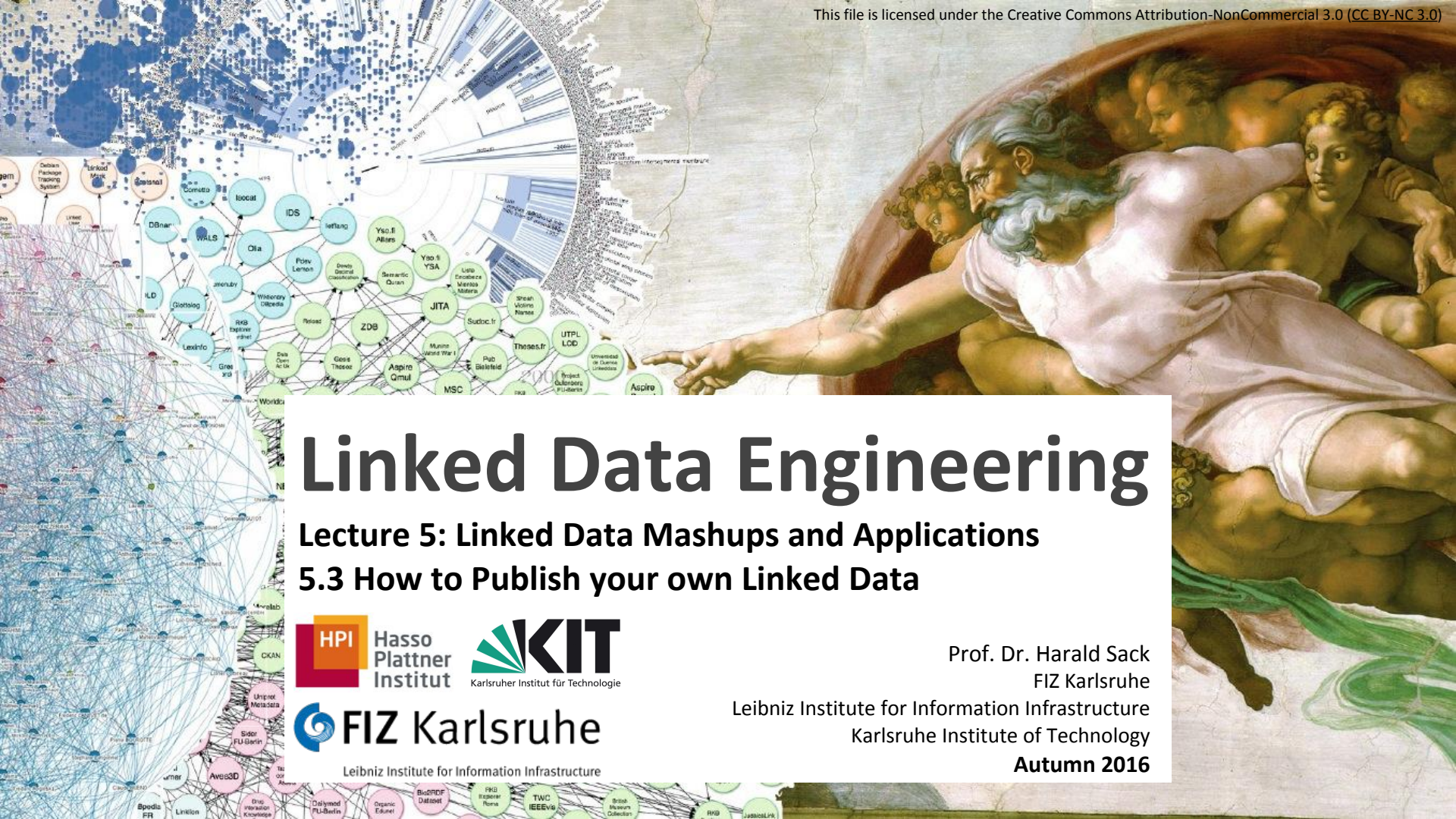

Linked Data Engineering

Lecture 5: Linked Data Mashups and Applications

5.3 How to Publish your own Linked Data

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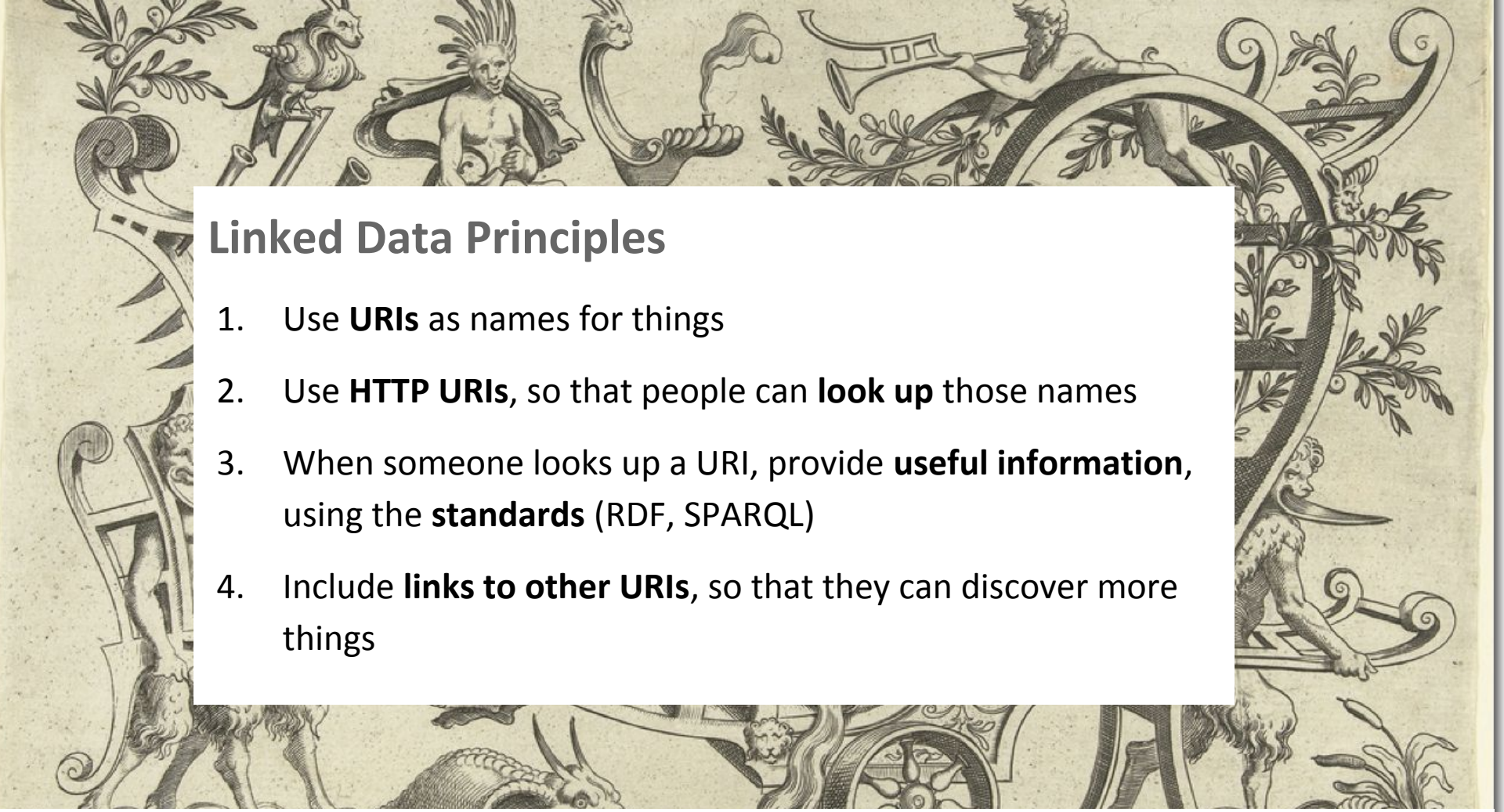
FIZ Karlsruhe
Leibniz Institute for Information Infrastructure
Karlsruhe Institute of Technology

Autumn 2016



Linked Data Principles

