

How to Publish Linked Data on the Web

Tom Heath, Platform Division, Talis, UK

Chris Bizer, FU Berlin, Germany

Richard Cyganiak, DERI Galway, Ireland

<http://sites.wiwiss.fu-berlin.de/suhl/bizer/pub/LinkedDataTutorial/>

<http://linkeddata.org/slides/2008-06-nyc-ldp.pdf>



Objectives

- Provide a broad understanding of the design decisions required when publishing Linked Data
- Introduce the principles and best practices that inform these decisions



Background



The RDF Data Model

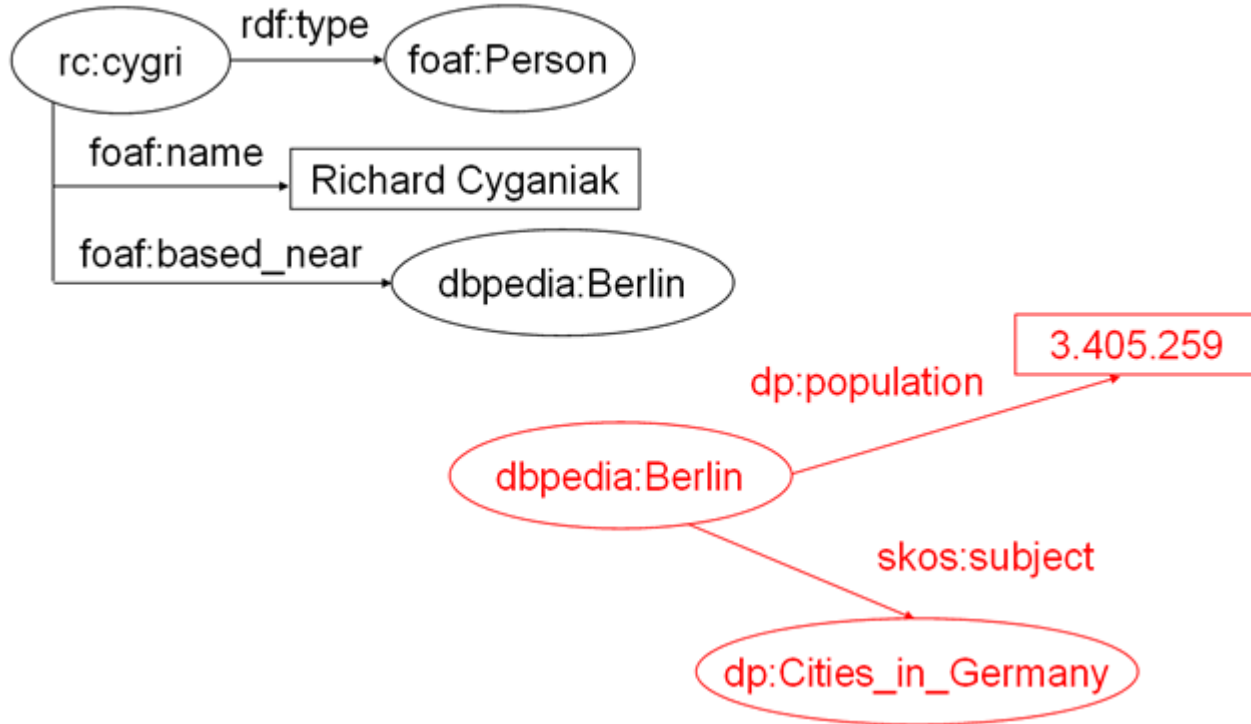
- *Triples*

subject → predicate → object

<uri> → typed-link → <uri> or "literal"

