

Mobile Application Development

Produced
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Android & Retrofit

A type-safe HTTP client for Android & Java





Retrofit

A type-safe HTTP client for Android and Java

Introduction

Retrofit turns your HTTP API into a Java interface.

```
public interface GitHubService {  
    @GET("users/{user}/repos")  
    Call<List<Repo>> listRepos(@Path("user") String user);  
}
```

The `Retrofit` class generates an implementation of the `GitHubService` interface.

```
Retrofit retrofit = new Retrofit.Builder()  
    .baseUrl("https://api.github.com/")  
    .build();  
  
GitHubService service = retrofit.create(GitHubService.class);
```

Each `Call` from the created `GitHubService` can make a synchronous or asynchronous HTTP request to the remote webserver.

```
Call<List<Repo>> repos = service.listRepos("octocat");
```

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Agenda & Goals

- ❑ Investigate the use of Retrofit in App Development
- ❑ Be aware of the different Retrofit Annotations and Classes and how, when and where to use them
- ❑ Revisit Java interfaces
- ❑ Understand how to integrate Retrofit into an Android App
- ❑ Refactor our **CoffeeMate** Case Study



What is it?

- ❑ Retrofit is a Java Library that turns your REST API into a Java interface
- ❑ Simplifies HTTP communication by turning remote APIs into declarative, type-safe interfaces
- ❑ Developed by Square (Jake Wharton)
- ❑ Retrofit is one of the most popular HTTP Client Library for Android as a result of its simplicity and its great performance compared to the others (next slide)
- ❑ Retrofit makes use of **OkHttp** (from the same developer) to handle network requests.



Retrofit Performance Analysis

	One Discussion	Dashboard (7 requests)	25 Discussions
AsyncTask	941 ms	4,539 ms	13,957 ms
Volley	560 ms	2,202 ms	4,275 ms
Retrofit	312 ms	889 ms	1,059 ms

<http://instructure.github.io/blog/2013/12/09/volley-vs-retrofit/>



Why Use it?

- ❑ Developing your own type-safe HTTP library to interface with a REST API can be a real pain: you have to handle many functionalities such as making connections, caching, retrying failed requests, threading, response parsing, error handling, and more.
- ❑ Retrofit, on the other hand, is very well planned, documented, and tested—a battle-tested library that will save you a lot of precious time and headaches.



The Basics

- ❑ Again, Retrofit2 is a flexible library that uses annotated interfaces to create REST calls. To get started, let's look at our CoffeeMate example that makes a **GET** request for Coffees.
- ❑ Here's the **Coffee** class we're using:
- ❑ Much simpler if field names matches server model (but doesn't have to, see later)

```
public class Coffee
{
    public String name;
    public String shop;
    public double rating;
    public double price;
    public boolean favourite;

    public String _id;
    public String usertoken;
    public String address;
    public String googlephoto;
    public Marker marker = new Marker();

    public Coffee() {...}

    public Coffee(String name, String shop, double rating,
                 double price, boolean fav, String token,
                 double lat, double lng, String path)
    {...}

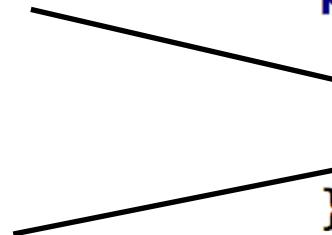
    @Override
    public String toString() {...}
}
```



The Service interface *

- Once we've defined the class, we can make a service interface to handle our API. A GET request to load all Coffees could look something like this:

```
public interface CoffeeService {  
    @GET("/coffees/{token}")  
    Call<List<Coffee>> getAllCoffees(@Path("token") String token);  
}
```

Two arrows originate from the annotations in the code. One arrow points from the path annotation "@GET("/coffees/{token}")" to the word "token" in the explanatory text below. Another arrow points from the path annotation "@Path("token")" to the word "token" in the explanatory text below.

- Note that the @GET annotation takes the endpoint we wish to hit. As you can see, an implementation of this interface will return a Call object containing a list of Coffees.



Call

- Models a single request/response pair
- Separates request creation from response handling
- Each instance can only be used once...
- ...instances can be cloned
- Supports both synchronous and asynchronous execution.
- Can be (actually) canceled



Beyond GET – other types of Calls

- ❑ Retrofit2 is not limited to GET requests. You may specify other REST methods using the appropriate annotations (such as @POST, @PUT and @DELETE).

