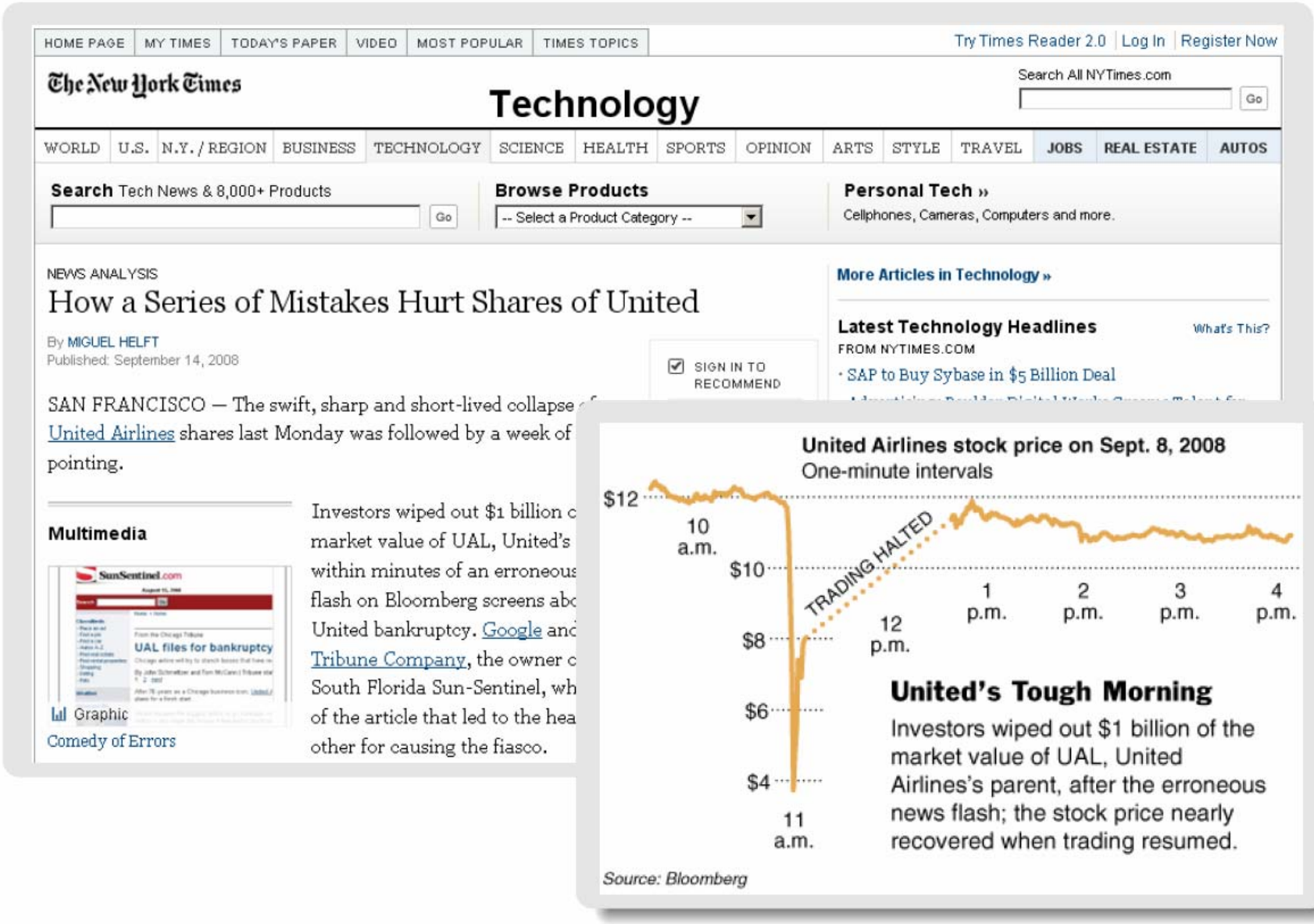
Do you care where your data comes from?

How to loose 1,000,000,000 US$ in half a day



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NEWS ANALYSIS

How a Series of Mistakes Hurt Shares of United

By MIGUEL HELFT
Published: September 14, 2008

SIGN IN TO RECOMMEND

SAN FRANCISCO — The swift, sharp and short-lived collapse of United Airlines shares last Monday was followed by a week of pointing.

Investors wiped out $1 billion c market value of UAL, United's within minutes of an erroneous flash on Bloomberg screens abo United bankruptcy. Google and Tribune Company, the owner o South Florida Sun-Sentinel, wh of the article that led to the hea other for causing the fiasco.

Multimedia

Graphic
Comedy of Errors

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FROM NYTIMES.COM
· SAP to Buy Sybase in $5 Billion Deal

United Airlines stock price on Sept. 8, 2008
One-minute intervals

$12
$10
$8
$6
$4
10 a.m.
11 a.m.
12 p.m.
1 p.m.
2 p.m.
3 p.m.
4 p.m.
TRADING HALTED

United's Tough Morning
Investors wiped out $1 billion of the market value of UAL, United Airlines's parent, after the erroneous news flash; the stock price nearly recovered when trading resumed.

