FPT ACADEMY INTERNATIONAL

FPT – APTECH COMPUTER EDUCATION

Online Aptitude Test

Supervisor: *LÊ THANH NHÂN*

Semester: *III*

Batch No: *T1.2208.M2*

Group No: *5*

Order:	**Full name**	**Roll No.**
1.	*VÕ MINH TIẾN*	*Student1381867*
2.	*HUỲNH HỮU KHA*	*Student1414349*

FPT ACADEMY INTERNATIONAL

FPT – APTECH COMPUTER EDUCATION

3.	*NGUYỄN MẠNH CHIẾN*	*Student1414353*

***Month**: 12 **Year**: 2023*

This is to certify that

Mr. **VÕ MINH TIẾN**

Mr. **HUỲNH HỮU KHA**

Mr. **NGUYỄN MẠNH CHIẾN**

Have successfully Designed & Developed

Online Aptitude Test

Submitted by:

Mr. LE THANH NHAN

Date Of Issue:

Authorized Signature:

Content

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Acknowledge

In the process of graduation, we have received a lot of help, suggestions, and enthusiastic advice from our teachers, family and friends. We sincerely thank Aptech Education for bringing the experience as well as practical skills in the project that have brought our skills to a higher level.

We would like to extend our heartfelt thanks to Mr. Le Thanh Nhan, a teacher of FPT Aptech for always being dedicated and professional. His mentoring and technical expertise has Without the knowledge and experience of our superior that has guided us throughout the entire process, this project wouldn’t have succeeded.

I, Vo Minh Tien, as the group leader, am immensely grateful to the entire team for their hard work and dedication. Each team member's unique contributions have collectively led to the realisation of our goals. Your collaborative spirit and tireless efforts have made this project a truly rewarding experience.

And we sincerely thank the families and friends of our team members for their great enthusiasm and support during the project and providing us with time and space to focus on our Project.

Thank you all for being an integral part of this journey. Your contributions have made this project a success, and I am truly grateful for the collaborative effort that has brought our project to life.

Synopsis

The Objective of this program is to give a sample project to work on real life projects. These applications help you build a larger more robust application.

The objective is not to teach you the software's but to provide you with a real life scenario and help you create basic applications using the tools.

You can revise the topics before you start with the project.

These programs should be done in the Lab sessions with assistance of the faculty if required.

It is very essential that a student has a clear understanding of the subject.

Kindly get back to eProjects Team in case of any doubts regarding the application or its objectives.

Review 01

Problem Definition

INTRODUCTION

The Webster organisation is one of the leading organisations in the world of Oil-Gas companies. They have various branches throughout the world. It has various bonds with different multinational companies. The company wants an application to be built for the jobseeker where the entire candidate as per the criteria will appear for the online test and based on the result of this the candidate will go for further rounds.

They have requested us to create a web application using the latest technology that is .NET 8, C# language, using ASP.NET Core MVC. The Database we will use SSMS for local use and deployed using Azure. Team will be using Github and Azure Devops to manage the development.

As part of the company's recruitment process, there is a need to implement an efficient and user-friendly Online Aptitude Test for evaluating the skills and capabilities of prospective candidates. The current manual assessment process is time-consuming, prone to errors, and lacks scalability, hindering the seamless identification of top-tier talent.

Client has forwarded all the data that they have required in the application, which is stated below:

The application should perform the following functions:

URL should be https://websterapplicantexam.com.

Page requirements:

- Main page (Login page)
- Applicant:
    - Dashboard
    - Exam page
    - Result page
    - Logout
- Manager:
    - Dashboard
    - View Applicant
    - Create/Edit Applicant
    - View Report
    - View Questions
    - Add/Edit Questions

1. Login page should contain 2 types of logins: one for Applicant, one for Manager.
2. Applicant dashboard should contain 3 links to exam, only first one is available and accessible.

3. Applicant exam should start at the scheduled time, containing 5 questions randomized from the Manager's question list and automatically submitted when time runs out, else they can choose to submit early and move on to the next Exam.
4. Results screen should show when they are done with all 3 Exams, calculating the total score from all the answered questions and pop-up "You have passed this round, next is the HR round" if the score is satisfactory. Then logout out of the session.
5. Manager dashboard should show all functions of the Manager such as: View Applicants, View Questions, Add/Edit Applicants, Add/Edit Questions, View Report.
6. View Applicants should show the list of Applicants, filterable by Name, other Details, or score if necessary. Allow Manager to click on Applicant to go into edit page or click on "Submit New Applicant" to go to Add Applicant page.
7. View Questions should show the list of Questions, Exam Type of question, links to Add and Edit / Delete Questions.
8. Add/Edit Applicants should show input boxes for all Applicant Details and a button to Save.
9. Add/Edit Questions should show input boxes for all Applicant Details and a button to Save.
10. Applicant and Manager navigation bar should show link to Logout

Customer Requirements Specifications

- **MANAGER:**

  Input:

  - Enter the details of the candidates appearing for the interview. Details to be maintained are Education details, Personal details, Work Experience
  - Allocate the Username and Password for the candidates.
  - Edit, update, add, save, delete the test Questions
  - Filtering info such as Reports, passed Candidates, question types

  Process:

  - Handle saving Candidate, Questions
  - Handle setting Candidate Usernames and Passwords
  - Handing setting and saving Questions
  - Generating Report based on user input filters

  Output:

  - View the list of all the candidates who are or have appeared along with the result (if achieved).

- View info of specific Candidates
- View report statistics. Report section must be added for viewing the generalised data which can be filtered by date, week or month.
- View info of Questions used in the Exam.

- **CANDIDATE**:

  Input:
  - Each candidate will have their login details provided to them by the Manager. These details must be entered in the candidate's login section.
  - Clicking on the first Exam in the Dashboard
  - Answering the Questions
  - Submitting the Exam
  - Logging out after finishing the Exam

  Process:
  - Calculate the Exam score
  - Handle time limit for the Exams
  - Handle validation to prevent Candidates from going back to finished Exams.
  - If the candidate passes the test, then their names are transferred for the next (HR) round, their data transferring to a new table to be referred to by concerned persons
  - Handle logout after finishing the test and showing Results.

Output:

- Viewing List of Exams
- Viewing List of Questions
- Viewing Results Page

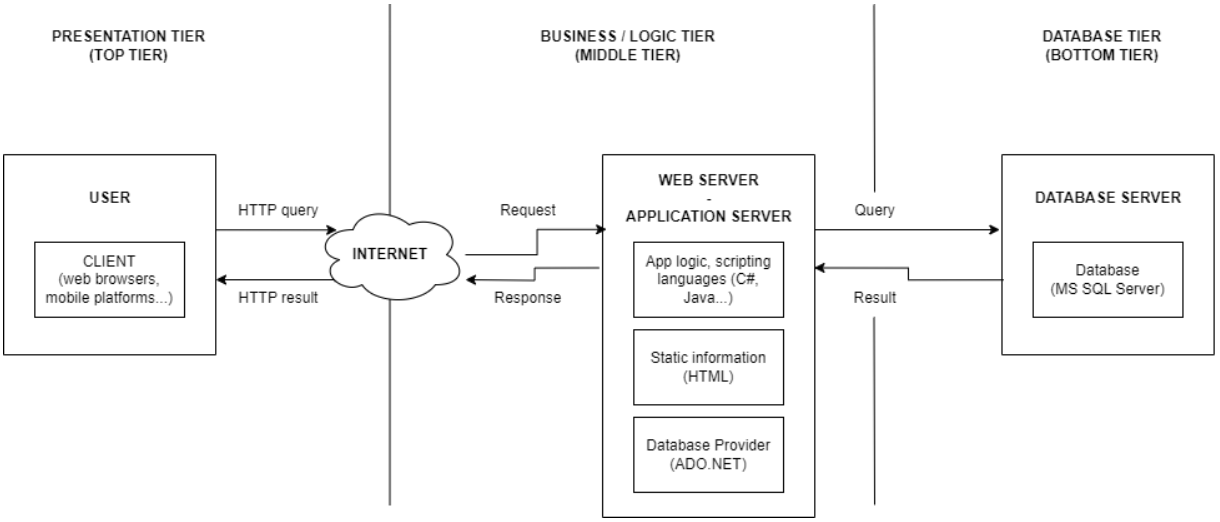
Hardware / software requirement

1.	System	Windows 10 or above
2.	Software	Visual Studio 2019 or later, SQL Server 2000 (or later)
3.	Web Browser	Later versions of Edge, Chrome, Firefox, etc…
4.	Fonts	Standard fonts such as Unicode: Arial, Tahoma, Lucida Console, Times New Roman, etc…
5.	Other requirements	A working internet connection.

Review 02

Architecture and Design of the Project

We will be using 3-tier architecture for this project:



The User will interact with the Front-end of the webpage, then the user Input will be sent as a request to the Web Server containing the App logic, Database and File System. It will handle all the required tasks and will return to the User the expected output on the View. An explanation for all three tiers are below:

Presentation tier:

This is the topmost level of the application. It is a layer that users can access directly (such as a web page, or an app's GUI). This is the Front-end of our project where the user can view and interact with the web app.

