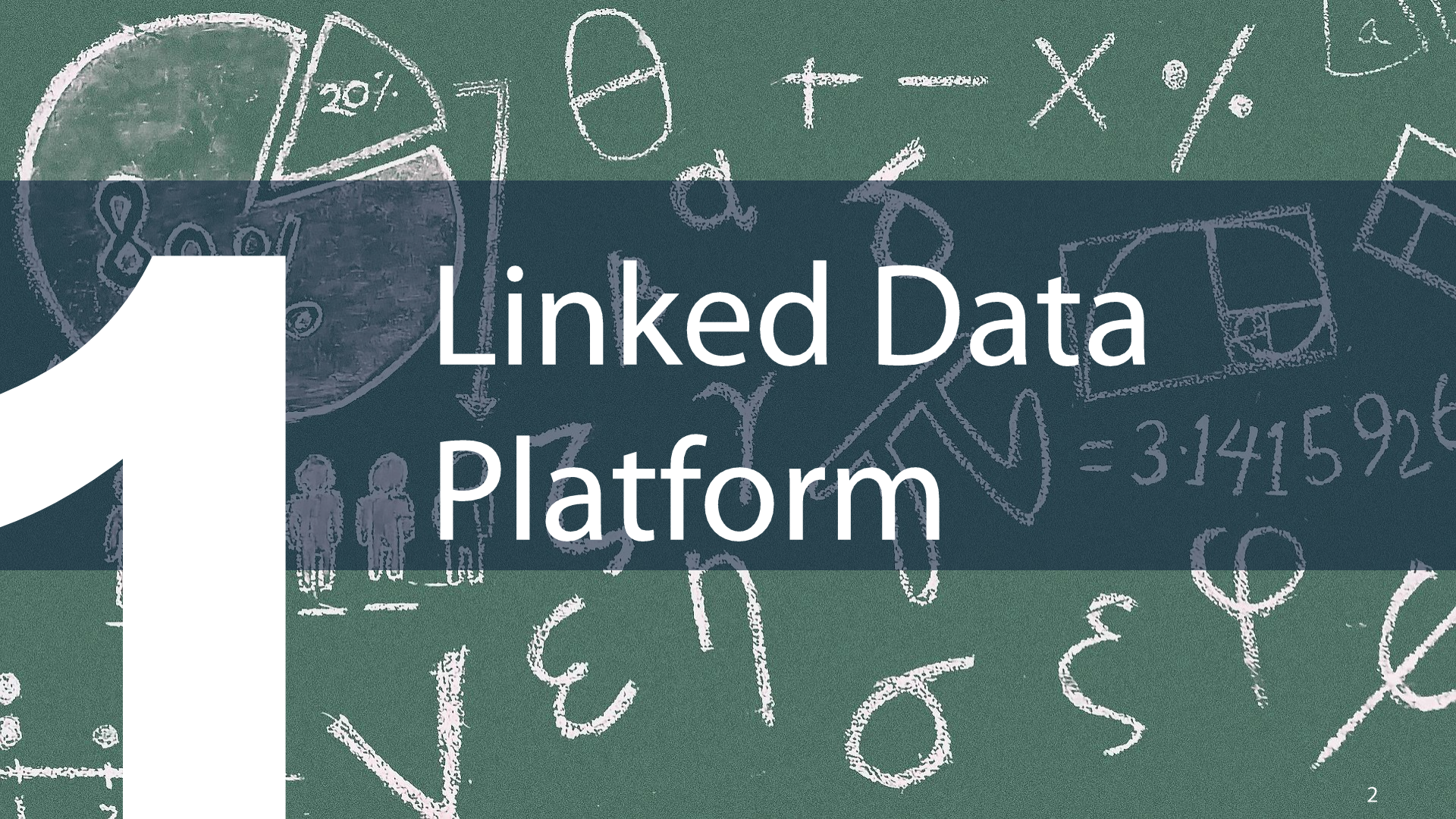
The Solid Ecosystem

///// Tutorial CTWE WS2019/2020 //////////////////////////

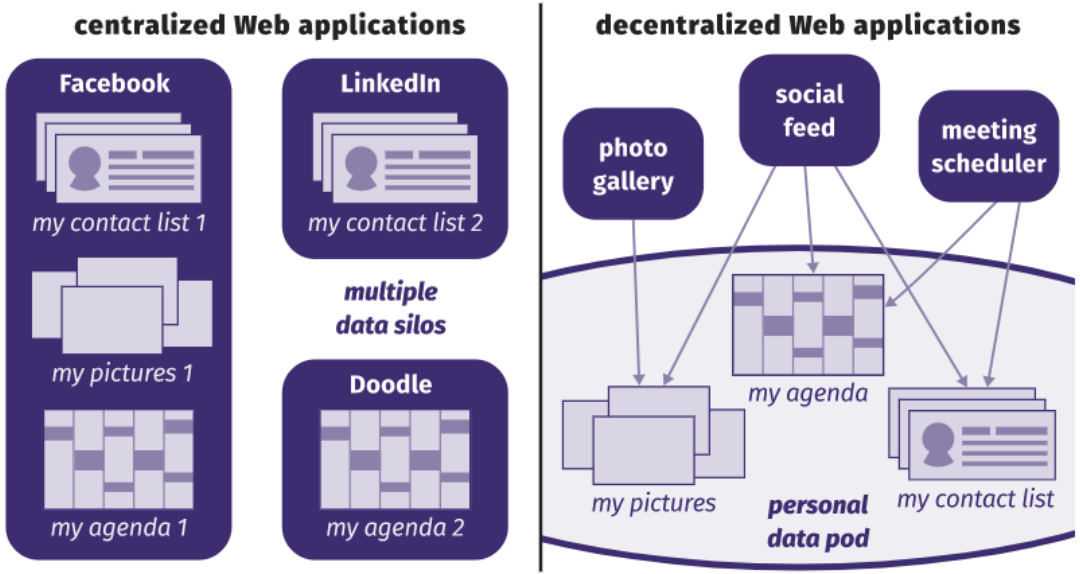
Dang Vu

Professorship for Distributed and Self-Organizing Systems



1 Linked Data Platform

You can grant apps and people access to very specific parts of your data.



- https://rubenverborgh.github.io/Solid-Lecture-2018/

“Linked Data Platform (**LDP**) is a Linked Data specification defining a set