1. Use **URIs** as names for things
2. Use **HTTP URIs**, so that people can **look up** those names
3. When someone looks up a URI, provide **useful information**, using the **standards** (RDF, SPARQL)
4. Include **links to other URIs**, so that they can discover more things

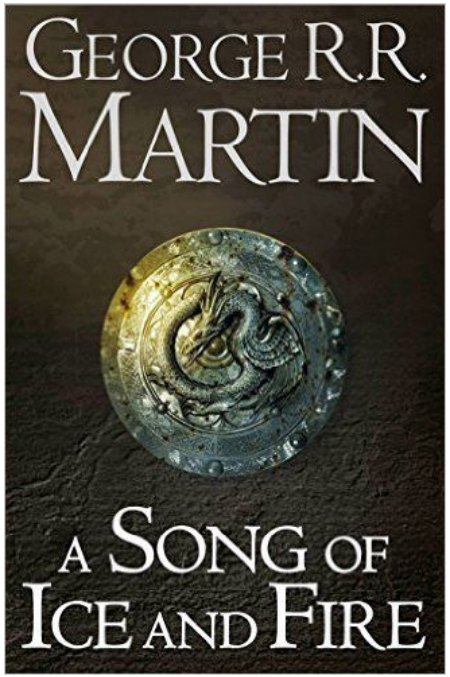
(Tim Berners-Lee, Linked Data, 2006, http://www.w3.org/DesignIssues/LinkedData.html)

