20CS3221-Object Oriented Analysis and Design

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Unit 4- Syllabus

Unit – II (Classes and Object Diagrams) **(9 Contact hours)**

Interactions, Interaction diagram, Use case, Use case diagram, Activity diagram .

Interaction diagram

Interaction diagram portrays the interactions between distinct entities present in the model. A set of messages that are interchanged between the entities to achieve certain specified tasks in the system is termed as interaction. It may incorporate any feature of the classifier of which it has access. In the interaction diagram, the critical component is the messages and the lifeline.

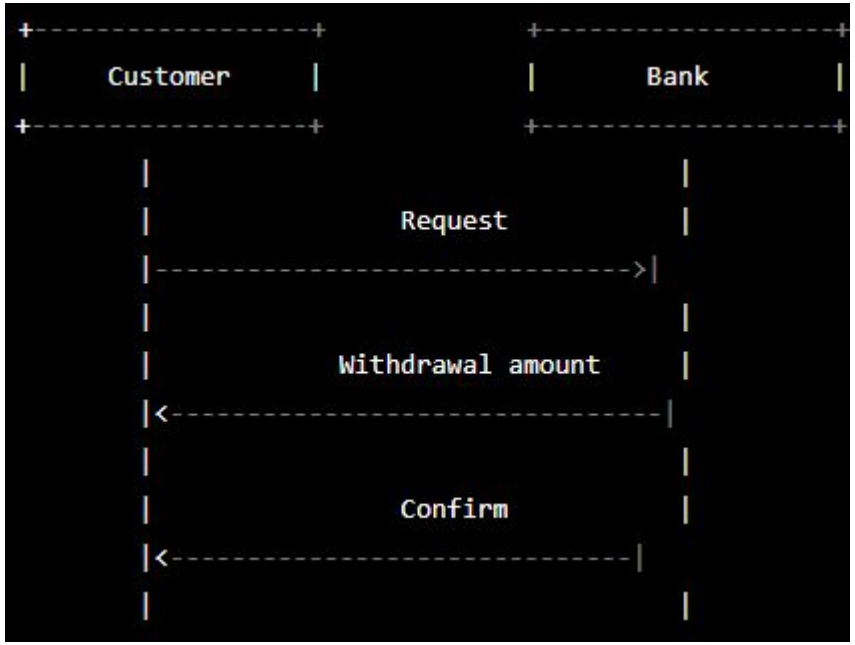
The message exchanged among objects is either to pass some information or to request some information. And based on the information, the interaction diagram is categorized into the sequence diagram, collaboration diagram, and timing diagram.

Sequence diagrams show the interactions between objects in a time-ordered sequence. They depict the order in which messages are exchanged between objects, and show how objects collaborate with one another to achieve a particular task.

Collaboration diagrams, also known as communication diagrams, are used to depict the interactions between objects in a system in a more abstract way than sequence diagrams. In a collaboration diagram, the objects are represented as nodes, and the messages are represented as links between these nodes.

A sequence diagram is a type of UML diagram that shows interactions between objects in a system in a time-ordered sequence. It shows the sequence of messages exchanged between objects, along with the lifelines of the objects involved, in order to depict the dynamic behavior.

Suppose we have a simple banking system that allows customers to withdraw money from their account. The sequence diagram below shows the interactions between the objects in the system for a typical withdrawal scenario:

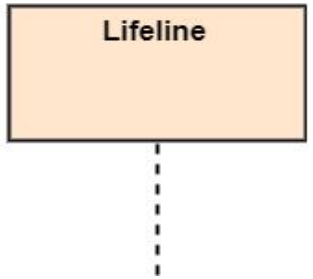


- There are two objects in the system: the Customer and the Bank. The Customer sends a Request message to the Bank to request a withdrawal. The Bank responds by sending a Withdrawal amount message back to the Customer, indicating the amount that can be withdrawn. The Customer then sends a Confirm message back to the Bank, indicating that they want to proceed with the withdrawal.
- The lifelines of the objects are represented by vertical lines on the diagram, and the messages exchanged between the objects are represented by arrows. The sequence of the messages is shown by the vertical ordering of the arrows on the diagram.
- Timing constraints such as delays, durations, and intervals can also be represented on the diagram using various notations, such as dotted lines or activation bars.
- Sequence diagrams can be used to model any kind of system that involves interactions between objects. They are useful for analyzing the dynamic behavior of a system and can help identify potential problems or bottlenecks in the system's design.

Sequence Diagrams Notations

Actors: Actors are represented as stick figures and are used to represent the users or external systems that interact with the system being modeled.

