Smartphone App

Created: December 29th, 2017

Content:

- Requirements
- Screen descriptions
- APIs
- Data structure
- Test environment

Update 11.01.2018:

- Fixes in section Encrypting data
- Update Test Environment: add payload and new qr code
- Requirement 3a: configurable location update interval removed
- User screen: removed drop-down for location update interval

Update: 18.01.2018

- Update link in Login Screen to sign-up for new data vault

Update: 03.02.2018

- Support creating of multiple items at once
- Data-vault API and frontend is available at single URL

Requirements

Nonfunctional requirements

1. Create / support in setting up a Google Play Store and Apple App Store account for OwnYourData
2. Upload Android version of the OwnYourData Smartphone App to Google Play Store and make it available world-wide
3. Upload iOS version of the OwnYourData Smartphone App to Apple App Store, get it accepted and make it available world-wide
4. The following additional functionality is planned for future versions of the app (in case of different options when designing/implementing the software keep those aspects in mind):
    - Authentication and authorization of access to functionality and data through a hardware token
    - Collect additional data from the smartphone
        - Any other sensor data (e.g., accelerometer, gyroscope, temperature)
        - Communication data (incoming and outgoing calls, texts, messages)
        - Other data stores (Google Fit, Apple Health, Samsung Health)

Functional requirements

1. Multi-language support and English and German versions available
2. The following screens shall be available – for details see section “Scree Description”
    a. Login screen (including QR scan mode)
    b. Module list (including in-app browser to display web apps)
    c. User screen
3. The app shall read location information provided by the smartphone and write the data to the data vault
    a. A sensible time interval for reading location information shall be chosen and described for documentation purposes
    b. If the approval process in the Apple App Store requires the user to directly access any collected data, provide a function to email the user the collected data in the User Screen
4. The app shall write collected location information to the data vault
    a. Location information shall be cached on the smartphone and written to the data vault when connected to a WLAN; if possible, a manual trigger for uploading the location data regardless of the available internet connection shall be available on the user screen
    b. The user screen shall allow to configure the repo to be used for storing the location information in the data vault; default value: eu.ownyourdata.location
    c. If the repo has a public_key defined (APIs > Public Key for Repo) the data shall be stored encrypted (see APIs > Write Data)
    d. The format of the location data is defined in the section “Data Structure”

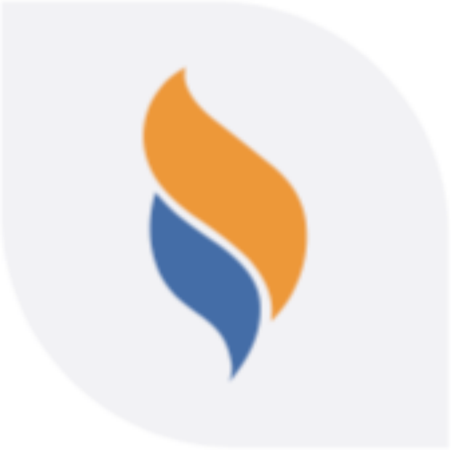
Screen Description

General

Please understand the screen designs as proposals and I'm happy to discuss suggestions. The UI design follows the Google Material Design guidelines (https://material.io). Graphics were created using PowerPoint and source file is available as screens_171229.pptx

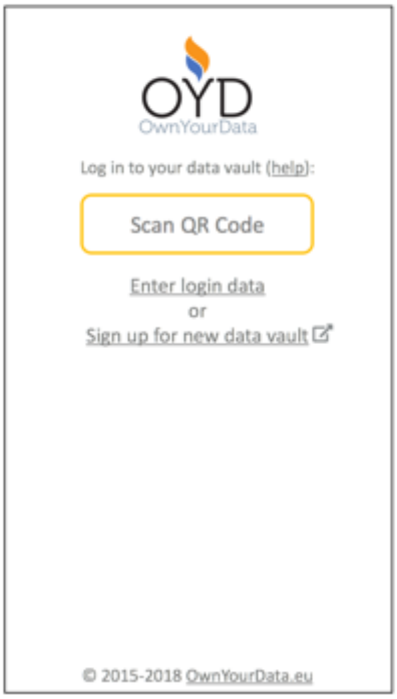
App Icon

Use the icon below as app icon – source is available as Adobe Illustrator file in OYD_Logo_final.ai



