

Lab 5: Week 2 - Prep: Establishing Google Cloud Access

Background

During week 3 of the lab, we will start writing data to the cloud. But first, we have to do some preparations in order to be able to access the Google Cloud. Completing these steps, will result in having a `credentials.JSON` file, that we can use to access the google sheets API.

The term API stands for *Application Programming Interface*.

An application programming interface (API) is a way for two or more computer programs or components to communicate with each other. It is a type of software interface, offering a service to other pieces of software.

Source: [Wikipedia](#)

You can imagine this like the image below.

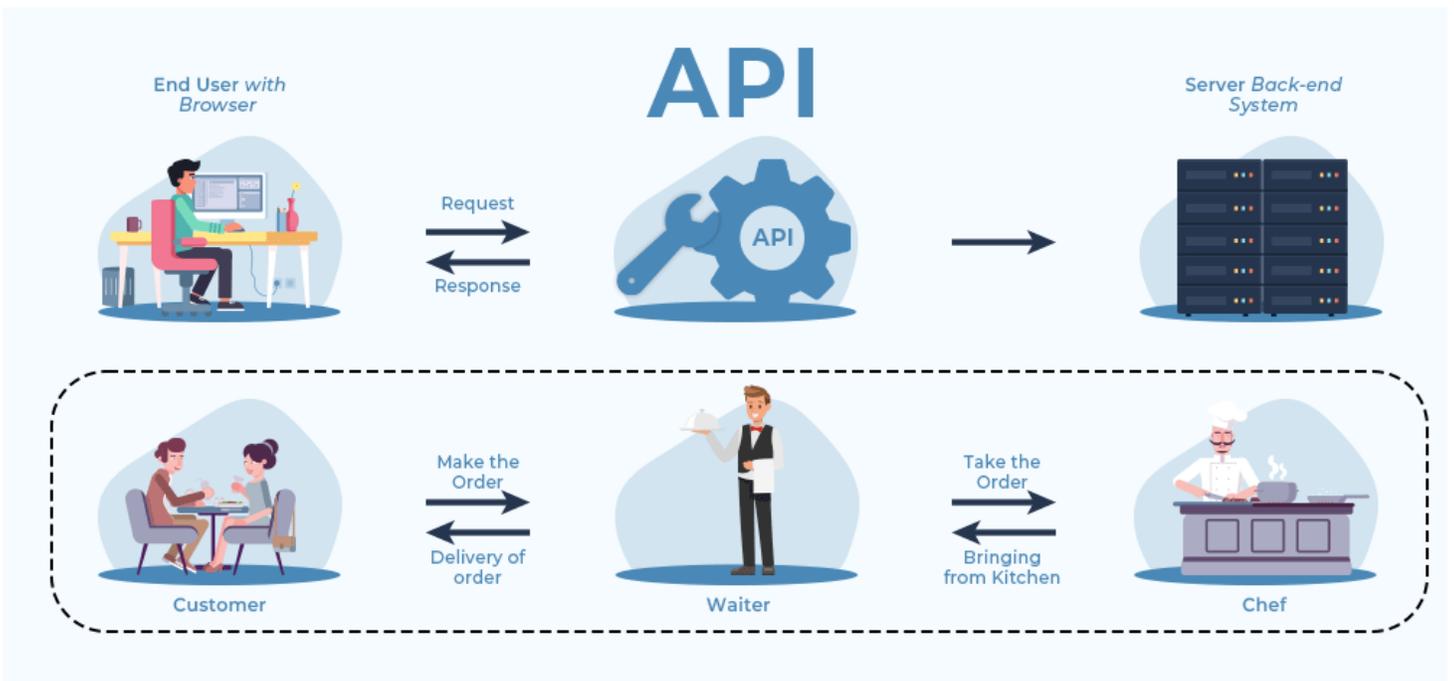


Figure 1: What is an API? *via* [Geeks For Geeks](#)

Methods: Establishing Cloud-based Data Storage

For simplicity, we will be writing the data to cloud using a simple google sheet.

To do so, we need to enable the google sheets API for us to use on the google server side and set up a way to authenticate the RPi to google.

The next steps will do just that.

Step 1: Setting up a New Google Account

! Important

For security reasons, each team will need to establish a NEW google account for this portion of the lab. We will be using the google sheets API to write to google sheets. Setting up API access will grant access to read, write, and delete files stored in the cloud. Therefore, you need to create a new unique account.

Google accounts are free, so there is no cost to the student, and they are secure (i.e. – they have cyber protection systems in place that limit who can access your Google Cloud account). We will be learning how to navigate the cyber security systems so that we can *authorize* the Raspberry Pi to be able to read and write data to your new Google Cloud account.

1. Navigate to google.com and create a new account. To do so, click on the account symbol in the top right corner and chose **Add Another Account**
2. Chose the **Create Account Option** and follow the instructions to create an account using the following naming scheme: ISAT300_SP25_S1_<Identifier>@gmail.com. (*Replace the <Identifier> with the initials of the team members*)

Step 2: Establishing Cloud-based Data Storage - Setting up Google Sheets API

i Note

Google, like all tech companies, has a tendency to change things around.

I updated this version of the instructions with new screenshots, if only there were substantial changes to the previous year.

This means some older screenshots will look a bit different compared to what you see, but will show the same functionalities.

1. Open a new tab and navigate to Google's [Cloud Computing Services](#)
2. Check in the top right corner (1) that your new google account is active.
3. Ignore the **Get started for free** and click on **Console** → *Agree* to the *Terms of Service*
 - If you start the **Free-Trial**, google will ask for credit card information. You can bypass that by going directly to the **Console**

