ONLINE EXAMINATION SYSTEM

Project Report Submitted

To

Gujarat University

In partial fulfilment of the requirements for the award to the Degree of

MASTERS IN COMPUTER SCIENCE

SEMESTER – IV

GUIDED BY:

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SUBMITTED BY:

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DEPARTMENT OF COMPUTER SCIENCE
GUJARAT UNIVERSITY, AHMEDABAD

YEAR: 2023-24

Acknowledgement

We would like to extend our heartfelt gratitude to all those who have played a crucial role in the successful completion of our online examination project. This journey would not have been possible without the invaluable guidance, support, and encouragement we received from several esteemed individuals.

First and foremost, we would like to express our deepest appreciation to our project mentor, Dr. Maitri Jhaveri. Her expert guidance, unwavering support, and insightful feedback were pivotal in shaping the course of this project. Dr. Jhaveri's extensive knowledge and experience in the field provided us with a clear direction and helped us overcome numerous challenges. Her patience and willingness to provide assistance at every stage of the project were truly inspiring. We are immensely grateful for her dedication and the time she invested in mentoring us, ensuring that we stayed on track and maintained high standards of quality and innovation.

We also owe a great debt of gratitude to Dr. Jyoti Pareek, the Head of our Department, for her continuous encouragement and support. Dr. Pareek's belief in our capabilities and her commitment to fostering a conducive learning environment were instrumental in motivating us to push the boundaries of our knowledge and skills. Her insightful suggestions and constructive criticism greatly contributed to the refinement of our project, ensuring its academic rigor and practical relevance.

In addition, we would like to extend our sincere thanks to Jay Patel Sir for his practical insights and hands-on approach, which provided us with a deeper understanding of the technical aspects of our project. His expertise in software development and his ability to simplify complex concepts were invaluable in helping us navigate through the technical challenges we encountered. Jay Patel Sir's enthusiasm and passion for teaching inspired us to strive for excellence and to apply theoretical knowledge to real-world problems.

Furthermore, we would like to acknowledge the support of all the faculty members who contributed to our learning and development throughout this project. Their diverse expertise and perspectives enriched our understanding and provided us with a well-rounded educational experience. The collaborative and supportive environment fostered by our faculty was crucial in helping us achieve our goals.

Finally, we would like to thank our families and friends for their unwavering support and encouragement. Their belief in our abilities and their understanding during the demanding phases of this project were instrumental in keeping us motivated and focused.

In conclusion, this project is a testament to the collective efforts, guidance, and encouragement of our mentors, faculty, and loved ones. We hope that this project will serve as a reflection of the high standards and values instilled in us by our mentors and faculty, and we are committed to carrying forward the lessons learned into our future endeavours.

Lamin Janka
Parin Makwana
Juhi Modi
Ishika Thakkar

Table of Contents

1. Project Profile

Title	Online Examination System
Aim	The Online Examination System aims to enhance accessibility by allowing students to create and take exams. It ensures security with robust authentication and provides diverse question formats. Objectives include a user-friendly interface, secure login, dynamic exam creation and efficient data storage.
Duration	6 Months
Team Size	4 Members
Technology Used	HTML, MYSQL, CSS, JAVASCRIPT,PHP
Guide	Dr. Maitri Jhaveri

Table 1: Project Profile

Group Profile

Name	Roll Number	Course
Lamin Janka	16	MSC CS IV
Parin Makwana	17	MSC CS IV
Juhi Modi	20	MSC CS IV
Ishika Thakkar	111	MSC CS IV

Table 2: Group Profile

2. Analysis

a. Software Requirement Specification (SRS):

The Software Requirement Specification (SRS) for the Online Examination System encompasses several key components to provide a comprehensive understanding of the system's requirements and specifications.

User requirements are delineated with precision, delineating the roles of different user categories such as students, administrators, and instructors. Each user role is elucidated with its corresponding functionalities and access permissions within the system.

Functional requirements elucidate the system's operational capabilities, encompassing features such as

- user authentication
- profile management
- question bank administration
- exam creation and management
- results processing.

Non-functional requirements elaborate on system attributes like

- performance as in response times
- security
- reliability as in availability standards
- usability, and scalability.

Feasibility Study:

1. Economic Feasibility

The project’s costs were analysed and found to be within budget. Using open-source technologies like PHP and MySQL reduces software costs. The primary expenses are for hardware, hosting, and development time, all of which are manageable..

2. Technical Feasibility

We evaluated the technical requirements and found them feasible. The project uses proven technologies like PHP, MySQL, HTML, CSS, and JavaScript. These are well documented, supported, and compatible with major browsers and OS. The development team has expertise in these technologies, ensuring efficient development and maintenance.

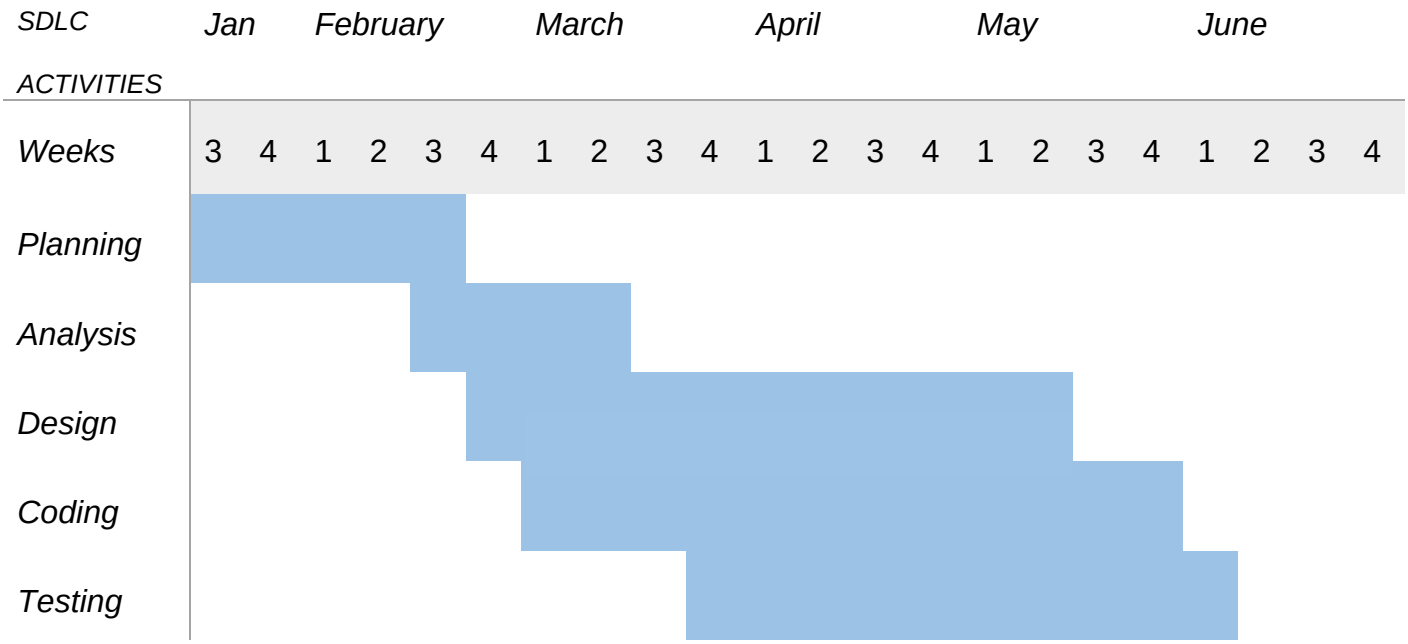
3. Schedule Feasibility

The project timeline was reviewed and found to be realistic. Tasks are evenly distributed among four team members, ensuring balanced workloads. The project phases are planned to fit within the designated timeframe, with milestones set to monitor progress. This structured approach ensures the project can be completed on schedule.

4. Resource Feasibility

We assessed the availability of resources and confirmed they are sufficient. The development team has the necessary skills in PHP, MySQL, HTML, CSS, and JavaScript. Required hardware and software are accessible. The team is also adequately staffed, ensuring the project can be completed on schedule.

b. Timeline Chart



c. Software Development Model Used

The Online Examination System uses the iterative software development model. In this approach, the project is developed in small, manageable sections called iterations. Each iteration involves planning, designing, coding, and testing a part of the system. This allows for regular feedback and improvements, ensuring the final product meets user requirements and adapts to changes effectively.

Iterative Development Model

The iterative software development model involves breaking down the development process into smaller, repeatable cycles called iterations. Each iteration encompasses planning, design, implementation, and testing of a part of the software. Feedback from each iteration is used to refine and improve subsequent versions, allowing for flexibility, continuous improvement, and better adaptation to changing requirements throughout the development lifecycle.

d. Work Distribution

NAME	WORK DONE
Ishika and Juhi	Question Bank & Front-end
Parin and Lamin	Database design & Back-end

3. Design

a. System Architecture

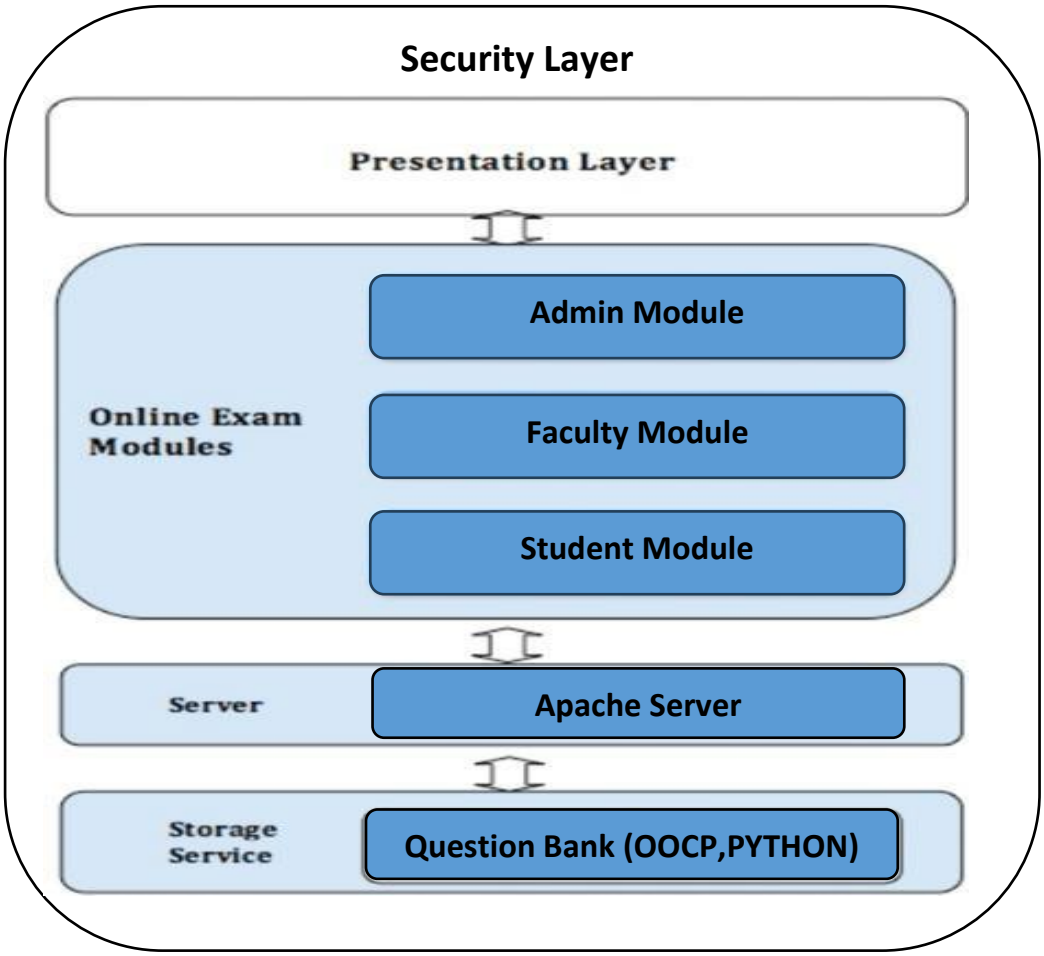
The system architecture for the online examination system includes three main roles: Student, Faculty, and Administrator. Each role interacts with the system through a dedicated interface and has specific functionalities.

1. **Presentation Layer:**
   - **User Interfaces:** Separate interfaces for Students, Faculty, and Administrators, developed using HTML, CSS, and JavaScript to ensure a responsive and user-friendly experience.
   - **Client-Side Scripting:** JavaScript enhances the user experience by providing dynamic content updates and form validation.

2. **Application Layer:**
   - **Server-Side Scripting:** PHP handles server-side logic, including user authentication, exam generation, and result processing.
   - **Business Logic:**
     - **Student Module:** Manages exam participation, answer submission, and result viewing.
     - **Faculty Module:** Manages question creation, exam configuration, and performance tracking.
     - **Admin Module:** Manages user accounts, oversees exam integrity, and generates reports.

