TAVAKOLI Taraneh

Google API Client Libraries with Dart

Google provides a large set of APIs that your applications can use to interact with Google products such as Google Drive, Gmail, Cloud Datastore, and Cloud Storage. These APIs are accessible via REST-like interfaces. The Dart team provides the googleapis and googleapis_beta packages, which provide generated Dart libraries for these APIs. Using the APIs, which are available for both web apps and cloud apps, is more convenient and less error-prone than using the raw REST protocol.

To use any of these APIs, you need a Cloud Project. In addition, based on the API being used, you need either an API key or a Client ID. And finally, depending on what kind of application is being used, you might need a Service Account. All these items are available through Google Developers Console when you create a project. Below are a few scenarios:

APIs require a Client ID specific to the kind of application when it accesses data that is owned by a user on behalf of that user (with consent): for example a browser application or a console application.

A server application can access data owned by the application itself by using a Service Account. Example: a server application accessing data in Datastore or Google Cloud Storage.

APIs that can be used to get public data require only an API key (for quota and billing purposes).

To set up authentication and authorization for your app, you need to create a project, create the authentication credentials, and activate the API you want to use, all of which you do at Google Developers Console.

Support for Google APIs is in two packages—googleapis and googleapis_beta. The googleapis package contains the APIs for all the APIs that are available in a stable version. The googleapis_beta package contains the APIs that are currently in beta and possibly only available through a Limited Preview program.

A third package, googleapis_auth, provides a way to obtain OAuth 2.0 credentials and an authenticated HTTP client required to use these APIs.

OAuth 2.0

Applications sometimes require OAuth 2.0 for authentication and authorization. Whether an application needs OAuth 2.0 depends on the API being used and the kind of data being accessed. For example, an application needs OAuth 2.0 if it needs user consent. An application sometimes needs OAuth 2.0 depending on the following properties:

Using public API (no credentials needed)

Using API that can be accessed using an API Key (no concrete user)

Using API that provides access to user data (user consent)

Using API that provides access to application data (service account)

The OAuth 2.0 protocol provides different flows for different types of applications, including web server, installed, and client-side applications. For example, the following diagram illustrates the flow of communication for client-side applications:

Token flow in client-only (JavaScript) application

Using OAuth 2.0 to Access Google APIs gives a detailed overview of the OAuth 2.0 authorization scenarios that Google supports

To write a program that interacts with a Google product, you need several tools and packages.

A Google account

If you don't already have a Google account, you can create one at Create your Google Account.

A project in Google Developers Console

Every application that uses the client libraries needs a project in Google Developers Console. A project is a collection of settings, credentials, and metadata about the application. Google Developers Console is where you manage aspects of your project, such as authenticating and authorizing you application, activating APIs, and managing team and billing information associated with your project. You must have a project to get OAuth2 service accounts and client IDs.

The googleapis_auth package

Access to Google APIs uses the HTTP protocol. The googleapis_auth package provides different means for creating an HTTP client that can handle the authorization. This HTTP client is then passed to the API objects and takes care of augmenting the communication with the required authorization information. The Dart googleapis_auth client library is available at pub.dartlang.org/packages/googleapis_auth. There you can find a detailed README file with code examples and explanatory text.

The googleapis or googleapis_beta package

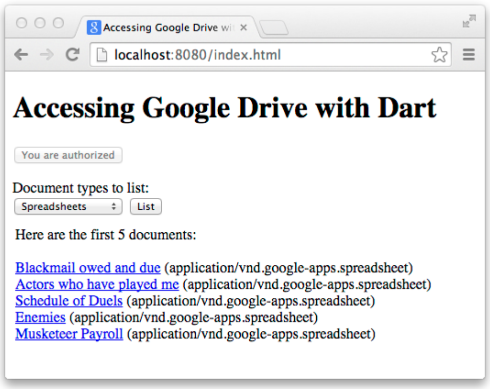
These packages are publicly available at pub.dartlang.org/packages/googleapis and pub.dartlang.org/packages/googleapis_beta. Later, you'll see an example of how to use them in your Dart program.

Dart

Get Dart from the download page.