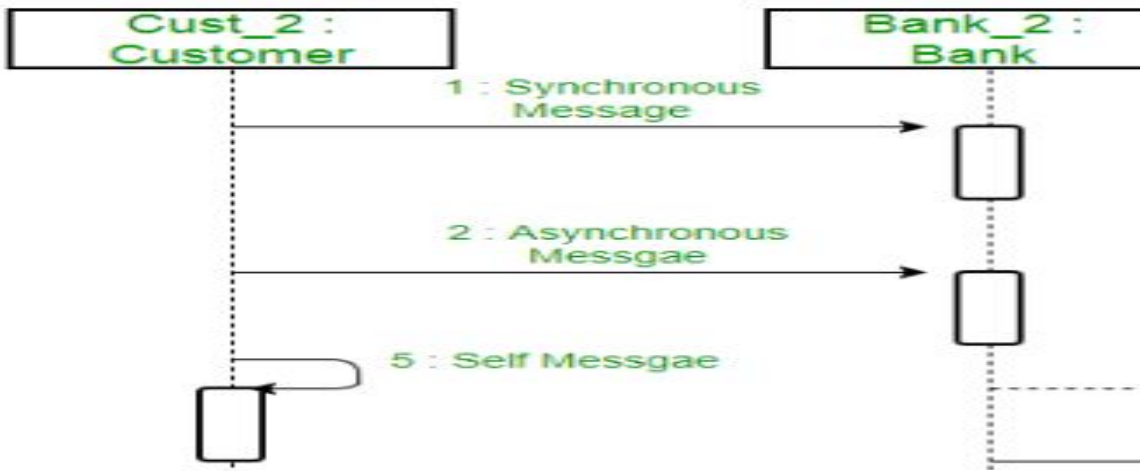
Lifelines: Lifelines represent the lifespan of an object or component in the system being modeled. They are drawn as vertical lines and may include a name or label at the top to indicate which object or component they represent.



Difference between a lifeline and an actor – A lifeline always portrays an object internal to the system whereas actors are used to depict objects external to the system.

Sequence Diagrams Notations

Messages: Messages are used to represent communication between objects or components in the system being modeled. They are shown as arrows that connect the lifelines of the objects involved in the interaction. Messages may include a label to indicate the name of the method or operation being called.

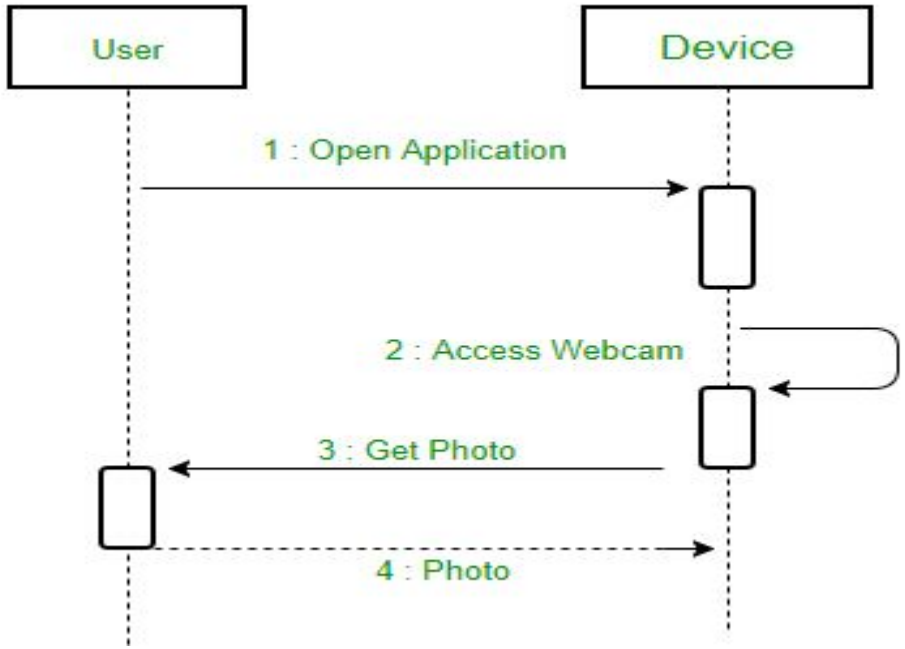


Delete Message – We use a Delete Message to delete an object. When an object is deallocated memory or is destroyed within the system we use the Delete Message symbol.

Sequence Diagrams Notations

Self Message: Certain scenarios might arise where the object needs to send a message to itself. Such messages are called Self Messages. example, Consider a scenario where the device wants to access its webcam. Such a scenario is represented using a self message.