- ❑ Here's another version of our **CoffeeService** interface (with full CRUD support)

```
public interface CoffeeService {  
  
    @GET("/coffees/{token}")  
    Call<List<Coffee>> getAllCoffees(@Path("token") String token);  
  
    @POST("/coffees/{token}")  
    Call<Coffee> createCoffee(@Path("token") String token,  
                               @Body Coffee coffee);  
  
    @GET("/coffees/{token}/{id}")  
    Call<Coffee> retrieveCoffee(@Path("token") String token,  
                               @Path("id") String id);  
  
    @PUT("/coffees/{token}/{id}")  
    Call<Coffee> updateCoffee(@Path("token") String token,  
                               @Path("id") String id,  
                               @Body Coffee coffee);  
  
    @DELETE("/coffees/{token}/{id}")  
    Call<List<Coffee>> deleteCoffee(@Path("token") String token,  
                                       @Path("id") String id);  
}
```



Calling the API

- ❑ So how do we use this interface to make requests to the API?
- ❑ Use **Retrofit2** to create an implementation of the above interface, and then call the desired method.
- ❑ Retrofit2 supports a number of converters used to map Java objects to the data format your server expects (JSON, XML, etc). we'll be using the **Gson** converter.

- **Gson**: com.squareup.retrofit2:converter-gson
- **Jackson**: com.squareup.retrofit2:converter-jackson
- **Moshi**: com.squareup.retrofit2:converter-moshi
- **Protobuf**: com.squareup.retrofit2:converter-protobuf
- **Wire**: com.squareup.retrofit2:converter-wire
- **Simple XML**: com.squareup.retrofit2:converter-simplexml
- **Scalars (primitives, boxed, and String)**: com.squareup.retrofit2:converter-scalars



Aside - CoffeeMate Android Client

❑ coffeeamateweb api endpoints

```
{ method: 'GET', path: '/coffees/{token}', config: CoffeeApi.findAll },
{ method: 'GET', path: '/coffees/{token}/{id}', config: CoffeeApi.findById },
{ method: 'POST', path: '/coffees/{token} ', config: CoffeeApi.addCoffee },
{ method: 'PUT', path: '/coffees/{token}/{id}', config: CoffeeApi.updateCoffee },
{ method: 'DELETE', path: /coffees/{token}/{id}', config: CoffeeApi.deleteCoffee }
```

❑ Use CoffeeService for

- ❑ Adding / Updating / Deleting a Coffee
- ❑ Listing All Coffees
- ❑ Finding a single Coffee



Android Networking (Using Retrofit) in CoffeeMate.5.1



Steps to integrate Retrofit into your App

1. Set up your Project Dependencies & Permissions
2. Create Interface for API and declare methods for each REST Call, specifying method type using Annotations -
 @GET, @POST, @PUT, etc. For parameters use - @Path,
 @Query, @Body
3. Use **Retrofit** to build the service client
4. Make the REST Calls as necessary using the relevant Callback mechanism



1. Project Dependencies & Permissions *

- Add the required dependencies to your build.gradle

```
dependencies {  
    compile fileTree(dir: 'libs', include: ['*.jar'])  
    compile 'com.android.support:appcompat-v7:26.1.0'  
    compile 'com.android.support:support-v4:26.1.0'  
    compile 'com.android.support:design:26.1.0'  
    compile 'com.makeramen:roundedimageview:2.2.1'  
    compile 'com.android.support.constraint:constraint-layout:1.0.2'  
    testCompile 'junit:junit:4.12'  
    compile project(':volley')  
    compile 'com.google.code.gson:gson:2.8.2'  
    compile 'com.google.android.gms:play-services-auth:11.8.0'  
  
    compile 'com.squareup.retrofit2:retrofit:2.1.0'  
    compile 'com.squareup.retrofit2:converter-gson:2.1.0'  
    compile 'com.squareup.okhttp3:okhttp:3.7.0'  
}
```

- Add the necessary permissions to your manifest – BEFORE/OUTSIDE the application tag

