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Web Components for Database Developers

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Outline

- Introduction

- Web-Components

- Architecture

- DB Web-components with examples

- Summary & Outlook

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Web-Frameworks

- Dozens of different frameworks

- Frameworks are typically complex

- Require a considerable training period

- New cool frameworks arrive ...

- Old frameworks disappear ...

- Vendor-lock in problematic

Web-Components

- W3C standard

- Create your own HTML-Elements with arbitrary semantics

- Run in the browser (client side)

- Implementation in ES2015 Javascript class (inherit from HTMLElement)
  - Implementation of callback methods

- Parameter can be passed in native way

- Shadow DOM to encapsulate Web-Component

- Templates (inactive HTML fragments that can be repeatedly used within a component)

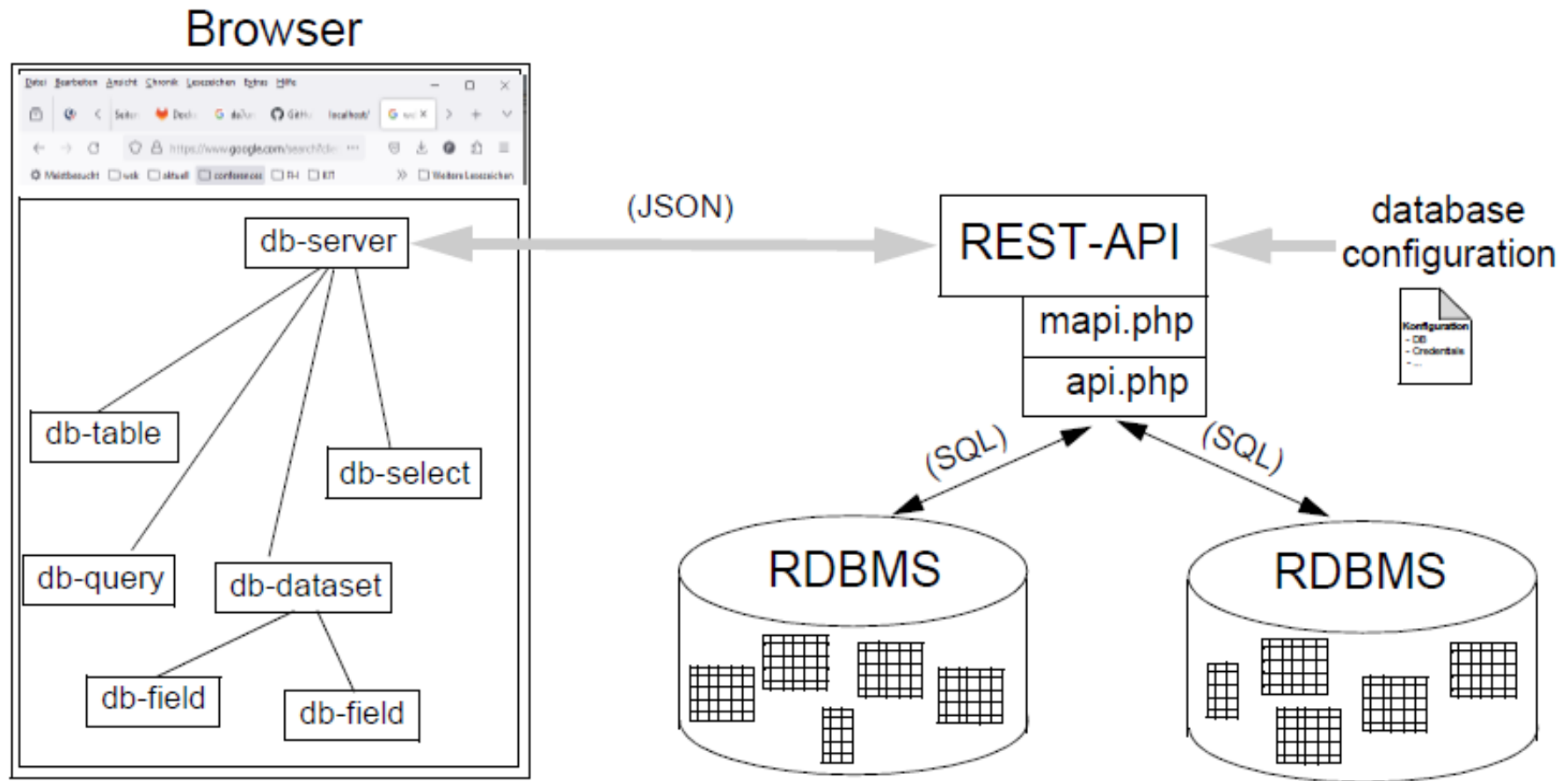- Slots (placeholder)

Web-Components

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support declarative web development

General Idea

- Visualize database content declaratively in a HTML page
- Support CRUD-Functionality
  - create dataset
  - show dataset(s)
  - edit dataset
  - delete dataset
  - filter datasets
  - query datasets
  - select data item from list
  - handle foreign key references

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Architecture

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db-server

HTML Markup

```
<db-server id="icwe-demo"
    url="http://it4edm.kit.edu/dbwc"
     database="icwe-demo">
</db-server>
```
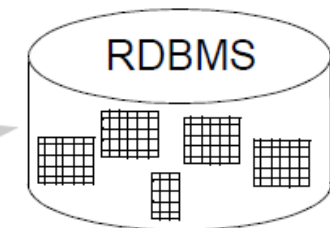
RESTful Webservice
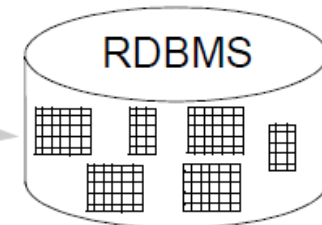
Configuration file:

```
[zeitgeist]
username=db_zeitgeist_rw
password=${PW_ZG_RW}
database=zeitgeist
host=zeitgeist.db.kit.edu

[icwe-demo]
username=dbu_icwe
password=${DBU_ICWE_PW}
database=icwe_demo
host=demo.iai.kit.edu:4306
```

