Imam Abdulrahman Bin Faisal University

College of Science and Humanities

Computer Science Department

Object Oriented Programming (2) Course Project Second semester 2023/2024

Digital Steps Program

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❖ Introduction:

Digital Steps is an interactive and engaging program designed to cater to users with varying levels of programming experience, from beginners to advanced learners. The program aims to provide a comprehensive learning experience for individuals interested in acquiring or enhancing their Java programming skills. It covers the basics of programming concepts and the Java language, offering step-by-step tutorials and exercises for novice programmers, expanding knowledge and problem-solving skills for intermediate learners, and providing advanced topics for experienced programmers. What sets Digital Steps apart is its game-based approach to learning programming languages. By incorporating gamification elements, the program makes the learning process fun, easy, and accessible outside the traditional educational framework. Through interactive content and adaptive learning features, Digital Steps enables learners to acquire problem-solving skills and grasp programming concepts more effectively. It creates an enjoyable and rewarding experience that fosters a deep understanding of the Java language. Our target audience spans from CS majors and programmers to anyone curious about Java OOP. This includes beginners seeking an interactive way to learn, self-motivated individuals who prefer a gamified approach, experienced programmers transitioning to Java, and hobbyists looking to explore Java OOP for their projects. By providing an immersive and gamified environment, DigitalSteps caters to learners from various backgrounds, empowering them to gain or enhance their Java OOP skills.

❖ Interfaces:

- **Welcome to digital steps:**

This interface is a video with music at the beginning of the program run.

Figure 1. Welcome to Digital Steps Interface.

- **Afterwelcome:**

This interface asks the player whether they want to play the digital steps game which is our main application that allows you to learn the java in steps, or playing the worldwide competition freely and anonymously.

Figure 2. Afterwelcome Interface

- **Admin Or Player**

This interface lets the user choose the role, either an admin or player.

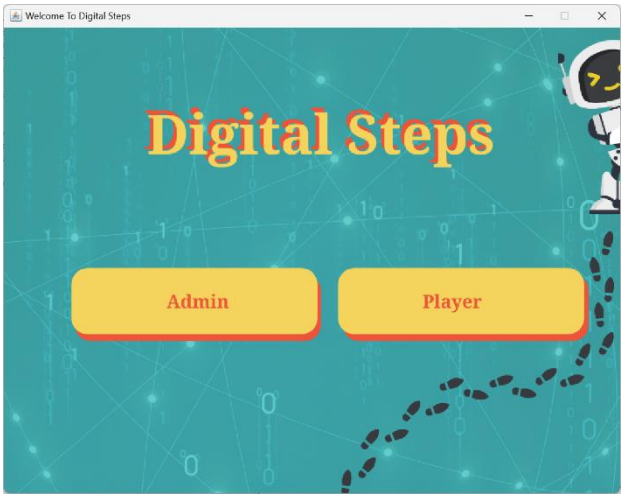


Figure 3. Admin Or Player Interface

- **Do You Have an Account**

This interface permits the player either indicate they have an existing account or are a new player.

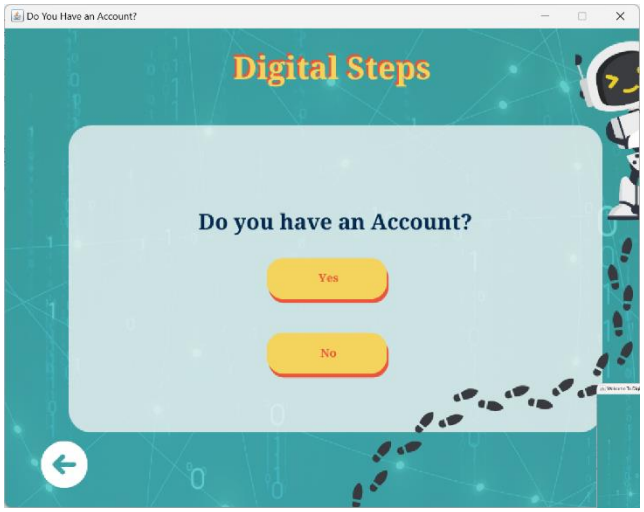


Figure 4. Do You Have an Account Interface

Player Part

- **Player Login**

This interface is designed to let the players login to the system, and then the program searches for the account in the database. And if the player does not have an account and wants to create one, there is a Label GUI component that takes the user to the Sign-up interface.

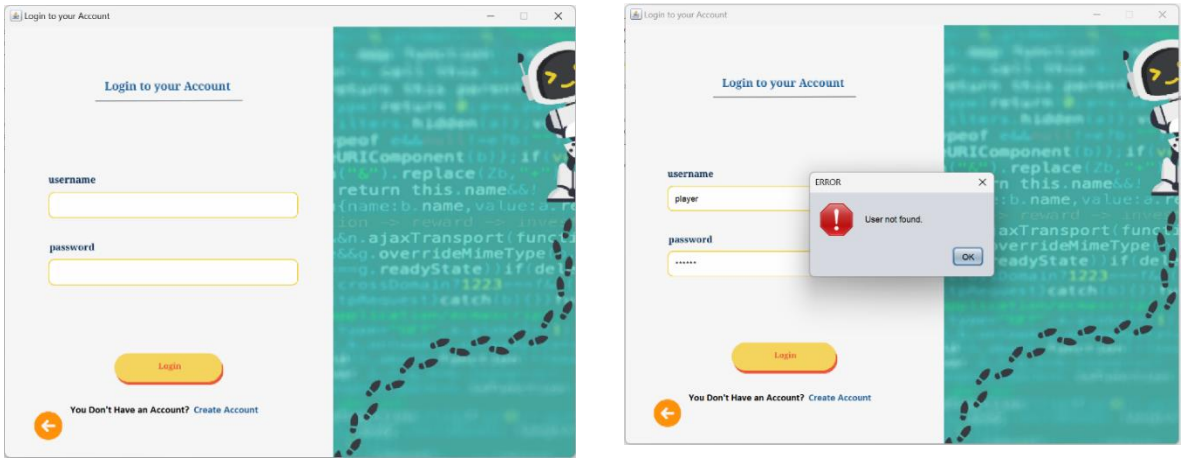


Figure 5. Player Login Interface

- **Create an Account**

This sign-up interface allows the player to enter the information needed to create an account. A Combobox GUI component facilitates the country selection. Moreover, to ensure data integrity, the program checks the validity of entered information, and it verifies the uniqueness of usernames and phone numbers and emails to prevent the creation of duplicate accounts.