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



2. Create interface for API

The screenshot shows the Android Studio interface. On the left, the Project tool window displays the project structure for 'CoffeeMate.5.1'. The 'app' module is expanded, showing its contents: manifests, java, res, and volley. The 'java' folder contains subfolders like ie.cm, activities, adapters, and api. Inside the api folder, there are files for CoffeeApi, CoffeeService (which is highlighted with a blue selection bar), VolleyListener, and CoffeeMateApp. Below these are fragments and main folders. The 'models' folder contains Coffee, Coords, and Marker. At the bottom, there are androidTest and test folders under ie.cm, res, and volley. The 'Gradle Scripts' section shows build.gradle and settings.gradle. On the right, the code editor shows the 'CoffeeService' interface definition.

```
public interface CoffeeService {  
  
    @GET("/coffees/{token}")  
    Call<List<Coffee>> getAllCoffees(@Path("token") String token);  
  
    @POST("/coffees/{token}")  
    Call<Coffee> createCoffee(@Path("token") String token,  
                               @Body Coffee coffee);  
  
    @GET("/coffees/{token}/{id}")  
    Call<Coffee> retrieveCoffee(@Path("token") String token,  
                               @Path("id") String id);  
  
    @PUT("/coffees/{token}/{id}")  
    Call<Coffee> updateCoffee(@Path("token") String token,  
                               @Path("id") String id,  
                               @Body Coffee coffee);  
  
    @DELETE("/coffees/{token}/{id}")  
    Call<List<Coffee>> deleteCoffee(@Path("token") String token,  
                               @Path("id") String id);  
}
```



3. Build Service Client - CoffeeMateApp *

- ☐ Implement the necessary interface & variables

```
public class CoffeeMateApp extends Application
{
    //...
    public CoffeeService coffeeService;
    //...
    public String serviceURL = "http://coffeemateweb.herokuapp.com";
```

Our
CoffeeService
instance

Note the **serviceURL**



3. Build Service Client - CoffeeMateApp *

- Create the proxy service '**coffeeService**', with the appropriate Gson parsers

```
@Override  
public void onCreate() {  
    super.onCreate();  
  
    //...  
    Gson gson = new GsonBuilder().create();  
  
    OkHttpClient okHttpClient = new OkHttpClient.Builder()  
        .connectTimeout( timeout: 30, TimeUnit.SECONDS )  
        .writeTimeout( timeout: 30, TimeUnit.SECONDS )  
        .readTimeout( timeout: 30, TimeUnit.SECONDS )  
        .build();  
  
    Retrofit retrofit = new Retrofit.Builder()  
        .baseUrl(serviceURL)  
        .addConverterFactory(GsonConverterFactory.create(gson))  
        .client(okHttpClient)  
        .build();  
  
    coffeeService = retrofit.create(CoffeeService.class);  
  
    Log.v( tag: "coffeemate", msg: "Coffee Service Created" );  
}
```



3. Build Service Client - CoffeeMateApp *

Gson for converting our JSON

OkHttpClient for communication timeouts (optional)

Retrofit.Builder to create an instance of our interface

```
@Override  
public void onCreate() {  
    super.onCreate();  
  
    //...  
    Gson gson = new GsonBuilder().create();  
  
    OkHttpClient okHttpClient = new OkHttpClient.Builder()  
        .connectTimeout( timeout: 30, TimeUnit.SECONDS )  
        .writeTimeout( timeout: 30, TimeUnit.SECONDS )  
        .readTimeout( timeout: 30, TimeUnit.SECONDS )  
        .build();  
  
    Retrofit retrofit = new Retrofit.Builder()  
        .baseUrl(serviceURL)  
        .addConverterFactory(GsonConverterFactory.create(gson))  
        .client(okHttpClient)  
        .build();  
  
    coffeeService = retrofit.create(CoffeeService.class);  
  
    Log.v( tag: "coffeemate", msg: "Coffee Service Created");  
}
```



4. Calling the API - CoffeeFragment *

- ☐ Implement the necessary interface & variables

```
public class CoffeeFragment extends Fragment implements AdapterView.OnItemClickListener,  
    View.OnClickListener,  
    AbsListView.MultiChoiceModeListener,  
    CallBack<List<Coffee>>  
{  
    //...  
  
    public Call<List<Coffee>> call;  
  
    public CoffeeMateApp app = CoffeeMateApp.getInstance();
```

the **call** object, for
making the requests

Note the
Callback
interface



4. CoffeeFragment – onResume() *

```
@Override  
public void onResume() {  
    super.onResume();  
  
    //...  
  
    call = (Call<List<Coffee>>) app.coffeeService.getAllCoffees(app.googleToken);  
    call.enqueue(callback: this);  
}
```

enqueue() allows
for asynchronous
callback to our service



4. CoffeeFragment – onResponse() *

- ❑ Triggered on a successful call to the API
- ❑ Takes 2 parameters
 - ❑ The **Call** object
 - ❑ The expected **Response** object
- ❑ Converted JSON result stored in **response.body()**

```
@Override  
public void onResponse(Call<List<Coffee>> call, Response<List<Coffee>> response) {  
    app.coffeeList = response.body();  
  
    listAdapter = new CoffeeListAdapter(getActivity(), deleteListener: this, app.coffeeList);  
    coffeeFilter = new CoffeeFilter(app.coffeeList, filterText: "all", listAdapter);  
    setListView(listView);  
  
    //...  
}
```



