Substance of the Semantic Web

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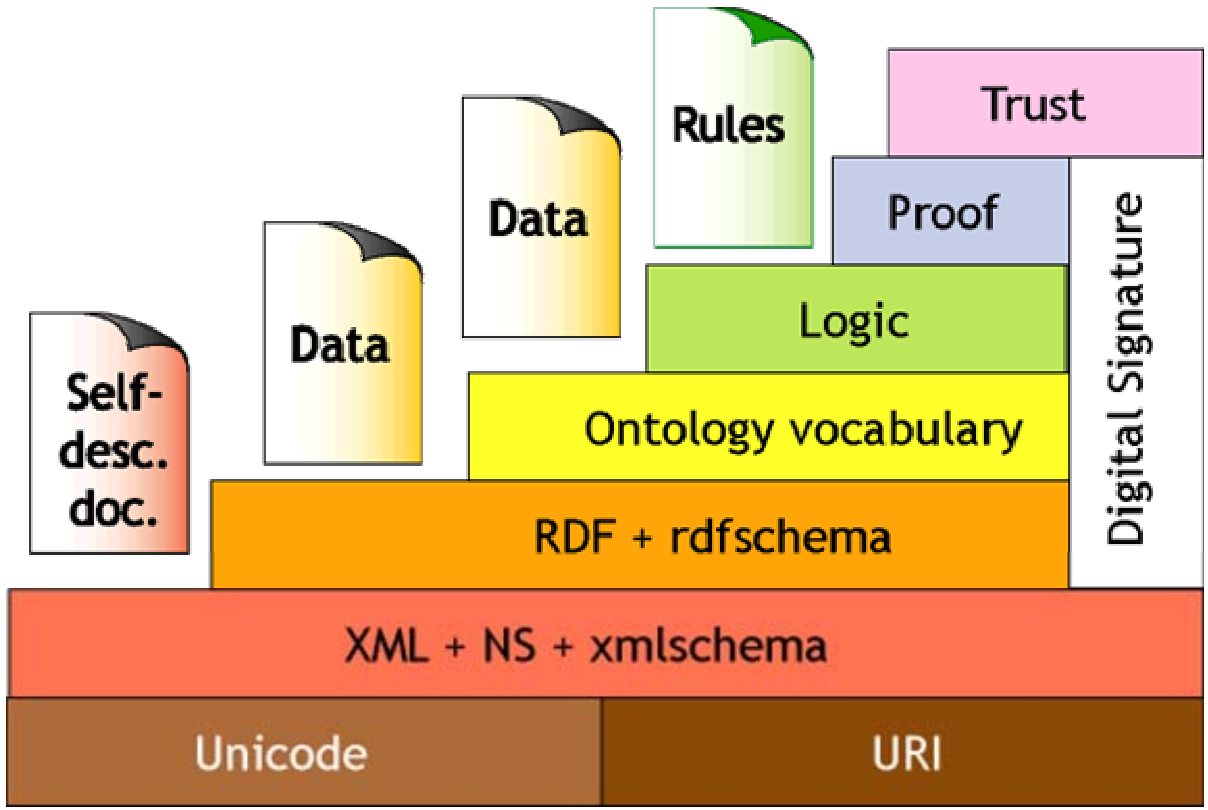
Outline

- Background and Technical Details
- Selected Technical Benefits of the Semantic Web

Semantic Web Perspectives

- The Semantic Web means different things to different people. It is multi-dimensional
  - Distributed data access
  - Inference
  - Data Integration
  - Logic
  - Services
  - Search
  - Configuration
  - Agents
  - …
- Different users value these dimensions differently
- Theme: Machine-operational declarative specification of the meaning of terms

