Practical 5

AIM : To study UML class diagrams and its components.

Unified Modelling Language (UML):

A standard language for designing and documenting a system in an object oriented manner.

It is not a programming language, it is a modelling language.

It is a language by which technical architect can communicate with developers.

It is the language by which one can express the design of software architecture.

It has nine diagrams which can be used in the design of documents.

What does a Modelling Language mean?

A model is nothing but it is the final representation of project.

For example:

If you are doing construction of building of house or a bridge.

A civil engineer will first make a model and taking the model to the workers basically finally make an output.

So the same way in case of software, we have to create models before coding or executing using unified models.

For example:

Voucher entry scheme

- Voucher number
- Voucher date
- Debit account (dropdown list)
- Voucher description (summary)
- Amount (text box)
- Add voucher cancel voucher (buttons)
- Voucher description Debit acc. Credit acc. Amount
- SUBMIT VOUCHER (button)

How we can see all these actions and analyse these actions in voucher entry system and how to interact with each others.

UML consist of main three things:-

1. Activity diagram
2. Used cases
3. Class diagrams

Activity Diagram:

It is the graphical representation of workflow of step wise activities. It tells the start and end of the activities.

Uses Cases:

it consists of entities/actors(customers or suppliers) and associations(customer has association in product catalogue within our system customers can browse the catalogue of the product)

Class Diagram:

It tells all about classes, objects and properties in our system. Class diagrams are very important to understand the static part of the project. Views of a software project:-

1. Static part 2. Dynamic part

Figure of class attributes:

Class Name   Customer code/name   Add customer

Class Name: It is in the first section or topmost section of the class which represent the name of the class.

Customer Code: (Attributes): It represents the properties of the system. This section carries the operations and methods to act on the attributes. The other important part in the class diagram is basically how the entities and properties are exposed to the external world. This is represented by using ' +' (public),'#' (protected), '-' (private). For example: Discount: #, Net project:-.

Class diagram is the main building block of object oriented model.
class members have attributes and methods.

CLASS DIAGRAM COMPONENTS

1) **Generalization**

- It is an inheritance relationship between classes.
- Arrows from child class point upward toward the parent class.
- It is a process of extracting shared characteristics from two or more classes and communicating into a generalized superclass.

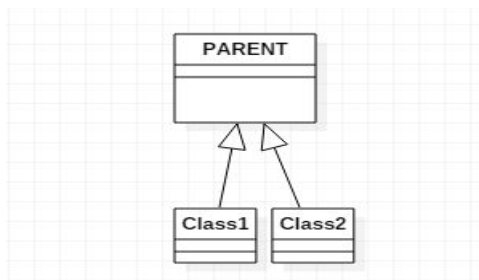open staruml>add>add diagram>class diagram

Fig 5.1

2) Association

- It represents a family link.
- Types of association

--directed and binary, reflexive association

Reflexive association

Association

Fig 5.2

Directed association

Fig 5.3

Multiplicity in class diagram

It refers to the numbers of classes/instances that are used.

- Star(*) :0,1 or more classes/instances
- Exactly '1' instance
- Between m and n
- Between m and infinite

Example:

- 1-1 : Student must carry one id card, so 1-1 association is present between classes, students and id card.
- 1-many
- Many-many: Both sides star available.

Different customers and multiple orders.

3) Aggregation

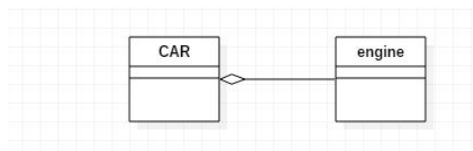- It means part of
- Symbol is the clear diamond

Fig 5.4

4) Compositions

- It means entirely made of
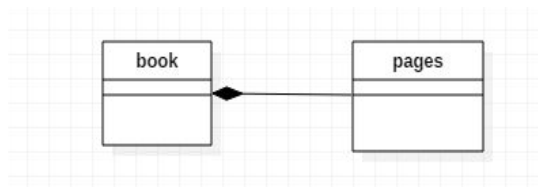- Stronger version of aggregation
- Symbol dark diamond

Fig 5.5

5) Dependency

- It uses temporarily
- Symbol is dotted line

Fig 5.6

Example:
Use a UML class diagram to represent the following elements for the problem of hockey league:-
It is made of at least four hockey teams. Each hockey team is composed 6-12 players .A team has a name and the record (attributes of hockey team class), players have a number and a position (here players are the class with attributes). Hockey team play games against each other (game here is a class) each game has a score and a location. Teams are sometimes lead by a coach (class). A coach has a level of accreditation and the years of experience and can coach multiple teams. Coaches and players are people having name and address. Draw a class diagram for this information with
appropriate multiplicity.