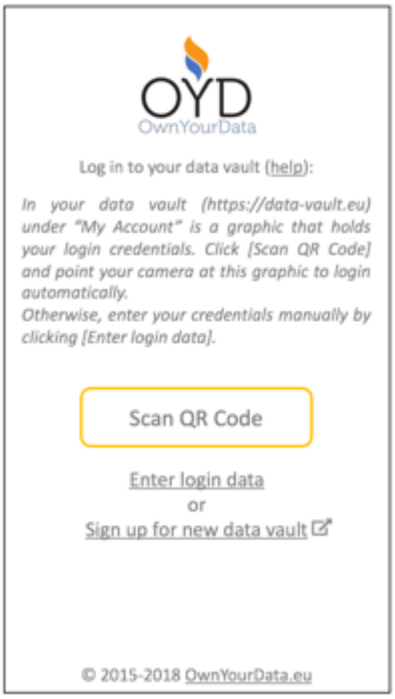
Login screen

English version:



Log in to your data vault (help):

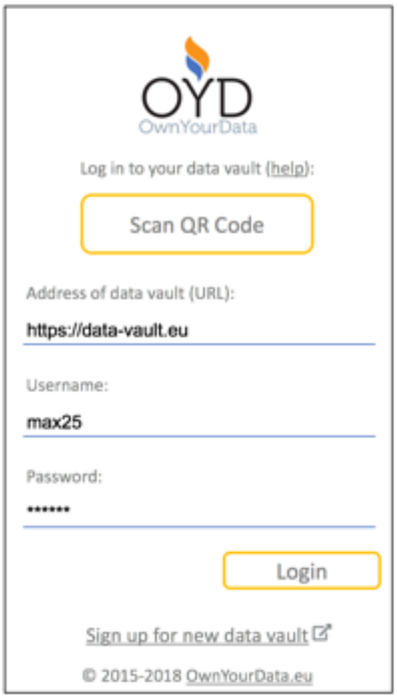
© 2015-2018 OwnYourData.eu



Log in to your data vault (help):

In your data vault (https://data-vault.eu) under "My Account" is a graphic that holds your login credentials. Click [Scan QR Code] and point your camera at this graphic to login automatically.
Otherwise, enter your credentials manually by clicking [Enter login data].

© 2015-2018 OwnYourData.eu



Log in to your data vault (help):

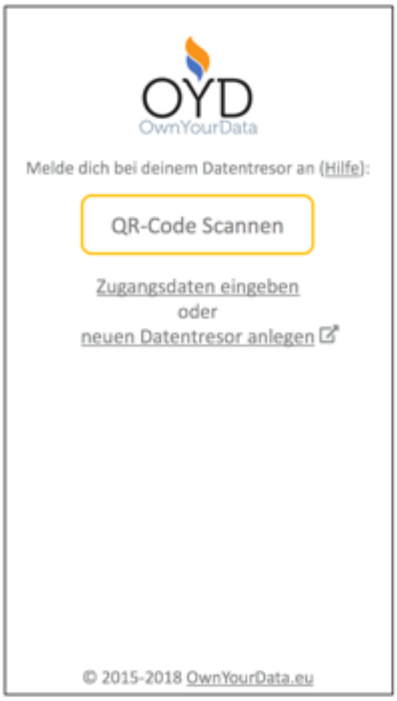
Address of data vault (URL):
https://data-vault.eu

Username:
max25

Password:
******

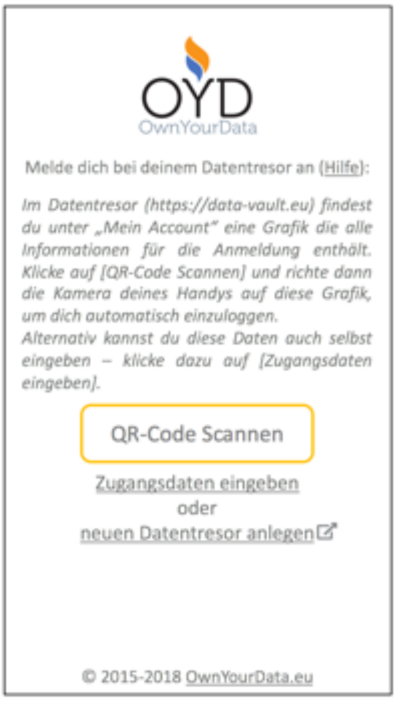
© 2015-2018 OwnYourData.eu

German version:



Melde dich bei deinem Datentresor an (Hilfe):