Understand your Data

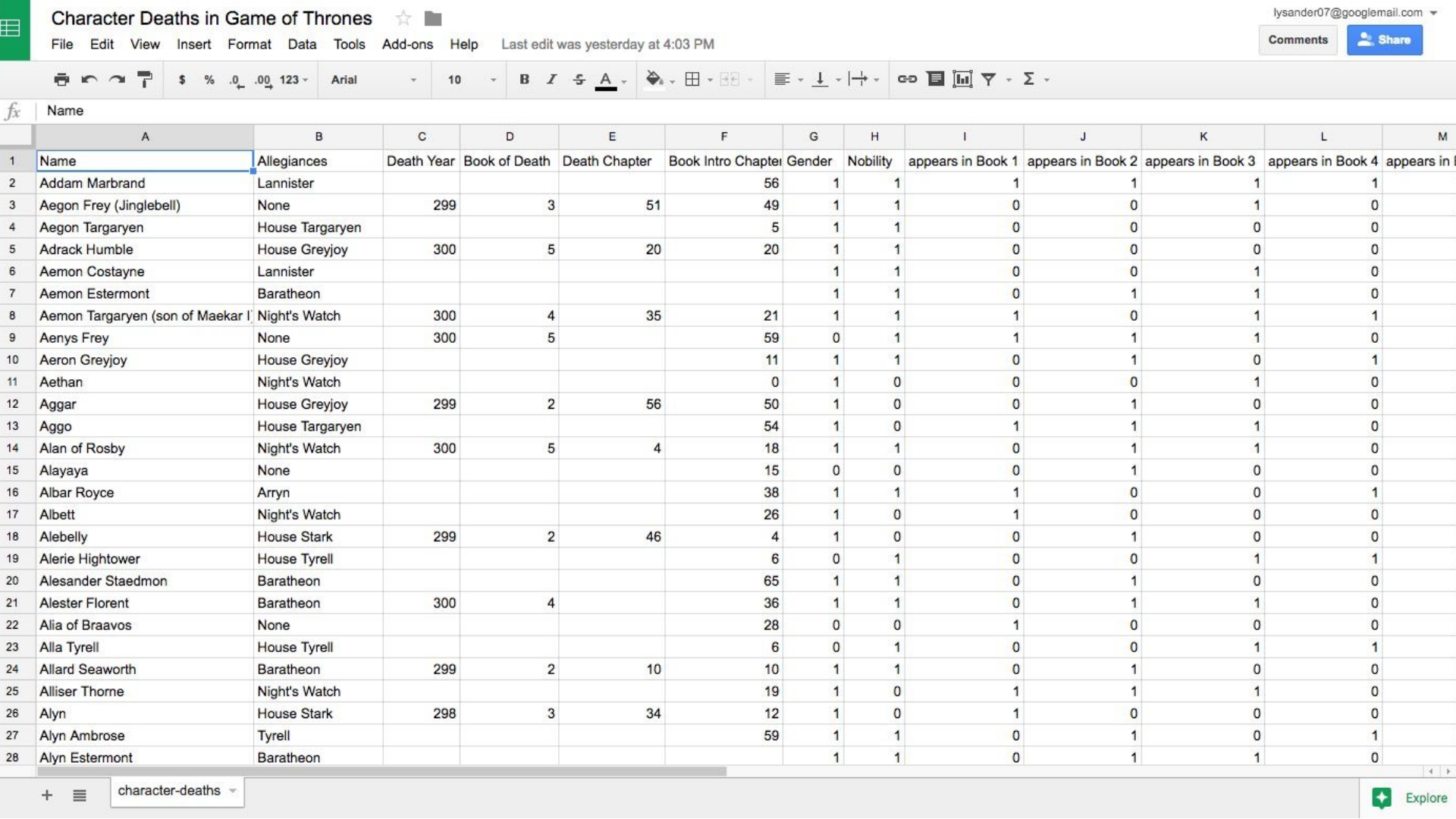
- What are the **key things present in your data**?
  - People ?
  - Places ?
  - Books ?
  - Films ?
  - Musicians ?
  - Photographs ?
  - Reviews ?
  - Comments ?
  - Animals ?
  - Plants ?
  - Research Data ?
  - ...

Hands On Example

- Character Deaths in GAME OF THRONES
  - Character Names
  - Allegiances
  - Gender
  - Nobility
  - Appears in Book x
  - Dies in Book x
  - Death Year



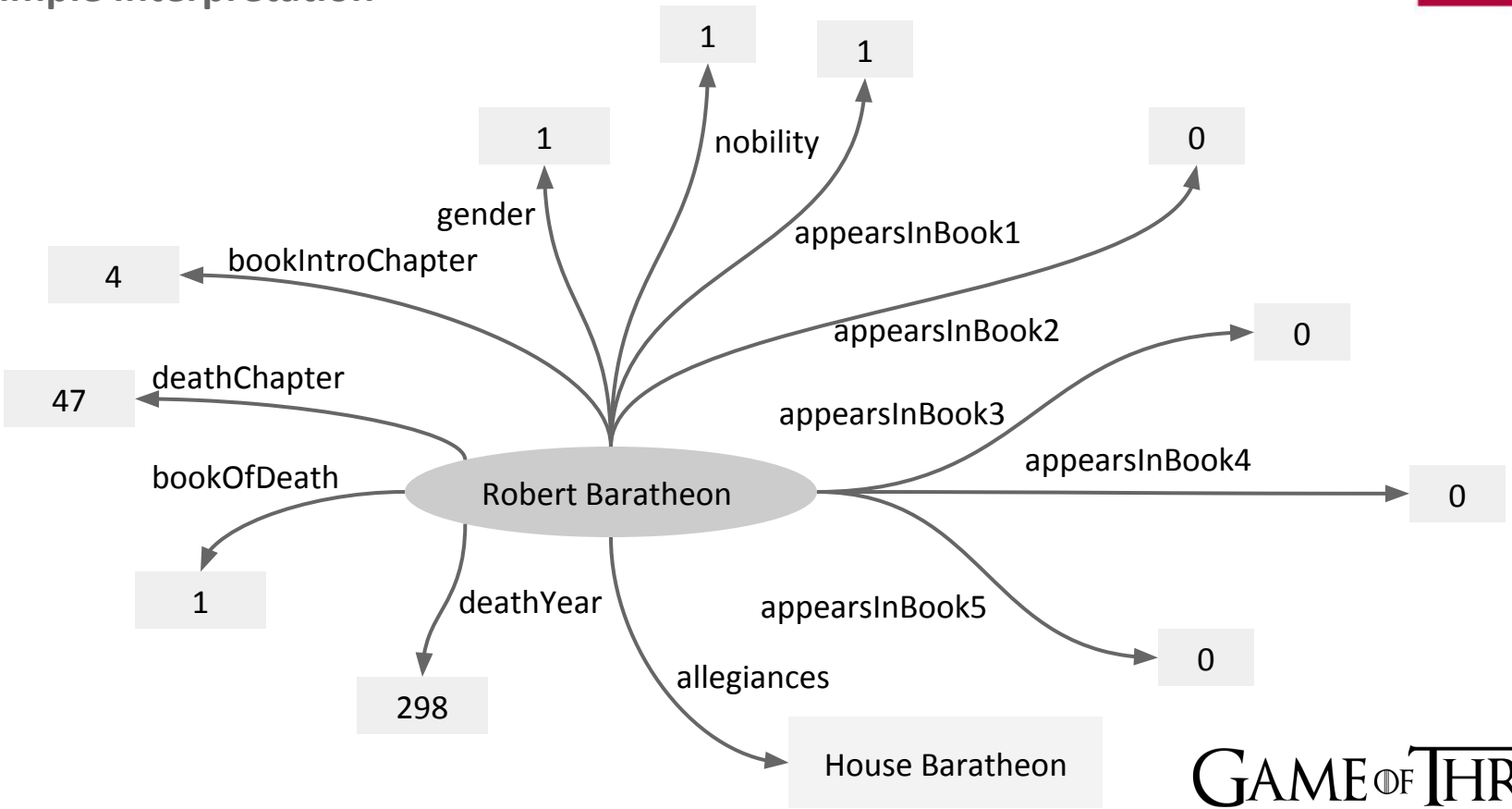
Dataset available at:
http://www.kaggle.com/mylesoneill/game-of-thrones



