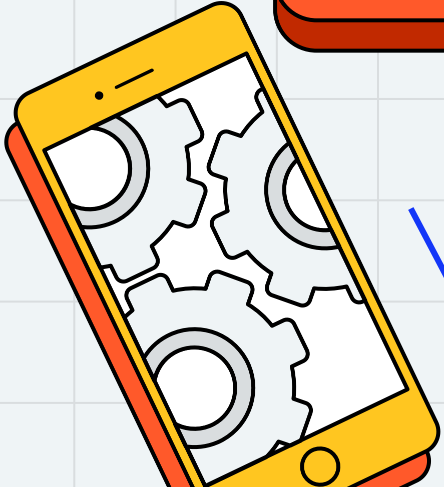
Application Programming

Hend Alkittawi

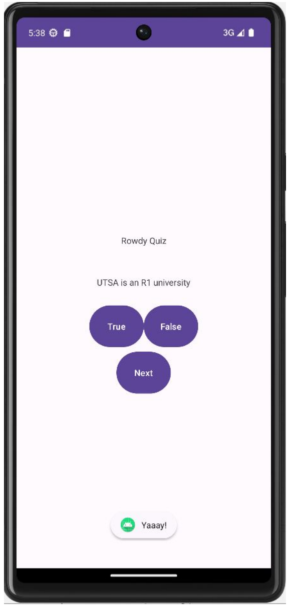


Android Development

Building An Application That
Utilizes Data

ROWDY QUIZ APP

- We created the Rowdy Quiz app, with hard-coded questions
- Now, it is time to load the questions from a data file
- We will also add a logo to our screen

