Guide-2

Techwars 2025-2026

Overview

This series of guides will walk you through setting up a local data pipeline using Node-RED, Google Sheets, and Grafana.

By following the steps in this guide, you will install the required tools, connect them using APIs, and create a live data visualization dashboard.

By the end of this guide, you will have:

- A running Node-RED instance
- A Grafana dashboard connected to Google Sheets
- A basic understanding of how APIs connect these tools

Prerequisites

Before starting, ensure the following software is installed:

- Node.js (LTS version): Required to install and run Node-RED
- Terminal / Command Prompt access: Used to install and run Node-RED and Grafana

Run the following command in your terminal:
node -v
If a version number appears, Node.js is installed correctly.
e.g. v22.20.0

Here is a video explaining how to install Node.js:
https://www.youtube.com/watch?v=lt5D2EWZMN0

Installing Node-RED

Official Website	https://nodered.org/

Run the following command in your terminal:
“sudo npm install -g --unsafe-perm node-red”

e.g.,

```
MacBook-Air ~ % sudo npm install -g --unsafe-perm node-red
```

Start node-RED by entering the following command:
“node-red”
e.g., MacBook-Air ~ % node-red
You will see lines similar to the image on the following page

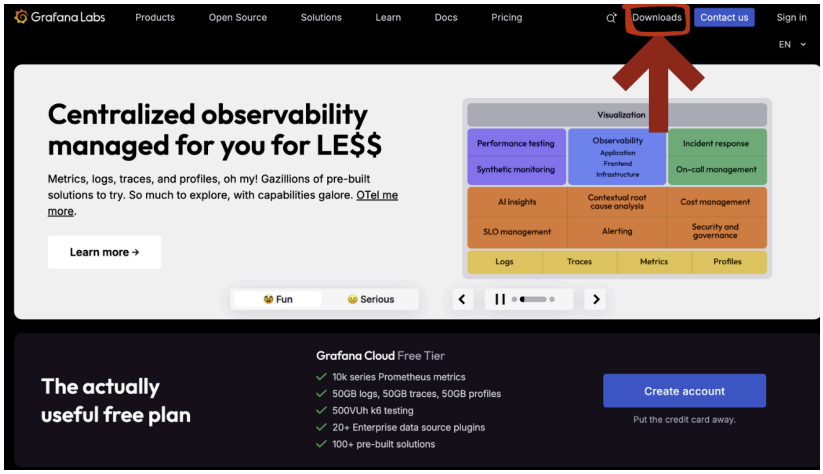
Use this link to access your Node-RED application: http://localhost:1880/

```
$ node-red

Welcome to Node-RED
===================

30 Jun 23:43:39 - [info] Node-RED version: v1.3.5
30 Jun 23:43:39 - [info] Node.js  version: v14.7.2
30 Jun 23:43:39 - [info] Darwin 19.6.0 x64 LE
30 Jun 23:43:39 - [info] Loading palette nodes
30 Jun 23:43:44 - [warn] rpi-gpio : Raspberry Pi specific node set inactive
30 Jun 23:43:44 - [info] Settings file  : /Users/nol/.node-red/settings.js
30 Jun 23:43:44 - [info] HTTP Static    : /Users/nol/node-red/web
30 Jun 23:43:44 - [info] Context store  : 'default' [module=localfilesystem]
30 Jun 23:43:44 - [info] User directory : /Users/nol/.node-red
30 Jun 23:43:44 - [warn] Projects disabled : set editorTheme.projects.enabled=true to enable
30 Jun 23:43:44 - [info] Creating new flows file : flows_noltop.json
30 Jun 23:43:44 - [info] Starting flows
30 Jun 23:43:44 - [info] Started flows
30 Jun 23:43:44 - [info] Server now running at http://127.0.0.1:1880/red/
```

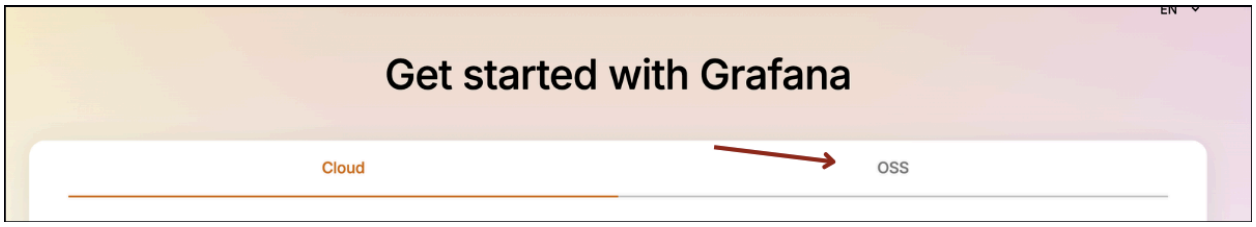
Installing Grafana

Official Website	https://grafana.com/

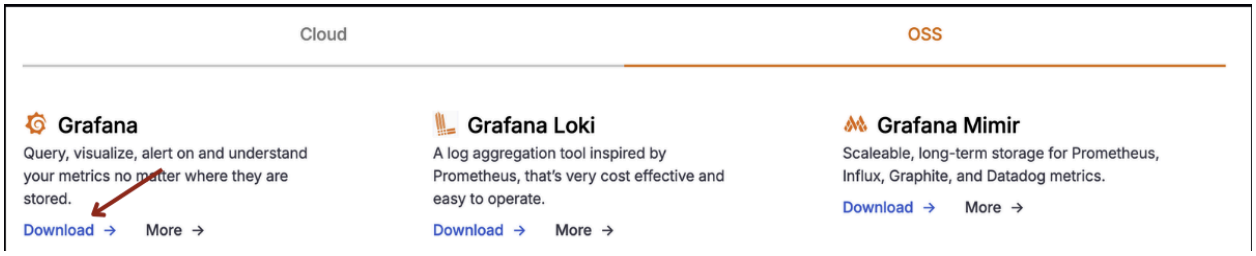
First, viisit the Grafana website.
At the top bar click "Downloads"



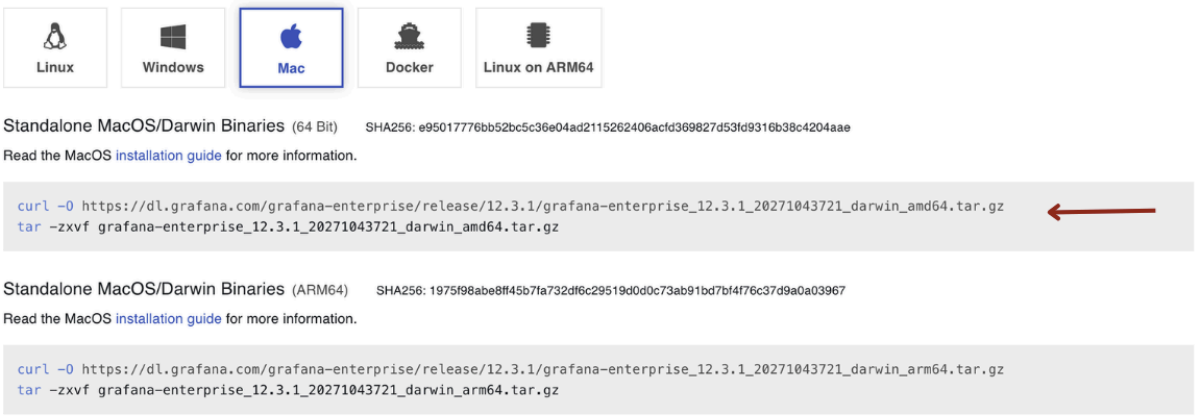
Select the OSS menu



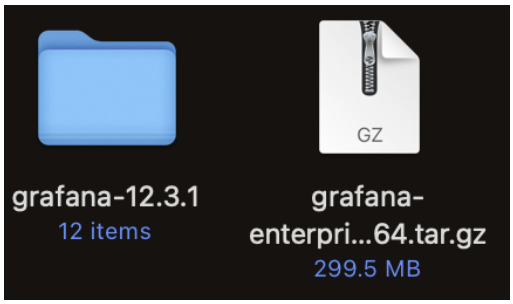
Click Download under "Grafana"



