PANEL ON ADVCOMP/SEMAPRO/EMERGING

TOPIC: HANDLING/OPTIMIZING COMPUTATION COMPLEXITY: LESSONS LEARNED FROM DOMAIN APPLICATIONS

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ntroduction/the panelists

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ichela Quadrini, UNICAM, Italy

(MOBILE?) CLOUD COMPUTING IN CONTEXT

Dr. Constandinos X. Mavromoustakis
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OUTLINE

OTIVATION

HAT IS MOBILE CLOUD COMPUTING? HOW EDUCTION IN COMPLEXITY COMES?

DVANTAGES/APPLICATIONS

OFFLOAD THE BEST WAY TO “GAIN” ESOURCES (?)

MOTIVATION

vation

In human life Mobile devices e.g., smartphone, tablet pcs, etc) become an essential part
"**Information at your fingertips anywhere anytime"**

Resources may be exploited at a remote location (not a static one only, but a "nearby" mo
device)

When compared to conventional information processing devices these Mobile devices are lack
resources

ltion

Mobile Cloud Computing (MCC)

OBILE CLOUD COMPUTING (MCC) FOR OMPUTATIONAL COMPLEXITY REDUCTION

MCC refers to an infrastructure where both the data ***storage*** and data ***processi*** happen ***outside*** of the mobile device.

Mobile cloud applications move the computing power and data storage away fr the mobile devices and into powerful and centralized computing platforms located clouds, which are then accessed over the wireless connection based on a thin nat client.

MOBILE CLOUD COMPUTING (MCC)

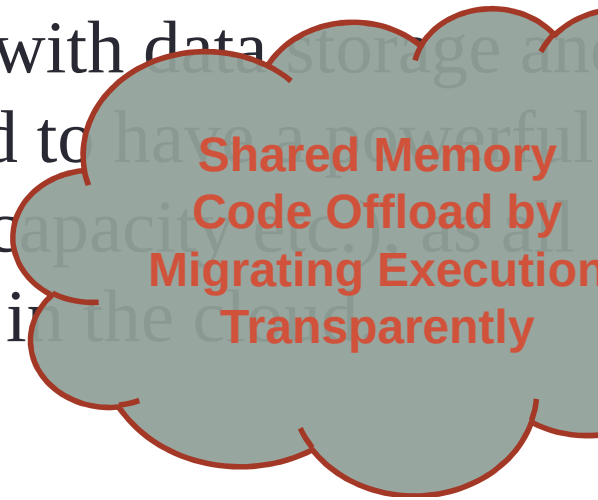
=

M*obile* ***C****omputing* + ***C****loud* ***C****omputing*

WHY MCC IS NOW INCREMENTALLY BECOMING A NECESSITY

Everything goes Mobile..

- Mobile devices face many resource challenges (battery life, storage, bandwidth etc.)
- Cloud computing offers advantages to users by allowing them to use infrastructure, platforms and software by cloud providers at low cost and elastically in an on-demand fashion.
- Mobile cloud computing provides mobile users with data storage and processing services in clouds, obviating the need to have a powerful device configuration (e.g. CPU speed, memory capacity etc.), as all resource-intensive computing can be performed in the cloud.



APPLICATIONS

Mobile Commerce

Mobile HealthCare

Mobile Learning

Mobile Gaming

Aviation Communication (through HAPs contribution etc.)

…

One key issue is to run remotely something that will benefit the mobile device and distribute the computational complexity among devices

Offloading/Migrate

OFFLOADING/MIGRATING THE BEST WAY TO “GAIN” SOURCES (?)

nswer: ***No-one knows*** ***←This is our answer today!***

ffloading may cause problems

Security (i.e. Code Offloading/code may be stolen-case of “Cloudlet”)

Selfishness

Resources may be kept and devices’ starve (still may be hungry to run and execute)

Thank you!

