Semantic Lifting of Budget Data

Semantic Data Web Technologies Lab

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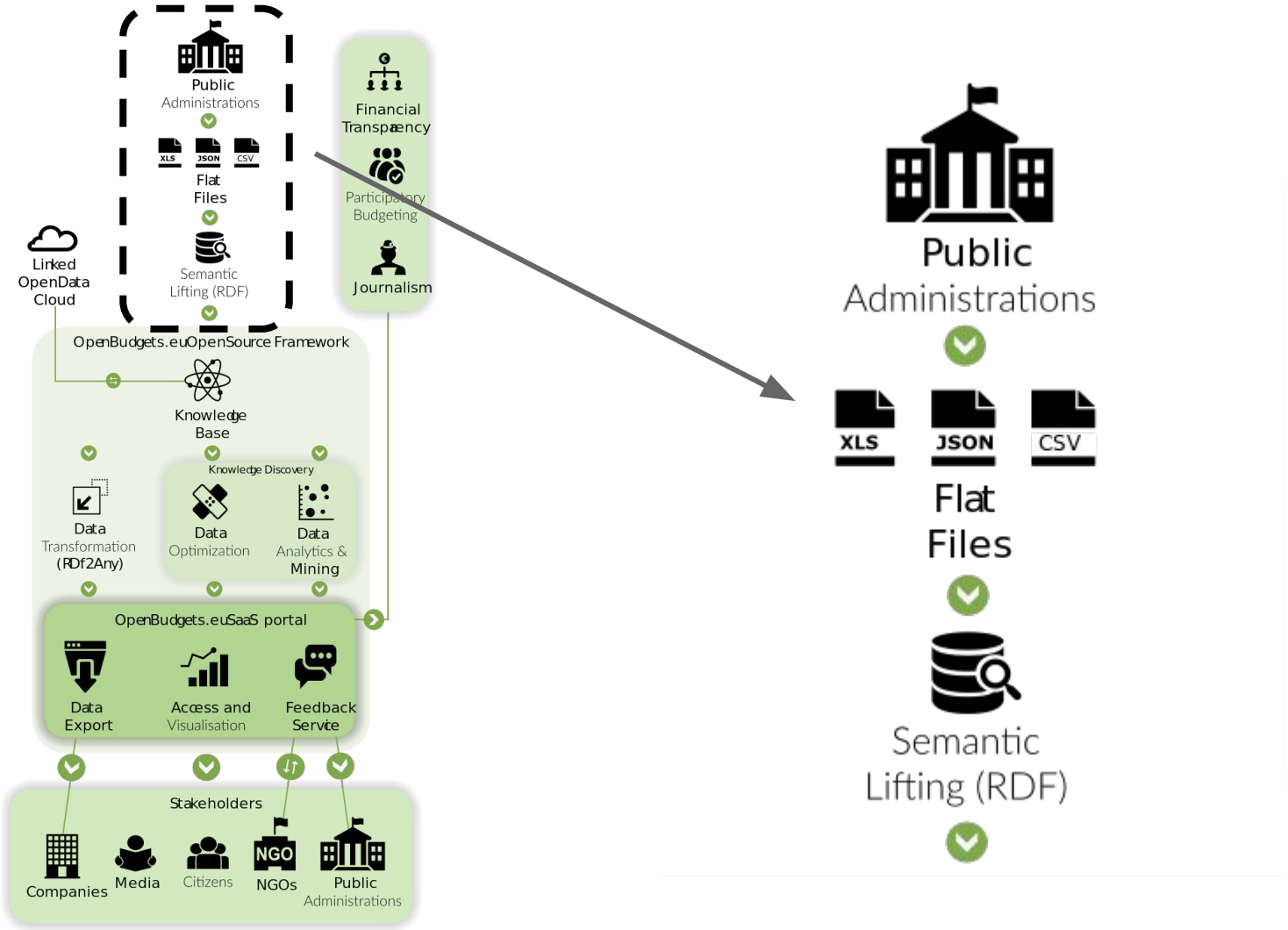
1.
Motivation

OpenBudgets.eu Overview



Motivation

Definition: **Semantic Lifting**

Budget and transaction data published by public entities do not adhere to the schema as developed in OpenBudgets. **Semantic lifting** will transform the raw data into a well defined format.

