Library Management for Standford

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Stanford Library

STAKEHOLDERS

ACTOR	What he can do on the Software Created
Student	• Student can select categorized resources based on subjects from the software • Student can access free e-books and e-journals through the software • Student can access the library online through desktop/mobile to know the return date • Student can go to the checkout counter for payment of the borrowed book
Library Staff	• Library staff can search book using the software with name or author of the book • Library staff can keep track of the inventory stock in the library
Management	• Management can access the reports for most rented books • Management can check the issued and unissued books from the library • Management can track the amount of fine collected in day, week or month by selecting the date criteria • Management can also check the total number of books, lost books, journals etc. • Management can track the age of books with the criteria of not old than 20 years to keep the library up to date.

PROBLEM DEFINITION AND SOLUTION

- Stanford University needs a good library management system to save their employees time and reducing manual interventions
- The library management system can provide quick fine calculations and thus increase productivity
- The library staff can access dynamic reports based on book issued date to keep a track of their improving efficiency to deliver service to the students
- It can help improve the student's engagement rate

Advantages of LMS

Advantages of Library Management System:

- The system will have up to date records of all books, journals, magazines, research papers and other resources available in library

- It can reduce cost of managing the library and reduce overheads caused by manual interventions
- It can increase the flexibility of students to search the required materials and return them within the given TAT
- It can help promote the e-books and e-journals in the form of rewards
- It can help to set reminders of the books older than 20 years to replace it with new editions for students learning references
- It can also trigger alarm by anti - theft detection in case anyone tried to pass the gate with unissued book

EXISTING SYSTEM

- The existing system has a large room with the capacity of 100 readers and more than 4 million books in it
- The existing system has a paper-based transaction entry for handling library resources
- Students can deposit books only in the library timings

PROPOSED SYSTEM

- The system keeps tracks of resources based on subjects which allows users to search using book or author name
- The system automatically captures the issue and return date once it is added in the cart of the system for the staff to validate
- Every resource in library has a RFID which is stored in database with information like book name, author, publisher, edition, cost etc.
- The staff will search the book and validate the entry of the book with RFID specified on the book for the issue date and return date
- Student can access the system through web or mobile interface and borrow up to 2 books at a time using the system
- The system will also provide free e-books and e-journals to students to encourage student engagement in the system
- Auto emails will be triggered to the students 3 days before the return date to avoid penalty fees and late return of books
- Anti-theft feature of the system allows to track the unissued book using RFID within 2 metres in case someone tries to access the gate
- The system will have 3 different screens based on the user roles namely:

Student screen:

- Creating profile in system
- Student can request the resources available in the library to the staff to avoid chaos through the system and wait for the approval from the staff
- They can check the books details like the author, publisher, issue date and return date of the books

Staff Screen:

- The student details with the count of books borrowed, date of issuance and retrieval of fines if any in case of late retrievals
- The search screen for searching resources available in the library

M**anagement screen**:

- Management can view the reports on the total resources available in the library, resources used, books borrowed versus books returned daily/weekly/monthly with or without fines

Flowchart for LMS

A detailed flowchart for a library management system involves understanding the interactions between different actors (staff, students, and management) and various processes within the system. Here's a simplified flowchart that outlines the main functionalities and interactions:

- Student Interaction:

Request Book Issue: The student requests a book issue from the library system.

Return Book: The student returns a book to the library.

- Staff Interaction:

Issue Book: The staff member issues a book to the student after verifying the request.

Update Library Inventory: The staff updates the library inventory when a book is returned.

- Management Interaction:

Approve Book Purchase: Management approves book purchase requests initiated by the library staff.