Select OS and follow the installation process for your OS

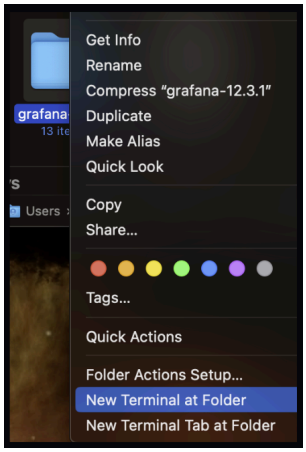


Extract the zip file to access the binaries

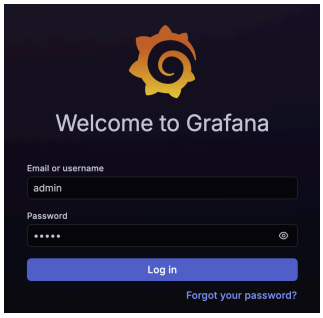


Open cmd in the grafana/bin directory

use grafana-cli.exe plugins install grafana-googlesheets-datasource. (Mac users: command click the unzipped folder, select “new terminal at folder and run the following command in the terminal: ./bin/grafana-server) (If you are having trouble with the plugins command, skip it and refer to the accessing sheets section later.)



Run grafana and login (username and password are set to “admin” by default) (Grafana Usage explained later)

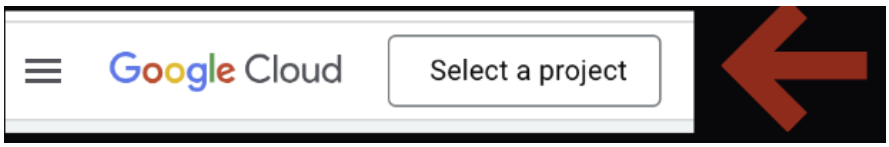


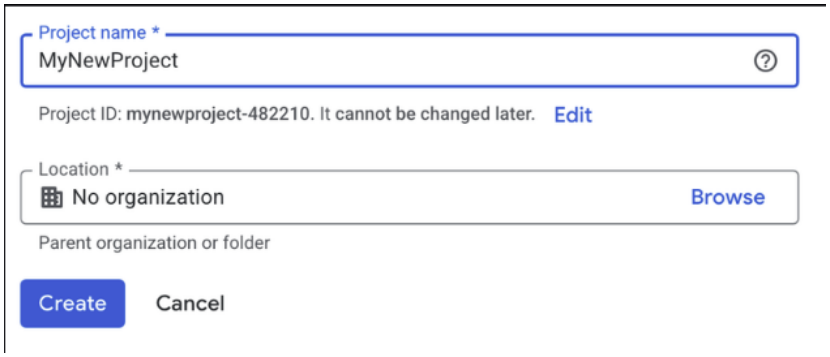
Setting Up Google Cloud Service Account

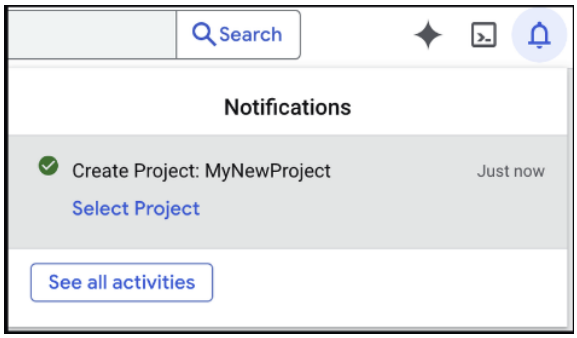
Official Website	https://console.cloud.google.com

To get started, visit the website.

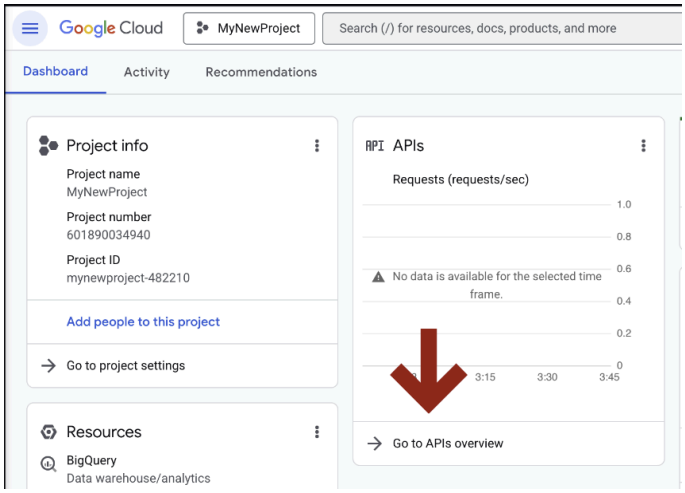
Create a Project - Click Select Project, then click new project, name your project, click create, click the bell icon (home page), then click select project.