of integration patterns for building RESTful HTTP services that are capable of read-write of RDF data.”

- https://en.wikipedia.org/wiki/Linked_Data_Platform
- https://www.w3.org/TR/ldp-primer/
- https://www.w3.org/TR/ldp/

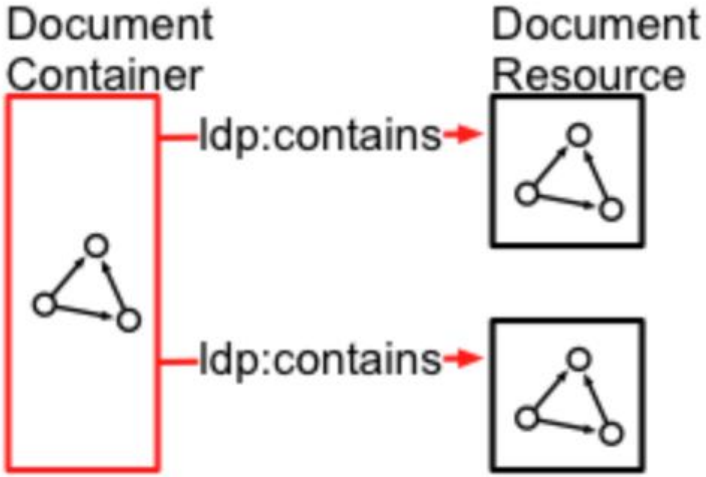
- Based on RDF
- Use HTTP Verbs for CRUD Operations
  - POST
  - GET
  - PUT/PATCH
  - DELETE
- Cover “RDF sources” as well as binary resources (LDPR)
- Organize these resources in LDP containers (LDPC)