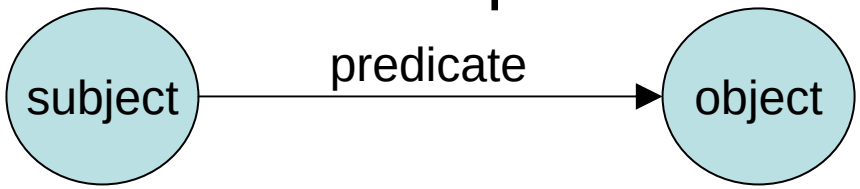
Semantic Web Layering



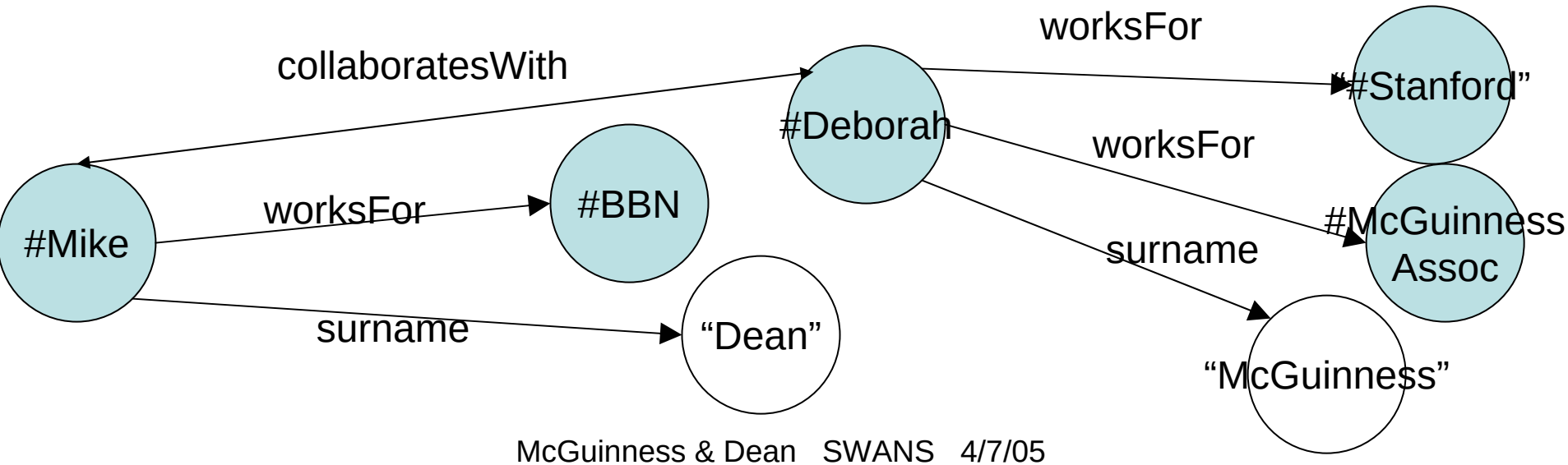
From: Berners-Lee XML 2000

Semantic Web Statements

- The Semantic Web is made up of individual statements



- The subject and predicate are Uniform Resource Identifiers (URIs) – the object can be a URI or an optionally typed literal value

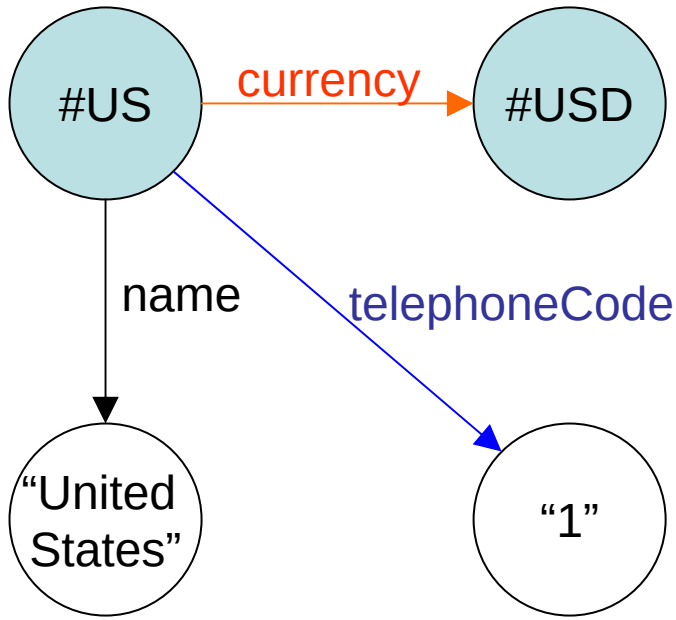


Selected Technical Benefits

1. Integrating Multiple Data Sources
2. Semantic Drill Down / Focused Perusal
3. Statements about Statements
4. Inference
5. Translation
6. Smart (Focused) Search
7. Smarter Search … Configuration
8. Proof