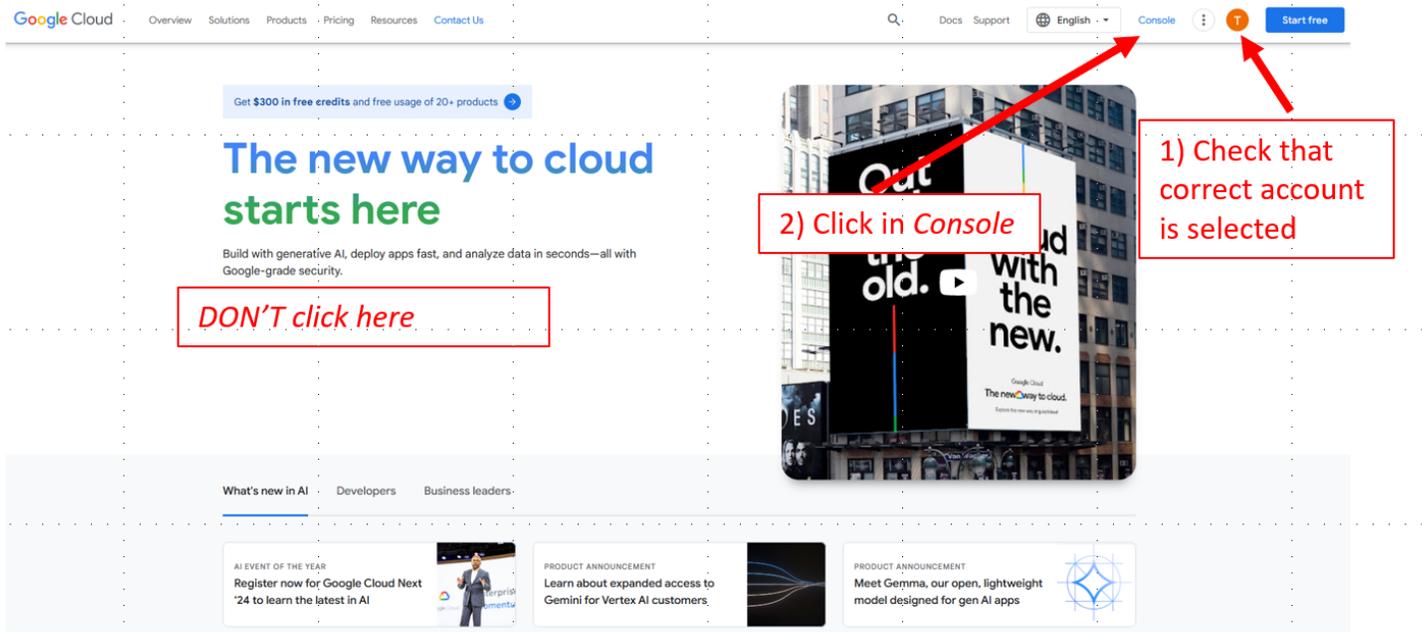
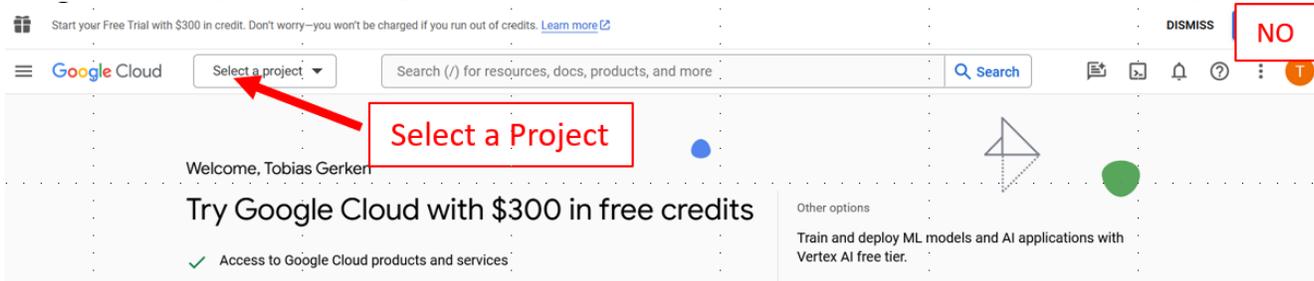


Figure 2: Getting to the Google Cloud Console

4. Create a new Project by clicking on **Select a Project** and then chose **NEW PROJECT** in the top right corner



5. Give your project a name like *ISAT 300* (see Figure)
6. Click **Create**

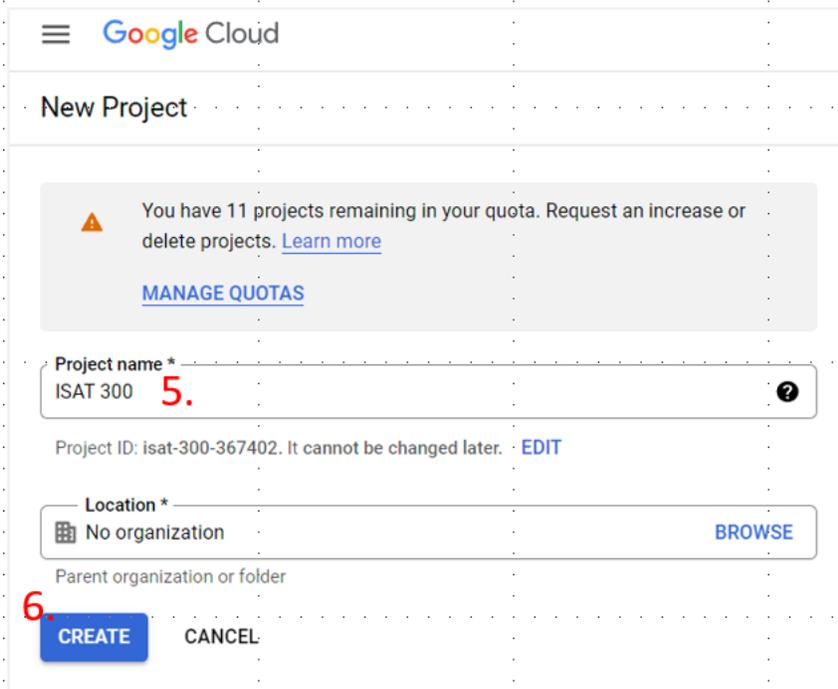


Figure 3: Naming the Project

7. After creating the project, you will automatically return to the Console.
8. Select the *ISAT 300* Project from the **Select Project** Menu.
9. Open the left sidebar and select **APIs & Services** (as shown below) and click on **Enabled APIs & Services**

