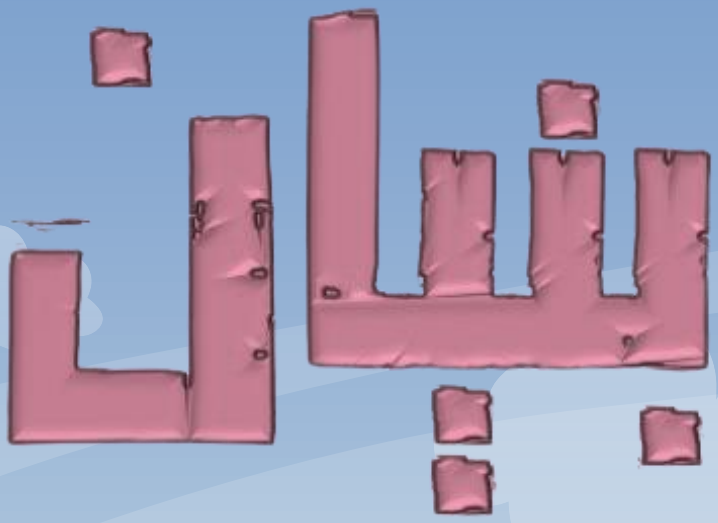
Umm Al-Qura University
Computer & Info. Systems College
Computer Science department

Advanced Programming
2nd Semester 2023-2024
Course Project



Project Number : 3

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Advanced Programming Course

Instructor: Dr. Manal Alghamdi

2023- 2024

1- Project Title : **Bunyan**

2- Project Idea and Project Aims

project idea:

The idea of the game is different because it contains three stages. Each stage represents a floor of the house that the player wants to build. In each stage there is a different game that the player must complete in order to collect points that will help him build a floor of the house. It is worth noting that there are points and time to increase the effectiveness of the game and the possibility of accurate arrangement of players' positions.

target user : Gamers

aim of the project :

motivating game users to complete their building floors with high quality and in a short time, and this infuses the player's heart with competition and increased concentration. it is important to clarify that this game contains many ideas, as this activates all parts of the mind and increases the rate of enthusiasm when playing

3- Project Functionalities

Mention all the functionalities or services which are provided by your application in details.

Sign UP :

1- The player shall be able to create a new account
1.1 The game shall be able to display sign up form to the user which contains set of fields : (First, and last name , Email , Password,Question,ans)
1.2 the game shall be able to validate the entered data with these constraints: (The email must be unique and there is no other record in the database has the same values, The password contains letters in and numbers Password must not contain symbols)
1.3 When all the data is filled in correctly, the account data will be stored in the database

Sign in :

2-The player shall be able to sign in his / her account
The game shall be able to display login form to the user 2.1
2.2 The game shall be able to check from the entered data with the database
2.3 The game shall be able to check if the password matches the password of this player in the database
If not, the system will create an error message (incorrect password)
If the user logged in successfully then the game will view

Avatar :

3- The player shall be able to choose a specific avatar
3.1 The game must be able to display more than one avatar to the player
3.2 The game should be able to store a unique number for each avatar and image in the database

Levels :

4-The player shall be able to play in multiple levels

4.1 The game should offer multiple levels of increasing difficulty

4.2 The game shall be able to display the levels available to the player

4.3 The game shall be able to prevent the player from entering the next level until he finishes the current level

Playing :

5-The player shall be able to interact with the puzzle by tapping, dragging, or swiping the screen

5.1 A game must have a set of rules that determine how players can manipulate the items within it

Progress saving :

7-The player should be able to resume their game from where they left off

7.1 The game should be able to automatically save the player's progress after completing each level

Achievements:

8- Players shall be able to see their ranking in the game according to specific criteria

8.1 The game shall be able to display all players in order by the number of coins and time spent

8.2 The game shall be able to calculate the number of trees each player has gained based on the number of coins they have collected

4- Project Design and Implementation

A. Graphical User Interface

Write paragraph(s) that answers all of the following questions:
What is the purpose of each interface?
Explain in details the usage flow of your application.

We have designed in the game "Bunyan" there are 22 graphical user interfaces:

1. **Loading interface:** which displays the first interface for only 5 seconds while the progress bar finishes.
2. **Log-In interface:** Allows the player to enter the main game interface through email and password based on verification.
3. **Sign-Up interface:** allows new players to register a new account and then return to the login interface
4. **Forgot password interface:** It allows registered players to recover their password by answering the question that was asked to them during the sign-up process.
5. **The main interface:** which allows the player to interact with 5 buttons: (display the application idea, display the profile interface, display the achievements board interface, display the levels interface, exit the program and return to the login screen)
6. **Profile interface:** which displays the player's information with the ability to modify his avatar image instead of the default one.
7. **Achievements board interface:** which displays all the achievements of "Bunyan" players through Table View in descending order according to the highest level, number of coins, and least time consuming.

10. **Levels interface:** which consists of 3 levels (floors) that have not yet been built, and by completing each stage, the floor becomes colored. Also, the player can see the total number of coins and trees that he has collected.
11. **Start level1 interface:** allows the player to operate with 3 buttons, either to start playing in the stage, to go to the achievements interface, or to return to the levels interface.
12. **Rules interface:** The rules display the 3 tasks required to complete the first stage for only 20 seconds, while allowing you to return to view them.
13. **First task interface:** The game displays 3 boxes (green, red, blue) and they must be filled with rectangles that carry the same color as the text.
14. **Second task interface:** Like the maze game, it allows the player to use the keyboard to deliver the engineer to the house by pressing the opposite arrow on the keyboard.
15. **Third task interface:** allows the player to draw the shape depending on the desired shape, but with different colors of the layers of the shape.
16. **End of the level1 interface:** displays the number of stars owed to the player along with the total number of queens and trees.
17. **Start level2 interface:** allows the player to operate with 3 buttons, either to start playing in the stage, to go to the achievements interface, or to return to the levels interface.
18. **Game level2 interface:** This game displays several arithmetic problems. The correct answer can be chosen by pressing the button. (Each wrong answer deducts 5 coins)
19. **End of the level2 interface:** displays the number of stars owed to the player along with the total number of queens and trees.
20. **Start level3 interface:** allows the player to start playing or return to the levels interface.
21. **Game level3 interface:** This game displays words that are missing one letter that must be filled in using the keyboard.
22. **End of the level3 interface:** displays the total number of queens and trees and a button to return to the stages interface.

The application starts from the **loading interface** > the **login interface** (from which you can go to the **Sign Up interface** / the **forget password interface** and then return to it) > the **main interface** (from which you can go to the personal **profile interface** / the **achievements board interface** / the **levels interface** / the **login interface**." If he wants to get out"..

