

A Dataflow Platform for In-silico Experiments Based on Linked Data

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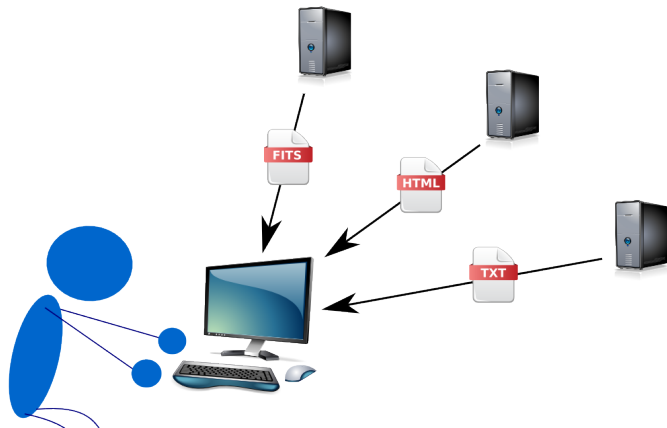
Computer Science Department
"Sapienza", University of Rome - Italy

Databases in Networked Information Systems
DNIS 2014

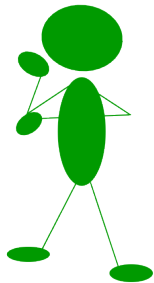
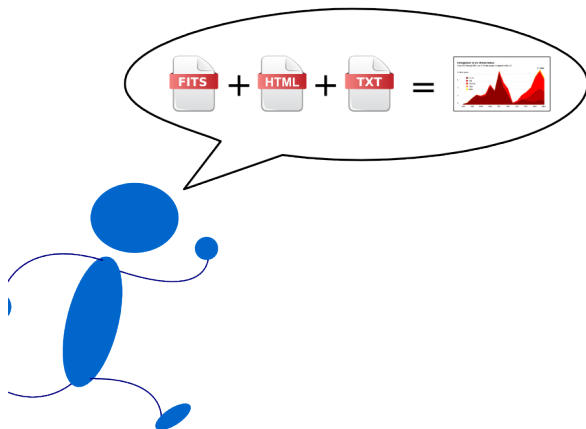
Outline

- 1 Motivation
- 2 Background: Linked Data
- 3 Our Solution: SWOWS
 - Main Ideas
 - Dataflow Language
 - Semantics
 - Platform
 - Example Application
- 4 Conclusions

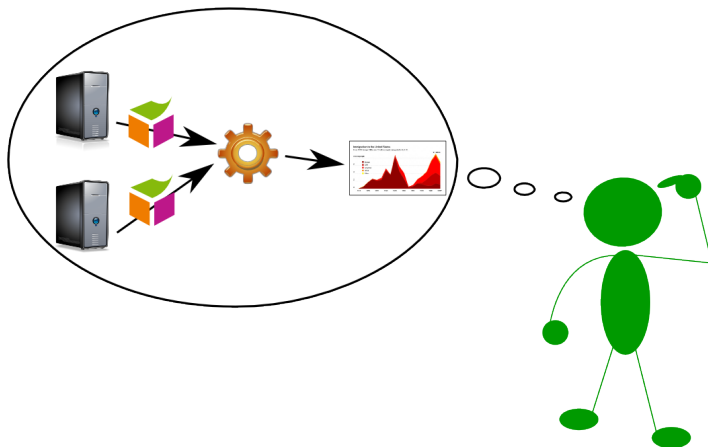
Researching Online Databases



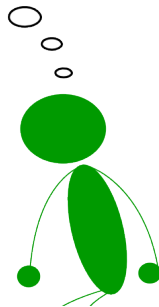
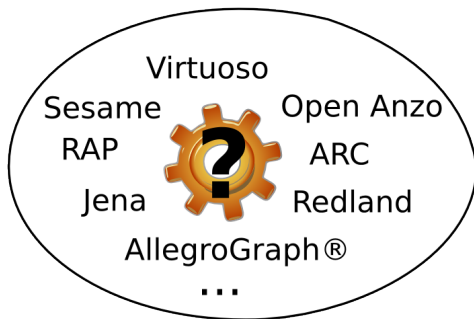
Data Analysis and Visualizations