Business / Logic tier:

The business tier is pulled out from the presentation tier and controls an application's functionality by performing detailed processing. Through the web server, the request from the user will be handled by the app logic and will return to the presentation tier where the results are displayed to the end-user.

Database tier:

The database tier includes the data mechanisms (database servers, file shares, etc.) and the data access layer that encapsulates the data mechanisms and exposes the data for processing. The data access layer should provide an API to the application tier that helps manage and process the data. This is the Database of our application where we will get the data to handle tasks in the business tier.

We will be using ASP.NET Core MVC for this Application, it is explained as below:

1. **Model:**

- The Model represents the core business logic and data of the application. In the case of the aptitude test application, the Model would handle tasks such as:
  - Storing and managing candidate data.
  - Defining the structure of the aptitude tests, including questions, answers, and correct solutions.
  - Handling scoring and result calculations.
  - Managing communication with the database for persistent data storage.

2. **View:**

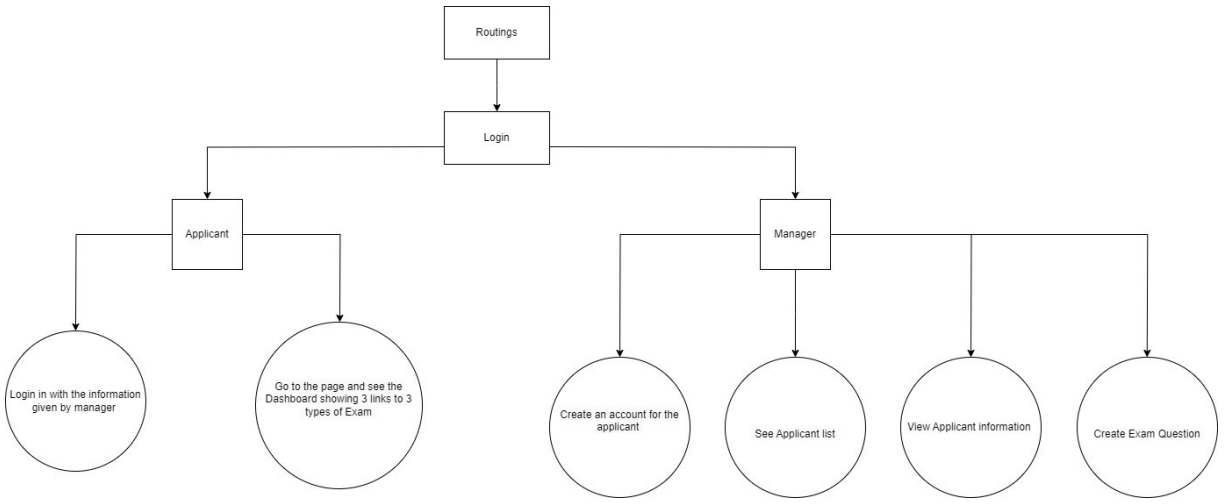
- The View is responsible for presenting the user interface to the applicants and displaying information from the Model. For the aptitude test application, the View would include:
  - UI for Applicants to take the aptitude test.
  - Feedback on test results.
  - UI for Managers to view reports and analytics.

3. **Controller**:

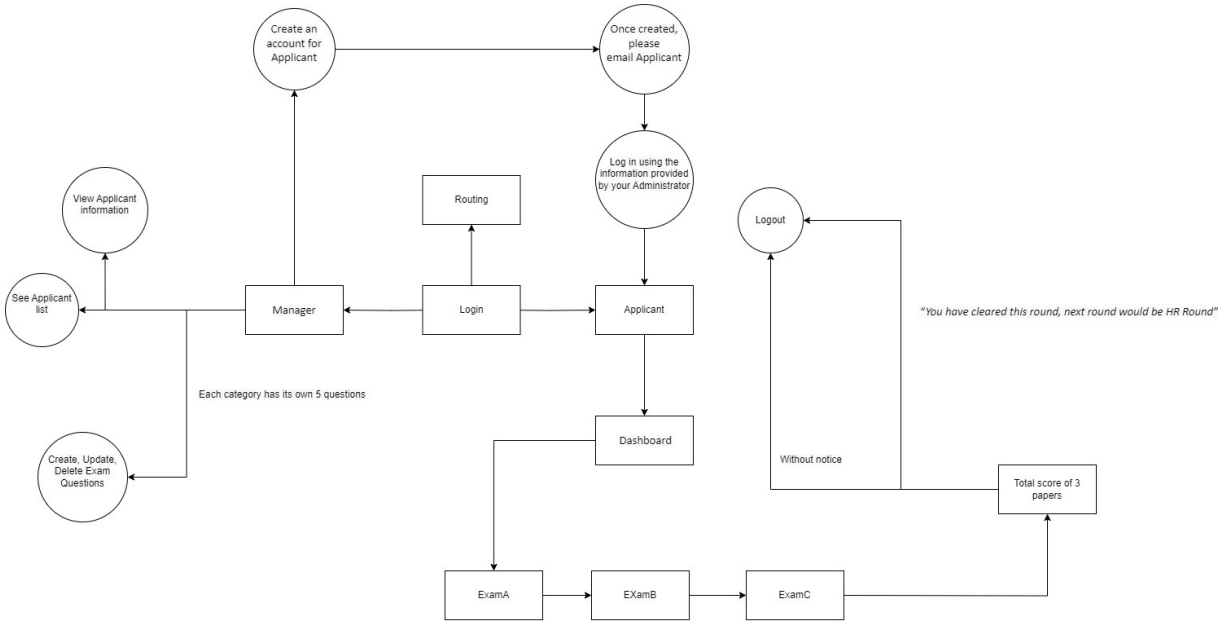
- The Controller acts as an intermediary between the Model and the View. It receives user inputs from the View, processes them, and updates the Model accordingly. The Controller handles:
  - Handling user interactions during the test, such as submitting answers or navigating through questions.
  - Initiating actions based on user inputs, like starting or ending a test.
  - Updating the Model with the results of the aptitude test.
  - Managing the flow of the application and controlling the navigation between different views.

Data Flow Diagram

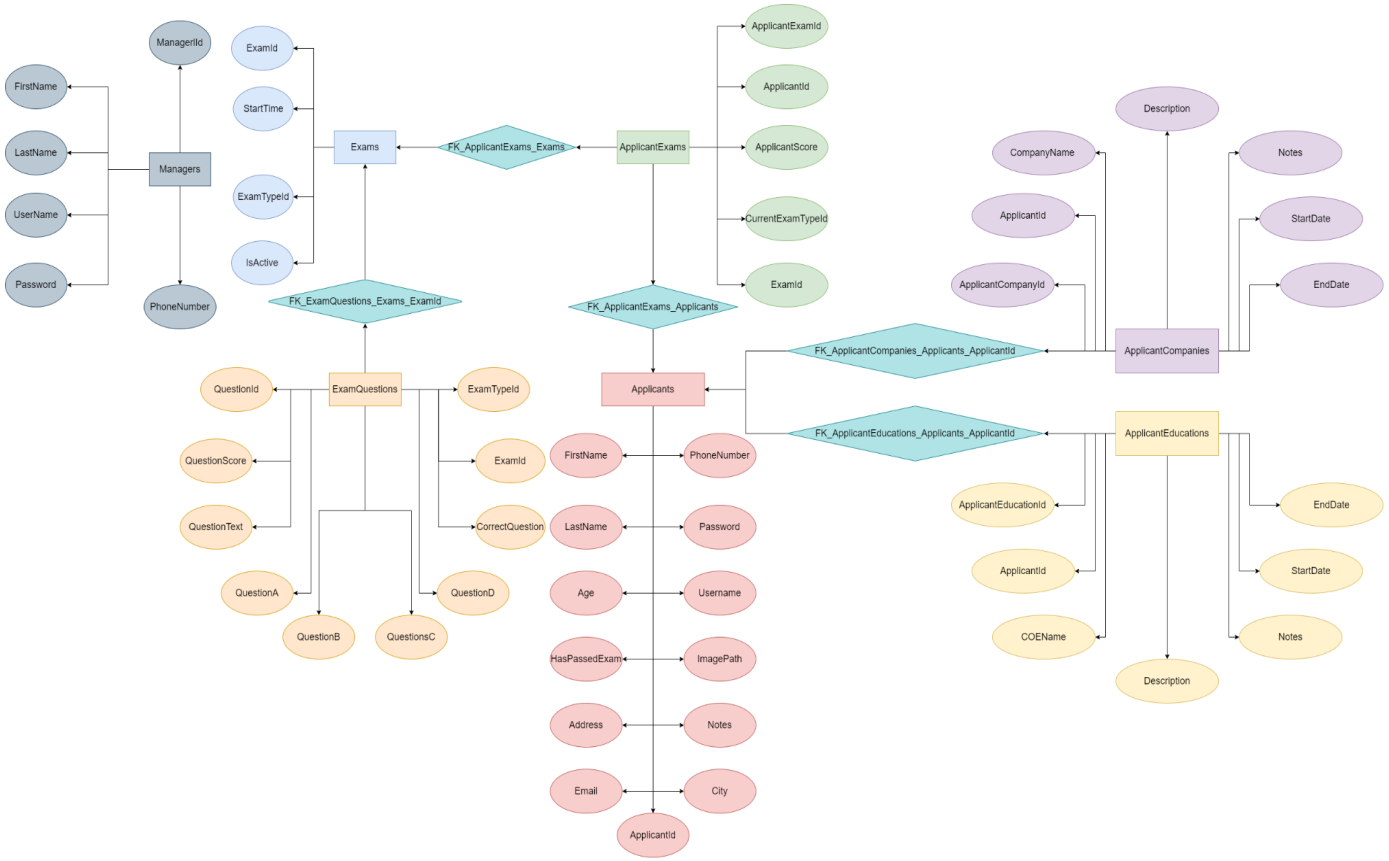
DFD Level 0:



DFD Level 1:


Create an account for Applicant
Once created, please email Applicant
Log in using the information provided by your Administrator
View Applicant information
Routing
Logout
See Applicant list
Manager
Login
Applicant
"You have cleared this round, next round would be HR Round"
Each category has its own 5 questions
Dashboard
Create, Update, Delete Exam Questions
Without notice
Total score of 3 papers
ExamA
EXamB
ExamC

Entity Relationship (ER) Diagram



	Prepared by (Student)	**Approved by (Faculty)**
	Project Group No: 5	LE THANH NHAN
Signature		
Date		

A. Table Design

The Table Design is defined below:

1. ApplicantCompanies

ApplicantCompanies				
	Field name	Data type	Key/Constraint	Description
1	ApplicantCompanyId	int	PK	Stores the id of the Applicant Companies
2	ApplicantId	uniqueidentifier	FK	Stores the Applicant Id
3	CompanyName	nvarchar(255)		Stores the Company Name
4	Description	nvarchar(255)		Stores the Description
5	Notes	nvarchar(3000)		Stores the Notes
6	StartDate	datetime2(7)		Stores the Start Date of the Applicant's tenure here
7	EndDate	datetime2(7)		Stores the End Date of the Applicant's tenure here

2. ApplicantEducations

ApplicantEducations				
	Field name	Data type	Key/Constraint	Description
1	ApplicantEducationId	int	PK	Stores the id of the
2	ApplicantId	uniqueidentifier	FK	Stores the ApplicantId
3	COEName	nvarchar(255)		Stores the name of the Center of Education
4	Description	nvarchar(2000)		Stores the Description
5	Notes	nvarchar(3000)		Stores the Notes
6	StartDate	datetime2(7)		Stores the Start Date of the Applicant's tenure here
7	EndDate	datetime2(7)		Stores the End Date of the Applicant's tenure here

3. ApplicantExams

ApplicantExams

ApplicantExams				
	Field name	Data type	Key/Constraint	Description
1	ApplicantExamId	int	PK	Stores the id of the ApplicantExam
2	ApplicantId	uniqueidentifier	FK	Stores the ApplicantId
3	ApplicantScore	int		Stores the Applicant Score
4	CurrentExamTypeId	int		Stores the Current Exam Type
5	ExamId	int	FK	Stores the current in progress Exam

4. Applicants

Applicants				
	Field name	Data type	Key/Constraint	Description
1	ApplicantId	uniqueidentifier	PK	Stores the id of the
2	FirstName	nvarchar(255)		Stores the Applicant's First Name
3	LastName	nvarchar(255)		Stores the Applicant's Last Name
4	Age	int		Stores the Applicant's Age
5	HasPassedExam	bit		Stores the Applicant's HasPassedExam
6	Address	nvarchar(255)		Stores the Applicant's Address
7	Email	nvarchar(255)		Stores the Applicant's Email
8	City	nvarchar(255)		Stores the Applicant's City
9	Notes	nvarchar(3000)		Stores the Applicant's Notes
10	ImagePath	nvarchar(MAX)		Stores the Applicant's ImagePath
11	Username	nvarchar(512)		Stores the Applicant's Username
12	Password	nvarchar(512)		Stores the Applicant's Password
13	PhoneNumber	nvarchar(255)		Stores the

5. ExamQuestions

ExamQuestions				
	Field name	Data type	Key/Constraint	Description
1	QuestionId	int	PK	Stores the id of the Question
2	QuestionScore	int		Stores the Question Score
3	QuestionText	nvarchar(3000)		Stores the Question Text
4	QuestionA	nvarchar(512)		Stores Question number 1
5	QuestionB	nvarchar(512)		Stores Question number 2
6	QuestionC	nvarchar(512)		Stores Question number 3
7	QuestionD	nvarchar(512)		Stores Question number 4
8	CorrectQuestion	nvarchar(512)		Stores the Correct Question
9	ExamId	int	FK	Stores the Exam using these Questions
10	ExamTypeId	int	FK	Stores the Exam Type of these questions

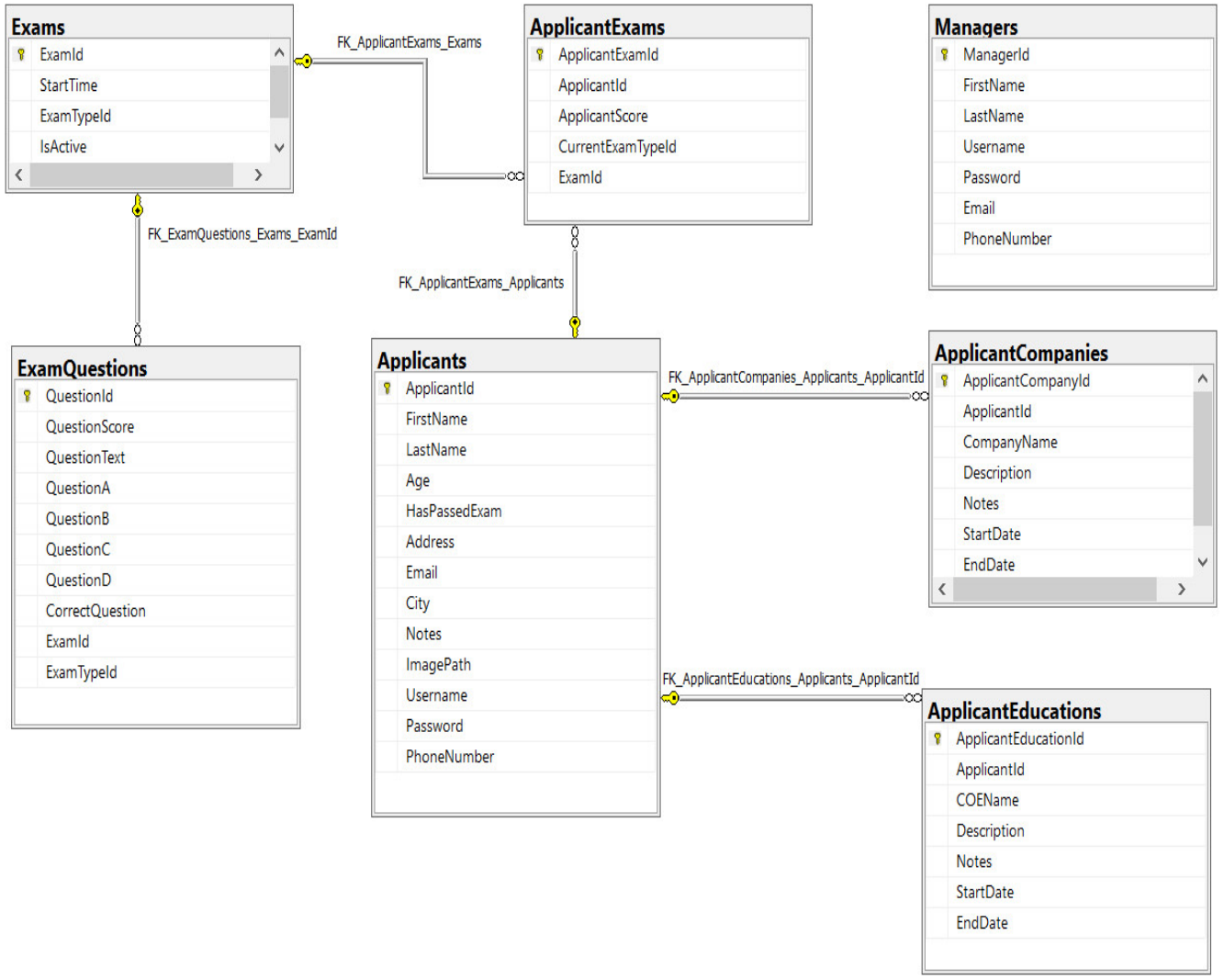
6. Exams

Exams				
	Field name	Data type	Key/Constraint	Description
1	ExamId	int	PK	Stores the id of the Exam
2	StartTime	datetime2(7)		Stores the Start Time of the exam
3	ExamTypeId	int	FK	Stores the Exam Type
4	IsActive	bit		Stores the Activeness of the Exam