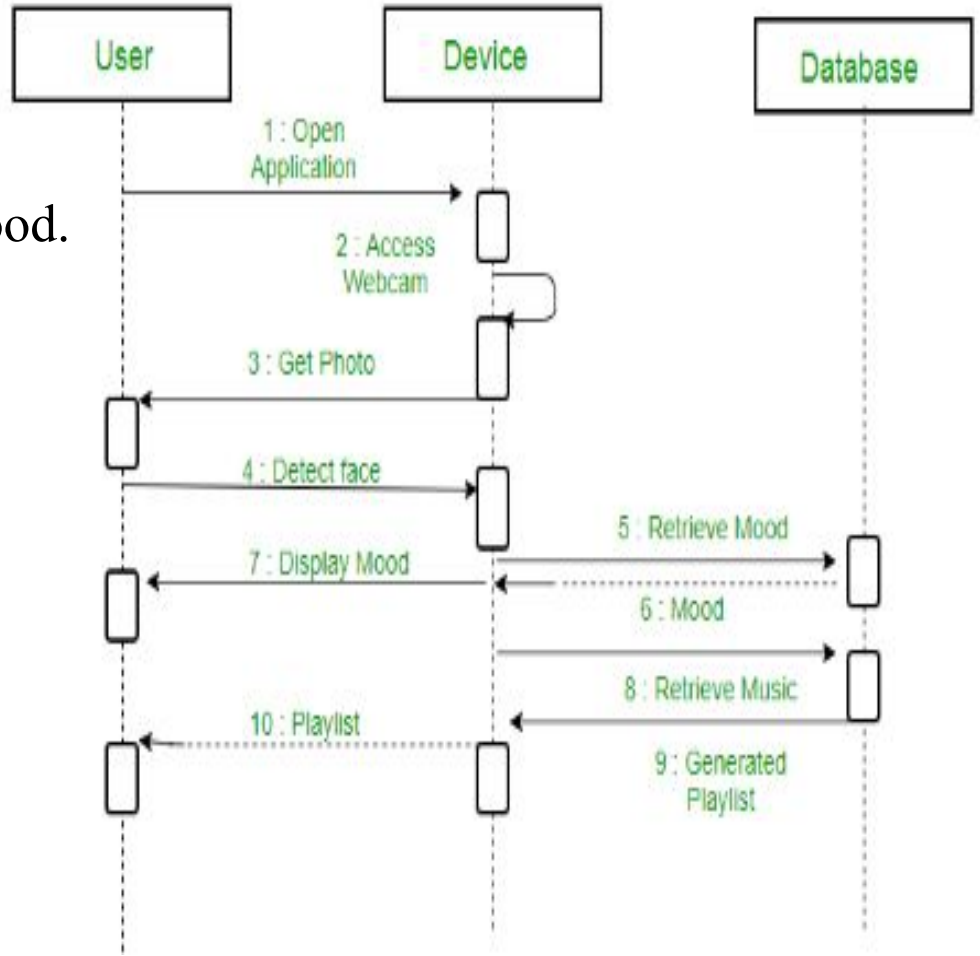
Reply Message: Reply Message: Reply messages are used to show the message being sent from the receiver to the sender. We represent a return/reply message using an open arrowhead with a dotted line.