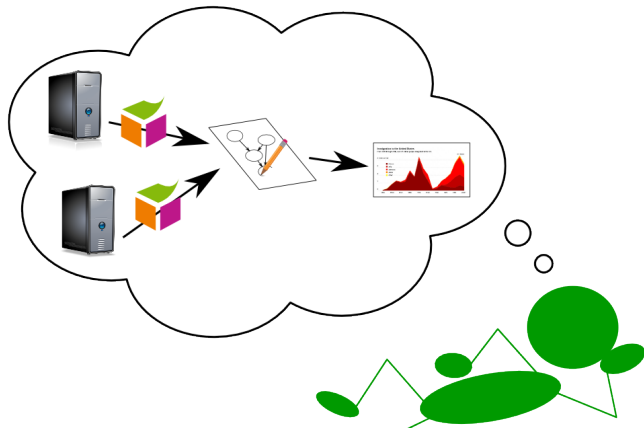
Linked (Open) Data can help



How to build an Open Data application?



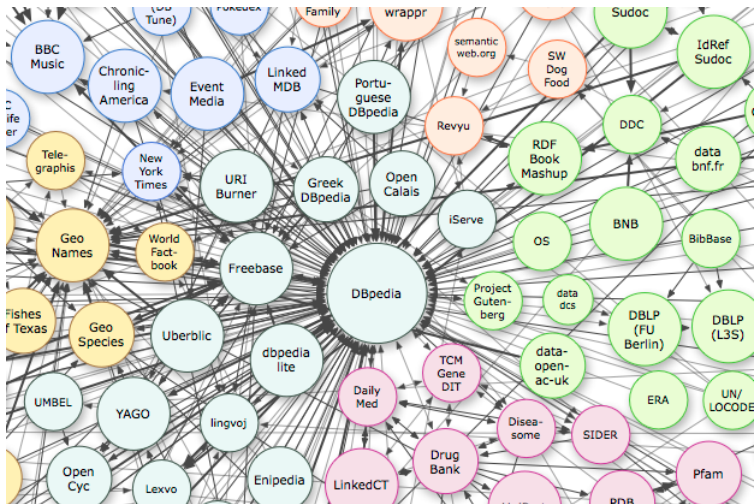
High Level, Expressive Design



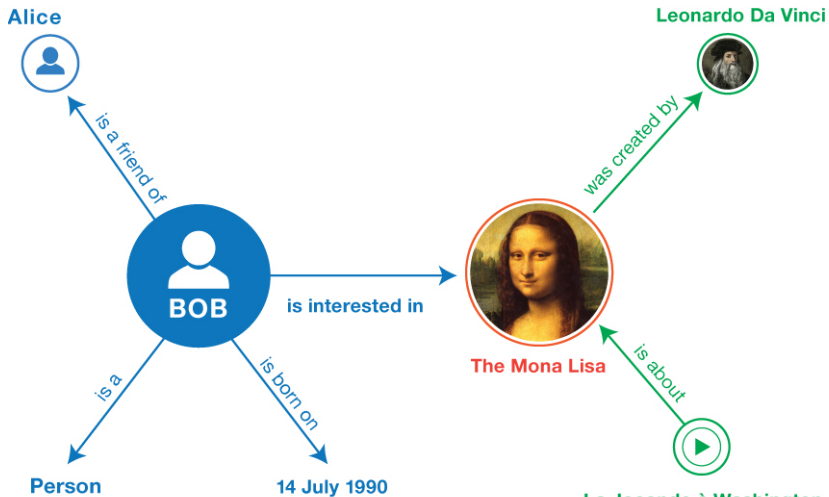
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Linked Open Data

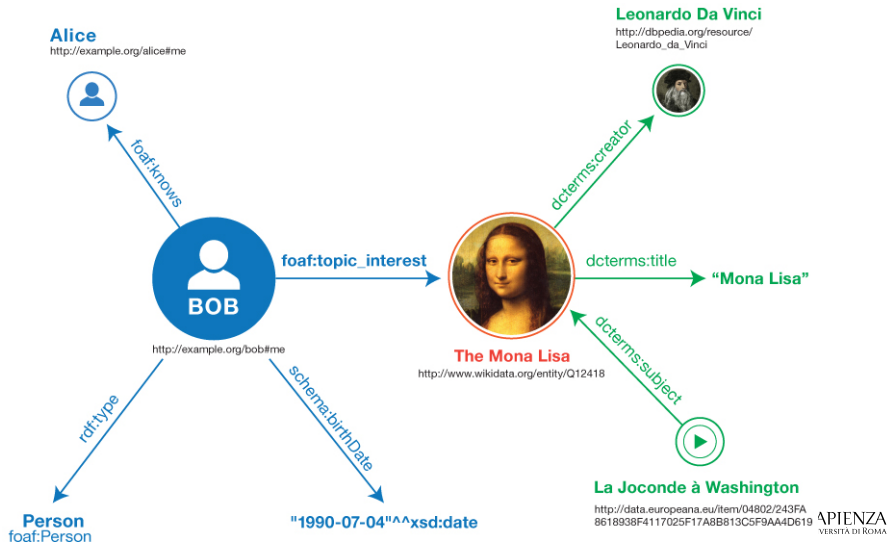


RDF (1): the model



La Joconde à Washington 

RDF (2): IRIs



SPARQL (1)

