Advanced – The API

Setting up and using the API in REDCap

The REDCap API (Application Programming Interface) is a functionality built into REDCap that allows for data and data triggers to be pushed into or pulled out of REDCap to/from other software platforms. Those other platforms might be statistical packages like R, SAS, SPSS, Stata, etc. or data visualization applications like PowerBI or Tableau. The API is not unique to REDCap. Most application platforms have an API of some sort and it is common to use the APIs of two or more applications you are trying to connect to actually build a data pathway between them. The API can also (and is commonly) be used to simply bring data in and out of REDCap securely from a .CSV or directory. Read through the sections below to grasp how the API can be used in practice and be sure to test in your own project when you feel ready. Remember, the API is a very powerful tool, although not overly complicated, and misuse of it can result in protocol breaches, compliance failures, and leaked data. Users are highly encouraged to understand the API thoroughly before using.

Familiarize: API Playground

Anytime you want to test out an idea with the REDCap API, you should start with the API Playground. Especially when you are starting out, this is the area of REDCap where you will build test examples of your API "requests" or calls on REDCap to see what sort of results you may get. To access the API playground, you will need API privileges granted to you in User Rights to allow you to see the option under your Applications menu (left vertical menu throughout your project). Once you can access the API Playground page, you will be asked to create an API token ("Create API token now" button). Your token is user/project specific so you will need one for each project you attempt to use the API. NEVER share your API token. It grants incredible access to your project and its data, and if used by another user they could do things like delete all of the data in your project and it would look as though you yourself had done so. Once you have your API token, which is granted to you by REDCap Administrators, you will be able to use the API Playground. In the playground, requests are executed with code and this is core to how you will use the API. Knowing a particular programming language is incredibly helpful and will jumpstart your work with the API. Otherwise, you will need to learn how to use a common programming language in order to use the API. Examples are PHP, Python, cURL, Ruby, Java, and R. The playground helps you simplify this process though by giving a step-by-step workflow to build sample code and show you what it "returns" when you execute the call.

Starting at the top, you will choose an **API Method**. Methods are simply types of requests you can make with the API. These are primarily centered on exporting, importing, and deleting various elements of your project (data, records, reports, arms, events, DAGs, user privileges, etc.) You will notice that these correlate with functions you could execute in the application itself by visiting the correct page and utilizing the UI. This is where the API shines. It allows you to do these things in REDCap, for your project, without having to use REDCap directly. After you select a method and choose the parameters of that method you want to test (which REDCap will auto-update in the Raw Request Parameters window), there is an

"Execute" button in the following Response section. This will generate a text window with the output from your request as you've designed prior. The final section shows you the code, in a particular language tab of your choice, where you will be able to copy the code and paste into your own script file, saving for actual use and/or to modify further later and eventually use. This code needs to be copied, saved in a file respective to the language (e.g., PHP, a .php file) and then run in order to execute the code.

Leverage your Scripts

Once you have some scripts you have tested and would be ready to use you have to decide on how you want to use them: manually and ad-hoc, or automatically on a schedule. If manual, you will simply store the script on a network location and run it with your specific language protocol. If automated use is desired, you will have to set schedules using any variety of options, though a common choice built into Windows is the Windows Task Scheduler. There you can set new tasks, telling the operating system to run your script at specific intervals to help facilitate things like auto-updating your data in your project, or always sending a report output to a specific location, etc. This is the most complicated step as it requires you to have a when functioning script, a well setup scheduled task, and a knowledge of how it should all work so you can monitor and confirm a successful executed request.

Some applications have APIs of their own and when given the correct URL to REDCap's API, they can execute requests to REDCap from that application. You are welcome to use either or both. It is important to remember that as you use the API, it is not usually fast and rapidly setup process for most users, nor are requests universal or easily copied. Each request will be unique and you will almost always have to jump into the code REDCap auto-generates for you and customize it for your needs (when will the file be saved, what sort of file do you want the data stored in, where will other files be read from, what transformations will the data need to undergo, etc.) Give yourself plenty of time to test requests using the API Playground and get comfortable using the language you intend to program your requests in.

Key Items

- You can always find a complete list of all current **API Methods** here:
  https://rces.atriumhealth.org/redcap/api/help/ **or**
  https://redcap.wakehealth.edu/redcap/api/help/
  (You will need to be logged into the respective instance of REDCap to view these pages)
- **Postman** (https://www.postman.com/) - an application to help you trial and test API calls (download and install on your machine).
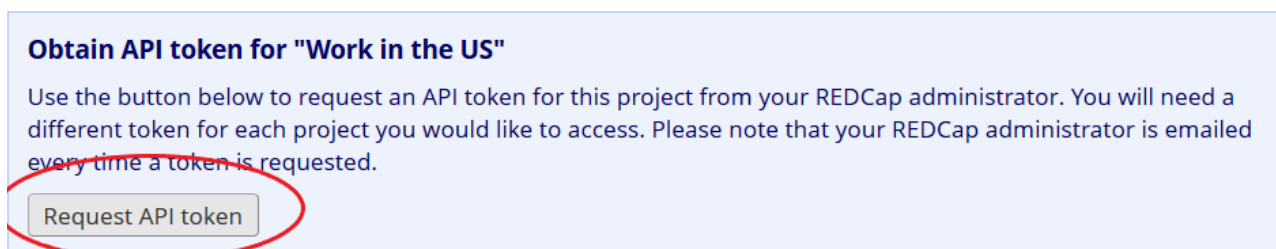
How to get an API Token

