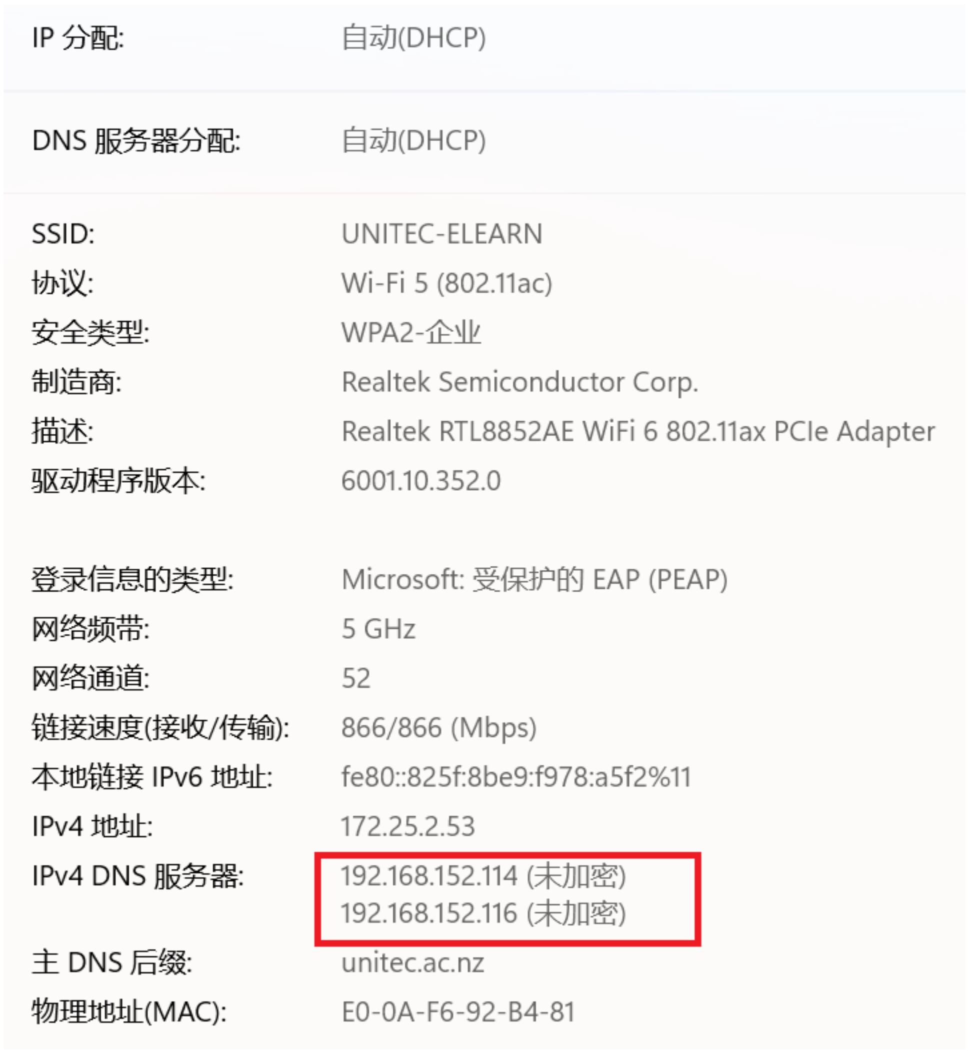
Index

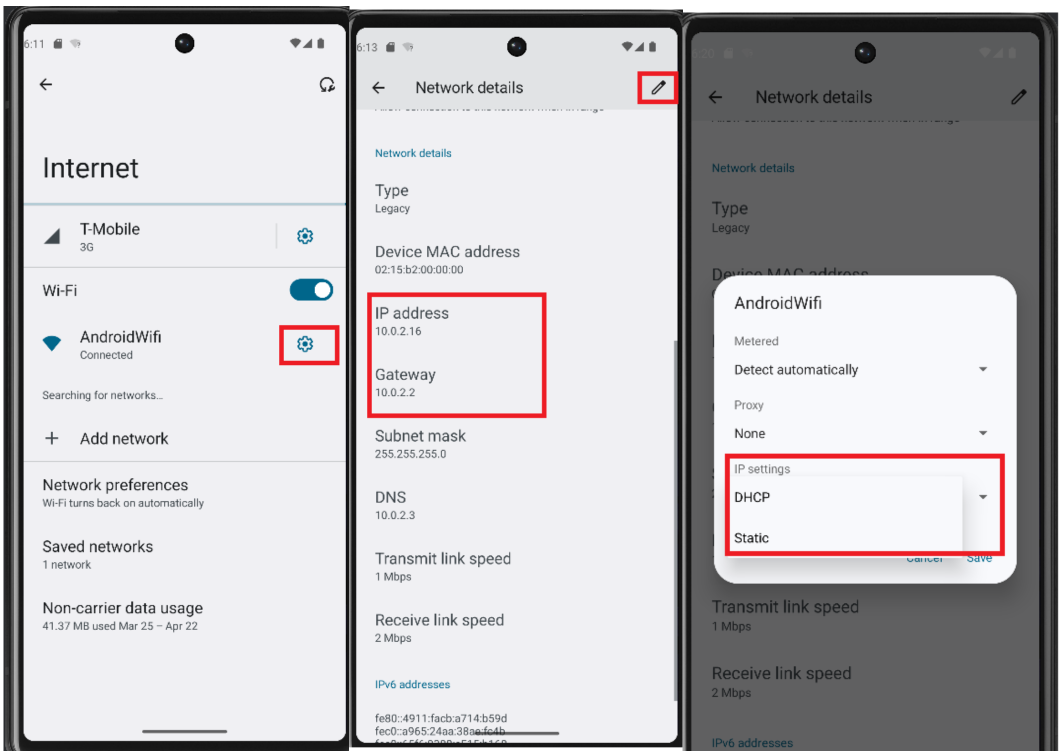
Connect Your Android Emulator to the Internet

1. Find out the current network status of your computer and make a note of the current DNS addresses (both of them).



IP 分配:	自动(DHCP)
DNS 服务器分配:	自动(DHCP)
SSID:	UNITEC-ELEARN
协议:	Wi-Fi 5 (802.11ac)
安全类型:	WPA2-企业
制造商:	Realtek Semiconductor Corp.
描述:	Realtek RTL8852AE WiFi 6 802.11ax PCIe Adapter
驱动程序版本:	6001.10.352.0
登录信息的类型:	Microsoft: 受保护的 EAP (PEAP)
网络频带:	5 GHz
网络通道:	52
链接速度(接收/传输):	866/866 (Mbps)
本地链接 IPv6 地址:	fe80::825f:8be9:f978:a5f2%11
IPv4 地址:	172.25.2.53
IPv4 DNS 服务器:	192.168.152.114 (未加密) 192.168.152.116 (未加密)
主 DNS 后缀:	unitec.ac.nz
物理地址(MAC):	E0-0A-F6-92-B4-81

2. Go back to Android Studio, locate the network settings of the emulator (which is the same procedures as connecting to Wi-Fi in real life). Click on the settings button to enter network details.



Internet

T-Mobile
3G

Wi-Fi

AndroidWifi
Connected

Searching for networks...

