RDF: Semantic Web Scripting

Final presentation
WebDev 2016
Daniel & Yannis

Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Outline

- Motivation
- Structured data in HTML
- Related Work
- Demo 1
- Implementation
- Demo 2
- Evaluation
- Future Work
- Conclusion

HPI Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Motivation

Websites provide semantic information about displayed content (ca. 30% of crawlable web)

Idea: Reify semantic information and make them progammable

Goal: Extract RDFa Data, Microformats – Embed UI for Publishing/Sharing

Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Structured data in HTML

HPI Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

- **RDFa**

```
<span property="http://schema.org/addressCountry">Deutschland</span>
```

- **Microdata**

```
<span itemScope itemType="http://schema.org/addressCountry" itemprop="
homeCountry">Deutschland</span>
```

- **Microformats**

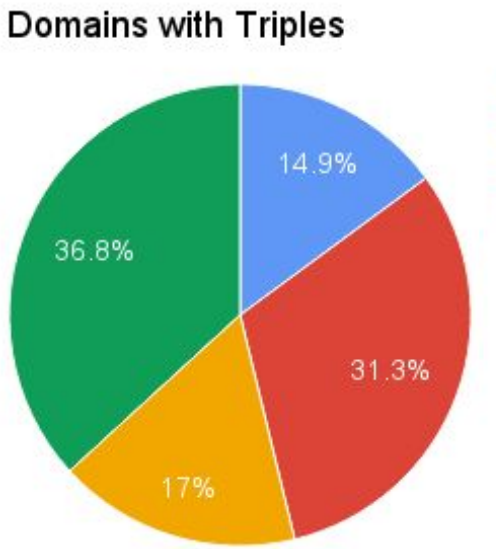
```
<span class="h-adr">
    <span class="p-country-name">Deutschland</span>
</span>
```

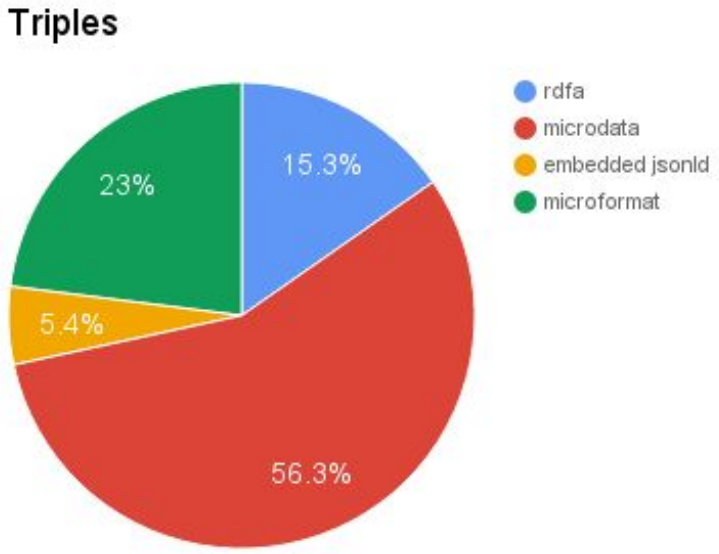
- **JSON-LD**

```
{"@context": "http://schema.org",
    "address": {
      "@type": "PostalAddress",
      "addressCountry": "Deutschland"}}
```

Web Data Commons - 2015

HPI Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam





RDF vs. RDFa

RDF - **R**esource **D**escription **F**ramework

- "the W3C's standard for interoperable machine-readable data"
- "An RDF graph is made up of triples consisting of a subject, predicate and object."

RDFa - **R**esource **D**escription **F**ramework in **A**ttributes

- "RDFa is a way of expressing RDF-style relationships using simple attributes in existing markup languages such as HTML"

Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Related Work

- https://developers.google.com/structured-data/testing-tool/
  - Testing tool and viewer for structured data on websites
- https://github.com/alexmilowski/green-turtle
  - RDFa Parser and API
  - Triples viewer (Chrome extension)
- https://github.com/IKS/VIE
  - Utility library for implementing decoupled Content Management systems
  - Uses RDFa to add semantic to editable content

HPI Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Demo (1)

