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

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Databases in Networked Information Systems
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Outline

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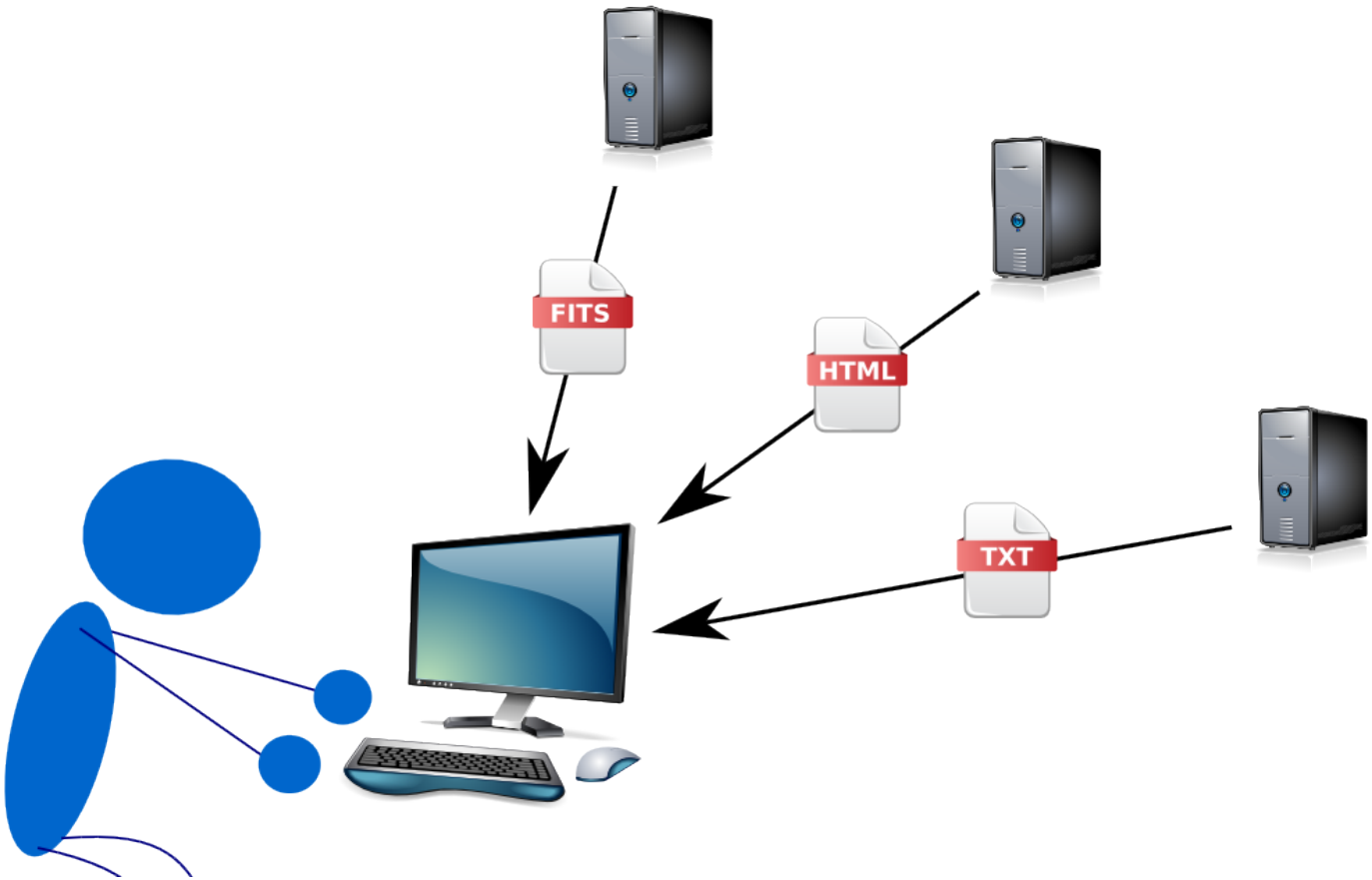
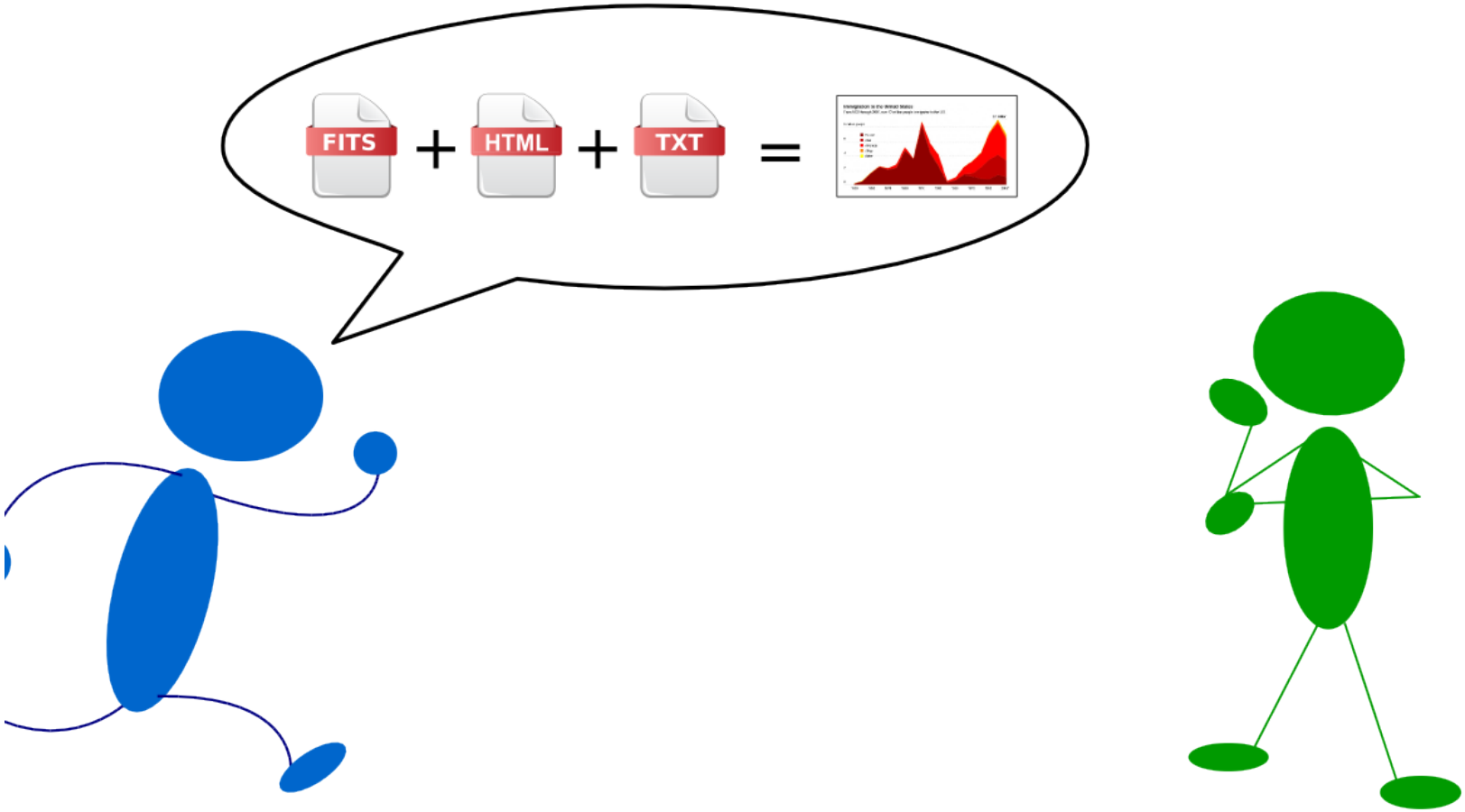
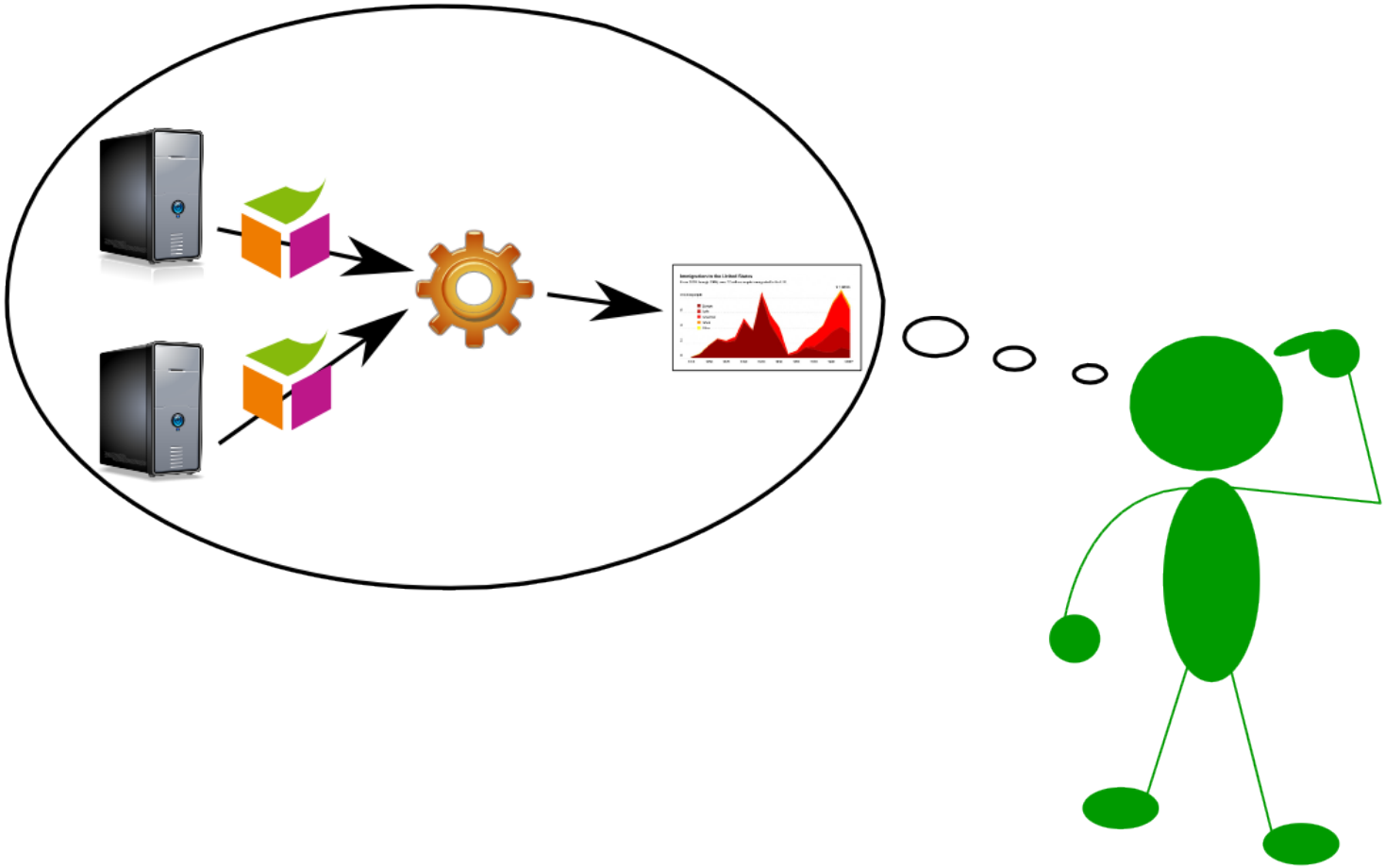
Researching Online Databases