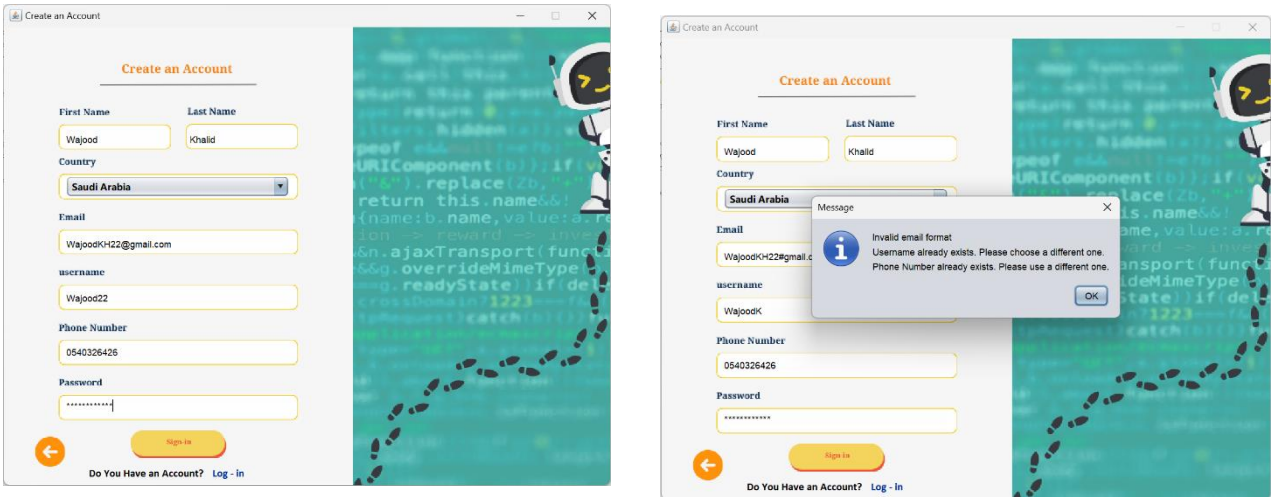


Figure 6. Sign-Up Interface

- **Player Profile**

  The Player Profile interface shows data about the player's account. To protect sensitive data, the password is hidden by default. However, there is a button to display it if needed. Moreover, there is a button to permanently delete the admin account from the database.

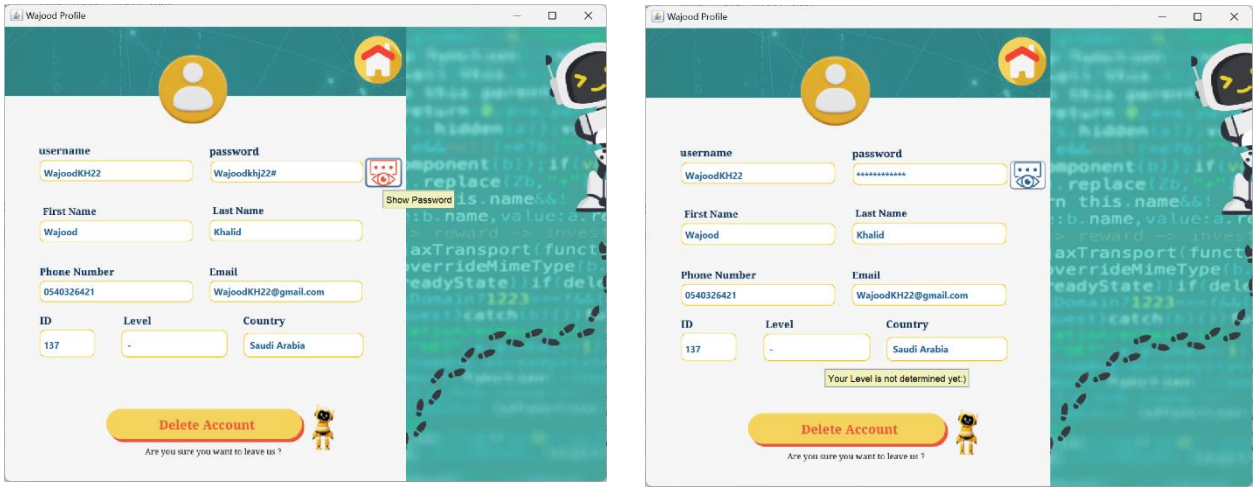


Figure 7. Player's Profile Interface

- **Experience question:**

This interface asks the players about their experience in programming language, if the player answers (yes I have) the program will take the player to the next interface "Do you your level in programming language" If the player answers no i don't, the program will take the player to the interface that will educate the player about basic programming concept.

Figure 8. Experience question

- **Programing Basic Home Interface**

This interface is a Java class named ProgramingBasicHome that extends the javax.swing.JFrame class. It represents a graphical user interface (GUI) window for a basic programming home page. Overall, this class represents a basic GUI window for a programming home page with buttons and labels. It uses Swing components and event handling to provide interactivity to the user.

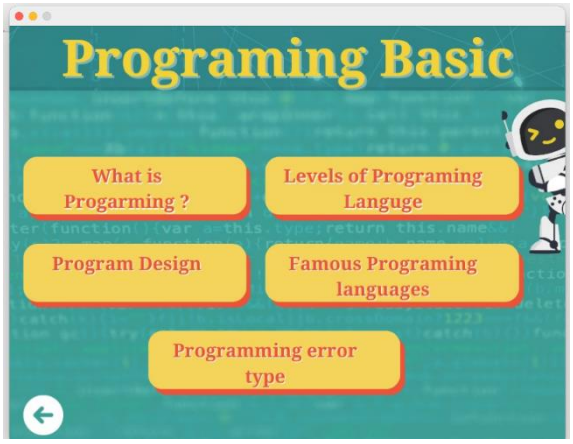
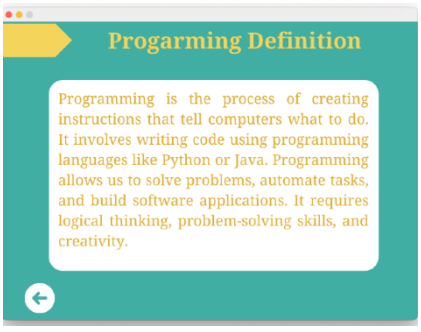
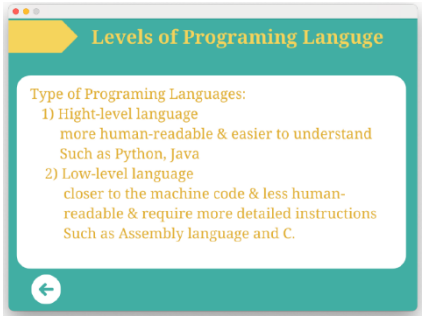
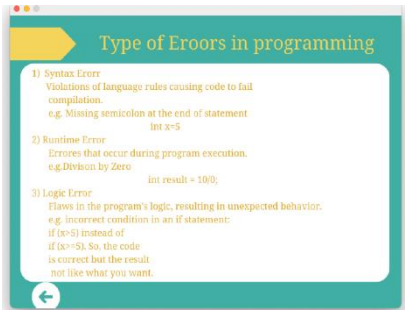


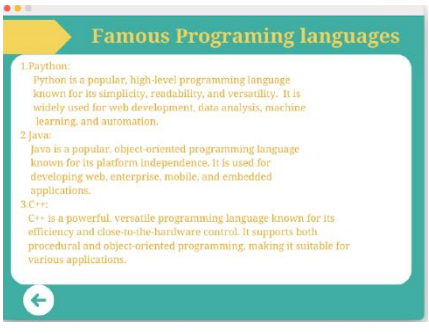
Figure 9. Programming concept interface.

This interface is a graphical user interface (GUI) component that creates a window with some interactive elements. Overall, those code creates a simple GUI window that displays famous Programming Languages, Levels of Programming Languages, Programming Definitions and Type of Error. and it provides a button to close the window and open another window (ProgramingBasicHome).









- **Do you know your level:**

This interface will ask the player whether they know their level in programming language or not, if they know the program will move to next interface which is “choose your level”, if the don’t know, they can perform a level measurement quiz to know it.

Figure 10. Do you know your level Interface.

- **Level Quiz Frame:**

This interface represents a Java Swing interface for quiz questions. This interface represents a single quiz question interface with multiple buttons for selecting answers and performing actions based on the selected answer and the same for the rest of the questions.