1: Integrating Multiple Data Sources

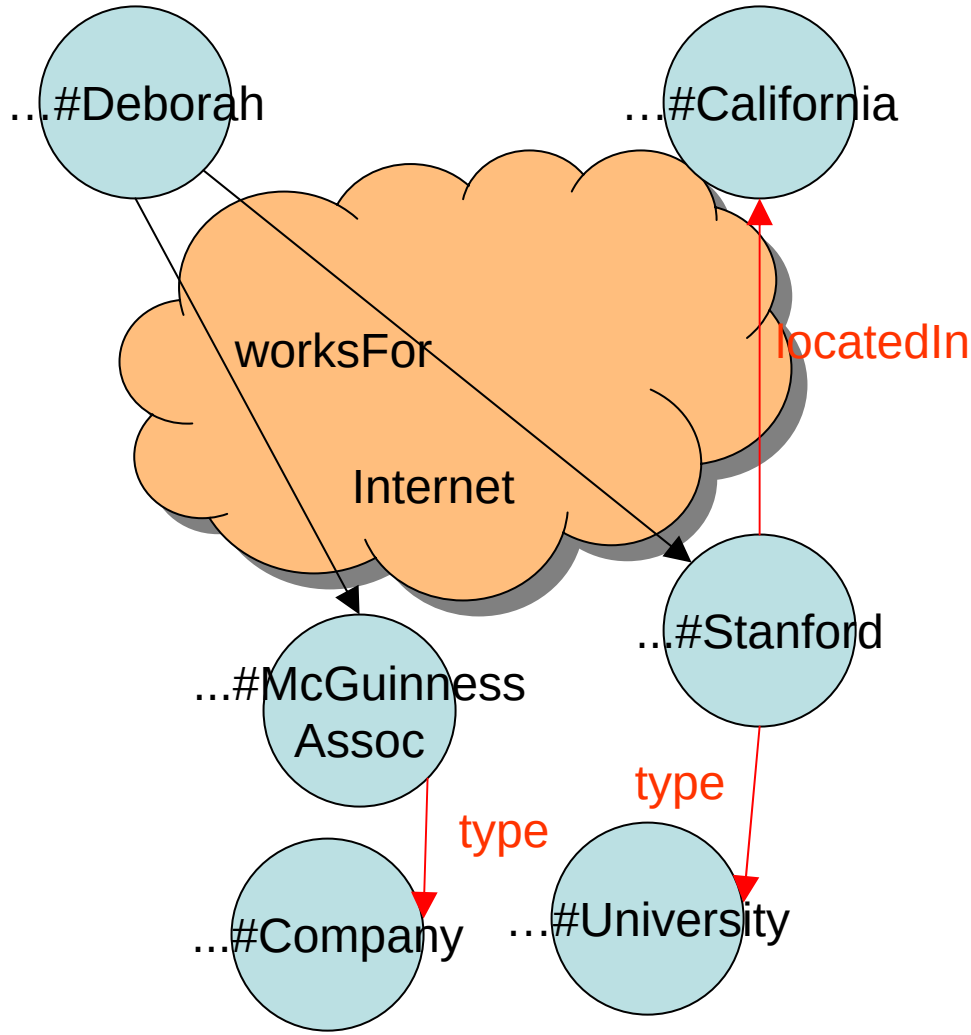
- The Semantic Web lets us merge statements from different sources
- The RDF Graph Model allows programs to use data uniformly regardless of the source
- Figuring out where to find such data is a motivator for Semantic Web Services



