KnowledgeStore

— Scalable Framework for Interlinking Text and Knowledge —

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FONDAZIONE BRUNO KESSLER

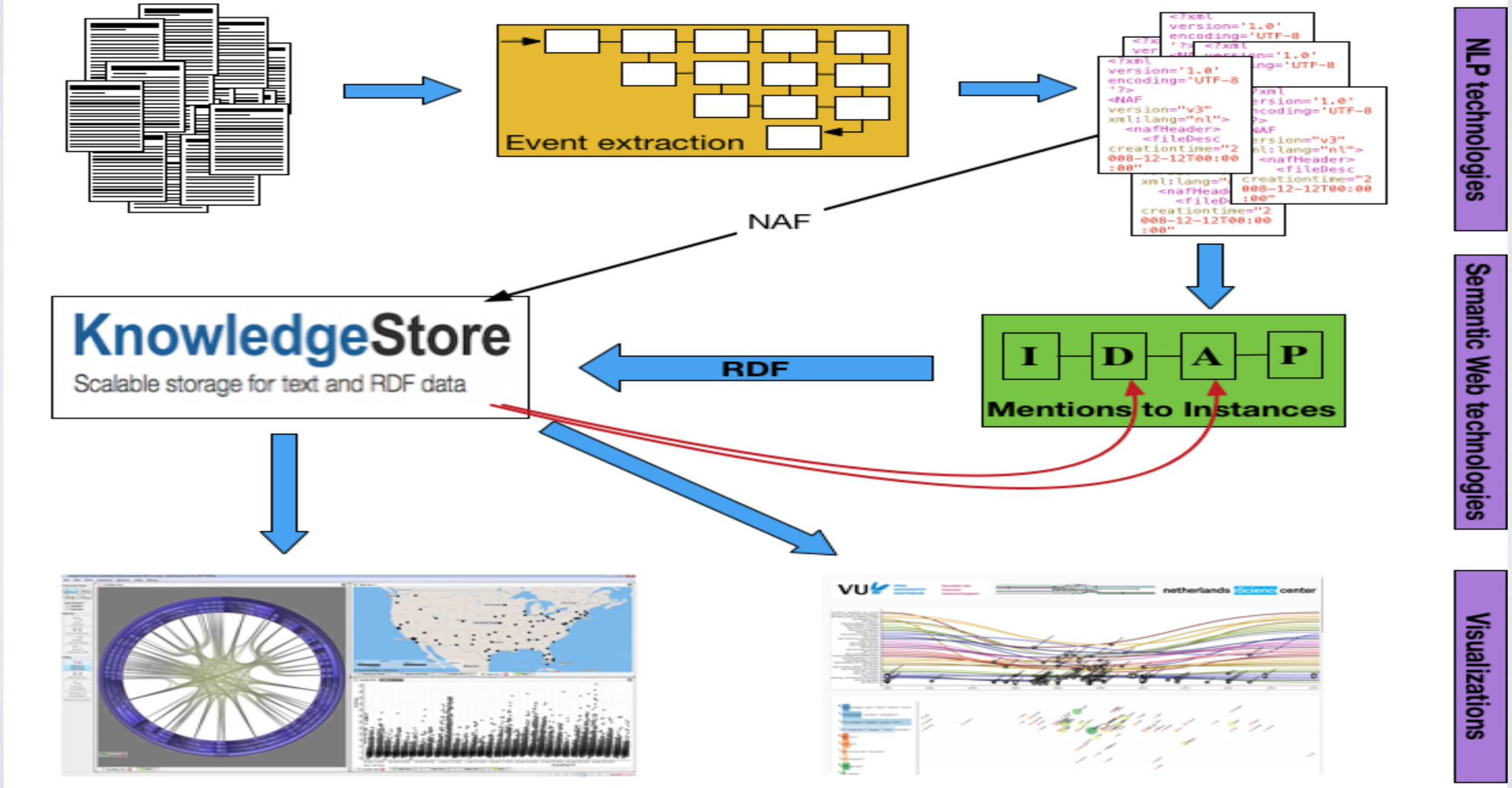
NewsReader
POST HOC ERGO PROPTER HOC

SEVENTH FRAMEWORK PROGRAMME

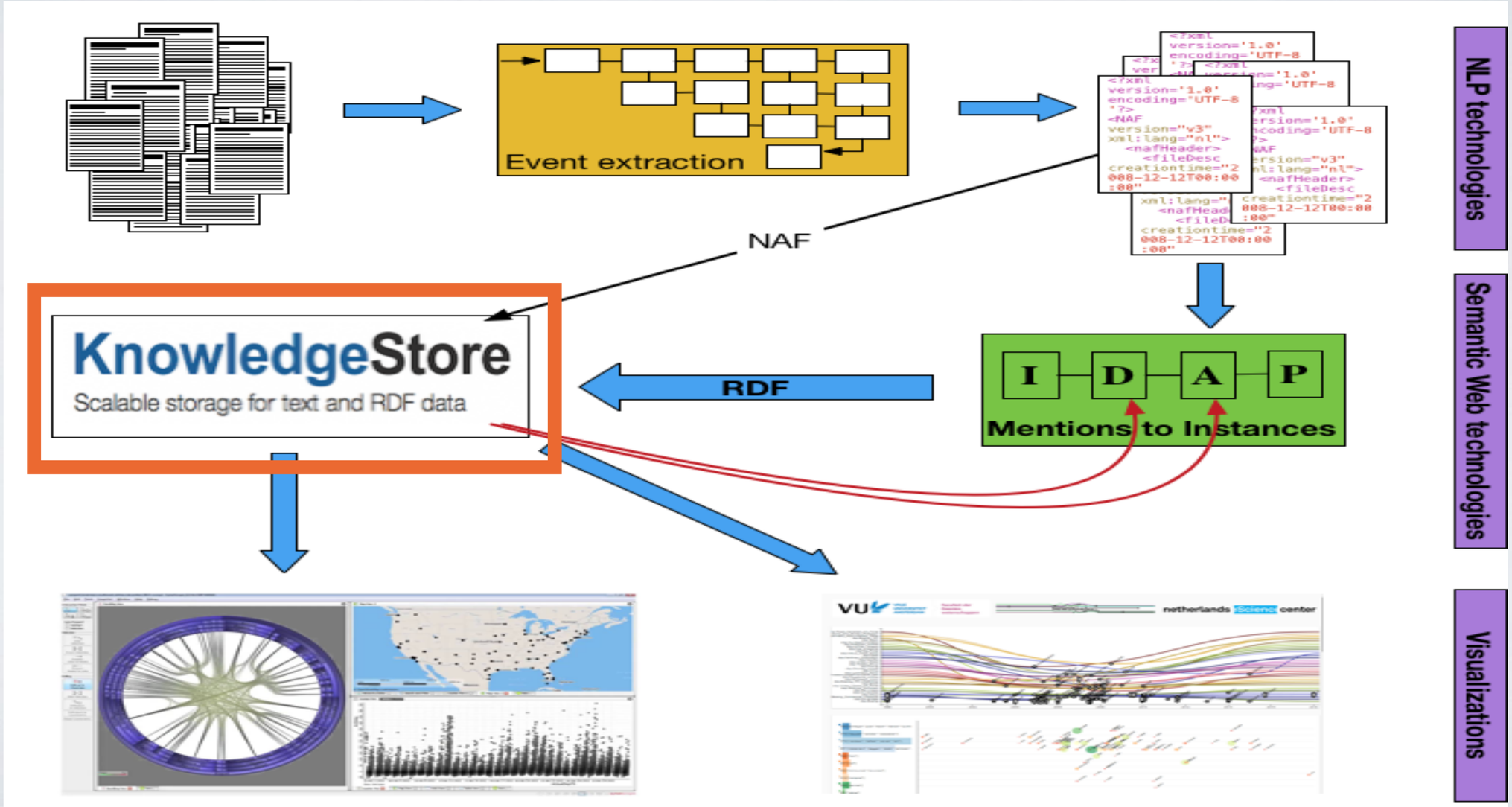
KnowledgeStore

- A scalable, fault-tolerant, and Semantic Web grounded storage system to jointly store, manage, retrieve, and query, both structured and unstructured data