- Mix schemas/vocabularies within one document
- Less painful data merging

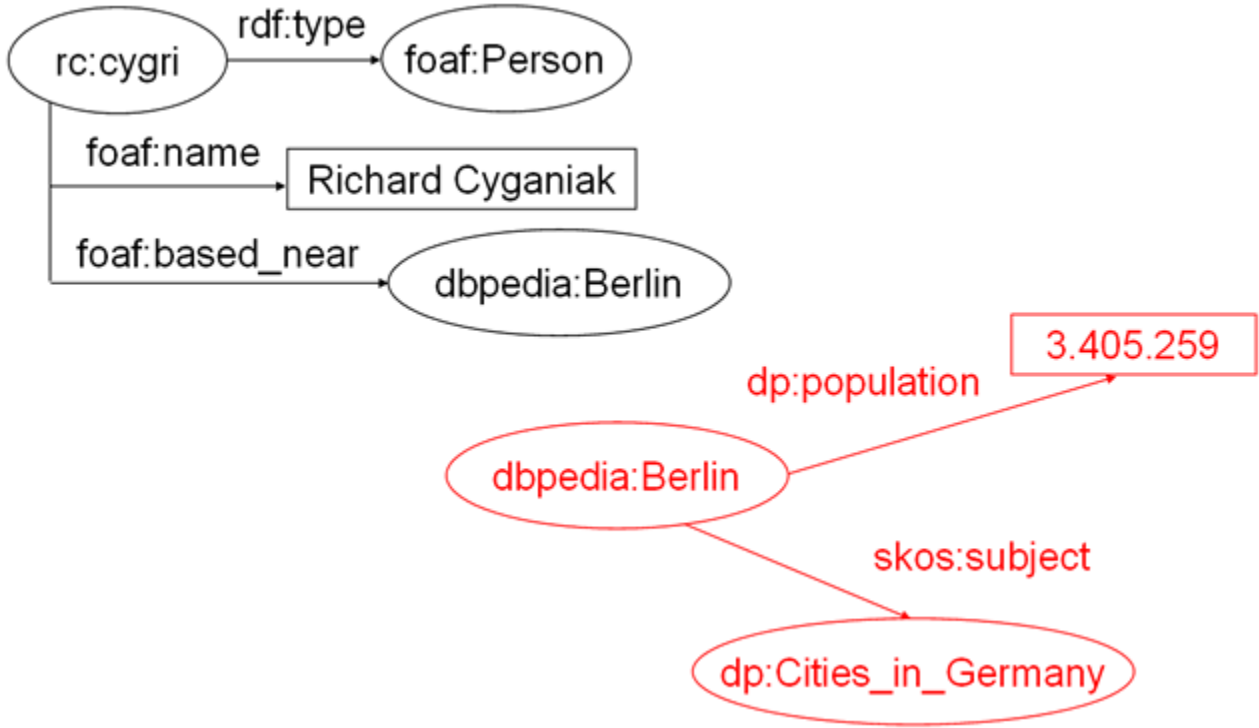
Data Merging with RDF



Prefixes

- rc: <http://richard.cyganiak.de/foaf.rdf#>
- rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
- foaf: <http://xmlns.com/foaf/0.1/>
- dbpedia: <http://dbpedia.org/resource/>
- dp: <http://dbpedia.org/property/>
- skos: <http://www.w3.org/2004/02/skos/core#>

What is Linked Data?





Why Publish Linked Data?

- Ease of Discovery
- Ease of Consumption
- Reduced Redundancy
 - avoid duplication
- Added Value
 - build ecosystems around your data/content



Scenario

- Online whisky shop: *Wiskii.com*
- New business venture, founded by *Jeff*
- For the whisky connoisseur
- Detailed background information from experts
- Contributions from customers
- Custom web app, relational backend
- Simultaneous publication in HTML and RDF



How to Publish Linked Data on the Web



5 Steps to Publishing Linked Data

1. Understand the Principles
2. Understand your Data
3. Choose URIs for Things in your Data
4. Setup Your Infrastructure
5. Link to other Data Sets



1. Understand the Principles

1. Linked Data Principles

- Use URIs as names for things
 - anything, not just documents
 - you are not your homepage
 - information resources and non-information resources
- Use HTTP URIs
 - globally unique names, distributed ownership
 - allows people to look up those names
- Provide useful information in RDF
 - when someone looks up a URI
- Include RDF links to other URIs
 - to enable discovery of related information



2. Understand your Data

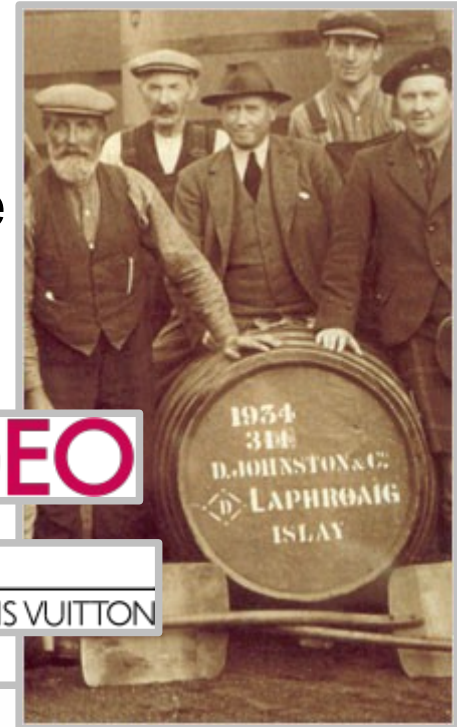


2. Understand Your Data

- What are the key things present in your data?
 - People?
 - Places?
 - Books?
 - Films?
 - Musicians?
 - Concepts?
 - Photos?
 - Comments?
 - Reviews?
 - ...

2. Understand Your Data

- Things in the *Wiskii.com* database
 - Distilleries
 - Regions and Locations
 - Founders
 - Owners
 - Brands
 - Products
 - Photos
 - Reviews
 - Comments
 - Prices/Offers



DIAGEO

LVMH
MOËT HENNESSY • LOUIS VUITTON





2. Understand Your Data

- What vocabularies can be used to describe these?
 - Principles
 - Reuse, don't reinvent
 - Mix liberally
 - Potential Ontologies/Vocabularies
 - Geo
 - GoodRelations
 - FOAF
 - Review
 - SIOC
 - Whisky



3. Choose URIs for Things in Your Data

3. Choosing URIs: Principles

- Use HTTP URIs
- Keep out of other peoples' namespaces
 1. <http://www.imdb.com/title/tt0441773/>
 2. <http://www.imdb.com/title/tt0441773/thing>
 3. <http://myfilms.com/tt0441773>
 4. <http://myfilms.com/tt0441773/html>
- Abstract away from implementation details
 1. <http://dbpedia.org/resource/Berlin>
 2. <http://www4.wiwiss.fu-berlin.de:2020/demos/dbpedia/cgi-bin/resources.php?id=Berlin>
- Hash or Slash
 1. <http://mydomain.com/foaf.rdf#me>
 2. <http://mydomain.com/id/me>

3. Choosing URIs: Common Patterns

- http://dbpedia.org/resource/New_York_City ← Thing
- http://dbpedia.org/data/New_York_City ← RDF data
- http://dbpedia.org/page/New_York_City ← HTML page

