

Course Project-CISC3002

ZHANG HUAKANG/ DB927606

Introduction

This application named *King of Karaoke* is a quiz game about music. Users will login in with their account(they can use Google Account), answer a number of question which are randomly selected from a question's library within the specified time, finally submit their score to the server and let other users know their grade.

In this project, I use **Java** and **Android SDK** to develop the front-end application. As for the back end which is used to store data, I use **Python** and **Django Framework** to develop it.

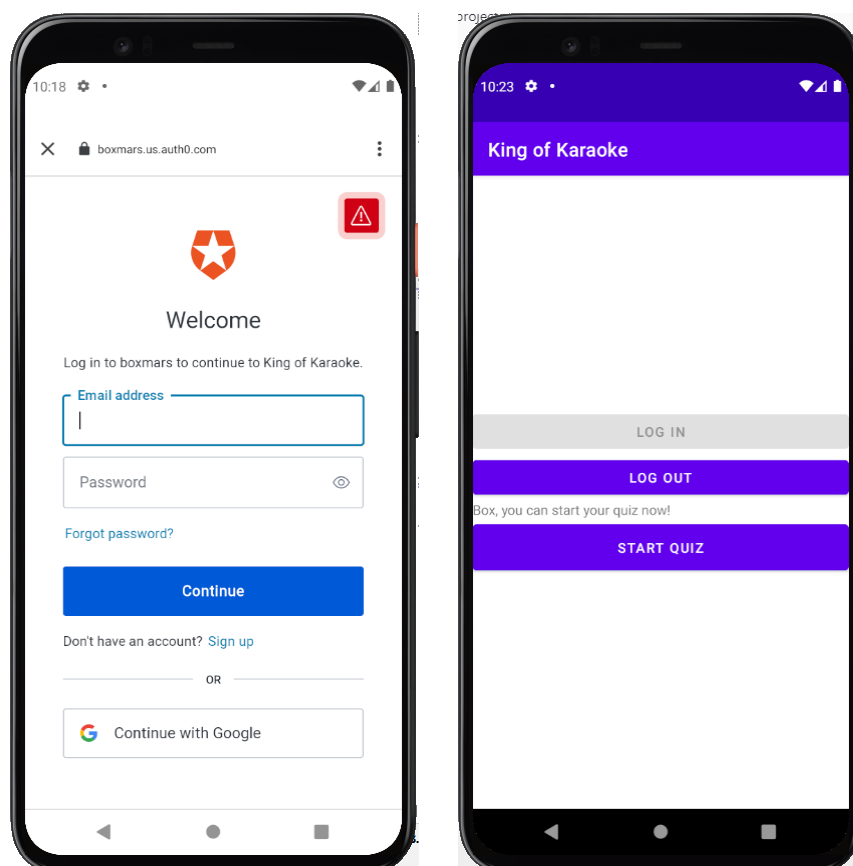
Since the course focuses on Android application development, I will not go into details about the specific implementation of the back-end. The source code of the whole project and other data used in this was upload to [Github](#).

Details

Login/ Logout

This part uses a third-party services named **Auth0** to implement. When user click the button to login or logout.

When user click *Login* button, *Auth0* will bring up a browser window.



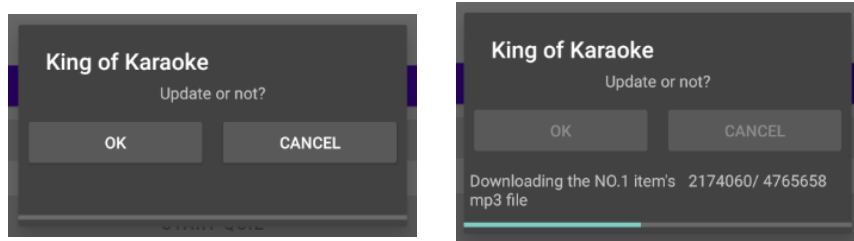
After the user login successfully, the application will get the username and the email which will be stored and the email will be used as the unique identification information of the scoring system.