Add network

Network preferences
Wi-Fi turns back on automatically

Saved networks
1 network

Non-carrier data usage
41.37 MB used Mar 25 – Apr 22

Network details

Network details

Type
Legacy

Device MAC address
02:15:b2:00:00:00

IP address
10.0.2.16

Gateway
10.0.2.2

Subnet mask
255.255.255.0

DNS
10.0.2.3

Transmit link speed
1 Mbps

Receive link speed
2 Mbps

IPv6 addresses

fe80::4911:facb:a714:b59d
fec0::a965:24aa:38ae:fc4b

AndroidWifi

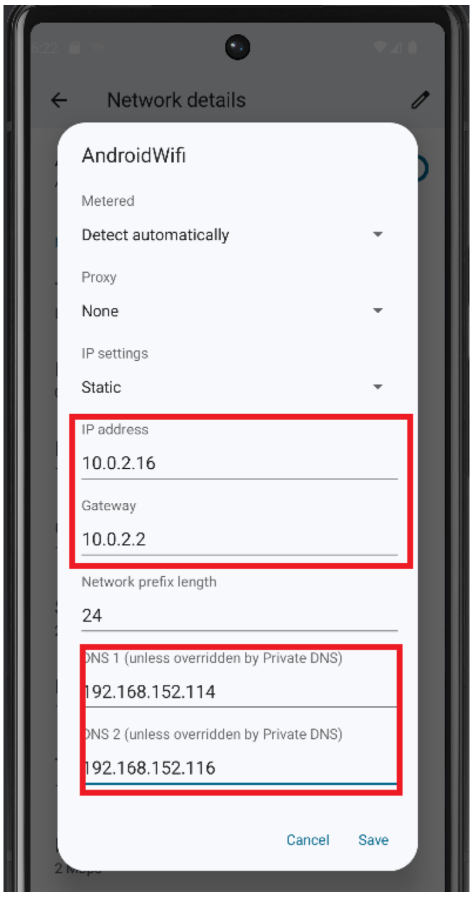
Metered
Detect automatically

Proxy
None

IP settings
DHCP
Static

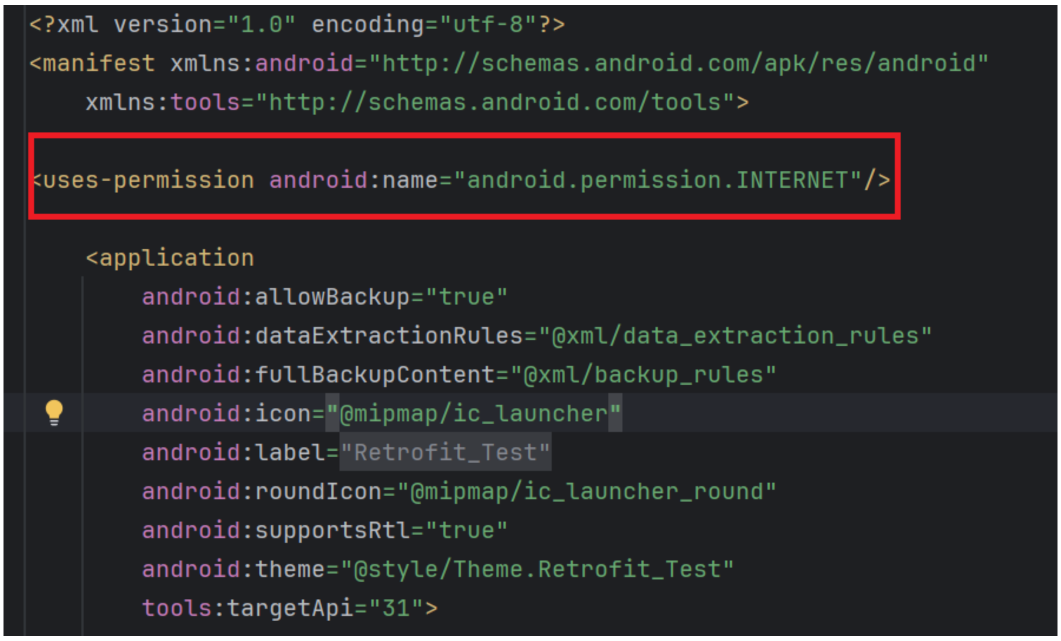
3. Scroll down and make note of the IP address and gateway. Then, click on the edit button in the top right corner to open a dialog box. Change the IP Setting from DHCP to Static.

4. In the newly opened dialog box, input the new IP address, gateway, and DNS. The IP address and gateway are the ones we just noted down, while the DNS is that of our computer. Here is my case.



Metered: Detect automatically
Proxy: None
IP settings: Static
IP address: 10.0.2.16
Gateway: 10.0.2.2
Network prefix length: 24
DNS 1 (unless overridden by Private DNS): 192.168.152.114
DNS 2 (unless overridden by Private DNS): 192.168.152.116

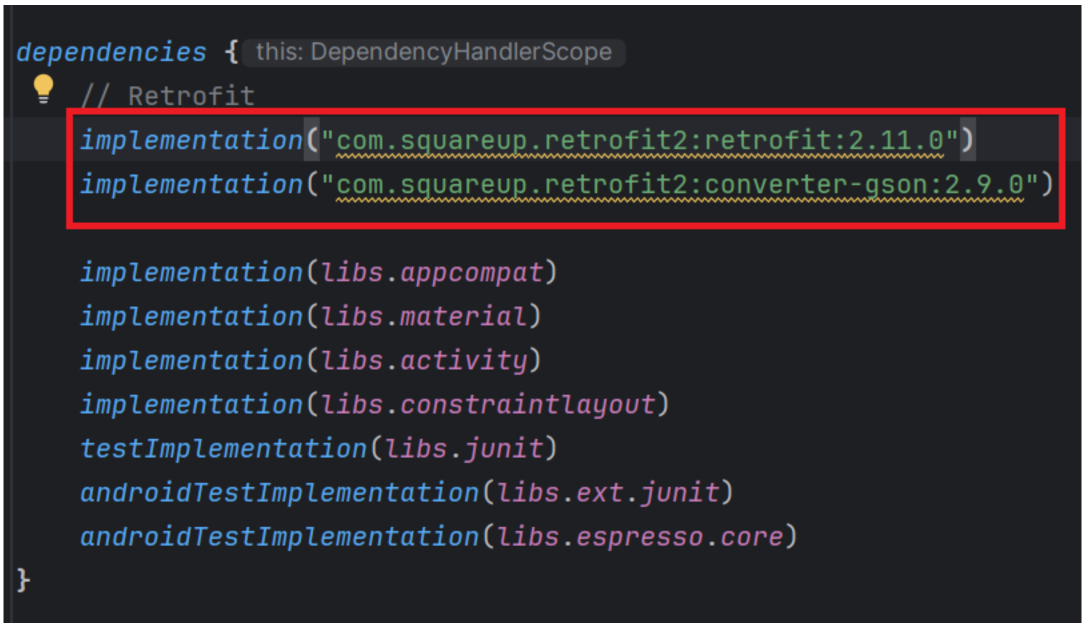
5. Find the app's Manifest.xml file and add this line of code. Restart the app, and you should be able to connect to the internet.



```xml
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools">

<uses-permission android:name="android.permission.INTERNET"/>

    <application
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="Retrofit_Test"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.Retrofit_Test"
        tools:targetApi="31">
```