KnowledgeStore



KnowledgeStore



KnowledgeStore

Motivating scenario

- Among a collection of news articles, a user is interested in retrieving all 2014 articles reporting statements of a 20th century US president where he is positively mentioned as "commander-in-chief".

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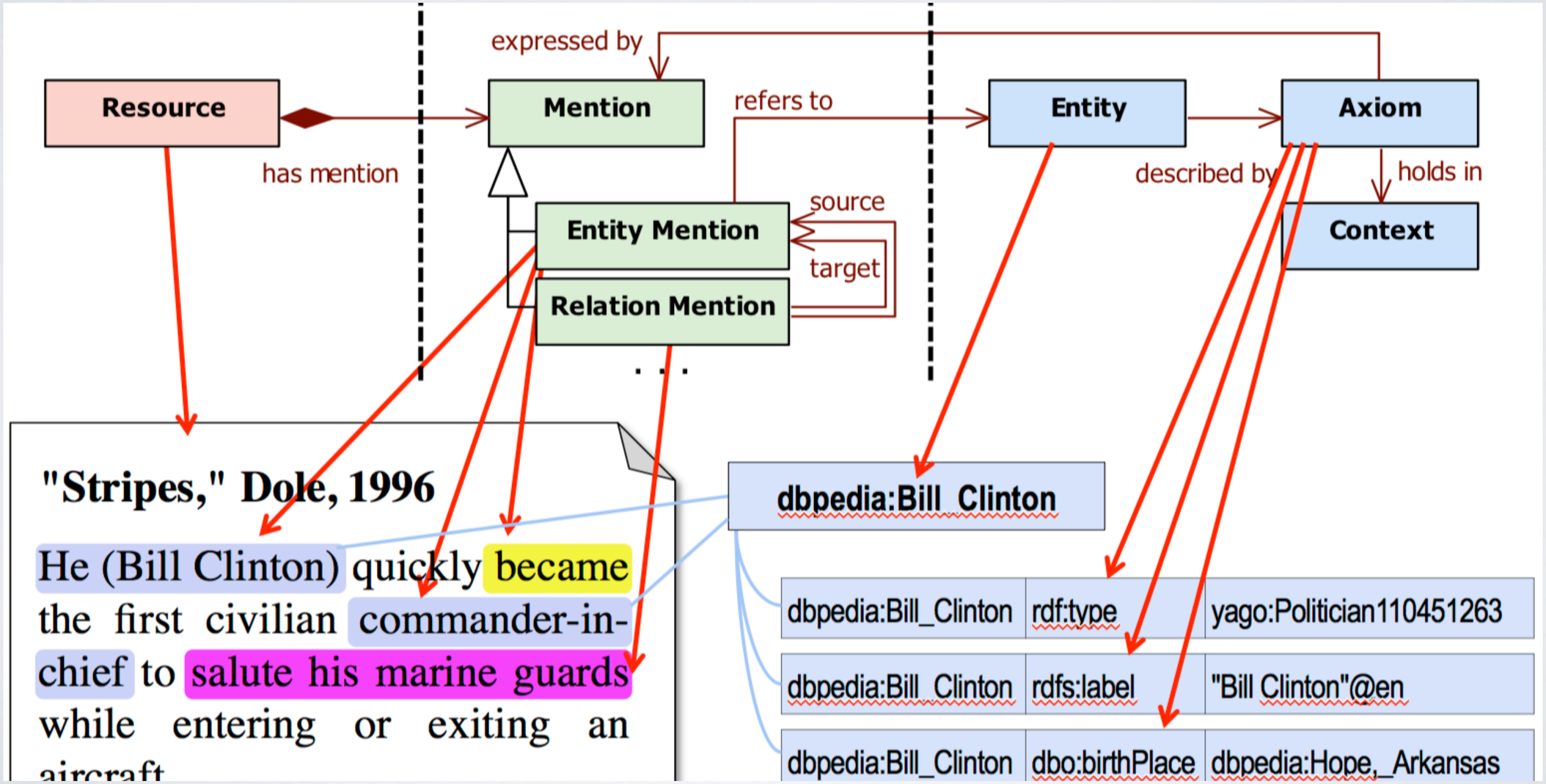
In a nutshell