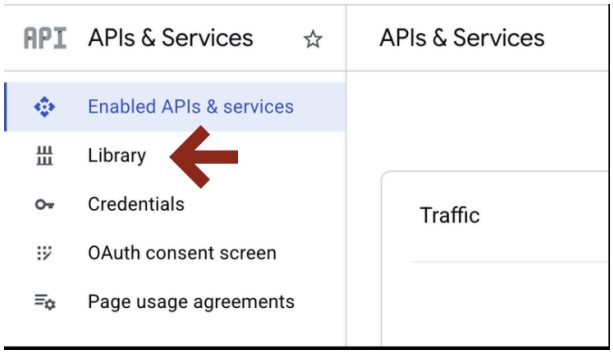




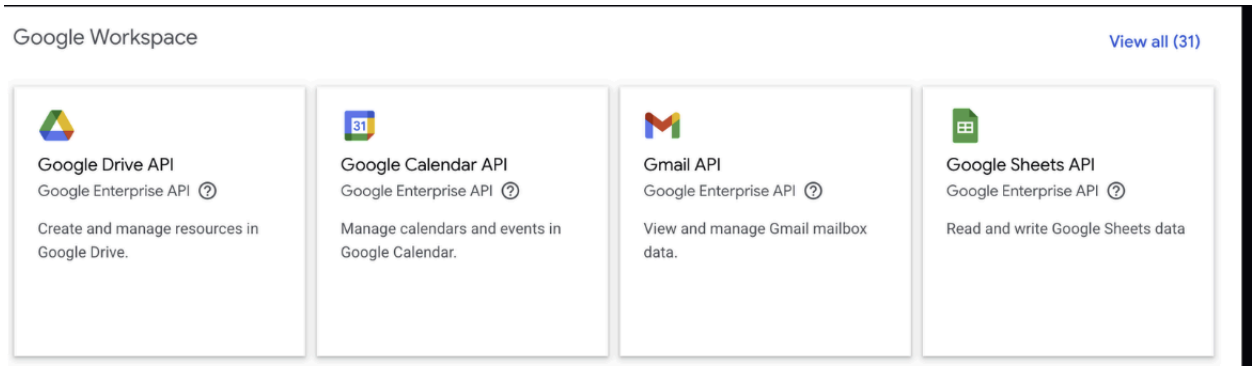


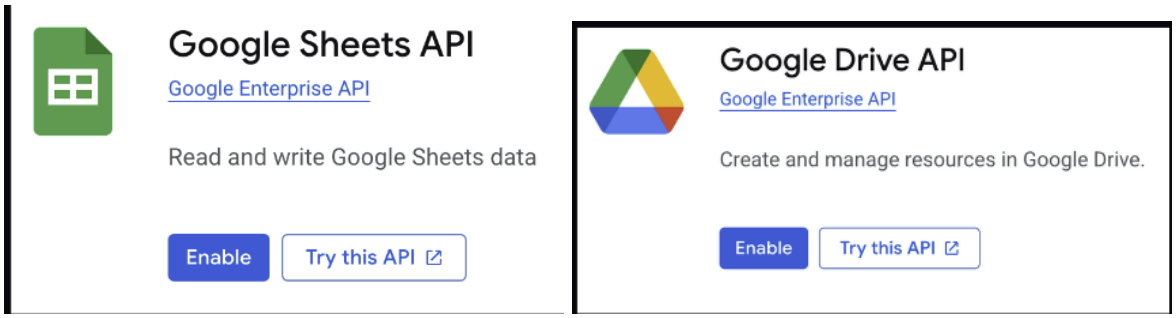
Go to APIs & Service → Library



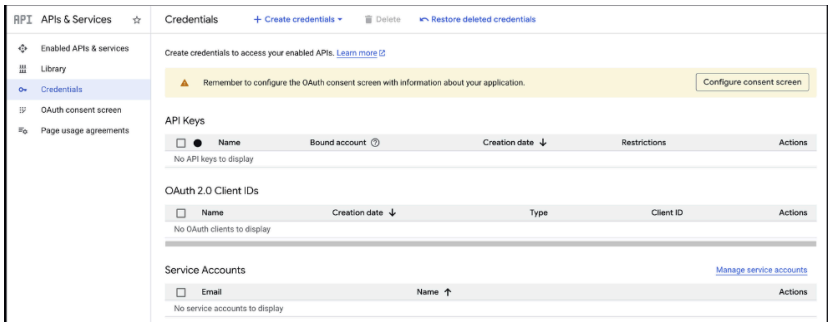


Search and enable "Google Sheets API"
Search and enable "Google Drive API"