A web application

Let's look at a web application example that uses the googleapis Google Drive API to retrieve documents from a user's Google Drive. The following screenshot shows the app after it has retrieved a list of spreadsheets from a user's Google Drive and displayed them



Accessing Google Drive with Dart

You are authorized

Document types to list:
Spreadsheets List

Here are the first 5 documents:

Blackmail owed and due (application/vnd.google-apps.spreadsheet)
Actors who have played me (application/vnd.google-apps.spreadsheet)
Schedule of Duels (application/vnd.google-apps.spreadsheet)
Enemies (application/vnd.google-apps.spreadsheet)
Musketeer Payroll (application/vnd.google-apps.spreadsheet)

on the page.

You can find the source code for this example, drive_search_web, and others, at googleapis_examples on GitHub.

The section Example explained describes the code in the drive_search_web example related to googleapis and googleapis_auth. But first let's look at how to run the example.

Running the example

To run this example, you need to create a project, activate an API, and create a Client ID in Google Developers Console. This section provides instructions about how to do these for this particular example. For complete information and detailed explanations, refer to Google Developers Console Help.

Create project

- Go to Google Developers Console.

- Click the **Create Project** button.
- Provide a name for your project.
- Click the **Create** button.

Activate the Drive API

- On left of the project page, click **APIs & auth**, click **APIs**.
- Turn on the authentication for **Drive API**. It might take a couple of minutes to propagate.

Create a client ID

- On the left of the project page, under **APIs & Auth**, then click **Credentials**.
- Click **Create new Client ID**.
- In the popup window, click **Web application**, then fill in the form. Use http://localhost:8080 for **Authorized JavaScript origins**. Because this example is a client-side-only application, don't put a value in **Authorized redirect URIs**. This example runs on the local computer and uses port 8080. Ensure nothing else is using port 8080. If you later run this example from a different origin, you'll need a new Client ID.
- Click **Create Client ID**.

Run the example

- In the index.dart file, change to the client ID generated in the previous step. The client ID ends in apps.googeusercontent.com.
- In the top directory of the application, run `pub serve`.
- Visit http://localhost:8080 in a browser window. After a little while, you'll see a built version of the app.
- Click **Authorize** and accept the authorization on the page that appears.
- Select a document type from the drop-down menu and click **List**. The program displays the list of files from the Google Drive of the user who is currently logged in. (Later the user can revoke access if desired.) Refer to Security - Account Settings for details.

This example, drive_search_web, uses the Google Drive API and the OAuth 2.0 API to access the user's files on Google Drive. Let's look at the relevant parts of the example.

- To use the googleapi packages, you need to declare dependencies in the pubspec.yaml file.

```
dependencies:
  googleapis_auth: '>=0.1.0 < 0.2.0'
  googleapis: '>=0.1.1 < 0.2.0'
```

- In addition to declaring dependencies, you need to import the libraries from the packages into your Dart file. This example has only one Dart file, index.dart, which imports the libraries like this:

```
import 'package:googleapis_auth/auth_browser.dart' as auth;
import 'package:googleapis/drive/v2.dart' as drive;
```

- At the top level, the program gets an identifier for the client with its ID created in Google Developers Console. In addition, the code defines the scope of the APIs it intends to use. The scope controls the set of APIs or parts of APIs that can access token permits. During the access-token request, your application sends one or more values in the scope parameter.

```
final identifier = new auth.ClientId(
     "<custom-app-id>.apps.googleusercontent.com",
    null);

final scopes = [drive.DriveApi.DriveScope];
```

- The main() method authorizes the client with a call to authorizedClient(), passing the identifier and scopes in as parameters.

```
authorizedClient(loginButton, identifier, scopes).then((client) {
  ...
}
```

Let's take a look at authorizedClient().

```
Future authorizedClient(ButtonElement loginButton, auth.ClientId id, scopes) {
  return auth.createImplicitBrowserFlow(id, scopes)
      .then((auth.BrowserOAuth2Flow flow) {
        return flow.clientViaUserConsent(forceUserConsent: false).catchError((_) {
          loginButton.text = '';
          return loginButton.onClick.first.then((_) {
            return flow.clientViaUserConsent(forceUserConsent: true);
          });
        }, test: (error) => error is auth.UserConsentException);
  });
}
```

First the code initializes the browser flow as illustrated in the OAuth 2.0 diagram above. Then the program attempts to proceed without user consent using flow.clientViaUserConsent() with `false` as a parameter value. If the user previously gave consent, this will succeed. Otherwise, the program sets up the authorization button in the UI. When the user presses the button, the program brings up a popup window where the user can provide consent. To ask the user for consent, the code call flow.clientViaUserConsent() again using `true` for the parameter value.