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Name	Allegiances	Death Year	Book of Death	Death Chapter	Book Intro Chapter	Gender	Nobility	appears in Book 1	appears in Book 2	appears in Book 3	appears in Book 4	appears in
2	Addam Marbrand	Lannister				56	1	1	1	1	1	1	
3	Aegon Frey (Jinglebell)	None	299	3	51	49	1	1	0	0	1	0	
4	Aegon Targaryen	House Targaryen				5	1	1	0	0	0	0	
5	Adrack Humble	House Greyjoy	300	5	20	20	1	1	0	0	0	0	
6	Aemon Costayne	Lannister					1	1	0	0	1	0	
7	Aemon Estermont	Baratheon					1	1	0	1	1	0	
8	Aemon Targaryen (son of Maekar I	Night's Watch	300	4	35	21	1	1	1	0	1	1	
9	Aenys Frey	None	300	5		59	0	1	1	1	1	0	
10	Aeron Greyjoy	House Greyjoy				11	1	1	0	1	0	1	
11	Aethan	Night's Watch				0	1	0	0	0	1	0	
12	Aggar	House Greyjoy	299	2	56	50	1	0	0	1	0	0	
13	Aggo	House Targaryen				54	1	0	1	1	1	0	
14	Alan of Rosby	Night's Watch	300	5	4	18	1	1	0	1	1	0	
15	Alayaya	None				15	0	0	0	1	0	0	
16	Albar Royce	Arryn				38	1	1	1	0	0	1	
17	Albett	Night's Watch				26	1	0	1	0	0	0	
18	Alebelly	House Stark	299	2	46	4	1	0	0	1	0	0	
19	Alerie Hightower	House Tyrell				6	0	1	0	0	1	1	
20	Alesander Staedmon	Baratheon				65	1	1	0	1	0	0	
21	Alester Florent	Baratheon	300	4		36	1	1	0	1	1	0	
22	Alia of Braavos	None				28	0	0	1	0	0	0	
23	Alla Tyrell	House Tyrell				6	0	1	0	0	1	1	
24	Allard Seaworth	Baratheon	299	2	10	10	1	1	0	1	0	0	
25	Alliser Thorne	Night's Watch				19	1	0	1	1	1	0	
26	Alyn	House Stark	298	3	34	12	1	0	1	0	0	0	
27	Alyn Ambrose	Tyrell				59	1	1	0	1	0	1	
28	Alyn Estermont	Baratheon					1	1	0	1	1	0	