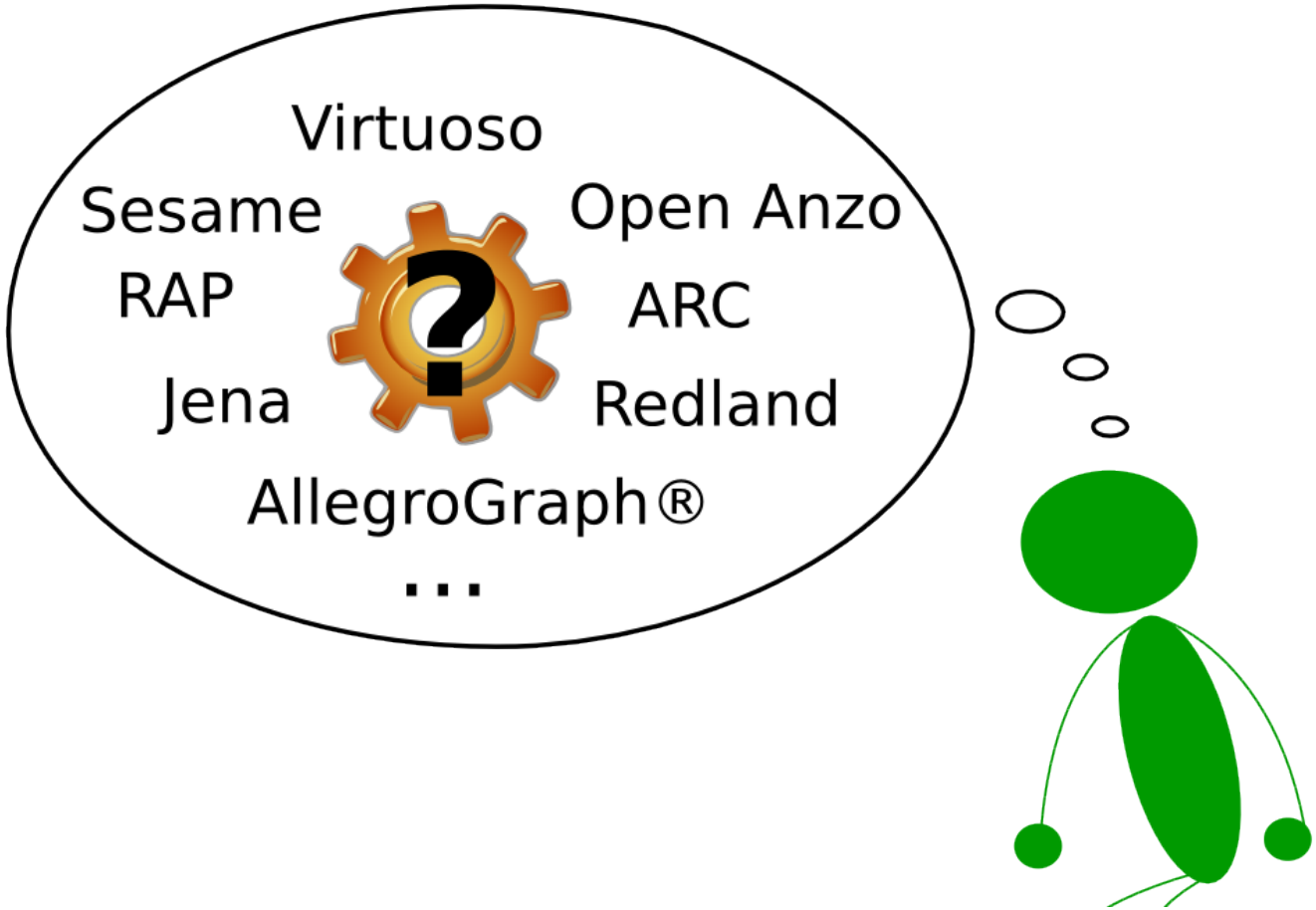
Data Analysis and Visualizations



Linked (Open) Data can help



How to build an Open Data application?



High Level, Expressive Design

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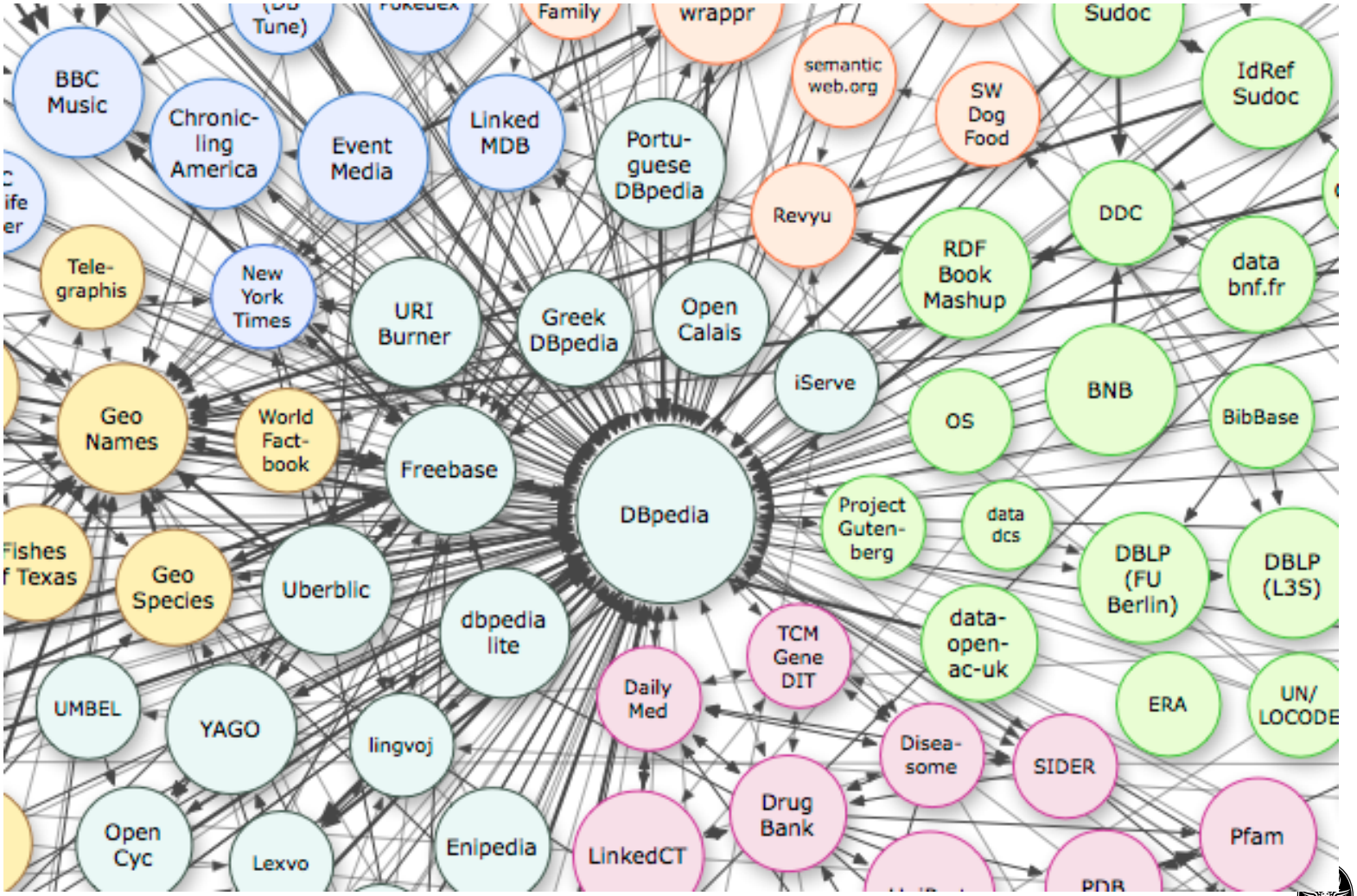
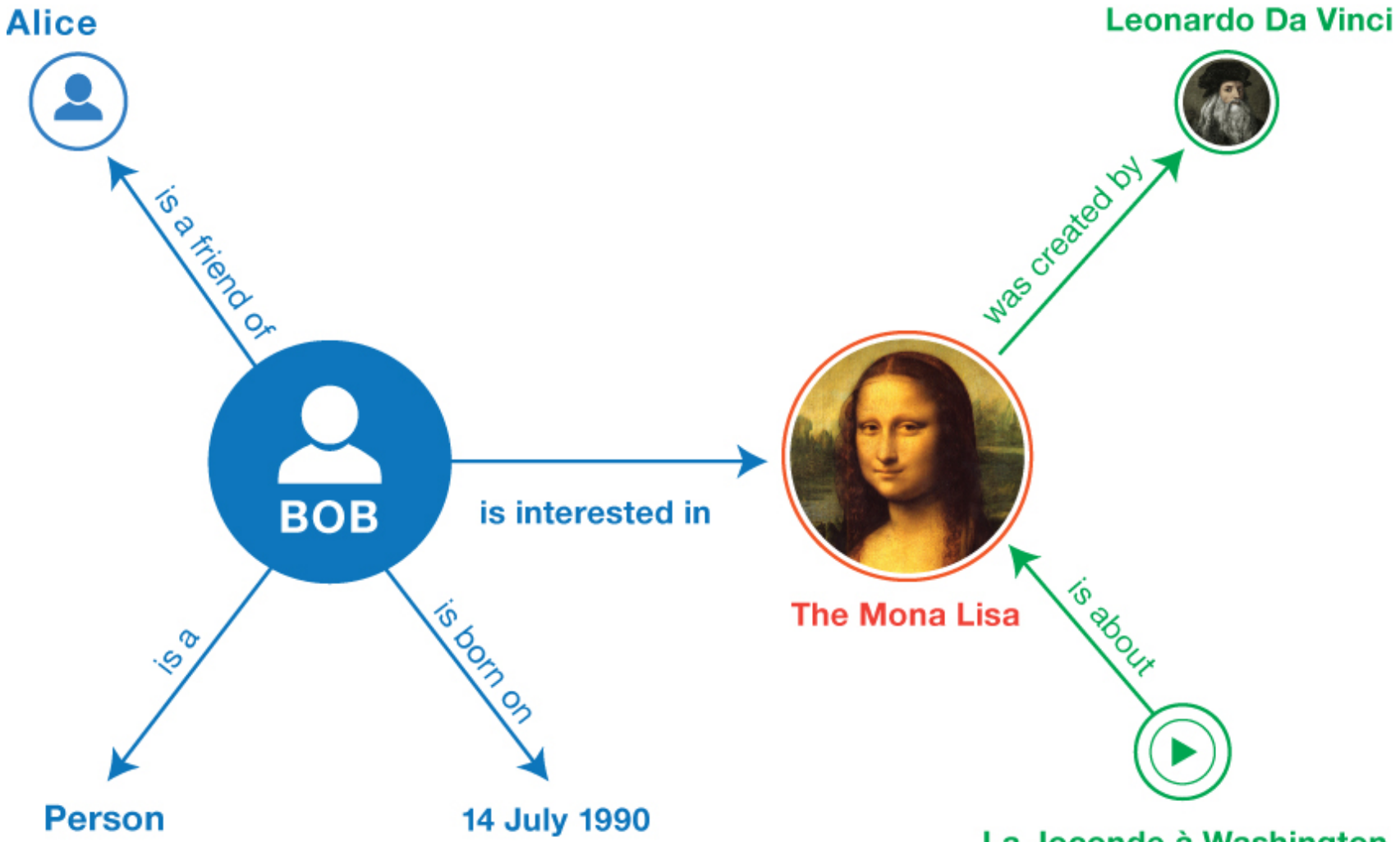
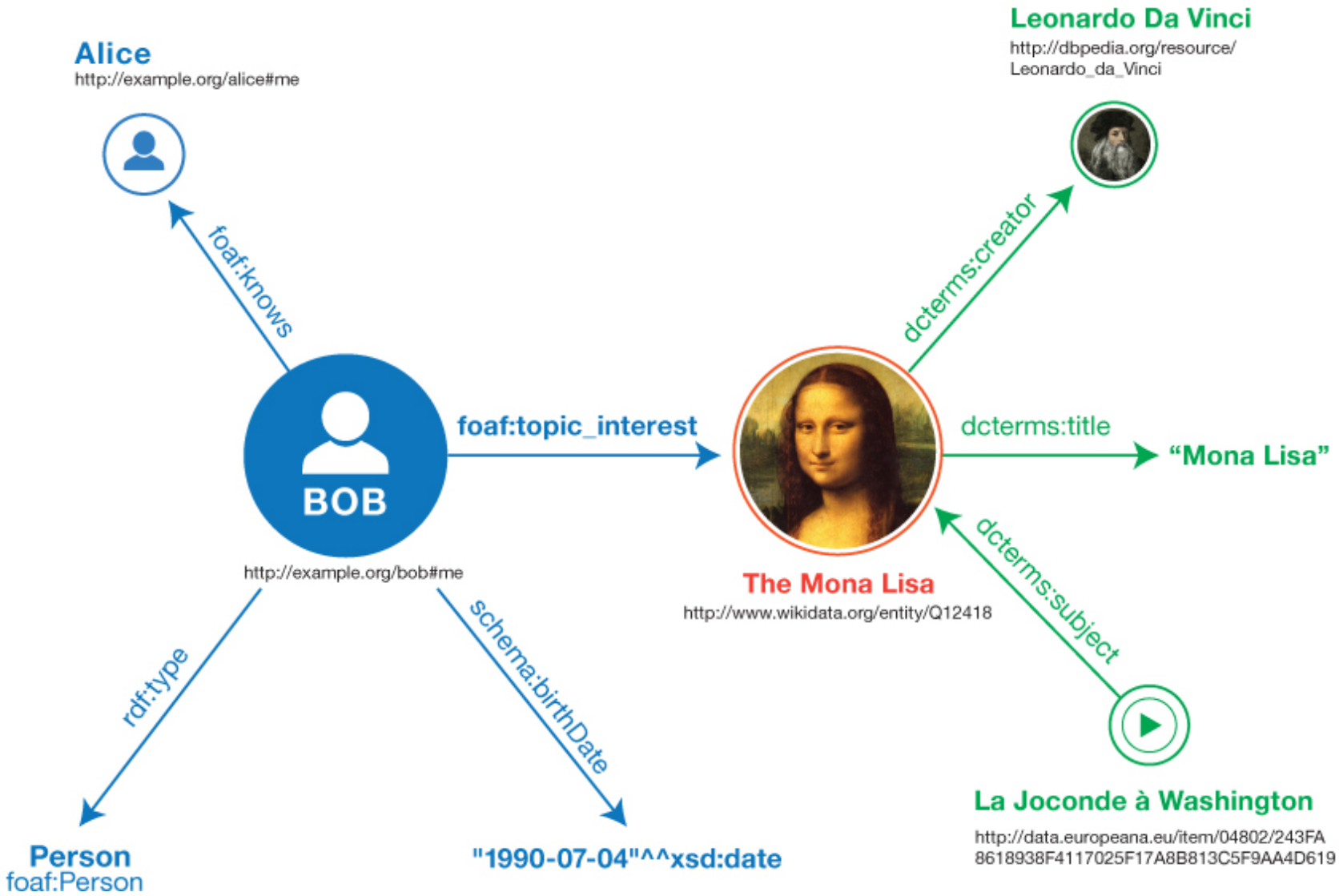
Linked Open Data



RDF (1): the model



RDF (2): IRIs


Alice
http://example.org/alice#me