Relational Databases

RDBMS

RDBMS

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db-table


```
<db-table table="country"
          filter-fields="on"
          inline-edit="on"
          pagesize="10">
</db-table>
```

- customization via
  - css stylesheets
  - html attributes

db-table Attributes

Attribute	Description	Mandatory
table	Name of the table	Yes
filter	Filter condition, the datasets must fulfill	No
pagesize	Maximum number of datasets on a page	No
page	Page to display	No
order	Sort order (column name)	No
direction	Sort direction (asc, desc)	No
attribute-list	Comma separated list of attributes to display (default: all)	No
filter-fields	Enables Filter functionality for the individual columns	No
inline-edit	Allows inline editing of datasets (default setting: off)	No
delete	Adds a delete button at the end of each dataset	No
refresh-rate	Time in seconds after which the table data is reloaded from the database	No

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db-select

- Supports prefix/infix search

- can be used within forms

- Specification of

  - table & two columns
  - sql statement

- Emits events on change

```
ne
```

Nepal
Netherlands
New Caledonia
New Zealand
Papua New Guinea
Saint Kitts and Nevis

```
<db-select table="country"
           key="Id"
           label="Name"
           name="Country_fk">
</db-select>
```

db-select Attributes

Attribute	Description	Mandatory
prefix-search	The term entered in the search field is considered as a prefix (Default: true)	No
Variant I		
table	Name of the table	Yes
key	Name of the attribute used for the value-attribute of the option element (returned by the form).	Yes
label	Name of the attribute used for the text-node of the option element (value used for search).	Yes
filter	Mandatory condition the datasets must fulfill	No
Variant II		
sql	SQL-Statement with one or two columns	Yes

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db-dataset

- manage dataset
- View/edit/create mode
- Provides internal form or works with external form
- Foreign keys are resolved
- Can work as a controller
- Customization via
  - external form
  - css-stylesheets
  - db-field

Name: France

Code: F

Area: 547031

Population: 583174

Capital: Pari

Paris

```
<db-dataset table-name="country"
            display-key="off"
            key="60" >
</db-dataset>
```

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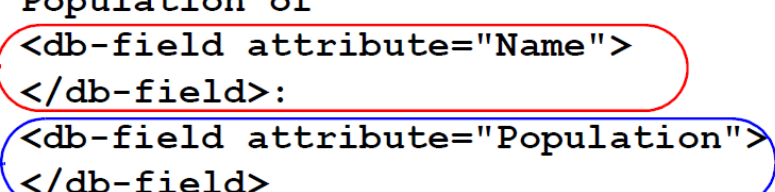| Attribute	Description	Mand.
table	Name of the table	Yes
is-editable	Specifies if the dataset should be editable.	No
display-key	Flag, if the database key should be displayed or not	No
attribute-list	Comma separated list of attributes to be shown (default: all attributes)	No
key	The value of the primary key of a dataset in this table.	No
visible	Indicates if the dataset should be displayed or not	No
form	references an external view in which values should be edited	No
mapping	Mapping between form field name and table column name (only external form)	No
controller	Enable controller-mode. If the parameter is set to true, the parameter action must also be set (store-from-get-request, store-from-data).	No
action	See description above (controller-mode).	No
data	json encded data (if controler == store-from-data)	
target-url	Page to load after dataset is written (controller-mode).	No
refresh-rate	Duration (in seconds) until the dataset is read again	No

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db-field

- Works together with invisible db-dataset
- Allows own layout for „non-editable" db-dataset views
- Also possible for editable db-datasets (Attribute form)

```
<db-dataset table-name="country"
            key="60"
            visible="off" >
</db-dataset>

Population of
<db-field attribute="Name">
</db-field>:
<db-field attribute="Population">
</db-field>
```

Population of France: 583174

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db-query

| first | prev | [1 - 10] (203) | next | last |

name	border_length	num_neighbors
China	22113	14
Russia	19913	14
Brazil	14691	10
India	14103	6
United States of America	12248	3
Kazakstan	12012	5
Zaire	10271	8
Argentina	9665	5
Canada	8893	1
Mongolia	8114	2

| first | prev | [1 - 10] (203) | next | last |

```
<db-query
    sql="select c.name,
                sum(b.Length) border_length,
                count(*) num_neighbors
         from country c
         left join borders b
           on (b.Country1=c.Code or
               b.Country2=c.Code)
         group by c.code
         order by 2 desc"
    pagesize="10">
</db-query>
```

db-query Attributes

Attribute	Description	Mand.
sql	SQL Statement to be executed	Yes
pagesize	Maximum number of datasets on a page	No
page	page to display	No
refresh-rate	Duration (in seconds) until the query is resubmitted	No

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Summary

- Client side, declarative integration of dynamic database content into HTML-pages
- Supports CRUD functionality
- Allows integration into CMS like wordpress, etc.
- Customization of layout through ...
  - custom css
  - external forms
  - db-dataset & db-field combination
- Communication through generic RESTful webservice on server side

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Outlook

- Integration of Authentication and access control

- Support for parameterizable SQL

- Extend db-select to select multiple values (n:m relationships)

- Resolution of foreign-keys in db-table component

- Composing cell values within db-table component (i.e. merge field values, construct links)

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