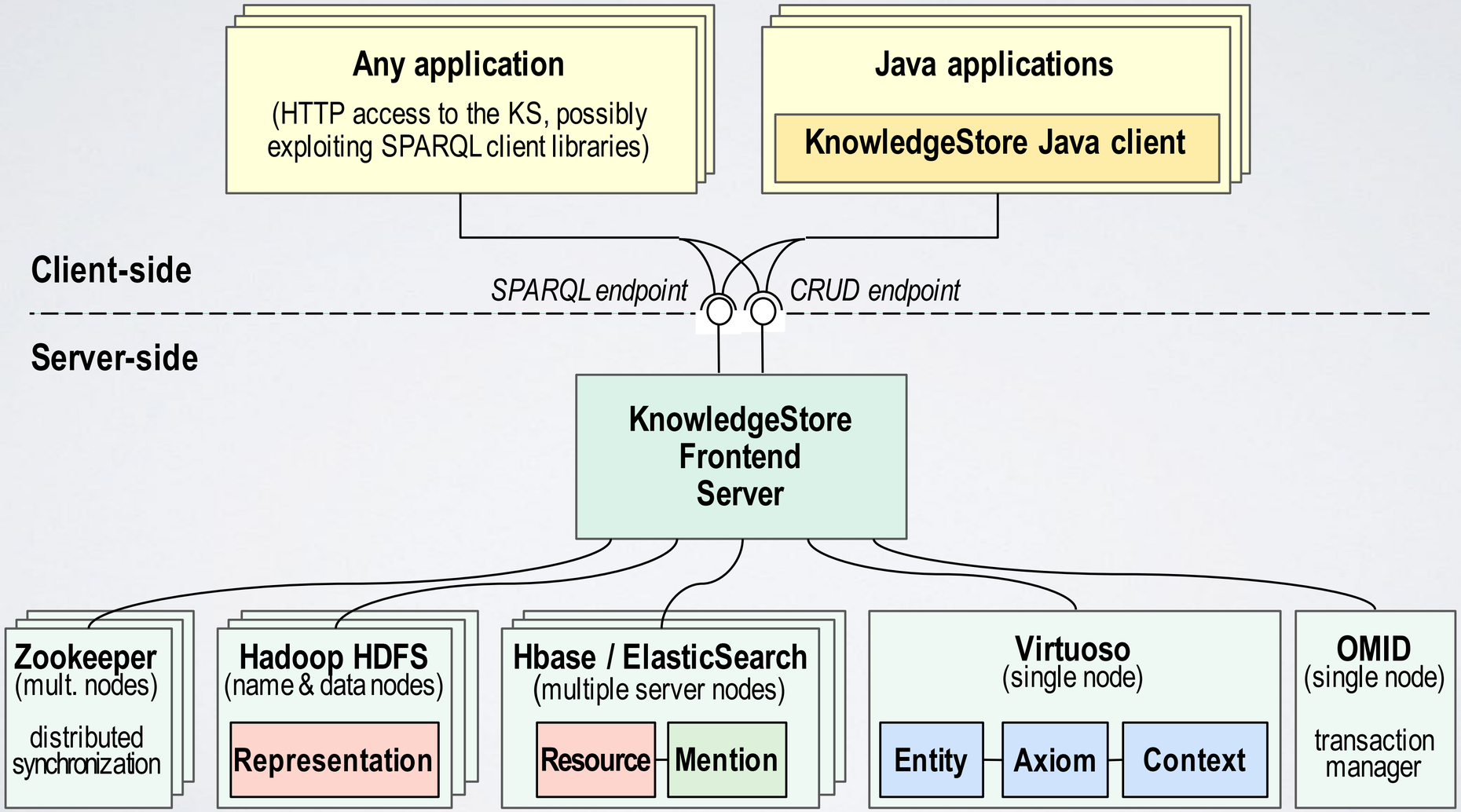
KnowledgeStore

Exploitation

- Enhanced applications (e.g., decision support systems)
- Developing, debugging, training, and evaluating NLP and knowledge processing tasks
- Reasoning on Extracted Information (e.g., on Events)
- Text Exploration