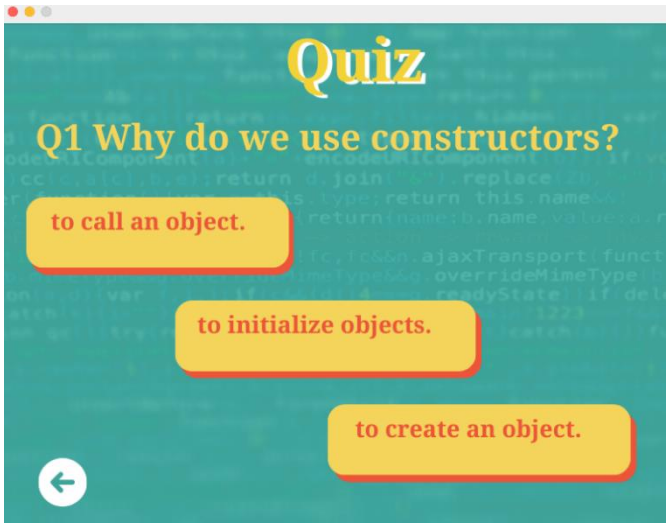


*Figure 11. **Quiz Questions Interface.***

- **Quiz Result Interface**

This interface represents a Java class named "QuizResult" that extends the "javax.swing.JFrame" class. It is used to create a graphical user interface (GUI) window for displaying quiz results.

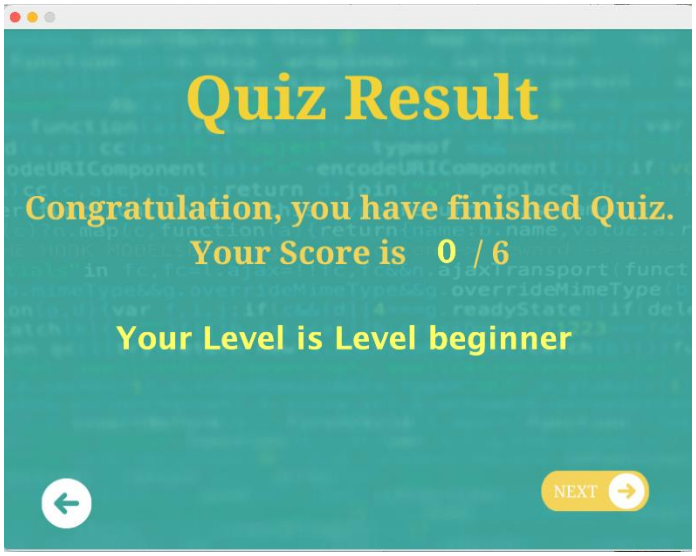


Figure 12. Quiz Result Interface

- **Choose your level:**

This interface will ask the players about their level in programming language, the player answer will be registered in the data based for each player differently.

Figure 13. Coose your level Interface.

- **Player home:**

  This is the player home, we have 3 different player's home: beginner level player home, intermediate level player home, advance level player home. So, each player will have different lessons, quizzes based on their level. In this home, the player can go back to see their profile account as In figure 7. Also, the player can retake the level measurement quiz to see their progress in learning and automatically their level will be updated based on the result from that quiz. Last but not least, the player can see the about us interface by clicking on the information button, the about us interface contains a brief description about the game and a button to leave feedback about the game that will appears in the admin's dashboard (writing and reading from file).

Figure 14. Plyer Home Interface

Figure 15. About Us Interface

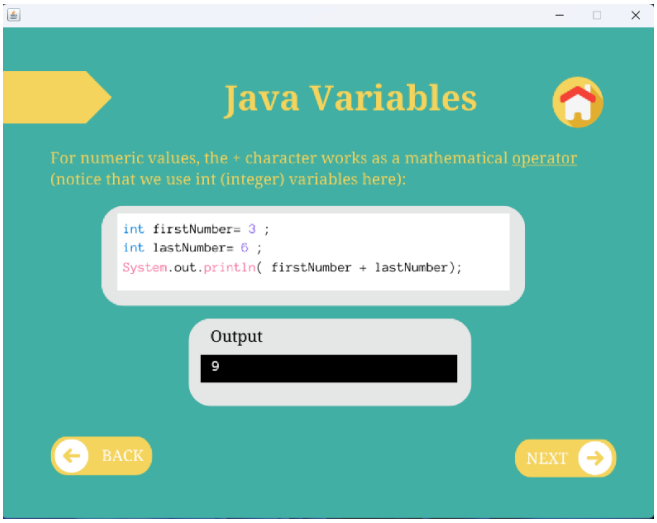
- **Lessons:**

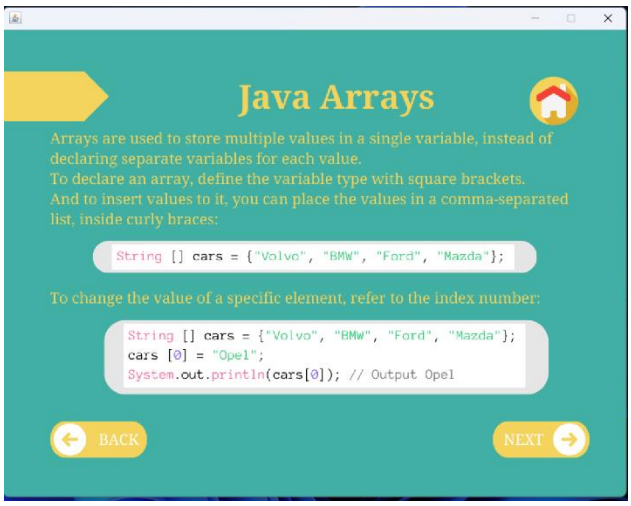
There are about 50 lessons in the program so far. There are 15 lessons for the beginner level, 15 lessons for the intermediate level, and 19 lessons for the advanced level.

The lessons start with an introduction, the correct way to write Java code, and the definition of variables. In addition, knowing the types of data and operations that are allowed to be used. Finally, use if-conditions, Switch, Loops and Array.

In each interface there are approximately three buttons: a button to return to Home, Back button and finally a Next button (when this button is pressed, the completion of this lesson is stored for the student in the database).

Here is some lessons:





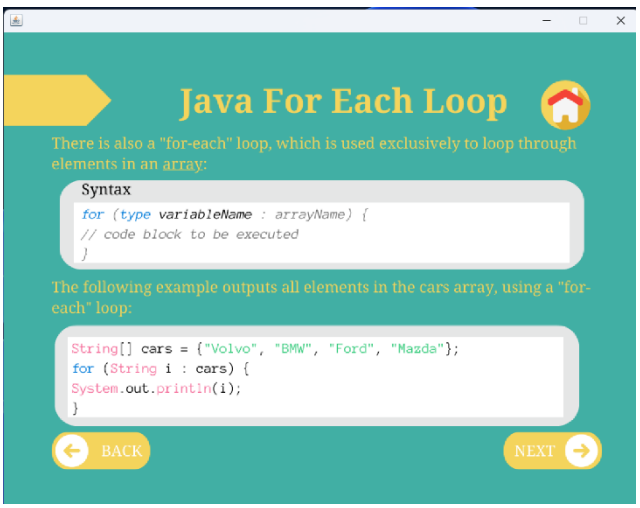


Figure 16. lessons interface.

- **Quiz:**

For each level, there is a test that measures the level of understanding of the player, and this test determines whether he has finished understanding all the lessons of the level and thus will move him to the next level. Each test contains ten questions, so if the player is able to answer all of them, he will get 10 points.

