

Knowledge Management & Intelligent Web Services

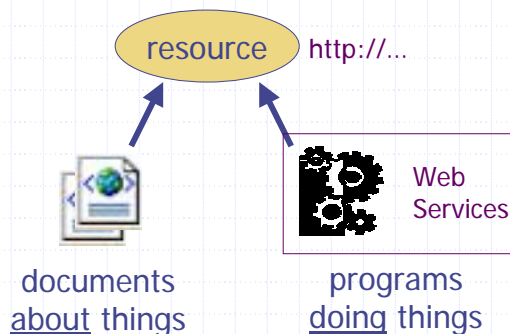
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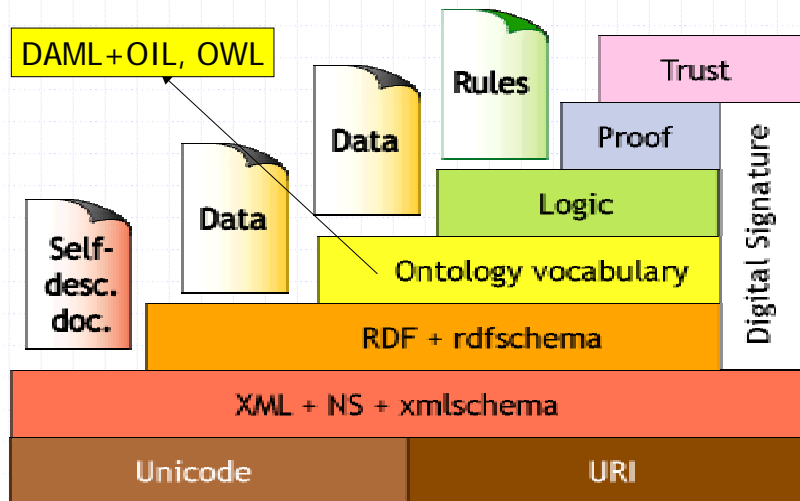


The Semantic Web

- ◆ Vision of a machine-processable Web of **resources** – the Web as a "giant brain"?
- ◆ Unifies static documents & invocable programs – everything has a **URI**



Semantic Web Architecture



[Semantic Web "layer cake" slide due to Tim Berners-Lee]

Semantic Web & Web Services

- ◆ Web Services are
 - Describable using semantically-rich language
e.g. DAML-S
 - Locatable using yellow pages / broker services
e.g. UDDI
 - Invocable using high-level protocols
e.g. SOAP
- ◆ Course-grained distributed computing revisited, though with XML-based standards
- ◆ Emphasis on loose-coupling

Agents & Web Services

- ◆ Agents are **describable, locatable, invocable...** ✓
- ◆ Agents use **messaging** rather than **RPC-style** communications ✓
- ◆ Growing use of **XML** in agent platforms (KQML, FIPA, ...) ✓
- ◆ Agents offer greater flexibility in **interactions**
– **real** loose-coupling ✓
- ◆ Agents deal explicitly with **trust & reputation** ✓

Intelligent Web Services

- ◆ Web services using **intelligent systems** techniques
- ◆ Fusion of
 - (Semantic) Web service technology: W3C standards including (but not restricted to) "layer cake" languages
 - **Ontology technology**: semantic data models, promoting sharing & reuse
 - **Agent technology**: autonomy, interaction, negotiation

Intelligent Web Services: Applications

- ◆ Knowledge management, including
 - communities of practice (COP)
 - intelligent integration of information (I³)
- ◆ Ecommerce, including
 - auctions
 - B2B
- ◆ Bootstrapping services for the Semantic Web itself, including
 - ontology services
 - brokers
 - markup tools



IEEE IS
Jan/Feb 2002
Preece & Decker (eds)

The Rest of this Talk

- ◆ Vignettes from 2 projects
 - AKT: Advanced Knowledge Technologies
 - Agentcities@Aberdeen
- ◆ Highlighting
 - Importance of Web standards
 - Role of agents
 - "Eating our own dogfood"