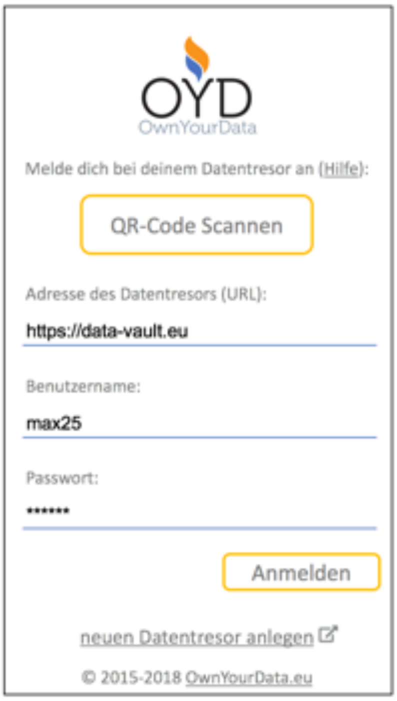
© 2015-2018 OwnYourData.eu



Melde dich bei deinem Datentresor an (Hilfe):

Im Datentresor (https://data-vault.eu) findest du unter „Mein Account" eine Grafik die alle Informationen für die Anmeldung enthält. Klicke auf [QR-Code Scannen] und richte dann die Kamera deines Handys auf diese Grafik, um dich automatisch einzuloggen.
Alternativ kannst du diese Daten auch selbst eingeben – klicke dazu auf [Zugangsdaten eingeben].

© 2015-2018 OwnYourData.eu



Melde dich bei deinem Datentresor an (Hilfe):

Adresse des Datentresors (URL):
https://data-vault.eu

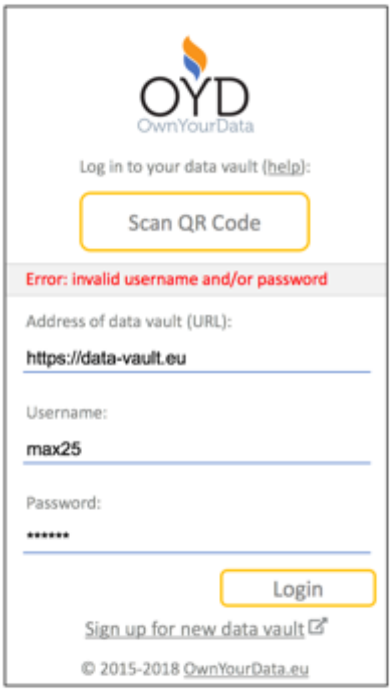
Benutzername:
max25

Passwort:
******

© 2015-2018 OwnYourData.eu

Behavior of Login screen

1. Help link below logo displays help text (shown in middle screen)
2. [Scan QR Code] button accesses camera and reads qr information
    a. if qr code is scanned and contains valid information (JSON with PIA_URL, APP_KEY and APP_SECRET keys) the app automatically logs in and shows module list
    b. if qr code is scanned and contains valid information but credentials don't work: show scanned information in login form fields and error message
    c. if qr code contains invalid / incomplete information show read information in login form fields where possible
    d. if possible show [Cancel] / [Abbrechen] in scan screen to get back to login screen
3. [Enter login data] shows login form; "address of data vault" has default value https://data-vault.eu
   note: for testing purposes use the address https://mobile.data-vault.eu
4. [Login] button performs login request – see section APIs > Login
    a. if request is successful (response = status code 200) show module list
    b. if data vault is not reachable (no response or response time out) display:
        - Error: can't access data vault
        - Fehler: Datentresor nicht erreichbar
    c. If response != 200 display:
        - Error: invalid username and/or password
        - Fehler: ungültiger Benutzername und/oder Passwort
5. [Sign up for new data vault] opens the address https://data-vault.eu/en/new
   [neuen Datentresor anlegen] opens the address https://data-vault.eu/de/new
   both links are opened in the default web browser of the smartphone
6. [OwnYourData.eu] link opens https://www.ownyourdata.eu in the default web browser of the smartphone
7. The login screen shall only support portrait orientation and on displaying the onscreen keyboard the input fields and login button shall not be covered by the keyboard


OYD
OwnYourData
Log in to your data vault (help):
Scan QR Code
Error: invalid username and/or password