foaf:knows
BOB
http://example.org/bob#me
foaf:topic_interest
rdf:type
Person
foaf:Person
schema:birthDate
"1990-07-04"^^xsd:date
Leonardo Da Vinci
http://dbpedia.org/resource/
Leonardo_da_Vinci
dcterms:creator
dcterms:title
"Mona Lisa"
The Mona Lisa
http://www.wikidata.org/entity/Q12418
dcterms:subject
La Joconde à Washington
http://data.europeana.eu/item/04802/243FA
8618938F4117025F17A8B813C5F9AA4D619

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 }
```

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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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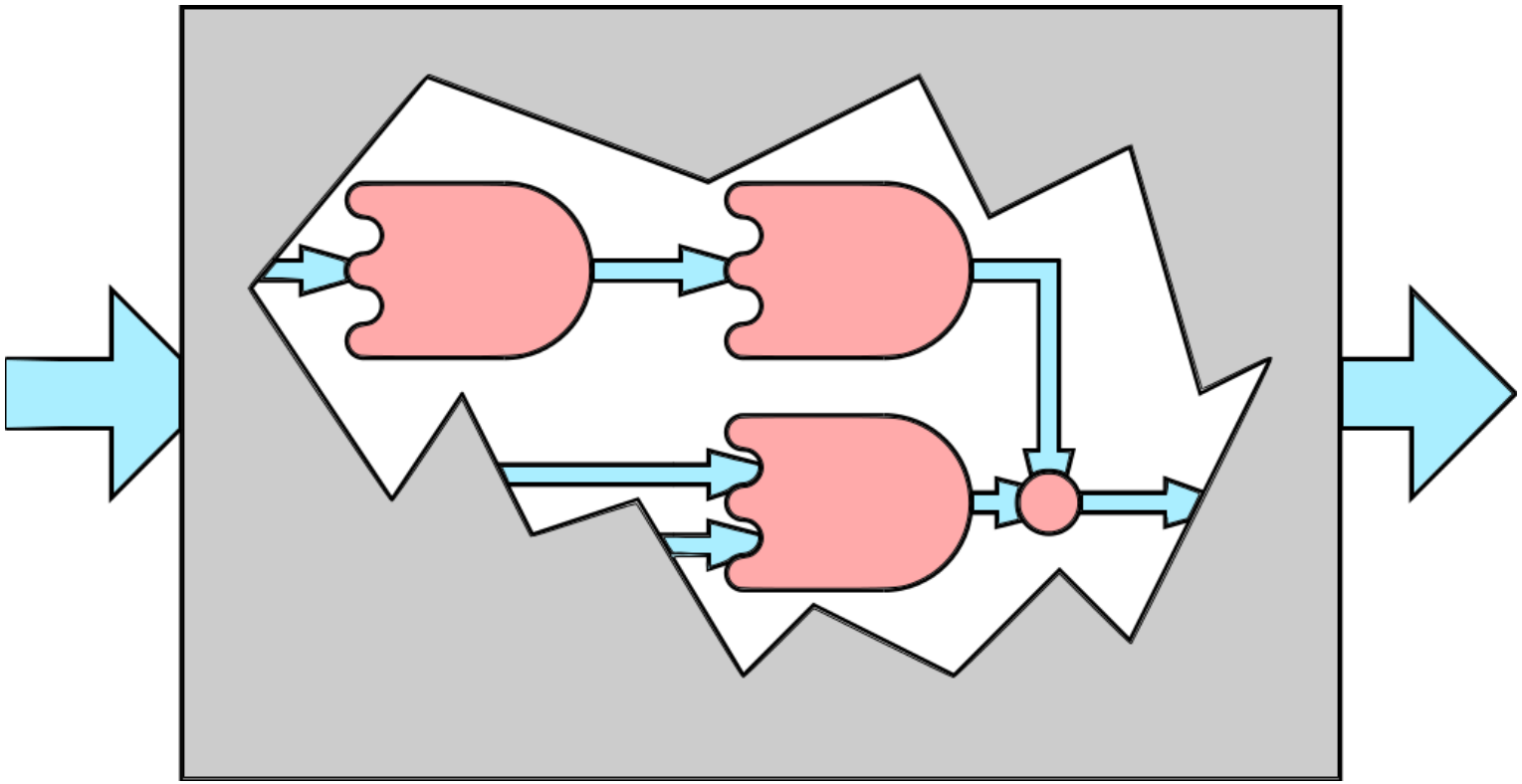
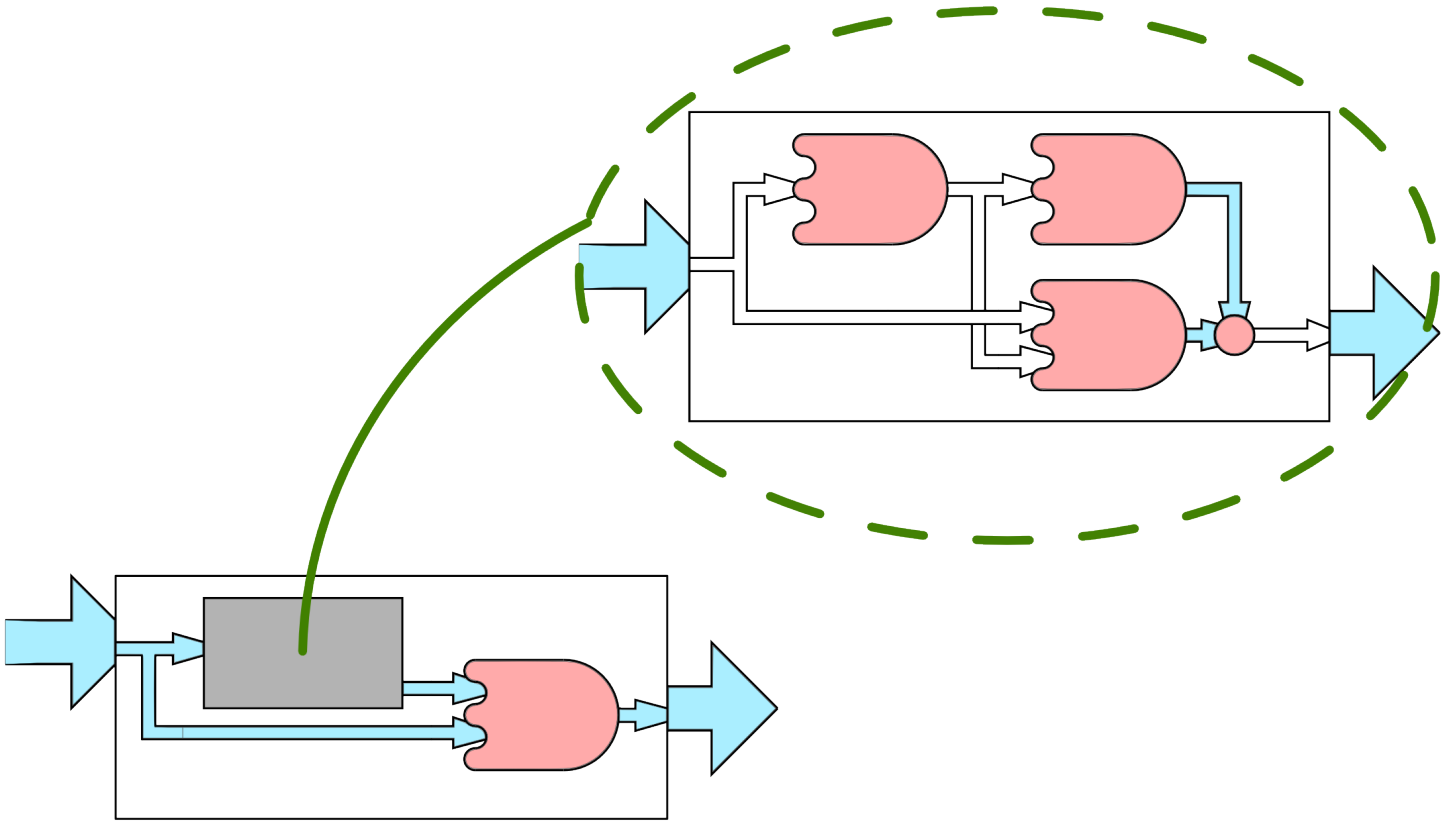
Open Computing

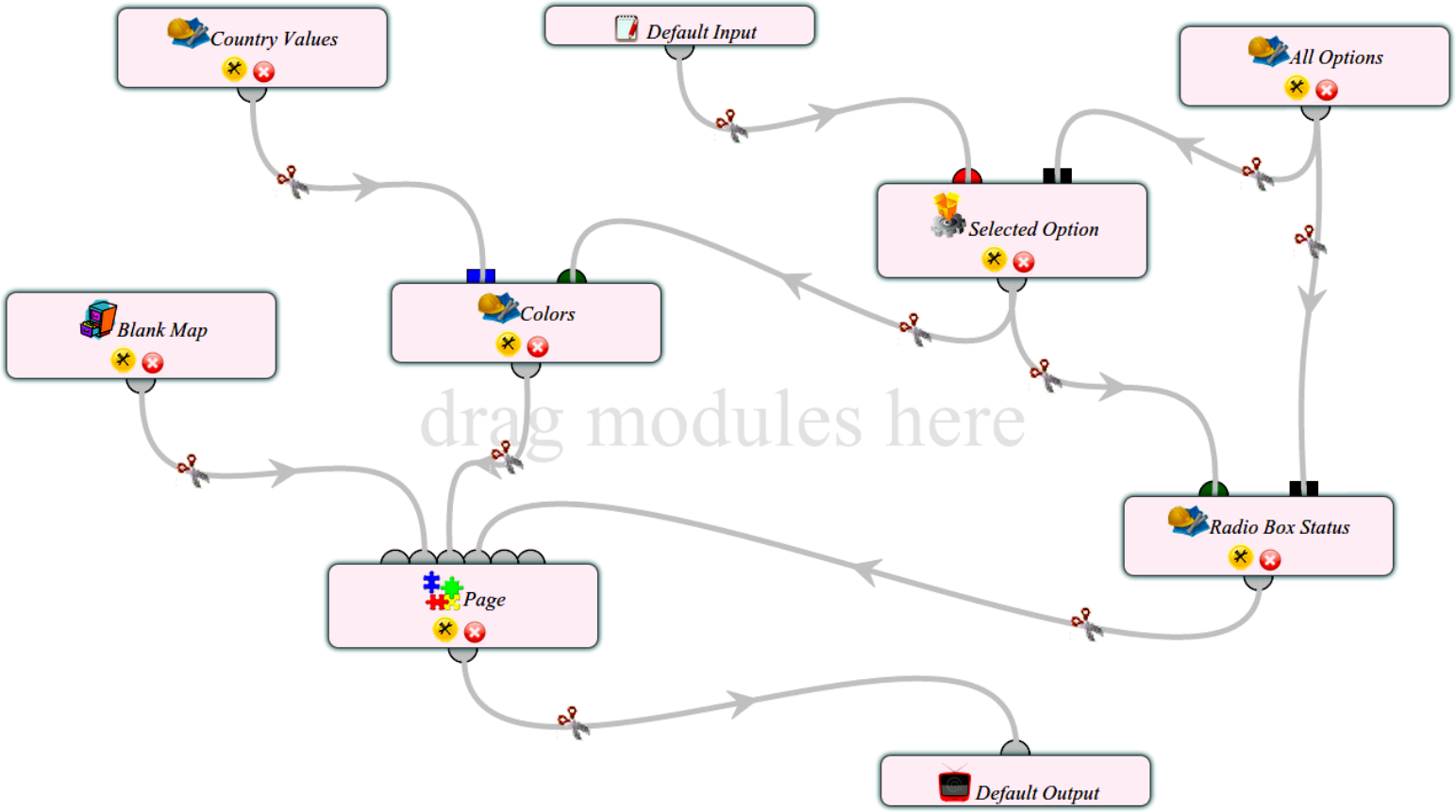


Transparent Boxes vs Black Boxes

Linked Programs



Dataflow Paradigm



