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 Rasberry 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 $Console \rightarrow Agree$ 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

Google Cloud	Overview Solutions Products Pricing Resources Contact Us	Q. Docs Support 💮 English 🔹 Console 🔋 🍸 Start free
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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

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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.

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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.

Monitoring (4) Mobile (12) YouTube (3)	Google Workspace			Select Google Sheets API
Google Workspace (19) Security Command Center Ser (1) Financial services (1) Firebase (5) Other (45) PRICE Free (1) Paid (4)	Google Drive API Google Enterprise API The Google Drive API allows clients to access resources from Google Drive	Google Calendar API Google Enterprise API Integrate with Google Calendar using the Calendar API.	Gmail API Google Enterprise API Flexible, RESTful access to the user's inbox	Google Sheets API Google Enterprise AFI Google Sheets API The Sheets API gives you full control over the content and appearence of your spreadsheet

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

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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

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≡¢	Data Access		The name of the app asking for consent
	Verification Center	2 3 4 CREA	Ver support email* Your email here For users to contact you with questions about their consent. Learn more [2] NEXT Audience Contact Information Finish CANCEL

Figure 10: Configuring the OAuth consent screen - App Information

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

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	Verification Center		Internal 🚱
			Only available to users within your organization. You will not need to submit your app for verification. Learn more about user type 🖸
		(External 🛛
			Available to any test user with a Google Account. Your app will start in testing mode and will only be available to users you add to the list of test users. Once your app is ready to push to production, you may need to verify your app. Learn more about user type 🛙
			NEXT
		3 C	Contact Information
		4 F	inish
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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.

App Information	
Contact Information	Your Gmail
Your email here	
These email addresses are for Google to project.	notify you about any changes to your
NEXT Click Next	
Finish Accept Terms	and Conditions
CREATE CANCEL Create the C	OAuth Client

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.

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=0	Data Access	from their Google Account. Learn more		>	Google Sheets API	/auth/spreadsheets	See, edit, create, and delete all your Google Sheets spreadsheets
	Verification Center	ADD OR REMOVE SCOPES	Google Sheets API		Google Sheets API	/auth/spreadsheets .readonly	See all your Google Sheets spreadsheets
			See, edit, and delete		Google Sheets API	/auth/drive	See, edit, create, and delete all of your Google Drive files
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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

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90	Google Auth Platform /	Clients / Create client	
Ħ	Overview	← Create OAuth client ID	
\odot	Branding		
Θ	Audience	A client ID is used to identify a single app to Google's OAuth servers. If your a multiple platforms, each will need its own client ID. See <u>Setting up OAuth 2.0</u>	pp runs on for more
	Clients	information. Learn more ^[2] about OAuth client types.	
≡¢	Data Access	Application type *	
V	Verification Center	Android Chrome Extension iOS TVs and Limited Input devices	
		Universal Windows Platform (UWP)	

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!

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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.

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Acknowledgements

These instructions were originally prepared by Dr. Chris Bachmann.

Revision	Description	Author
2025-03-13 (S25) 2024 02 07 (S24)	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	Toblas Gerken