Knowledge Science in action: transport and mobility

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How far do you live from work?
Who answered a distance in time using one or more modes of transport?
Transport use cases can always use more data
The long tail of data adoption in route planners

Most important datasets for a route planner

Datasets that could give you an added value, but just cost too much to integrate
How do we lower integration costs then?
Steps to publishing your data for automated reuse

1. **Vocabulary**
   Choose and document your domain model (rdfs is fine, really)

2. **Application Profile**
   Describe your things by documenting what fields you keep in your dataset using SHACL or ShEx, and where you refer to other databases

3. **Self-describing Linked Data API**
   Now publish the actual data... But what API should you use?
Approach 1: Hosting querying APIs

- Dataset
  - WFS
    - GIS application
  - SPARQL
    - Graph-based application
  - Route Planning API?
    - Map app?
Dataset

- WFS
- SPARQL
- ...

Publisher

3d parties

Maintenance hell

- GIS application
- Graph-based application
- ...

Graph-based application
Approach 2: Sharing dumps

Data dump

Publisher

WFS

Autocompletion

Awesome application

Awesome application

...

3d parties

...
Replication hell

- Data dump
  - WFS
    - Awesome application
  - Autocompletion
    - Awesome application
  - ...

Publisher

3d parties
Event streams focus on live replication
The SEMIC EU specification on Linked Data Event Streams (LDES) – https://w3id.org/ldes/specification

Linked Data Event Streams
Living Standard, 15 March 2021

This version:
https://w3id.org/ldes/specification

Issue Tracking:
Github

Editor:
Pieter Colpaert

Abstract
A Linked Data Event Stream is a collection of immutable objects (such as version objects, sensor observations or archived representations). Each object is described in RDF.

§ 1. Introduction

A Linked Data Event Stream (LDES) (ldes:EventStream) is a collection of immutable objects, each object being described using a set of RDF triples (rdf:json-ld).

This specification uses the TREE specification for its collection and fragmentation (or pagination) features, which in its turn is compatible to other specifications such as activitystreams:core, Vocabulary-O-CAT-2, LDP or Shape Trees. For the specific compatibility rules, read the TREE specification.

An ldes:EventStream is an rdfs:subClassOf of the tree:collection class. It extends the tree:collection class by saying all of its members are immutable, and you can thus only add members to the collection.

Note: When a client once processed a member, it should never have to process it again. A Linked Data Event Stream client can thus keep a list (or cache) of already processed member IRIs. A reference implementation of a client is available as part of the Comunica framework on NPM and Github.
LDES published through multiple Linked Data Fragments interfaces

Linked Data Event Stream
?page=1

E.g., geospatial data tiles
/x/y/z?page=1

WFS

Awesome application

Publisher

3d parties

Geospatial API
?bbox=...&q=...
5 minutes,  
5 demos,  
here we go  
1. Parking availabilities  
2. Public Transit time schedules  
3. Route Planning on OSM  
4. Railway Infrastructure (RINF)  
5. Autocompletion of street names
Decentralized parking availabilities

1. Retrieve DCAT catalog
2. Javascript filters parking dataset and populates dropdown
3. Fetch LDES view for a parking site
4. Show real-time and historic info in sparkline

Time-based fragmentation of public transit time schedules with Linked Connections

<< a lc:Connection ;
  lc:departureTime "2022-03-30T17:00";
  lc:arrivalTime "2022-03-30T17:10";
  lc:arrivalStop <S1> ;
  lc:departureStop <S2> .

later

Page 1

Page 2

Page ...

Page X

later

time
Plan routes from your browser

https://linkedconnections.org

Same idea, but geospatial tiling of roads

Extra summary index speeds it up
Railway compatibility in Europe

Online app at http://data-interop.era.europa.eu/
Railway compatibility in Europa


Substring fragmentations for autocompletion


Live demo at tree.linkeddatafragments.org
But everything API starts from the Linked Data Event Stream
Current status of Linked Data in mobility

1. Interesting prototypes, vocabularies and architectures are sprouting

2. The MaaS alliance doesn’t list Linked Data as a useful exchange model, but only sees it as a way to create conceptual data models

3. I believe the idea of Linked Data Event Streams and the ecosystem around it will bridge that gap

Want to help? Next up: the Sem4Tra Workshop

In September at SEMANTiCS! Prepare your submissions!

We're happy to announce that the 4th edition of Sem4tra is officially going to happen at @SemanticsConf Europe! CfP and deadlines will be soon available at sem4tra.linkeddata.es #Sem4Tra22

Join our Slack:
https://join.slack.com/t/sem4tra/shared_invite/zt-16c579hlG-sXwAgjPKmreRyd2Dje08oQ
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