REDCap provides API tokens at the user-project level. This means that if three users on the same project need to use the API, each user will need to individually request an API token. Similarly, if one user wants an API token for three different projects, they will need to request an API token for each project.
For a user to get an API token for a project, they can take the following steps:

1. Go to the project you need an API token for.

2. In the left-hand menu under "Applications," push the "API" link. a. If you do not see this link, check (or have someone else check) the User Rights table and grant you API privileges.

Applications

- 🔔 Alerts & Notifications
- 📅 Calendar
- 📑 Data Exports, Reports, and Stats
- 📥 Data Import Tool
- ≠ Data Comparison Tool
- 📋 Logging
- 💬 Field Comment Log
- 📁 File Repository
- 👤 User Rights and 👥 DAGs
- 📋 Data Quality
- 💻 API and 💻 API Playground

a. If it is your first time requesting an API token, the REDCap administrative team will send you an API agreement to complete. This agreement collects information about you and your department, but also provides information about API best practices. These best practices are also outlined later in this document.

3. Push the "Request API token" to send a token request to the REDCap administrative team.

Obtain API token for "Work in the US"

Use the button below to request an API token for this project from your REDCap administrator. You will need a different token for each project you would like to access. Please note that your REDCap administrator is emailed every time a token is requested.

Request API token

4. After you have been granted an API token, you are ready to start exploring the REDCap API!

Using the REDCap API

It is recommended that users planning to use REDCap's API have prior coding experience. The REDCap API supports many coding languages, but the two most popular are R and Python. The Illinois REDCap team is

able to provide limited support troubleshooting API code.
The best way to familiarize yourself with the REDCap API is to explore the API Playground.

1. Click on the "API Playground" link from the left-hand menu under "Applications."

2. Once in the API Playground, there is a blue box with a dropdown menu labeled "API Method." This dropdown includes all the API actions REDCap can take. a. If a project is in production, the methods listed in this dropdown *will be limited* so as not to affect real data in the project. This is noted in the green text under the "API Method" dropdown.

3. Select the method you need from the dropdown menu and complete the additional information. The additional information (e.g. "Format", "Instrument", etc.) will vary depending on which API method you choose and the project structure. In the below example, the researcher is asking to export a list of survey participants from the "contact_info" survey on the "baseline_survey" event of a longitudinal project as a CSV. a. To see all the API functions REDCap is capable of, and export a .zip file of sample code, click on the "REDCap API documentation" link that is available on both the "API" page and in the "API Playground."

Select an API method from the drop-down list below, after which it will load any other options that are specific to that method.

API Method: Export Survey Participants

Production - Some APIs have been disabled for the playground because they affect data

Format: CSV

Instrument: contact_info

Event: baseline_survey_arm_1

Errors: JSON

4. When you scroll further down the page, there is an open text box with a series of tabs on the top, with each tab corresponding to a coding language. Each tab will provide the API code in the indicated language.

PHP   Perl   Python   Ruby   Java   R   cURL

Displayed in the box below is the code you would use to execute this API request in the selected programming language.

```php
<?php
$data = array(
    'token' => '                    ',
    'content' => 'exportFieldNames',
    'format' => 'json',
    'returnFormat' => 'json'
);
$ch = curl_init();
curl_setopt($ch, CURLOPT_URL, 'https://redcap.atriumhealth.org/redcap/api/');
curl_setopt($ch, CURLOPT_RETURNTRANSFER, true);
curl_setopt($ch, CURLOPT_SSL_VERIFYPEER, false);
```

5. This is a reliable and workable starting place. You can copy and paste this code into the necessary program to run it. Sometimes, this is all you require if your request is simple enough. Additional

customization and testing/tweaking is often necessary to get the exact result you want or intend to execute.

Warning: On the API Playground, there is a button that will let you "Execute Request." This *will perform the API action you are programming* and thus *affect the data in your project*. Use this button with a great amount of caution.

API Best Practices

- Never share your API token with anyone. Giving someone else access to your token is a HIPAA violation, and any action taken with your token is logged in REDCap as an action taken by you.
- Do not test API tokens in browsers. Using an API token in plain text within a script is unsecure. An API token should be encrypted within a script, be called via secure environment variables, or otherwise be accessible from the script via other secure mechanisms.
- Before you share code anywhere, remove your API token. This includes sharing code via email, GitHub, etc.
- Regenerate your API token every 90 days, or at any point that you think your token has been compromised. To regenerate your token, go to the API page and select "Regenerate token." If you are no longer using the API functionality on your project, delete your token.
- If your API token is shared, lost, or otherwise compromised, you should alert your REDCap Administrators IMMEDIATELY.