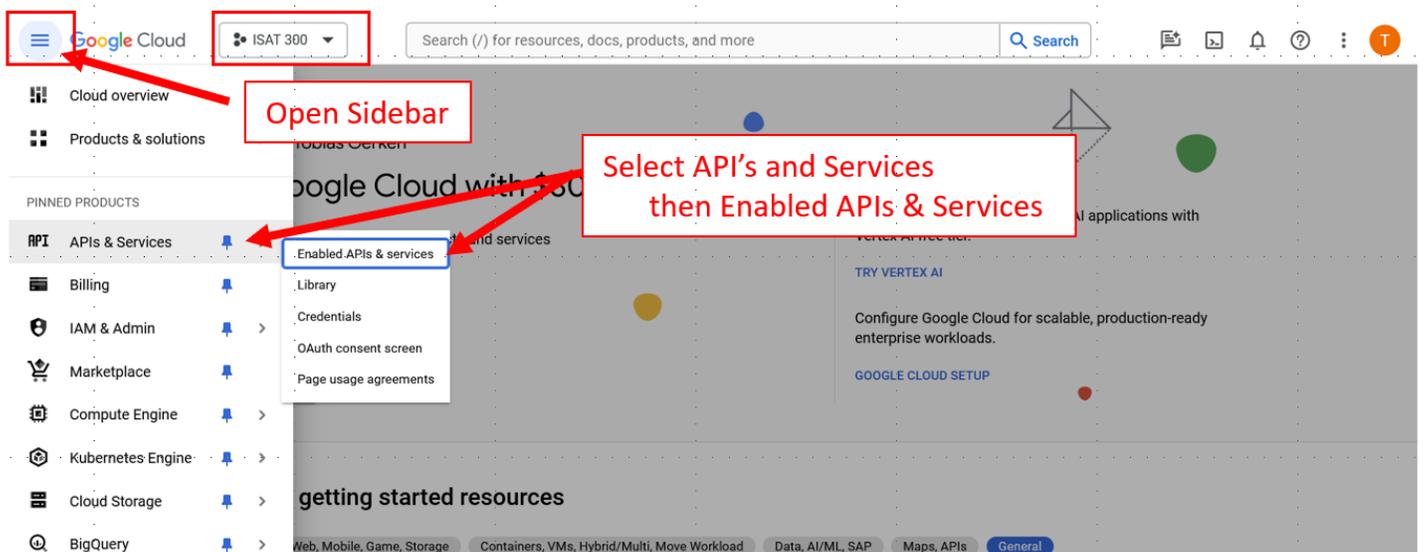


Figure 4: Enable APIs & Services

10. Now that your project is created, we need to enable the APIS. Click on Enable APIS and Services.

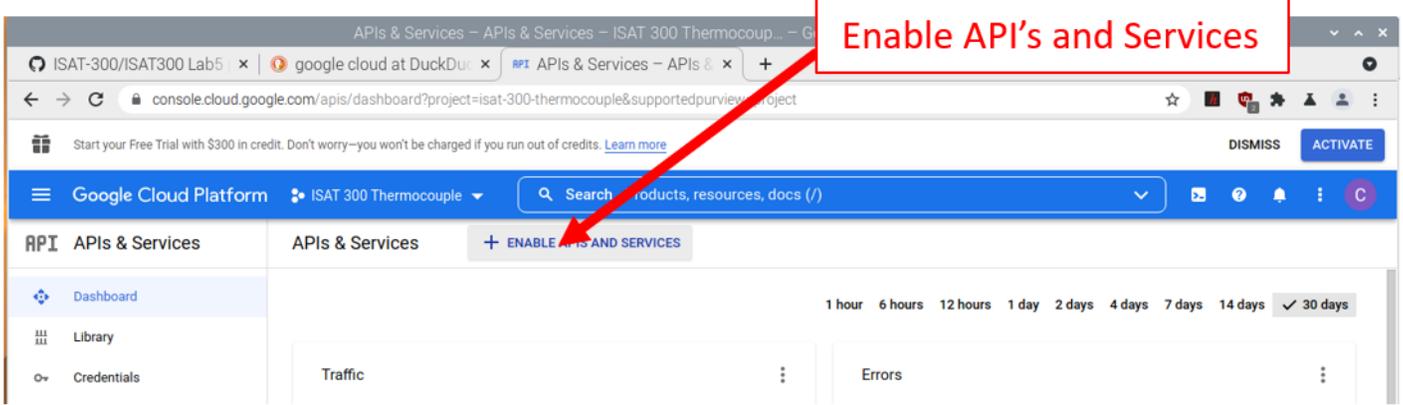


Figure 5: Enable APIs & Services - Continued

11. You will see a Welcome message to the API Libraries. There are many APIs available. Use the search bar to search for Google Sheets or scroll down until reach the Google Workspace category. **Select the Google Sheets API by clicking on it.**

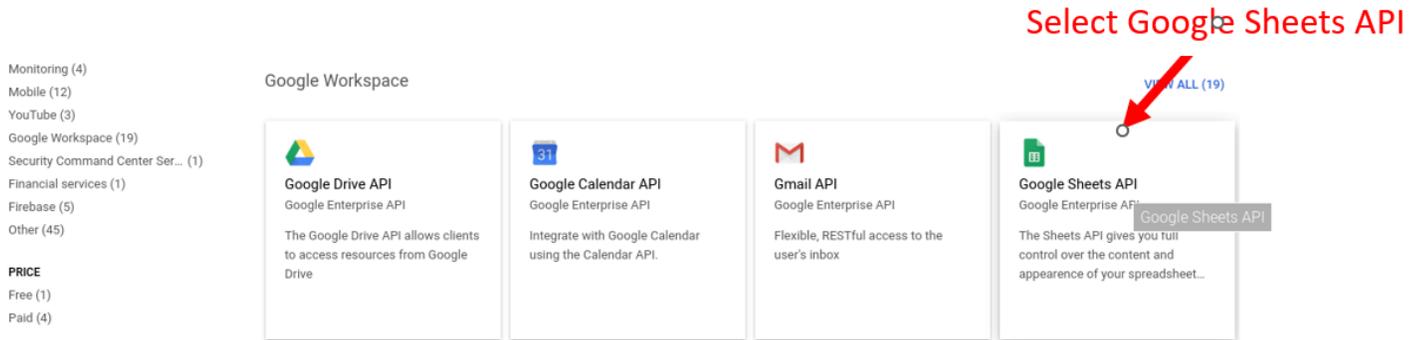


Figure 6: Select Google Sheets API

12. After you have selected the Google Sheets API, you will need to **enable** it.

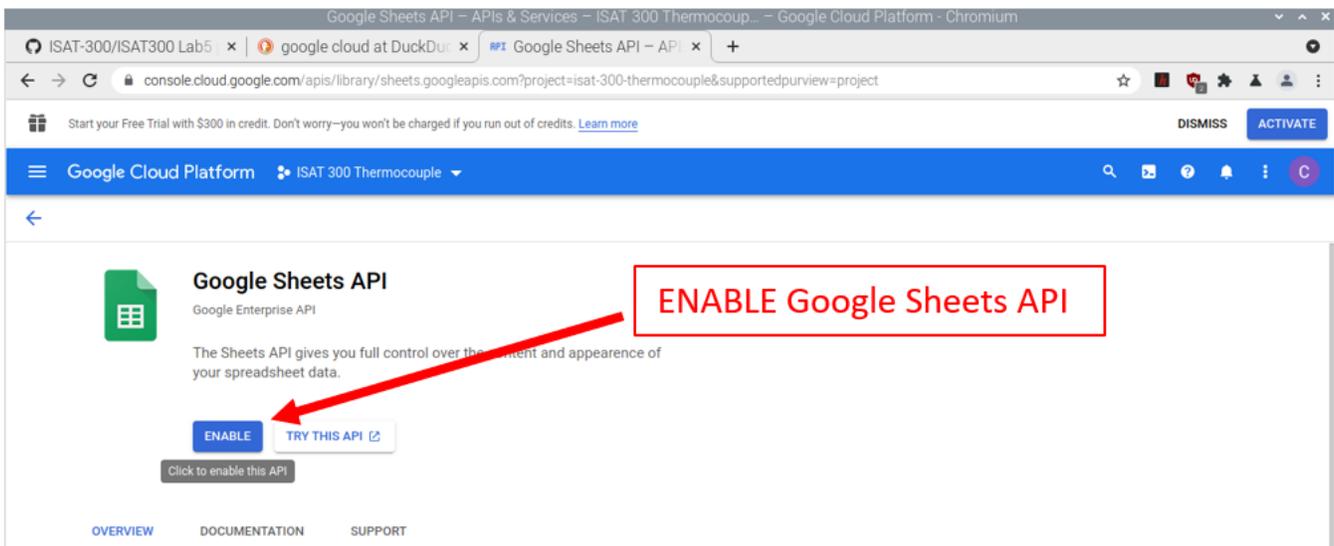


Figure 7: Enable Google Sheets API

i Note

A green check mark will appear if the API is enabled and the button will change from **Enable** to **Manage**, but will have the same functionality as before.