Implementations

- Apache Marmotta
- Trellis LDP
- Fedora Commons Repository

- SoLiD

GET /mycontainer/ HTTP/1.0

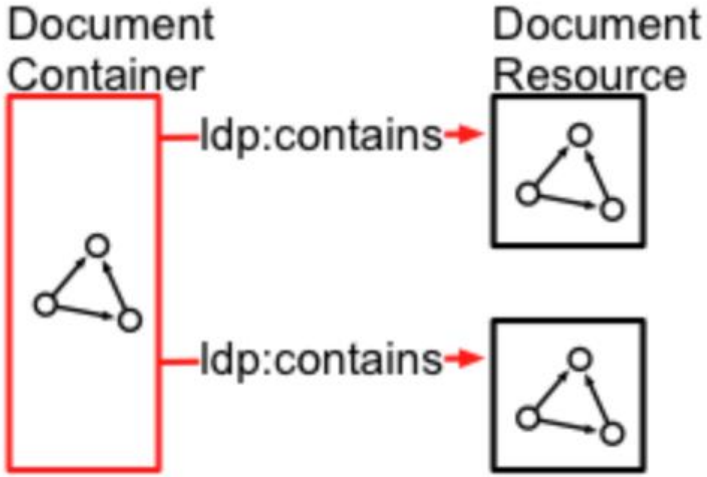


mycontainer

HTTP/1.0 200 OK
Link: <http://www.w3.org/ns/ldp#BasicContainer>; rel="type",
<http://www.w3.org/ns/ldp#Resource>; rel="type"

@prefix dcterms: <http://purl.org/dc/terms/>.
@prefix ldp: <http://www.w3.org/ns/ldp#>.

<http://example.org/mycontainer/>
a ldp:Container, ldp:BasicContainer;
dcterms:title 'My data storage on the Web' .



mycontainer

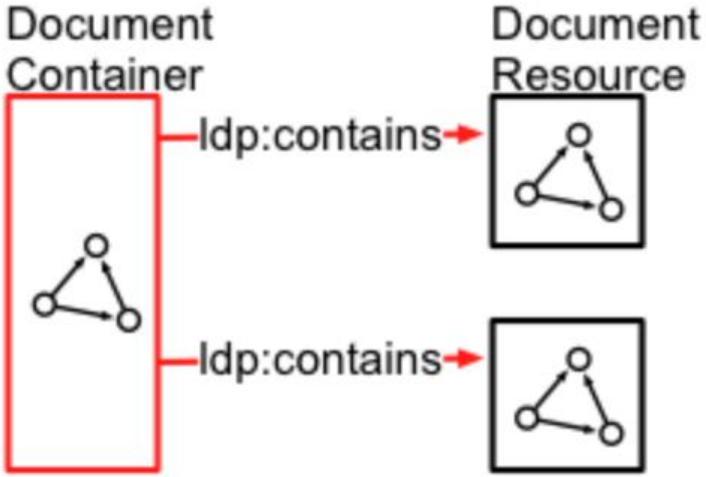
```
POST /mycontainer/ HTTP/1.0
Link: <http://www.w3.org/ns/ldp#Resource>; rel="type"
Slug: myfile.ttl
Content-Type: text/turtle

@prefix dc: <http://purl.org/dc/terms/> .
@prefix foaf: <http://xmlns.com/foaf/0.1/> .

<> a foaf:PersonalProfileDocument;
   foaf:primaryTopic <#me> ;
   dc:title 'My Profile file' .

<#me> a foaf:Person;
   foaf:name 'Oliver Meier'  .
```

HTTP/1.0 201 Created
Location: http://example.org/mycontainer/myfile.rdf
Link: <http://www.w3.org/ns/ldp#Resource>; rel="type"



mycontainer

```
POST /mycontainer/ HTTP/1.0
Link: <http://www.w3.org/ns/ldp#Resource>; rel="type"
Slug: myfile.png
Content-Type: image/png

# binary data
```

HTTP/1.0 201 Created
Location: http://example.org/mycontainer/myfile.png
Link: <http://www.w3.org/ns/ldp#Resource>; rel="type"
Link: <http://example.org/mycontainer/myfile.png/meta>; rel="describedby"

What is SoLiD?

- Technology Stack
  - LDP REST API
  - Authentication
  - Authorization
- Ecosystem for Social Apps
- Practical Implementation

- https://github.com/solid/solid
- https://github.com/solid/solid-spec

Extension to LDP

- “POD” - concept
- WebID-based Authentification
- Access Control Lists (.acl) based on WAC
- SPARQL-endpoint for each resource
- Basic prototypical Web User Interface
- Multiple application types


2
The SoLiD specification

Time for our own POD

- https://github.com/solid/node-solid-server
- https://hub.docker.com/r/aveltens/solid-server
- https://solid.inrupt.com/

https://solid.inrupt.com/docs

https://github.com/solid/userguide

- Identity
- Profiles
- Authentication
- Authorization and Access Control
- Content Representation
- Reading and Writing Resources
- Social Web App Protocols

Identity: how is this implemented?