Update the data library

When the application starts, it will send a request to the server and get the latest version number of the songs library ([VERSION_API](#)). At the same time, it will also get the version information stored locally. If those two version number are different, the application will call a new *Activity* with dialog theme to ask the user whether to update the information. If user choose Yes, the application will request the songs information in *JSON* ([SONGS_API](#)), like this:

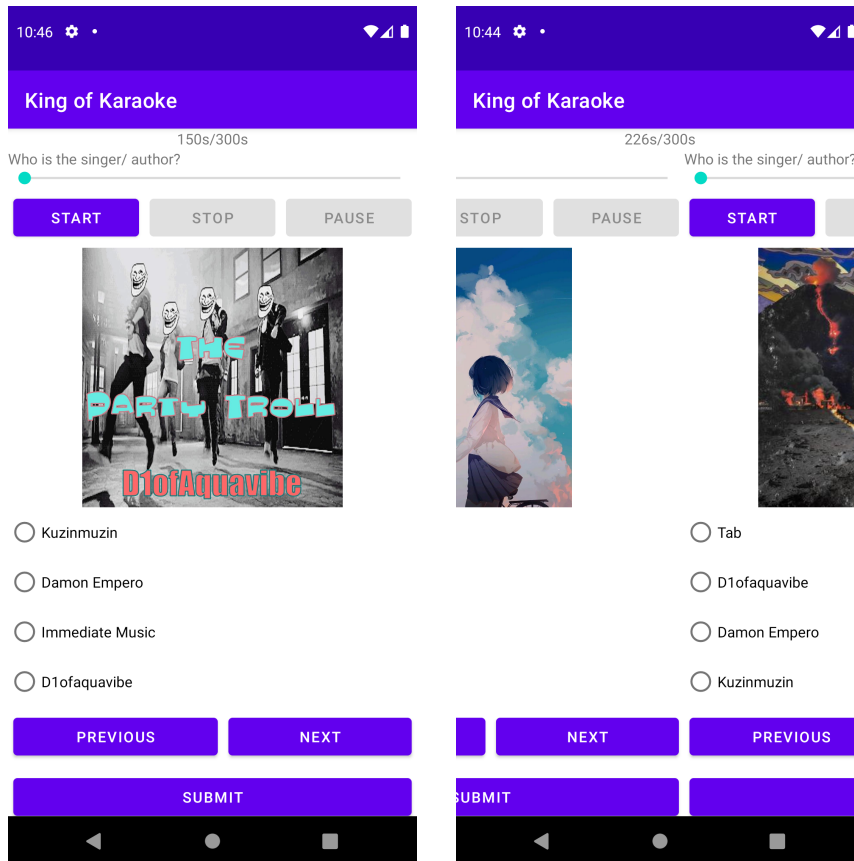
```
[
  {
    "song": "Chocolate",
    "singer": "Alfonso Lugo",
    "songURL":
    "https://github.com/BoxMars/AndroidDevCourseProject/raw/master/static/Alfonso_Lugo_-_Chocolate.mp3"
  },
  {
    "song": "Study and Relax",
    "singer": "D JAY KOI",
    "songURL":
    "https://github.com/BoxMars/AndroidDevCourseProject/raw/master/static/D_JAY_KOI_-_HOUSE_PARTY_-_Feat_Fil_Straughan__.mp3"
  },
  ...
  ...
  ...
]
```

Those information will be stored in application's internal storage. A *DownloadAsyncTask* will start to download all music and store them in internal storage.



Quiz

The Quiz activity consists of five parts. On the top there is a *countdown timer*. Under the countdown timer is the *music player* part and the *cover image* of the music. Then, there are four radio buttons and three buttons, *Previous*, *Next*, and *Submit*.



Every question are chosen from question library randomly, and the option of each question are also randomly generated.

The function that several questions can be swiped on the screen is implemented by [ViewPager2](#) and [Fragment](#). The two buttons at the bottom can also be used to browse between different questions.

Countdown Timer

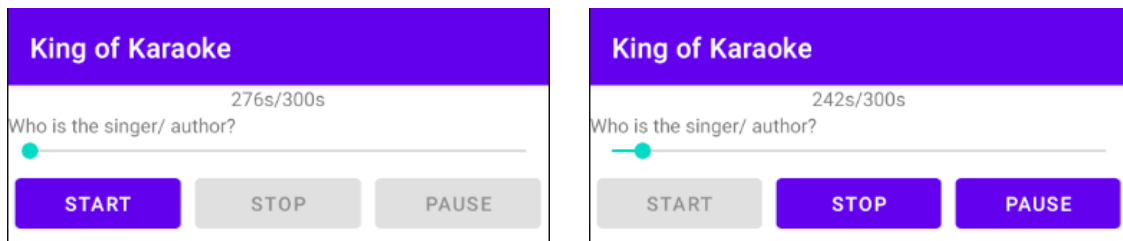
User can submit his/her answers before within the specified time, or answers are automatically submitted, when time runs out. The function which will be called when the time is up:

```
countDownTimer=new CountDownTimer(300000,1000) {
    @Override
    public void onTick(long millisUntilFinished) {
        TextView textView=findViewById(R.id.timerTextView);
        textView.setText(millisUntilFinished/1000+"s/300s");
    }

    @Override
    public void onFinish() {
        Intent intent1=new Intent();
        intent1.setClass(getApplicationContext(),ScoreActivity.class);
        startActivity(intent1);
    }
};
countDownTimer.start();
```