Side-Effects Free Operators

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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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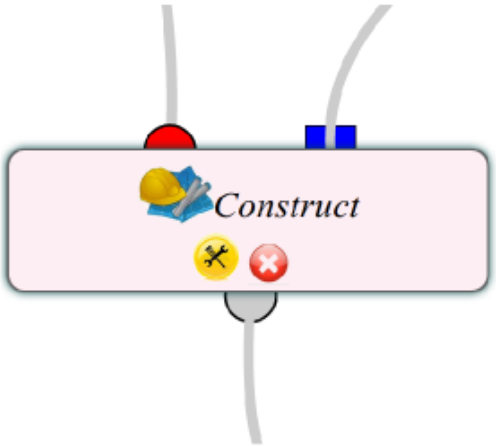
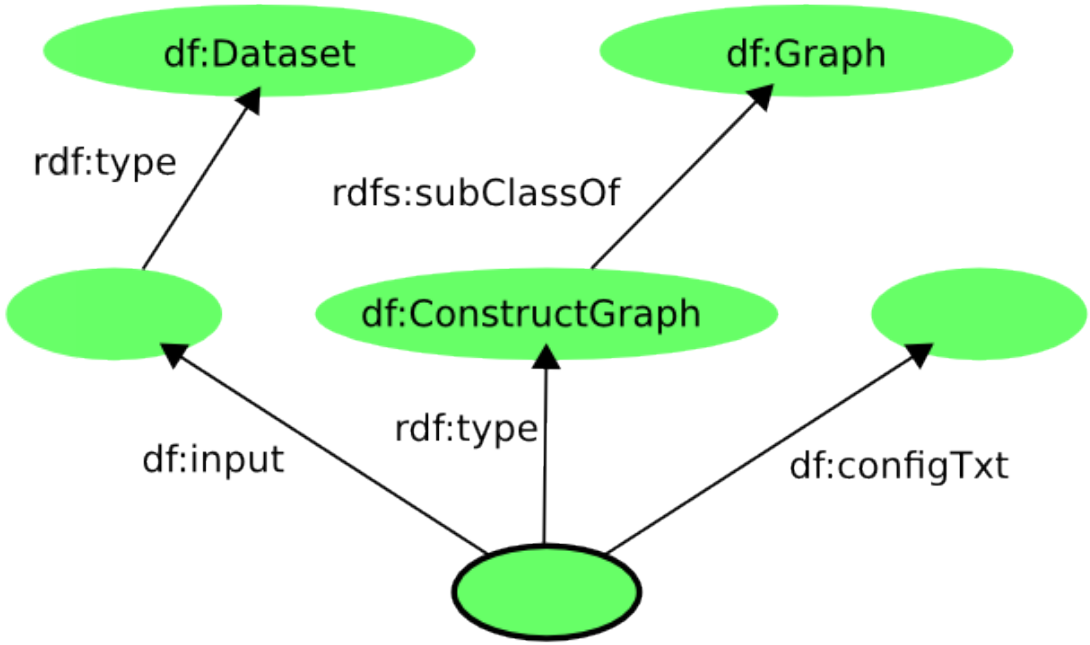
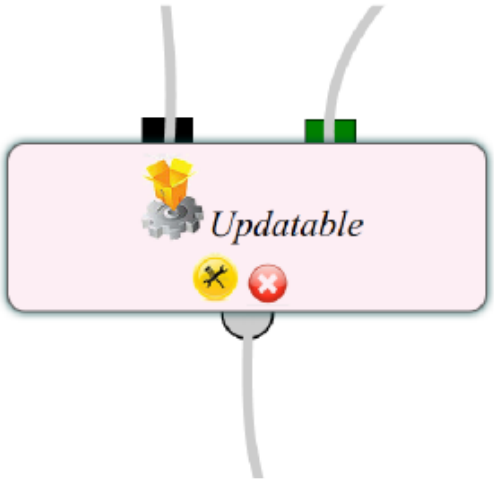
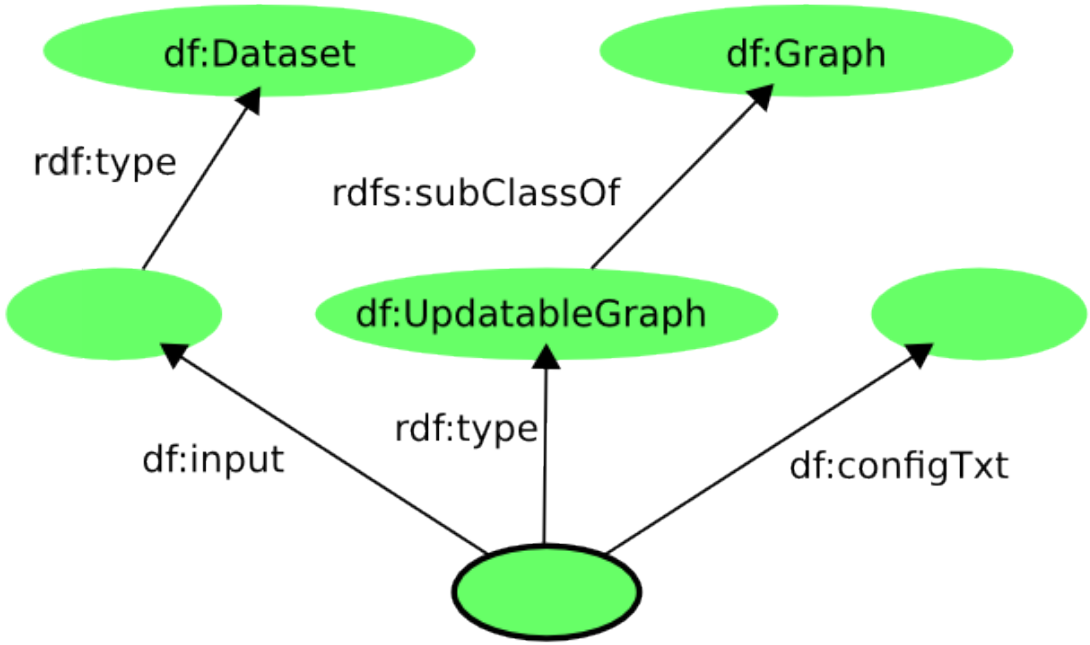
Construct Graph Operator





Updatable Graph Operator