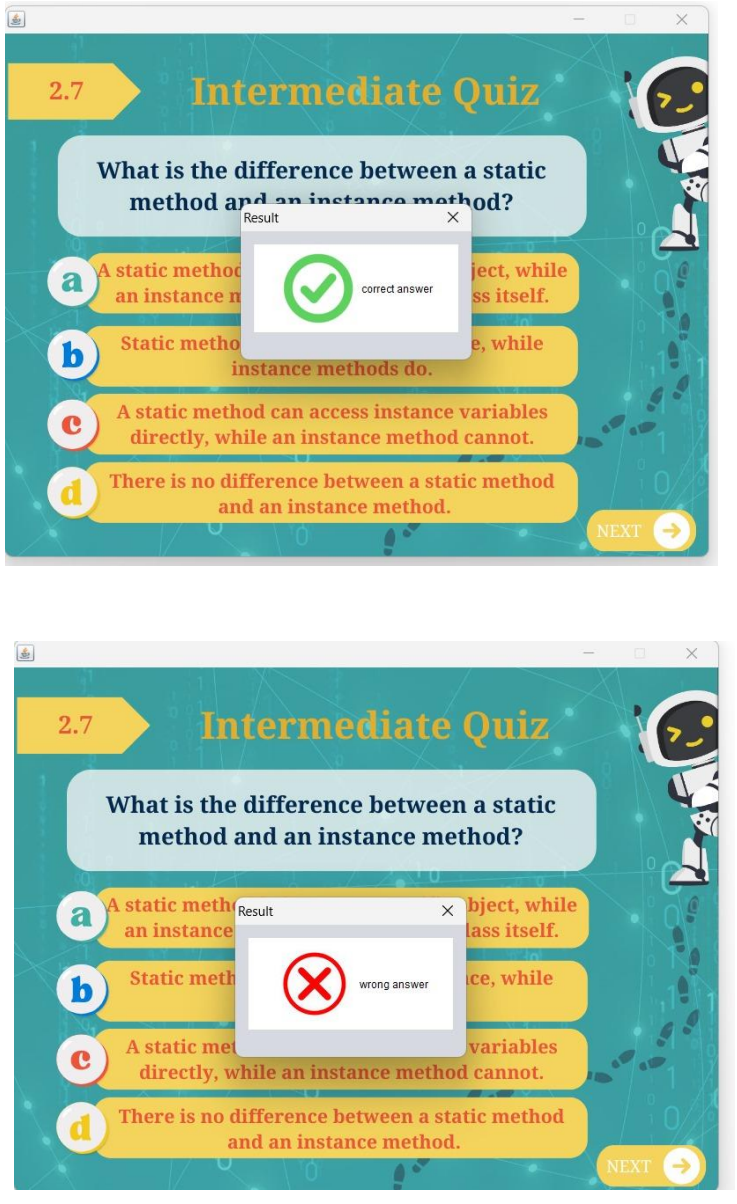


Figure 17. Lesson Quiz Interfaces

- **Worldwide Competition frames:**

It’s a game to check knowledge in java (i.e. 11 qustion each one one score) and its have to let user enter a neck name , chouse avatar and play to test their knowledge ,and store data and time for each player play in text field

Figure 18. World Wide Coptation

Admin Part

- **Admin Login**

This interface is designed to let the authorized admins login to the system, and then the program searches for the account in the database. Notice that DigitalStep has a specified set of authorized admins, unlike regular users admins cannot be created by other users, which helps to maintain program security.

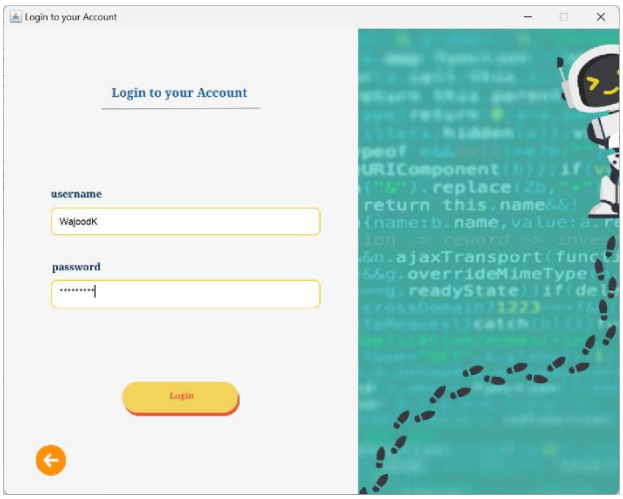


Figure 19. Admin Login Interface

- **Admin Profile**

The Admin Profile interface shows data about the administrator's account. To protect sensitive data, the password is hidden by default. However, there is a button to display it if needed. Moreover, there is a button to permanently delete the admin account from the database.

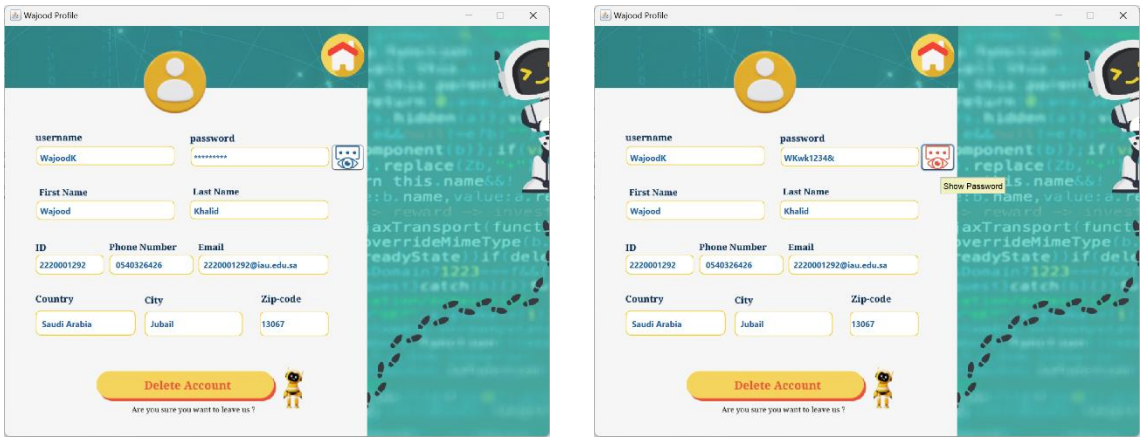


Figure 20. Admin's Profile Interface

- **Admin frames:**

Admin had an admin dashboard retrieve total player and total quiz from database had three button.

