Interact with Google Sheets from Java

baeldung.com/google-sheets-java-client

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1. Overview

Google Sheets provides a convenient way to store and manipulate spreadsheets and collaborate with others on a document.

Sometimes, it can be useful to access these documents from an application, say to perform an automated operation. For this purpose, Google provides the Google Sheets API that developers can interact with.

In this article, **we're going to take a look at how we can connect to the API and perform operations on Google Sheets.**

2. Maven Dependencies

To connect to the API and manipulate documents, we'll need to add thegoogle-api-client, google-oauth-client-jetty and google-api-services-sheets dependencies:

```
< dependency >
< groupId >com.google.api-client</ groupId >
< artifactId >google-api-client</ artifactId >
< version >1.23.0</ version >
</ dependency >
< dependency >
< groupId >com.google.oauth-client</ groupId >
< artifactId >google-oauth-client-jetty</ artifactId >
< version >1.23.0</ version >
</ dependency >
< dependency >
< groupId >com.google.apis</ groupId >
< artifactId >google-api-services-sheets</ artifactId >
< version >v4-rev493-1.23.0</ version >
</ dependency >
```

3. Authorization

The Google Sheets API requires OAuth 2.0 authorization before we can access it through an application.

First, we need to obtain a set of OAuth credentials, then use this in our application to submit a request for authorization.

3.1. Obtaining OAuth 2.0 Credentials

To obtain the credentials, we'll need to create a project in the Google Developers Console and then enable the Google Sheets API for the project. The first step in the Google Quickstart guide contains detailed information on how to do this.

Once we've downloaded the JSON file with the credential information, let's copy the contents in a *google-sheets-client-secret.json* file in the *src/main/resources* directory of our application.

The contents of the file should be similar to this:

```
{
"installed":
{
"client_id":"<your_client_id>",
"project_id":"decisive-octane-187810",
"auth_uri":"https://accounts.google.com/o/oauth2/auth",
"token_uri":"https://accounts.google.com/o/oauth2/token",
"auth_provider_x509_cert_url":"https://www.googleapis.com/oauth2/v1/certs",
"client_secret":"<your_client_secret>",
"redirect_uris":["urn:ietf:wg:oauth:2.0:oob","http://localhost"]
}
}

```

3.2. Obtaining a *Credential* object

A successful authorization returns a *Credential* object we can use to interact with the Google Sheets API.

Let's create a *GoogleAuthorizeUtil* class with a static *authorize()* method which reads the content of the JSON file above and builds a *GoogleClientSecrets* object.

Then, we'll create a *GoogleAuthorizationCodeFlow* and send the authorization request:

```
public class GoogleAuthorizeUtil {
public static Credential authorize() throws IOException,
GeneralSecurityException {
List<String> scopes = Arrays.asList(SheetsScopes.SPREADSHEETS);
return credential;
}
}


```

In our example, we're setting the *SPREADSHEETS* scope since we want to access Google Sheets and using an in-memory *DataStoreFactory* to store the credentials received. Another option is using a *FileDataStoreFactory* to store the credentials in a file.

For the full source code of the *GoogleAuthorizeUtil* class, check out the GitHub project.

4. Constructing the *Sheets* Service Instance

For interacting with Google Sheets, we'll need **a *Sheets* object which is the client for reading and writing through the API**.

Let's create a *SheetsServiceUtil* class that uses the *Credential* object above to obtain an instance of *Sheets:*

```
public class SheetsServiceUtil {
private static final String APPLICATION_NAME = "Google Sheets Example" ;
public static Sheets getSheetsService() throws IOException,
GeneralSecurityException {
Credential credential = GoogleAuthorizeUtil.authorize();
return new Sheets.Builder(
GoogleNetHttpTransport.newTrustedTransport(),
JacksonFactory.getDefaultInstance(), credential)
.setApplicationName(APPLICATION_NAME)
.build();
}
}
```

Next, we'll take a look at some of the most common operations we can perform using the API.

5. Writing Values on a Sheet

Interacting with an existing spreadsheet requires knowing that spreadsheet's id, which we can find from its URL.

For our examples, we're going to use a public spreadsheet called "Expenses", located at:

https://docs.google.com/spreadsheets/d/1sILuxZUnyl_7-MlNThjt765oWshN3Xs-PPLfqYe4DhI/edit#gid=0

Based on this URL, we can identify this spreadsheet's id as "1sILuxZUnyl_7-MlNThjt765oWshN3Xs-PPLfqYe4DhI".

Also, **to read and write values, we're going to use *spreadsheets.values* collections.**

The values are represented as *ValueRange* objects, which are lists of lists of Java *Objects,* corresponding to rows or columns in a sheet.

