The Good Health Pass Interoperability Blueprint – Paper Credentials Cookbook

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The mission of the Trust over IP (ToIP) Foundation is to define a complete architecture for Internet-scale digital trust that combines cryptographic assurance at the machine layer with human accountability at the business, legal, and social layers. Founded in May 2020 as a non-profit hosted by the Linux Foundation, the ToIP Foundation has over 300 organizational and 100 individual members from around the world.

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Revision History

Version	Date Approved	Revisions
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Introduction

This document is a "cookbook" for creating Good Health Pass (GHP) paper credentials and passes (PCP).

The "recipe" consists of the following steps"

1. Choose a file repository
2. Create Data Definitions
3. Encode Data
4. Wrap Encoded Data in Verifiable Credential
5. Encode VC as QR Code

There are four different types of data objects you can create with GHP:

1. Vaccination Credential - Proof of Immunization
2. COVID-19 Citizen Recovery Credential - Proof of Recovery
3. COVID-19 Antigen Test Credential - Proof of Test
4. Good Health Pass

You should be familiar with the basic terminology used in Verifiable Credentials:

- Holder
- Verifier
- Issuer
- Credential
- Pass

The full GHP Blueprint, including a guide to terminology can be found here: https://www.goodhealthpass.org/blueprint. If you just want to dive in and look and code, JSON and W3C Verifiable Credentials, go here: https://github.com/trustoverip/ghp-paper-creds.

The Recipe

Choose an Online File Repository

GHP Paper Credentials will require several files to be retrievable online. These files can be cached in any Validator and do not pose a tracking risk to Holders.

The files that need to be uploaded are:

- the @context for JSON-LD files
- optionally, the template for JSON-XT compression

Although there is a common set of data elements defined by GHP, these must be customized for each particular Issuer for the needs of their country / locale (for example, medical coding changes from country to country).

At the end of this process, you should be able to retrieve files like:

- https://example-locale.com/context.json
- https://example-locale.com/templates.json

We suggest you keep these domains, paths and filenames as short as possible, as encoding data on QR codes is very space sensitive.

Create Data Definitions

There are four different data objects that can be created in GHP (Proof of Immunization, Recovery, Test; and a Pass), which need to be customized to your particular locale. The customization process is fairly straightforward and should not be time consuming.

Expanded data definitions can be found here: GHP COVID-19 Data Capture. Example data definition can be found https://github.com/trustoverip/ghp-paper-creds and if you need further advice, please reach out to Paul Knowles at paul.knowles@humancolossus.org.

Common Fields to all Passes and Credentials

Note that there are privacy concerns about encoding data and digitally signing it with "well-known" organizations such as national governments. If your use case permits, consider omitting as much data as possible - for example, only use the person's initials or birth year.

- givenName
- middleName
- familyName
- birthDate

Good Health Pass

If you're accepting proof documents and manually or digitally validating them and then issuing a short term pass - say, for entry to a province or a country - this is probably the one you wish to use.

- **recipient** - The resource identifier of the schema used for event recipient identification (*includes givenName, middleName, familyName, birthDate*)
- **linkedCredential** - Unique identifier(s) of associated credential(s)
- **status** - Trust decision made by the verifier

Vaccination Credential (Proof of Immunization)

- **recipient** - The resource identifier of the schema used for event recipient identification (*includes givenName, middleName, familyName, birthDate*)
- **linkedVaccineCertificate** - Unique identifier of the associated vaccination certificate
- **disease** - Disease or agent that the vaccination provides protection against
- **vaccineDescription** - Generic description of the vaccine/prophylaxis
- **vaccineType** - Generic description of the vaccine/prophylaxis or its component(s) [J07BX03 covid-19 vaccines]
- **medicinalProductName** - Medicinal product name
- **cvxCode** - CVX code (North America only)
- **marketingAuthorizationHolder** - Marketing Authorisation Holder

- **doseNumber** - Number of dose administered in a cycle
- **dosesPerCycle** - Number of expected doses for a complete cycle (specific for a person at the time of administration)
- **dateOfVaccination** - The date the vaccination event occurred (or was intended to occur)
- **stateOfVaccination** - The state in which the individual has been vaccinated
- **countryOfVaccination** - The country in which the individual has been vaccinated
- **certificateNumber** - Unique identifier of the certificate (UVCI), to be printed (human readable) into the certificate; the unique identifier can be included in the IIS

COVID-19 Citizen Recovery Credential (Proof of Recovery)