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>  
SELECT ?name ?mbox  
WHERE  
  { ?x foaf:name ?name .  
    ?x foaf:mbox ?mbox }
```

SPARQL (2): CONSTRUCT

```
PREFIX foaf:    <http://xmlns.com/foaf/0.1/>
```

```
PREFIX org:    <http://example.com/ns#>
```

```
CONSTRUCT { ?x foaf:name ?name }
```

```
WHERE { ?x org:employeeName ?name }
```

SPARQL (3): UPDATE

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
```

```
WITH <http://example/addresses>
```

```
DELETE { ?person foaf:givenName 'Bill' }
```

```
INSERT { ?person foaf:givenName 'William' }
```

```
WHERE
```

```
  { ?person foaf:givenName 'Bill'
```

```
  }
```



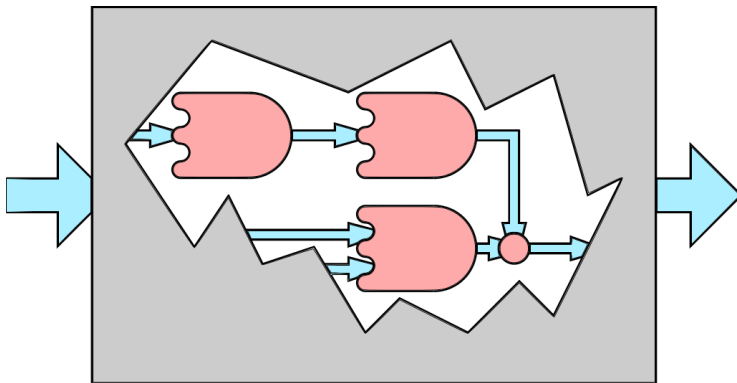
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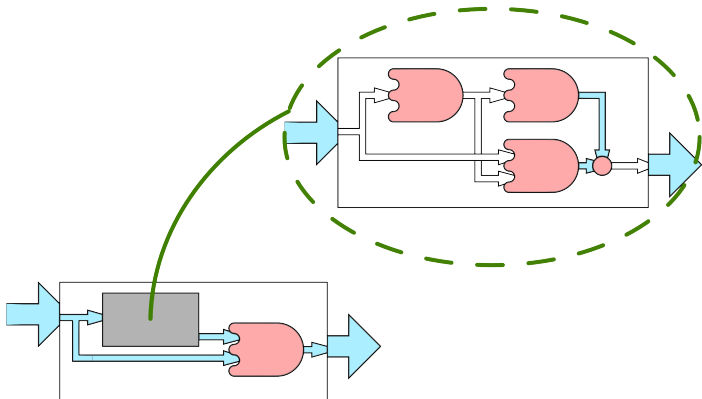
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Open Computing

