

ExampleStack Manual

Section I. Overview

Developers often resort to online Q&A forums such as Stack Overflow for filling their programming needs. Online Q&A forums have accumulated a large number of code examples that developers can reuse code from. However, such curated code examples are often incomplete and inadequate for the local context of the developers; adaptation of those examples is necessary to integrate them to production code. As a consequence, the process of adapting curated examples is done over and over again, independently, by multiple developers.

The goal of our Chrome extension, ExampleStack, is to guide developers adapt and customize online code examples to fit their own contexts. ExampleStack has two main functions: for a given SO example, (1) it shows a list of similar code snippets in GitHub, and (2) it presents an adaptation-aware template lifted from those snippets by identifying common, unchanged code, as well as the hot spots where most changes happen. Developers can interact and customize these lifted templates by selecting desired code options to fill in the hot spots.

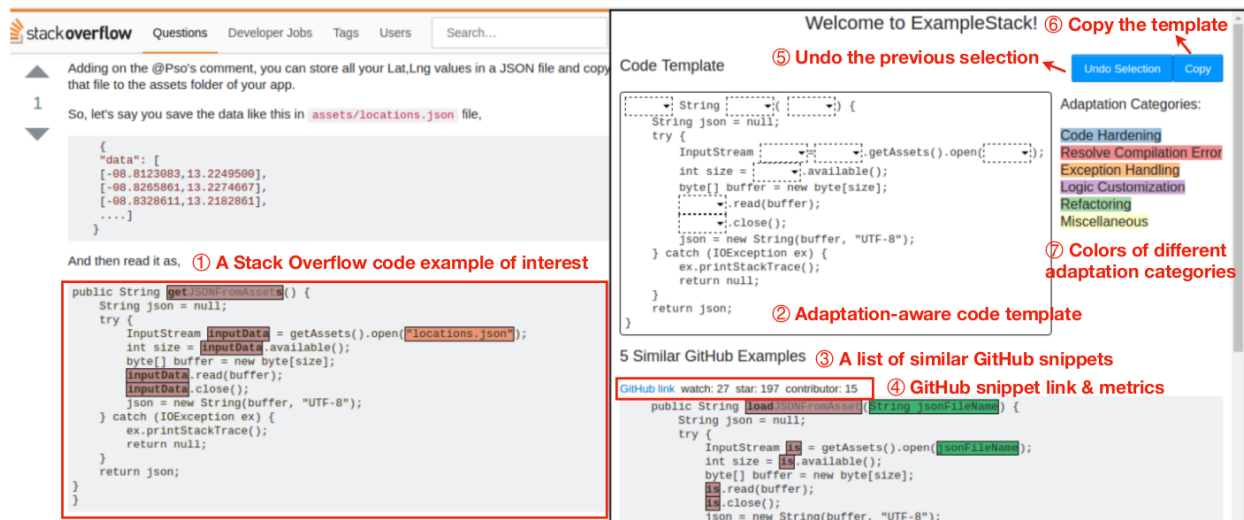


Figure 1. An overview of ExampleStack UI

Section II. Install

Install the Chrome extension

Step 1. Open your Chrome browser and type “chrome://extensions” in the URL address bar to go to the extension management tab.

Step 2. Enable the developer mode and then click the “Load unpacked extension” button (see Figure 2). The UI of this page may vary in a different version of Chrome Web Browser. But you should be able to find these two buttons in similar locations.

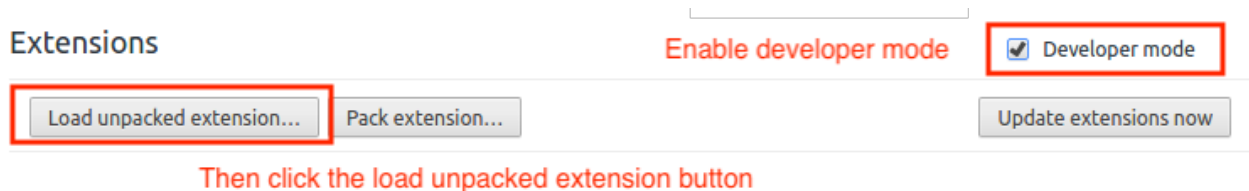


Figure 2. Load the ExampleStack Chrome extension

Step 3. Choose the “chrome” folder in our artifact to load the ExampleStack extension into your Chrome web browser. After this, you should be able to see the ExampleStack icon in the right-top toolbar of your Chrome browser, as shown in Figure 3.