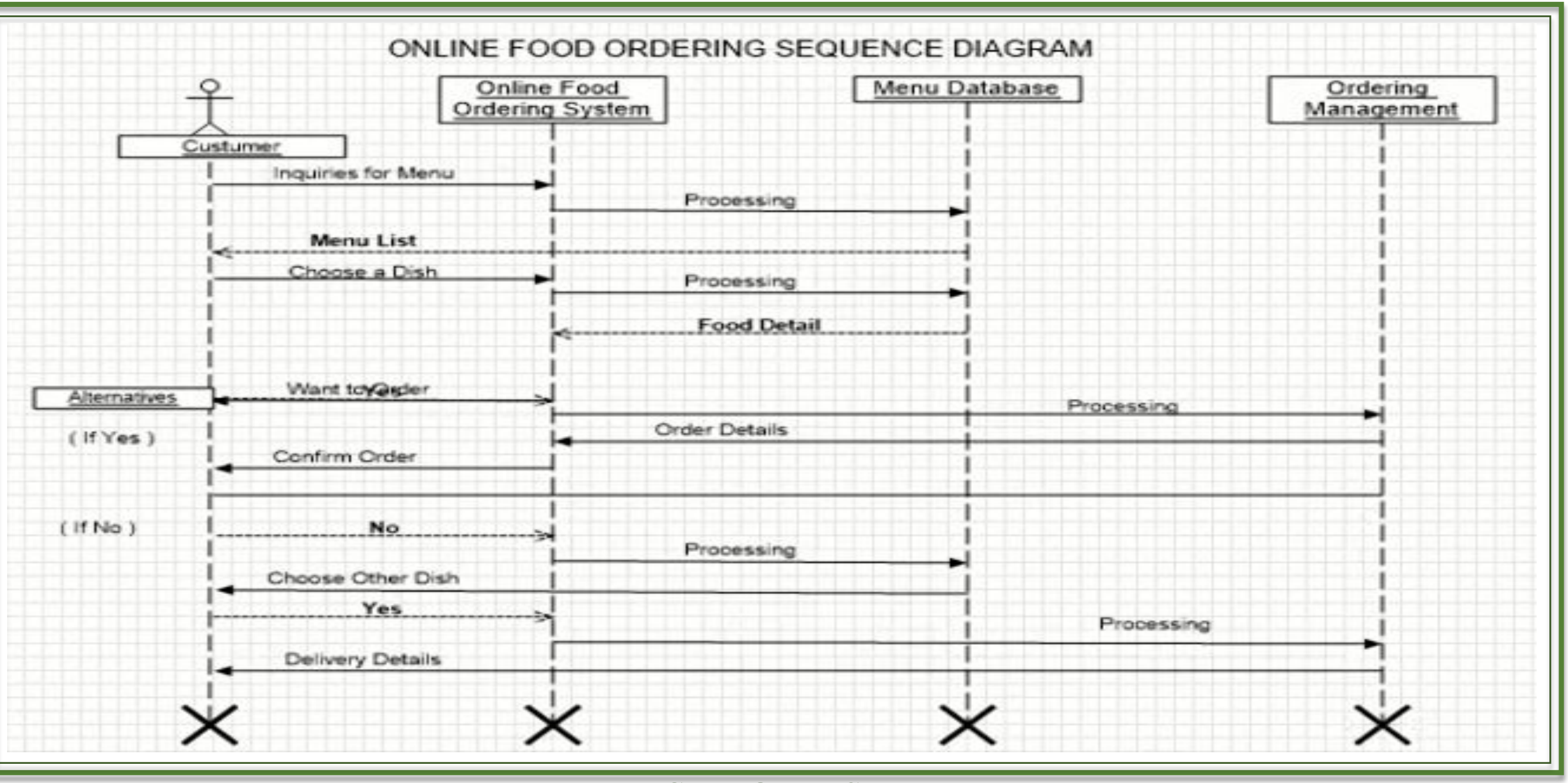


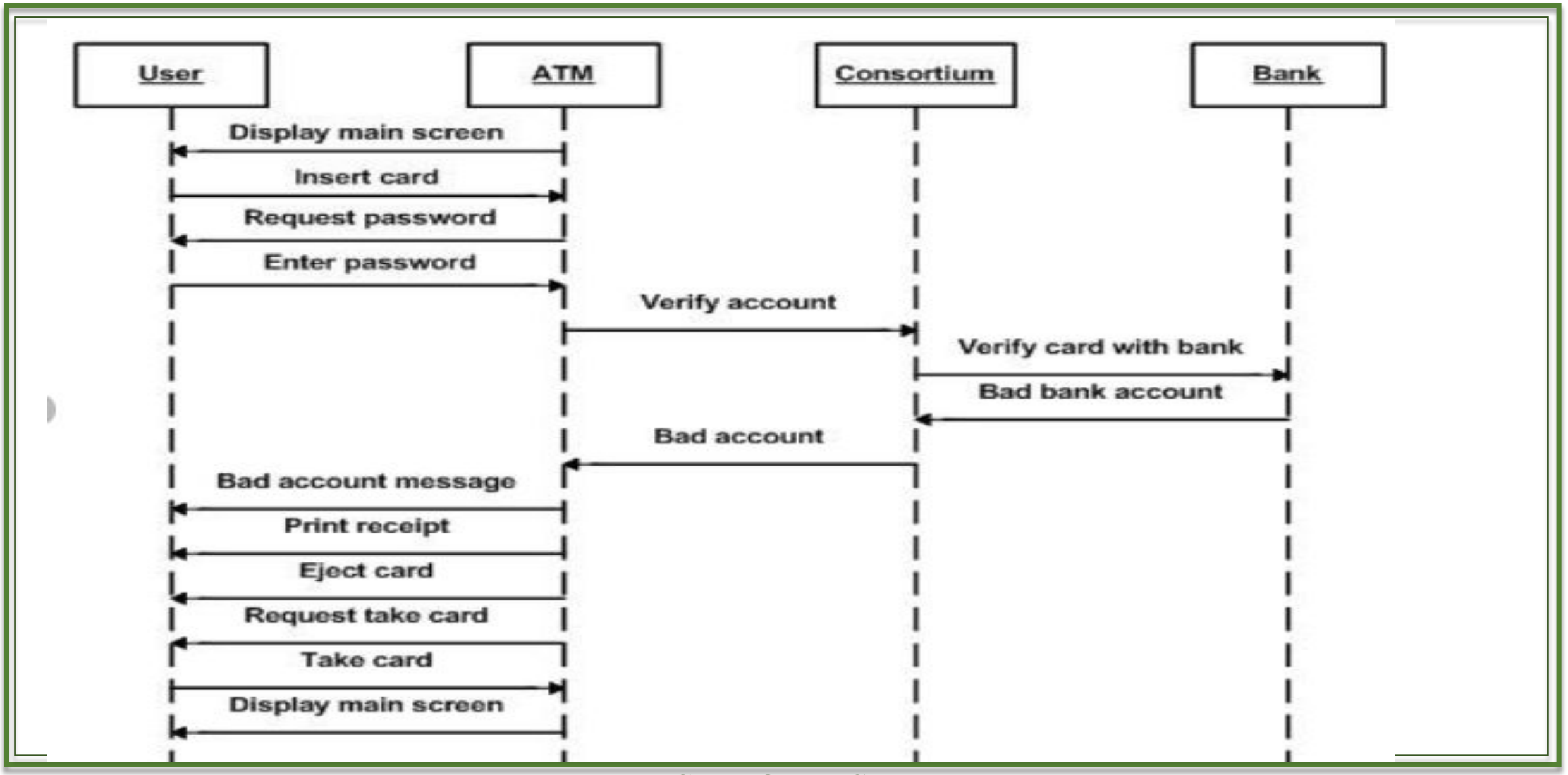
Sequence Diagrams Notations

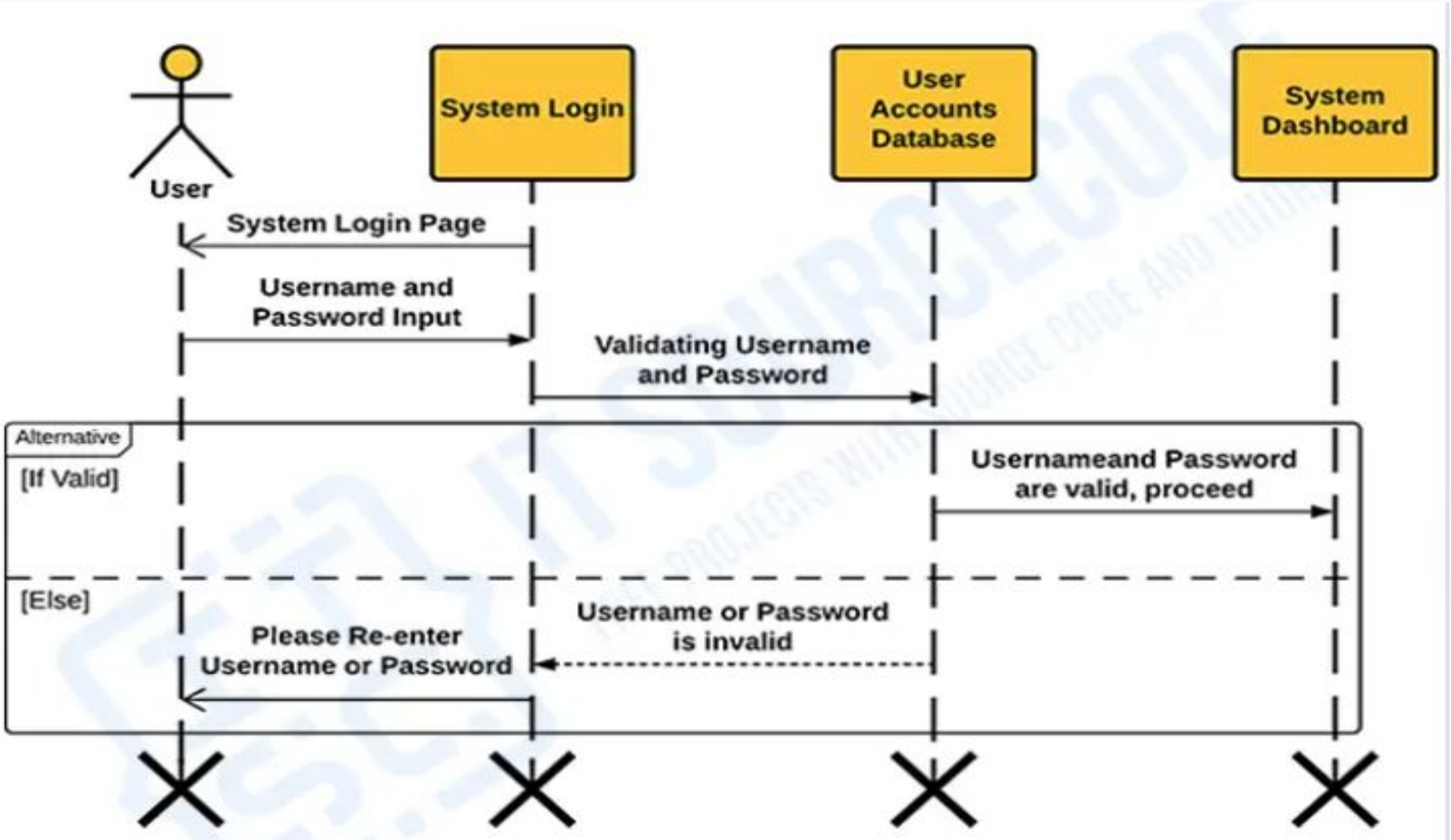
A sequence diagram for an emotion based music player :

1. Firstly the application is opened by the user.
2. The device then gets access to the web cam.
3. The webcam captures the image of the user.
4. The device uses algorithms to detect the face and predict the mood.
5. It then requests database for dictionary of possible moods.
6. The mood is retrieved from the database.
7. The mood is displayed to the user.
8. The music is requested from the database.
9. The playlist is generated and finally shown to the user.




ONLINE FOOD ORDERING SEQUENCE DIAGRAM
Online Food Ordering System
Menu Database
Ordering Management
Custumer
Inquiries for Menu
Processing
Menu List
Choose a Dish
Processing
Food Detail
Alternatives
Want to Order
Processing
(If Yes)
Order Details
Confirm Order
(If No)
No
Processing
Choose Other Dish
Yes
Processing
Delivery Details


User
ATM
Consortium
Bank
Display main screen
Insert card
Request password
Enter password
Verify account
Verify card with bank
Bad bank account
Bad account
Bad account message
Print receipt
Eject card
Request take card
Take card
Display main screen


User
System Login
User Accounts Database
System Dashboard
System Login Page
Username and Password Input
Validating Username and Password
Alternative
[If Valid]
Usernameand Password are valid, proceed
[Else]
Username or Password is invalid
Please Re-enter Username or Password

Collaboration diagram

Collaboration diagram, also known as a communication diagram, is a type of diagram in the Unified Modeling Language (UML) that shows how objects interact with each other to perform a specific task or accomplish a particular goal.

Collaboration diagrams depict objects as vertical lifelines, and the interactions between the objects are shown as horizontal arrows that connect the lifelines. The arrows indicate messages that are passed between the objects, and they can also include information about the timing and order of the messages.

