

# Community Solid Server evaluation

Maria Dimou (CERN) & Theo Meyer (IT University Copenhagen)

Presentation for the [31st January 2022 Terra Incognita event](#)

# Overview

- **Solid terms' reminder**
- **Community Solid Server Introduction**
  1. CSS introduction
  2. Components.js
  3. Customising CSS
- **Community Solid Server Review**
  1. UI integration
  2. SSO integration
  3. Code quality
  4. Open source community review
  5. Deploying CSS into CERN infrastructure

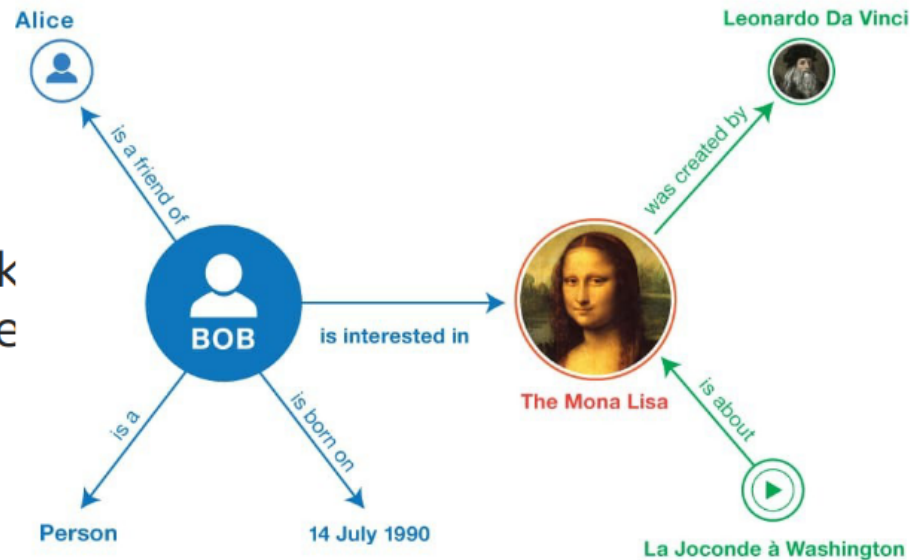
# Solid

- **Social Linked Data**, is a project, a standard, an ecosystem, a movement and a community initiated by Sir Tim Berners-Lee.
- Allows people to control *where* their own data are stored and *who* has access to them.
- It combines existing W3C standards and is built on top of the existing Web.

# Linked Data

## Linked Data

Resource Description Framework  
IRIs: International Resource Ide  
*Example: URI*



Subject: < [http://dbpedia.org/resource/Mona\\_Lisa](http://dbpedia.org/resource/Mona_Lisa) >

Predicate: < <http://dbpedia.org/property/artist> >

Object: < [http://dbpedia.org/resource/Leonardo\\_da\\_Vinci](http://dbpedia.org/resource/Leonardo_da_Vinci) >

See more in presentation by Lukas Vanhoucke / CERN





# The Solid pod

A decentralized data store for one's personal data. A pod is like a secure personal Web server for all kinds of data.

- Data is stored as *Linked Data*, i.e. the resource gets its own HTTP URI on the Web.
- The pod is described by a unique WebID. WebID examples:
  - <https://timbl.inrupt.net/profile/card#me>
  - <https://dimou.solidcommunity.net/profile/card#me>
  - <https://janschill.net/profile/card#me>
  - <https://css.app.cern.ch/dimou/>
  - <https://css.app.cern.ch/tmey/>

# Pod example with Node Solid Server (NSS)

The screenshot shows a web browser window displaying a Solid profile page for Maria Dimou. The browser's address bar shows the URL `https://dimou.solidcommunity.net/profile/card#me`. The page layout is as follows:

- Header:** A purple 'S' logo on the left and a search bar on the right.
- Profile Card (Left):** Features a large image of the Nike of Samothrace statue. Below the image, the name **Maria Dimou** is displayed, followed by the text "CERN-Solid collaboration manager at CERN" and the pronouns "(she/her/hers)".
- Friends List (Middle-Left):** Titled "Friends", it lists three contacts: Jan Schill, Michiel de Jong, and Tim (inrupt) BL, each with a small profile picture and a follow icon.
- Bio Section (Middle-Right):** Titled "Bio" in green, it contains the text "CERN CERN Solid project manager" and a list of languages: English, Modern Greek, French, Russian, Italian, Spanish, and German.
- Activity Feed (Right):** Shows a post from "Maria Dimou" dated "Jan 29". The post content is obscured by a large blue rectangle. Below the post are icons for a person, a snake, and a key.

# Pod example with Community Solid Server (CSS)

https://css.app.cern.ch/dimou/

Community Solid Server

## Contents of dimou

[css.app.cern.ch](#) > [dimou](#)

[profile/](#)

[README](#)

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# The Solid server

A Web server that stores users' pods, with support for access control.

A Solid server acts as a data pod  
that stores and guards your data.