If you go to the **levels interface**:

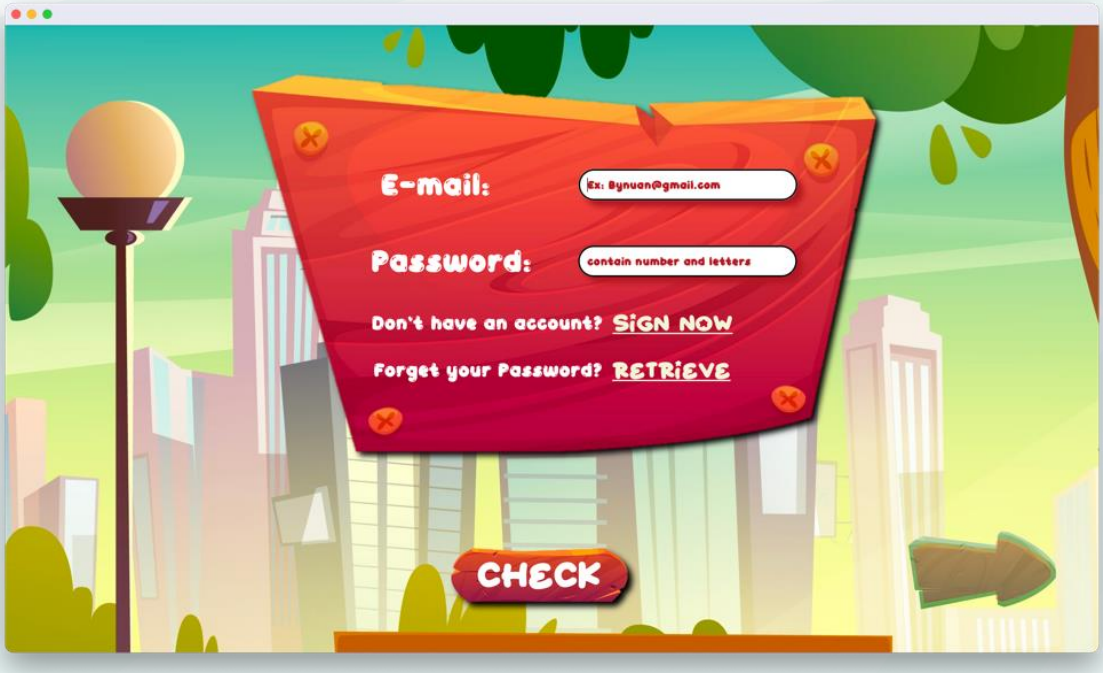
1 - The **Start level1 interface** > the **Rules interface** > the **First task interface** > the **Second task interface** > the **Third task interface** > the **End of the level1 interface** > then return to the **levels interface**.

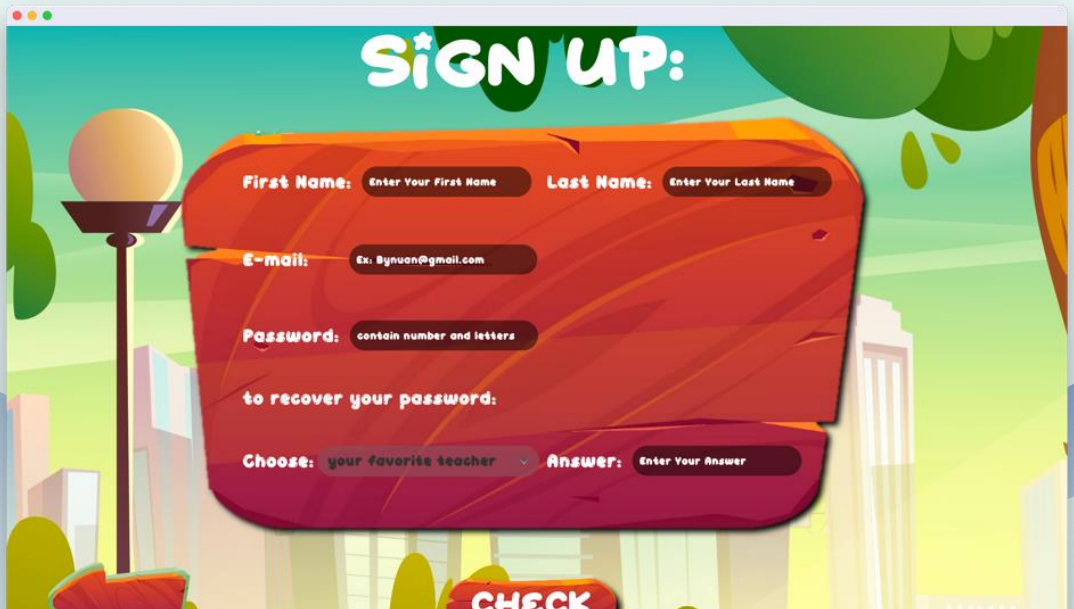
2- The **Start level2 interface** > the **Game level2 interface** > the **End of the level2 interface** > then returning to the **levels interface**.

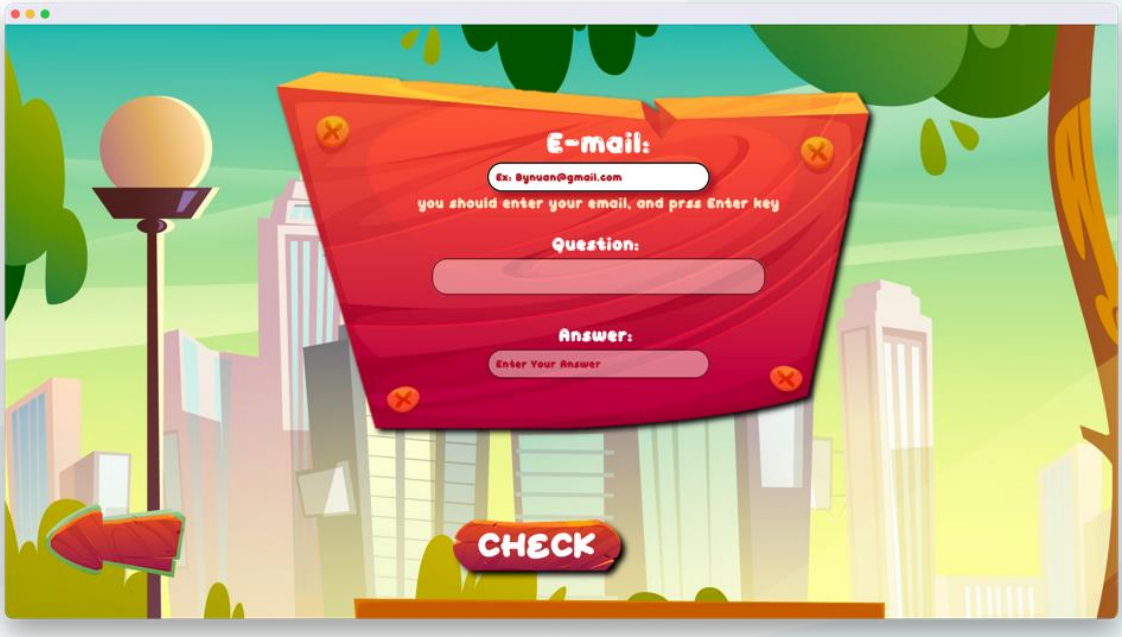
3- The **Start level3 interface** > the **Game level3 interface** > the **End of the level3 interface** > then returning to the **levels interface**.