7. Managers

Managers				
	Field name	Data type	Key/Constraint	Description
1	ManagerId	uniqueidentifier	PK	Stores the Manager Id
2	FirstName	nvarchar(255)		Stores the FirstName of the Manager
3	LastName	nvarchar(255)		Stores the LastName of the Manager
4	Username	nvarchar(512)		Stores the Username of the Manager
5	Password	nvarchar(512)		Stores the Password of the Manager
6	Email	nvarchar(255)		Stores the Email of the Manager
7	PhoneNumber	nvarchar(255)		Stores the FirstName of the Manager

B. Relationship Diagram



	Prepared by (Student)	Approved by (Faculty)
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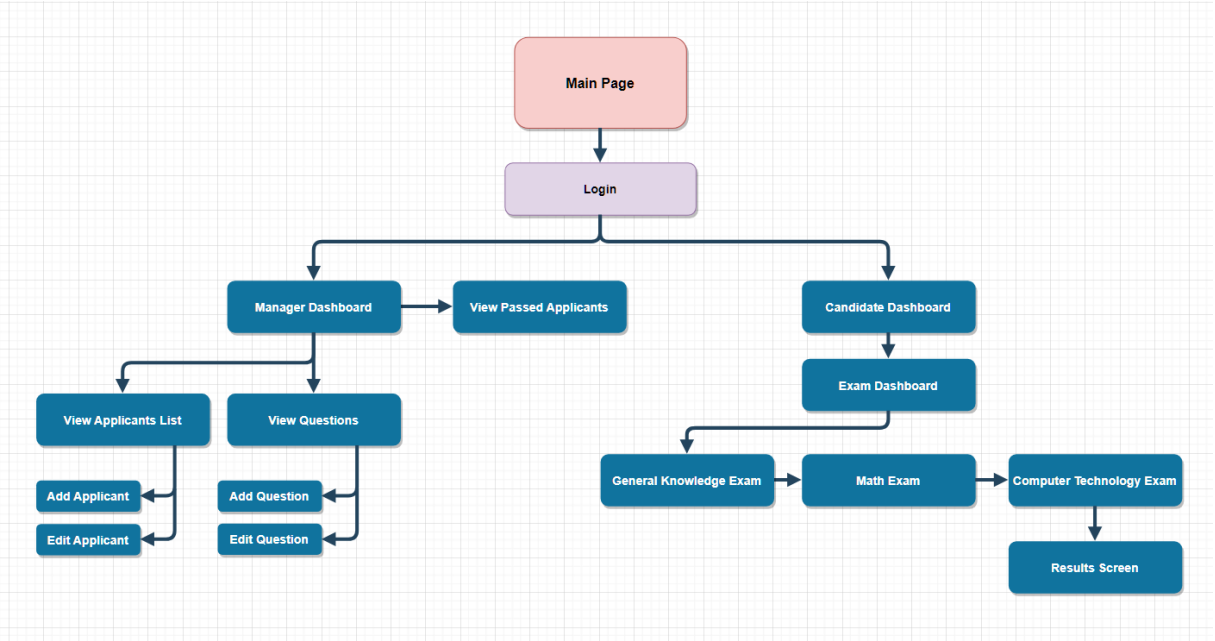
Date		

SiteMap


Main Page
Login
Manager Dashboard
View Passed Applicants
Candidate Dashboard
Exam Dashboard
View Applicants List
View Questions
Add Applicant
Edit Applicant
Add Question
Edit Question
General Knowledge Exam
Math Exam
Computer Technology Exam
Results Screen