It is a regular Web server

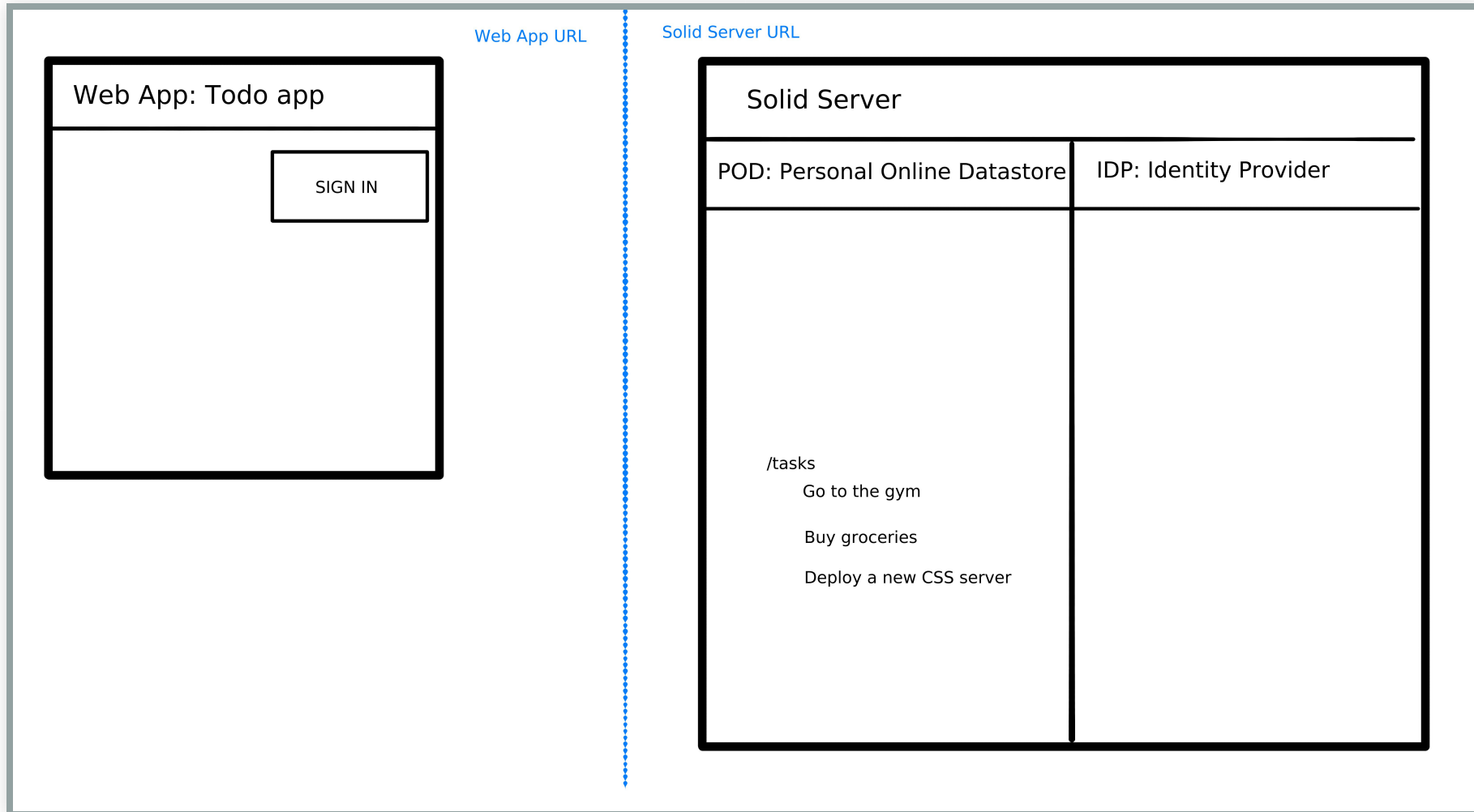
...with support for access control.

...with support for Linked Data.

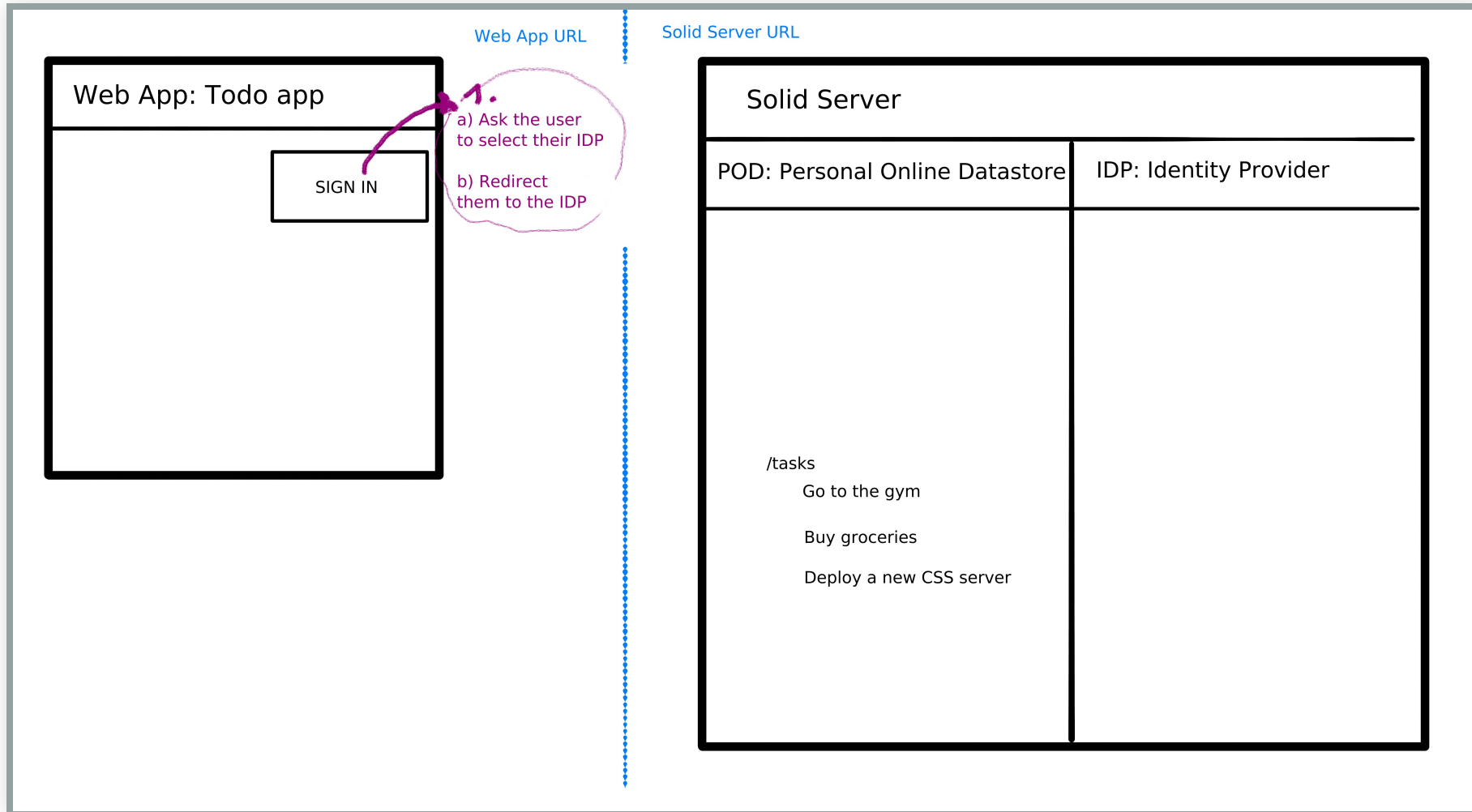
Its interface is application-agnostic.