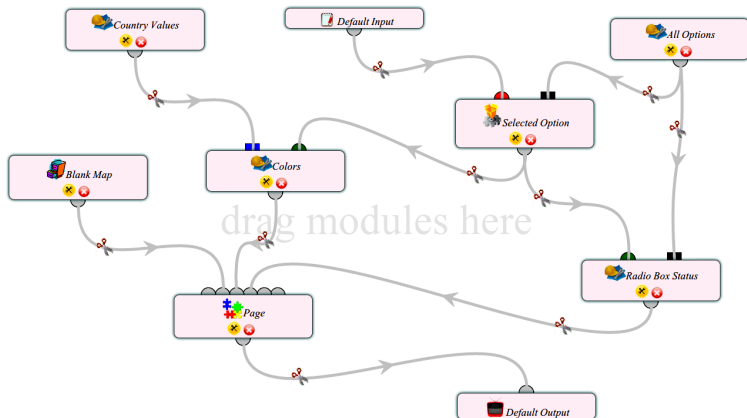


Transparent Boxes vs Black Boxes

Linked Programs



Dataflow Paradigm



Side-Effects Free Operators

Based on Established Standards

Web Standards

- XML, XML DOM, XML DOM Events
- Scalable Vector Graphics

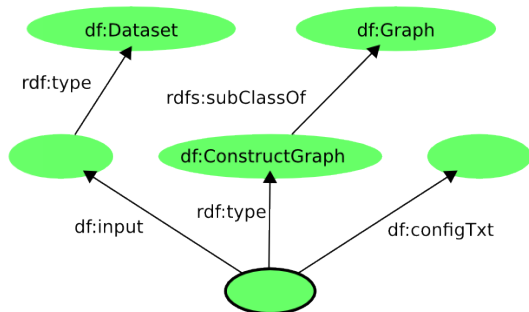
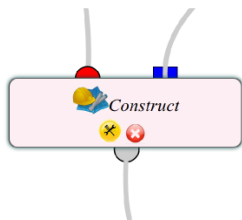
Semantic Web Standards

- RDF
- SPARQL 1.1

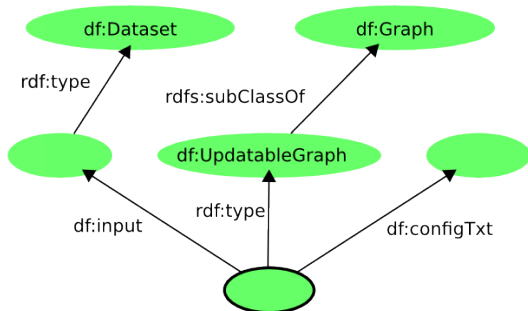
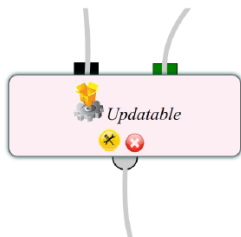
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Construct Graph Operator



Updatable Graph Operator



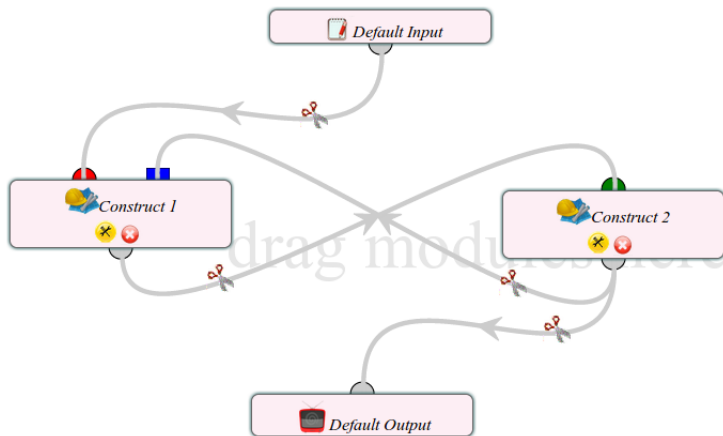
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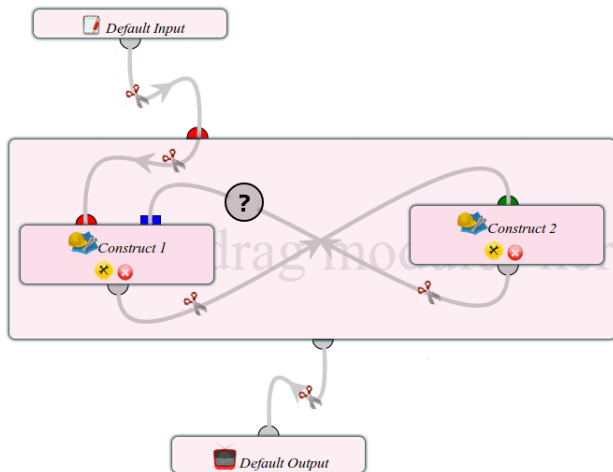
Events and (Implicit) Time

- Temporal RDF Graphs (snapshots)
- RDF Streams (descr. of events)