#Note: Most interfaces include allowing returning to the previous interface (while keeping the current object)

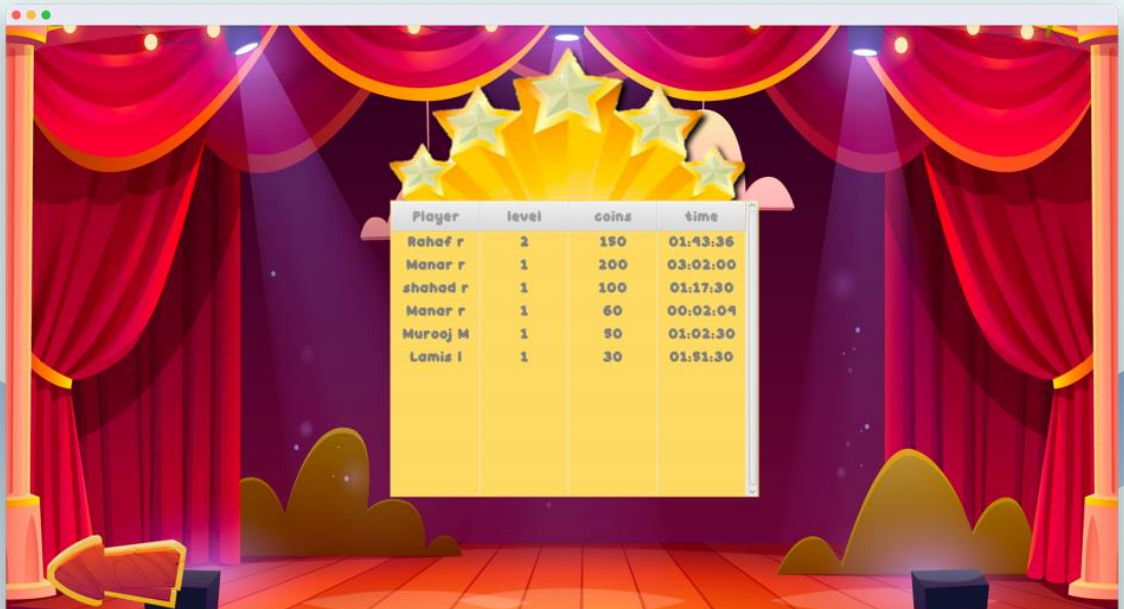
What have been designed? How many interfaces? (add screen shots).

