* UML

→ UML stand for "Unified Modeling Language".

→ UML is a standard language which are used for specifying the visualizing, constructing and documenting the Component of the Software.

→ UML was Created by OMG. "Object Management Group".

→ UML is Totaly designe on the Basis of Object oriented Programs. (OOP).

→ UML is a pictorial language used to make s/w Blueprints.

→ UML is not a Programming Language but a one type of tool that can be used to generate Code in Various - Languages using UML Diagrams.

→ UML include the following Nine diagrams that plays an important role to design the Software on the Basic of OOAD (object Oriented Analysis & Design).

1) Class Diagram.
2) Object Diagram.
3) Use case Diagram.
4) Sequence diagram.
5) Collaboration diagram.
6) Activity diagram.
7) Statechart diagram.
8) Deployment diagram.
9) Component diagram.

→ UML plays an important role in defining different s/w of OOP these are...

1) Design
2) Implementation.
3) Process
4) Deployment.

* Characteristics of OOM :-

→ In the process of defining the roles of an objects, some features of object orientations are used.

→ The following three basic features can be considered as a characteristics of an OOM.

1) Class & objects

2) Links & Association

3) Generalization & Inheritance

1. Class & object

→ A class is a collection of different things or the concepts that have the same characteristics.

→ A class is a collection of properties (attributes) and operations (methods) to represent the particular object.

→ The object is a real world things or an entity.

→ A object is a concept which are handled by the class.

→ The e.g. of objects are
- students
- vehicle
- book

etc....

→ The following notations are used to represent the class and object.

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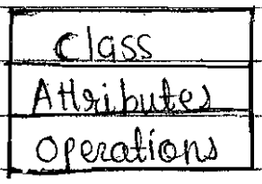
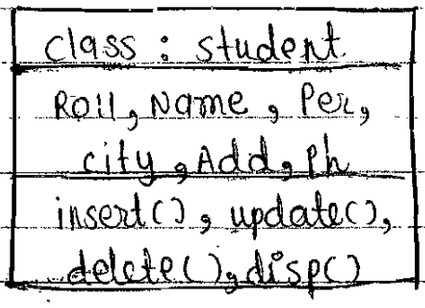
⊙ class



Class Notetion

For e.g:-



⊙ Object

object : class
Attribute1 = value1
Attribute2 = value2

For e.g :-

object : student
Roll = 1
Name = "Bhoomi"
Per = "78"
Ph = "9999999999"
city = "Mahuva"

2. Link & Association :-

⟶ The links & associations are used to establish relationship between objects or classes of the system.

⟶ A link is a physical or conceptual connection between objects.

⟶ For e.g :- "Bhoomi" student study in Mkbhav uni

⟶ The association is a rules of relationship.

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→ For e.g:-

one to many

many to one

or

one to one,

many to many relationship

→ The link & Association type is given below.

1. Multiplicity

2. Agreegation

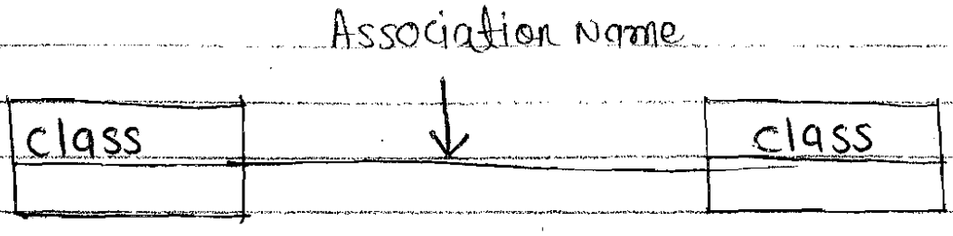
(1) Multiplicity :-

→ Multiplicity is an association that specifies how many objects participates in a relationship.

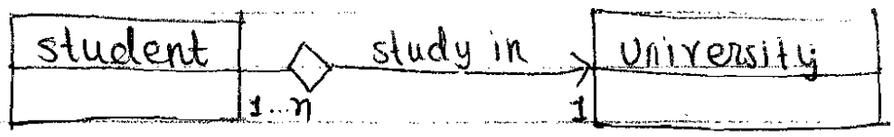
(2) Agreegation :-

→ Agreegation is a special form of association. It means it specify whole part relationship.