Music Player

It has three function: *Start*, *Pause* and *Stop* to control the music playing.



The first image shows the music is stopped or not started. The second image shows that the music is paused after starting.

The cover image are directly from MP3 file's metadata. I use `MediaMetadataRetriever` to decode the information and show it on the screen.

```
MediaMetadataRetriever mmr = new MediaMetadataRetriever();
mmr.setDataSource(String.valueOf(new File(getActivity().getFilesDir(), "mp3 file
name")));
byte [] data = mmr.getEmbeddedPicture();
Bitmap bitmap = BitmapFactory.decodeByteArray(data, 0, data.length);
imageView.setImageBitmap(bitmap);
```

When the music starts, there will be a handler to get the current music playback progress and pass the data to seekbar.

```
Handler handler=new Handler(Looper.myLooper());
Runnable runnable=new Runnable() {
    @Override
    public void run() {
        if(mediaPlayer!=null)
        {
            seekBar.setProgress(mediaPlayer.getCurrentPosition());
            handler.postDelayed(this, 200);
        }
    }
};
mediaPlayer.start();
seekBar.setMax(mediaPlayer.getDuration());
handler.postDelayed(runnable, 200);
```

Previous and Next button

The buttons *Previous* and *Next* are in the `Fragment`, when they are clicked, system will call the following function:

```
ViewPager2 viewPager2=getActivity().findViewById(R.id.viewPage);
nextBtn.setOnClickListener(new View.OnClickListener() {
    @Override
```

```

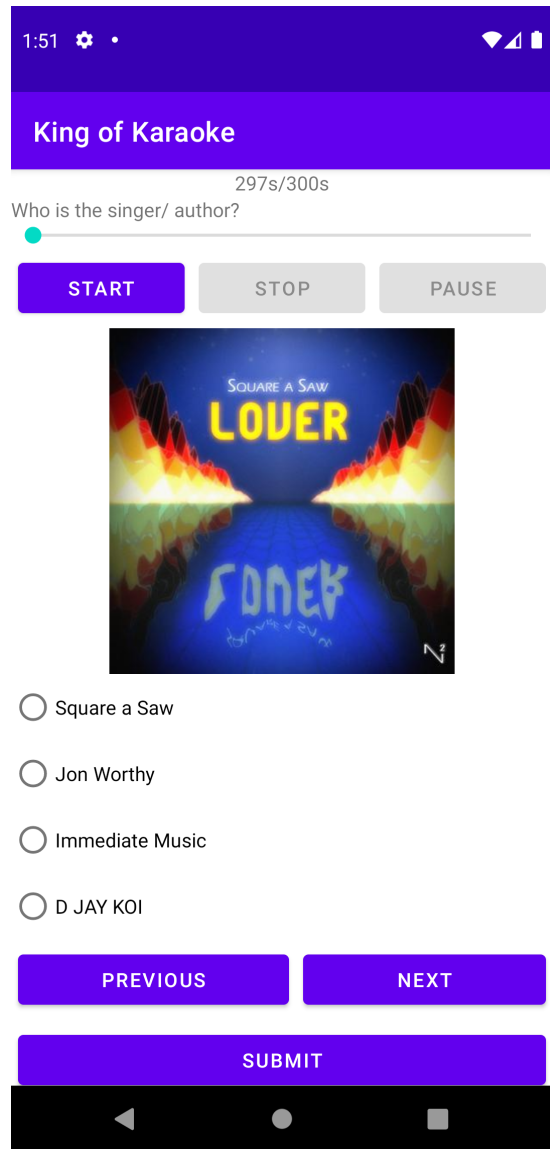
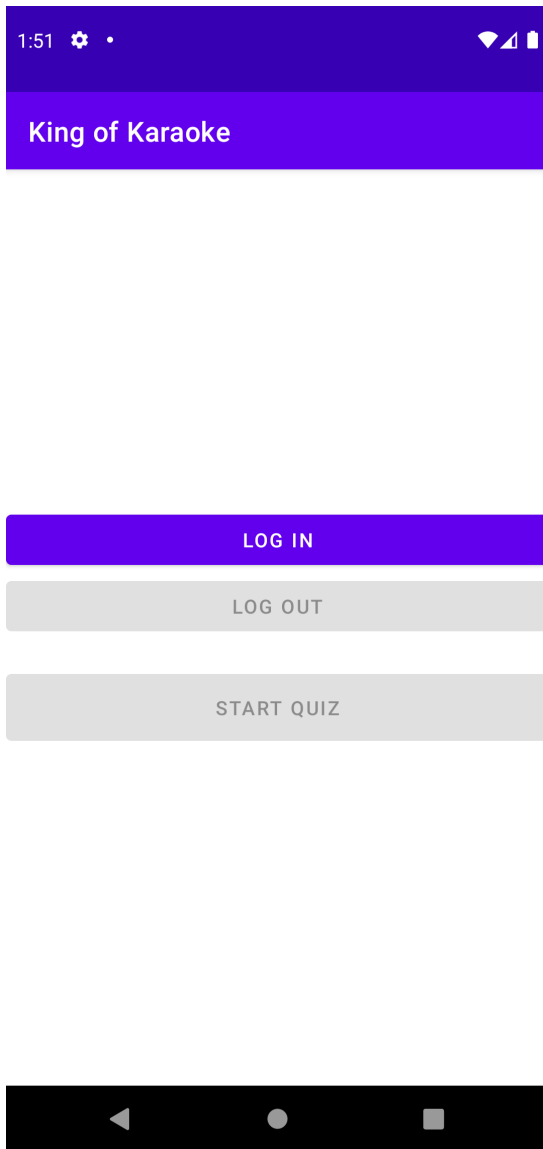
        public void onClick(View v) {
            if (viewPager2.getCurrentItem() < Question.questionArrayList.size()) {
                viewPager2.setCurrentItem(viewPager2.getCurrentItem() + 1, true);