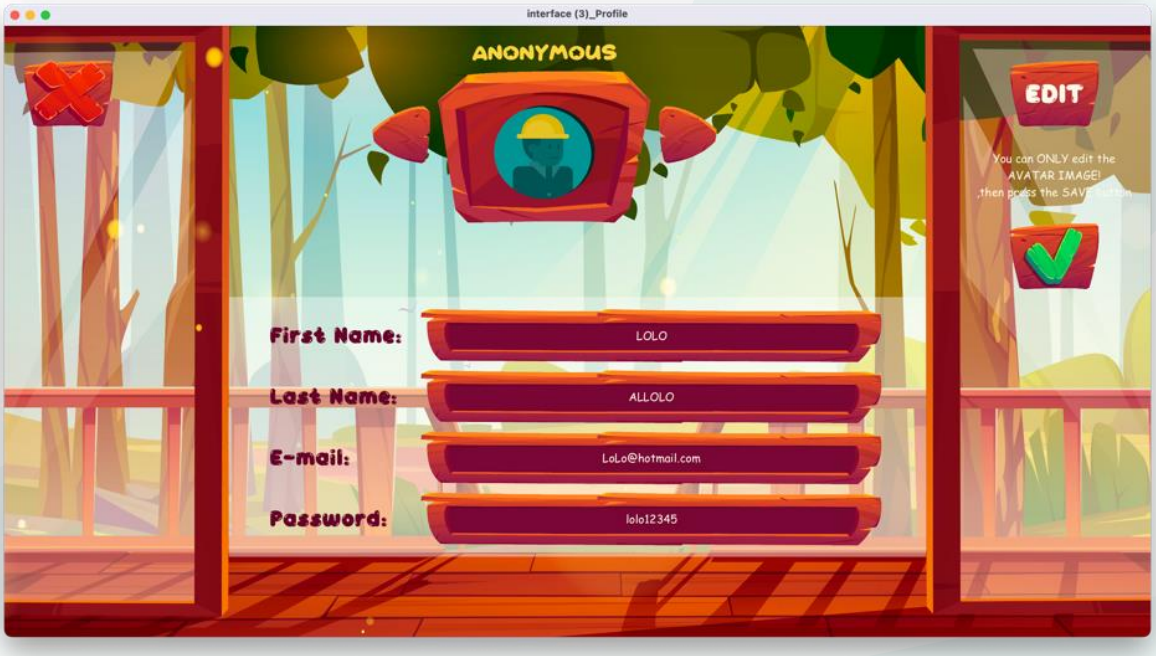


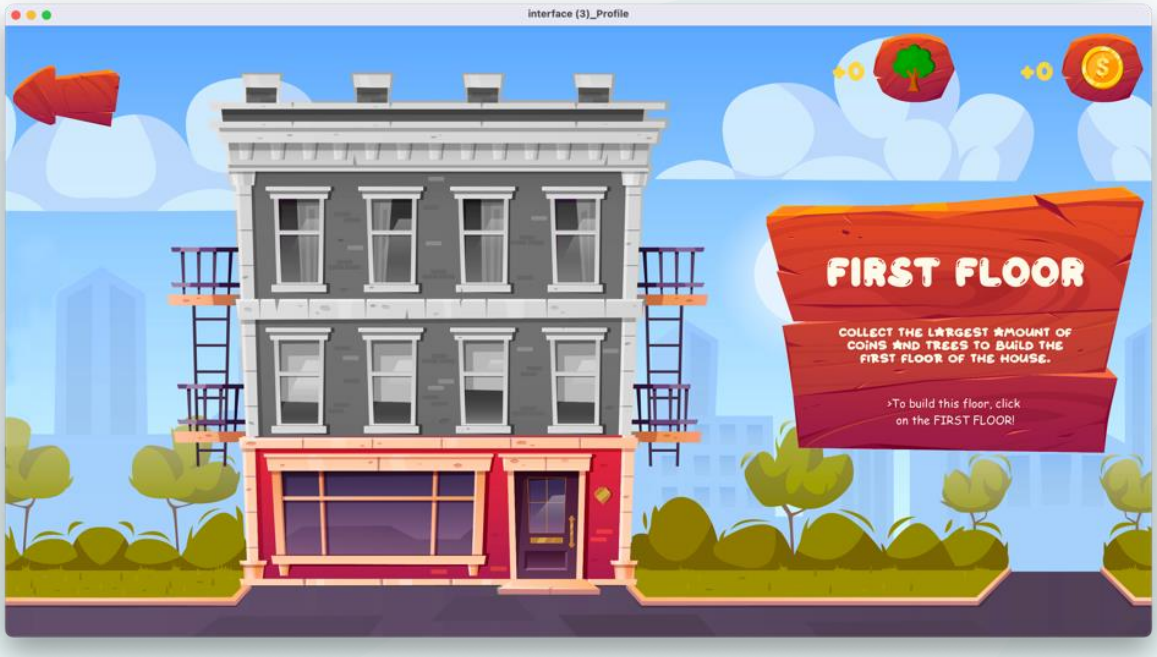


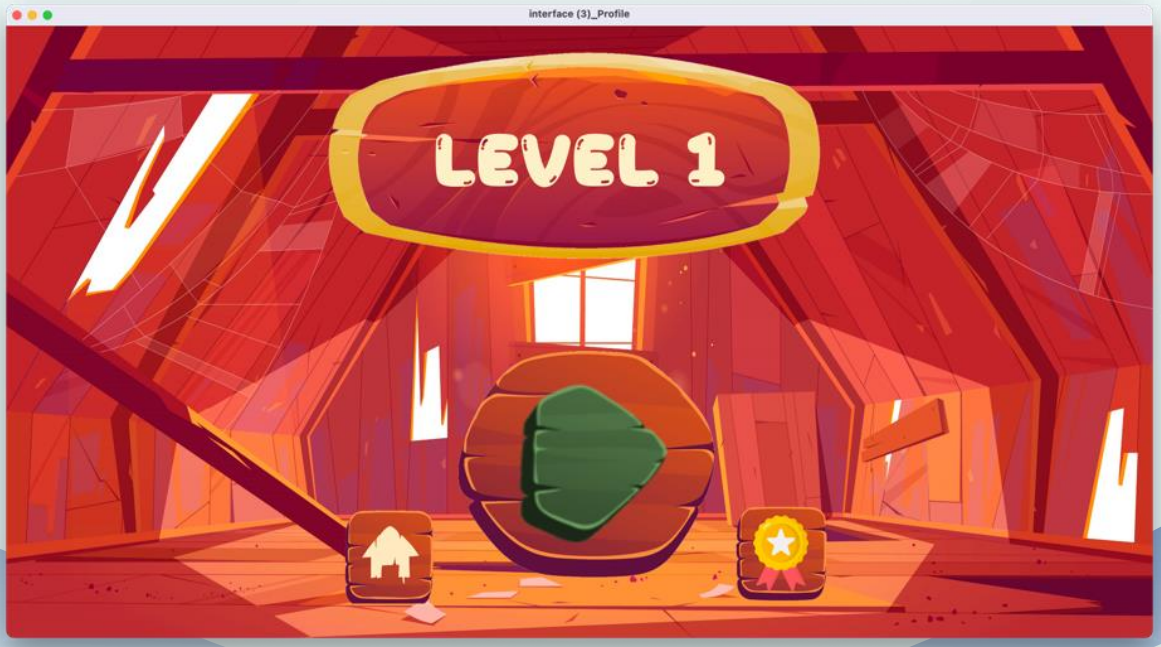

E-mail:
Ex: Bynuan@gmail.com
you should enter your email, and prss Enter key
Question:
Answer:
Enter Your Answer
CHECK


بنيان

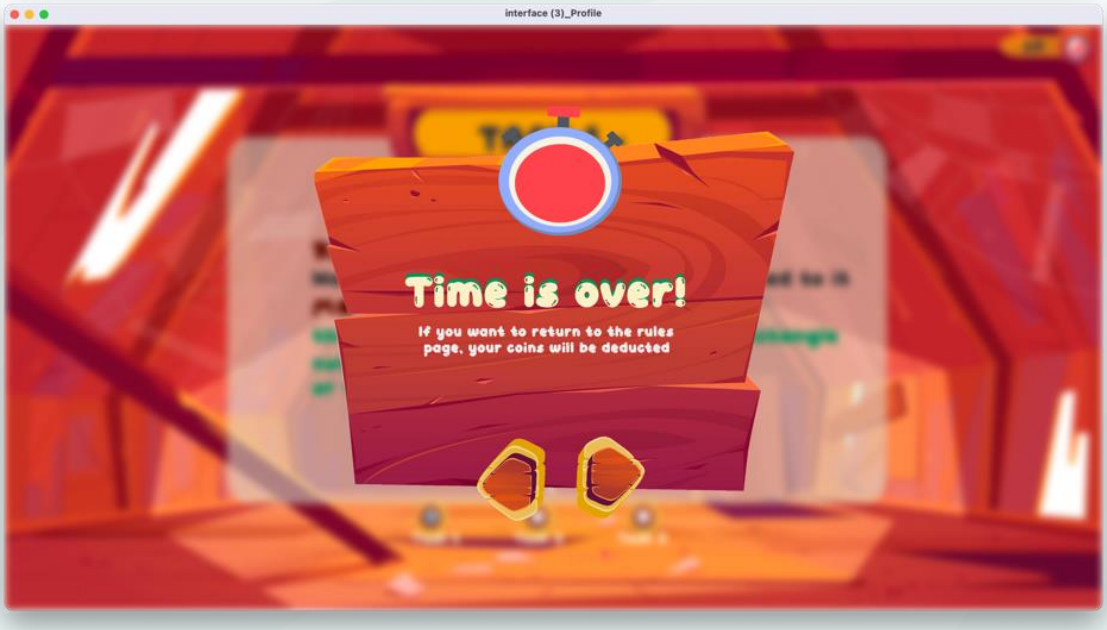

Player level coins time
Rahaf r 2 150 01:43:36
Manar r 1 200 03:02:00
shahad r 1 100 01:17:30
Manar r 1 60 00:02:09
Muroj M 1 50 01:02:30
Lamis l 1 30 01:51:30

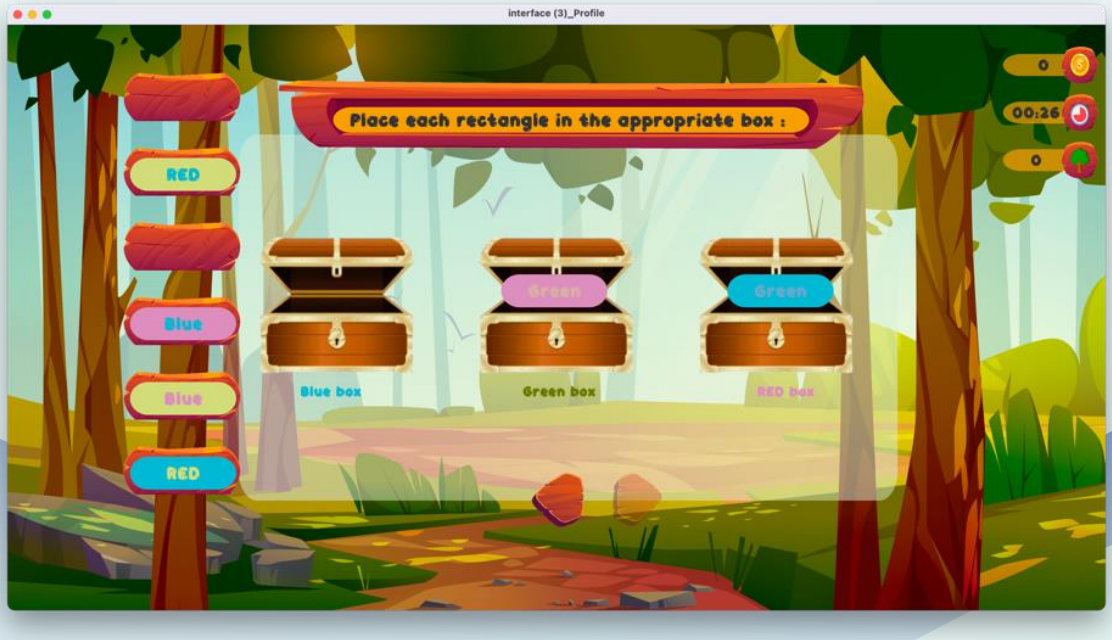

interface (3)_Profile
ANONYMOUS
EDIT
You can ONLY edit the AVATAR IMAGE!
,then press the SAVE button
First Name:
LOLO
Last Name:
ALLOLO
E-mail:
LoLo@hotmail.com
Password:
lolo12345


interface (3)_Profile
FIRST FLOOR
COLLECT THE LARGEST AMOUNT OF COINS AND TREES TO BUILD THE FIRST FLOOR OF THE HOUSE.
>To build this floor, click on the FIRST FLOOR!