3. **Data Layer:**
   - **Database Management System (DBMS):** MySQL is used to store and manage data, including user details, questions, answers, exam results, and session data.
   - **Database Access:** PHP scripts interact with the MySQL database to retrieve and update data as required by the application.

4. **Security Layer:**
   - **Authentication and Authorization:** Secure login mechanisms ensure that only authenticated users can access the system.
   - **Data Encryption:** Sensitive data such as passwords is encrypted to protect against unauthorized access.



b. Module Hierarchy

The module hierarchy of the online examination system, based on roles, ensures modularity and ease of maintenance. The main modules are:

1. **Profile Management:**
   - **Registration Module:** Handles user registration and stores user credentials.
   - **Login Module:** Authenticates users and manages sessions.
   - **Profile Management Module:** Allows users to view and edit their profiles.
2. **Student Module:**
   - **Exam Participation Module:** Manages exam access, question display, and answer submission.
   - **Result Viewing Module:** Allows students to view their exam results and performance history.
   - **Progress Tracking Module:** Enables students to track their progress over time.
3. **Faculty Module:**
   - **Question Bank Management:** Allows faculty to create, edit, and categorize questions.
   - **Exam Configuration:** Enables faculty to set up exams, including selecting questions, setting difficulty levels, and scheduling.
   - **Performance Analysis:** Provides tools for faculty to analyze student performance and generate reports.
4. **Admin Module:**
   - **User Management:** Allows administrators to manage user accounts and permissions.
   - **Exam Integrity:** Monitors and ensures the integrity of exams.
   - **Report Generation:** Generates comprehensive reports on system usage, exam results, and user activity.

c. Use Case Diagrams

Diagram for Student:

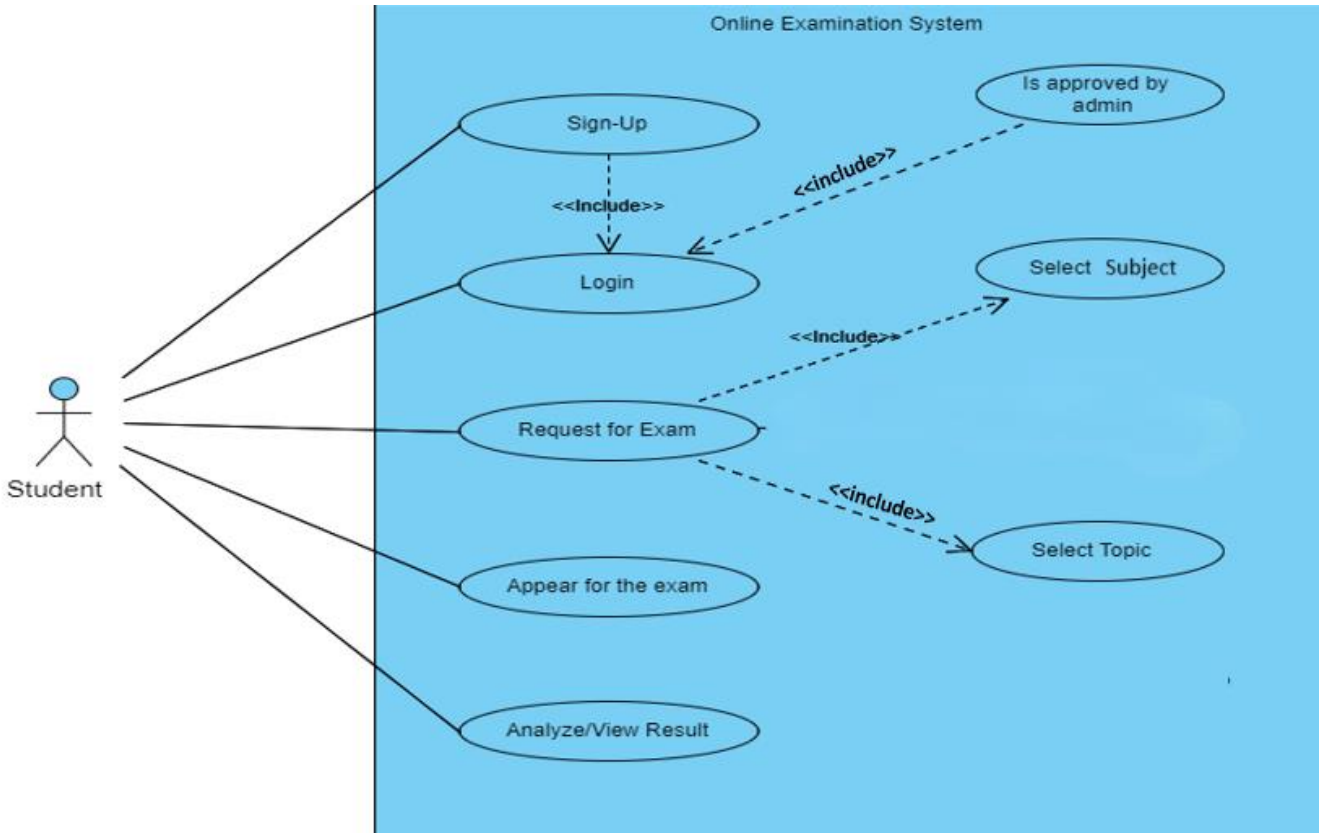


Diagram for Admin:

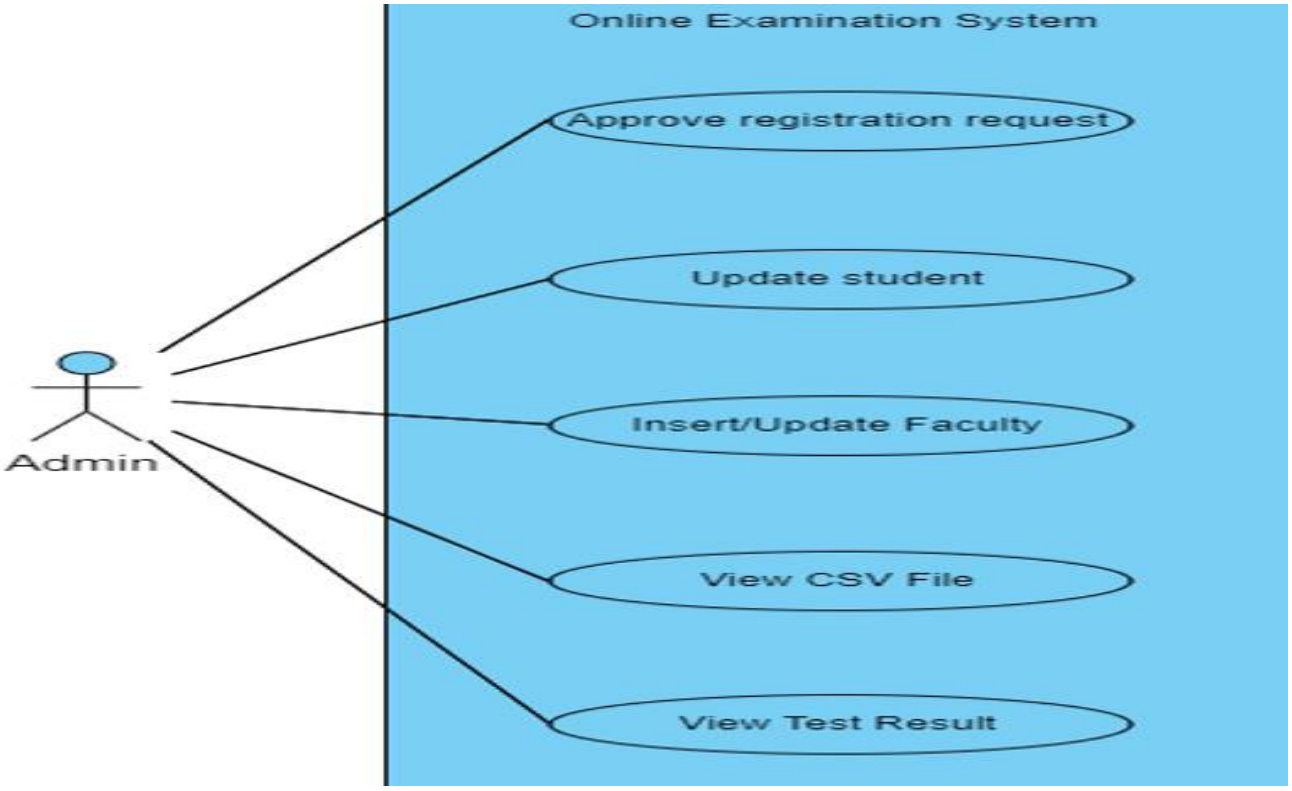
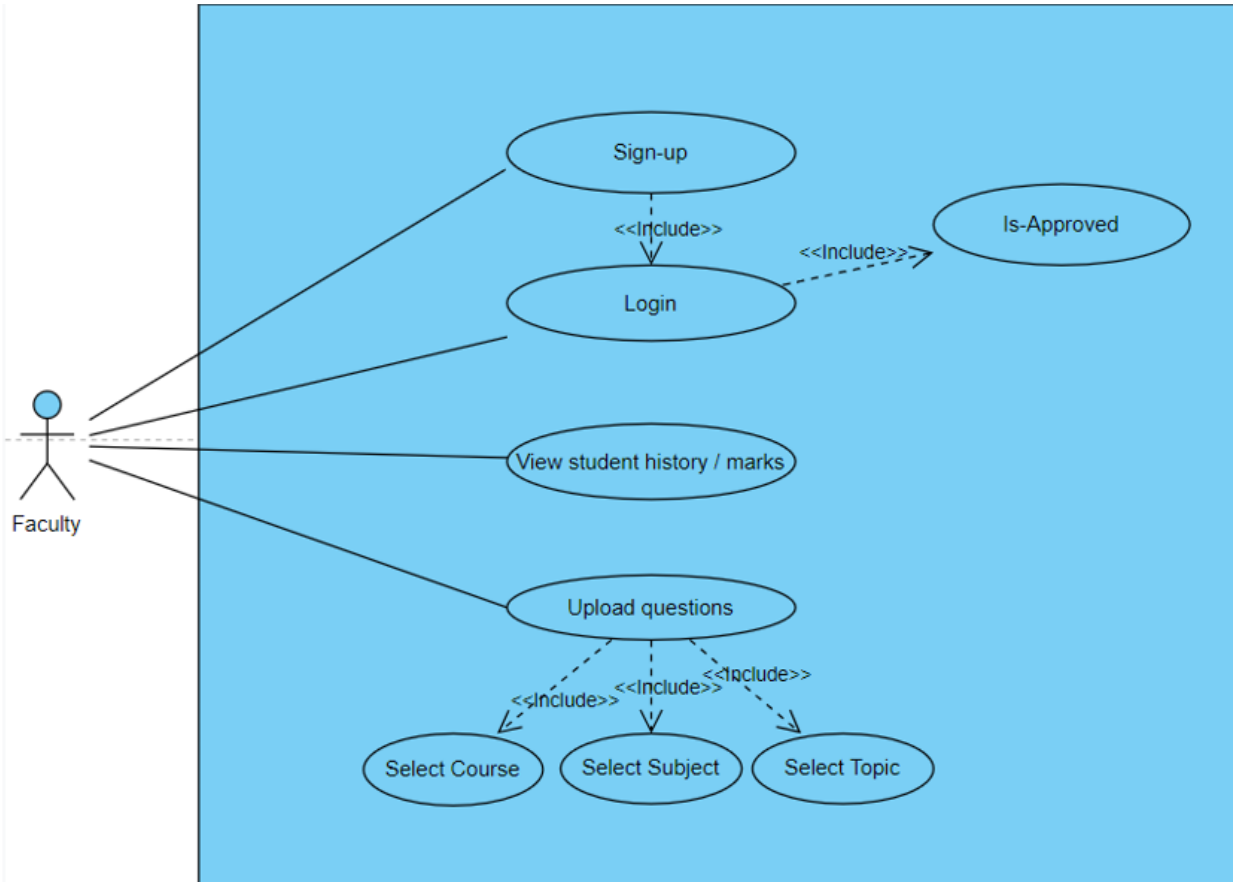
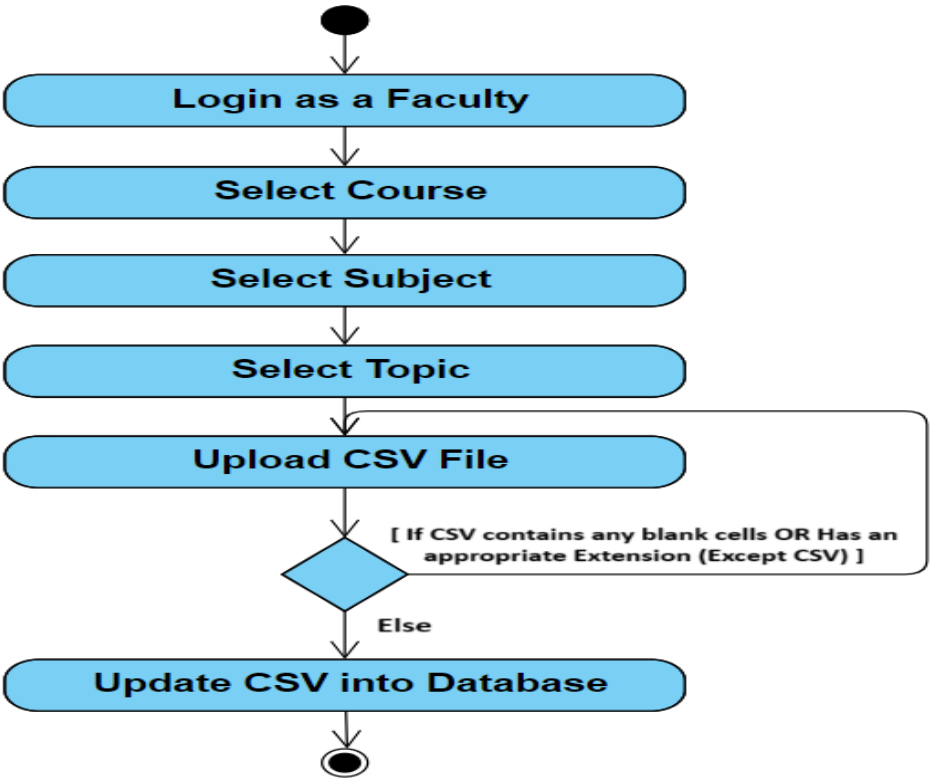


