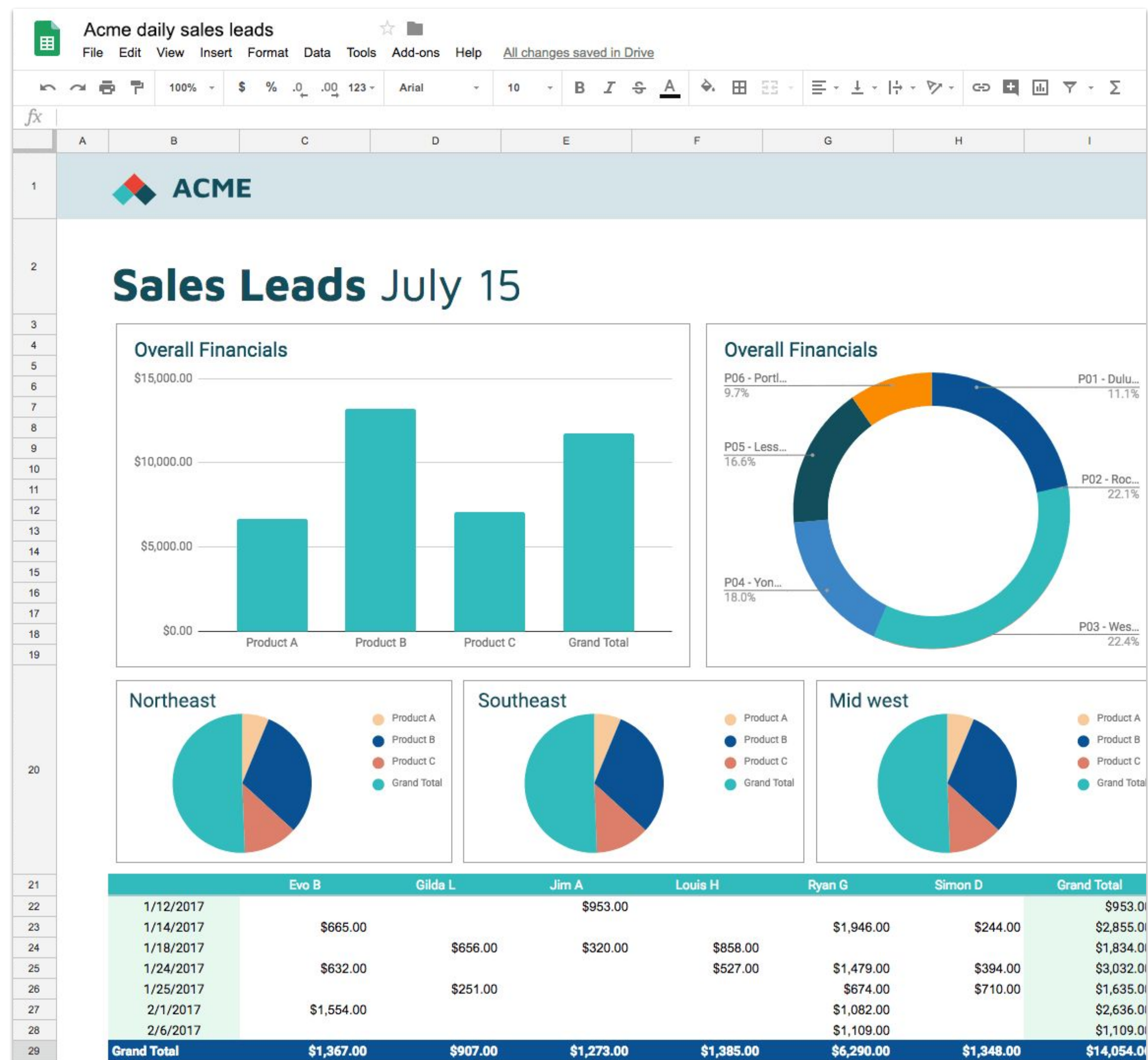


# Work Less and Do More: Google Sheets for Node.js Developers

*Anu Srivastava*  
*Franziska Hinkelmann*







# Why Sheets?



@asrivas\_dev @fhinkel



Collect



Prepare



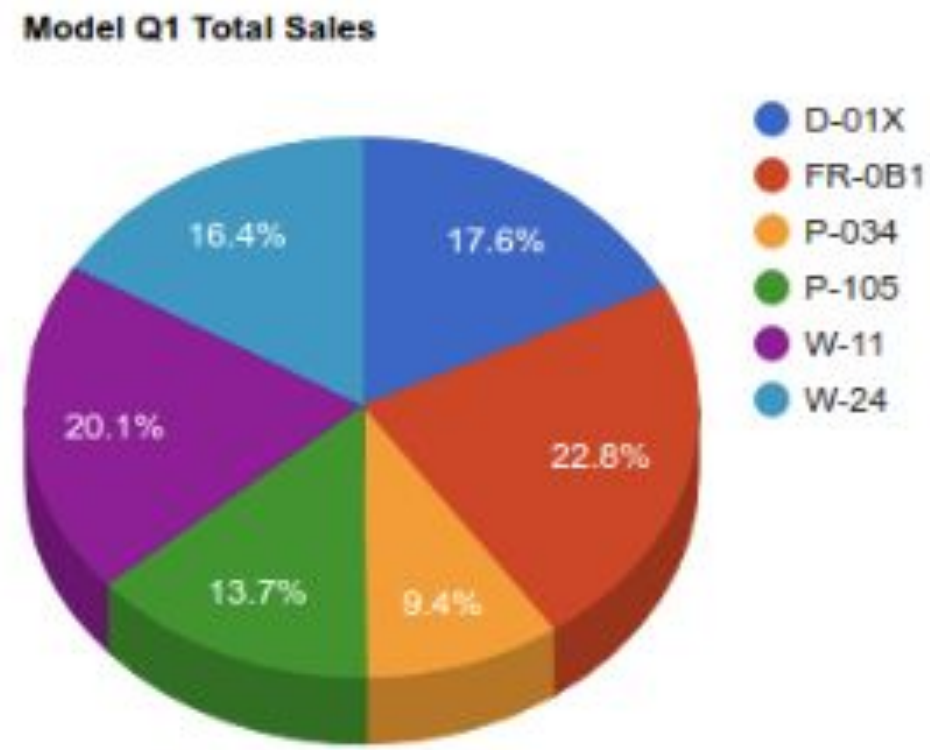
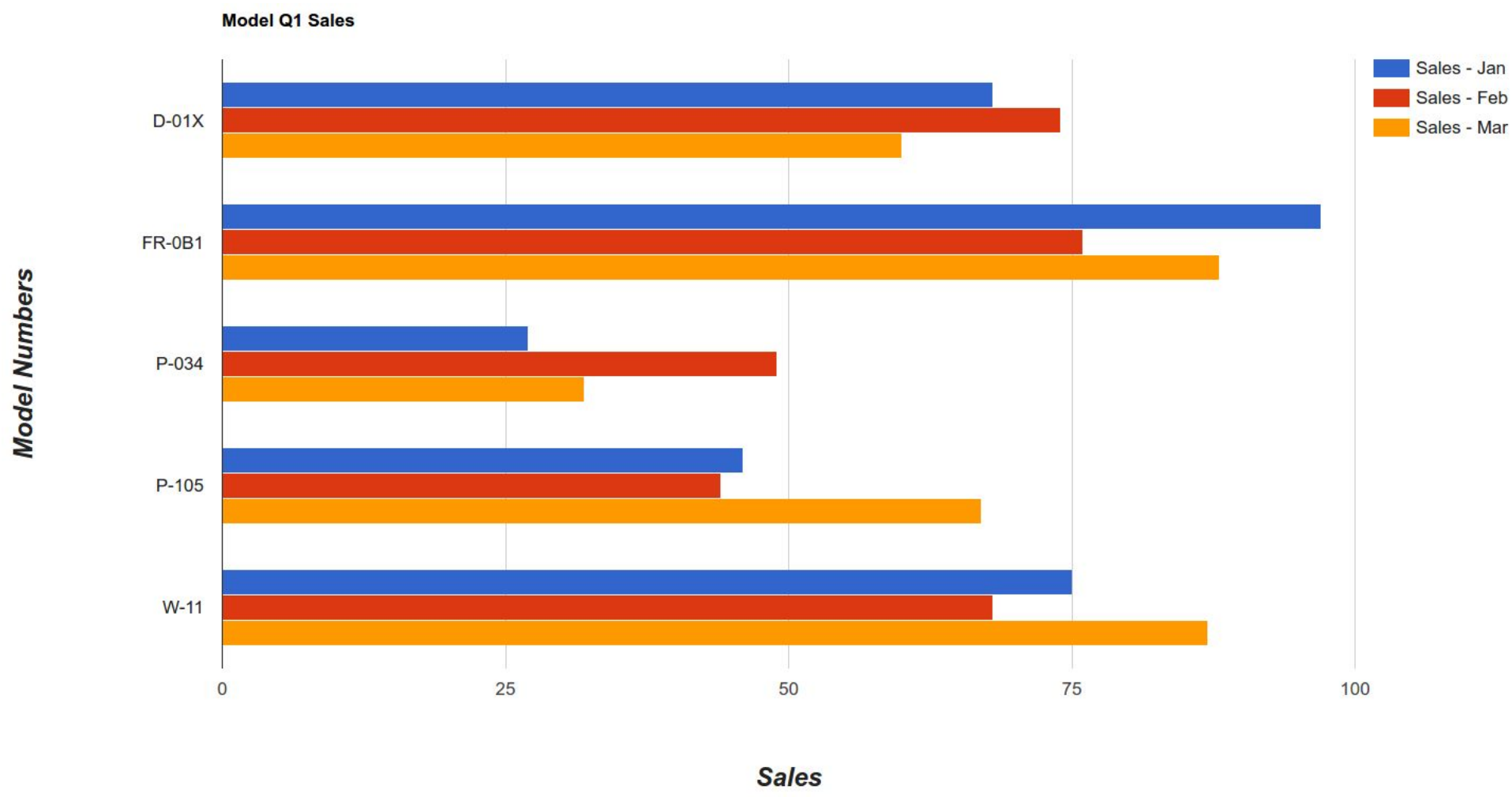
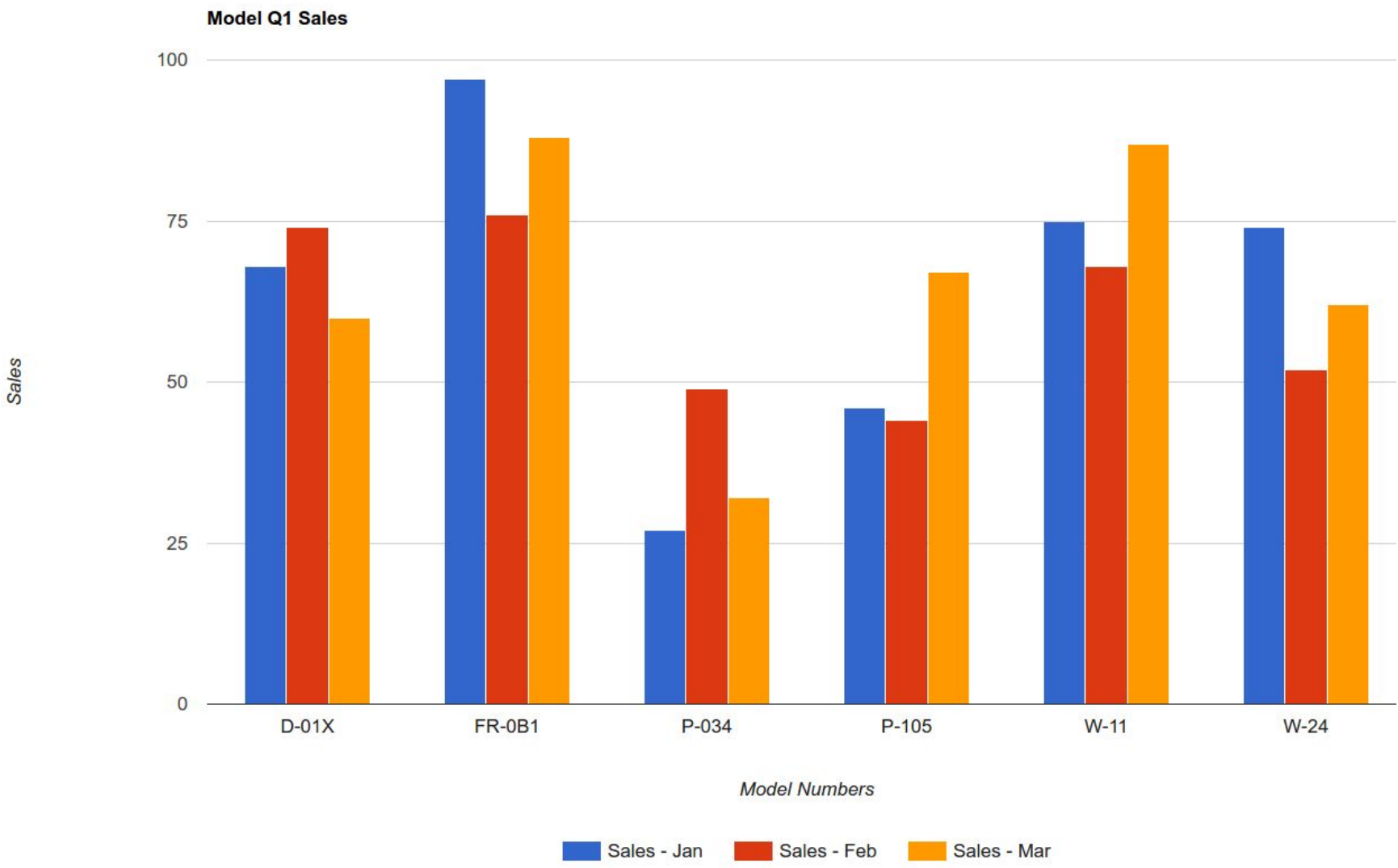
Analyze



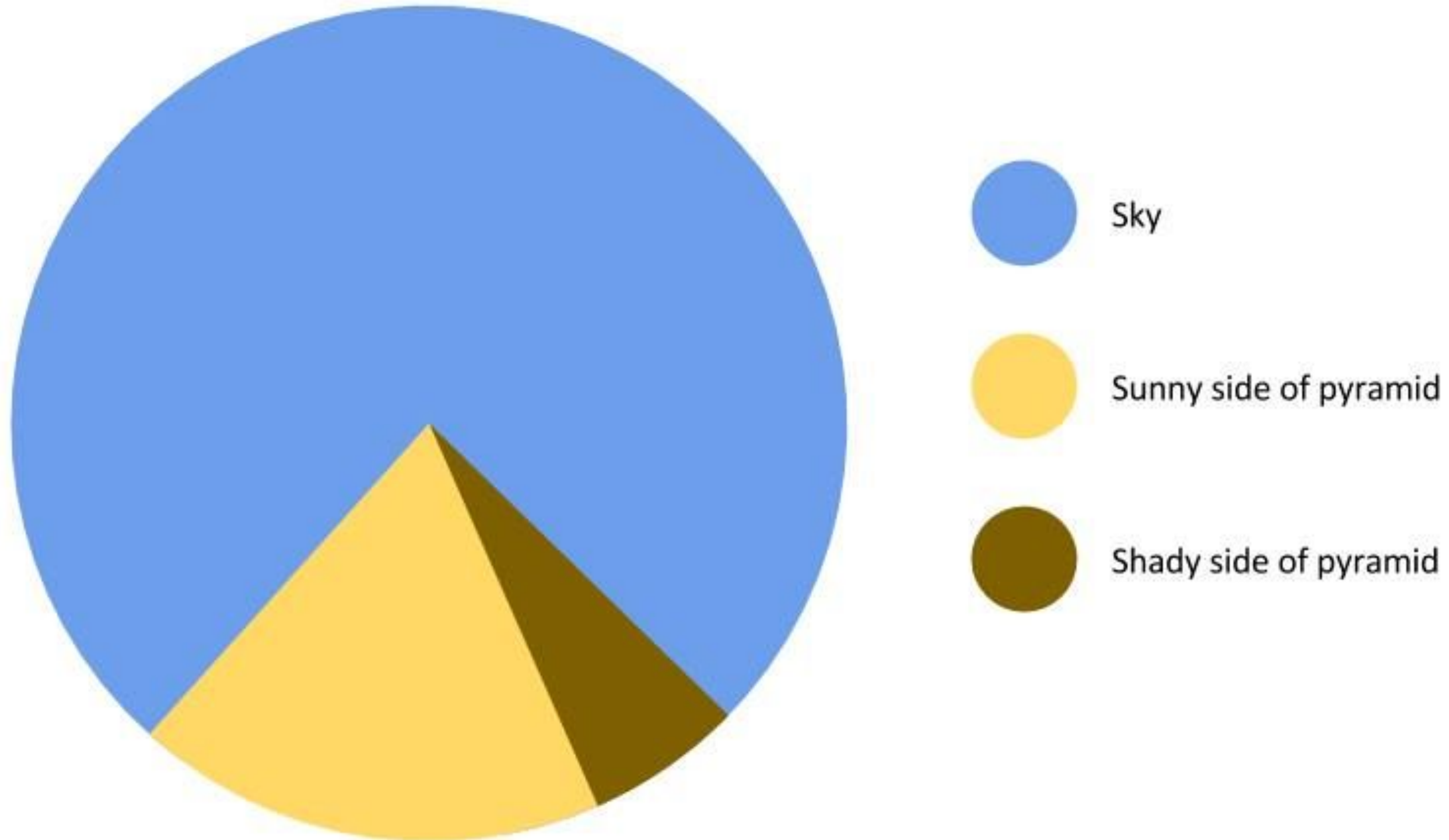
Visualize



# Charts

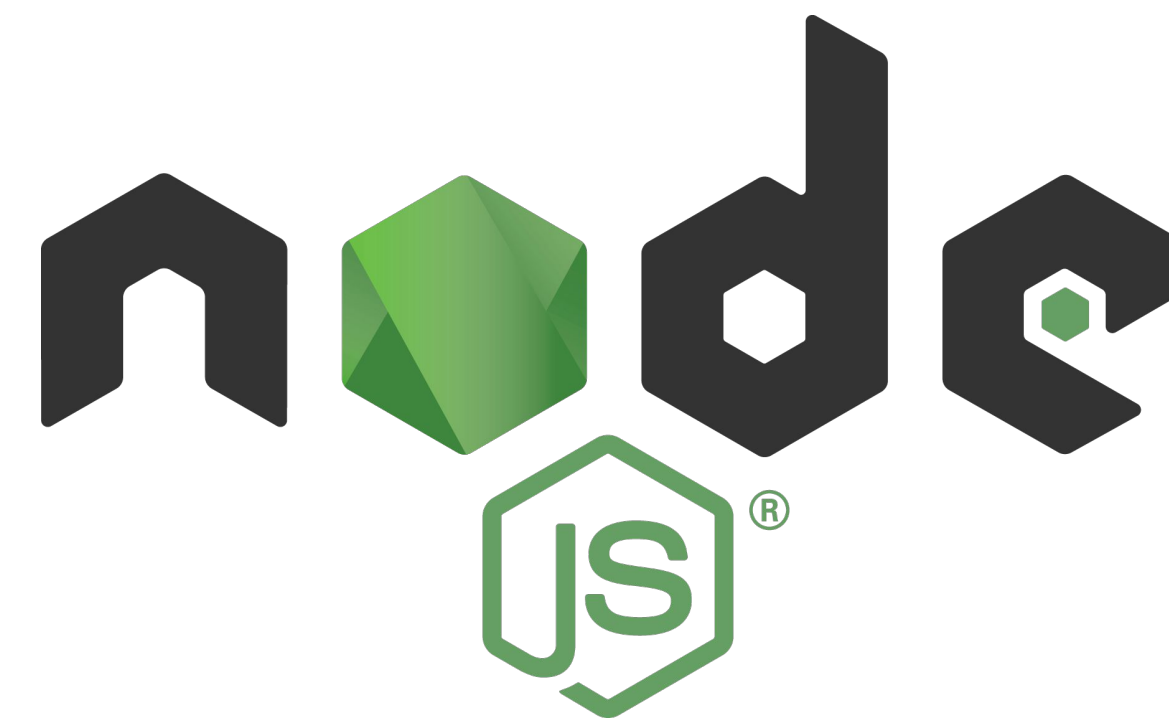


# 0. Prototyping



# Automate the task!

## Node.js to the rescue





# Google Sheets API



```
$ npm install googleapis
```



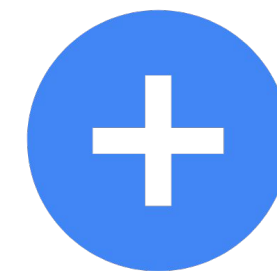
# G Suite APIs







# Google Cloud



## G Suite



@asrivas\_dev @fthinkel

# Google APIs client libraries for many languages

Documentation	Samples
<a href="#">Google API Client Library for Java</a>	<a href="#">Java samples</a>
<a href="#">Google API Client Library for JavaScript (beta)</a>	<a href="#">JavaScript samples</a>
<a href="#">Google API Client Library for .NET</a>	<a href="#">.NET samples</a>
<a href="#">Google API Client Library for Objective-C</a>	<a href="#">Objective-C samples</a>
<a href="#">Google API Client Library for PHP (beta)</a>	<a href="#">PHP samples</a>
<a href="#">Google API Client Library for Python</a>	<a href="#">Python samples</a>
These early-stage libraries are also available:	
Documentation	Samples
<a href="#">Google APIs Client Libraries for Dart (beta)</a>	<a href="#">Dart samples</a>
<a href="#">Google API Client Library for Go (alpha)</a>	<a href="#">Go samples</a>
<a href="#">Google API Client Library for Node.js (alpha)</a>	<a href="#">Node.js samples</a>
<a href="#">Google API Client Library for Ruby (alpha)</a>	<a href="#">Ruby samples</a>

```
const { google } = require('googleapis');
```



```
const { google } = require('googleapis');
```

```
const SCOPES =  
  [ 'https://www.googleapis.com/auth/spreadsheets' ];
```

```
const sheets = google.sheets({  
  version,  
  auth  
});
```



```
await sheets.spreadsheets.values.update({  
    spreadsheetId,  
    range: 'A1',  
    resource: {  
        values: [['Hello World!']],  
    },  
});
```



Browser window showing Google Sheets titled "Hello World". The URL bar highlights the spreadsheet ID: `1AqRUH17_hWK-pz-_oq2FWqU39bgVIBZq6Vu7q2r-Oo0`.