interface (3)_Profile
LEVEL 1

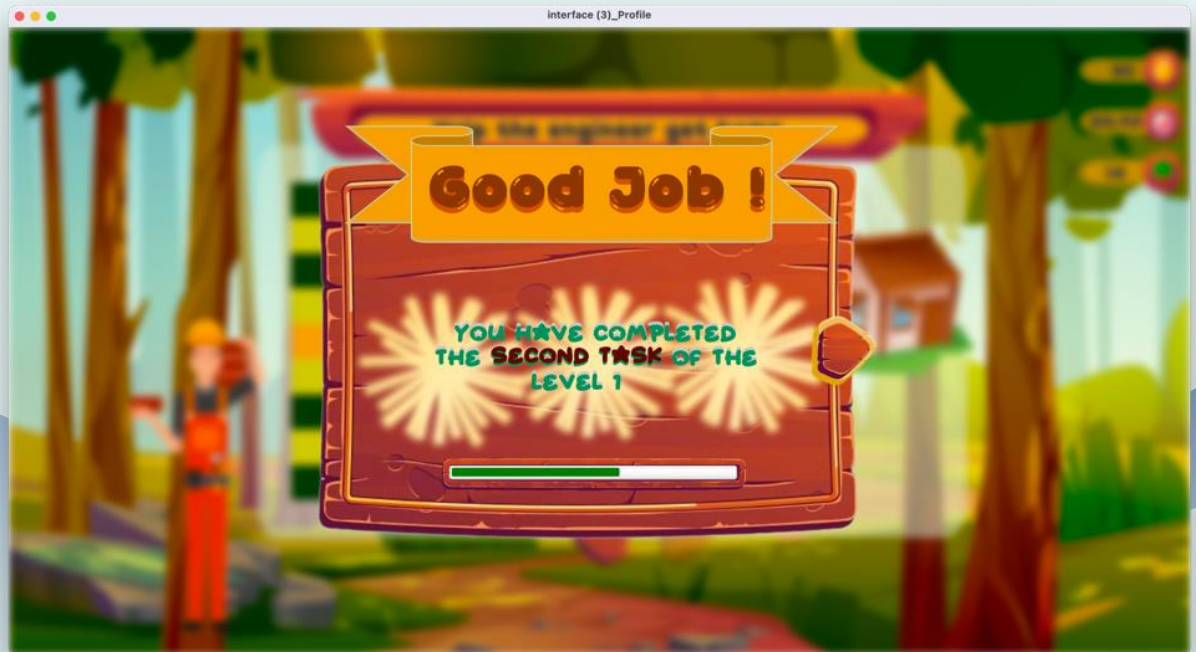

interface (3)_Profile
11
TASK 1 :
REQUIRED :
Match the rectangle with the box assigned to it
MATCHING BY :
the color of the word written on the rectangle
not the color of the rectangle
or the color written on the rectangle.
Task 1
Task 2
Task 3

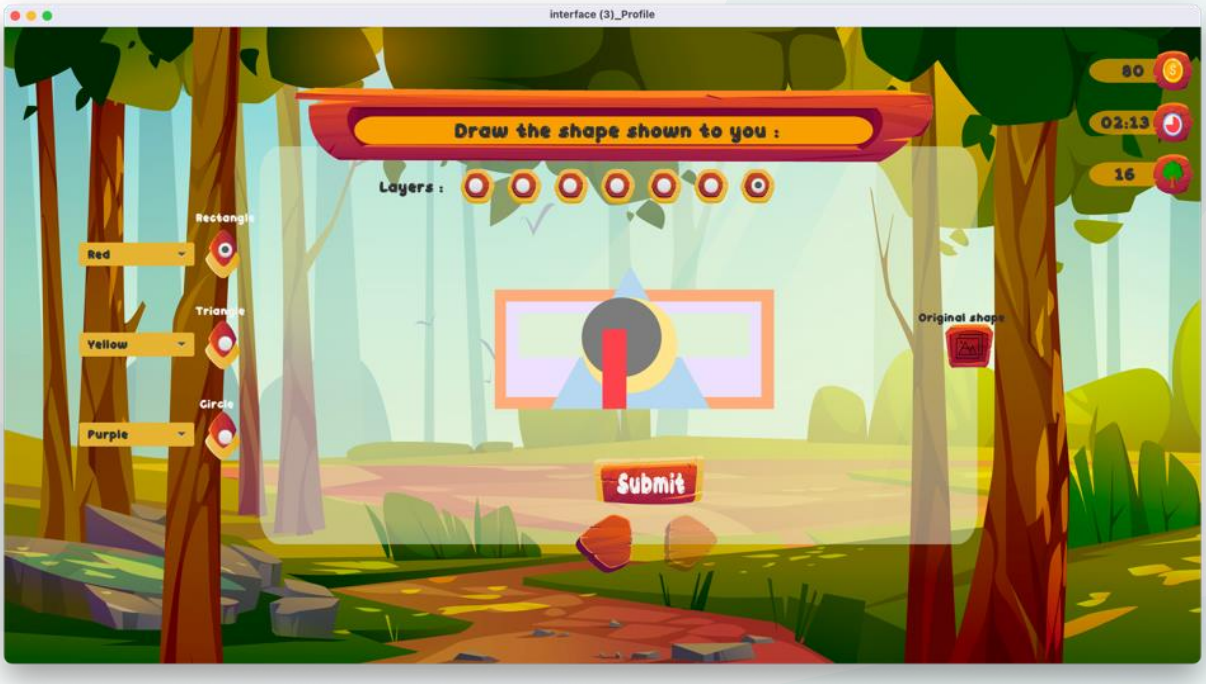

interface (3)_Profile
Time is over!
If you want to return to the rules page, your coins will be deducted


interface (3)_Profile
Place each rectangle in the appropriate box :
0
00:26
0
RED
Blue
Blue
RED
Green
Green
Blue box
Green box
RED box


interface (3)_Profile
Good Job !
YOU HAVE COMPLETED
THE FIRST TASK OF THE
LEVEL 1