- <http://revyu.com/people/tom> ← Thing
- <http://revyu.com/people/tom/about/rdf> ← RDF data
- <http://revyu.com/people/tom/about/html> ← HTML page

- <http://kmi.open.ac.uk/people/tom/> ← Thing
- <http://kmi.open.ac.uk/people/tom/rdf> ← RDF data
- <http://kmi.open.ac.uk/people/tom/html> ← HTML page

- <http://mydomain.com/thing> ← Thing
- <http://mydomain.com/thing.rdf> ← RDF data
- <http://mydomain.com/thing.html> ← HTML page



3. Choosing URIs: Wiskii.com

- <http://wiskii.com/regions/speyside>
- <http://wiskii.com/distilleries/talisker>
- <http://wiskii.com/brands/talisker>
- <http://wiskii.com/products/talisker-20-yo>
- <http://wiskii.com/products/glenmorangie-lasanta>
- <http://wiskii.com/people/william-matheson>
- <http://wiskii.com/photos/58>
- <http://wiskii.com/reviews/271>



3. Choosing URIs: Wiskii.com

- <http://wiskii.com/distilleries/talisker>
- <http://wiskii.com/distilleries/talisker/rdf>
- <http://wiskii.com/distilleries/talisker/html>

- <http://wiskii.com/brands/talisker>
- <http://wiskii.com/brands/talisker/rdf>
- <http://wiskii.com/brands/talisker/html>

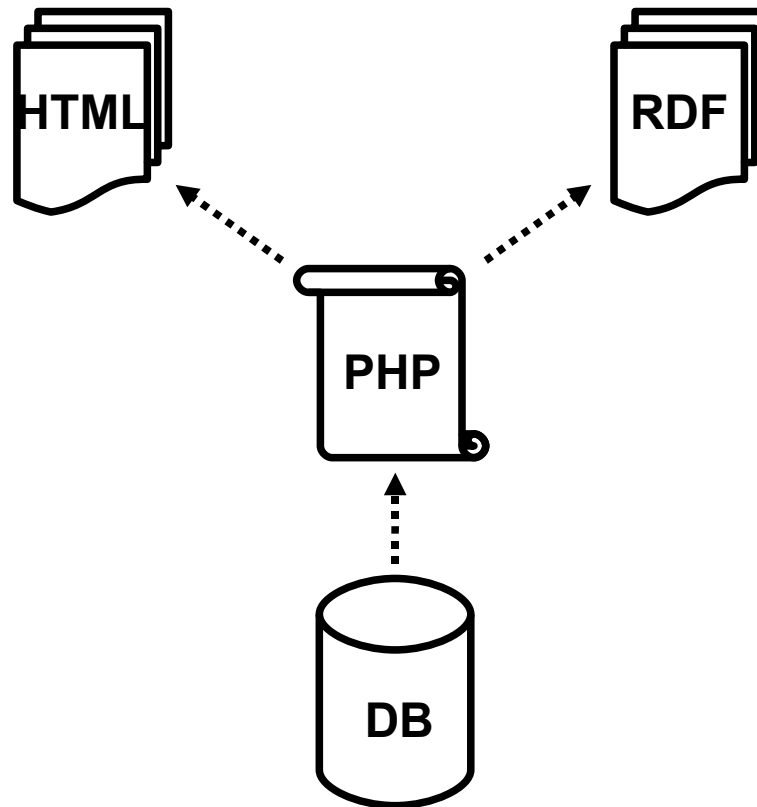
- <http://wiskii.com/people/william-matheson>
- <http://wiskii.com/people/william-matheson/rdf>
- <http://wiskii.com/people/william-matheson/html>