Different line & text colors represent different data sources

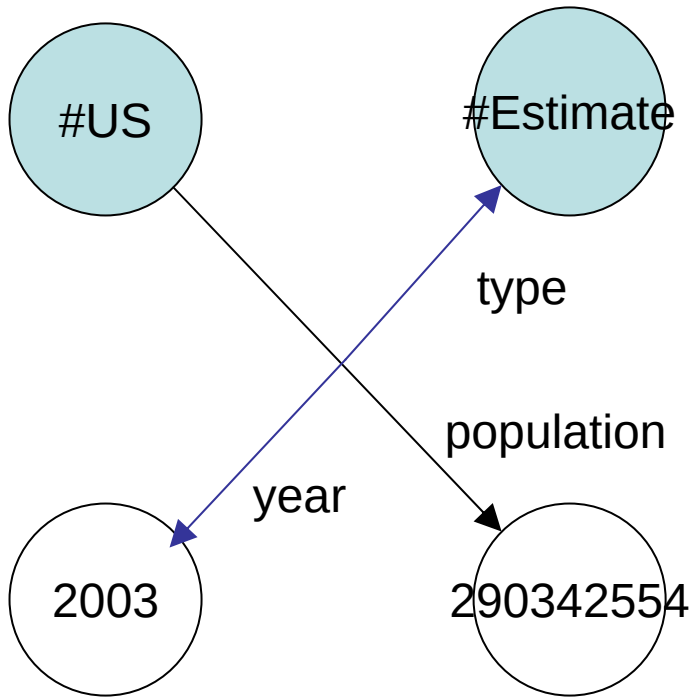
2: Drill Down /Focused Perusal

- The Semantic Web uses Uniform Resource Identifiers (URIs) to name things
- These can typically be resolved to get more information about the resource
- This essentially creates a web of data analogous to the web of text created by the World Wide Web
- Ontologies are represented using the same structure as content
  - We can resolve class and property URIs to learn about the ontology



3: Statements about Statements

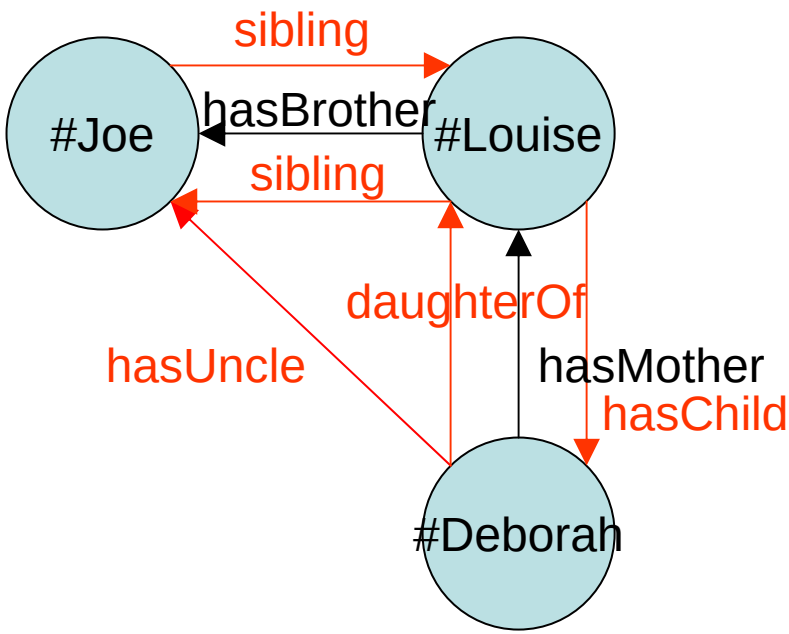
- The Semantic Web allows us to make statements about statements
  - Timestamps
  - Provenance / Lineage
  - Authoritativeness / Probability / Uncertainty
  - Security classification
  - …
- This is an unsung virtue of the Semantic Web particularly relevant to the Intelligence Community