Notations of a Collaboration Diagram

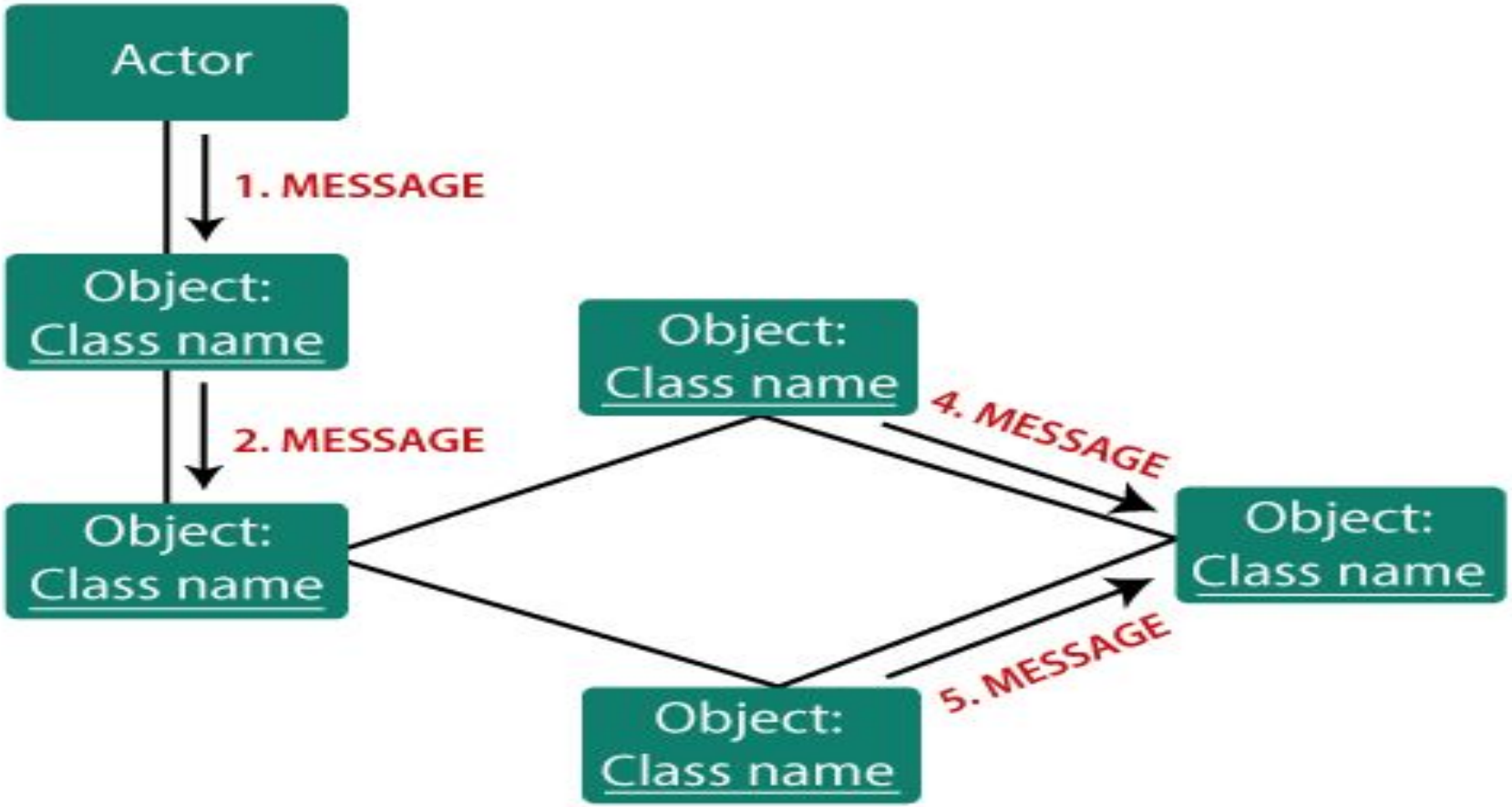
Objects: The representation of an object is done by an object symbol with its name and class underlined, separated by a colon. In the collaboration diagram, objects are utilized in the following ways:

- The object is represented by specifying their name and class.
- It is not mandatory for every class to appear.
- A class may constitute more than one object.
- In the collaboration diagram, firstly, the object is created, and then its class is specified.
- To differentiate one object from another object, it is necessary to name them.