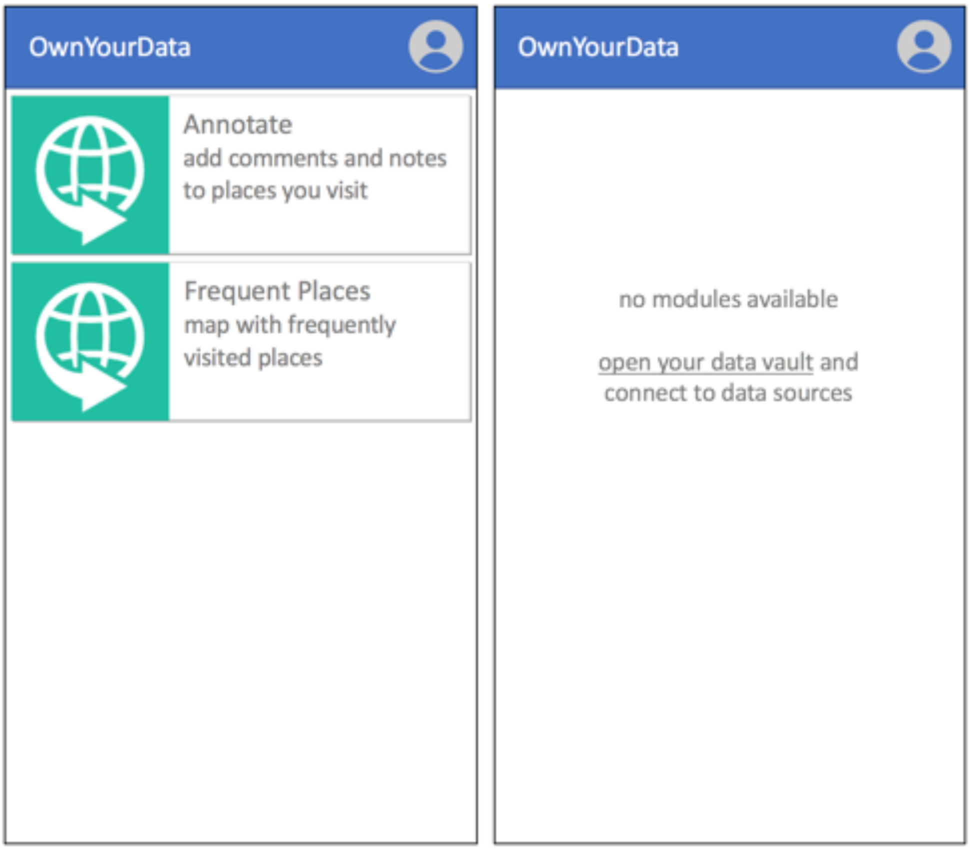
Address of data vault (URL):
https://data-vault.eu

max25

******

Login
Sign up for new data vault
© 2015-2018 OwnYourData.eu

Module list



OwnYourData

Annotate
add comments and notes to places you visit

Frequent Places
map with frequently visited places

OwnYourData

no modules available

open your data vault and connect to data sources

Behavior of the Module list

1. The module list renders a list of all items returned from API > List of Modules and displays the image, title and description.

2. The module list shall only support portrait orientation.

3. Title is a single line and truncated with an ellipsis (…) if longer than the available space; description is 3 lines and truncated with an ellipsis (…) if longer than the available space.

