

Experiment 6

Aim: To draw structural view diagram for the library management system: class diagram, object diagram.

In object-oriented modeling, the main building block generally represent different objects in a system, their attribute, their different functions and relationship among objects. These building block are known as class Diagram.

Class diagram for library Management system:

Aggregation or multiplicity are two important points that needs to take into consideration while designing a class diagram.

1) Aggregation

Aggregation simply shows a relationship where one thing can exist independently of other thing. It means to create or composed different abstraction together in defining a class. Aggregation is represented as a part of relationship in class diagram. In diagram given below, we can see that aggregation is represented by an edge with edge with a diamond end pointing towards Superclass..

2) Multiplicity

Multiplicity means the no. of element of a class is associated with another class. These relation can be one-to one, many to many, many to one, one-to many, for denoting one element we use 1, for zero elements we use 0 and for many element we use *.

Classes of Library Management System.

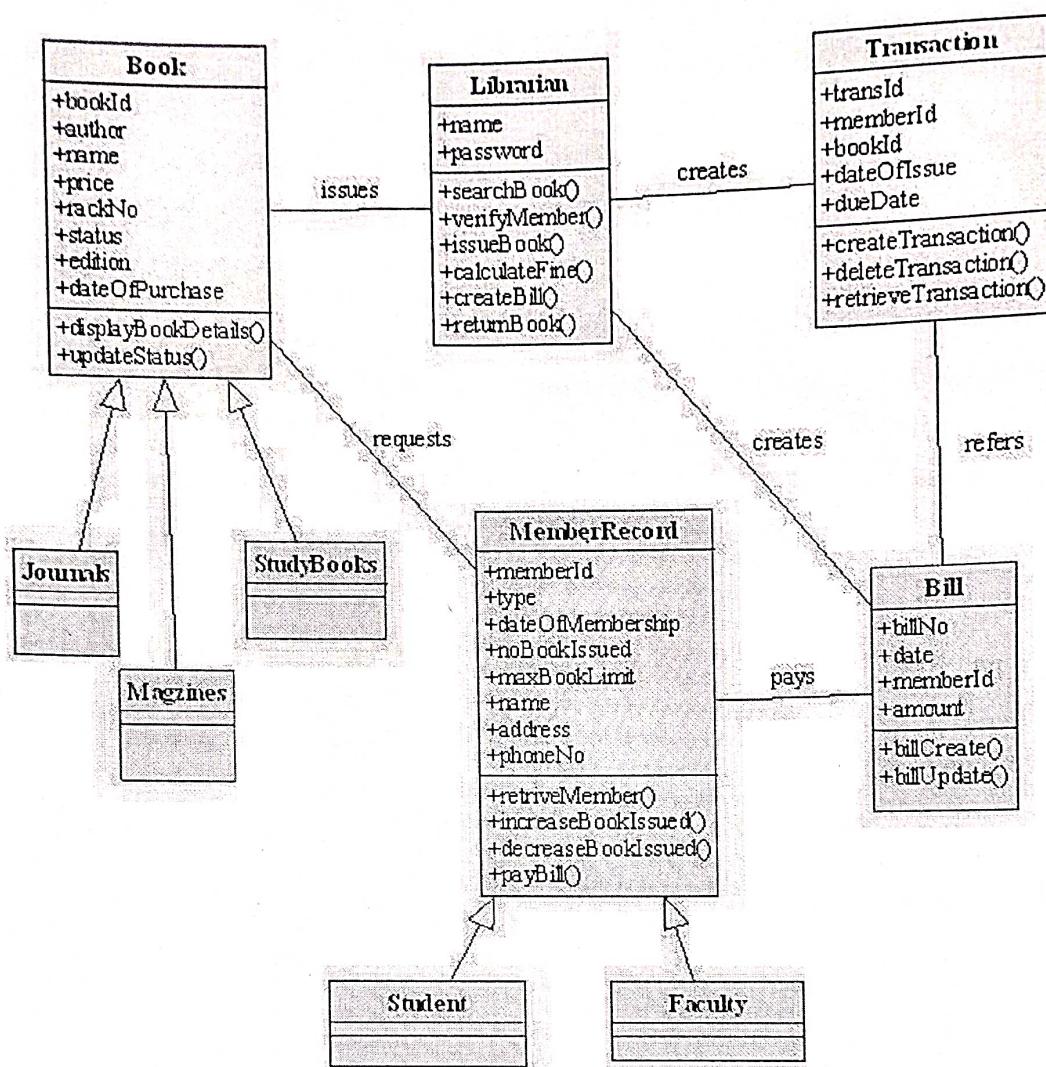
- Library Management system class
- user class → operation of user
- Librarian class → operation of librarian
- Book class → operation of Books
- Account class → operation of accounts
- Library database class → operation of library database
- Staff class → operation of staff
- Student class → operation of student

Attributes of Library Management System

- Library management system attributes → Username
- User attributes → Name
- Librarian attributes → Name
- Book attributes → Title
- Account attributes → no-refunded books
- Staff class attributes → Dept
- Student class attributes → Class

Methods of Library Management System

- Library management system methods → login()
- User methods → verify()
- Library methods → search()
- Book methods → Reservation-status()
- Account methods → calculate-fine()
- Library database methods → Add(), delete()



class diagram of Library management system

Conclusion: structural view diagram for the library management system drawn successfully.