Application-specific logic resides in clients.

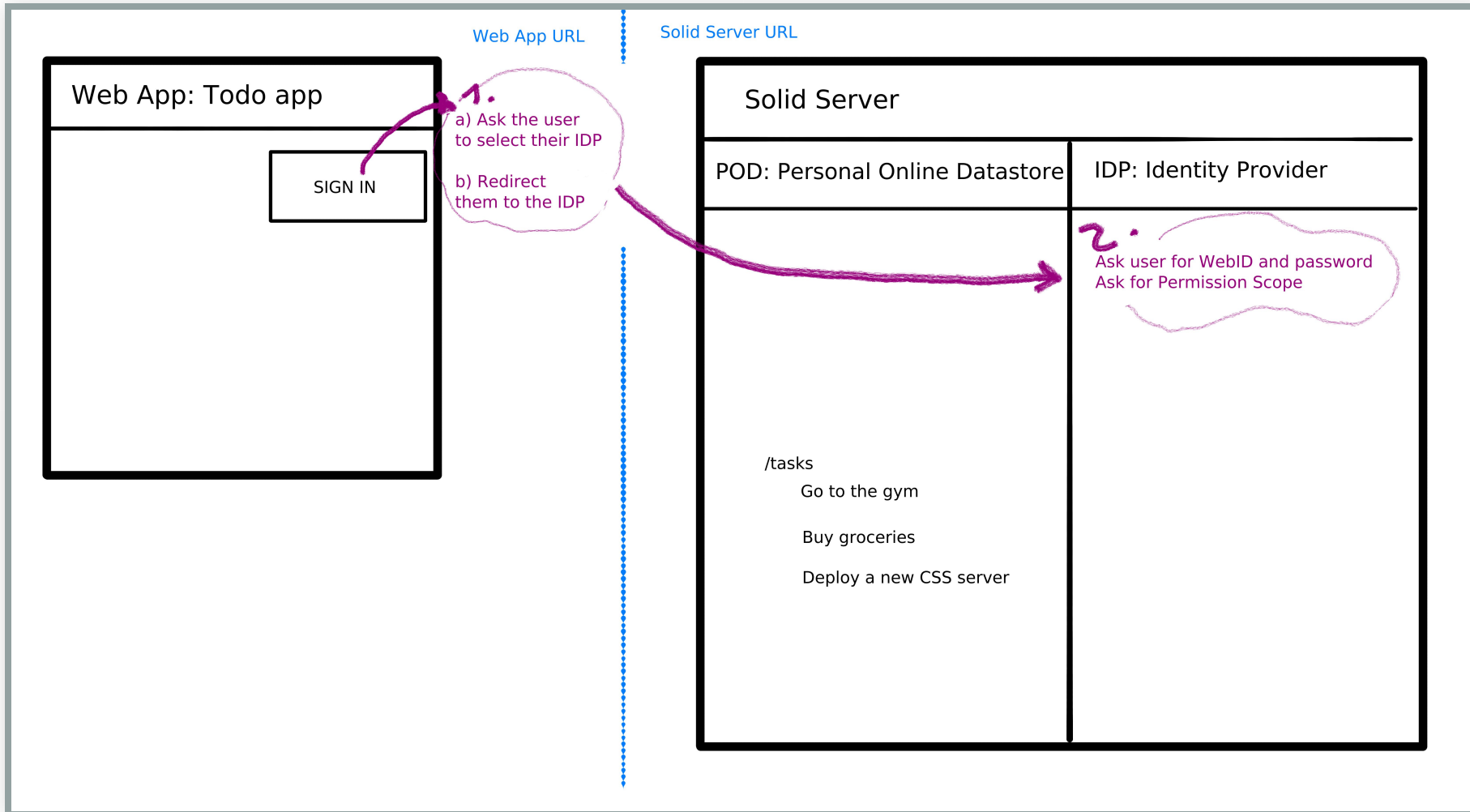
# Basic Solid workflow 1



# Basic Solid workflow 2

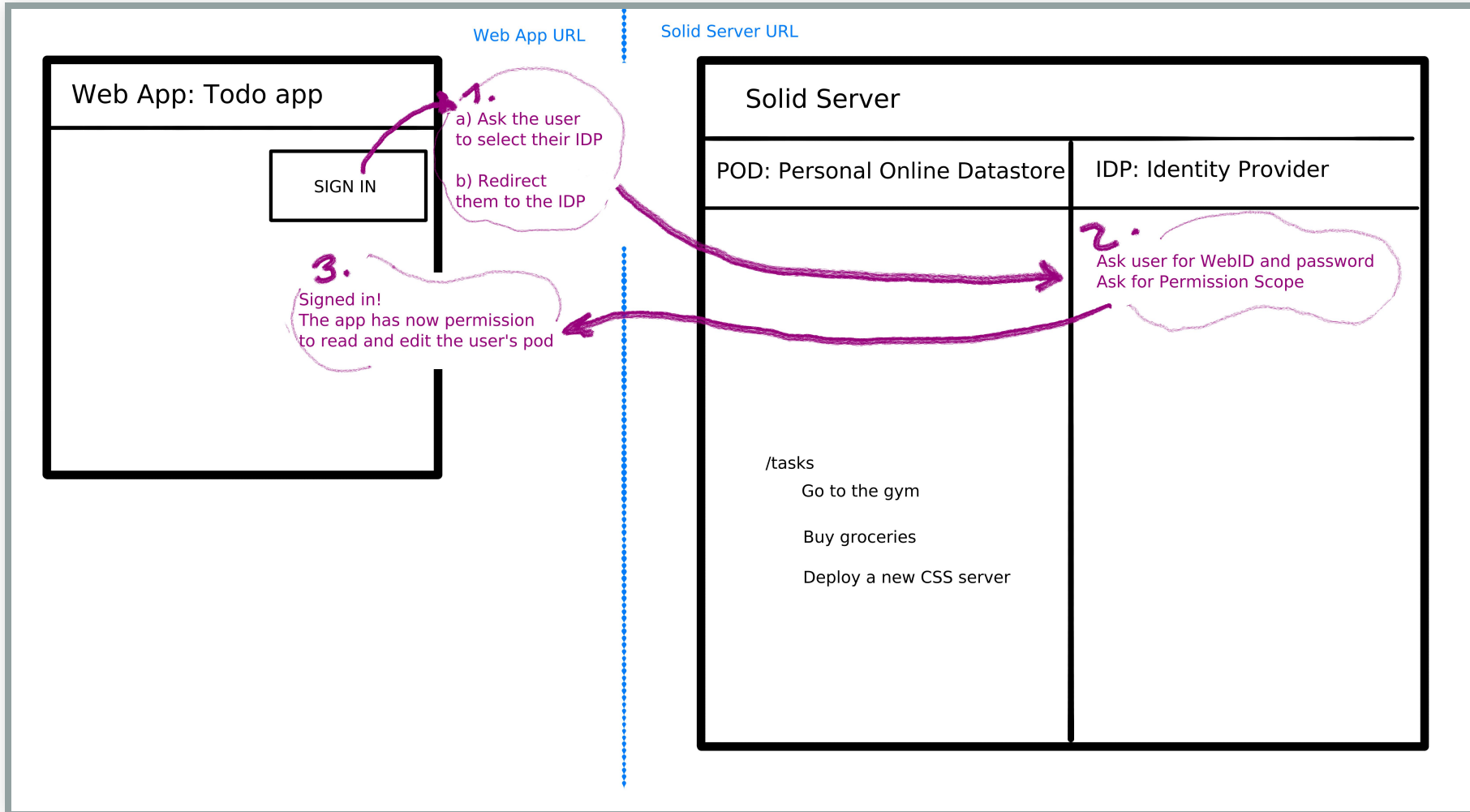


# Basic Solid workflow 3

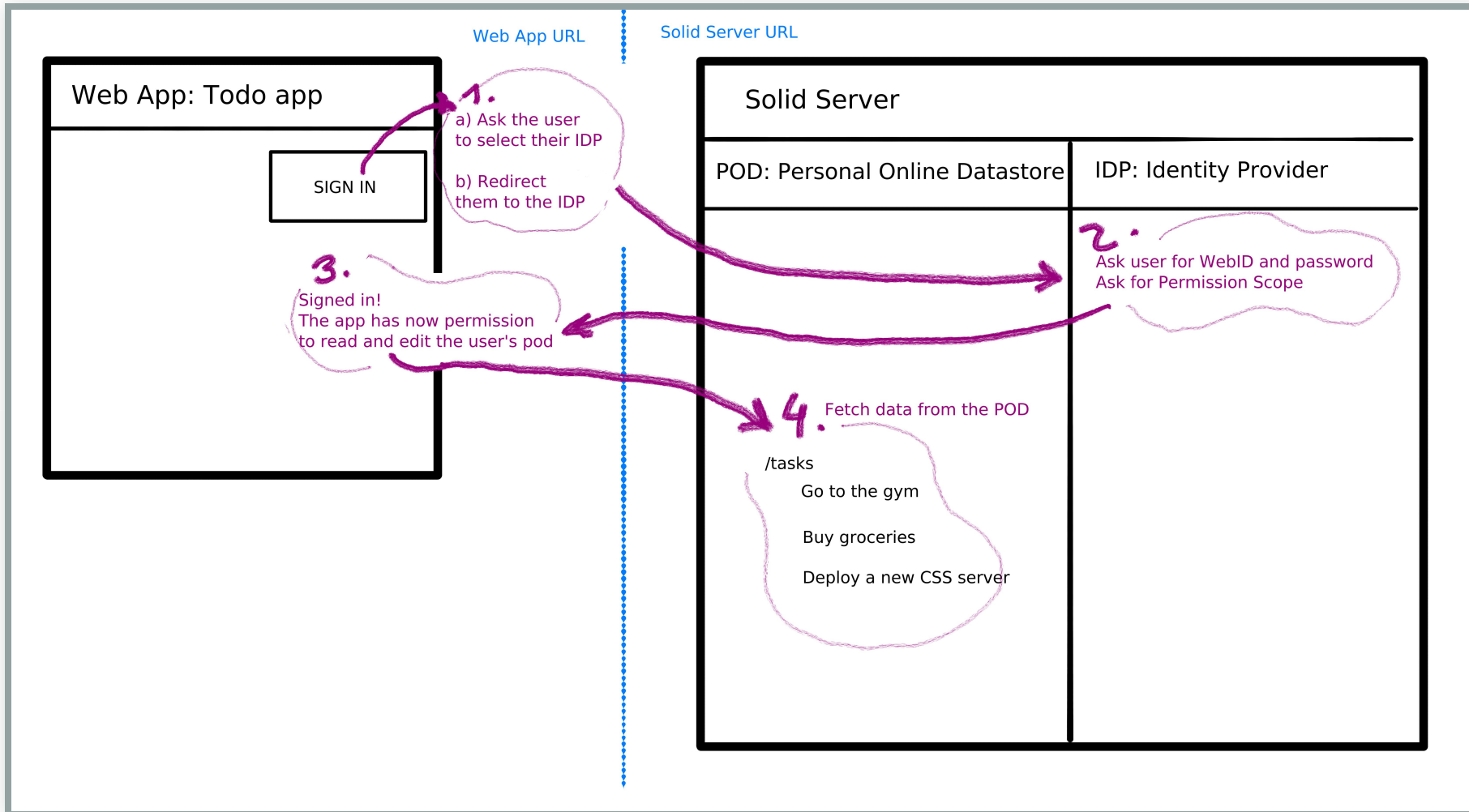




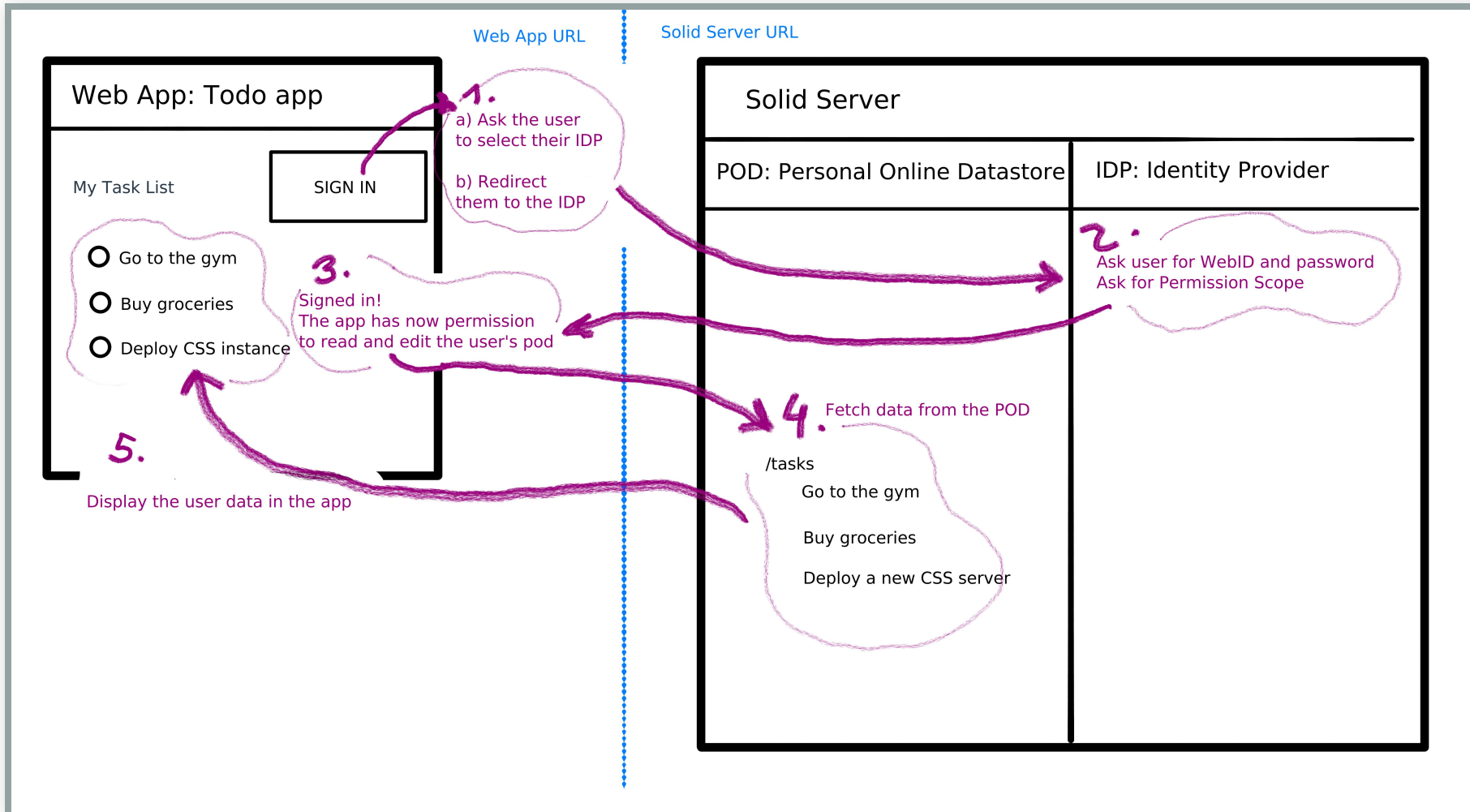
# Basic Solid workflow 4



# Basic Solid workflow 5



# Basic Solid workflow 6



# What is the Community Solid Server (CSS)

- A pod and ID provider server, i.e. delivers WebIDs.
- A fresh replacement for the NSS Solid servers (<https://solidcommunity.net> is one of them) used by SolidOS.
- Version 1.0 released in August 2021, i.e. still in testing phase.
- Developed at [IDLab](#) from Gent university (Belgium).
  - Four core contributors: Joachim Van Herwegen, Ruben Verborgh, Ruben Taelman, and Matthieu Bosquet.
  - Copyrighted by [Inrupt Inc.](#) and [imec](#) and available under the [MIT License](#)
- Abbreviated CSS for now (might change in the future for SCS).

# CSS Design

- Highly modular and flexible software.