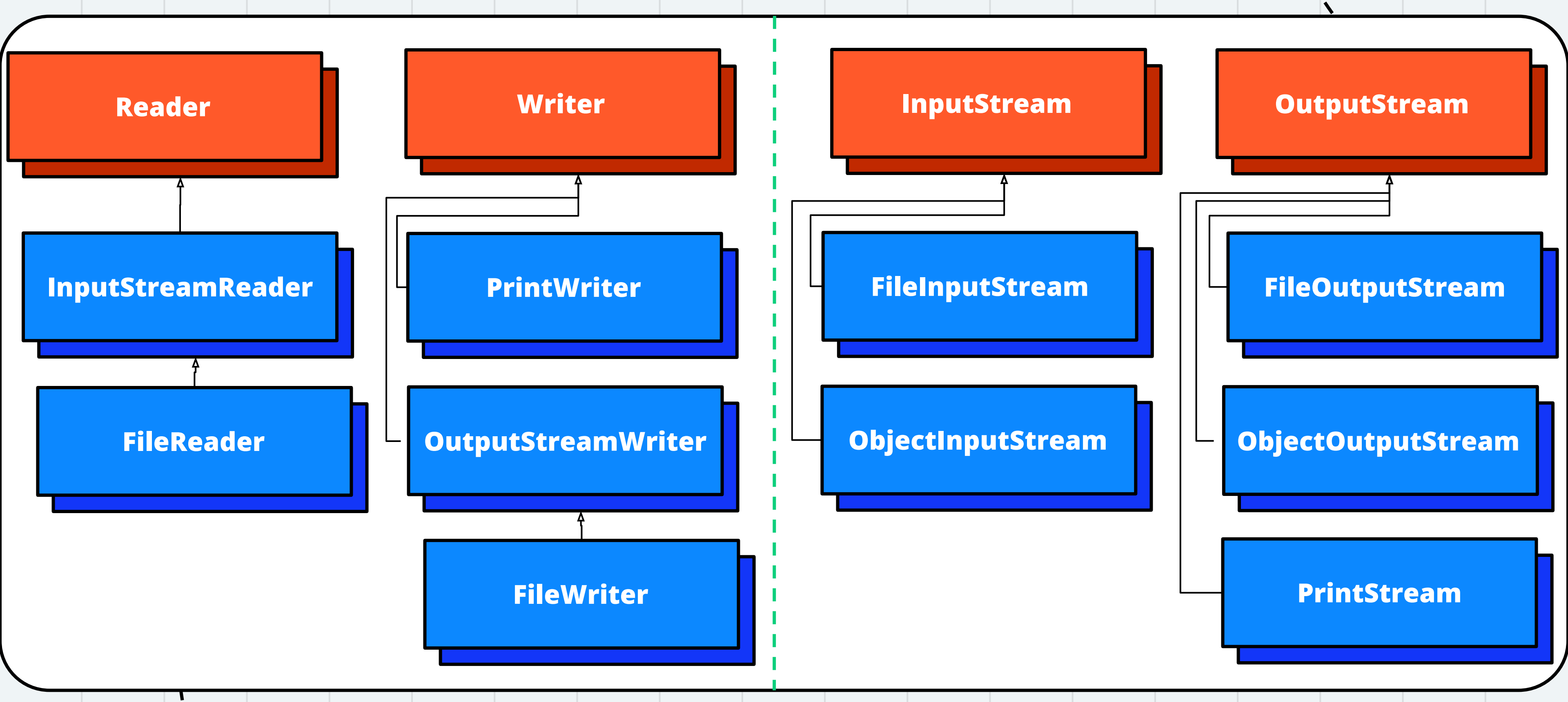


Rowdy Quiz

UTSA is an R1 university

Yaaay!