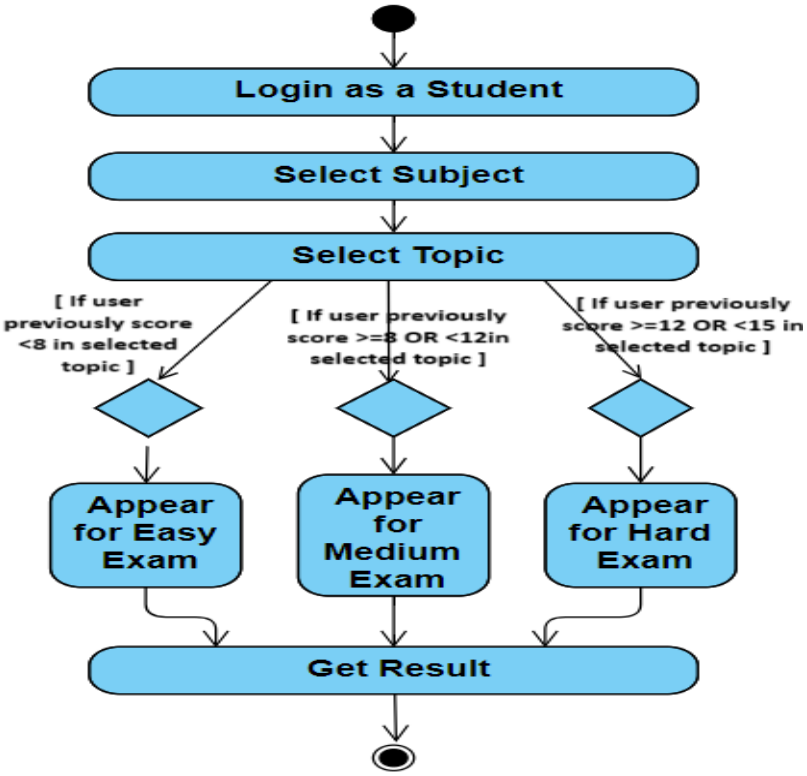
Diagram for Faculty:



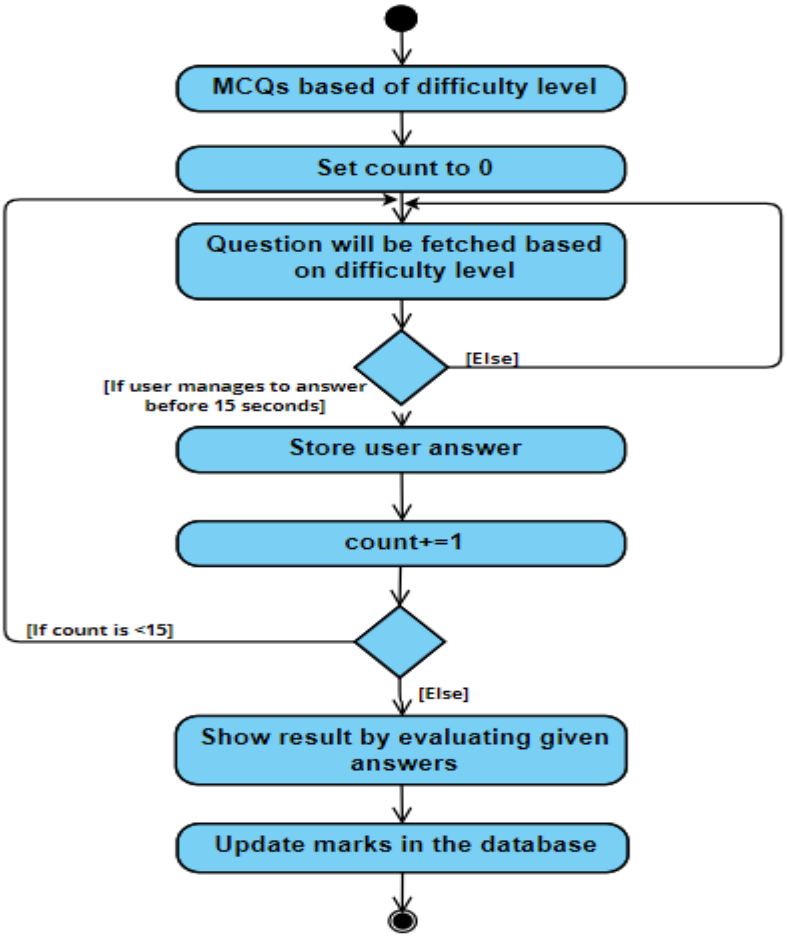
d.Activity Diagrams
Faculty



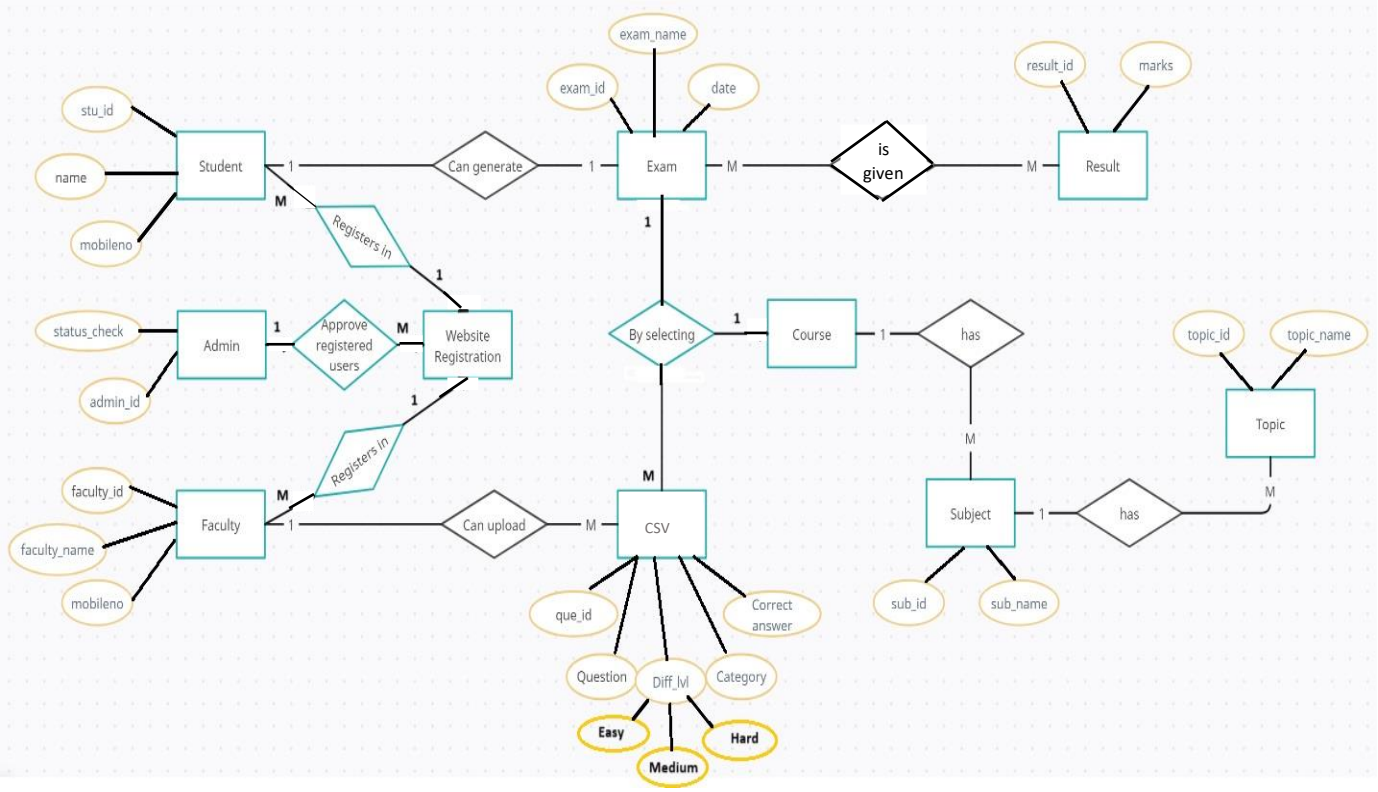
Student
Exam Creation:



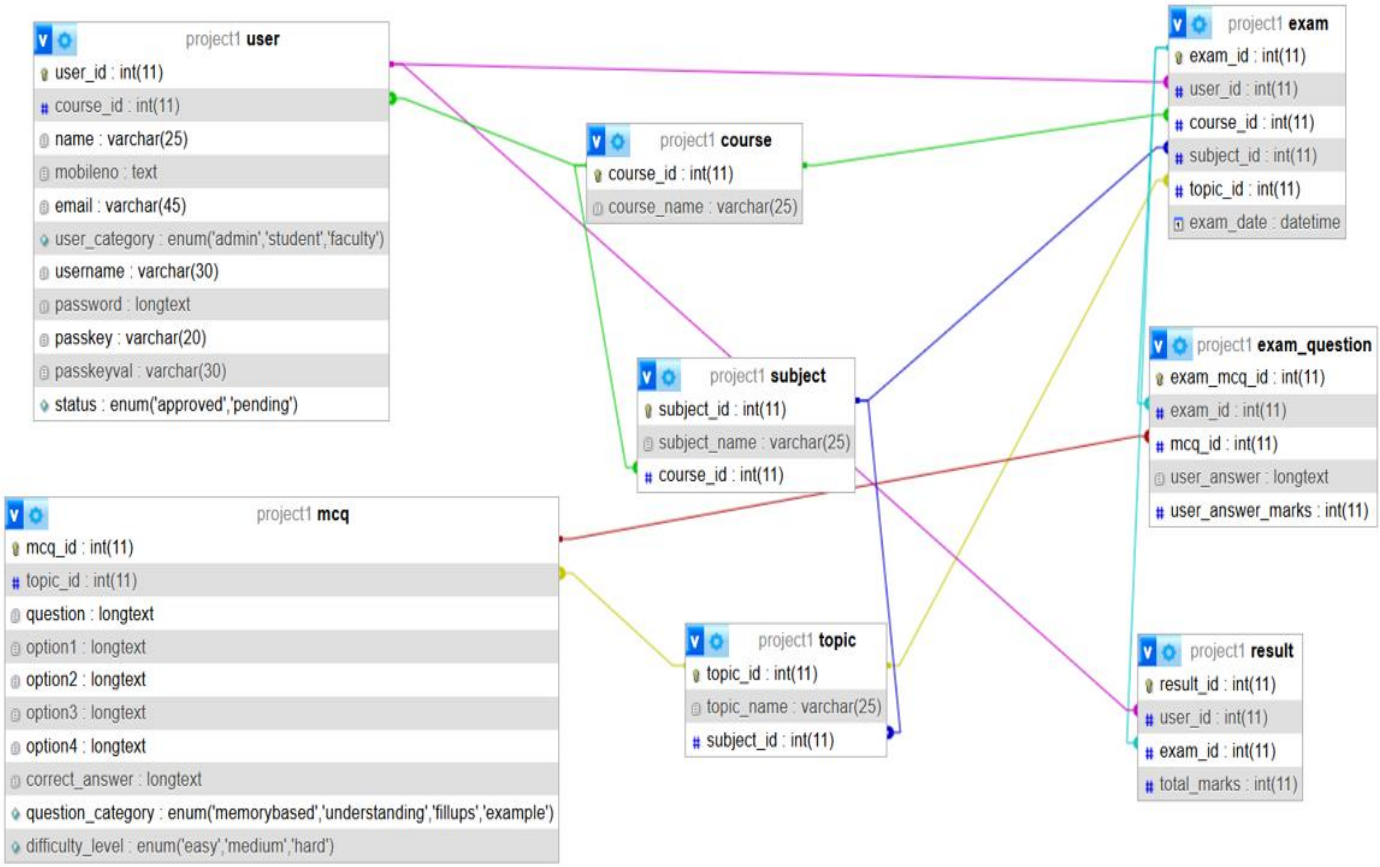
Elaborating Exam Conception



e. ER Diagram



f. Database Design



7. Implementation

a. Tools & Technologies Used

- PHP
- HTML5
- CSS3
- JavaScript
- JQuery
- MySQL
- Apache
- XAMPP
- Git
- GitHub
- Visual Studio Code

b. Database Screenshots

User Table:

Column		Data
user_id (PK)	int(11)	1
course_id (FK)	int(11)	1
name	varchar(25)	ABC
mobileno	text	9227488547
email	varchar(45)	abc@gmail.com
username	varchar(30)	abc@123
password	long text	Abc@123
user_category	enum('admin', 'student', 'faculty')	student
passkey	varchar(20)	favbook
passkey_value	varchar(30)	harrypotter
status	enum('approved', 'pending')	approved

Course table:

Column		Data
course_id (PK)	int(11)	1
course_name	varchar(25)	MSCCS

Subject Table:

Column		Data
subject_id (PK)	int(11)	1
subject_name	varchar(25)	oocp
course_id (FK)	int(11)	1

Topic Table:

Column		Data
topic_id (PK)	int(11)	1
topic_name	varchar(25)	Array
subject_id (FK)	int(11)	1

MCQ Table:

Column		Data
mcq_id (PK)	int(11)	1
topic_id (FK)	int(11)	1
question	longtext	What is Array?
option1	longtext	A
option2	longtext	B
option3	longtext	C
option4	varlongtext	D
correct_answer	longtext	C
question_category	enum('memorybased', 'understanding', 'fillups', ‘example’)	memorybased
difficulty_level	enum('easy', 'medium', 'hard')	easy

Exam Table:

Column		Data
Exam_id	Int(11)	1
User_id	Int(11)	1
Course_id	Int(11)	1
Subject_id	Int(11)	1
Topic_id	Int(11)	1
Exam_date	datetime	2024-06-07 8:21:33

Exam Question Table:

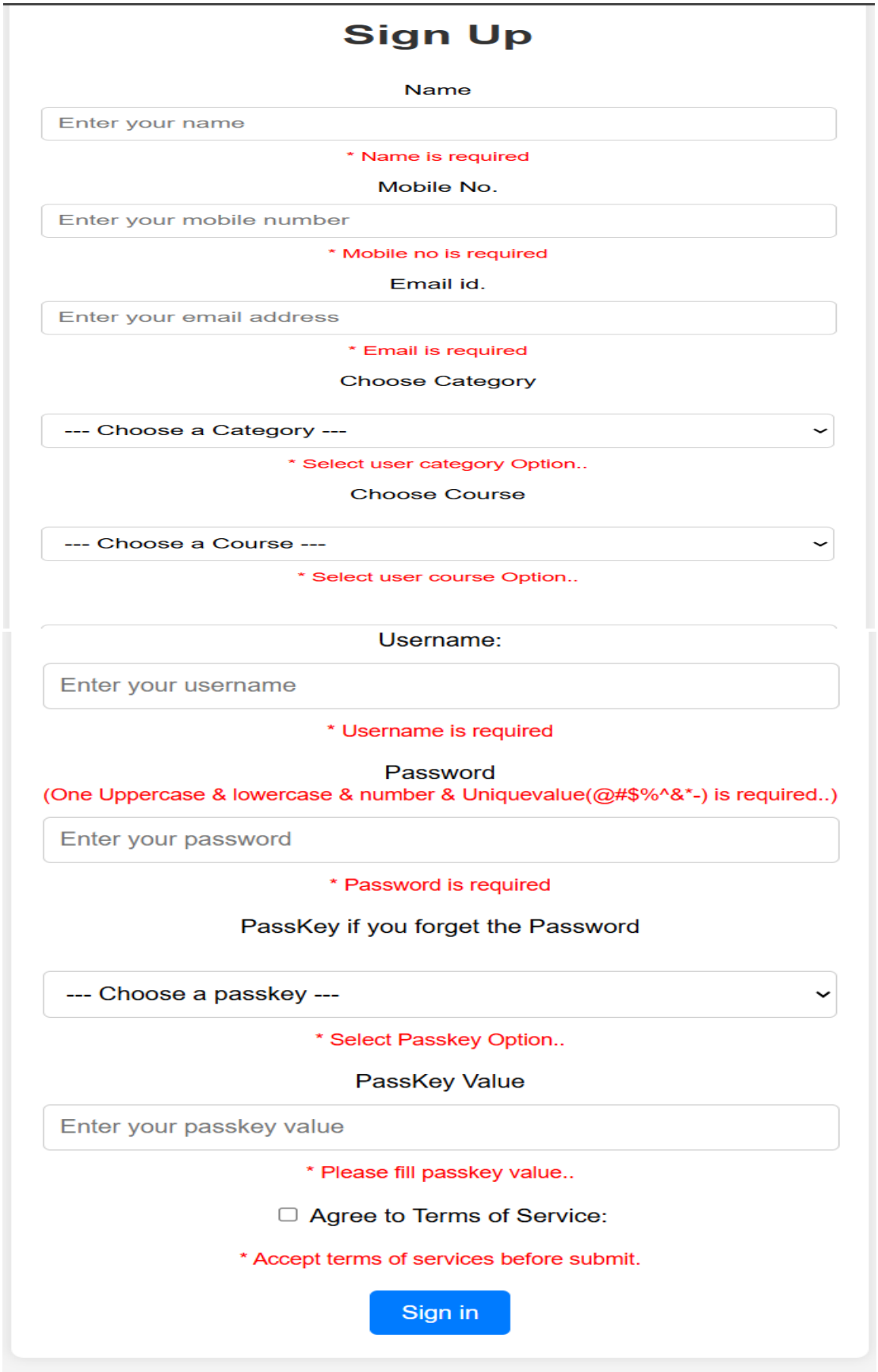
Column		Data
exam_mcq_id (PK)	int(11)	1
exam_id (FK)	int(11)	1
mcq_id (FK)	int(11)	1
user_answer	longtext	Answer
user_answer_marks	int(11)	Either 0 or 1

Result Table:

Column		Data
result_id (PK)	int(11)	1
user_id (FK)	int(11)	1
exam_id (FK)	int(11)	1
total_marks	int(11)	7

c. Application Screenshots

Signup



Login

Username:

rohan_mehta_123

Password:

••••••••••

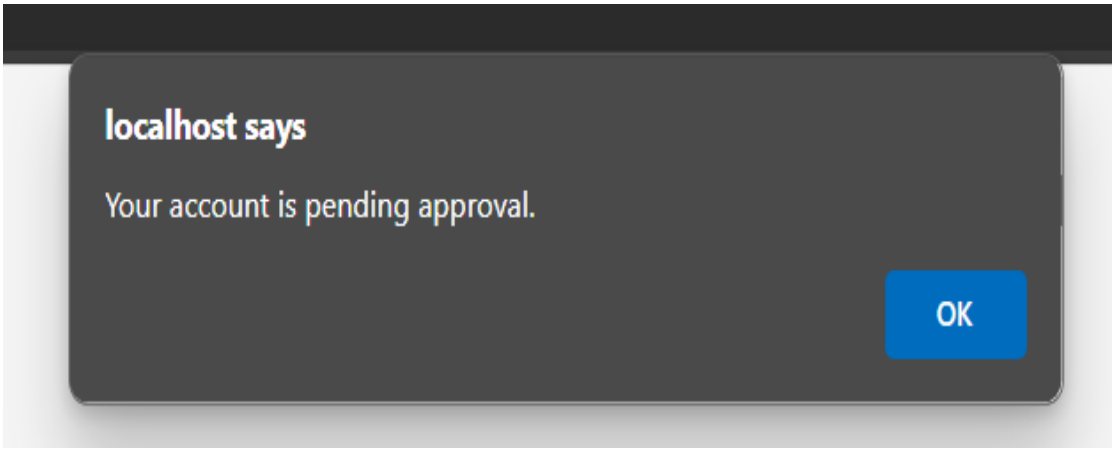
Enter Captcha:

bd20d0

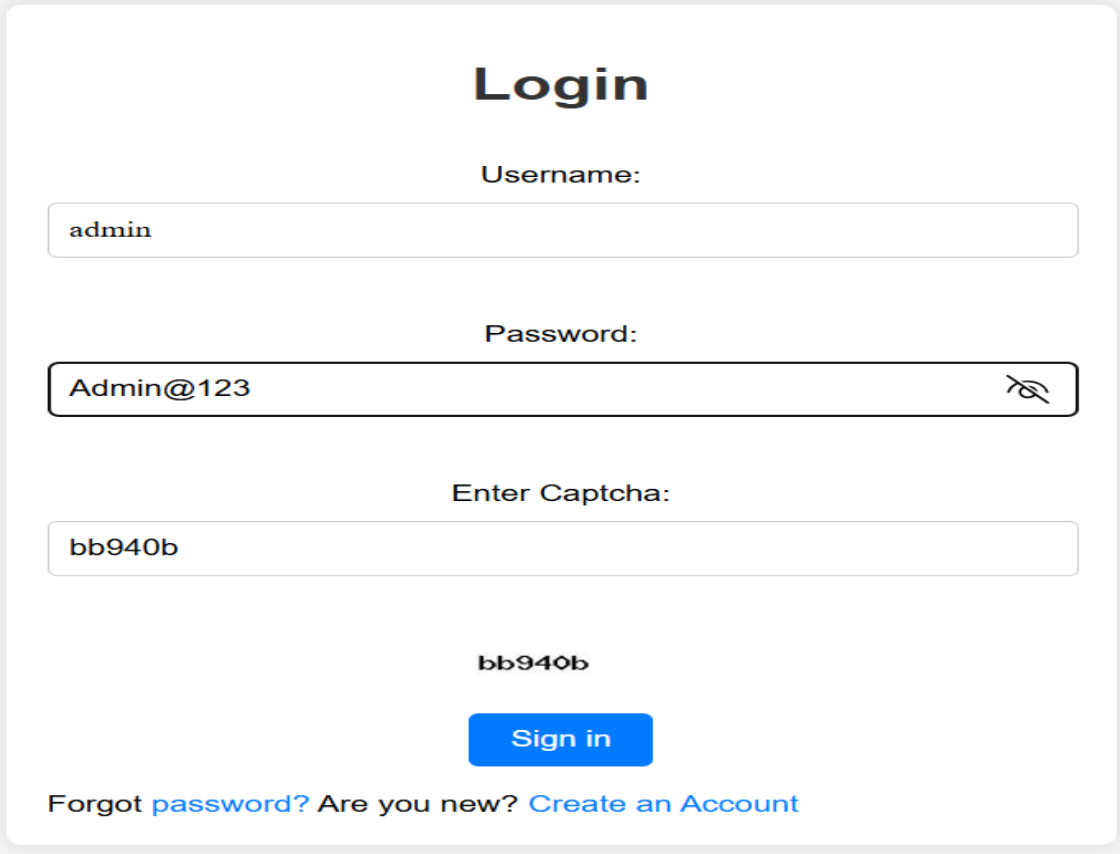
bd20d0

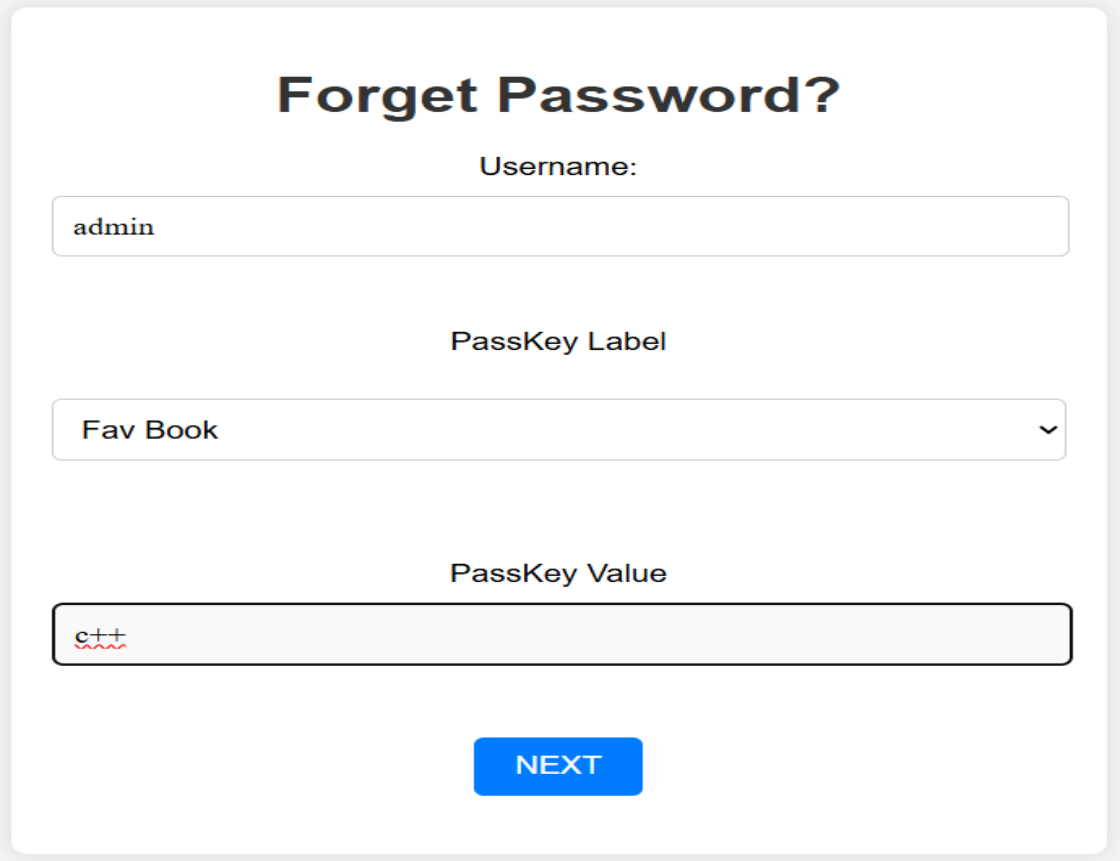
Sign in

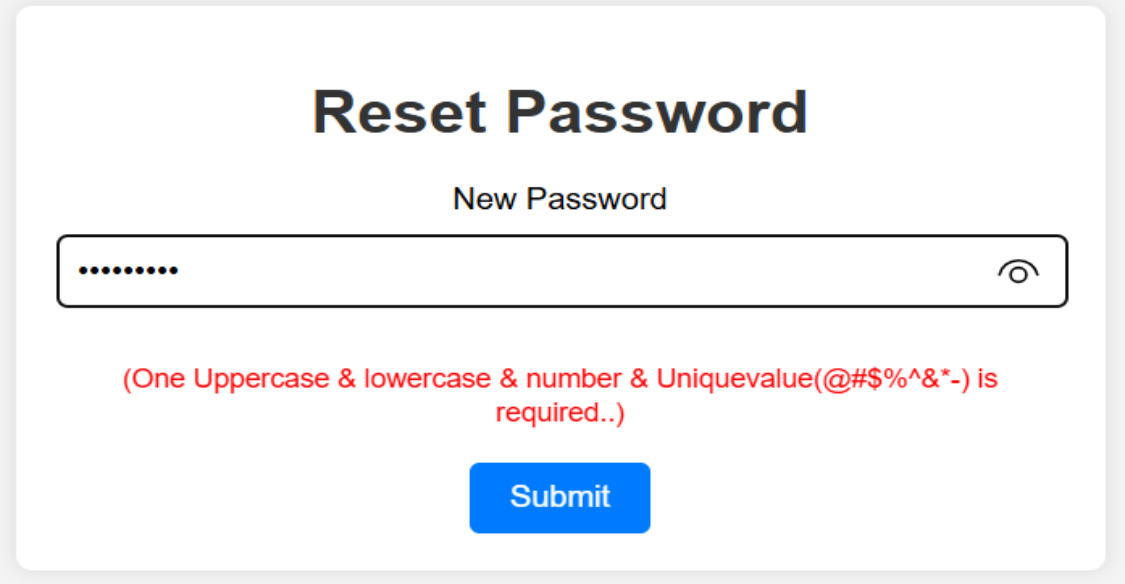
Forgot password? Are you new? Create an Account

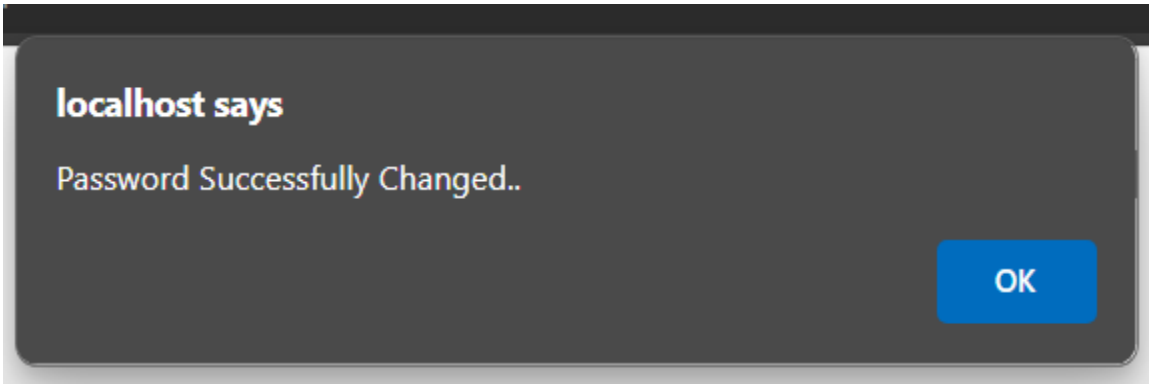


Admin


Login
Username:
admin
Password:
Admin@123
Enter Captcha:
bb940b
bb940b
Sign in
Forgot password? Are you new? Create an Account


Forget Password?
Username:
admin
PassKey Label
Fav Book
PassKey Value
c++
NEXT





Log Out

Pending List

Name	Username	Mobile No	User Category	Status
Rohan Mehta	rohan_mehta_123	8745965810	student	Approve Reject
Jhanvi Thakkar	jhanvi@m3hta	8714966060	faculty	Approve Reject

1 2

Approval List

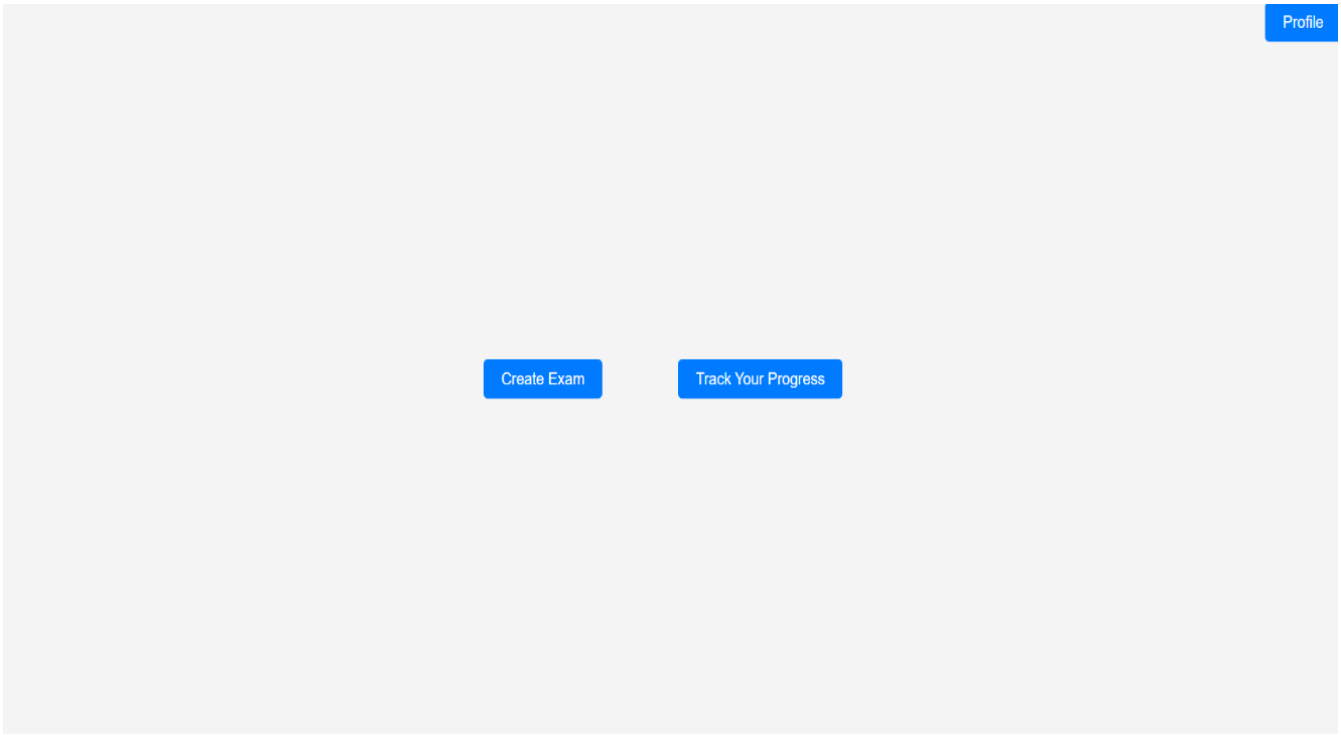
Name	Username	Mobile No	User Category	Status
Parin Dhavalbhai Makwana	parin_210	9714966060	student	approved
Maitry Jhaveri	admin	9624355944	admin	approved

1 2 3 4 5

	user_id	course_id	name	mobileno	email	user_category	username	password	passkey	passkeyval	status
Edit Copy Delete	1	1	Parin Dhavalbhai Makwana	9714966060	parin@gmail.com	student	parin_210	$2y$10$rNF6.vCuW1T.Brgy3A	favmovie	abcd	approved
Edit Copy Delete	2	1	Maitry Jhaveri	9624355944	maitry@gmail.com	admin	admin	$2y$10$m2kn5KSRHJ.irobtfPT	favbook	c++	approved
Edit Copy Delete	3	1	Maitry Jhaveri	9714966060	maitry@gmail.com	faculty	maitry_jhaveri	$2y$10$/GvnV4CxGurtZnLG2A	favbook	c++	approved
Edit Copy Delete	4	1	Lamin Janka	8320960851	lamin@gmail.com	student	lamin_16	$2y$10$i4f9py6iHVwv8X0iANV	favmovie	fight club	approved
Edit Copy Delete	5	1	Ishika Thakkar	8401698751	ishika@gmail.com	student	ishika_111	$2y$10$sTvNAuBfMSvCBlakF	favbook	twisted love	approved
Edit Copy Delete	6	1	Juhi Modi	9227455897	juhirollwala@gmail.com	student	juhi_20	$2y$10$6p/RkgsX1M.U/d.o5rL	favteacher	maitry maam	approved
Edit Copy Delete	7	2	Manav Ghiya	6353844120	manav@email.com	student	manav_123	$2y$10$Jq14ZhjFbN3dwdSvzL	favteacher	monali maam	approved
Edit Copy Delete	8	2	Purav Shah	9874522844	purav@gmail.com	student	purav_239	$2y$10$gCipjbtNKTw1UZQdBc	favmovie	welcome	approved
Edit Copy Delete	9	2	Eric	9173745154	eric@rollwala.com	faculty	eric@aiml	$2y$10$gHpe/FQ5AWjosKBZY	favmovie	fast & furious	approved
Edit Copy Delete	10	3	Rohan Mehta	8745965810	rohanmehta@gmail.com	student	rohan_mehta_123	$2y$10$Gc4bFCaAMhr3Yo32e	favbook	memories	pending
Edit Copy Delete	11	3	Jhanvi Thakkar	8714966060	jhanvithakkar@gmail.com	faculty	jhanvi@m3hta	$2y$10$Ur66o64/WXKGbYw/g	favteacher	diksha maam	pending
Edit Copy Delete	12	1	Kajol	9221477854	kajol@yahoo.com	student	kajol@123	$2y$10$5FzNJmOG6EY4khJtF	favmovie	3 idiots	pending

Check all *With selected:* Edit Copy Delete Export

Student



Please select the Subject in which you want to create an Exam:

Select Subject

Select Subject
oocp
dbms

Please select the Topic in which you want to conduct the exam:

Select Topic

Select Topic
array
inheritance

Exam Category : easy

Important Instructions :

---> Read all the questions before attempting them
---> You will have 10 seconds for each question to be answered
---> Read the correct answers of each question after submitting
---> No negative markings are there

Start

Question 2:

A linear collection of data elements where the linear node is given by means of pointer is called_____

?Linked list

?Node list

Primitive list

Unordered list

Submit

Question 2:

A linear collection of data elements where the linear node is given by means of pointer is called_____