Document title: Hello World

Menu: File Edit View Insert Format Data Tools Add-ons Help

Toolbar: Undo, Redo, Print, Copy, Paste, 200%, \$, %, .0, .00, 123, Arial, 10, Bold, Italic, Underline, Text color, Fill color, Background color, Font color, Font size, Font weight, Font style, Font underline, Font color, Font size, Font weight, Font style, Font underline, Font color, Font size, Font weight, Font style, Font underline.

Formula bar: fx

	A	B	C	D
1	Hello World!			
2				
3				
4				
5				

Sheet tabs: + Sheet1



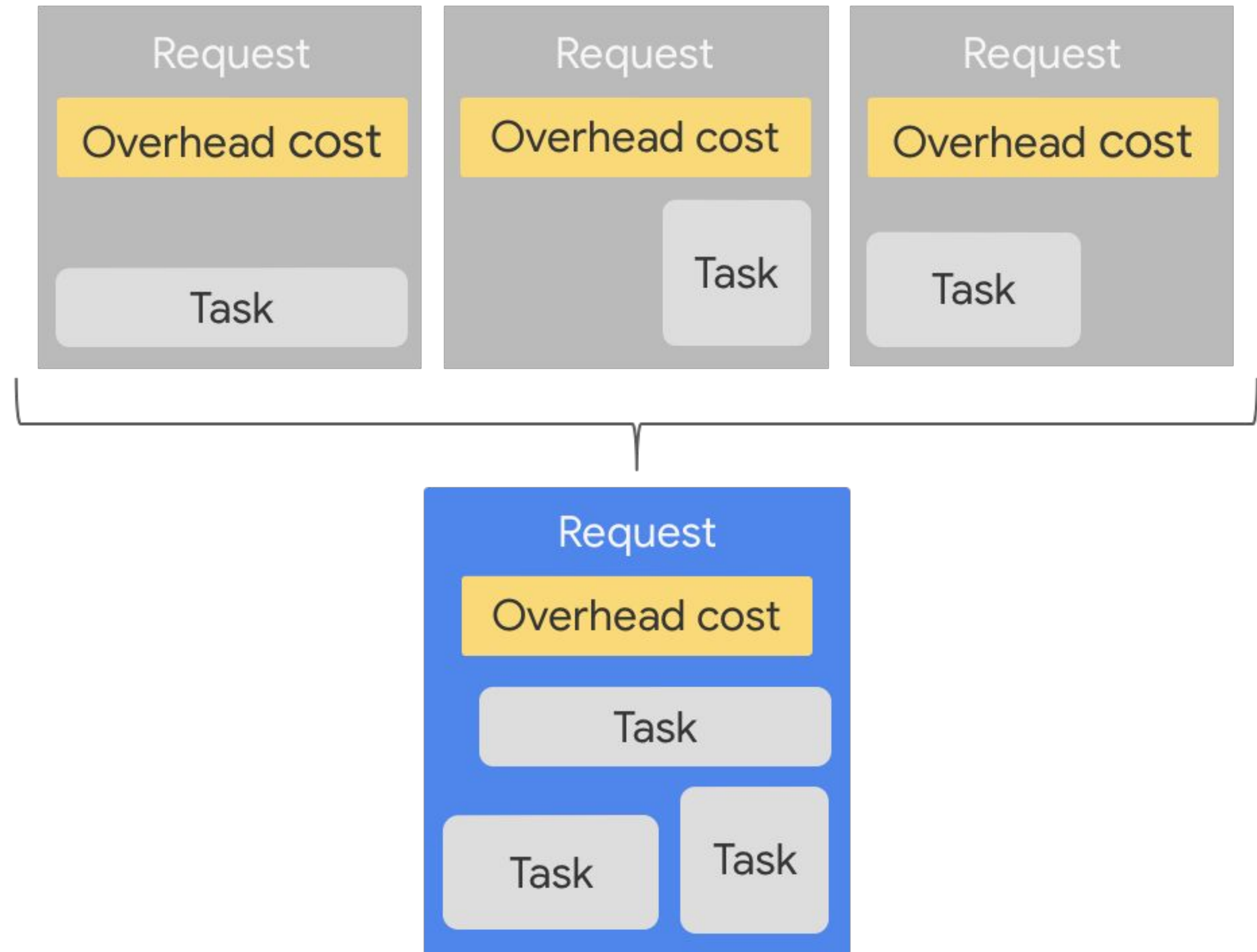
# Writing to spreadsheets

Use `batchUpdate()`



# Why batch?

- Reduce latency
- Less quota




# For almost anything!

- Write data
- Add charts
- Format cells
- Add/Delete sheets
- Sort/filter data
- Add developer metadata











Search or jump to...


[Pull requests](#) [Issues](#) [Marketplace](#) [Explore](#)










 **nodejs / node**

 **Code**

 **Issues 658**

 **Pull requests 223**

 **Actions**

Node.js JavaScript runtime ✨🐢🚀✨

<https://nodejs.org/>

nodejs

javascript

runtime

with

linux

macos

Traffic

Commits

Code frequency

Dependency graph

Alerts

Network

Forks

People

50 Active Pull Requests

3

Merged Pull Requests

47

Proposed Pull Requests

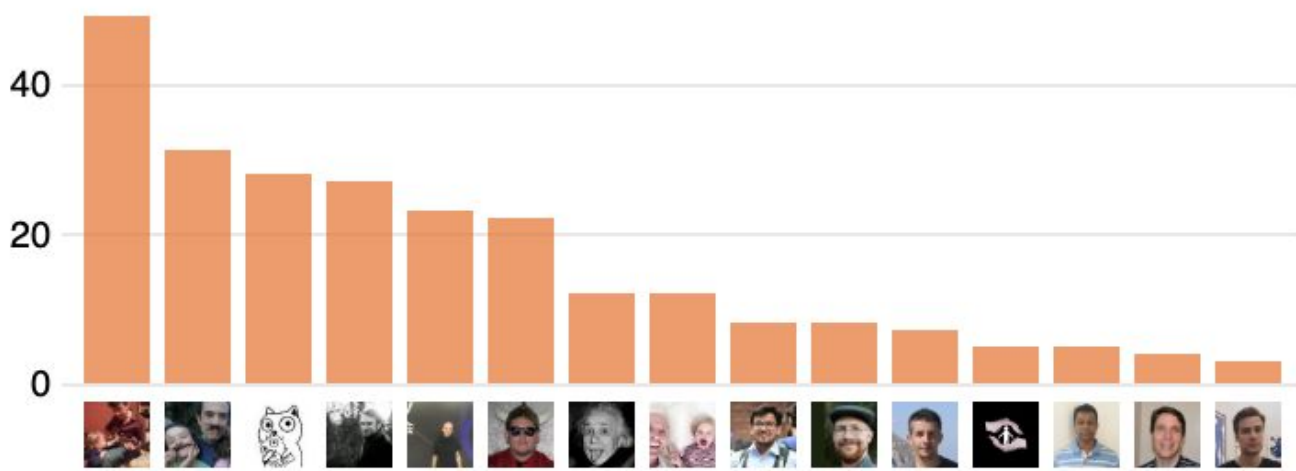
29

Closed Issues

20

New Issues

Excluding merges, **88 authors** have pushed **92 commits** to master and **364 commits** to all branches. On master, **778 files** have changed and there have been **33,798 additions** and **21,339 deletions**.





Instar 60,766

Fork 13,555

Settings




Period: 1 week


 @asrivas\_dev @fhinkel





Search or jump to...


[Pull requests](#) [Issues](#) [Marketplace](#) [Explore](#)


  

 **nodejs / node**

 **Code**

 **Issues** **658**

 **Pull requests** **223**

 **Actions**

Node.js JavaScript runtime ✨🐢🚀✨

<https://nodejs.org/>

Traffic

Commits

Code frequency

Dependency graph

Alerts

Network

Forks

People

50 Active Pull Requests

3

Merged Pull Requests

47

Proposed Pull Requests

29

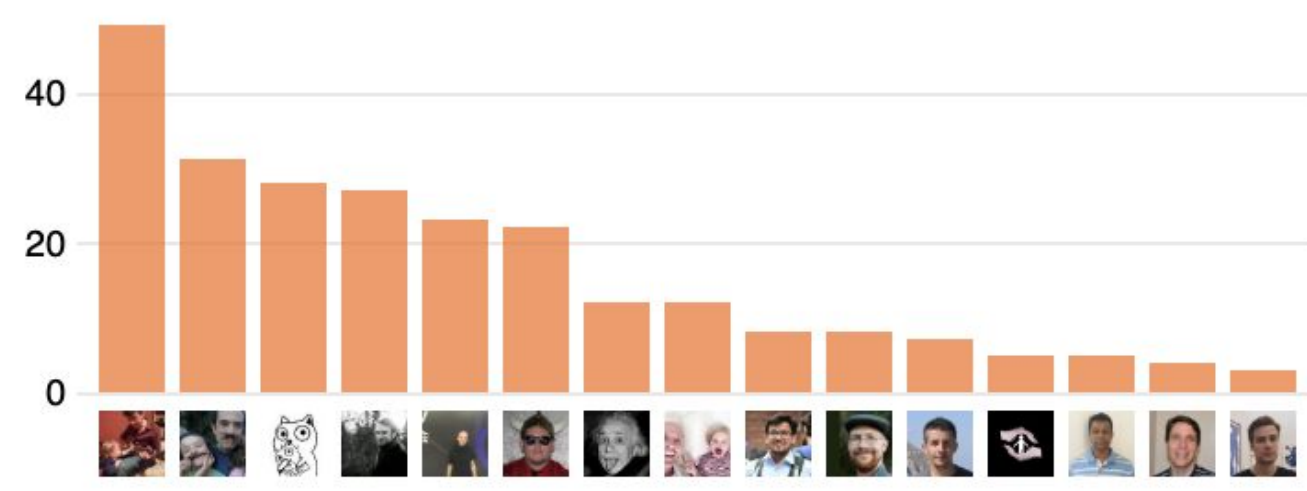
Closed Issues


20

New Issues

49 Active Issues

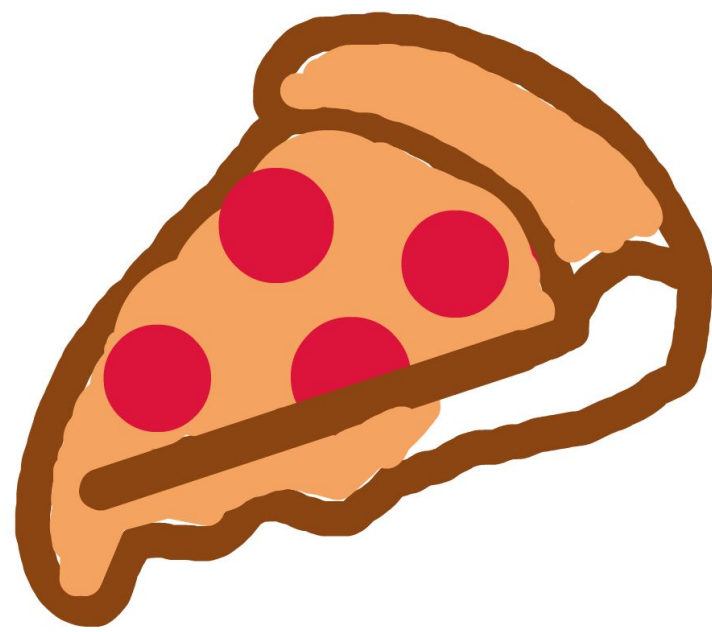
Excluding merges, **88 authors** have pushed **92 commits** to master and **364 commits** to all branches. On master, **778 files** have changed and there have been **33,798 additions** and **21,339 deletions**.



