

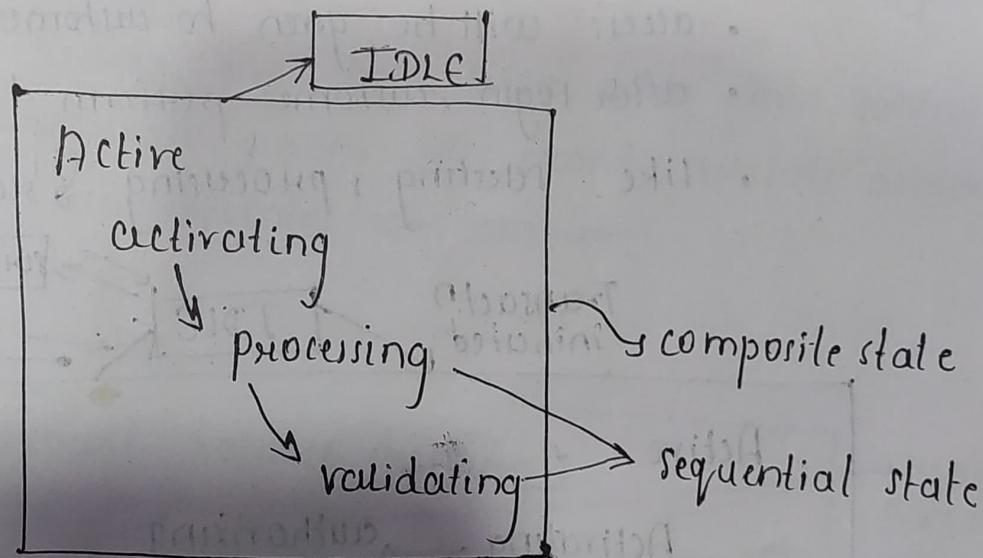
UNIT - 3

OMD :-

Nested States :- States which are **nested inside** other states.

ex. when working machine is in active state, it can have nested states called activate state.

- Nested state also called **composite** or **substate**.
- basic difference b/w simple & composite is that simple state doesn't have substate & composite holds sequential, substate.

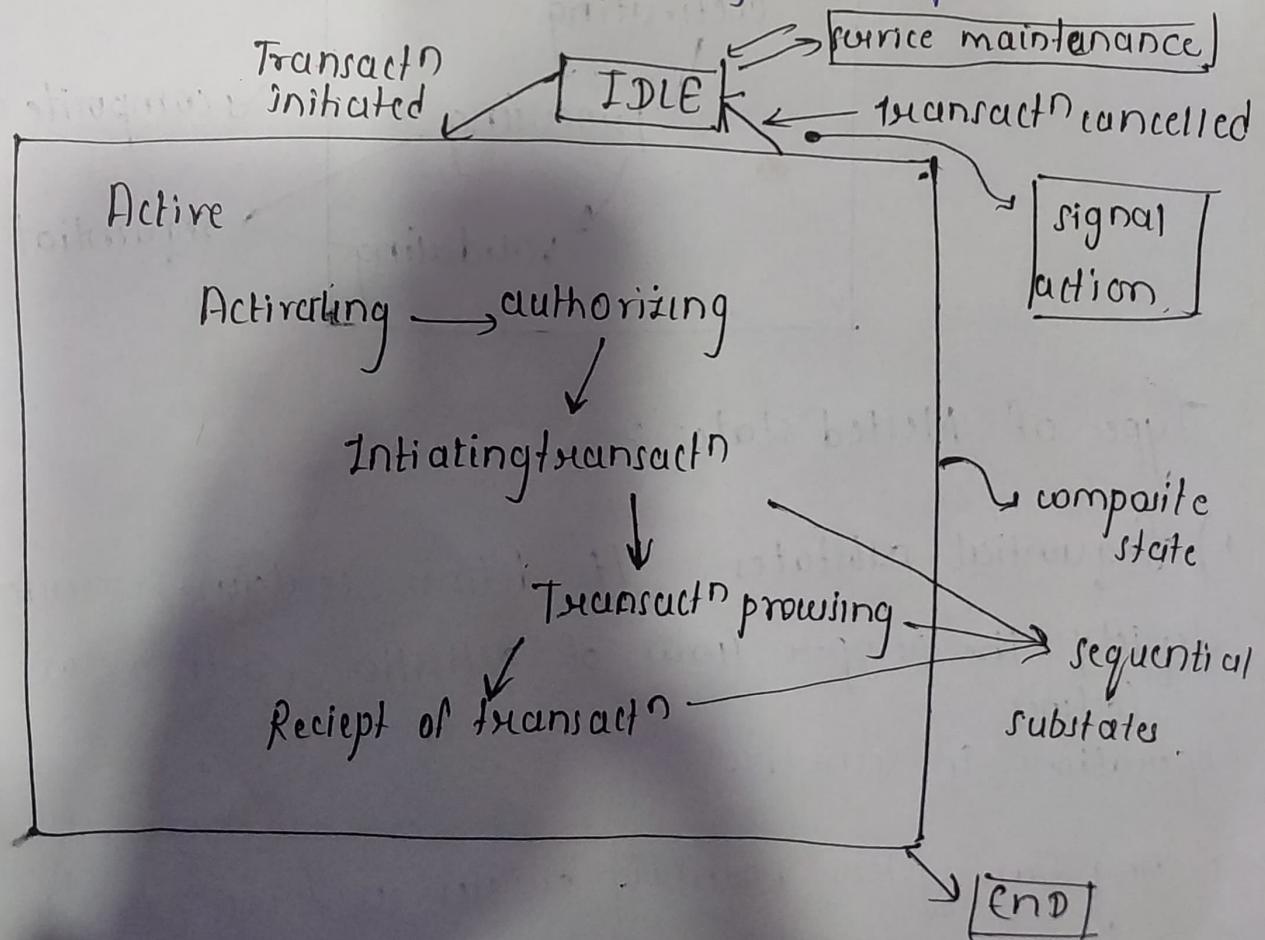


Types of Nested states :-

- 1) Sequential substates :- It defines certain scenarios & depicts the proper flow of activities, action or (define) operations in scenario.
- Any s/w. system normally executes in four states : Idle, activating, active & end state.