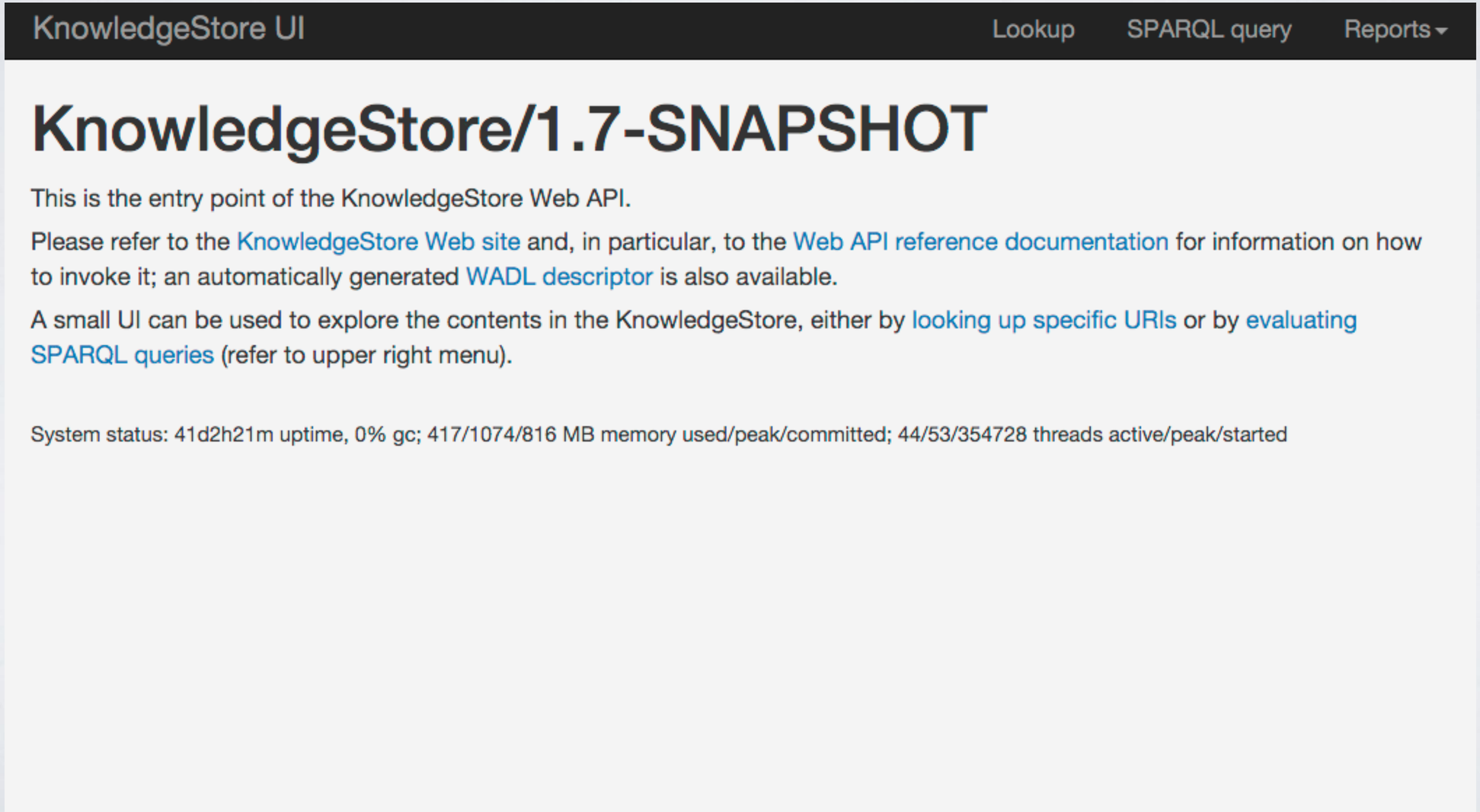
KnowledgeStore

Architectural View



KnowledgeStore

Looking through the glass box: the **User Interface**



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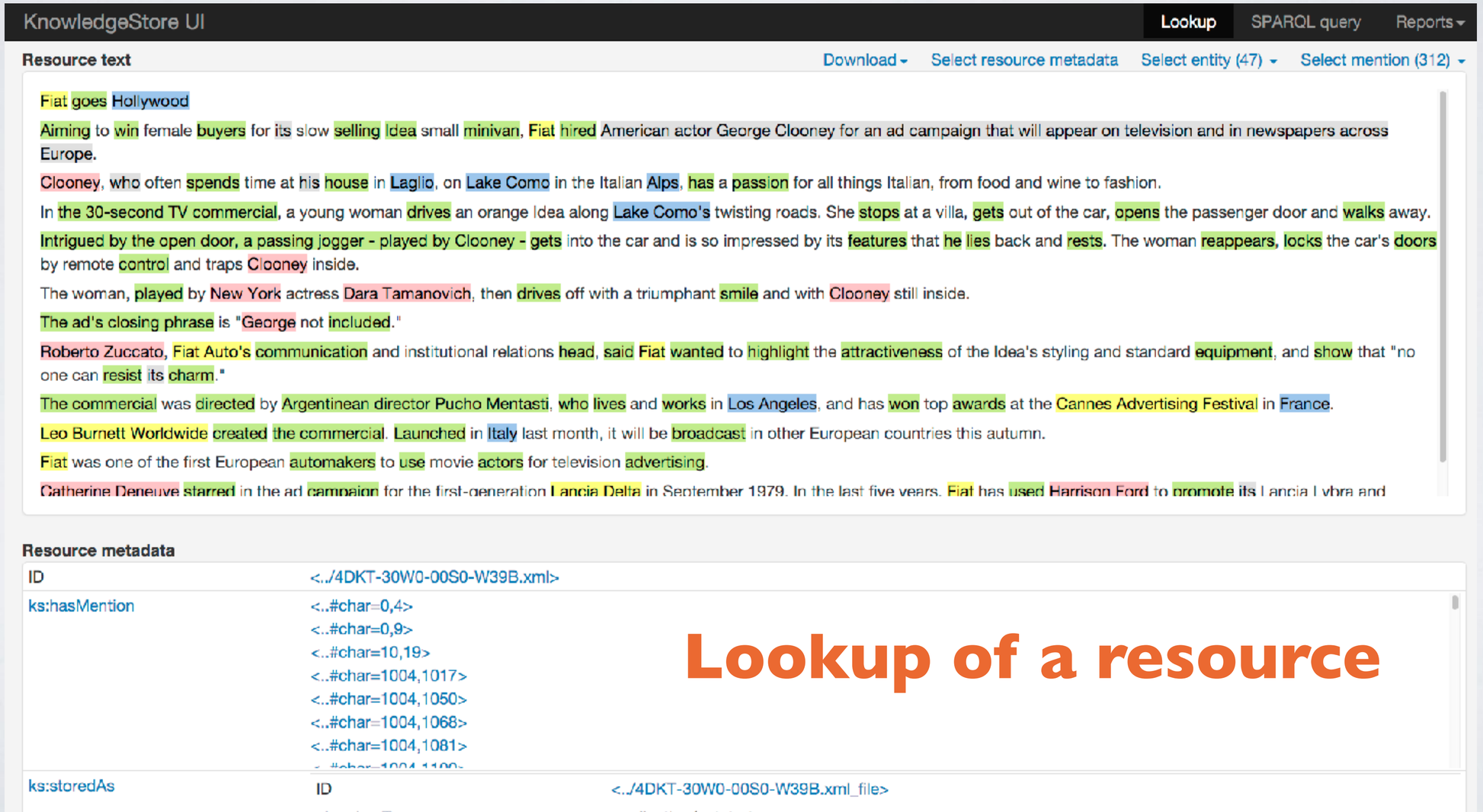

