Towards describing version history of BCF data in the Semantic Web

28. May 2022

LDAC 2022
Jyrki Oraskari, Oliver Schulz, Jakob Beetz
Introduction
BCF Event Services

GET /bcf/3.0/projects/F445F4F2-4D02-4B2A-B612-5E456BEF9137/topics/A245F4F2-2C01-B43B-B612-5E456BEF8116/events

Response Code: 200 - OK
Body:
```
[
  {
    "topic_guid": "A245F4F2-2C01-B43B-B612-5E456BEF8116",
    "date": "2014-11-19T14:24:11.316Z",
    "author": "Architect@example.com",
    "events": [
      {
        "type": "type_updated",
        "value": "Error"
      }
    ]
  },
  {
    "topic_guid": "A245F4F2-2C01-B43B-B612-5E456BEF8116",
    "date": "2013-10-21T17:34:22.409Z",
    "author": "Architect@example.com",
    "events": [
      {
        "type": "status_updated",
        "value": "Open"
      }
    ]
  }
]
```
Towards describing version history of BCF data in the Semantic Web
Jyrki Oraskari, Oliver Schulz, Jakob Beetz | Design Computation
LDAC 2022

Constraints

- Everything should be accessible via SPARQL and contained in the graph
- All operations should be limited to additions (no deletions)
- Focus on the concept of BCF

4 Towards describing version history of BCF data in the Semantic Web
Jyrki Oraskari, Oliver Schulz, Jakob Beetz | Design Computation
LDAC 2022
Reification & RDF-Star

Towards describing version history of BCF data in the Semantic Web
Jyrki Oraskari, Oliver Schulz, Jakob Beetz | Design Computation
LDAC 2022
States in Linked Building Data

Towards describing version history of BCF data in the Semantic Web
Jyrki Oraskari, Oliver Schulz, Jakob Beetz | Design Computation
LDAC 2022

Rasmussen et al. 2018
Four approaches

1) Events

2) States

3) Statements of Statements (RDF-Star)

4) Object Property Annotations (RDF-Star)
Events

Towards describing version history of BCF data in the Semantic Web
Jyrki Oraskari, Oliver Schulz, Jakob Beetz | Design Computation
LDAC 2022
States
Statements of Statements
Object Property Annotations

Towards describing version history of BCF data in the Semantic Web
Jyrki Oraskari, Oliver Schulz, Jakob Beetz | Design Computation
LDAC 2022
Scenario

<table>
<thead>
<tr>
<th>Initial Topic</th>
<th>Updated Topic</th>
<th>Final Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author: Jyrki</td>
<td>Author: Jyrki</td>
<td>Author: Jyrki</td>
</tr>
<tr>
<td>Creation Date: 03/11/2021</td>
<td>Creation Date: 03/11/2021</td>
<td>Creation Date: 03/11/2021</td>
</tr>
<tr>
<td>Status: Active</td>
<td>Status: Closed</td>
<td>Status: Active</td>
</tr>
<tr>
<td>Label: Heating</td>
<td>Label: Heating</td>
<td>Label: Documentation</td>
</tr>
</tbody>
</table>

Added | Modified | Removed | Unchanged

Towards describing version history of BCF data in the Semantic Web
Jyrki Oraskari, Oliver Schulz, Jakob Beetz | Design Computation
LDAC 2022
Evaluation

<table>
<thead>
<tr>
<th>Approach</th>
<th>Events</th>
<th>States</th>
<th>RDF-Star: Statements of Statements</th>
<th>RDF-Star: Object Property Annotations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial triples in the data model</td>
<td>29</td>
<td>14</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>Triples added in the first update</td>
<td>12</td>
<td>8</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Triples added in the final update</td>
<td>15</td>
<td>9</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Triples at the end</td>
<td>57</td>
<td>31</td>
<td>35</td>
<td>54</td>
</tr>
</tbody>
</table>

*blue - good, red comparatively bad*
Conclusion

Events:

• Close to the original BCF API data model

• (Current) State has to be inferred from the Graph
Conclusion

States:

- Close to current developments in the LBD Group
- Easy to implement and use
- It lacks granularity
Conclusion

RDF-Star:

• Allows granularity

• RDF-Star is non-invasive and generic

• Graph needs to support RDF-Star

• How to include in a TBox?
Next steps

- Observe performance of approaches with bigger datasets
- Rework bcfOWL so it contains version history
- Introduce provenance data to bcfOWL (e.g., with PROV)
- Investigate how to sign changes / issues
References


BCF API (no date) https://github.com/buildingSMART/BCF-API
Thank you for your attention