Use Retrofit

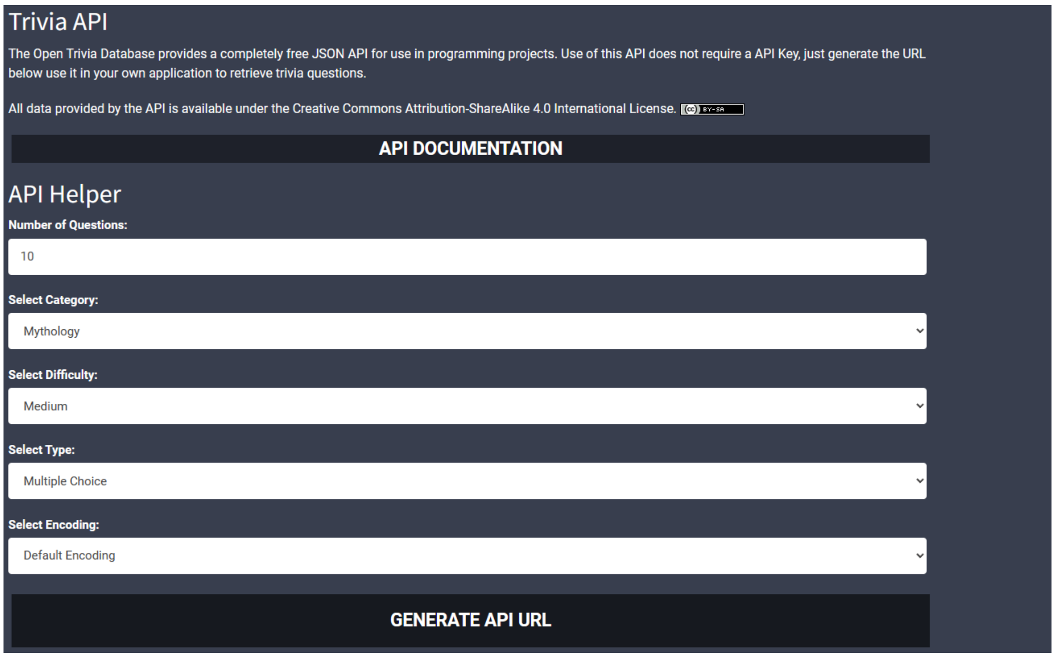
1. Add the dependency (Note that the converter-gson may not be the latest version, check official documentation further).



```
dependencies {  this: DependencyHandlerScope
    // Retrofit
    implementation("com.squareup.retrofit2:retrofit:2.11.0")
    implementation("com.squareup.retrofit2:converter-gson:2.9.0")

    implementation(libs.appcompat)
    implementation(libs.material)
    implementation(libs.activity)
    implementation(libs.constraintlayout)
    testImplementation(libs.junit)
    androidTestImplementation(libs.ext.junit)
    androidTestImplementation(libs.espresso.core)
}
```

2. Have a look at the official documentation of Open Trivia DB. Seems all we need is a URL address. [Open Trivia DB: Free to use, user-contributed trivia question database. (opentdb.com)]

Let's try it out. Click on Generate API URL, and it will generate a URL. Copy it and open it in your browser. This JSON file is the data we have obtained. Next, all we need to do is to fetch and display it in our code.



Trivia API

The Open Trivia Database provides a completely free JSON API for use in programming projects. Use of this API does not require a API Key, just generate the URL below use it in your own application to retrieve trivia questions.

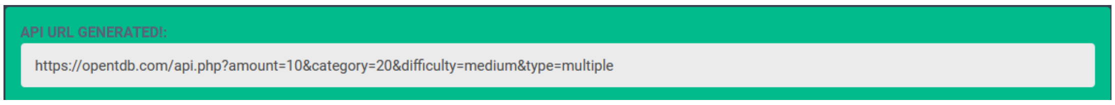
All data provided by the API is available under the Creative Commons Attribution-ShareAlike 4.0 International License.

API DOCUMENTATION

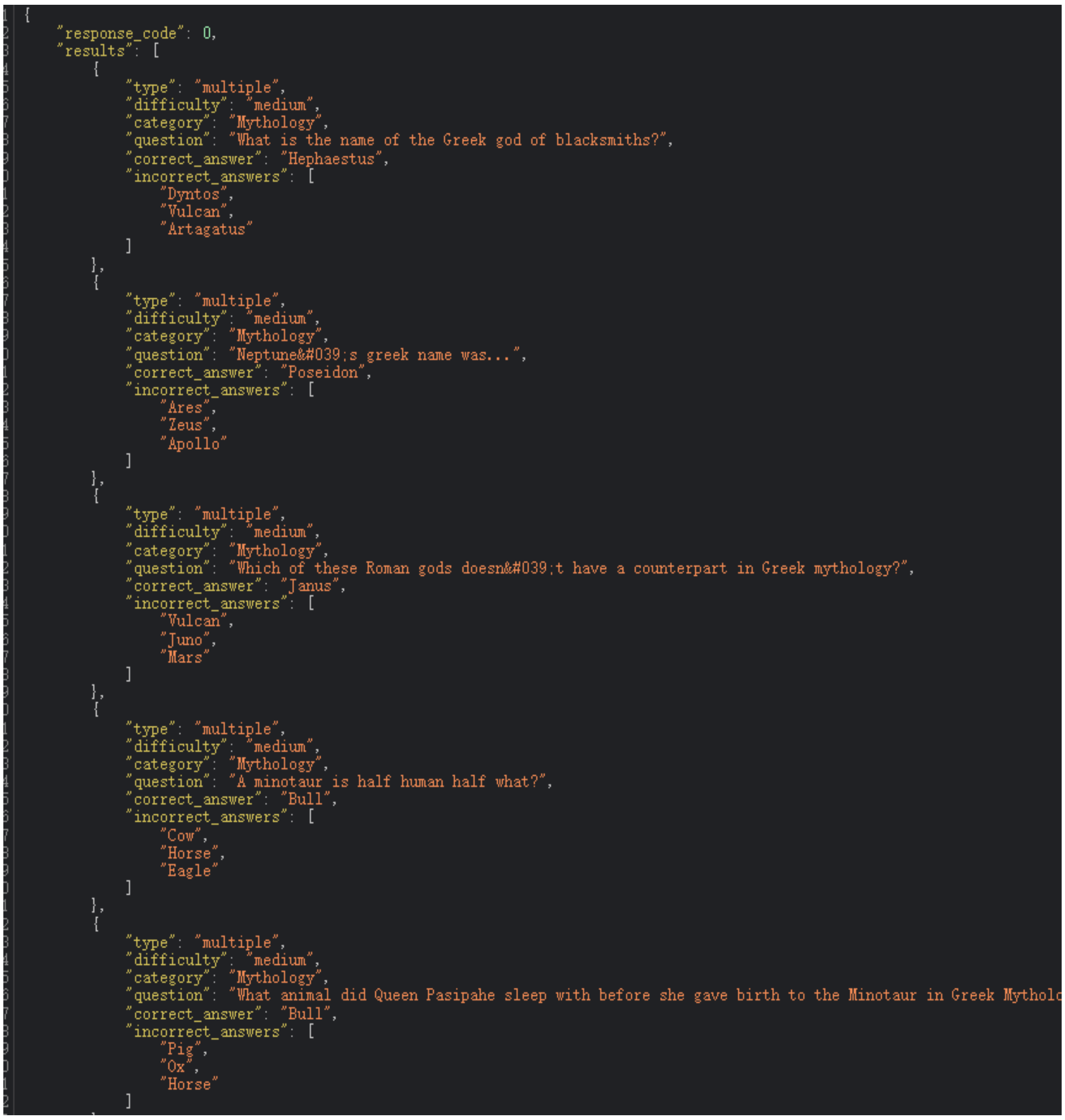
API Helper

Number of Questions:	10
Select Category:	Mythology
Select Difficulty:	Medium
Select Type:	Multiple Choice
Select Encoding:	Default Encoding

GENERATE API URL


API URL GENERATED!:

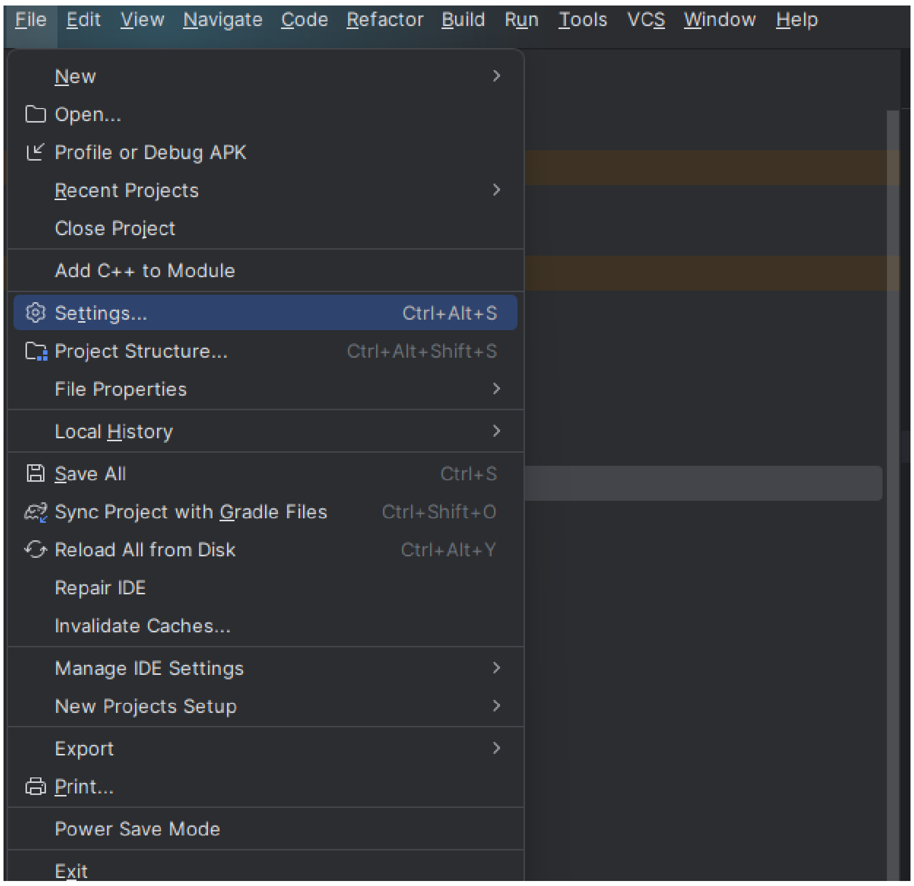
https://opentdb.com/api.php?amount=10&category=20&difficulty=medium&type=multiple

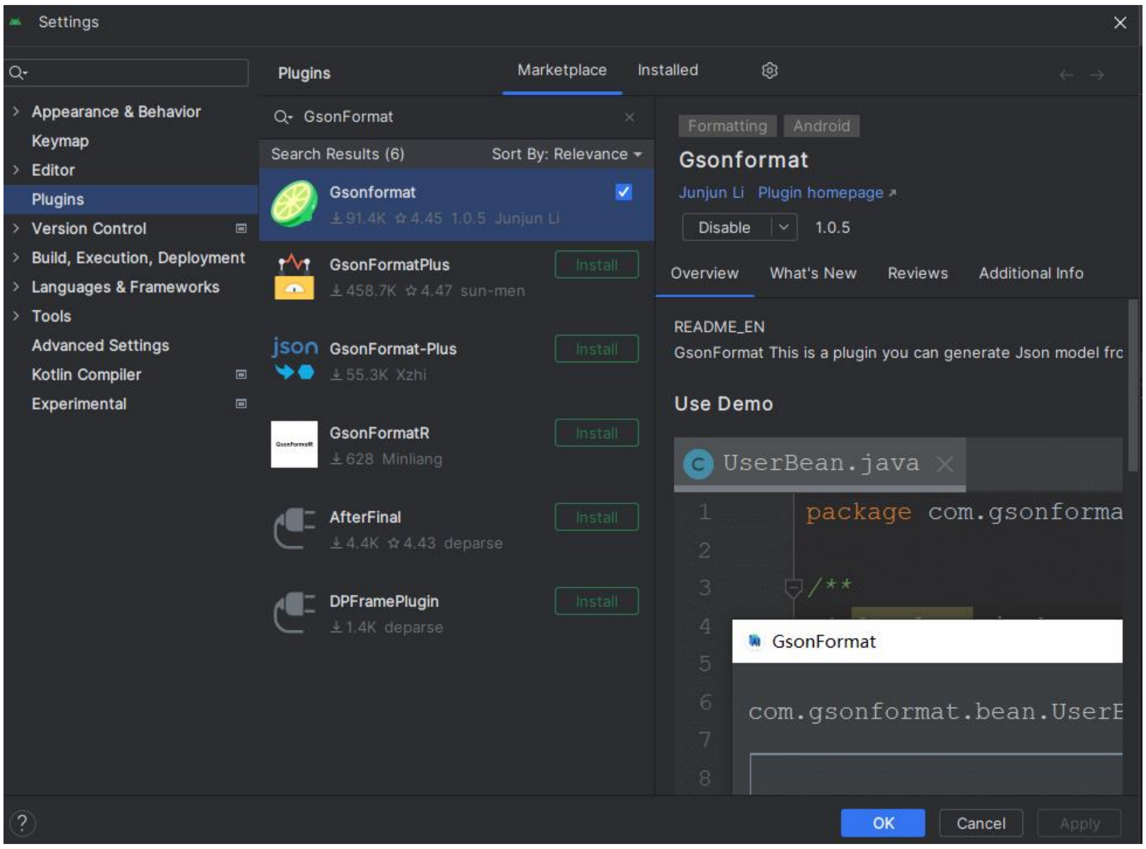


```
{
    "response_code": 0,
    "results": [
        {
            "type": "multiple",
            "difficulty": "medium",
            "category": "Mythology",
            "question": "What is the name of the Greek god of blacksmiths?",
            "correct_answer": "Hephaestus",
            "incorrect_answers": [
                "Dyntos",
                "Vulcan",
                "Artagatus"
            ]
        },
        {
            "type": "multiple",
            "difficulty": "medium",
            "category": "Mythology",
            "question": "Neptune&#039;s greek name was...",
            "correct_answer": "Poseidon",
            "incorrect_answers": [
                "Ares",
                "Zeus",
                "Apollo"
            ]
        },
        {
            "type": "multiple",
            "difficulty": "medium",
            "category": "Mythology",
            "question": "Which of these Roman gods doesn&#039;t have a counterpart in Greek mythology?",
            "correct_answer": "Janus",
            "incorrect_answers": [
                "Vulcan",
                "Juno",
                "Mars"
            ]
        },
        {
            "type": "multiple",
            "difficulty": "medium",
            "category": "Mythology",
            "question": "A minotaur is half human half what?",
            "correct_answer": "Bull",
            "incorrect_answers": [
                "Cow",
                "Horse",
                "Eagle"
            ]
        },
        {
            "type": "multiple",
            "difficulty": "medium",
            "category": "Mythology",
            "question": "What animal did Queen Pasipahe sleep with before she gave birth to the Minotaur in Greek Mytholo
            "correct_answer": "Bull",
            "incorrect_answers": [
                "Pig",
                "Ox",
                "Horse"
            ]
```

3. Java is an object-oriented programming language, so firstly we will create a class to represent this data.

   Open File-Settings-Plugins and find a plugin that automatically converts JSON into Java class, such as GsonFormat. Install the plugin and restart Android Studio.