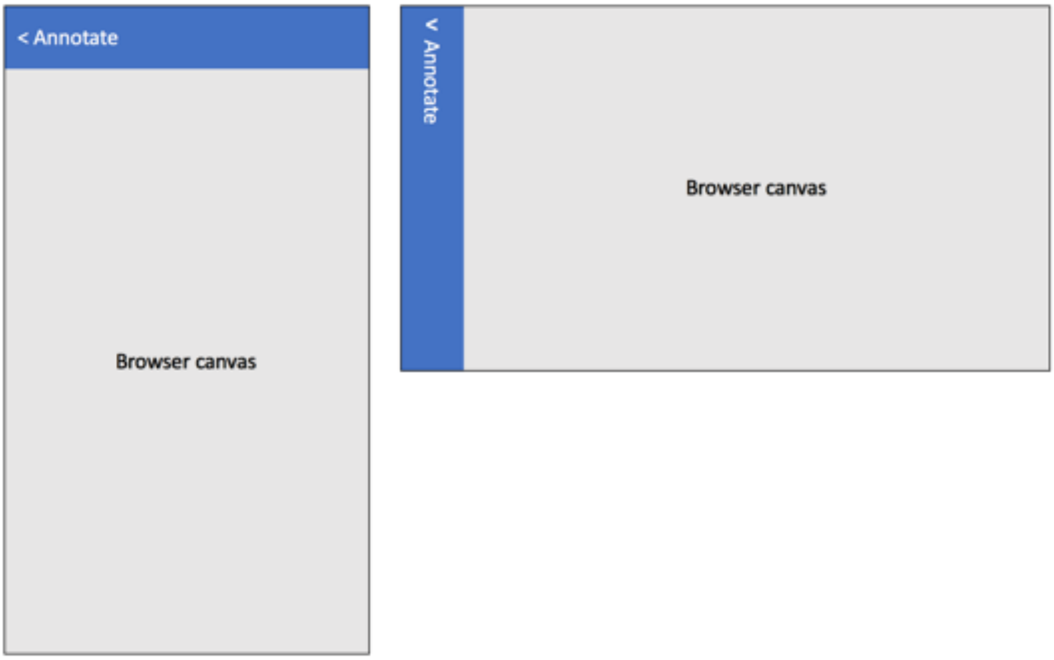
4. Tapping on an item shall open the address in the in-app browser using the following URL built of components provided by APIs > List of Modules:
   - MODULE_URL: provided as field "url" in response
   - PIA_URL: provided when logged in to the smartphone app
   - APP_KEY: provided as field "uid" in response
   - APP_SECRET: provided as field "secret" rin response

   Concatenate those pieces in the following way:
   [MODULE_URL]?PIA_URL=*[PIA_URL]*&APP_KEY=*[APP_KEY]*&APP_SECRET=*[APP_SECRET]*
   Example:
   https://kontoentwicklung.oydapp.eu/?PIA_URL=https%3A%2F%2Fdemo.datentresor.org&APP_KEY=eu.ownyourdata.bank&APP_SECRET=fZTpuPtu6XEAVlJCcI5y

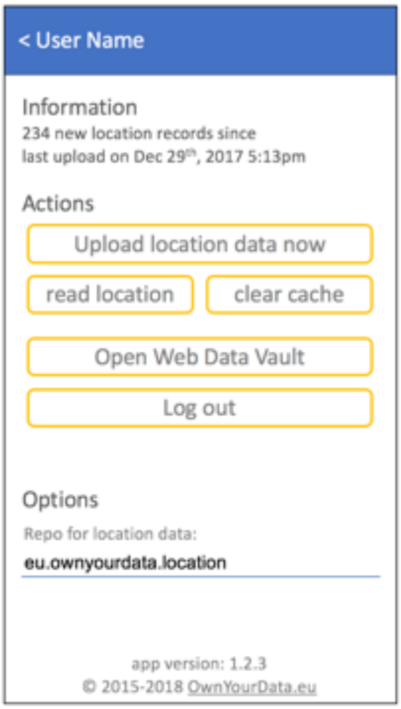
5. In case an empty list is returned from APIs > List of Modules the following text shall be rendered:
   - no modules available
     open your data vault and connect to data sources
   - keine Module verfügbar
     öffnen deinen Datentresor und erschließe Datenquellen

   „open your data vault“ / “öffne deinen Datentresor” shall open the data vault URL provided on login in the default web browser of the smartphone.

6. Opening an URL in the in-app browser shall display the module title in the header and tapping on the title shall bring back the module list. If possible the screen with the in-app browser shall support portrait and landscape view as depicted below.