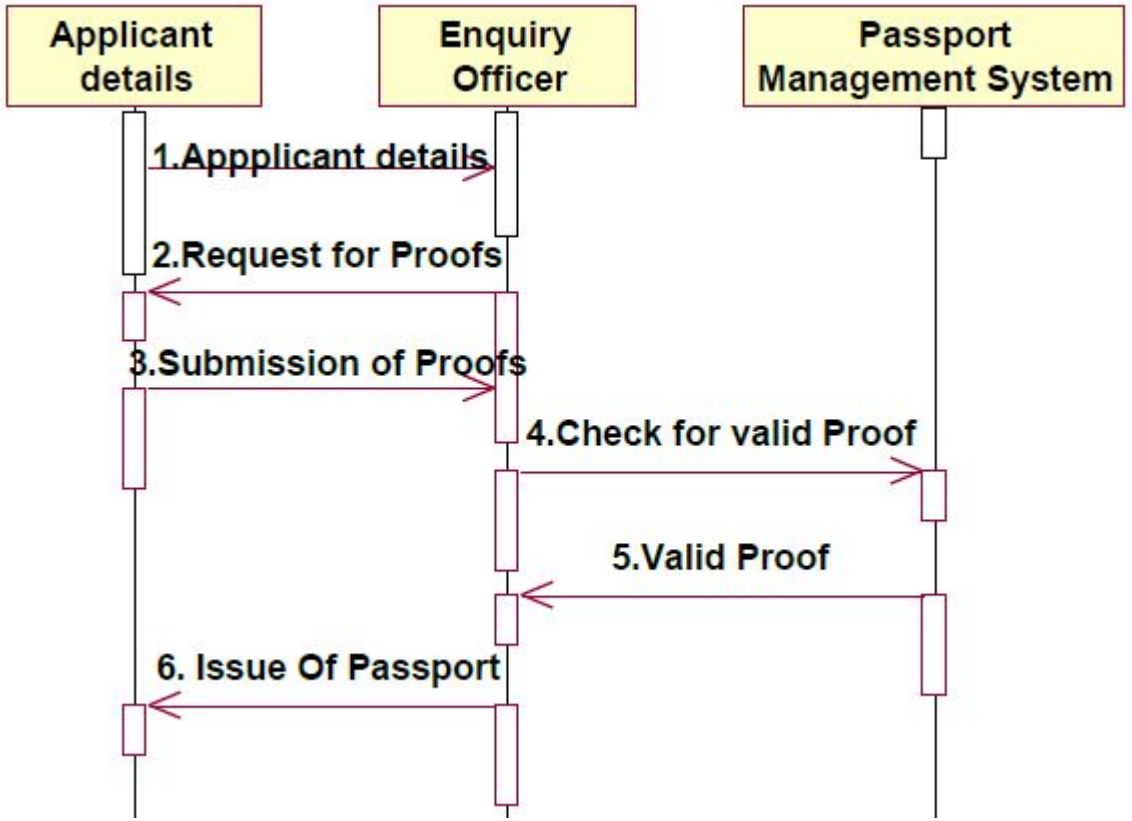
Actors: In the collaboration diagram, the actor plays the main role as it invokes the interaction. Each actor has its respective role and name.

Links: The link is an instance of association, which associates the objects and actors. It portrays a relationship between the objects through which the messages are sent. It is represented by a solid line.

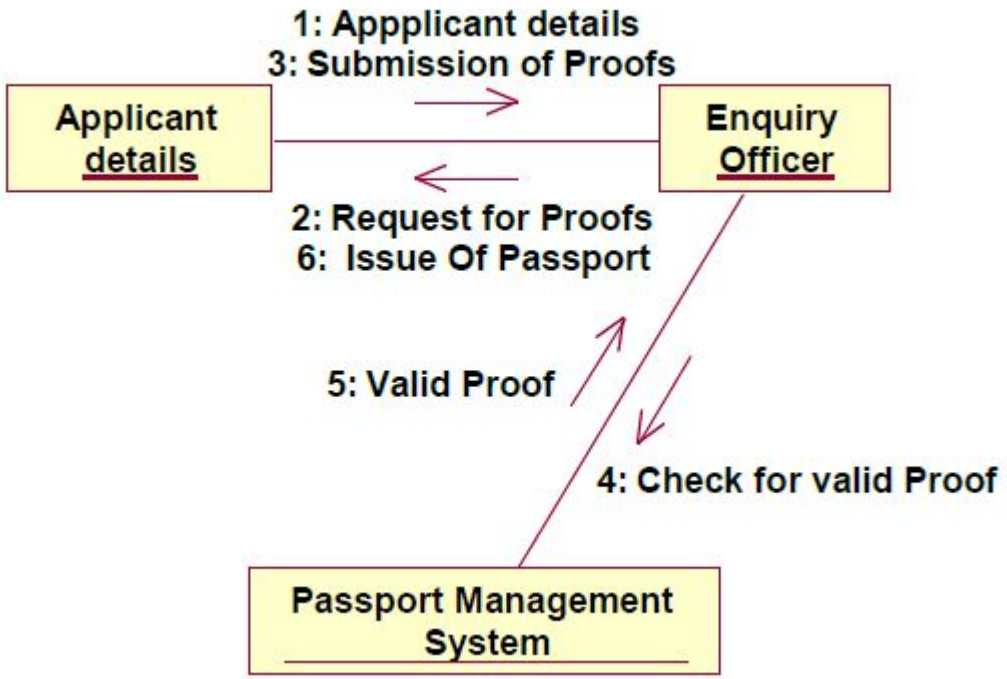
Messages: It is a communication between objects which carries information and includes a sequence number, so that the activity may take place. It is represented by a labeled arrow, which is placed near a link. The messages are sent from the sender to the receiver, and the direction must be navigable in that particular direction.