From CIA World Factbook

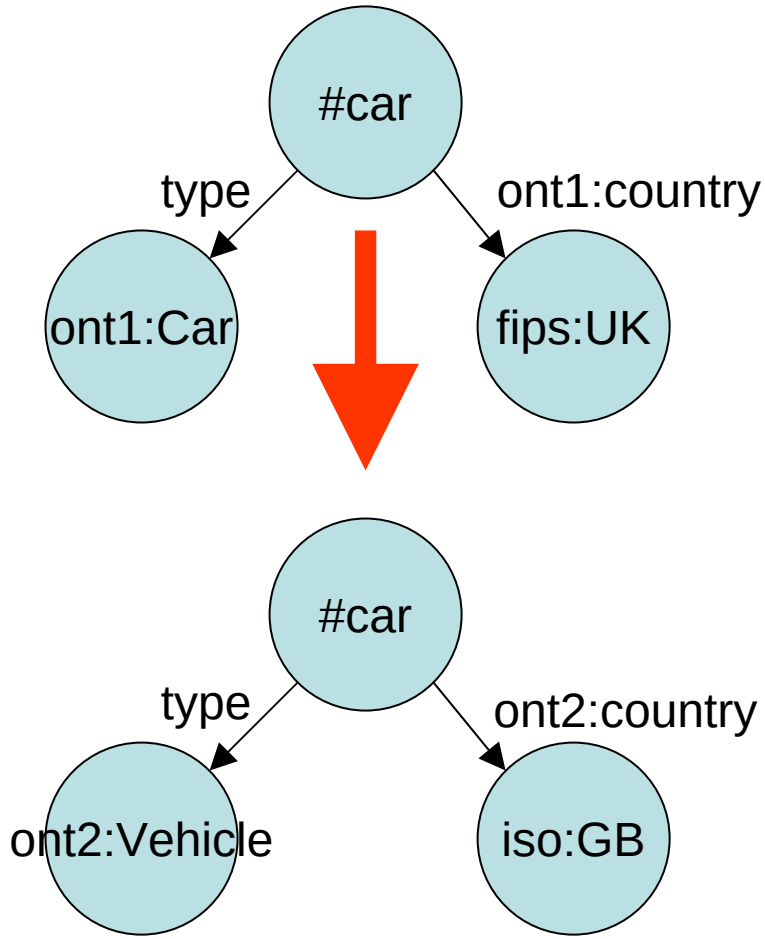
4: Inference

- The formal foundations of the Semantic Web allow us to infer additional (implicit) statements that are not explicitly made
- Unambiguous semantics allow question answerers to infer that objects are the same, objects are related, objects have certain restrictions, …
- SWRL allows us to make additional inferences beyond those provided by the ontology



5: Translation

- While encouraging sharing, the Semantic Web allows multiple URIs to refer to the same thing
- There are multiple levels of mapping
  - Classes
  - Properties
  - Instances
  - Ontologies
- OWL supports equivalence and specialization; SWRL allows more complex mappings



6: Smart (Focused) Search

- The Semantic Web associates 1 or more classes with each object
- We can use ontologies to enhance search by:
  - Query expansion
  - Sense disambiguation
  - Type with restrictions
  - ….

[Go Back To Results List] [New Find]

Directory **Westfield**

Home | Residents | Businesses | Feedback | About | Find | Leader

Visage Salon

Monday	10 AM - 3:30 PM
Tuesday to Friday	10 AM - 7:30 PM
Saturday	8:30 AM - 4:30 PM
Sunday	10 AM - 4 PM