4. CoffeeFragment – onFailure() *

- ❑ Triggered on an unsuccessful call to the API
- ❑ Takes 2 parameters
 - ❑ The **Call** object
 - ❑ A **Throwable** object containing error info
- ❑ Probably should inform user of what's happened

```
@Override  
public void onFailure(Call<List<Coffee>> call, Throwable t) {  
    Toast.makeText(getActivity(),  
        text: "Coffee Service Unavailable. Try again later",  
        Toast.LENGTH_LONG).show();  
}
```



'Add' UseCase *

```
public class AddFragment extends Fragment implements View.OnClickListener,  
Callback<Coffee> {  
  
    private TextView titleBar;  
    private String coffeeName, coffeeShop;  
    private double coffeePrice, ratingValue;  
    private EditText name, shop, price;  
    private RatingBar ratingBar;  
    public CoffeeMateApp app = CoffeeMateApp.getInstance();  
  
    public Call<Coffee> callCreate;  
  
    public AddFragment() {...}  
  
    public static AddFragment newInstance() {...}  
  
    @Override  
    public void onCreate(Bundle savedInstanceState) {...}  
  
    @Override  
    public View onCreateView(LayoutInflater inflater, ViewGroup container,  
        Bundle savedInstanceState) {...}  
  
    @Override  
    public void onResume() {...}
```

Android & Retrofit

Callback and Call
references



'Add' UseCase *

```
public void onClick(View v) {  
  
    coffeeName = name.getText().toString();  
    coffeeShop = shop.getText().toString();  
    try {  
        coffeePrice = Double.parseDouble(price.getText().toString());  
    } catch (NumberFormatException e) {  
        coffeePrice = 0.0;  
    }  
    ratingValue = ratingBar.getRating();  
  
    if ((coffeeName.length() > 0) && (coffeeShop.length() > 0)  
        && (price.length() > 0)) {  
        Coffee c = new Coffee(coffeeName, coffeeShop, ratingValue,  
            coffeePrice, fav: false, app.googleToken, lat: 0, lng: 0, app.googlePhotoURL);  
  
        //app.coffeeList.add(c);  
        callCreate = app.coffeeService.createCoffee(app.googleToken, c);  
        callCreate.enqueue(callback: this);  
    } else  
        Toast.makeText(  
            getActivity(),  
            text: "You must Enter Something for "  
                + "'Name'", "'Shop'" and "'Price'",  
            Toast.LENGTH_SHORT).show();  
}
```

Creating the **Call** and
triggering the **Callback**



CoffeeMateWeb + Mobile

The image displays the CoffeeMate application across three platforms: a mobile phone, a tablet, and a desktop browser.

Mobile Phone (Left): Shows the "Coffee Check In" screen. Fields include "Name : Test Name", "Shop : Test Shop", "Price : 1.99", and a "Star Rating" of 3 stars. A "SAVE COFFEE" button is present at the bottom.

Tablet (Middle): Shows the "Recently Added Coffees" screen. It lists six coffee entries with details like name, shop, price, rating, and a delete icon:

Name	Shop	Price	Rating
Cuppa Ta	Mam's Place	€0.99	4.0+
Coffee Latte	Tesco's	€2.99	1.0+
Black Coffee	Ardkeen Stores	€2.59	4.0+
Test Name	Test Shop	€1.99	3.0+
Mocca Latte	Bishops Place	€1.49	3.0+
new nn	my shop	€2.50	3.5+

A "Successfully Added Coffee" message is visible at the bottom.

Desktop Browser (Right): Shows the "List All Coffees" page. It displays the same list of coffees from the tablet, each with a star rating, shop name, price, and edit/remove buttons. The page title is "Coffees Page!" and includes a link to "View the tutorial on GitBook".