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Laboratory page:

http://www.mosys.unic.ac.cy/

MoSys Lab

The Mobile Systems Lab

Dejan Zupan

Solution Strategies in Solving Large Systems of Non-linear Equations: Experiences From Spatial Frame Structures

the Panel on "Handling/Optimizing Computation Complexity: Lessons Learned from Domain Applications"

8th International Conference on Advanced Engineering Computing and Applications in Sciences

Rome, Italy

August 24 – 28, 2014

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*University of Ljubljana, Faculty of Civil and Geodetic Engineering, Slovenia

Governing equations

The complete set of equations of a beam element consists of:

i) constitutive equations (relating strains and stresses)

$$\mathbf{R}(x)\,\mathcal{C}_N\left(\gamma_G(x), \kappa_G(x)\right) - N_g(x) = 0$$
$$\mathbf{R}(x)\,\mathcal{C}_M\left(\gamma_G(x), \kappa_G(x)\right) - M_g(x) = 0,$$

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ii) equilibrium equations (relating displacements. rotations and stresses)

$$N_g'(x) + n_g(x) = 0$$
$$M_g'(x) + m_g(x) - N_g(x) \times \mathbf{R}(x)\,(\gamma_G(x) - c_G(x)) = 0,$$

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ii) equilibrium equations (relating displacements. rotations and stresses)

$$\begin{aligned}N_g'\left(x\right)+n_g\left(x\right)&=0\\ M_g'\left(x\right)+m_g\left(x\right)-N_g\left(x\right)\times\mathbf{R}\left(x\right)\left(\gamma_G\left(x\right)-c_G\left(x\right)\right)&=0,\end{aligned}$$

iii) and kinematic equations (relating displacements, rotations and strains)

$$\begin{aligned}r_g'\left(x\right)-\mathbf{R}\left(x\right)\left(\gamma_G\left(x\right)-c_G\left(x\right)\right)&=0\\ \vartheta_g'\left(x\right)-\mathbf{T}^{-T}\left(x\right)\left(\kappa_G\left(x\right)-d_G\left(x\right)\right)&=0.\end{aligned}$$

Applied approaches

Three different approaches were analyzed:

i) **direct global approach** where the constitutive stress-resultant force and moment vectors are evaluated directly from the known strains in each step of the global iteration;

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iii) **partly reduced approach** where the constitutive equation for forces is eliminated from the system of governing equations.

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Foure's column

2 linear elements

method	global it	local it	flops	lateral deflection
global	9	-	481292	2.483
reduced	9	5	738676	2.483
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2 5-node elements

method	global it	local it	flops	lateral deflection
global	9	-	1510866	2.501
reduced	9	5	1918859	2.501
reduced, 1 it	9	1	1603198	2.501

Biaxially bent columns

$\alpha = \pi/6$

2 linear elements

method	global it	local it	flops	u_Y	u_Z
global	7	-	512595	0.794	0.107
reduced	7	3–5	750611	0.794	0.107
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method	global it	local it	flops	u_Y	u_Z
global	7	-	1346473	0.793	0.107
reduced	7	3–5	1745037	0.793	0.107
reduced, 1 it	8	1	1705030	0.793	0.107

Frame of Ferguson and Breen

2 linear elements

method	global it	local it	flops	u_Z
global	7	-	1464768	3.805
reduced	7	4–5	2132472	3.805
reduced, 1 it	8	1	2060391	3.805

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2 5-node elements:

method	global it	local it	flops	u_Z
global	8	-	5401430	3.916
reduced	7	4–5	5672299	3.916
reduced, 1 it	8	1	5584964	3.916