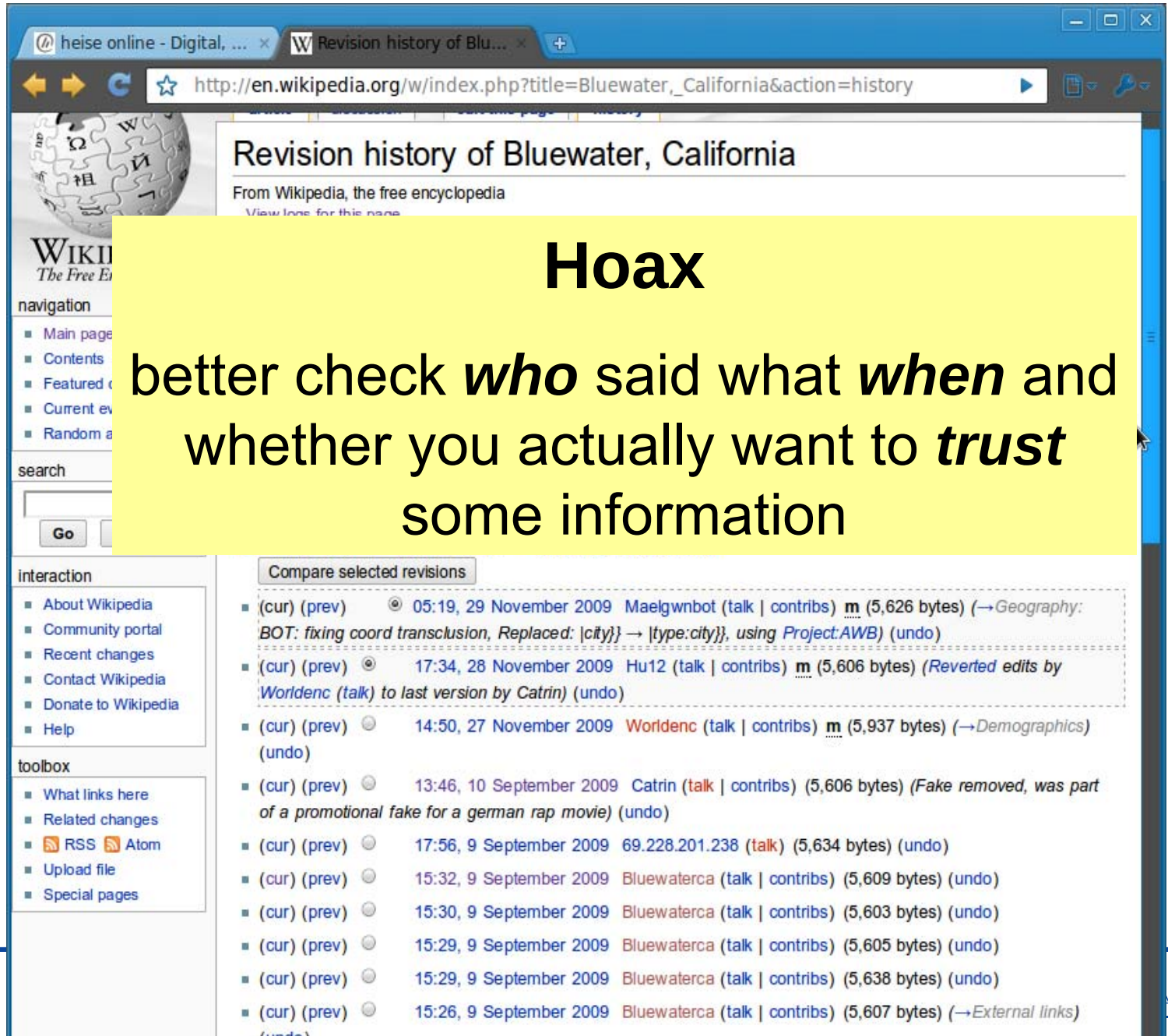
Source: Bloomberg

+++ „Los Angeles (**dpa**) – In der kalifornischen Kleinstadt Bluewater soll es nach einem Bericht des örtlichen Senders vpk-tv zu einem Selbstmordanschlag gekommen sein. Es habe in einem Restaurant zwei Explosionen gegeben...“ +++

German Press Agency DPA, 10 Sep 2009

Guerilla Marketing

Loosing your reputation quickly…



Knowing Something About Your Semantic Web Data

Steffen Staab

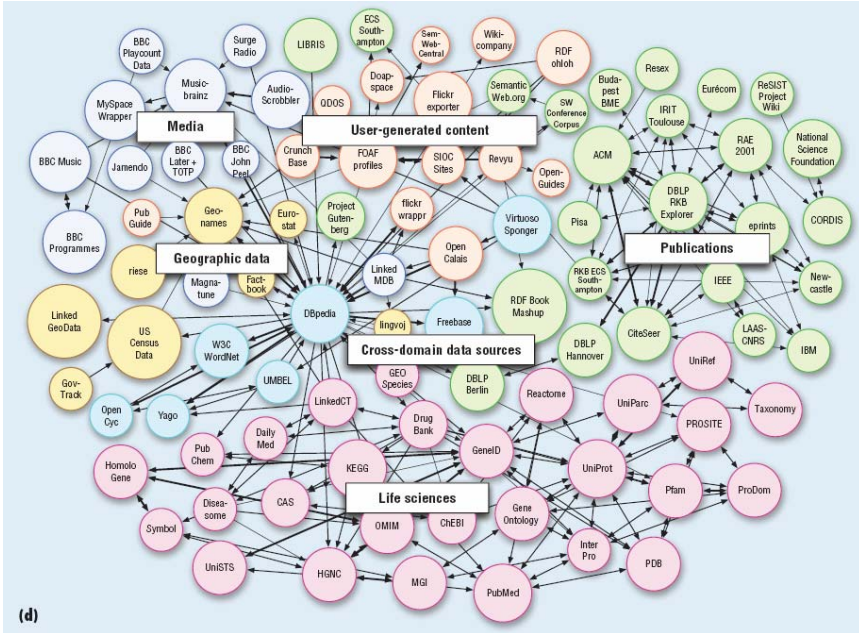
Joint work with
Simon Schenk, Renata Dividino, Christoph Ringelstein

The situation…

- Call to Ontoprise from an insurance company:
  „Can you integrate our ***5000*** databases?“

- EU IP experience (Large Engineering Company):
  „oh, we just ***found*** another PC that has several tens of thousands of relevant documents“

- Linked open data cloud



Some of the problems…

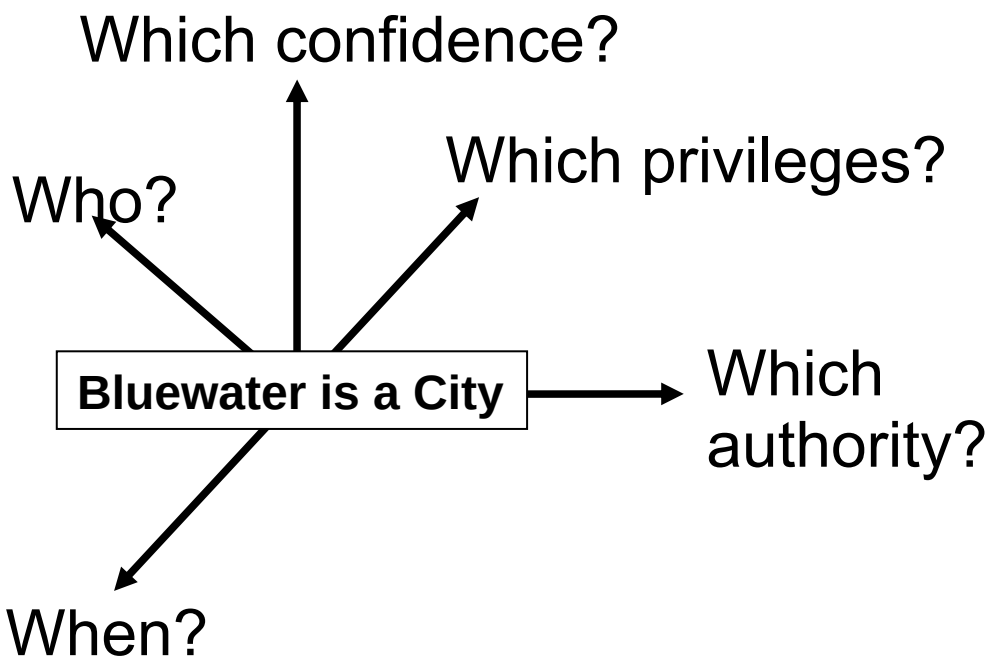
- I have this piece of data.
  Can I actually believe it?
  - Default answer: Find some expert and ask him. ☹

- I have this inconsistency in my data.
  Who has introduced it and why?
  - Default answer: Try to find it in the sources. ☹

- I have this piece of data.
  How can I use it? Can I show it to anyone?
  - Default answer:
    - You are not allowed to do anything with it.
      Just throw it away. ☹