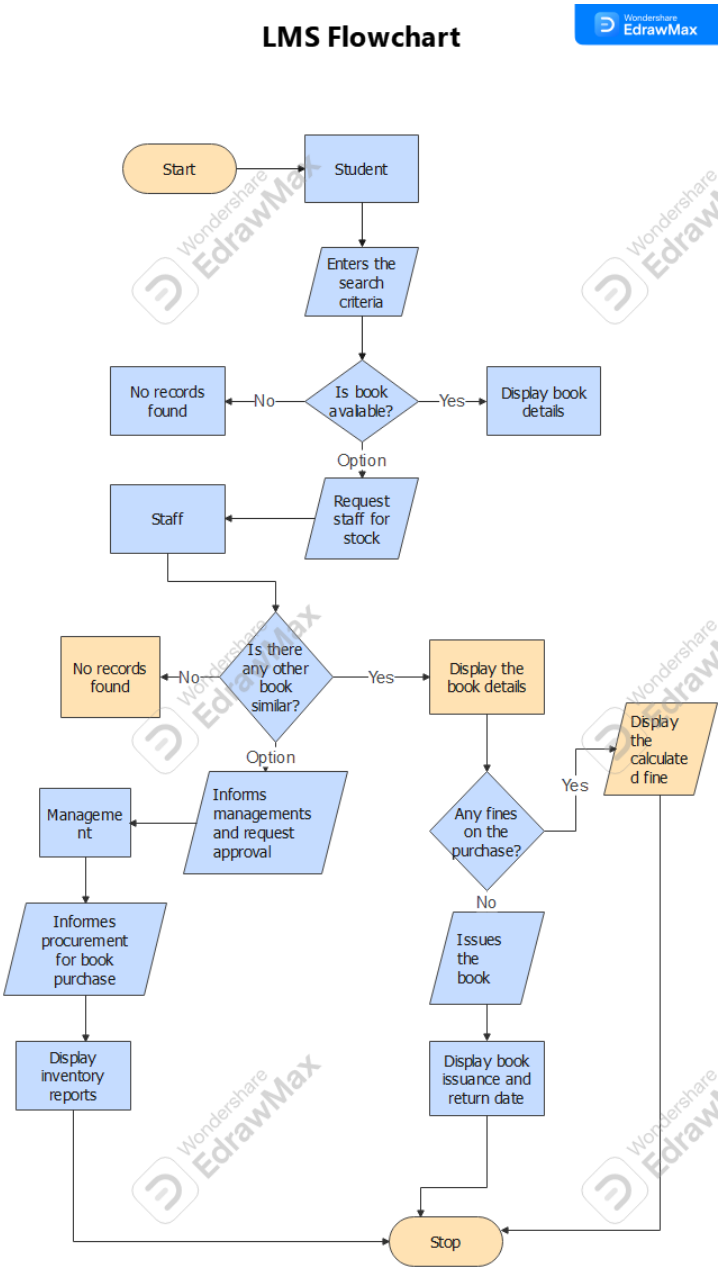
Procurement: The library staff handles the purchase of approved books.

Key Interactions:

- Students interact with the library system primarily for borrowing and returning books.

- Staff members manage book issuance and updating inventory.

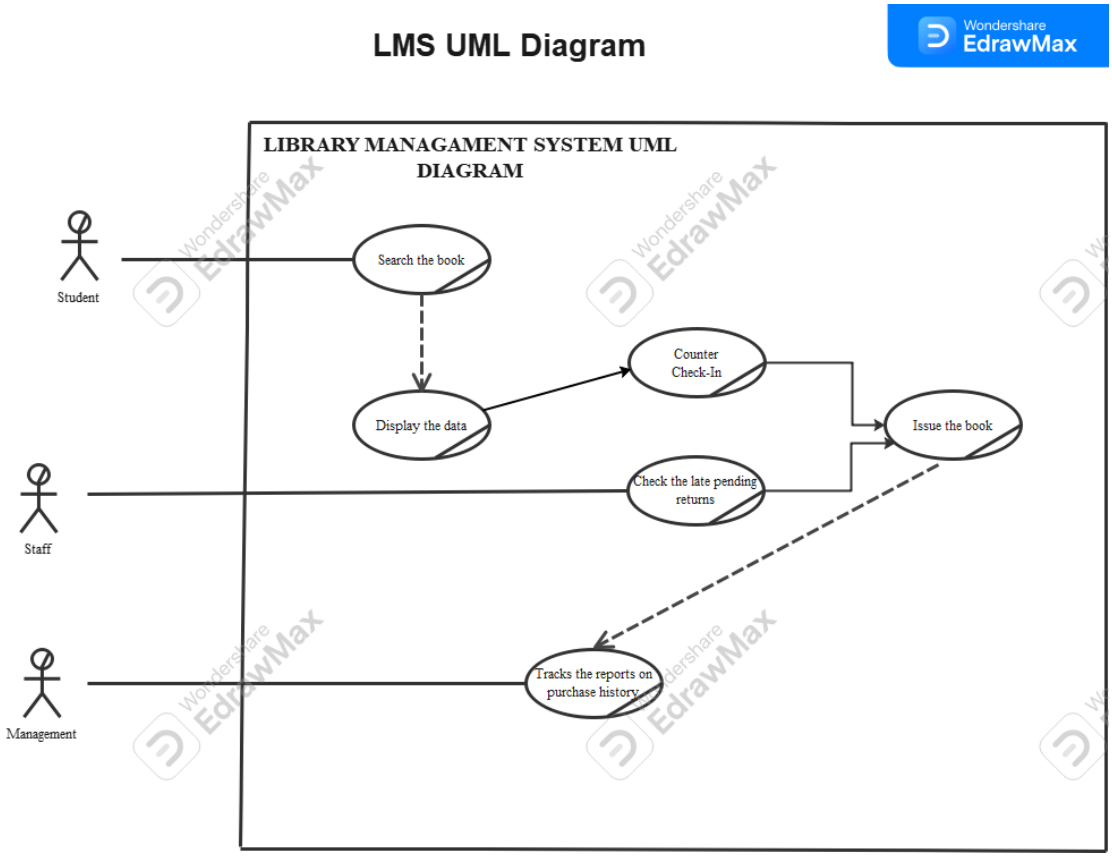
- Management tracks the reports and approves book purchase requests by library.



