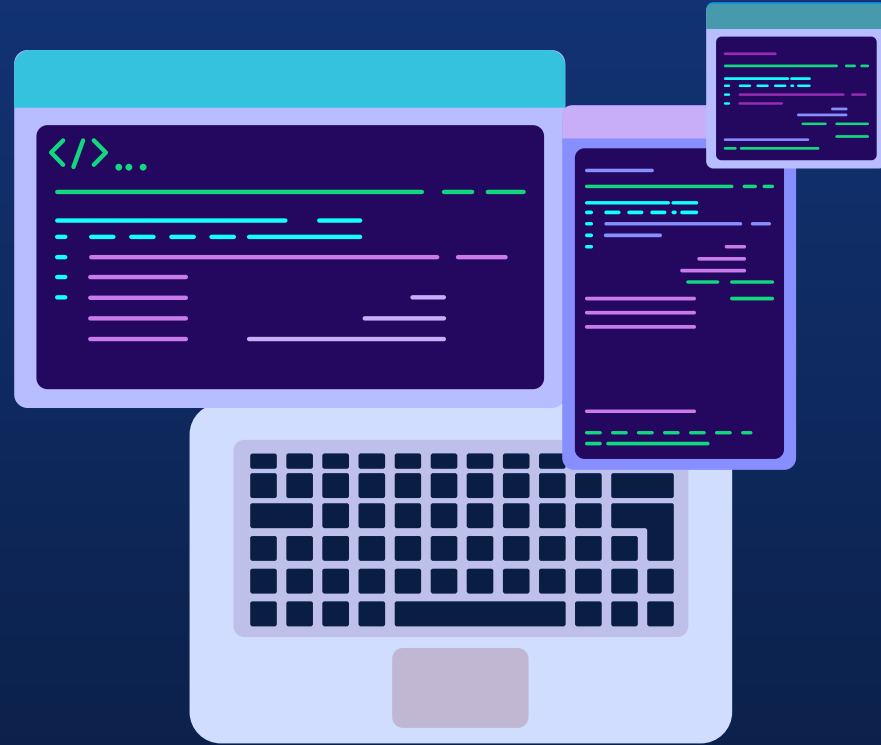# Virtual Reality Educational game

Assignment 2

By:
- Khaled Bahaa-El-Din (2101397)
- Abdullah Aml (2101398)

Project description.

- The project is mainly a virtual reality educational game based on topics in a course.

- The actors in the system are:
  1. Instructors　　　　　2. Students　　　3. Admins

- The software targets 2 perspectives:

  - **System dashboard:** Where the instructors, students can communicate with each other and get latest news.

  - **Game system:** The software used inside the game.

Project description.

- At the beginning of the semester, students register the course through the dashboard system.
- Once their registration request is made, the System Admin ensures that student's registration is compliant with the laws. If it is, registration is done successfully.
- Then, Instructors are notified with the registered students to communicate with them.
- Instructors can edit/delete/modify stages within the course (following CRUD metric).
- On each modification from the instructor, students are notified by their dashboard.
- The game types within the system are (design, exploration, assembly and puzzles).
- Each instructor specifies the suitable game type related to their course.
- The VR game system is connected to the database that contains details to specific course.

PROBLEM VS SOLUTION

PROBLEM

Students can't use their imagination to properly visualize the contents of the demonstrated course chapters

SOLUTION

A virtual reality game with 3D figures related to the course can greatly improve the students' understanding

Quote

"Agile methods derive much of their agility by relying on the tacit knowledge embodied in the team, rather than writing the knowledge down in plans"