Viva Questions

Q-1 what is class diagram for Library Management System?

Ans Library management system class diagram describe the structure of a library system.

Q-2 why is class diagram used?

Ans It is used for general conceptual modeling of the structure of the application and for detailed modeling + translating the models into programming code.

Q-3 what is the relationship of class diagram?

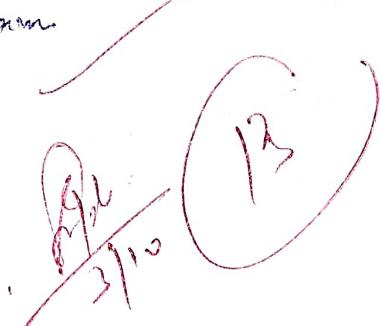
Ans It shows the interaction b/w classes and classifiers

Q-4 what are the limitations of class diagram?

1) A Lack of clarity in understanding the beneficiary of the diagram.

Q-5 give the another name of class diagram.

Ans static diagram



Experiment -7

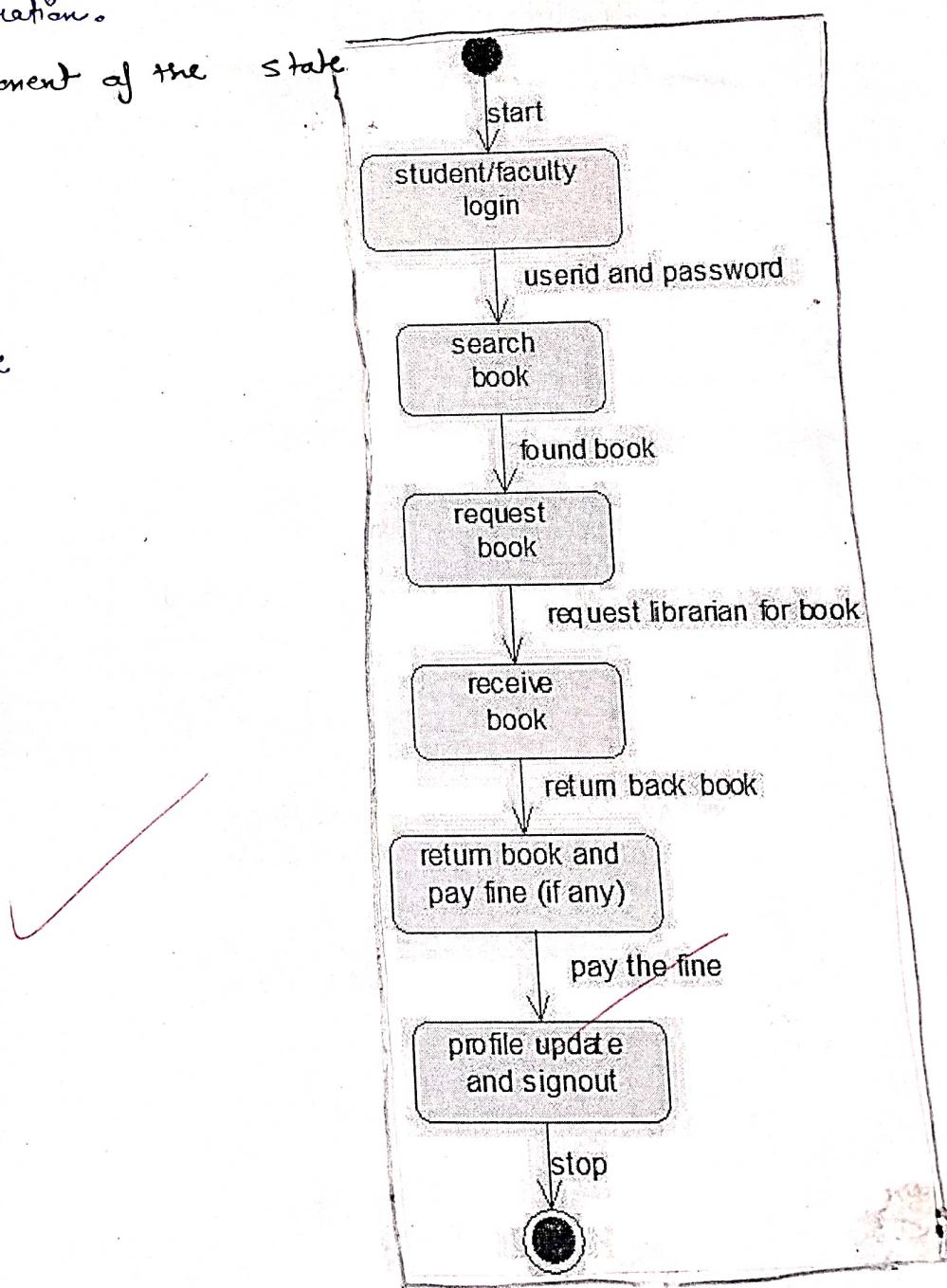
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Aim:- To draw behavioral view diagram: state-chart diagram,
Activity diagram of the library management system.