- A configuration file foresees multiple installation options.
- Written in typescript, as a Node Package Manager (NPM) package.
- High standard of code quality.
- Extensible through [components.js](#) .
- Unix-like: “Do one thing and do it well”. Only a pod and ID provider but compatible with other software.
  - E.g. it doesn't provide a UI but is compatible with existing UIs, e.g. [penny](#).

# Components.js 1

- A Dependency Injection framework by the CSS authors.
- A Dependency Injection: allows to bring in software modifications to the config space instead of the source code.
- Allows CSS to be modular and extensible.
- Based on Linked Data (a way to format data so that it is understandable by humans and computers).

# Components.js 2

**Without Components.js**

My code is spread all over CSS' source code

**With Components.js**

All my modification are under the same folder

CSS' source code remain untouched as a node module

Both are glued together in the config file



# Components.js 3

- Advantages:
  - Allows tremendous flexibility and customization to CSS.
  - No need to hack CSS source code to modify it.
  - Makes the contribution to CSS by the community accessible.
- Limitations:
  - Creates complex, nested config file.
  - The documentation is not mature yet.
  - Takes time to learn how to use it.

# CSS code quality review 1

- **Compatibility**

→ Highly compatible with other software through Components.js

- **Performance efficiency**

→ No benchmark available for *time behavior* nor *resource utilization*. Solid applications often need to fetch data from various pods, which affects performance.

(Without being a rigorous ISO25010 review, I take inspiration from the evaluation grid to review CSS).

# CSS code quality review 2

- **Usability**

- Depends on the chosen UI

- **Security**

- Built with strong, well established security standards ( ACL authorization, SOLID-OIDC authentication).

- No security audit has been done yet

- Used in production by some clients of [digita.ai](https://digita.ai).