Motivation (cont.)

- Governments publish fiscal data
  - Heterogeneous datasets
  - Various formats
  - Not comparable

- OpenBudgets.eu
  - Aims at fiscal transparency
  - Data model based on the RDF data cube
  - **Goal:** Analysis and comparison across government levels, regions, and countries

Motivation (cont.)

Goal of the Lab:

Make fiscal data transformation easy for users without knowledge of

- RDF
- SPARQL
- ETL

2.
Use Cases

Fiscal Data Transformation

EJERCICIO	CENTRO GESTOR	FUNCIONAL	ECONOMICA	FINANCIACION	DESCRIPCION	IMPORTE
2012	1010	1111	100000	91002	Retribuciones básicas de Altos Cargos	2414299,58
2012	1010	1111	100001	91002	Otras remuneraciones de Altos Cargos	261643,9
2012	1010	1111	110000	91002	Retribuciones básicas Pers. Eventual de Gabinete	145184,76
2012	1010	1111	110001	91002	Otras remuneraciones de Pers. Eventual de Gabinete	167792,52
2012	1010	1111	120000	91002	Sueldos de Personal Funcionario	1437683,04
2012	1010	1111	120005	91002	Trienios de Personal Funcionario	567097,34
2012	1010	1111	120006	91002	Pagas extraordinarias de Personal Funcionario	527906,5
2012	1010	1111	121000	91002	Complemento de destino de Personal Funcionario	648462,6
2012	1010	1111	121001	91002	Complemento específico de Personal Funcionario	587647,56
2012	1010	1111	122002	91002	Otras retribuciones en especie	130000
2012	1010	1111	130000	91002	Salario base de Personal Laboral Fijo	96070,8
2012	1010	1111	130001	91002	Antigüedad de Personal Laboral Fijo	37800,6
2012	1010	1111	130002	91002	Pagas extraordinarias de Personal Laboral Fijo	30109,02

```
@prefix qb: <http://purl.org/linked-data/cube#> .
@prefix aragon-dimension: <http://data.openbudgets.eu/ontology/dsd/aragon-budget-exp-2012/dimension> .

<http://data.openbudgets.eu/ontology/dsd/aragon-budget-exp-2012/observation/1> a qb:Observation ;
        aragon-dimension:administrativeClassification
<http://data.openbudgets.eu/resource/codelist/estructura_organica_aragon_2012/01010> ;
        aragon-dimension:economicClassification
<http://data.openbudgets.eu/resource/codelist/estructura_economica_aragon_2012/100000> ;
        aragon-dimension:functionalClassification
<http://data.openbudgets.eu/resource/codelist/estructura_funcional_aragon_2012/1111> ;
        aragon-dimension:fundingClassification
<http://data.openbudgets.eu/resource/codelist/estructura_financiacion_aragon_2012/91002> ;
        obeu-measure:amount 2414299.58 ;
        qb:dataSet <http://data.openbudgets.eu/resource/datasets/aragon-expenditure-2012> .
[...]
```

