
Clinician Scheduler Documentation

Release 1.0

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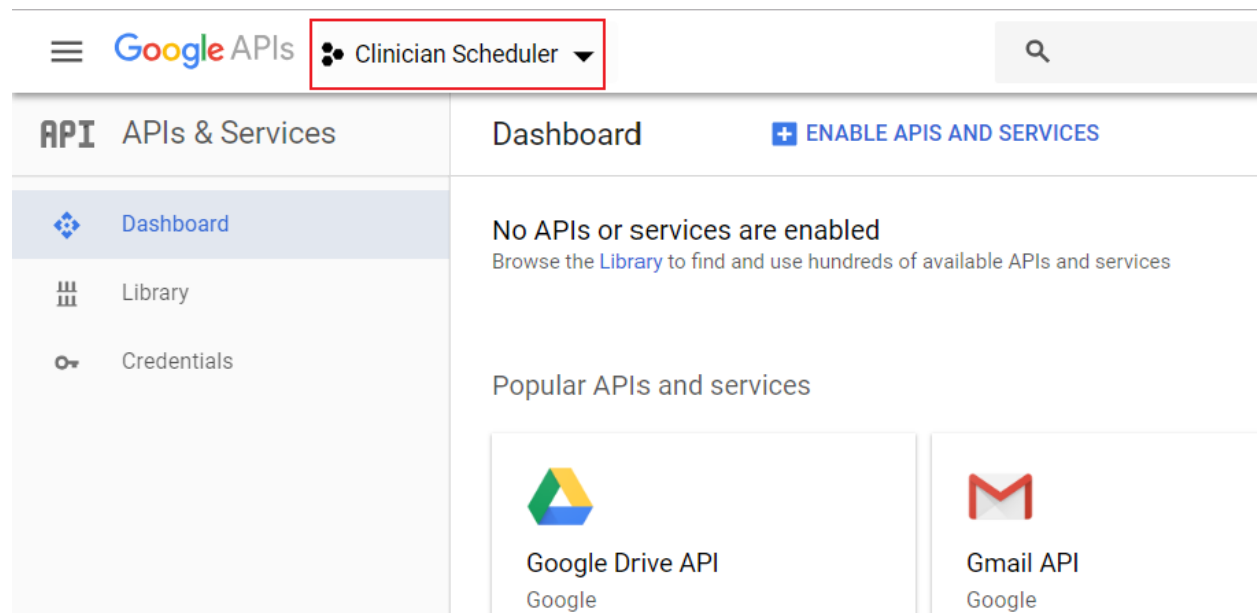
The clinician scheduler allows you to automatically generate and publish schedules that satisfy common constraints in an on-call system, while taking into account the preferences of clinicians.

1.1 Generating Google API credentials

Note: This process should only be done the very first time you are running the program. If you have previously generated a credential file using this process you should be able to re-use it. Just make sure that the credential file is placed in the same folder as the executable (`scheduler.exe`).

The application uses Google calendar for retrieving clinician time-off requests and long weekend information, as well as uploading the generated schedule to the calendar. These operations require the use of Google API credentials, which can be generated as follows.

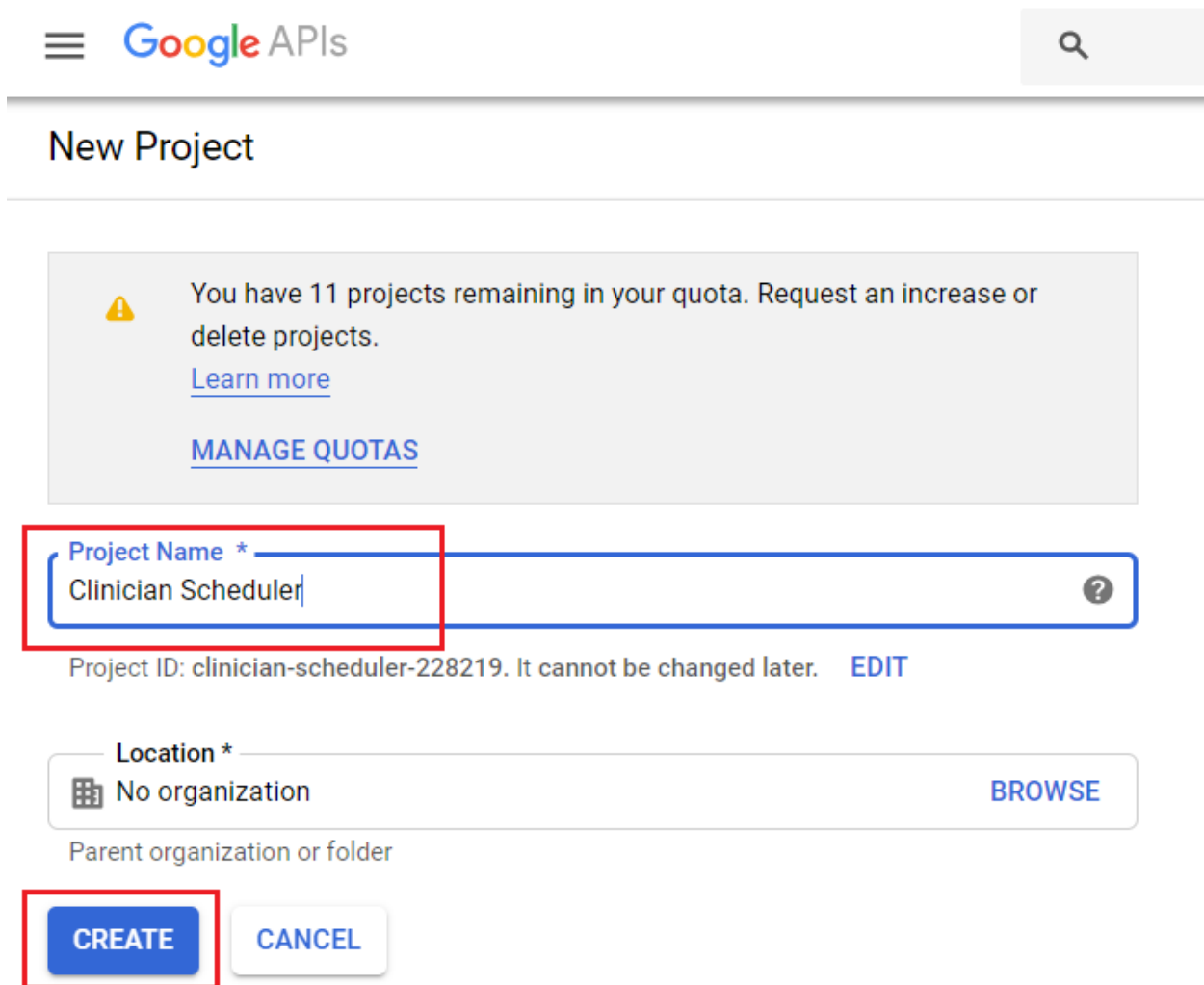
1. Sign into <https://console.developers.google.com>.
2. Click on the project selector at the top left of the page.



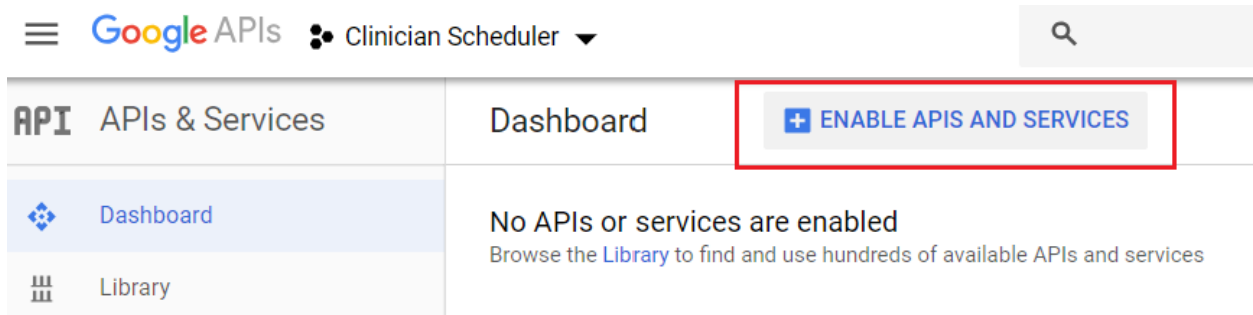
3. Click on *New Project*.