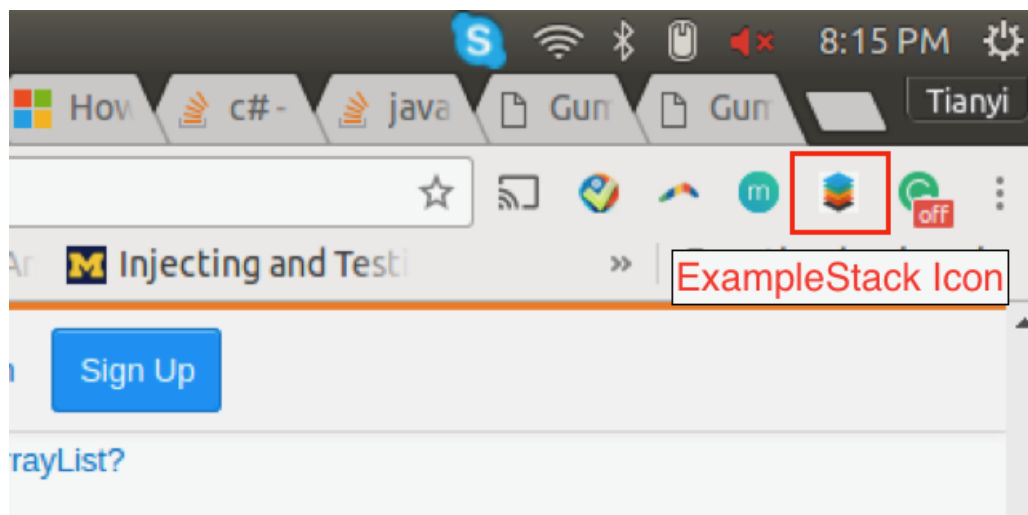


Figure 3. The ExampleStack icon appears in the toolbar after installation.

Set up the ExampleStack server

The Chrome extension communicates with a ExampleStack server, which does all the heavy lifting such as detecting similar GitHub code fragments and constructing the interactive code template. Please follow the instructions below to set up the server.

Step 1. Find the `examplestack-server.jar` in our artifact and then run the following command to start the server. The server will run on **`https://127.0.0.1:8080`**.

```
$ java -jar examplestack-server.jar [clone_dataset_path] [so_posts_path]
[ssl_certificate_keystore_path]
```

clone_dataset_path is the path to the dataset of clones detected by SourcererCC. You can provide the variation dataset or the adaptation dataset to our server. Note that since the variation dataset have around 14K clone groups, it may take a while to load these clones to the server. For your convenience of exploring ExampleStack, we provide a much smaller sample that contains only seven clone groups. This sample is in the ***sample-dataset*** folder.

so_posts_path is the path to the dataset of Stack Overflow posts that have GitHub clones.

ssl_certificate_keystore_path is the path to the ssl certificate keystore of ExampleStack. This is required because Chrome Web Browser only communicates with servers that are protected by SSL. In our artifact, we provide a self-signed SSL certificate for the ExampleStack server. The keystore file is named as `examplestack-keystore`.

If you have everything in the current working directory, you can simply run `java -jar examplestack-server.jar sample-dataset SO-posts examplestack-keystore` to launch the server.

Step 2. [Important] In your Chrome browser, go to <https://127.0.0.1:8080>. By default, Chrome Web Browser will prohibit you from accessing the HTTPS page running in 127.0.0.1:8080, as shown in Figure 4. This is because Chrome Web Browser does not trust any self-signed SSL certificate. You must manually make the Chrome browser trust the SSL certificate of ExampleStack by clicking “Proceed to 127.0.0.1 (unsafe)”, as shown in Figure 4.

