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BÁO CÁO MÔN HỌC

TÊN ĐỀ TÀI: QUIZ EXAMINATION SYSTEM

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Nhóm báo cáo: Nhóm 1

Tp. Hồ Chí Minh, Ngày 4 Tháng 1 Năm 2026

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Abstract

The purpose of this document is to describe the functional and non-functional requirements, design model, and software architecture of the Online Examination System.

This system is designed to facilitate the efficient and secure creation, management, and execution of online multiple-choice exams. It simplifies the management of users, exams, question banks, submissions, and results, ensuring a seamless assessment process.

User Roles

The system provides three main user roles:

Administrator: Responsible for managing user accounts and system-level configuration.

Teacher: Responsible for creating exams, managing question banks, assigning tests to students, and analyzing performance statistics.

Student: Allowed to participate in exams, complete tests, submit papers, and view results and achievement history.

1. FUNCTIONAL REQUIREMENTS

- **User Authentication**

+ The system shall users (Administrator, Teacher, Student) to log in using a username and password.

+ The system shall verifies login credentials and grants access based on user roles.

+ The system shall not provide a self-service “Forgot Password” feature.

+ When users forget their password, they must contact the administrator for password reset.

+ Only the administrator shall be authorized to reset user passwords.

- ***Account Management (Administrator)***

+ The Administrator shall be able to create, delete, and view user accounts for teachers and students.

+ The administrator shall be able to delete existing user accounts.

+ The administrator shall be able to view the list of existing user accounts.

+ The Administrator shall be able to reset any user's password.

+ The Administrator shall be successfully authenticated before performing any account management functions

- **User Profile Management**

+ Users shall be required to change their password upon first login .The changed password shall be at least 8 characters long, including uppercase letters, lowercase letters, numbers, and special characters.

+ Teachers and Students shall be able to change their own passwords after logging into the system.

+ Teachers and student shall be able to update their personal profile information

+ Students shall be able to view their specific examination and assignment history.

- **Exam Preparation (Teacher)**

+ Teachers shall be able to prepare examinations.

+ Teachers shall be able to create new exams.

+ Teachers shall be able to edit existing exams.

+ Teachers shall be able to select exam questions from the exam question archive.

+ Teachers shall be able to set the exam schedule (start time and end time).

+ Teachers shall be able to configure result display policies for examinations

- **Exam Publishing and Access Control**

+ When an exam is published, the system automatically generates an exam access code.

+ Teachers shall not to manually create or modify the exam code.

+ Teachers shall be able to set a room password for the examination.

+ The exam code is shared by the teacher to students through external communication channels.

+ Students shall enter both the exam code and the room password to access the exam.

- **Exam Participation (Student)**

+ Students shall be able to join an exam by entering the exam code.

+ Students shall verify the room password to confirm access.

+ Students shall be able to take the exam within the allowed time.

+ The system automatically submits the exam when the time runs out.

+ Students shall be able to answer exam questions during the exam session.

- **Result and History Management**

+ The system shall automatically calculates exam scores after submission.

+ Students shall be able to view their test results if the teacher allows it to be displayed.

+ Students shall be able to view their exam history.

+ Teachers shall be able to view student exam results.

2. NON-FUNCTIONAL REQUIREMENTS

- **Performance**

+ The system shall support a minimum of 500 concurrent users and a total capacity of over 1,000,000 students participating in the online exam system.

+ While operating at peak load, the system shall maintain a response time of no more than 5 seconds for all user requests.

- **Security**

+ User passwords shall be stored using industry-standard one-way hashing algorithms..

+ Access to system functions shall be restricted based on user roles.

+ Exam access shall be protected by both an exam code and a room password.

- **Admin reset password:**

+ All administrative password reset actions must be logged for auditing purposes.

+ Each audit log record must include the administrator account, target user, timestamp, and reason for the action.

+ Audit logs must be protected from unauthorized modification.

+ Passwords must comply with a strong password policy, including a minimum length of 8 characters and a combination of uppercase letters, lowercase letters, numbers, and special characters.

+ Newly generated passwords are temporary and must be changed by the user upon first login.

- **Usability**

+ Users shall be able to perform their primary roles (e.g., a student taking an exam) after no more than 30 minutes of training or exploration.

+ Experienced users shall encounter an average of no more than 2 errors per hour of system use.

- **Reliability**

+ The system shall automatically save student answers every 30 seconds during an active exam session to prevent data loss.

+ In the event of a minor system failure, the system shall ensure that no submitted exam data is lost.

+ The system shall be able to restart and resume normal operation within 3 minutes after a failure occurs.

+ The system shall provide a warning notification when a student attempts to leave or refresh the exam page during an active exam.

+ The system shall ensure that student answers are not lost in case of page refresh, browser crash, or temporary network interruption during an active exam session.

- **Availability**

+ The system shall achieve an availability level of at least 99.9% during all scheduled examination periods.

+ Planned system maintenance shall be scheduled exclusively outside of established examination windows.

- **Compatibility**

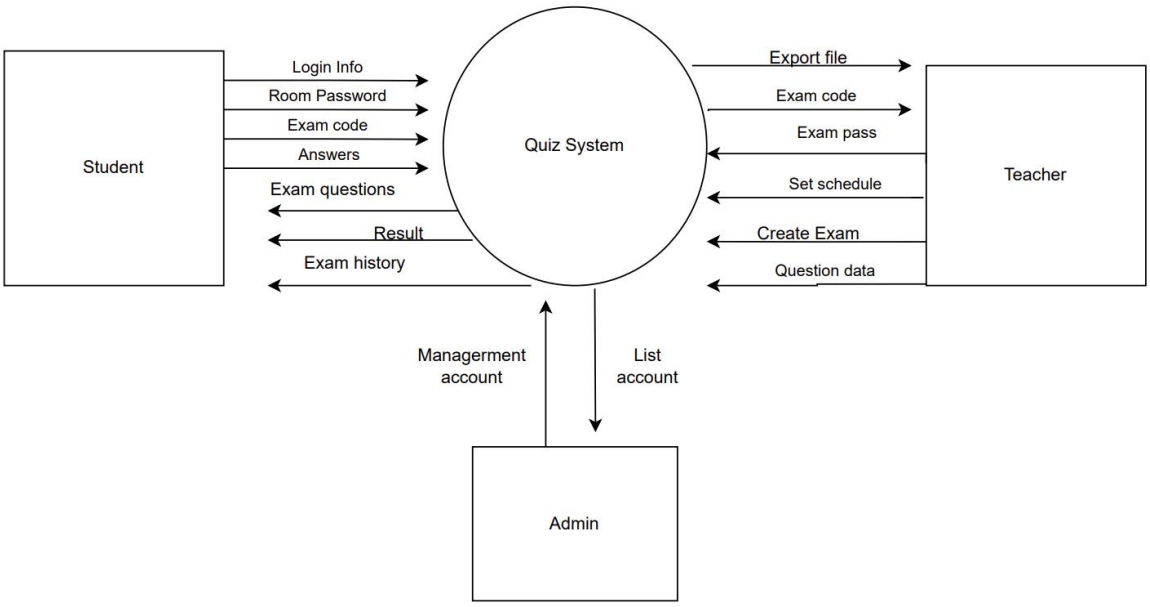
+ The system shall be fully compatible with the current versions of Google Chrome, Mozilla Firefox, and Microsoft Edge browsers on both desktop and laptop computers.

+ The system shall operate entirely within a web browser and shall not require the installation of additional software on the user's device.