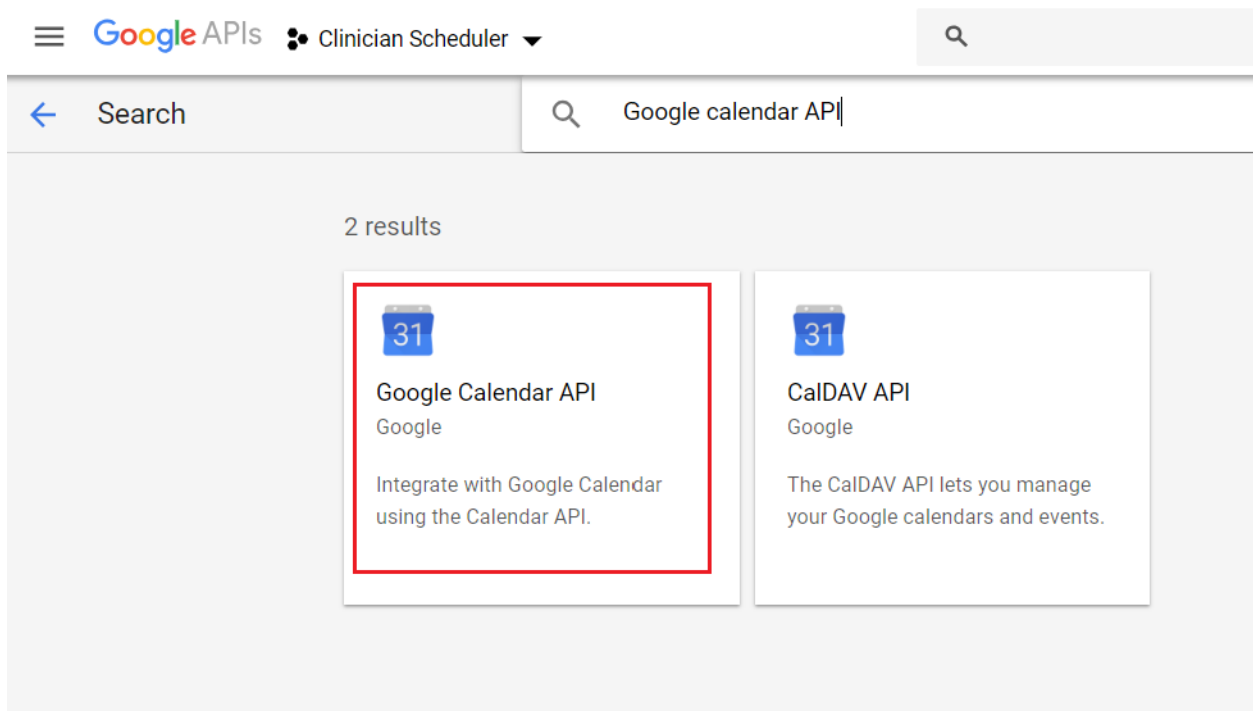
4. Enter “Clinician Scheduler” as the *Project Name* and click *Create*.



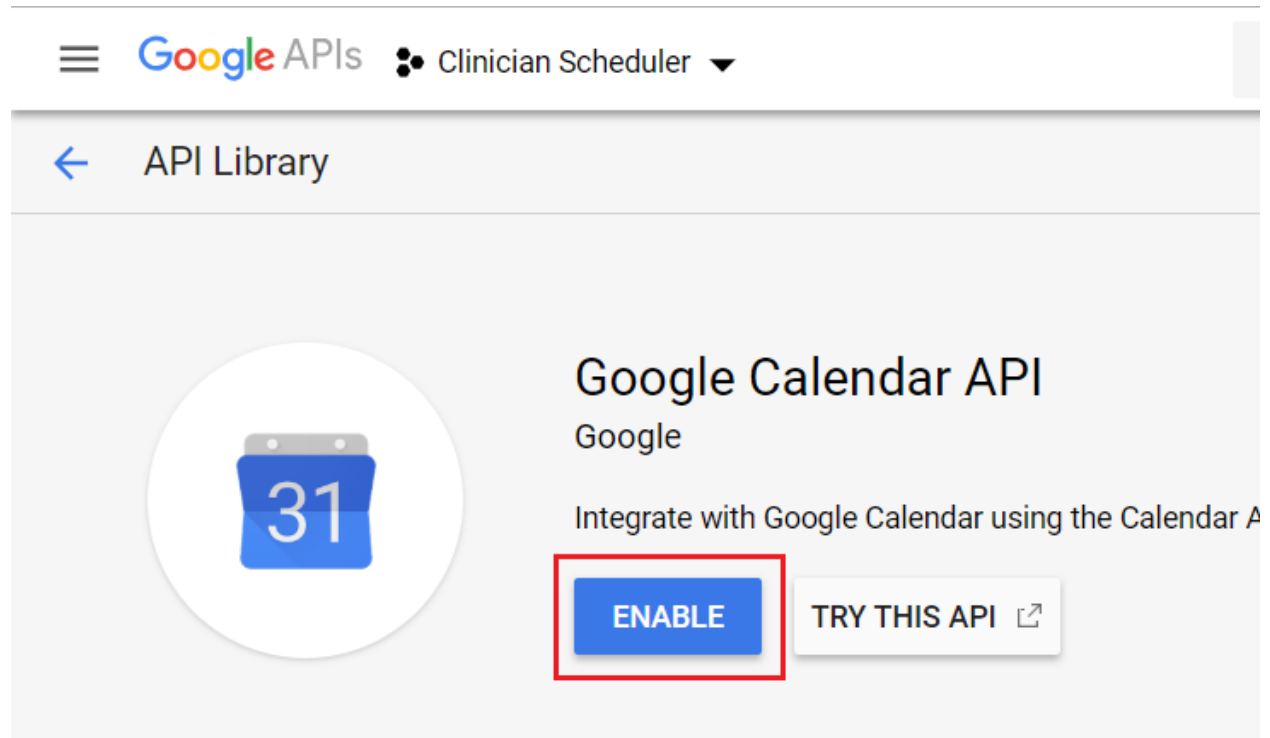
5. Now you should see the dashboard for the Clinician Scheduler project. You will need to enable the Google calendar API. Click on *Enable APIs and Services*.



6. Search for “Google calendar API” using the search bar, and select it.



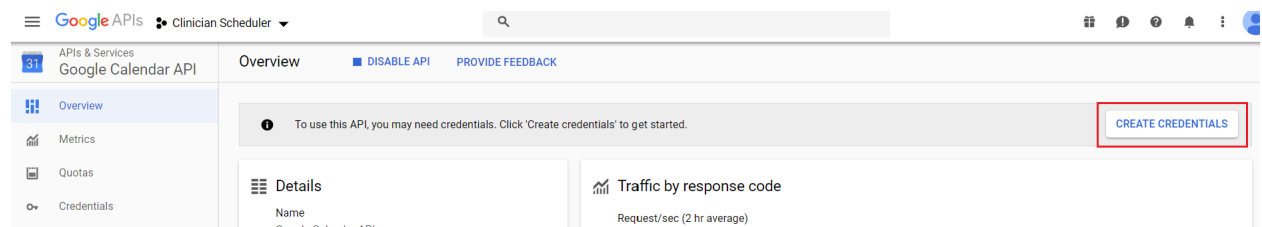
7. Click *Enable*.



Type

Overview

- Now you should see the overview page for the Google calendar API. To generate the credentials, click *Create credentials*.



- On the credentials form, choose “Google Calendar API” for *Which API are you using?*, then “Other UI (e.g. Windows, CLI tool)” for *Where will you be calling the API from?* and “User data” for *What data will you be accessing?*. Then click on *What credentials do I need?*.

Dashboard

Library

Credentials

Add credentials to your project

- Find out what kind of credentials you need

We'll help you set up the correct credentials
If you wish you can skip this step and create an [API key](#), [client ID](#), or [service account](#)

Which API are you using?
Different APIs use different auth platforms and some credentials can be restricted to only call certain APIs.

Google Calendar API

Where will you be calling the API from?
Credentials can be restricted using details of the context from which they're called.
Some credentials are unsafe to use in certain contexts.

Other UI (e.g. Windows, CLI tool)

What data will you be accessing?
Different credentials are required to authorize access depending on the type of data that you request.

☒ User data
Access data belonging to a Google user, with their permission
☐ Application data
Access data belonging to your own application

What credentials do I need?