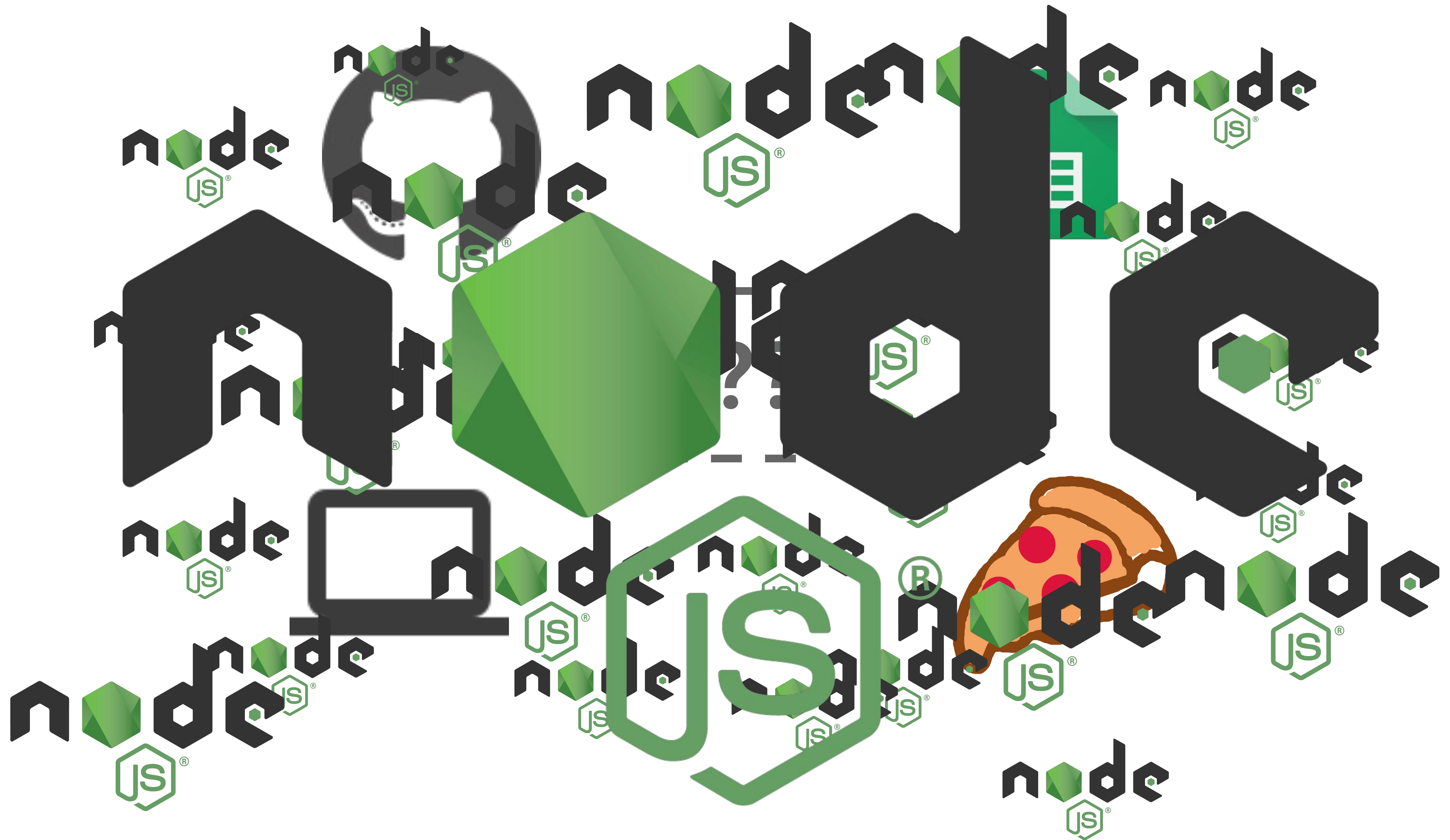
 @asrivas\_dev @fhinkel



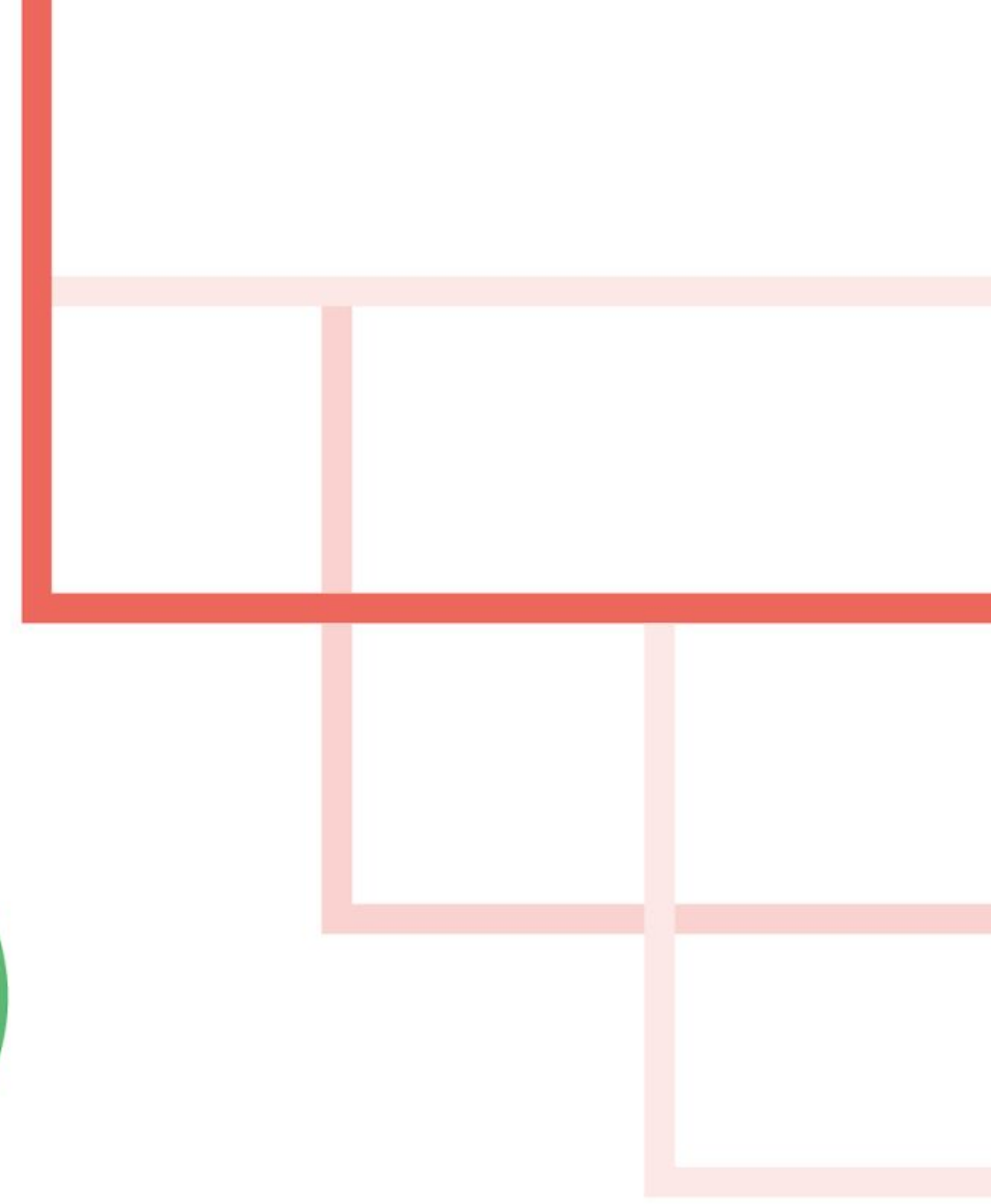
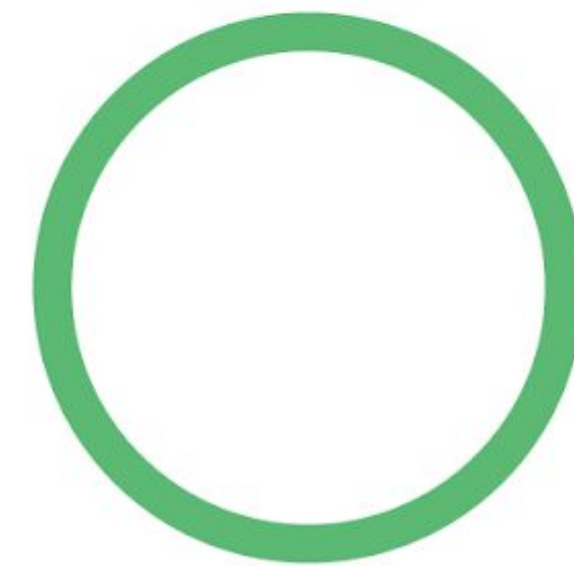
# Does food satisfaction correlate to Node.js health?







# 1. Collect data







Search or jump to...



[Pull requests](#) [Issues](#) [Marketplace](#) [Explore](#)



 [nodejs](#) / [node](#)

 Unwatch ▾

2,964

★ Unstar

60,766

 Fork

13,555

 Code

 Issues 654

 Pull requests 220

 Actions

 Projects 9

 Insights

 Settings

Node.js JavaScript runtime ✨🐢🚀✨ <https://nodejs.org/>

Edit

[nodejs](#)

[javascript](#)

[node](#)

[js](#)

[runtime](#)

[mit](#)

[linux](#)

[macos](#)

[windows](#)

[Manage topics](#)

 26,903 commits

 144 branches

 548 releases

 2,439 contributors

 View license

Branch: master ▾

New pull request

Create new file

Upload files

Find File

Clone or download ▾



gengjiawen and addaleax test: better output for test-report-uv-handles.js ...

Latest commit f8cf9f9 2 days ago

 [.github](#)

doc: add multiple issue templates for GitHub

9 months ago

 [benchmark](#)

lib: remove Reflect.apply where appropriate

2 days ago

 [deps](#)

deps: add acorn stage-3 plugins

a day ago

 [doc](#)

doc: add Electron 6 to abi\_version\_registry

8 hours ago

 [lib](#)

buffer,errors: improve bigint, big numbers and more

12 hours ago

 [src](#)

report: use const reference in node\_report.cc

2 hours ago

 [test](#)

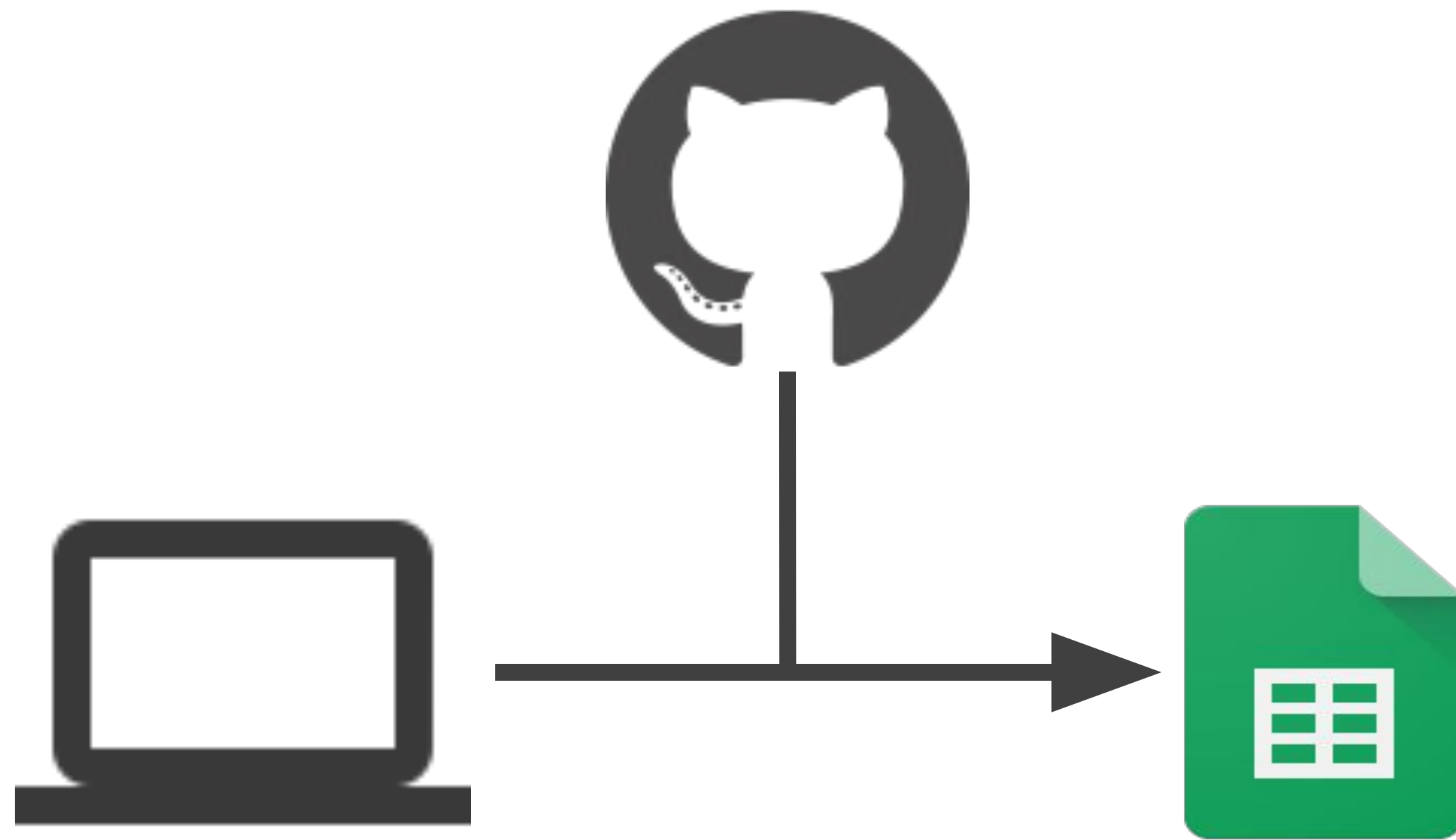
test: better output for test-report-uv-handles.is

2 hours ago



@asrivas\_dev @thinkel





# Octokit

- Github REST API client for JavaScript
- Same information as insights tab
- API calls for issues and PRs

fx						
	A	B	C	D	E	F
1	Date	Open Issues	Closed issues	Open PRs	Merged PRs	
2	4/15/2019	646	5	212	5	
3	4/16/2019	646	2	215	6	
4	4/17/2019	647	5	200	2	
5	4/18/2019	648	6	212	4	
6	4/19/2019	647	5	215	0	
7	4/20/2019	644	7	216	1	
8	4/21/2019	640	3	195	3	
9	4/22/2019	641	4	199	1	
10	4/23/2019	642	1	191	2	
11	4/24/2019	645	2	212	3	
12	4/25/2019	644	9	200	8	
13	4/26/2019	637	12	188	9	
14	4/27/2019	629	10	180	8	
15	4/28/2019	624	8	175	11	
16	4/29/2019	618	2	175	9	
17	4/30/2019	617	0	179	4	

+
≡
Form Responses 1
Github Data



# Very Scientific Food Satisfaction Survey

How satisfied are you with your food today

	1	2	3	4	5	
Not satisfied	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very satisfied

SUBMIT



<div> <span>↶</span> <span>↷</span> <span>🖨</span> <span>📋</span> </div> <div> 100% <span>▼</span> </div> <div> \$ % .0 <span>↶</span> .00 <span>↷</span> 123 <span>▼</span> </div> <div> Arial </div>			
<div> <span>fx</span> </div>			
	A	B	C
1	Timestamp	How was your lunch today?	
2	3/14/2019	4	
3	3/14/2019	5	
4	3/21/2019	1	
5	3/21/2019	1	
6	3/21/2019	1	
7	3/21/2019	3	
8	3/21/2019	1	
9	3/21/2019	1	
10	3/21/2019	1	
11	3/21/2019	1	
12	3/21/2019	1	
13	3/21/2019	1	
14	3/21/2019	1	
<div> <span>+</span> <span>☰</span> </div> <div> <span>☰</span> Form Responses 1 <span>▼</span> </div> <div> Github Data <span>▼</span> </div>			

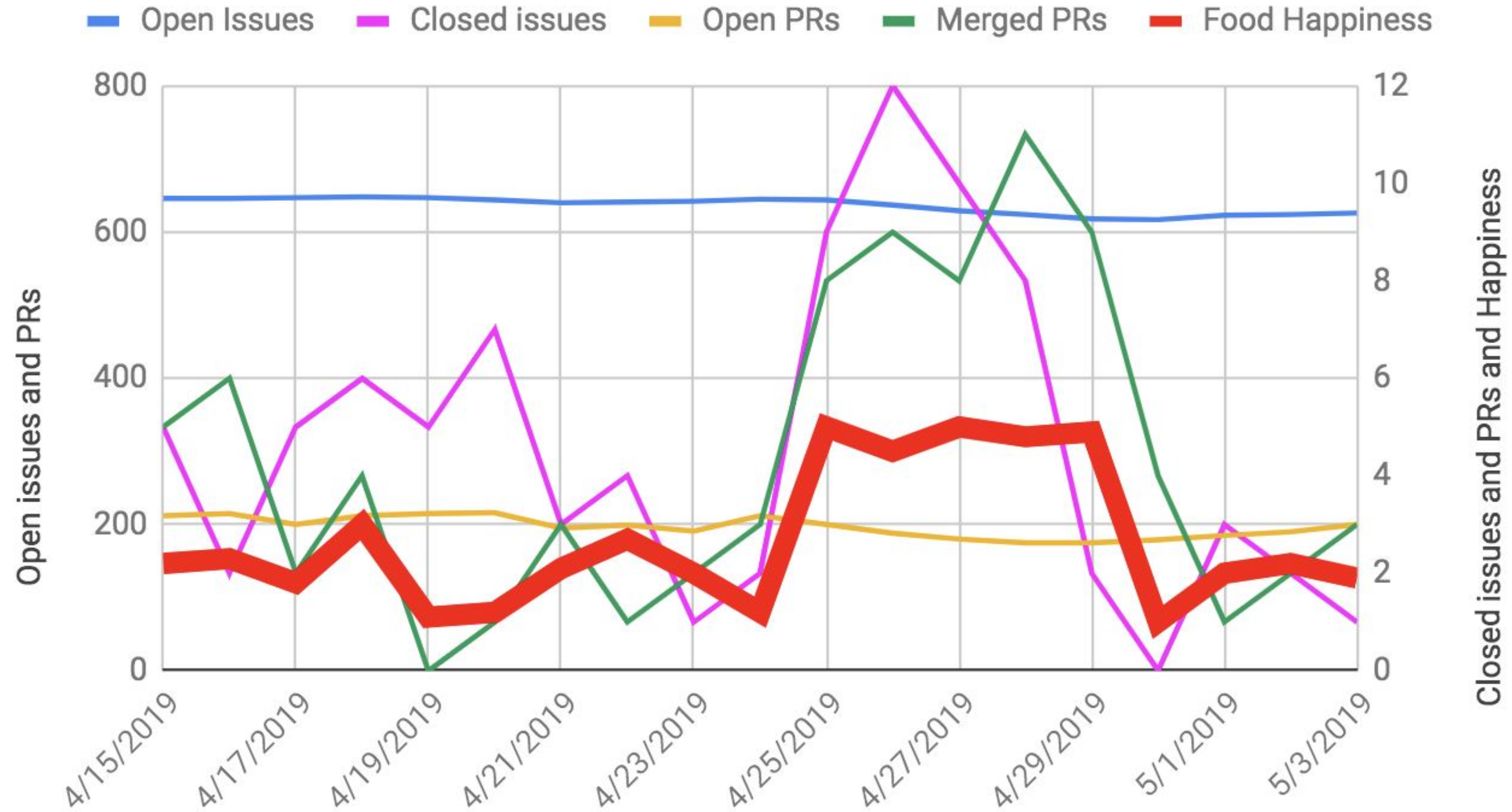




# Correlation?

- Hunger → more closed issues?
- Too much food → fewer merges?
- Hanger → more reported issues?

# Github Productivity vs Food



```
const requests = [{  
  addChart: {  
    chart: {  
      spec: {  
        title: "GitHub Productivity vs Food",  
        basicChart: {  
          chartType: "LINE", // BAR, SCATTER, ...  
          domains: [...],  
          series: [...],  
          ...  
        }  
      }  
    }  
  }  
}]
```

```
await sheets.spreadsheets.batchUpdate({  
  spreadsheetId,  
  resource: { requests },  
});
```