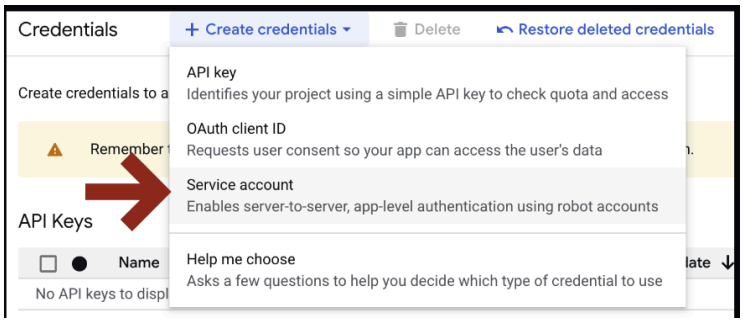




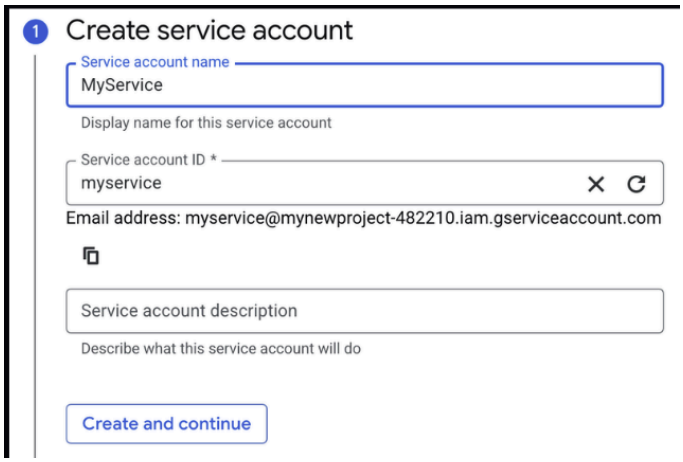
Go to APIs & Service → Credentials



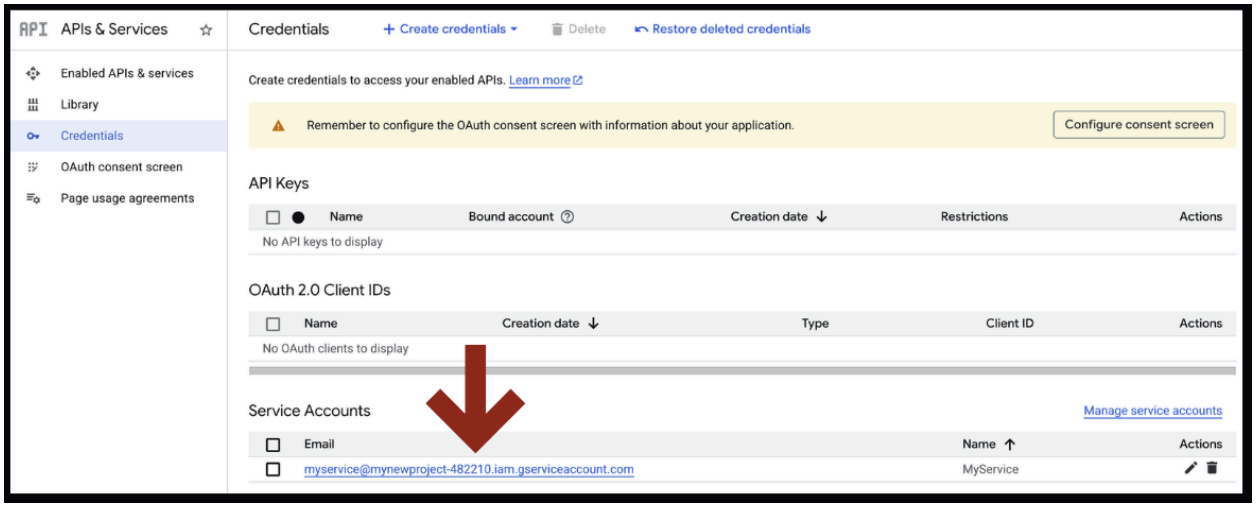
Select Create Credentials



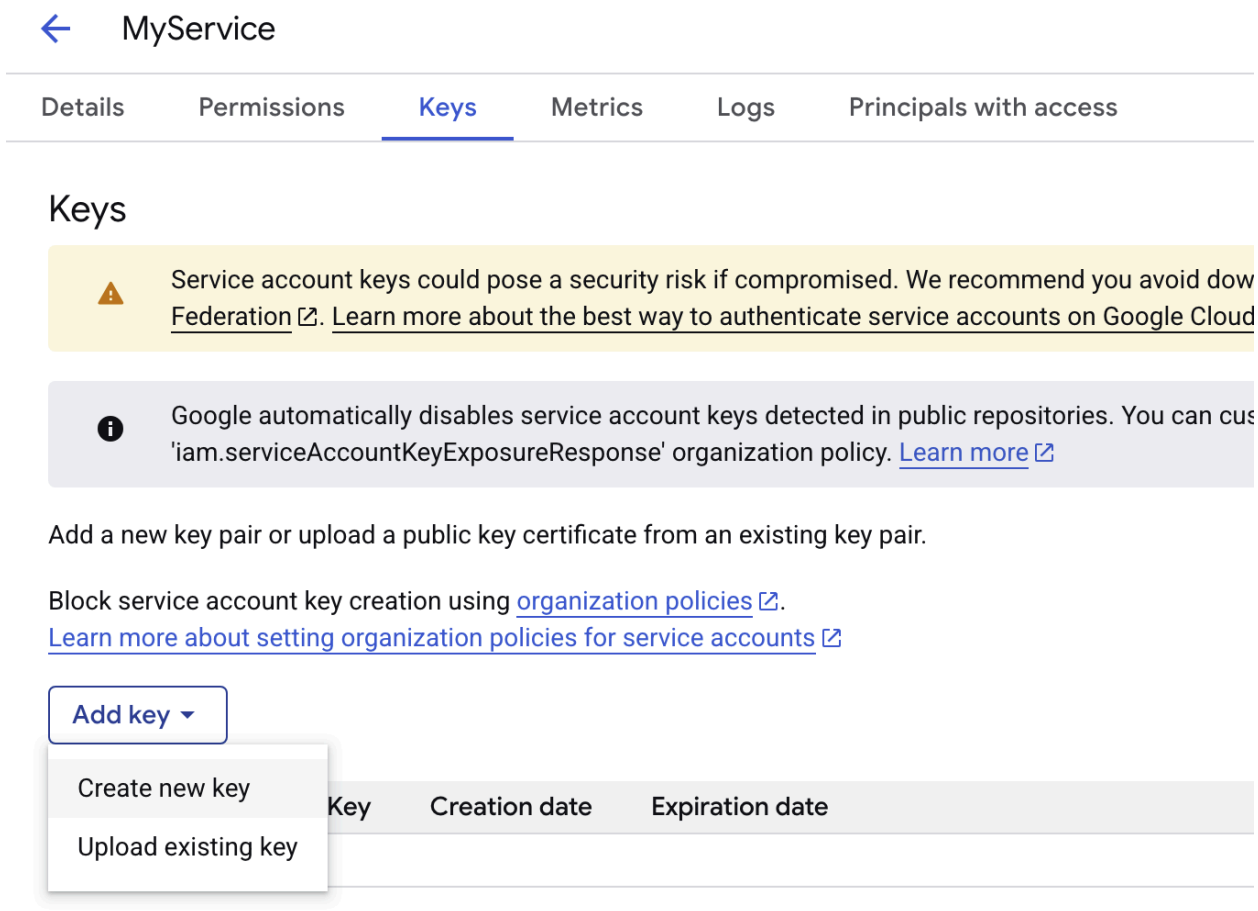
Select Service Account and create one with default settings (choose done for the optional menus)



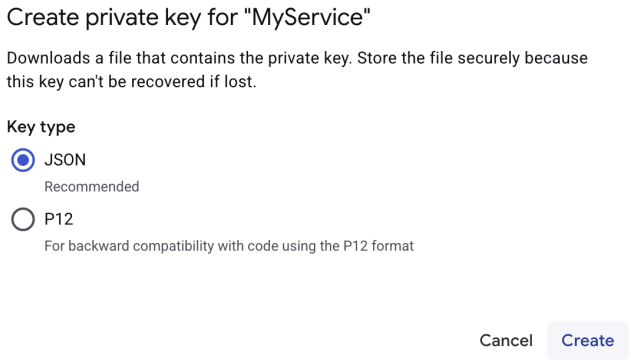
Click on the service account after it's been created



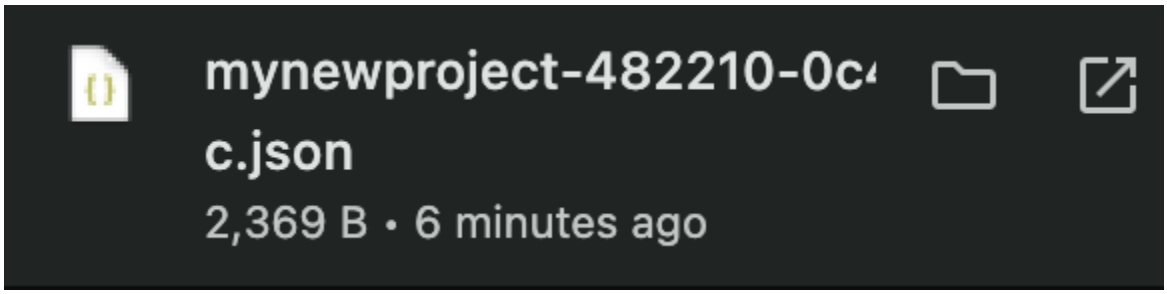
Go to the keys tab and create a new key

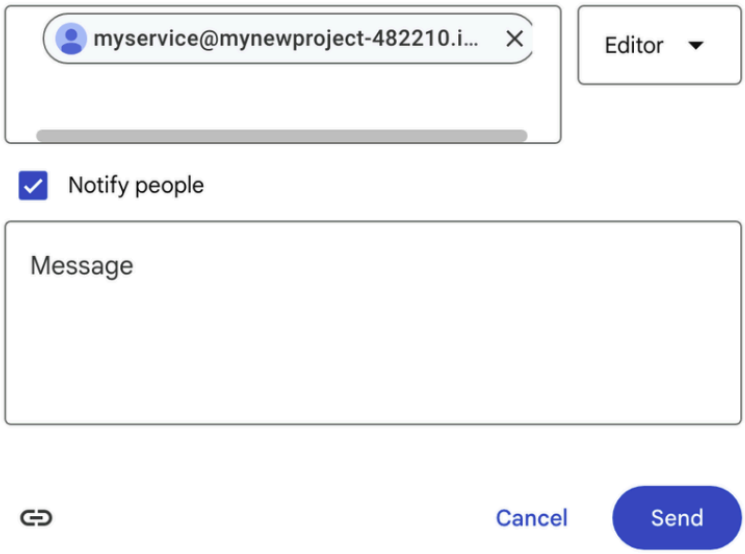


select JSON and it will be downloaded



Check the email of your service account from the JSON file, go to your desired Google Sheet, and add it as an Editor