13. We now need to create a set of credentials that will allow us to use the API. Click on **Create Credentials**

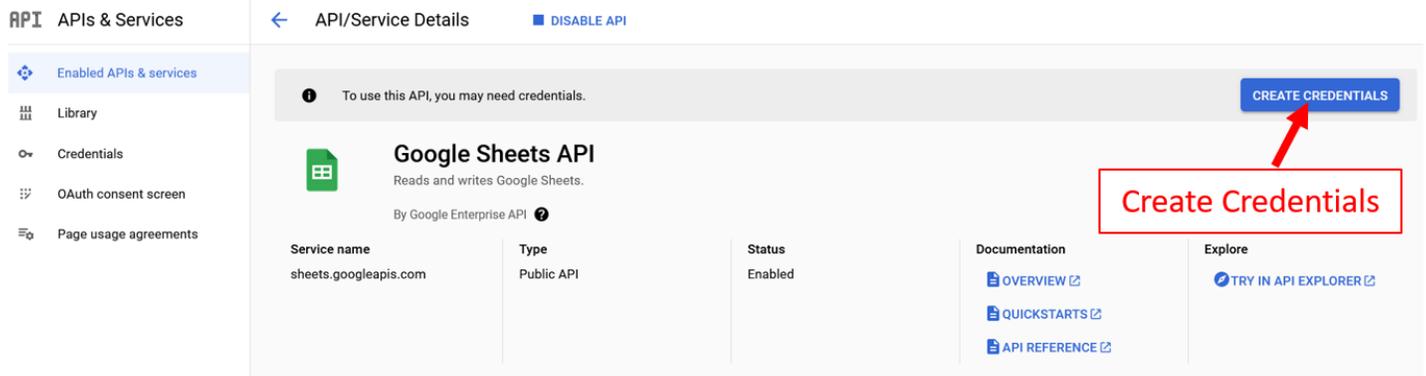


Figure 8: Create API Credentials

14. From the *Which API are you using?* dropdown menu, select **Google Sheets API** (see Figure).
15. For *What data will you be accessing?* select **Application Data**.
16. **Ignore the Next button and click Done!** If you accidentally click **Next**, cancel out of the Service Accounts and restart at Step 13.

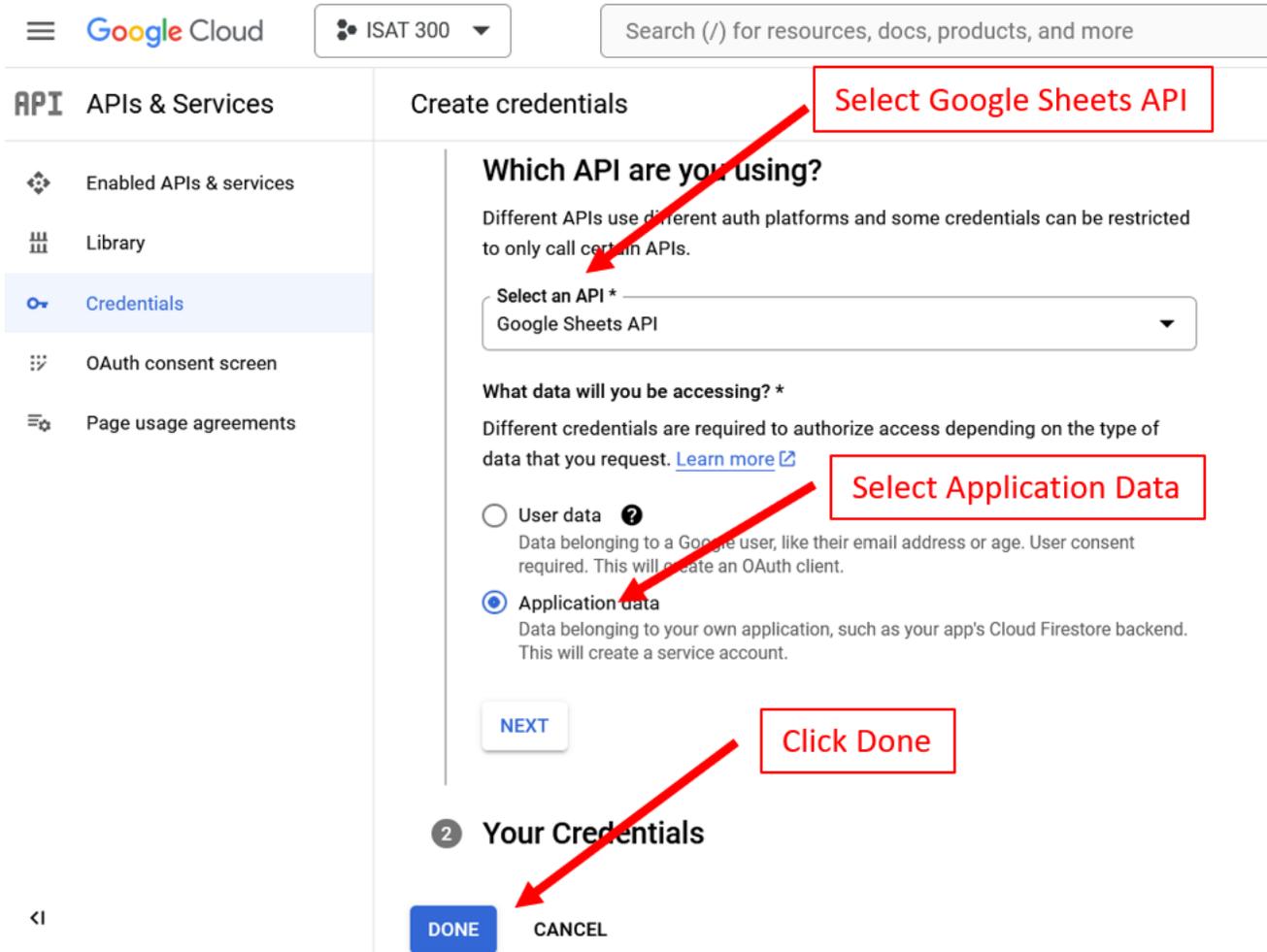


Figure 9: Credentials for Google Sheets API

The next couple of steps configure, how a user can authenticate themselves with the Google Sheets App. We will be using *Open Authorization* or *OAuth*:

OAuth essentially allows access tokens to be issued to third-party clients by an authorization server, with the approval of the resource owner. The third party then uses the access token to access the protected resources hosted by the resource serve.