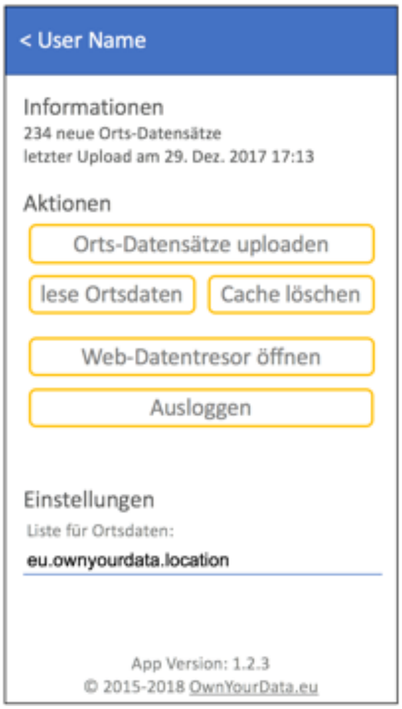
User screen



234 new location records since
last upload on Dec 29th, 2017 5:13pm

Repo for location data:
eu.ownyourdata.location

app version: 1.2.3
© 2015-2018 OwnYourData.eu



234 neue Orts-Datensätze
letzter Upload am 29. Dez. 2017 17:13

Liste für Ortsdaten:
eu.ownyourdata.location

App Version: 1.2.3
© 2015-2018 OwnYourData.eu

Behavior of the User Screen

1. The user screen shall render available actions and options as depicted above. The username in the header shall be used from the response from APIs > Login. The user name shall be truncated with an ellipsis (…) if it is wider than the available space
2. The user screen shall only support portrait orientation.
3. Information Section:
    a. Display number of location records currently stored
    b. Display date and time of last successful upload
4. Actions
    a. [Upload location data now]: upload all location records regardless of WLAN connection; show error message in case data vault cannot be contacted; clear internal location cache; update information in information section
    b. [read location]: create a new location record with currently available location information; show error message in case the OS does not provide location information; refresh number of available location records in information section
    c. [clear cache]: delete all location data currently stored on the smartphone; refresh number of available location records in information section
    d. [Open Web Data Vault]: open the data vault URL provided on login in the default web browser of the smartphone
    e. [Log out]: display login screen
5. Options
    a. Textfield [Repo for location data]
6. Footer
    a. Display version string
    b. Display copyright notice and link to https://www.ownyourdata.eu

APIs

Login: POST /oauth/token

Summary
request token to access resources associated to a user

Body Parameters

- email – string, email address of the user
- password – string, password of the user
- grant_type – string, “password”

Response (status code, description, schema)

- 200, OK,
  ```
  {"access_token":" [user token for subsequent requests]",
   "token_type":"bearer",
   "expires_in":7200,
   "created_at":[unix timestamp] ]",
   "username":"[user name]"}
  ```
- 401, Unauthorized,
  ```
  {"error":"[title]",
   "error_description":"[description]"}
  ```

Example

```
$ curl -d grant_type=password \
       -d email=user_a@ownyourdata.eu \
       -d password=user_a \
       -X POST https://mobile.data-vault.eu/oauth/token
```

Result:

```
{"access_token":"197a8130efe8933c8a99683c02f6bb46aa53146d18528350dfd03f
6df6fd3e12","token_type":"bearer","expires_in":7200,"created_at":151439
1263,"username":"User A"}
```

List of Modules: GET /api/modules/index

<u>Summary</u>
get list of mobile applications to be displayed

<u>Header Parameters</u>

- Content-Type – string, “application/json”
- Authorization – string, “Bearer “ + token from login

<u>Response</u> (status code, description, schema)

- 200, OK,
  {"id":*[unique id for each item]*,
  "name":" *[title]*",
  "description":" *[short description]*",
  "url":" *[url of web site to be opened within app]*",
  "uid":" *[key to access data vault]*",
  "secret":" *[secret to access data vault]*",
  "picture":" *[base64 encoded image]*"}
- 401, Unauthorized,
  {"error":"*[title]*",
  "error_description":"*[description]*"}

<u>Example</u>[1]

```
$ export TOKEN=`curl -s -d grant_type=password \
    -d email=user_a@ownyourdata.eu -d password=user_a \
    -X POST https://mobile.data-vault.eu/oauth/token | \
    jq -r '.access_token'`
$ curl -H "Content-Type: application/json" \
    -H "Authorization: Bearer $TOKEN" \
    -X GET https://mobile.data-vault.eu/api/modules/index
```

Result:

```
[{"id":1,"name":"Annotate","url":"https://location-
annotate.oydapp.eu","description":"add notes to places you
visit","uid":"8ac6377e5697123aa18f8bca860f3bd2d8db6ec54002cc3becbdce9b1
ac97943","secret":"95f1ea7336476d2d6c9b352c75d7bad1d2de0d3c456b973d3e9f
fae4e00a1694","picture":"data:image/png;base64,iVBORw0KGgoAA..."}]
```

[1] requires `jq` (command line JSON processor: https://stedolan.github.io/jq/)

Public Key for Repo: GET /api/repos/{:identifier}/pub_key

Summary

get the public key for a given repo (to be used when writing data into a repo)

Header Parameters

- Content-Type – string, “application/json”
- Authorization – string, “Bearer “ + token from login

Response (status code, description, schema)