Algorithm

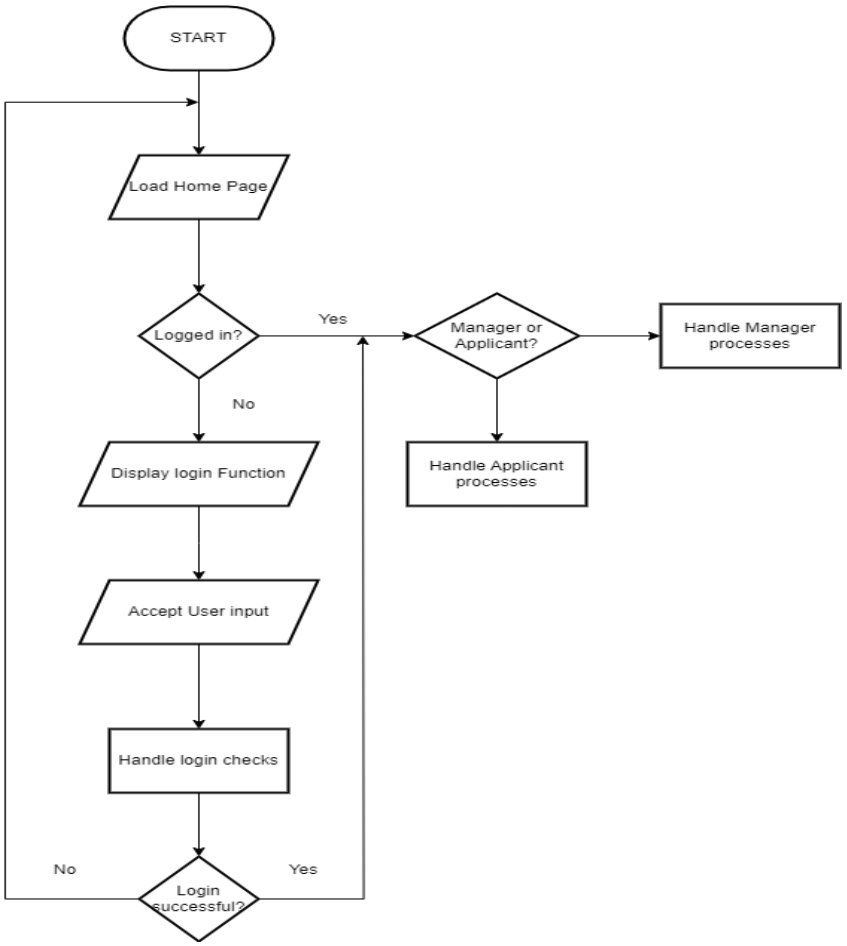


Figure 1. Flowchart showing processes of Main Page

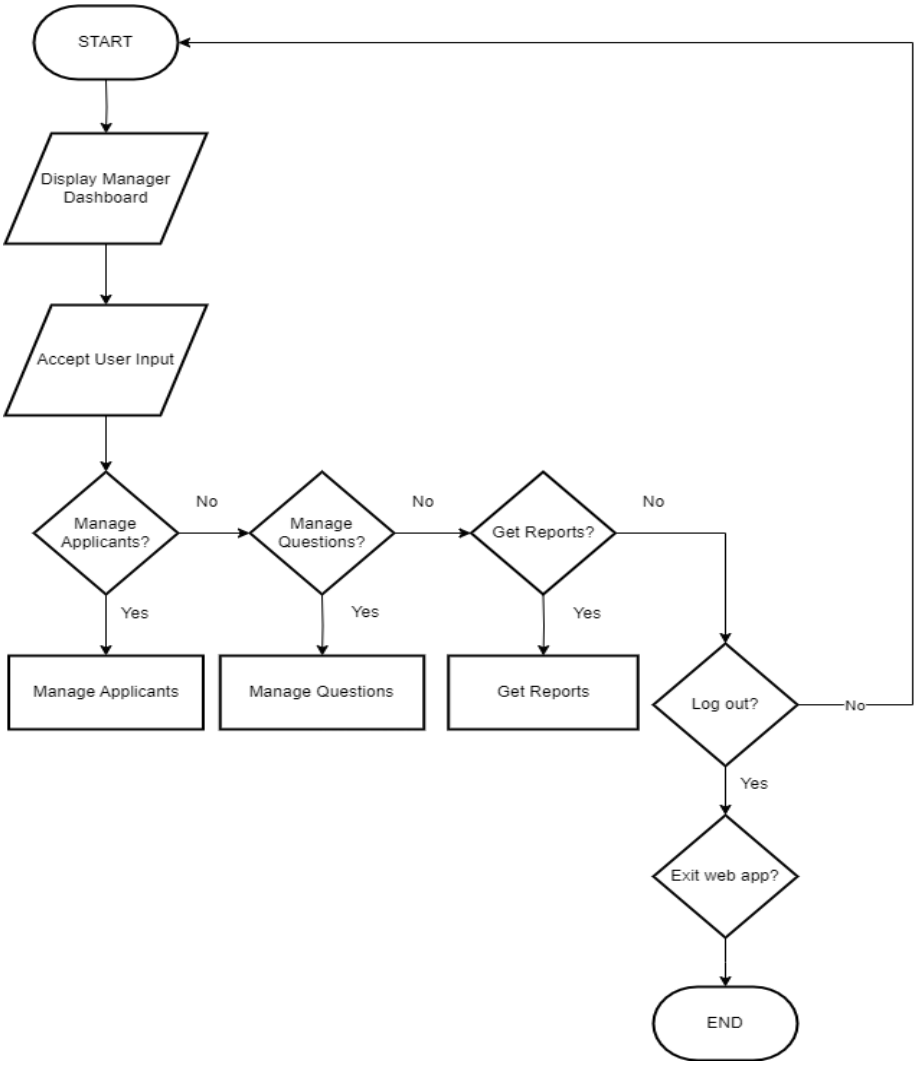


Figure 2. Flowchart for Manager activities

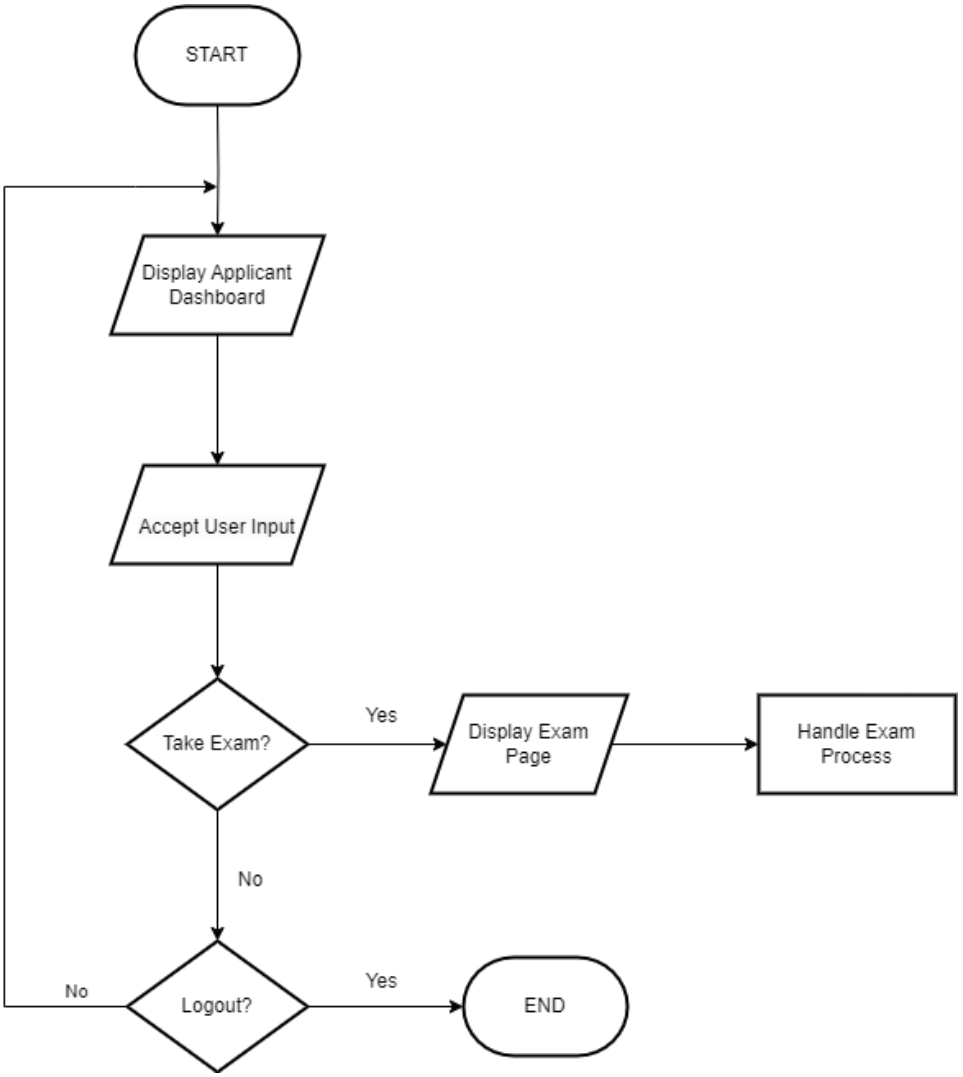


Figure 3. Flowchart for basic Applicant activities

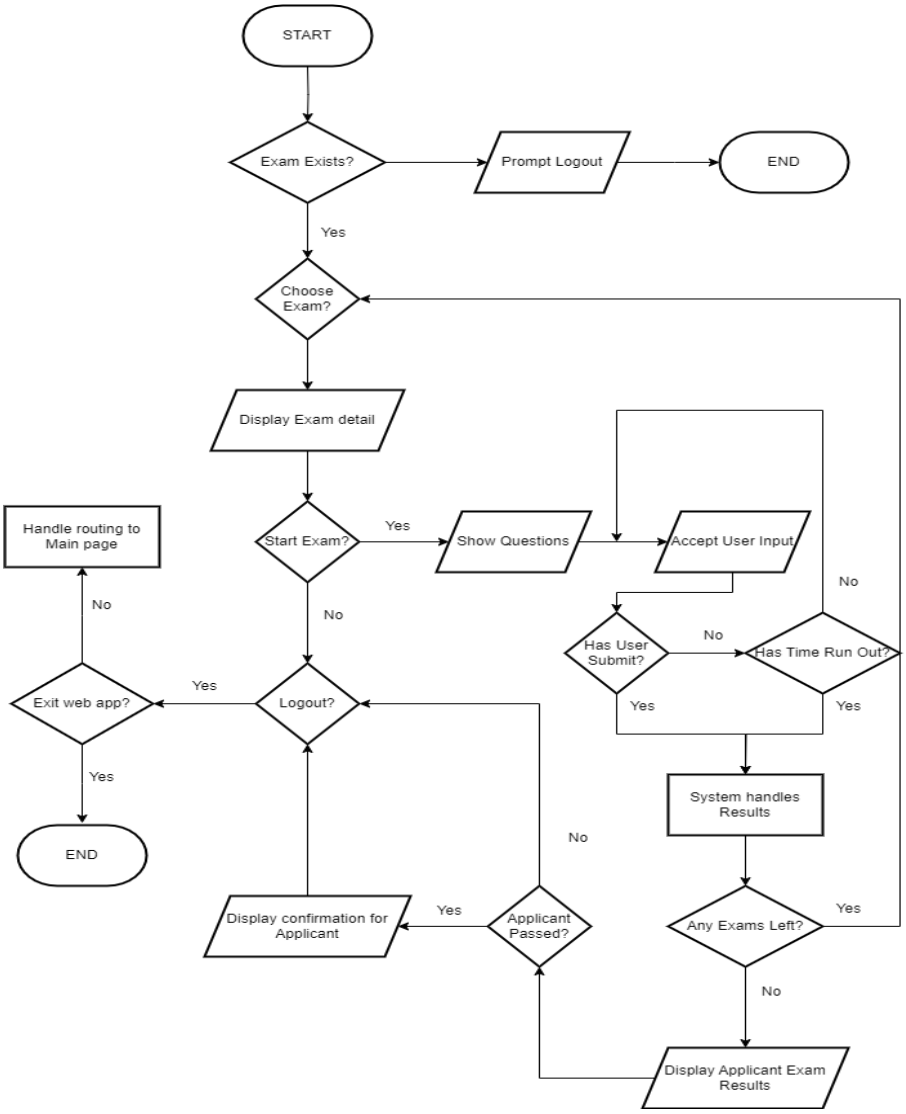


Figure 4. Flowchart for Exam functionality

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Date		

Review 03

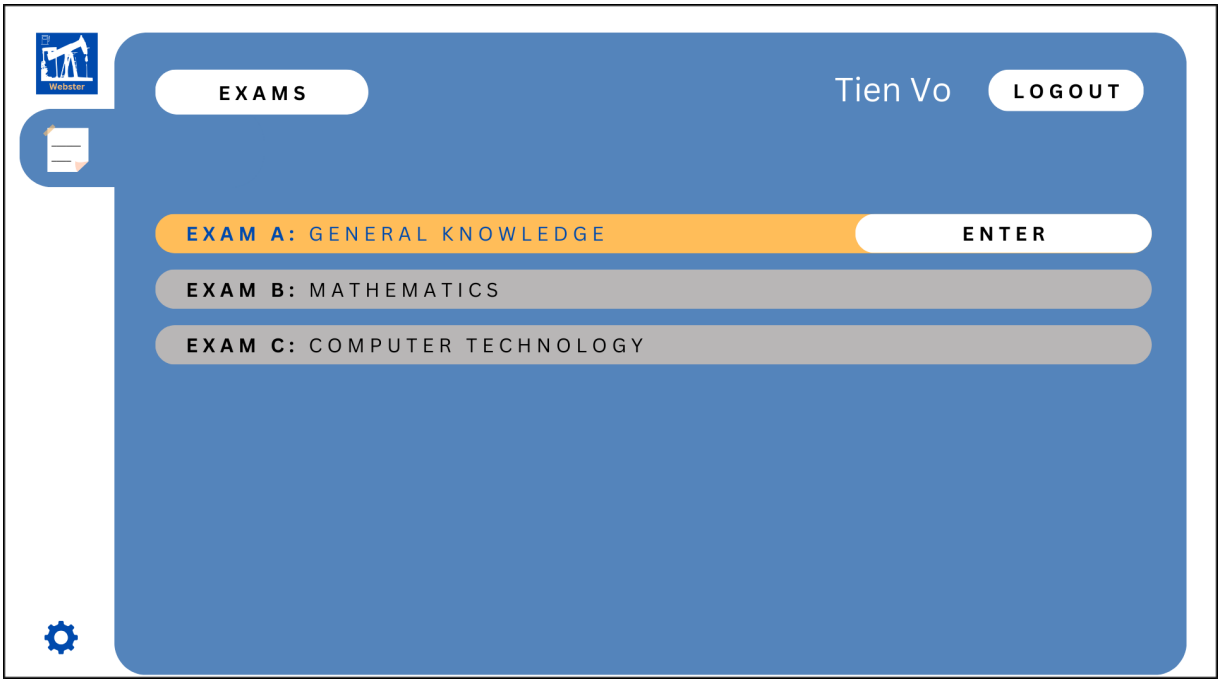
Screen shots

1. Home / Login

Description: Login / Main page, used to login into the System

Navigation: Go into the Applicant Dashboard if logged in as Applicant, Manager Dashboard if logged in as Manager