Anonymous Callbacks *

Anonymous Callback
allows for multiple calls
in same class



```
Call<Coffee> callUpdate = app.coffeeService.updateCoffee(app.googleToken,  
                                                    aCoffee._id,  
                                                    aCoffee);  
  
callUpdate.enqueue(new Callback<Coffee>() {  
    @Override  
    public void onResponse(Call<Coffee> call, Response<Coffee> response) {  
        Toast.makeText(context, text: "Successfully Updated Coffee" ,  
                      Toast.LENGTH_LONG).show();  
    }  
  
    @Override  
    public void onFailure(Call<Coffee> call, Throwable t) {  
        Toast.makeText(context, text: "Unable to Update Coffee" ,  
                      Toast.LENGTH_LONG).show();  
    }  
});
```



'Delete' UseCase *

```
public void onCoffeeDelete(final Coffee coffee)
{
    String stringName = coffee.name;
    AlertDialog.Builder builder = new AlertDialog.Builder(getActivity());
    builder.setMessage("Are you sure you want to Delete the 'Coffee' " + stringName + "?");
    builder.setCancelable(false);

    builder.setPositiveButton( text: "Yes", new DialogInterface.OnClickListener()
    {
        public void onClick(DialogInterface dialog, int id)
        {
            deleteACoffee(coffee._id);
            getAllCoffees();
        }
    }).setNegativeButton( text: "No", new DialogInterface.OnClickListener()
    {
        public void onClick(DialogInterface dialog, int id) { dialog.cancel(); }
    });
    AlertDialog alert = builder.create();
    alert.show();
}
```

Anonymous Callbacks

multiple calls here



'Delete' UseCase *

```
public void deleteACoffee(String id) {  
    Call<List<Coffee>> callDelete = app.coffeeService.deleteCoffee(app.googleToken, id);  
    callDelete.enqueue(new Callback<List<Coffee>>() {  
        @Override  
        public void onResponse(Call<List<Coffee>> call, Response<List<Coffee>> response) {  
            Toast.makeText(getApplicationContext(), text: "Successfully Deleted Coffee" ,  
                Toast.LENGTH_LONG).show();  
        }  
  
        @Override  
        public void onFailure(Call<List<Coffee>> call, Throwable t) {  
            Toast.makeText(getApplicationContext(), text: "Unable to Delete Coffee : " + "ERROR: " +  
                t.getMessage(), Toast.LENGTH_LONG).show();  
        }  
    });  
}
```

Anonymous Callback

```
public void getAllCoffees() {  
    callRetrieve = app.coffeeService.getAllCoffees(app.googleToken);  
    callRetrieve.enqueue(callback: this);  
}
```

Standard Callback



Bridging the Gap Between Your Code & Your API

❑ Variable Names

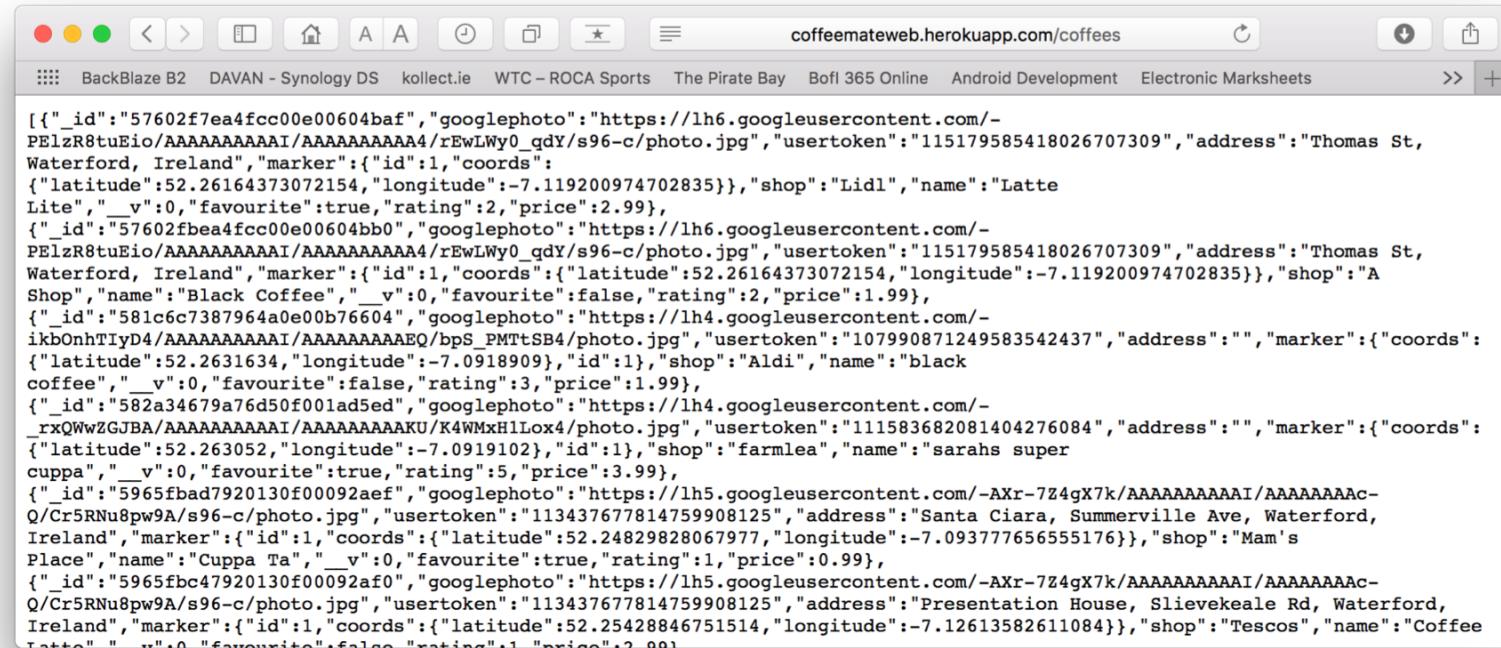
- ❑ In the previous examples, we assumed that there was an exact mapping of instance variable names between the Coffee class and the server. This will often not be the case, especially if your server uses a different spelling convention than your Android app.
- ❑ For example, if you use a Rails server, you will probably be returning data using `snake_case`, while your Java probably uses `camelCase`. If we add a `dateCreated` to the Coffee class, we may be receiving it from the server as `date_created`.
- ❑ To create this mapping, use the `@SerializedName` annotation on the instance variable. For example:

```
@SerializedName("date_created")
private Date dateCreated;
```