A state diagram is an illustration of all possible behavioral states a software system component may exhibit and the various state changes it's predicted to go undergo over the course of its operation.

Symbol and component of the state

- Initial state
- states
- state actions
- Transitions
- final state

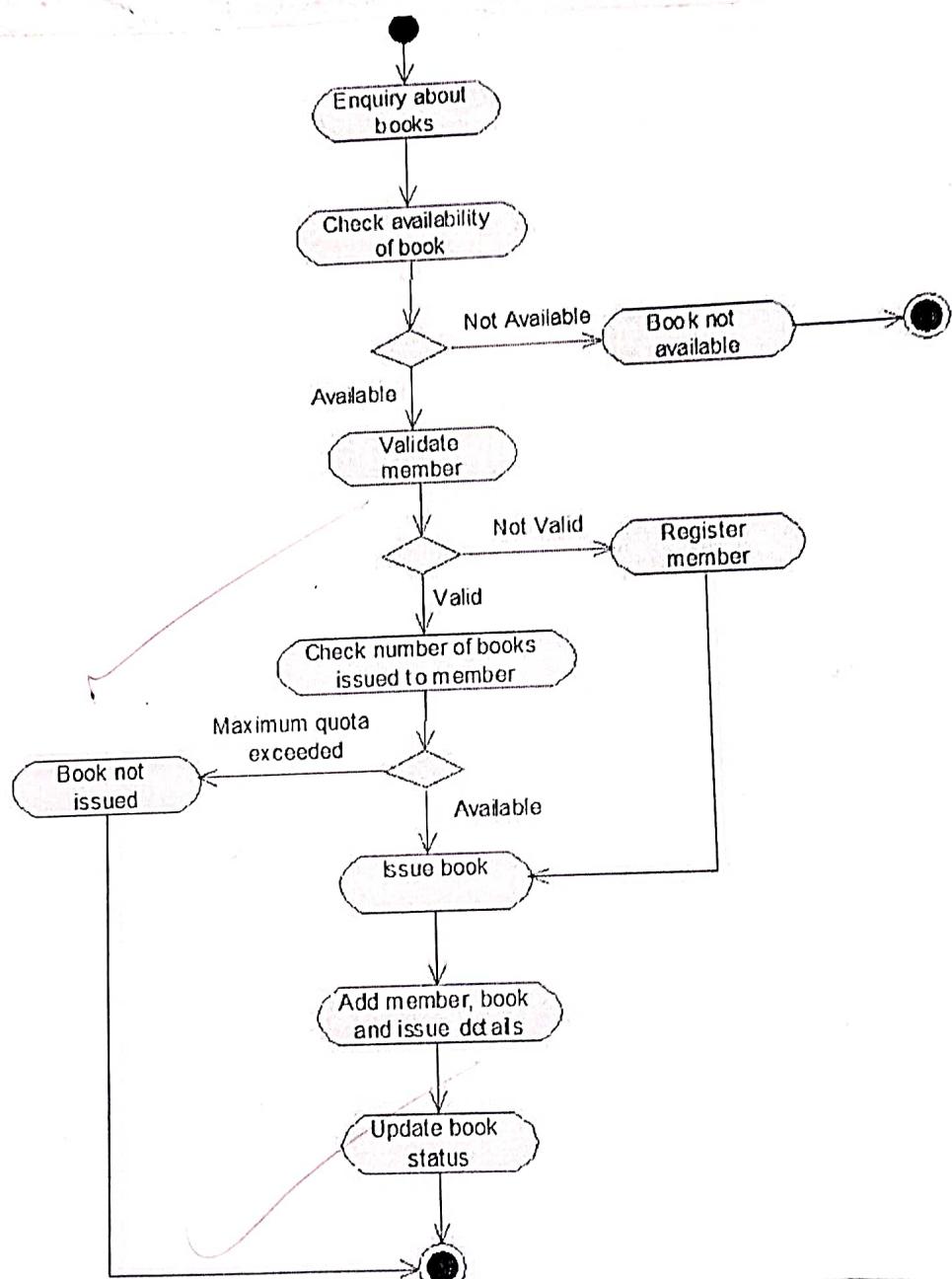


State chart diagram
for Library Management
System

* Activity diagram of Library management system

Activity diagram are similar to flowcharts because they show the flow of actions in an activity. However, activity diagram can also show parallel or concurrent flow and alternate flows. In activity diagram, we use activity nodes and activity edges to model the flow of control and data flow.

flow actions



Activity Diagram for Library management system

Conclusion : Behavioural view diagram for the library management system has been drawn successfully.

Viva Question

Q-1 = What is Library management system Activity diagram?

Ans It diagrams the various activities and task required to manage a library system.

Q-2 = What are the activities involved in Library management system?

Ans Planning, decision making, organizing, collecting and distributing information and controlling and monitoring the various function

Q-3 = what are the three components of activity diagram?