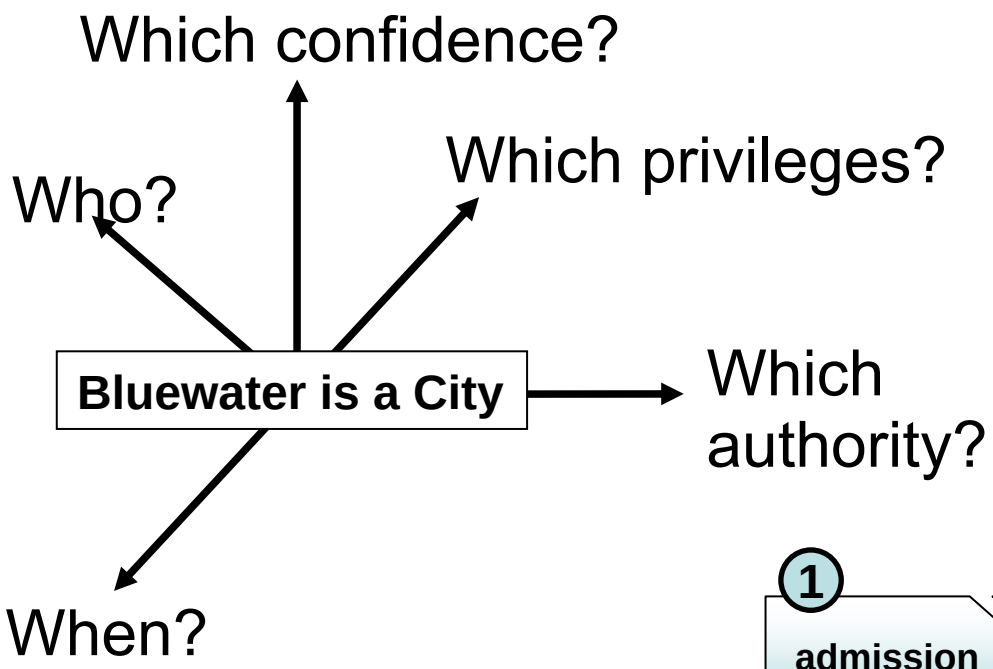
Two Types of Provenance Knowledge

Provenance labels for facts



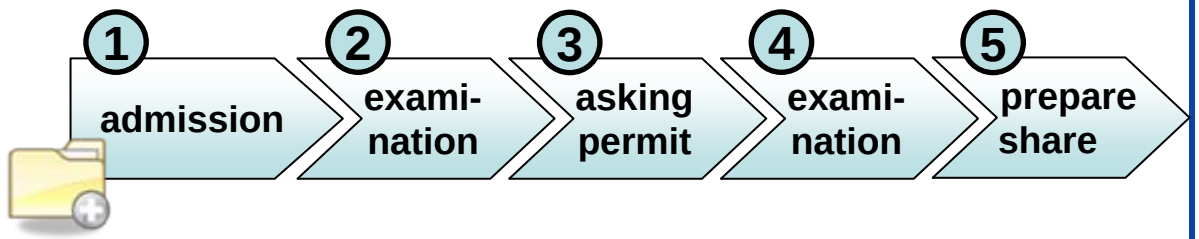
Two Types of Provenance Knowledge

Provenance labels for facts



Open Provenance Model

- RDF graph representing
  - Who did
    - what
    - when
    - why
    - …
  - to a data item



- „ex post“ workflow instance
- audit/re-enact

OWL REASONING USING PROVENANCE

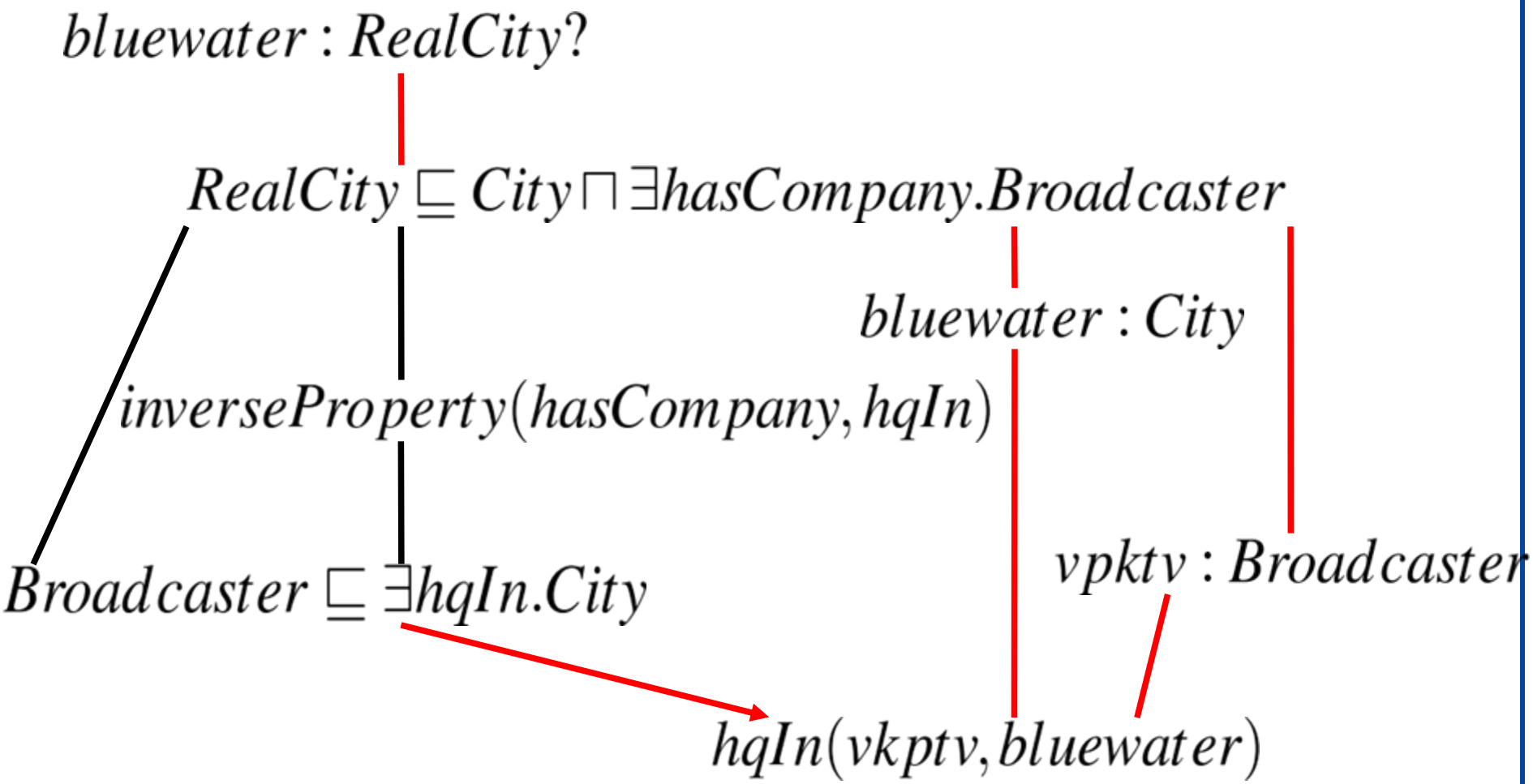
- Works also for RDF + SPARQL
  (with many technical differences of course)

  R. Dividino, S. Sizov, S. Staab, B. Schüler.
  Querying for Provenance, Trust, Uncertainty and other Meta Knowledge in RDF.
  In: *Journal of Web Semantics*. Elsevier, 7(3), 2009, pp. 204-219.

- Our work on using provenance with OWL reasoning:

  S. Schenk, R. Dividino, S. Staab, N. Kurz.
  Ontology Debugging Using Provenance.
  In: *Journal of Web Semantics*, Elsevier, accepted for publication.

Do we trust that bluewater is a real city?