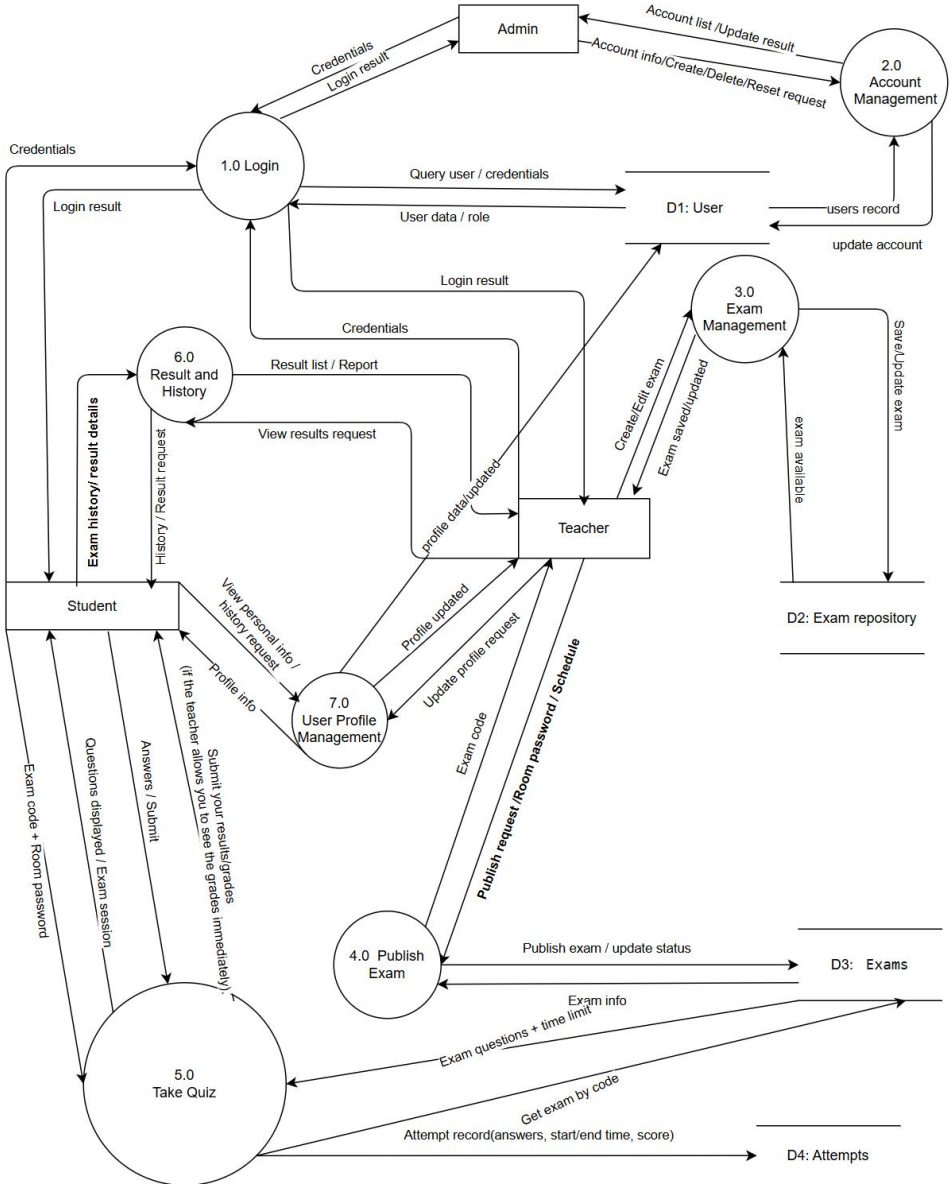
+ The system shall be designed using a modular architecture to allow for maintenance and future functional enhancements without system-wide disruption.

3. DATA FLOW DIAGRAM (DFD)

3.1 DFD level 0



3.2 DFD level 1



4. Use case Diagram

4.1 Overviewdiagram

Assign Exam to Class Section

4.2 List of actor

STT	Actor	Mean
1	**Admin**	Technical administrator responsible for account operations and access control.
2	**Student**	End users participate directly in the online exam process and can view their exam history.
3	**Teacher**	Technical administrators are responsible for account operations and monitoring the user list.

4.3 List of use case

STT	Use Case Name	Mean
1	**Login**	Allows users (Admin, Teacher, Student) to log into the system to access their authorized functions.
2	**Update Profile**	Allows users to update their personal profile and contact information.
3	**View list exist account**	Allows the Admin to view a comprehensive list of all teacher and student accounts currently in the system
4	**Create Account**	Allows the Admin to register new user accounts for Teachers or Students.
5	**Delete Account**	Allows the Admin to remove specific user accounts from the system
6	**Reset Password**	Allows the Admin to manually reset a user's password upon request.
7	**Prepare Exam**	Allows Teachers to create new exams, select questions from the repository, and set exam schedules/policies.
8	**Create Exam**	A mandatory step to design the content of a new test.
9	**Set Exam Schedule**	Defines the specific start and end times for the examination session
10	**Set Result Display Policy**	Configures when and how students can see their scores and answers

11	**Select Exam from Repository**	Allows Teachers to pull existing questions from the question bank
12	**Edit Exam**	Allows Teachers to modify the content of a previously saved exam.
13	**Change PassWord**	This allows students and faculty to change their passwords to something different from the initial admin password.
14	**Delete Exam**	Removes an existing exam from the repository or active list.
15	**View Result**	Displays student performance data to the Teacher.
16	**Filter by Code Section**	Allows Teachers to sort exam results by class or section code.
17	**Export file**	Generates a downloadable report (Excel/PDF) of exam statistics.
18	**Join Quiz**	The entry process for Students to access a specific examination.
19	**Enter Code**	A required step to input the specific alphanumeric exam identifier.
20	**Enter Room Password**	A required security step to verify access to a specific room.
21	**Take The Quiz**	The core interaction where students answer test questions.
22	**Mark The Question**	Allows students to flag a question for later review during the session.
23	**Auto submit**	A system trigger that submits the exam when the time limit expires.
24	**View Assignment History**	Allows students to review their past quiz attempts and results.

1. Use Case: Login

1.1 Summary

1.1 Summary

Allows users (Admin, Teacher, Student) to log into the system using valid account credentials.

1.2 Flow of Events

1.2.1 Main Flow

1. The system displays the Login screen.
2. The user enters username/email and password.
3. The system validates the entered credentials.
4. The system identifies the user role (Admin/Teacher/Student).
5. The system grants access and redirects the user to the corresponding dashboard.

1.2.2 Alternative Flow

Invalid credentials

1. The system displays an error message ("Invalid username or password").
2. The user is allowed to re-enter the credentials.

Forgotten password

1. The user is informed that password recovery is not supported by the system.
2. The user is instructed to contact the Training Office (Admin) to request a password reset.

1.3 Special Requirements

- Password input must be masked.
- User authentication must ensure data security.

1.4 Pre-condition

The user must have a valid and active account created by the system administrator.

1.5 Post-condition

The user is successfully authenticated and an active session is created.

1.6 Extension Point

The Reset Password use case is performed by the Admin upon user request outside the system

2. Use Case: Update Profile

2.1 Summary

This use case allows all users (Admin, Teacher, and Student) to modify their personal contact information and profile details.

2.2 Flow of Events

2.2.1 Main Flow

1. The user opens the "Profile" page.
2. The system displays the user's current profile information.
3. The user edits the desired fields (name, email, phone number, etc.).
4. The system validates the input data (email format and phone number format).
5. If the input is valid, the system saves the updated information to the database.
6. The system displays a confirmation message indicating the update was successful.

2.2.2 Alternative Flow

Invalid input format

1. The system detects an invalid email format or phone number format.
2. The system displays an error message indicating the invalid field(s).
3. The user is requested to correct the input and resubmit

2.2.2 Alternative Flow

1. The system detects an invalid email format or phone number format.
2. The system displays an error message indicating the invalid field(s).
3. The user is requested to correct the input and resubmit

2.3 Special Requirements

None.

2.4 Pre-condition

User is logged in.

2.5 Post-condition

Profile information is updated in database.

2.6 Extension Point

None.

3. Use Case: View List Existing Account (Admin)

3.1 Summary

Allows Admin to view the list of teacher and student accounts.

3.2 Flow of Events

3.2.1 Main Flow

1. Admin selects “User Management”.
2. System displays a list of accounts with basic info (name, role, status).
3. Admin can search, filter by role or keyword.

