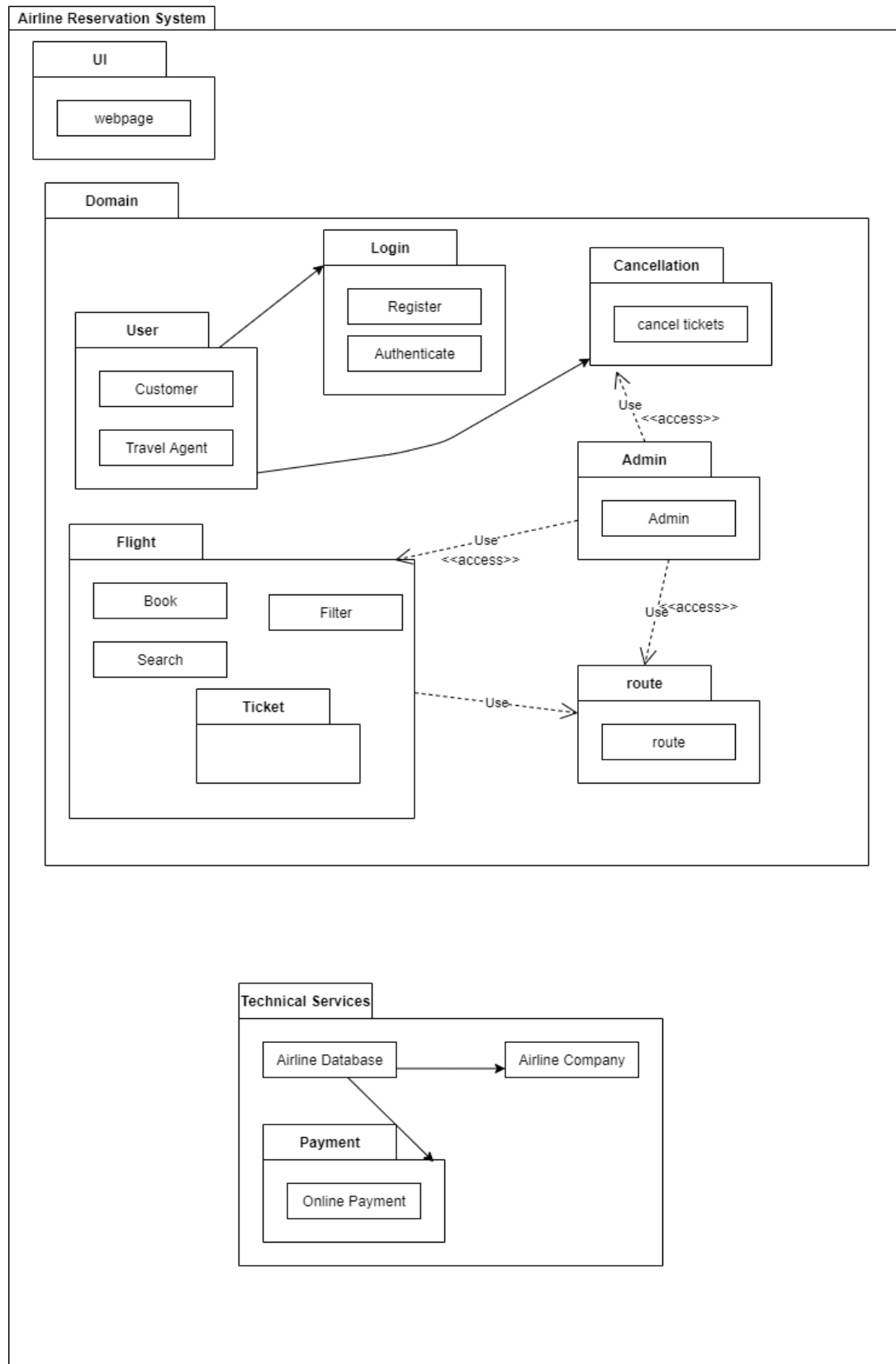


IDENTIFICATION OF PACKAGES:

- Login
- User
- Admin
- Flight
- Route
- Ticket
- Cancellation
- Payment

Airline Reservation System

PACKAGE DIAGRAM:



Airline Reservation System

DOCUMENTATION:

- Identifying the packages from the class diagram makes the implementation easier.
- Package diagram shows the arrangement and organization of model elements in middle to large scale project.
- Package diagram is used to simplify complex class diagrams, you can group classes into packages.
- We can also understand the various dependencies between packages.