German Press Agency, Highest trust, 2001-01-03

Neverest, Low trust, 2009-09-09

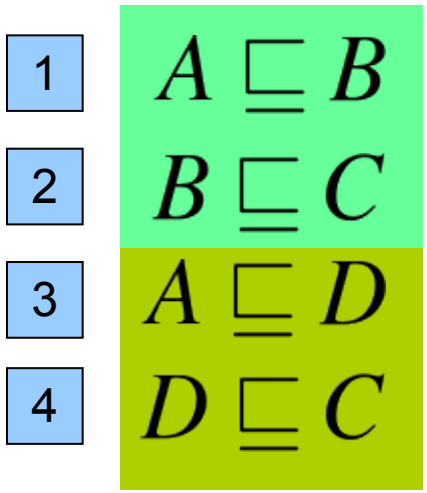
Explanation (Pinpointing)

Given Ontology O, Axiom α, $O' \subseteq O$

O' is an explanation (pinpoint) for α wrt. O, iff

$O' \models \alpha$ and

$O^* \not\models \alpha$ for all $O^* \subset O'$

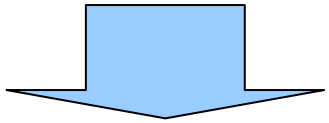


$A \sqsubseteq C$?

Explanation formula

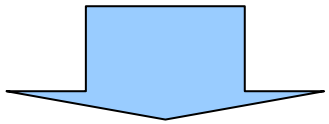
(1 ∧ 2) ∨ (3 ∧ 4)

Query: Meta Knowledge for $O \models \alpha$



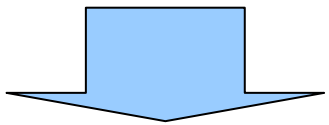
Compute Pinpointing Formula for α wrt O

$(A_1 \wedge \ldots \wedge A_m) \vee \ldots \vee (Z_1 \wedge \ldots \wedge Z_n)$



Insert Meta Knowledge degrees and operators

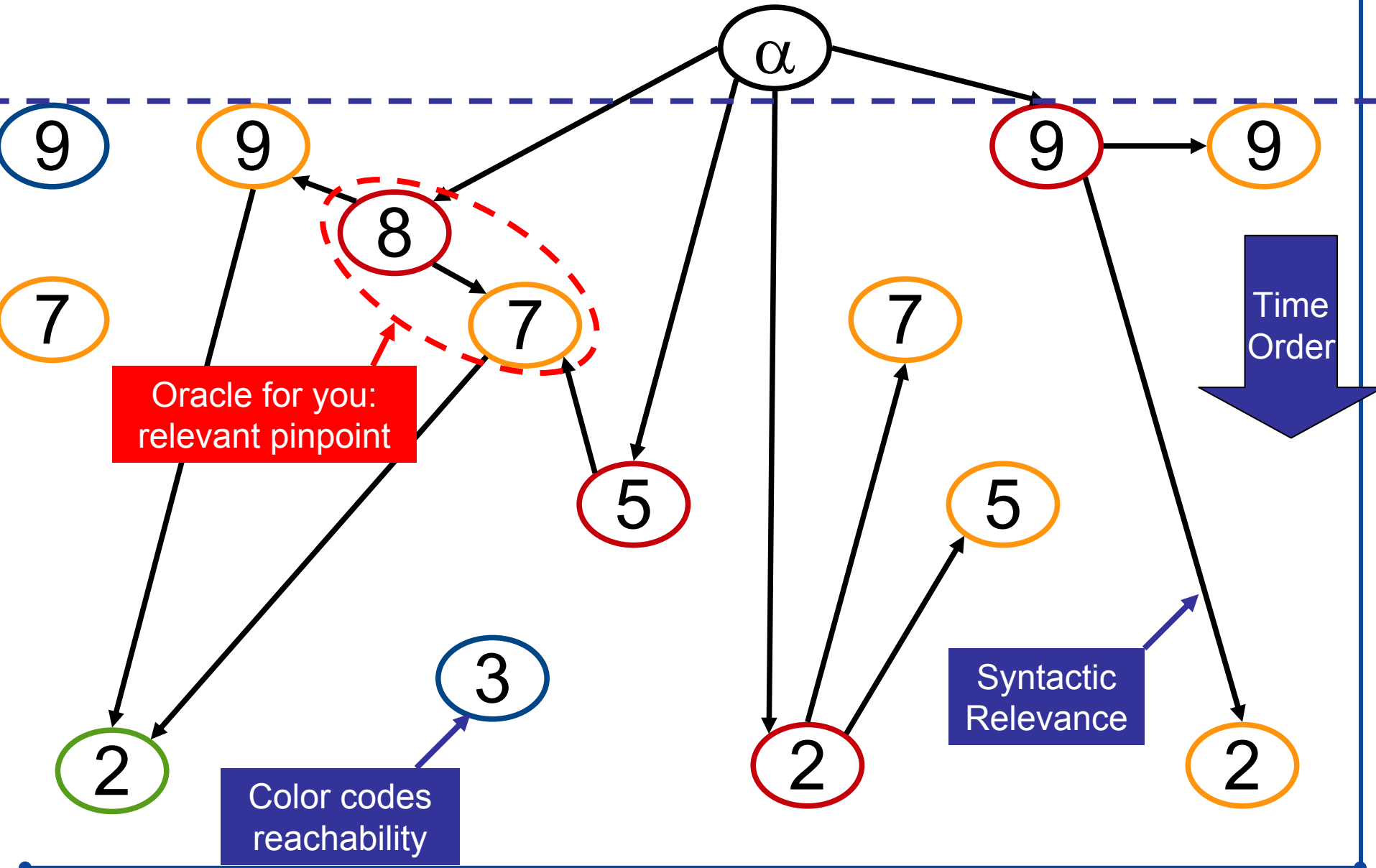
$\min(\max(\mathrm{Irm}(A_1), \ldots, \mathrm{Irm}(A_m)), \max(\mathrm{Irm}(Z_1), \ldots, \mathrm{Irm}(Z_n))$