- 200, OK,
  {"id":*[unique id for repo]*,
  "identifier":" *[fully qualified name for repo]*",
  "pub_key":" *[hexadecimal 64-character string]*"}
- 401, Unauthorized,
  {"error":"*[title]*",
  "error_description":"*[description]*"}

Example

```
$ export TOKEN=`curl -s -d grant_type=password \
    -d email=user_a@ownyourdata.eu -d password=user_a \
    -X POST https://mobile.data-vault.eu/oauth/token | \
    jq -r '.access_token'`
$ curl -H "Content-Type: application/json" \
    -H "Authorization: Bearer $TOKEN" \
    -X GET https://mobile.data-
    vault.eu/api/repos/oyd.location/pub_key
```

Result:

```
{"id":1,"identifier":"oyd.location","public_key":"c2c45a740316583c8b1af
013e24c66711590f1f1921cbc8ee2c8be9188b13731"}
```

Write Data: POST /api/repos/{:identifier}/items

Summary

Write a record into a given repo

Header Parameters

- Content-Type – string, “application/json”
- Authorization – string, “Bearer “ + token from login

Body Parameters

- JSON encoded record or array of JSON encoded records

Response (status code, description, schema)

- 200, OK,
  {"id":*[unique id for new item]*}
- 400, Bad Request
  {"processed":*n*,
   "responses":[{"error":"*[description]*"},{"id":*n*},...]}
- 401, Unauthorized,
  {"error":"*[title]*",
   "error_description":"*[description]*"}
- 403, Forbidden,
  {"error":"*[title]*",
   "error_description":"*[description]*"}

Example

```
$ export TOKEN=`curl -s -d grant_type=password \
    -d email=user_a@ownyourdata.eu -d password=user_a \
    -X POST https://mobile.data-vault.eu/oauth/token | \
    jq -r '.access_token'`
$ curl -H "Content-Type: application/json" \
    -H "Authorization: Bearer $TOKEN" \
    -d
    "{\"value\":\"2322818113e73144fab77ce62916ec8860568ea5e9fbe
    3867c862056bd4c1d8e10349cbb82c52e82e0b55764805a3e923bd78482
    0c5922ba0f079f10eeae4ef0b5155561d57986185708919d5318257d811
    beb9510697e307bd5d9fe27326f4e82af87f860eaa77a7eaf1207904873
    5afad76e1396101a4576c9aa8d2778f5a8b842117d\",\"nonce\":\"59
    b142f13c9520cd203effa2a96dbe589defb3c1e021876e\",\"version\
    ":\"0.4\"}" \
    -X POST https://mobile.data-
    vault.eu/api/repos/oyd.location/items
```

Result:

```
{"id":1}
```

Example for storing multiple items

```
$ export TOKEN=`curl -s -d grant_type=password \
    -d email=user_a@ownyourdata.eu -d password=user_a \
    -X POST https://mobile.data-vault.eu/oauth/token | \
    jq -r '.access_token'`
$ curl -H "Content-Type: application/json" \
    -H "Authorization: Bearer $TOKEN" \
    -d
    "[{\"value\":\"2322818113e73144fab77ce62916ec8860568ea5e9fb
    e3867c862056bd4c1d8e10349cbb82c52e82e0b55764805a3e923bd7848
    20c5922ba0f079f10eeae4ef0b5155561d57986185708919d5318257d81
    1beb9510697e307bd5d9fe27326f4e82af87f860eaa77a7eaf120790487
    35afad76e1396101a4576c9aa8d2778f5a8b842117d\",\"nonce\":\"5
    9b142f13c9520cd203effa2a96dbe589defb3c1e021876e\",\"version
    \":\"0.4\"},{\"value\":\"2322818113e73144fab77ce62916ec8860
    568ea5e9fbe3867c862056bd4c1d8e10349cbb82c52e82e0b55764805a3
    e923bd784820c5922ba0f079f10eeae4ef0b5155561d57986185708919d
    5318257d811beb9510697e307bd5d9fe27326f4e82af87f860eaa77a7ea
    f12079048735afad76e1396101a4576c9aa8d2778f5a8b842117d\",\"n
    once\":\"59b142f13c9520cd203effa2a96dbe589defb3c1e021876e\"
    ,\"version\":\"0.4\"}]" \
    -X POST https://mobile.data-
    vault.eu/api/repos/oyd.location/items
```

Result:

```
{"processed":2,"responses":[{"id":2,"status":200},{"id":3,"status":200}
]}
```

Comment:

Make sure to check if all items were written successfully. The response status code is 200 if all items were written successfully and 400 otherwise. Delete only those location items in the local cache that were actually written into the data vault and keep the others.