10. Enter “Client” for *Name* and click on *Create OAuth client ID*.

Library

Credentials

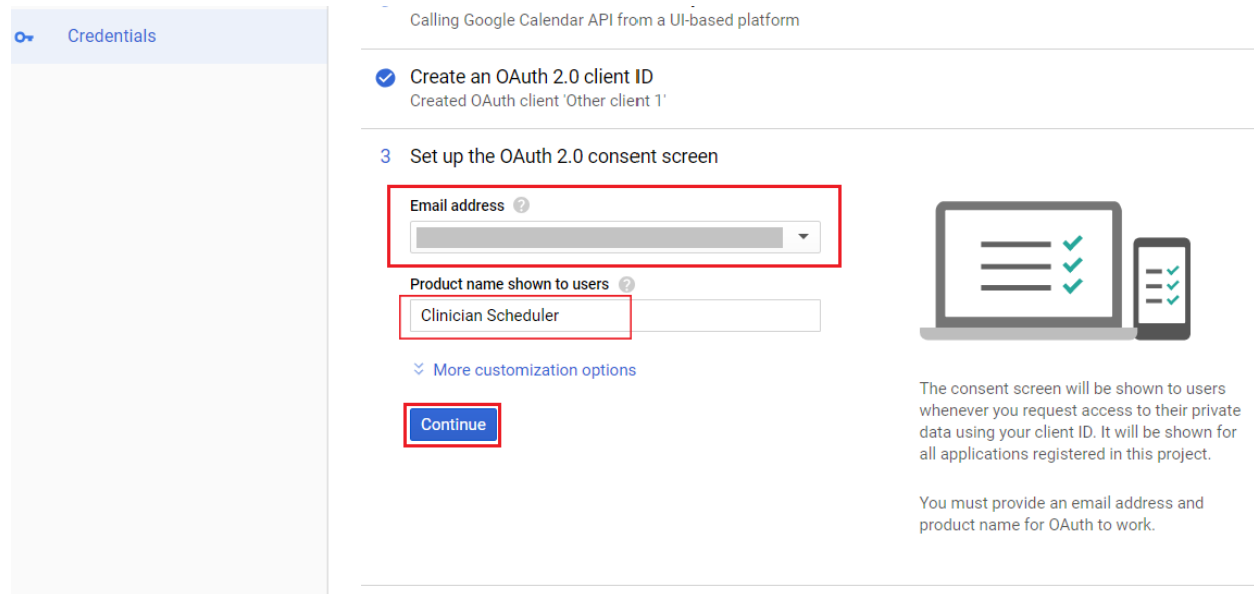
- Find out what kind of credentials you need
Calling Google Calendar API from a UI-based platform
- Create an OAuth 2.0 client ID

Name ?

Client

Create OAuth client ID

11. Choose the email address associated to your account for *Email address* and enter “Clinician Scheduler” for *Product name shown to users*, then click *Continue*.



Calling Google Calendar API from a UI-based platform

- ✓ Create an OAuth 2.0 client ID
Created OAuth client 'Other client 1'

3 Set up the OAuth 2.0 consent screen

Email address ?

Product name shown to users ?
Clinician Scheduler

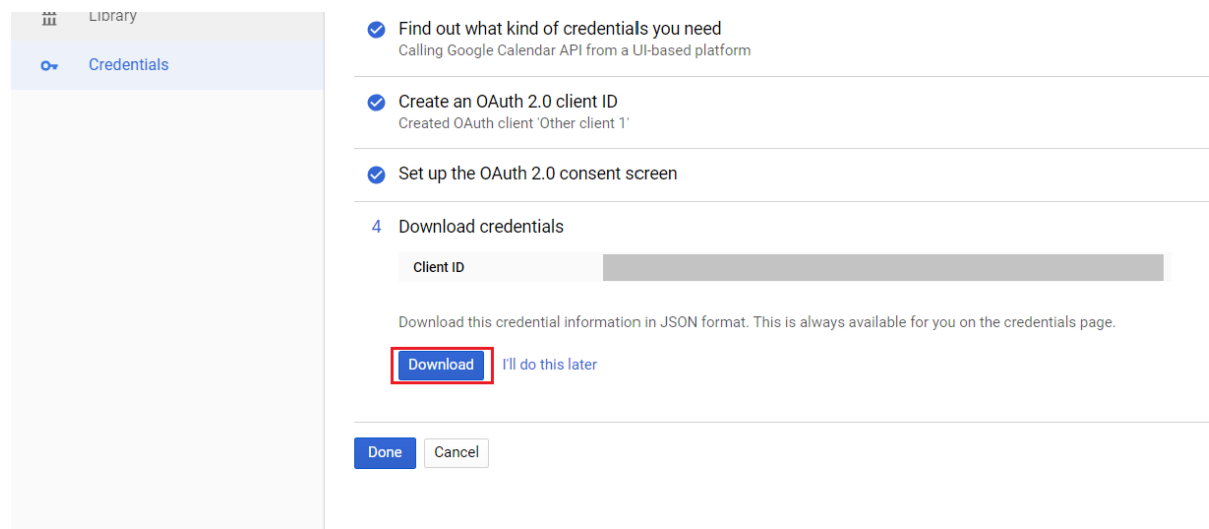
More customization options

Continue

The consent screen will be shown to users whenever you request access to their private data using your client ID. It will be shown for all applications registered in this project.

You must provide an email address and product name for OAuth to work.

12. Your credentials are now generated! Make sure to download and save them in the same location that you unzipped the application, so that the credential file and the executable file (`scheduler.exe`) are in the same folder.



Library

Credentials

- ✓ Find out what kind of credentials you need
Calling Google Calendar API from a UI-based platform
- ✓ Create an OAuth 2.0 client ID
Created OAuth client 'Other client 1'
- ✓ Set up the OAuth 2.0 consent screen

4 Download credentials

Client ID

Download this credential information in JSON format. This is always available for you on the credentials page.

Download I'll do this later

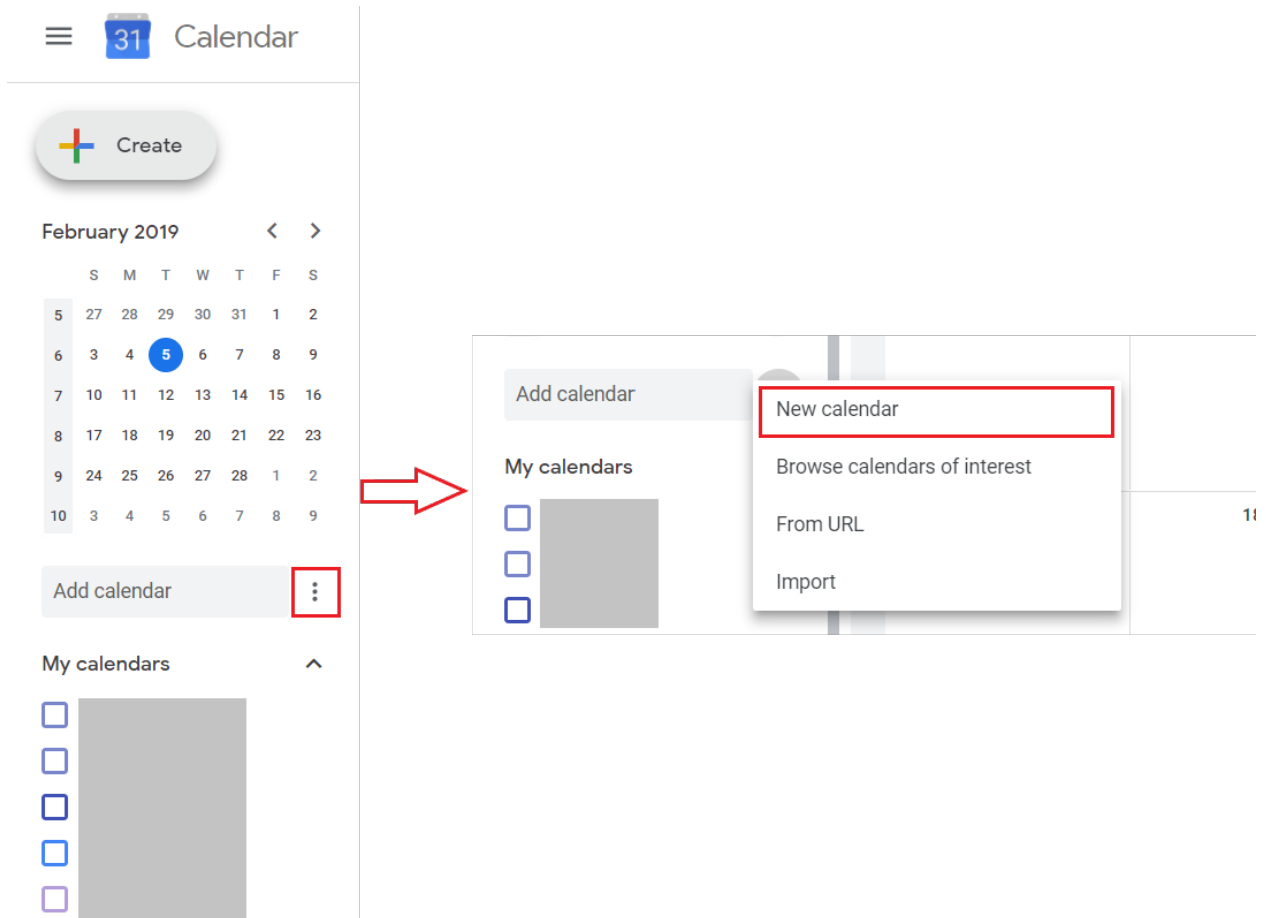
Done Cancel

Attention: Make sure the credential file is saved as `credentials.json` (rename it, if necessary), or otherwise the application will not be able to recognize it!

1.2 Google Calendar Configuration

1.2.1 Creating a calendar

1. Navigate to <https://calendar.google.com> and sign in to the appropriate account.
2. Click on the settings icon next on the left side, and select *New Calendar*.