- Action
- Decision node
- control flows

Q-4 = what are the advantages of Activity diagram?

They can be used to capture flow from one system to another and include capabilities such as branching, parallel flow and guards.

Q-5 = what are common properties of activity diagram?

Ans It consist of a no. of nodes connected by arrow lines (directed edges)

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6 11
10 10 23

Experiment - 8

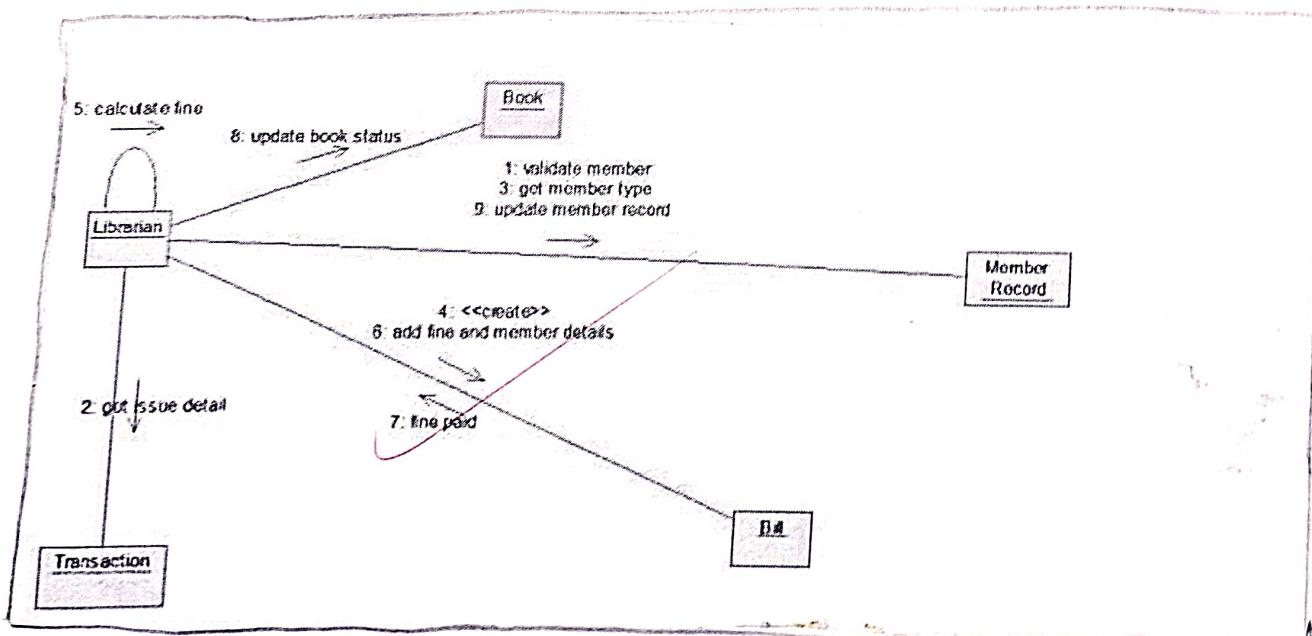
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A Aim:- To perform the behavioral view diagram of the library management system: sequence diagram, collaboration diagram.

d A collaboration diagram also known as communication diagram, is an illustration for the relationship and interaction among software objects in the Unified Modeling Language (UML). Developers can use these diagram to portray the dynamic behaviour of a particular use case and define the role of each object.

Notation of a collaboration diagram

- 1) object.
- 2) Actors
- 3) Links
- 4) Message b/w object.



Collaboration diagram for
Library management system

Sequence Diagrams

A sequence diagram simply depicts interaction between objects in a sequential order i.e. the order in which these interactions take place. We can also use the term event diagram or sequence diagrams to refer to a sequence diagram. Sequence diagrams describe how and in what order the objects in a system are used by users and under what conditions.

These diagrams are widely used by software developers to document requirements for new and existing systems.