GsonFormat

Search Results (6) Sort By: Relevance

Gsonformat ✓
91.4K ☆4.45 1.0.5 Junjun Li

GsonFormatPlus Install
458.7K ☆4.47 sun-men

GsonFormat-Plus Install
55.3K Xzhi

GsonFormatR Install
628 Minliang

AfterFinal Install
4.4K ☆4.43 deparse

DPFramePlugin Install
1.4K deparse

Formatting Android

Gsonformat

Junjun Li Plugin homepage ↗

Disable 1.0.5

Overview What's New Reviews Additional Info

README_EN

GsonFormat This is a plugin you can generate Json model fro

Use Demo

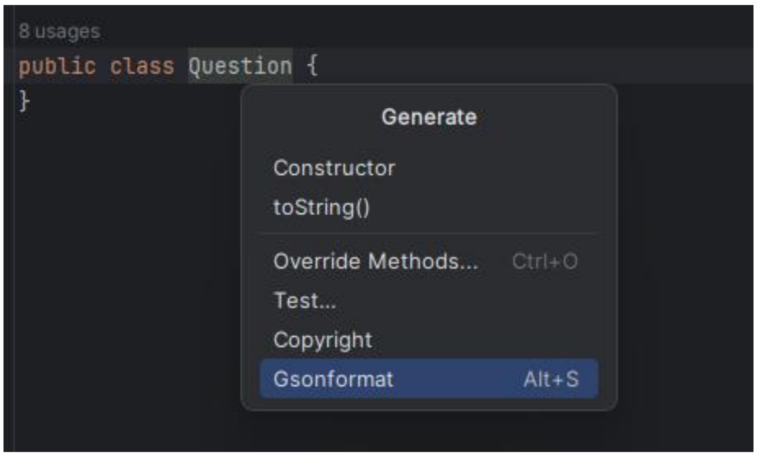
UserBean.java

```
package com.gsonforma

/**
```

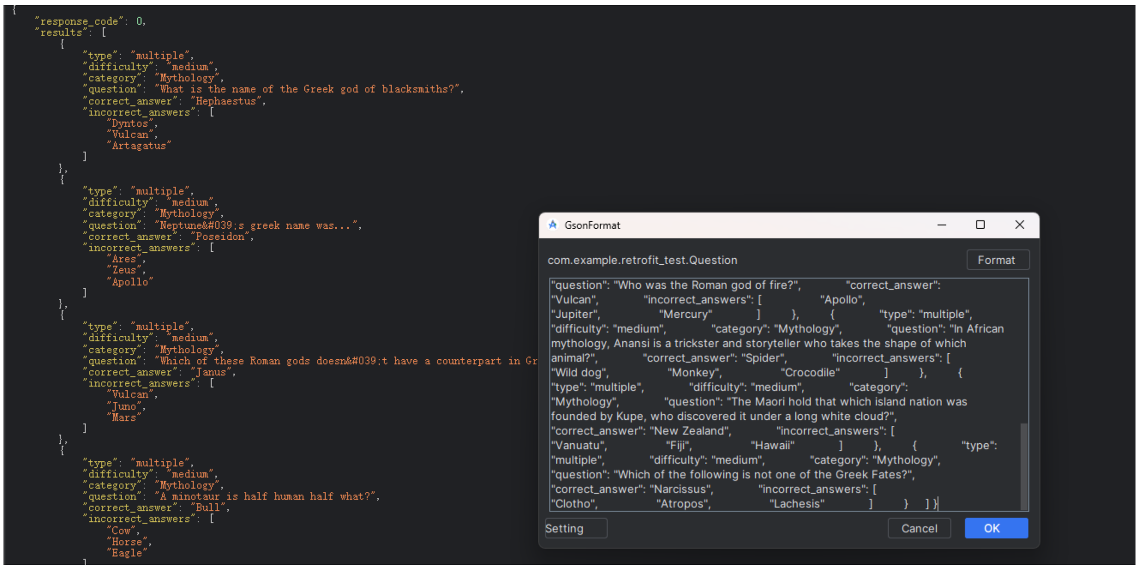
GsonFormat

com.gsonformat.bean.UserE

4. Create a class named Question, click Generate, and choose GsonFormat. Copy the JSON file you just opened in the browser into the text box. Click OK, and all fields will be generated automatically.



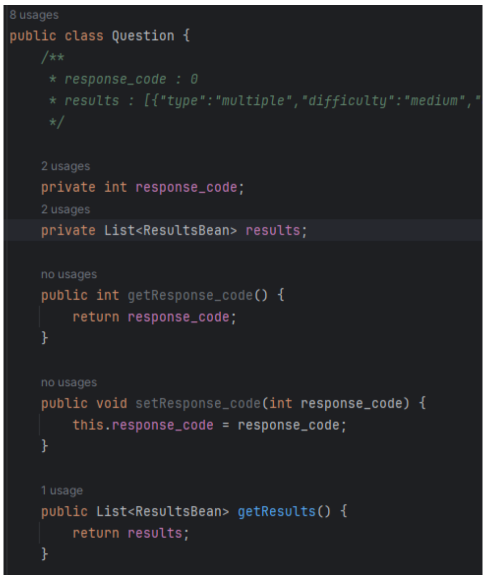
```
8 usages
public class Question {
}
```



```
{
    "response_code": 0,
    "results": [
        {
            "type": "multiple",
            "difficulty": "medium",
            "category": "Mythology",
            "question": "What is the name of the Greek god of blacksmiths?",
            "correct_answer": "Hephaestus",
            "incorrect_answers": [
                "Dyntos",
                "Vulcan",
                "Artagatus"
            ]
        },
        {
            "type": "multiple",
            "difficulty": "medium",
            "category": "Mythology",
            "question": "Neptune&#039;s greek name was...",
            "correct_answer": "Poseidon",
            "incorrect_answers": [
                "Ares",
                "Zeus",
                "Apollo"
            ]
        },
        {
            "type": "multiple",
            "difficulty": "medium",
            "category": "Mythology",
            "question": "Which of these Roman gods doesn&#039;t have a counterpart in Gr
            "correct_answer": "Janus",
            "incorrect_answers": [
                "Vulcan",
                "Juno",
                "Mars"
            ]
        },
        {
            "type": "multiple",
            "difficulty": "medium",
            "category": "Mythology",
            "question": "A minotaur is half human half what?",
            "correct_answer": "Bull",
            "incorrect_answers": [
                "Cow",
                "Horse",
                "Eagle"
            ]
```

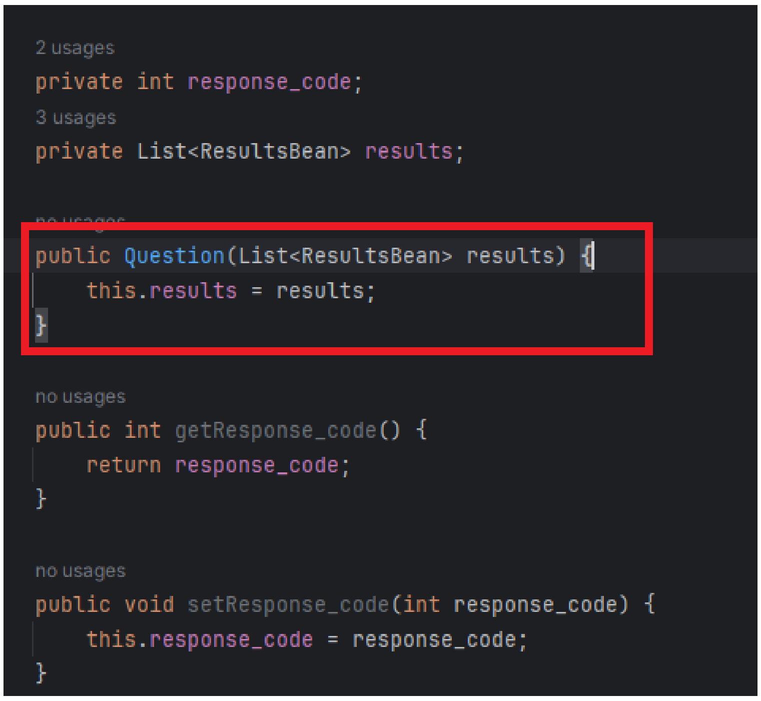
com.example.retrofit_test.Question

```
"question": "Who was the Roman god of fire?",            "correct_answer":
"Vulcan",            "incorrect_answers": [               "Apollo",
"Jupiter",               "Mercury"            ]         },         {            "type": "multiple",
"difficulty": "medium",            "category": "Mythology",            "question": "In African
mythology, Anansi is a trickster and storyteller who takes the shape of which
animal?",            "correct_answer": "Spider",            "incorrect_answers": [
"Wild dog",               "Monkey",               "Crocodile"            ]         },         {
"type": "multiple",            "difficulty": "medium",            "category":
"Mythology",            "question": "The Maori hold that which island nation was
founded by Kupe, who discovered it under a long white cloud?",
"correct_answer": "New Zealand",            "incorrect_answers": [
"Vanuatu",               "Fiji",               "Hawaii"            ]         },         {            "type":
"multiple",            "difficulty": "medium",            "category": "Mythology",
"question": "Which of the following is not one of the Greek Fates?",
"correct_answer": "Narcissus",            "incorrect_answers": [
"Clotho",               "Atropos",               "Lachesis"            ]         }   ] }
```