?Linked list

?Node list

Primitive list

Unordered list

Next

Correct Answer: ?Linked list

Exam ID	Out of 10
1	13

Exam Category : hard

Exam ID	Out of 10
2	4

Home

Your Progress

Name	Course	Subject	Topic	Exam ID	Date	Result ID	Total Marks
Parin Dhavalbhai Makwana	msccs	oocp	array	1	2024-06-07 18:21:34	1	13
Parin Dhavalbhai Makwana	msccs	oocp	array	2	2024-06-07 18:28:14	2	4

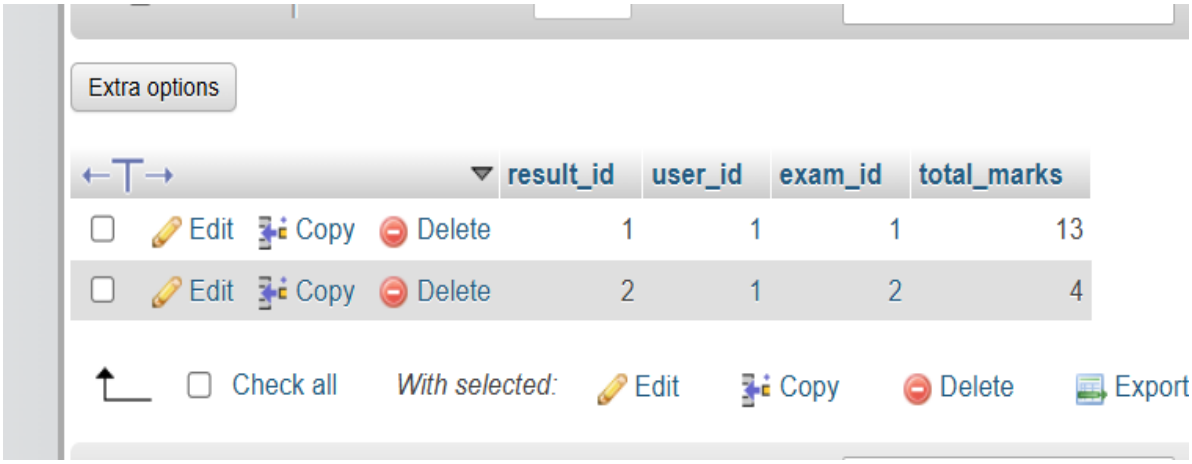
1

Extra options

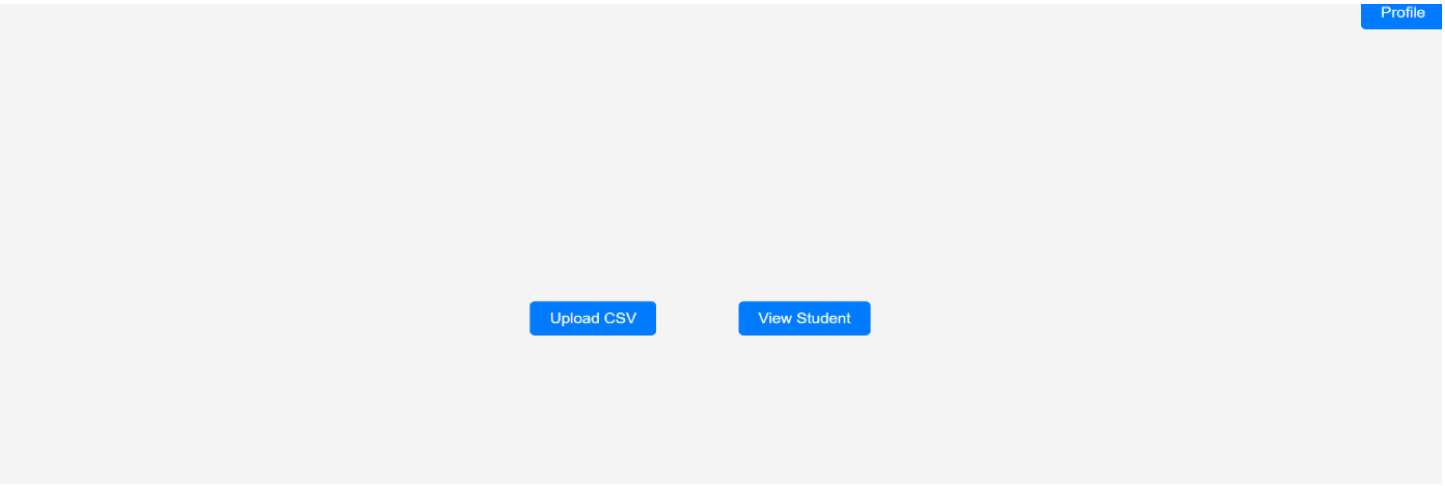
	exam_id	user_id	course_id	subject_id	topic_id	exam_date
Edit Copy Delete	1	1	1	1	1	2024-06-07 18:21:34
Edit Copy Delete	2	1	1	1	1	2024-06-07 18:28:14

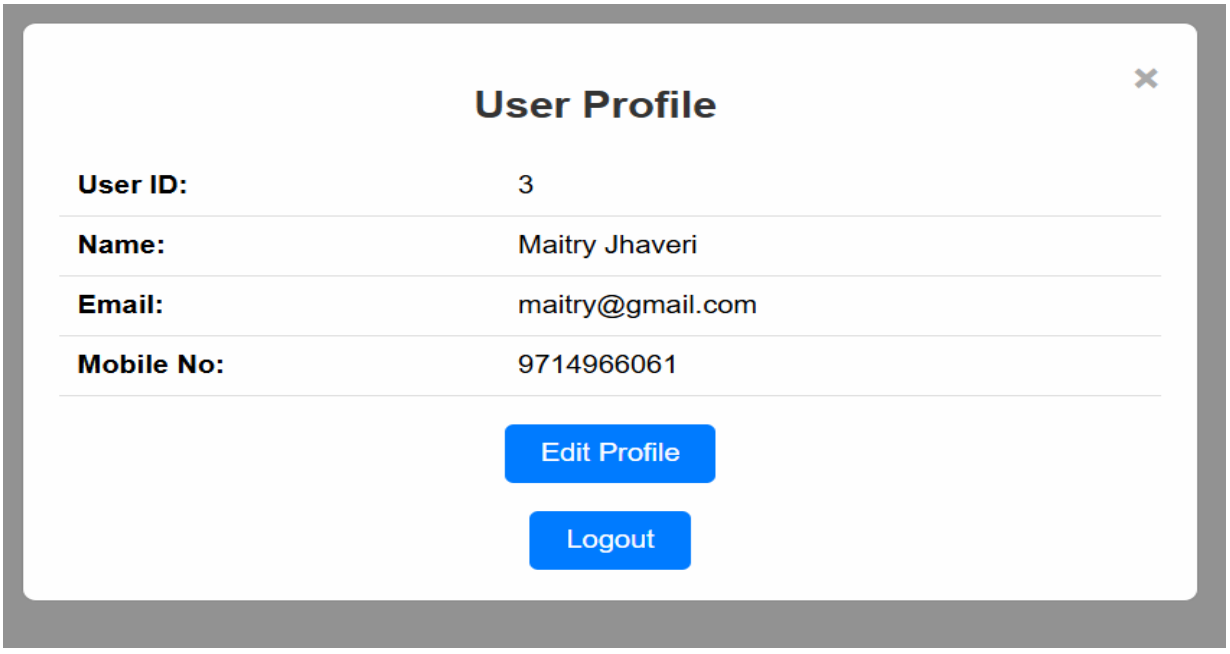
Check all *With selected:* Edit Copy Delete Export

	exam_mcq_id	exam_id	mcq_id	user_answer	user_answer_marks
Delete	1	1	132	*NULL*	0
Delete	2	1	130	Primitive list	0
Delete	3	1	107	All of the above	1
Delete	4	1	140	10 20	1
Delete	5	1	108	It does not store data and is used as a placeholde...	1
Delete	6	1	56	A data structure representing an element in the li...	1
Delete	7	1	90	It simplifies certain algorithms like round-robin ...	1
Delete	8	1	18	Null pointer is returned	1
Delete	9	1	76	*	1
Delete	10	1	112	previous; next	1
Delete	11	1	111	data; next	1
Delete	12	1	109	Storing the length in the first node	1
Delete	13	1	136	sentinel	1
Delete	14	1	113	deletion at the beginning	1
Delete	15	1	28	Linked lists require manual memory management	1
Delete	16	2	45	*NULL*	0
Delete	17	2	27	*NULL*	0
Delete	18	2	42	*NULL*	0
Delete	19	2	49	heap sort	0
Delete	20	2	23	It improves memory allocation efficiency	0
Delete	21	2	19	It degrades performance	1
Delete	22	2	16	Memory fragmentation	0
Delete	23	2	57	Deletion at the end	0



Faculty


Profile
Upload CSV
View Student


User Profile
User ID: 3
Name: Maitry Jhaveri
Email: maitry@gmail.com
Mobile No: 9714966061
Edit Profile
Logout

Change Name if you want

Mobile No.

9714966061

Change Mobile No. if you want

Email id.

maitry@gmail.com

Change Email if you want

Choose Course

MSCCS

Change Course if you want.

PassKey if you forget the Password

Fav Book

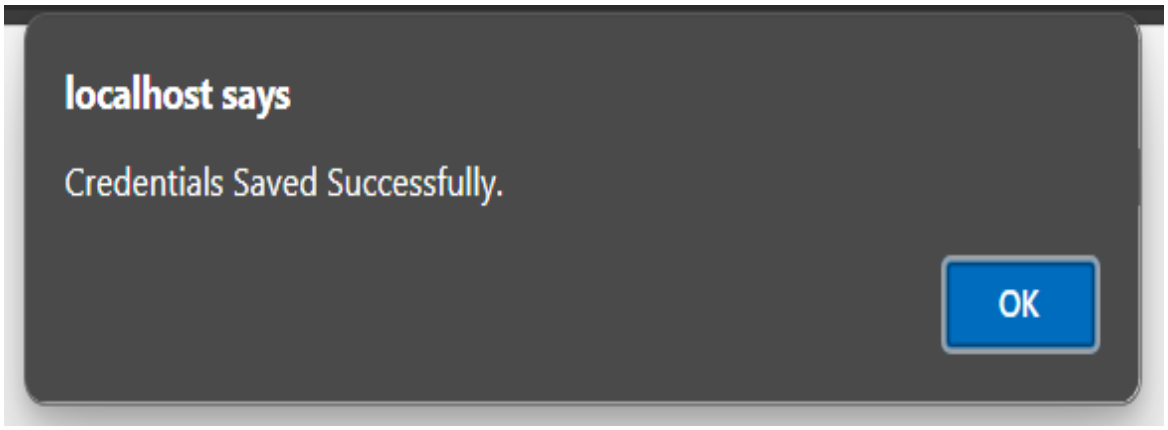
Change Passkey if you want

PassKey Value

c++

Change Passkey value if you want.