- <http://wiskii.com/photos/58>

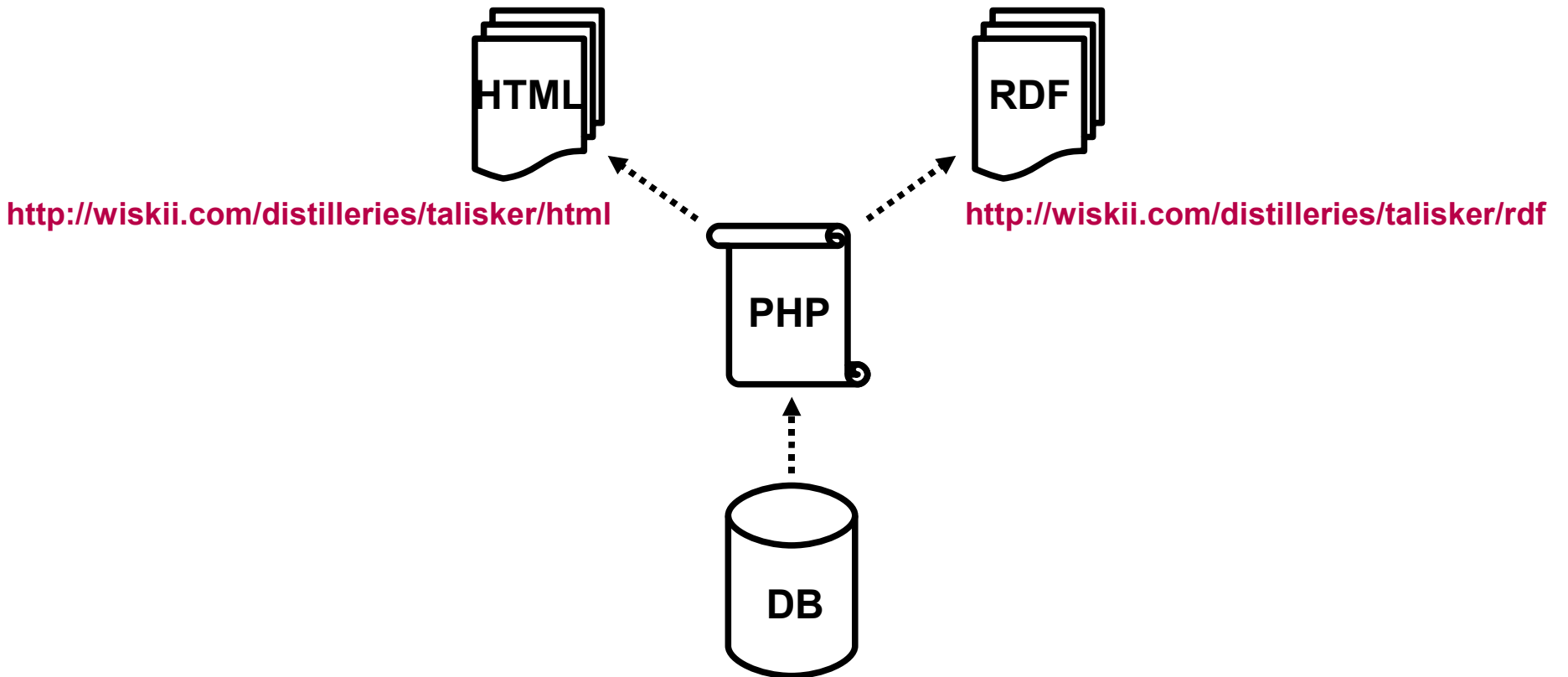


4. Setup Your Infrastructure

4. Setup Your Infrastructure