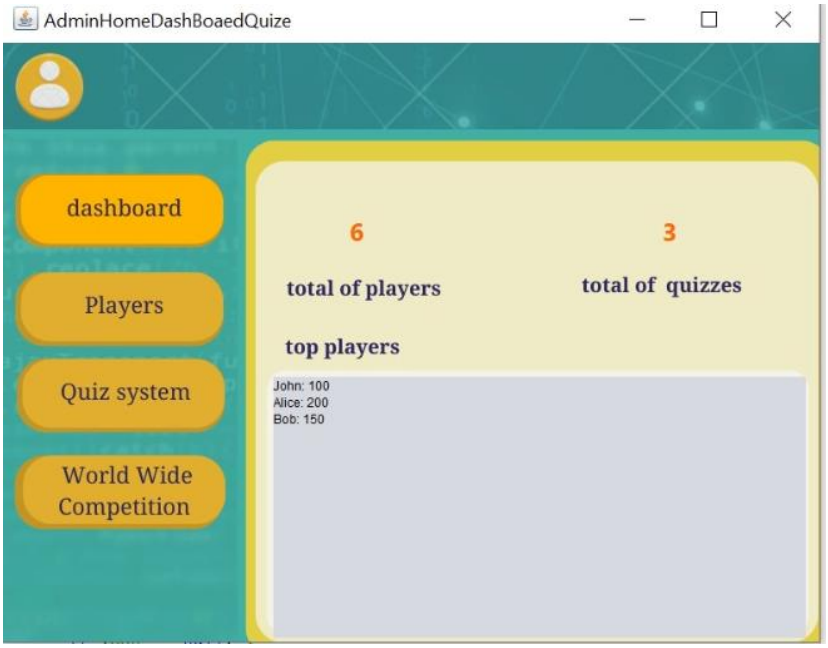


Figure 11. Admin DashBoared

First Button: to control player (display and delete) and players feedback been read from file

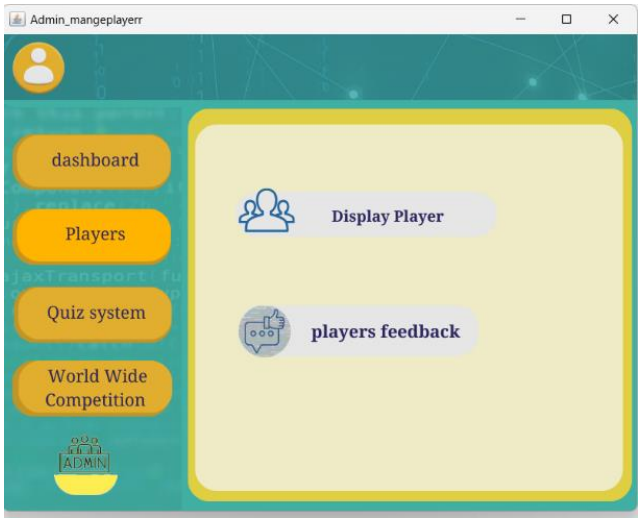


Figure 22. Player Button interfaces.

- **display players information:**

  This interface in the admin dashboard will allow the admin to display players information by entering their IDs. The admin can filter the displayed information from the JCompBox, and each displaying operation by the admin will be storer in the database table "administrative_Display_players" which will contain the player id and the admin ID.

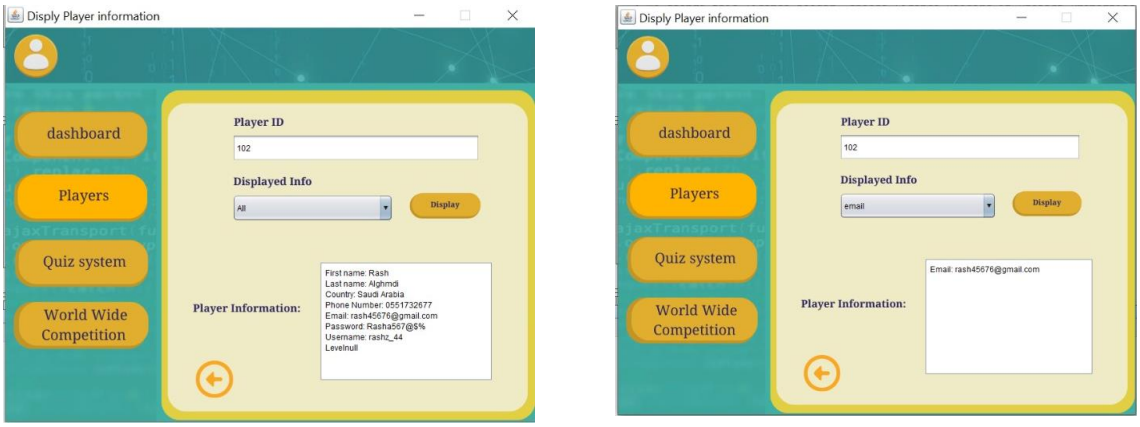


Figure 23. display players information Interface

- **Player Feedback**

  Reading from file, the writing was in the Feedback button in about as frame in player part.

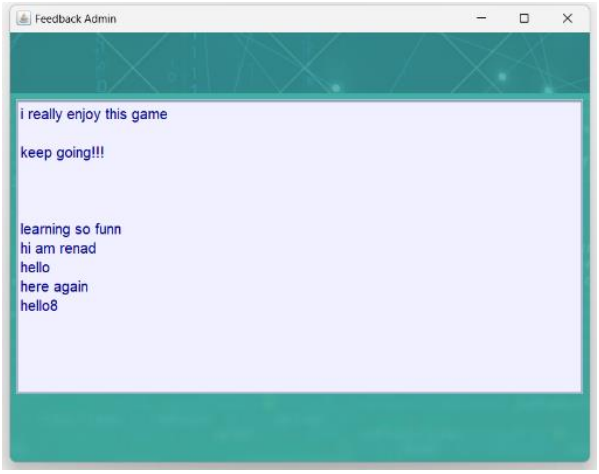


Figure 24. User Feedback interface

- **Second Button:** quiz system to create, delete, display and modify a quiz.

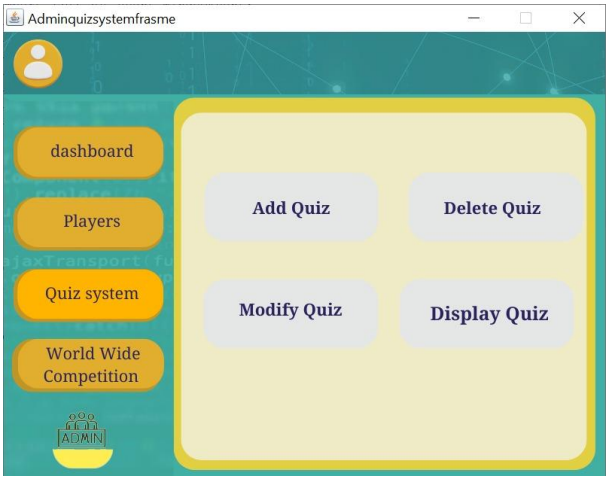


Figure 25. Quiz System interface.