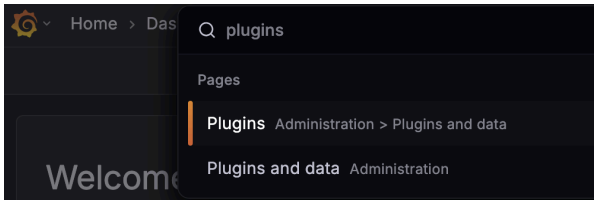


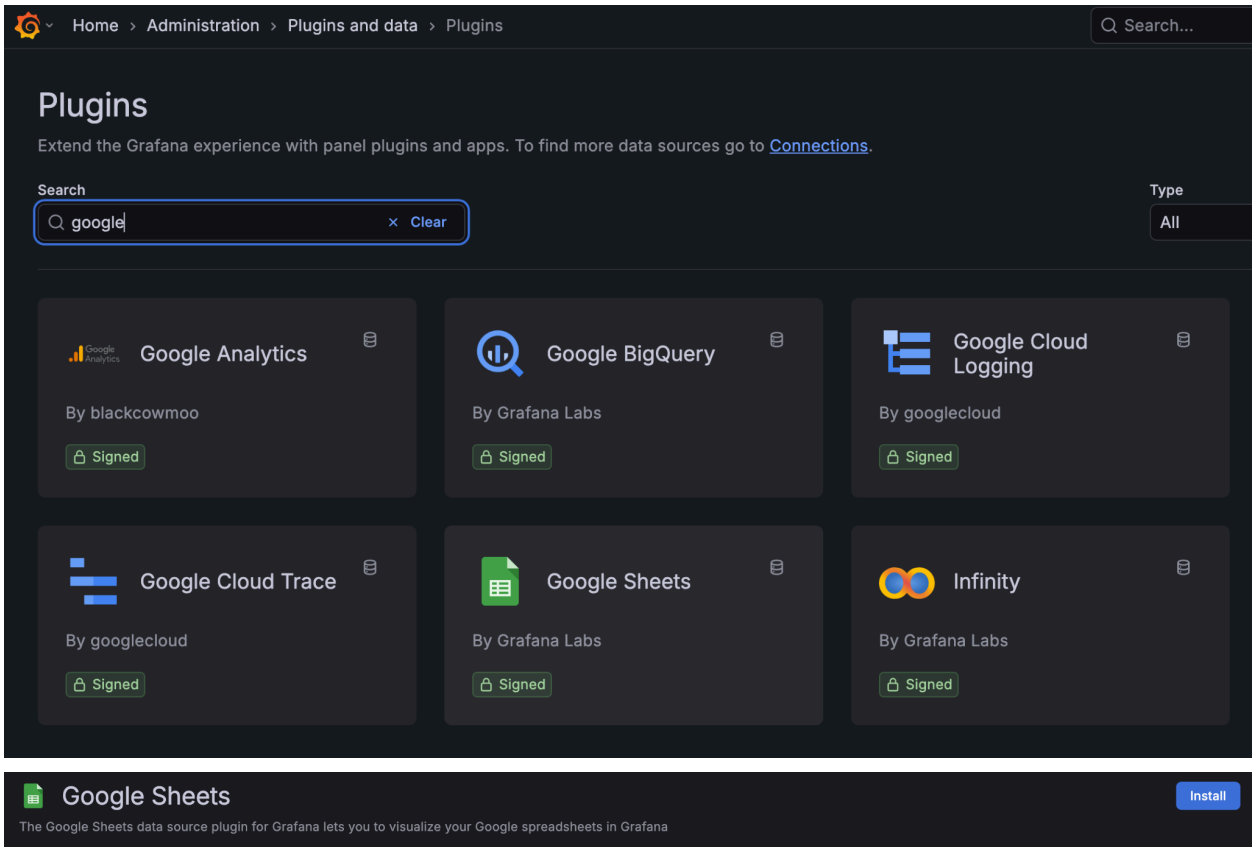


Accessing Sheets in Grafana

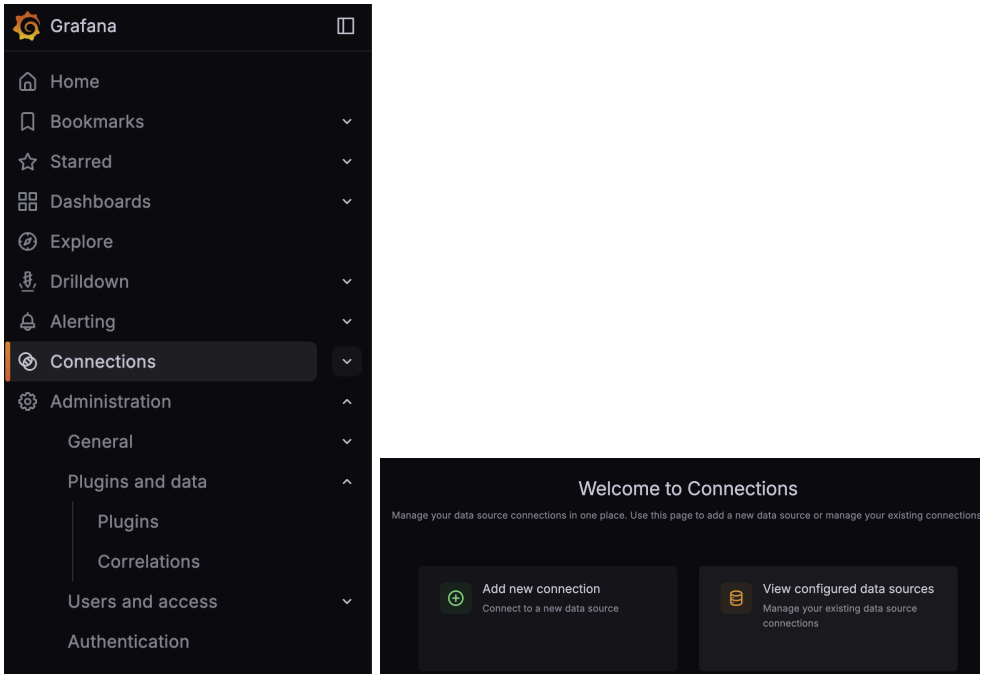
Open Grafana using this link: localhost:3000 (copy paste this exactly in the URL bar)

If you were unable to install the google sheets plugin, go to the grafana search bar, search “plugins” and then in the plugins section search “google sheets” and install the google sheets plugin. The click on add new data source on the same screen.



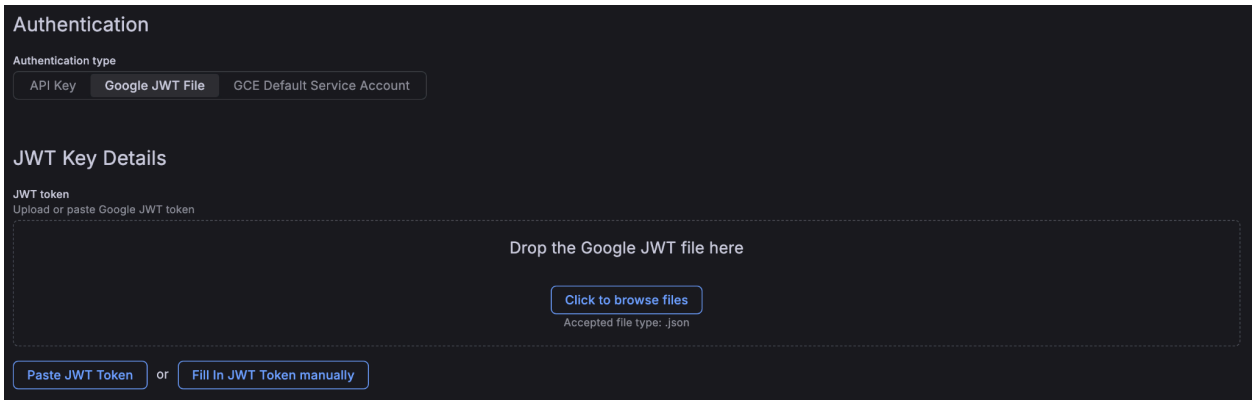


Navigate back to the grafana homepage, go to Connections and click on “View configured data sources.