# Chart parameters

- Type: Line
- Domain: Date
- Series: Number of Issues/PRs, Food Satisfaction



GitHub



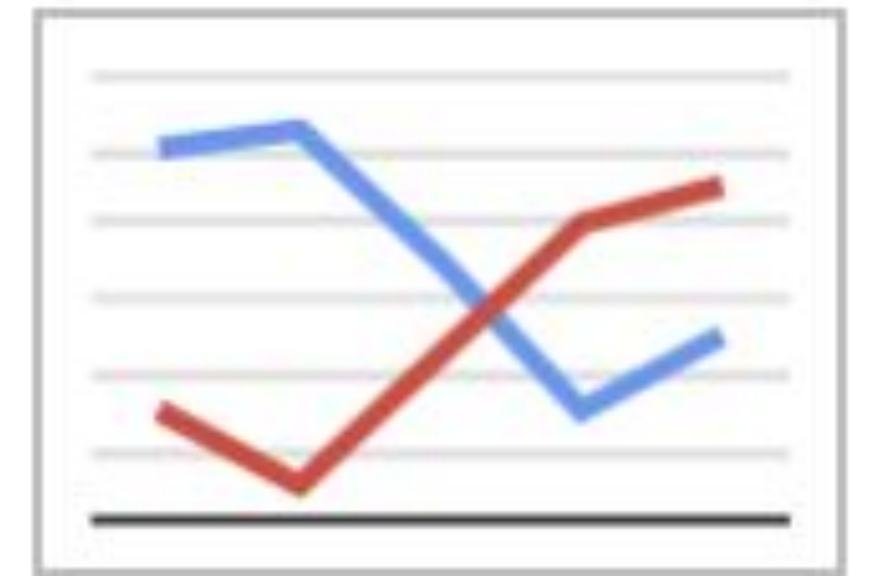
Google Forms

write

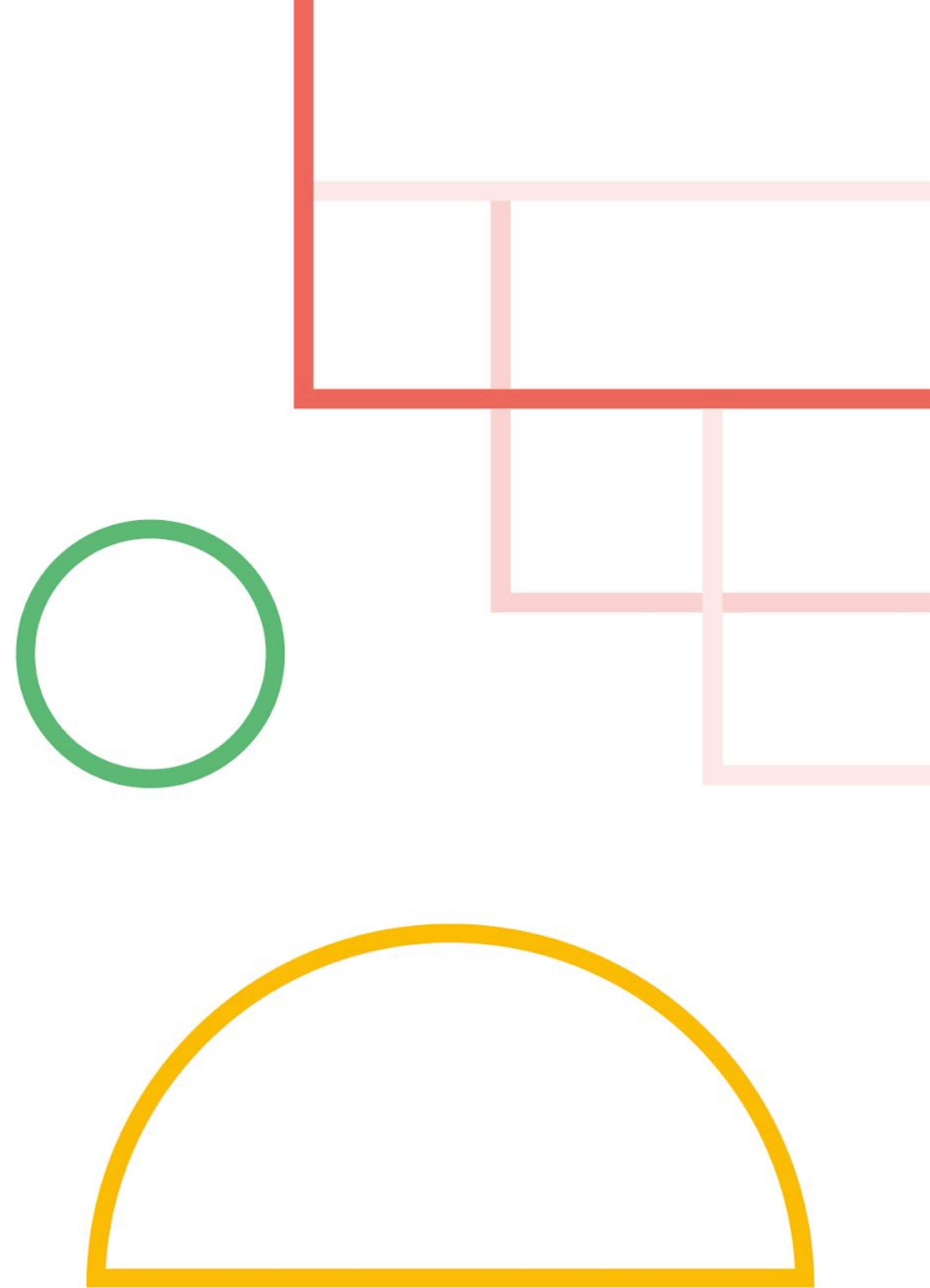


Google Sheets

addChart

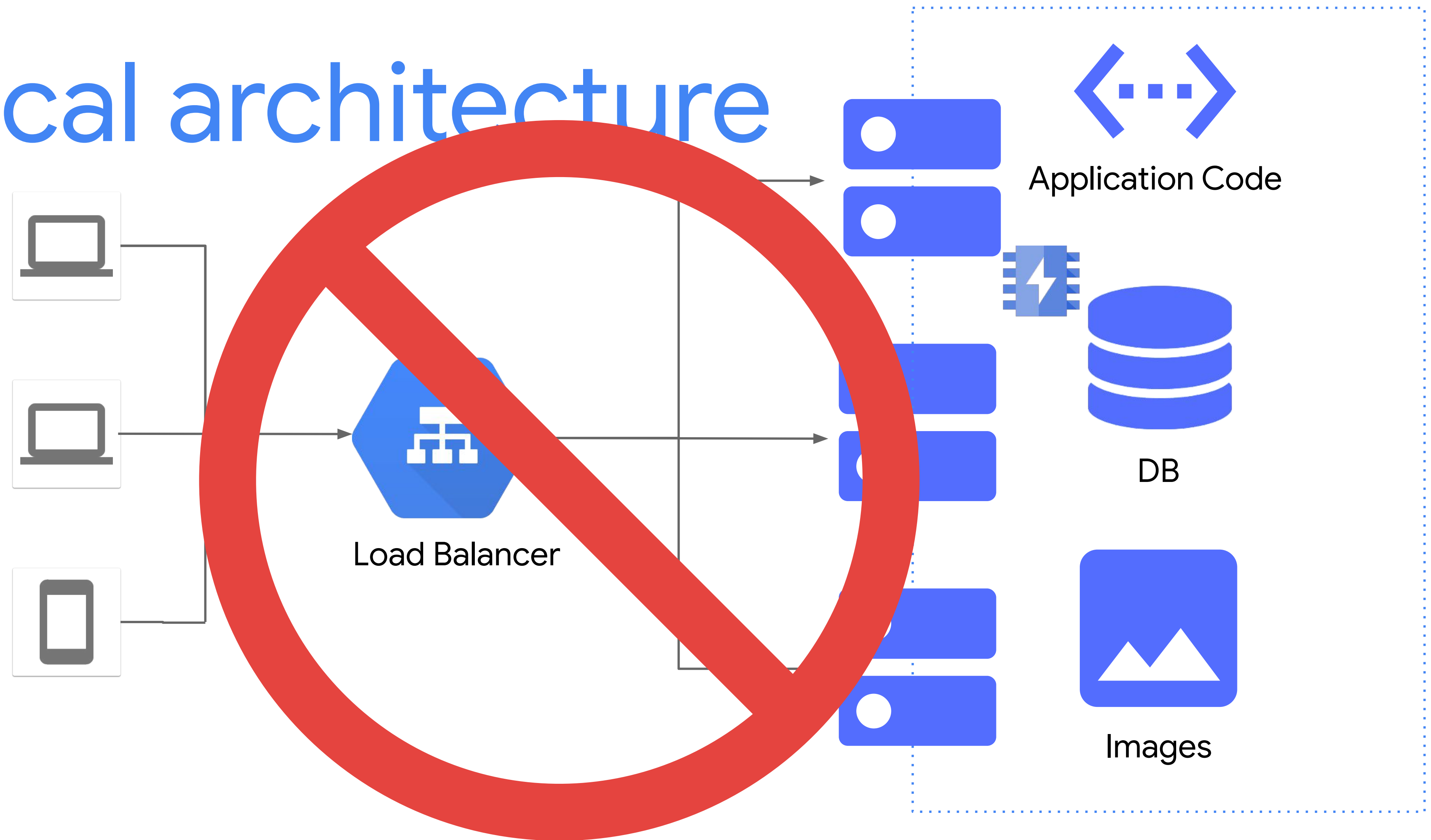


## 2. Hosting the application



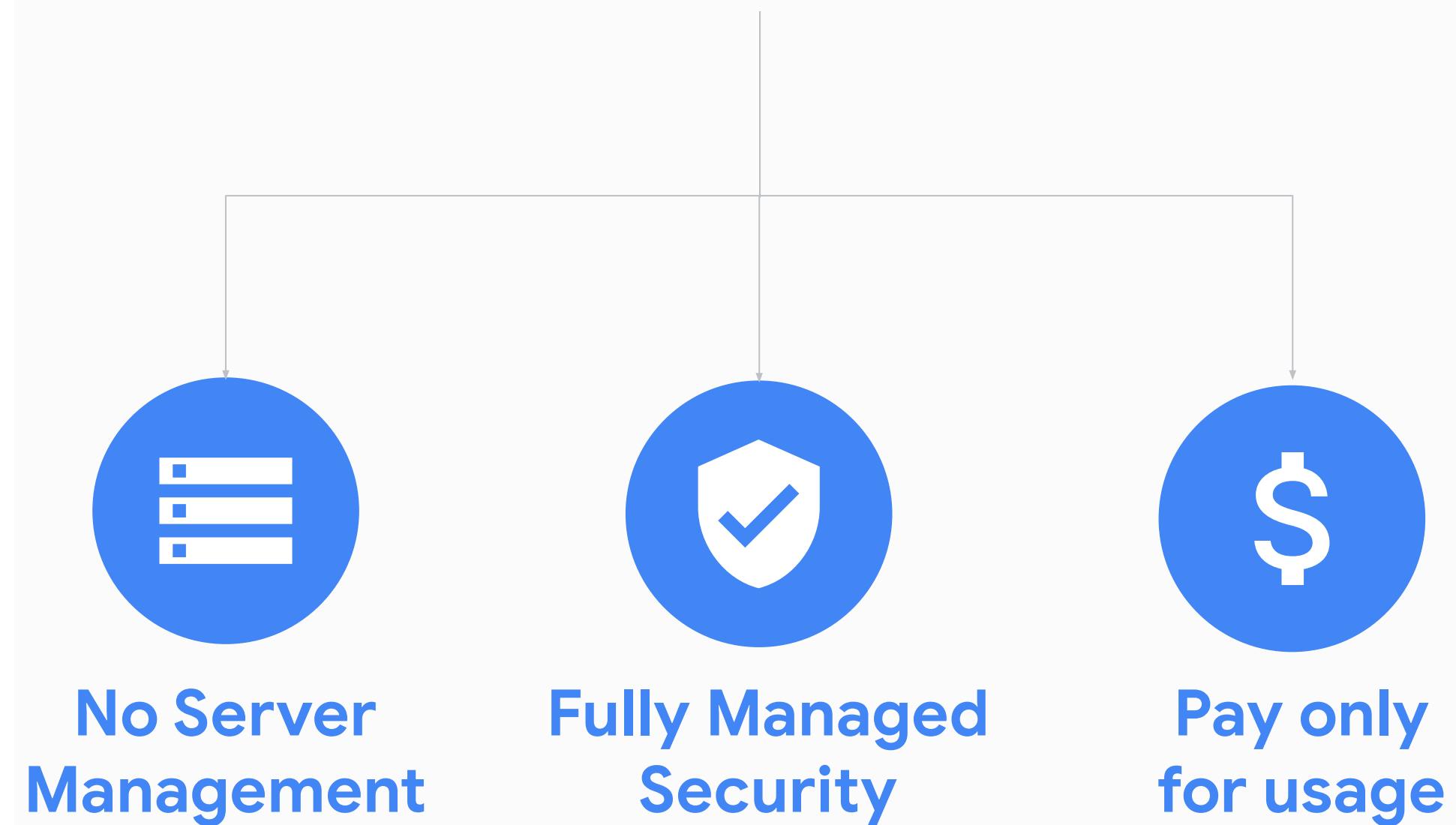


# Typical architecture

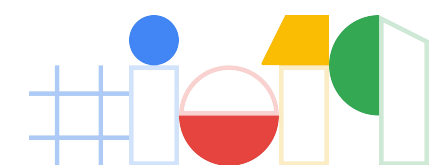
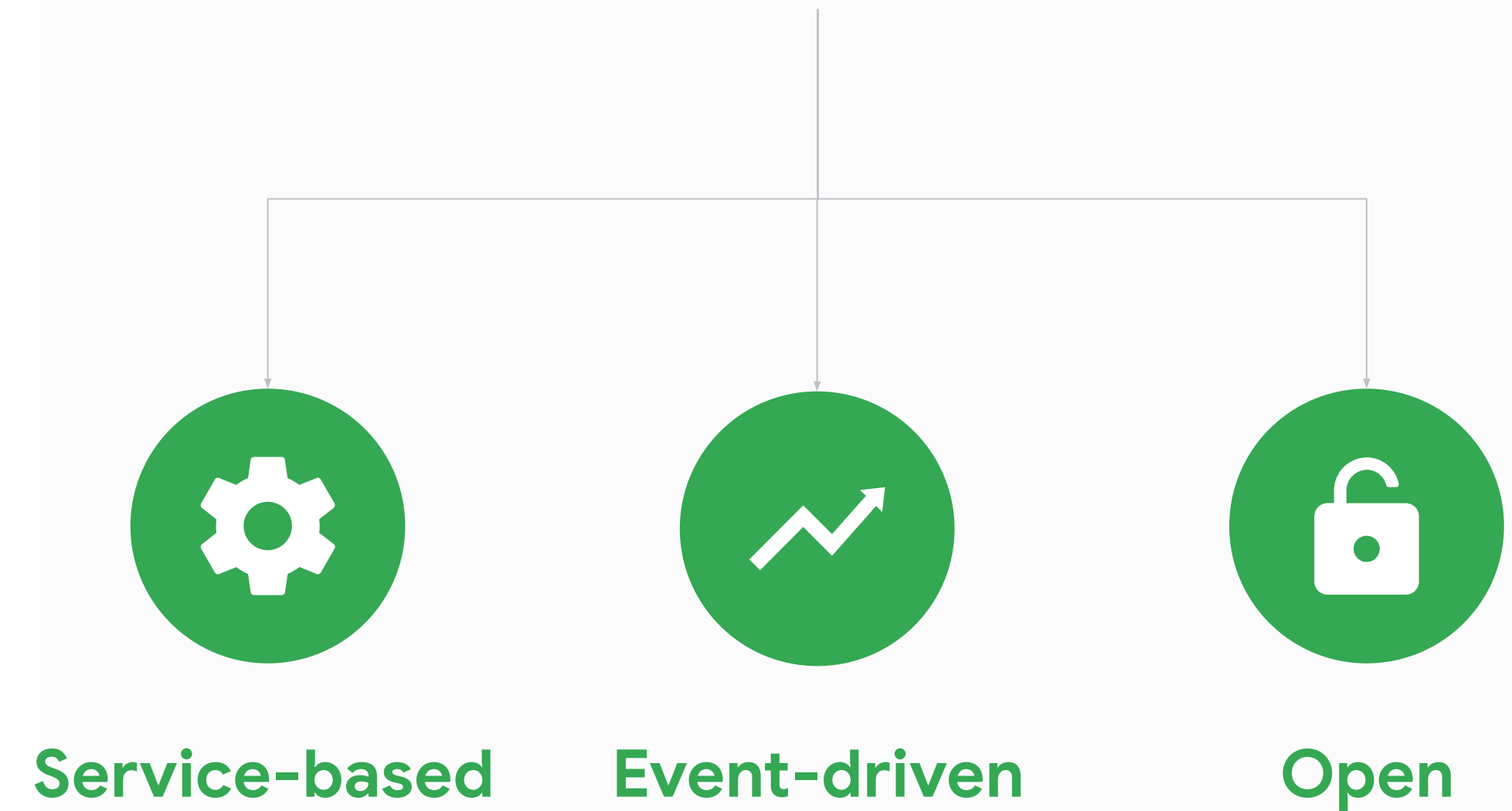


# Serverless compute

## Operational Model



## Programming Model

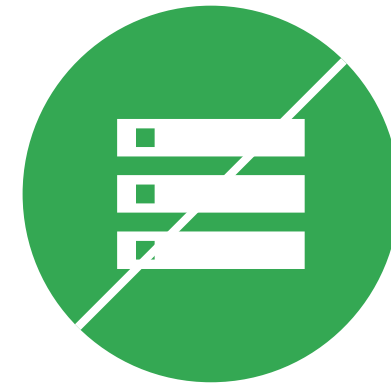


# Cloud Functions

Event-driven serverless compute platform

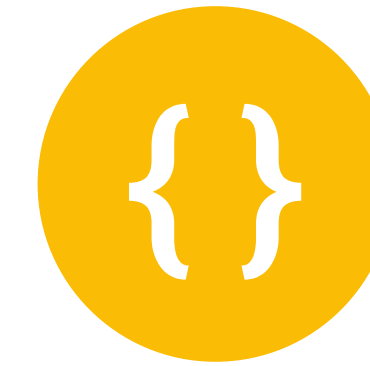


## React to events



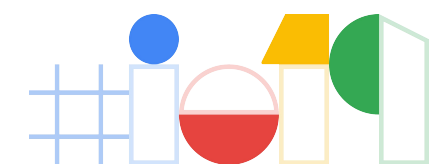
## Serverless

No servers to manage  
Scale to usage  
No patches/updates  
Pay for exact usage



## Choice of runtimes

Node.js, Python, Go,  
Java





# Types of Cloud Functions

## HTTP functions



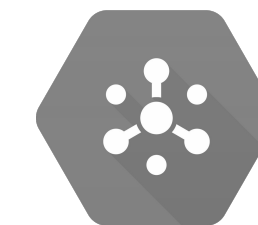
## Background functions



Cloud Storage



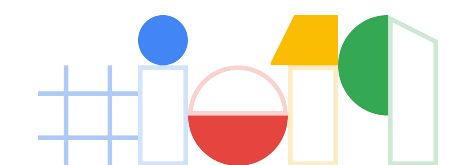
Stackdriver



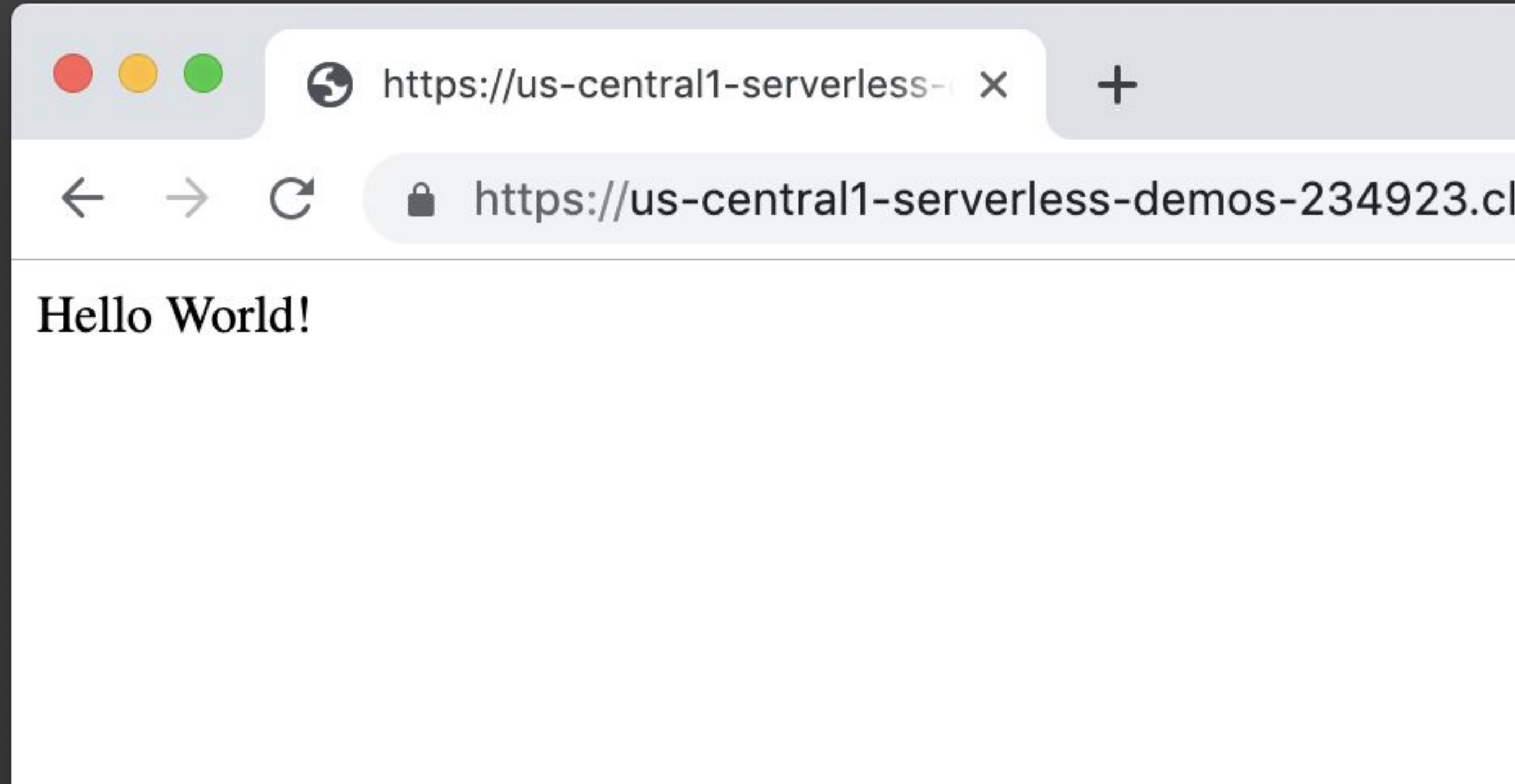
Cloud Pub/Sub



Firebase

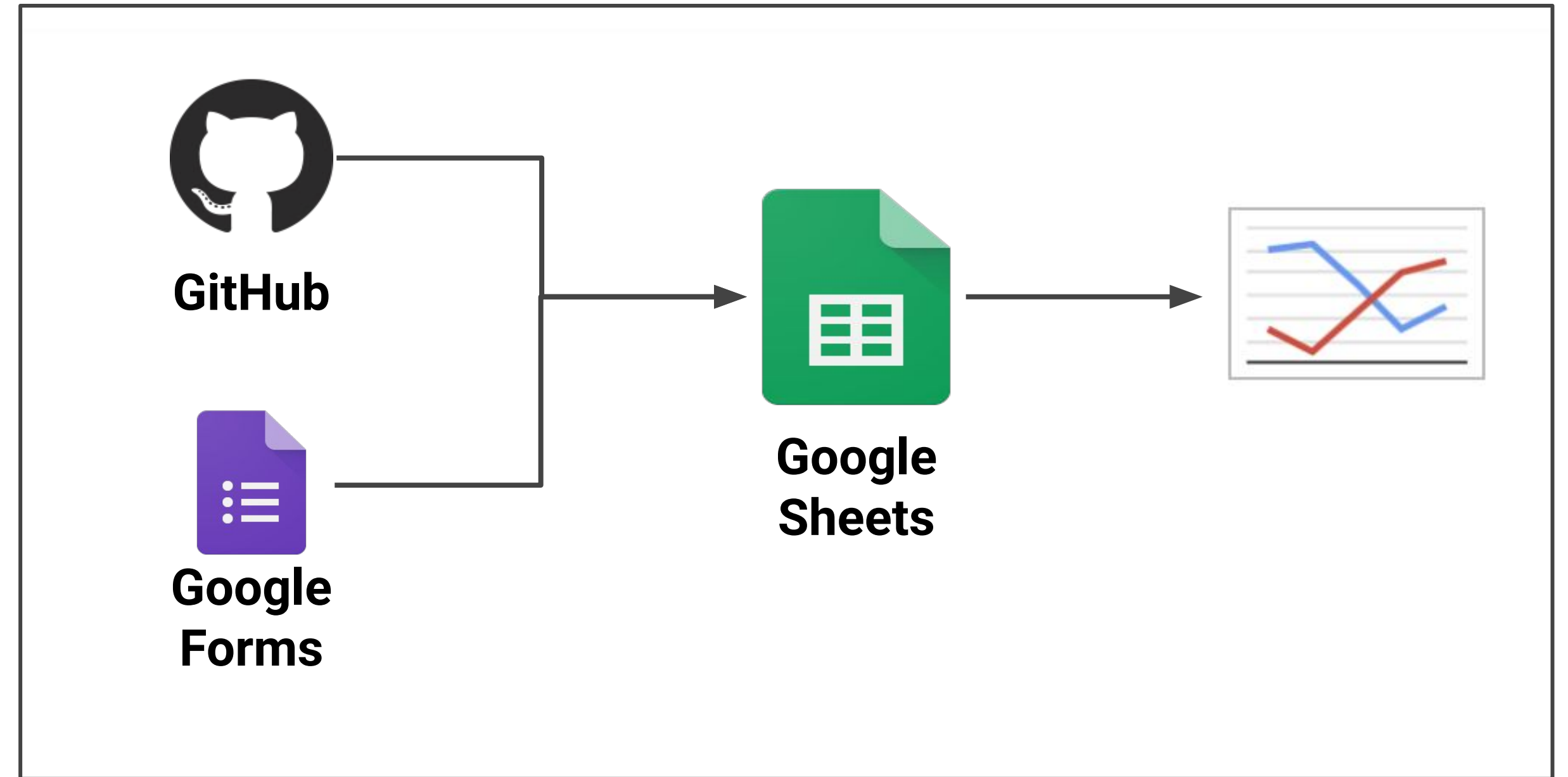


```
// Function triggered via HTTPS
exports.hello = (req, res) =>
  res.status(200).send('Hello World!');
```