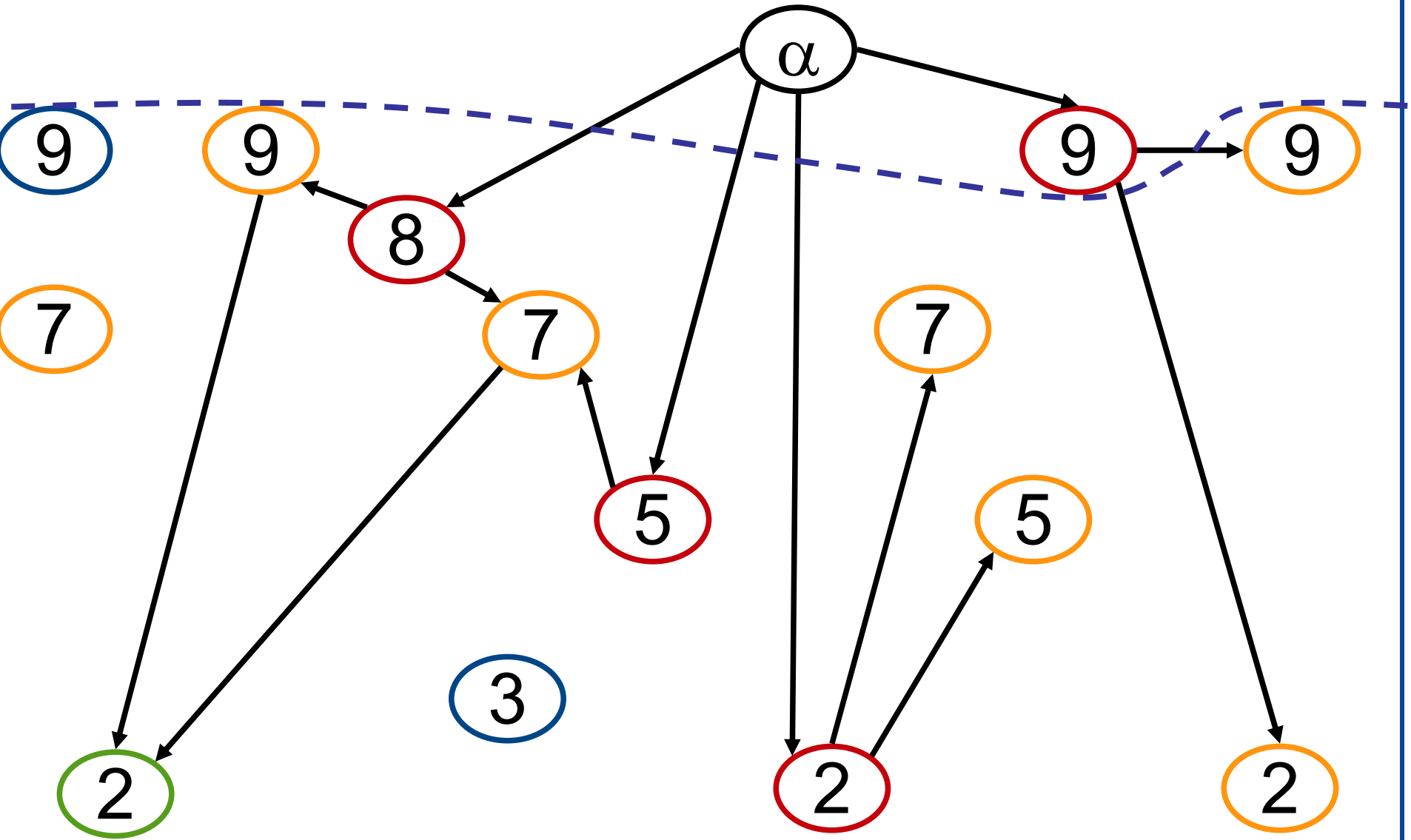
Evaluate

[KI 2009, SWPM2009]