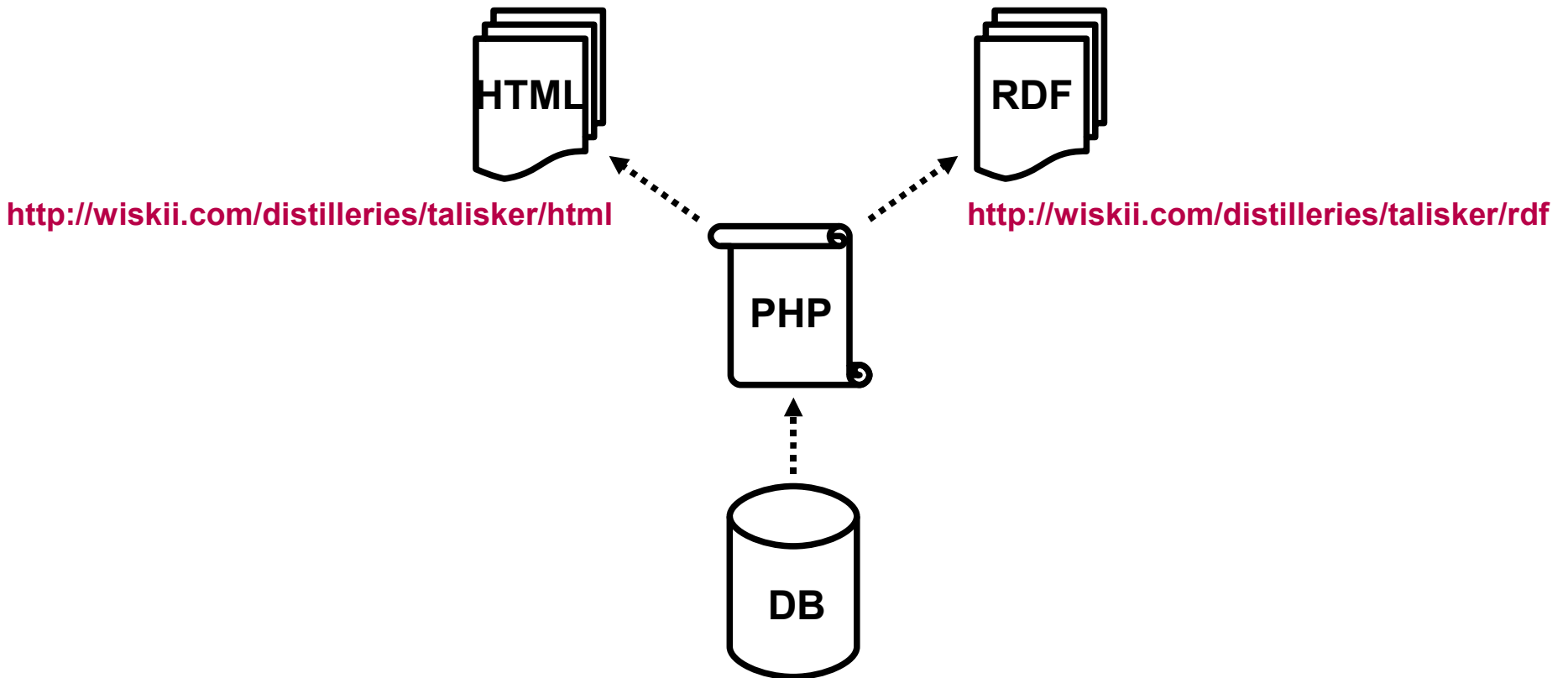


4. Setup Your Infrastructure

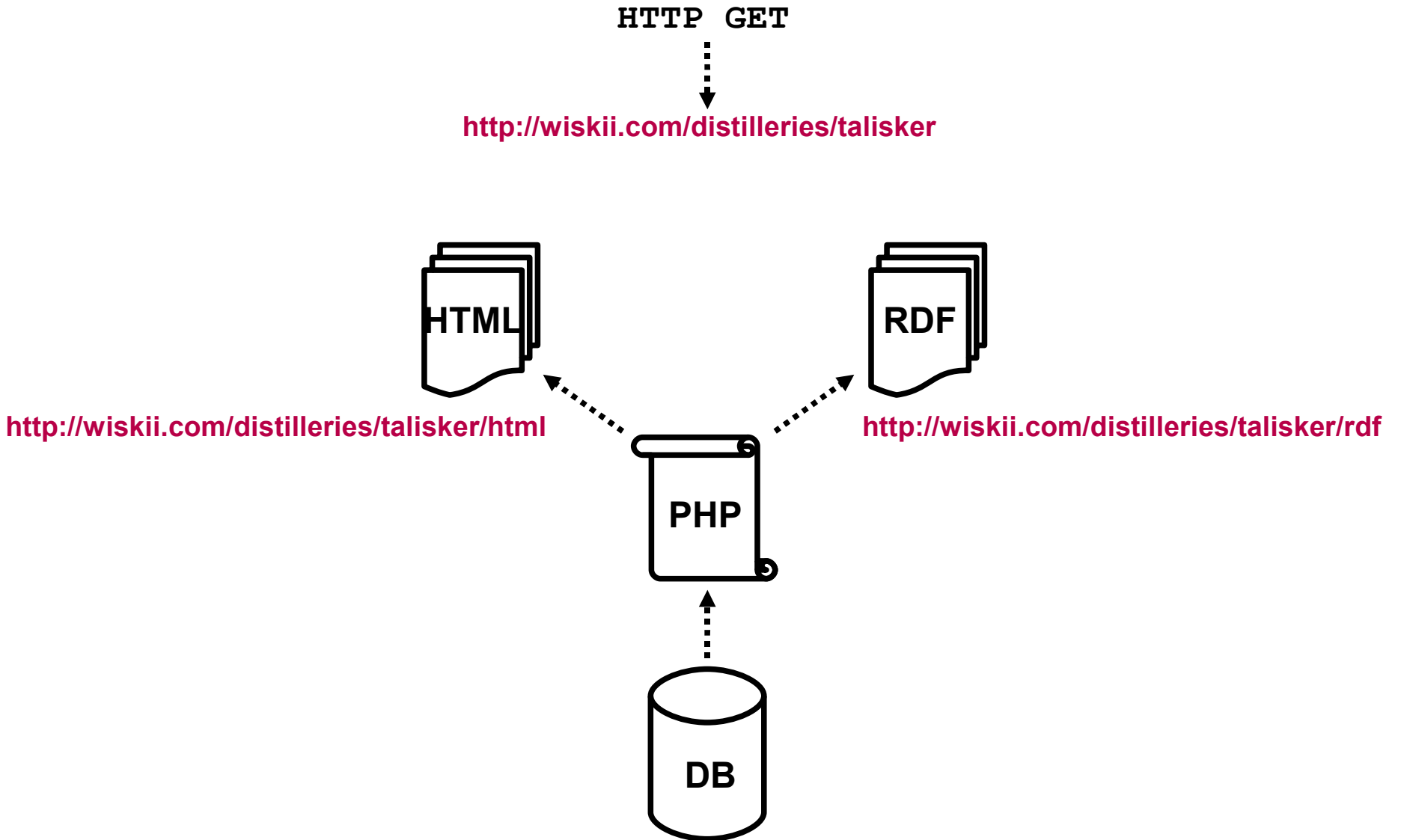