Notation of sequence diagram

1) Actors

2) Lifeline

3) Messages

4) Delete messages

5) Self messages

6) Reply messages

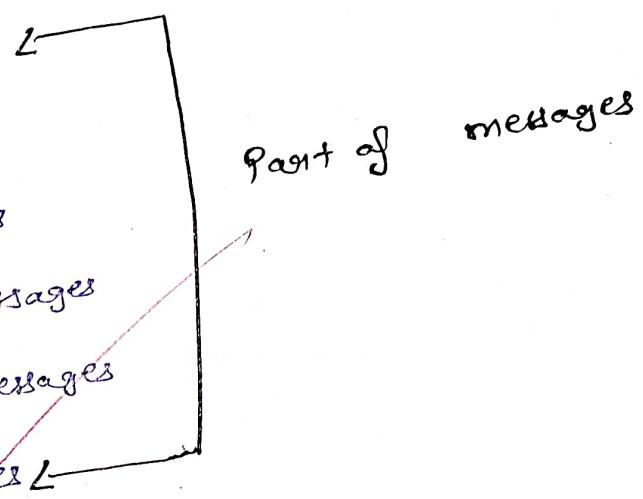
7) Sound messages

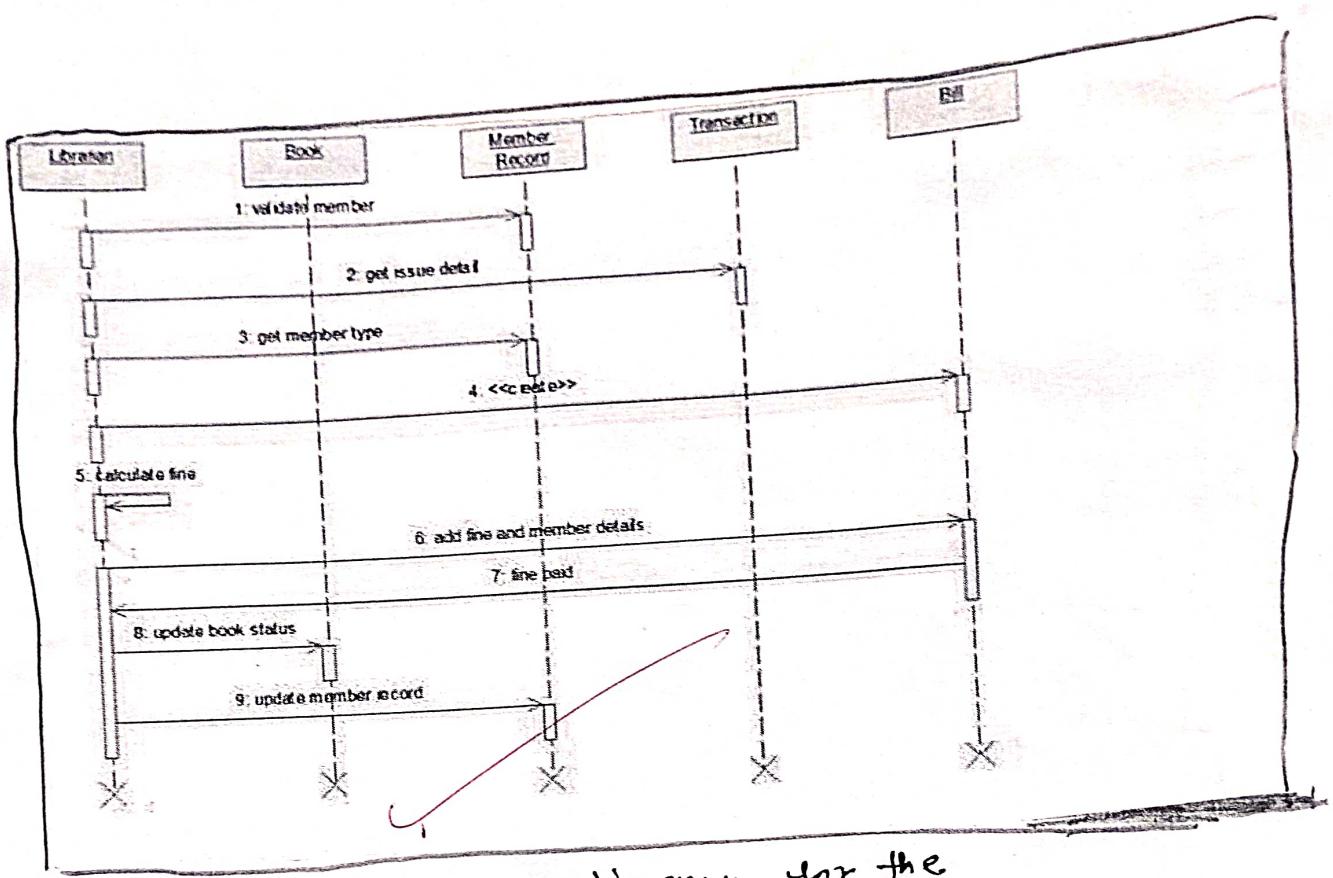
8) Synchronous messages

9) Asynchronous messages

10) Lost messages

11) Guards





sequence diagram for the
Library management system

Conclusion: Behavioral view diagram of the library management system has been drawn successfully.

Viva questions

- Q-1 what is sequence diagram for library management system?
Ans The sequence diagram maps out a library management system.
- Q-2 what is the purpose of a sequence diagram?
Ans It shows the sequence of messages passed b/w objects.
- Q-3 what are the types of sequence diagram?
Ans
• System Level sequence diagram
• Sub-system level sequence diagram
• Object level sequence diagram.
- Q-4 Give the another name of the Sequence diagram.
Ans Event diagram or Event Scenarios.
- Q-5 what are disadvantages of sequence diagram?
Ans The require the BA to work out not only which object performs each action but also which object request the action.

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Experiment - 9

Aim: To perform the implementation view diagram: component diagram for the system.