Ontology as advisor of data preprocessing

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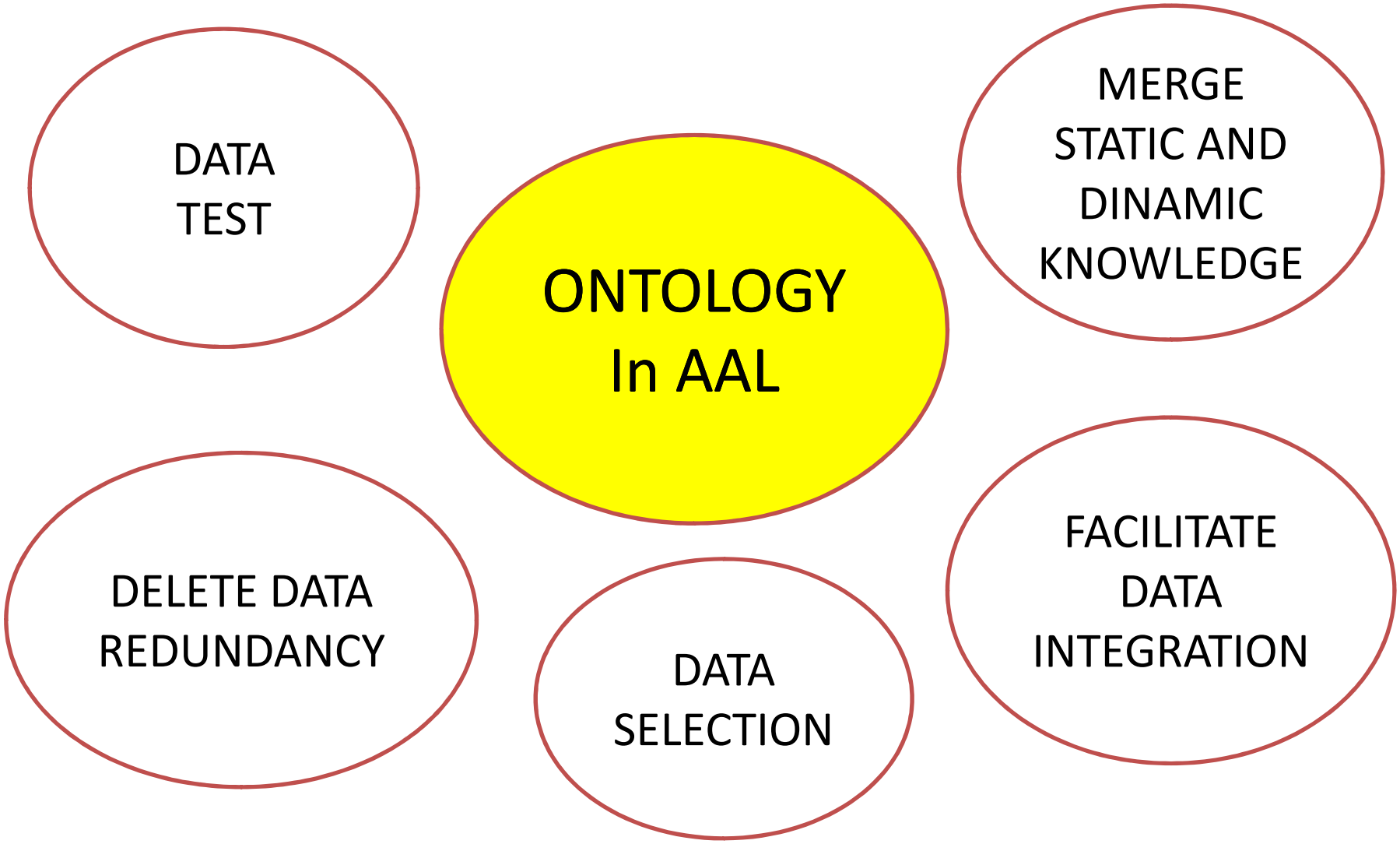