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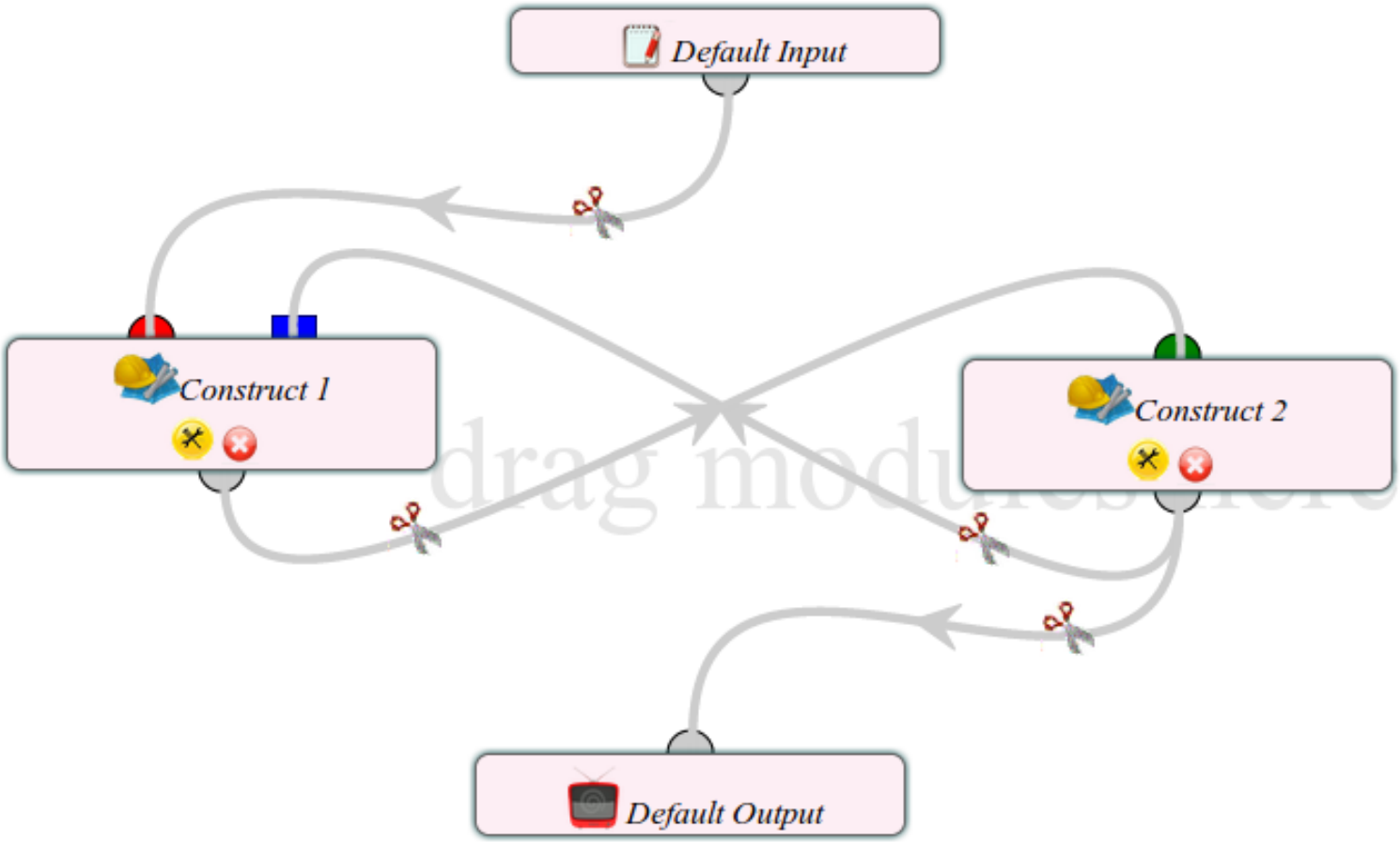
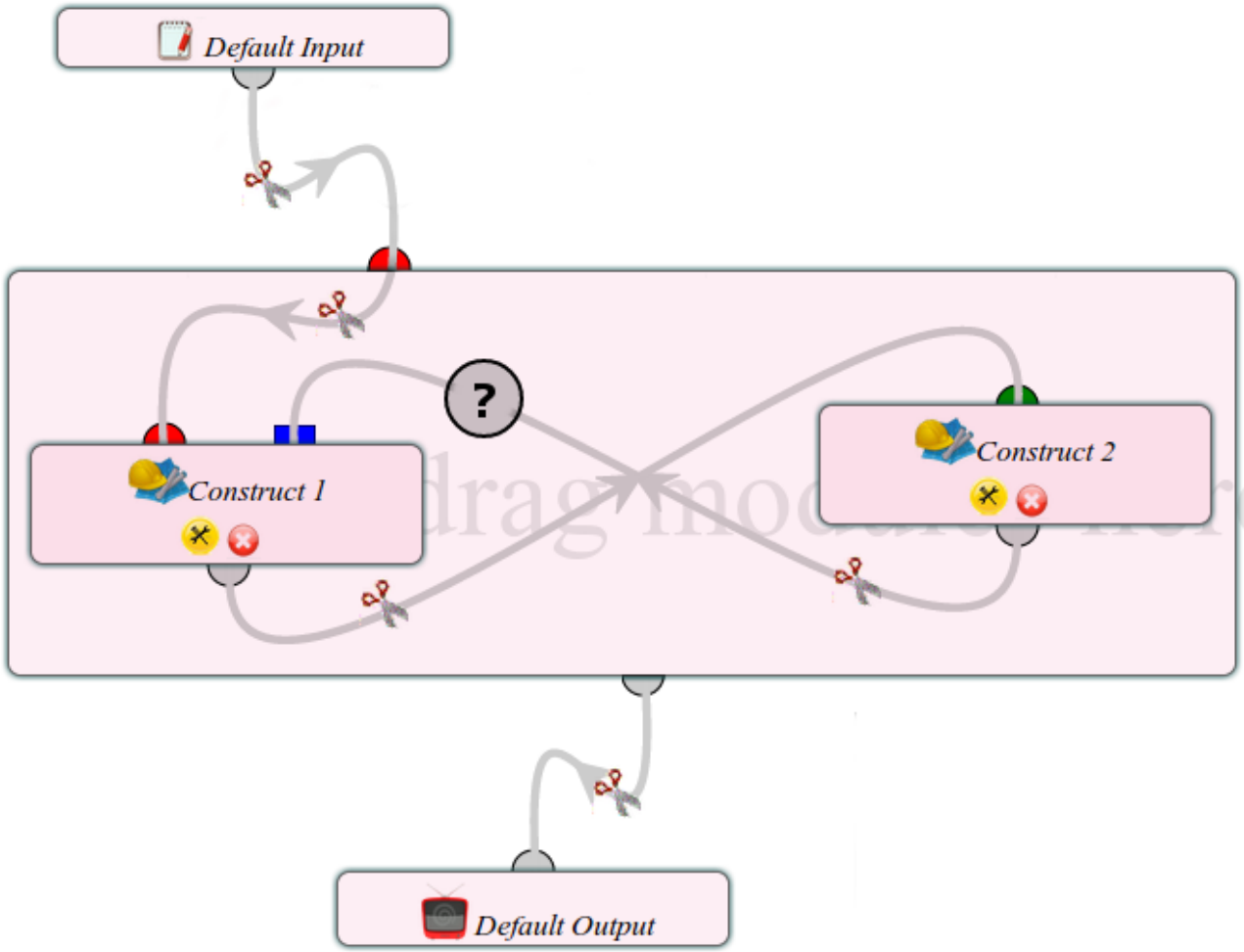
Events and (Implicit) Time

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

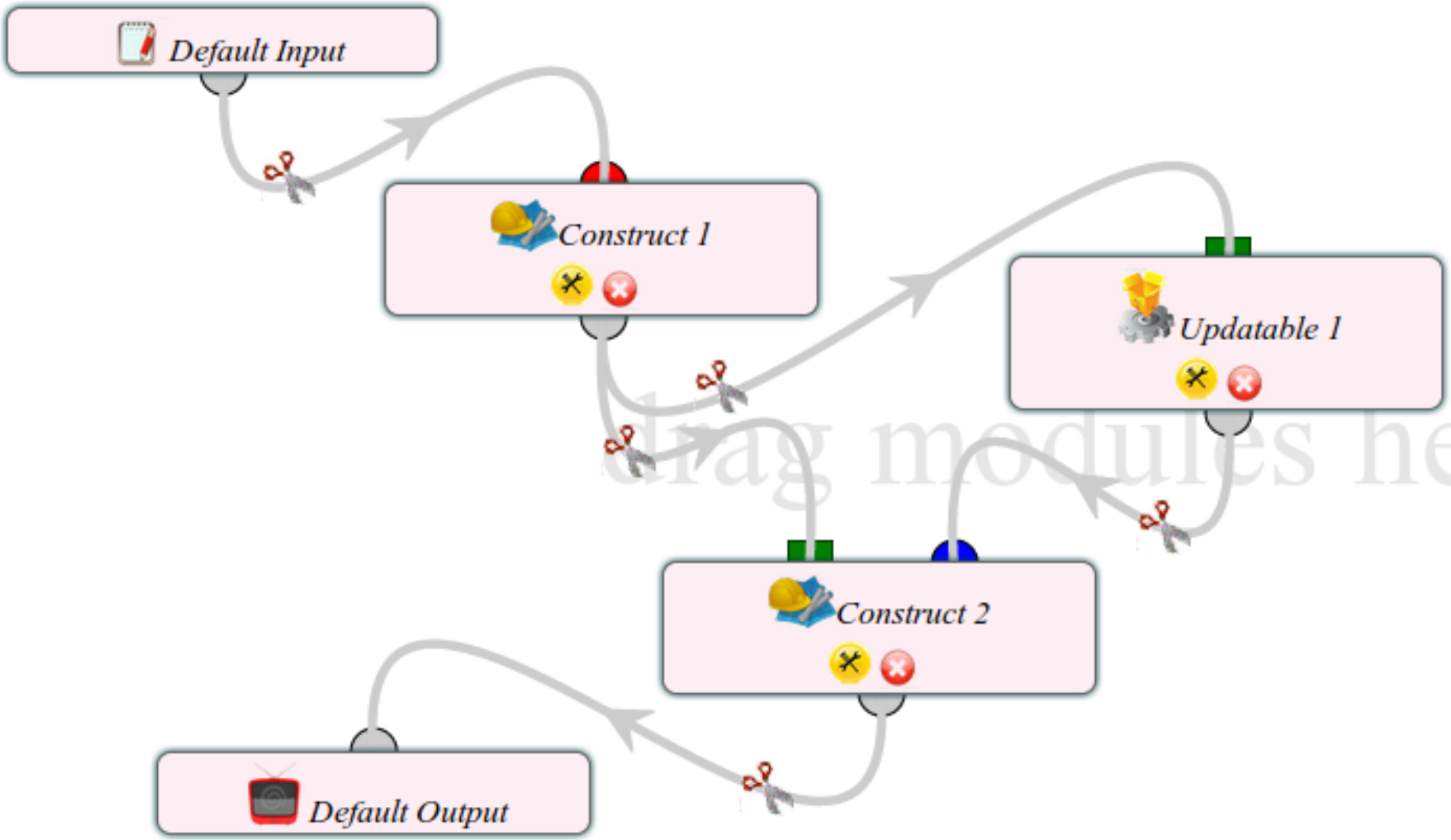
Fixpoint Operator



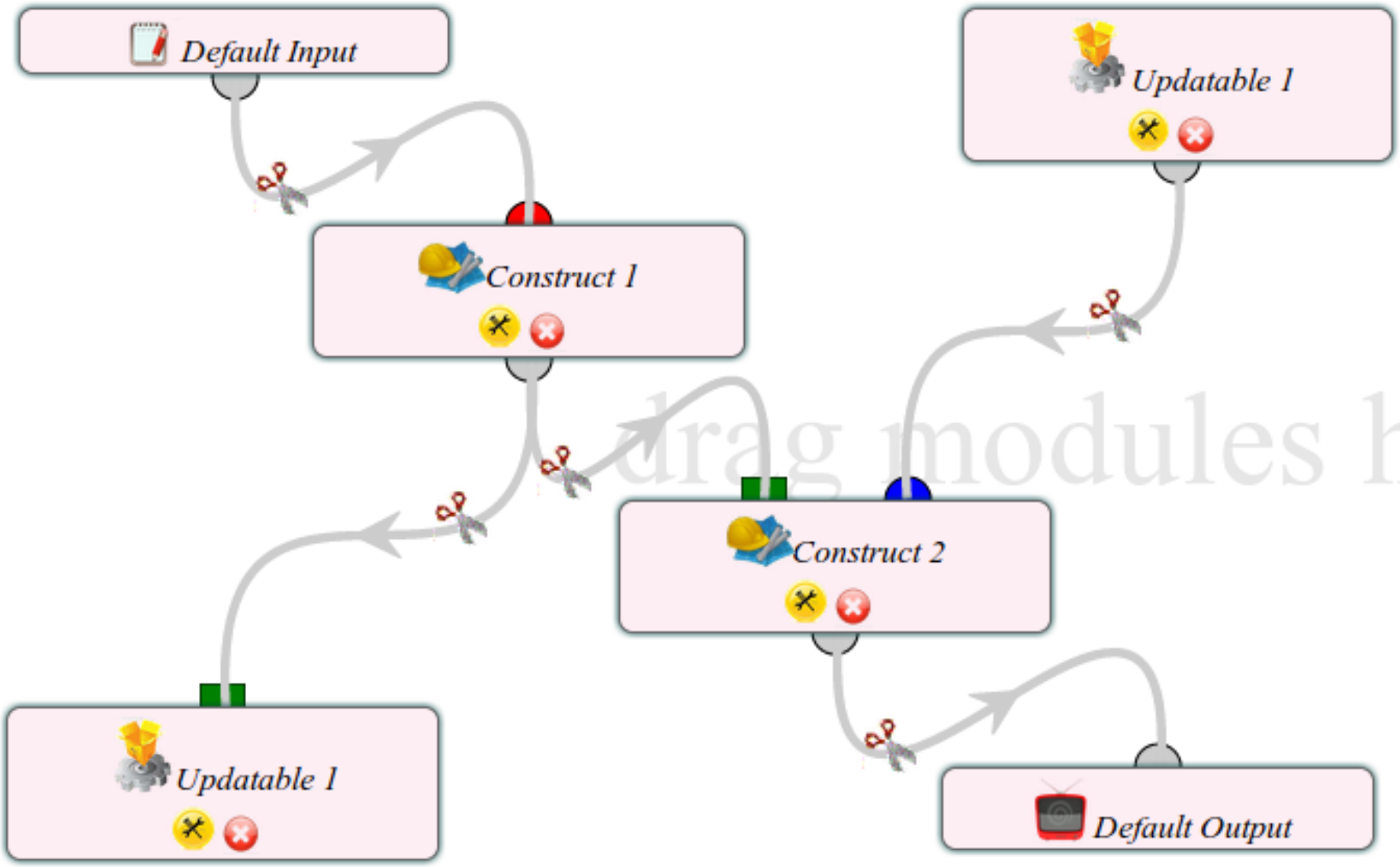
Fixpoint Operator



Update Semantics



Update Semantics



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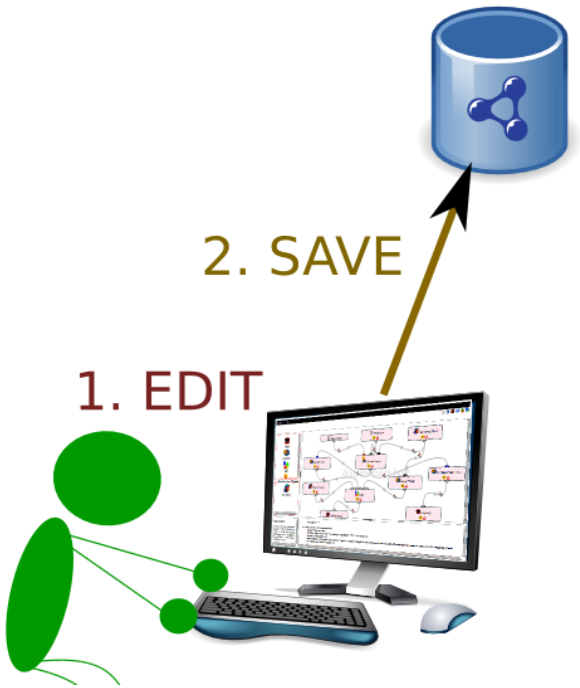