17. Google requires us to configure the OAuth consent screen first. This is the window, that will pop up for users to sign into the app. Click the **OAuth consent screen** on the navigation tab on the left and start configuring OAuth by clicking on the **GET STARTED** Button.
18. In the **App Information Step**: Select an App Name like *ISAT Thermocouple Lab*. Select your Gmail account for the user support email and click Next

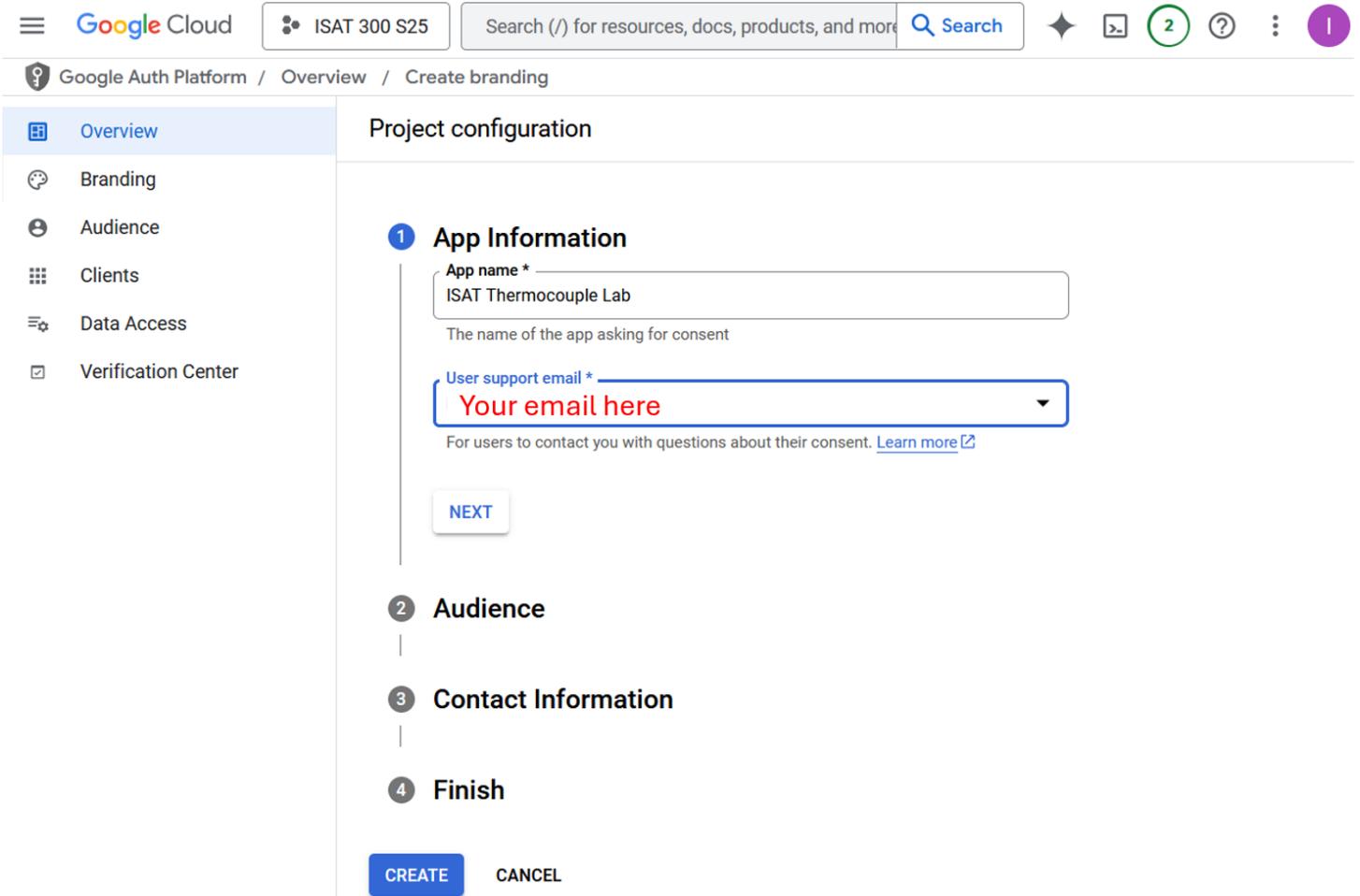


Figure 10: Configuring the OAuth consent screen - App Information

19. In the **Audience Step**: Select External as the *User Type*.

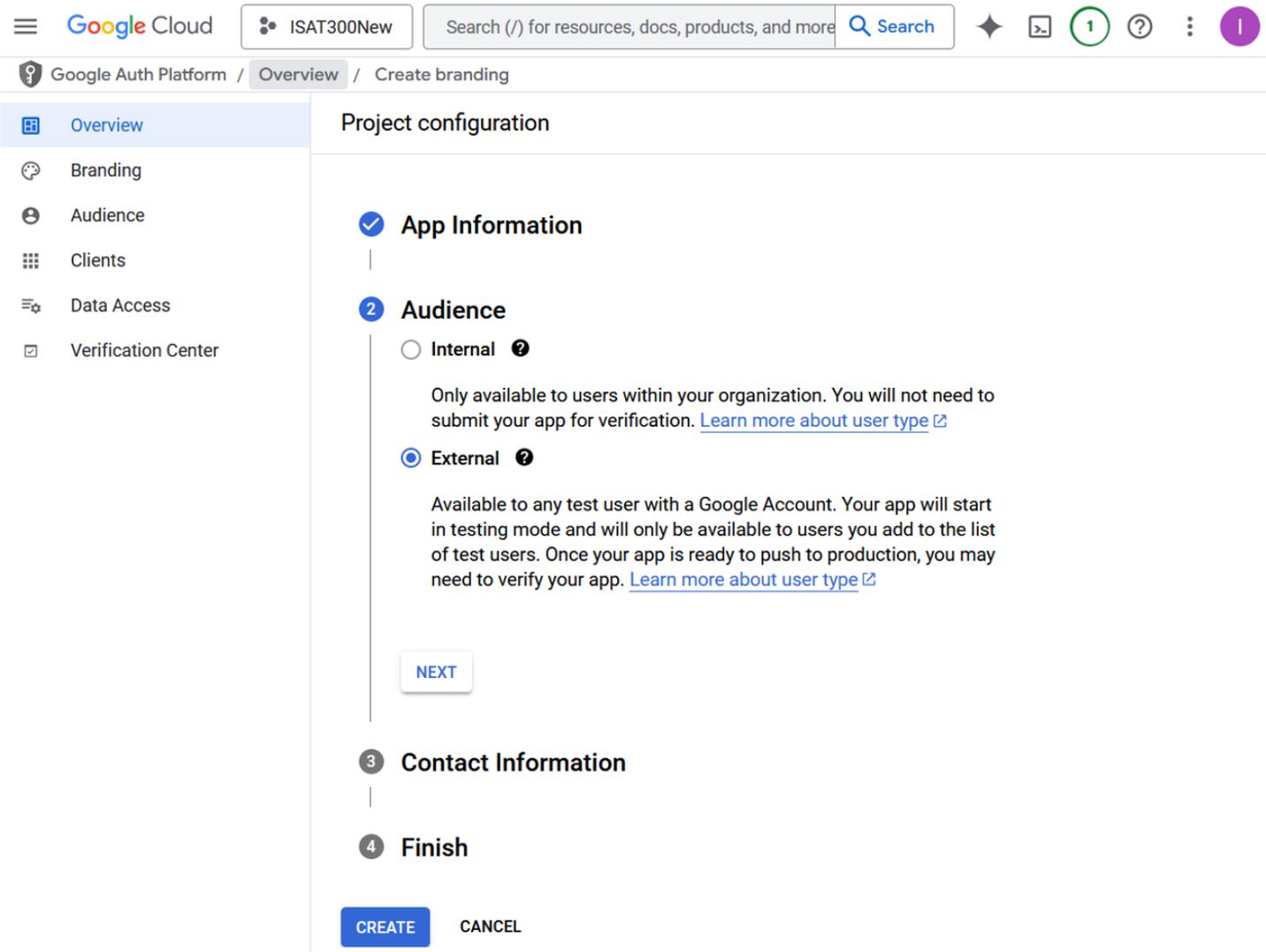


Figure 11: Configuring the OAuth consent screen - Audience

20. In the **Contact Information**: Enter you Gmail again as the developer contact. Finalize the process by accepting the Terms and Conditions in the **Finish Step**. Then click **Create** to exit the screen.

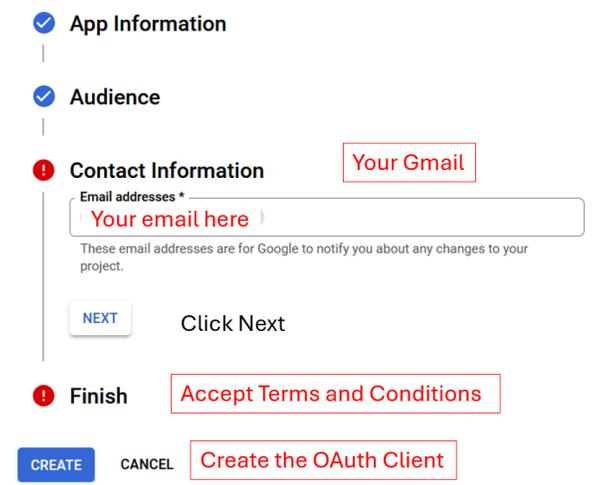


Figure 12: Configuring the OAuth consent screen - App Info Continues