—Prof. Barry Boehm

System break-down

01
Login
No interaction shall be done on dashboard unless the user is logged in

02
Dashboard interactions
Unique dashboard for every user type (instructor, student)

03
MVC architecture
The project follows MVC(Model, veiw, controller) design pattern

04
Different game views
Various stages across each course that are updated oftenly by instructors

05
Grading system
Intelligent grading systems that grant students live grades upon task completion within a stage

06
Effective communication
Instructors, students can chat lively

User stories

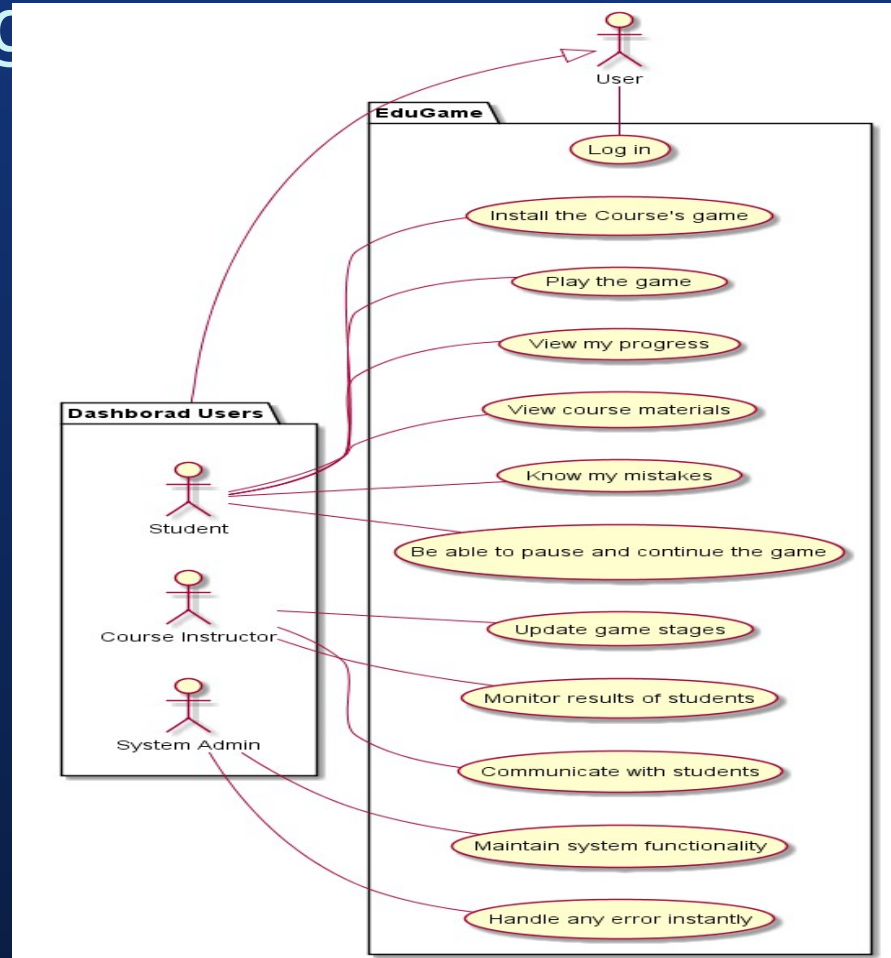| Story ID	As a/an	I want to...	So that...
1.	Student	Register in educational game	I participate in course curriculum.
2.	Student	Get notified with updates made on the system	I can check recent updates made by course instructors.
3.	Student	See all course stages before starting	I can manage my time correctly.
4.	Student	Have easy controls	I can navigate the game easily.
5.	Student	Complete all the game stages	I can proceed to the final stage and pass the course.
6.	Student	Get a second chance if I made a mistake	I can get high grades.
7.	Student	Receive email with final grades	I know whether I succeed or not.
8.	Student	Pause the game	Can encounter for sudden interrupts
9.	Course instructor	Make quizzes inside the game	Measure the student's understanding.
10.	Course instructor	Get notified when a student finishes the final stage	I can check their score and approve his grade.
11.	Course instructor	Edit/update the course material	I can modify the game stages.
12.	Course instructor	Get a list of scores of all students at the end of the semester	I can calculate the success percentage.
13.	Course instructor	Be able to approve the final results for all students taking courses	The system start sending mails to them.
14.	System admin	Monitor the system	I make sure the system is working properly.