- **Maintainability**

- To be compatible with components.js, class and function are created in a modular fashion, which makes CSS highly testable and modifiable

- **Portability**

- Easily portable (NPM package, docker image)

# CSS Integration with CERN SSO

- Current state of CSS integration with keycloak: not yet compatible.
- Compatibility gap between OIDC (Open ID Connect) provided by Keycloak and Solid-OIDC required by CSS.
- Not compatible either with other open source SSO providers (i.e. Auth0).
- keycloak not going to support Solid-OIDC anytime soon.
- Potential solutions:
  - Digita proxy
    - Close the compatibility gap between Solid and keycloak
  - Community pull requests

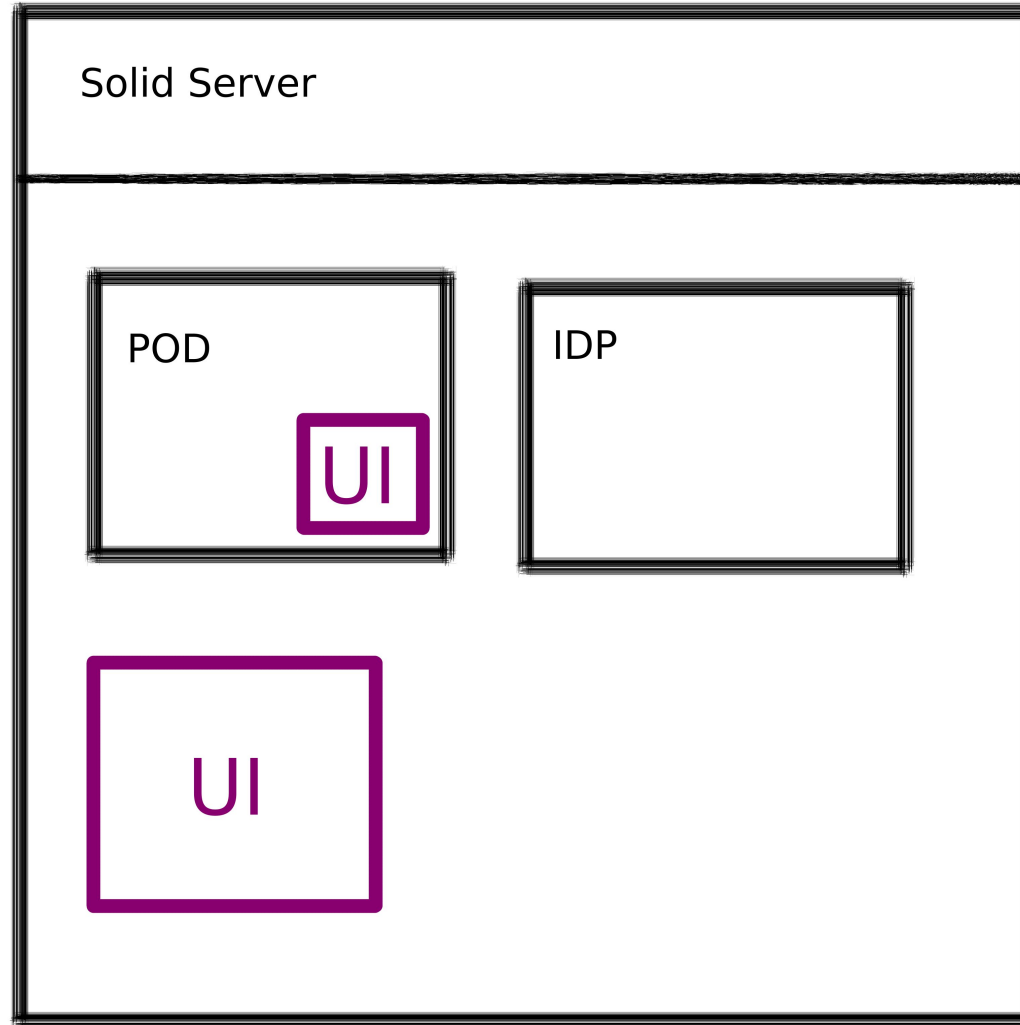
# UI integration

- Currently 5 options:
  - Mashlib
  - penny
  - inrupt's pod browser
  - Oh-My-Pod
  - Pod Homepage
- Usable as an external app or can be integrated into CSS
  - External UI: stable and usable
  - Internal UI: still experimental or under-developped

# UI possible locations

Web App URL

Solid Server URL



# UI Candidate: Penny





### Contained resources

card

+ Add Resource

Upload file(s)