⇒ Notation :-



⊙ For e.g :-



3. Generalization & Inheritance :-

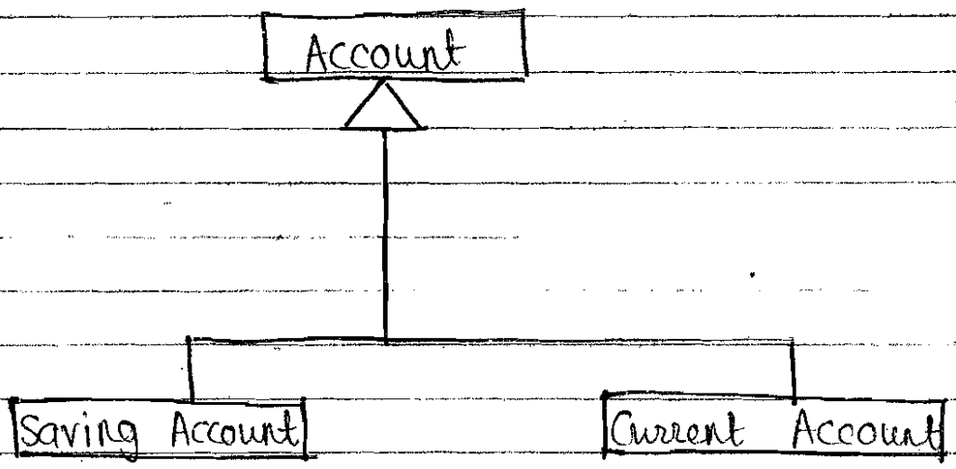
→ Generalization & Inheritance are powerful abstraction for sharing the structure or behaviour of one or more classes.

→ Here, generalization is an "is-A-kind-of" relationship.

→ For e.g :- Saving account is a kind of accound, Pa student is a kind of student.

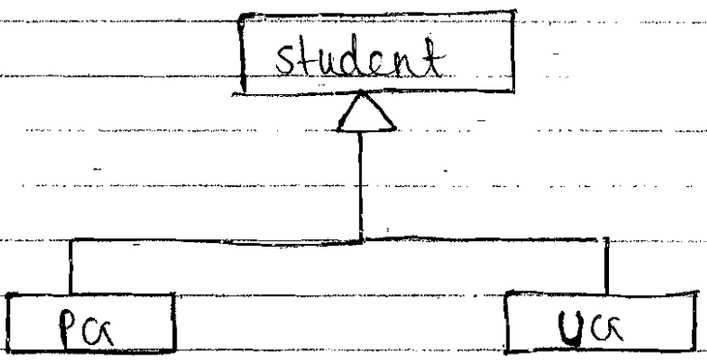
→ The notation for generalization is triangle connecting to a parent class to it's child class.

⊙ E.g:-



Generalization of Account class

⊙ Another e.g:-



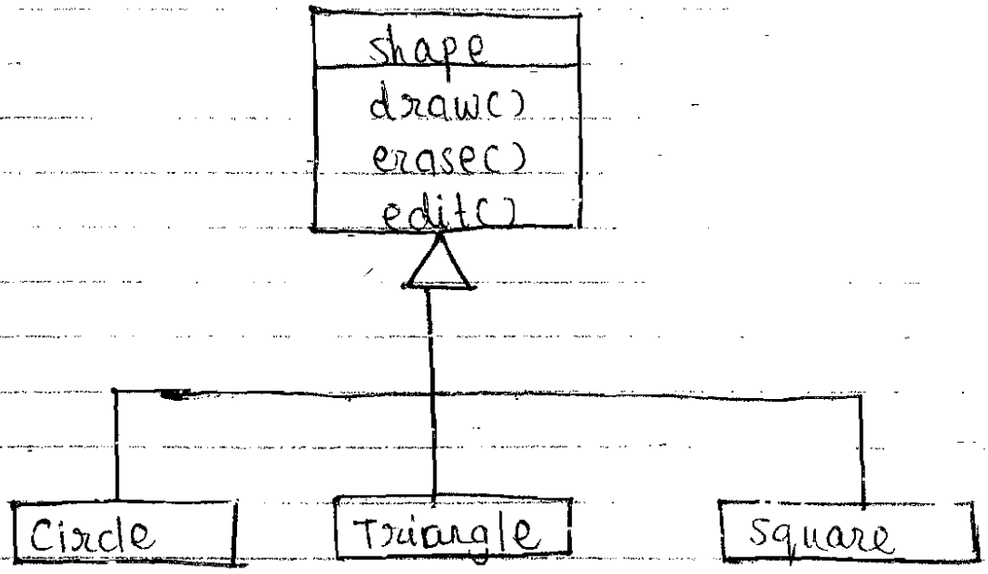
→ The Inheritance refers to the parent child relationship that provide the reusability of code.

→ There are different types of inheritance can be applicable between the class as per OOM.