3. Enter a name for your calendar and click *Create calendar*.

←

Settings

General

Add calendar

New calendar

Browse calendars of interest

From URL

Import & export

Settings for my calendars

New calendar

Name

Sample Calendar

Description

Time zone

(GMT-05:00) Eastern Time - New York

Owner

Create calendar

1.2.2 Adding holiday events

Note: It is recommended to create full-day events for holidays and clinician requests.

Create an event by clicking on any cell in the calendar. Make sure that the name of the event you create starts with “[holiday]”, so that the scheduler can recognize the event correctly. Click *Save* once you are done.

4

5

6

7

[holiday]

Event

Feb 7, 2019 – Feb 7, 2019

Add time

Sample Calendar

More options

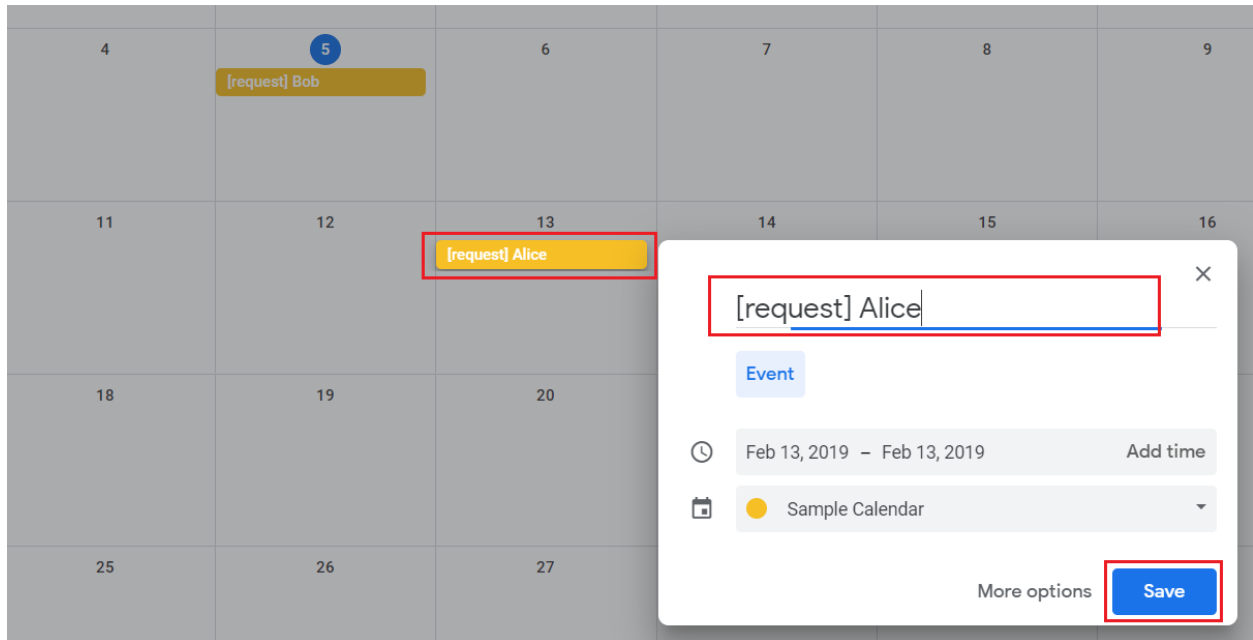
Save

14

21

1.2.3 Adding clinician requests

Create an event by clicking on any cell in the calendar. Make sure that the name of the event you create has the format: “[request] Name”, so that the scheduler can recognize the event correctly. Click *Save* once you are done.



Warning: It is important that the name you use in the event name matches the name in the clinician configuration you create in *Clinician Configuration*.

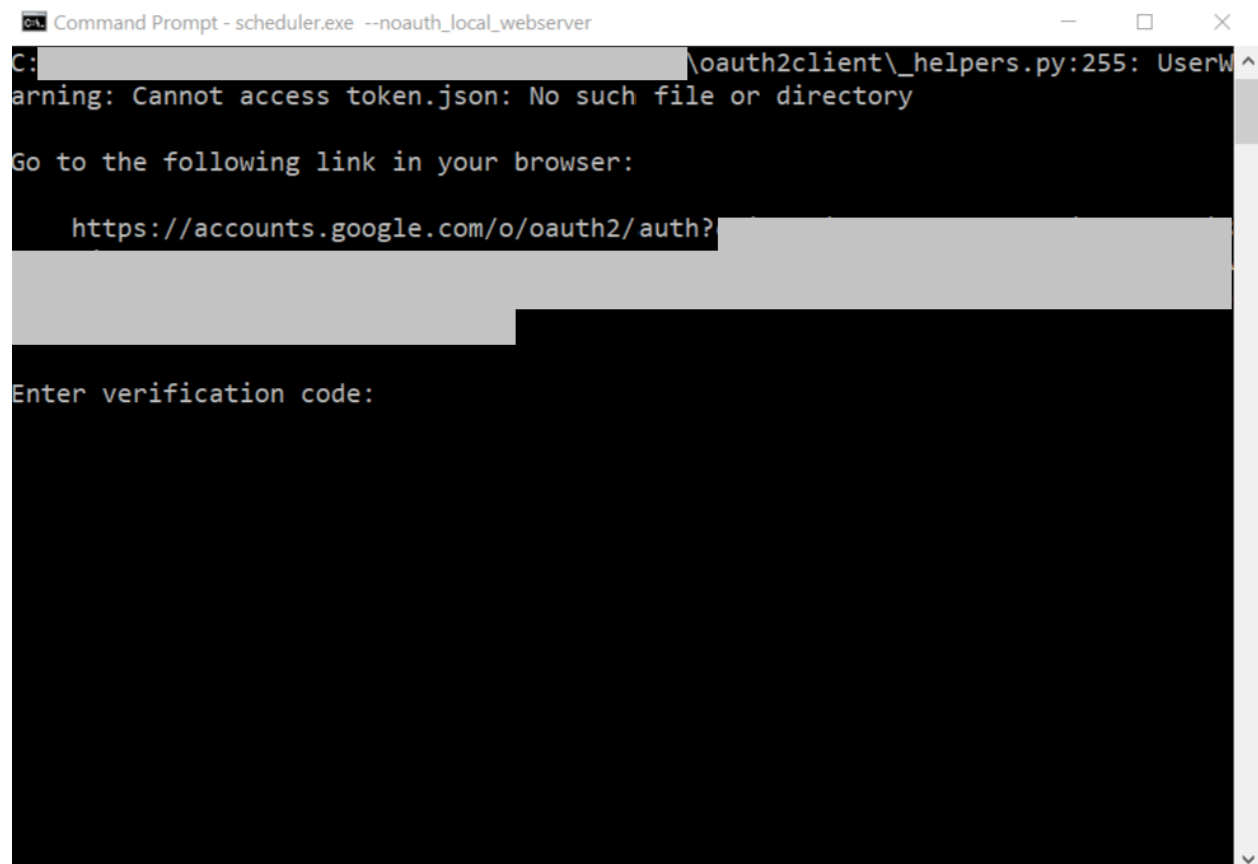
USAGE

2.1 Authentication

When the scheduler first makes a connection to Google calendar, it needs to create an authentication token, which will be used to simplify future connections.

This requires you to allow the scheduler application to access a calendar that you specified. You may encounter this when using any functionality that interacts with Google calendar, for example in *Generating a schedule* or in *Publishing a schedule to Google Calendar*.

1. The scheduler should have automatically opened the access request page in a browser window, in which case you can skip to step 2. **Otherwise**, locate the command prompt for the scheduler. You should see instructions to open the access request printed on the command prompt. Follow these instructions in order to open the access request page manually.



```
Command Prompt - scheduler.exe --noauth_local_webserver
C:\[redacted]\oauth2client\_helpers.py:255: UserWarning: Cannot access token.json: No such file or directory
Go to the following link in your browser:
https://accounts.google.com/o/oauth2/auth?
[redacted]
Enter verification code:
```

2. Follow the instructions on the access request page in order to allow the scheduler application to read/write from/to the calendar you specified.