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Implementation

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

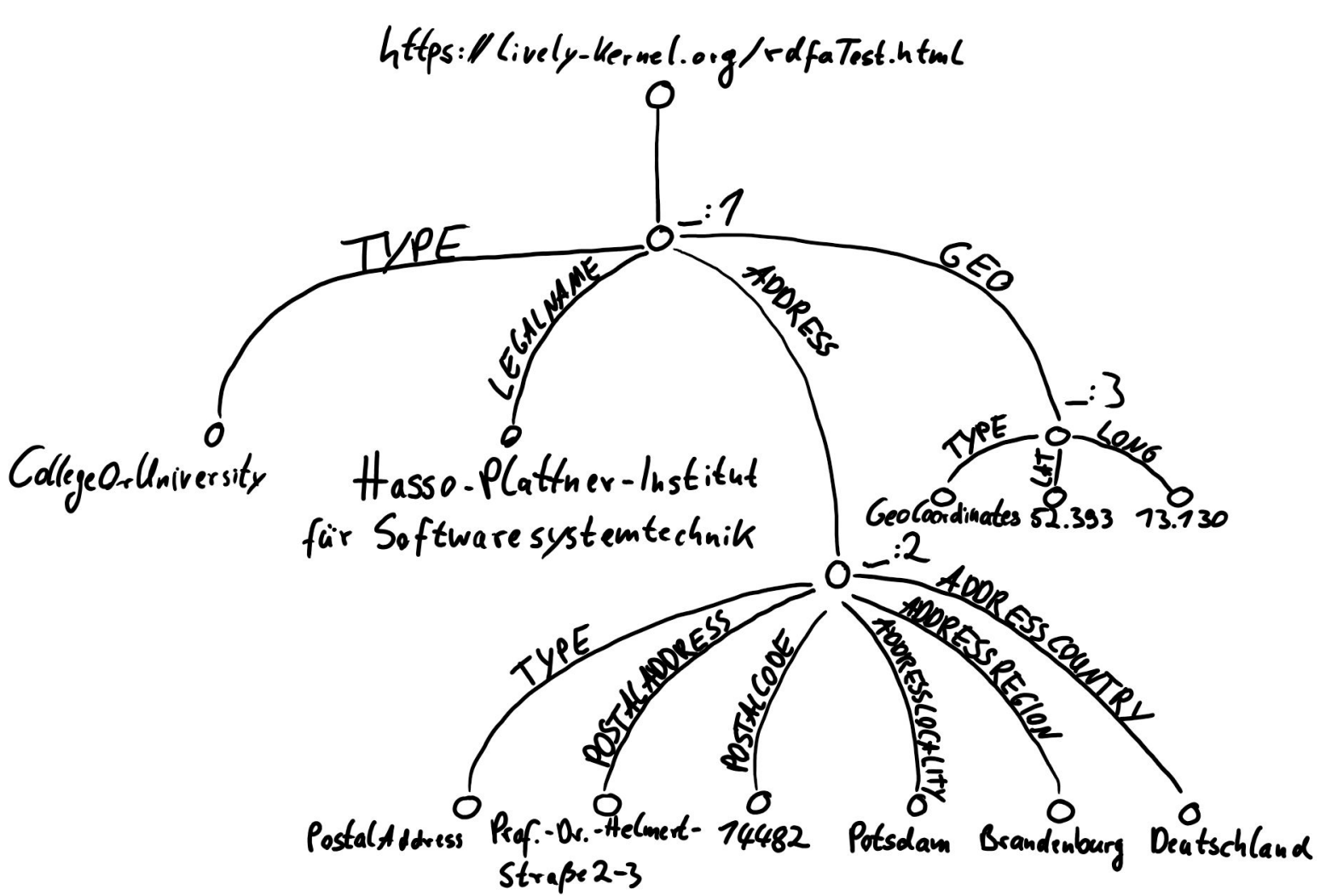
HPI

Anschrift:
Prof.-Dr.-Helmert-Straße 2-3 14482
Potsdam Brandenburg Deutschland

HPI location
52.393488, 13.1297163

```
<html>
<body>
<div vocab="http://schema.org" typeof="CollegeOrUniversity">
 <h1 property="legalName" content="Hasso-Plattner-Institut für
Softwaresystemtechnik GmbH">HPI</h1>
        <span property="address" typeof="PostalAddress">
           Anschrift:
           <span property="streetAddress">Prof.-Dr.-Helmert-Straße 2-3</ span
           <span property="postalCode">14482</span>
           <span property="addressLocality">Potsdam</span>