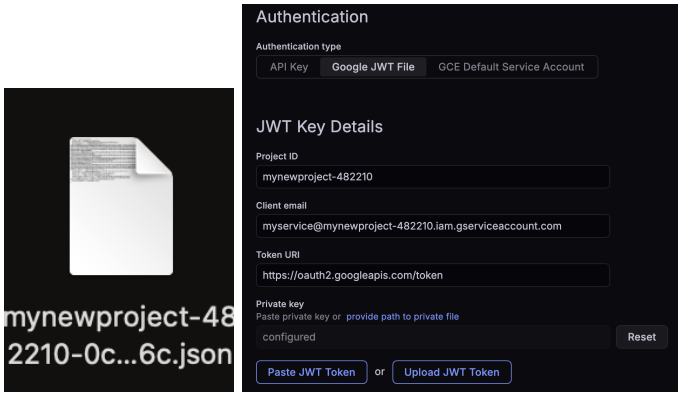


Add Data source(Search Google Sheets and select that)

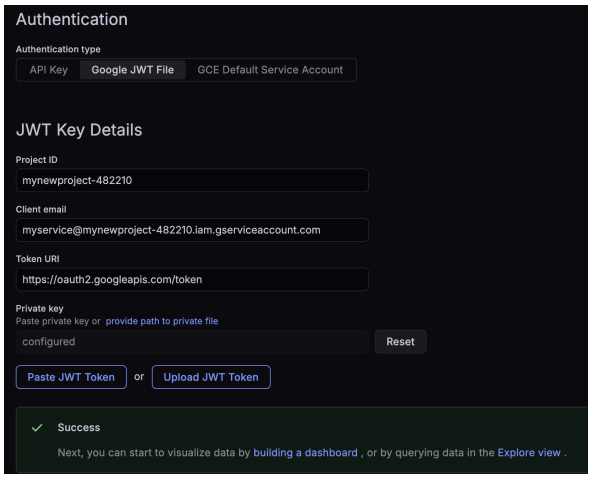
select Auth type to Google JWT file.



Drag and drop the JSON downloaded when setting up the service account

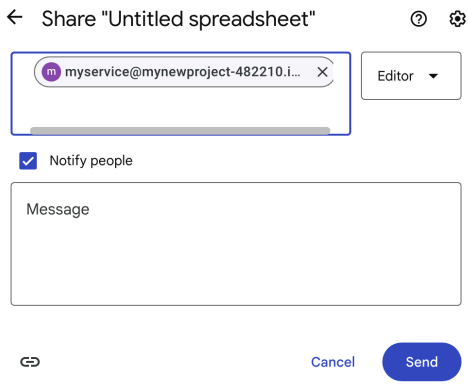


Save and test. (if the bottom displays “permissions failed” refer back to the google service account section and check if your google drive api and the google sheets api were enabled or not).

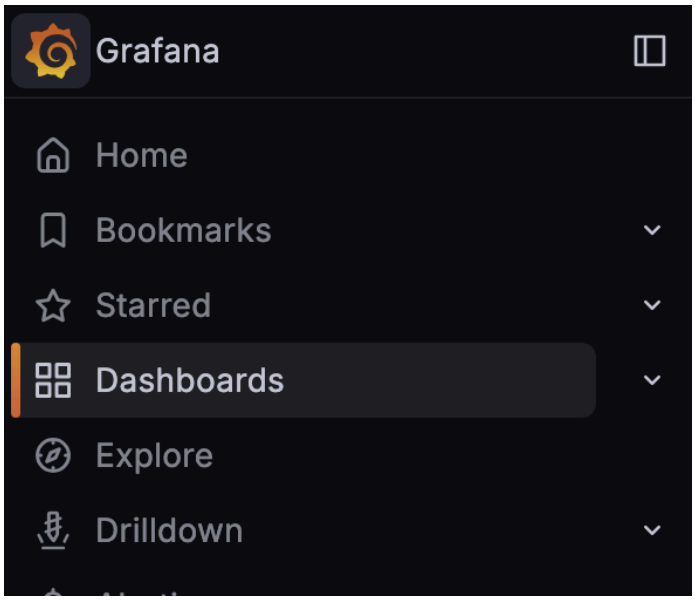


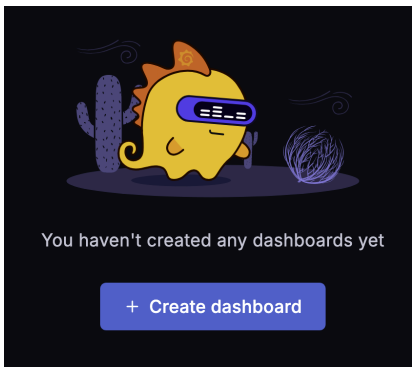
From the JSON file extract the client_email.

In the case that the Google sheet you're trying to access is private you will have to give access to the client_email by giving it viewership rights(Go to the sheet and share).

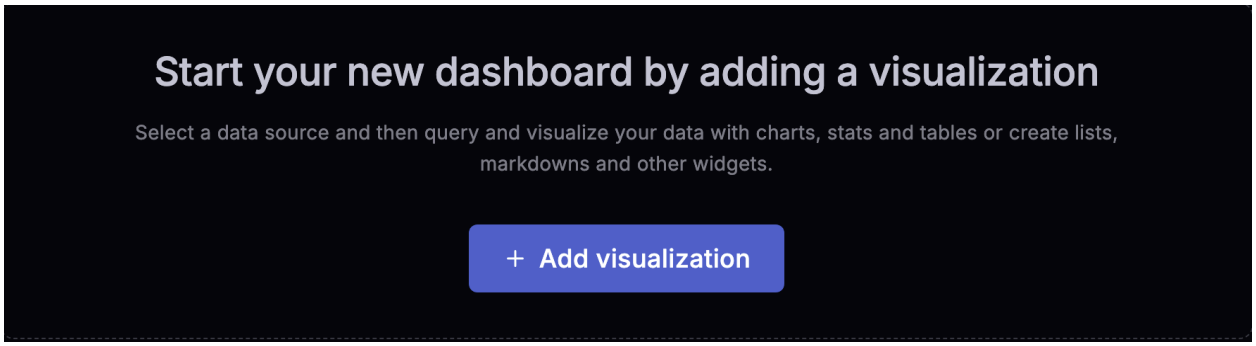


Navigate back to the homepage and go to the dashboards section and click create dashboard