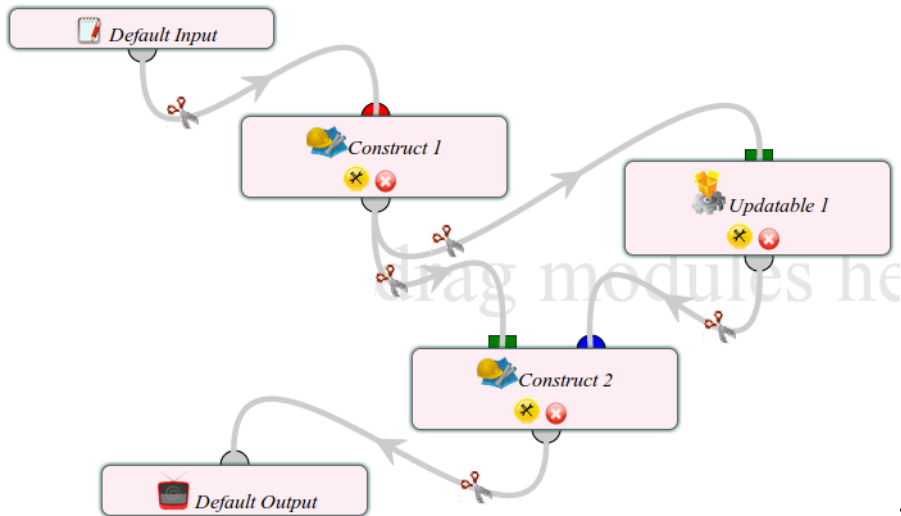
Fixpoint Operator



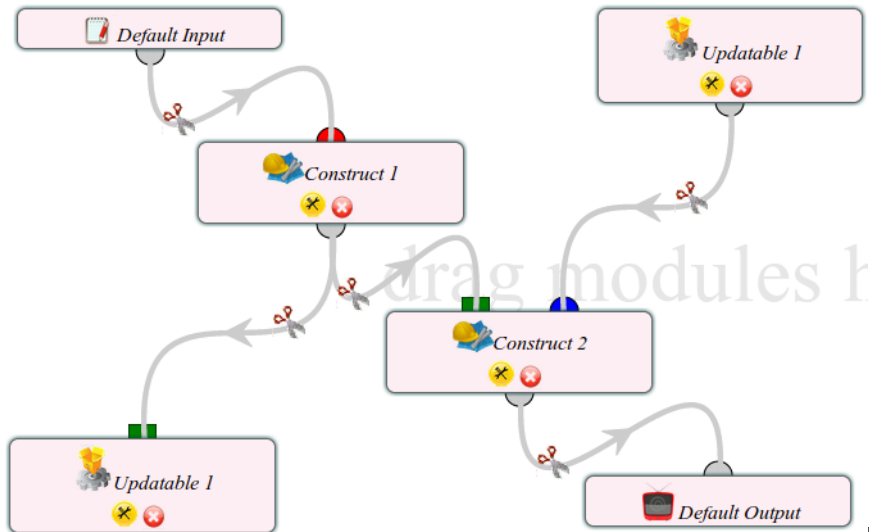
Fixpoint Operator



Update Semantics



Update Semantics



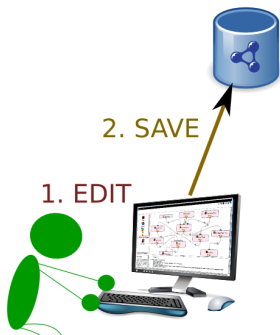
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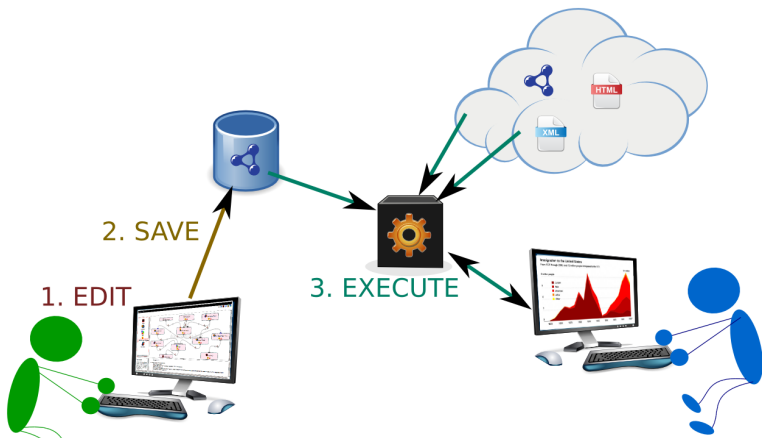
Platform Overview