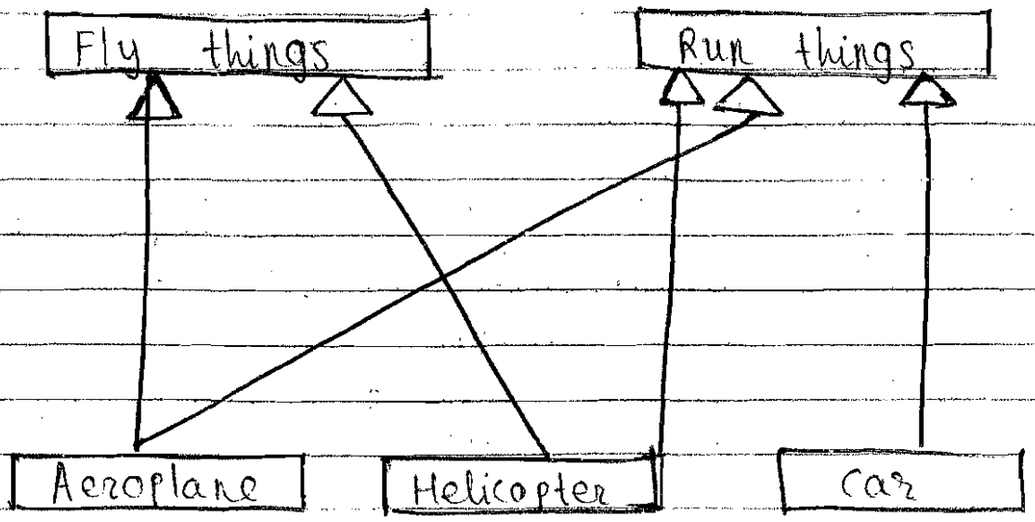
- Single Inheritance
- Multiple Inheritance
- Multilevel Inheritance

etc....

→ The following e.g. shows the use of inheritance & reusability of code.



Single Inheritance



(Multiple Inheritance)

* Types of multiplicity (options).

Multiplicity	option	Cardinality.
0..0	0	Collection must Empty
0..1		one instance or no instance.
0..*		Zero or more instance.
1..1	1	Exactly one instance.
1..*		Atleast 1 instance
5..5	5	Excelly 5 instance
m..n		Atleast m but no more then n instances.

* Dependency :-

It is a relationship that shows that an element, or a set of elements, requires other model elements for their Specification or implementation.

The element is dependent upon the independent element, called Supplier. Two or more elements in this relationship are called tuples.

* Qualified Association

Qualified association provide the same functionality as indexes. it may include a datatypes also.

* Reflexive association

The reflexive association is used when objects in the same class can be associated.

* Components of UML

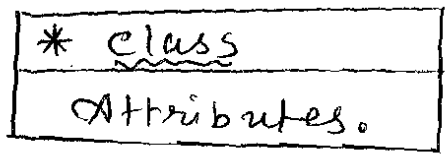
1) Class Diagram.
2) Object Diagram.
3) Use Case Diagram.
4) Activity Diagram.

⇒ Class Diagram

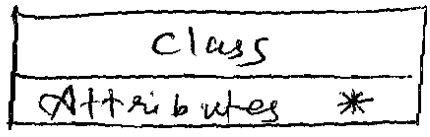
this diagram shows the Relationship between all the classes of the System.

Components

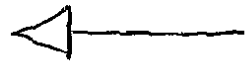
1) Class



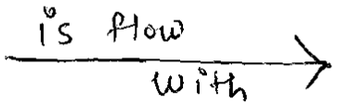
2) Attributes.



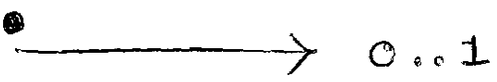
3) Generalization



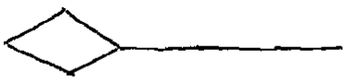
4) Association



5) Multiplicity



6) Aggregation



etc...

⇒ Object diagram

The Object diagram is used to show the Behaviour of the All Objects of the System.

Components :-

1) Objects

Instance of a class

For eg :- car.

2) class title

Name of the class.

3) Class Attributes.

Property of a class.

4) Links.

Association Rules between two class.

5) Aggregation & Inheritance.
or Generalization.

etc...

⇒ Use Case Diagram

It is the Building Block of all the objects of the System with user feedback.

Notation

1) Use Case (User Case)

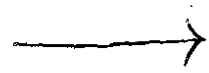
Horizontally Shaped ovels.

2) Actors

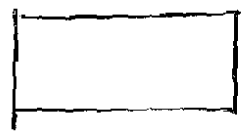
Stick figure with circle that represent people

3) Association

A line that Represent link. between two elements.



4) System Boundary Boxes. (Source or Desination).



5) Package

(group of classes).

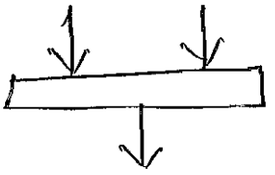
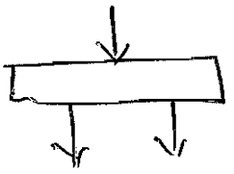
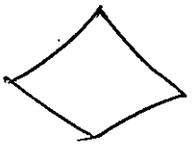
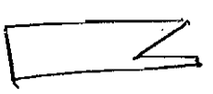
etc...

⇒ Activity Diagram

It is used to show the overall processing Actions at the System.

Components

1) Actions
2) Decision node
3) Control flow.
4) Start node
5) End node

Symbol	Name
	Start Symbol
	Activity
	Connector
	Joint & bar
	Fork
	Decision
	Send
	Receive
	END etc...