Functional requirements

Requirement ID	Requirement description
1.	All the topics present in the game must be stated in the course.
2.	The system of the game shall allow editing the game to course instructors only.
3.	Student level shall increase if and only if they perform the required tasks within a stage.
4.	Only authorized students shall have access to the game. (The authorized students are students that registered for the corresponding course).
5.	The game system shall prevent any kind of cheating. (e.g. by adding login system to make sure the student himself is accessing the game)
6.	A student cannot pass their current stage in the game unless all the stage objectives are done.
7.	No student shall reach the final stage unless all the previous stages are passed on their profile.
8.	The final stage is not accessible for a student until the student level meets minimum allowed. (e.g. level 10).
9.	The game system shall automatically generate a report once detected any cheating. The report must include student details and how was cheating detected.
10.	No student is allowed to participate in the game after the semester is finished.

Non-Functional requirements

| Requirement ID	Requirement description
1.	The game shall not fail during runtime for any reason.
2.	Safe login/logout must be maintained.
3.	The game may lag due to poor internet connection. But lag shall not exceed 200ms.
4.	The game system shall preserve a history of student's grades and levels for future reference.
5.	The game system may allow the students to access the game anytime.
6.	If an update was issued during runtime (when the student is already inside the game), the student has to be prompt by update so that he can leave the game within a given timeout.
7.	The figures in the game shall be friendly and interactive to student's gestures. e.g. no violence is allowed by any means
8.	The game system shall be able to receive all the students changes at the same time and update itself correspondingly with no delay.
9.	The game system shall have considerations for students having motion sickness. They shall have different visualizations accustomed to their mental state.
10.	The game system must be reliable enough to let the students play the game flawlessly.

Use case diag

Use case description: Communicate with students

| Use case	Communicate with students		
Actor	Course instructor		
Trigger	Several students start playing the game related to the course.		
Pre-condition	Game system allow communication between course instructor and students.		
Post-condition	Both students and instructor perform effective communication.		
Main scenario	1.	Course instructor (CI)	Log in to the system
	2.	Game system (GS)	Check input credentials and deduce that the user is an instructor. Then display the instructor dashboard.
	3.	CI	Check if there is any student tried to reach the instructor.
	4.	GS	Provide a notification panel that contain chats from students.
	5.	CI	Read students inquiries and reply to them.
	6.	GS	Provide a clear UI that contain student name and his message. Then transmit the instructor's answer and finally notify the student.
	7.	CI	Send a global message to all students to notify them with latest changes.
	8.	GS	Provide a global message option that broadcasts instructor's message across chat server.
	9.	CI	Categorize students' messages according to content.
	10.	GS	Provide filters in the chats section to categorize messages.
Extensions	3a. If there are no students tried to reach the instructor, the chat window has to display "No messages yet". 5a. If any student written an insult or improper words, the system replaces such words with asterisk '*'.		

Use case description: Play Game

| Use case	Play the game		
Actor	Student		
Trigger	The semester starts		
Pre-condition	Student installs the game, and log in		
Post-condition	Student finishes a stage or, multiple ones		
Main scenario	1.	Student (S)	Press start button
	2.	Game system (GS)	The game system renders the student stage
	3.	S	explore/design tasks in the game, and browse course materials
	4.	GS	Fetches the course materials form the dashboard database and render it to virtual reality glasses.
	5.	GS	The GS loads quiz and question form the dashboard database
	6.	S	Answers the questions and continue the game.
	7.	S	Finishes all the materials, and answers all questions
	8.	GS	will move the student to the next stage, stores the score, and progress of the student to the dashboard database

Extensions	1a. the virtual reality (VR) fails to connect to the server
	1b. GS will pop up a check internet connection message
	3a. If S is disconnected
	3b. when internet is back, GS will render the game of the last stop
	5a. S fails to answer the question
	5b. GS will give S 3 trials to answer the question.
	    IF S fails again
	    GS will restart the stage again, and multiplies the score by a decreasing ratio ex (.9, then .8 next reset and so on)		