3.2.2 Alternative Flow

No accounts found:

- The system displays a message (“No data”).

3.3 Special Requirements

If the number of accounts is large, the system should support pagination (optional).

3.4 Pre-condition

Admin is logged in.

3.5 Post-condition

Account list is displayed.

3.6 Extension Point

May lead to Create Account , Delete Account and Reset Password.

4. Use Case: Create Account (Admin)

4.1 Summary

Allows Admin to create new Teacher and Student accounts.

4.2 Flow of Events

4.2.1 Main Flow

1. Admin selects “Create Account”.
2. System displays account creation form.
3. Admin enters required info (name, email, username, role and default password).
4. System validates uniqueness of username, email.
5. System creates the account and shows success.

4.2.2 Alternative Flow

Duplicate username, email

1. The system rejects the request and displays an error message.
2. The Admin updates the information and resubmits.

4.3 Special Requirements

Username, email must be unique.

4.4 Pre-condition

Admin is logged in.

4.5 Post-condition

New account is created and stored.

4.6 Extension Point

None.

5. Use Case: Delete Account (Admin)

5.1 Summary

Allows Admin to remove a user account from the system.

5.2 Flow of Events

5.2.1 Main Flow

1. The Admin selects an account from the account list.
2. The Admin selects the “Delete” function.
3. The system displays a confirmation message.
4. The Admin confirms the deletion action.
5. The system deletes/deactivates the account and updates the list.
6. The system notifies the Admin that the action was successful.

5.2.2 Alternative Flow

Admin cancels

- The system displays an error message

5.3 Special Requirements

The system may store an audit log for deletion actions (optional).

5.4 Pre-condition

Admin is logged in and target account exists.

5.5 Post-condition

If successful, the account is deleted, deactivated. If failed, the account remains unchanged..

5.6 Extension Point

None.

6. Use Case: Reset Password (Admin)

6.1 Summary

Allows Admin to reset a user’s password upon request.

6.2 Flow of Events

6.2.1 Main Flow

1. The Admin selects a user account from the list.

2. The Admin selects the “Reset Password” function.
3. The system generates a temporary password or allows the Admin to set a new password.
4. The system saves the new password.
5. The system notifies the Admin that the password reset was successfu

6.2.2 Alternative Flow

Account not found

- The system displays an error message and aborts the operation.

6.3 Special Requirements

The temporary, new password must meet password complexity rules

6.4 Pre-condition

Admin is logged in. User account exists.

6.5 Post-condition

The user’s password is update

6.6 Extension Poin

None.

7. Use Case: Test Preparation (Teacher)

7.1 Summary

This use case allows the Teacher to prepare an exam by creating content, selecting questions, and configuring exam settings.

7.2 Event Flow

7.2.1 Main Flow

1. The Teacher selects “Prepare Exam”.
2. The system opens the exam preparation workspace.
3. The Teacher creates a new exam or selects an existing exam to edit.
4. The Teacher adds/updates exam information and selects questions from the repository.
5. The Teacher configures exam requirements (e.g., schedule and result display options).
6. The Teacher saves the exam configuration.
7. The system stores the exam and notifies the Teacher that the exam has been saved successfully.

7.2.2 Alternative Flow

Missing required information

- If mandatory fields (e.g., exam title or schedule) are missing, the system displays an error message.
- The Teacher completes the required information and resubmits.

7.3 Special Requests

- The system may automatically save drafts (optional).

7.4 Pre-condition

The Teacher must be logged into the system.

7.5 Post-condition

The exam draft/configuration is saved in the system.

7.6 Extension Point

This use case may lead to **Assign Exam to Class Section**.

8. Use Case: Create Exam (Teacher)

8.1 Summary

This use case allows the Teacher to create a new exam with basic information.

8.2 Flow of Events

8.2.1 Main Flow

1. The Teacher selects “Create Exam”.
2. The system displays an exam information form.
3. The Teacher enters exam information (title, description, duration, etc.).
4. The system validates the input.
5. The system creates an exam draft and notifies the Teacher that creation was successful

8.2.2 Alternative Flow

Invalid input

- If the title is empty or duration is invalid, the system displays an error message.
- The Teacher corrects the information and resubmits.

8.3 Special Requirements

Exam title cannot be empty.

8.4 Pre-condition

Teacher is logged in.

8.5 Post-condition

A new exam draft is created.

8.6 Extension Point

None.

9. Use Case: Set Exam Schedule (Teacher)

9.1 Summary

This use case allows the Teacher to set the exam schedule (start time, end time, or duration)

9.2 Flow of Events

9.2.1 Main Flow

1. Teacher opens “Schedule” settings.
2. Teacher sets start date/time and end date, time (or duration).
3. System validates time constraints.
4. System saves schdu

9.2.2 Alternative Flow

Invalid schedule

- If the end time is earlier than the start time, the system rejects the request and displays an error message.
- The Teacher corrects the schedule and resubmits.

9.3 Special Requirements

Timezone consistency.

9.4 Pre-condition

Exam draft exists.

9.5 Post-condition

Exam schedule is saved.

9.6 Extension Point

None.

10. Use Case: Set Result Display Policy (Teacher)

10.1 Summary

Allows Teacher to configure how/when students can view results (score, answers, review).

10.2 Flow of Events

10.2.1 Main Flow

1. The Teacher opens “Result Policy” settings.

2. The Teacher selects the desired options (show score immediately/after deadline; show answers; show correct answers).
3. The system saves the policy and displays a confirmation message.

10.2.2 Alternative Flow

None.

10.3 Special Requirements

Result policy must be clearly displayed to students.

10.4 Pre-condition

An Exam draft exists.

10.5 Post-condition

Result display policy is saved.

10.6 Extension Point

None.

11. Use Case: Select Exam from Repository (Teacher)

11.1 Summary

Allows teacher to select existing questions/exams from question bank.

11.2 Flow of Events

11.2.1 Main Flow

1. The Teacher opens the question repository.
2. The system displays available questions/exams.
3. The Teacher searches/filters and selects items.
4. The system adds the selected questions to the exam.
5. The system confirms that the selected questions have been added successfully

11.2.2 Alternative Flow

Repository is empty

- The system displays a message ("No questions available").

11.3 Special Requirements

Search, filter by topic, difficulty (optional).

11.4 Pre-condition

The teacher is editing, creating an exam.

11.5 Post-condition

Selected questions are added to exam.

11.6 Extension Point

None.

11. Use Case: Select Exam from Repository (Teacher)

11.1 Summary

Allows Teacher to select existing questions, exams from question bank.

11.2 Flow of Events

11.2.1 Main Flow

1. The teacher opens a repository and question bank.
2. System displays available questions, exams.
3. The teacher filters, searches and selects items.
4. The system adds selected questions to the exam.

11.2.2 Alternative Flow

Repository empty system displays “No questions available”.

1**1.3 Special Requirements**

Search, filter by topic, difficulty (optional).

11.4 Pre-condition

Teacher is editing, creating an exam.

11.5 Post-condition

Selected questions are added to exam.

11.6 Extension Point

None.

12. Use Case: Edit Exam (Teacher)

12.1 Summary

Allows Teacher to modify an existing saved exam.

12.2 Flow of Events

12.2.1 Main Flow

1. The Teacher selects an exam from the exam list.
2. The system loads the exam content and current settings.
3. The Teacher edits questions and/or exam settings.
4. The Teacher saves the changes.
5. The system validates the updates and stores the new version of the exam.
6. The system notifies the Teacher that the exam has been updated successfully.

12.2.2 Alternative Flow

Teacher cancels editing

- The system aborts the operation and no changes are saved.

Invalid updates

- If edited content is invalid (e.g., missing title, invalid duration), the system displays an error message.
- The Teacher corrects the information and resubmits.

12.3 Special Requirements

- Only the exam creator is authorized to edit the exam.
- Versioning may be supported (optional).

12.4 Pre-condition

The exam must exist and belong to the Teacher.

12.5 Post-condition

If successful, the exam is updated. If failed/cancelled, the exam remains unchanged.

12.6 Extension Point

None.