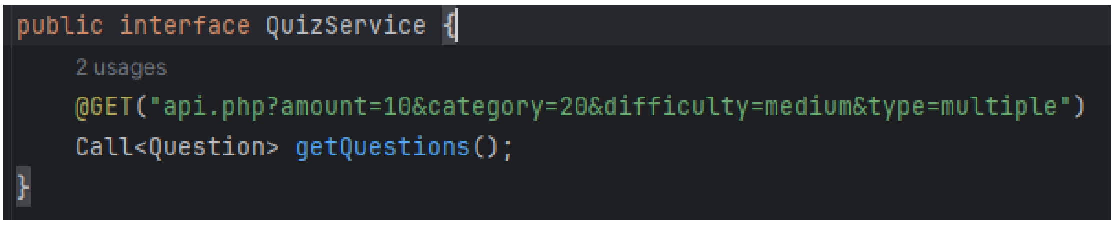
```
8 usages
public class Question {
    /**
     * response_code : 0
     * results : [{"type":"multiple","difficulty":"medium","
     */

    2 usages
    private int response_code;
    2 usages
    private List<ResultsBean> results;

    no usages
    public int getResponse_code() {
        return response_code;
    }

    no usages
    public void setResponse_code(int response_code) {
        this.response_code = response_code;
    }

    1 usage
    public List<ResultsBean> getResults() {
        return results;
    }
```

5. Generate a constructor as well, the Question class is ready.



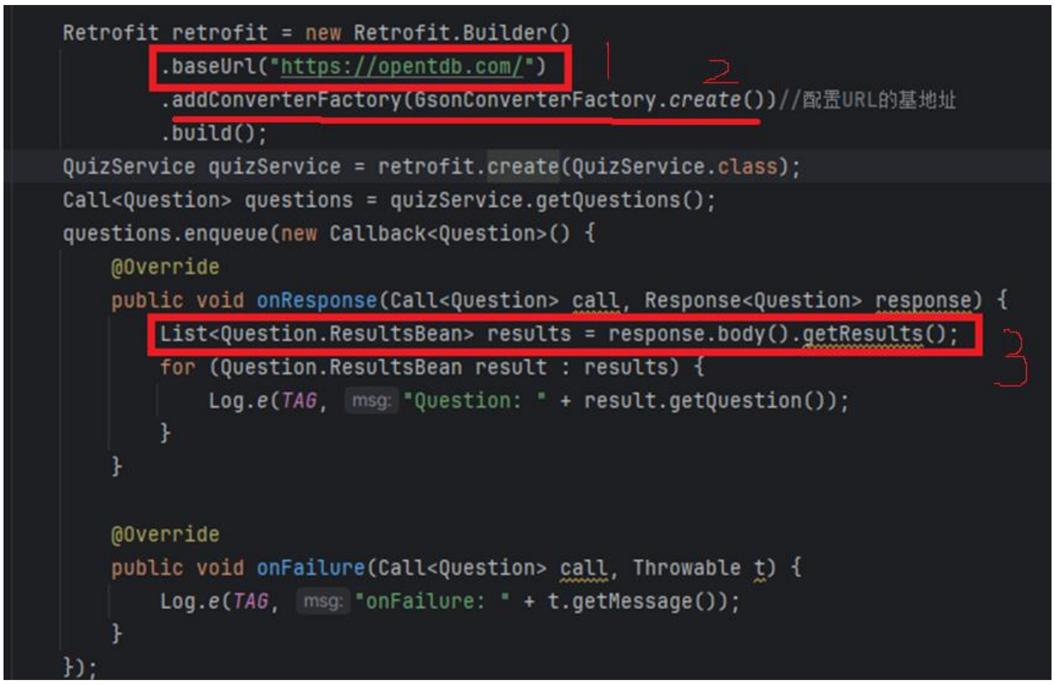
```
2 usages
private int response_code;
3 usages
private List<ResultsBean> results;

no usages
public Question(List<ResultsBean> results) {
    this.results = results;
}

no usages
public int getResponse_code() {
    return response_code;
}

no usages
public void setResponse_code(int response_code) {
    this.response_code = response_code;
}
```

6. Next, we define a Retrofit interface called QuizService, just like what we do when implement DAO.

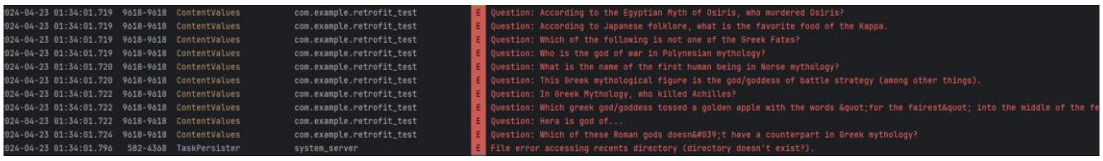


```
public interface QuizService {
    2 usages
    @GET("api.php?amount=10&category=20&difficulty=medium&type=multiple")
    Call<Question> getQuestions();
}
```

7. Go to MainActicity, enter those lines of code (AI will generate them automatically, hopefully). Start app, open Logcat, 10 questions have been generated.



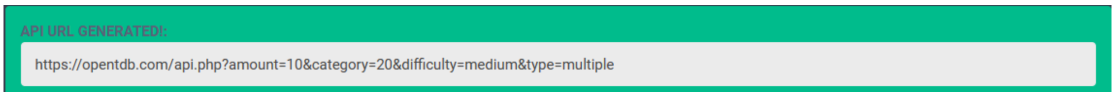
```java
Retrofit retrofit = new Retrofit.Builder()
        .baseUrl("https://opentdb.com/")
        .addConverterFactory(GsonConverterFactory.create())//配置URL的基地址
        .build();
QuizService quizService = retrofit.create(QuizService.class);
Call<Question> questions = quizService.getQuestions();
questions.enqueue(new Callback<Question>() {
    @Override
    public void onResponse(Call<Question> call, Response<Question> response) {
        List<Question.ResultsBean> results = response.body().getResults();
        for (Question.ResultsBean result : results) {
            Log.e(TAG, msg: "Question: " + result.getQuestion());
        }
    }

    @Override
    public void onFailure(Call<Question> call, Throwable t) {
        Log.e(TAG, msg: "onFailure: " + t.getMessage());
    }
});
```



```
024-04-23 01:34:01.719  9618-9618  ContentValues           com.example.retrofit_test            E  Question: According to the Egyptian Myth of Osiris, who murdered Osiris?
024-04-23 01:34:01.719  9618-9618  ContentValues           com.example.retrofit_test            E  Question: According to Japanese folklore, what is the favorite food of the Kappa.
024-04-23 01:34:01.719  9618-9618  ContentValues           com.example.retrofit_test            E  Question: Which of the following is not one of the Greek Fates?
024-04-23 01:34:01.719  9618-9618  ContentValues           com.example.retrofit_test            E  Question: Who is the god of war in Polynesian mythology?
024-04-23 01:34:01.720  9618-9618  ContentValues           com.example.retrofit_test            E  Question: What is the name of the first human being in Norse mythology?
024-04-23 01:34:01.720  9618-9618  ContentValues           com.example.retrofit_test            E  Question: This Greek mythological figure is the god/goddess of battle strategy (among other things).
024-04-23 01:34:01.722  9618-9618  ContentValues           com.example.retrofit_test            E  Question: In Greek Mythology, who killed Achilles?
024-04-23 01:34:01.722  9618-9618  ContentValues           com.example.retrofit_test            E  Question: Which greek god/goddess tossed a golden apple with the words &quot;for the fairest&quot; into the middle of the fe
024-04-23 01:34:01.722  9618-9618  ContentValues           com.example.retrofit_test            E  Question: Hera is god of...
024-04-23 01:34:01.724  9618-9618  ContentValues           com.example.retrofit_test            E  Question: Which of these Roman gods doesn&#039;t have a counterpart in Greek mythology?
024-04-23 01:34:01.796   582-4368  TaskPersister           system_server                        E  File error accessing recents directory (directory doesn't exist?).
```