Example: ATM Machine:

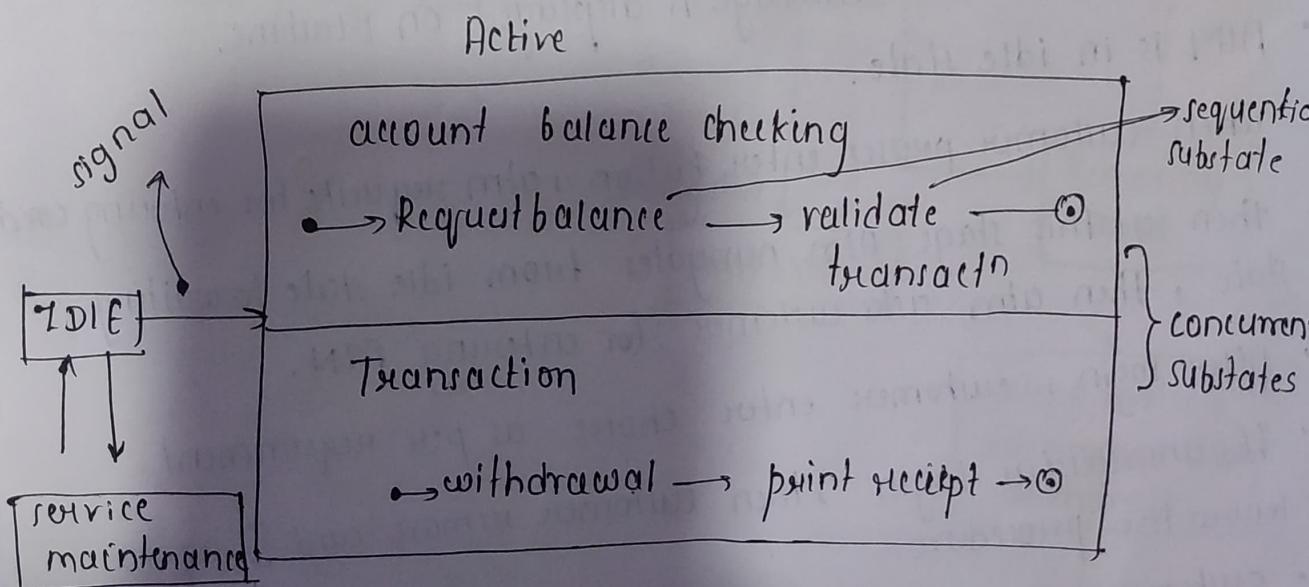
- idle state of atm Machine is that the system is waiting for communication from customer.
- when customer presses start button , UI of machine comes in activating state & hence it becomes ready for further transaction.
- active state comprise all activities involved in transaction which is handled by customer . & then active state is followed by end state showing end .
- Basically , ATM machine validates the customer.
 - access will be given to customer.
 - after login , customer perform task.
 - like selecting , processing & receipt of transactn.



sequential substrate might have one initial & one final state

concurrent substrates :

- If we have to show two or more state machine that execute concurrently, then we use concurrent substrate to represent concurrency among state machines.
- we use concurrent substrate to show parallel flow of execution in two nested state machines.
- it does not have initial & final states.
- execution of two or more concurrent substrates continues in parallel.
- If one substrate achieve final state before other then control of that achieved final state pauses till second substrate achieve its final state & then substrates are combined.



Signal Generalization:-

- In state models, we can change signals in generalization.
- It offers use of different level of abstraction.
- Each & every signal can be viewed as leaf node or child node in generalization hierarchy.