HTTP →

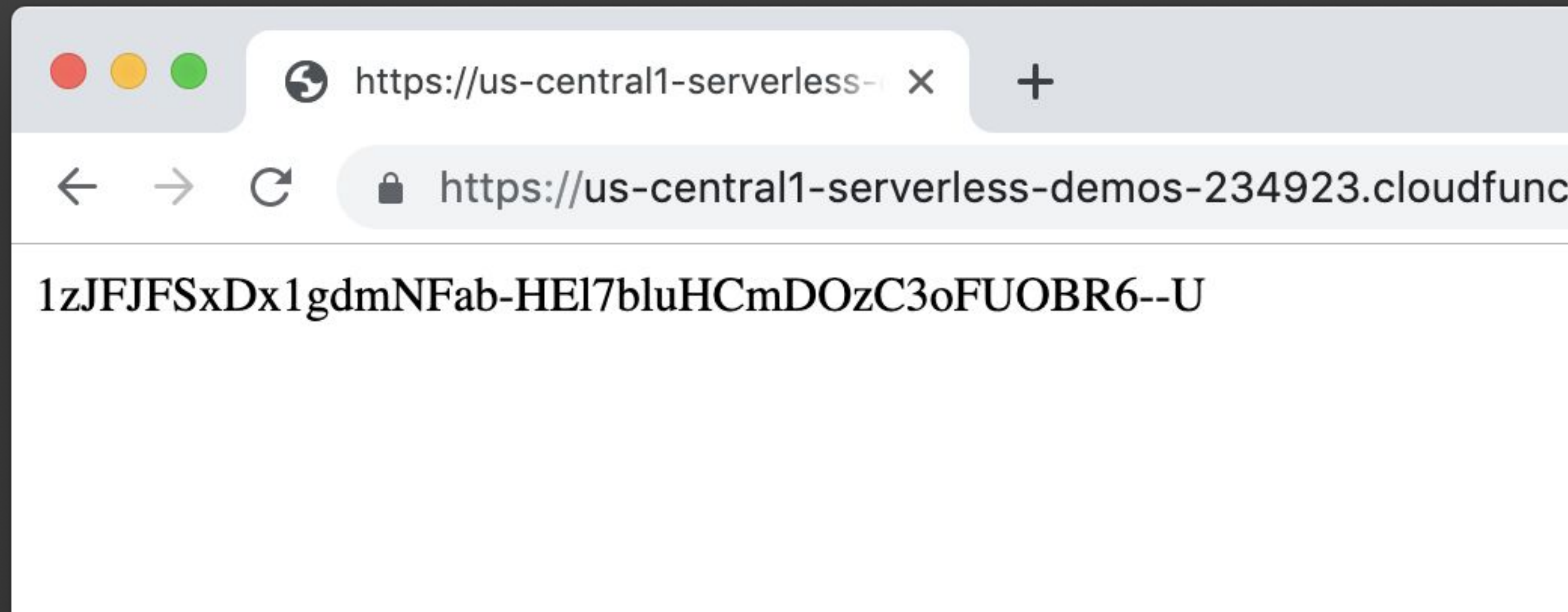


Cloud Functions



```
const sheet = require('./sheet');

exports.githubChart = async (req, res) => {
  const id = await sheet.main("Github vs Food");
  res.status(200).send(id);
};
```



```
$ gcloud functions deploy githubChart --trigger-http
```





Code preview

driveHelpers.js githubHelpers.js githubToken.json index.js

package.json sheet.js sheetHelpers.js

```
1 {  
2   "name": "function",  
3   "version": "1.0.0",  
4   "description": "",  
5   "main": "index.js",  
6   "scripts": {  
7     "test": "echo \"Error: no test specified\" && exit 1"  
8   },  
9   "author": "",  
10  "license": "ISC",  
11  "dependencies": {  
12    "googleapis": "^38.0.0",  
13    "@octokit/rest": "^16.19.0"  
14  }  
15 }  
16
```

Function to execute

githubChart



https://us-central1-serverless-



https://us-central1-serverless-demos-234923.cloudfunctions.net/githubChart

1zJFJFSxDx1gdmNFab-HEl7bluHCmDOzC3oFUOBR6--U





3	4/16/2019	646	
4	4/17/2019	647	
5	4/18/2019	648	
6	4/19/2019	647	
7	4/20/2019	644	
8	4/21/2019	640	
9	4/22/2019	641	
10	4/23/2019	642	
11	4/24/2019	645	
12	4/25/2019	644	
13	4/26/2019	637	
14	4/27/2019	629	
15	4/28/2019	624	
16	4/29/2019	618	
17	4/30/2019	617	



# Cloud Scheduler



1. Establish a Cloud Scheduler schedule (down to 1 min intervals)
2. Cloud Scheduler invokes Cloud Functions over HTTPS or via Cloud Pub/Sub



**Description** (Optional)**Frequency**

Schedules are specified using unix-cron format. E.g. every minute: "\* \* \* \* \*", every 3 hours: "0 \*/3 \* \* \*", every monday at 9:00: "0 9 \* \* 1". [Learn more](#)

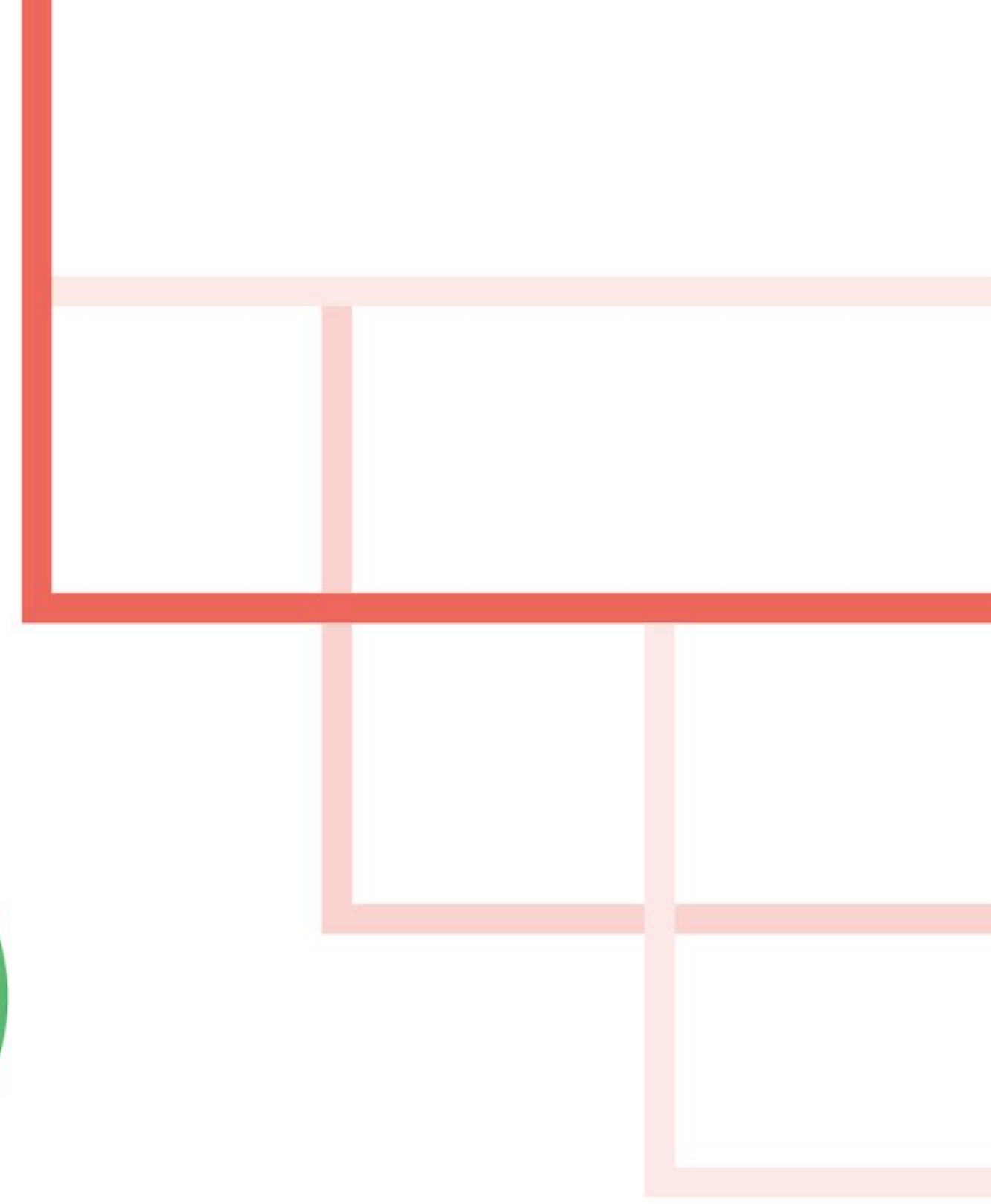
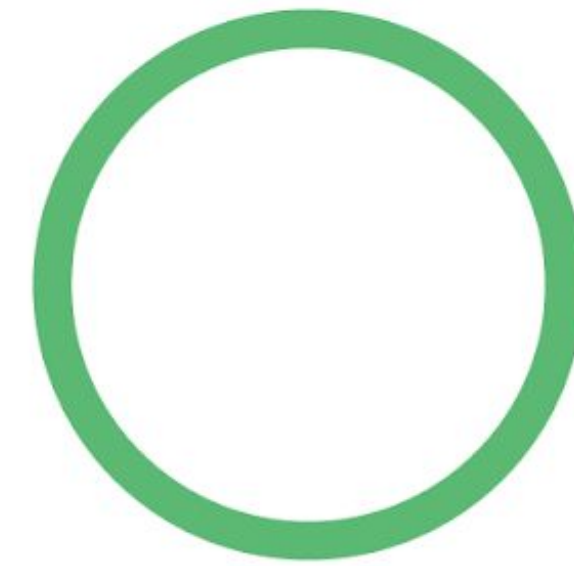
**Timezone****Target****URL**

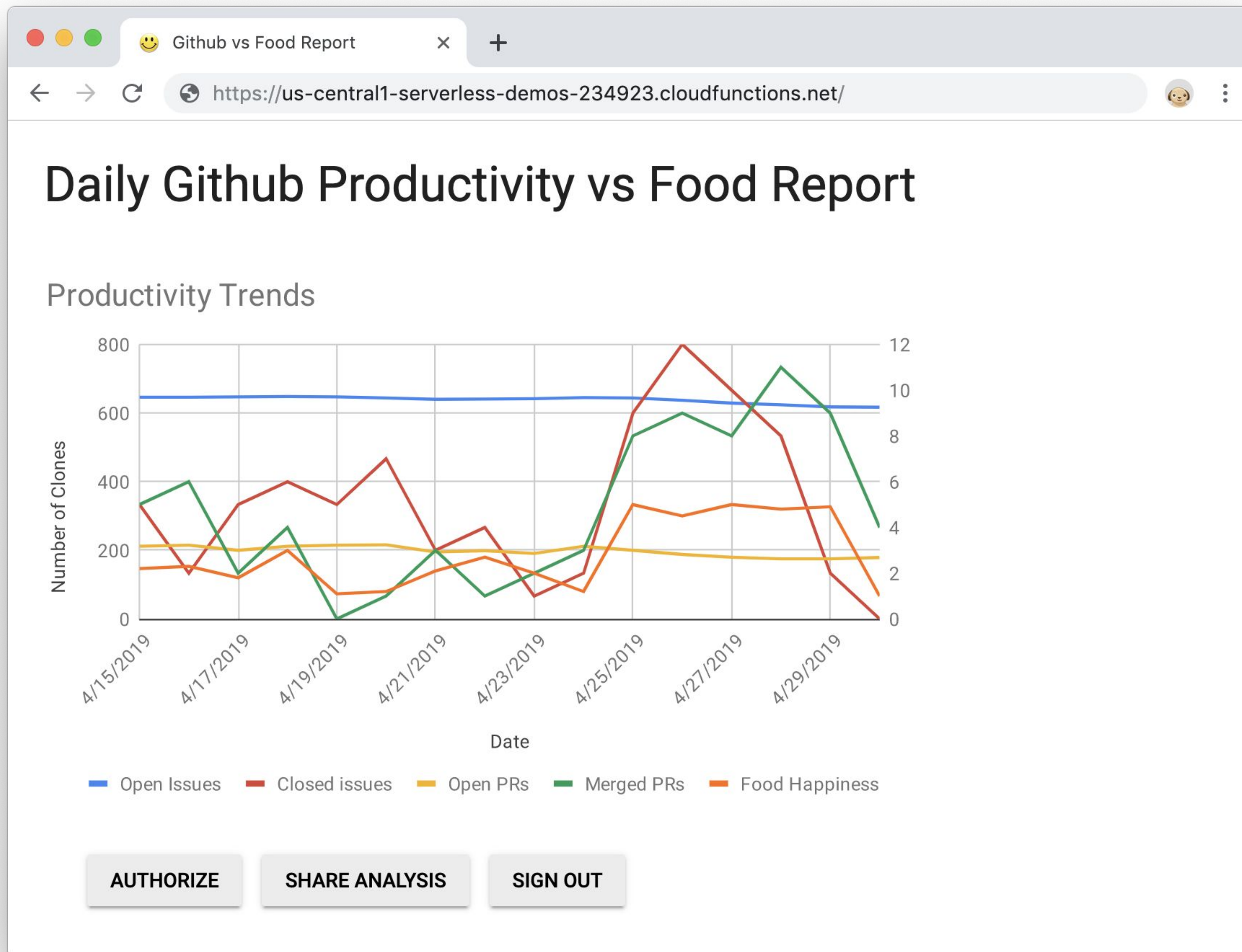
Must be the full URL path beginning with either "http://" or "https://".

**HTTP method**



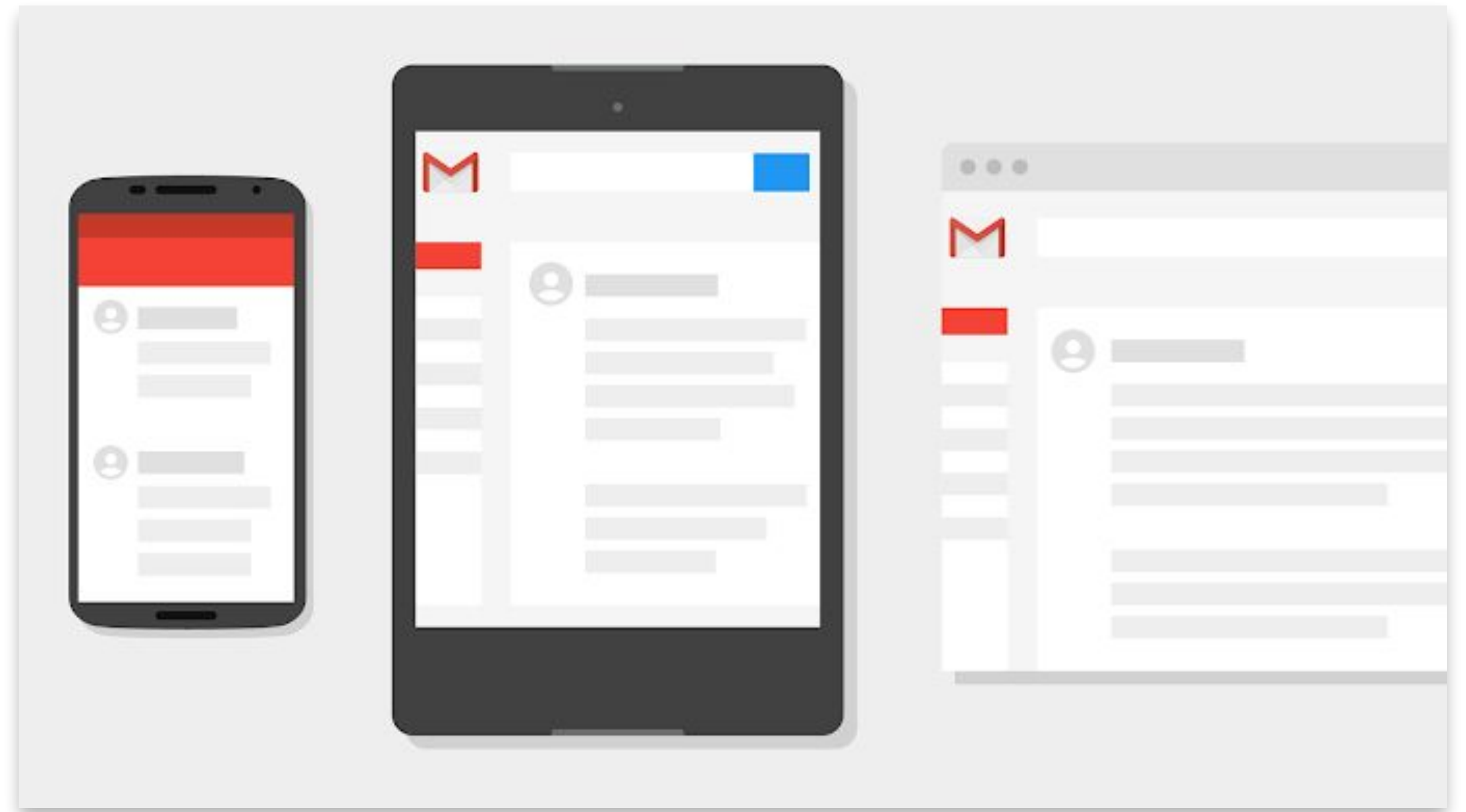
# 3. Adding a client



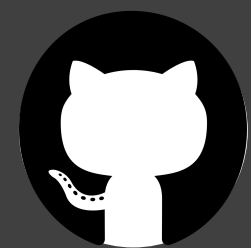


# Send email

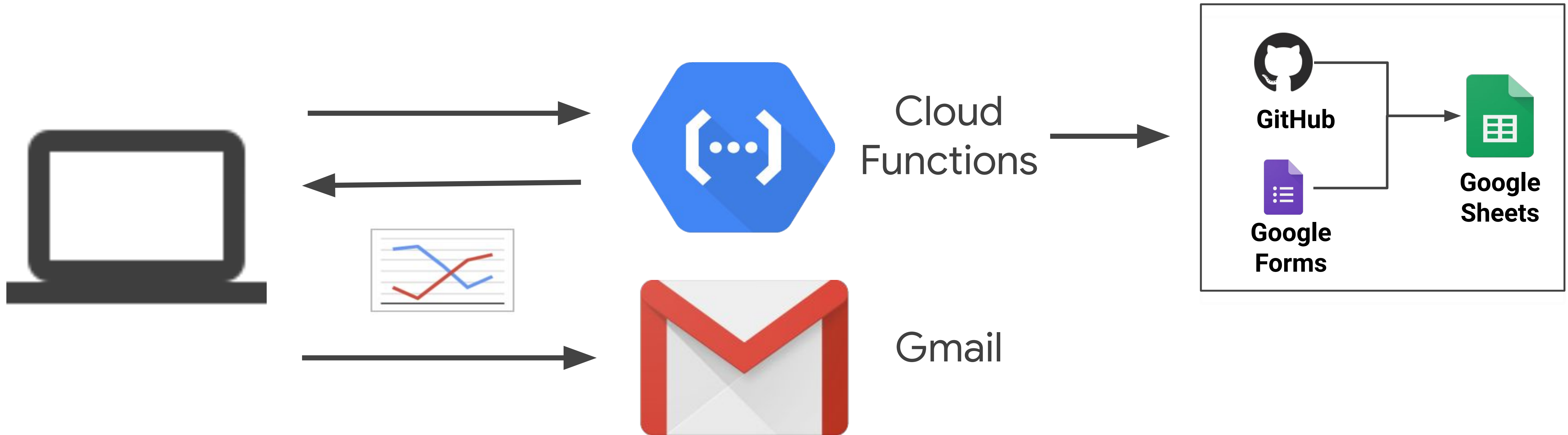
Gmail API!



```
const response = await gmail.users.messages.send({  
  userId: 'me',  
  resource: {  
    raw: rawEmail  
  }  
});
```