Codelist Transformation

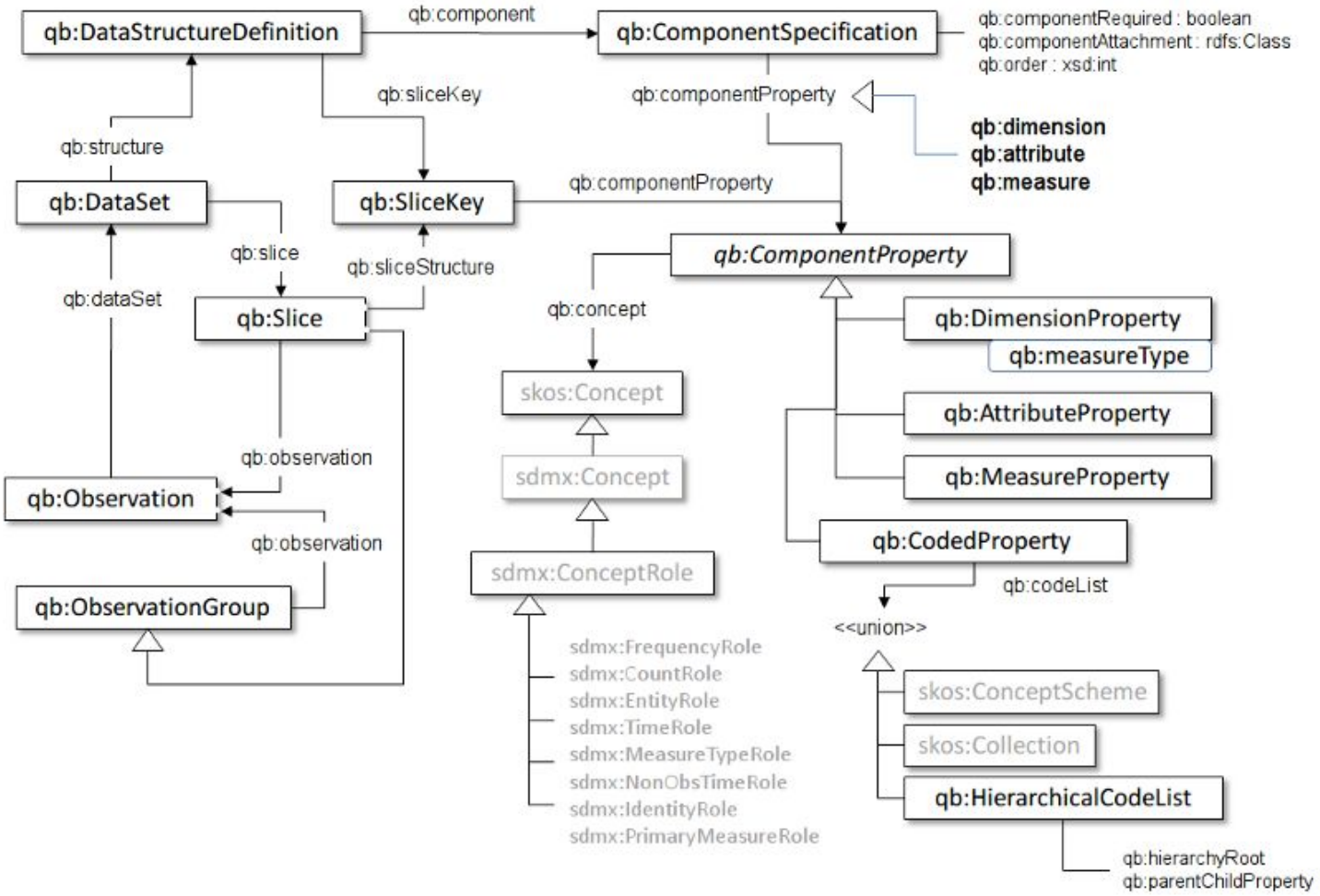
EJERCICIO	TYPE	CAPITULO	ARTICULO	CONCEPTO	SUBCONC	DESCRIPCION CORTA	DESCRIPCION LARGA
2012	G	1	10	100	100000	Retr.básicas de Alt.Cargo	Retribuciones básicas de Altos Cargos
2012	G	1	10	100	100001	Otras remun. de Alt.Cargo	Otras remuneraciones de Altos Cargos
2012	G	1	11	110	110000	Retr.básicas de P.Ev.Gab.	Retribuciones básicas de Personal Eventual de Gabinete
2012	G	1	11	110	110001	Otras remun. de P.Ev.Gab.	Otras remuneraciones de Personal Eventual de Gabinete
2012	G	1	12	120	120000	Sueldos de Funcionarios	Sueldos de Personal Funcionario
2012	G	1	12	120	120005	Trienios de Funcionarios	Trienios de Personal Funcionario
2012	G	1	12	120	120006	Pagas extras Funcionarios	Pagas extraordinarias de Personal Funcionario
2012	G	1	12	121	121000	C. destino Funcionarios	Complemento de destino de Personal Funcionario
2012	G	1	12	121	121001	C. especif. Funcionarios	Complemento específico de Personal Funcionario
2012	G	1	12	121	121008	C. progr. esp. Justicia	Complementos para programas concretos de actuación en el ámbito de Justicia
2012	G	1	12	121	121009	Otras retr. compl. Func.	Otras retribuciones complementarias de Personal Funcionario

```
@prefix skos-core: <http://www.w3.org/2004/02/skos/core#>

<http://data.openbudgets.eu/resource/codelist/estructura_economica_aragon_2012/100000> a
skos-core:Concept ;
        skos-core:prefLabel "Retribuciones básicas de Altos Cargos"@es ;
        skos-core:altLabel "Retr.básicas de Alt.Cargo"@es ;
        skos-core:notation "100000" ;
        skos-core:inScheme
<http://data.openbudgets.eu/resource/codelist/estructura_economica_g_aragon_2012> .

[...]
```