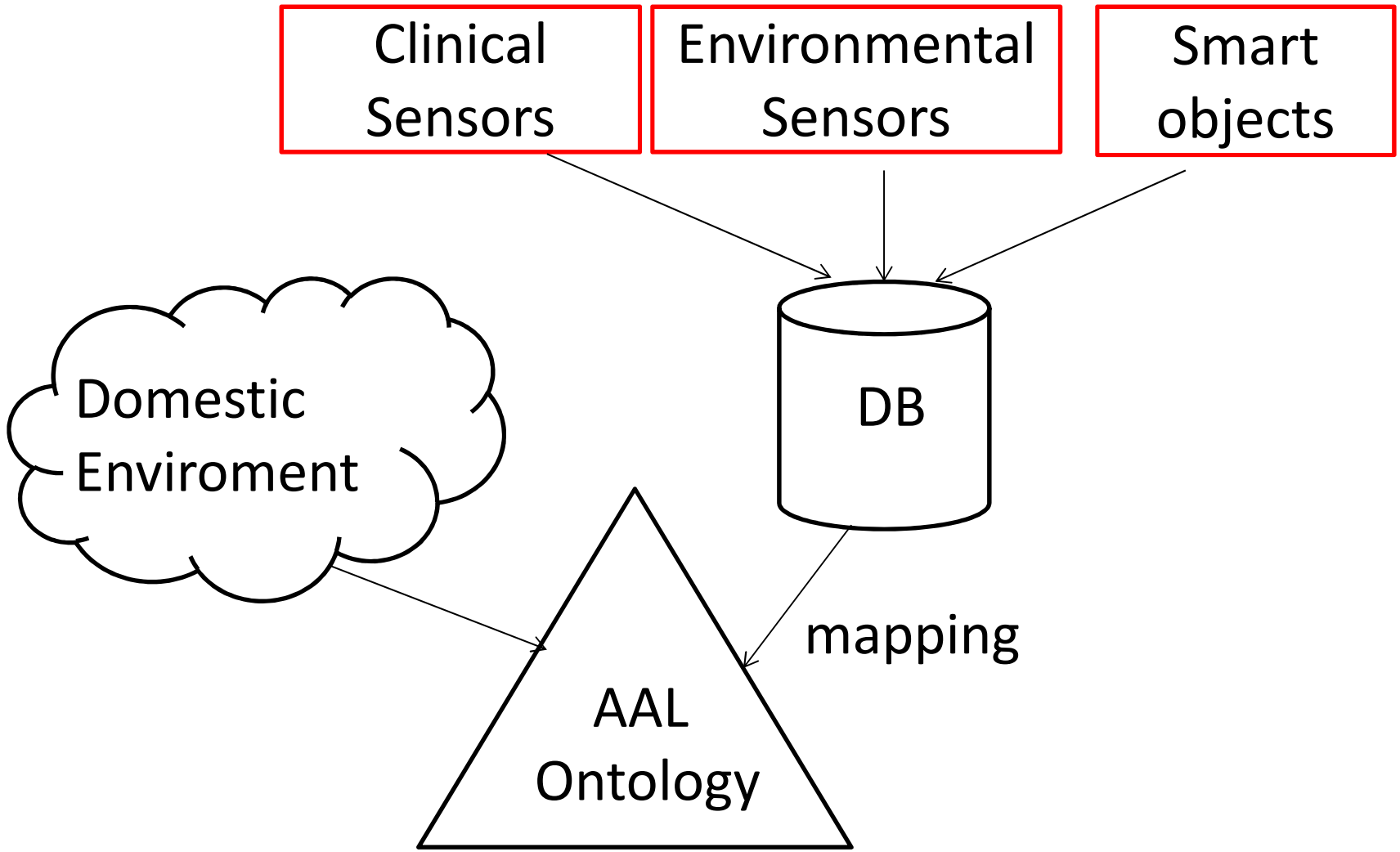
Computer Science Division,
School of Sciences and Technologies,
University of Camerino