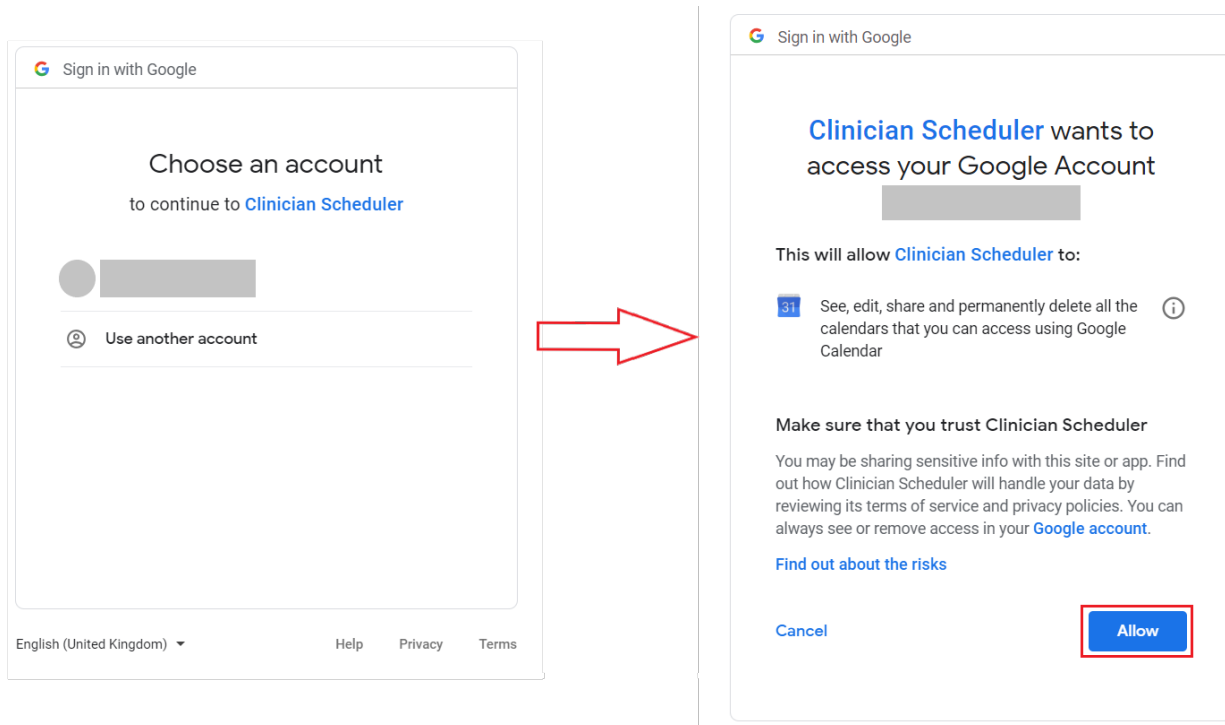
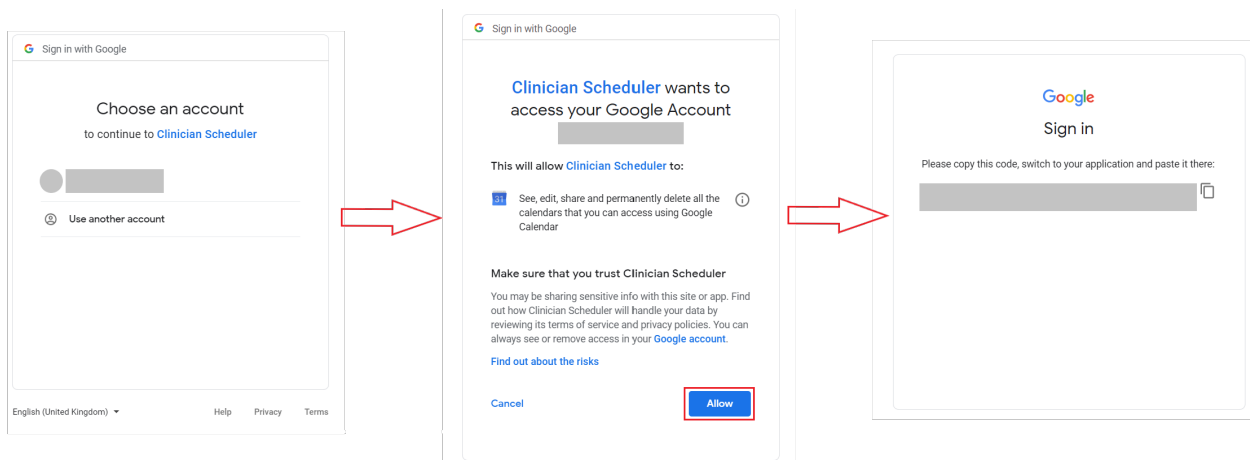


Fig. 1: **(Optional)** If you opened the access request manually in step 1, you will receive an authentication code which needs to be pasted into the command prompt



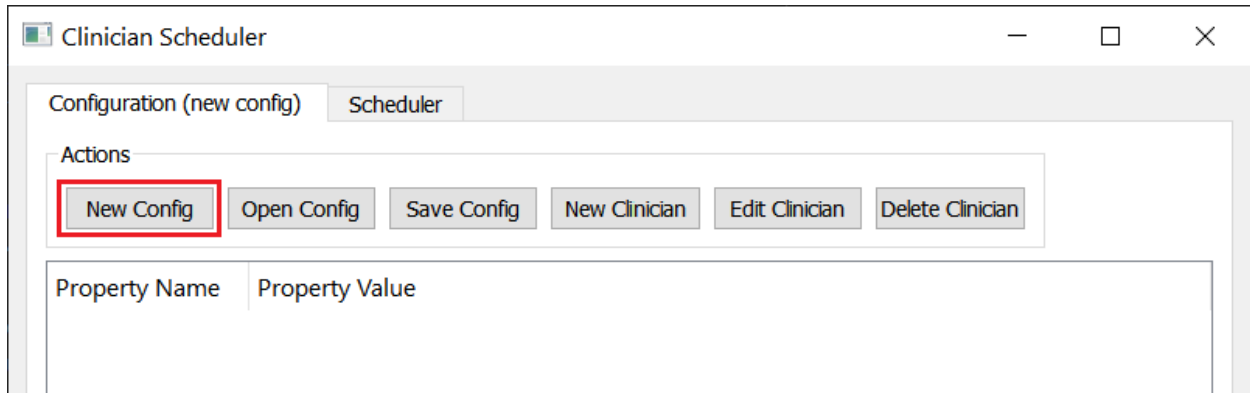
3. Once you have completed the authentication process, the scheduler will automatically resume its functionality.

2.2 Clinician Configuration

Before we can generate a schedule, we need to create a configuration file that specifies which clinicians are available, and how many weeks each clinician should fulfill.

2.2.1 Creating a new configuration file

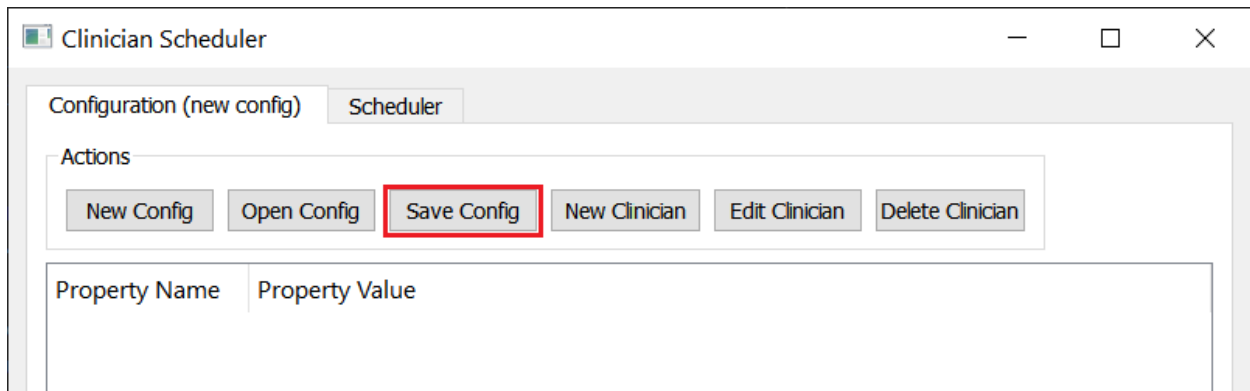
By default, you will get a blank configuration file when you launch the program. If you would like to discard the changes you have made and start a configuration file from scratch, simply click on *New Config*.



Warning: Unsaved changes to a configuration file will be discarded upon clicking *New Config*.

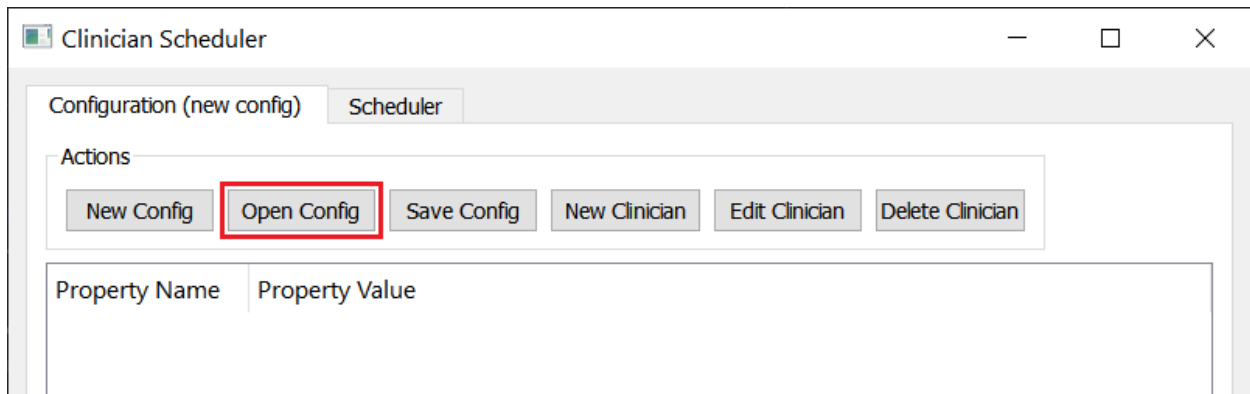
2.2.2 Saving the configuration file

When you are ready to save the configuration you created, click on *Save Config* and choose a place to save your file. Make note of the name and directory of the file so you could load it in future runs.