Class diagram
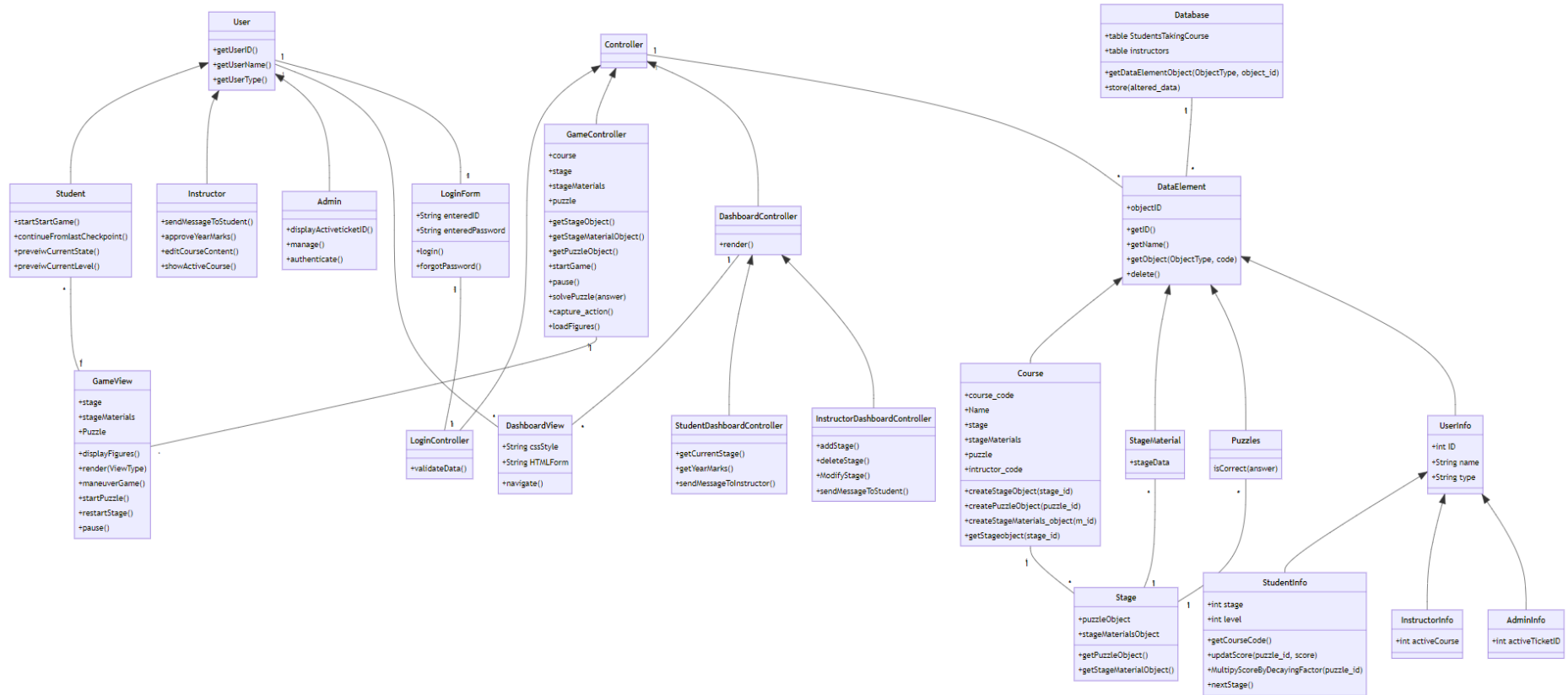
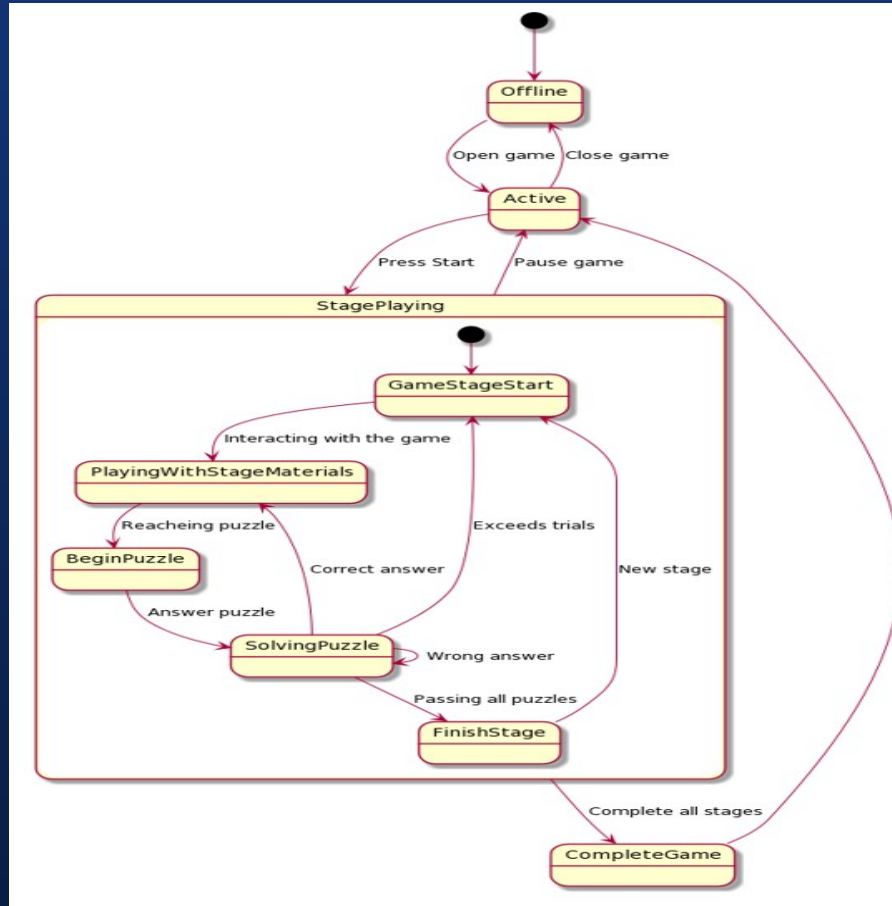# Dashboard sequence diagram