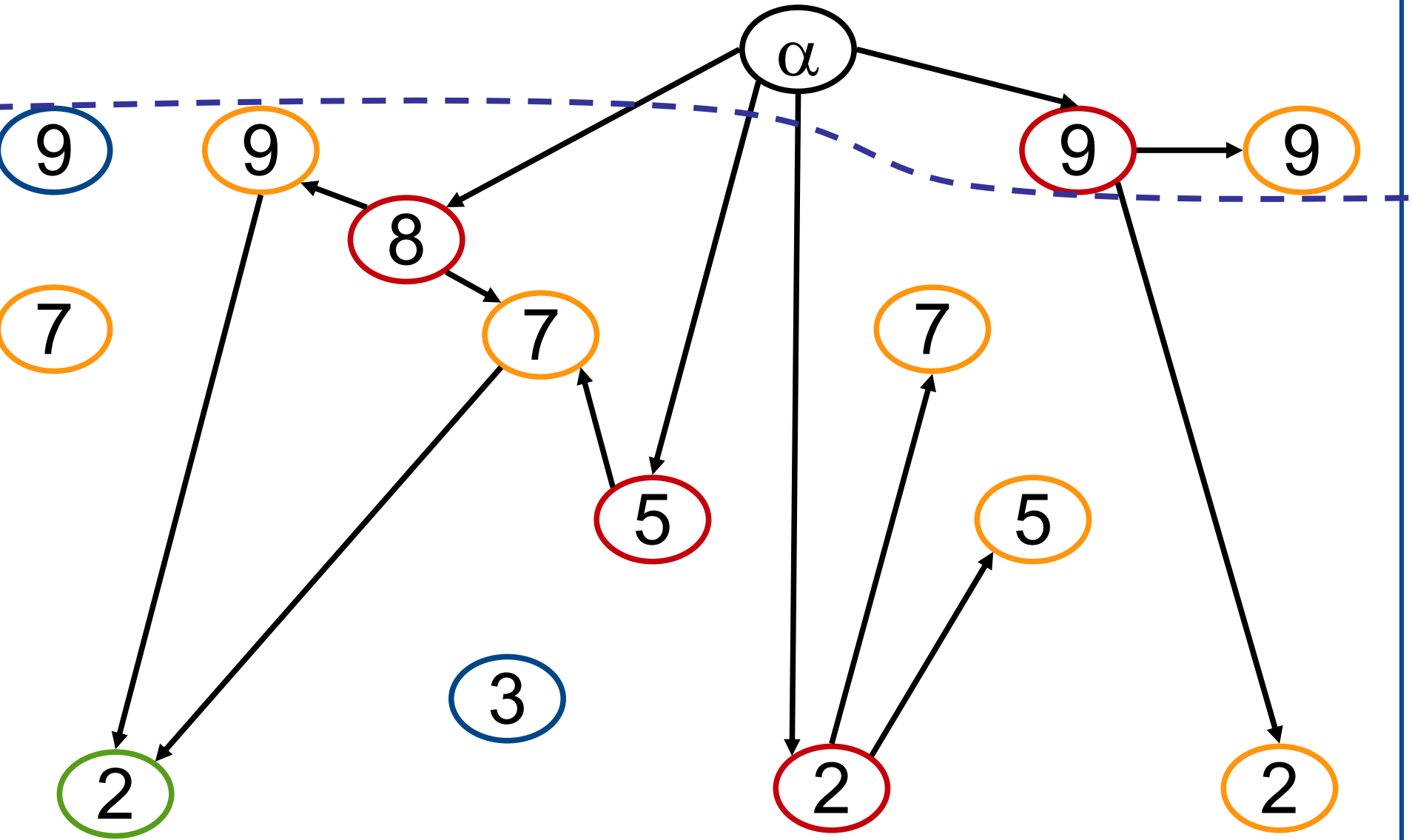
Optimized Computation of Provenance



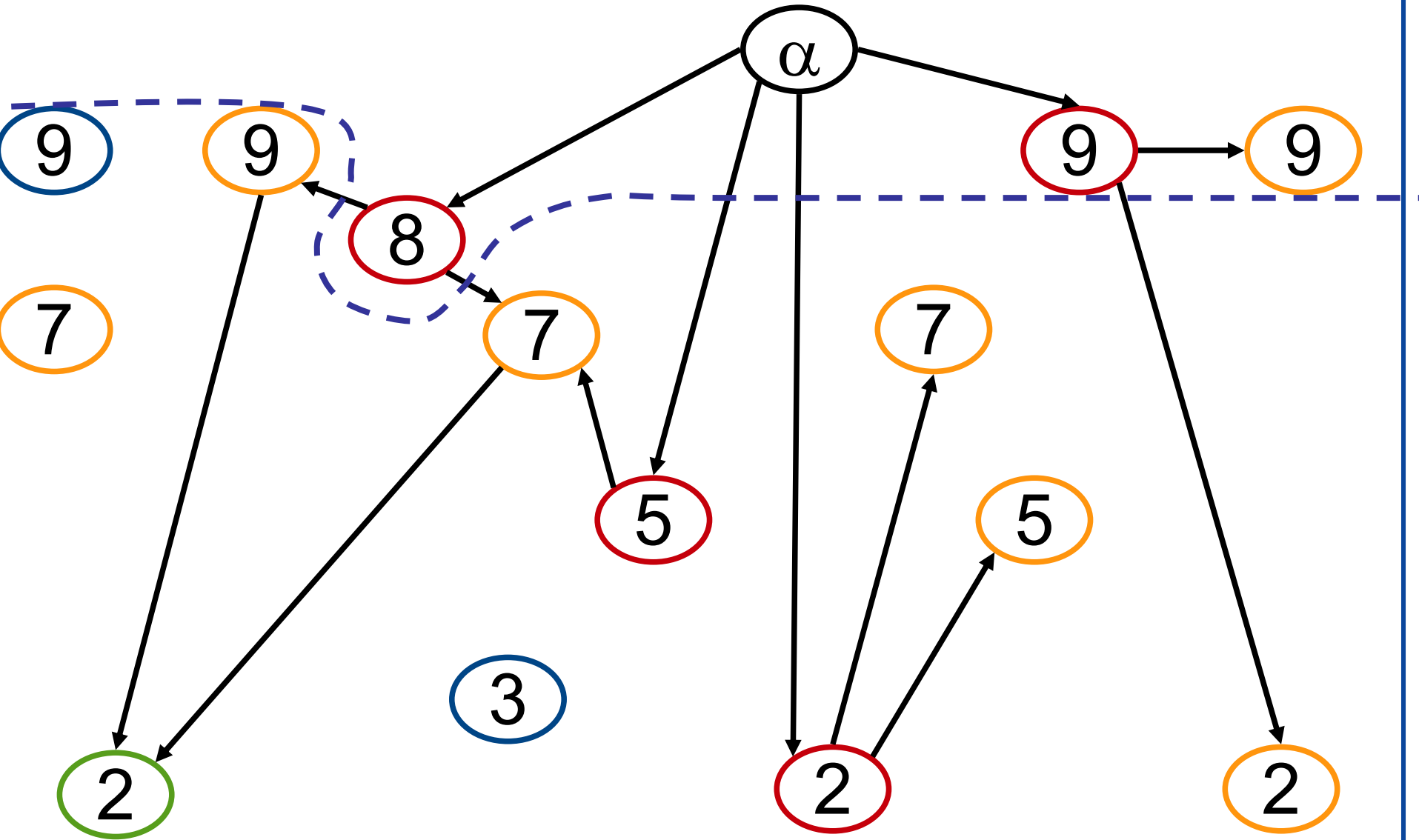
Optimized Computation of Provenance



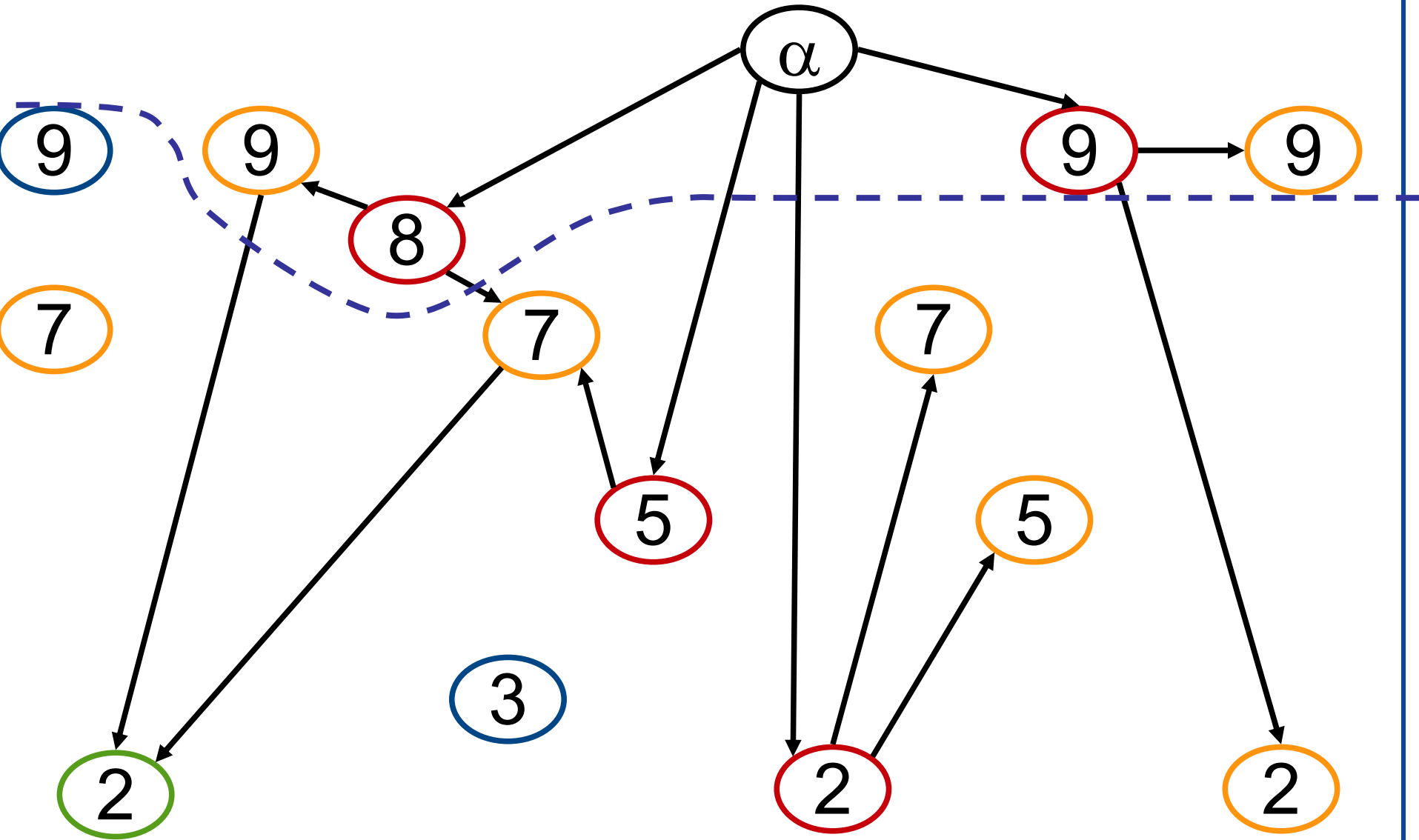
Optimized Computation of Provenance



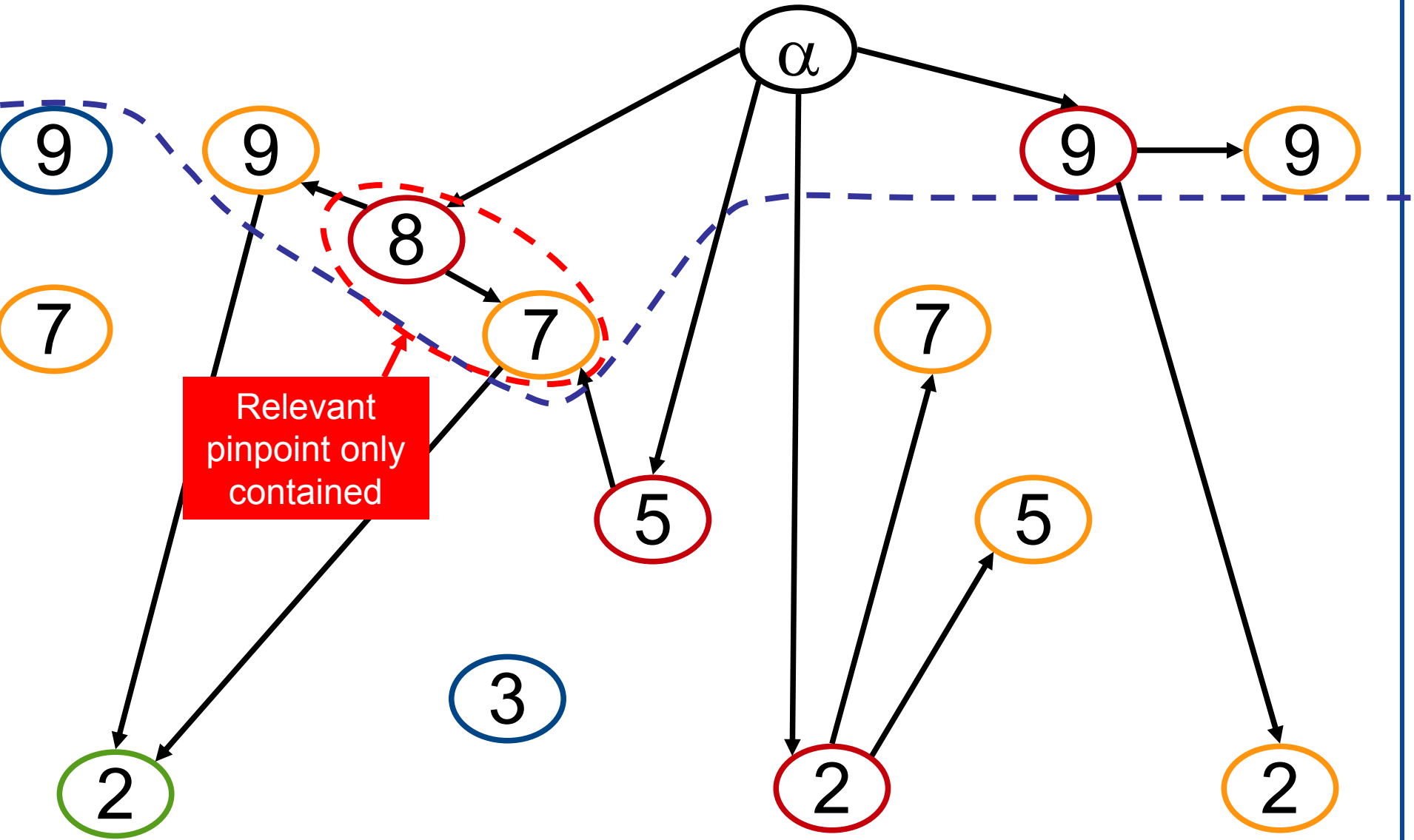
Optimized Computation of Provenance



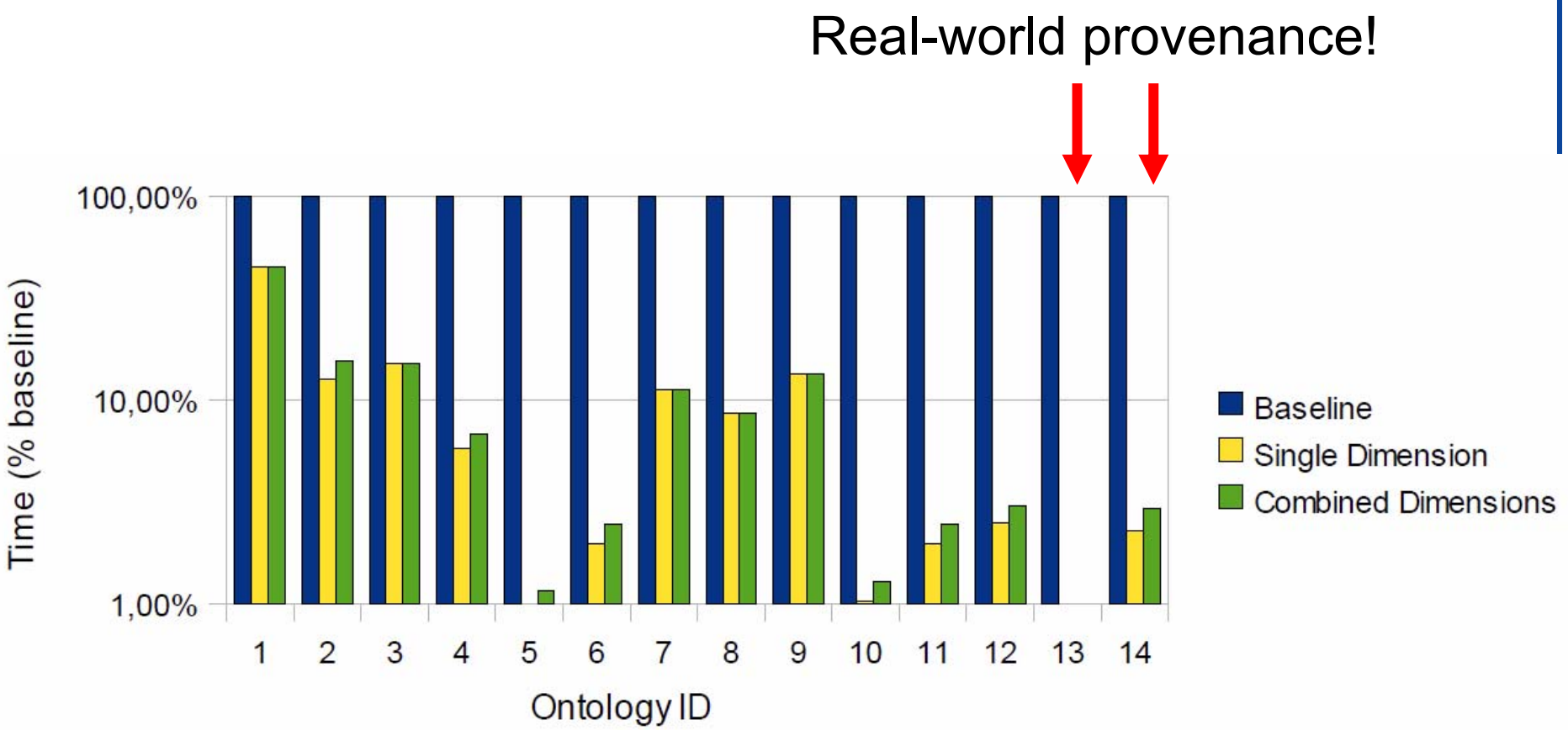
Optimized Computation of Provenance



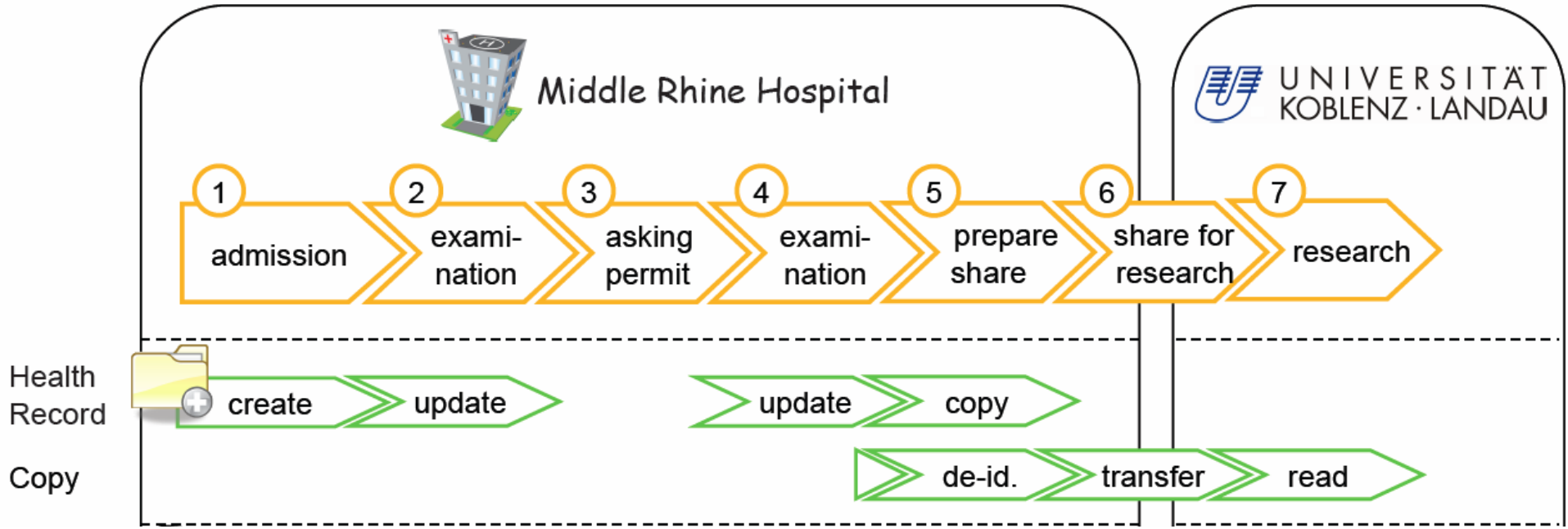
Optimized Computation of Provenance



Evaluation: Computing Provenance in Milliseconds



PROVENANCE AWARE POLICY LANGUAGE


Middle Rhine Hospital
UNIVERSITÄT KOBLENZ · LANDAU
1
admission
2
exami-
nation
3
asking
permit
4
exami-
nation
5
prepare
share
6
share for
research
7
research
Health
Record
create
update
update
copy
Copy
de-id.
transfer
read

Middle Rhine Hospital

UNIVERSITÄT KOBLENZ · LANDAU

1