### Things

profile/

modified

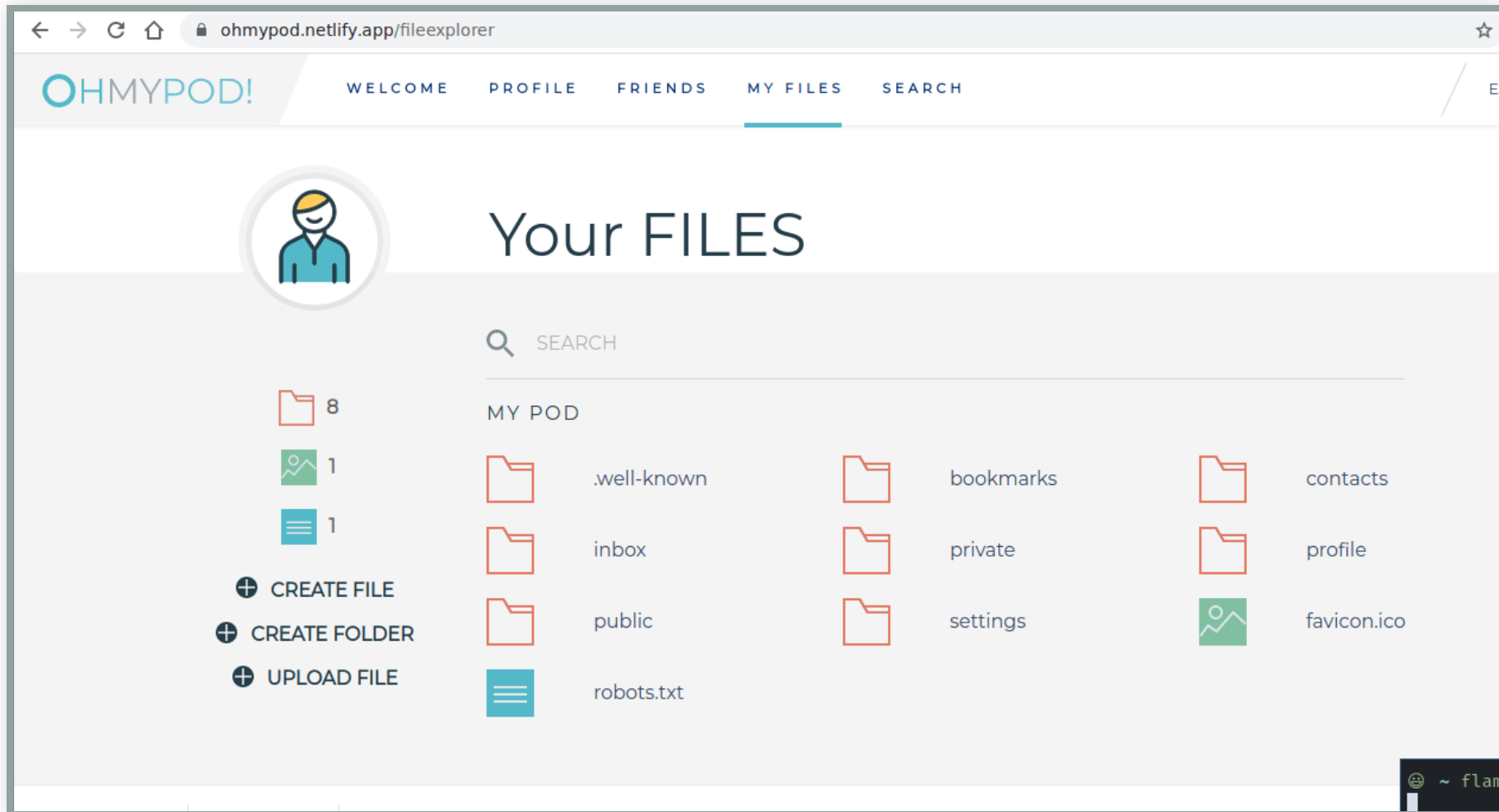
8/31/2021, 12:05:37 PM

+ URL String 1 Integer 1.0 Decimal Datetime

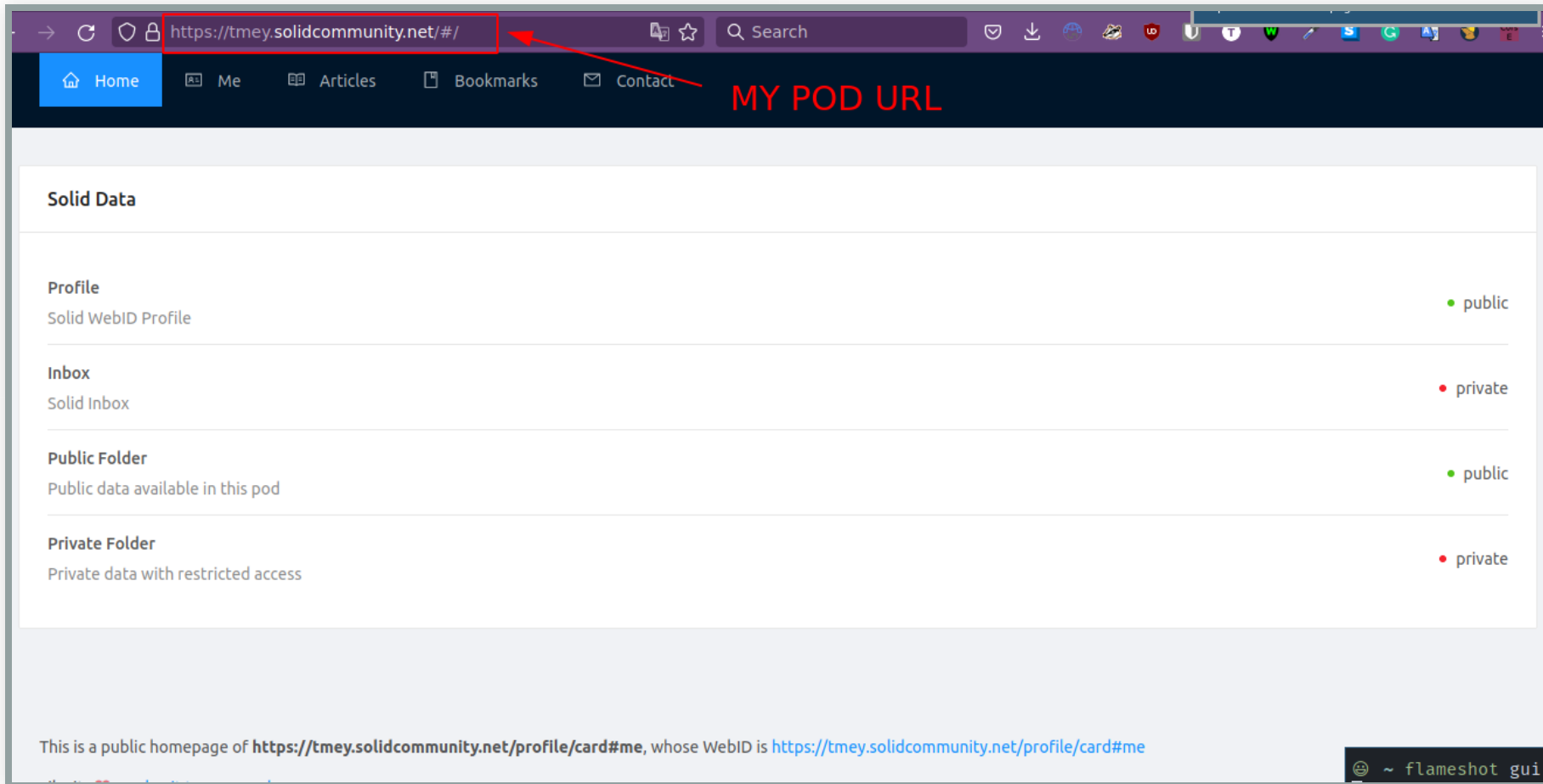
type

http://www.w3.org/ns/ldp#BasicContainer

# UI Candidate: Oh my pod



# UI Candidate: Pod homepage



# CSS open-source community in numbers

- Median time to issues' first response: 5h ( !! )
- 98% of new issues are answered
- 90% of issues first response made by a core dev
- newcomers make 25% of PRs
- 27 different newcomers submitted PR