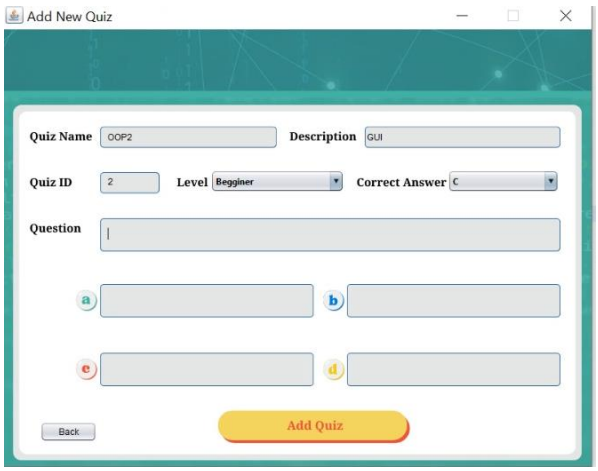


Figure 26. Add new Quiz Interface

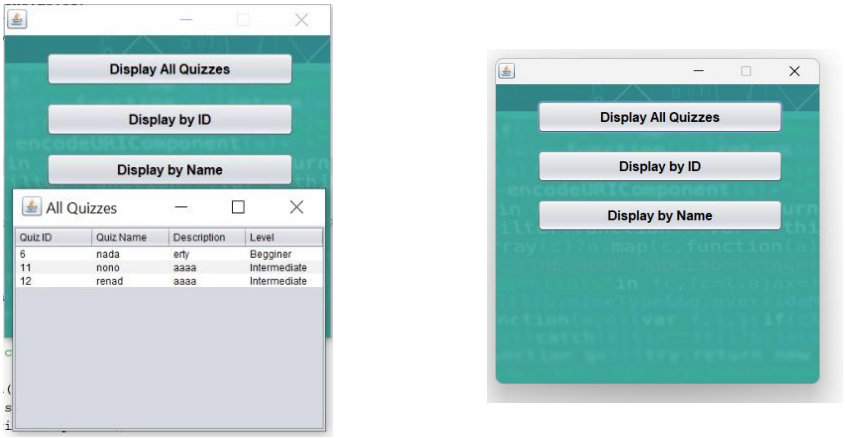


Figure 27. Display Quizzes Intrtface

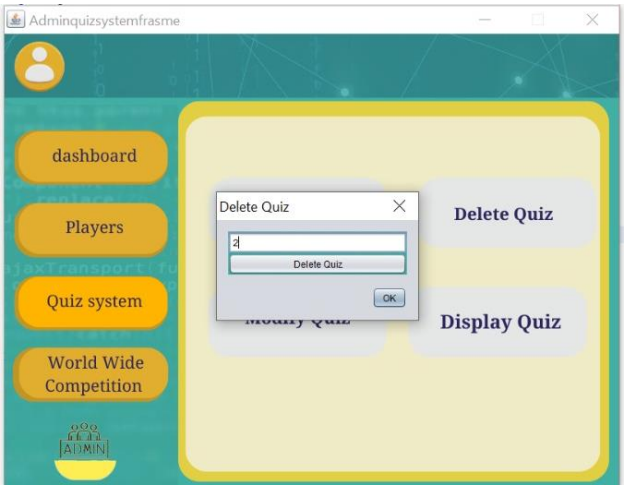


Figure 28. Delete Quiz Interface

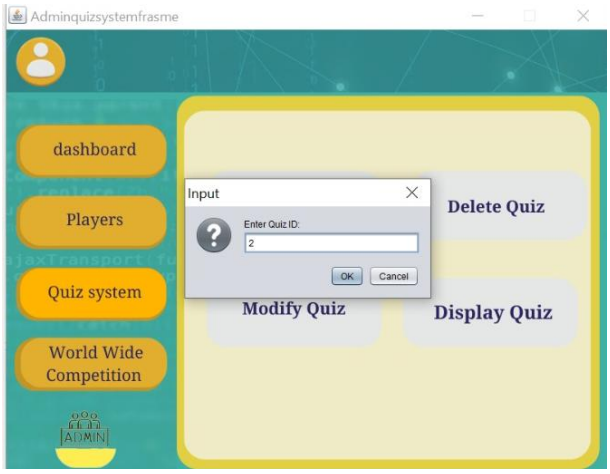


Figure 29. Update Quize

Third Button: worldwide competition had a pop message to check player sign out and play it.

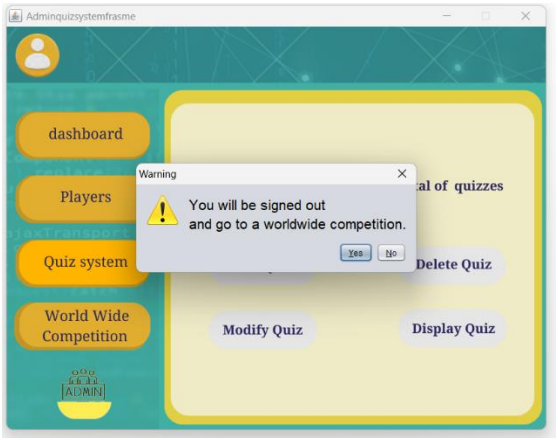
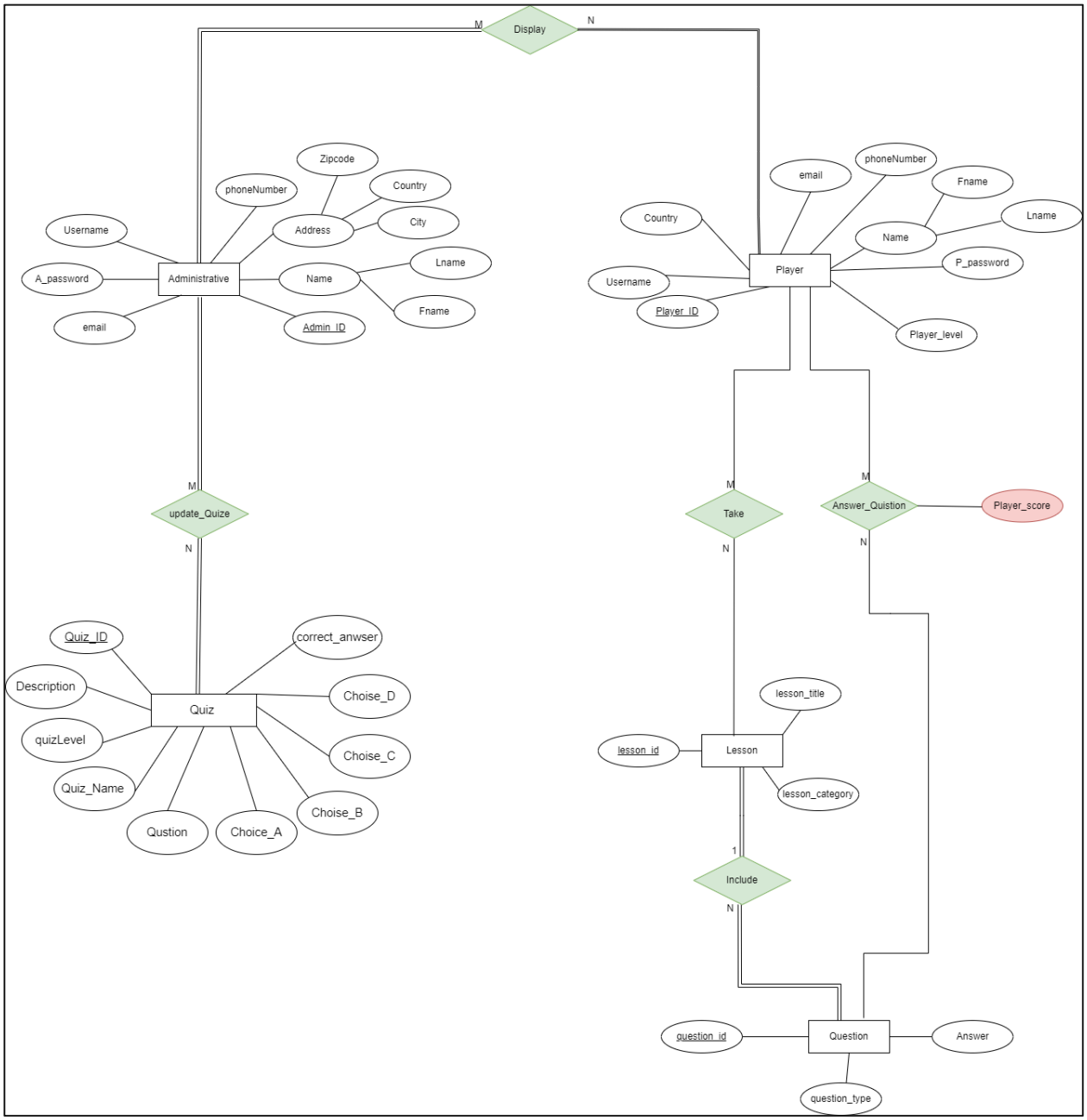