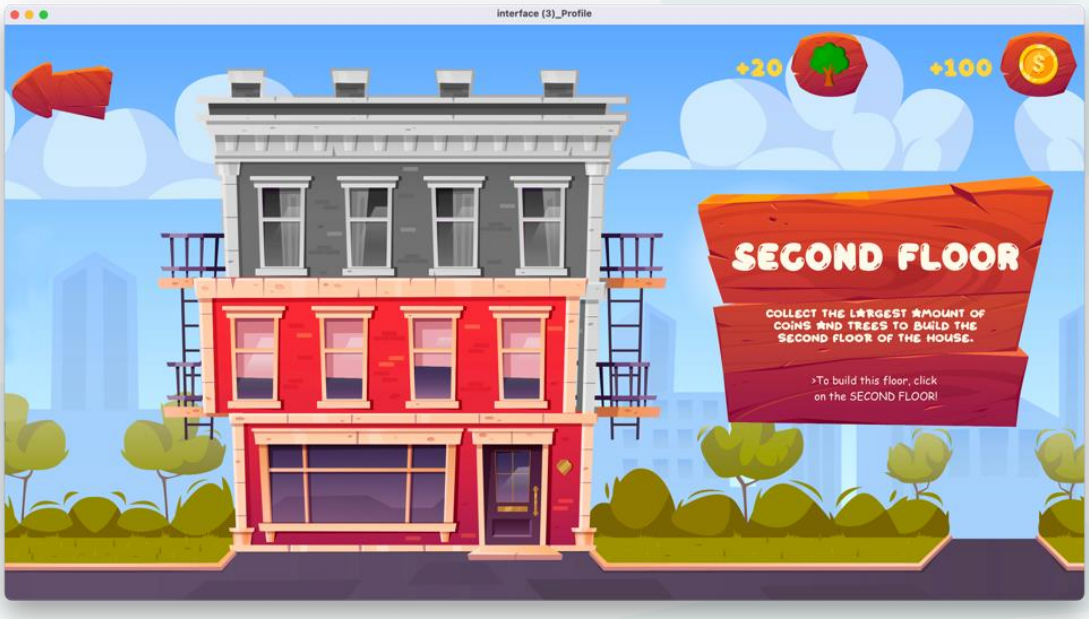

interface (3)_Profile
Help the engineer get home
20
00:40
4

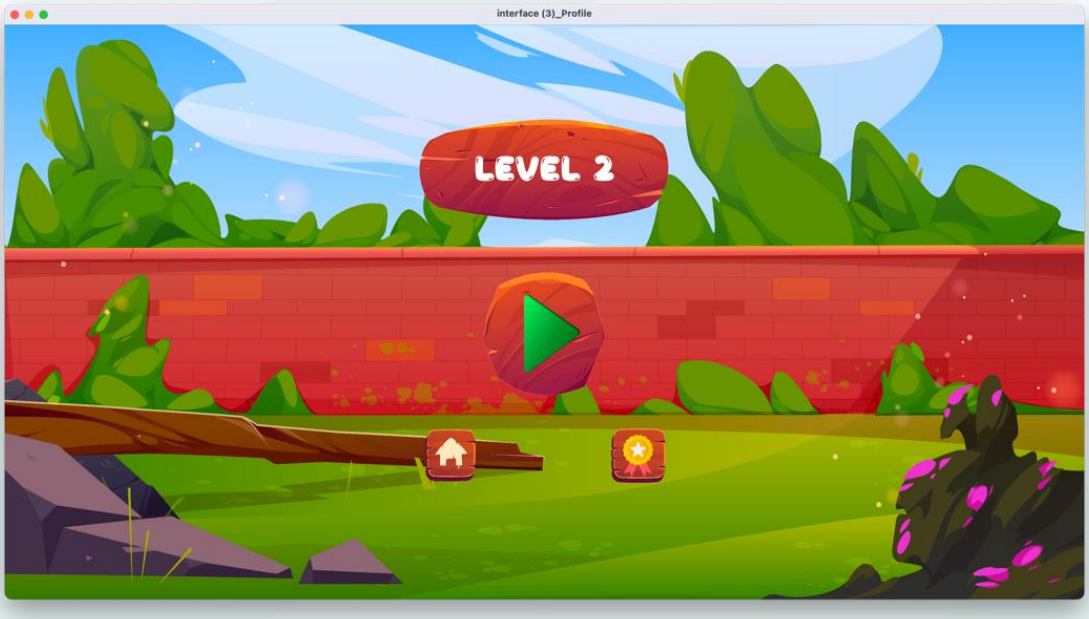

interface (3)_Profile
Good Job !
YOU HAVE COMPLETED
THE SECOND TASK OF THE
LEVEL 1

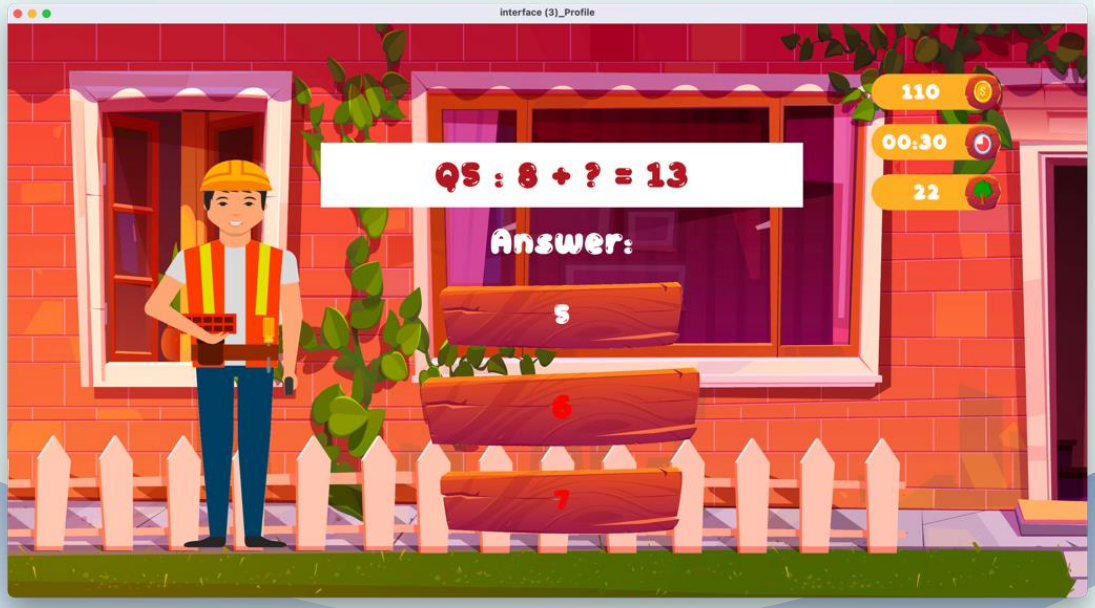

interface (3)_Profile
Draw the shape shown to you :
Layers :
80
02:13
16
Rectangle
Red
Triangle
Yellow
Circle
Purple
Original shape
Submit

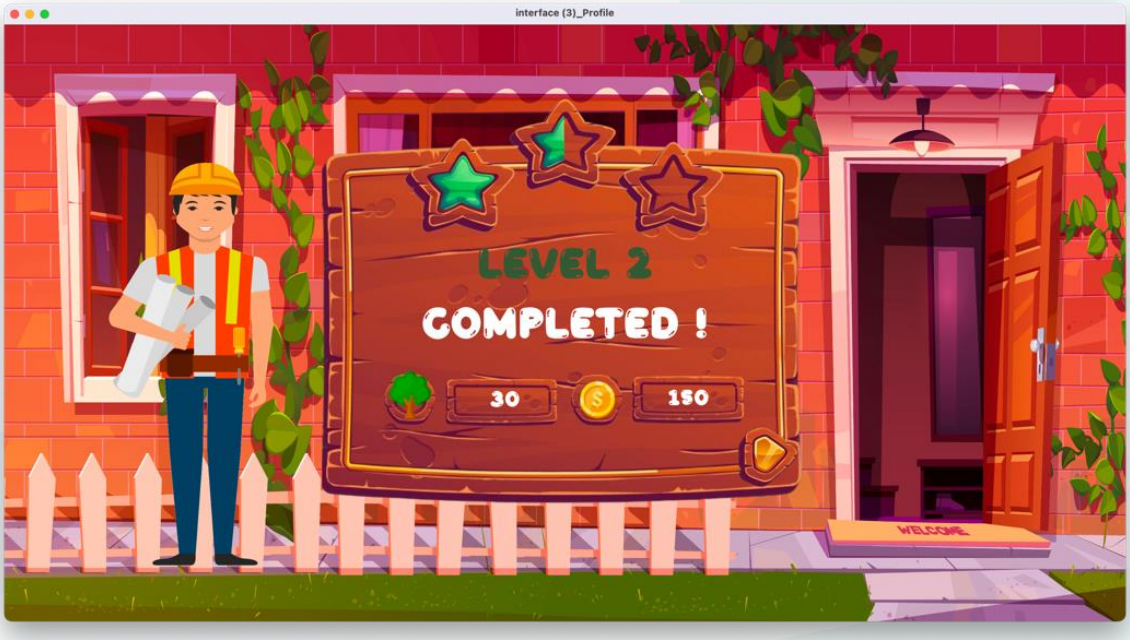

interface (3)_Profile
Good Job !
YOU HAVE COMPLETED
THE THIRD TASK OF THE
LEVEL 1