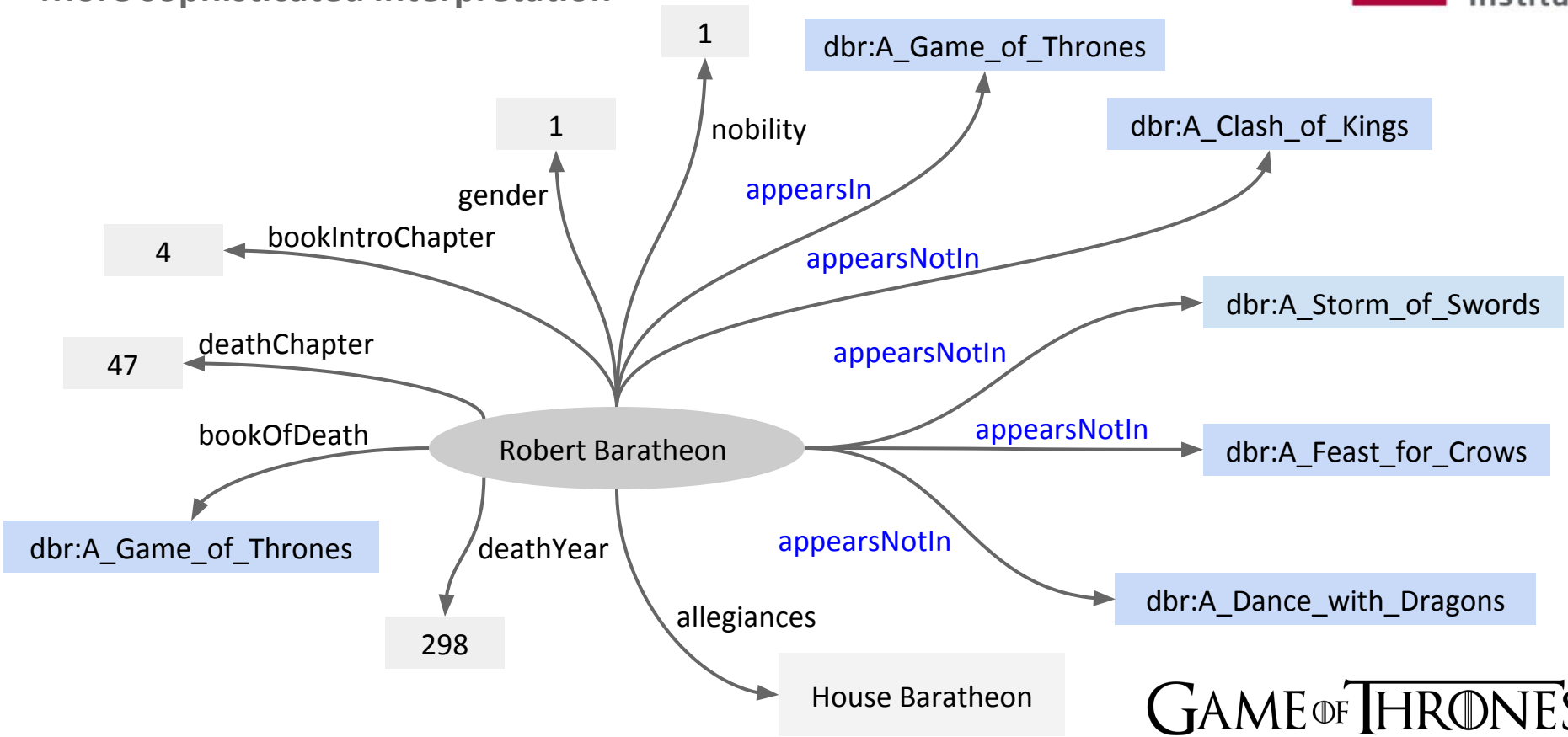
From Table to Triples

Simple Interpretation



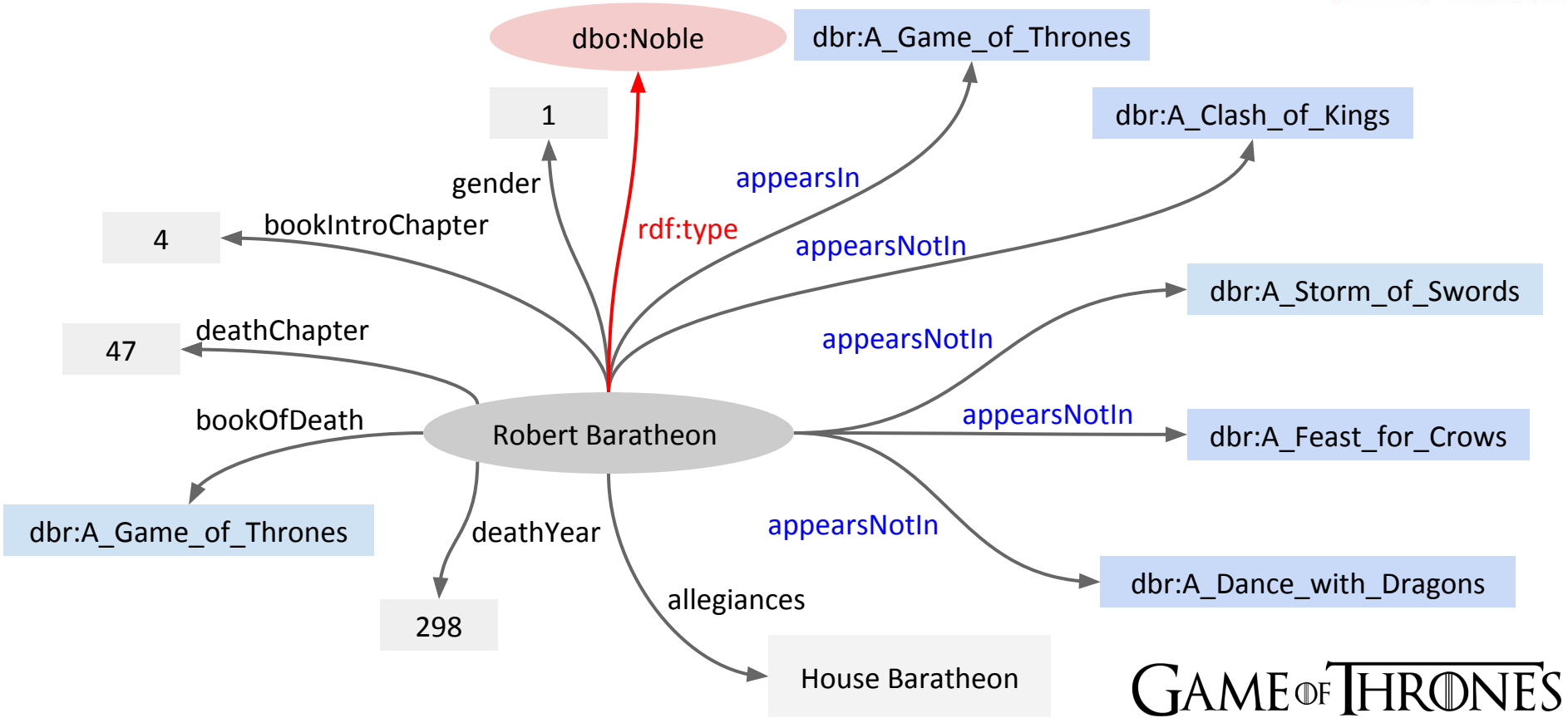
From Table to Triples

More sophisticated interpretation



From Table to Triples

More sophisticated interpretation

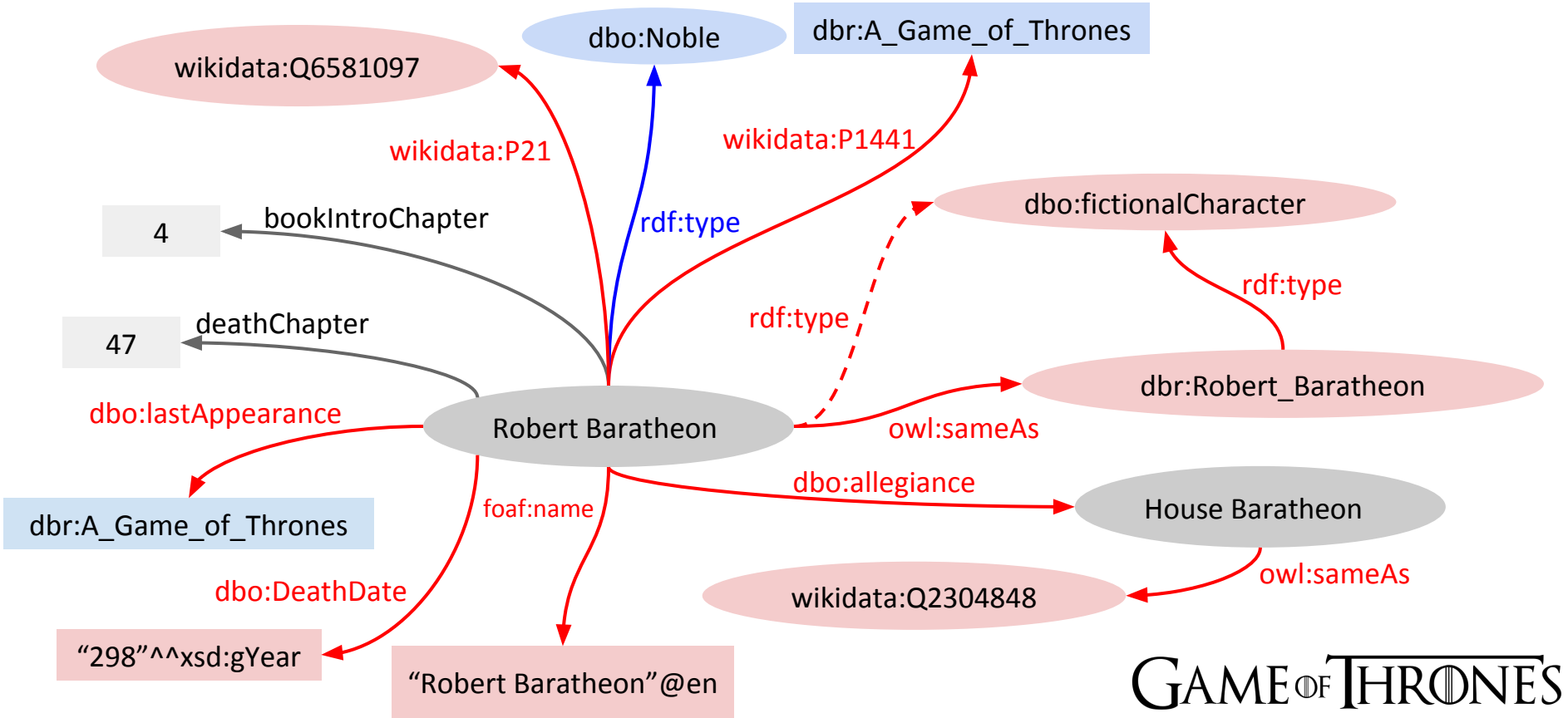


Vocabularies to be used

- Principles:
  - **Reuse**, don’t reinvent
  - **Mix** liberally
- Potential Ontologies / Vocabularies:
  - **FOAF** (for persons and names)
  - **DBpedia Ontology** (Person, Book, death date, lastAppearance, FictionalCharacter)
  - **Wikidata** (gender, Male, Female)

From Table to Triples

More sophisticated interpretation



Choosing URIs

- Keep out of other peoples' namespaces
  - http://dbpedia.org/resource/Neil_Armstrong/
  - http://dbpedia.org/resource/Neil_Armstrong/mything
- Abstract away from implementation details
  - http://dbpedia.org/resource/Berlin
  - http://www4.wiwiss.fu-berlin.de:2020/demos/dbpedia/cgi-bin/resources.php?id=Berlin
- Hash or slash
  - http://mydomain.org/foaf.rdf#me
  - http://mydomain.org/id/me

Common Patterns for URIs

- http://dbpedia.org/resources/A_Game_of_Thrones ← Thing
- http://dbpedia.org/data/A_Game_of_Thrones ← RDF data
- http://dbpedia.org/page/A_Game_of_Thrones ← HTML page