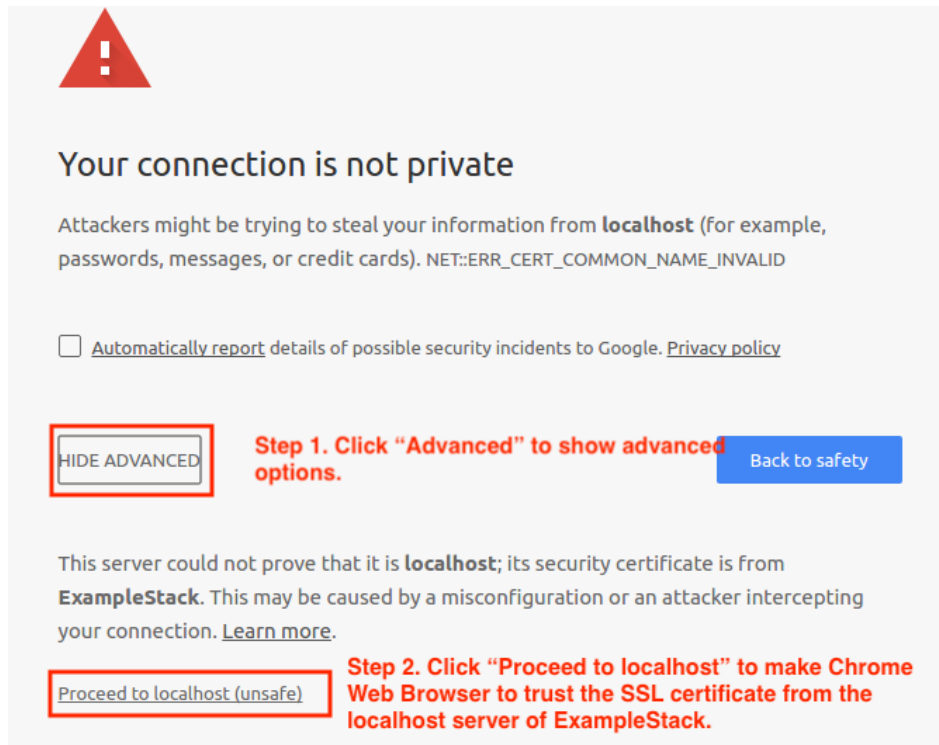


Figure 4. Go to <https://127.0.0.1:8080> and make your browser trust the SSL certificate.

After clicking the “Proceed to 127.0.0.1 (unsafe)”, you will see the 404 error page, as shown in Figure 5. This means you have successfully loaded the SSL certificate of ExampleStack and it is now trusted by your Chrome browser. Don’t worry about the 404 error. It is simply because there is no webpage in 127.0.0.1:8080.

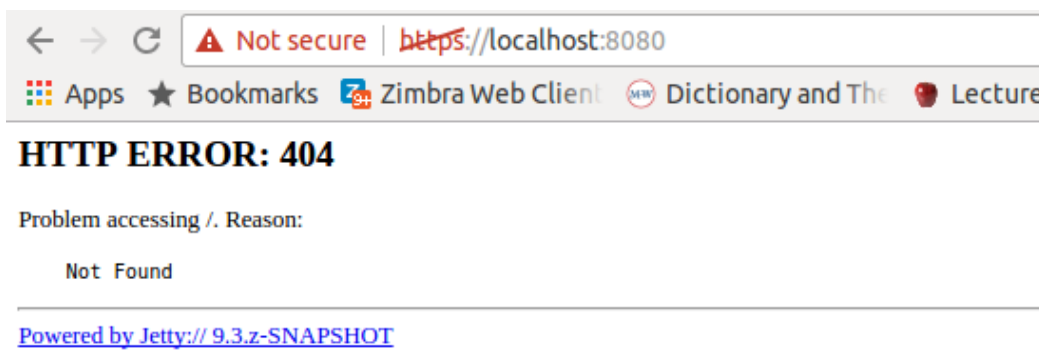


Figure 5. If you see this 404 error, the self-signed SSL certificate has been successfully loaded and trusted by Chrome Web Browser.

Note: We are in the process of applying an SSL certificate that is trusted by Google Chrome Web Browser by default. Before it gets approved, users have to manually do this step to make Chrome Web Browser trust the SSL certificate of ExampleStack.

Section III. Tool Features

This section uses [a Stack Overflow post](https://stackoverflow.com/questions/37273498/add-latitude-and-long-to-arraylist/37273871#37273871) (<https://stackoverflow.com/questions/37273498/add-latitude-and-long-to-arraylist/37273871#37273871>) as the running example and walks you through the tool features in ExampleStack. This example demonstrates how to read the location asset file in Android. This is the same example as in Figure 4 in our ICSE paper. You can also refer to the descriptions in our ICSE paper.