Bridging the Gap Between Your Code & Your API

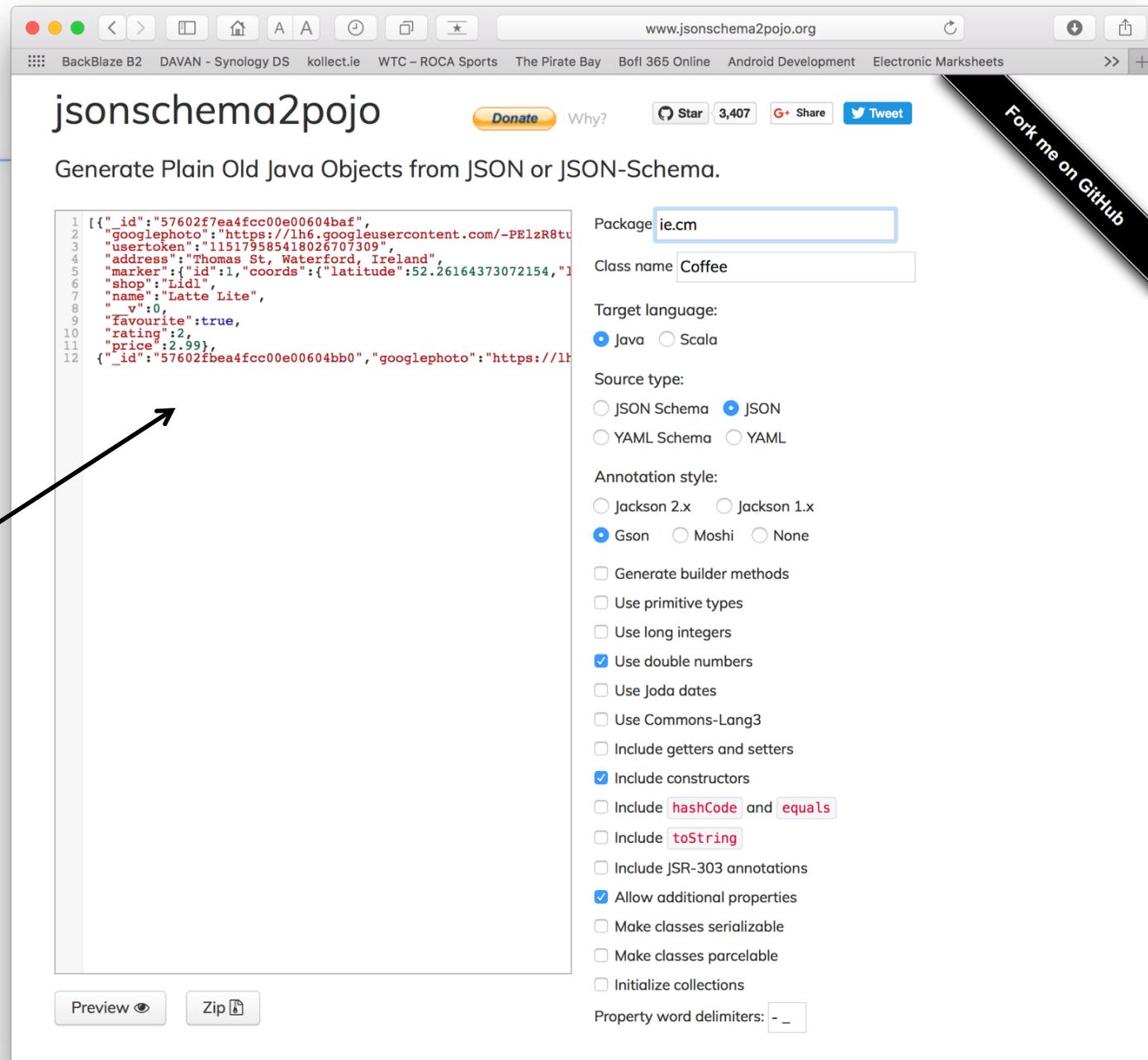
- You can also create your models automatically from your JSON response data by leveraging a very useful tool:
jsonschema2pojo - <http://www.jsonschema2pojo.org>
- Grab your JSON string, visit the above link and paste it in, like so



```
[{"_id": "57602f7ea4fcc00e00604baf", "googlephoto": "https://lh6.googleusercontent.com/-PElzR8tuEio/AAAAAAAAAAI/AAAAAAAABAA/rEwLWy0_qdY/s96-c/photo.jpg", "usertoken": "115179585418026707309", "address": "Thomas St, Waterford, Ireland", "marker": {"id": 1, "coords": {"latitude": 52.26164373072154, "longitude": -7.119200974702835}}, "shop": "Lidl", "name": "Latte Lite", "v": 0, "favourite": true, "rating": 2, "price": 2.99}, {"_id": "57602fbea4fcc00e00604bb0", "googlephoto": "https://lh6.googleusercontent.com/-PElzR8tuEio/AAAAAAAAAAI/AAAAAAAABAA/rEwLWy0_qdY/s96-c/photo.jpg", "usertoken": "115179585418026707309", "address": "Thomas St, Waterford, Ireland", "marker": {"id": 1, "coords": {"latitude": 52.26164373072154, "longitude": -7.119200974702835}}, "shop": "A Shop", "name": "Black Coffee", "v": 0, "favourite": false, "rating": 2, "price": 1.99}, {"_id": "581c6c7387964a0e00b76604", "googlephoto": "https://lh4.googleusercontent.com/-ikbOnhTIyD4/AAAAAAAAAAI/AAAAAAAEEQ/bpS_PMTtSB4/photo.jpg", "usertoken": "107990871249583542437", "address": "", "marker": {"coords": {"latitude": 