Panel Section, IARIA Conference, 2014

Ontology in Ambient Assisted Living



MERGE STATIC AND DINAMIC KNOWLEDGE



MERGE STATIC AND DINAMIC KNOWLEDGE

We can considerate a temperature sensor.

This device has particular features:

- Communication protocol;
- Measured physical characteristics;
- Range of values.

The range of registered values is different if the sensor is installed into the house or outdoor.

FACILITATE DATA INTEGRATION

We can take 4 presence sensors into account (Boolean output) which are installed into the same room (for example, kitchen).

When the person is in the room, at least one sensor takes note of the event.

If we want to verify the presence in the kitchen, we have to combine the values of the sensors as a whole.

DELETE DATA REDUNDANCY

We allow for

- a light switches installed in the fridge;
- a door sensor installed on the fridge's door.

In this case:

different output, different sensors,

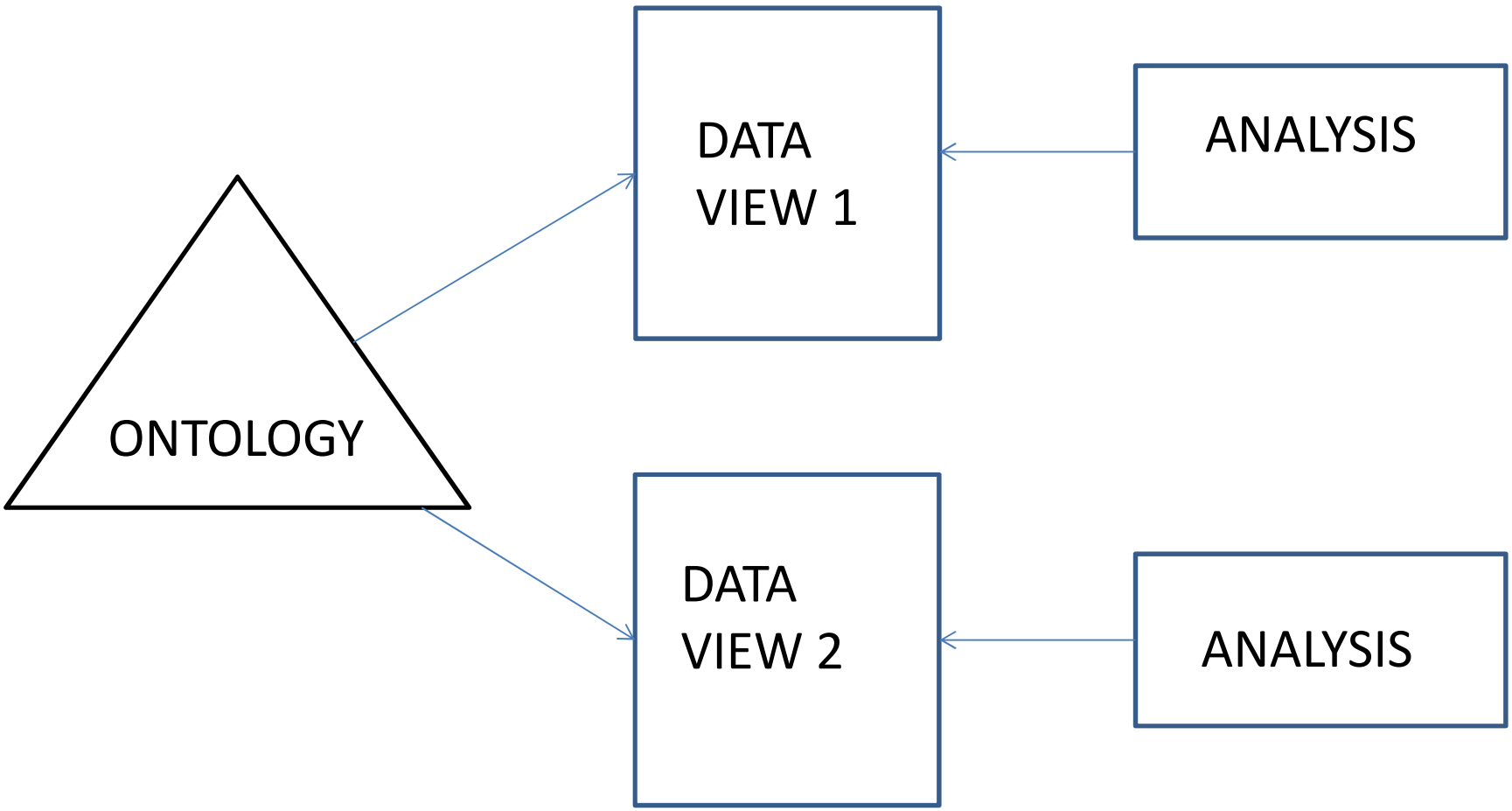
but the same semantic event.

DATA VERIFY

On the other hand, there is a connection between data collected from two devisors.

When data don’t fulfill the connection, the sensor or the connection is broken.