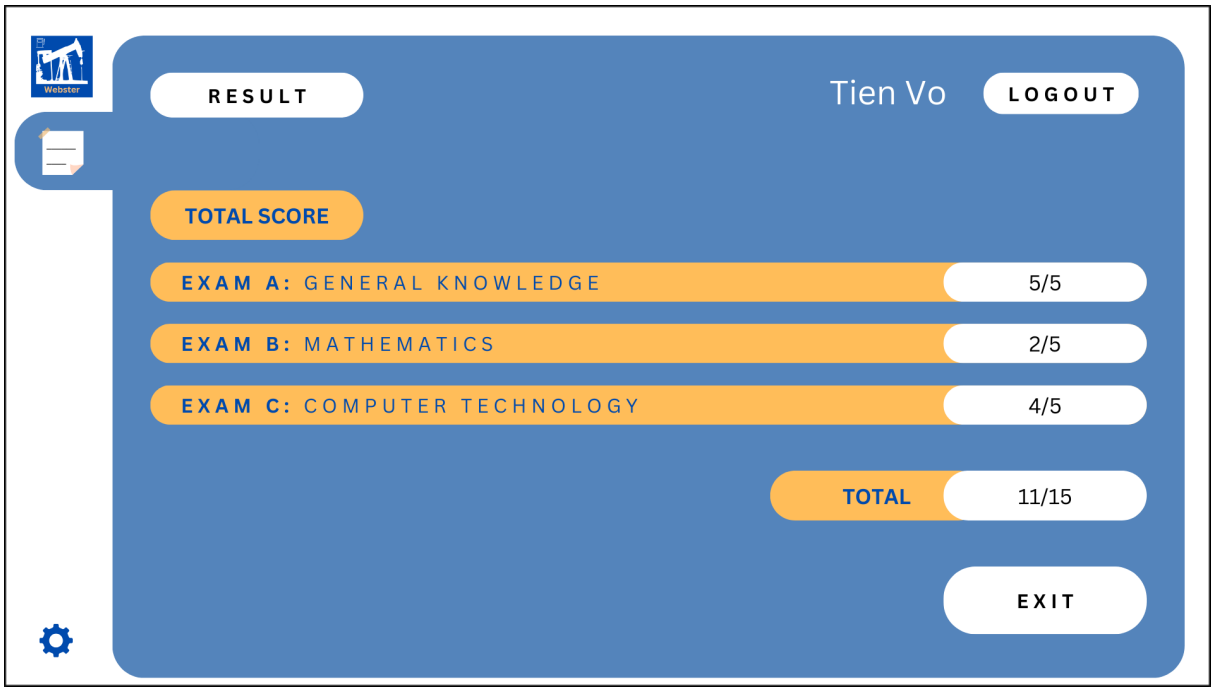
2. Applicant Exam Dashboard



Description: Applicant Exam Dashboard, showing 3 links to the exams, only General Knowledge exam is enabled

Navigation: Exam Detail, Logout, Exams

3. Result

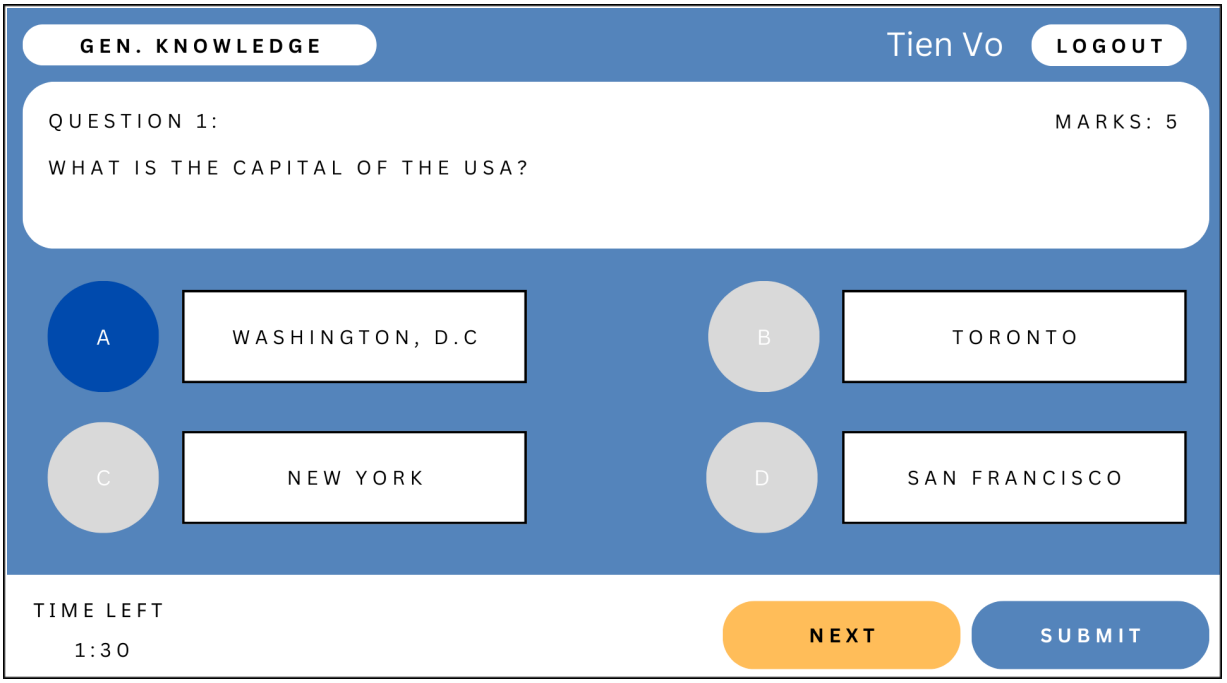


Description: Result Screen displaying the results of the 3 exams

Navigation: Applicant Dashboard, Logout

4. Exam Detail Page

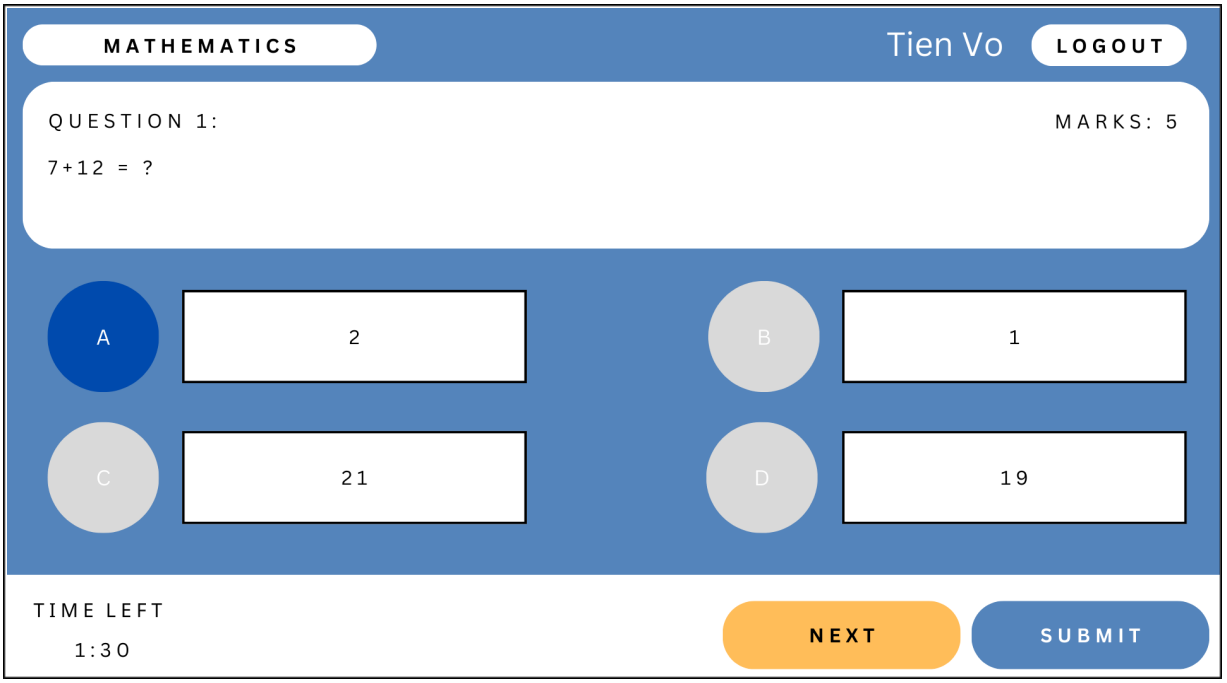
4.1. General Knowledge Exam



Description: Exam Page for Applicant (General Exam page)