Using WebIDs

Example:

https://vunguyenhaidang.solid.community/profile/card#me

Or

https://dangvu.com/profile/card#me

Profiles: What are WebID Profile Document?

```
@prefix solid: <http://www.w3.org/ns/solid/terms#>.
@prefix foaf: <http://xmlns.com/foaf/0.1/>.
@prefix pim: <http://www.w3.org/ns/pim/space#>.
@prefix schema: <http://schema.org/>.
@prefix ldp: <http://www.w3.org/ns/ldp#>.

<>
    a foaf:PersonalProfileDocument ;
    foaf:maker <https://vunguyenhaidang.solid.community/profile/card#me> ;
    foaf:primaryTopic <https://vunguyenhaidang.solid.community/profile/card#me> .

<https://vunguyenhaidang.solid.community/profile/card#me>
    a foaf:Person ;
    a schema:Person ;

    foaf:name "Dang Vu Nguyen Hai" ;

    solid:account </> ;  # link to the account uri
    pim:storage </> ;    # root storage

    ldp:inbox </inbox/> ;

    pim:preferencesFile </settings/prefs.ttl> ;  # private settings/preferences
    solid:publicTypeIndex </settings/publicTypeIndex.ttl> ;
    solid:privateTypeIndex </settings/privateTypeIndex.ttl> .
```

User identity

User preferences discover

Security credentials

Linked Data Format: turtle (.ttl), JSON-LD or HTML+RDFa

Authentication:

Primary Authentication :

- Traditional approach: username-and-password
- WebID-TLS: public-private key pair
- WebID-OIDC: based on the OAuth2/OpenID (currently implementing)

Secondary Authentication:

- Passwords can be forgotten, browser certificates can be lost…

-> Account Recovery

Authorization and Access Control:

Web Access Control (WAC)

- The resources are identified by URIs
- Users and the groups are all identified by URIs
- Authorization statements are placed into Access Control List Resource (.acl)

```
<#authorization1>
    a               acl:Authorization;
    acl:agent       <https://alice.databox.me/profile/card#me>;  # Alice's WebID
    acl:accessTo    <https://alice.databox.me/docs/file1>;
    acl:mode        acl:Read,
                    acl:Write,
                    acl:Control.
```

Content Representation:

Two kinds of resources

- Linked Data resources (RDF in form of JSON-LD, Turtle, HTML+RDFa, etc)
- Everything else (binary data and non-linked-data structured text)

Resources are grouped in directory- like **Containers**

- Basic Container
- Direct Container
- Indirect Container

Reading and Writing Resources:

- HTTPS REST API
- WebSocket API

What is globbing?

TO aggregate all RDF resources from a container and retrieve them with a single GET operation

Alternative: using SPARQL

Social Web App Protocols:

What are they for?

- Notifications
- Friends Lists, Followers and Following


3
Hands-on

Time for making a first Solid App

- https://solid.inrupt.com/docs/app-on-your-lunch-break

Learning objectives:

- Building a basic app with Solid
- Logging in and out
- Reading data from a Solid pod

Prerequisites:

- HTML, CSS, JavaScript knowledge

Required tools:

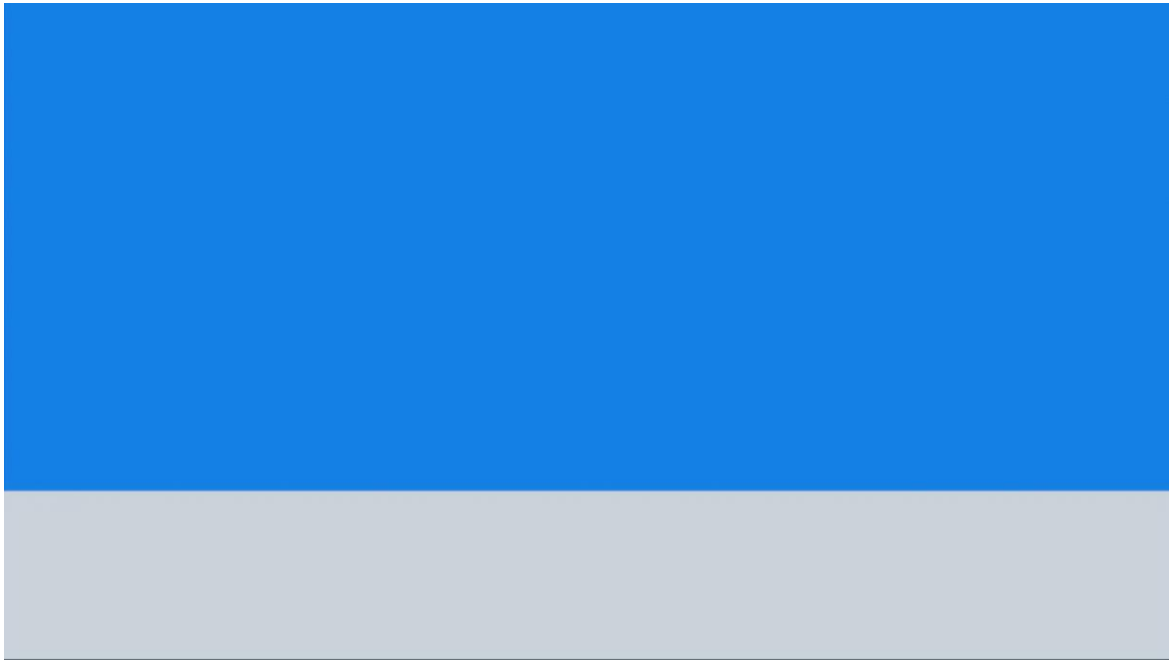
- Text editor (i.e. Visual Studio Code)
- a Web Server to run your app locally (i.e local-web-server)

Download sample code: **mytuc.org/nhyr**

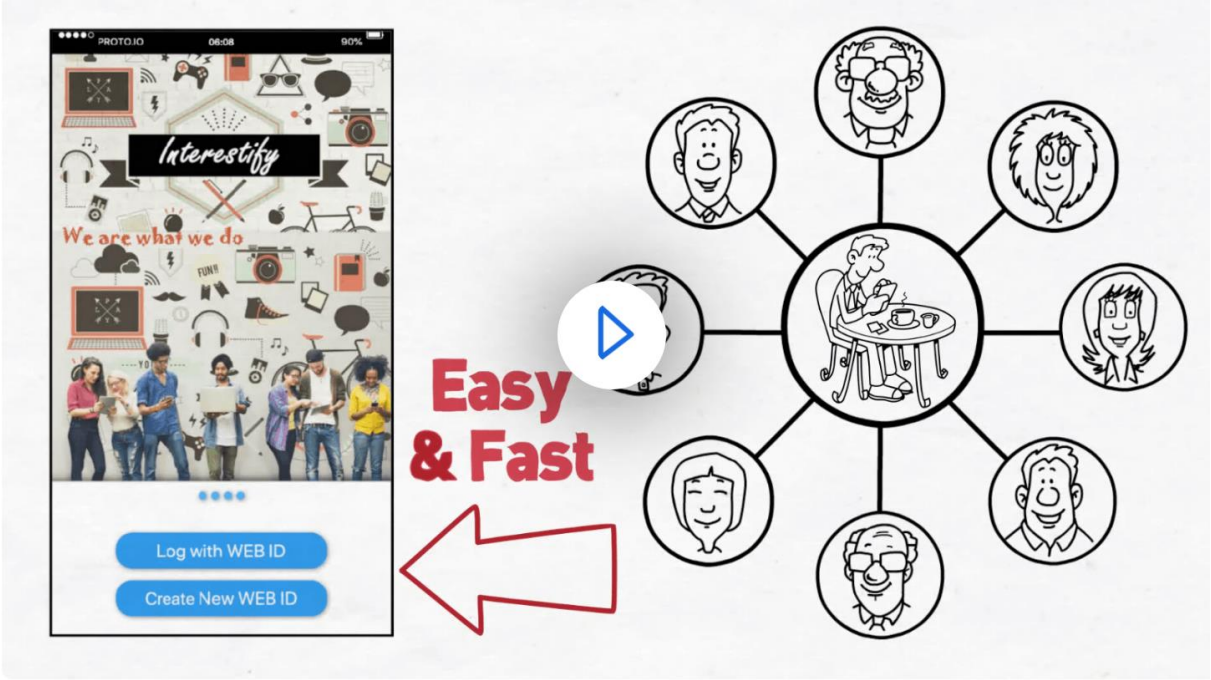
4 Use Cases

https://github.com/solid/solid-apps

Management of medical health records



Find new friends



5 Conclusion