21. Next: Select the **Audience** Screen on the side bar to add yourself or your group members as a *Test User* to the App for the google sheets API.

i Note

You can use your new google email account, or any other google account. However, because the App is not published for everyone to use (which is something that we won't do, the google account you use in the following labs, will have to be added here.)

22. Make sure that the email you enter saves and appears in the *Test users* Section below the **ADD USERS** Button. ***You need to hit the ADD button to confirm.***

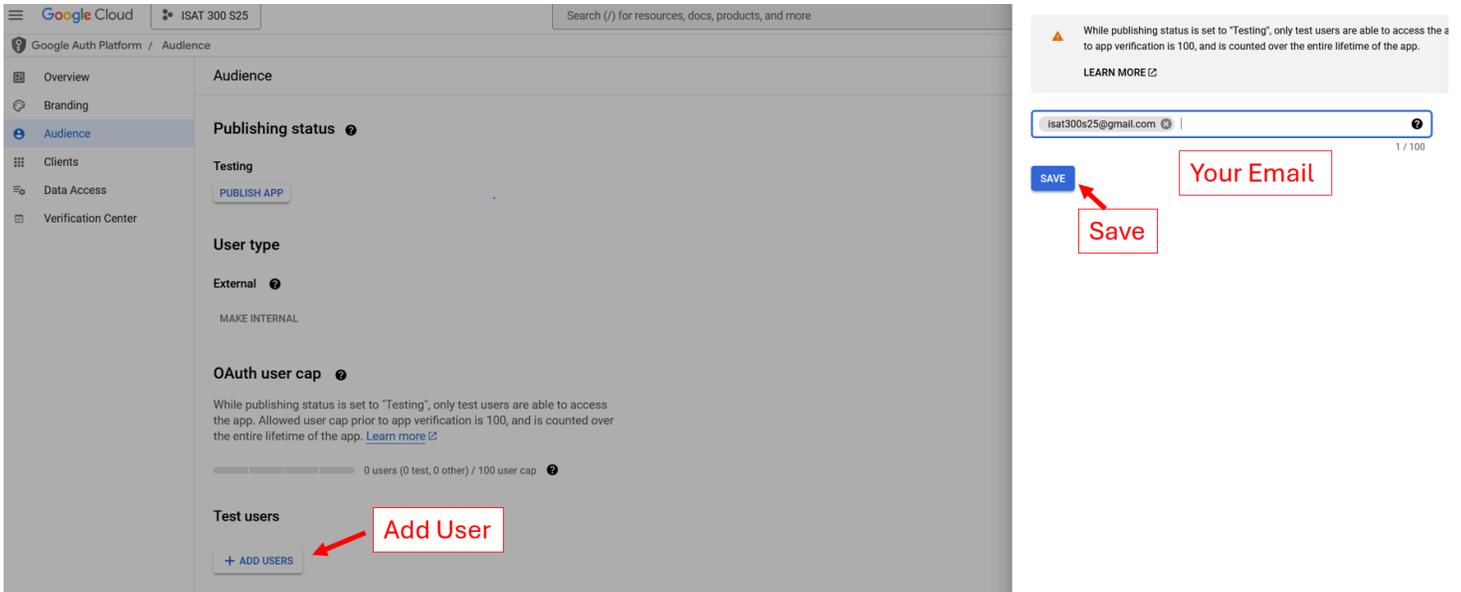


Figure 13: Configuring the OAuth consent screen - Adding Test Users

23. Navigate to **Data Access** on the side bar and click on **Add or Remove Scopes**. Select **Google Sheets API** that allows you to **See, edit, and delete** all your **Google Sheets** spreadsheets (which is why you need to use a new account). Then click **Update** to confirm and exit.