Concurrency:-

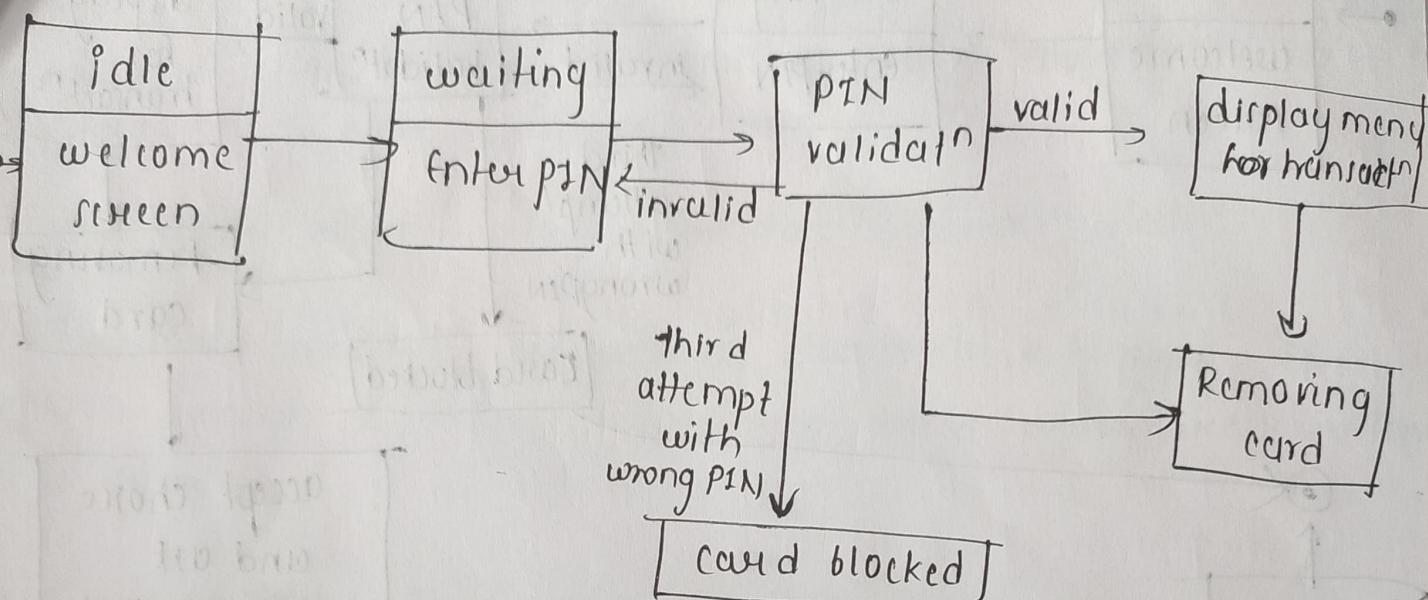
- State model indirectly supports & permits concurrency b/w objects.
- For achieving concurrency, each & every object should share their features, operations & constraints with other objects.

State diagram of ATM Machine:-

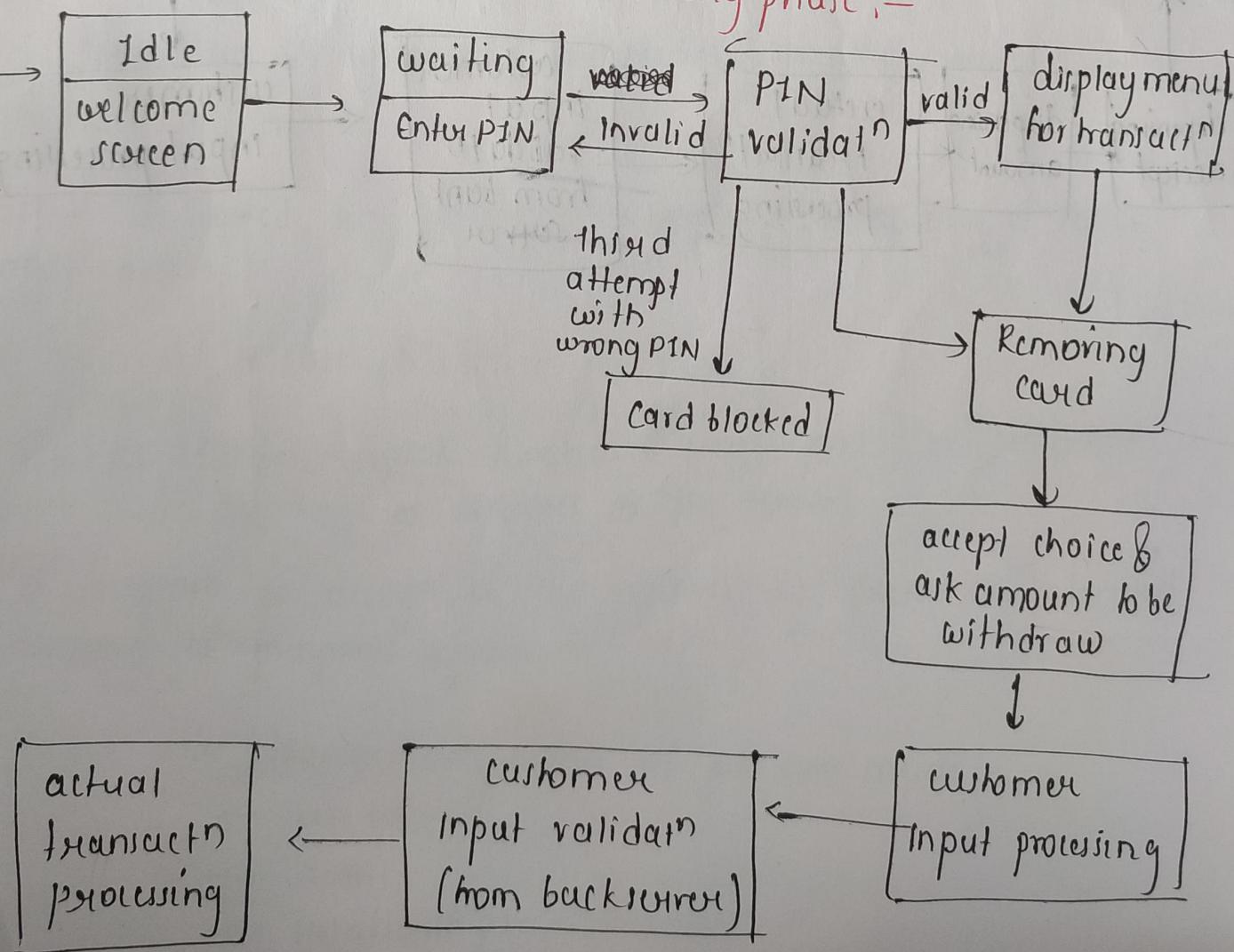
- At first, welcome message is displayed on Machine.
- ATM is in idle state.
- When customer presses enter button, atm requests for entering card.
- Then at this stage ATM navigates from idle state to waiting state, then ATM asks customer for entering PIN.
- After login, customer enters choice as per requirement.
- If unsuccessful login, then customer removes card & again follows the procedure.
- Customer should proceed the transaction according to instructions.
- After, machine is responsible for processing transaction.
- ATM contacts to bank central server for checking exact balance amount & validates it.