Lookup of a resource

KnowledgeStore

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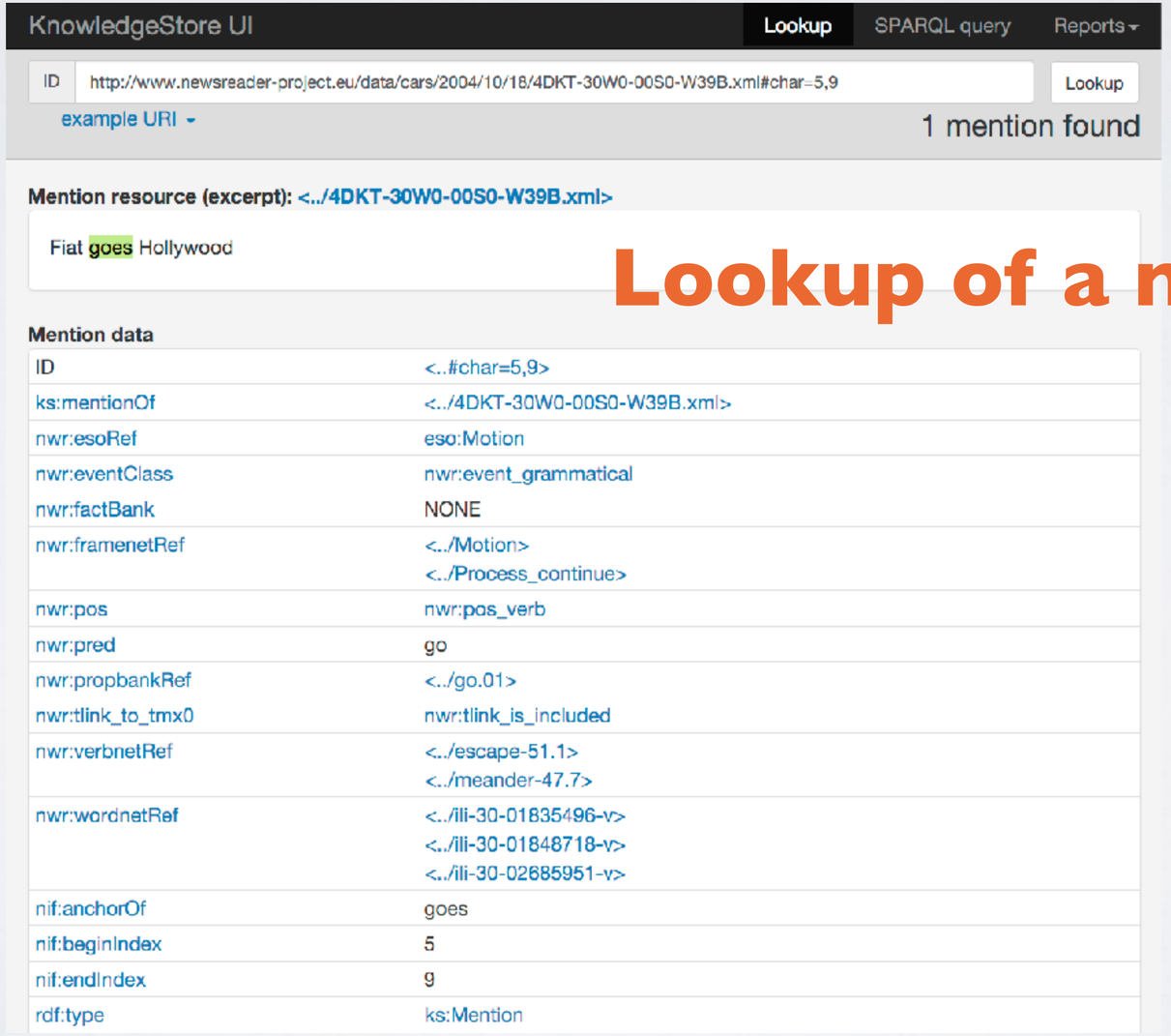

Lookup of a mention

KnowledgeStore

Looking through the glass box: the **User Interface**

KnowledgeStore UI | Lookup | SPARQL query | Reports

```
SELECT DISTINCT ?event ?event_label ?year ?month ?day
WHERE {
    ?event a sem:Event, eso:JoiningAnOrganization .
    ?event rdfs:label ?event_label .
    ?event eso:employment-employer dbpedia:Kia_Motors .
    ?event sem:hasTime ?time .
    ?time owltime:inDateTime ?time_owl .
    ?time_owl owltime:year ?year; owltime:month ?month; owltime:day ?day .
}
ORDER BY ?year ?month ?day
```

SPARQL query

Timeout | s | Display results | Download as... | example query

7 results in 29 ms show / hide query panel

event	event_label	year	month	day
<..#ev31>	hiring	2006	8	1
<..#ev4>	hire	2006	8	1
<..#ev8>	hire	2010	1	13
<..#ev2>	hire	2010	1	14
<..#ev8>	hire	2010	1	14
<..#ev16>	hire	2012	8	10
<..#ev17>	hire	2012	8	10

KnowledgeStore

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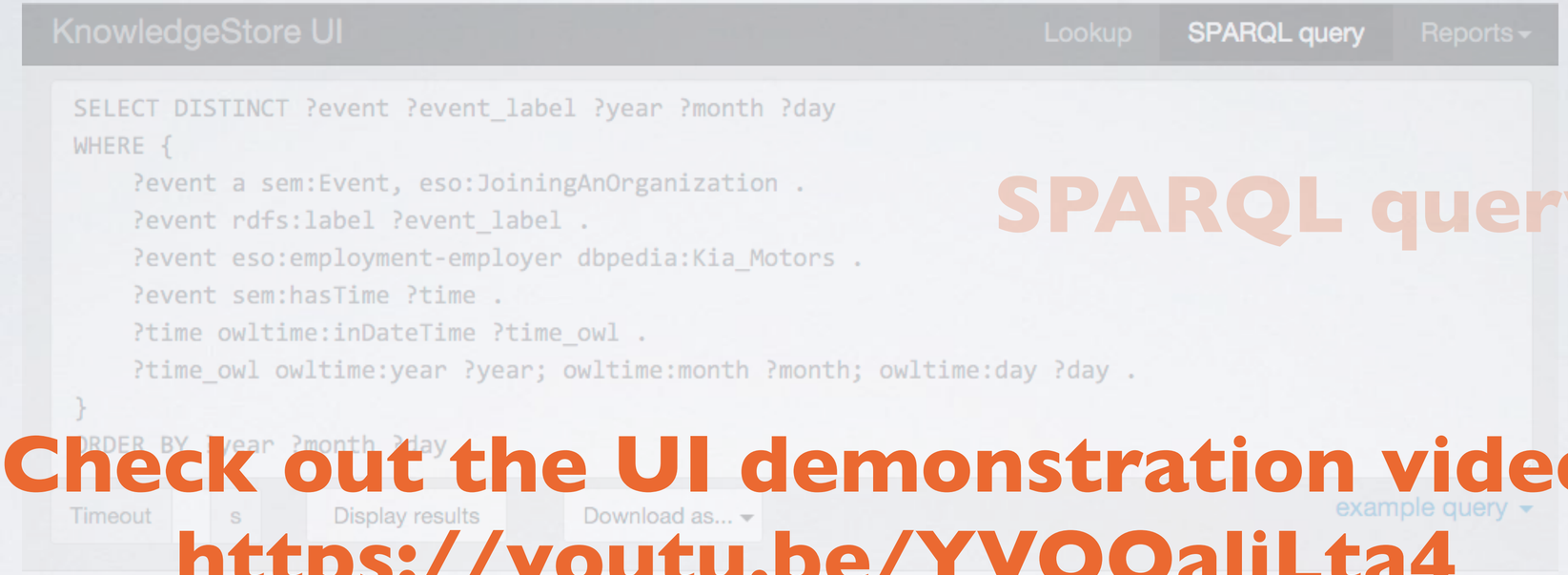

Check out the UI demonstration video:
https://youtu.be/YVOQaljLta4

KnowledgeStore

Reasoning on Events

- Inferring Knowledge **not Explicitly Mentioned** in Text (powered by ESO)
  - Example: "Kia has hired Peter Schreyer as chief design officer."