            }
        }
    });

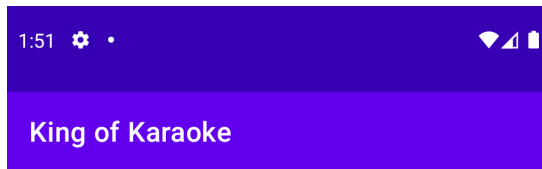
    previousBtn.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            if (viewPager2.getCurrentItem() > 0) {
                viewPager2.setCurrentItem(viewPager2.getCurrentItem() - 1, true);
            }
        }
    });

```

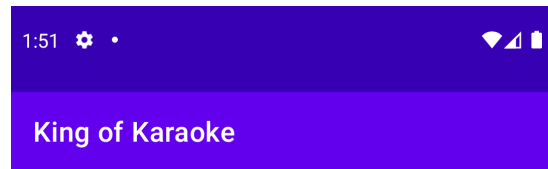
Submit button

When user click the submit button or the time is up, the application will bring up the **Score** activity and because the **Quiz** activity's launch mode is **singleInstance** which means that when user click **back** button in **Score** activity, he/her will come back to the **Login/Logout** activity to start a new quiz or logout instead of **Quiz** activity.





Rank
0
Box zhanghukang88@gmail.com



LOG IN

LOG OUT

Box, you can start your quiz now!

START QUIZ

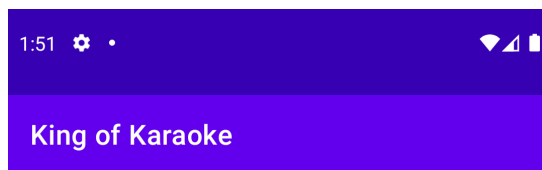


Score

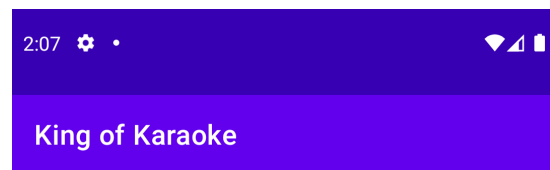
When user click the **Submit** button in **Quiz** activity, the **Score** activity will be called. At the begin of the activity starts,the application will calculate the user's score and send the result to the server by the API (**SUBMIT_API** : https://API_SERVER/submitrank/?username=test&email=test@test.com&score=8). Then the application will request to get the record of all users by **GETRANK_API**. The following **JSON** data is an example:

```
[
  {
    "username": "Box",
    "email": "test@gmail.com",
    "score": 0
  }
  ...
  ...
]
```

After getting response, the application will sort the data according to the score and display them in the user interface in order from high to low. In particular, the font size of the current user's information is larger. If user get full mark, a congratulation image will be shown.