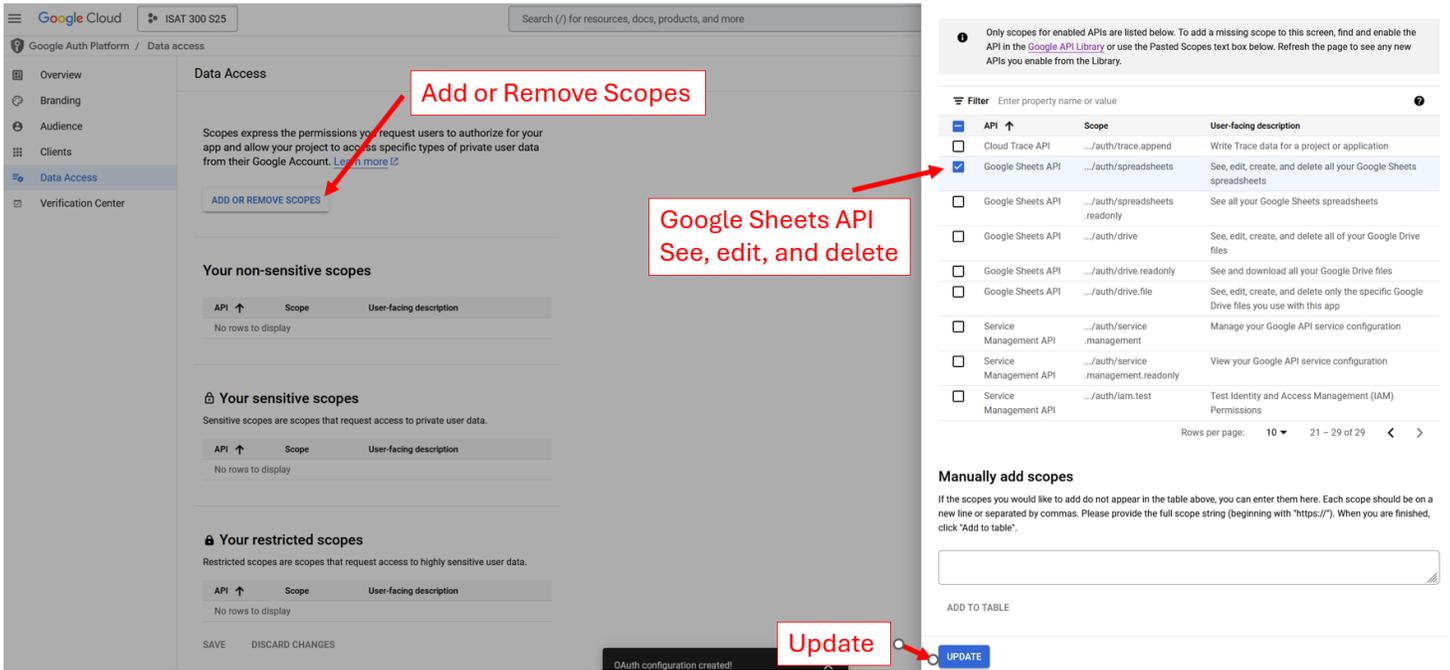


Figure 14: Configuring the OAuth consent screen - Scopes

24. Navigate to **Clients** on the side bar, to finally create credentials for the API.

25. For *Application Type*, select *Desktop*. You don't need to rename it. Click **Create**

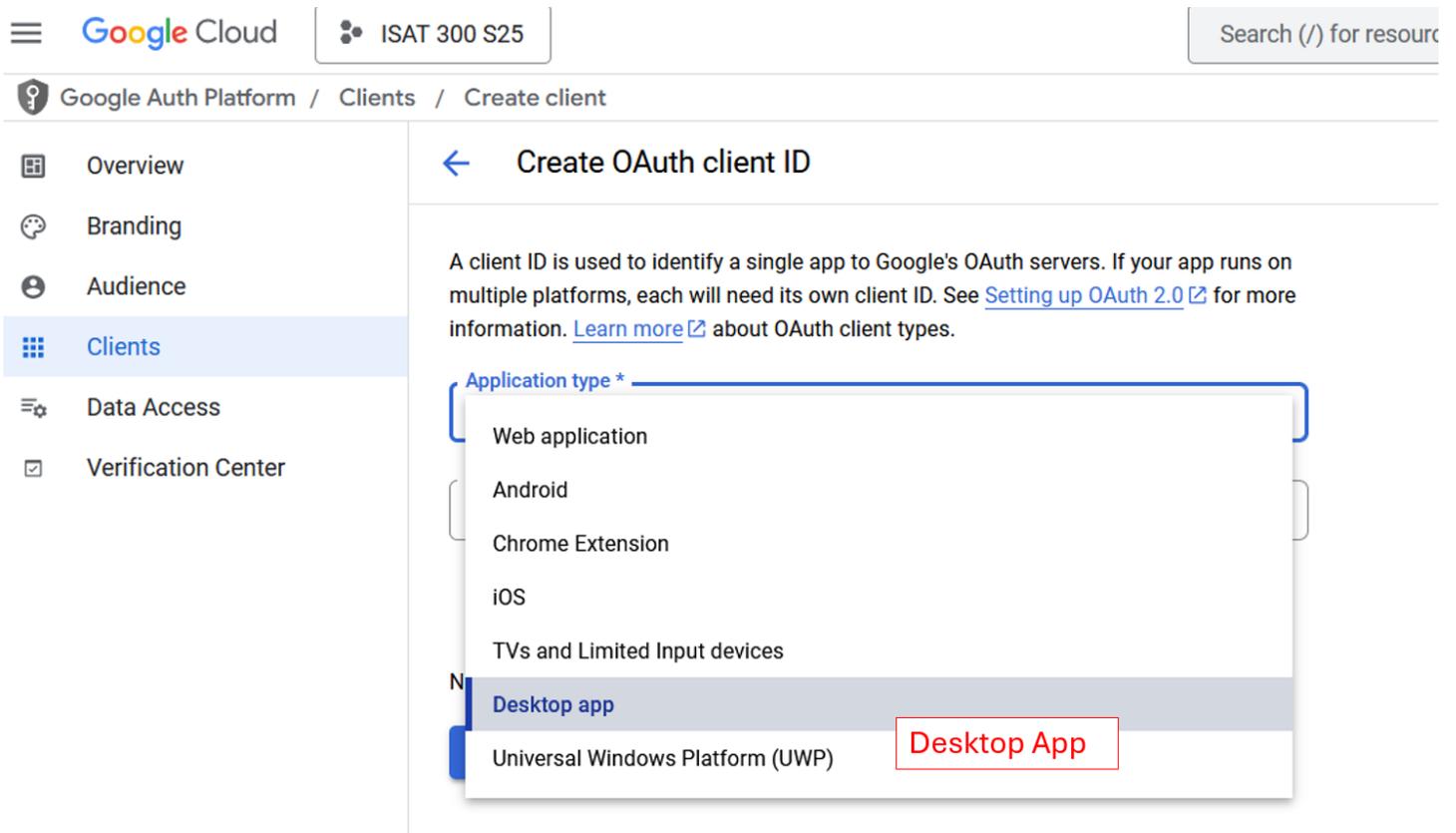


Figure 15: Credentials for Google Sheets API

26. The screen should now say *OAuth client created*. Click on **Download JSON** and make sure that you keep this file in a save location. You will need this file on your RPi in the next lab.