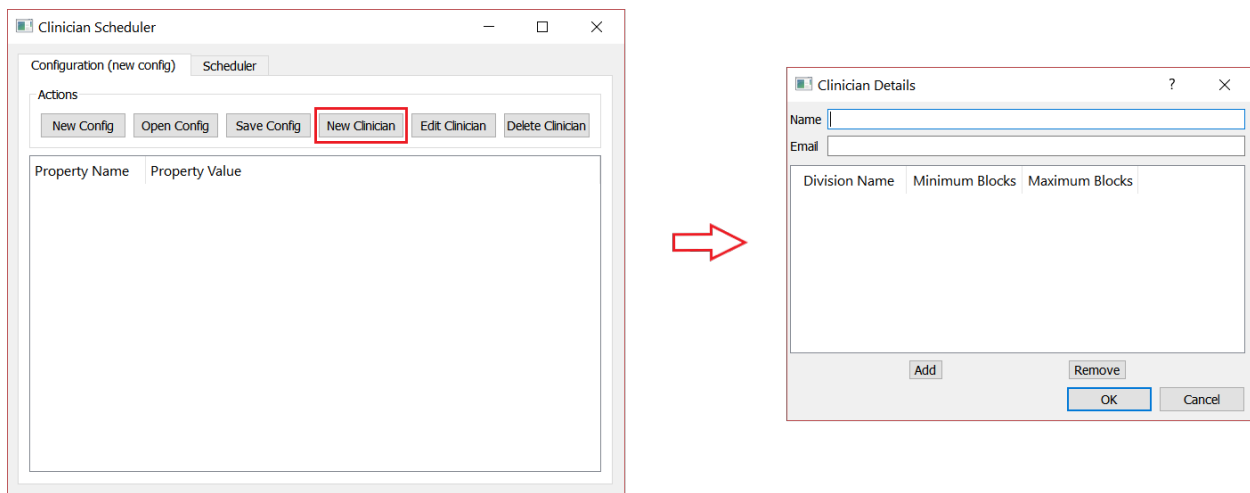
2.2.3 Loading a configuration file

If you would like to open a previously created configuration file, simply click on *Open Config*, navigate to the location of the configuration file, and select it.



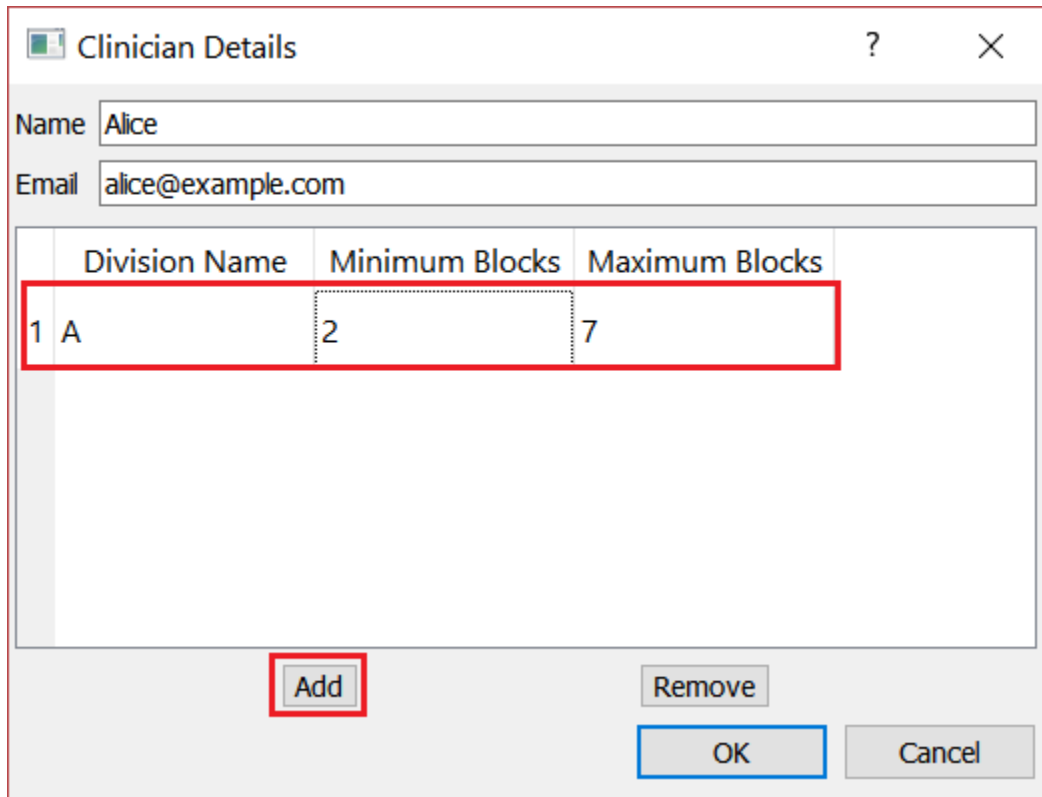
2.2.4 Adding a new clinician

1. From the configuration tab, click *New Clinician*. You should see a form for supplying details.



2. Fill out the name, email (optional), and divisions that the clinician will be covering. To add a division you can click on *Add* and a new row will be added to the table which you can fill out. You can set the minimum and maximum number of blocks that a clinician can work in a given division.

Note: A single block corresponds to two weeks.