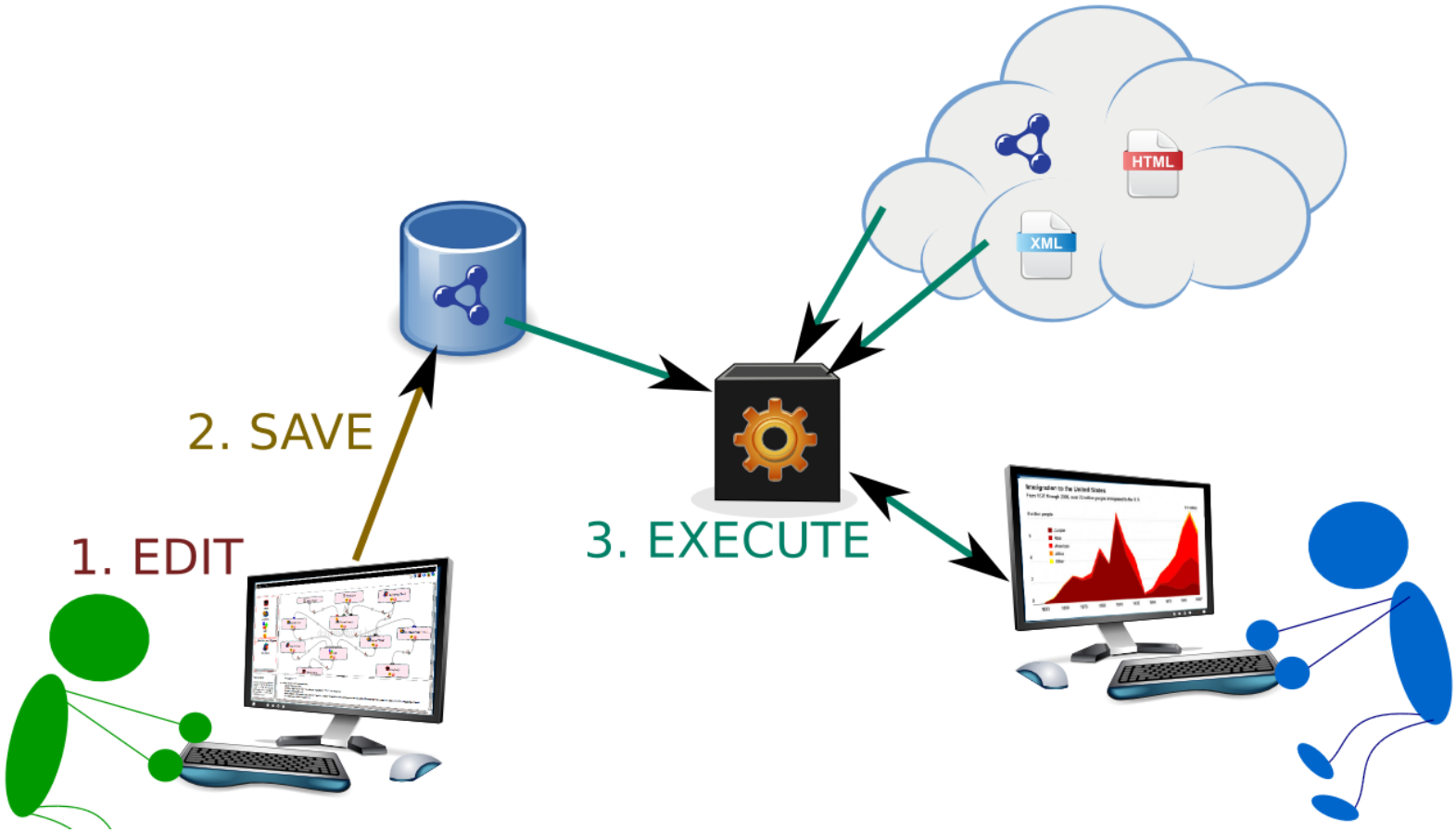
Platform Overview

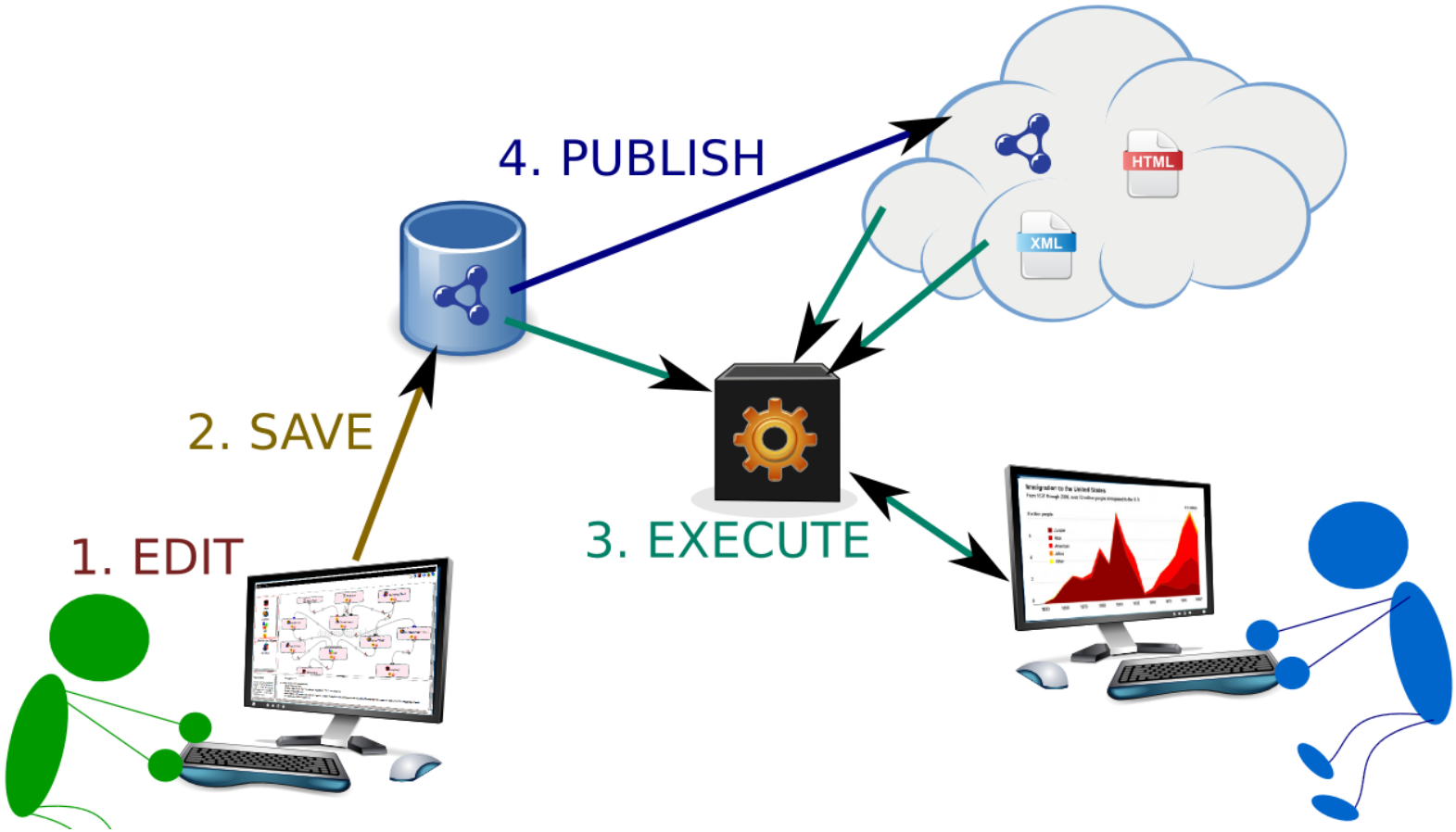
Platform Overview



Platform Overview



Platform Overview



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An example

Data used

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

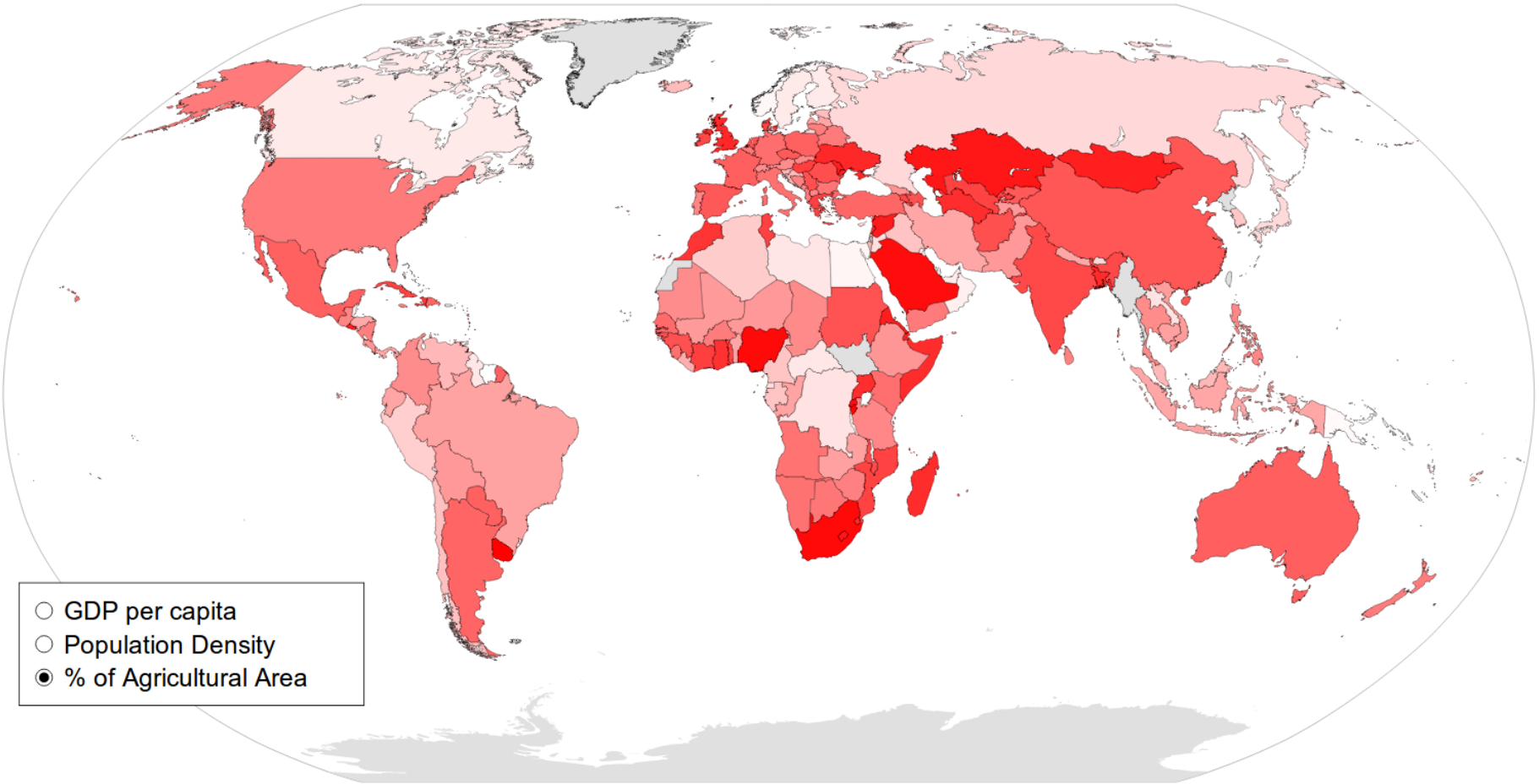
Output

- Countries colored on the map by derived geopolitical indexes