DATA SELECTION



Thank you

UPPSALA
UNIVERSITET

Panel Discussion on ADVCOMP/SEMAPRO/EMERGING
ADVCOMP 2014
Aug 24-28, 2014 - Rome, Italy

Handling/Optimizing Computation Complexity: Lessons Learned from Domain Applications

Mikael Fridenfalk
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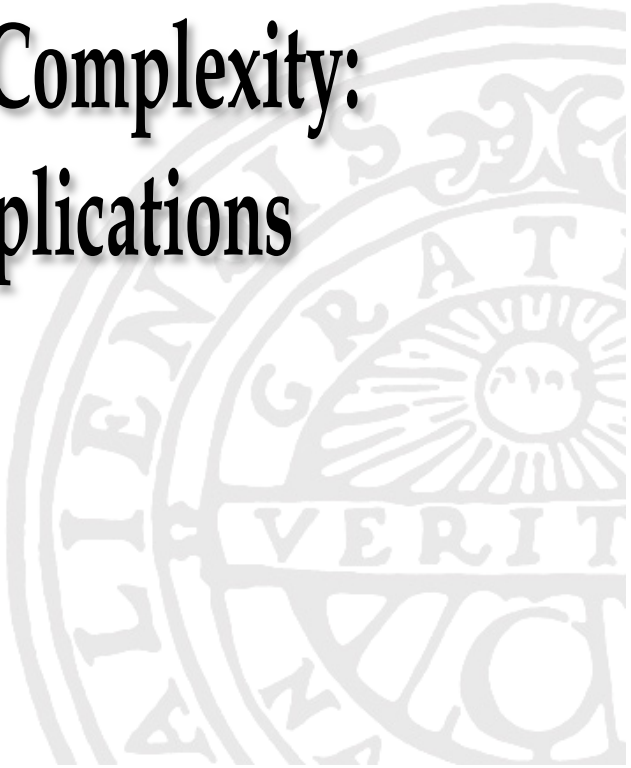
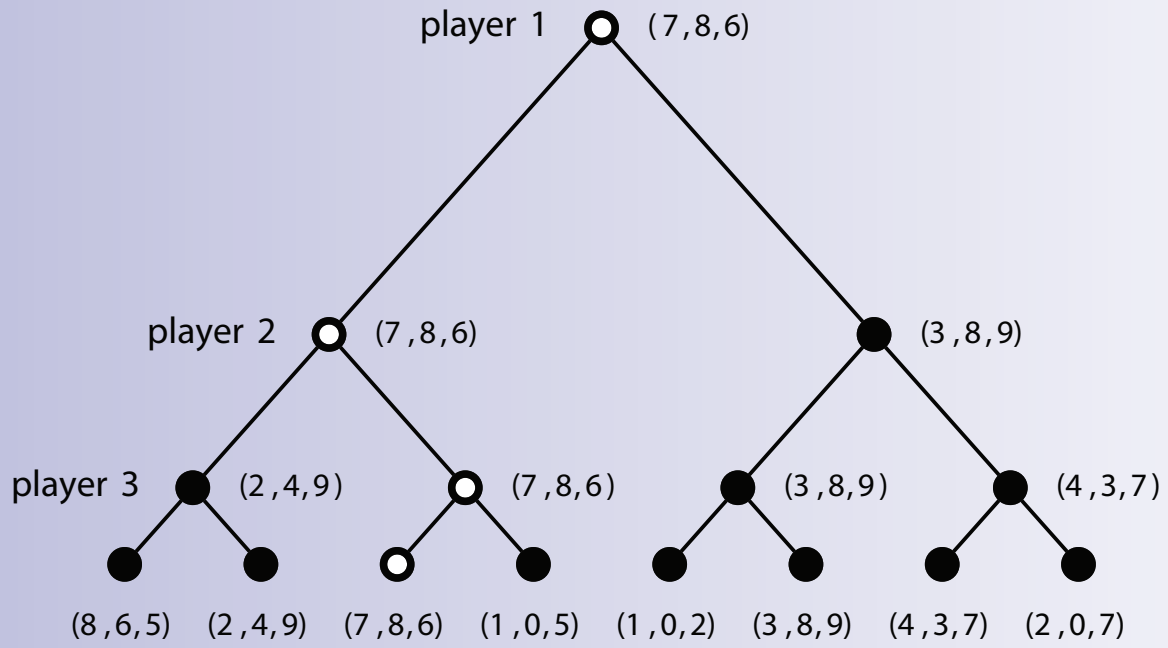
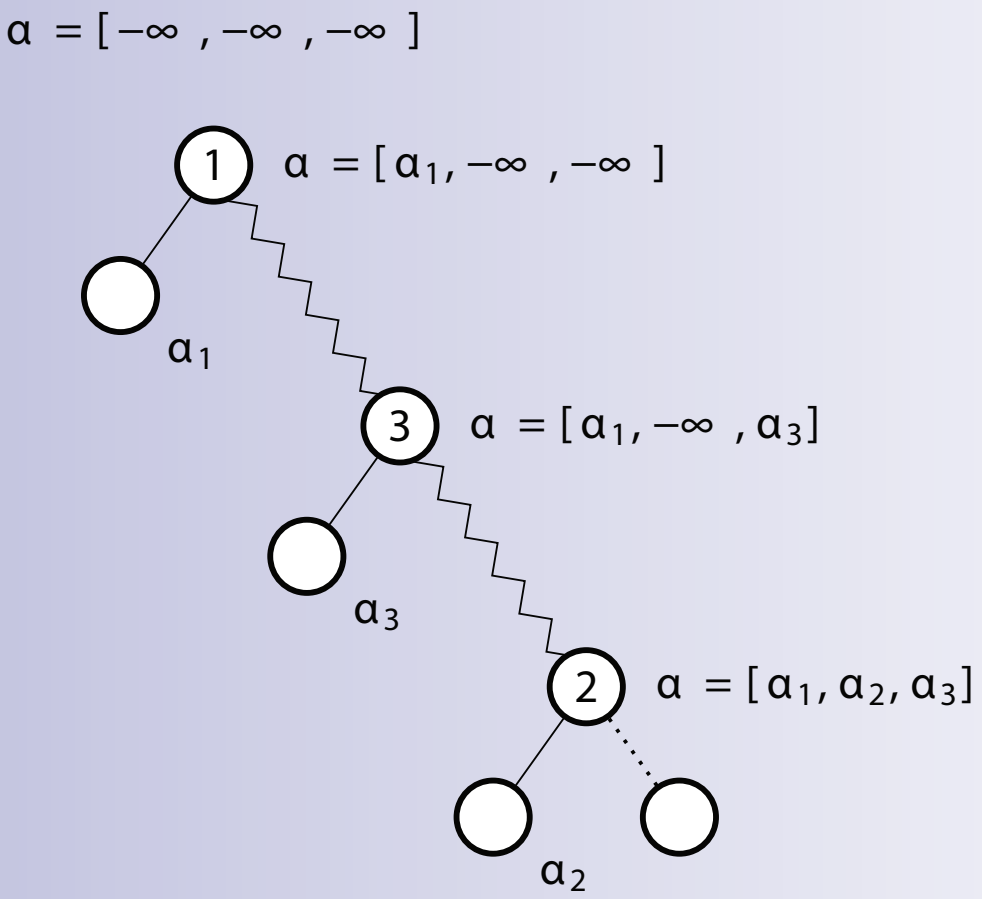