- http://mydomain.org/thing ← Thing
- http://mydomain.org/rdf ← RDF data
- http://mydomain.org/html ← HTML page

- http://mydomain.org/thing ← Thing
- http://mydomain.org/thing.rdf ← RDF data
- http://mydomain.org/thing.html ← HTML page

Common Patterns for URIs

Structure your namespace:

- http://mydomain.org/persons/Aemon_Targaryen
- http://mydomain.org/persons/Jon_Snow

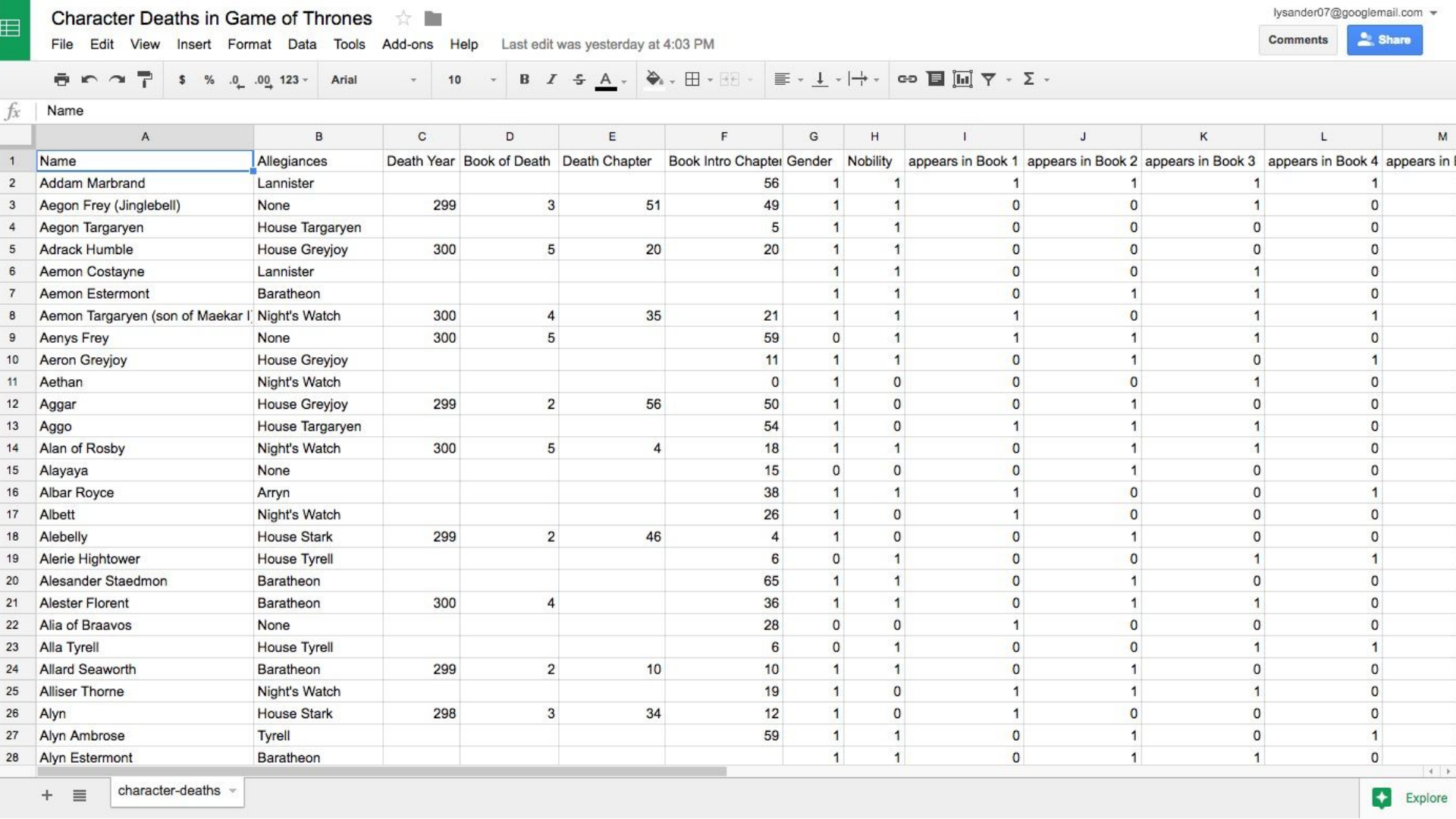
- http://mydomain.org/families/House_Targaryen
- http://mydomain.org/families/House_Lannister

Convert to RDF

Most simple form: Database export as CSV

- **RDB to RDF**
  - **Rows** denote facts about a common **subject** denoted by the primary key
  - **Columns** denote **properties** and **property values**

- Substitute field values with suitable URIs
  `Jon Snow → http://mydomain.org/persons/Jon_Snow`
  or
- interpret values as (typed) literals
  `299 → "299"^^<http://www.w3.org/2001/XMLSchema#gYear>`