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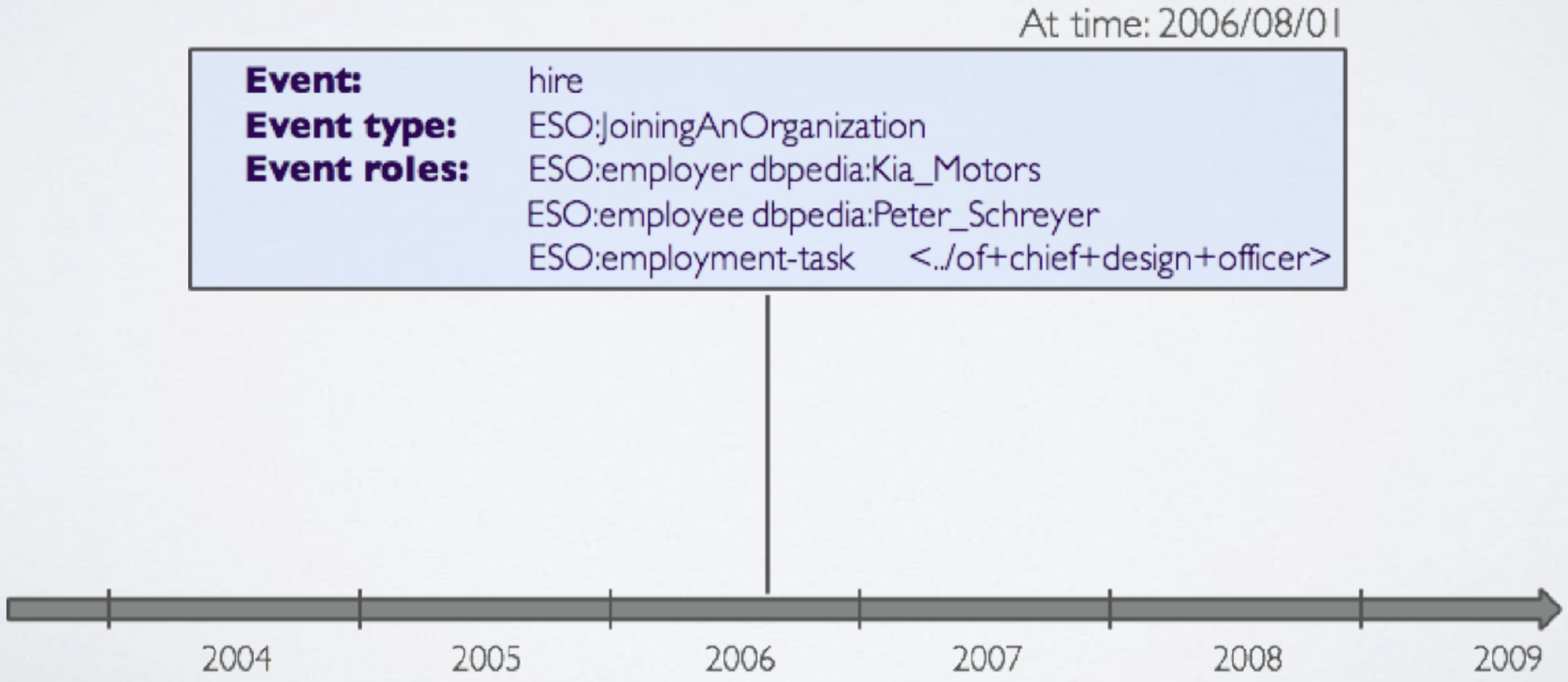

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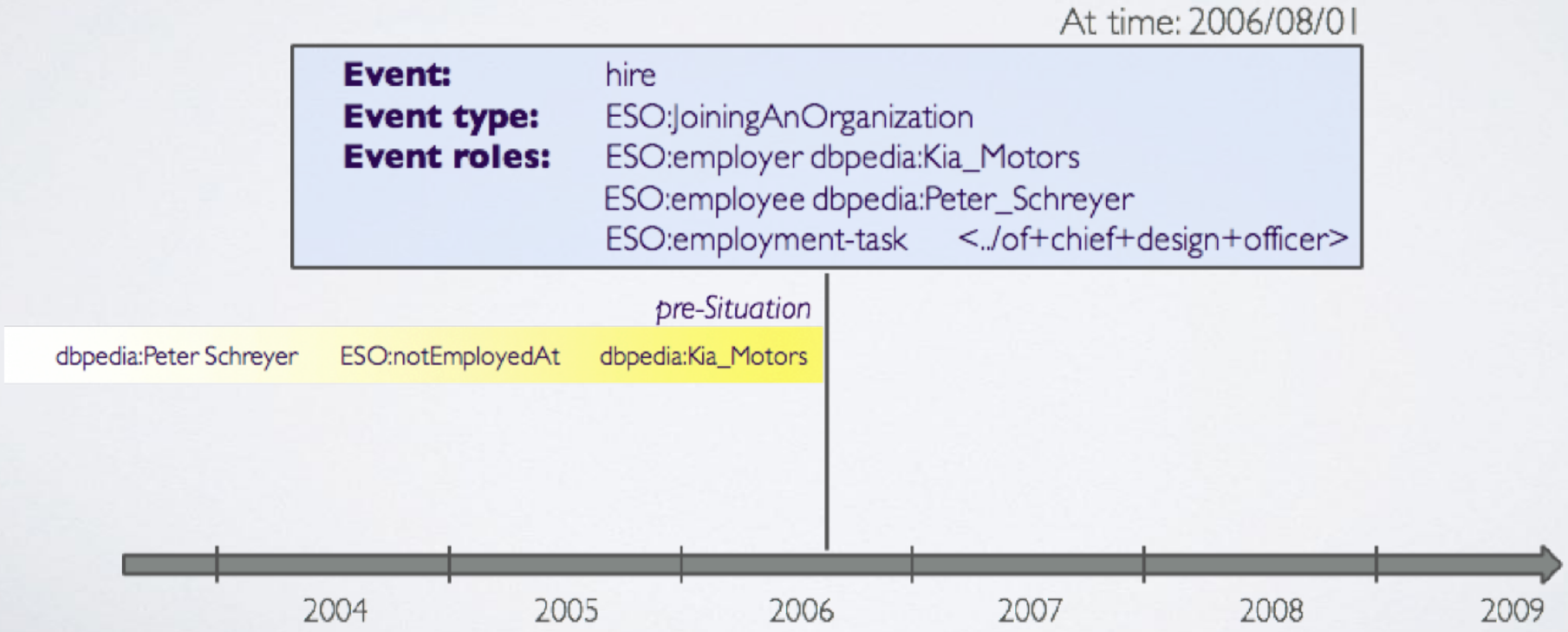