13. Use case Change PassWord

13.1 Summary

This use-case allows authenticated users (Students and Teachers) to change their current password in order to maintain account security.

13.2 Flow of Events

13.2.1 Main Flow

1. The use-case begins when the user selects the Change Password function.
   The system displays the change password form.
2. The user enters the current password, a new password, and confirms the new password.
3. The system verifies that the current password is correct.
4. The system validates the new password according to security rules.
5. The system updates the user's password successfully.
6. The system notifies the user that the password has been changed successfully.

13.2.2 Alternative Flows

- If the current password is incorrect, the system displays an error message and requests re-entry.

- If the new password and confirmation do not match, the system displays an error message.
- If the new password does not meet security requirements, the system rejects the request.

13.3 Special Requirements

The new password must meet the system's security policy (minimum length, character requirements, etc.).

Password information must be encrypted during processing and storage.

13.4 Pre-condition

- The user must be logged into the system.
- The user account must be active.

13.5 Post-condition

- If the use-case is successful, the user's password is updated in the system.
- If the use-case fails, the user's password remains unchanged.

13.6 Extension Points

This use-case may be extended with additional security features such as password strength indicators or forced password expiration policies.

14. Use case Delete Exam

14.1 Summary

This use-case allows the Teacher to delete an existing exam from the system when the exam is no longer needed or should not be available to students.

14.2 Flow of Events

14.2.1 Main Flow

1. The use-case begins when the Teacher selects the Delete Exam function.
2. The system displays a list of existing exams created by the Teacher.
3. The Teacher selects an exam to delete.
4. The system displays a confirmation message to verify the deletion request.
5. The Teacher confirms the deletion action.
6. The system removes the selected exam from the exam repository.
7. The system notifies the Teacher that the exam has been deleted successfully.

14.2.2 Alternative Flows

- If the Teacher cancels the deletion request, the system aborts the operation and no changes are made.

- If the selected exam does not exist or is already deleted, the system displays an error message.

14.3 Special Requirements

- The system must ensure that only the exam creator is authorized to delete the exam.
- The system must prevent deletion of exams that are currently active or in progress.

14.4 Pre-condition

- The Teacher must be logged into the system.
- The exam must exist in the system and belong to the Teacher.

14.5 Post-condition

- If the use-case is successful, the selected exam is permanently removed from the system.
- If the use-case fails, the exam remains unchanged.

14.6. Extension Points

- This use-case may be extended to support soft deletion or exam recovery features in the future.

15.Use case View Result

15.1 Summary

This use-case allows the Teacher to view students' examination results in order to evaluate performance and review scores after an exam is completed.

15.2 Flow of Events

15.2.1 Main Flow

1. The use-case begins when the Teacher selects the View Result function.
2. The system displays a list of exams created by the Teacher.
3. The Teacher selects an exam to view results.
4. The system retrieves student performance data related to the selected exam.
5. The system displays the exam results, including student scores and submission status.
6. The Teacher reviews the displayed results.

15.2.2 Alternative Flows

- If no students have submitted the exam, the system displays a notification indicating that no results are available.
- If the selected exam does not exist, the system displays an error message.

15.3 Special Requirements

- The system must ensure that only authorized Teachers can view exam results.
- Result data must be displayed accurately and completely.

15.4 Pre-condition

- The Teacher must be logged into the system.
- The selected exam must exist and have at least one student attempt or submission.

15.5 Post-condition

- The system displays the exam results to the Teacher.
- No system data is modified during this use-case.

15.6 Extension Points

- This use case can be extended to allow code filtering to view results or exporting results to a file.

16. Use-case Filter by Code Section

16.1 Summary

This use-case allows the Teacher to filter examination results based on a specific exam code or section code in order to quickly analyze results.

16.2 Flow of Events

16.2.1 Main Flow

1. The use-case begins when the Teacher selects the Filter by Code Section option while viewing exam results.
2. The system displays a field for entering the exam code or section code.
3. The Teacher enters the desired code.
4. The system validates the entered code.
5. The system filters the exam results according to the provided code.
6. The system displays the filtered results to the Teacher.

16.2.2 Alternative Flows

- If the entered code is invalid or does not match any exam section, the system displays a notification indicating that no results were found.
- If the Teacher cancels the filtering operation, the system returns to the full result view.

16.3 Special Requirements

- The system must ensure accurate filtering of results based on the provided code.
- Filtering should be performed efficiently to maintain system performance.

16.4 Pre-condition

- The Teacher must be logged into the system.
- Exam results must be available in the system.

16.5 Post-condition

- Filtered exam results are displayed to the Teacher.
- No exam data is modified during this use-case.

16.6 Extension Points

- This use-case, may be extended to support filtering criteria such as date range or score range.

17. Use-case Export File

17.1. Summary

This use-case allows the Teacher to export examination results and reports into external file formats for record keeping and further analysis.

17.2 Flow of Events

17.2.1 Main Flow

1. The use-case begins when the Teacher selects the Export File function.
2. The system displays available export file formats (e.g., Excel, PDF).
3. The Teacher selects the desired file format.
4. The system retrieves the corresponding examination results.
5. The system generates the file based on the selected format.
6. The system allows the Teacher to download the generated file.

17.2.2 Alternative Flows

- If no examination results are available, the system displays a notification indicating that there is no data to export.
- If the file generation fails, the system displays an error message.

17.3 Special Requirements

- Exported files must accurately reflect the examination results stored in the system.
- The system must ensure data integrity during the file generation process.

17.4 Pre-condition

- The Teacher must be logged into the system.
- Examination results must exist in the system.

17.5 Post-condition

- The examination results are successfully exported into a file.
- No examination data within the system is modified.

17.6 Extension Points

- This use-case may be extended to support additional file formats or automated report generation in the future.

18. Use-case Join Quiz

18.1 Summary

This use-case allows a Student to join an examination session by entering a valid exam code and room password provided by the Teacher.

18.2 Flow of Events

18.2.1 Main Flow

1. The use-case begins when the Student selects the **Join Quiz** function.
2. The system displays the exam access form.
3. The Student enters the exam code.
4. The Student enters the room password.
5. The system validates the exam code and room password.
6. If the information is valid, the system grants the Student access to the examination session.

18.2.2 Alternative Flows

- If the exam code is invalid, the system displays an error message indicating that the code is incorrect.
- If the room password is incorrect, the system displays an error message.
- If the exam is not within the allowed examination time window, the system denies access.
- If the Student cancels the operation, the use-case ends without any changes.

18.3 Special Requirements

- The system must ensure secure validation of the exam code and room password.
- Only students with valid access credentials are allowed to join the exam session.

18.4 Pre-condition

- The Student must be logged into the system.
- The exam must be published and available for participation.

18.5 Post-condition

- If successful, the Student is admitted into the exam session.

- The system prepares and displays the examination questions for the Student.

18.6 Extension Points

- This use-case may be extended by the **Take The Quiz** use-case.

19. Use Case: Entering a Code

19.1 Summary

This use case allows students to enter an exam code to verify access to a specific exam session.

19.2 Event Flow

19.2.1 Main Flow

1. The use case begins when the student selects the "Enter Code" function.
2. The system displays the exam code entry field.
3. The student enters the exam code provided by the teacher.
4. The system validates the entered exam code.
5. If the exam code is valid, the system proceeds to the exam room password verification step.

19.2.2 Alternative Flows

- If the entered exam code is invalid, the system displays an error message and prompts the student to re-enter the code.
- If the student cancels the operation, the use case ends without any changes.

19.3 Special Requirements

- The system must ensure secure exam code validation.
- The verification of the exam code must be handled efficiently to avoid delays.

19.4 Prerequisites

The exam must be published and operational.

19.5 Conditions after execution

- If successful, the exam code will be accepted and the system will allow the student to proceed to the next verification step.
- If unsuccessful, access will be denied.

19.6 Extensions

This use case can be extended with the Room Password Entry use case.

20. Use-case Enter Room Password

20.1 Summary

This use-case allows a Student to enter the room password to complete the exam access verification process and gain permission to start the examination.