Let's create a test class where we initialize our *Sheets* service object and a SPREADSHEET_ID constant:

```
public class GoogleSheetsIntegrationTest {
private static Sheets sheetsService;
private static String SPREADSHEET_ID =
@BeforeClass
public static void setup() throws GeneralSecurityException, IOException {
sheetsService = SheetsServiceUtil.getSheetsService();
}
}

```

Then, we can write values by:

- writing to a single range
- writing to multiple ranges
- appending data after a table

5.1. Writing to a Single Range

To write values to a single range on a sheet, we'll use the *spreadsheets().values().update()* method:

```
@Test
public void whenWriteSheet_thenReadSheetOk() throws IOException {
ValueRange body = new ValueRange()
.setValues(Arrays.asList(
Arrays.asList( "Expenses January" ),
Arrays.asList( "books" , "30" ),
Arrays.asList( "pens" , "10" ),
Arrays.asList( "Expenses February" ),
Arrays.asList( "clothes" , "20" ),
Arrays.asList( "shoes" , "5" )));
UpdateValuesResponse result = sheetsService.spreadsheets().values()
.update(SPREADSHEET_ID, "A1" , body)
.setValueInputOption( "RAW" )
.execute();
}

```

Here, we're first creating a *ValueRange* object with multiple rows containing a list of expenses for two months.

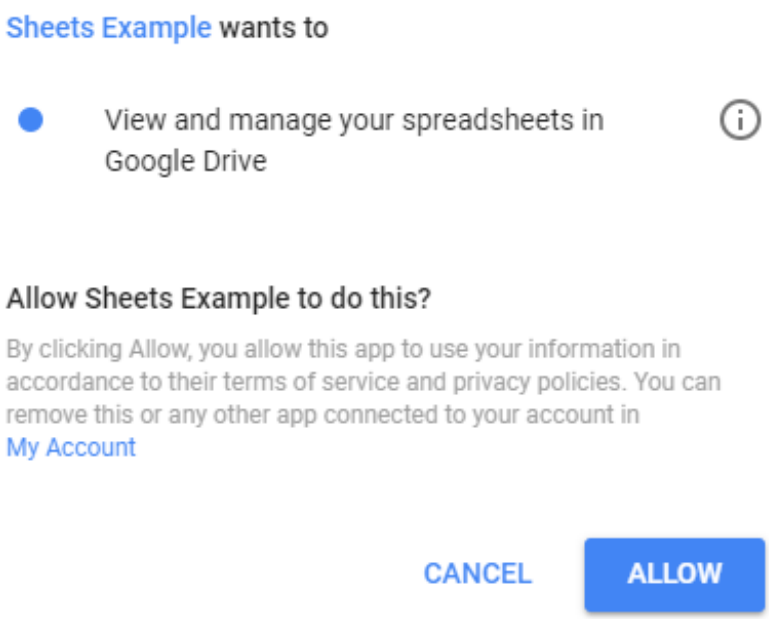
Then, we're using the *update()* method to build a request that writes the values to the spreadsheet with the given id, starting at the "A1" cell.

To send the request, we're using the *execute()* method.

If we want our value sets to be considered as columns instead of rows, we can use the *setMajorDimension("COLUMNS")* method.

The "RAW" input option means the values are written exactly as they are, and not computed.

When executing this JUnit test, **the application will open a browser window using the system's default browser that asks the user to log in and give our application permission to interact with Google Sheets on the user's behalf:**



Note that this manual step can be bypassed if you have an OAuth Service Account.

A requirement for the application to be able to view or edit the spreadsheet is that the signed-in user has a view or edit access to it. Otherwise, the request will result in a 403 error. The spreadsheet we use for our example is set to public edit access.

Now, if we check the spreadsheet, we'll see the range "*A1:B6*" is updated with our value sets.

Let's move on to writing to multiple disparate ranges in a single request.

5.2. Writing to Multiple Ranges

If we want to update multiple ranges on a sheet, we can use a *BatchUpdateValuesRequest* for better performance:

```
List<ValueRange> data =  new ArrayList<>();
data.add( new ValueRange()
.setRange( "D1" )
.setValues(Arrays.asList(
Arrays.asList( "January Total" ,  "=B2+B3" )));
data.add( new ValueRange()
.setRange( "D4" )
.setValues(Arrays.asList(
Arrays.asList( "February Total" ,  "=B5+B6" )));
BatchUpdateValuesRequest batchBody =  new BatchUpdateValuesRequest()
.setValueInputOption( "USER_ENTERED" )
.setData(data);
BatchUpdateValuesResponse batchResult = sheetsService.spreadsheets().values()
.batchUpdate(SPREADSHEET_ID, batchBody)
.execute();
```

In this example, we're first building a list of *ValueRanges,* each made up of two cells that represent the name of the month and the total expenses.

Then, we're creating a *BatchUpdateValuesRequest* with **the input option *"USER_ENTERED",* as opposed to *"RAW",* meaning the cell values will be computed based on the formula** of adding two other cells.

Finally, we're creating and sending the *batchUpdate* request. As a result, the ranges "*D1:E1*" and "*D4:E4*" will be updated.

5.3. Appending Data After a Table

Another way of writing values in a sheet is by appending them at the end of a table.

For this, we can use the *append()* method:

```
ValueRange appendBody =  new ValueRange()
.setValues(Arrays.asList(
Arrays.asList( "Total" ,  "=E1+E4" )));
AppendValuesResponse appendResult = sheetsService.spreadsheets().values()
.append(SPREADSHEET_ID,  "A1" , appendBody)
.setValueInputOption( "USER_ENTERED" )
.setInsertDataOption( "INSERT_ROWS" )
.setIncludeValuesInResponse( true )
.execute();
ValueRange total = appendResult.getUpdates().getUpdatedData();
assertThat(total.getValues().get( 0 ).get( 1 )).isEqualTo( "65" );
```

First, we're building the *ValueRange* object containing the cell values we want to add.