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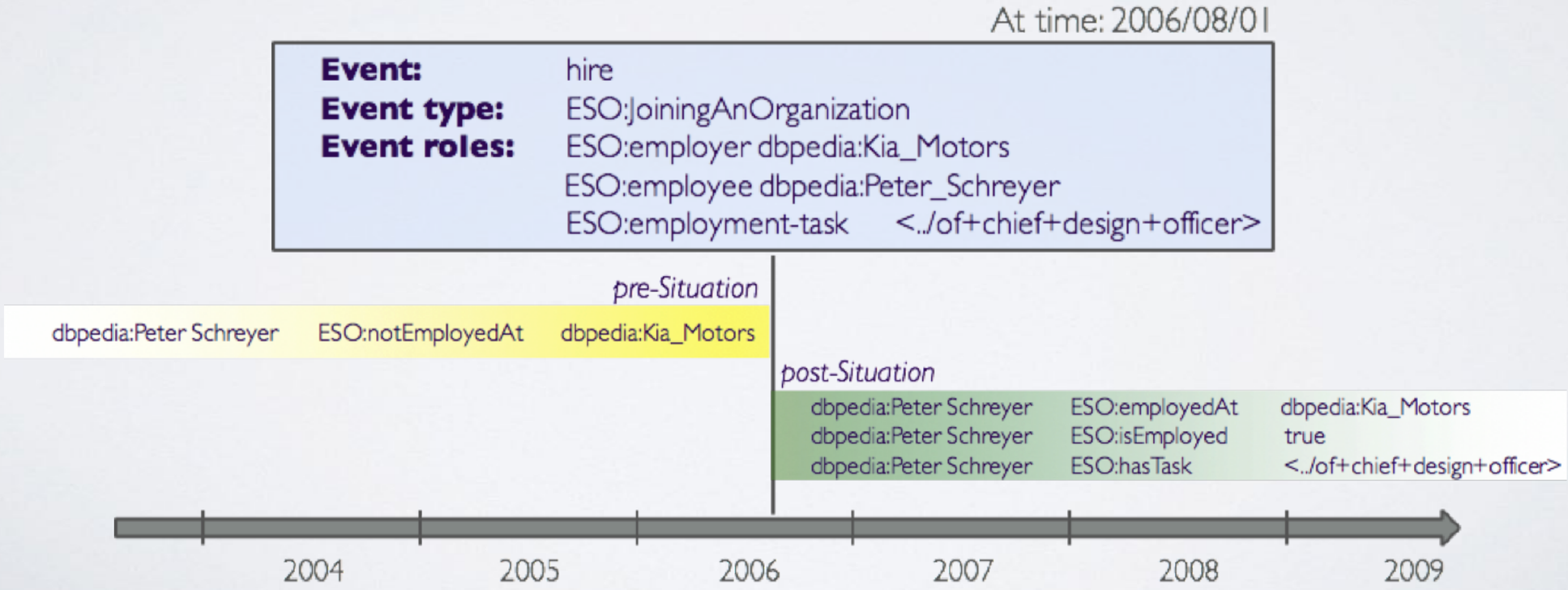