This flowchart provides a high-level overview of how different actors interact with the library management system, ensuring efficient handling of book requests, issuances, returns, and procurement processes.

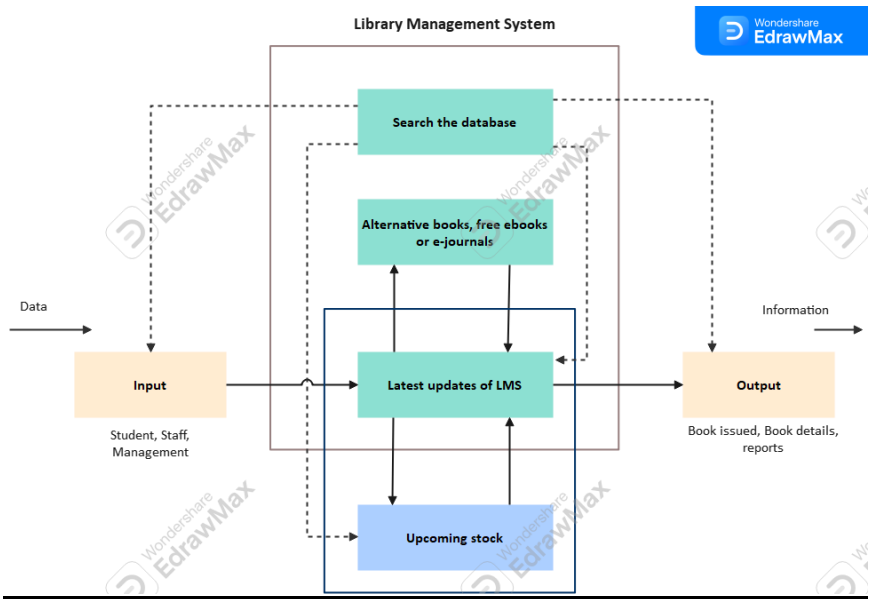
SCOPE using Use Case Diagram (UML)

Below UML diagram depicts the book purchase and borrowing stage and actions performed by student, staff and management