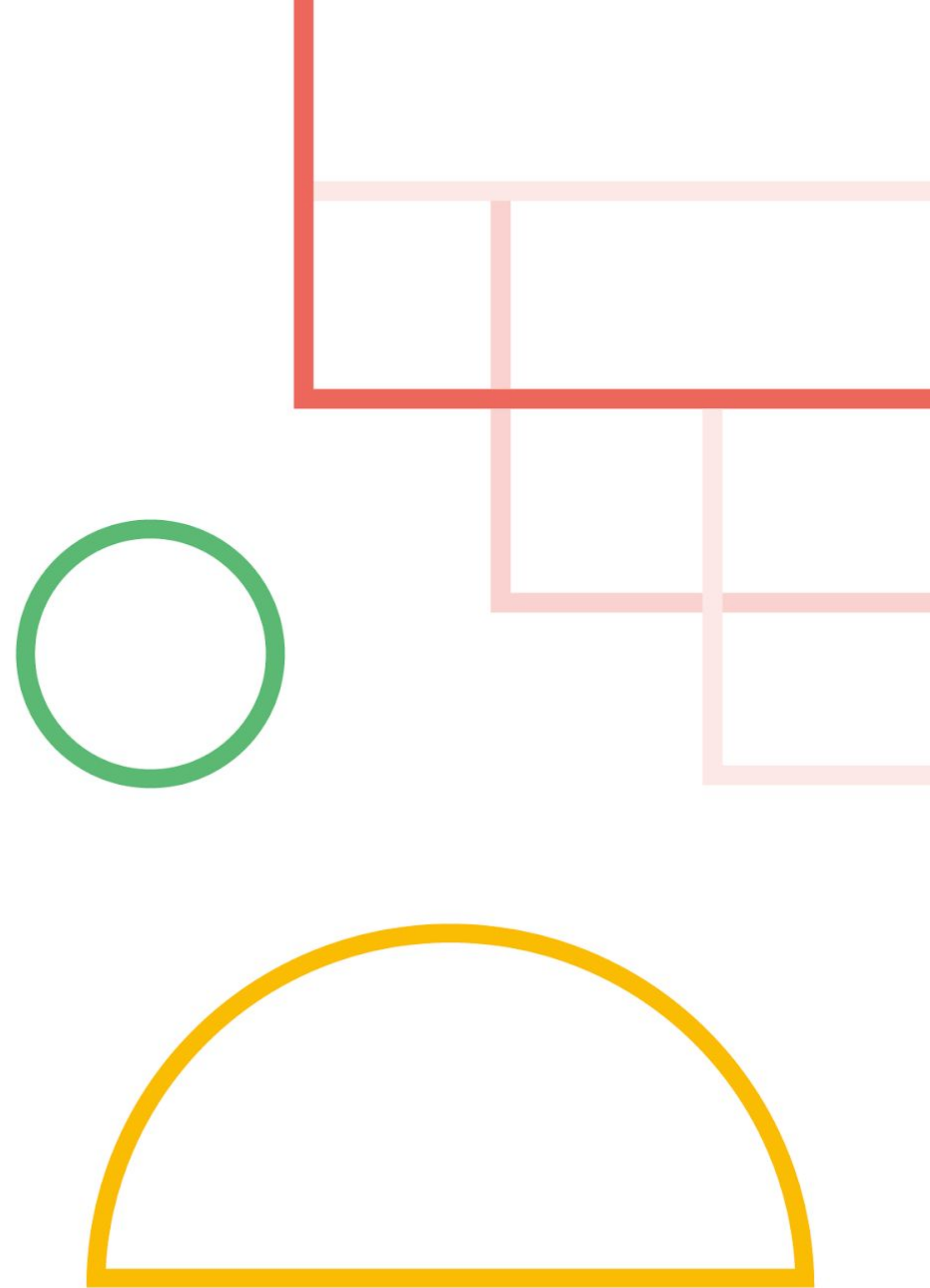


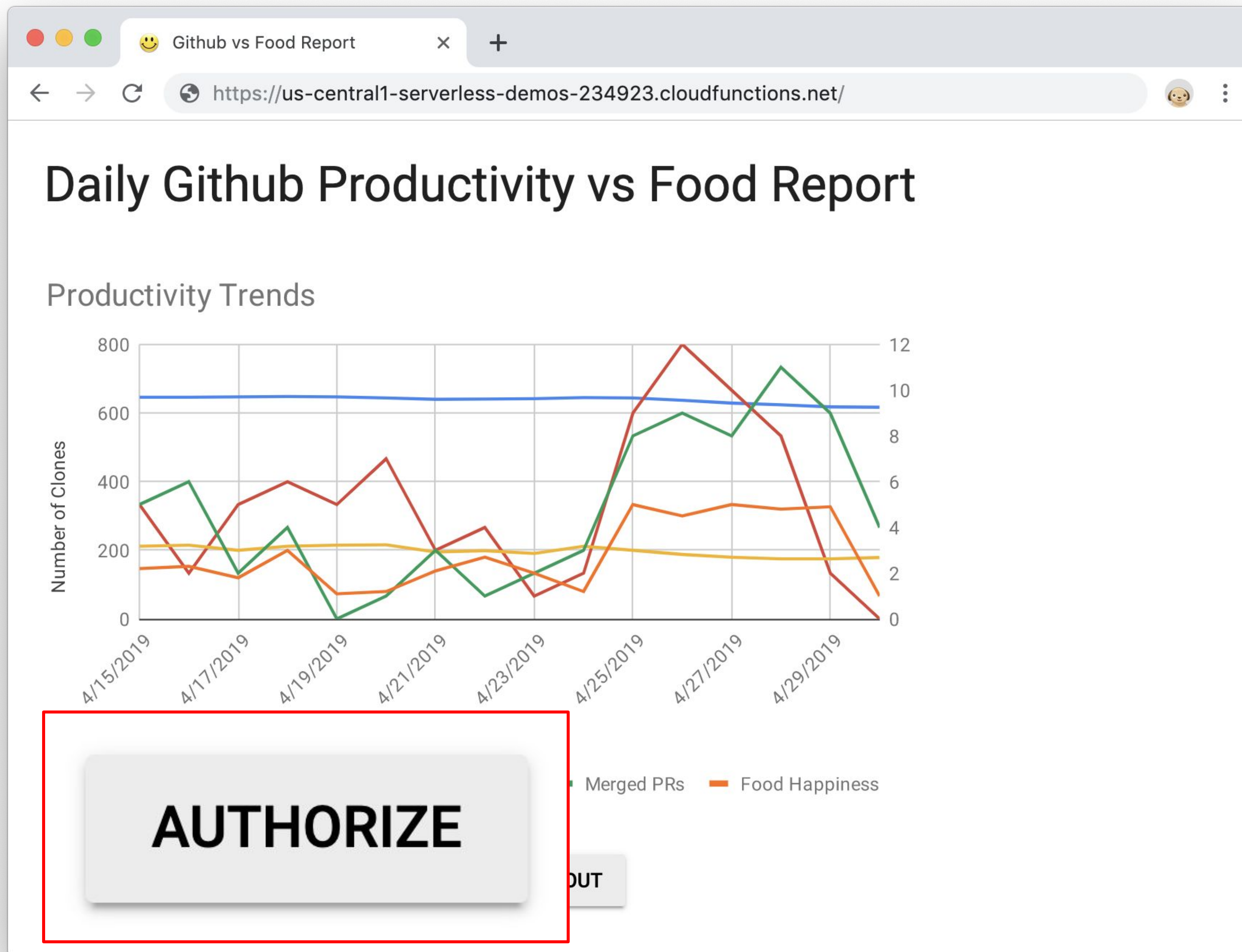
# Is that the whole story?

JK, we left out auth



# 4. Authorization







# Daily Github P



Please au

AUTHORIZE

SHARE

Sign in - Google Accounts

https://accounts.google.com/signin/oauth/consentsummary?authuser=0&part=A...

☒ Associate you with your personal info on Google

☒ See your personal info, including any personal info you've made publicly available

☒ View your email address

☒ Send email on your behalf

## Make sure you trust Work less do more

You may be sharing sensitive info with this site or app. Learn about how Work less do more will handle your data by reviewing its terms of service and privacy policies. You can always see or remove access in your [Google Account](#).

[Learn about the risks](#)

Cancel

Allow

English (United States) →

[Help](#)

[Privacy](#)

[Terms](#)

# OAuth 2.0



Your app



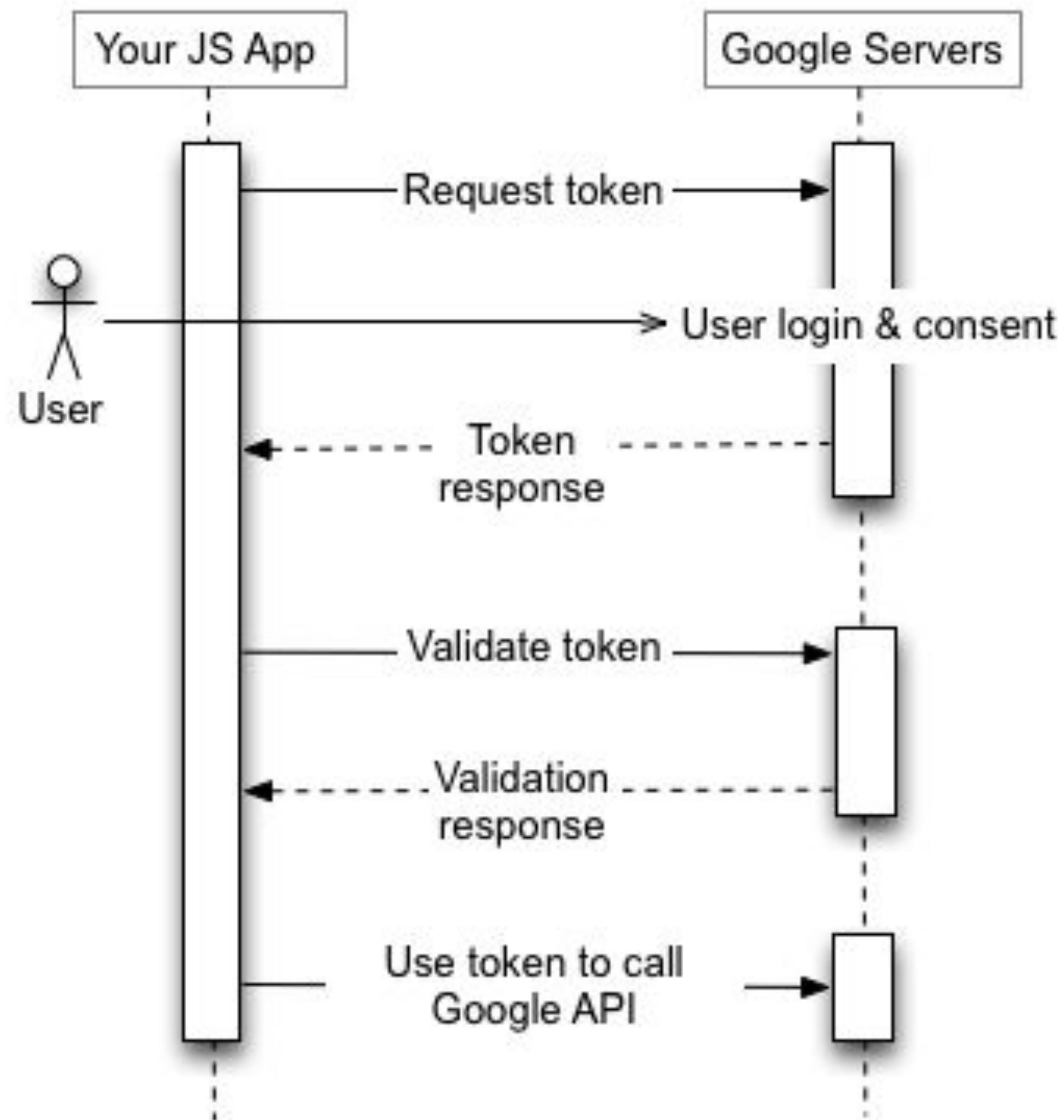
User consent



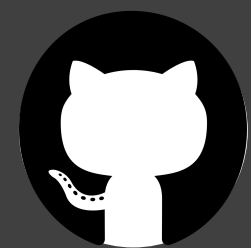
User data



# Three-legged OAuth



```
const SCOPES =  
  [ 'https://www.googleapis.com/auth/gmail.send'];  
  
gapi.client.init({  
  apiKey: API_KEY,  
  clientId: CLIENT_ID,  
  discoveryDocs: DISCOVERY_DOCS,  
  scope: SCOPES  
})
```





Scope	Meaning
<code>https://www.googleapis.com/auth/spreadsheets.readonly</code>	Allows read-only access to the user's sheets and their properties.
<code>https://www.googleapis.com/auth/spreadsheets</code>	Allows read/write access to the user's sheets and their properties.
<code>https://www.googleapis.com/auth/drive.readonly</code>	Allows read-only access to the user's file metadata and file content.
<code>https://www.googleapis.com/auth/drive.file</code>	Per-file access to files created or opened by the app.
<code>https://www.googleapis.com/auth/drive</code>	Full, permissive scope to access all of a user's files. Request this scope only when it is strictly necessary.



# Backend auth

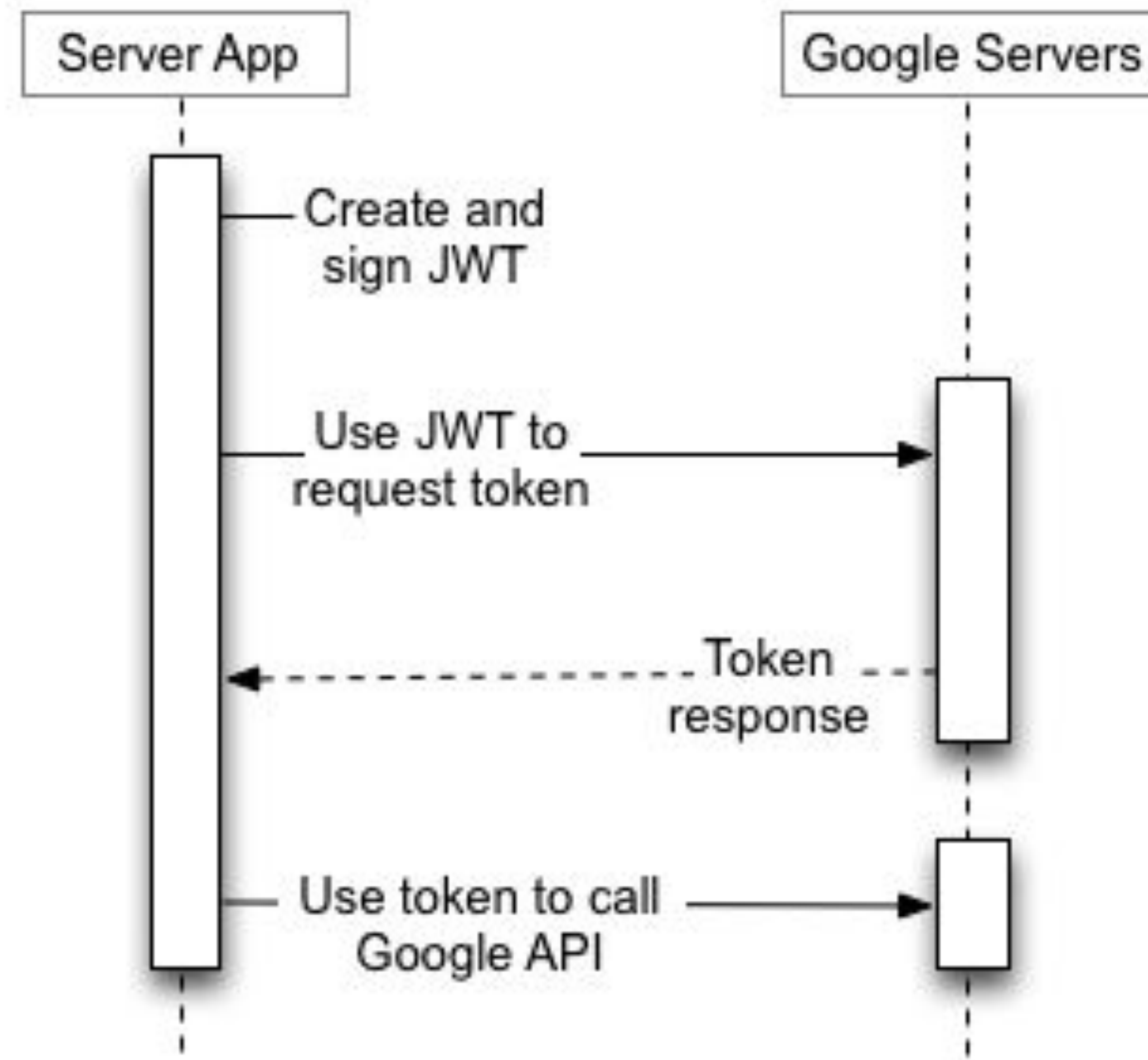


- No end users involved
- Sheet belongs to application
- Server to server authorization