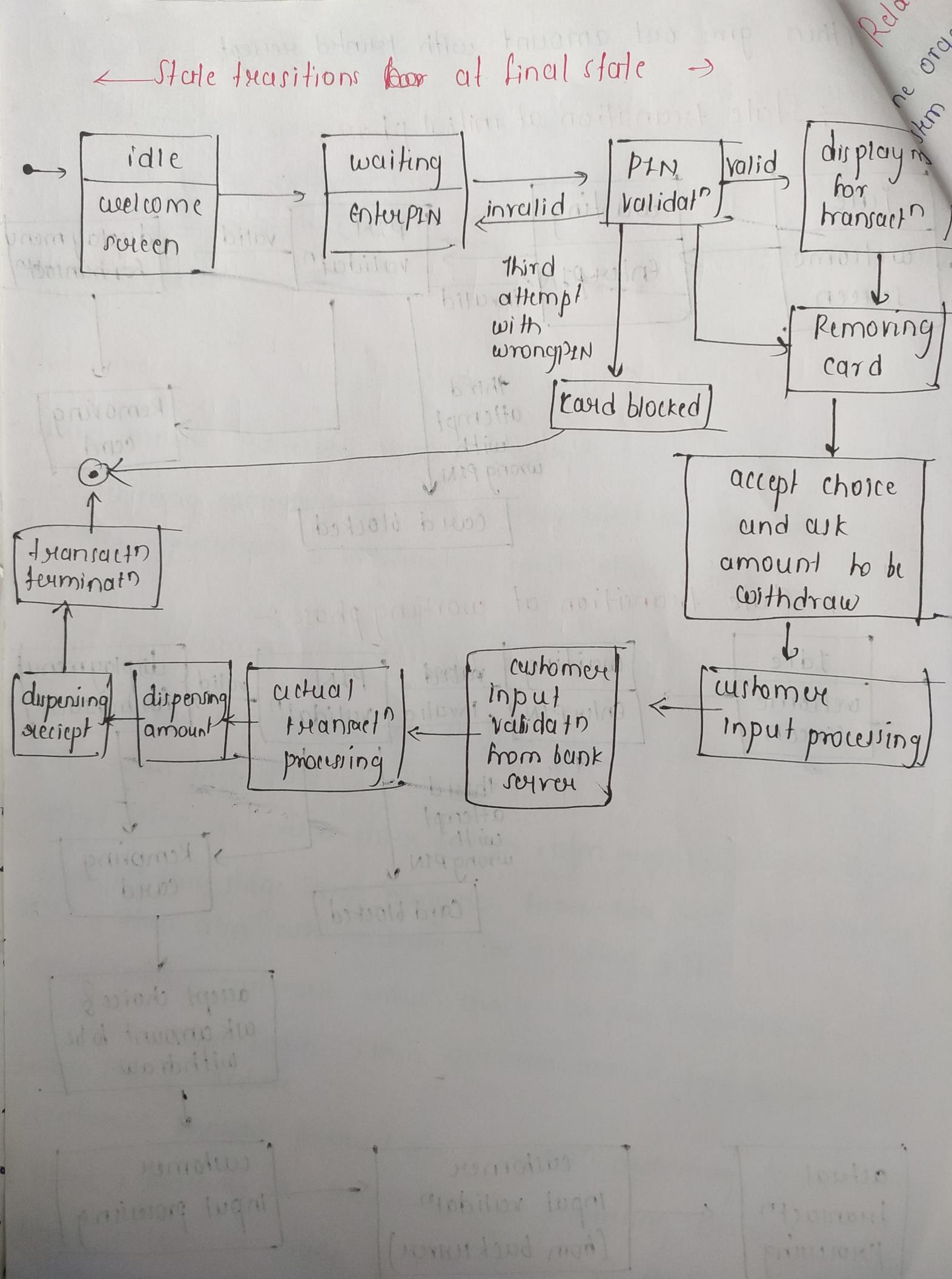
it then gives out amount with printed receipt.

→ State transition at initial phase:-



→ State transition at working phase:-





Relation of class Model & state model :-

The organization & detailed structure of objects involved in system is depicted known as class model.

- detailed structure of object consist of their characteristics & interaction to other objects in scenario.
- class model offers framework for state & interactn model.
- The main motivatn for building class model is to apply the theories, principles & conceptions from real world which are important to system.
- State model : It describes aspects of objects concerned with time & sequencing of operations.
- It organized & systemized the states & events involved in proposed system.
- It is dedicated for detailed description of sequence of tasks and services.