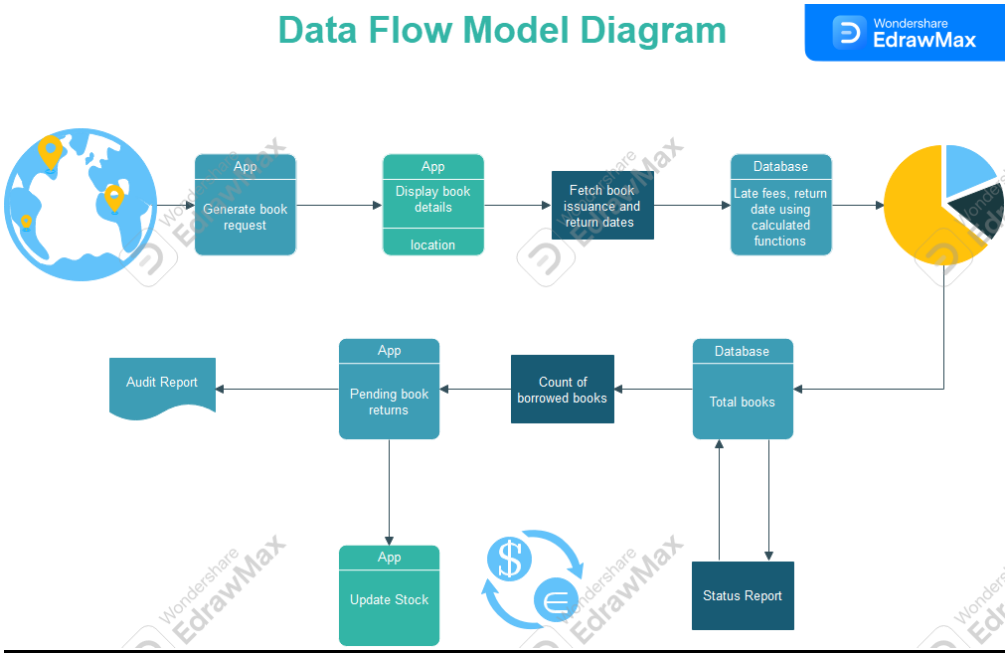
SCOPE using Context Diagram

Below context diagram shows the database architecture of LMS for searching the data request and displaying the results



DATA FLOW DIAGRAM

The below DFD shows the data flow in the model:



IN SCOPE

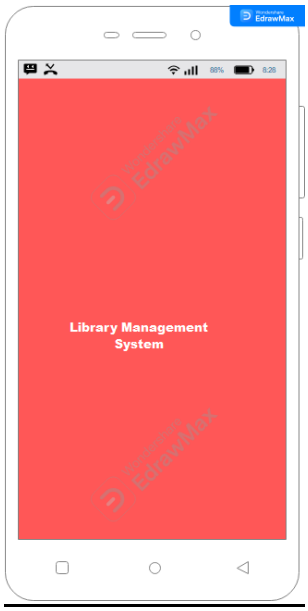
- Security constraints for account recovery in case of user credentials authentication issues can be implemented using forgot password features and email trigger to the registered email address
- Students can request for the resources or books which are unavailable in the system by raising request through the system to the library staff and then wait for management approval

OUT OF SCOPE

- Students cannot purpose books from anywhere in the university they have to visit the library for purpose of books
- Borrowed books can be returned by visiting the library only and not by courier and that too by paying the fine if applicable
- Students cannot check the upcoming stock they can see only the stock available in the library

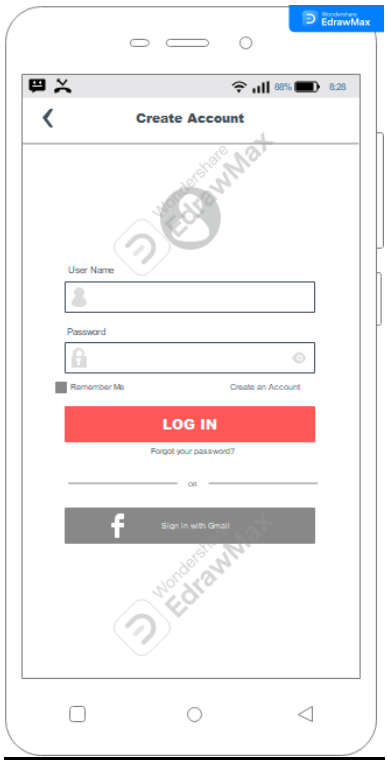
Wireframes:

Default page: The click on the application will display the below page for the end user



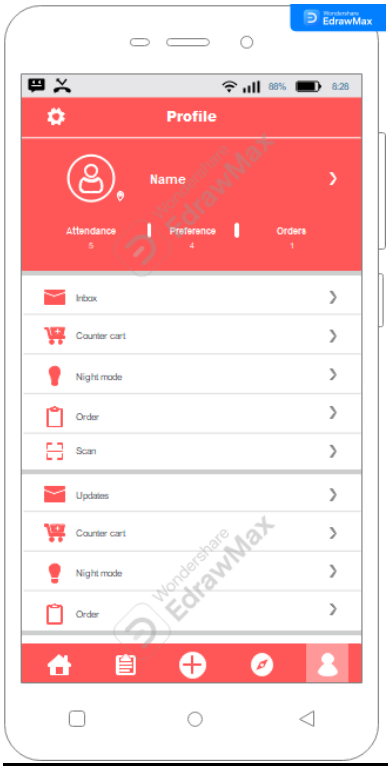
User Sign in Page: It will be used to login to access the system