The AKT Project

- ◆ 5 UK university sites
 - Aberdeen
 - Edinburgh
 - Open
 - Sheffield
 - Southampton (lead)
- ◆ 6 years
- ◆ 7+ million pounds from EPSRC IRC initiative
- ◆ Project to develop "whole life-cycle knowledge management tools & techniques"
- ◆ Industry club of 20+ companies

See
<http://www.aktors.org>

[Also Expert Update
current issue]

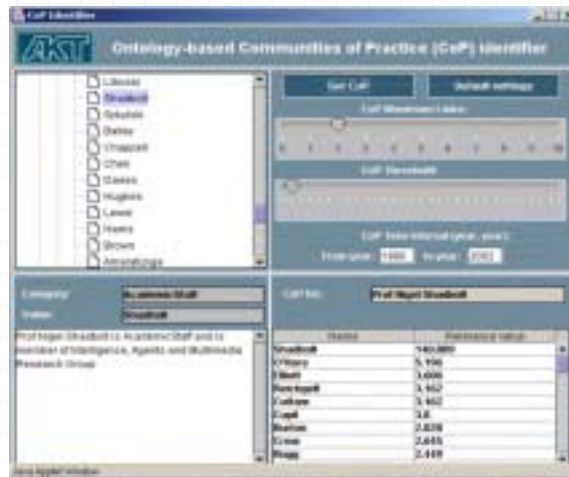


The AKT Lifecycle



AKT Snapshot: COP Service

- ◆ Uses AKT ontology of academia domain
- ◆ Heuristics to discover people's COPs



[Soton]



AKT Snapshot: Planet News Service

- ◆ Refinement of OU's personalised news service
- ◆ Includes named entity recognition by Sheffield's GATE



[OU & Sheffield]



AKT Snapshot: I-X/KRAFT TIE Service

- ◆ Allows people to collaborate on shared tasks (I-X)
- ◆ Includes checking & solving of constraints (KRAFT)



[Aberdeen & Edinburgh]



AKT Infrastructure: High-Level View

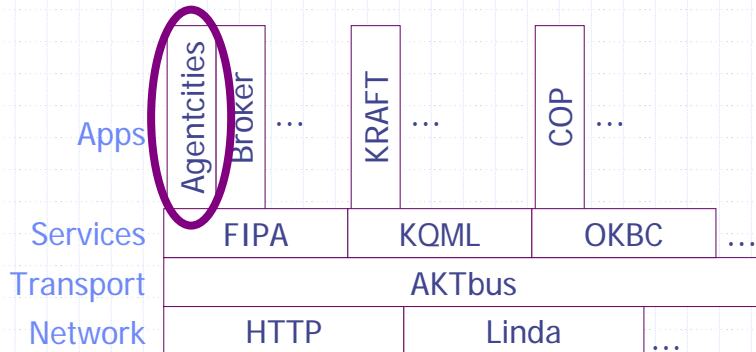
e.g.

AKTbus applications layer	COP, Planet, I-X/KRAFT
AKTbus services layer	KQML, FIPA, OKBC
AKTbus transport layer	HTTP-XML/RDF
Network transport layer	TCP/IP, wireless

Driving principle: KISS (Keep It Small & Simple)



AKT Infrastructure: Zooming in...



<http://www.csd.abdn.ac.uk/research/akt/aktbus>



Agentcities @ Aberdeen

- ◆ Agentcities.NET node
- ◆ Deployment project: [deploying AKT services on Agentcities network](#)
- ◆ Complements our activity in [AgentLink-II](#) & [Ontoweb](#)
- ◆ Domains
 - [WeatherAgent](#)
 - Academic services: [IdAgent](#), [Publications](#)
 - Visitor info: [Restaurants](#), [Pubs](#), [Entertainment](#)
- ◆ See <http://www.csd.abdn.ac.uk/research/agentsgroup>



Aberdeen WeatherAgent

- ◆ Running continuously since January 2002
- ◆ Repackages UK [met office](#) data ...