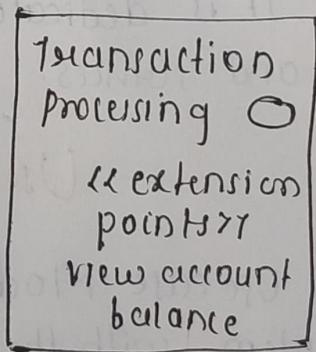
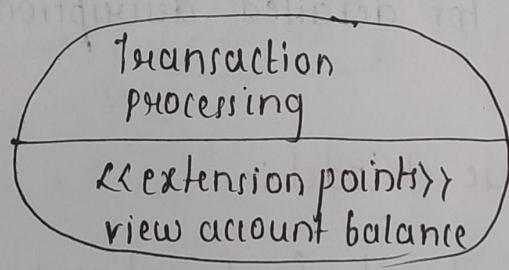
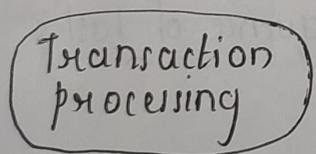
Use case Model :-

- Use case Model depicts functional requirement of proposed system with the help of usecases & the actors.
- It supports in design of the system by presenting intended behaviour of proposed system.
- There are three components of use case mode:-
 - usecases
 - actors
 - Relationships

Use cases :-

- In UML, system requirements & functionality of system are depicted with the help of usecases.
- It offers detailed description of how system is used.
- The set of activities & events in proper sequence specifying interactions among system & its end user called scenarios.
- Ex:- in case of atm machine . If login is successful , then customer will perform transaction. else no access will be given to customer.
as we can see both the scenarios are different but have same goal , to perform transaction.
- use case encompasses interaction b/w actor & system.
- Graphically , a use case is shown with the help of oval shape containing use case name inside the body.

→ use case Notations in UML :-



Template :- usecase ID;

usecase name;

usecase descriptr;

actors;

preconditions;

main sequence description;

Non functional requirements;

postconditions;

frequency of use :

are use ID : It acts as unique identifier for unique identification

usecase name : unique name given to each use case & it should specify functionality.

- 3) usecase description : use case should described in brief.
- 4) actors : primary actors are main actors & secondary actors cooperate with usecase.
- 5) preconditions : It is limitations that should attained before triggering usecase.
- 6) main sequence description : actual flow of events & activities.
- 7) Alternative sequence description : usecase can have alternative flow of execution.
- 8) Non functional requirements : security & performance requirement.
- 9) postconditions : constraints that achieved after successful execution.
- 10) frequency of use : describes frequency.

usecase scenario for login into ATM machine :-

usecase ID : 01

usecase name : login into ATM machine

usecase description : after successful attempt, account opening in system user will be provided with unique PIN with which user can get entry into system for transactions.

actors : customer.

preconditions : customer should open account in bank.

atm machine have sufficient free memory to launch task

main sequence description : Click entry button on ATM.
Enter PIN for login
after authentication & validation, access given to customer.

Alternative sequence descriptn: NZL

Nonfunctional Requirement: unique PIN should be provided
customer

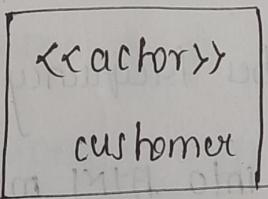
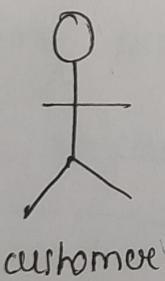
Postconditions :- authorized access to the system will be provided
to customer

frequency of use :- 01

Actors :-

- An actor is an external user of system who is responsible for communication & coordinate with other systems.
- we may have either element as an actor.

∴ actor Notation in UML:-



- Actor are always external.
- there is direct communication & coordination amongst actor & system.

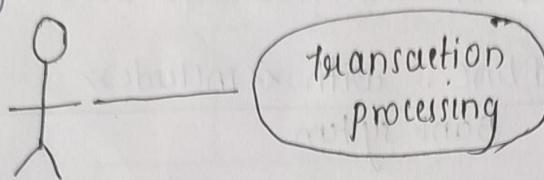
subject :-

- It is part of system come inside system boundary
- represented by rectangular box.

Use Case Relationships :-

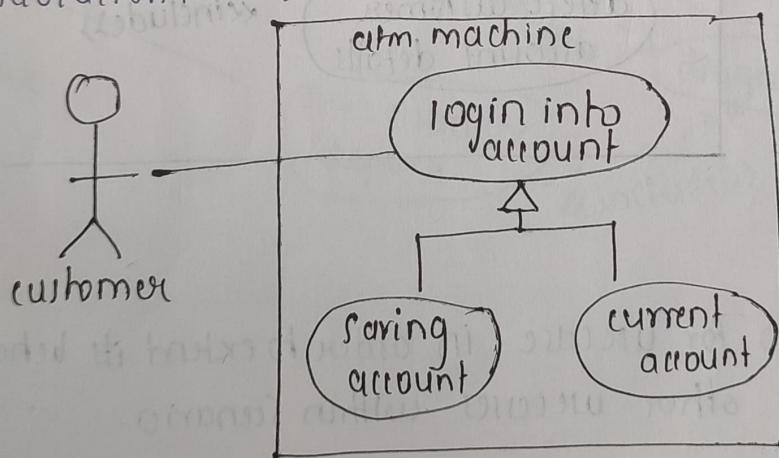
Use Case / Actor Association :- It specifies that the actor initiates the usecase.

- One actor can be associated with one ore more usecases.
- shown by solid line.