           <span property="addressRegion">Brandenburg</ span>
           <span property="addressCountry">Deutschland</ span>
        </span>
 <div property="geo" typeof="GeoCoordinates">
   HPI location
   <span property="latitude">52.393488</ span>
   ,
   <span property="longitude">13.1297163</ span>
 </div>
```

```
<_:blanknode1> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> <http://schema.org/CollegeOrUniversity>
<_:blanknode1> <http://schema.org/legalName> <Hasso-Plattner-Institut für Softwaresystemtechnik GmbH>
```



Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

WebDev 2016

Topic: RDF

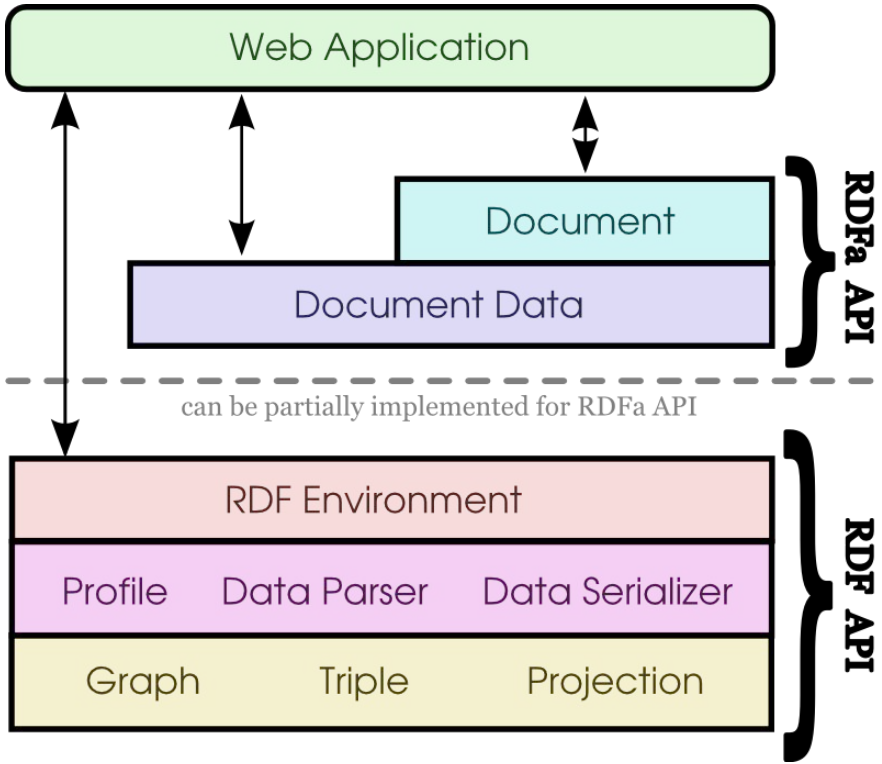
2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