WORKING WITH DATA

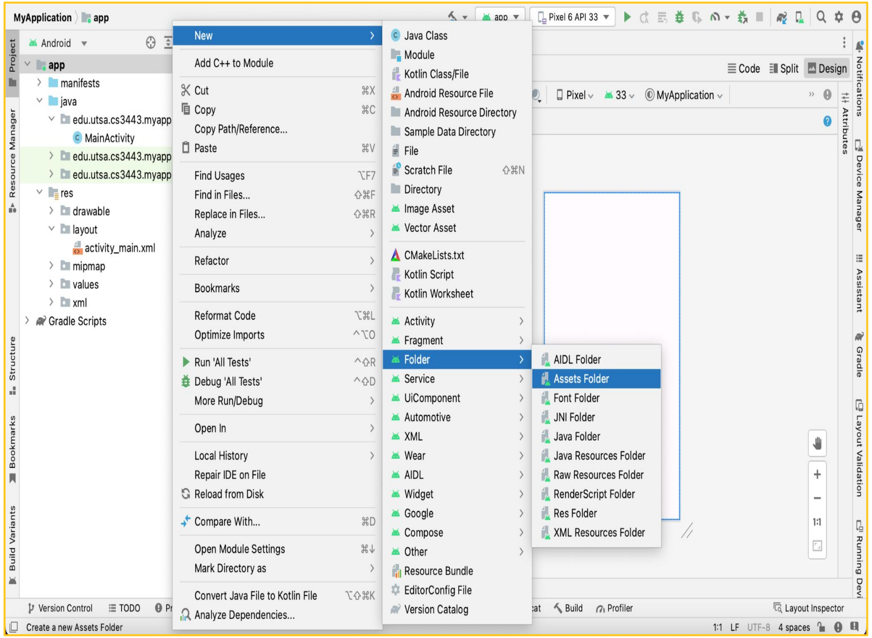


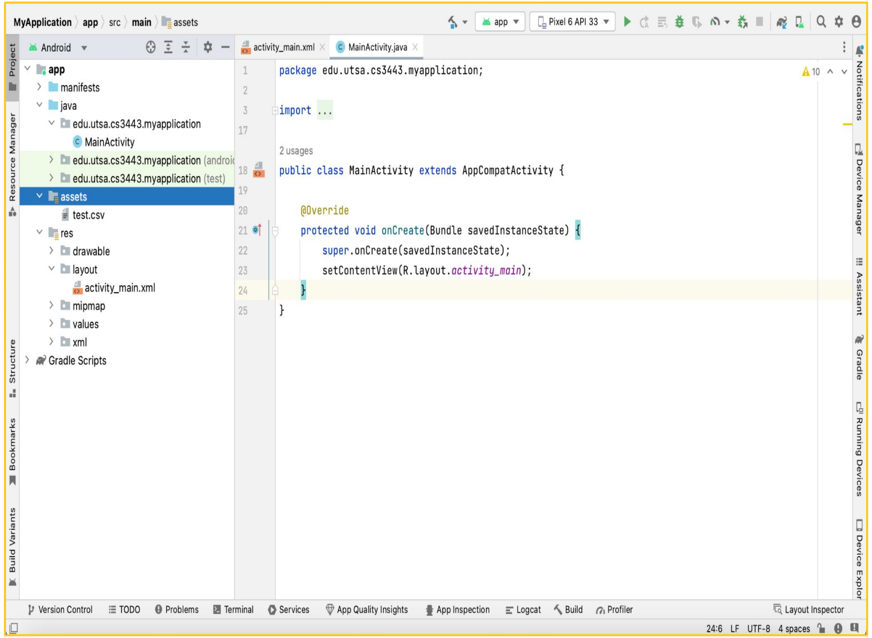
WORKING WITH DATA

- Classes utilized for reading and writing data in Android
  - Activity
  - AssetManager
  - InputStream
  - OutputStream

READING DATA FROM A FILE

- To **read** data from a file:
    - place the file in the Assets folder
        - app > New > Folder > Assets Folder (do not change the folder location)

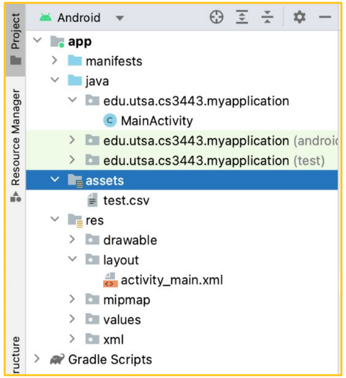




```
package edu.utsa.cs3443.myapplication;

import ...

2 usages
public class MainActivity extends AppCompatActivity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
}
```

READING DATA FROM A FILE

- Under the **model** package, modify QuizBank.java
    - Modify the **loadQuestions()** method to create the questions from a data (*.csv) file
        - the method uses the **Activity**, **AssetManger** and **InputStream** classes to read the data from the file



```
public void loadQuestions(MainActivity activity){
        AssetManager manager = activity.getAssets();
        Scanner scan = null;
        String filename = "test.csv";
        try {
            InputStream file = manager.open(filename);
            scan = new Scanner(file);
            // do something with the file data
        }
        catch (IOException e) { // handle exception }
}
```

READING DATA FROM A FILE

- For the controller, modify MainActivity.java
    - **onCreate()** calls the createQuizBank() method to load the questions in the quiz bank
    - createQuizBank() calls the **loadQuestions()** method which requires an AssetManager to load the data from the *.csv file in the Assets folder
    - Get an **AssetManager** object from MainActivity using **activity.getAssets()**

```
private void createQuizBank(){
        quizBank = new QuizBank();
        quizBank.loadQuestions(this);
}
```