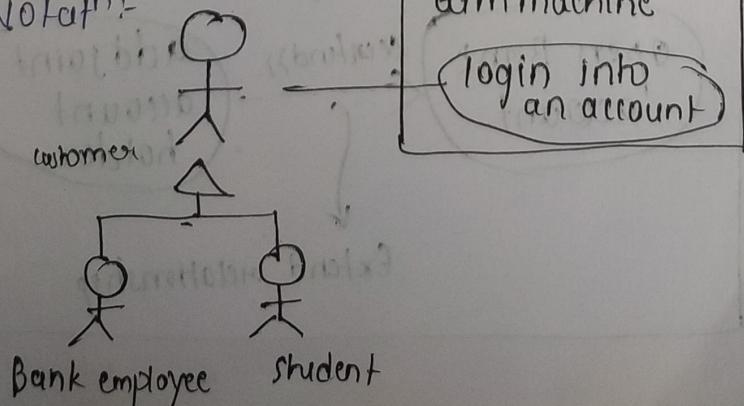
★ use case Generalization :- It indicates generalization relationship b/w specific usecase & general usecase.

- It should be used in simplification of usecase model.
- A general usecase inherits properties from their individual parent usecase.
- UML Notation :-



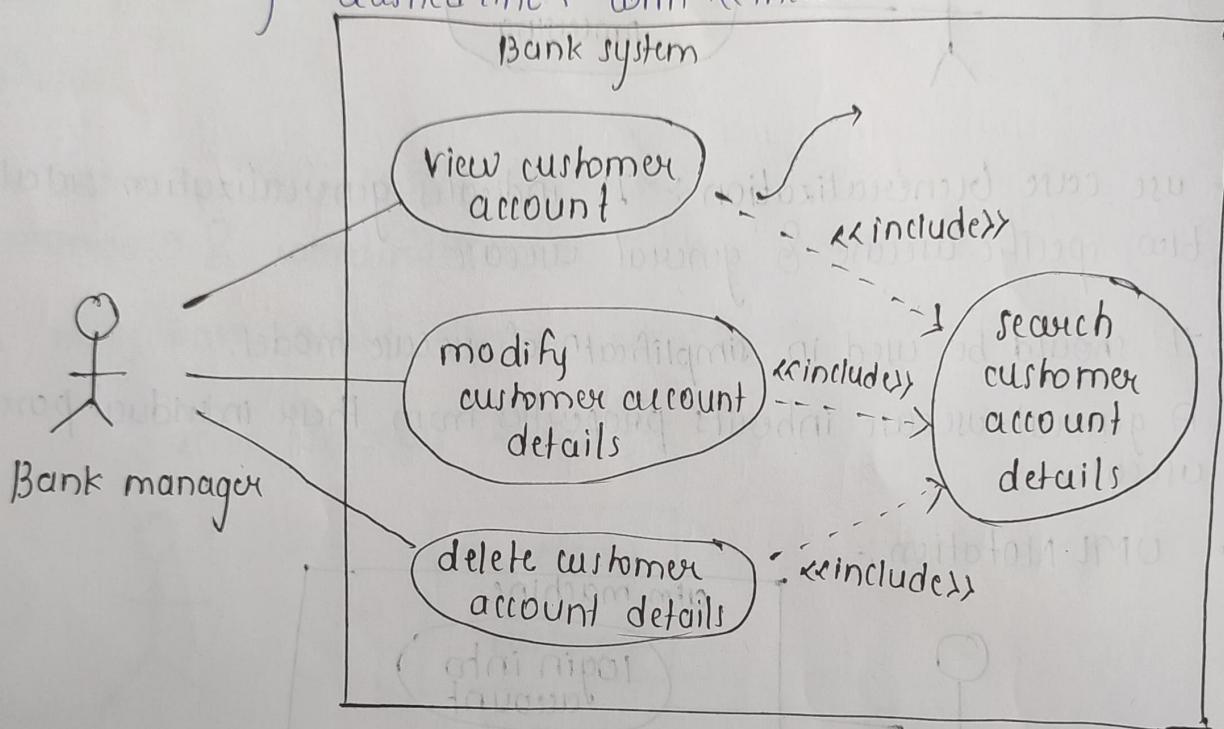
★ Actor Generalization :- It indicates generalization relationship between specific actor & general actor.

- UML Notation :-



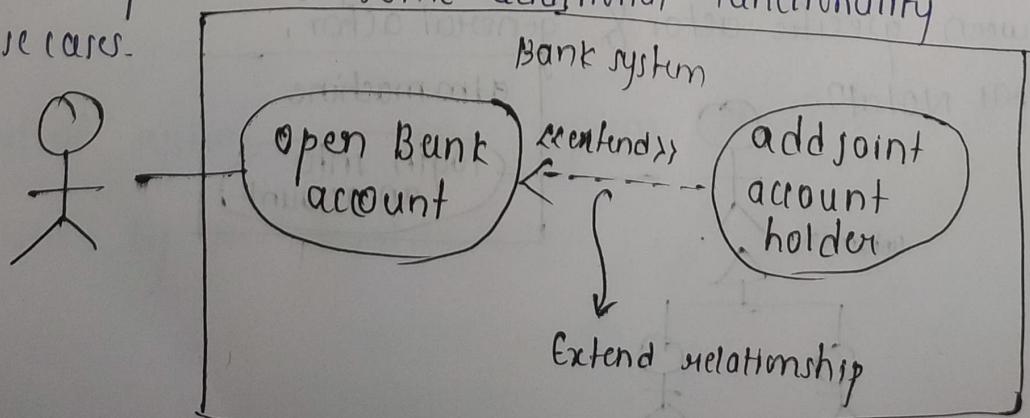
* << include >>

- It gives facility to include behavior of one use case into another use case involved within scenario.
- Including usecase called base usecase while included usecase called inclusion usecase.
- Inclusion usecase provides its behaviour to base usecase.
- drawn using dashed line, with <<include>>