Rank
0
Box zhanghukang88@gmail.com



Rank
9
Box zhanghukang88@gmail.com

Congratulations!



The sorting implementation:

```
for (int i = 0; i < users.size()-1; i++) {  
    for (int j = i+1; j < users.size(); j++) {  
        if (users.get(j).getScore() > users.get(i).getScore()) {  
            User t = users.get(j);  
            users.set(j, users.get(i));  
            users.set(i, t);  
        }  
    }  
}
```

Some implementations

The randomly selection of questions

After the data is stored in memory,

```
ArrayList<Question> questionArrayList=new ArrayList<>();
Random random=new Random();
while (questionArrayList.size()<=Math.min(8,Question.questionArrayList.size())){
    int result=random.nextInt(Question.questionArrayList.size());
    if (!questionArrayList.contains(Question.questionArrayList.get(result))){
        questionArrayList.add(Question.questionArrayList.get(result));
    }
}
Question.questionArrayList=questionArrayList;
Question.generateOption();
```

```
public static void generateOption(){
    isCorrectList=new ArrayList<>();
    userAnswer=new ArrayList<>();
    for (int i = 0; i < questionArrayList.size(); i++) {
        ArrayList<Integer> options=new ArrayList<>();
        Random random=new Random();
        while(options.size()<=3){
            int result=random.nextInt(questionArrayList.size());
            if (result!=i&&!options.contains(result)){
                options.add(result);
            }
        }
        int result=random.nextInt(4);
        options.add(result,i);
        questionArrayList.get(i).setOptions(options);
        questionArrayList.get(i).setAnswer(result);
        isCorrectList.add(false);
        userAnswer.add(4);
    }
}
```

the application will randomly select 8 question and generate each question's option. The main code is :

```
while(options.size()<=3){
    int result=random.nextInt(questionArrayList.size());
    if (result!=i&&!options.contains(result)){
        options.add(result);
    }
}
```

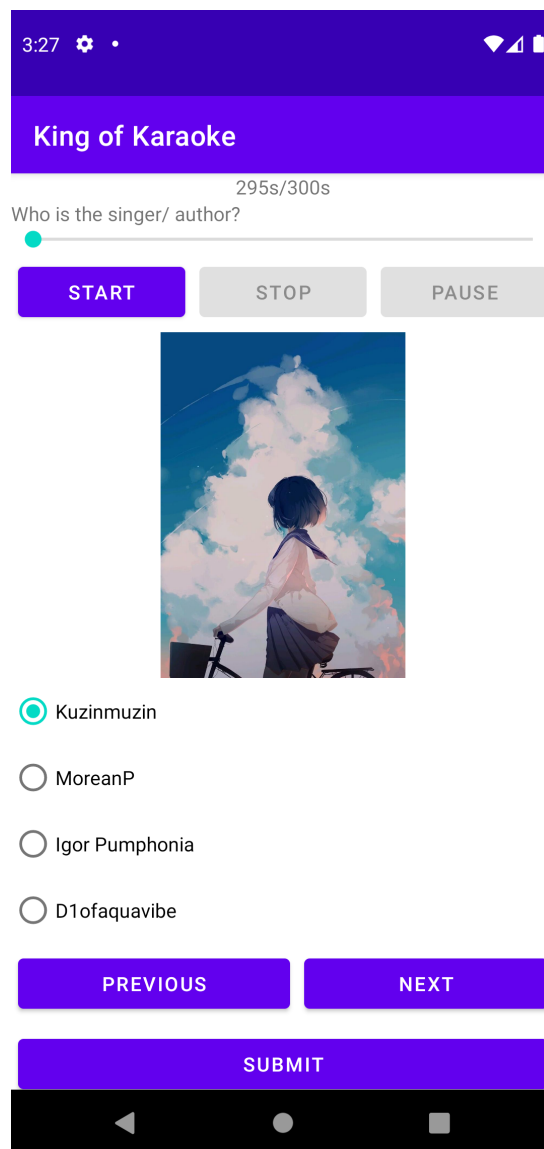
Due to the small scale, the speed is very fast.