READING DATA FROM A FILE

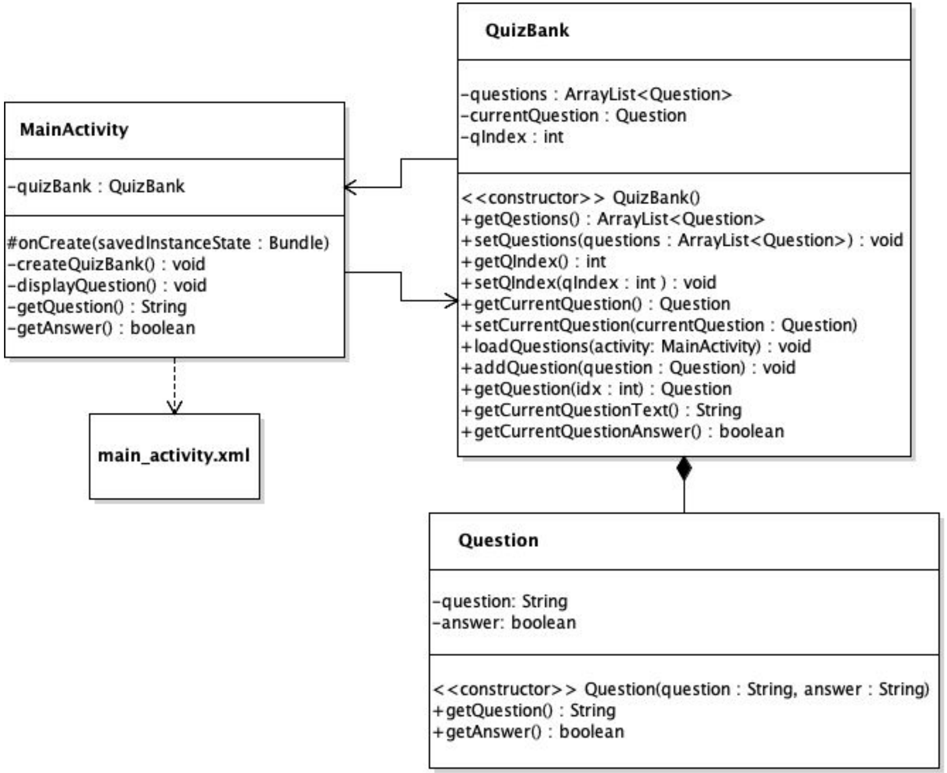
- In QuizBank.java

```java
public void loadQuestions(MainActivity activity){
        AssetManager manager = activity.getAssets();
        Scanner scan = null;
        try {
            InputStream file = manager.open("test.csv");
            scan = new Scanner(file);
            // do something with the file data
        }
        catch (IOException e) {
            // handle exception
        }
}
```

- In MainActivity.java

```java
private void createQuizBank(){
      quizBank = new QuizBank();
      quizBank.loadQuestions(this);
}
```

ROWDY QUIZ APP UML



MainActivity

-quizBank : QuizBank

#onCreate(savedInstanceState : Bundle)
-createQuizBank() : void
-displayQuestion() : void
-getQuestion() : String
-getAnswer() : boolean

main_activity.xml

QuizBank

-questions : ArrayList<Question>
-currentQuestion : Question
-qIndex : int

<<constructor>> QuizBank()
+getQestions() : ArrayList<Question>
+setQuestions(questions : ArrayList<Question>) : void
+getQIndex() : int
+setQIndex(qIndex : int) : void
+getCurrentQuestion() : Question
+setCurrentQuestion(currentQuestion : Question)
+loadQuestions(activity: MainActivity) : void
+addQuestion(question : Question) : void
+getQuestion(idx : int) : Question
+getCurrentQuestionText() : String
+getCurrentQuestionAnswer() : boolean

Question

-question: String
-answer: boolean

<<constructor>> Question(question : String, answer : String)
+getQuestion() : String
+getAnswer() : boolean

WRITING DATA TO A FILE

- The Assets folder is read-only, we cannot write data to the files in the Assets folder
- To **write** data to a file, create a file in the **AVD memory**.
- Once created, the file can be located in the AVD memory by navigating to View > Tool Windows > Device Explorer then data > user > 0 > edu.utsa.cs3443.*projectName* > files

WRITING DATA TO A FILE

- Under the **model** package, modify QuizBank.java
    - add the **saveData()** method to save data to a (*.txt) file
        - the method uses the **Activity** and **OutputStream** classes to read the data from the file

```
public void saveData(MainActivity activity){
      try {
         OutputStream out = activity.openFileOutput(filename, Context.MODE_PRIVATE );
         out.write("test writing to a file".getBytes(StandardCharsets.UTF_8));
         out.close();
     } catch (IOException e) {
            System.out.println("Failed to write data");
     }
}
```

WRITING DATA TO A FILE

- For the controller, modify MainActivity.java
    - **onCreate()** calls the createQuizBank() method to load the questions in the quiz bank
    - **saveData()** method requires an Activity to access the AVD memory

```
quizBank.loadQuestions(this);
quizBank.saveData(this); // call it wherever your code needs to save data
```