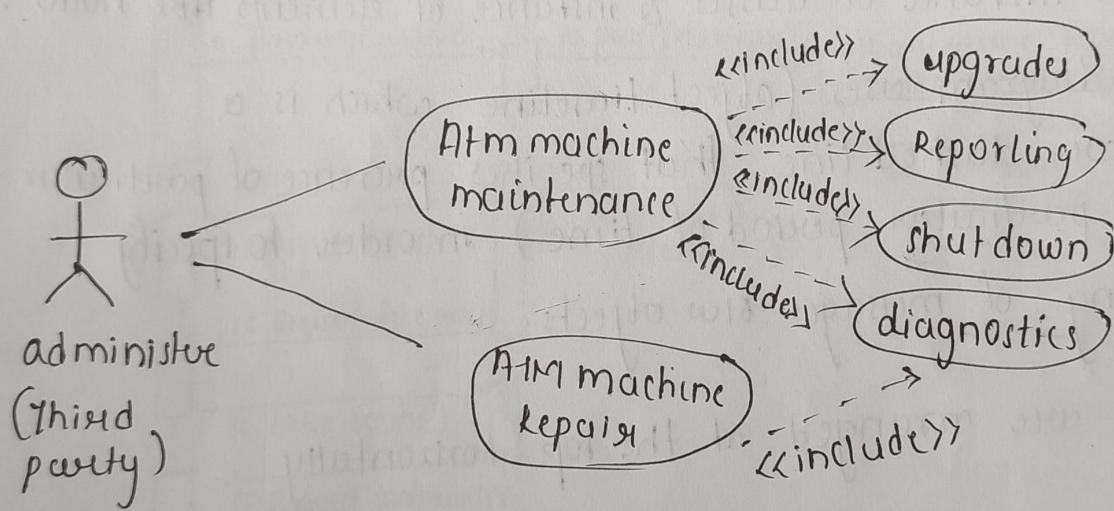
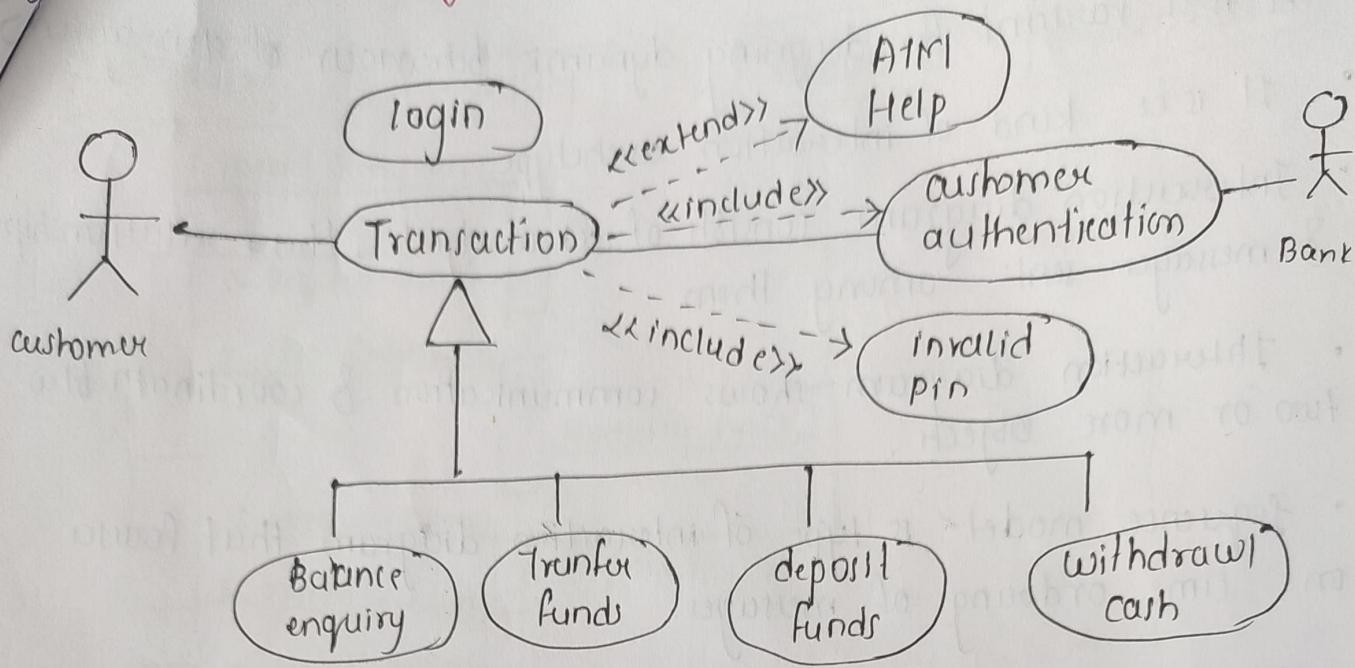


* << extend >>

- It gives platform for usecase in order to extend its behaviour with one or more other usecases within scenario.
- If certain specified conditions are satisfied , we make use of this relationship to add some additional functionality in base usecase.