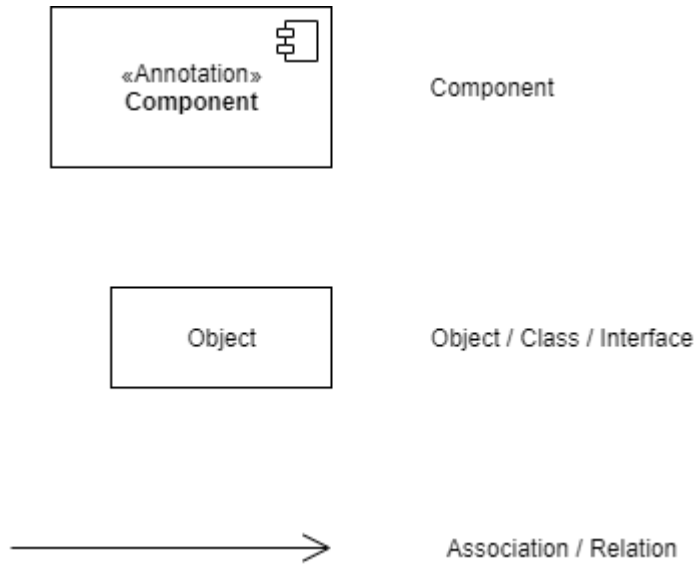
Airline Reservation System

COMPONENT AND DEPLOYMENT DIAGRAM

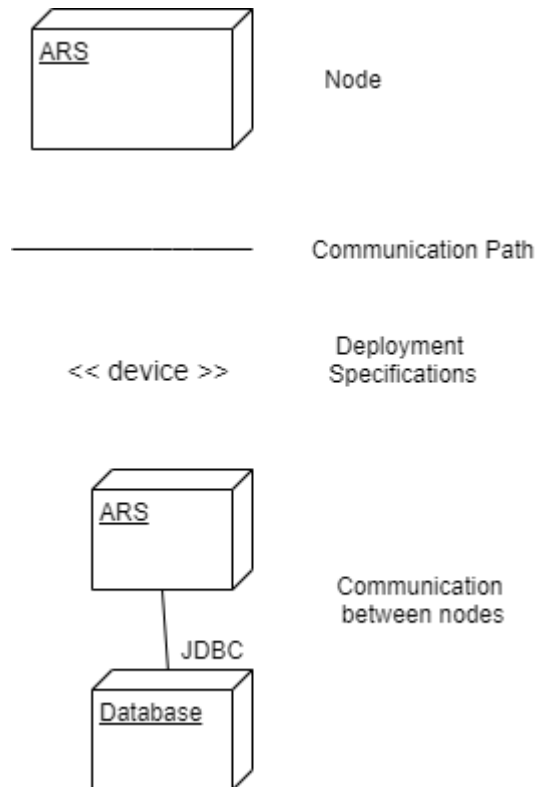
AIM:

To create a component and deployment diagram for ARS.

UML NOTATIONS FOR COMPONENT DIAGRAM:

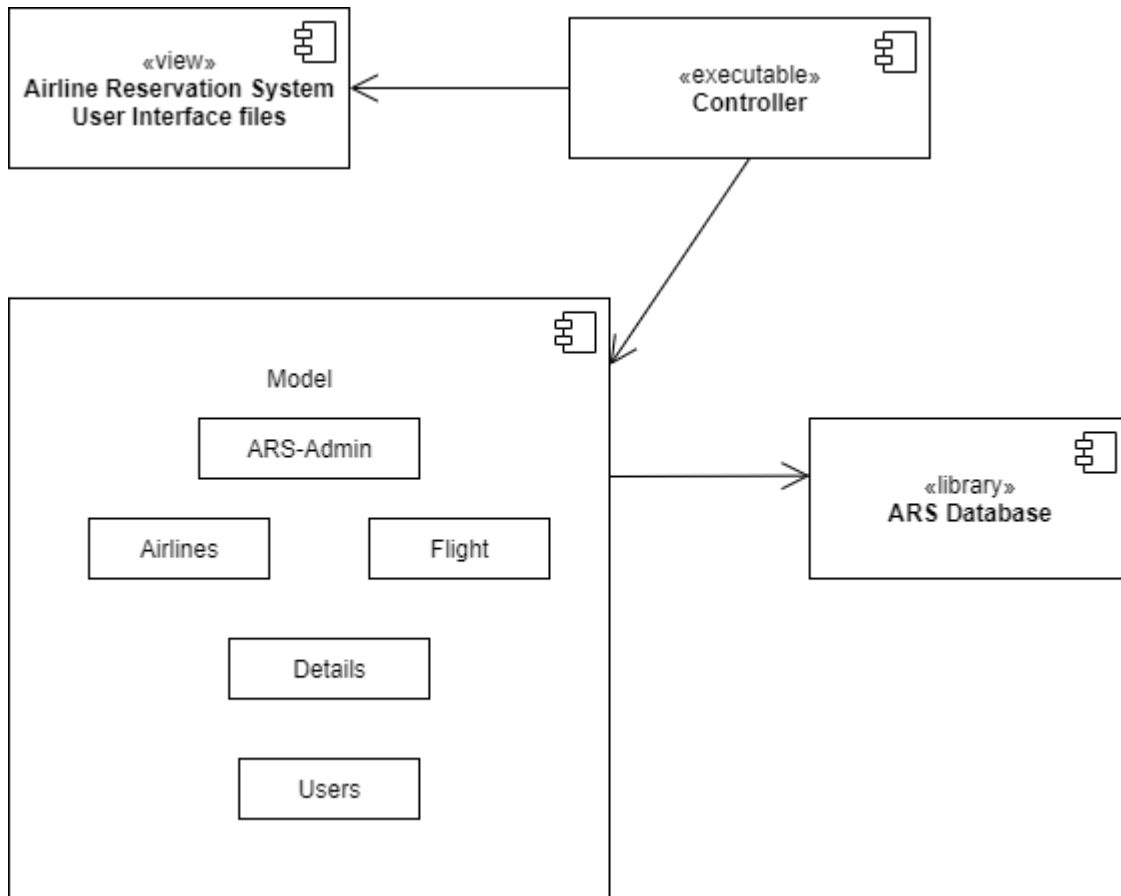


UML NOTATIONS FOR DEPLOYMENT DIAGRAM:



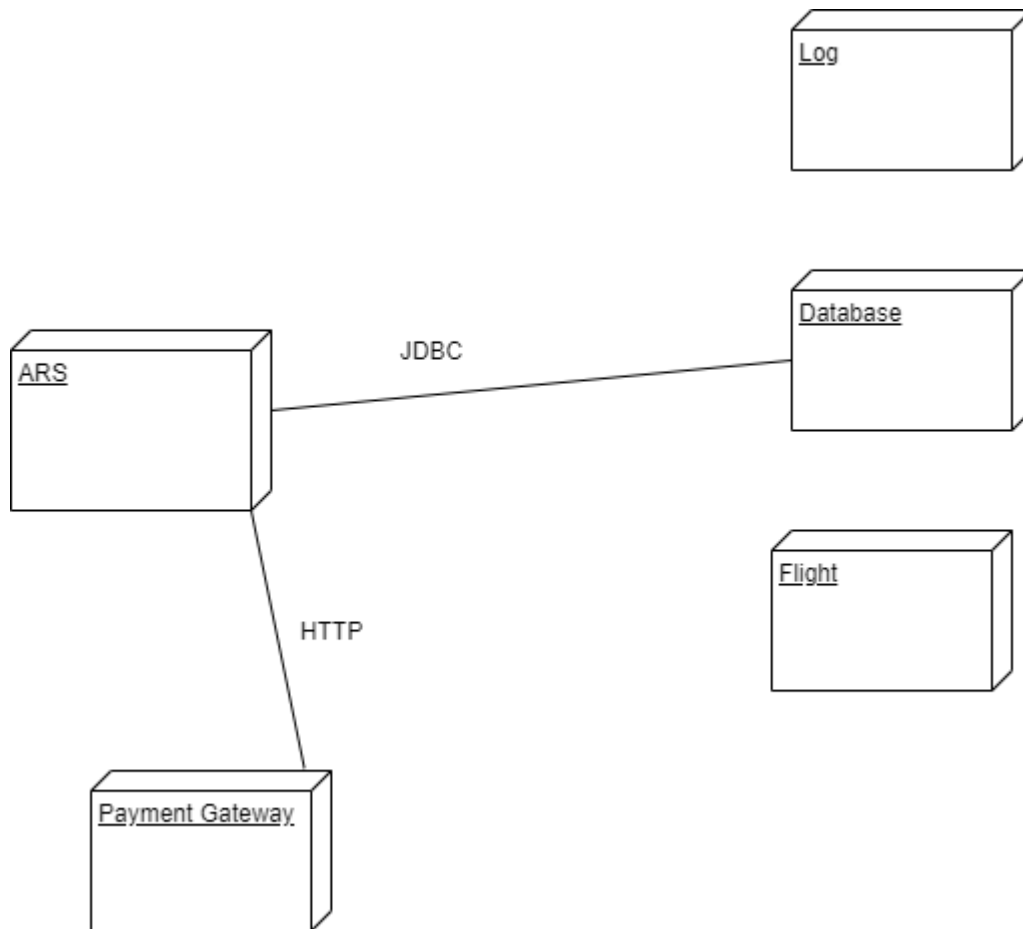
Airline Reservation System

COMPONENT DIAGRAM:



Airline Reservation System

DEPLOYMENT DIAGRAM:



DOCUMENTATION:

Component diagram represents implementation perspective. Reflect grouping of different design elements of system. Component diagram shows how the physical components of the system is organized.

Deployment diagram shows the structure of the nodes on which components are deployed. It shows the structure of the runtime system. It capture the hardware that will be used to implement the system and the links between different items of hardware.

These diagrams are used to make executable systems.