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7	Aemon Estermont	Baratheon					1	1	0	1	1	0	
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9	Aenys Frey	None	300	5		59	0	1	1	1	1	0	
10	Aeron Greyjoy	House Greyjoy				11	1	1	0	1	0	1	
11	Aethan	Night's Watch				0	1	0	0	0	1	0	
12	Aggar	House Greyjoy	299	2	56	50	1	0	0	1	0	0	
13	Aggo	House Targaryen				54	1	0	1	1	1	0	
14	Alan of Rosby	Night's Watch	300	5	4	18	1	1	0	1	1	0	
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16	Albar Royce	Arryn				38	1	1	1	0	0	1	
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21	Alester Florent	Baratheon	300	4		36	1	1	0	1	1	0	
22	Alia of Braavos	None				28	0	0	1	0	0	0	
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26	Alyn	House Stark	298	3	34	12	1	0	1	0	0	0	
27	Alyn Ambrose	Tyrell				59	1	1	0	1	0	1	
28	Alyn Estermont	Baratheon					1	1	0	1	1	0	

Convert to RDF

Reuse existing vocabularies, if possible

- ```
  @PREFIX :         <http://mydomain.org/persons/> .
  @PREFIX foaf:     <http://xmlns.com/foaf/0.1/> .
  @PREFIX wikidata: <https://www.wikidata.org/entity/> .
  @PREFIX rdf:      <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
  @PREFIX rdfs:     <http://www.w3.org/2000/01/rdf-schema#> .
  @PREFIX dbo:      <http://dbpedia.org/ontology/> .

  :Jon_Snow     rdfs:label "Jon Snow"@en ;
                foaf:name "Jon Snow"@en ;
                rdf:type dbo:FictionalCharacter ;
                dbo:allegiance :NightsWatch ;
                :deathChapter 47 ;
                wikidata:P21 wikidata:Q6581097 .
  ```
  ```

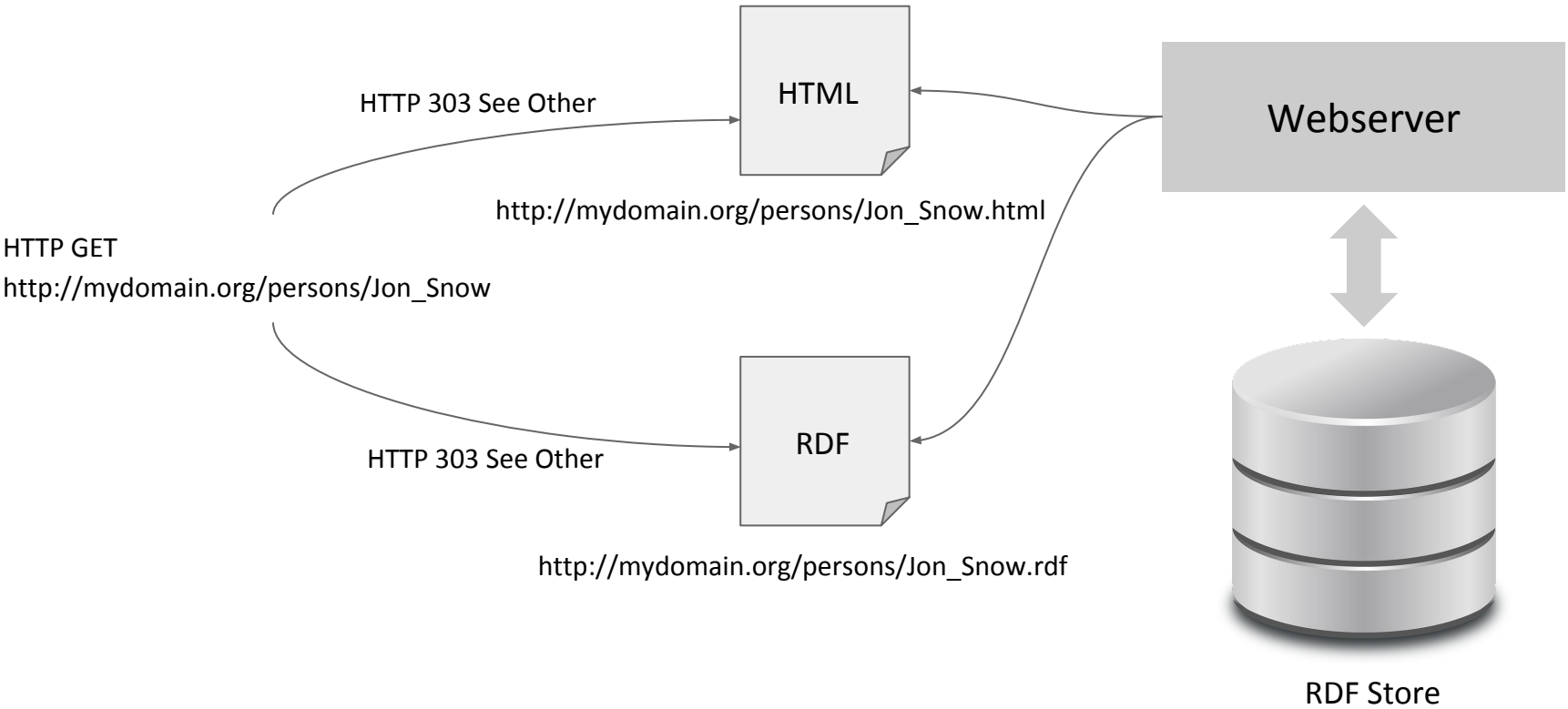
Link to Other Linked Data Datasets

GAME OF THRONES

http://mydomain.org/

```
:Jon_Snow     owl:sameAs dbr:Jon_Snow_(character) .
:NightsWatch  owl:sameAs wikidata:Q1088558 .
```

Set Up your Infrastructure



Next: 04 - Linked Data Programming

Lecture 5 - Linked Data Mashups & Applications - OpenHPI - Course Linked Data Engineering