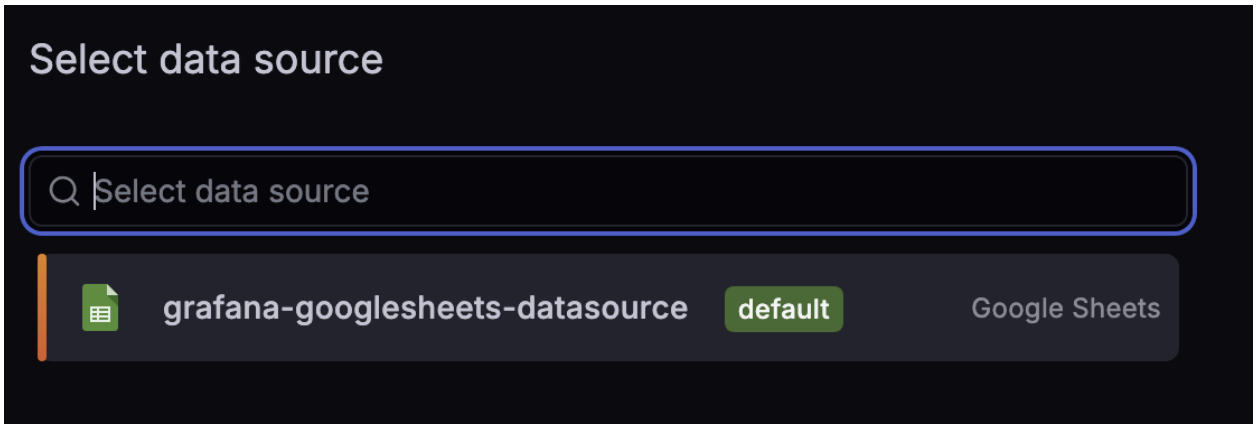




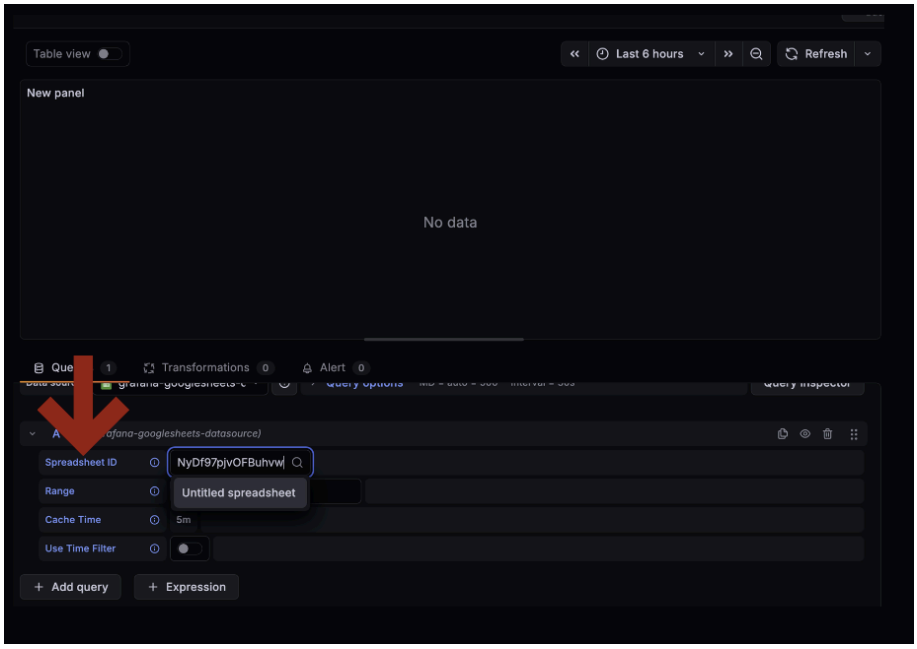
Add a visualization



Select Google Sheets as the data source



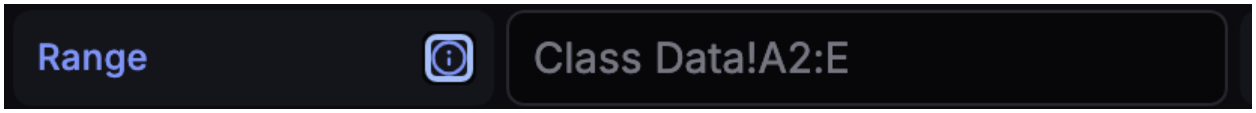
For Spreadsheet ID add the sheet ID found in the URL between the d/ and the /edit



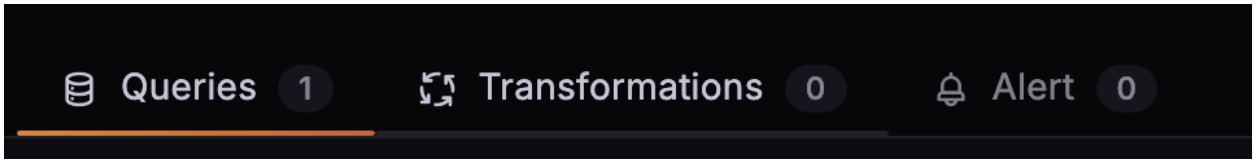
Save the dashboard. Grafana should now have access to the sheet and you can visualise the data from it!

Data Visualisation

After Entering the Spreadsheet ID under the Queries tab you can select range from the spreadsheet to utilize. You may set the range as whatever you want. Use this syntax: “<sheet_name!<lower_limit>:<upper_limit>”



(optional section) Visit the tab next to queries labelled "Transformations" and select organized fields by name to choose which fields to include in any particular visualisation.



To the right you can select the visualization type and customize it.

Example Visualisation:

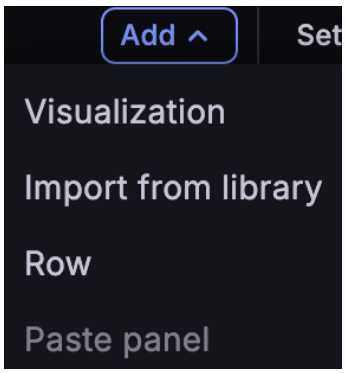
This is specific only to the table visualisation structure provided by grafana, there are many more options available for you and you are free to try any.

Firstly, go to your Google Sheet and input data in a table-like manner as shown:

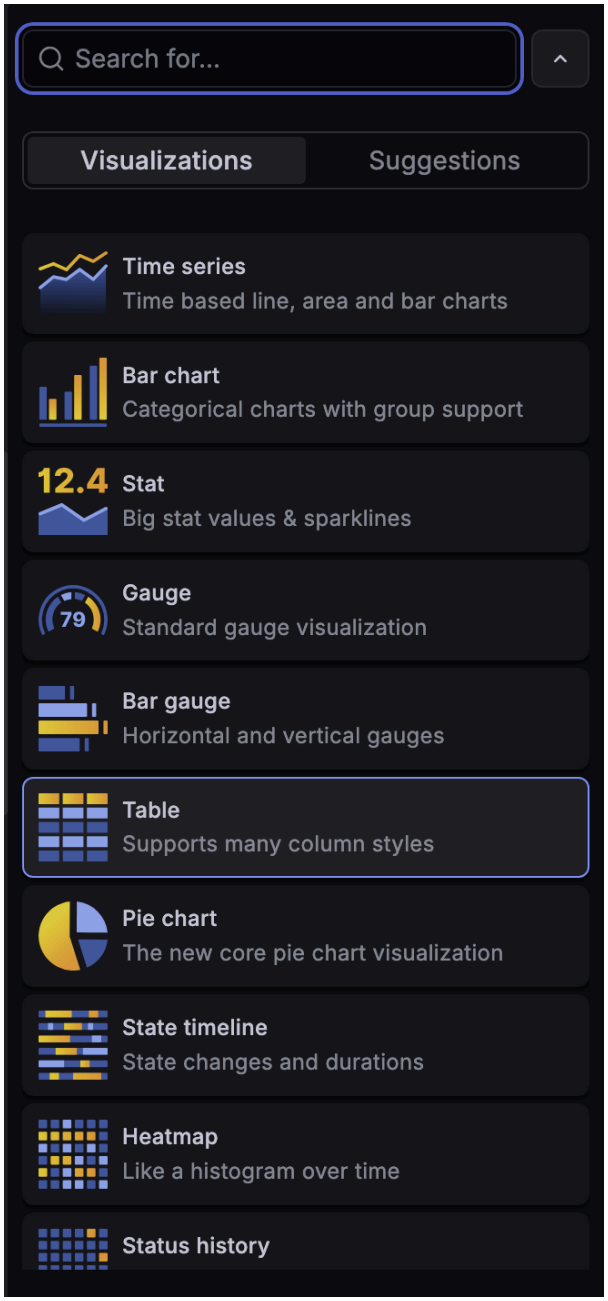
	A	B	C	D
1	Physics	Math	CS	
2	78	100	87	
3	76	99	86	
4	56	25	45	
5	90	74	74	
6	56	89	90	
7				
8				
9				