Clinician Details ? X

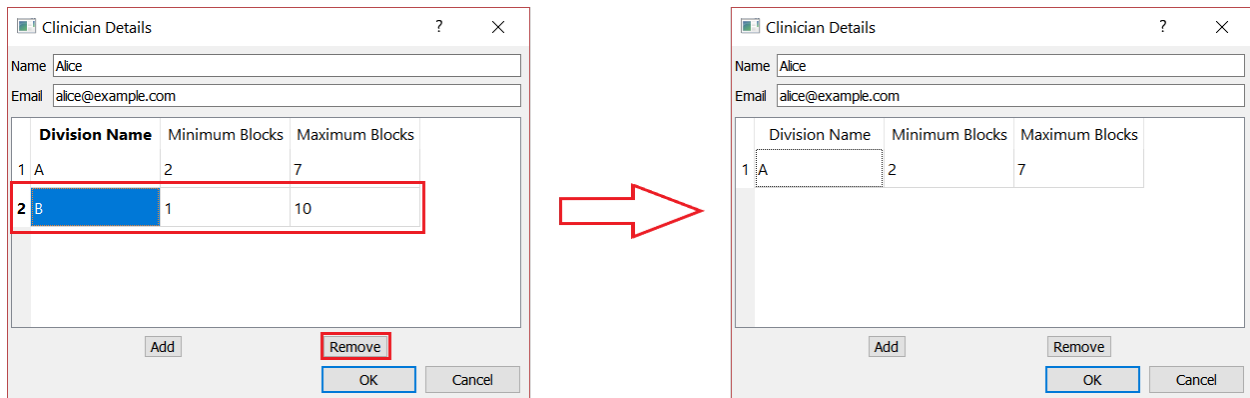
Name

Email

	Division Name	Minimum Blocks	Maximum Blocks
1	A	2	7

Add Remove OK Cancel

3. To delete a row from the table, select the row and then click *Remove*.



Clinician Details ? X

Name

Email

	Division Name	Minimum Blocks	Maximum Blocks
1	A	2	7
2	B	1	10

Add Remove OK Cancel

→

Clinician Details ? X

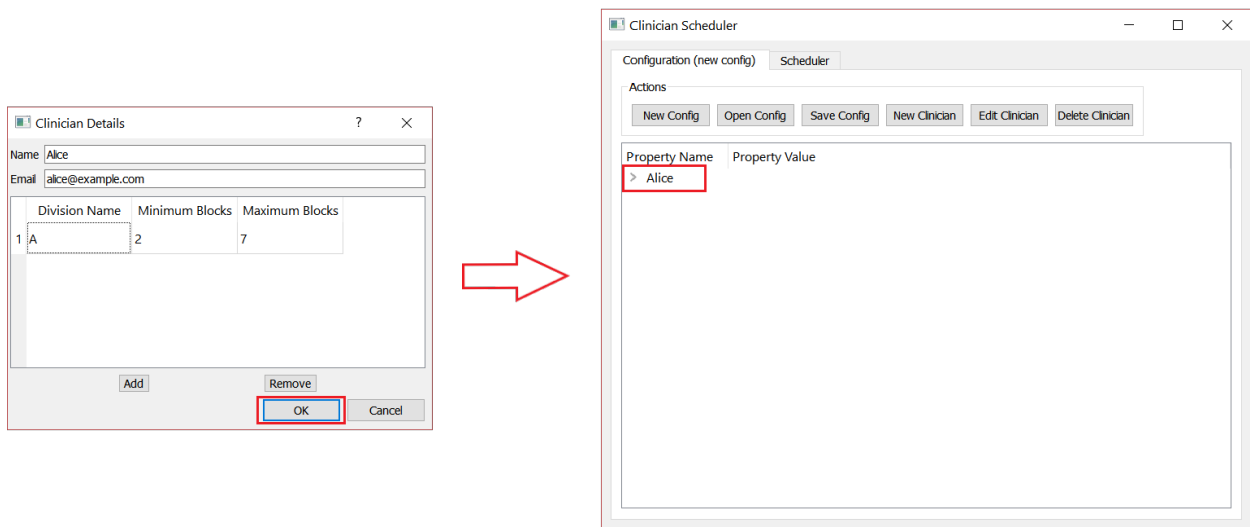
Name

Email

	Division Name	Minimum Blocks	Maximum Blocks
1	A	2	7

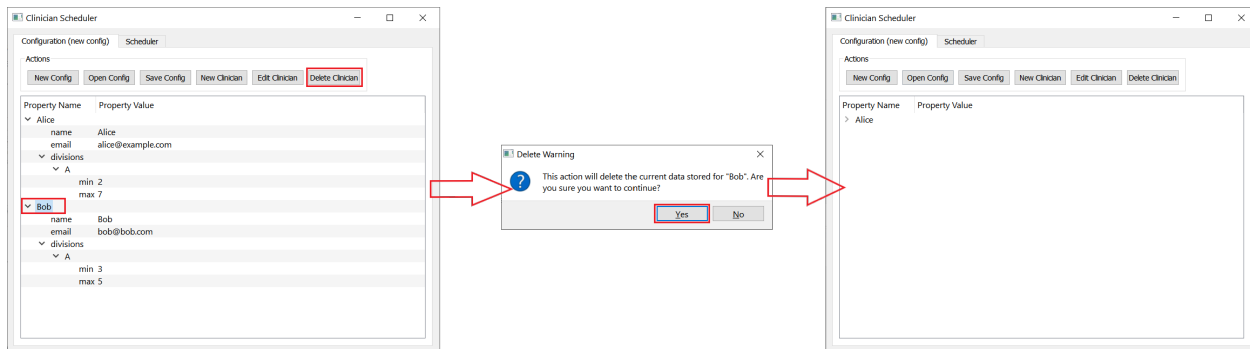
Add Remove OK Cancel

4. When you are finished entering the data for the clinician, click *Ok*. You should now see a new entry in the main table for that clinician.



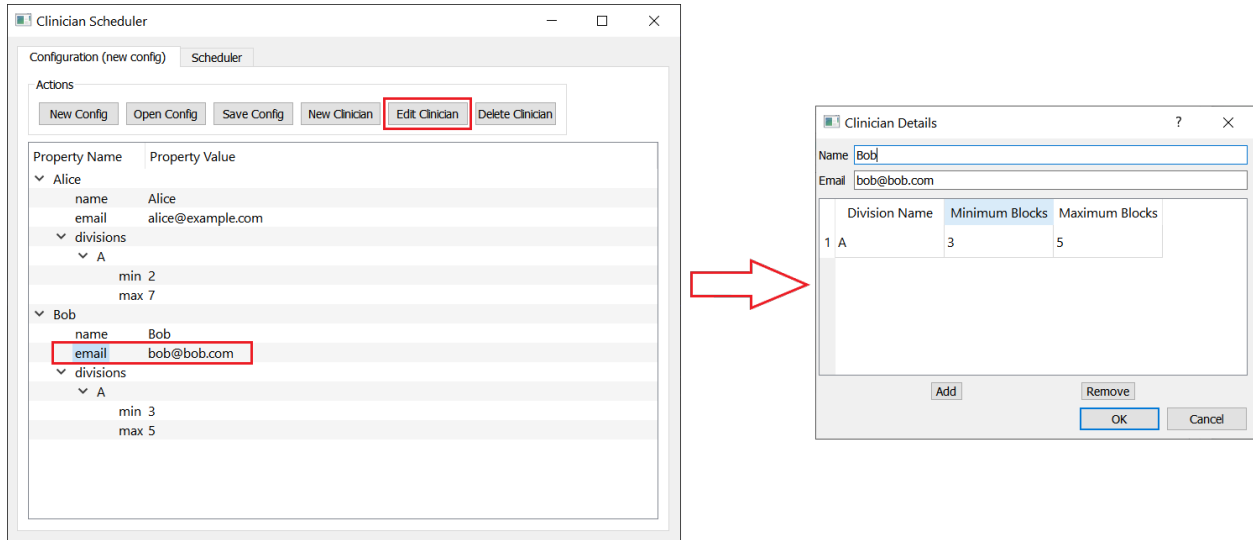
2.2.5 Deleting an existing clinician

To delete an existing clinician, simply select a row corresponding to the clinician in the table and click on *Delete Clinician*.



2.2.6 Editing an existing clinician

To edit the information of a clinician, select a row corresponding to the clinician in the table and click on *Edit Clinician*. You should see a dialog window where you can change the information. For more details on how to enter data in the edit dialog, see [Adding a new clinician](#).

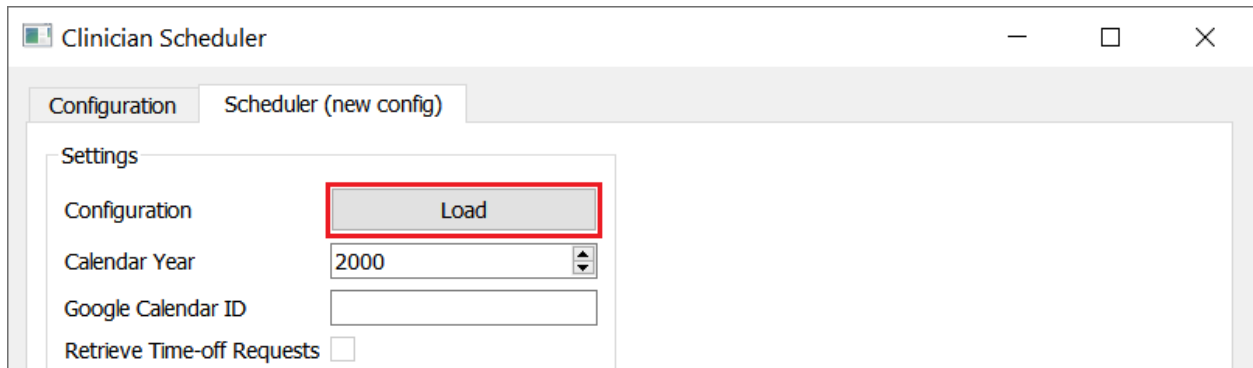


2.3 Scheduling

2.3.1 Generating a schedule

Once you have created a configuration file, you can switch over to the *Scheduler* tab of the application in order to generate a schedule.

1. From the scheduling tab, click on *Load* and select the configuration file that you generated in *Clinician Configuration*



2. Enter the calendar year for the schedule that you want to generate.

Configuration Scheduler (new config)

Settings

Configuration Load

Calendar Year 2000

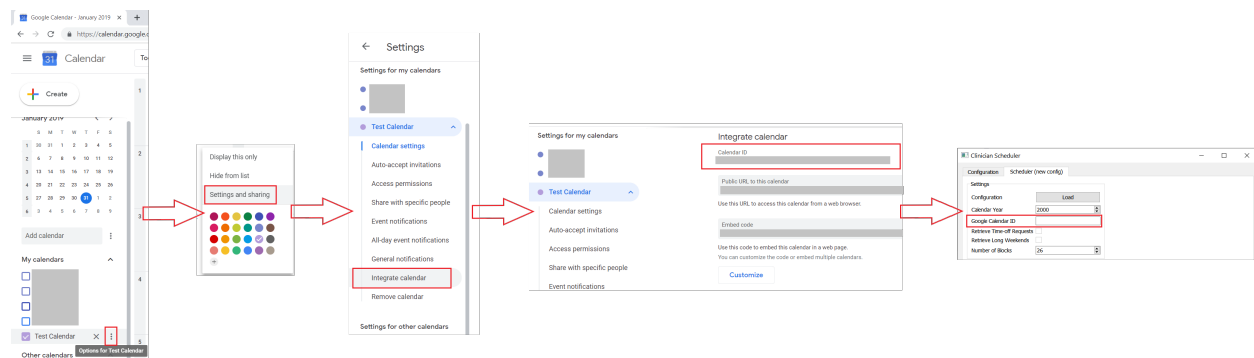
Google Calendar ID

Retrieve Time-off Requests ☐

Retrieve Long Weekends ☐

Number of Blocks 26

3. **(Optional)** In order to retrieve the time-off requests that were populated in Google calendar in *Adding clinician requests*, we need to specify the calendar ID. Open the calendar in your browser, and navigate to the *Settings and sharing* page. On the setting page, navigate to the *Integrate calendar* section, and copy the value under *Calendar ID* to your clipboard. Paste this value into the *Google Calendar ID* textbox on the *Scheduler* tab.