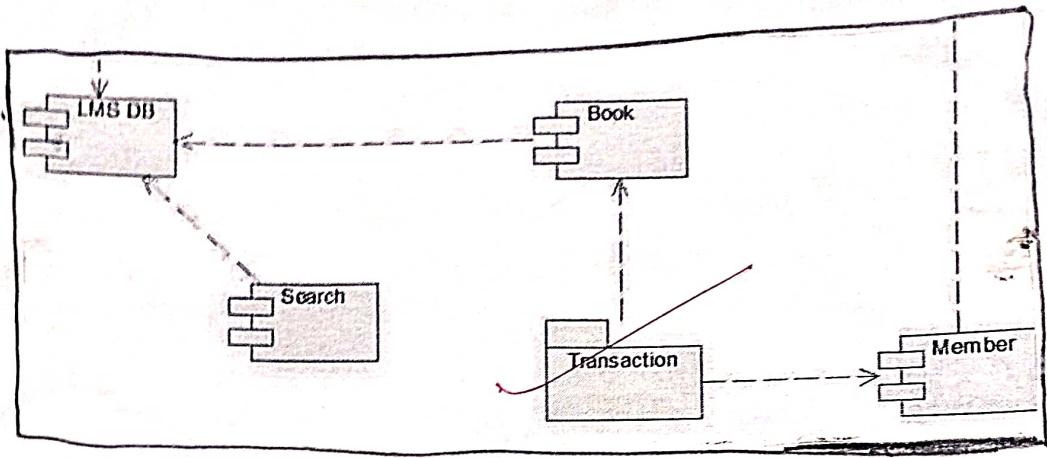
The component diagram of library management system which shows components, provided and required interfaces, ports, relationships b/w issues, students, student, librarian, member and address. These type of diagrams used in component-based development to describe system with service-oriented architecture.

Components of Library Management System

- Issue component
- student component
- Librarian component
- Member component
- Address component

features of Library Management component diagram

- We can show the models the component of library management system.
- Model the database schema of library management system.
- Model the executables of an application of library management system.
- Model the source code of library management system.



Component diagram for the
Library management system

Conclusion: The implementation view diagram for the library management system has been drawn successfully

viva question

Q-1 what is component diagram for library management system

Ans It can include both software and hardware components

They could be a database, a user interface, or anything else that aids the operation of the library management system.

Q-2 what are five components of library?

- Books of course
- Infrastructure
- Readers
- Librarians
- Software.

Q-3 what is the purpose of component diagram?

Ans To show the relationship b/w different components in a system.

Q-4 what is the most important component of the library?

Ans Library staff.

*Ans
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Q-5 Is component diagram structural?

Ans Yes, it is one of the unified modeling language structural diagrams.

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Experiment 10

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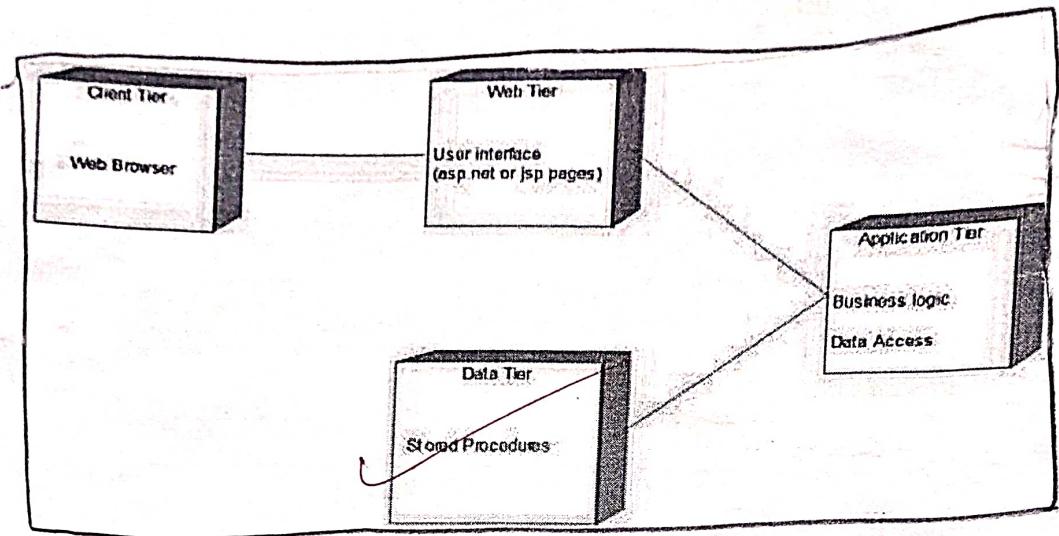
Aim: To perform the environmental view diagram = Deployment diagram of the system.

A library deployment diagram in the unified modeling language (UML) is used to model the physical deployment of software components and runtime elements that lives on nodes. In the context of a library management system (LMS), a deployment diagram would be illustrate how various software and hardware components are distributed and interact in a real world environment.

Notation in deployment diagram of the system.

- Library server
- Database server
- Library workstation
- Application servers
- Database
- LMS client

Arrows b/w the components indicate the direction of communication or dependencies. This diagram provides an overview of how different components of the library management system are distributed across servers and workstations. Adjust the diagram based on the specific architecture and technology stack used in the system.