52.2631634, "longitude": -7.0918909}, "id": 1}, "shop": "Aldi", "name": "black coffee", "v": 0, "favourite": false, "rating": 3, "price": 1.99}, {"_id": "582a34679a76d50f001ad5ed", "googlephoto": "https://lh4.googleusercontent.com/-rxQWwZGJBA/AAAAAAAAAAI/AAAAAAAAKU/K4WMxh1Lox4/photo.jpg", "usertoken": "111583682081404276084", "address": "", "marker": {"coords": {"latitude": 52.263052, "longitude": -7.0919102}, "id": 1}, "shop": "farmlea", "name": "sarabs super cuppa", "v": 0, "favourite": true, "rating": 5, "price": 3.99}, {"_id": "5965fbad7920130f00092aef", "googlephoto": "https://lh5.googleusercontent.com/-AXr-7Z4gX7k/AAAAAAAAAAI/AAAAAAAAC-Q/Cr5RNu8pw9A/s96-c/photo.jpg", "usertoken": "113437677814759908125", "address": "Santa Ciara, Summerville Ave, Waterford, Ireland", "marker": {"id": 1, "coords": {"latitude": 52.24829828067977, "longitude": -7.093777656555176}}, "shop": "Mam's Place", "name": "Cuppa Ta", "v": 0, "favourite": true, "rating": 1, "price": 0.99}, {"_id": "5965fbc47920130f00092af0", "googlephoto": "https://lh5.googleusercontent.com/-AXr-7Z4gX7k/AAAAAAAAAAI/AAAAAAAAC-Q/Cr5RNu8pw9A/s96-c/photo.jpg", "usertoken": "113437677814759908125", "address": "Presentation House, Slievekeale Rd, Waterford, Ireland", "marker": {"id": 1, "coords": {"latitude": 52.25428846751514, "longitude": -7.12613582611084}}, "shop": "Tescos", "name": "Coffee Tattos", "v": 0, "favourite": false, "rating": 1, "price": 2.99}
```