- The user can use any email address to log in or can use the existing Gmail account for accessing the system



Student Profile Page: It will be used to create student profile and display the student details and update the user about new editions

- The student attendance will show visit per week, preferences will show the preferred areas of interests and orders will display the past order details

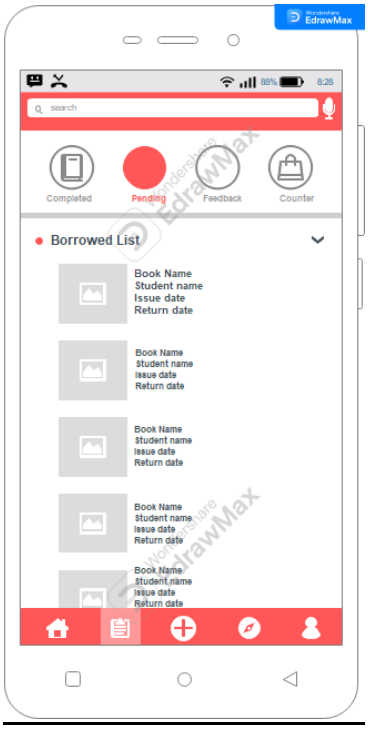


Search Page for Student Login:

- Student can search any resource from the library using the search box and the key words will be extracted to check the book names in the database with case insensitive constraints to display the results
- Marked label will show the preferences and Wishlist of books bookmarked or some which are already referred and bookmarked
- New label will show the latest addition in the inventory stock of the system

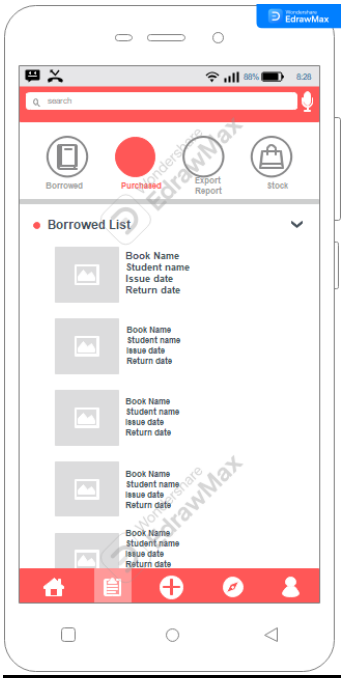
Inventory page for Staff:

- The inventory page is used for administrative purposes by the staff which displays the categories of completed transactions, pending or borrowed books, in counter and user feedbacks to take actions
- Pending label will display the student details along with the book and RFID to track further process of book retrieval