4. **(Optional)** If you supplied a calendar ID in step 3, you can configure the options *Retrieve Time-off Requests* and *Retrieve Long Weekends* as necessary. Enabling *Retrieve Time-off Requests* will read the time-off calendar events from the calendar specified in *Calendar ID*, while enabling *Retrieve Long Weekends* will read the holiday events from that calendar.

Configuration Load

Calendar Year 2000

Google Calendar ID some calendar id...

Retrieve Time-off Requests ☐

Retrieve Long Weekends ☐

5. **(Optional)** In the case that you only need to generate a schedule for a subset of the calendar year, you can select the amount of blocks you need to generate by specifying a value in *Number of Blocks*. By default, the scheduler will generate a full schedule, corresponding to 26 blocks.

Google Calendar ID some calendar id...

Retrieve Time-off Requests ☐

Retrieve Long Weekends ☐

Number of Blocks 26

6. Click on *Generate*, and after a few moments you should see a preview of the generated schedule in the table.

(Optional) See [Authentication](#) in case you encounter problems with Google calendar at this stage.

Calendar Year
2019
Google Calendar ID
Retrieve Time-off Requests
☐
Retrieve Long Weekends
☐
Number of Blocks
26

Schedule

Generate
Export Yearly
Export Monthly

Calendar

Publish
Clear

Week Number	A	B	Weekend
1	Jane	Bob	Jane
2	Jane	Bob	Bob
3	Michael	Alice	Alice
4	Michael	Alice	Bob
5	Jane	Bob	Jane
6	Jane	Bob	Bob
7	Michael	Alice	Michael
8	Michael	Alice	Alice

Note: It is possible that the scheduler will not be able to come up with a schedule that satisfies your constraints. You can try adjusting some constraints by changing the minimum and maximum number of blocks of clinicians in the configuration file. See [Clinician Configuration](#) for more information on changing the configuration file.

2.3.2 Exporting a schedule

If you are satisfied with the generated schedule, you can choose to export it as an Excel file. There are two format options: *Yearly Export* and *Monthly Export*.

Selecting the *Yearly Export* option will generate an excel file with a single sheet, displaying the clinicians that are covering a particular division for a given week or weekend. It is very similar to the table output in the application itself.

Retrieve Time-off Requests ☐
 Retrieve Long Weekends ☐
 Number of Blocks

Schedule:
 Calendar:

Week Number	A	B	Weekend
1	Jane	Bob	Jane
2	Jane	Bob	Bob
3	Michael	Alice	Alice
4	Michael	Alice	Bob

Selecting the *Monthly Export* option will generate a more detailed breakdown of the schedule, with a separate sheet for every month, detailing which clinician covers which division on which day.

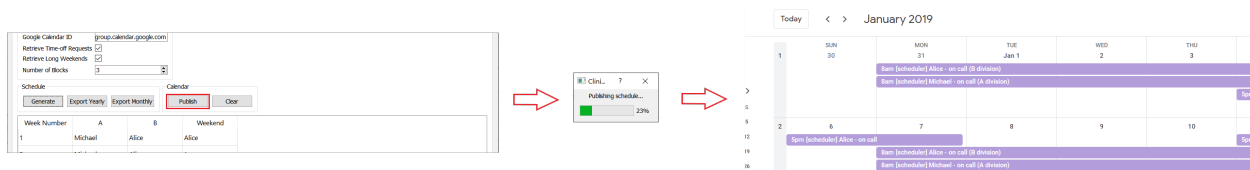
Retrieve Long Weekends ☐
 Number of Blocks

Schedule:
 Calendar:

Week Number	A	B	Weekend
1	Jane	Bob	Jane
2	Jane	Bob	Bob
3	Michael	Alice	Alice

2.3.3 Publishing a schedule to Google Calendar

If you are satisfied with the generated schedule, you can publish it to Google calendar, by clicking on *Publish*.



Warning: This process might take some time, especially if the number of events to be published is quite large.

2.3.4 Clearing a published schedule

If you want to remove all the published events created by the application, simply click on *Clear*.

Retrieve Long Weekends ☒
 Number of Blocks

Schedule:
 Calendar:

Week Number	A	B	Weekend
1	Michael	Alice	Alice
2	Michael	Alice	Jane

Warning: This process might take some time, especially if the number of published events is quite large.

CHAPTER THREE

SAMPLE OUTPUT

Yearly output format

AutoSave

Sample Yearly Output.xlsx - Excel

FileHomeInsertPage LayoutFormulasDataReviewViewDeveloperAdd-insHelpTeamTell me what you want to doShare

CutCopyFormat PainterClipboard

Calibri11A^A_A

Font

Wrap Text

General

Conditional FormattingFormat as Table

NormalBadGoodNeutral

Styles

InsertDeleteFormat

Fill

Clear

Sort & Find & Filter > Select >

Editing

A1Week Number

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Week Num	A	B	Weekend																	
2	1	Jane	Bob	Jane																	
3	2	Jane	Bob	Bob																	
4	3	Michael	Alice	Alice																	
5	4	Michael	Alice	Bob																	
6	5	Jane	Bob	Jane																	
7	6	Jane	Bob	Bob																	
8	7	Michael	Alice	Michael																	
9	8	Michael	Alice	Alice																	
10	9	Bob	Jane	Bob																	
11	10	Bob	Jane	Jane																	
12	11	Alice	Michael	Alice																	
13	12	Alice	Michael	Michael																	
14	13	Jane	Bob	Bob																	
15	14	Jane	Bob	Michael																	
16	15	Alice	Michael	Alice																	
17	16	Alice	Michael	Jane																	
18	17	Jane	Bob	Bob																	
19	18	Jane	Bob	Jane																	
20	19	Michael	Alice	Alice																	
21	20	Michael	Alice	Michael																	
22	21	Jane	Bob	Bob																	
23	22	Jane	Bob	Michael																	
24	23	Michael	Alice	Alice																	
25	24	Michael	Alice	Bob																	
26	25	Jane	Bob	Jane																	
27	26	Jane	Bob	Michael																	
28	27	Michael	Alice	Alice																	

Sheet

Ready

100%

Monthly output format

Clinician Scheduler Documentation, Release 1.0

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1					A Service			B Service												
2	Date	Day	Fellow	0800 - 1700	1700 - 0800	Backup	0800 - 1700	1700 - 0800	Backup											
3	Dec-31	Mon		Jane	Jane	Bob	Bob	Bob	Jane											
4	Jan-01	Tue		Jane	Jane	Bob	Bob	Bob	Jane											
5	Jan-02	Wed		Jane	Jane	Bob	Bob	Bob	Jane											
6	Jan-03	Thu		Jane	Jane	Bob	Bob	Bob	Jane											
7	Jan-04	Fri		Jane	Jane	Jane	Bob	Jane	Jane											
8	Jan-05	Sat		Jane	Jane	Jane	Jane	Jane	Jane											
9	Jan-06	Sun		Jane	Jane	Jane	Jane	Jane	Jane											
10	Jan-07	Mon		Jane	Jane	Bob	Bob	Bob	Jane											
11	Jan-08	Tue		Jane	Jane	Bob	Bob	Bob	Jane											
12	Jan-09	Wed		Jane	Jane	Bob	Bob	Bob	Jane											
13	Jan-10	Thu		Jane	Jane	Bob	Bob	Bob	Jane											
14	Jan-11	Fri		Jane	Bob	Bob	Bob	Bob	Bob											
15	Jan-12	Sat			Bob	Bob	Bob	Bob	Bob											
16	Jan-13	Sun			Bob	Bob	Bob	Bob	Bob											
17	Jan-14	Mon		Michael	Michael	Alice	Alice	Alice	Michael											
18	Jan-15	Tue		Michael	Michael	Alice	Alice	Alice	Michael											
19	Jan-16	Wed		Michael	Michael	Alice	Alice	Alice	Michael											
20	Jan-17	Thu		Michael	Michael	Alice	Alice	Alice	Michael											
21	Jan-18	Fri		Michael	Alice	Alice	Alice	Alice	Alice											
22	Jan-19	Sat		Alice	Alice	Alice	Alice	Alice	Alice											
23	Jan-20	Sun		Alice	Alice	Alice	Alice	Alice	Alice											
24	Jan-21	Mon		Michael	Michael	Alice	Alice	Alice	Michael											
25	Jan-22	Tue		Michael	Michael	Alice	Alice	Alice	Michael											
26	Jan-23	Wed		Michael	Michael	Alice	Alice	Alice	Michael											
27	Jan-24	Thu		Michael	Michael	Alice	Alice	Alice	Michael											