226 North Avenue
Westfield, NJ 07090

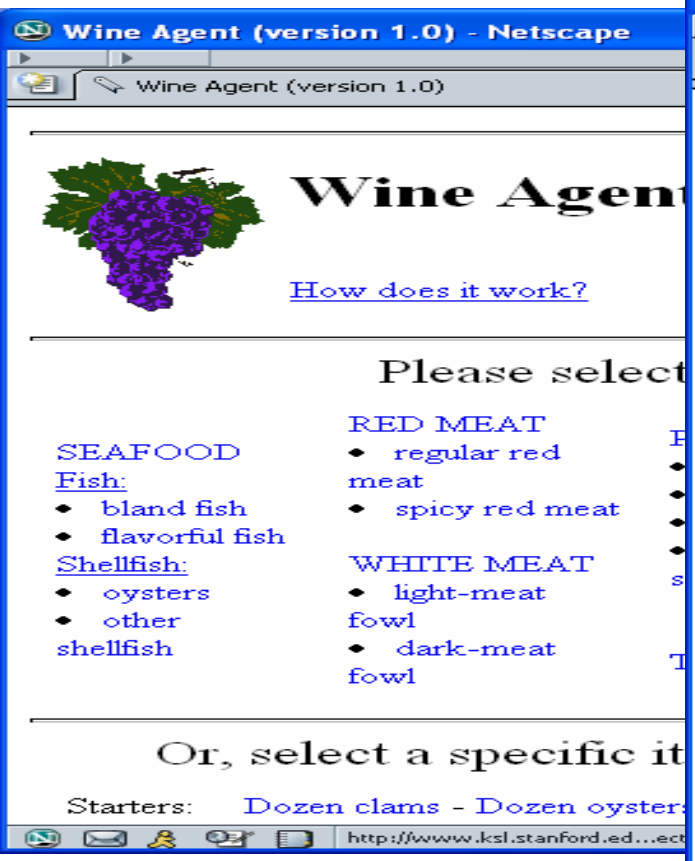
Phone: (908) 233-2726

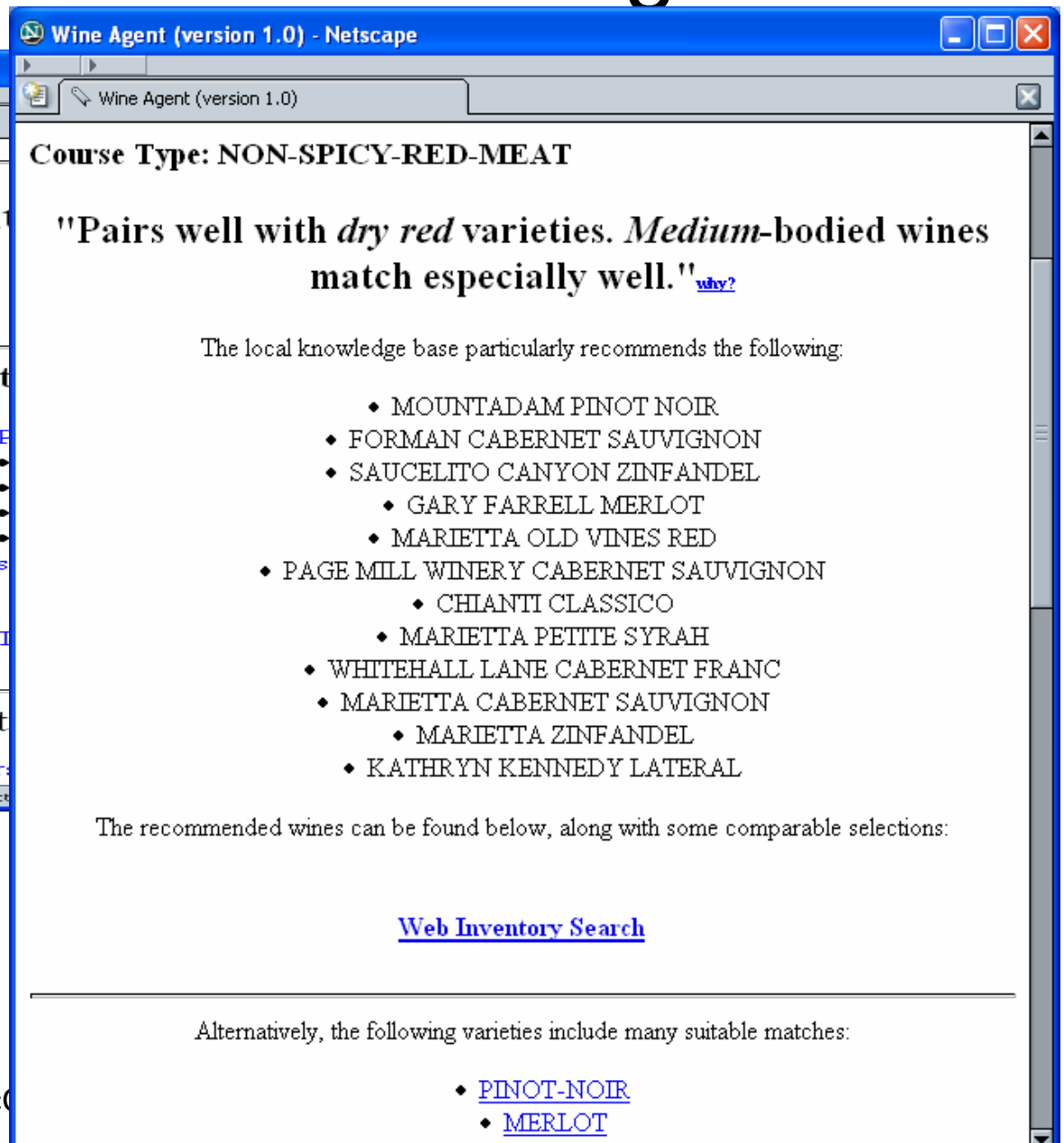
Stroll the Neighborhood | Map | Plan a Trip

Specializing in custom **hair design** and color, texture waves and correction work. Also **manicures**, **pedicures**, waxing and full retail **haircare** system.