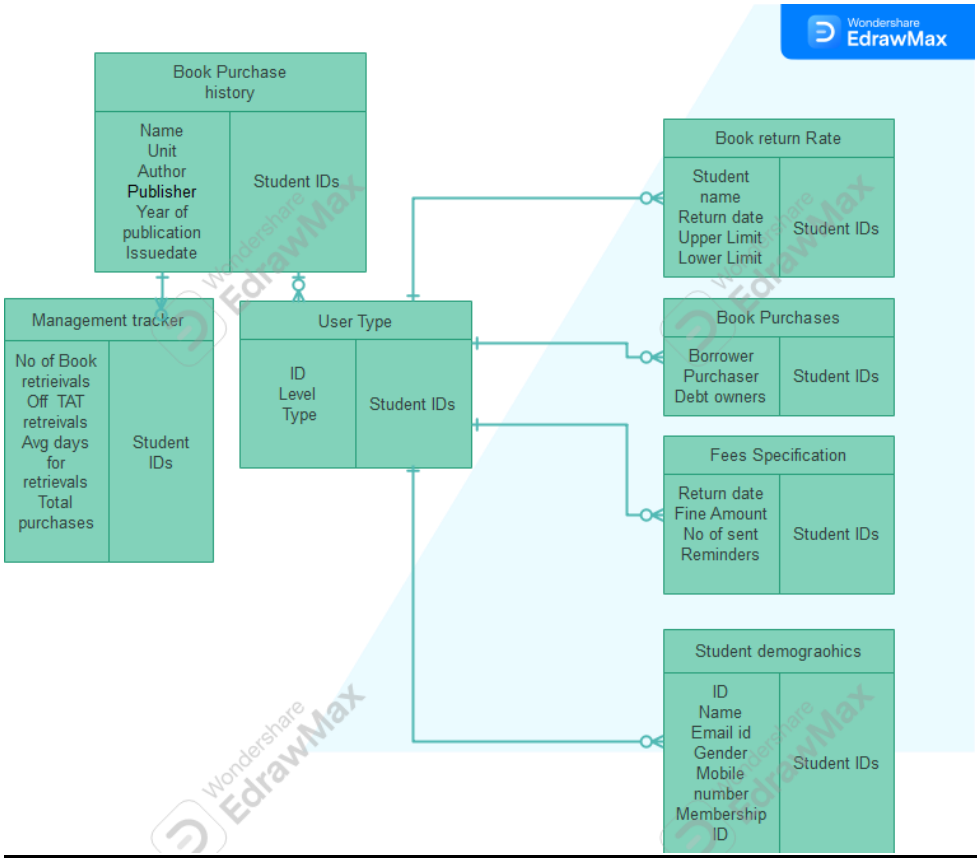


Management page for Reports:

- Management can extract reports from the system for any date criteria to track the issued, returned and borrowed books with student details
- Feedback feature of the student works on email approval mechanism with is auto triggered to staff and then management for requesting the unavailable books in library
- Management can click the approve button to make the purchased copies available in the library



ER DIAGRAM FOR THE SOFTWARE



FUNCTIONAL REQUIREMENTS

- The library management system should have accessibility to three user roles namely student, staff and management
- The system should adhere the user accessibility and security constraints in case of authentication issues by forgot password links on registered email addresses
- The system should be accessed by the student only on one smartphone device at a time to avoid multiple sessions and security breaches
- The system should be used by the staff for maintaining the inventory status, location and fine calculation of the borrowed non return books
- The system can track the unissued books within 2 metres of library thus implementing antitheft feature for the staff
- The management role users can extract reports anytime using the system for making important decisions related to book discounts, fine changes, in stock inventory of the library

NON-FUNCTIONAL REQUIREMENTS

System requirements, usability and environments are the non-functional or technical requirements in the LMS

System Requirement:

Hardware:

- Desktop/Smartphones for end users
- Internet – At least 1 Mbps
- Processor – Multicore processor with 4 cores
- RAM – 16 GB
- Storage – HDD/SSD of minimum 500 GB
- Network – High speed network interface

Software:

Operating system – Windows 10 or above OS version for client and Windows server latest version for server OS

DBMS: Relational database like MySQL, PostgreSQL or Oracle

Web Server: Server Software should be either Apache or Microsoft IIS.

Application Software – Back-end software in Java or .NET and Front-end software in HTML/CSS or angular JS.

Security Software – It should have firewall, antivirus and SSL/TLS

Network Software – It should have WAN for better internet connectivity and LAN for data security with routers and switches for high bandwidth

Legal and Regulatory Compliance – It should have adherence to data protection laws like GDPR to cover compliance perspective.

Usability:

For students:

- User Interface – It should have interactive user interface for better navigation between the web pages, visually appealing font colours and should be compatible to user in mobile or desktop systems
- Ease of use – Students can have personalized preferences for books in their profiles and FAQ of the system should be one stop solution for the system and solving the most probable queries students may face while using the system
- Search and Retrieval – The search criteria should be keywords specific and case insensitive to retrieve the search results and save student's time
- Security and Privacy – A student can use his credentials in only one system at a time either mobile or desktop
- User Feedback – Students feedback is collected after every successful transaction in the survey form and the payment related issues are solved on high priority

For staff:

- Administrative features – The staff can manage the inventory by maintaining data efficiently with book location, number of copies, book loans and students account management

For Management:

- Scalability and Maintenance – The design architecture should be such that if the members are increased then it should not affect the UI and can be managed efficiently with scheduled system upgrades with minimal disruption

Environments:

Development Environment – The environment used when the system is in development stage and is accessible only to developers of the system

Testing Environment – The environment used when the system has been developed and is under validation by testing techniques like alpha and beta testing for various check constraints of the system

Production Environment – The environment used when the system is live for the end user's usage and have successfully covered the testing of test cases required for the system

Training Environment – The environment used when the end users are given demo on the system usage and the features available in the system

Backup and Recovery Environment – The environment used in case of application or system crash to recover the data files for better and efficient working of the system