READING DATA FROM A FILE

- In QuizBank.java

```
public void saveData(MainActivity activity){
      try {
         OutputStream out = activity.openFileOutput(filename, Context.MODE_PRIVATE );
         out.write("test writing to a file".getBytes(StandardCharsets.UTF_8));
         out.close();
     } catch (IOException e) {
            System.out.println("Failed to write data");
     }
}
```

- In MainActivity.java

```
quizBank.saveData(this);
```

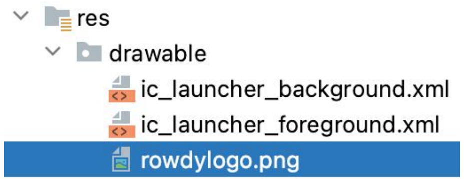
WORKING WITH DATA

- What if we would like to update data in a file from the Assets folder?
  - The Assets folder is read-only, we cannot write data to the files in the Assets folder
  - A work around this is to create a copy of the file from the Assets to the AVD memory, then use the “copy file” for reading and writing data.

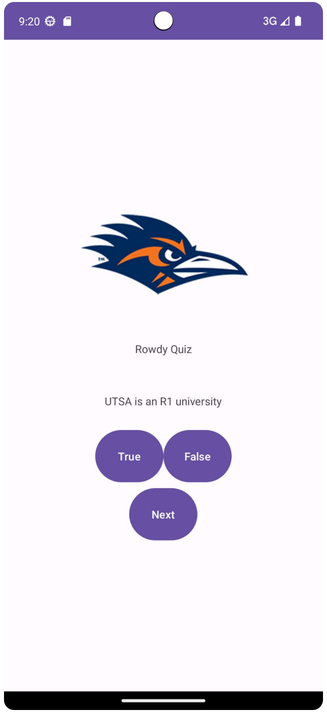
ADDING IMAGEVIEWS TO THE LAYOUT

- Use an ImageView in the layout file to display an image on the screen
- ImageViews can display images from the drawable folder
  - Place the image file under res > drawable
- The ImageView's **src** attribute specifies the image that the ImageView will display

```
<ImageView
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:src="@drawable/rowdylogo"/>
```



```
res
  drawable
    ic_launcher_background.xml
    ic_launcher_foreground.xml
    rowdylogo.png
```



Rowdy Quiz

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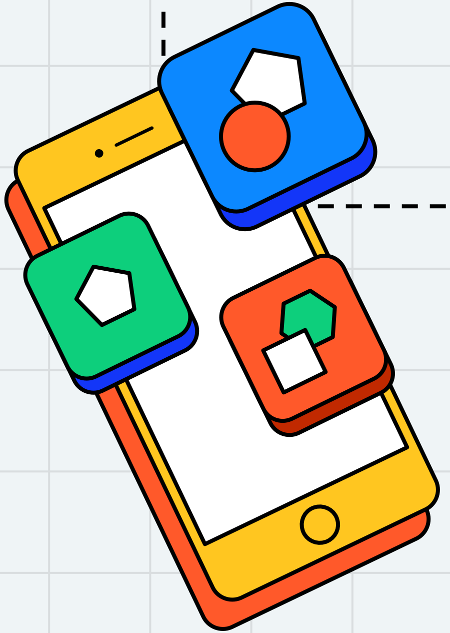
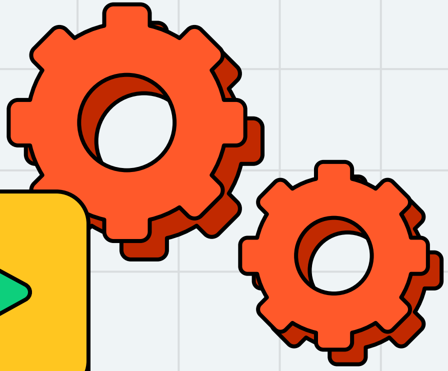
CODE DEMO

- Walk through the Android App in Android Studio





THANK YOU!

DO YOU HAVE ANY QUESTIONS?

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🕒 By Appointment

📍 Online