Save



Home

Student Details

Name	Course	Subject	Topic	Exam ID	Date	Result ID	Total Marks
Parin Dhavalbhai Makwana	msccs	oocp	array	1	2024-06-07 18:21:34	1	13
Parin Dhavalbhai Makwana	msccs	oocp	array	2	2024-06-07 18:28:14	2	4

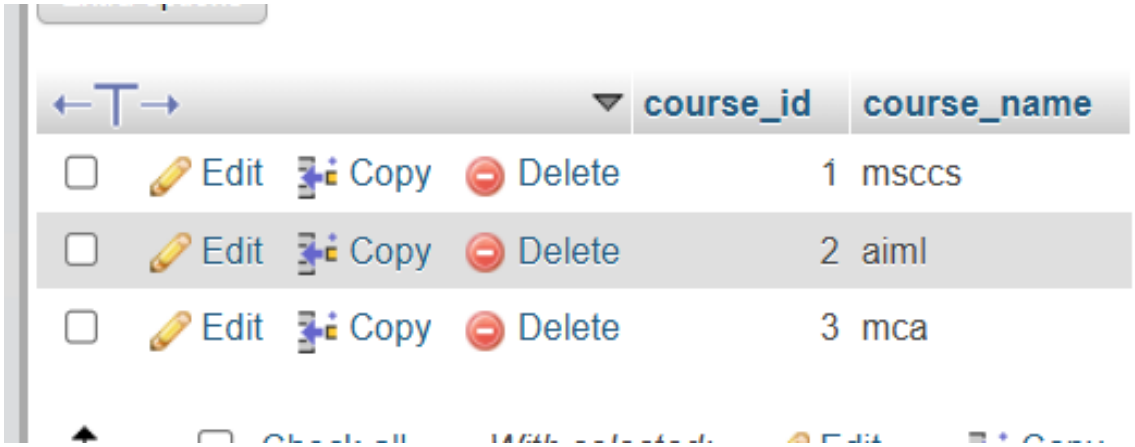
1

Upload CSV

Please select the course in which you want to upload a CSV file:

--- Choose a Course ---

Go



Please select the Subject in which you want to upload a CSV file:

oocp

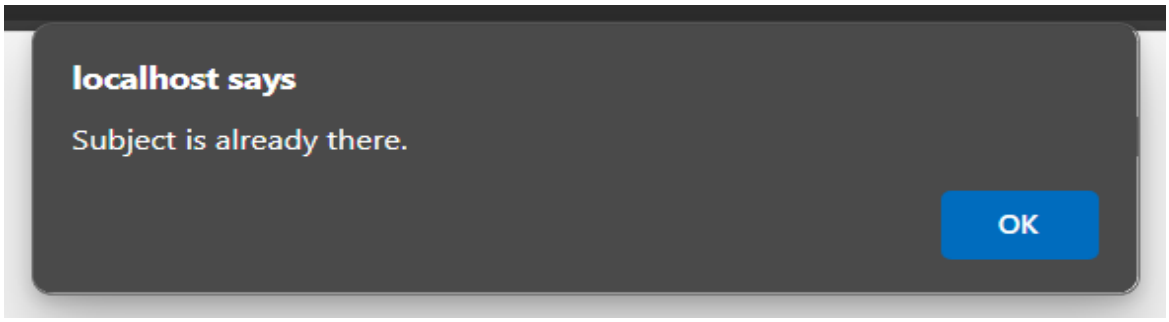
Submit

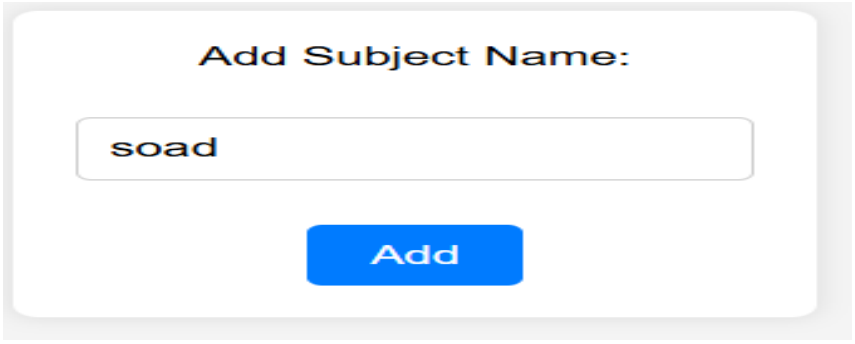
Want to Add More Subject???

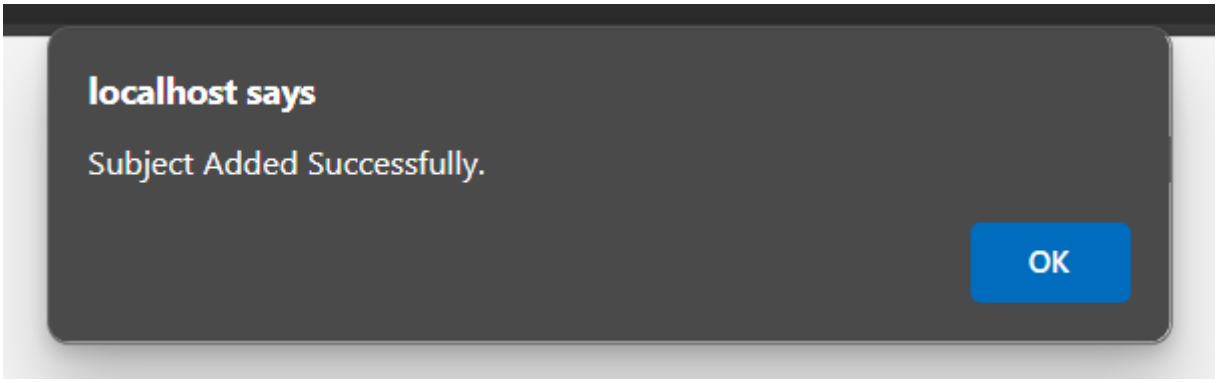
Add Subject Name:

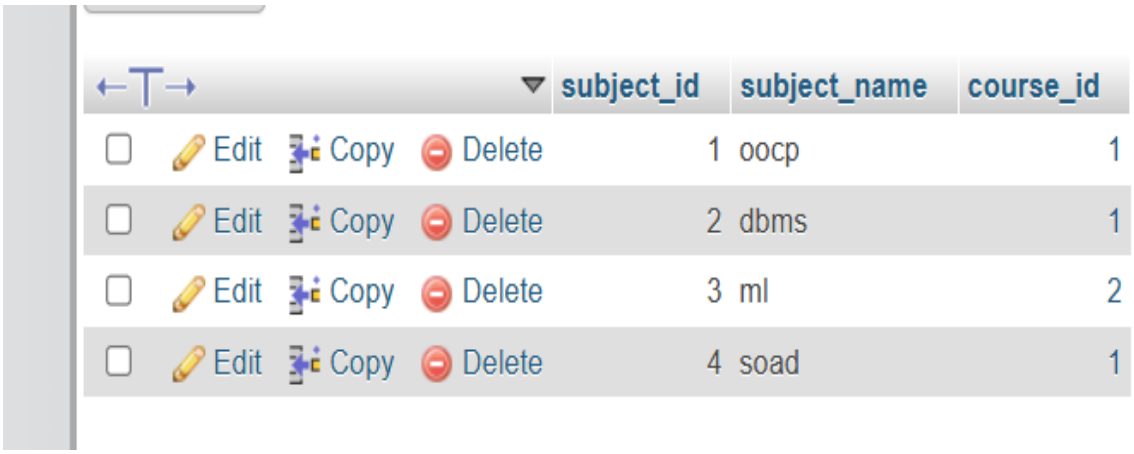
oocp

Add









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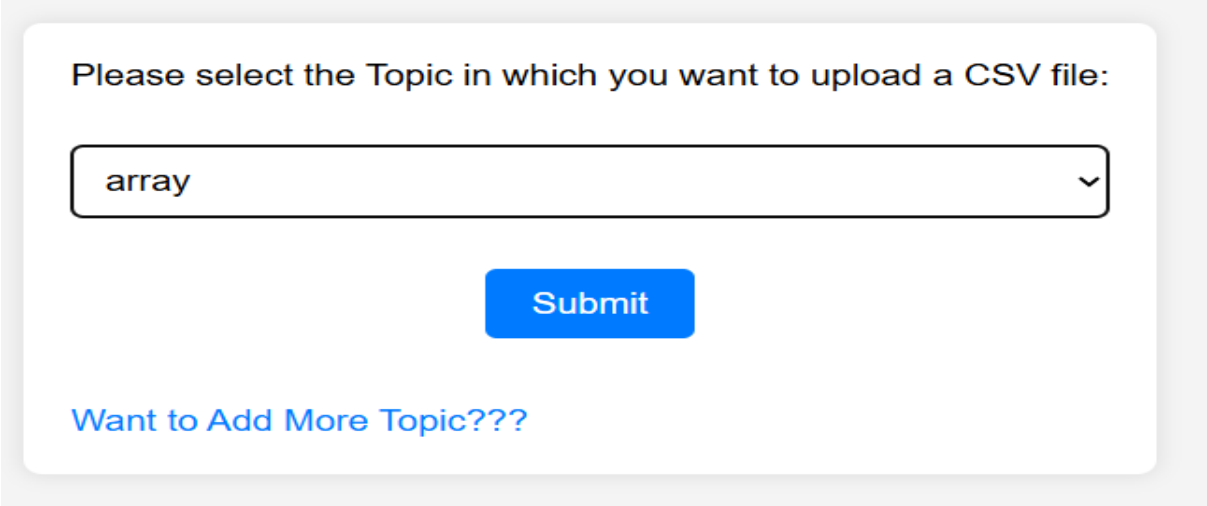
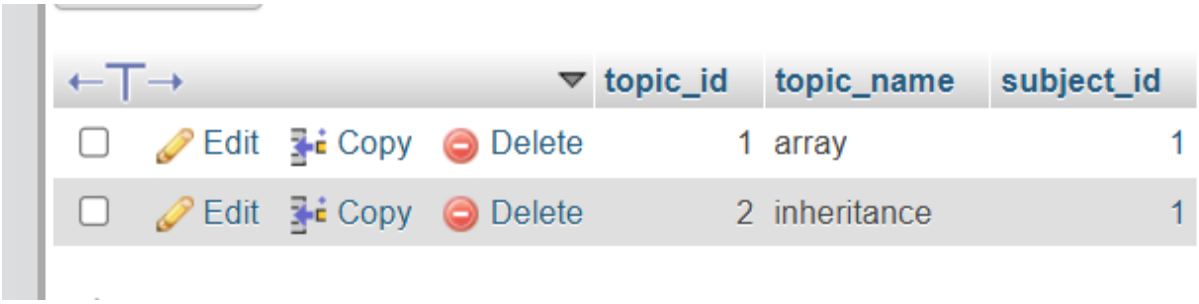
Edit Copy Delete	2	dbms	1
Edit Copy Delete	3	ml	2
Edit Copy Delete	4	soad	1





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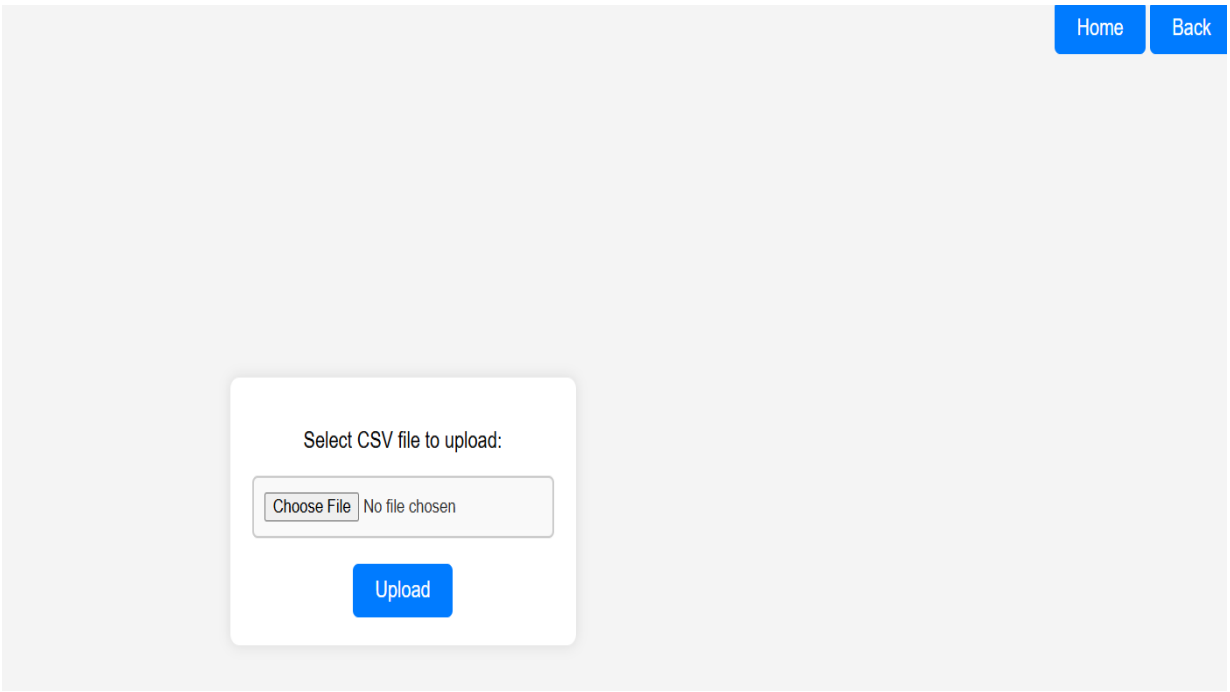
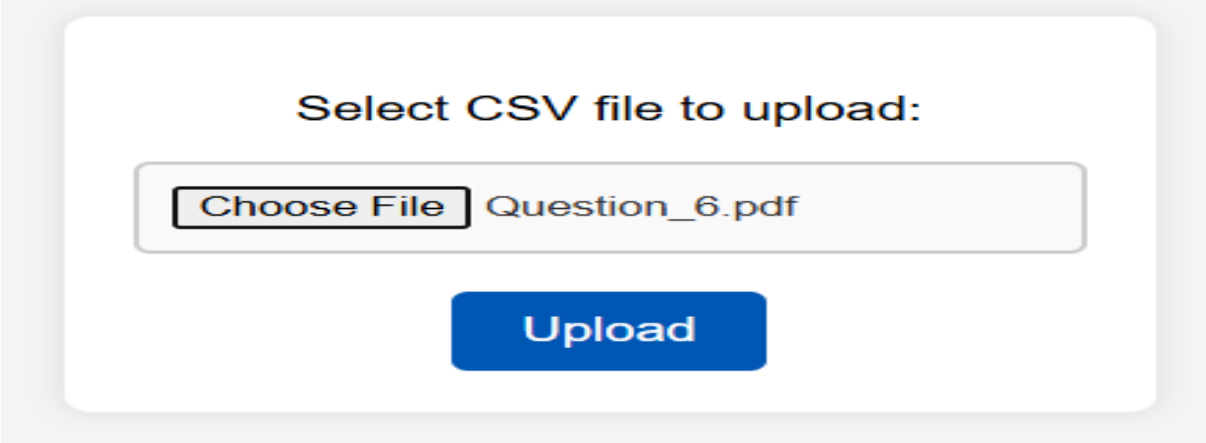
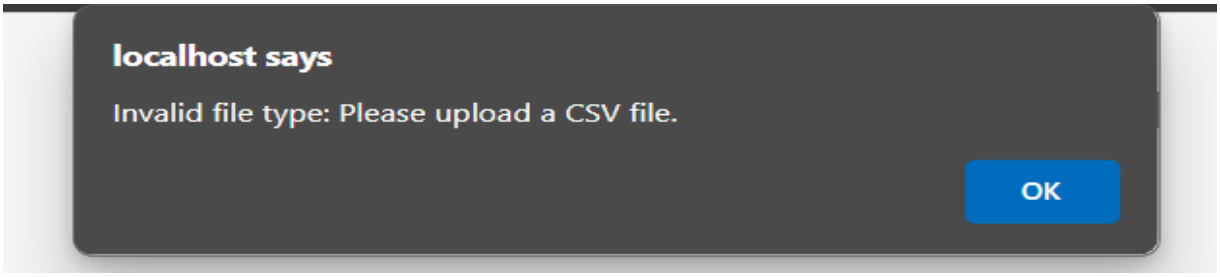
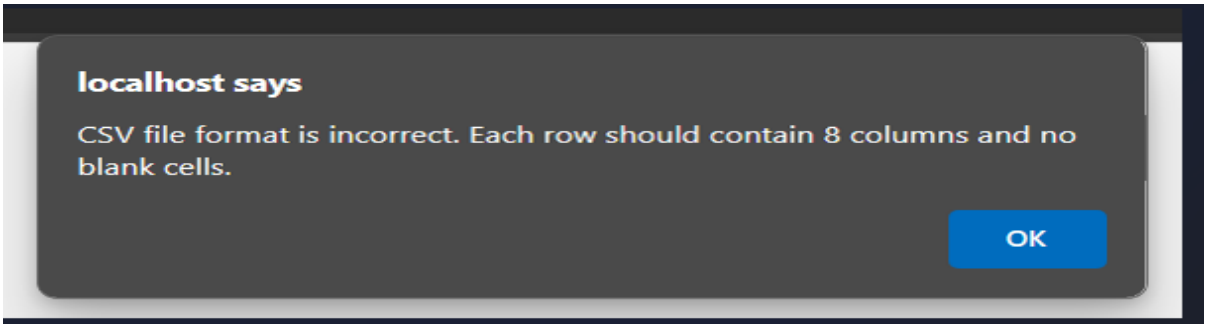