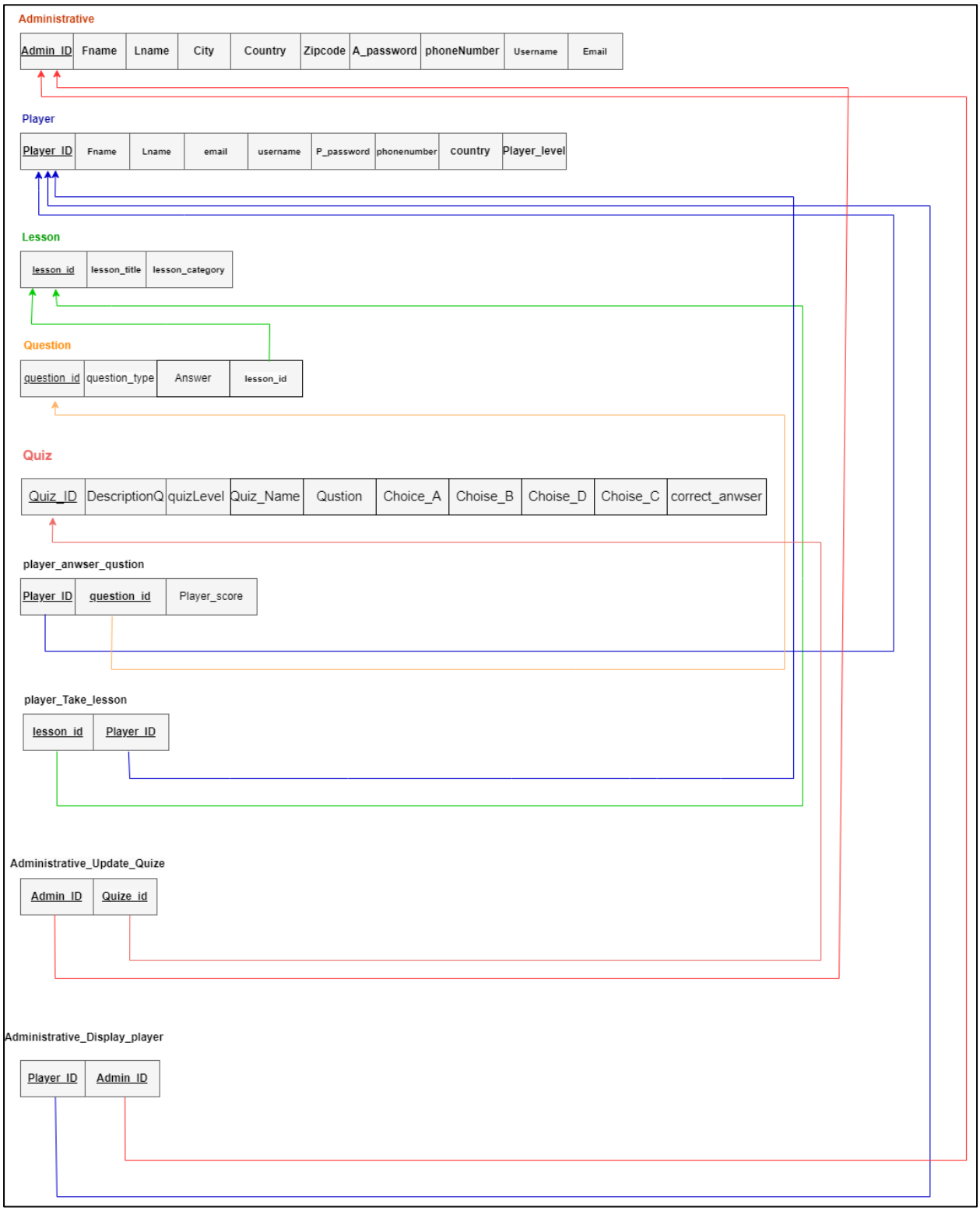
Figure 30. Go to World Wide Comprtition.

❖ Database:

ERD:



Mapping:


Administrative
Admin_ID
Fname
Lname
City
Country
Zipcode
A_password
phoneNumber
Username
Email
Player
Player_ID
Fname
Lname
email
username
P_password
phonenumber
country
Player_level
Lesson
lesson_id
lesson_title
lesson_category
Question
question_id
question_type
Answer
lesson_id
Quiz
Quiz_ID
DescriptionQ
quizLevel
Quiz_Name
Qustion
Choice_A
Choise_B
Choise_D
Choise_C
correct_anwser
player_anwser_qustion
Player_ID
question_id
Player_score
player_Take_lesson
lesson_id
Player_ID
Administrative_Update_Quize
Admin_ID
Quize_id
Administrative_Display_player
Player_ID
Admin_ID