In our case, this contains a cell with the total expenses for both months that we find by adding the *"E1"* and *"E2"* cell values.

Then, we're creating a request that will append the data after the table containing the "*A1*" cell.

The *INSERT_ROWS* option means that we want the data to be added to a new row, and not replace any existing data after the table. This means the example will write the range "*A7:B7*" in its first run.

On subsequent runs, the table that starts at the *"A1"* cell will now stretch to include the *"A7:B7"* row, so a new row goes to the *"A8:B8"* row, and so on.

We also need to set the *includeValuesInResponse* property to true if we want to verify the response to a request. As a result, the response object will contain the updated data.

6. Reading Values from a Sheet

Let's verify that our values were written correctly by reading them from the sheet.

We can do this by using the *spreadsheets().values().get()* method to read a single range or the *batchUpdate()* method to read multiple ranges:

```
List<String> ranges = Arrays.asList( "E1" , "E4" );
BatchGetValuesResponse readResult = sheetsService.spreadsheets().values()
.batchGet(SPREADSHEET_ID)
.setRanges(ranges)
.execute();
ValueRange januaryTotal = readResult.getValueRanges().get( 0 );
assertThat(januaryTotal.getValues().get( 0 ).get( 0 ))
.isEqualTo( "40" );
ValueRange febTotal = readResult.getValueRanges().get( 1 );
assertThat(febTotal.getValues().get( 0 ).get( 0 ))
.isEqualTo( "25" );
```

Here, we're reading the ranges *"E1"* and *"E4"* and verifying that they contain the total for each month that we wrote before.

7. Creating New Spreadsheets

Besides reading and updating values, we can also manipulate sheets or entire spreadsheets by using *spreadsheets()* and *spreadsheets().sheets()* collections.

Let's see an example of creating a new spreadsheet:

```
@Test
public void test() throws IOException {
Spreadsheet spreadSheet = new Spreadsheet().setProperties(
new SpreadsheetProperties().setTitle( "My Spreadsheet" ));
Spreadsheet result = sheetsService
.spreadsheets()
.create(spreadSheet).execute();
assertThat(result.getSpreadsheetId()).isNotNull();
}
```

Here, we're first creating a *Spreadsheet* object with the title *"My Spreadsheet"* then building and sending a request using the *create()* and *execute()* methods.

The new spreadsheet will be private and placed in the signed-in user's Drive.

8. Other Updating Operations

Most other operations take the form of a *Request* object, which we then add to a list and use to build a *BatchUpdateSpreadsheetRequest.*

Let's see how we can send two requests to change the title of a spreadsheet and copy-paste a set of cells from one sheet to another:

```
@Test
public void whenUpdateSpreadSheetTitle_thenOk() throws IOException {
UpdateSpreadsheetPropertiesRequest updateSpreadSheetRequest
=  new UpdateSpreadsheetPropertiesRequest().setFields( "*" )
.setProperties( new SpreadsheetProperties().setTitle( "Expenses" ));
CopyPasteRequest copyRequest =  new CopyPasteRequest()
.setSource( new GridRange().setSheetId( 0 )
.setStartColumnIndex( 0 ).setEndColumnIndex( 2 )
.setStartRowIndex( 0 ).setEndRowIndex( 1 ))
.setDestination( new GridRange().setSheetId( 1 )
.setStartColumnIndex( 0 ).setEndColumnIndex( 2 )
.setStartRowIndex( 0 ).setEndRowIndex( 1 ))
.setPasteType( "PASTE_VALUES" );
List<Request> requests =  new ArrayList<>();
requests.add( new Request()
.setCopyPaste(copyRequest));
requests.add( new Request()
.setUpdateSpreadsheetProperties(updateSpreadSheetRequest));
BatchUpdateSpreadsheetRequest body
=  new BatchUpdateSpreadsheetRequest().setRequests(requests);
sheetsService.spreadsheets().batchUpdate(SPREADSHEET_ID, body).execute();
}
```

Here, we're creating an *UpdateSpreadSheetPropertiesRequest* object which specifies the new title, a *CopyPasteRequest* object which contains the source and destination of the operation and then adding these objects to a *List* of *Requests.*

Then, we're executing both requests as a batch update.

Many other types of requests are available to use in a similar manner. For example, we can create a new sheet in a spreadsheet with an *AddSheetRequest* or alter values with a *FindReplaceRequest.*

We can perform other operations such as changing borders, adding filters or merging cells. The full list of *Request* types is available here.

9. Conclusion

In this article, we've seen how we can connect to the Google Sheets API from a Java application and a few examples of manipulating documents stored in Google Sheets.

The full source code of the examples can be found over on GitHub.

I just announced the new Spring 5 modules in REST With Spring:

>> CHECK OUT THE LESSONS

Learning to "Build your API with Spring"?