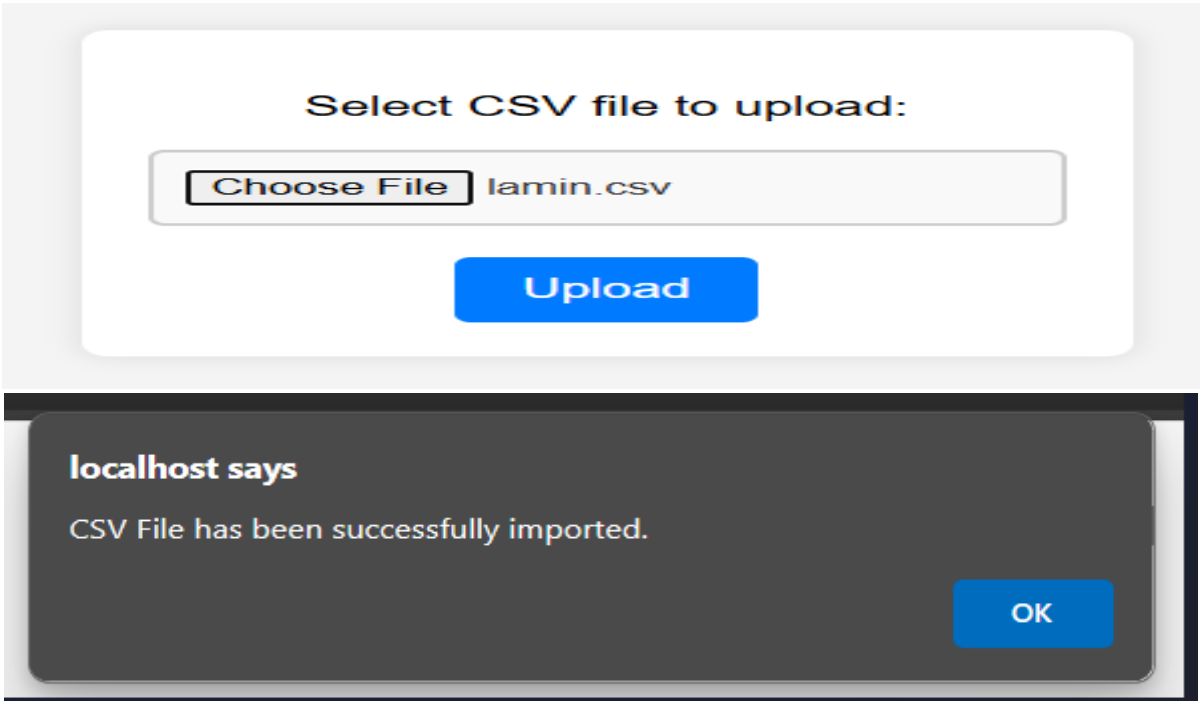
If CSV is not in proper extension





If CSV contains any blank cell





mcq_id	topic_id	question	option1	option2	option3	option4	correct_answer	question_category	difficulty_l
1	1	What is a linked list?	A linear data structure	A sorting algorithm	A type of tree structure	A database query language	A linear data structure	memorybased	easy
2	1	Which of the following is true about a singly link...	Each node has two pointers	Traversal can only be done in one direction	It requires less memory than a doubly linked list	Deletion at the middle requires O(1) time complexi...	Traversal can only be done in one direction	memorybased	easy
3	1	What is the time complexity of inserting a node at...	O(1)	O(log n)	O(n)	O(n log n)	O(1)	memorybased	medium
4	1	Which of the following is not an advantage of a li...	Dynamic size	Ease of insertion/deletion at any position	Random access of elements	Efficient memory utilization	Random access of elements	memorybased	medium
5	1	What is the purpose of a tail pointer in a linked ...	It points to the previous node	It points to the next node	It points to the last node	It points to the first node	It points to the last node	memorybased	easy
6	1	In a circular linked list, how does the last node ...	NULL pointer	It points to the previous node	it points to a special marker indicating the end	it directly points to first node	it directly points to first node	understanding	medium
7	1	Which type of linked list allows traversal in both...	singly linked list	doubly linked list	circular linked list	skip list	doubly linked list	memorybased	easy
8	1	What is a dummy node in a linked list?	A node with null pointers	A node with data equal to zero	A node used as a placeholder	A node that is disconnected from the list	A node used as a placeholder	memorybased	medium
9	1	How is memory allocated for nodes in a linked list...	Contiguous allocation	Stack allocation	Heap allocation	Global allocation	Heap allocation	memorybased	easy
10	1	Which operation in a linked list has the highest t...	Insertion at the beginning	Insertion at the end	Deletion at the beginning	Deletion at the end	Deletion at the end	understanding	hard
11	1	What is the memory overhead for each node in a sin...	4 bytes	8 bytes	12 bytes	16 bytes	4 bytes	memorybased	hard
12	1	How does memory allocation for nodes in a linked l...	Nodes are allocated contiguously in memory	Nodes are allocated on the stack	Nodes are allocated dynamically on the heap	Nodes are allocated statically	Nodes are allocated dynamically on the heap	memorybased	medium

8. Testing

a. Test cases

Sr. no	Date	Action	Exact Outcome	Expected Outcome	States
1	20/3/24	Login of users	Logged in successfully	Logging in successfully	Pass
2	28/3/24	CSV shouldn't upload if it contains any blank cell in it	CSV went to the database	CSV should not go to the database	Fail
3	29/3/24	CSV shouldn't upload if it contains any blank cell in it	CSV didn't update in the database	CSV shouldn't update in the database	Pass
4	24/4/24	Exams should be created and marks should be displayed	As per the answers given by students, appropriate marks are given	As per the answers given by students, appropriate marks are given	Pass
5	28/4/24	Time constraint given to each question	The question still appears when time is over	The question should skip and instead next question should be fetched	Fail
6	22/5/24	Time constraint should appear for each question	The question gets skipped and instead next question will be displayed.	The question gets skipped and instead next question will be displayed.	Pass

Constraints

Scalability: The system may face challenges in handling a large number of concurrent users, leading to performance issues.

Security: Ensuring data security and protecting against potential vulnerabilities such as SQL injection, cross-site scripting (XSS), and other cyber-attacks.

Integration: Difficulty in integrating with other educational platforms or systems due to varying data formats and standards.

Browser Compatibility: Ensuring consistent functionality across different web browsers and devices may require extensive testing and optimization.

Accessibility: The system is designed such that people with severe disabilities may not be able to use the system effectively..

Internet Dependency: Reliance on stable internet connectivity, which may be a limitation in regions with poor internet infrastructure.

Time: Tight project deadlines may affect the thoroughness of development, testing, and deployment processes.

Future Work

Responsive Design: Enhancing the user interface to ensure a seamless experience across different devices, including smartphones and tablets.

Personalization: Incorporating personalized learning paths and recommendations based on user performance and preferences.

User Feedback: Incorporating user feedback to continuously improve the system's features, usability, and functionality.

Agile Development: Adopting agile development methodologies to ensure continuous delivery of enhancements and new features based on evolving user needs.

Appendix

Survey Questionnaire

1. **How often do you use online examination systems?**
    - Daily
    - Weekly
    - Monthly
    - Rarely

2. **What features do you find most important in an online examination system?**
    - User-friendly interface
    - Secure login
    - Real-time progress tracking
    - Adaptive learning
    - Diverse question formats

3. **Rate your overall satisfaction with online examination systems on a scale of 1 to 5.**
    - 1 (Very Dissatisfied)
    - 2 (Dissatisfied)
    - 3 (Neutral)
    - 4 (Satisfied)
    - 5 (Very Satisfied)

4. **What challenges have you faced using online examination systems?**
    - Technical issues
    - Security concerns
    - Inadequate feedback
    - Limited question types

Example Data in CSV

Question	Opt1	Opt2	Opt3	Opt4	Correct Answer	Category	Difficulty Level
What is a linked list?	**A linear data structure**	**A sorting algorithm**	**A type of tree structure**	**A database query language**	**A linear data structure**	**memorybased**	**easy**
Which of the following is true about a singly linked list?	**Each node has two pointers**	**Traversal can only be done in one direction**	**It requires less memory than a doubly linked list**	**Deletion at the middle requires O(1) time complexity**	**Traversal can only be done in one direction**	**memorybased**	**easy**
What is the time complexity of inserting a node at the beginning of a linked list	**O(1)**	**O(log n)**	**O(n)**	**O(n log n)**	**O(1)**	**memorybased**	**Medium**
What is the memory overhead for each node in a singly linked list in a 32-bit system?	**4 bytes**	**8 bytes**	**12 bytes**	**16 bytes**	**4 bytes**	**memorybased**	**Hard**
In a doubly linked list, the number of pointers affected for an insertion operation will be	**5**	**0**	**1**	**none of the above**	**none of the above**	**understanding**	**Easy**

Technical Specifications

- **Programming Languages**: PHP, JavaScript, HTML, CSS
- **Database**: MySQL
- **Server**: Apache (via XAMPP)
- **Security Measures**: CAPTCHA for login, SSL encryption
- **Browser Compatibility**: Chrome, Firefox, Safari, Edge

User Guide

1. **Registration**: Visit the registration page and fill out the required fields.
2. **Creating an Exam:** Navigate to the 'Create Exam' section, enter the exam details, and add questions.
3. **Taking an Exam**: Go to the 'Take Exam' section, select an exam, and start answering the questions.
4. **Viewing Results**: After completing an exam, go to the 'Results' section to view your performance.

Glossary

- **Self-Assessment:** A system feature allowing users to evaluate their own learning and performance.
- **Iteration**: A cycle in the iterative development model that includes planning, designing, coding, and testing.
- **CAPTCHA**: A security measure to verify that a user is human, preventing automated access.

Bibliography

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