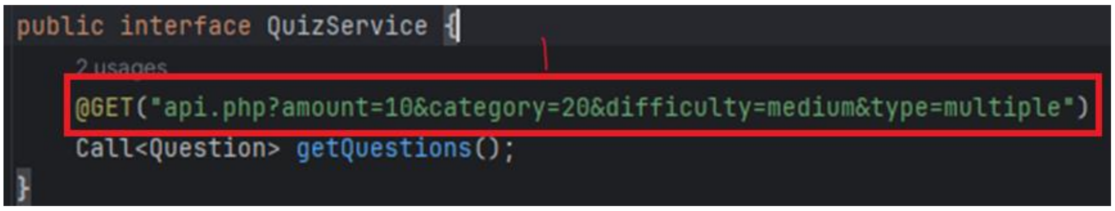
Here, we won't explain the workings of Retrofit (mainly because I don't understand it either), but only point out a few key parameters and statements.

1. Reviewing the URL address, it's clear that combining the addresses from MainActivity and QuizService results in the complete URL address. The former is the base address, and the latter is the query address. You might wonder if we can directly place the complete address in QuizService interface. The answer is yes. In fact, there are three ways to write the address, as detailed in the official documentation.



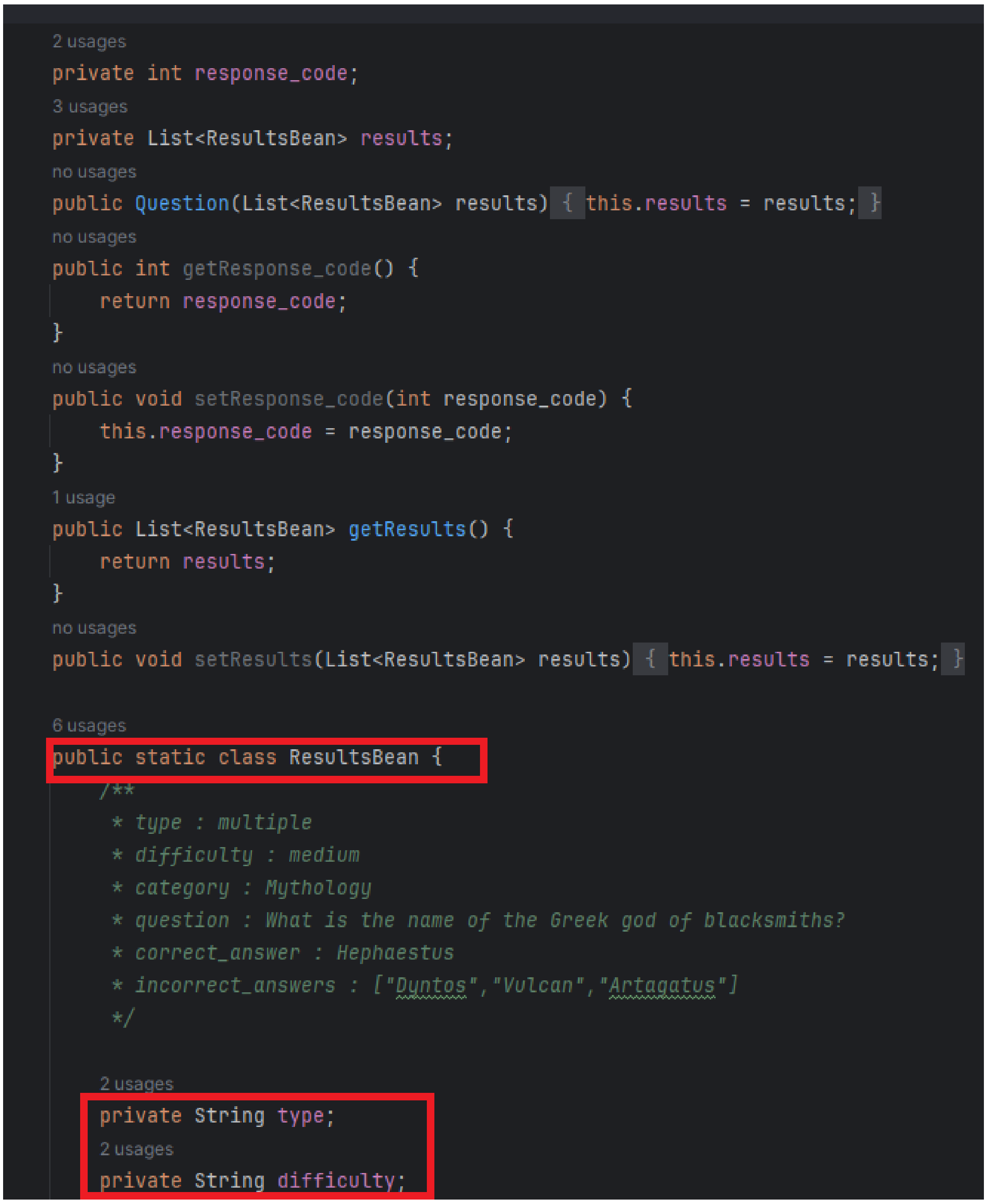
API URL GENERATED!:

https://opentdb.com/api.php?amount=10&category=20&difficulty=medium&type=multiple



```java
public interface QuizService {
    2 usages
    @GET("api.php?amount=10&category=20&difficulty=medium&type=multiple")
    Call<Question> getQuestions();
}
```

2. A function is called to convert the data from JSON into a format that Java can recognize. If this functionality is not needed, it can be removed.
3. Response.body is exactly the instance that contains the returned data. The following statements simply retrieve different fields of this instance. Also, note that our automatically generated Question class actually contains an inner class, and the fields of this inner class are the data we need (such as category, question, answer). The outer class can freely access all methods of the inner class. If you forget this point, you can review it and compare it to the writing style of a recyclerview adapter, where the viewholder is also an inner class, right?

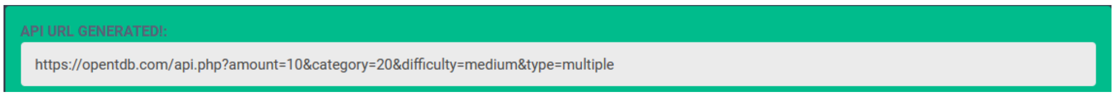


```
2 usages
private int response_code;
3 usages
private List<ResultsBean> results;
no usages
public Question(List<ResultsBean> results) { this.results = results; }
no usages
public int getResponse_code() {
    return response_code;
}
no usages
public void setResponse_code(int response_code) {
    this.response_code = response_code;
}
1 usage
public List<ResultsBean> getResults() {
    return results;
}
no usages
public void setResults(List<ResultsBean> results) { this.results = results; }

6 usages
public static class ResultsBean {
    /**
     * type : multiple
     * difficulty : medium
     * category : Mythology
     * question : What is the name of the Greek god of blacksmiths?
     * correct_answer : Hephaestus
     * incorrect_answers : ["Dyntos","Vulcan","Artagatus"]
     */

    2 usages
    private String type;
    2 usages
    private String difficulty;
```

Dynamically Fetch Data

Previously, we could only retrieve data based on a fixed URL address, but in reality, we need to dynamically obtain information such as categories, difficulty, etc.