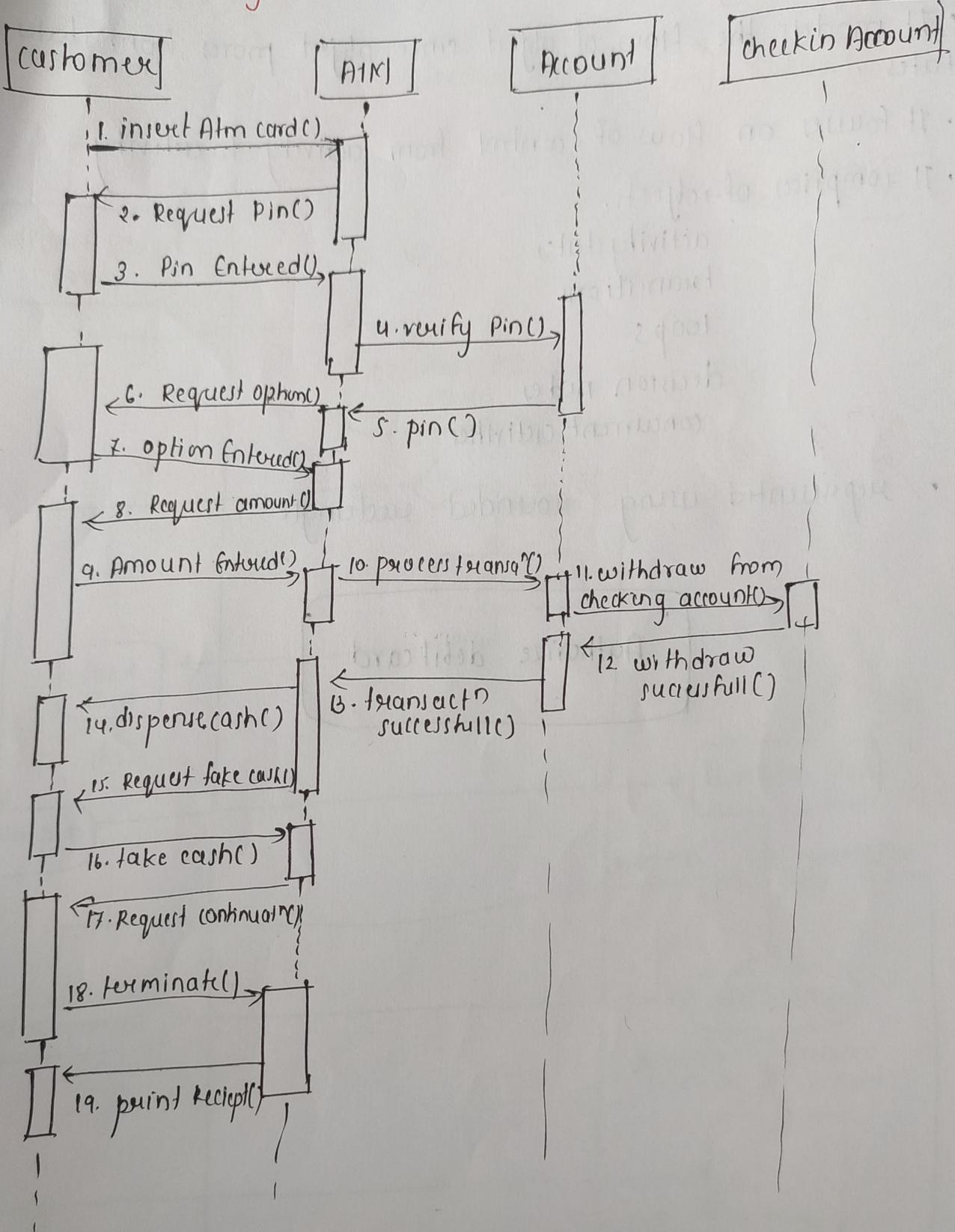
usecase diagram for ATM machine :-



Sequence Model :-

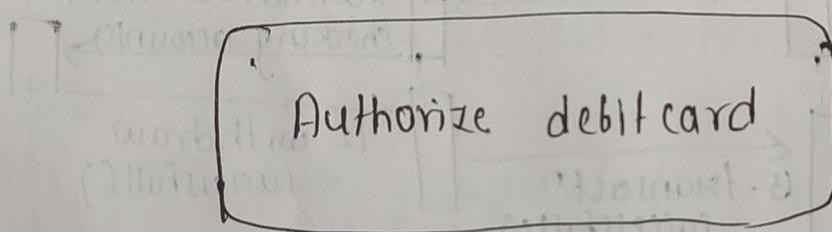
- It is a variant for designing dynamic behaviour of SW system.
- It is a kind of interaction archetype.
- Interaction diagram consists of set of objects, their relationships & messages sent among them.
- Interaction diagram shows communication & coordination b/w two or more objects.
- Sequence model is type of interaction diagram that focuses on time ordering of messages.
- Objects are instance of classes & instance of elements like nodes.
- Sequence diagram uses object timeline which is a perpendicular dashed line that specifies presence of particular object over particular period of time) in order to specify time ordering of messages b/w objects.
- all objects are arranged at the top horizontally.
- focus of control is other element represented as rectangle that shows time period during an object is active.

Sequence diagram for ATM Machine



Activity Model :-

- It models the flow of object since object moves from state to state.
- It focus on flow of control from activity to activity.
- It consists of → objects.
 - activity states
 - transitions
 - loops
 - decision nodes
 - concurrent activities
- Represented using rounded rectangle.



Activity diagram for ATM Machine with special constructs