Encrypting data

The Sodium crypto library (https://libsodium.org) is used to encrypt and decrypt data for OwnYourData.

The following R script illustrates the encryption process:

```
# public_key is return value from GET /api/repos/eu.ownyourdata.location/pub_key
public_key <- '3c140482018abdc7e2a8d70f1f797e83b46c77218a9bc56ce1ae35acd2b53920'

# public_key_raw are 32 pairs of hex digits representing the key for encryption
public_key_raw <- as.raw(strtoi(sapply(seq(1, nchar(public_key), by=2),
                         function(x) substr(public_key, x, x+1)), 16L))

# authentication_key is only used because of the required signature key when
# using the function auth_encrypt
authentication_key <- sodium::sha256(charToRaw('auth'))

# nonce is non-secret unique data to randomize the cipher
nonce <- sodium::random(24)

# JSON message to be encrypted
message <- '{"latitude":40.75846,"longitude":73.92248,"elevation":160.34,
"timestamp":"2017-12-28T16:49:22Z","datum":"EPSG:4326"}'

# libsodium requires a sequence of raw bytes
message_raw <- charToRaw(message)

# encrypting and signing the message
cipher <- sodium::auth_encrypt(message_raw,
                               authentication_key,
                               public_key_raw,
                               nonce)

# converting value and nonce into a character string for JSON encoding
value <- paste0(as.hexmode(as.integer(cipher)), collapse = '')
nonce <- paste0(as.hexmode(as.integer(nonce)), collapse = '')

# creating JSON record to be stored in data vault
record <- jsonlite::toJSON(list(value   = value,
                                nonce   = nonce,
                                version = "0.4"),
                           auto_unbox = TRUE)
```

Result (content of variable `record`):

```
{"value":"2322818113e73144fab77ce62916ec8860568ea5e9fbe3867c862056bd4c1
d8e10349cbb82c52e82e0b55764805a3e923bd784820c5922ba0f079f10eeae4ef0b515
5561d57986185708919d5318257d811beb9510697e307bd5d9fe27326f4e82af87f860e
aa77a7eaf12079048735afad76e1396101a4576c9aa8d2778f5a8b842117d","nonce":
"59b142f13c9520cd203effa2a96dbe589defb3c1e021876e","version":"0.4"}
```

Use the following link to open the OwnYourData Location application and display the stored data: https://location.oydapp.eu/?PIA_URL=https%3A%2F%2Fmobile.data-vault.eu&APP_KEY=8ac6377e5697123aa18f8bca860f3bd2d8db6ec54002cc3becbdce9b1ac97943&APP_SECRET=95f1ea7336476d2d6c9b352c75d7bad1d2de0d3c456b973d3e9ffae4e00a1694

The password for decrypting the stored data is: `user_a`
(this is now the same as the password for login)

Data Structure

Proposed JSON format for location data:

```
{
    "timestamp":"2017-12-28T00:49:22Z",
    "speed":0,
    "accuracy":20,
    "heading":0,
    "longitude":47.0700467,
    "altitude":1.34,
    "latitude":15.4288967,
    "datum":"EPSG:4326"
}
```

JSON format for encrypted data:

```
{
     "value":"[encrypted record]",
     "nonce":"[unique data for randomizing cipher]",
     "version":"0.4"
}
```

Test Environment

To implement and test the app the current state of the OwnYourData data vault is deployed at the following URL: https://mobile.data-vault.eu

The following data is available:

- 2 users (use for login to https://mobile.data-vault.eu)
  - Name: User A
    Email: user_a@ownyourdata.eu
    Password: user_a
  - Name: Very long User Name with many words
    Email: user_b@ownyourdata.eu
    Password: Q/wdfbv67

  Note: New users (with working email address) can be created at this URL:
  https://mobile.data-vault.eu/en/new
- Desktop View “Location” installed for user_a
- Mobile View “Location” installed for user_a
- Repo `oyd.location` with Public Key available and permissions set to allow writing
- QR code for loging in as user_a@ownyourdata.eu
  payload:

```
{
      "PIA_URL":"https://mobile.data-vault.eu",
      "email":"user_a@ownyourdata.eu",
      "password":"user_a"
}
```