interface (3)_Profile
LEVEL 1
COMPLETED !
100
20

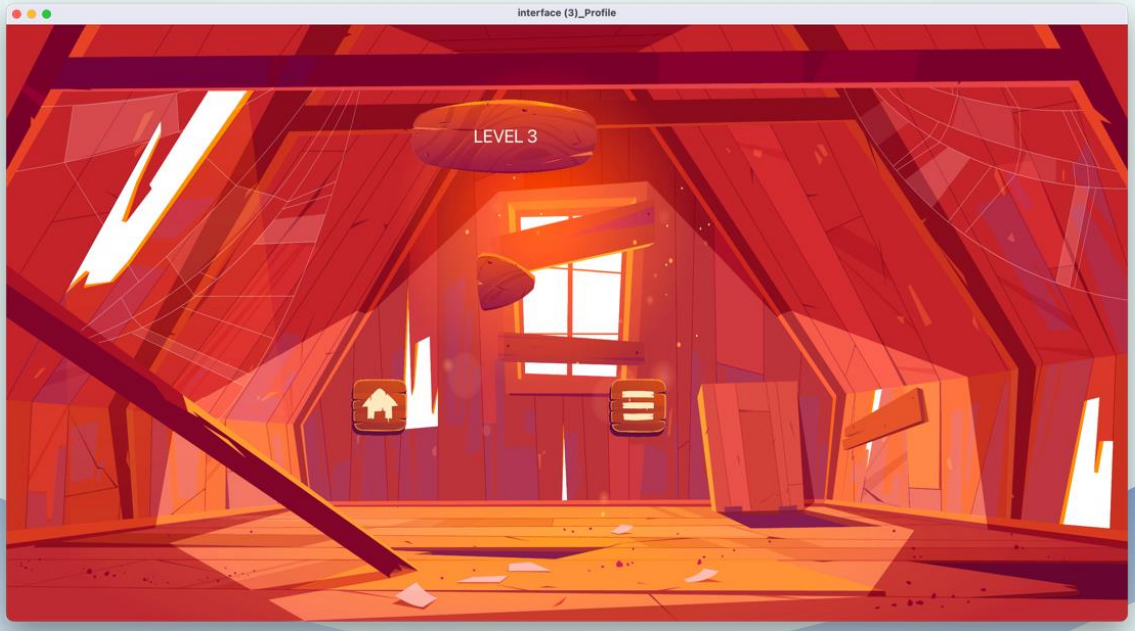

interface (3)_Profile
+20
+100
SECOND FLOOR
COLLECT THE LARGEST AMOUNT OF COINS AND TREES TO BUILD THE SECOND FLOOR OF THE HOUSE.
>To build this floor, click on the SECOND FLOOR!


interface (3)_Profile
LEVEL 2

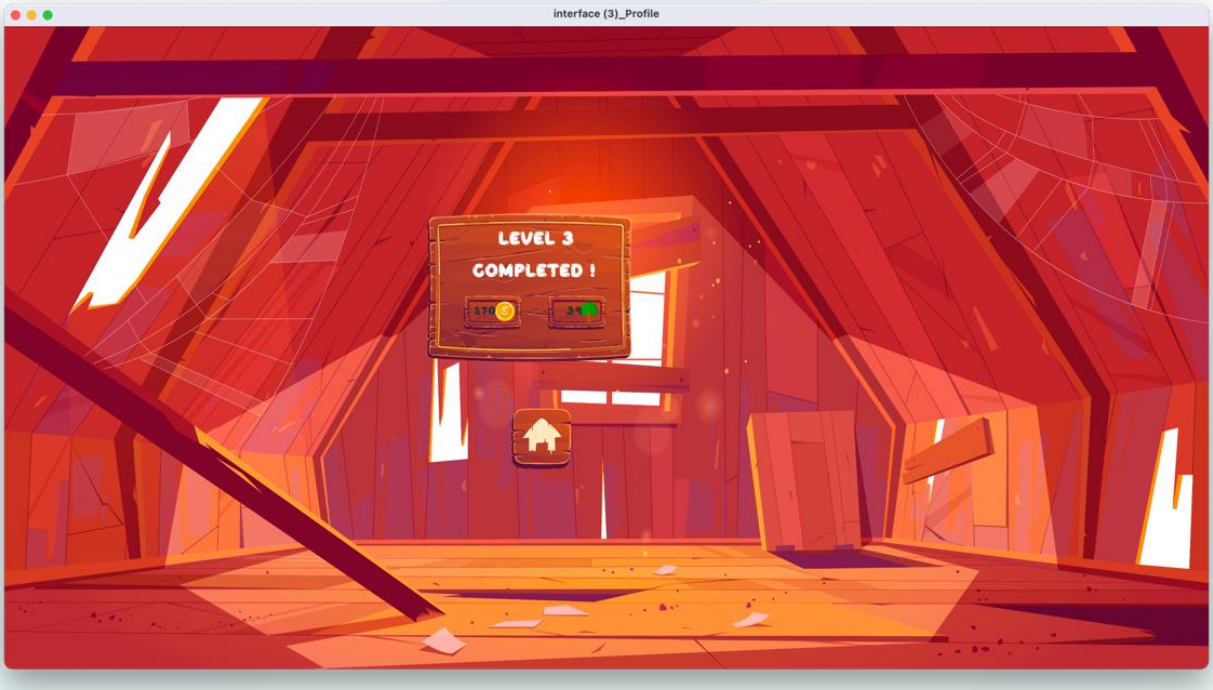

interface (3)_Profile
110
00:30
22
QS : 8 + ? = 13
Answer:
5
6
7


interface (3)_Profile
LEVEL 2
COMPLETED !
30
150
WELCOME


interface (3)_Profile
+30
+150
THIRD FLOOR
COLLECT THE LARGEST AMOUNT OF COINS AND TREES TO BUILD THE THIRD FLOOR OF THE HOUSE.
>To build this floor, click on the THIRD FLOOR!


interface (3)_Profile
LEVEL 3


interface (3)_Profile
Incorrect letter
140
27
A
P
L
E
P
Q
W
M
T


interface (3)_Profile
LEVEL 3
COMPLETED !


interface (3)_Profile
+34
+170

B. Event-Driven Programming

Write paragraph(s) that answers all of the following questions.
How many events?
What types of events have been implemented in your Application?
Mention and explain all the event sources in your application

We have used events in almost all interfaces of all types:

1/ **ActionEvent** ,such as:

- Check buttons in the login interface
- Most of the buttons that perform the function of moving to another interface
- Click on the correct answer
- And others...