4. Setup Your Infrastructure

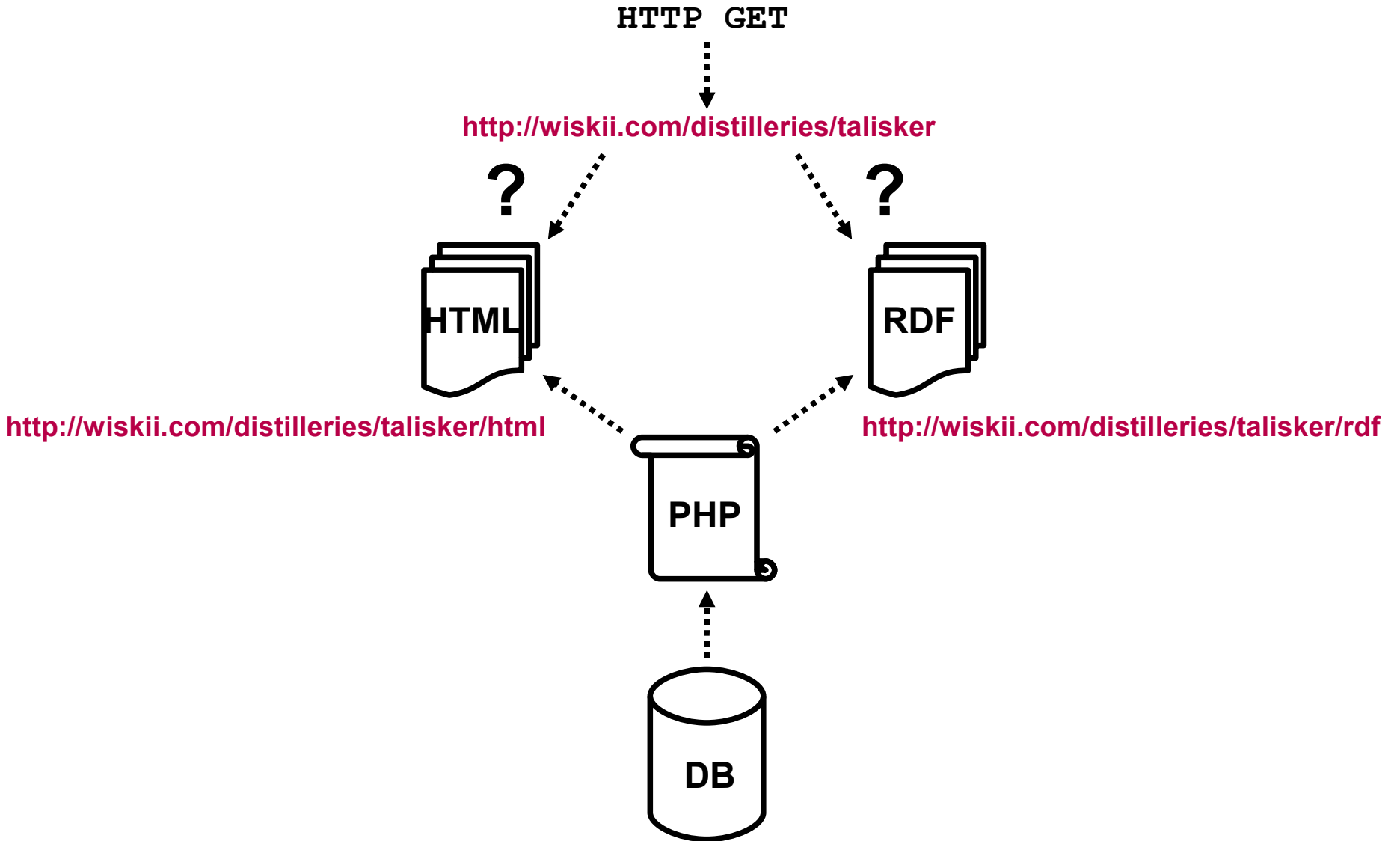
<http://wiskii.com/distilleries/talisker>