## **Recommendation:**

Three-legged OAuth for G Suite APIs

# Two-legged OAuth



# Three-legged

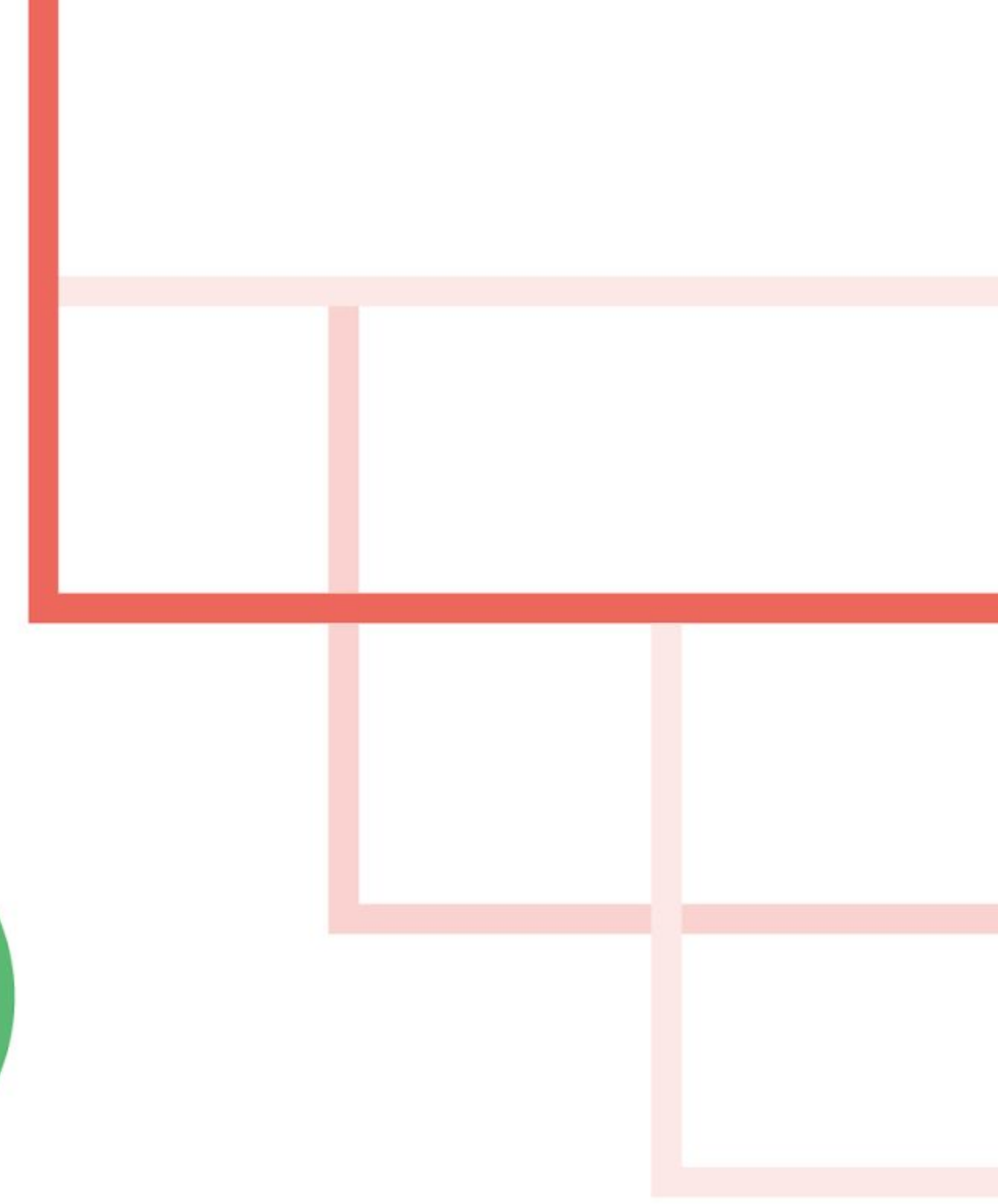
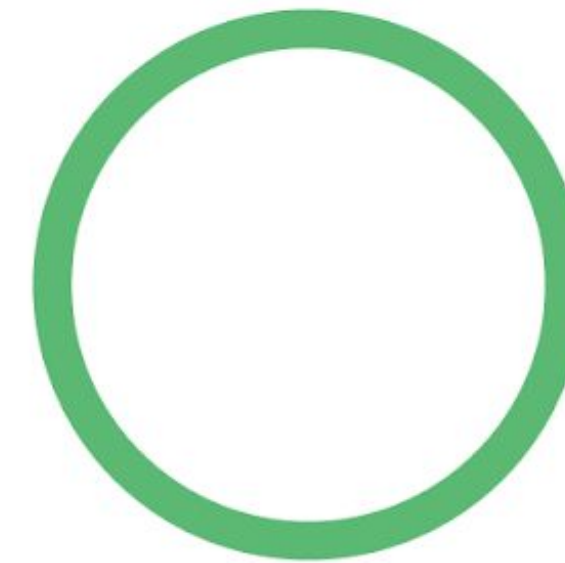
- On behalf of end users
- Requires user consent
- Best practice for G Suite

# Two-legged

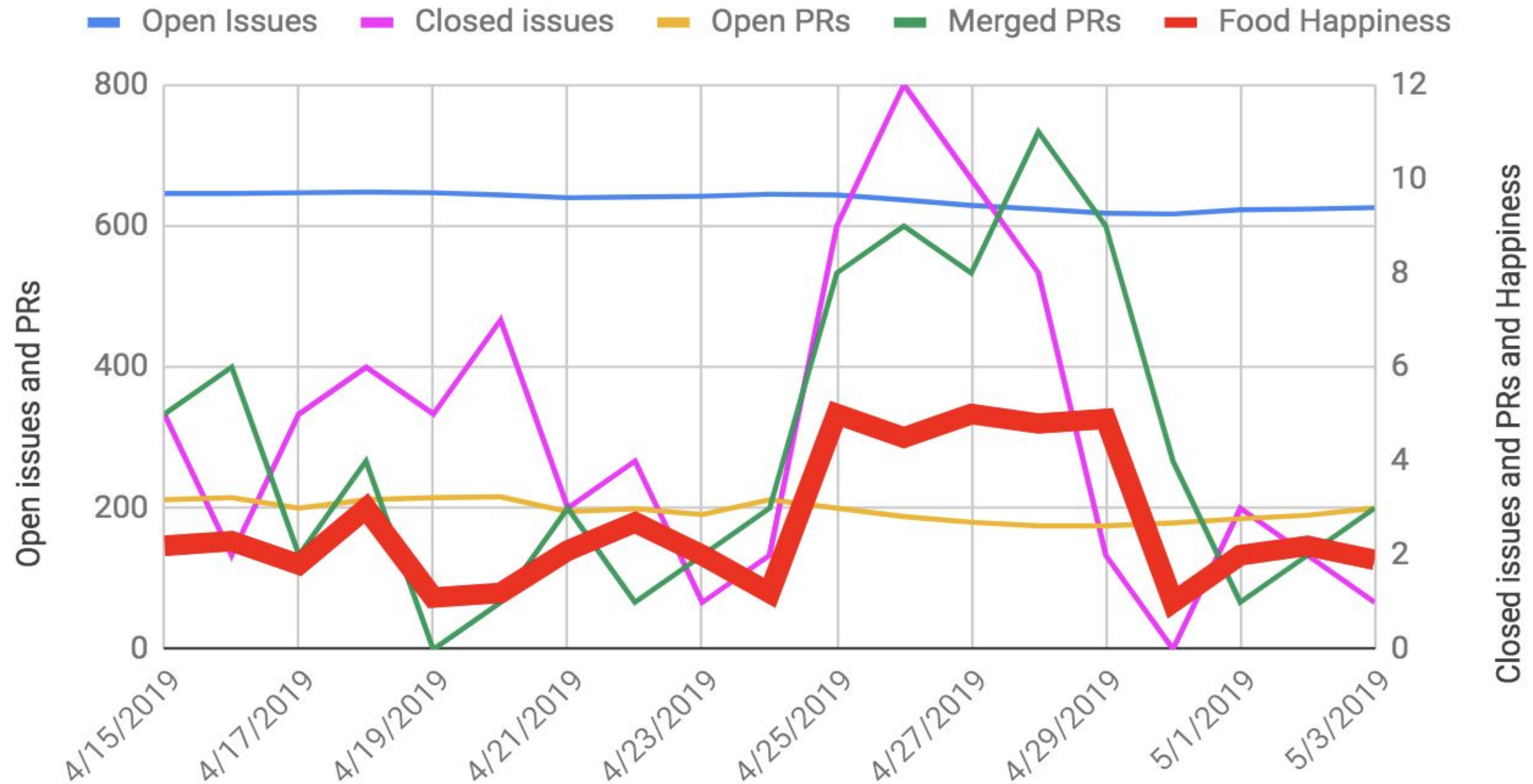
- Server to server
- On behalf of application
- Belongs to application
- JSON Web Token



# 5. Insights



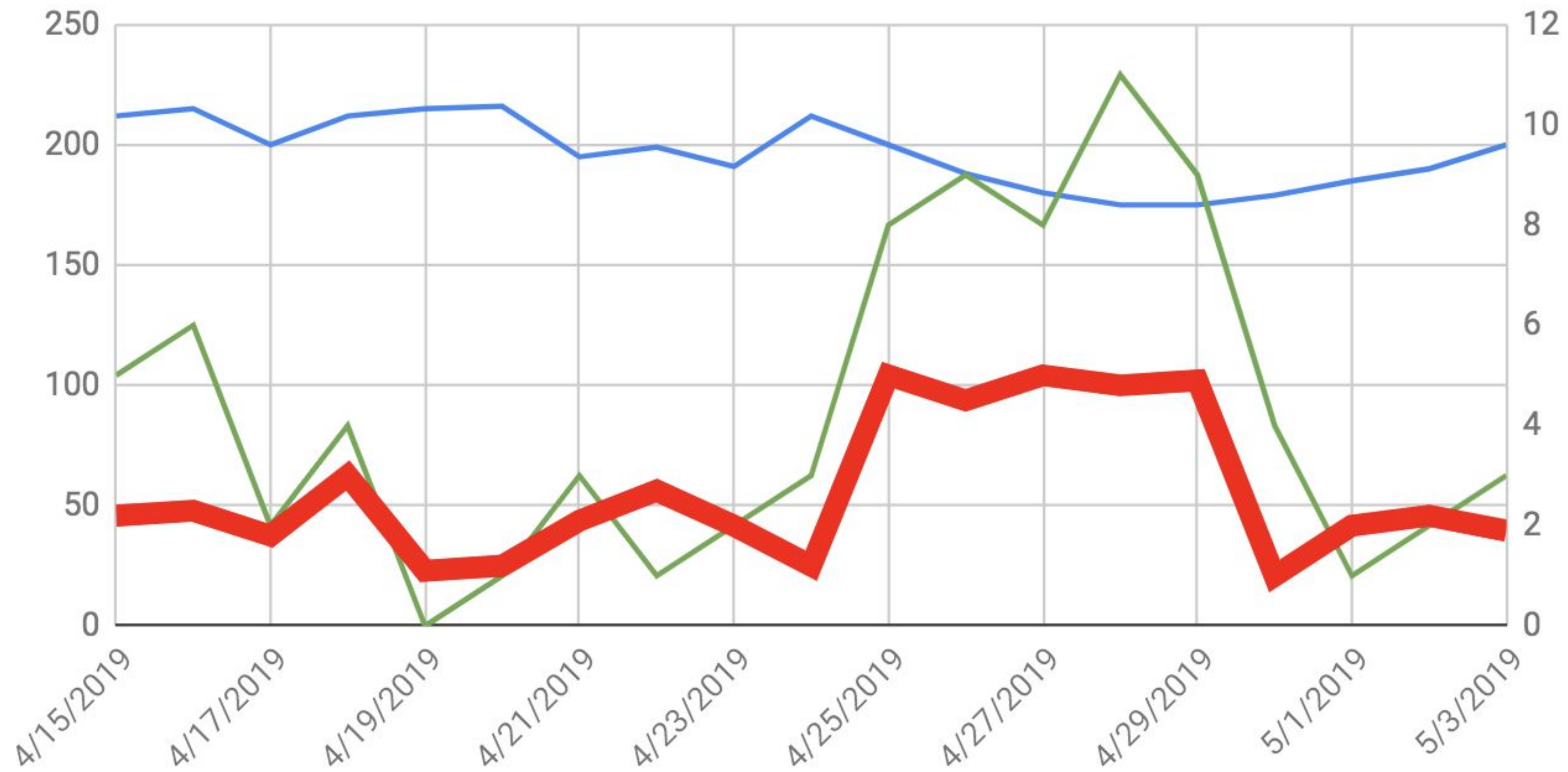
# Github Productivity vs Food



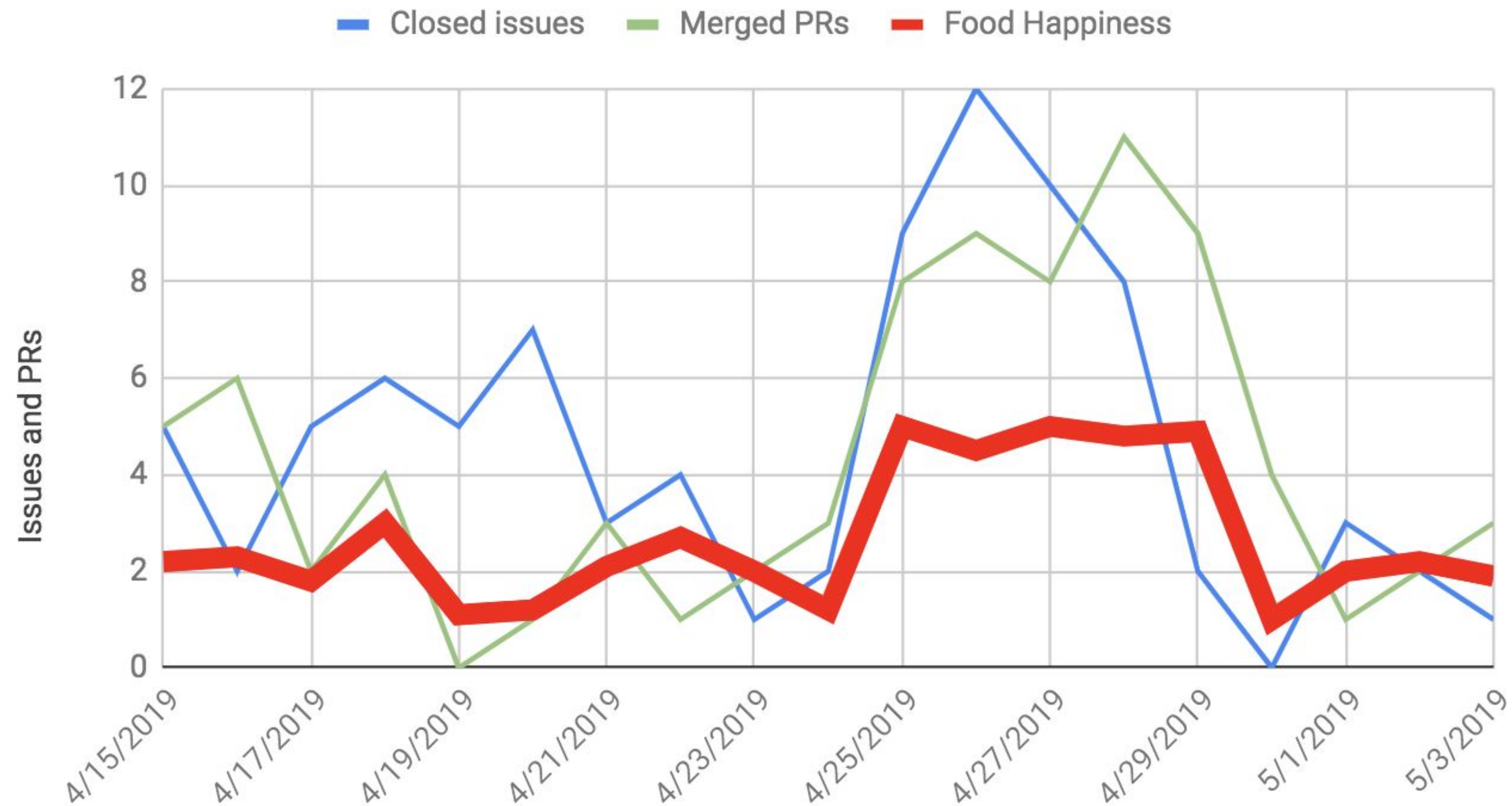


## PRs vs Food Happiness

Open PRs Merged PRs Food Happiness



## Closed Issues and PRs vs Food

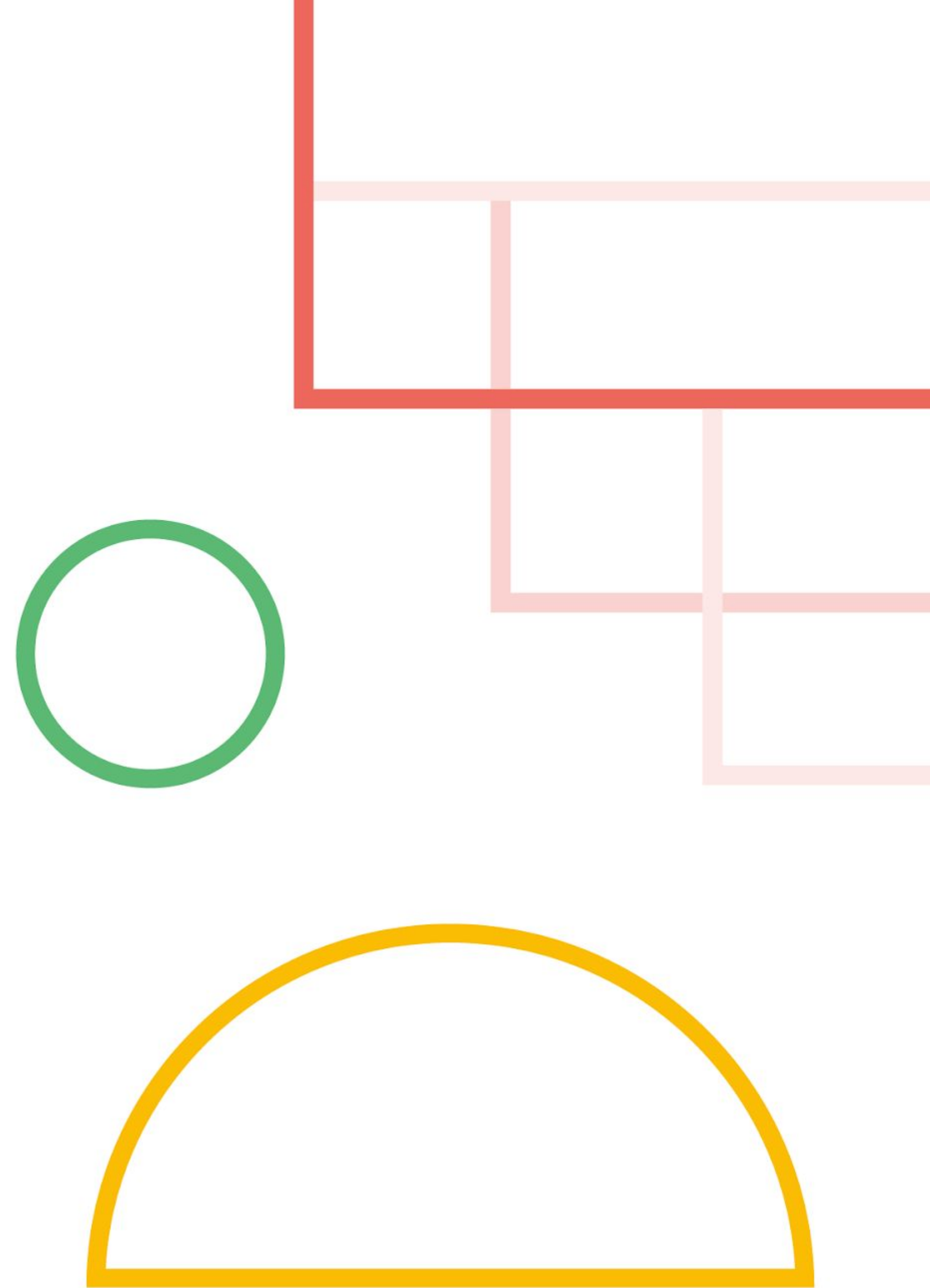




GOOD FOOD === GOOD CODE



# 6. Reporting with templates





# Productivity Report - 05/01/2019



File Edit View Insert Format Slide Arrange Tools Add-ons Help

All changes saved in Dr...