Detect similar GitHub code fragments.

Please copy the URL of the Stack Over post and open it in your Chrome browser. To detect GitHub code fragments similar to the SO code example, please click the ExampleStack icon in the top-right toolbar of the Chrome browser (see Figure 3).

Note: For some versions of Chrome Web Browser, you may see a warning about unsafe scripts, as shown in Figure 6. Please click “Load unsafe scripts” so that the javascript code of our Chrome extension can be executed by your browser.

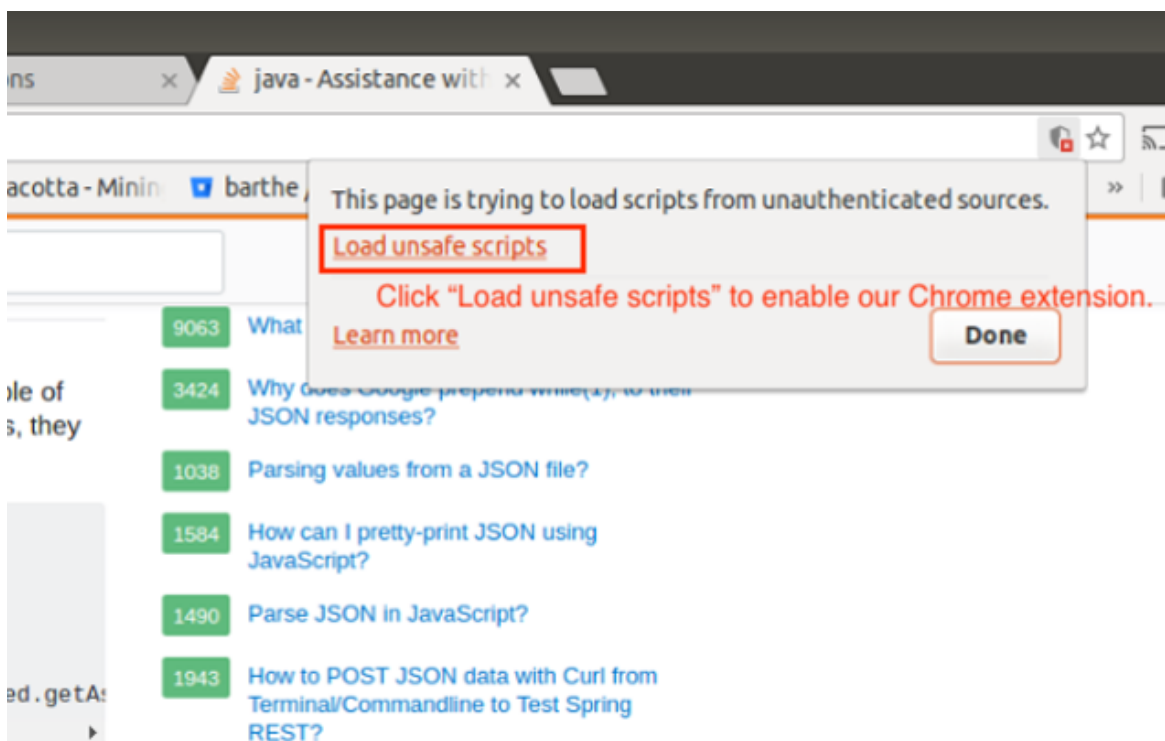


Figure 6. Enable the scripts in ExampleStack Chrome extension (if this warning shows up)

The ExampleStack server will scan through the loaded clone groups and check whether code snippets in this SO post have any clones in GitHub. If such GitHub clones are found, ExampleStack then highlights the parts of the SO code example that have GitHub clones, as shown in Figure 7. The highlighted method, `getJSONFromAsset`, has similar code (i.e., clones) in GitHub.

▲ Adding on the @Pso's comment, you can store all your Lat,Lng values in a JSON file and copy that file to the assets folder of your app.