20.2 Flow of Events

20.2.1 Main Flow

1. The use-case begins after the Student has successfully entered a valid exam code.
2. The system displays the room password input field.
3. The Student enters the room password provided by the Teacher.
4. The system validates the entered room password.
5. If the room password is correct, the system grants the Student access to the examination session.

20.2.2 Alternative Flows

- If the room password is incorrect, the system displays an error message and requests the Student to re-enter the password.
- If the Student cancels the operation, the use-case ends without any changes.

20.3 Special Requirements

- The room password must be securely processed and protected by the system.
- Multiple incorrect password attempts may be limited to prevent unauthorized access.

20.4 Pre-condition

- The Student must be logged into the system.
- A valid exam code must have been entered successfully.
- The exam must be published and available.

20.5 Post-condition

- If successful, the Student is authenticated for the exam session.
- The system prepares the exam environment for the Student.

20.6 Extension Points

- This use-case may be extended by the **Take The Quiz** use-case.

21. Use-case Take The Quiz

21.1. Summary

This use-case allows a Student to answer examination questions within the allocated time after successfully joining the exam session.

21.2. Flow of Events

21.2.1. Main Flow

1. The use-case begins when the Student has successfully entered the exam session.
2. The system displays the examination questions along with the remaining time.
3. The Student selects answers for the questions.
4. The system periodically saves the Student's answers during the exam session.
5. The Student may navigate between questions and modify answers.
6. The Student submits the exam before the time limit expires.
7. The system records the Student's answers and submission time.
8. The system confirms that the exam has been submitted successfully.

21.2.2 Alternative Flows

- If the Student refreshes the page, closes the browser, or experiences a temporary network interruption during the exam, the system automatically saves the Student's current answers.
- When the Student returns to the exam within the allowed time, the system restores the previous exam state and allows the Student to continue the exam.
- If the Student attempts to leave or refresh the exam page during the exam, the system displays a warning message informing the Student that leaving the page may affect the exam process.
- If the Student does not submit the exam before the time limit expires, the system automatically submits the exam.

21.3 Special Requirements

- The system must accurately track the remaining examination time.
- The system must automatically save student answers at regular intervals during the exam session.
- The system shall provide a warning notification when a Student attempts to refresh or leave the exam page.
- Student answers must be securely stored to prevent data loss.

21.4 Pre-condition

- The Student must be logged into the system.
- The Student must have successfully joined the exam session using a valid exam code and room password.
- The exam session must be active.

21.5 Post-condition

- If submitted successfully, the Student's answers are stored in the system.

- The exam attempt is marked as completed.
- The Student is redirected according to the configured result display policy.

21.6 Extension Points

- This use-case may be extended by the **Mark The Question** use-case.
- This use-case may be extended by the **Auto Submit** use-case.

22. Use-case Mark The Question

22.1 Summary

This use-case allows a Student to mark one or more questions during an examination session in order to review them later before final submission.

22.2 Flow of Events

22.2.1 Main Flow

1. The use-case begins while the Student is taking the exam.
2. The system displays the current question.
3. The Student selects the **Mark Question** option.
4. The system marks the selected question for review.
5. The system visually indicates that the question has been marked.
6. The Student continues answering other questions.

22.2.2. Alternative Flows

- If the Student unmarks a previously marked question, the system removes the mark.
- If the Student refreshes the page or temporarily leaves the exam page, the system restores the marked status when the exam is resumed.

22.3 Special Requirements

- The system must save the marked status of questions during the exam session.
- Marking or unmarking a question must not affect the student's answers or exam timing.

22.4 Pre-condition

- The Student must be actively taking an exam.

22.5 Post-condition

- The selected question is marked or unmarked for later review.
- The Student can easily identify marked questions during the exam.

22.6 Extension Points

- This use-case may be extended by the **Take The Quiz** use-case.

23. Use-case Auto Submit

23.1 Summary

This use-case allows the system to automatically submit a student's exam when the allotted examination time expires.

23.2 Flow of Events

23.2.1 Main Flow

1. The use-case is triggered when the examination time reaches its limit.
2. The system automatically collects the Student's current answers.
3. The system submits the exam on behalf of the Student.
4. The system records the submission time and saves the exam attempt.
5. The system notifies the Student that the exam has been automatically submitted.

23.2.2 Alternative Flows

- If a temporary system interruption occurs at the moment of submission, the system attempts to retry the submission process automatically.
- If some answers were not saved immediately before time expiration, the system submits the most recently saved answers.

23.3 Special Requirements

- The system must ensure that automatic submission is executed reliably and without data loss.
- Auto submit must occur immediately when the exam time expires, without requiring any user interaction.

23.4 Pre-condition

- The Student must be actively taking the exam.
- The examination session must be active and time-limited.

23.5 Post-condition

- The Student's exam attempt is submitted and marked as completed.
- The Student is no longer allowed to modify answers after submission.

23.6 Extension Points

- This use-case may be extended from the **Take The Quiz** use-case.

24. Use-case View Assignment History

24.1 Summary

This use-case allows a Student to view their past examination attempts, including submission status, scores, and basic exam information.

24.2 Flow of Events

24.2.1 Main Flow

1. The use-case begins when the Student selects the **View Assignment History** function.
2. The system retrieves the Student's examination history from the database.
3. The system displays a list of past exam attempts, including exam name, submission date, and score (if available).
4. The Student reviews the displayed history details.

24.2.2 Alternative Flows

- If the Student has no previous exam attempts, the system displays a message indicating that no history is available.
- If result visibility is restricted by the exam policy, the system hides scores and displays only permitted information.

24.3 Special Requirements

- The system must ensure that students can view only their own examination history.
- Examination history data must be displayed accurately and securely.

24.4 Pre-condition

The Student must have at least one completed or recorded exam attempt.