Deployment Diagram for
Library management
System

Conclusion: The environmental view diagram of the Library management system has been drawn successfully.

Viva question

Q-1 what is the purpose of deployment diagram?

Ans It is used to visualize the hardware processors (nodes) devices of a system, the links of communication b/w them and the placement of software files on that hardware.

Q-2 what are the characteristics of deployment diagram?

Ans It is a type of node that represent a physical computational resource in a system - such as an application server.

Q-3 what are benefits of deployment diagram?

Ans visualizing

- specifying
- documenting the following types of system.

Q-4 what is deployment diagram example?

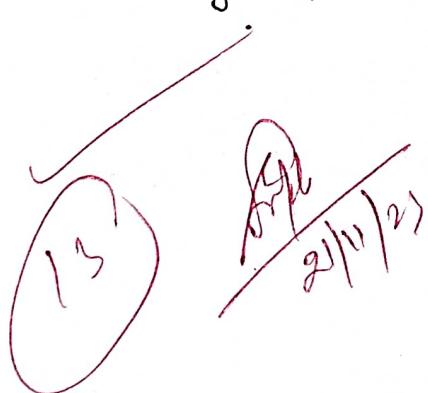
Ans It shows relationships among software and hardware estate transaction.

components involved in real

Q-5 what are the elements of deployment design?

Ans ① Association

② component.



Experiment - 11

Aim: To perform various testing using testing tool unit testing, integration testing of a sample code of library management system.

source code:

- 1) ISSUE-Book
- 2) Enter choice
 - (a) select book according to book name
 - (b) select book according to author name
- 3) If (choice = 'a')
- 4) then enter the book name
- 5) If book name found and available
 - 6) then issue the book
 - 7) else not issue the book
 - 8) End if
- 9) else
 - 10) enter the author name
 - 11) If author's name found and available
 - 12) then issue the book
 - 13) else not issue book
 - 14) End if
- 15) End if
- 16) End ISSUE-Book .

* unit testing

unit testing is important because software developer try saving time doing minimal unit testing and this is myth because inappropriate unit testing leading to a high cost defect fixing during system testing, integration testing and even Beta Testing after application is built.

unit test helps to fix bugs early in the development cycle and save costs.

It helps the developer to understand the testing code base and enables them to make changes quickly and unit tests serve as project documentation.

unit tests help with code re-use. Migrate both your code and your tests to your new project. Tweak the code until the test run again. Unit testing is of two types

- 1) Manual
- 2) Automated.

Unit testing is commonly automated but may be performed manually. Software engineering does not favour one over the other but automation is preferred.

A manual approach to unit testing may employ a step by step instructional document.

* Integration testing

It is defined as a type of testing where software modules are integrated logically and tested as a group. A typical software project consists of multiple software, coded by different programmers. The purpose of this level of testing is to expose defects in the integration of these software modules when they are integrated.

Source code / Algorithm

1) Identify components

e.g. 'Library'

2) understand interaction

3) Define Integration Test cases

4) Setup Test Environment

5) Perform Integration Tests

6) Handle data dependencies

7) check for isolation

8) Test error handling

9) Validate Rollback mechanism

10) Document and report

11) Repeat for different configuration

12) Regression testing

13) Continuous Integration

Viva Questions

Q-1 what is test cases for library management system?

Ans 1) If we enter not valid roll no or login id.
2) If we only put the valid roll no or login id and after pressing the login button.

Q-2 why do we use testing library?

Ans It helps ensure our test give you confidence in our UI code.

Q-3 what is the purpose of test systems?

Ans It is to ensure that a system meet its specification and any non-functional requirements that have been agreed with its users.

Q-4 what is end to end testing?

Ans It is a way to make sure that applications behave as expected and that flow of data is maintained for all kind of user tasks and processes.

Q-5 what is code coverage in testing?

Ans It is a metric that can help us to understand how much our source is tested.

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Aim: Estimation of efforts using FP estimation for library management system.

A function point (FP) is a unit of measurement to express the amount of business functionality in an information system as a product provides to the user. FP's measures software size. They are widely accepted as industry standard for functional sizing.

FP counting process involves the following steps:

Step 1: Determine the type of count

Step 2: Determine the boundary of count.

Step 3: Identify each elementary processes (EP) required by the user.

Step 4: Determine the unique EPs.

Step 5: Measure the data function.

Step 6: Measure the transactional functions.

Step 7: Calculate functional size (adjusted function point count)

Step 8: Determine Value adjustment factor (VAF).

Step 9: Calculated adjusted function point count.

$$FP = \text{count total} * [0.65 + 0.005 * (\Sigma n)]$$

Information domain value	Count	Weighting factor		
		Simple	Average	Complex
External inputs	39	3	6	117
External outputs	10	4	7	40
External Enquiries	3	3	6	9
Internal logical file	9	7	15	63
External interface files	0	5	10	0

Count Total

3229

In the table information domain values are defined in the following manner

- 1) No. of External inputs (EIs) \rightarrow Each external inputs originated for a user or is transmitted from another application and provide oriented data.
- 2) No. of External outputs (EOS) \rightarrow It refers to reports, messages.
- 3) No. of External Enquiries \rightarrow It is defined as online input that result in the generation of some response.
- 4) No. of Internal logical file \rightarrow Grouping of data
- 5) No. of External interface file \rightarrow

$$\text{Time } \times f = 38$$

$$FP = \text{Count total} * [0.65 + 0.005 * (km)]$$

$$= 229 * (0.65 + (0.005 * 38))$$

$$= 235.87$$

Viva Questions

Q-1 = what are the objectives of FPA?
 It is used to measure the functionality that the user requests and receives.