[Go Back To Results List] [New Find]

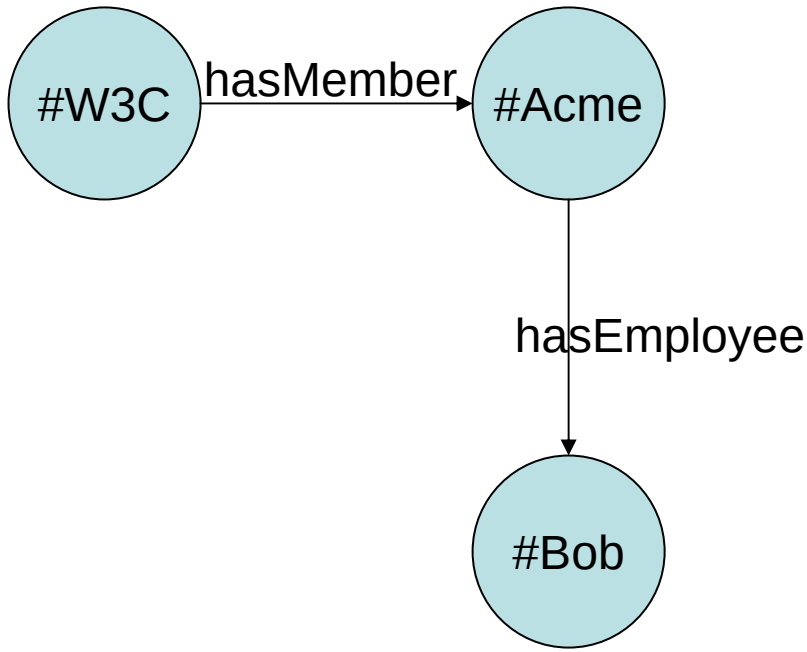
7: Smarter Search / Configuration





8: Proof

- The logical foundations of the Semantic Web allow us to construct proofs that can be used to improve transparency, understanding, and trust
- Proof and Trust are on-going research areas for the Semantic Web: e.g., See PML and Inference Web



"Employees of member companies can acces W3C's content"

Selected Technical Benefits

1. Integrating Multiple Data Sources
2. Drill Down / Focused Perusal
3. Statements about Statements
4. Inference
5. Translation
6. Smart (Focused) Search
7. Smarter Search … Configuration
8. Proof and Trust

Resources

Selected Papers:

- McGuinness. Ontologies come of age, 2003
- Das, Wei, McGuinness, Industrial Strength Ontology Evolution Environments, 2002.
- Kendall, Dutra, McGuinness. Towards a Commercial Strength Ontology Development Environment, 2002.
- McGuinness Description Logics Emerge from Ivory Towers, 2001.
- McGuinness. Ontologies and Online Commerce, 2001.
- McGuinness. Conceptual Modeling for Distributed Ontology Environments, 2000.
- McGuinness, Fikes, Rice, Wilder. An Environment for Merging and Testing Large Ontologies, 2000.
- Brachman, Borgida, McGuinness, Patel-Schneider. Knowledge Representation meets Reality, 1999.
- McGuinness. Ontological Issues for Knowledge-Enhanced Search, 1998.

Selected Tutorials:

-Smith, Welty, McGuinness. OWL Web Ontology Language Guide, 2004.
-Noy, McGuinness. Ontology Development 101: A Guide to Creating your First Ontology. 2001.
-Brachman, McGuinness, Resnick, Borgida. How and When to Use a KL-ONE-like System, 1991.

Languages, Environments, Software:

- OWL - http://www.w3.org/TR/owl-features/ , http://www.w3.org/TR/owl-guide/
- Inference Web - http://www.ksl.stanford.edu/software/iw/
- Wine Agent - http://www.ksl.stanford.edu/people/dlm/webont/wineAgent/
- Chimaera - http://www.ksl.stanford.edu/software/chimaera/
- FindUR - http://www.research.att.com/people/~dlm/findur/
- TAP – http://tap.stanford.edu/
- OWL-QL - http://www.ksl.stanford.edu/projects/owl-ql/
- Network Inference – http://www.networkinference.com
- Sandpiper Software – http://www.sandsoft.com