2/ **MouseEvent** ,such as:

- Enlarge the shape when you point to some bots
- Drag the shape and drop it to the desired location
- Click on the correct answers with the mouse
- And others...

3/ **KeyEvent** ,such as:

- Enter player information when registering
- Navigating the maze in the first level game
- Enter the correct letter in the last level game.
- And others...

4/**Property Event : Listener** ,such as:

- addListener is used to bind functions to a specific event, allowing a specific behavior or response to be defined immediately upon occurrence of the event

C. Java Database Programming

Write paragraph(s) that answers all of the following questions.

Explain the need of database in your application and how you utilized from each table you have created in your database.
How many tables? What are the columns?

In our game , a database is essential for efficiently storing and managing player information, including progress and achievements. It ensures seamless retrieval, updating, and tracking of player data, allowing players to resume their gaming experience. The database also plays a vital role in recording and managing player achievements, enabling features like leaderboards. Additionally, it facilitates personalized user interfaces, in-game notifications, and targeted updates based on player information. Overall, the database is indispensable for enhancing the gaming experience by providing continuity, personalization, and a foundation for various in-game features.

Explain how you connect your object model to your relational model?.

First, we design our object model by creating classes that represent entities in the application, like the "Achievement" class for tracking accomplishments. These classes serve as the foundation, encapsulating attributes and behaviors.
Secondly, we use Hibernate annotations to map these object classes to corresponding tables in the relational database. Each attribute is annotated to specify its counterpart in the database, a crucial step for Hibernate to understand how to store and retrieve data.
Hibernate is configured through an XML file where we provide necessary settings such as database connection details. Mapped classes are declared in this configuration file, allowing Hibernate to recognize and manage these entities effectively.
In our code, database interactions involve opening a Hibernate session. For example, when creating a new Achievement, we instantiate the object, set attributes, and use the session's save method to persist it.
When retrieving data, we employ Hibernate Query Language (HQL) or Criteria queries, translated by Hibernate into SQL queries.

Explain the relationship between your database and your GUI, i.e mention all the mappings between the columns and UI components.

Player:
PlayerID: Typically not directly editable by the user, possibly displayed as a label or identifier
fname and lname: Mapped to text fields for the player's first and last
PlayerEmail and PlayerPass: Correspond to text fields for email .names and password input
playerQues: Mapped to a comboBox for selecting security questions
playerAns: Mapped to a text field for entering security answers
Achievement:
AchievementID: not be directly shown in the UI but used as a reference
PlayerID: Could be linked to the player's name or displayed as a label
levelNum, totalTime, numberOfCoins: Intended to be updated dynamically in response to specific action events
Avatar:
AvatarImageID: not be directly shown in the UI but used as a reference
AvatarName: Automatically determined by the database based on the selected AvatarImageID

D. Extra

Write paragraph(s) that answer all of the following questions.
If you did any extra work, explain what is it? Why you did it? How it is related to your application?

Timeline :
What is it? A timeline is a visual representation of a sequence of events over time. Used to manage and control the timing of animations or other events
Why did you use it? Relation to the Application? Timelines are useful for orchestrating and synchronizing various actions in an application, especially when dealing with animations. They provide a structured way to manage the progression of events
Animation:
What is it? Animation involves creating the illusion of motion by rapidly displaying a sequence of static images or frames. be applied to shapes, for visual appeal or interactive elements
Why did you use it? Relation to the Application? Animation enhances the user experience by adding dynamic and engaging elements to the application. It can draw attention to specific features, guide user focus, and make the interface more interactive and user-friendly

Input File :

What is it? An input file refers to a file containing data or configuration settings that can be read by the application. This data can be used to customize or provide initial parameters to the Game

Why did you use it? Relation to the Application? Using an input file allows for flexibility and customization without modifying the source code. It enables users to configure aspects of the application without directly interacting with the code, promoting a more user-friendly experience

Progress Bar :

What is it? A progress bar is a visual representation of the completion status of a task. It typically indicates the percentage of completion or the progress of a particular operation

Why did you use it? Relation to the Application? Progress bars provide real-time feedback to users about the status of ongoing operations. They are helpful for tasks that may take some time to complete, giving users a sense of how much progress has been made and how much is remaining

View a table :

What is this? A table view is a user interface element that displays data in a tabular format, in rows and columns

Why did you use it? Relation to the Application? Table views are excellent for presenting structured data in a clear and organized way. Here we used it to display the list of achievements in the game

5- The distribution of the work

In this section, mention the distribution of the work between the team. Be honest and feel free to show your tasks individually. Each member (if you want) can calculate the spent time in this project (days, hours or even minutes).

Member	Individual tasks			Shared tasks	
	GUI	Database		Participation in linking the overall project	All agreed collective requirements are completed
		How many queries create	Query type		
Lamis Mohammed	-Sign Up Interface -Login Interface - Forget Pass Interface - Achievement Interface	5	- insert - retrieve	✓	✓
Rahaf Al-Mehdar	-Start Level 2 - Game Level 2 -End of Level 2	2	-update -retrieve	✓	✓
Manar Al-mashi	-Loading Interface -Avatars Interface -Start Levels Interface -Levels Interface	1	- retrieve	✓	✓
Murooj Al-Zahrani	-Start Level 1 - Rules level1 -Task 1 of Level 1 -Task 2 of Level 1 -Task 3 of Level 1 -End of Level 1	4	- insert - update -retrieve	✓	✓
Shahd Al-Thobaiti	-Start Level 3 - Game Level 3 -End of Level 3	✗		✗	✗

6- What we learnt

Write paragraph(s) that answers the following questions.
What you have learned from the project?
What is the advantages you gained from designing this project?
Did you feel the teamwork was very useful in programming project?
Are you satisfied with your application?
Did you feel you will be able to work in a large scale project later?

In this project, we acquired several skills from several aspects. First, **developing programming skills** when analyzing the problems we encountered and considering them as challenges to improve our experience. Secondly, **applying theoretical concepts** to the subject helped us obtain the information well. Finally, **greatly developing teamwork skills**, as the work is related to each other, which led to gaining benefits from each other and exchanging ideas and experiences.

We are very satisfied with our order and will be able to work on a large-scale project later.

7- Project difficulties

Write paragraph(s) that answers the following questions.
Mention any difficulties you have faced in this project if any (Resources difficulties, technical difficulties, programming difficulties or teamwork difficulties)

In the project we encountered an issue with incompatibility between the netbeans versions used and the Hibernate versions, which significantly disrupted the workflow. The mismatch between netbeans and Hibernate versions created challenges, leading to disruptions in the project progress. Another major challenge we faced was the tight time constraints to complete the project. The limited time frame imposed additional pressure on the team, which affected the pace of the development and testing phases. Time constraints necessitated effective project management and prioritization of tasks to meet deadlines, which contributed to an increased workload on the team.
Despite these challenges, the team worked collaboratively and integratedly

8- Project Declaration

We confirm that the work of this project was solely undertaken by ourselves and that no help was provided from other sources as those allowed. As well as we confirm that we completely aware of the violation consequences of the academic integrity.
Read and check the previous declaration.

Lamis Mohammed	443007788
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