Q-2 = what is function point estimation?
 It is a unit of measurement to express amount of business functionality an information system provides to a user.

Q-3 = what is formula for function point?

$$F^P = UFP \times VFA^P \\ = 0.65 \times (0.01 \times TPI) + UFP.$$

Q-4 = How are functional points divided?
 It is divided into five large classes and general system characteristics.

Q-5 = what are advantages of function point?
 It reduce maintenance costs.

→ mitigate risks.

Experiment - 13

Aim: To prepare time Line chart / Gantt chart / PERT chart for selected software project.

* Gantt chart

Gantt chart is a visual representation of the project schedule that shows the start and finish dates of the various elements of a project. It is often used in project management to illustrate the timing of tasks or activities as they progress over time. Each task is represented as a horizontal bar that spans the duration of task.

Components

1) Task or activities

2) Timeline

3) Bars

4) Dependencies

Task 1 : Requirement Gathering
System design

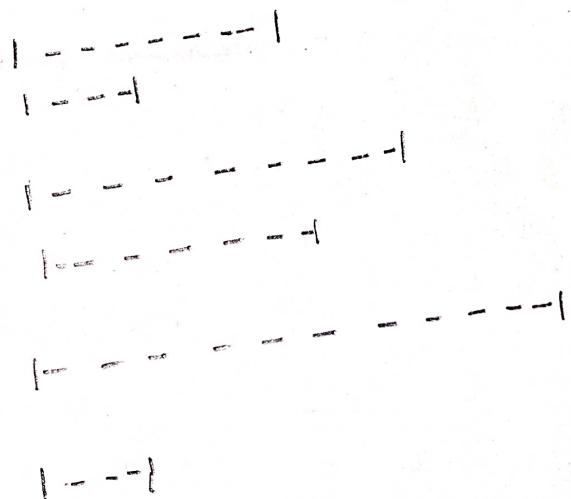
Task 2 : Database Development

Task 3 : UI design

Task 4 : Testing

Task 5 : Deployment

Task 6 :



WORK TASKS	PLANNED START	ACTUAL START	PLANNED COMPLETE	ACTUAL COMPLETE
Problem Statement	Sep,w1	Sep,w1	Sep,w2	Sep,w2
Software Requirement Specifications	Sep,w2	Sep,w3	Sep,w3	Sep,w3
DFD and structured chart	Sep,w2	Sep,w2	Sep, w4	Sep,w4
Entity Realationship(ER DIAGRAM)	Sep,w4	Sep,w4	Sep,w4	Sep,w4
Use Case Diagram	Sep,w3	Sep,w3	Oct,w1	Oct,w1
Class Diagram and Object Diagram	Oct,w2	Oct,w2	Oct,w2	Oct,w2
State-Chart Diagram and Activity Diagram	Oct,w3	Oct,w3	Oct,w4	Oct,w4
Sequence Diagram and Collabration Diagram	Oct, w4	Nov,w1	Nov,w1	Nov,w2
Component Diagram	Nov, w2	Nov,w3	Nov,w4	Nov,w1
Deployment Diagram	Nov, w4	Nov,w4	Nov,w4	Nov,w4
Testing	Nov,w1	Nov,w1	Nov,w1	Nov,w1
Estimation Of efforts	Nov,w2	Nov,w2	Nov,w2	Nov,w2
Time Line Chart	Nov,w2	Nov,w2	Nov,w2	Nov,w2
Gantt Chart	Nov,w2	Nov,w3	Nov,w3	Nov,w3

Time line chart of the
library management system

Library Management System project

Problem Statement

Software System Requirement

DFD and Structured Chart

Entity Relationship Diagram

Use Case Diagram

Class and Object Diagram

State Chart and Activity Diagram

Sequence and Collaboration Diagram

Component Diagram

Deployment Diagram

Testing

Estimation

Gantt Chart

SEPTEMBER

OCTOBER
NOVEMBER

TODAY

Ques

Ques

Q-1 = what are the important elements of a Gantt chart?

- Toolbar
- Time scale
- Start date and current date
- Fix Versions
- Spans.

Q-2 = what are the uses of Gantt chart?

- For planning
- Scheduling projects.
- Managing dependencies.

Q-3 = what are the principle of Gantt chart?

Ans It presents tasks and activities as horizontal bars along a time line, show their start and end date. and progress.

Q-4 = what is full form of Gantt chart?

Ans Generalized Activity Normalization Time Table

Q-5 = what are advantages of Gantt chart?

- Avoid resource overload
- Experience more clarity.

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Topic
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