- **recipient** - The resource identifier of the schema used for event recipient identification (*includes* *givenName, middleName, familyName, birthDate*)
- **linkedTestCertificate** - Unique identifier of the associated test certificate
- **disease** - Disease or agent the citizen has recovered from.
- **dateOfFirstPositiveResult** - Date when the sample for the test was collected that led to positive test obtained through a procedure established by a public health authority in the Member State.
- **stateOfTest** - The state in which the individual was tested
- **countryOfTest** - The country in which the first positive test was performed.
- **certificateValidFrom** - Certificate valid from (required if known)
- **certificateValidTo** - Certificate valid until
- **certificateNumber** - Unique identifier of the certificate (UVCI), to be printed (human readable) into the certificate; the unique identifier can be included in the IIS

COVID-19 Antigen Test Credential (Proof of Test)

- **recipient** - The resource identifier of the schema used for event recipient identification (*includes* *givenName, middleName, familyName, birthDate*)
- **linkedTestCertificate** - Unique identifier of the associated test certificate
- **disease** - Disease or agent that the test provides detection of.
- **testDescription** - Generic description of the test
- **testType** - Description of the type of test that was conducted, e.g. NAAT or rapid antigen test.
- **testCommercialName** - Commercial or brand name of the test.
- **testManufacturer** - Legal manufacturer of the test.
- **dateOfSample** - Date and time when the sample was collected.
- **dateOfResult** - Date and time when the test result was produced.
- **testResult** - For example, negative, positive, inconclusive or void.

- **testingCentre** - Name/code of testing centre, facility or a health authority responsible for the testing event.
- **stateOfTest** - The state in which the individual was tested
- **countryOfTest** - The country in which the individual was tested.
- **certificateNumber** - Unique identifier of the certificate (UVCI), to be printed (human readable) into the certificate; the unique identifier can be included in the IIS

JSON-LD @context

When you have completed your data definition, it should look at the example in the Appendices - we're not including it in the text here because of the size. Again, if you're having trouble creating this, please get in touch with us and we can help you out.

Encode Data

The following sections are examples of the encoded data - this may vary slightly depending on your **@context** definition; these ones have been produced for Canada.

Vaccination Credential (Proof of Immunization)

https://github.com/trustoverip/ghp-paper-creds/blob/main/examples/example-vaccination.json


```
{
  "type": [ "GHPVaccinationCertificate" ],
  "recipient": {
    "type": [ "GHPEventRecipient" ],
    "birthDate": "1972-10-17",
    "givenName": "Rodney",
    "middleName": "Milburn",
    "familyName": "Dangerfield"
  },
  "linkedVaccineCertificate": "VAX383469956",
  "medicinalProductName": "28571000087109",
  "cvxCode": "207",
  "marketingAuthorizationHolder": "MOD",
  "doseNumber": 1,
  "dosesPerCycle": 2,
  "dateOfVaccination": "2021-08-04",
  "stateOfVaccination": "CA-AB",
  "countryOfVaccination": "CA",
  "disease": "RA01",
  "vaccineType": "XM0GQ8",
  "certificateNumber": "URN:UVCI:01:CA:67097896F94ADD0FF5093FBC875BE2396#D"
}
```


COVID-19 Citizen Recovery Credential (Proof of Recovery)

https://github.com/trustoverip/ghp-paper-creds/blob/main/examples/example-recovery.json


```
{
  "type": [ "GHPCitizenRecoveryCredential" ],
  "recipient": {
    "type": [ "GHPEventRecipient" ],
    "birthDate": "1972-10-17",
    "givenName": "Rodney",
    "middleName": "Milburn",
    "familyName": "Dangerfield"
  },
  "linkedTestCertificate": "PGR39264009",
  "dateOfFirstPositiveResult": "2020-11-23",
  "stateOfTest": "CA-AB",
```

```
  "countryOfTest": "CA",
  "disease": "RA01",
  "certificateValidFrom": "2021-08-02",
  "certificateValidTo": "2021-08-09",
  "certificateNumber": "URN:UVCI:01:US:78543092A86FDS3SD5612DBV673FG943#C"
}
```


COVID-19 Antigen Test Credential (Proof of Test)

https://github.com/trustoverip/ghp-paper-creds/blob/main/examples/example-antigen.json


```
{
  "type": [ "GHPAntigenTestCredential" ],
  "recipient": {
    "type": [ "GHPEventRecipient" ],
    "birthDate": "1972-10-17",
    "givenName": "Rodney",
    "middleName": "Milburn",
    "familyName": "Dangerfield"
  },
  "linkedTestCertificate": "PGR39264009",
  "disease": "RA01",
  "testType": "LP6464-4",
  "testCommercialName": "GLN-8800075500014/M22MD100M",
  "testManufacturer": "GLN-8800075500014",
  "dateOfSample": "2021-08-02T01:08:03Z",
  "dateOfResult": "2021-08-02T01:08:02Z",
  "testResult": "260415000",
  "testingCentre": "Joseph Walker Williams Community Center",
  "stateOfTest": "CA-AB",
  "countryOfTest": "CA",
  "certificateNumber": "URN:UVCI:01:US:10807843F94AEE0EE5093FBC254BD813#B"
}
```