GreenTurtle

An RDFa 1.1 implementation in JavaScript for browsers

https://github.com/alexmilowski/green-turtle



Concept Stack for the RDFa API and RDF API

Software Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

First approach

Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

HPI

Anschrift:
Prof.-Dr.-Helmert-Straße 2-3 14482
Potsdam Brandenburg Deutschland

HPI location
52.393488, 13.1297163

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

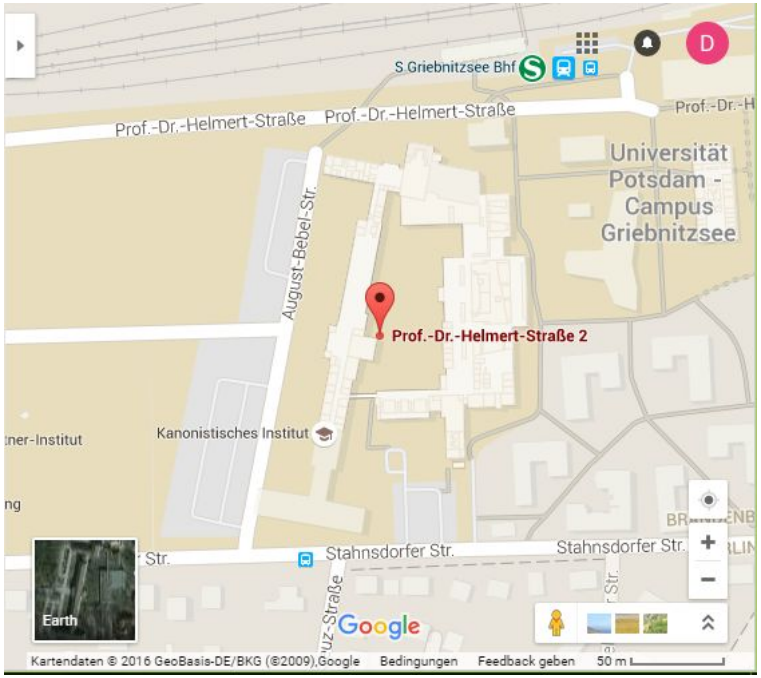
Presenters:
Daniel Stolpe
Yannis Kommana

First approach

HPI

Anschrift:
Prof.-Dr.-Helmert-Straße 2-3 14482
Potsdam Brandenburg Deutschland

HPI location
52.393488, 13.1297163



Software Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

HPI

Anschrift:
Prof.-Dr.-Helmert-Straße 2-3 14482
Potsdam Brandenburg Deutschland

HPI location
52.393488, 13.1297163

```
<html>
<head>
 <meta typeof="CollegeOrUniversity" />
 <meta property="http://schema.org/legalName" content="Hasso-Plattner-Institut für
Softwaresystemtechnik GmbH" />
 <meta property="http://schema.org/streetAddress" content="Prof.-Dr.-Helmert-Straße 2-3" />
 <meta property="http://schema.org/postalCode" content="14482" />
 <meta property="http://schema.org/addressLocality" content="Potsdam" />
 <meta property="http://schema.org/addressRegion" content="Brandenburg" />
 <meta property="http://schema.org/addressCountry" content="Deutschland" />
 <meta property="geo" typeof="GeoCoordinates" />
 <meta property="latitude" content="52.393488" />
 <meta property="longitude" content="13.1297163" />
</head>
<body>

<div>
 <h1>HPI</h1>
        <span>
           Anschrift:
           <span>Prof.-Dr.-Helmert-Straße 2-3<span>
           <span>14482</span>
           <span>Potsdam</span>
           <span>Brandenburg</span>
           <span>Deutschland</span>
        </span>
 <div>
   HPI location
   <span>52.393488</span>
   ,
   <span>13.1297163</span>
 </div>
</div>
</body>
</html>
```

Software Architecture Group

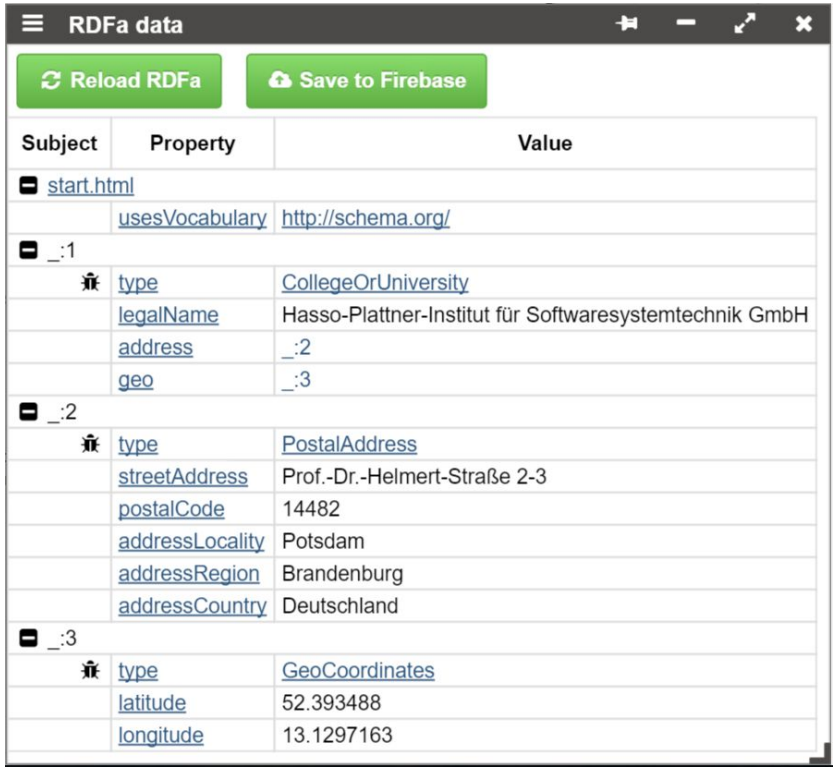
WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Second approach: RDFa-Viewer