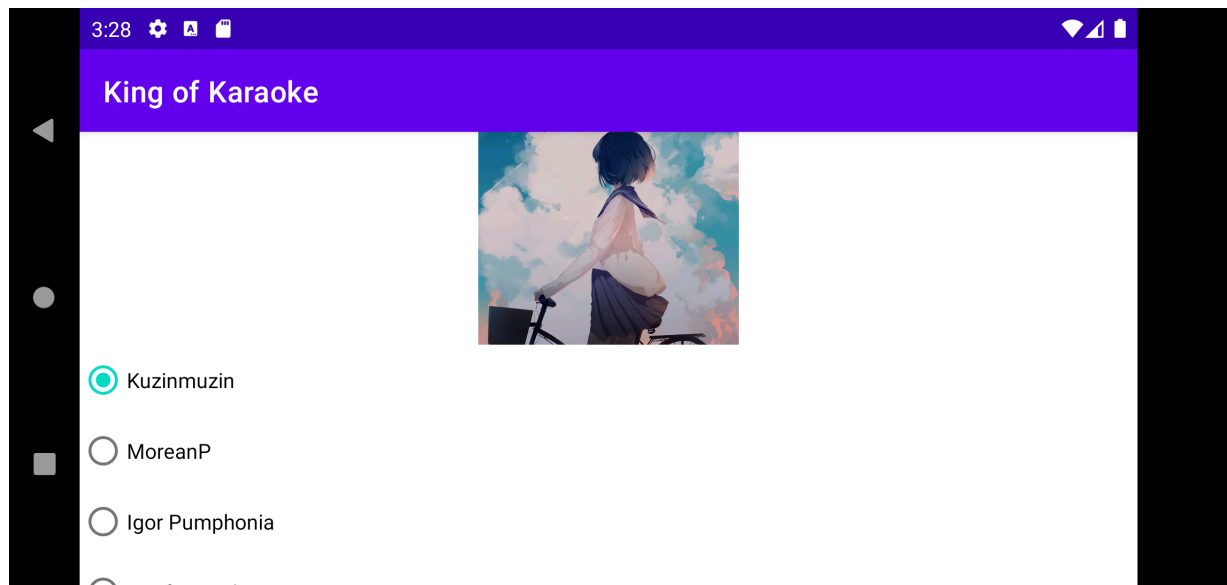
Rotation of phone

Due to the characteristics of the *Java Virtual Machine*, the static variables in the class will always exist from the time the class is loaded to the end of the program. Thus, I did not use *ViewModel* but chose to set all the variables that need to be used throughout the life cycle of the program into static variables, which means no matter how the program status changes, all data is correctly stored and displayed before the program ends. The following code is an example:

```
public class Question implements Serializable {  
    public static ArrayList<Question> questionArrayList=new ArrayList<>();  
    public static ArrayList<Integer> userAnswer=new ArrayList<>();  
    public static ArrayList<Boolean> isCorrectList=new ArrayList<>();  
}
```

The questions, answers are static variables. So, when user rotates his/her phone in **Quiz** Activity, the user's answers and the order of the questions will no change.





Handling of Exceptions

- No Internet
 - Since the *Login/Logout* activity need Internet, the whole application will never go further if there is no Internet connection
- No local file or downloading error
 - If there is no local file, the version number will be -1, it will compare with the server version number and call the *Update* activity. If user chooses *No* button in *Update* activity, the application will toast an error message. Since no data is read in memory, when user clicks the *Start Quiz*, the application will also toast an error message and not go further to prevent errors.
 - If there is a downloading error, the file will not be stored correctly. When the application read the file, the program will throw an exception, and the exception will be caught and handled.

Conclusion

Overall, we can divide the entire project into two parts: the front end and the back end. The back end is responsible for storing data and processing user requests, while the front end provides a user interface to display data. In this application, the main data are getting from the server. The front-end and back-end separation architecture model is more conducive to the development of applications for other platforms.

New Vewsion

In my opinion, the user interface can be optimized. We can also develop the forum function so that users can communicate and share with each other, not just the score ranking.

Major Features of Android

- Writing and reading of internal storage
- Network access
- UI widgets of Android Sysytem