Navigation: Logout, Math exam

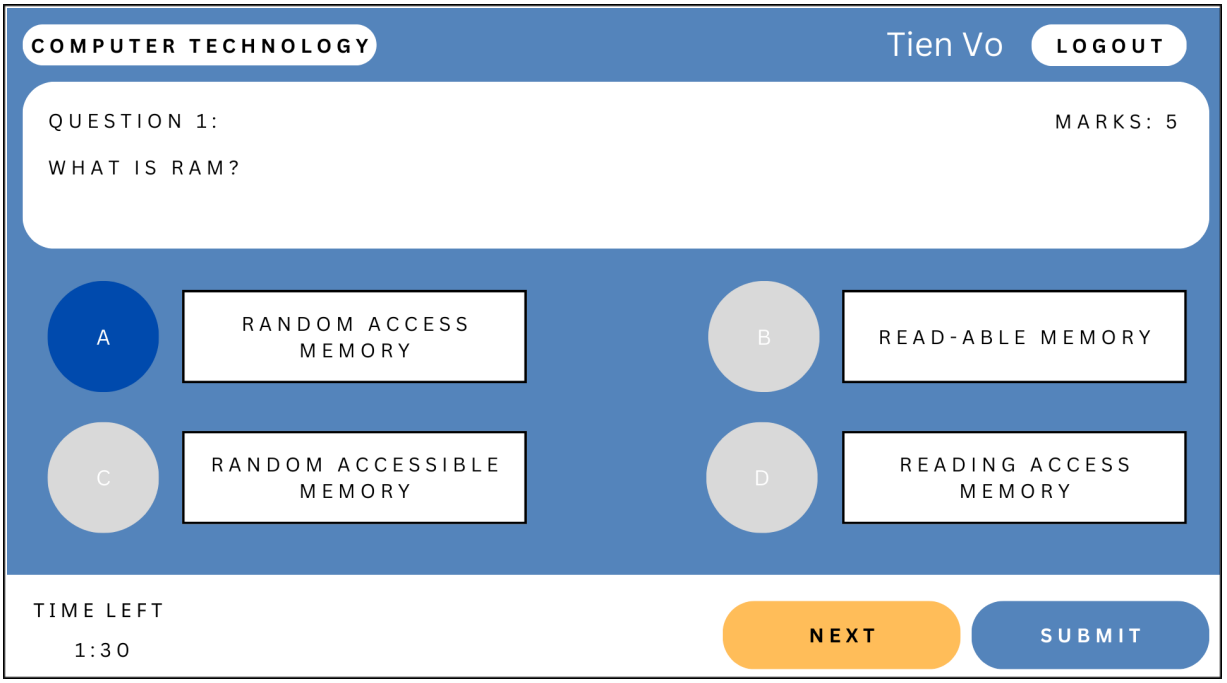
4.2. Mathematics Exam



Description: Exam Page for Applicant (General Exam page)

Navigation: Logout, Computer Technology Exam

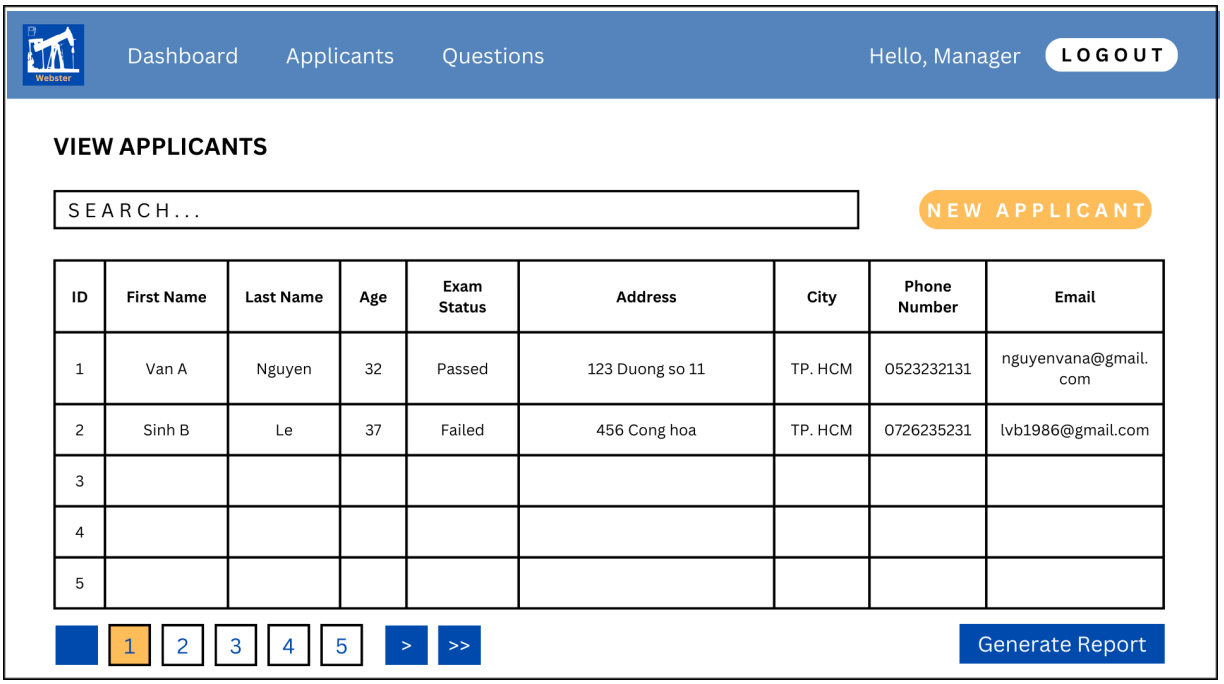
4.3. Computer Technology Exam



Description: Exam Page for Applicant (General Exam page)