KnowledgeStore

Instances Populated During the Project

	MEANTIME	WikiNews (Ver. 1)	WikiNews (Ver. 2)	Cars (Ver. 1)	FIFA WorldCup	Dutch Parliament	Cars (Ver. 2)	Cars (Ver. 3)
Topic	General News	General News	General News	Automotive Industry	Sport, Football	Financial crisis	Automotive Industry	Automotive Industry
Period	2003-2013	2003-2013	2003-2015	2003-2013	2004-2014	around 2008/2009	2003-2013	2003-2015
News Providers	http://en.wikinews.org/	http://en.wikinews.org/	http://en.wikinews.org/	LexisNexis	LexisNexis, BBC, The Guardian	House of Parliament: news, debates, journals	LexisNexis	LexisNexis
Language	English	English	English	English	English	Dutch	English	English
Populated in	October 2015	February 2015	October 2015	December 2013	May 2014	June 2015	December 2014	October 2015
Pipeline Version	3.0	2.0	3.0	1.0	1.0	1.0-dutch	2.0	3.0
News Articles	120	18,510	19,755	63,635	212,258	597,530	1,259,748	2,316,158
Mentions	35,237	2,629,176	5,206,202	9,110,683	76,165,114	9,231,113	205,114,711	842,639,827
Events	3,333	624,439	632,704	1,783,991	9,387,356	5,383,498	25,156,574	42,296,287
Entities	339	45,592	40,314	428,700	858,982	111,579	1,967,150	2,263,156
Persons	82	19,677	17,617	199,999	403,021	43,546	729,797	895,541
in DBpedia	46	9,744	10,784	16,787	40,511	13,942	128,183	126,140
Organizations	172	15,559	14,358	187,842	431,232	44,139	947,262	1,139,170
in DBpedia	115	6,317	4,940	8,695	15,984	12,907	60,547	44,458
Locations	85	10,356	8,339	40,859	24,729	23,894	290,091	228,445
in DBpedia	81	7,773	7,369	11,364	16,372	11,167	88,695	76,341
Triples	95,219,534	105,675,519	110,861,823	316,034,616	240,731,408	188,296,316	535,035,576	1,240,774,944
from Mentions	1,046,544	9,700,585	16,688,833	46,359,300	136,135,841	65,631,222	439,060,642	1,146,601,954
from DBpedia	94,172,990	95,974,934	94,172,990	269,675,316	104,595,567	122,665,094	95,974,934	94,172,990
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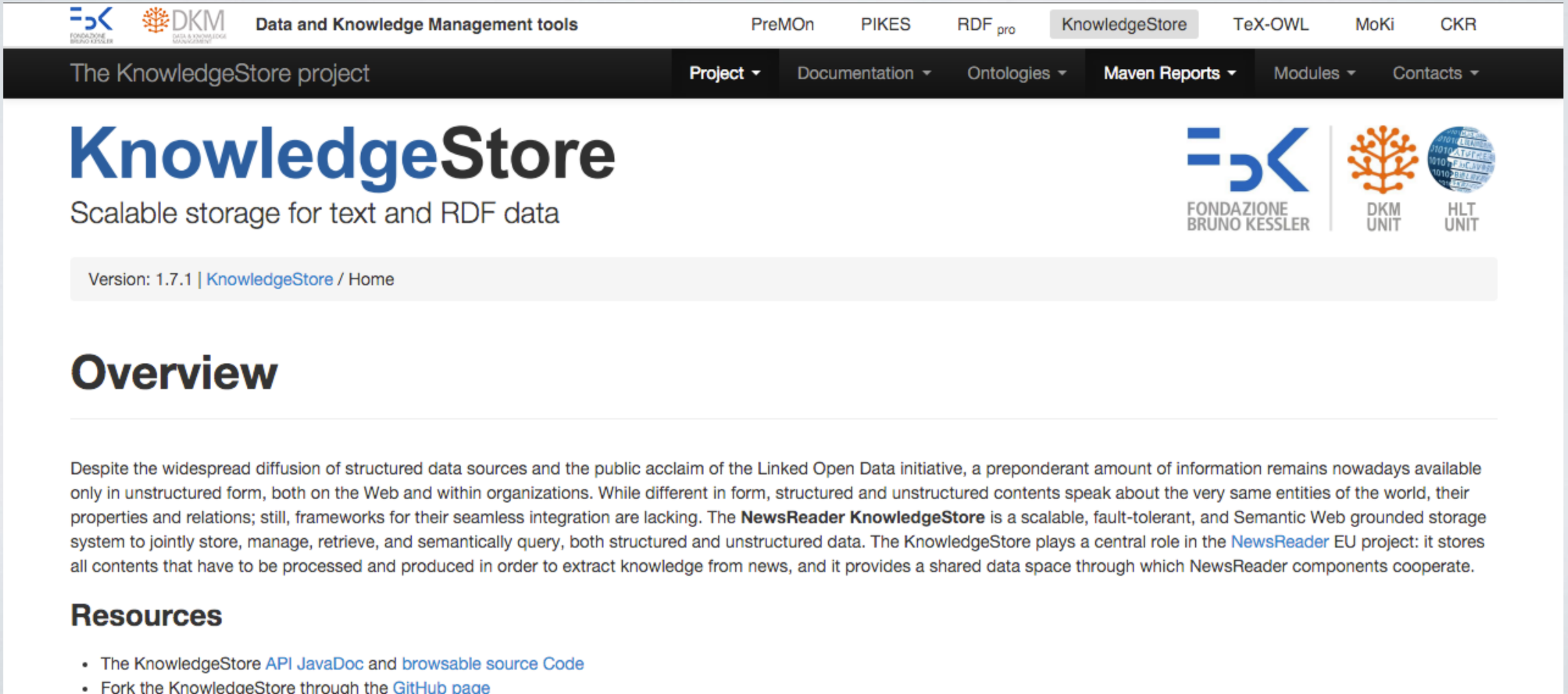
KnowledgeStore

How to Know More…

- Publications
  - [Main Reference] **The KnowledgeStore: a Storage Framework for Interlinking Unstructured and Structured Knowledge** (Francesco Corcoglioniti, Marco Rospocher, Roldano Cattoni, Bernardo Magnini, Luciano Serafini), In International Journal on Semantic Web and Information Systems, volume 11, 2015.
  - **Interlinking Unstructured and Structured Knowledge in an Integrated Framework** (Francesco Corcoglioniti, Marco Rospocher, Roldano Cattoni, Bernardo Magnini, Luciano Serafini), in The 7th IEEE International Conference on Semantic Computing (ICSC), Irvine, CA, USA, 2013
  - **Integrating NLP and SW with the KnowledgeStore** (Marco Rospocher, Francesco Corcoglioniti, Roldano Cattoni, Bernardo Magnini, Luciano Serafini) in ISWC 2014 Posters & Demonstrations Track, within the 13th International Semantic Web Conference (ISWC 2014), Riva del Garda, Italy, October 21, 2014
  - **Integrating Unstructured and Structured Knowledge with the KnowledgeStore** (Marco Rospocher, Francesco Corcoglioniti, Roldano Cattoni, Bernardo Magnini, Luciano Serafini) in Proceedings of the Posters and Demos of the 19th International Conference on Knowledge Engineering and Knowledge Management (EKAW2014)
  - **A Simple API to the KnowledgeStore** (Ian Hopkinson, Steve Maude, Marco Rospocher) in Proc. of ISWC Developers Workshop colocated with 13th Int. Semantic Web Conference (ISWC'14), Riva del Garda, Italy
- Deliverables
  - **D6.1: KnowledgeStore Design** (June 2013)
  - **D6.2.1: KnowledgeStore version 1** (December 2013)
  - **D6.2.2: KnowledgeStore version 2** (February 2015)
  - **D6.2.3: KnowledgeStore version 3** (October 2015)
- Demos
  - **Demonstration video** showing accessing the KnowledgeStore through the UI - https://youtu.be/YVOQaljLta4
- Publicly Accessible KnowledgeStore Instance
  - **Wikinews KnowledgeStore**: https://knowledgestore2.fbk.eu/nwr/wikinews/ui

KnowledgeStore

http://knowledgestore.fbk.eu



KnowledgeStore

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The Team

Roldano Cattoni, Francesco Corcoglioniti, Bernardo Magnini, Alessio Palmero Aprosio, Mohammed Qwaider, Marco Rospocher, Luciano Serafini