Bridging the Gap Between Your Code & Your API

Your JSON goes here



Bridging the Gap Between Your Code & Your API

Your annotated class

The screenshot shows a web browser window for www.jsonschema2pojo.org. The page title is "jsonschema2pojo" and the subtitle is "Generate Plain Old Java Objects from ISON or ISON-Schema". A JSON schema is pasted into the input area, and a preview of the generated Java code is shown in a modal window. The Java code is for a "Coffee" class with annotations like @SerializedName and @Expose. The modal has a "Preview" button at the top left and a "Copy to Clipboard" button at the top right. At the bottom of the modal, there are buttons for "Preview" and "Zip". Below the modal, there are checkboxes for "Initialize collections" and "Property word delimiters: - _". The background of the page features a dark theme with a "Fork me on GitHub" button.

```
1 [ {"_id": "57602f7ea4",  
2   "googlephoto": "http://",  
3   "usertoken": "1157",  
4   "address": "Thomas",  
5   "marker": { "id": 1,  
6     "shop": "Lid",  
7     "name": "Latte Lit",  
8     "v": 0,  
9     "favourite": true,  
10    "rating": 2,  
11    "price": 2.99},  
12   {"_id": "57602fbbe4",  
13     "id": 1,  
14     "name": "Latte Lit",  
15     "rating": 2,  
16     "price": 2.99},  
17 } ]  
  
-----ie.cm.Coffee.java-----  
  
package ie.cm;  
  
import com.google.gson.annotations.Expose;  
import com.google.gson.annotations.SerializedName;  
  
public class Coffee {  
  
    @SerializedName("_id")  
    @Expose  
    public String id;  
    @SerializedName("googlephoto")  
    @Expose  
    public String googlephoto;  
    @SerializedName("usertoken")  
    @Expose  
    public String usertoken;  
    @SerializedName("address")  
    @Expose  
    public String address;  
    @SerializedName("marker")  
    @Expose  
    public Marker marker;  
    @SerializedName("shop")  
    @Expose  
    public String shop;  
    @SerializedName("name")  
    @Expose  
    public String name;  
    @SerializedName("__v")  
    @Expose  
    public Integer v;  
    @SerializedName("favourite")  
    @Expose  
    public Boolean favourite;  
    @SerializedName("rating")  
    @Expose  
    public Integer rating;  
    @SerializedName("price")  
    @Expose  
    public Integer price;  
  
    /**  
     * No args constructor for use in serialization  
     *  
     */  
    public Coffee() {  
    }  
  
    /**  
     * @param id  
     * @param v  
     * @param shop  
     * @param price  
     * @param marker  
     */  
}
```





Bridging the Gap Between Your Code & Your API

□ Date Formats

- ❑ Another potential disconnect between the app and the server is the way they represent date objects.
- ❑ For instance, Rails may send a date to your app in the format "yyyy-MM-dd'T'HH:mm:ss" which Gson will not be able to convert to a Java Date. We have to explicitly tell the converter how to perform this conversion. In this case, we can alter the Gson builder call to look like this:

```
Gson gson = new GsonBuilder()  
        .setDateFormat("yyyy-MM-dd'T'HH:mm:ss")  
        .create();
```



Additional Info - Headers

- ❑ If you wish to add headers to your calls, you can annotate your method or arguments to indicate this.
- ❑ For instance, if we wanted to add a content type and a specific user's authentication token, we could do something like this:

```
@POST("/coffees")
@Headers({ "Content-Type: application/json" })
Call<Coffee> createCoffee(@Body Coffee coffee,
                           @Header("Authorization") String token);
```



Full List of Retrofit Annotations

- @POST
- @PUT
- @GET
- @DELETE
- @Header
- @PATCH

- @Path
- @Query
- @Body



References

- ❑ <http://square.github.io/retrofit/>
- ❑ <https://spin.atomicobject.com/2017/01/03/android-rest-calls-retrofit2/>
- ❑ <https://code.tutsplus.com/tutorials/getting-started-with-retrofit-2--cms-27792>