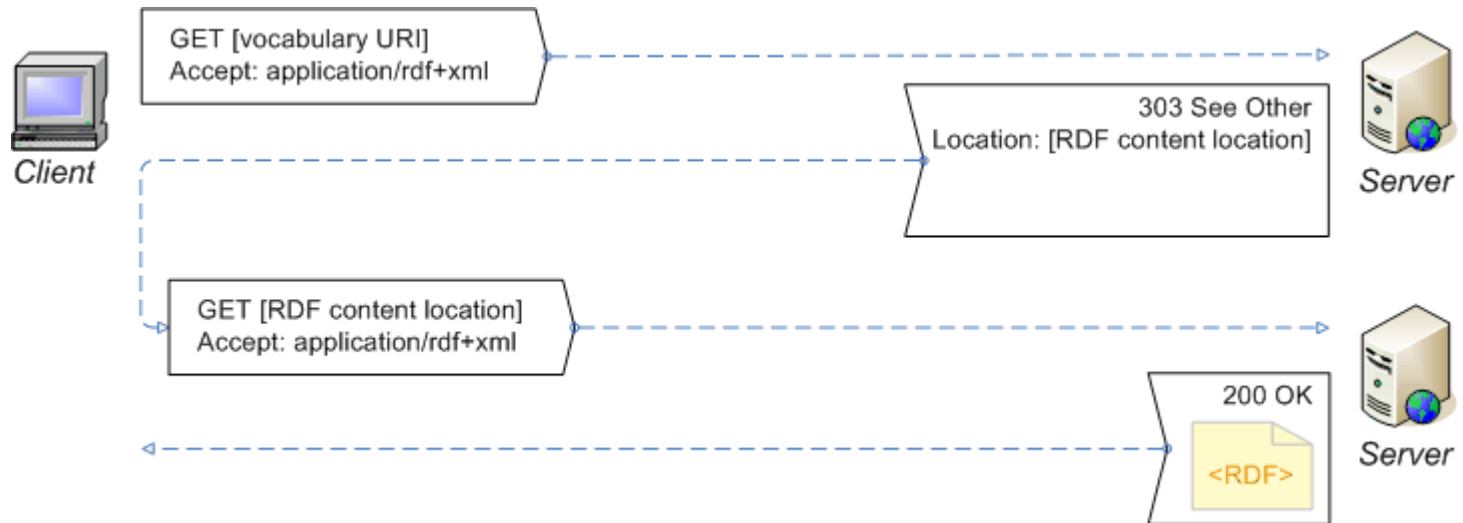
4. Setup Your Infrastructure



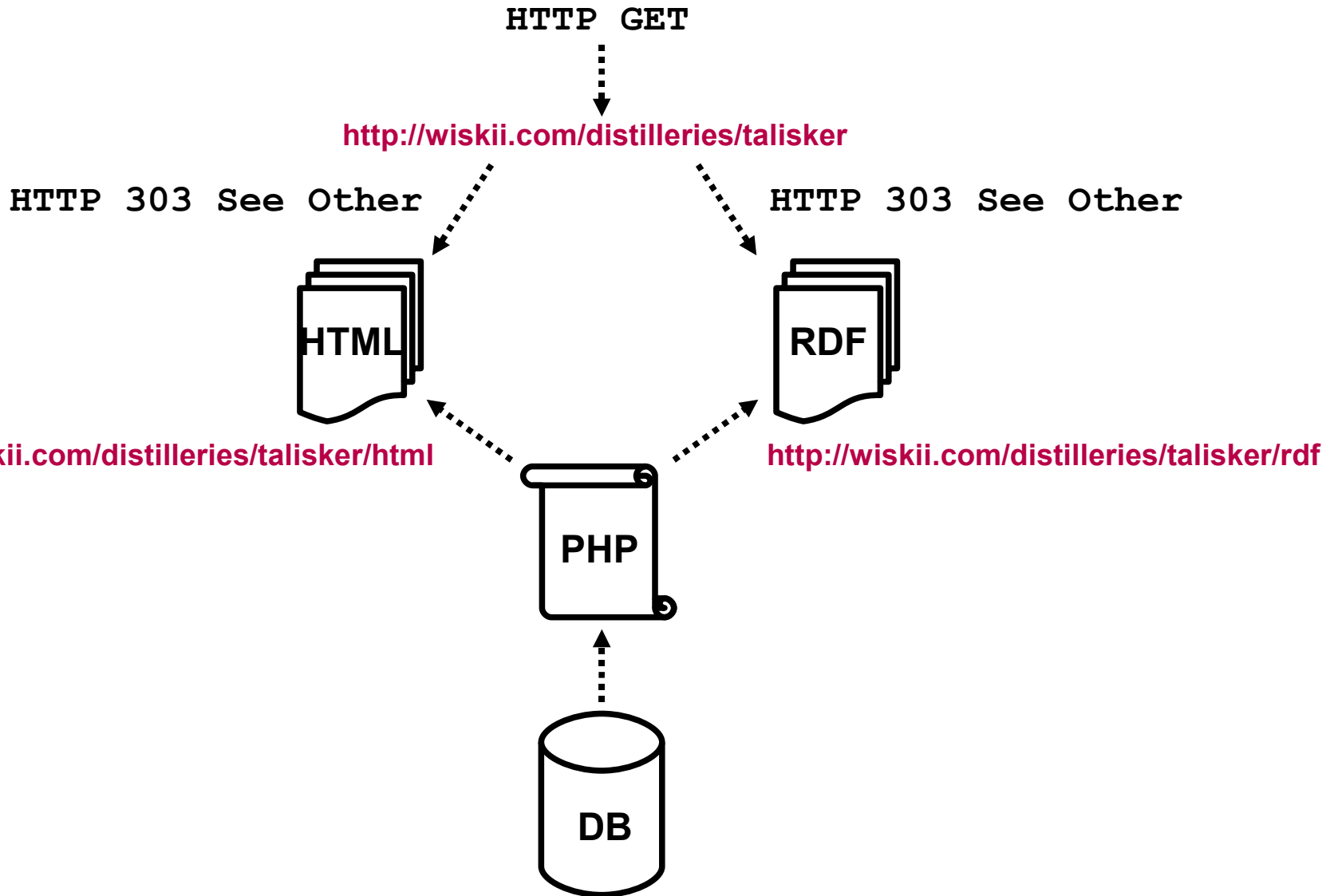
4. Setup Your Infrastructure



Content Negotiation



4. Setup Your Infrastructure





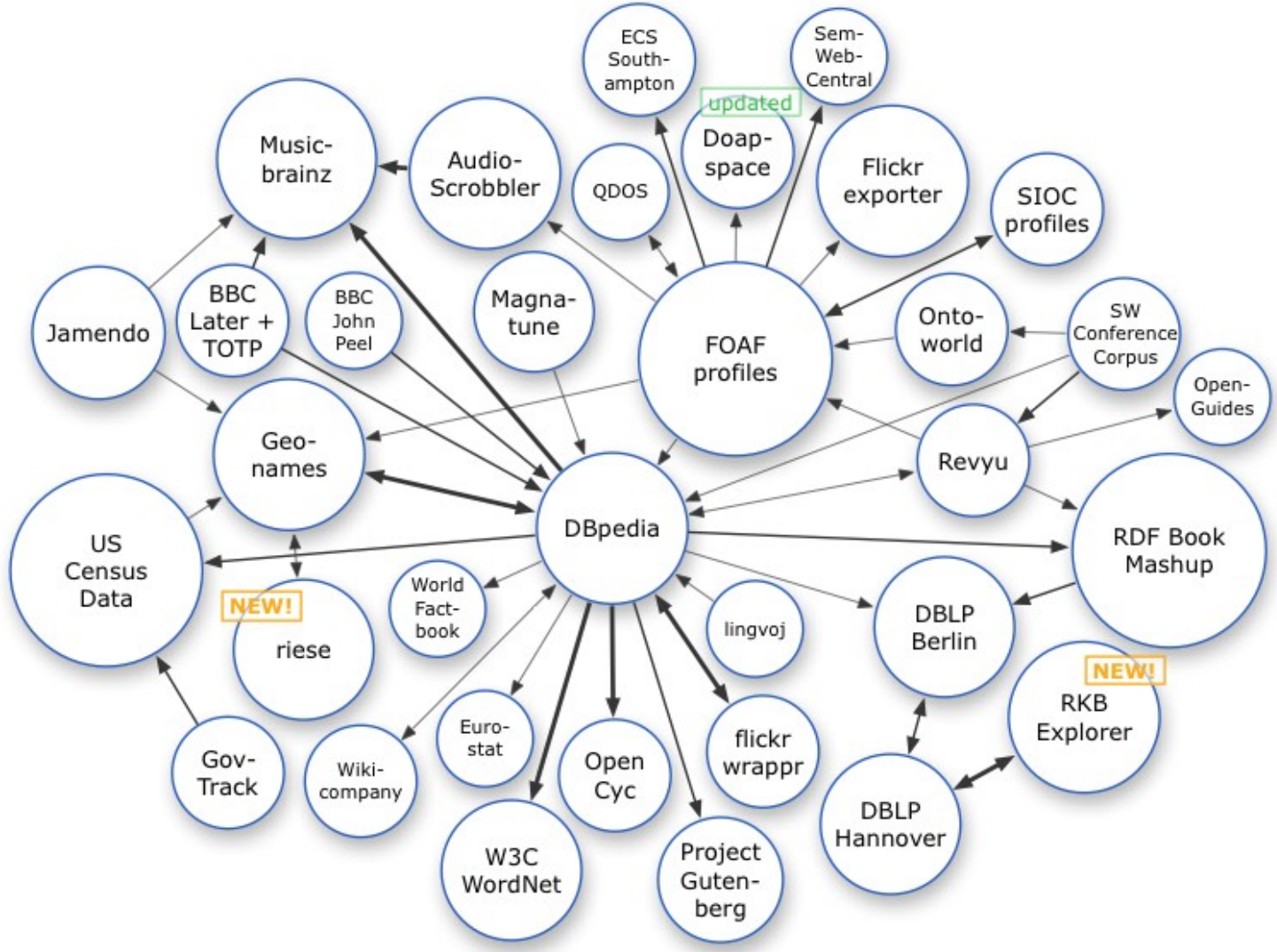
4. Setup Your Infrastructure

- Rolling your own is not the only option
- See Linking Open Data area of the ESW Wiki
 - <http://esw.w3.org/topic/TaskForces/CommunityProjects/LinkingOpenData/PublishingTools>



5. Link to Other Data Sets

Other Available Data Sets



5. Link to other Data Sets

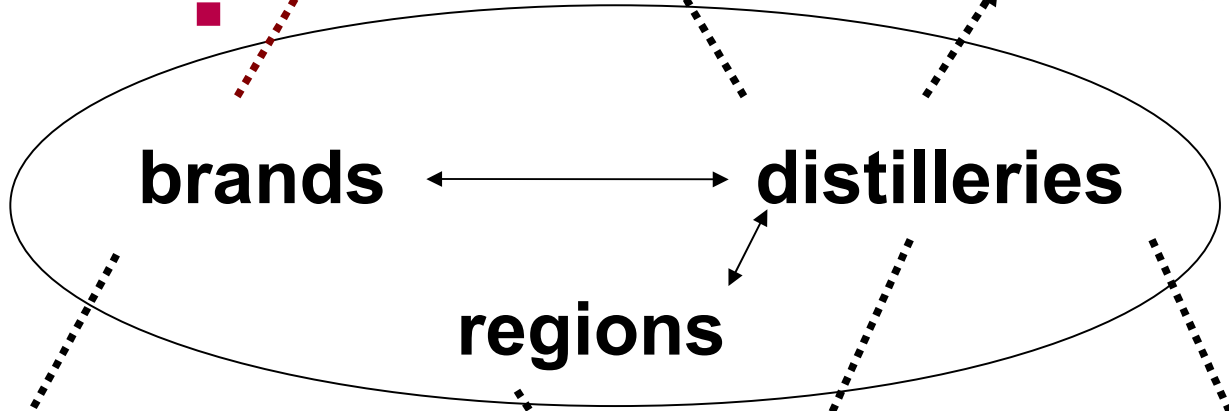
- Popular Predicates for Linking
 - owl:sameAs
 - foaf:homepage
 - foaf:topic
 - foaf:based_near
 - foaf:maker/foaf:made
 - foaf:depiction

 - foaf:page
 - foaf:primaryTopic
 - rdfs:seeAlso

5. Link to other Data Sets

DBpedia

Wikicompany



Homepages

Geonames

FlickrWrappr

5. Link to other Data Sets

- Linking Algorithms
 - String Matching
 - e.g. Lexical Distance between labels
 - Common Key Matching
 - e.g. ISBN, Musicbrainz IDs
 - Property-based Matching
 - Do these two things have the same label, type and coordinates
- Aim for reciprocal links



Summary

1. Understand the Principles
2. Understand your Data
3. Choose URIs for Things in your Data
4. Setup Your Infrastructure
5. Link to other Data Sets



Questions?



More Information

- **Contact Details**
 - tom.heath [at] talis.com
 - chris [at] bizer.de
 - richard.cyganiak [at] deri.org
- **Slides**
 - <http://linkeddata.org/slides/2008-06-nyc-ldp.pdf>
- **Tutorial**
 - <http://sites.wiwiss.fu-berlin.de/suhl/bizer/pub/LinkedDataTutorial/>
- **Photo Credit**
 - Gregory Todd Williams, <http://flickr.com/photos/kasei>

shared innovation