1

▼ So, let's say you save the data like this in `assets/locations.json` file,

```
{
  "data": [
    [-08.8123083, 13.2249500],
    [-08.8265861, 13.2274667],
    [-08.8328611, 13.2182861],
    ....]
}
```

And then read it as,

```
public String getJSONFromAssets() {
    String json = null;
    try {
        InputStream inputData = getAssets().open("locations.json");
        int size = inputData.available();
        byte[] buffer = new byte[size];
        inputData.read(buffer);
        inputData.close();
        json = new String(buffer, "UTF-8");
    } catch (IOException ex) {
        ex.printStackTrace();
        return null;
    }
    return json;
}
```

Figure 7. Highlight the parts of a SO code example that contain similar code in GitHub.

Note: The Chrome extension connects to the server via web socket. The web socket will be closed if you do not interact with the Chrome extension for a while. If you find the Chrome extension does not respond after you click, it means the web socket is closed. Please reload the page.

Display similar GitHub code fragments.

A user can click the highlighted code to display similar GitHub code fragments detected by our tool, as shown in Figure 8. The clicked code is surrounded with a red dashed box to indicate the current focus. The detected similar GitHub code snippets (i.e., clones) are displayed at the right side of the Chrome browser. Each GitHub clone is also accompanied with its GitHub link and the number of watches, stars, and folks of the GitHub repositories.

activeoldestvotes

Adding on the @Pso's comment, you can store all your Lat,Lng values in a JSON file and copy that file to the assets folder of your app.

So, let's say you save the data like this in `assets/locations.json` file,

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And then read it as,

```

public String getJSONFromAssets() {
    String json = null;
    try {
        InputStream inputData = getAssets().open("locations.json");
        int size = inputData.available();
        byte[] buffer = new byte[size];
        inputData.read(buffer);
        inputData.close();
        json = new String(buffer, "UTF-8");
    } catch (IOException ex) {
        ex.printStackTrace();
        return null;
    }
    return json;
}

```

Use the JSON data anywhere in your code like,

```


JSONObject obj = new JSONObject(getJSONFromAssets());
JSONArray arr = obj.getJSONArray("data");
if (arr != null)
    for (int i=0;i<arr.length();i++)
        locations.add(arr.get(i).toString());

```

shareimprove this answer

edited May 17 '16 at 12:54

answered May 17 '16 at 10:44



PsyGik

1,184 ● 11 ● 29

Welcome to ExampleStack!

Code Template

Undo SelectionCopy

```

String (String) {
    String json = null;
    try {
        InputStream is = getAssets().open("locations.json");
        int size = is.available();
        byte[] buffer = new byte[size];
        is.read(buffer);
        is.close();
        json = new String(buffer, "UTF-8");
    } catch (IOException ex) {
        ex.printStackTrace();
        return null;
    }
    return json;
}

```

Adaptation Categories:

Code Hardening

Resolve Compilation Error

Exception Handling

Logic Customization

Refactoring

Miscellaneous

5 Similar GitHub Examples

GitHub link

watch: 28

star: 199

folk: 99

```

public String loadJSONFromAsset(String jsonFileName) {
    String json = null;
    try {
        InputStream is = getAssets().open(jsonFileName);
        int size = is.available();
        byte[] buffer = new byte[size];
        is.read(buffer);
        is.close();
        json = new String(buffer, "UTF-8");
    } catch (IOException ex) {
        ex.printStackTrace();
        return null;
    }
    return json;
}

```

GitHub link

watch: 13

star: 54

folk: 20

```

public String loadJSONFromAsset() {
    String json = null;
    try {
        InputStream is = getAssets().open("capitals_3857.geojson");
    }

```

Figure 8. Display similar GitHub code snippets (i.e., clones) in a sidebar.

Note: If you click on the highlighted code too fast before our server returns the GitHub clones to the Chrome extension, you may see a pop-up window as in Figure 9. If this happens, just click OK and wait for several seconds. And then click the highlighted code again.