Data cube validation



https://www.w3.org/TR/vocab-data-cube/

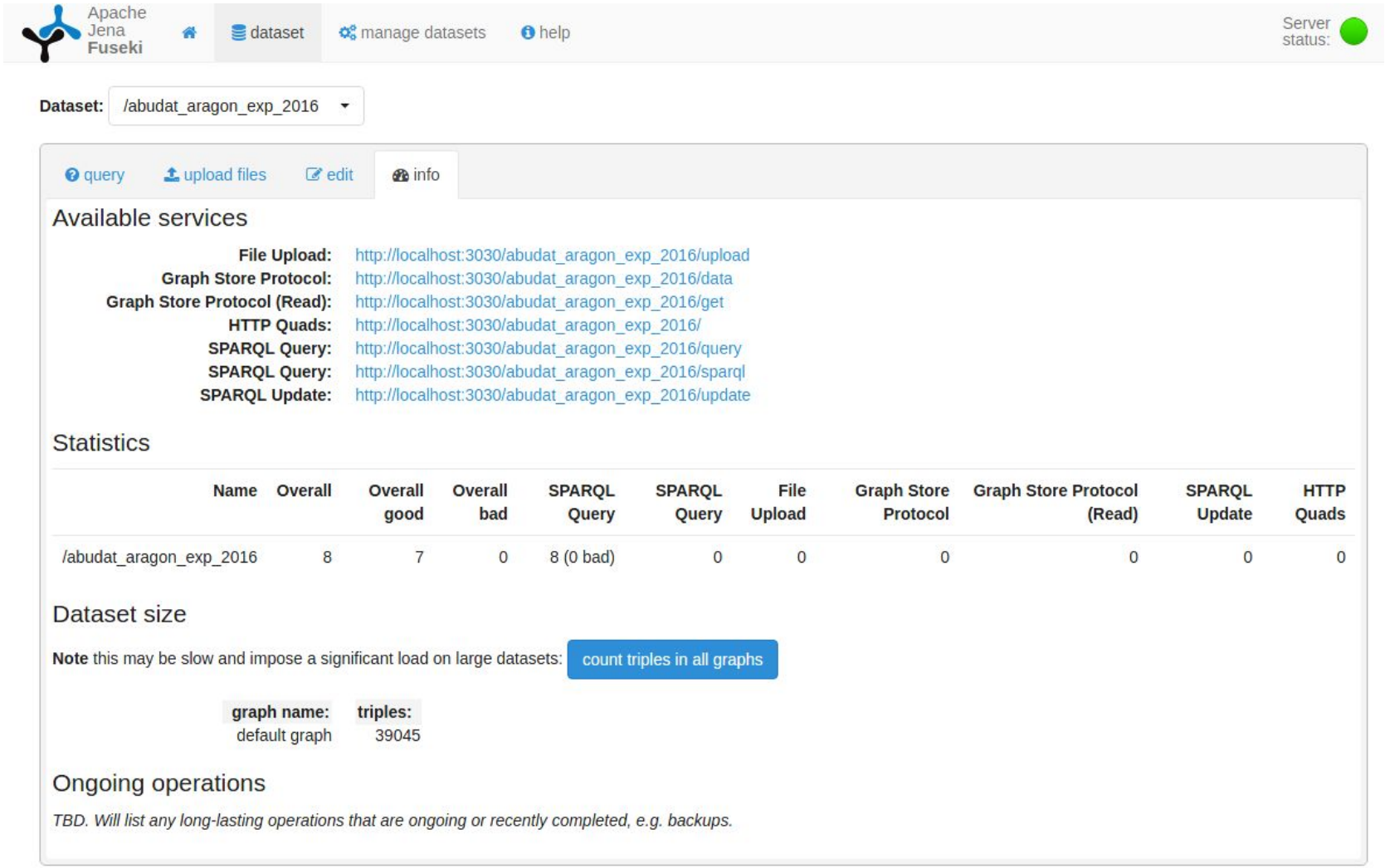
Data cube validation

21 Integrity constraints

Examples:

- Every **qb:Observation** has exactly one associated **qb:DataSet**.
- Every **qb:DataSet** has exactly one associated **qb:DataStructureDefinition**.
- Every **qb:Observation** has a value for each declared attribute that is marked as required.