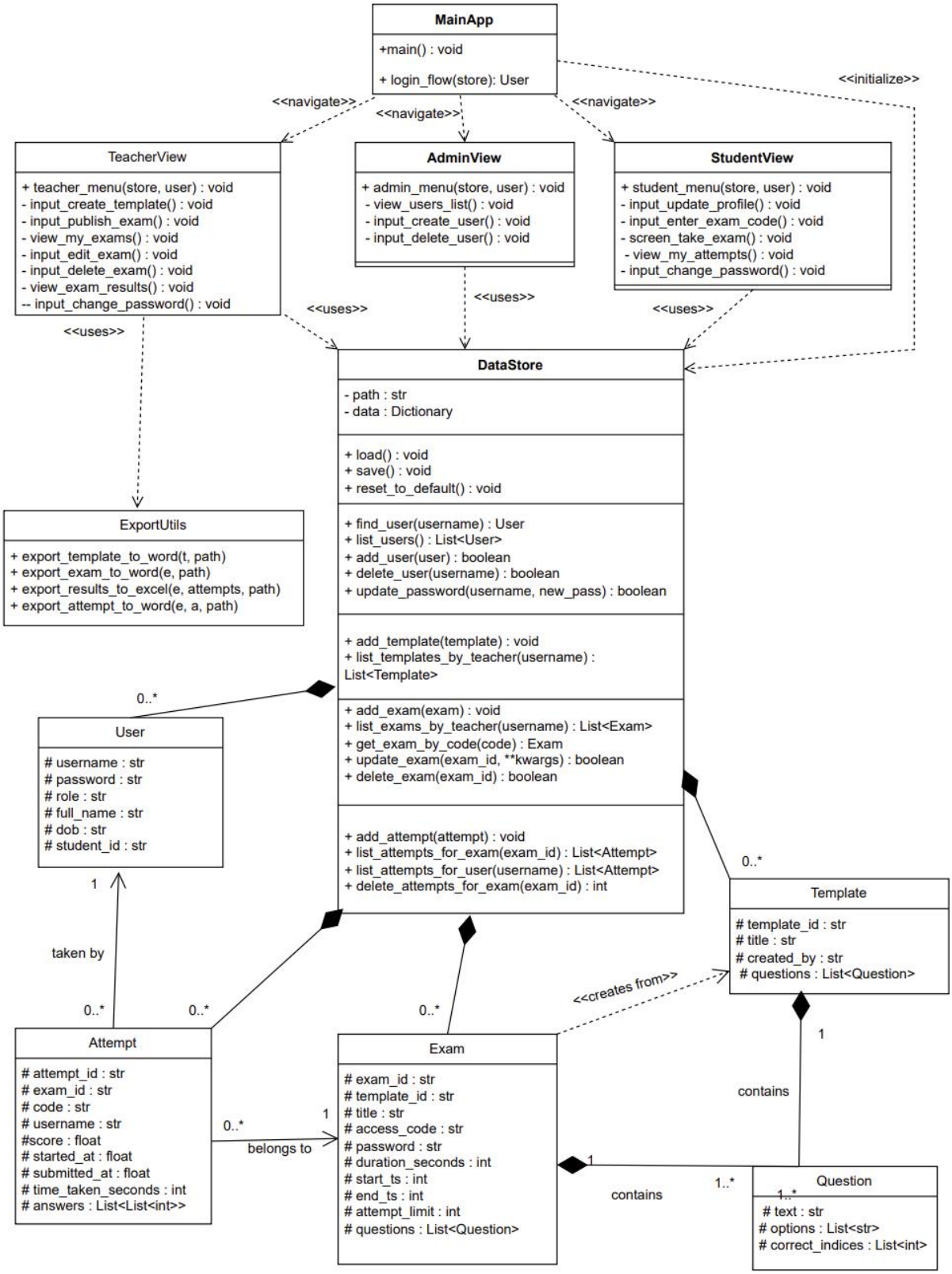
24.5 Post-condition

- The Student's assignment history is displayed.
- No examination data is modified during this use-case.

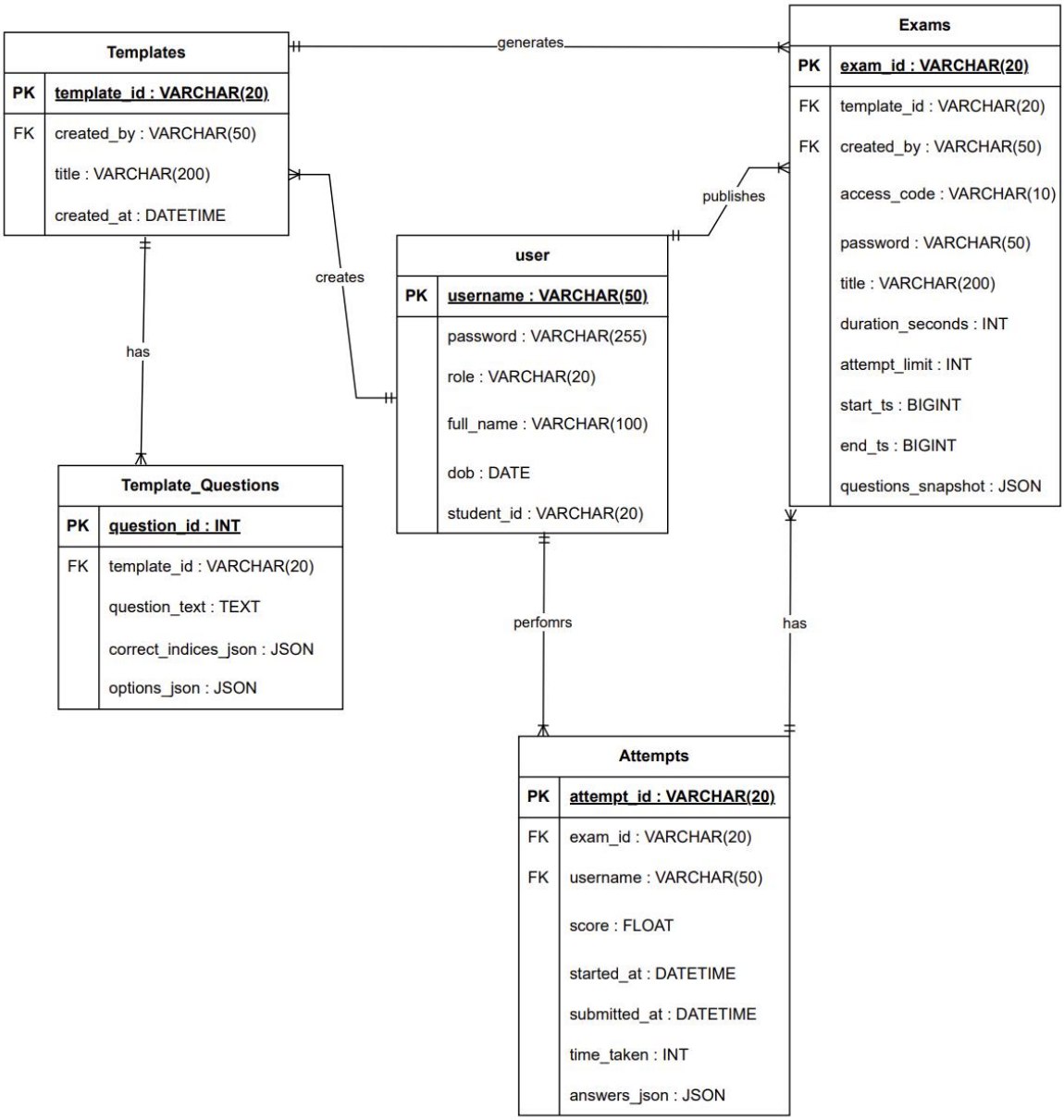
24.6 Extension Points

None.

5. CLASS DIAGRAM



6.DATA MODEL.


Templates
PK template_id : VARCHAR(20)
FK created_by : VARCHAR(50)
title : VARCHAR(200)
created_at : DATETIME
generates
Exams
PK exam_id : VARCHAR(20)
FK template_id : VARCHAR(20)
FK created_by : VARCHAR(50)
access_code : VARCHAR(10)
password : VARCHAR(50)
title : VARCHAR(200)
duration_seconds : INT
attempt_limit : INT
start_ts : BIGINT
end_ts : BIGINT
questions_snapshot : JSON
publishes
creates
user
PK username : VARCHAR(50)
password : VARCHAR(255)
role : VARCHAR(20)
full_name : VARCHAR(100)
dob : DATE
student_id : VARCHAR(20)
has
Template_Questions
PK question_id : INT
FK template_id : VARCHAR(20)
question_text : TEXT
correct_indices_json : JSON
options_json : JSON
perfomrs
has
Attempts
PK attempt_id : VARCHAR(20)
FK exam_id : VARCHAR(20)
FK username : VARCHAR(50)
score : FLOAT
started_at : DATETIME
submitted_at : DATETIME
time_taken : INT
answers_json : JSON

7. INTERFACE DESIGN DESCRIPTION

1. Global Layout & Style

Window Size: 1280x800 (Responsive, min-size 1180x760).

Typography: "Segoe UI" (Clean, sans-serif).

Headings: Bold, sizes 18-24.

Body text: Size 10-12.

Code/Input: Consolas.

Color Palette (Bootstrap Standard):

Primary (Blue): Main actions, headers, active tabs.

Success (Green): Create actions, Submit buttons, "Correct" indicators.

Danger (Red): Delete actions, "Wrong" indicators, Low timer.

Info (Cyan): Management panels, secondary highlights.

Light/Secondary (Gray): Backgrounds, borders, inactive states.

2. Screen: Login Interface (LoginFrame)

Goal: Clean, focused entry point. **Layout:** Centered Card on a neutral background.

Visual Elements:

Icon: A large Emoji at the top center.

Title: "HỆ THỐNG THI TRẮC NGHIỆM" (Bold, Primary Color).