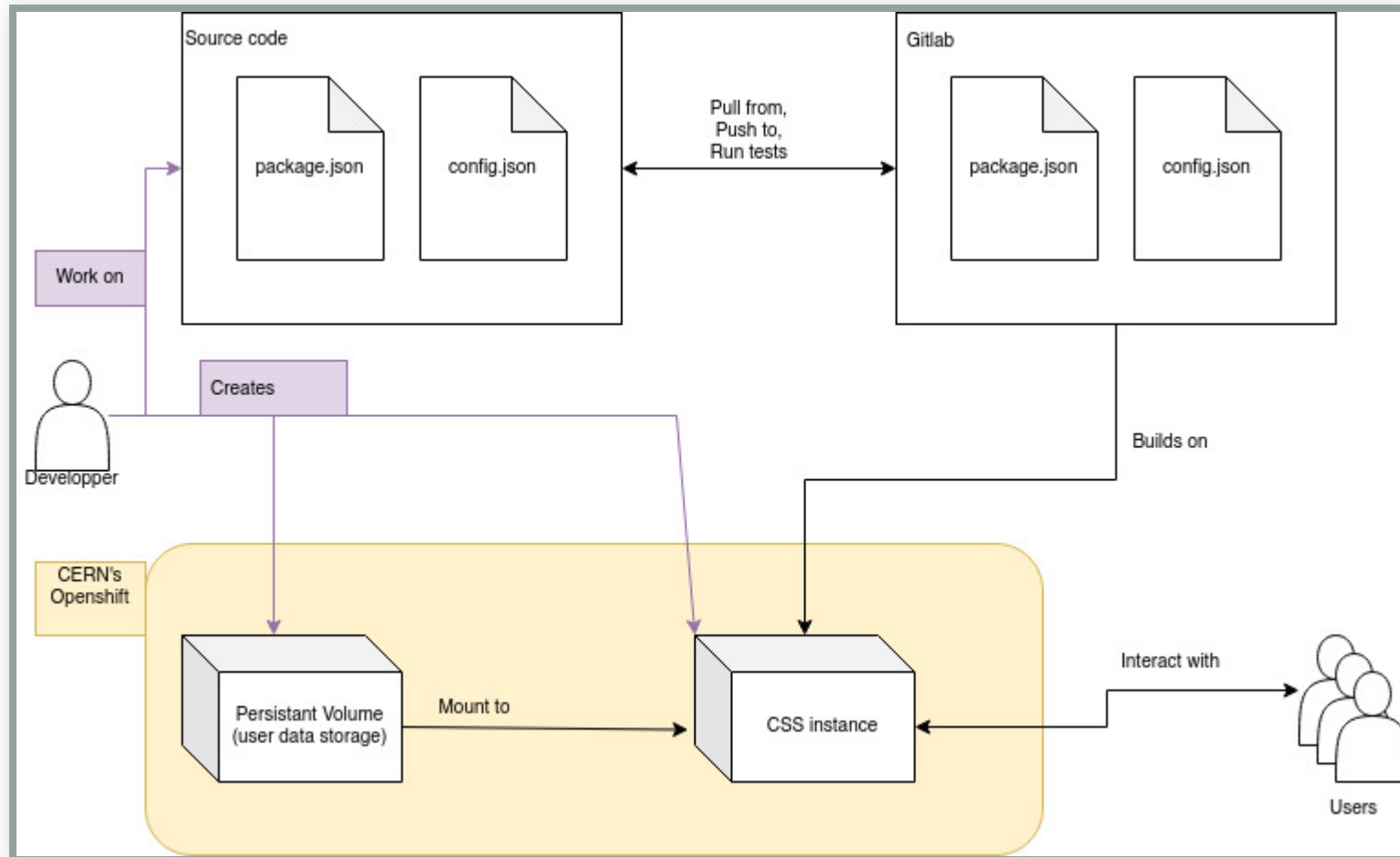
# CSS open-source community

- Core devs involved in the community
  - always answer
  - answer fast
- Community is not strongly developed yet
  - no issue answered by non-core dev
  - newcomers start submitting PRs

# Deploying CSS inside CERN infrastructure step 1

- Creation of a 'recipe', meaning the creation of two files:
  - Package.json:
    - import dependencies such as CSS and UIs
    - define context for components.js if custom files need to be imported
  - config.json: customize the feature needed for the CSS instance

# Deploying CSS inside CERN infrastructure step 2



Script available at: [https://github.com/joeitu/cern-css/blob/master/devops/create\\_app.sh](https://github.com/joeitu/cern-css/blob/master/devops/create_app.sh)



# Conclusions on CSS

- CSS software of high quality, built to last, design to adapt
  - CSS is not opinionated software
  - Highly extensible
  - Configure your own CSS instance with the chosen feature
  - Great support from core-devs
  - Small community but growing
- Integration with SSO not ready yet, but Work In Progress
- UI integration with CSS still experimental

# Use cases

- CERN User profiles
- Easier way to create apps for CERN users
  - handle most if not all of the backend needs (authorization, authentication, store data)
  - build-in, standardized API with Linked-Data
  - helps with GDPR compliance

# Strategic decisions for CERN

Despite the challenges with the UI, encryption and evolving specs, the Solid project has:

- Government agencies that embrace it officially (UK NHS, Flanders' and Swedish administration).
- Universities in Belgium, the Netherlands, Germany, Denmark, Switzerland.
- At least four start-ups per month showing Solid pod interfaces.
- Almost 2K members in [the Solid gitter chat](#)
- It is strategically and ideologically important for CERN to be engaged with Solid, as a standard for the Decentralised Web.

# Recommendation on the CERN-Solid future

For the above-explained reasons we recommend that:

- we get resources approved for a stable in-house CSS instance.
- integrate it with the new CERN SSO.
- develop our own UI with open source tools, proceeding incrementally from the current one available with SolidOS.
- Consider the creation of long-overdue CERN users' profiles as the first use-case. The EDH, HRT, LANDB, MERIT, dosimetry info, Indico events where chair/speaker, personalised searches, notifications, etc can be referenced from the users' pods.



# References

- [CSS manual for CERN's users](#)
- [The Solid project website](#)
- [CERN-Solid entry point](#)
- [CERN-Solid chat](#)
- [Solid pod providers](#)
- [This project](#)
- [Policy document for a CERN Solid server](#)