Then specify the range of your data; in this case, the data set goes from cell A1 to cell C6. You will find this option at the bottom of your dashboard.

On the top right of your dashboard, you will see an “Add” button; click on it and select visualisation



Choose the table visualisation in the visualisation menu



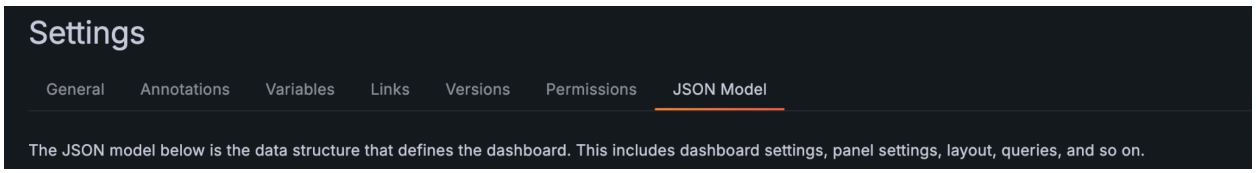
A table of this sorts will appear on your dashboard: you have created your visualisation!

Physics	Math	CS
78	100	87
76	99	86
56	25	45
90	74	74
56	89	90

You can use the menu on the right hand side to format this in the exact way you wish.

Go back to the dashboards page and click on settings (a formatted table for reference)

Select “JSON Model”



Paste the following code in the space of this section to access an example formatted table for you to experiment with:

```
{
 "annotations": {
   "list": [
     {
       "builtIn": 1,
       "datasource": {
         "type": "grafana",
         "uid": "-- Grafana --"
       },
       "enable": true,
       "hide": true,
       "iconColor": "rgba(0, 211, 255, 1)",
       "name": "Annotations & Alerts",
       "type": "dashboard"
     }
   ]
 },
```

```
"editable": true,
"fiscalYearStartMonth": 0,
"graphTooltip": 0,
"id": 0,
"links": [],
"panels": [
  {
    "datasource": {
      "type": "grafana-googlesheets-datasource",
      "uid": "df85p3ob0308wa"
    },
    "description": "hello\n",
    "fieldConfig": {
      "defaults": {
        "custom": {
          "align": "center",
          "cellOptions": {
            "type": "auto"
          },
          "footer": {
            "reducers": []
          },
          "inspect": false,
          "styleField": "100",
          "wrapHeaderText": false
        },
        "mappings": [],
        "thresholds": {
          "mode": "absolute",
          "steps": [
            {
              "color": "green",
              "value": 0
            },
            {
              "color": "red",
```

```
              "value": 80
            }
          ]
        },
        "unit": "%"
      },
      "overrides": []
    },
    "gridPos": {
      "h": 8,
      "w": 12,
      "x": 0,
      "y": 0
    },
    "id": 2,
    "options": {
      "cellHeight": "sm",
      "showHeader": true
    },
    "pluginVersion": "12.3.1",
    "targets": [
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        "range": "Sheet1!A1:C6",
        "refId": "A",
        "spreadsheet": "1mUIRs9wh0BhiWC9S8PEI0nQ7seiNyDf97pjvOFBuhvw"
      }
    ],
    "title": "New panel",
    "type": "table"
  },
  {
    "datasource": {
      "type": "grafana-googlesheets-datasource",
      "uid": "df85p3ob0308wa"
    },
```

```
    "fieldConfig": {
      "defaults": {
        "color": {
          "mode": "palette-classic"
        },
        "custom": {
          "axisBorderShow": false,
          "axisCenteredZero": false,
          "axisColorMode": "text",
          "axisLabel": "",
          "axisPlacement": "auto",
          "barAlignment": 0,
          "barWidthFactor": 0.6,
          "drawStyle": "line",
          "fillOpacity": 0,
          "gradientMode": "none",
          "hideFrom": {
            "legend": false,
            "tooltip": false,
            "viz": false
          },
          "insertNulls": false,
          "lineInterpolation": "linear",
          "lineWidth": 1,
          "pointSize": 5,
          "scaleDistribution": {
            "type": "linear"
          },
          "showPoints": "auto",
          "showValues": false,
          "spanNulls": false,
          "stacking": {
            "group": "A",
            "mode": "none"
          },
          "thresholdsStyle": {
```

```
            "mode": "off"
          }
        },
        "mappings": [],
        "thresholds": {
          "mode": "absolute",
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            {
              "color": "green",
              "value": 0
            },
            {
              "color": "red",
              "value": 80
            }
          ]
        }
      },
      "overrides": []
    },
    "gridPos": {
      "h": 8,
      "w": 12,
      "x": 0,
      "y": 8
    },
    "id": 1,
    "options": {
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        "calcs": [],
        "displayMode": "list",
        "placement": "bottom",
        "showLegend": true
      },
      "tooltip": {
        "hideZeros": false,
```

```
        "mode": "single",
        "sort": "none"
      }
    },
    "pluginVersion": "12.3.1",
    "targets": [
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        "cacheDurationSeconds": 300,
        "datasource": {
          "type": "grafana-googlesheets-datasource",
          "uid": "df85p3ob0308wa"
        },
        "refId": "A",
        "spreadsheet": "1mUIRs9wh0BhiWC9S8PEI0nQ7seiNyDf97pjvOFBuhvw"
      }
    ],
    "title": "New panel",
    "type": "timeseries"
  }
],
"preload": false,
"schemaVersion": 42,
"tags": [],
"templating": {
  "list": []
},
"time": {
  "from": "2025-12-25T02:17:20.873Z",
  "to": "2025-12-25T08:17:20.873Z"
},
"timepicker": {},
"timezone": "browser",
"title": "New dashboard",
"uid": "adpm224",
"version": 4
}
```

Next Steps

Now you may refer to Guide-3 for Node-RED and API usage:

https://docs.google.com/document/d/1aDf66Jmn8E-IRz1RGE8FL9GGfKQbnUxi2WLivL_XtPs/edit?usp=sharing