Max^N


player 1
(7,8,6)
player 2
(7,8,6)
(3,8,9)
player 3
(2,4,9)
(7,8,6)
(3,8,9)
(4,3,7)
(8,6,5)
(2,4,9)
(7,8,6)
(1,0,5)
(1,0,2)
(3,8,9)
(4,3,7)
(2,0,7)

Hypermax



Experimental Results

N	b	d	A_{best}	A_0/A_{best}	u_1	u_2	μ	μ_s
3	4	6	1249	4.4	4.88	0.273	1.75	1.23
3	4	9	21556	16.2	5.26	0.253	1.75	1.23
3	4	12	351607	63.6	5.37	0.249	1.82	1.20
3	4	15	5653114	253.3	5.39	0.247	1.56	1.12
3	4	18	90560125	1011.8	5.40	0.247	1.30	1.05
3	4	21	1449404032	4045.8	5.40	0.247	1.16	1.02
3	8	6	18333	16.3	4.48	0.255	1.77	1.17
3	8	9	1198816	128.0	4.57	0.250	1.48	1.08
3	8	12	76932323	1020.9	4.59	0.249	1.19	1.04
3	16	6	278197	64.3	4.24	0.251	1.78	1.08
3	16	9	71621560	1023.4	4.27	0.250	1.20	1.02
3	32	6	4324197	256.3	4.12	0.250	1.36	1.07
4	4	8	24120	3.6	5.89	0.226	1.49	1.13
4	4	12	1697044	13.2	6.47	0.206	1.40	1.10
4	4	16	111227024	51.5	6.63	0.201	1.21	1.03
4	4	20	7161077388	204.7	6.67	0.200	1.09	1.01
4	8	8	1452180	13.2	5.54	0.206	1.40	1.08
4	8	12	764214800	102.8	5.69	0.201	1.12	1.02
4	16	8	88785324	51.6	5.29	0.202	1.19	1.04
5	4	10	448943	3.1	6.85	0.195	1.35	1.09
5	4	15	129130324	11.1	7.70	0.173	1.20	1.04
5	8	10	110644503	11.1	6.59	0.173	1.23	1.07

Semapro Panel

Handling/Optimizing Computation Complexity: Lessons learned from Domain Application

PIONEERING DIAGNOSTICS

SEMAPRO 2014

Stéphane Schicklin

BIOMÉRIEUX

BioPedia Project

- **Data deluge**
  - Different technologies
  - Different formats, contents
- **Hurdle to data & knowledge sharing**
  - Plodding access to data
  - Loss of knowledge between and within projects

- **Need a system offering connectivity**
  - Connection between heterogeneous data
  - Centralized and collaborative
  - Linked data
- **Birth of BioPedia**

- **Time saving for decision making and project leading based on facts**

BioPedia: iteration 1

- **Mediawiki: free software open source wiki package written in PHP, originally for use on Wikipedia**

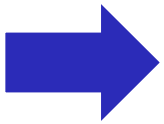
- **SMW: Semantic Mediawiki is a free, open-source extension to MediaWiki that lets you store and query data within the wiki's pages. It turns a wiki into a powerful and flexible knowledge management system that uses semantic Web technologies (#ask parser function, …)**
  - + Semantic Drilldown *(using categories and filters on semantic properties)*
  - + Interwiki
  - + ... (about 20 extensions by wiki, some self-made)
    - **4** main **domains** (one wiki by domain)
    - A wiki with **11 categories**
      - One with **26 properties** (~ **40 000 instances**)
      - Another one with **13 properties** (~ **400 000 instances**)

Drilldown does not work, wiki's navigation become very slow…
even with « subojects » or « Internal Objects »
Data still locked in their wiki domain

BioPedia: iteration 2

Extraction of the wiki content (XML/RDF)

- XML/RDF serialization from SMW lasts approximately **6 hours**

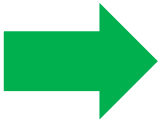


4store

- load in 4store takes less than **4 minutes** (same hardware 8 CPU, 16 Gb RAM, CentOS)

Some counts:

- About **6'000'000 triples** for this domain
- Between **7** and **8 million** of serialized lines (XML/RDF)

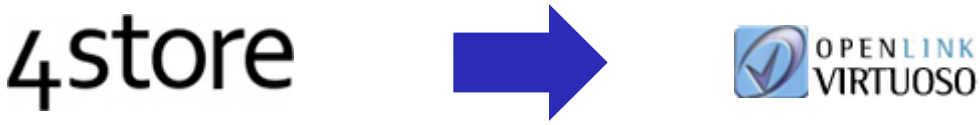


The **data** of **all domains** are **together**, even if we keep them **separated** into distinct **graphs**

We have **lost wiki functionalities** (GUI, collaborative approach, …). **SPARQL 1.1** is **not fully implemented**

BioPedia: iteration 3

- **Extraction of the wiki content (XML/RDF)**
  - RDF (Turtle, N3, …) serialization from 4store is as effective as import



  - load in virtuoso is, at least, as fast as 4store load
- **Some counts:**
  - About **16 million** of triples (all domains combined)

The **data** of **all domains** are **together**, **separated graphs**
All **SPARQL 1.1 functionalities** implemented (?)
•Property paths
•Federated queries (SERVICE …)
•SPARUL, Bind …

Still need to develop a GUI