Present



Background...

Layout

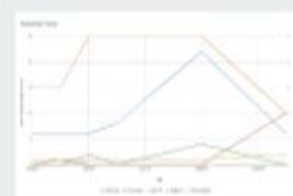
Theme...

Transition...

1

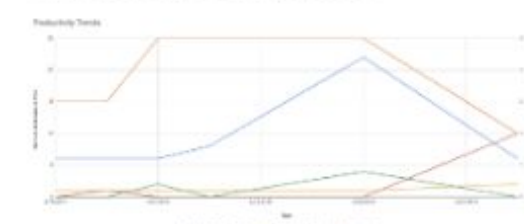
## Productivity Weekly Report

05/01/2019



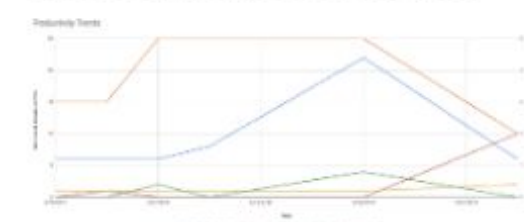
2

### GitHub Issues vs Happiness



3

### GitHub Pull Requests vs Happiness



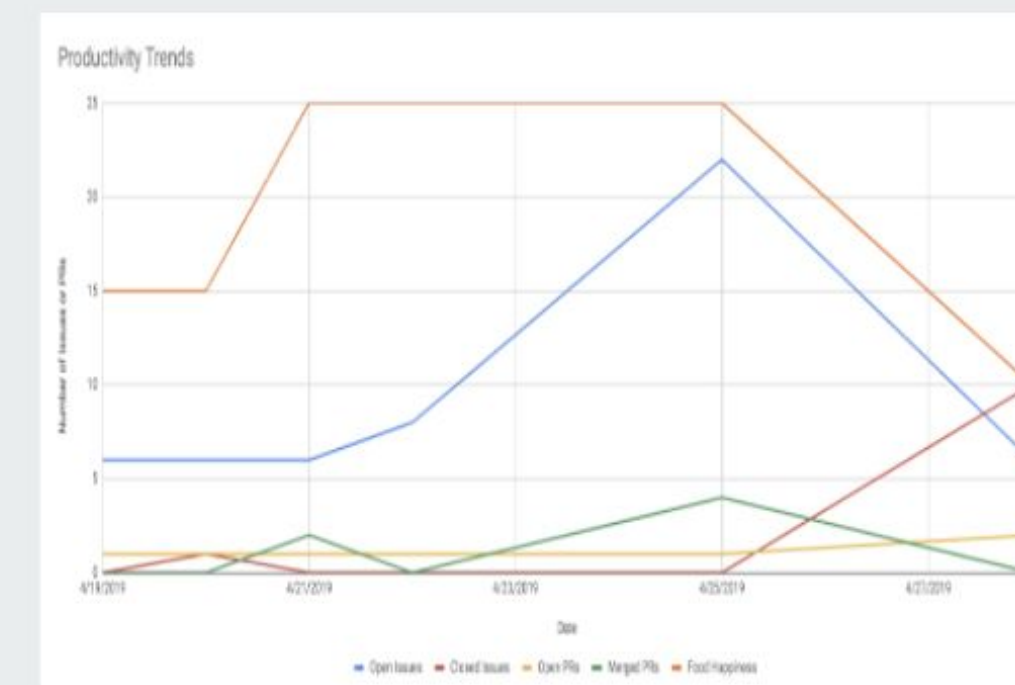
4

### Survey Stats

Total Submissions This Week	Average Happiness Score
{WEEKLY_SURVEY_TAKER_NUMBER}	{AVERAGE_HAPPINESS_SCORE}

# Productivity Weekly Report

05/01/2019



Click to add speaker notes



@asrivas\_dev @fhinkel



# Report Template



File Edit View Insert Format Slide Arrange Tools Add-ons Help

All changes saved in Dr...



Present



Background...

Layout

Theme...

Transition...

1

## Productivity Weekly Report

{{DATE}}

2

## GitHub Issues vs Happiness

[CHART]

3

## GitHub Pull Requests vs Happiness

[CHART]

4

## Survey Stats

Total Submissions This Week	Average Happiness Score
{{WEEKLY_SURVEY_TAKER_NUMBER}}	{{AVERAGE_HAPPINESS_SCORE}}

# Productivity Weekly Report

{{DATE}}

Click to add speaker notes



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```
const { google } = require('googleapis');
```

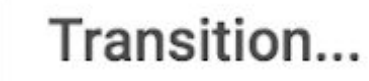
```
const slides = google.slides({  
  version,  
  auth  
});
```

```
let requests = [{  
  replaceAllText: {  
    containsText: {  
      text: '{{DATE}}',  
      matchCase: true,  
    },  
    replaceText: new Date(),  
  },  
},  
...]
```

```
await slides.presentations.batchUpdate({  
  presentationId,  
  resource: { requests },  
});
```

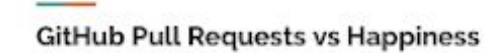
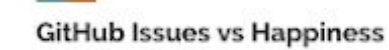


File Edit View Insert Format Slide Arrange Tools Add-ons Help All changes saved in Dr...



## Productivity Weekly Report

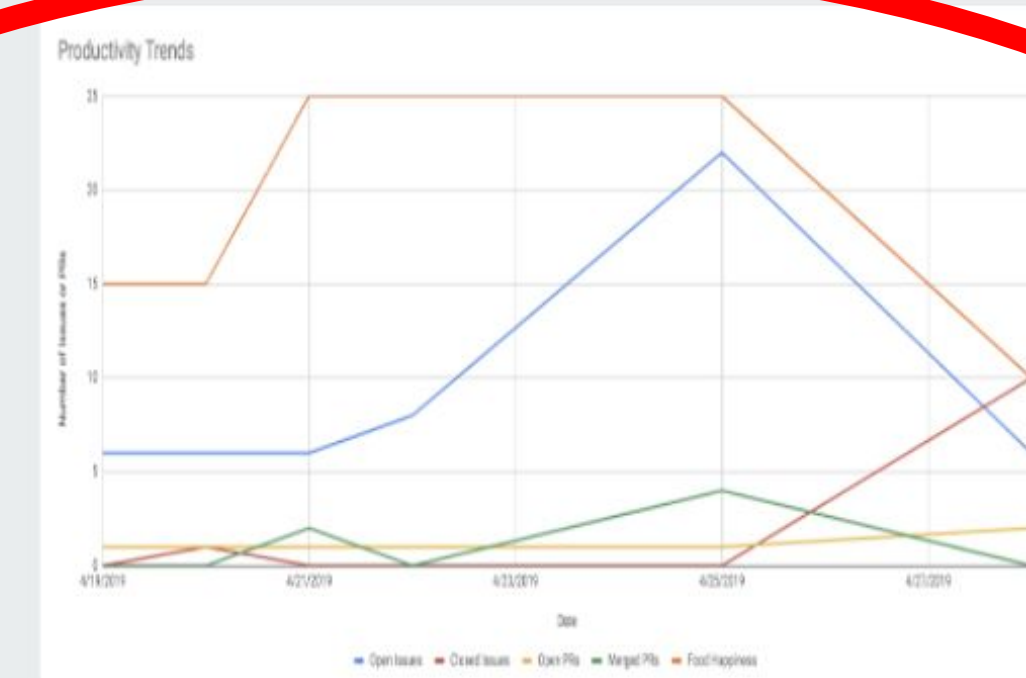
05/01/2019



Total Submissions This Week	Average Happiness Score
{{WEEKLY_SURVEY_TAKER_NUMBER}}	{{AVERAGE_HAPPINESS_SCORE}}

# Productivity Weekly Report

05/01/2019

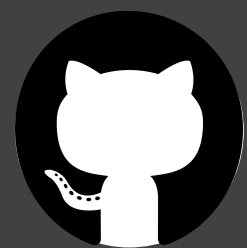


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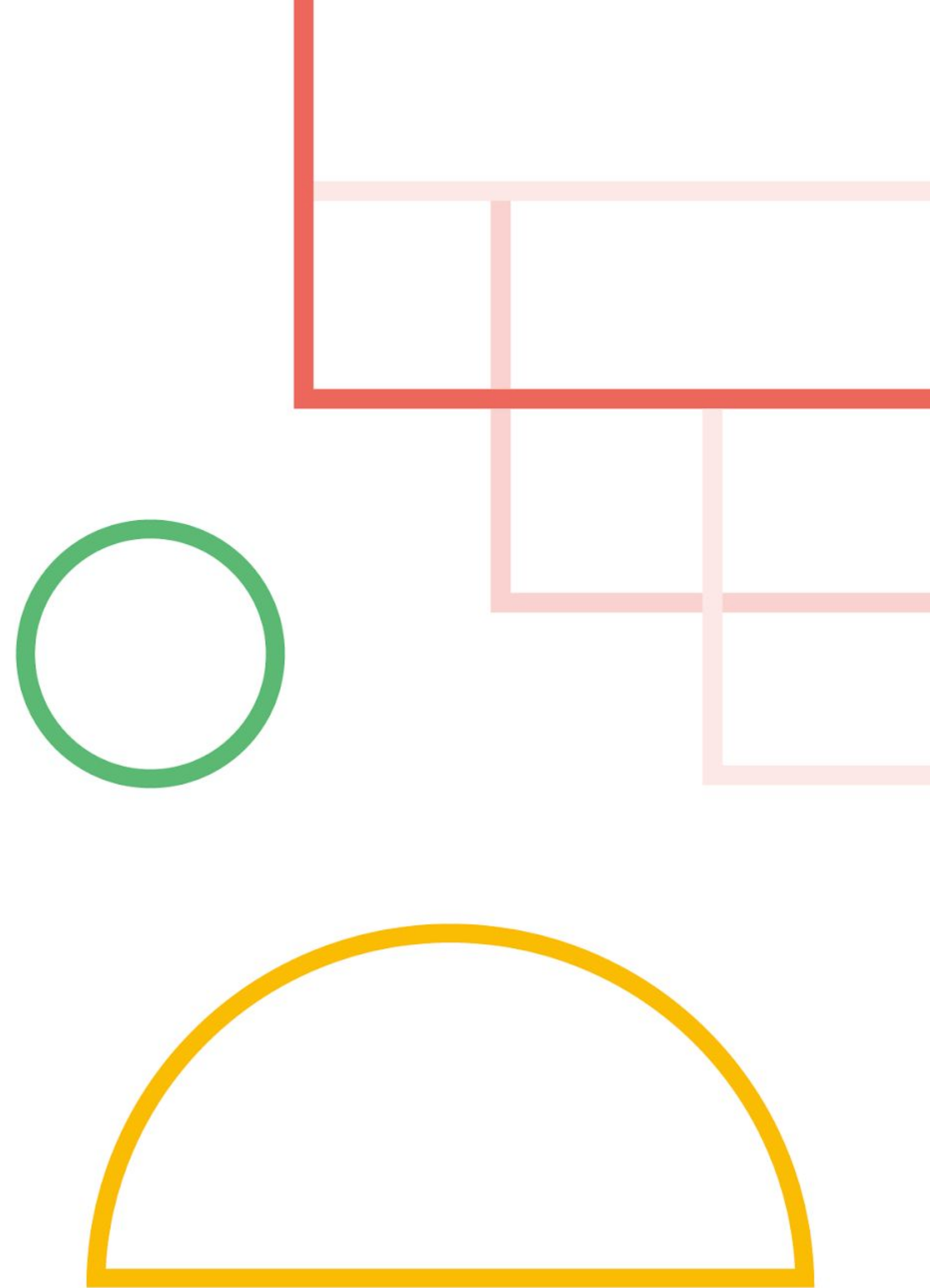


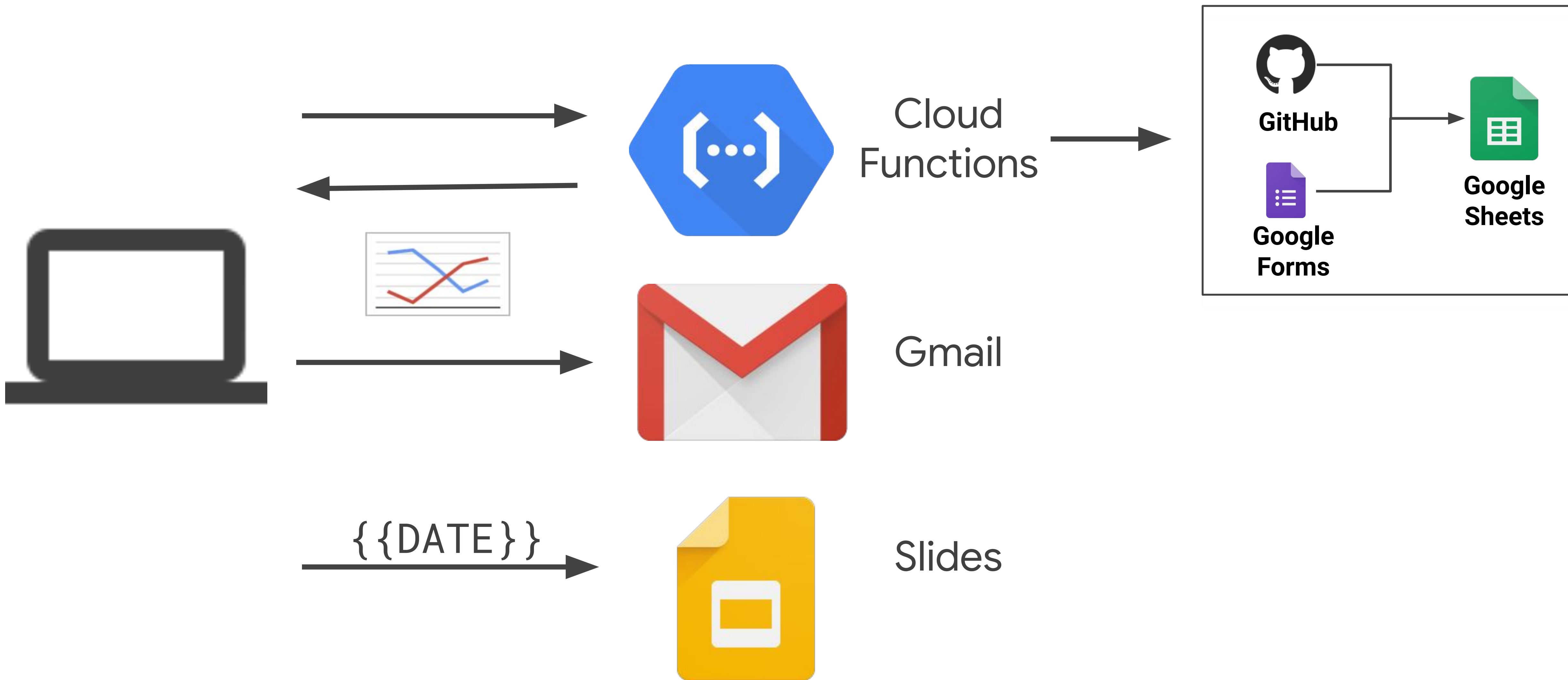


```
let requests = [{  
  createSheetsChart: {  
    objectId,  
    spreadsheetId,  
    chartId: 'chartId',  
    linkingMode: 'LINKED',  
    elementProperties: {  
      pageObjectId: pageId,  
      size: {  
        height:  
  
        . . .  
      }  
    }  
  }  
}]
```



# 1. 7. Conclusion





# Your turn!

<b>Sheets API</b>	<a href="https://developers.google.com/sheets/api/">developers.google.com/sheets/api/</a>
<b>Cloud Functions</b>	<a href="https://cloud.google.com/functions/">cloud.google.com/functions/</a>
<b>Cloud Scheduler</b>	<a href="https://cloud.google.com/scheduler/">cloud.google.com/scheduler/</a>

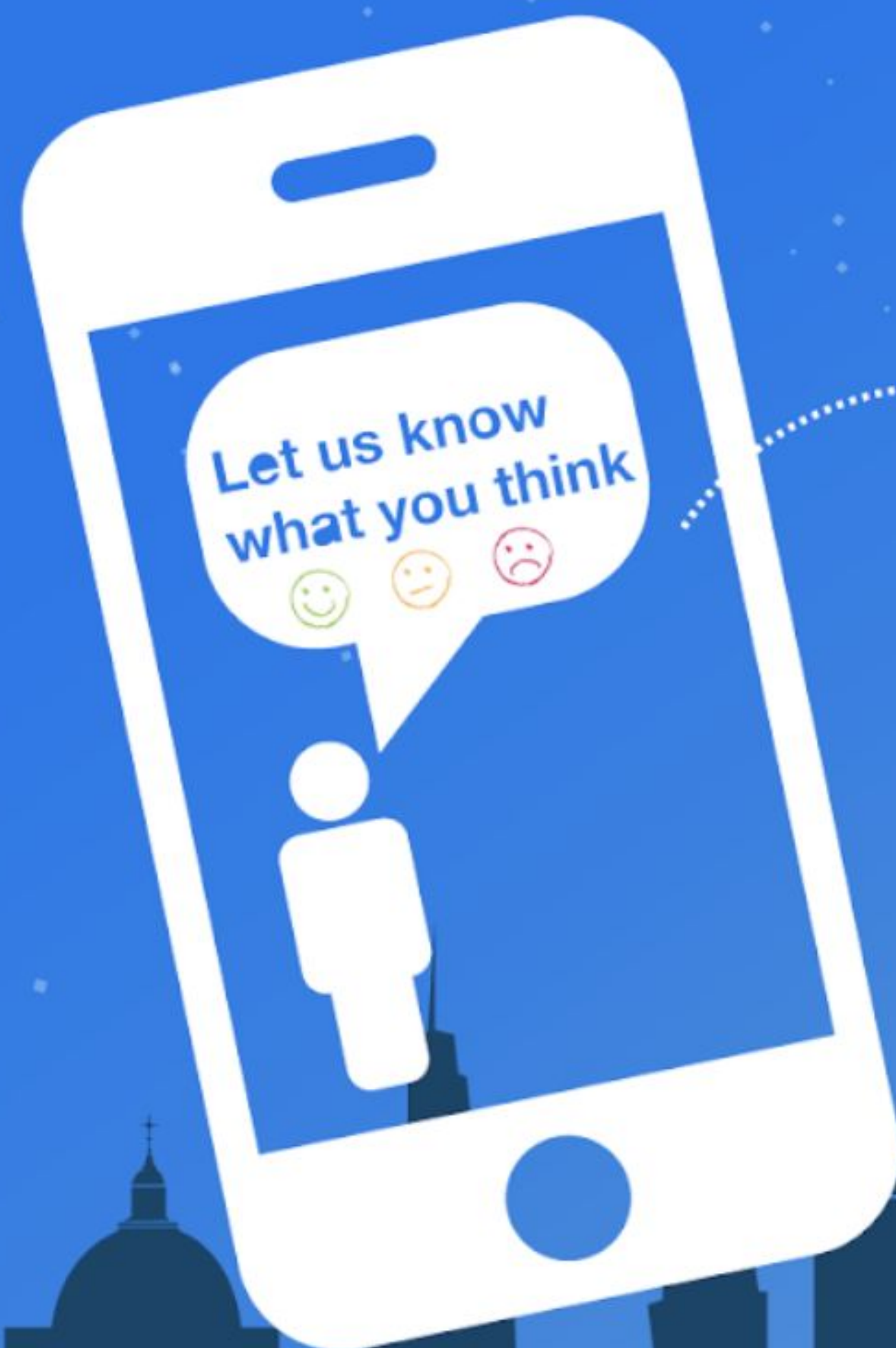


[github.com/asrivas/work-less-do-more](https://github.com/asrivas/work-less-do-more)



@asrivas\_dev @fhinkel





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