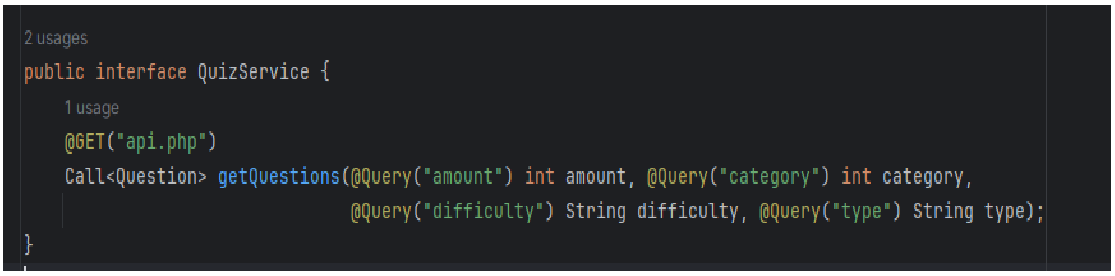
Reviewing the format of this URL address, it's quite clear. If we want 10 questions, then amount=10; if we want medium difficulty questions, we set difficulty=medium. It's all very structured formatting.



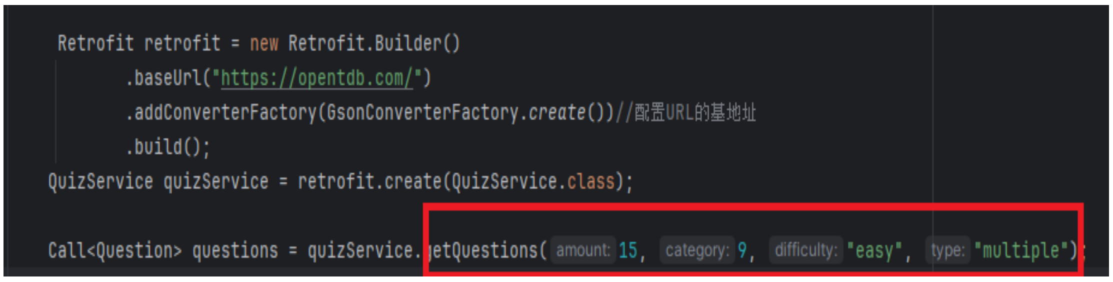
API URL GENERATED!:

```
https://opentdb.com/api.php?amount=10&category=20&difficulty=medium&type=multiple
```

So, we modify the query statement. Using the @Query annotation, we dynamically generate query parameters. Go back to MainActivity, manually input the new parameters, and all done.



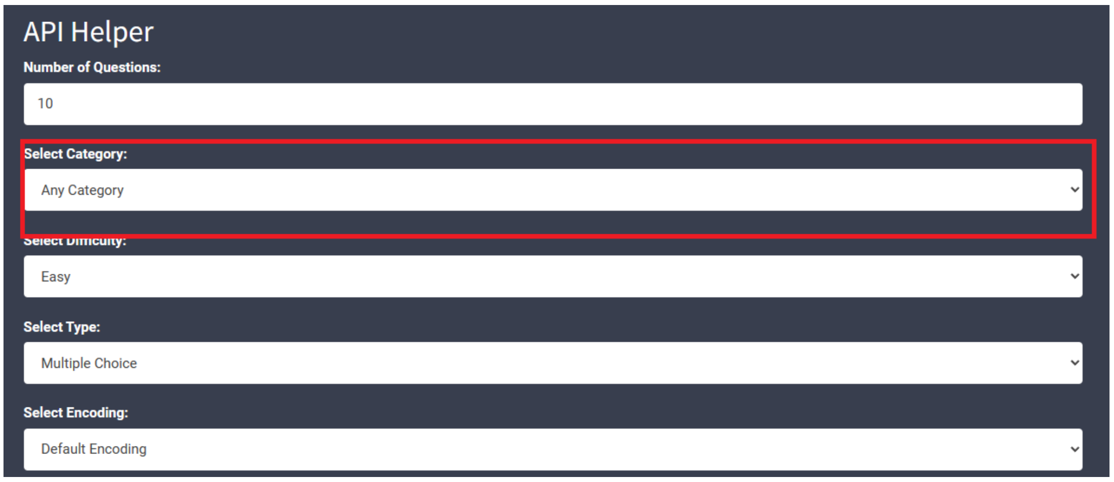
```
2 usages
public interface QuizService {
    1 usage
    @GET("api.php")
    Call<Question> getQuestions(@Query("amount") int amount, @Query("category") int category,
                                @Query("difficulty") String difficulty, @Query("type") String type);
}
```



```
    Retrofit retrofit = new Retrofit.Builder()
            .baseUrl("https://opentdb.com/")
            .addConverterFactory(GsonConverterFactory.create())//配置URL的基地址
            .build();
    QuizService quizService = retrofit.create(QuizService.class);

    Call<Question> questions = quizService.getQuestions( amount: 15, category: 9, difficulty: "easy", type: "multiple");
```

Three Further Details

1. If we select any category then there won't be a "category" parameter in the generated URL. In this case, how should the code be written? In fact, if it's an integer type, you can write it as 0. If your parameter is a string, you can write it as null. For example, the generated result in the image below is for 15 questions without any restrictions, and the corresponding URL address is.


API Helper

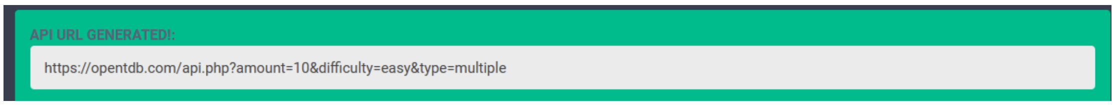
Number of Questions: 10

Select Category: Any Category

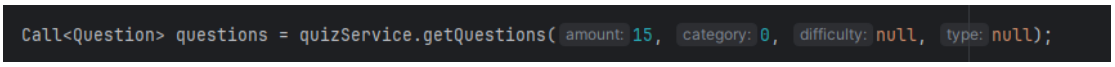
Select Difficulty: Easy

Select Type: Multiple Choice

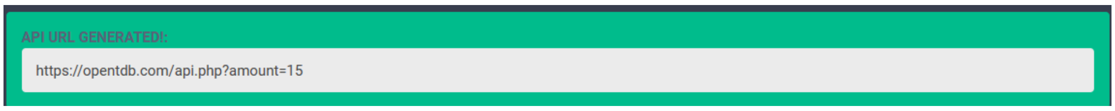
Select Encoding: Default Encoding


API URL GENERATED!:

```
https://opentdb.com/api.php?amount=10&difficulty=easy&type=multiple
```



```java
Call<Question> questions = quizService.getQuestions( amount: 15,  category: 0,  difficulty: null,  type: null);
```


API URL GENERATED!:

```
https://opentdb.com/api.php?amount=15
```

2. Difficulty and type parameters are quite limited, but there are as many as 32 categories, so there's no need to search for them manually. The official documentation has provided the URL opentdb.com/api_category.php, which also returns data in JSON format.
3. Lastly, how to use a session token to generate non-repetitive questions remains to be solved.