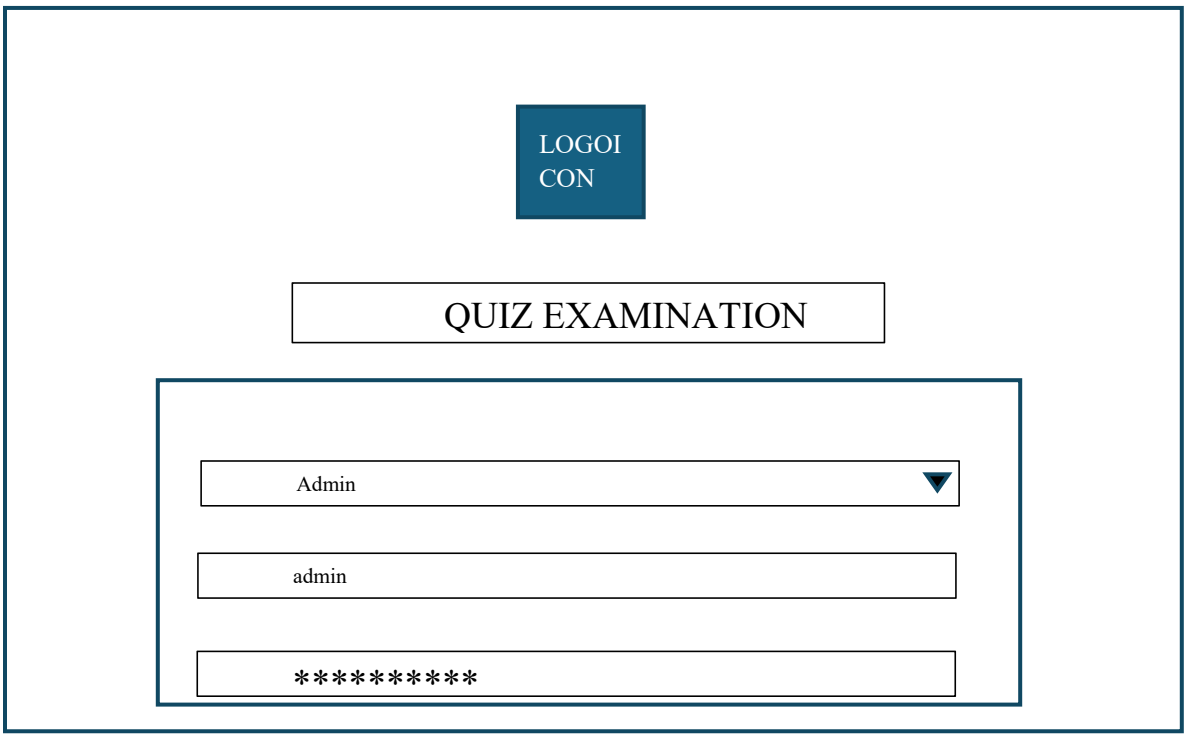
Container: A Labelframe with "LOGIN" title.

Interaction:

Role Selection: Dropdown (Admin / Teacher / Student). Defaults to Admin.

Inputs: Username and Password (masked with *).

Action: Large "ĐĂNG NHẬP" button (Primary Blue).



3. Screen: Admin Dashboard (AdminFrame)

Goal: Quick user management. **Layout:** Split View (Left: Creation, Right: Management).

Header: "Admin Dashboard" with "Reload Data" and "Logout" buttons top-right.

Left Panel (Create): Green accent border (bootstyle="success").

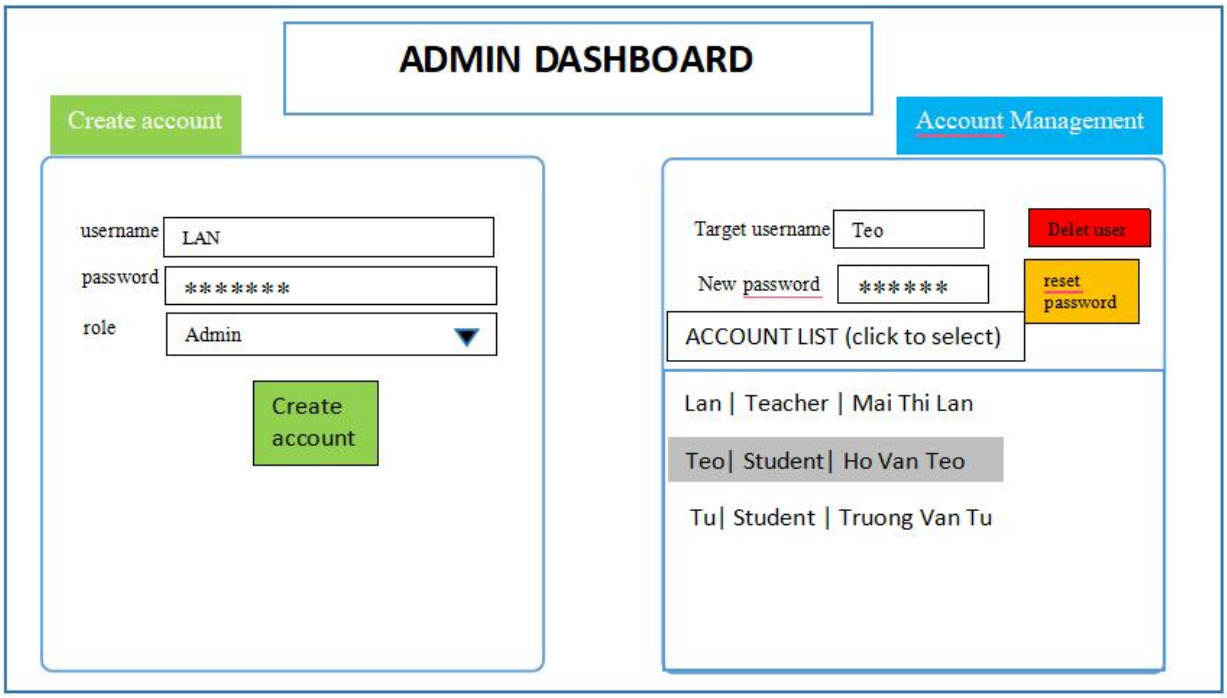
Simple form: Username, Password, Role.

Button: "Create User".

Right Panel (Manage): Cyan accent border (bootstyle="info").

Action Row: "Target Username" input, "Delete User" (Red button), "Reset Password" (Yellow outline button).

List: A scrollable listbox showing Username | Role | Full Name. Clicking a row auto-fills the "Target Username".



4. Screen: Teacher Dashboard (TeacherFrame)

Goal: Comprehensive exam management. **Layout:** Sidebar Navigation + Tabbed Content Area.

A. Navigation (Left Sidebar)

Style: Dark Blue background (bootstyle="primary"), White text.

User Info: Displays "GV. [Name]" at the top.

Menu Items:

LOGO ICON (Dashboard)

LOGOICON (Builder)

LOGOICON (Manager)

LOGOICON (Results)

Footer: "Log Out" button.

B. Content Area (Right Panel)

Tab 1: Dashboard (Home)

Layout: A Grid of clickable Cards (Big buttons).

Cards: "bank question" (Blue), "management exam" (Green), "results" (Yellow), plus placeholders for Profile/Stats.

Tab 2: Builder (Question Creator)

Left Side (Form):

Template Title input.

Question Text input.

4 Option inputs, each with a (Correct) toggle switch.

Button: "add question".

Right Side (List):

Table (Treeview) showing added questions.

Actions: Delete selected, **" save question"** (Primary Button).

Tab 3: Manager (Exam Publishing)

Layout: Three-column layout (PanedWindow).

Templates (Left): List of saved question banks. Buttons: Edit, Delete, Export Word.

Config (Middle):

Start/End Date inputs.

Duration (Spinner).

Attempts Limit (Spinner).

Toggles: "password", "review".

Action: ">>> export exam >>>" (Yellow/Warning button).