This is your Client Secret – it is essential for navigating Google’s Cyber Security!

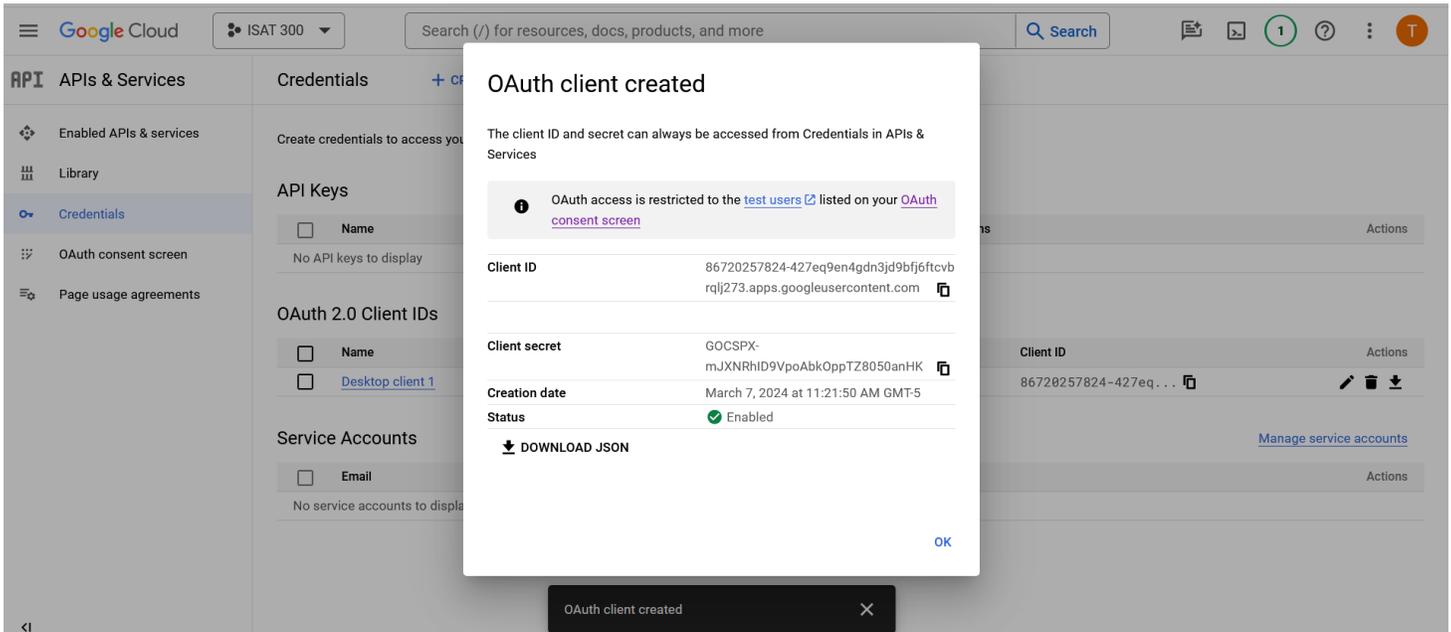


Figure 16: Credentials for Google Sheets API

27. Rename the JSON file to `credentials.json`. This file is the key for your RPi to access google sheets in the new account. You will need this file for the next labs.

! Important

Similar to the keys to your apartment the credentials file should not be shared with other people because it enables access to your google account.

💡 Tip

If you need to re-download the JSON file with the API Credentials, you can do so in the **Credentials** Tab of the *google Cloud console*.

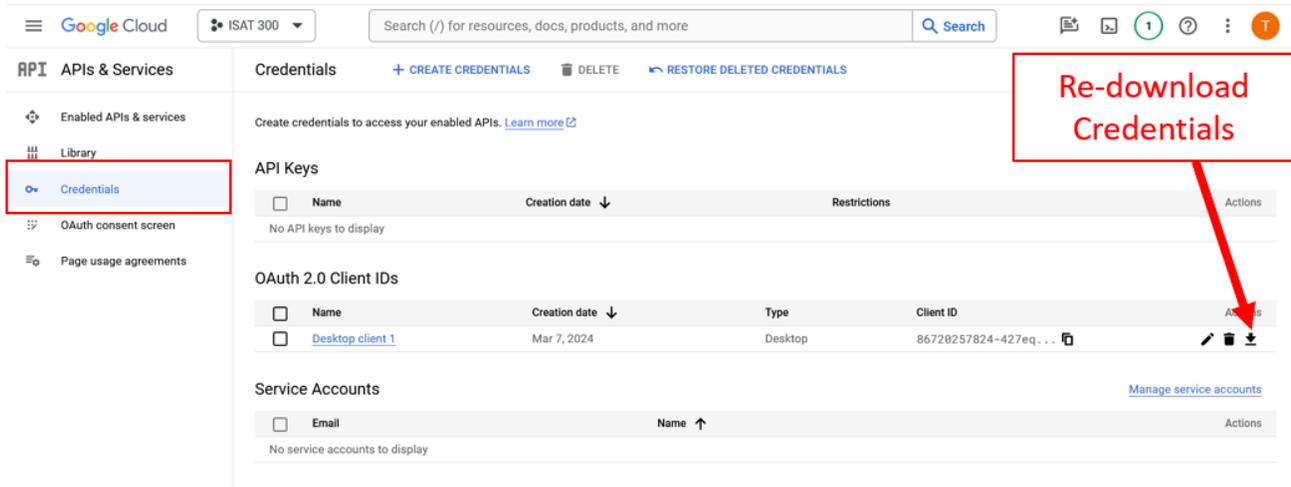


Figure 17: Re-download API Credentials

Acknowledgements

These instructions were originally prepared by Dr. Chris Bachmann.

| Revision | Description | Author |
|------------------|--|---------------|
| 2025-03-13 (S25) | Updates to match current google cloud layout and steps | Tobias Gerken |
| 2024-03-07 (S24) | Updated to Web, and updates to match current google cloud layout | Tobias Gerken |