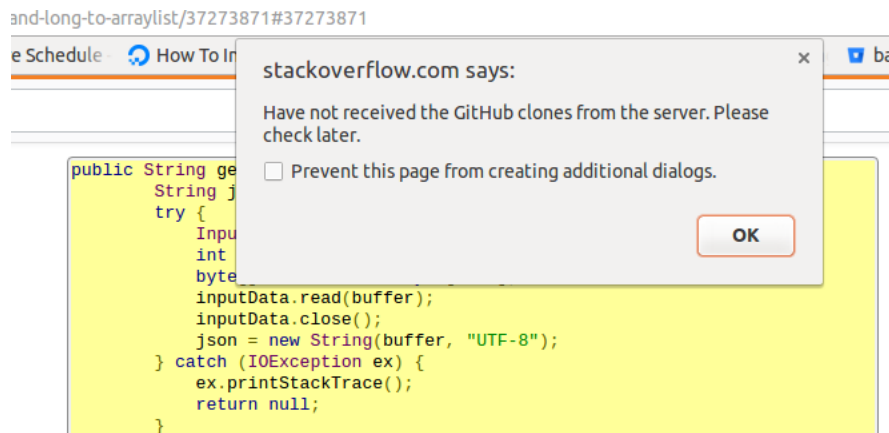


Figure 9. ExampleStack will ask you to wait several seconds if it hasn't finished processing all GitHub clones of a SO code example. Just click OK and check it again after several seconds.

Browse GitHub clones with differences.

In Figure 7, ExampleStack highlights each GitHub clone to show its differences from the original SO code example. A user can further inspect the detailed program differences in a side-by-side manner by clicking on the GitHub clone of interest. As shown in Figure 8, the original SO snippet is then highlighted with the differences with respect to the clicked GitHub clone.

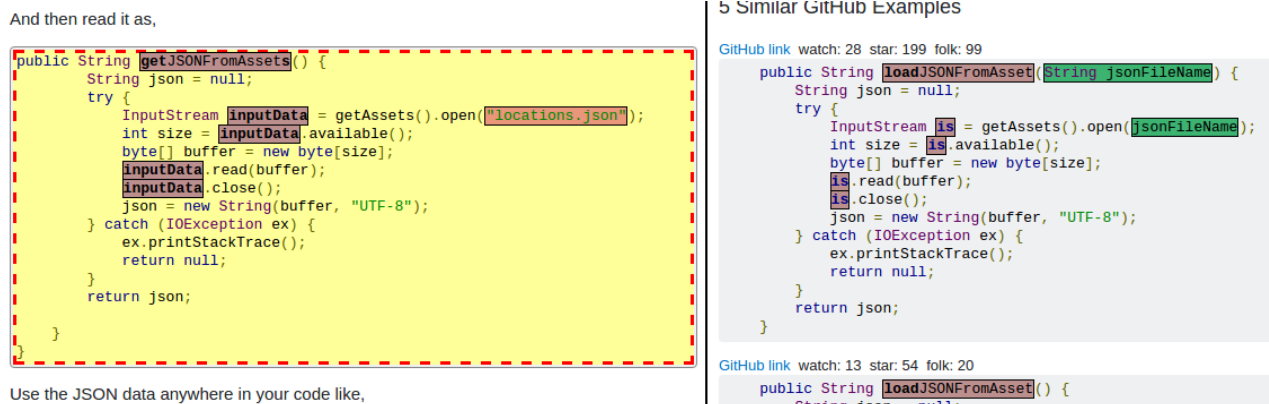


Figure 8. Inspect program differences between a SO code example and a corresponding GitHub clone in a side-by-side manner.

View the adaptation options in a code template.

ExampleStack generates a code template to help developers obtain a comprehensive view of possible adaptation options, indicated from the variations between the original SO code example and corresponding GitHub clones. Figure 9 shows the template.