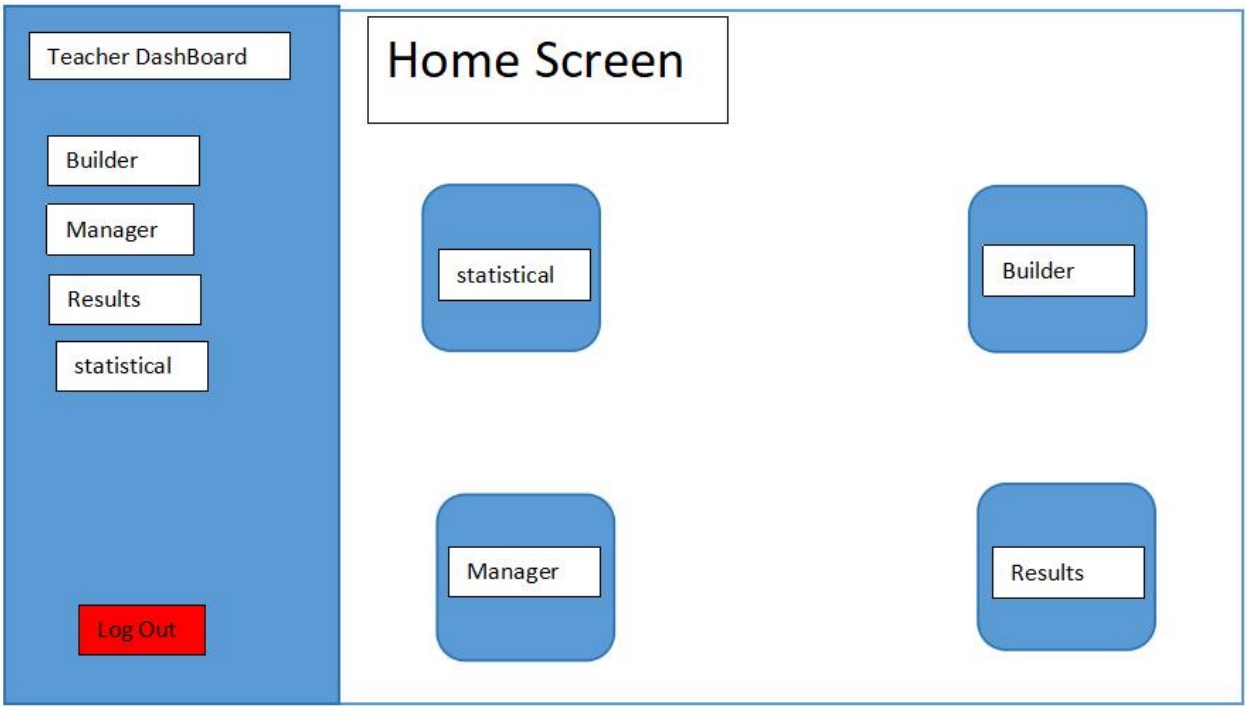
Active Exams (Right): List of published exams with status (OPEN/CLOSED). Buttons: Delete, Reset Attempts.

Tab 4: Results

Top Bar: Dropdown to select an Exam. Button to "export Excel".

Main Table: List of student attempts (ID, Name, Score, Time).

Interaction: Double-click a row to open the specific **Attempt Detail View**.



5.Goal: Simplicity and focus. Layout: Two distinct panels.

Left Panel (Entry): Green accent.

Focus: Large input field for " **CODE EXAM"**.

Action: Giant "start exam" button.

Right Panel (Profile & History): Cyan accent.

Form to update Name/DOB/Student ID.

Listbox: History of taken exams (Date | Title | Score).

Action:"View Review"

6. Screen: Exam Taking Interface (ExamTakeFrame)

Goal: Distraction-free testing environment. **Layout:** Header + Sidebar + Main Content.

Header:

Timer: Left side. Text like "time limit: 15:30". Turns **Red** when under 5 minutes.

Exit: Gray button on the right.

Right Sidebar (Question Map):

Grid: A grid of numbered buttons (1, 2, 3, 4...).

Color Coding:

Gray Outline: Unanswered.

Green Solid: Answered.

Yellow: Marked for review.

Blue: Current question.

Main Content (Center):

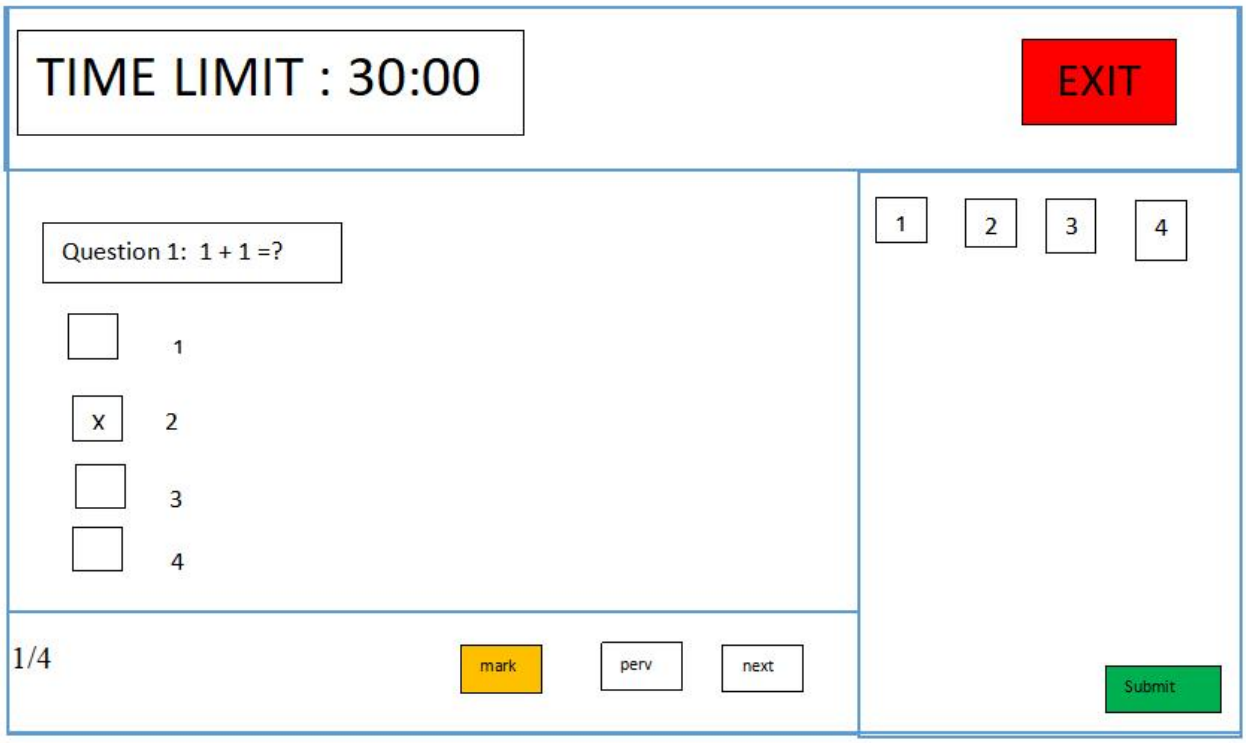
Question Text: Large font (Size 14).

Options: 4 Checkboxes (allows multiple choice).

Bottom Navigation:

text.

Buttons: (Prev), (Next), (Mark), (Submit - Green).



7. Screen: Review / Details (ReviewFrame)

Goal: Feedback on performance. **Layout:** Full-screen scrolled text document.

Header: Attempt Details

Content: A rich-text document showing:

Score Summary: e.g., "grade: 8.5/10".

Question List:

Question Text.

Options listed.

User Selection: Marked with [x] and colored **Blue**.

Correct Answer: Marked with <-- colored **Green**.

Points earned per question.

User Flow Diagram

Launch -> **LoginFrame**

Login Logic:

If Admin -> **AdminFrame** -> Create/Delete Users -> Logout.

If Teacher -> **TeacherFrame**:

-> **Builder** -> Create Template.

-> **Manager** -> Select Template -> Publish Exam.

-> **Results** -> View Scores / Export.

If Student -> **StudentFrame**:

-> Enter Code -> **ExamTakeFrame** -> Submit -> **StudentFrame**.

-> Select History -> **ReviewFrame** -> **StudentFrame**.