Navigation: Logout, Results Screen

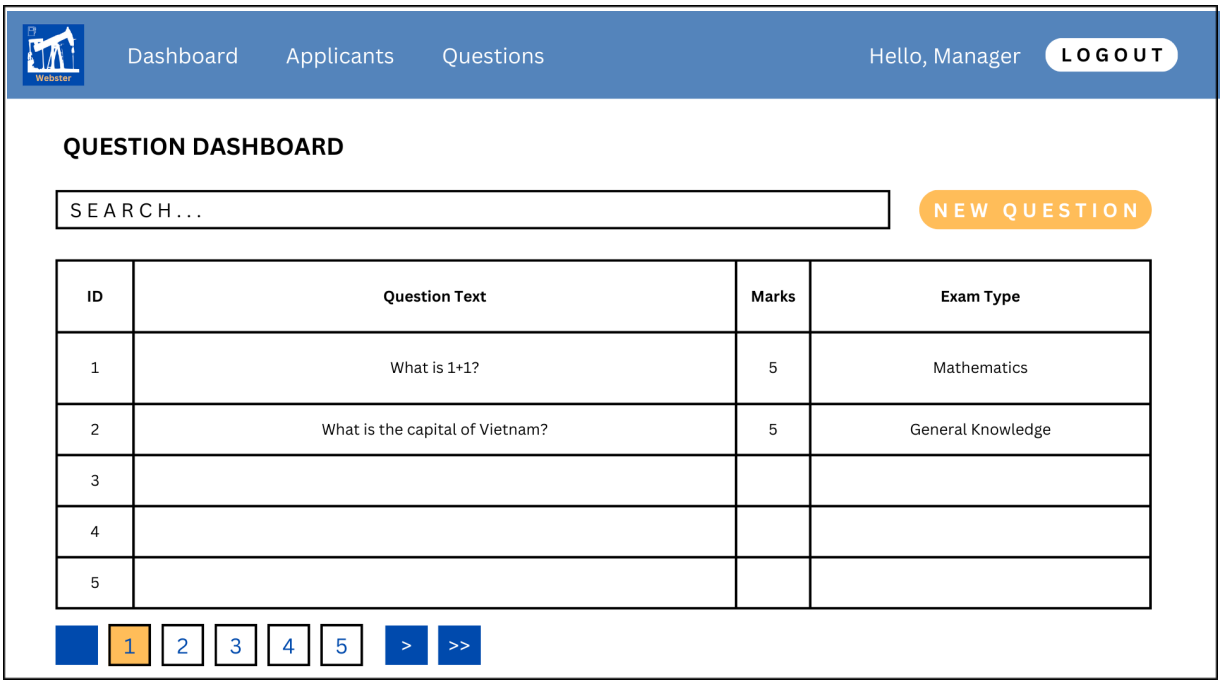
5. View Applicants



Description: View Applicants for Manager

Navigation: Add/Edit Applicant, View Questions, Logout

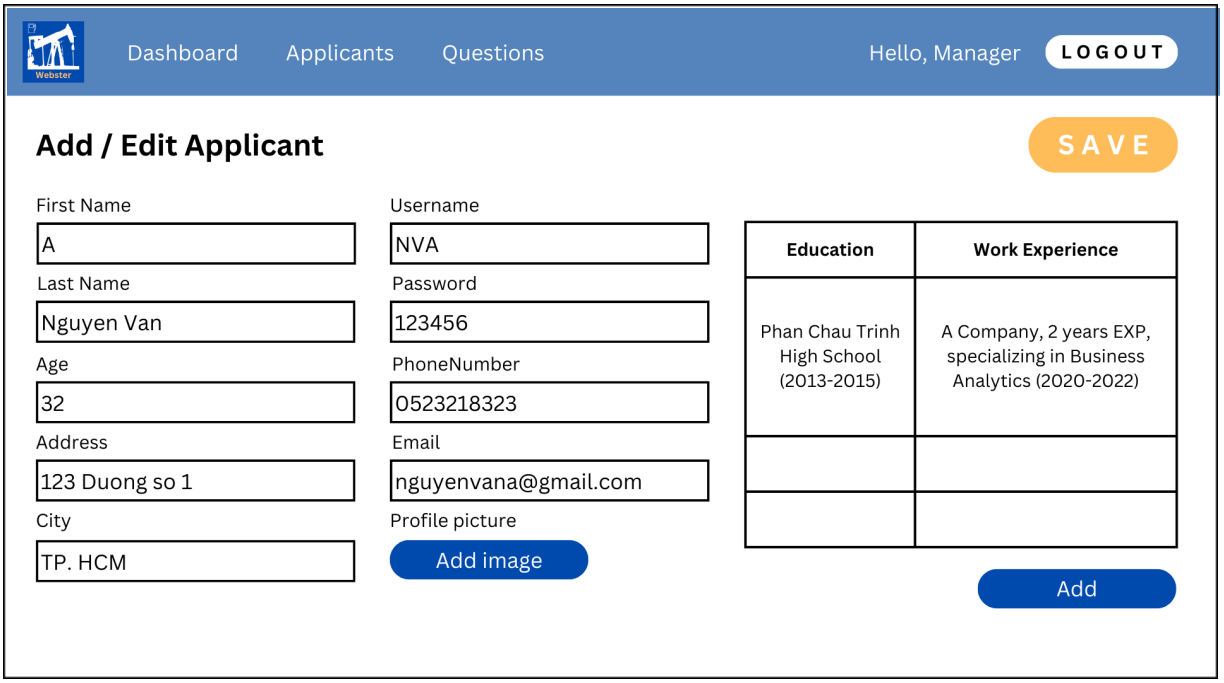
6. View Questions



Description: View Questions for Manager

Navigation: Add/Edit Questions, View Applicants, Logout

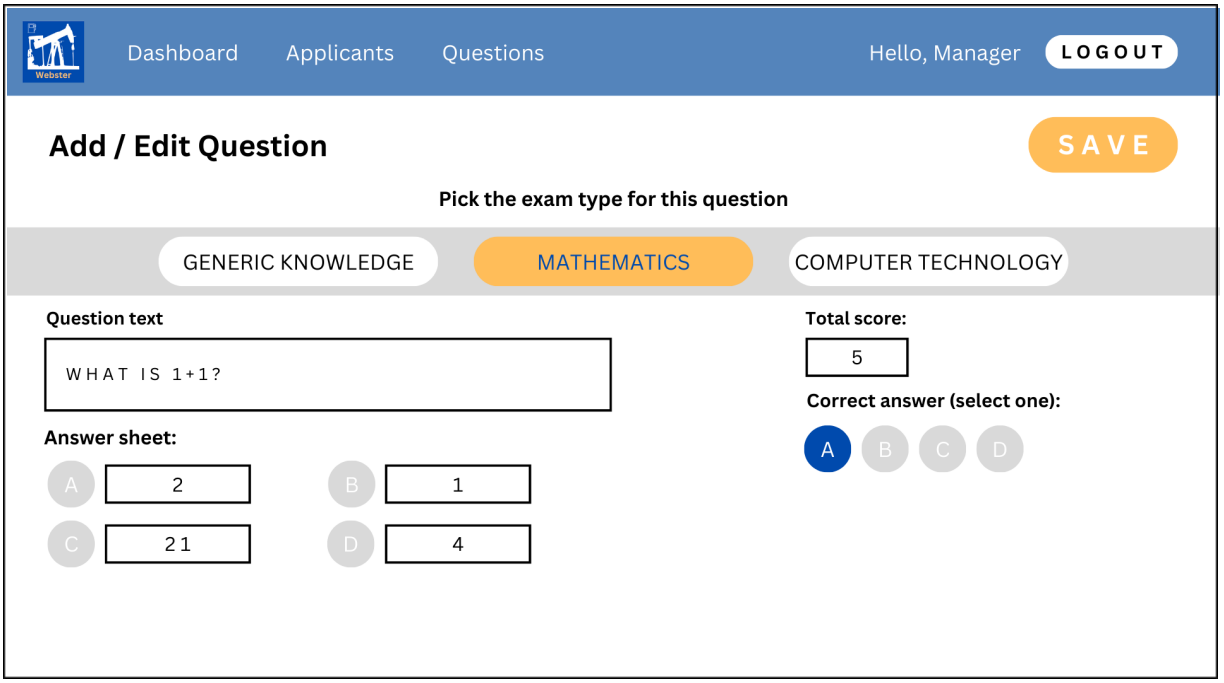
7. Add / Edit Applicant



Description: Add / Edit Applicant

Navigation: View Applicants, View Questions, Logout

8. Add / Edit Question



Description: Add / Edit Question

Navigation: View Applicants, View Questions, Logout

Checklist of Validations

Option	Validated
Are all the questions answered before allowing Applicant to submit prematurely?	Yes
Does the manager have the right to add/edit all Applicants?	Yes
Are all the records properly fed into the appropriate database?	Yes
Are all the program codes working?	Yes
Have all the modules been properly integrated and are completely functional?	Yes
Have all the Design and Coding Standards been followed and implemented?	Yes
Is the GUI design consistent all over?	Yes
Is the navigation sequence correct through all the forms/ screens in the application?	Yes

Is exception handling mechanism implemented in all the screens?	Yes

Submission Checklist

Sr. No.	Particulars	Yes	No	N A	Comments
1.	Are all users able to search for a particular record?	Yes			
2.	Are all old records properly saved and retrieved when required?	Yes			
3.	Have all modules been properly integrated and are completely functional?	Yes			
4.	Are GUI contents devoid of spelling mistakes?	Yes			
5.	Is the application user-friendly?	Yes			
6.	Is the project published properly into a setup file?	Yes			

	Prepared by (Student)	Approved by (Faculty)
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Date		

No	Member	Task		Activity Plan	Date of Preparation of Activity Plan		
				Planned Start Date	Actual Start Date	Actual Days	Status
1	**VÕ MINH TIẾN**	DB	Create DbContext for Web App	12/17/2023	12/17/2023	0.5	OK

	Prepared by (Student)	Approved by (Faculty)
	Project Group No: 5	LE THANH NHAN
Signature		
Date		

2		Manager	Create Manager	12/23/2023	12/23/2023	0.5	OK
3		Exam	Create Exam Questions model	12/28/2023	1/2/2024	4	OK
			Create template for Exam Page				
			Create timer for Exam				
4		Main	Create nav-bar	12/22/2023	12/23/2023	1	OK

	Prepared by (Student)	**Approved by (Faculty)**
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Date		

5		Report	Create Report functionality				
6		Applicants	Create Applicant models	12/18/2023	12/23/2023	1.5	OK
			Create display function for Applicants			3.5	

	Prepared by (Student)	**Approved by (Faculty)**
	Project Group No: 5	LE THANH NHAN
Signature		
Date		

	Prepared by (Student)	**Approved by (Faculty)**
	Project Group No: 5	LE THANH NHAN
Signature		
Date		

1	**HUỲNH HỮU KHA**	Manager	Create Manager model	12/19/2023	12/20/2023	1	OK
			Create Manager login system				
2		Exam	Create Exam dashboard page	12/22/2023	12/24/2023	2	OK
3		Login	Create Login page	12/17/2023	12/19/2023	2	OK
			Create Login				

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			functionality				
4		Questions	Create Question dashboard page	12/27/2023	12/28/2023	1	OK
5		Result	Create Result page	12/26/2023	12/27/2023	1	OK
6		Validation	Create Validation for all inputs	12/22/2023	12/24/2023	2	OK

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1	**NGUYỄN MẠNH CHIẾN**	Database	Create Exam models Create ApplicantExam model	12/16/2023	12/17/2023	1	OK
2		Manager	Create Manager Dashboard and Data getting functions	12/19/2023	12/21/2023	2	OK
3		Back-end	Create Generic Repository	12/17/2023	12/19/2023	2	OK

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4		Questions	Create Add Questions page Create Question adding/edit function	12/20/2023	12/24/2023	3	OK
5		Result	Add calculating Result functionality	12/21/2023	12/23/2023	2	OK
6		Applicant	Creating Applicant adding/edit function	12/25/2023	12/27/2023	2	OK

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