Aberdeen 5 day forecast

Saturday 7th September	Sunday 8th September	Monday 9th September	Tuesday 10th September	Wednesday 11th September
Day Night	Day Night	Day Night	Day Night	Day
Max: 15°C Min: 10°C	Max: 16°C Min: 11°C	Max: 17°C Min: 11°C	Max: 17°C Min: 10°C	Max: 19°C
59°F 50°F	61°F 52°F	63°F 52°F	63°F 50°F	66°F

[Close window](#) Issued at: Saturday September 7th 2002 [Map](#)

- ◆ ... against [DAML ontology](#)
- ◆ Key issue was ontology [mapping](#): not unusual



RDF Query-By-Example

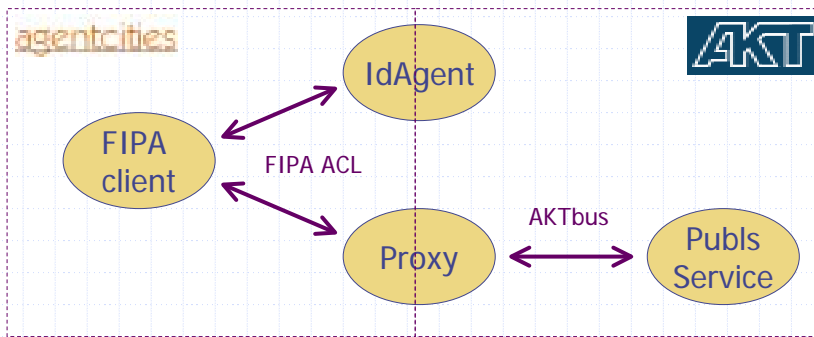
- ◆ Principle: [query](#) RDF [using](#) RDF
- ◆ If users can read RDF descriptions, they can write [patterns](#) that [match](#) RDF descriptions
- ◆ Basic queries [exact-match](#) OAV triples [[example](#)]
- ◆ More advanced queries incorporate [variable expressions](#)
- ◆ See

<http://www.csd.abdn.ac.uk/research/AgentCities/QueryByExample/>



AKT/Agentcities Snapshot

- ◆ IdAgent: FIPA (JADE), using AKT ontology
- ◆ Publications Service: AKTbus service



AKT/Agentcities Demo

1. Query to IdAgent
 - [Query](#)
 - [Result](#)
2. Query to Publications Service
 - [Query](#)
 - [Result](#)

Towards IdAgent2

- ◆ Interested in learning research profiles
 - people aren't good at maintaining them!
- ◆ Work to date
 - converting CiteSeer data to RDF
 - using Progol FOL learner
 - Early results reported at ECML Semantic Web Mining workshop
- ◆ Applications
 - COP identification (knowledge management)
 - recommender systems



Summing Up

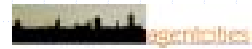
- ◆ Intelligent Web Services are an exciting fusion of
 - Web technology
 - Ontology technology
 - Agent technology
- ◆ Shown examples from 2 projects
 - AKT – knowledge management life-cycle
 - Agentcities@Aberdeen - doing it to ourselves



Lesson 1: Content is a Battleground

- ◆ Language wars: **RDF** vs **DAML+OIL** vs **OKBC** vs **OWL** vs [insert your favourite]
- ◆ Emerged a consensus for **RDF** as low baseline (few commitments)
- ◆ Querying still in a variety of formats: **OKBC** vs **RDF QLS** vs [insert your favourite]
- ◆ Storage & reasoning using **Protégé** vs **Ontobroker** vs **AKT triple store** vs [insert your favourite]

- ◆ Nevertheless, all this is good enough to do useful work, now



Lesson 2: Web Standards are Key

- ◆ The W3C's standard set are the most important game to play
- ◆ Defined Agent Communication Languages (ACLs) as **XML protocols**
- ◆ Content languages are all XML-based:
 - E-R / ontology data
 - constraints (& rules)
 - queries
- ◆ Service description & location
 - **DAML-S mapping**



Questions?

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