Subject	Property	Value
start.html		
	usesVocabulary	http://schema.org/
_:1		
	type	CollegeOrUniversity
	legalName	Hasso-Plattner-Institut für Softwaresystemtechnik GmbH
	address	_:2
	geo	_:3
_:2		
	type	PostalAddress
	streetAddress	Prof.-Dr.-Helmert-Straße 2-3
	postalCode	14482
	addressLocality	Potsdam
	addressRegion	Brandenburg
	addressCountry	Deutschland
_:3		
	type	GeoCoordinates
	latitude	52.393488
	longitude	13.1297163

Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Sample application

Idea: Build personal movie-library with custom ratings bridging two different data sources

Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

WebDev 2016

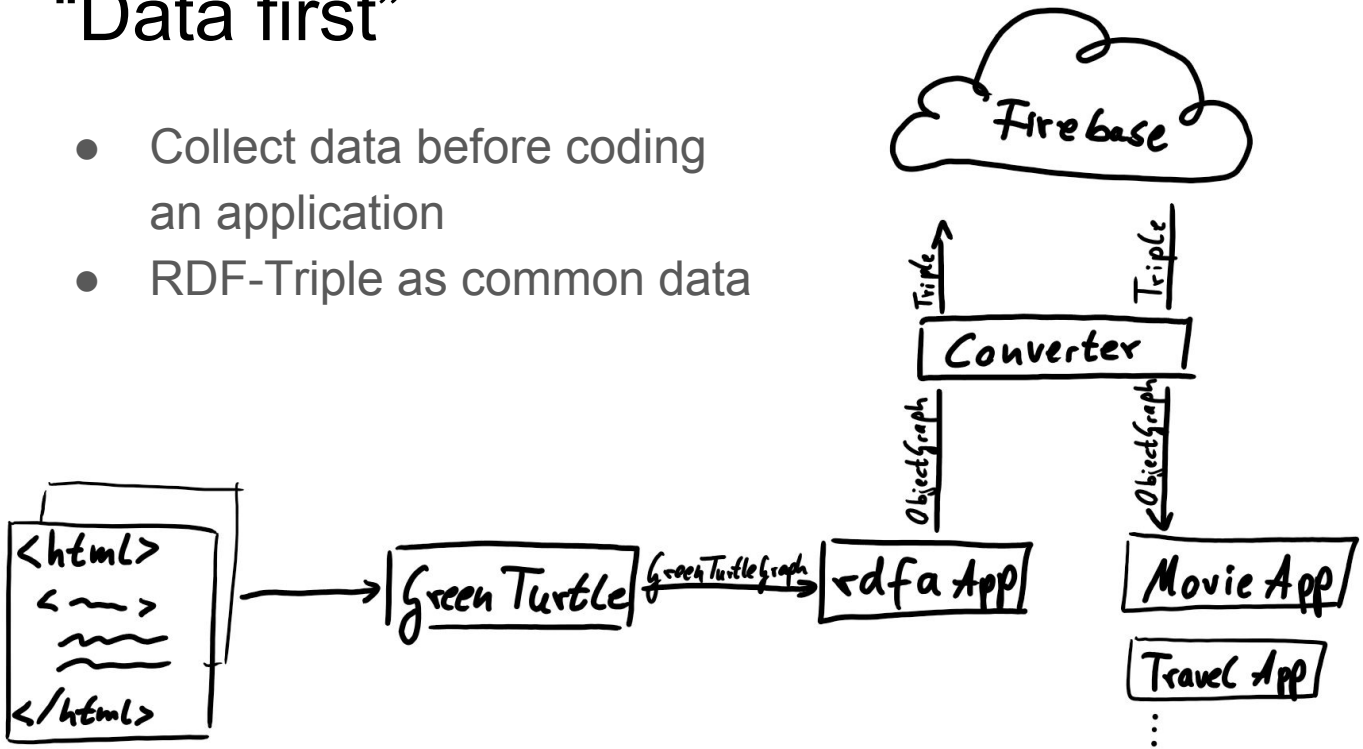
Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