Game sequence

Game sequence diagram: Link
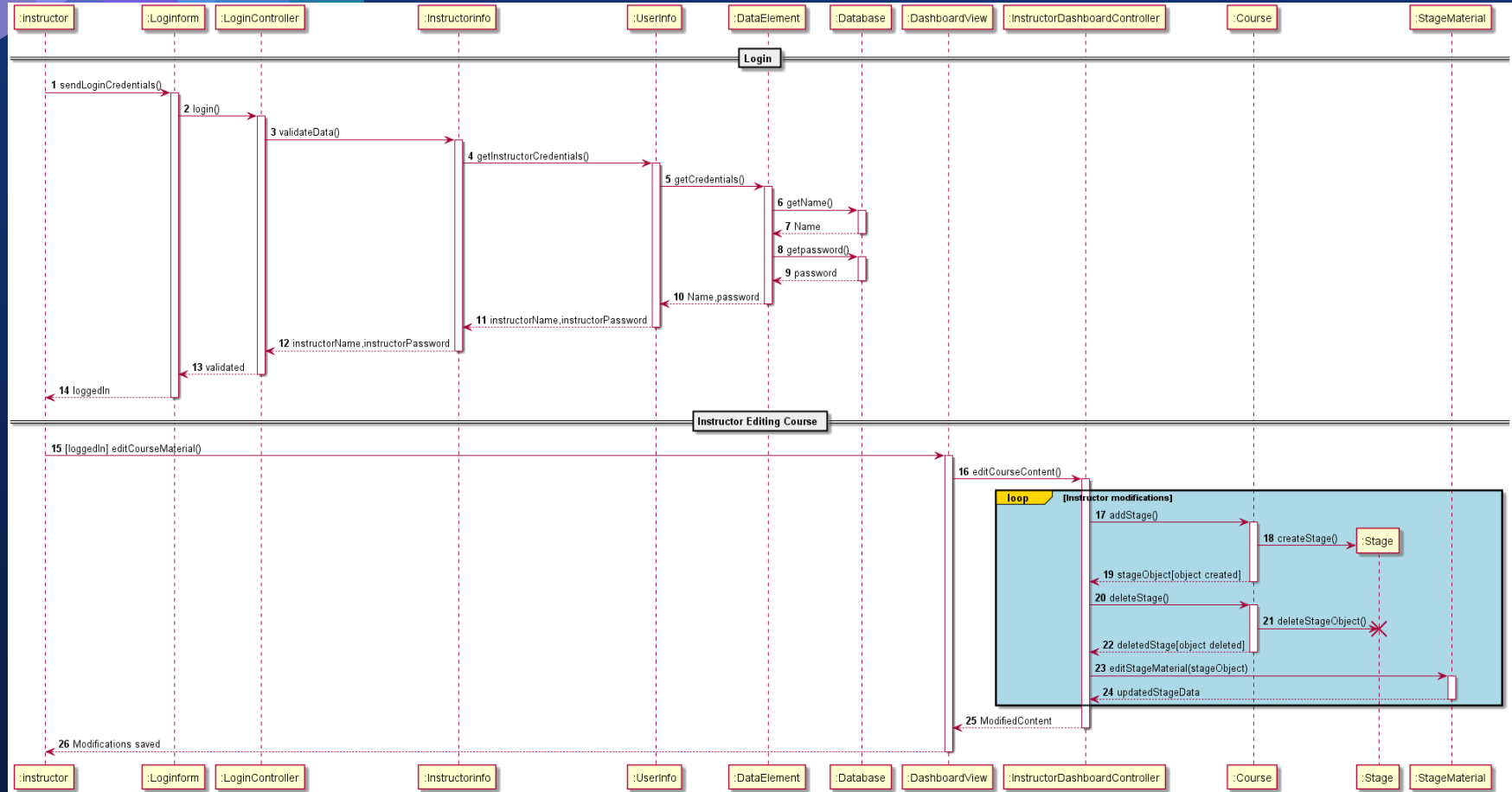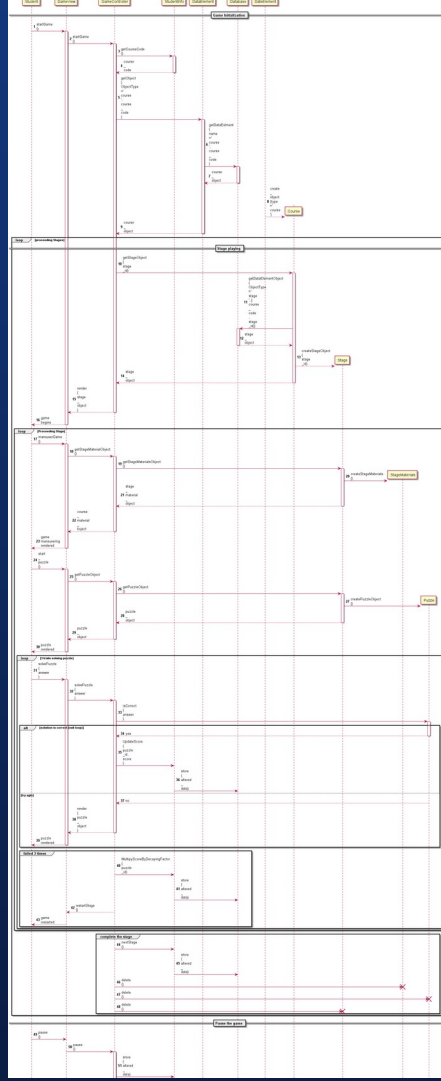
Dashboard state diagram

Game state diagram

01

Instructor

Instructor research

1

The instructor age is between 20-40.

2

The instructor should have material developing experience.

3

The Instructor should be familiar with technology. If not there will be hand on session to get the instructor ready

02

Student

Student research

1

The student's age is between 15-20.

2

The student is expected to be familiar with smart-phones, and technology, and if not there will be an intro game to make the student familiar with the game.

3

The student is not supposed to have basic scientific knowledge (can read, write, apply basic mathematical operations

03

Admin

Student research

1

The admin should have two years of experience.

2

The admin sets all time on disk so interface should be reliable and consistent.

3

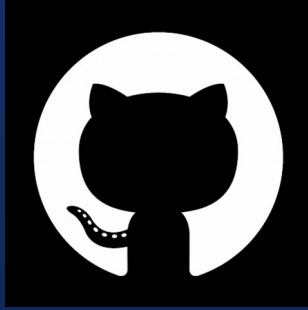Age is not a concern if there were an experience.

UI screens

Tools

Please visit our
Repository
HERE

PlantUML: a script
driven UML maker
visit **LINK**
And alive demo
from our state
diagram **HERE**

Thank you

Presented by:
- Khaled Bahaa El-Din (2101397)
- Abdullah Aml (2101398)