Actor
1. MESSAGE
Object:
Class name
2. MESSAGE
Object:
Class name
Object:
Class name
4. MESSAGE
Object:
Class name
5. MESSAGE
Object:
Class name

Passport automation system

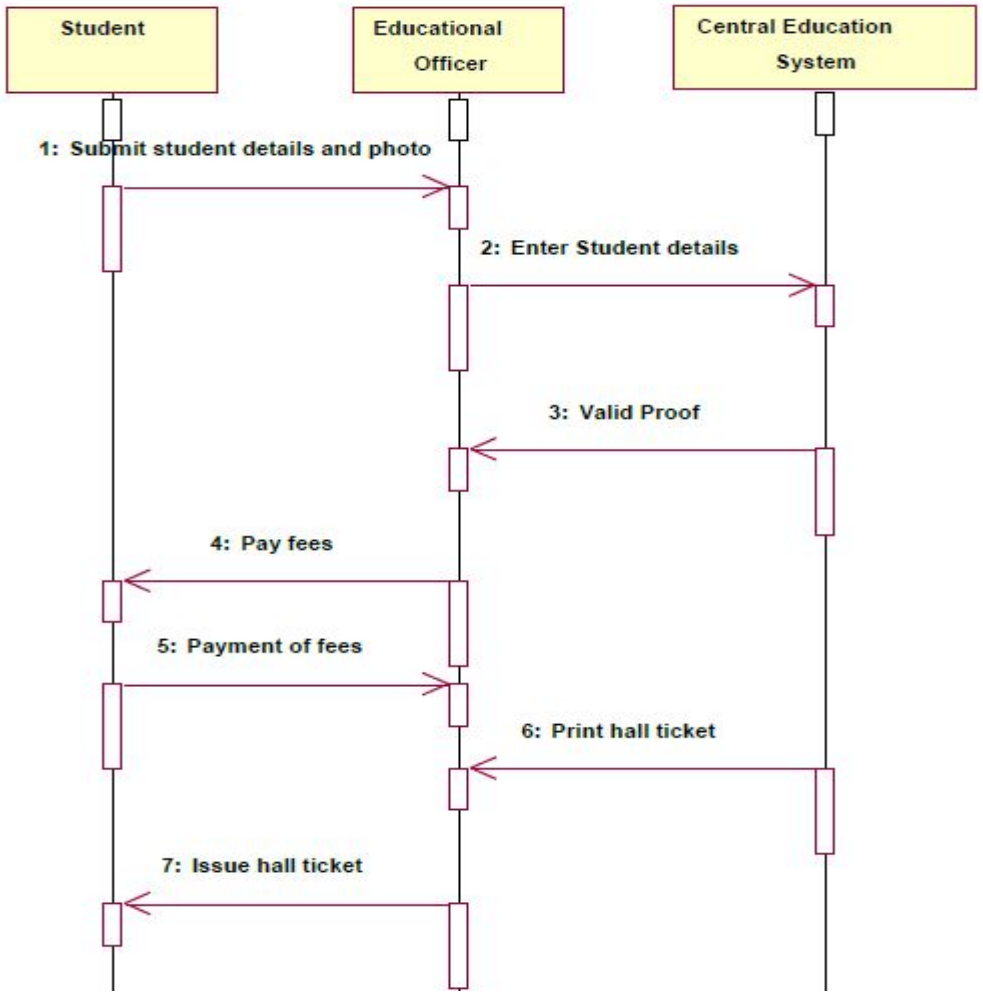


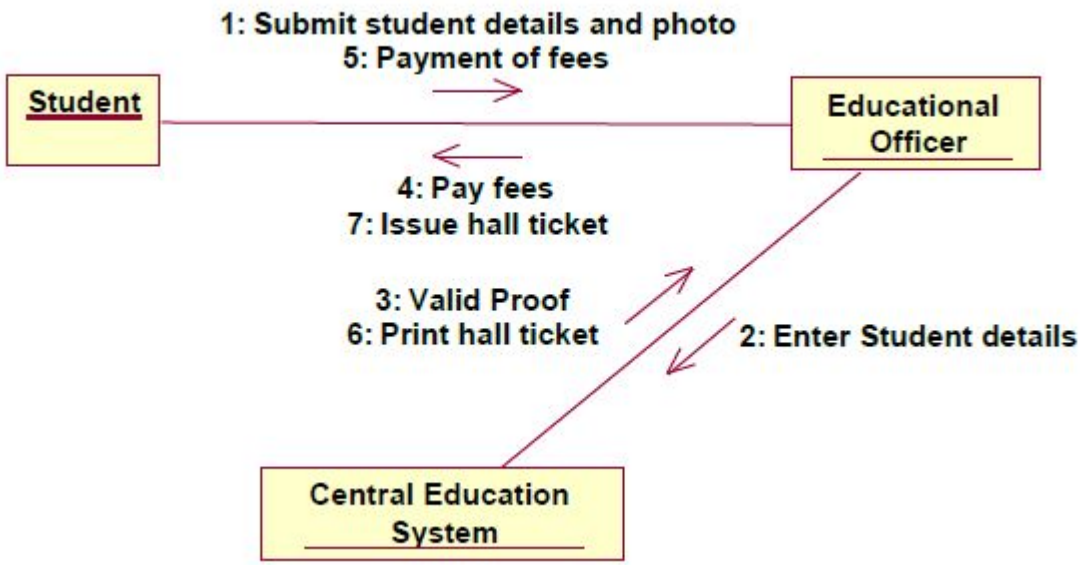
Sequence Diagram



Collaboration Diagam

Exam registration system





Use Case diagram

Thank
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