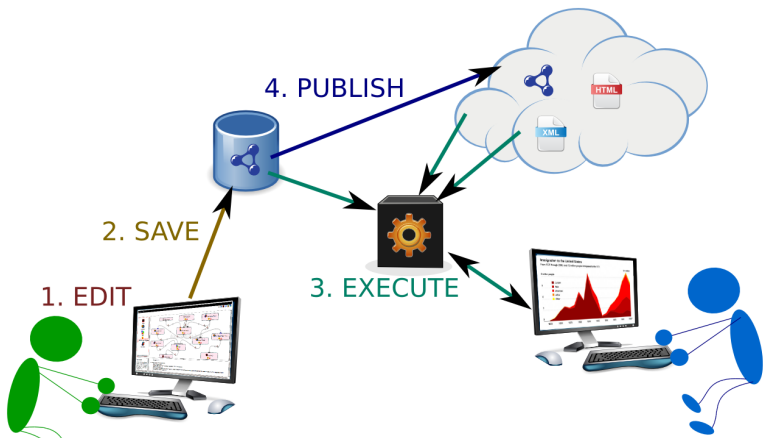
Platform Overview



Platform Overview



Platform Overview



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An example

Data used

- FAO geopolitical ontology
- World Map with country borders from Wikipedia

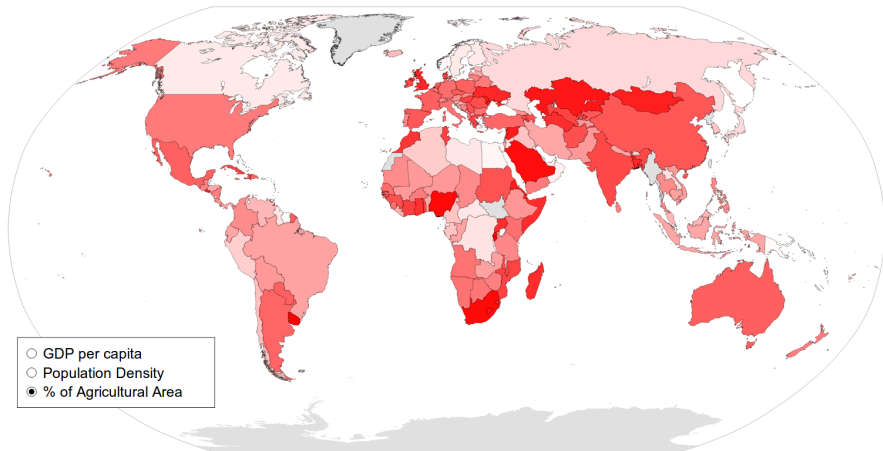
Output

- Countries colored on the map by derived geopolitical indexes

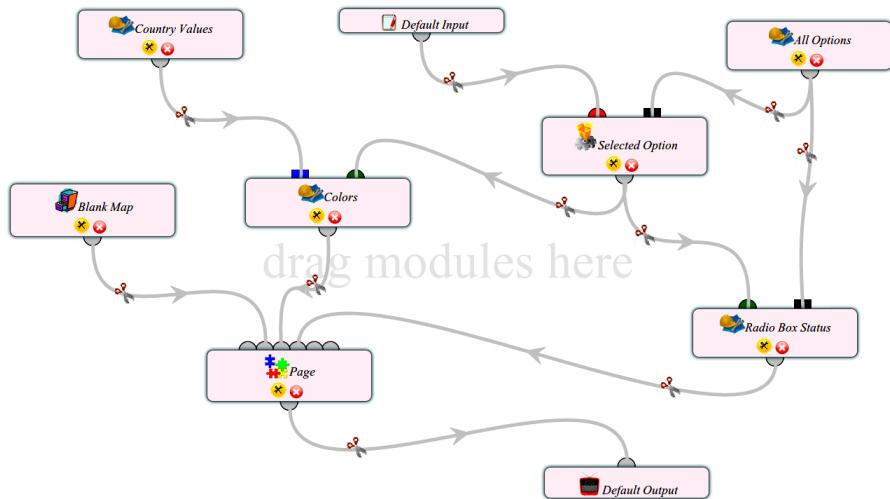
Interaction

- Radio buttons, to choose one of three different geopolitical indexes

A screenshot



The dataflow



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Results

Model for Linked Data Interactive Apps

- pipeline language
- handling of events
- RDF representation of UI

Web-based Dev Platform based on this Model

- visual pipeline editor
- thin-client pipeline engine
- RDF representation of pipelines

Future Work

- Higher Level Development Environments
- User Interface Adaptation
- Multi-Device Interaction
- Parallel/Pipeline Processing

Acknowledgements

- Sapienza, University of Rome
 - Dipartimento di Informatica (Computer Science Department)



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DIPARTIMENTO
DI INFORMATICA

- Regione Lazio



Thank you!

swows.org

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