“Data first”

- Collect data before coding an application
- RDF-Triple as common data



HPI Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

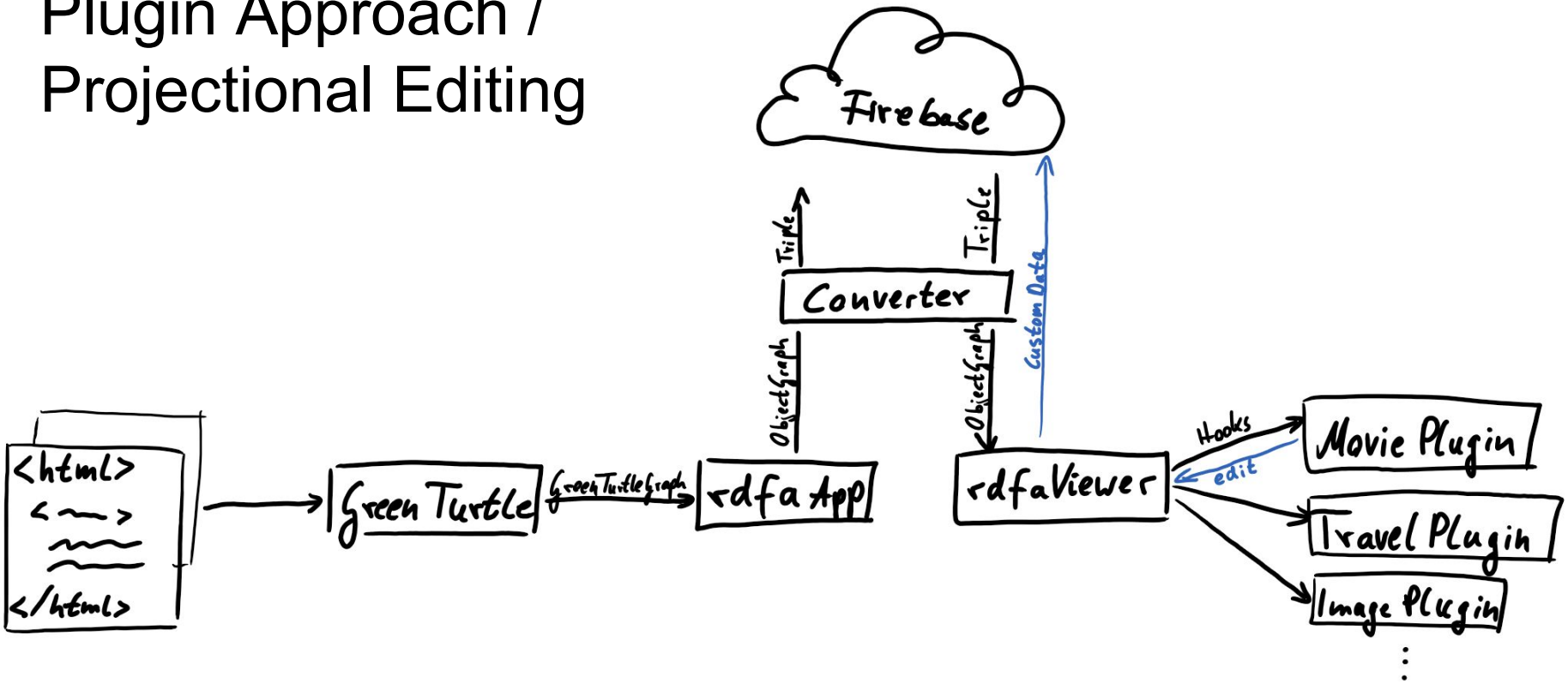
WebDev 2016

Topic: RDF

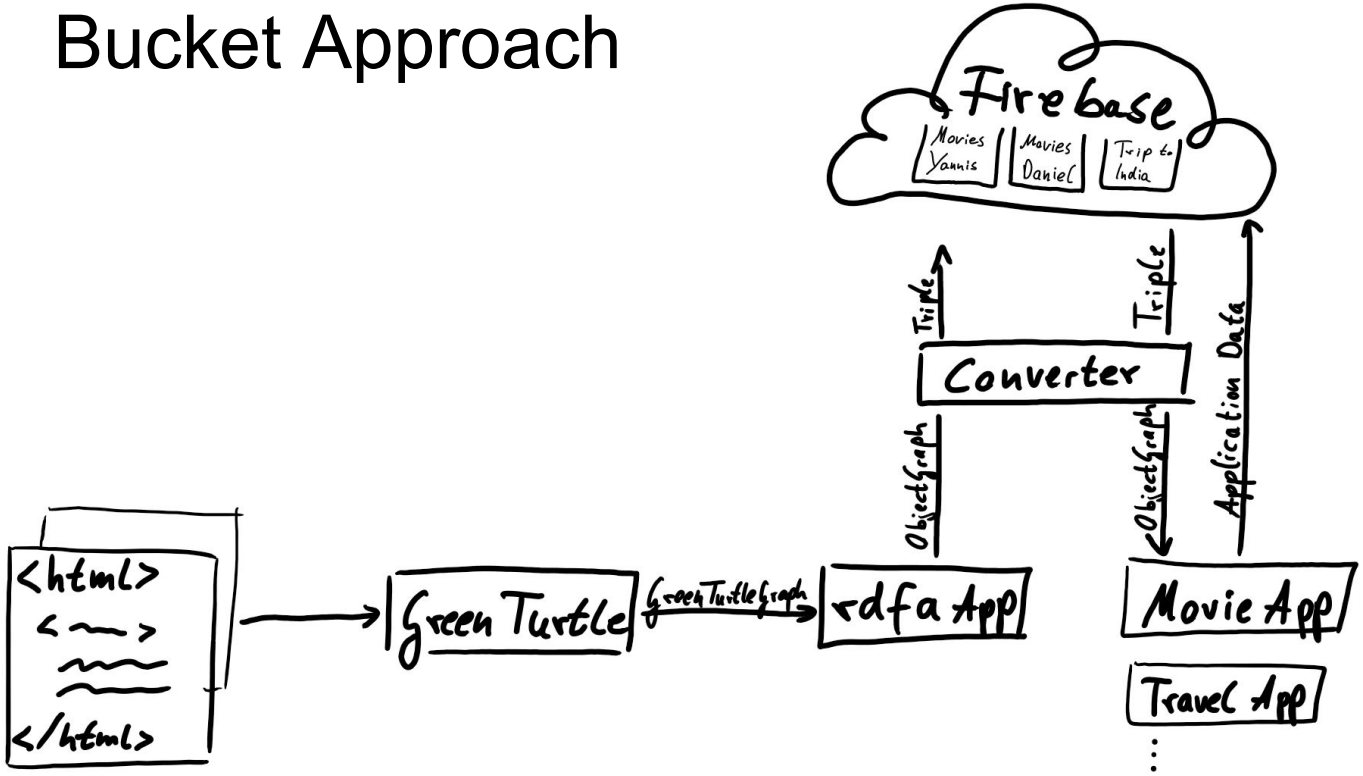
2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Plugin Approach / Projectional Editing



Bucket Approach



HPI Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Demo (2)

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Evaluation

Pro	Contra
+ Lightweight + Object-oriented graph + Conversion from/to triples	- Lack of querying API => GreenTurtle already has one - Code duplication

Next step: Convert our triples to GreenTurtle graph to get access to querying API

Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Future Work

- Support other formats (Microdata etc.)
- Firebase - account config / abstraction from storage backend
- Chrome-loader fix (keep load.js in snyc with lively-init-code)
- Concept for non-lively-core-applications (Einbindung, Modifikation) #64
- Projectional Editing für Tripel

HPI Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Conclusion

- RDFa often times only used to improve search results, not as navigatable graph data
- Bucket approach: collecting data first without thinking about data model

Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

RDF: Semantic Web Scripting

Final presentation
WebDev 2016
Daniel & Yannis

Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

BACKUP

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Obstacles during the project

- In the beginning: local development with local server -> HTTPS problems
- Shadow DOM problems with RDFa (content of lively-container invisible)
- Problem chrome-loader load.js =! lively4 load.js (how to keep them in sync?)
- Working without internet connection
- Problems when working in parallel with “outdated” files (accidentially overwrite files with changes from other people)

HPI Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

Design decision: RDFa event listener

RdfaManager.addRdfaEventListener(mappings, callback)

Get notified, when RDFa data with a certain mapping is detected on the page, e.g. instances of type “schema.org/movie”

DEMO?

Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

Software Architecture Group

WebDev 2016

Topic: RDF

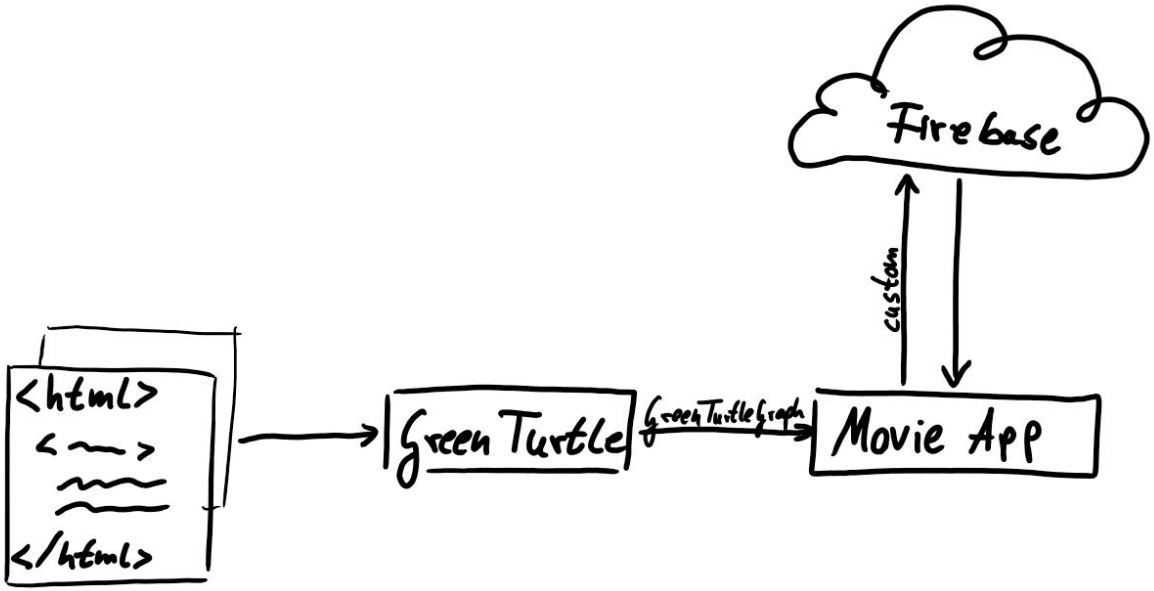
2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana

```
@prefix rdfa: <http://www.w3.org/ns/rdfa#> .
@prefix schema: <http://schema.org/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .

<https://rdfa.info/play/>
   rdfa:usesVocabulary schema: .
_:1
   rdf:type schema:CollegeOrUniversity;
   schema:legalName "Hasso-Plattner-Institut für Softwaresystemtechnik GmbH";
   schema:address _:2;
   schema:geo _:3 .
_:2
   rdf:type schema:PostalAddress;
   schema:streetAddress "Prof.-Dr.-Helmert-Straße 2-3";
   schema:postalCode "14482";
   schema:addressLocality "Potsdam";
   schema:addressRegion "Brandenburg";
   schema:addressCountry "Deutschland" .
_:3
   rdf:type schema:GeoCoordinates;
   schema:latitude "52.393488";
   schema:longitude "13.1297163" .
```

“App first”



Software
Architecture Group

WebDev 2016

Topic: RDF

2016-07-13

Presenters:
Daniel Stolpe
Yannis Kommana