SQL Code:

```
create database DigitalStep1;
use DigitalStep1;
create table Administrative(
Admin_ID numeric (10)  primary key,
Fname  char(10) ,
Lname  char(10) ,
 Country text,
City text,
Zipcode char(5),
A_password varchar(45) not null,
phoneNumber varchar(15),
Username varchar(45) not null UNIQUE,
Email varchar (320) not null
);

insert into Administrative
values (2220000572,'Norah','Alanzi','Saudi
Arabia','Dammam','12345','No1222$#8935','0551732744','NorahAl
anzi.51','22200000572@iau.edu.sa'),
( 2220000552 , 'Nada' ,'Alrashidi',' Saudi
Arabia','Dammam','33312','1115811Nn','0543559646','nada134','22
20000552@iau.edu.sa'),
( 2220001292 , 'Wajood' ,'Khalid',' Saudi
Arabia','Jubail',13067,'WKwk1234&','0540326426','WajoodK','222
0001292@iau.edu.sa'),
```

```
(2220001372 , 'Waad' ,'Alshammari',' Saudi
Arabia','Jubail',35817,'6676Ww','0566989760','Waad5120','222000
1372@iau.edu.sa'),
(2230040060 , 'Sarah' ,'Alhethily',' Saudi
Arabia','Khobar',34741,'Sa653','05646666514','sarah44','22300400
60@iau.edu.sa'),
(2220001911,'Miad','Alosaimi','Saudi
Arabia','Jubail','57689','Mia5678$','0545901215','Miah67','2220001
911@iau.edu.sa'),
(2220003572 , 'Renad' ,'Alhktani',' Saudi
Arabia','Khobar',34767,'rr761','
0559795009','renad0','2220003572@iau.edu.sa');

#------------------------------------

CREATE TABLE Player (
   Player_ID INT AUTO_INCREMENT,
   Fname CHAR(10) NOT NULL,
   Lname CHAR(10),
   email VARCHAR(100) NOT NULL,
   username VARCHAR(45) NOT NULL UNIQUE,
   P_password VARCHAR(45) NOT NULL,
   phonenumber VARCHAR(15),
   country TEXT,
   Plyer_Level CHAR(20),
   PRIMARY KEY (Player_ID)
) AUTO_INCREMENT = 100;


#------------------------------------
```

```
CREATE TABLE lesson (
  lesson_id INT PRIMARY KEY,
  lesson_title VARCHAR(255),
  lesson_category VARCHAR(255)
);

#------------------------------------

CREATE TABLE Question (
    question_id NUMERIC(10) PRIMARY KEY,
    question_type VARCHAR(30),
    Answer char(30) not null,
    lesson_id INT NOT NULL,
    FOREIGN KEY (lesson_id) REFERENCES lesson(lesson_id)
);

CREATE TABLE Quiz(
    Quiz_ID int PRIMARY KEY,
    Quiz_Name VARCHAR(255),
    DescriptionQ VARCHAR(1000),
    quizLevel  VARCHAR(20),
    Qustion TEXT,
    Choice_A char(20),
    Choice_B  char(20),
    Choice_C char(20),
    Choice_D char(20),
    correct_anwser TEXT

);
```

```
#-----------------------------------

create table Administrative_Display_player(
Admin_ID numeric (10) ,
Player_ID INT NOT NULL,
primary key(Admin_ID,Player_ID)
);
alter table Administrative_Display_player add foreign key
(Admin_ID) references Administrative (Admin_ID);
alter table Administrative_Display_player add foreign key
(Player_ID) references Player (Player_ID);
#-----------------------------------
create table player_anwser_qustion(
question_id NUMERIC(10) ,
Player_ID INT NOT NULL,
Player_score CHAR(20),
primary key(question_id,Player_ID)
);
alter table player_anwser_qustion add foreign key (question_id)
references Question (question_id);
alter table player_anwser_qustion add foreign key (Player_ID)
references Player (Player_ID);
#-----------------------------------
create table player_Take_lesson(
lesson_id INT NOT NULL ,
Player_ID INT NOT NULL,

primary key(lesson_id,Player_ID)
);
```

```
alter table player_Take_lesson add foreign key (lesson_id)
references lesson (lesson_id);
alter table player_Take_lesson add foreign key (Player_ID)
references Player (Player_ID);

#-----------------------------------
create table Administrative_Update_Quize(
Quiz_ID int  ,
Admin_ID numeric (10) ,
primary key(Quiz_ID,Admin_ID)
);
alter table Administrative_Update_Quize add foreign key
(Quiz_ID) references Quiz (Quiz_ID);
alter table Administrative_Update_Quize add foreign key
(Admin_ID) references Administrative (Admin_ID);

#-----------------------------------
insert into player
values(101,'Maha','Mohammed','Maha@gmail.com','maha28','mah
a2003$','0540324624','Saudi Arabia','Beginner'),
(102,'Rash','Alghmdi','rash45676@gmail.com','rashz_44','Rasha56
7@$%','0551732677','Saudi Arabia',null),
(103,'Ghaida','Alkhtani','GhKhtani.66@gmail.com','Ghaidoo_566','
khtanighid456&','0567600000','Saudi Arabia','intermediate'),
(104,'Shima','Alsaab','Shooshh.567@gmail.com','shosh_456','shosh
so123456','0500067892','Saudi Arabia','Advanced'),
(105,'Ebhar','Alghmdi','Ebhar.679@gmail.com','Bobo_ty56','Ebhar
5768#','0551230876','Saudi Arabia',null),
(106,'Lama','Khalid','lama.78@gmail.com','lmoosh_345','6lmlml87
5$','0567890001','Kwait','Beginner');
```

```
#----------------------------------


insert into  Administrative_Display_player  Values
(2220001372,101);

insert into lesson
values(1101,'Lesson1','Beginner'),
 (1102,'Lesson2','Beginner'), (1103,'Lesson3','Beginner'),
(1104,'Lesson4','Beginner'),
 (1105,'Lesson5','Beginner'), (1106,'Lesson6','Beginner'),
(1107,'Lesson7','Beginner'), (1108,'Lesson8','Beginner'),
 (1109,'Lesson9','Beginner'), (1110,'Lesson10','Beginner'),
(1111,'Lesson11','Beginner'),(1112,'Lesson12','Beginner'),
 (1113,'Lesson13','Beginner'),(1114,'Lesson14','Beginner'),
(1115,'Lesson15','Beginner'),

(1116,'Lesson116','intermediate'),
(1117,'Lesson17','intermediate'),(1118,'Lesson18','intermediate'),
(1119,'Lesson19','intermediate'),(1120,'Lesson20','intermediate'),
(1121,'Lesson21','intermediate'),(1122,'Lesson22','intermediate'),
(1123,'Lesson23','intermediate'),(1124,'Lesson24','intermediate'),
(1125,'Lesson25','intermediate'),
(1126,'Lesson26','intermediate'),(1127,'Lesson27','intermediate'),
(1128,'Lesson28','intermediate'),(1129,'Lesson29','intermediate'),
(1130,'Lesson30','intermediate'),

(1131,'Lesson1','Advanced'),
(1132,'Lesson1','Advanced'),(1133,'Lesson1','Advanced'),
(1134,'Lesson1','Advanced'),(1135,'Lesson1','Advanced'),
```

(1136,'Lesson1','Advanced'),(1137,'Lesson1','Advanced'),
(1138,'Lesson1','Advanced'),(1139,'Lesson1','Advanced'),
(1140,'Lesson1','Advanced'),(1141,'Lesson1','Advanced'),
(1142,'Lesson1','Advanced'),(1143,'Lesson1','Advanced'),
(1144,'Lesson1','Advanced'),(11345,'Lesson1','Advanced'),
(1146,'Lesson1','Advanced'),(1148,'Lesson1','Advanced'),
(1149,'Lesson1','Advanced'),(1150,'Lesson1','Advanced');

insert into Question values (101,'Q1_for beggener','A',1101);
insert into Question values (102,'Q2_for beginner','B',1102);
insert into Question values (103,'Q3_for beginner','C',1103);
insert into Question values (104,'Q4_for beginner','D',1104);
insert into Question values (105,'Q5_for beginner','A',1105);
insert into Question values (106,'Q6_for beginner','B',1106);
insert into Question values (107,'Q7_for beginner','C',1107);
insert into Question values (108,'Q8_for beginner','D',1108);
insert into Question values (109,'Q9_for beginner','A',1109);
insert into Question values (110,'Q10_for beginner','B',1110);
insert into Question values (201,'Q1_for intermediate','C',1116);
insert into Question values (202,'Q2_for intermediate','D',1117);
insert into Question values (203,'Q3_for intermediate','A',1118);
insert into Question values (204,'Q4_for intermediate','B',1119);
insert into Question values (205,'Q5_for intermediate','C',1120);
insert into Question values (206,'Q6_for intermediate','D',1121);
insert into Question values (207,'Q7_for intermediate','A',1122);
insert into Question values (208,'Q8_for intermediate','B',1123);
insert into Question values (209,'Q9_for intermediate','C',1124);
insert into Question values (210,'Q10_for intermediate','D',1125);
insert into Question values (301,'Q1_for advanced','A',1131);
insert into Question values (302,'Q2_for advanced','B',1132);

```
insert into Question values (303,'Q2_for advanced','C',1133);
insert into Question values (304,'Q4_for advanced','D',1134);
insert into Question values (305,'Q5_for advanced','A',1135);
insert into Question values (306,'Q6_for advanced','B',1136);
insert into Question values (307,'Q7_for advanced','C',1137);
insert into Question values (308,'Q8_for advanced','D',1138);
insert into Question values (309,'Q9_for advanced','A',1139);
insert into Question values (310,'Q10_for advanced','B',1140);
```

❖ Conclusion:

In brief, Digital Steps is an exceptional educational application suitable for programmers. at all levels. It provides a comprehensive curriculum, adaptive learning features, and interactive content. By facilitating beginner-friendly learning, enhancing skill development, and promoting advanced proficiency, Digital Steps empowers individuals to effectively master the Java language. With Digital Steps, programmers can unleash their full potential in the world of Java programming.