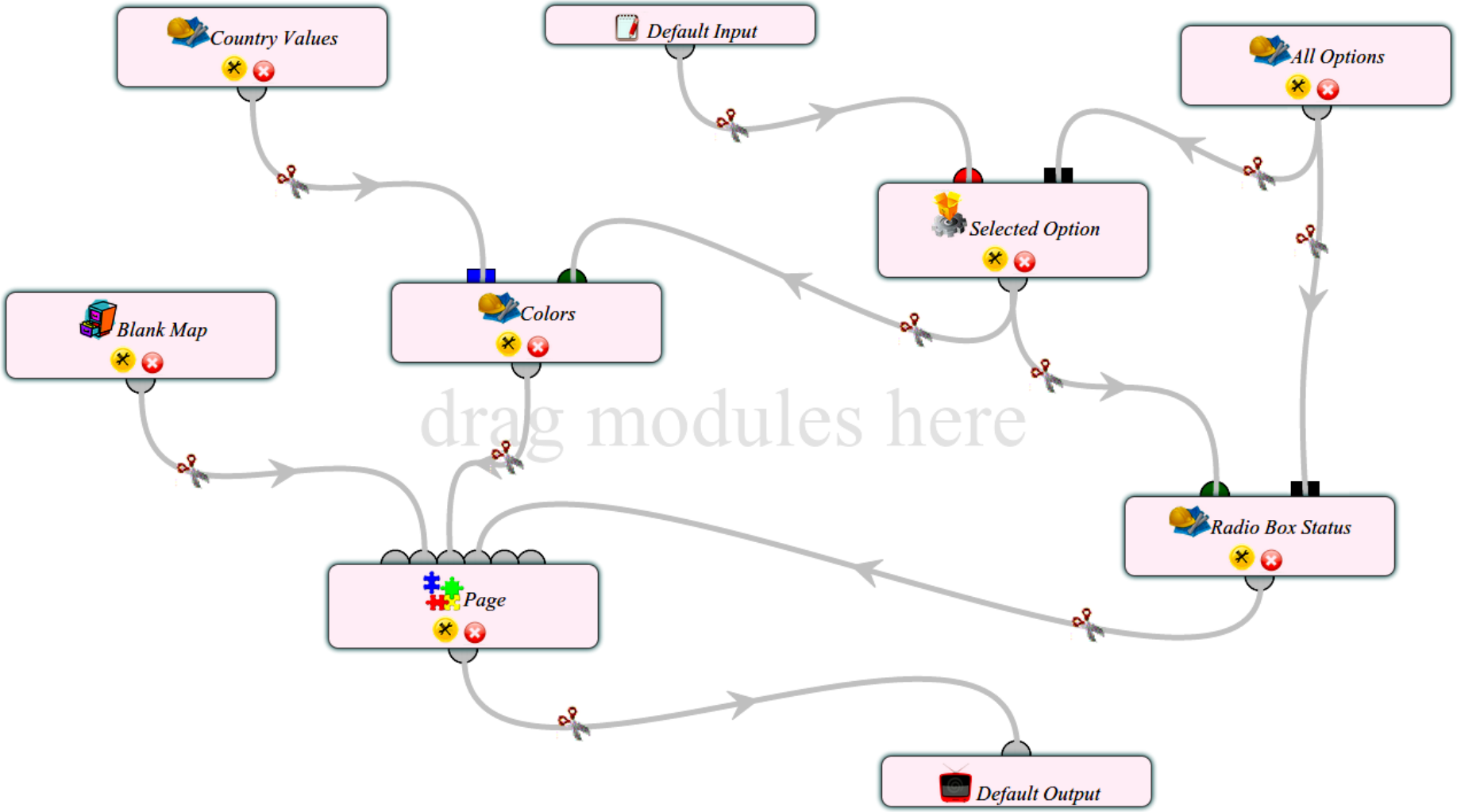
Interaction

- 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

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Future Work

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

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Acknowledgements

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

- Regione Lazio

Thank you!

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