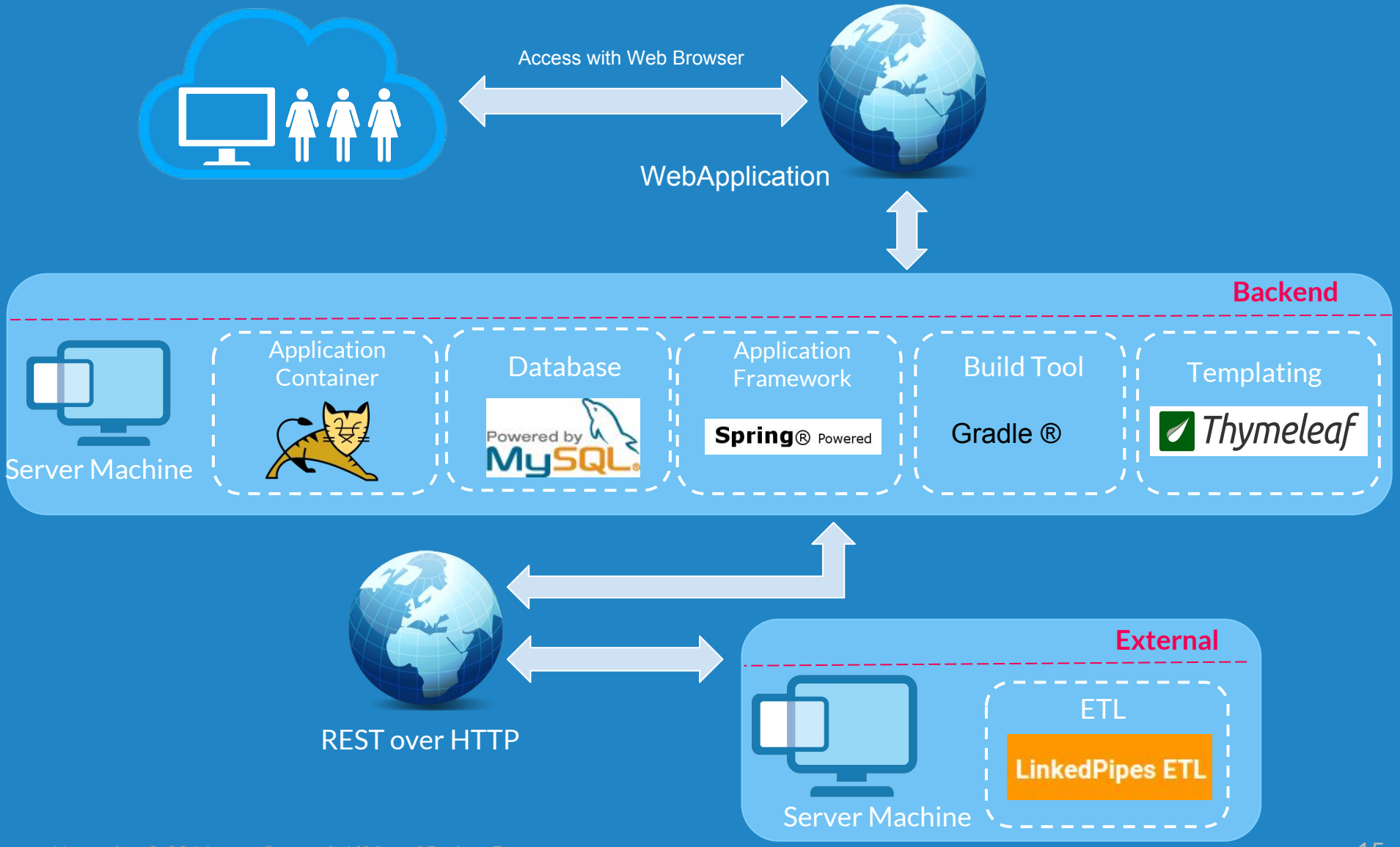
Triple Store Upload



3.
ABuDaT

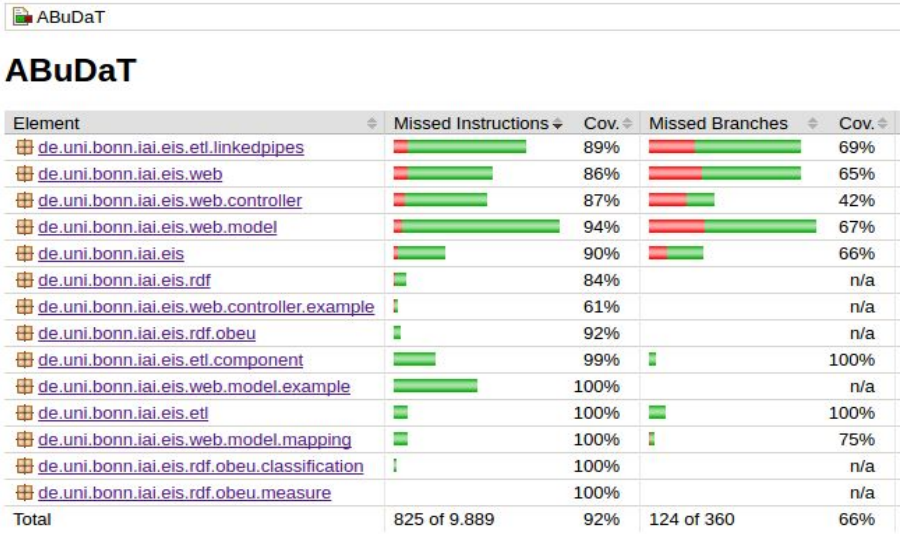
Administrative Budget Data Transformer

System architecture:



Facts about ABuDaT:

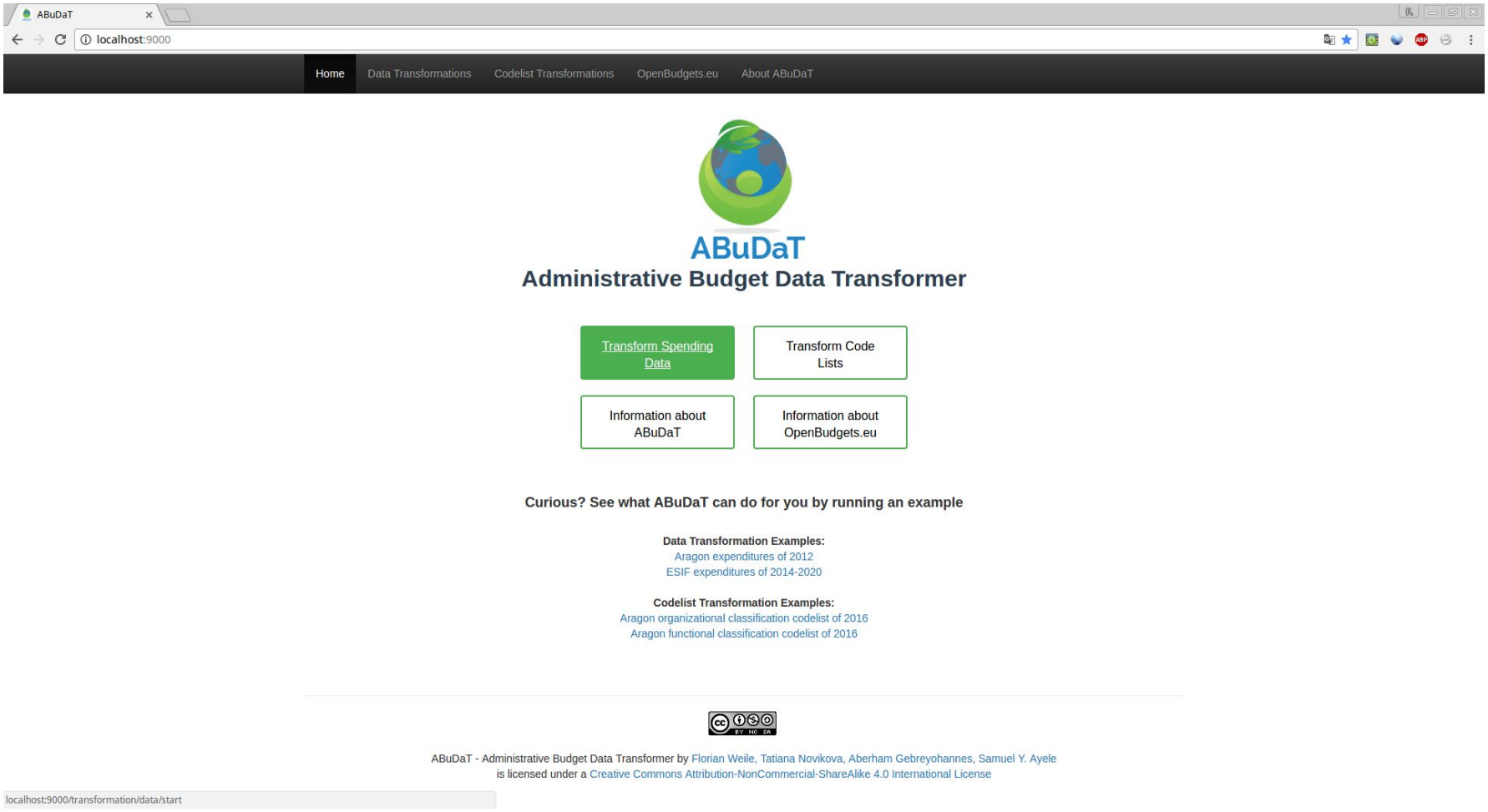
- ~ 6.5k Lines of Production Code;
- ~ 3.5k Lines of Test Code;
- ~ 4.5k Lines of HTML;
- Frontend tested with Selenium;
- Unit and Integration Tests.
  - 92% Test Coverage (LOC)