- In the main() function, the code gets access to the Drive API by creating a new DriveApi object and passing in the HTTP client.

```
var api = new drive.DriveApi(client);
```

- The code uses the API provided by the DriveApi object to search the user's documents:

```
Future<List<drive.File>> searchTextDocuments(drive.DriveApi api,
                                             int max,
                                             String query) {
  var docs = [];
  Future next(String token) {
    // The API call returns only a subset of the results. It is possible
    // to query through the whole result set via "paging".
    return api.files.list(q: query, pageToken: token, maxResults: max)
        .then((results) {
      docs.addAll(results.items);
      // If we would like to have more documents, we iterate.
      if (docs.length < max && results.nextPageToken != null) {
        return next(results.nextPageToken);
      }
      return docs;
    });
  }
  return next(null);
}
```

Using a service account for a Cloud API

For APIs such as Cloud Datastore and Cloud Storage you need a Google service account, which is an account that represents your application instead of an individual end user. You can create one when creating a new Client ID: just click **Service account** instead of **Web application**.

The example cloudstorage_upload_download_service_account needs a service account because it uses the Google Cloud Storage API.

Let's take a quick look at the relevant code.

The following code creates account credentials from the service account specified in the details of the given JSON string. After you create the service account, you can download the JSON from the Cloud Console. Then enter the appropriate information to replace the placeholders.

```
final accountCredentials = new auth.ServiceAccountCredentials.fromJson(r'''
{
  "private_key_id": "<please fill in>",
  "private_key": "<please fill in>",
  "client_email": "<please fill in>@developer.gserviceaccount.com",
  "client_id": "<please fill in>.apps.googleusercontent.com",
  "type": "service_account"
}
''');
```

The program selects the scopes it will use and gets the StorageAPI, just like the previous example retrieved the Drive API.

```
final scopes = [storage.StorageApi.DevstorageFullControlScope];
...
var api = new storage.StorageApi(client);
```

Using the credentials and scopes parameters, a call to clientViaServiceAccount gets an authenticated client that can use the Storage APIs.

```
auth.clientViaServiceAccount(accountCredentials, scopes).then((client) {
  ...
  var regexp = new RegExp(r'^gs://([^/]+)/(.+)$');
  switch (args.first) {
    case 'upload':
  ...
}
```

Note that the code shown above creates accountCredentials, which identifies this application. The code specified by then() processes the command-line arguments and uploads or downloads a file as indicated.

The following line of code uses the Storage API to upload a media file to Google Cloud Storage.

```
return api.objects.insert(null, bucket, name: object, uploadMedia: media);
```

Resource links

Here's a convenient list of the resources you might need:

- Google Developers Console
- Google Developers Console Help
- Using OAuth 2.0 to Access Google Apis
- googleapis
- googleapis_auth
- googleapis_beta
- googleapis_examples

Contribute

The following notes for those who are contributing to this package. If you are only using this package, you can skip this section.

- Clone this package and run `pub upgrade` from the top-level directory.

-
  ```
  $ rm -rf .dart_tool
  $ pub upgrade
  ```

- Download and generate the APIs using the `config.yaml` configuration (avoid doing this on corp network, use cloudshell instead).

```
$ dart bin/generate.dart run_config download
```

Note: You may need to reset some of the downloaded discovery documents, such as drive, or prediction.

- Generate the APIs.

```
$ dart bin/generate.dart run_config generate
```

- Create a diff with the previous APIs to determine whether a minor or a major update to the version number is required.
- Update the appropriate `CHANGELOG.md` file under `resources/`.
- Update `config.yaml` with a new version number and generate again.

```
$ dart bin/generate.dart run_config generate
```

- Run the tests.

```
$ pushd generated/googleapis
$ pub get
$ pub run test
$ cd ../googleapis_beta
$ pub get
$ pub run test
$ popd
```

- Commit the downloaded discovery documents and generated packages.