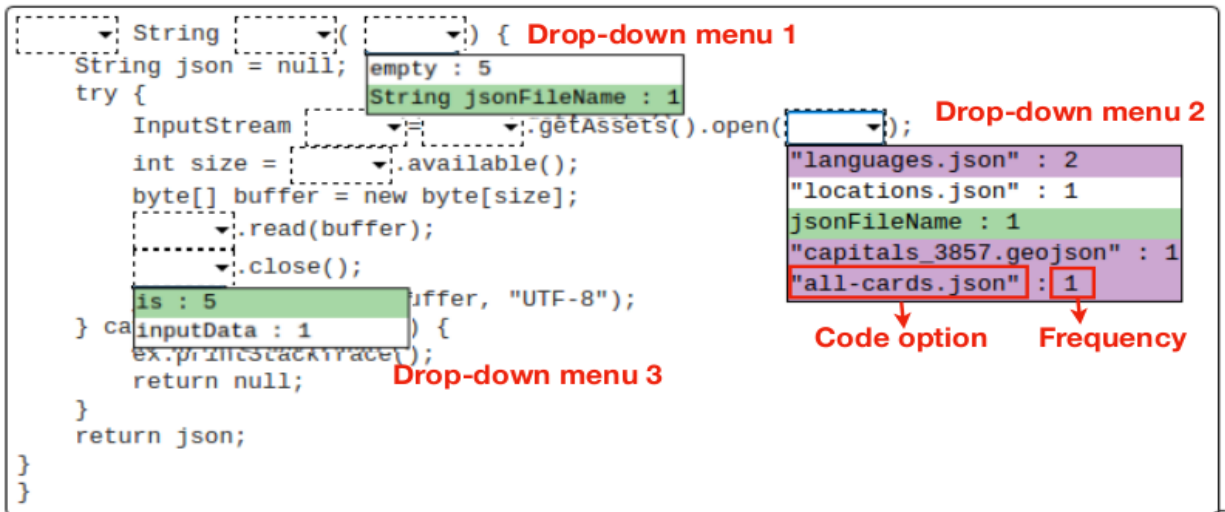


Figure 9. A code template that lists the possible adaptation options indicated by the variations between a SO code example and the corresponding GitHub clones

Each adaptation option is annotated with its frequency. For example, the first drop-down menu in Figure 9 shows that one GitHub example inserts a new method argument, `String jsonFileName`. In addition, each adaptation option is also colored based on its high-level categories. Currently, ExampleStack supports five categories, as shown in Figure 6. For example, replacing `locations.json` to `languages.json` is considered as a logic customization, since the functionality of the code snippet is changed to read the language asset file to support multiple languages. Therefore, the `languages.json` option in the second drop-down menu is colored with purple. Figure 10 shows all six adaptation categories highlighted by ExampleStack.

Adaptation Categories: **Code Hardening** **Resolve Compilation Error**
Exception Handling **Logic Customization** **Refactoring** **Miscellaneous**

Figure 10. Six high-level adaptation categories detected by ExampleStack

Customize the code template with desired adaptations.

A user can select a desired adaptation option to fill in the template. For example, a user can select the `is` option in the third drop-down menu in Figure 5 to rename the `InputStream` object from `inputData`, to a simpler name, `is`. ExampleStack will automatically fill in the rest of the template with code options that are occurred with the selected option, as shown in Figure 11.

Code Template

Undo Selection
Copy

```

String ( ) {
String json = null;
try {
InputStream is = getAssets().open( );
int size = is.available(); Auto Filled
byte[] buffer = new byte[size];
is.read(buffer);
is.close();
User Selected json = new String(buffer, "UTF-8");
} catch (IOException ex) {
ex.printStackTrace();
return null;
}
return json;
}
}

```

Adaptation Categories:
Code Hardening
Resolve Compilation Error
Exception Handling
Logic Customization
Refactoring
Miscellaneous

5 Similar GitHub Examples

GitHub link watch: 28 star: 199 folk: 99

```

public String loadJSONFromAsset(String jsonFileName) {
String json = null;

```

Figure 11. ExampleStack automatically fill in the rest of the template based on the user selection.

Terminate server

A user can just use command `ctrl + C` in the terminal to shut down the server.

Other SO posts to try our tool

Here is the list of other Stack Overflow posts that we use in our user study (see Table II and Figure 7 in our ICSE paper). They are all in the sample-dataset folder.

computes the distance between two coordinates on earth

<https://stackoverflow.com/questions/837872/calculate-distance-in-meters-when-you-know-longitude-and-latitude-in-java/837957#837957>

Add animation to an Android view <https://stackoverflow.com/questions/33464239/how-can-i-add-animations-to-existing-ui-components#33464536>

Encode an array of bytes to a hexadecimal string
<https://stackoverflow.com/questions/25802970/how-to-use-sha-256-with-android/25803281#25803281>

Decode and scale an image without consuming a lot of memories
<https://stackoverflow.com/questions/477572/strange-out-of-memory-issue-while-loading-an-image-to-a-bitmap-object#3549021>