ABuDaT

ABuDaT

Element	Missed Instructions	Cov.	Missed Branches	Cov.
de.uni.bonn.iai.eis.etl.linkedpipes		89%		69%
de.uni.bonn.iai.eis.web		86%		65%
de.uni.bonn.iai.eis.web.controller		87%		42%
de.uni.bonn.iai.eis.web.model		94%		67%
de.uni.bonn.iai.eis		90%		66%
de.uni.bonn.iai.eis.rdf		84%		n/a
de.uni.bonn.iai.eis.web.controller.example		61%		n/a
de.uni.bonn.iai.eis.rdf.obeu		92%		n/a
de.uni.bonn.iai.eis.etl.component		99%		100%
de.uni.bonn.iai.eis.web.model.example		100%		n/a
de.uni.bonn.iai.eis.etl		100%		100%
de.uni.bonn.iai.eis.web.model.mapping		100%		75%
de.uni.bonn.iai.eis.rdf.obeu.classification		100%		n/a
de.uni.bonn.iai.eis.rdf.obeu.measure		100%		n/a
Total	825 of 9.889	92%	124 of 360	66%

ABuDaT Demo


ABuDaT
localhost:9000
Home
Data Transformations
Codelist Transformations
OpenBudgets.eu
About ABuDaT
ABuDaT
Administrative Budget Data Transformer
Transform Spending Data
Transform Code Lists
Information about ABuDaT
Information about OpenBudgets.eu
Curious? See what ABuDaT can do for you by running an example
Data Transformation Examples:
Aragon expenditures of 2012
ESIF expenditures of 2014-2020
Codelist Transformation Examples:
Aragon organizational classification codelist of 2016
Aragon functional classification codelist of 2016
ABuDaT - Administrative Budget Data Transformer by Florian Weile, Tatiana Novikova, Aberham Gebreyohannes, Samuel Y. Ayele
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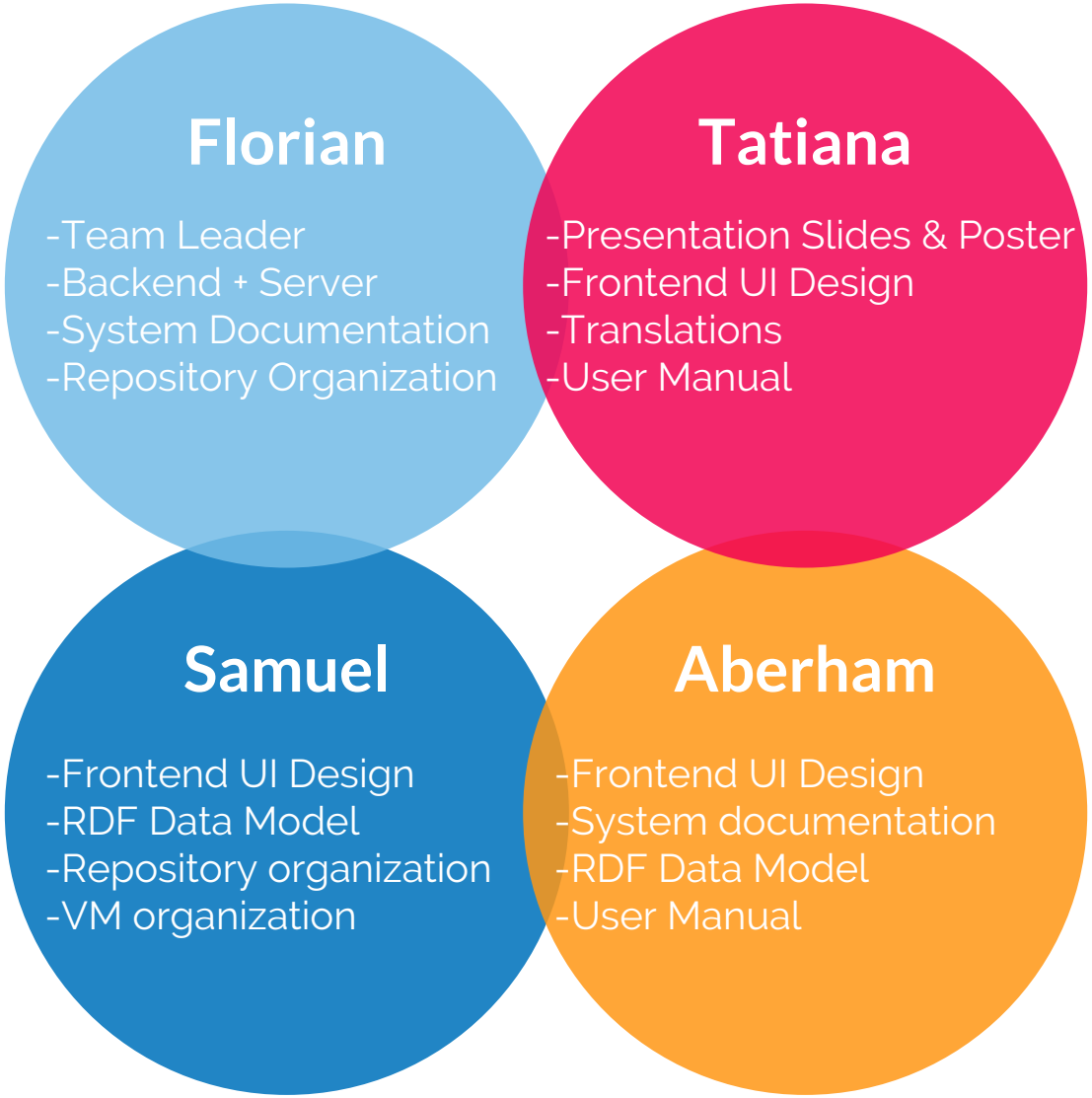
localhost:9000/transformation/data/start

Team members' responsibilities:



4.
Challenges & Limitations

Challenges:

- Heterogeneous datasets;
- Various file formats;
- SPARQL based data cube validation very time consuming;
- LinkedPipes ETL REST-API is not convenient.

Limitations:

- Input Format;
  - CSV and XLS supported
  - Users might prepare the data
- No data upload support;
- LinkedPipes ETL on the same machine.
  - Security concerns
  - LinkedPipes ETL limitations

Limitations (cont.)

- Aggregation of amounts for observations with duplicate dimensions;
- Validation.
  - Data Cube validation only
  - No OpenBudgets.eu validation

5.
Conclusion

Conclusion

ABuDaT makes fiscal data transformation EASY.

No technical background knowledge required.

Given that the input data format meets the requirements.

Thank you!

(Any questions?:)