Good Health Pass

https://github.com/trustoverip/ghp-paper-creds/blob/main/examples/example-pass.json


```
{
  "type": [ "GoodHealthPass" ],
  "recipient": {
    "type": [ "GHPEventRecipient" ],
    "birthDate": "1972-10-17",
    "givenName": "Rodney",
    "middleName": "Milburn",
    "familyName": "Dangerfield"
  },
  "status": true
}
```

Wrap Encoded Data in Signed Verifiable Credential

See the Appendices for how to use the code to sign VCs (https://github.com/trustoverip/ghp-paper-creds/blob/main/demo/src/demo.js).

Example VC (Good Health Pass)

https://github.com/trustoverip/ghp-paper-creds/blob/main/examples/example-pass-vc.json - note that in this folder there are example Verifiable Credentials for all the GHP Credential Types.


```
{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://www.goodhealthpass.org/context/v1"
  ],
  "type": [
    "VerifiableCredential"
  ],
  "issuer": "DID:WEB:DEMO.COM:CONTROLLER",
  "issuanceDate": "2021-09-03T14:58:13Z",
  "credentialSchema": {
    "id": "7VhEMSUkXt8jnhgXKGkipDcoT6RTiESwAWKCKJV8rbpj",
    "type": "OCASchemaValidator"
  },
  "credentialSubject": {
    "type": [
      "GoodHealthPass"
    ],
    "recipient": {
      "type": [
        "GHPEventRecipient"
      ],
      "birthDate": "1972-10-17",
      "givenName": "Rodney",
      "middleName": "Milburn",
      "familyName": "Dangerfield"
    },
    "status": true
  }
}
```

Encode VC as QR Code

See the Appendices for how to use the code to sign VCs (https://github.com/trustoverip/ghp-paper-creds/blob/main/demo/src/demo.js).

Example JSON-XT QR Code (Good Health Pass)

https://github.com/trustoverip/ghp-paper-creds/blob/main/examples/example-pass-vc.png - note that in this folder there are example QR Codes for all the GHP Credential Types.

Example JSON-XT URL (Good Health Pass)

https://github.com/trustoverip/ghp-paper-creds/blob/main/examples/example-pass-vc.txt - note that in this folder there are example JSON-XT URLs for all the GHP Credential Types.

```
JXT:DEMO.COM:VAX:1:Rodney/Milburn/Dangerfield/26OJ
A1GJ4E05//DID%3AWEB%3ADEMO.COM%3ACONTROLLER/*G$0DEMO.COM%3ACONTROLLER%23KEY/
3U30D58G9XLEF2WELCM8R80L0VU6W3B5VLI34HTRDOLNJGW8RL6G26W6E86SRLOWNGE0HTXW1FYC
PLG0RVDY74W78CQ27BEZKMRR9
```

Appendices

Demo Code

Installation

From a *nix shell

```
git clone git@github.com:trustoverip/ghp-paper-creds.git
cd ghp-paper-creds/demo
npm install
```

Running

This demo has all the code you need. It will:

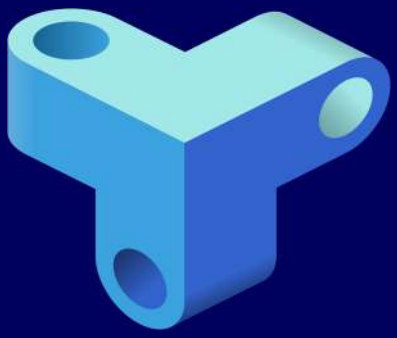
- create a W3C Verifiable Credential
- sign it using `Ed25519Signature2020`
- pack the result into a JSON-XT URL
- optionally, write that URL as a PNG QR Code
- verify the signature

```
cd ghp-paper-creds/demo/src
node demo --help
node demo
```

Sample JSON-LD @context

Due to size, we've left this out of this document. Note that this @context is for Canada, you need to customize for your own jurisdiction but this is a good jumping off point.

https://github.com/trustoverip/ghp-paper-creds/blob/main/demo/src/cache/context/ghp-context.json



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The Trust Over IP Foundation (ToIP) is hosted by the Linux Foundation under its Joint Development Foundation legal structure. We produce a wide range of tools and deliverables organized into five categories:

- Specifications to be implemented in code
- Recommendations to be followed in practice
- Guides to be executed in operation
- White Papers to assist in decision making
- Glossaries to be incorporated in other documents

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To learn more about the Trust Over IP Foundation please visit our website, https://trustoverip.org.