admission

Health Record

create

Policies

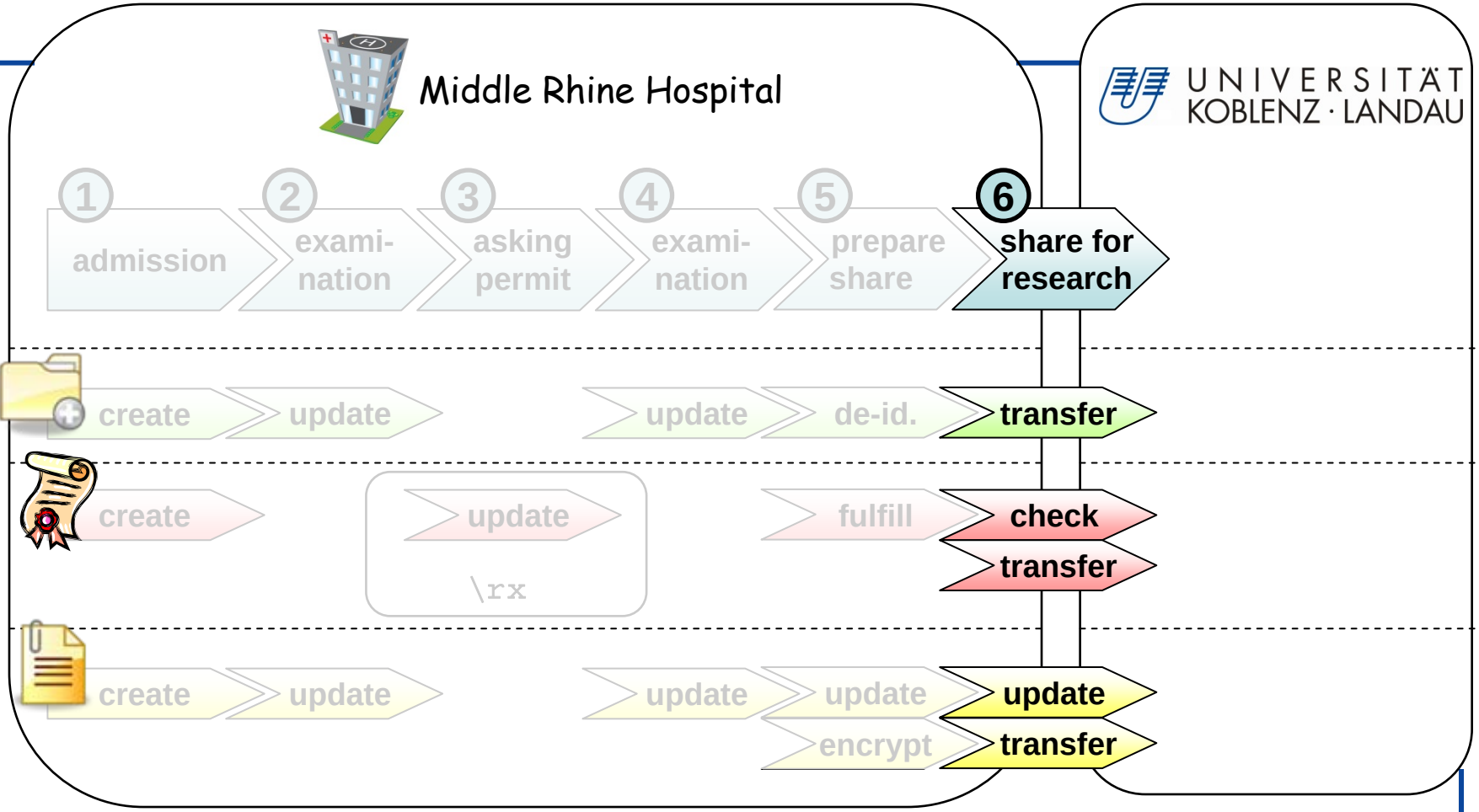
create

Sticky Log

creat

(P1): ukob *is allowed to process health records for research purposes. However,* **ukob** *is not allowed to transfer the health records of patients to other organizations.*

(P2): *The* **mrh** *demands that the record is only accessed by* **ukob** *after the sharing of the health records is approved by the patient and the approval must have been confirmed by a doctor.*



Sticky Log:

```
step (record, {mrh}, {}, create, patient_treatment, 1, {0})
step (record, {mrh}, {}, update, examination, 2, {1})
reduced (record, hidden, hidden, update, hidden, 4, {2})
step (record, {mrh}, {}, de-identified, privacy, 5, {4})
attribute (record, de-identified, true, 5)
step (record, {mrh}, {ukob}, transfer, research, 6, {5})
```

Middle Rhine Hospital

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1 admission → 2 exami-nation → 3 asking permit → 4 exami-nation → 5 prepare share → 6 share for research

Health Record

create → update → update → de-id. → transfer

Policies

create → update → fulfill → check

transfer

Sticky Log

creat

```
permit (6)?

(P3):
permit (ID) IF (step (record, _, _, transfer, _, ID, _) AND
                attribute (record, de-identified, true, ID)).
```

Sticky Log:

```
step (record, {mrh}, {}, create, patient_treatment, 1, {0})
step (record, {mrh}, {}, update, examination, 2, {1})
reduced (record, hidden, hidden, update, hidden, 4, {2})
step (record, {mrh}, {}, de-identified, privacy, 5, {4})
attribute (record, de-identified, true, 5)
step (record, {mrh}, {ukob}, transfer, research, 6, {5})
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Middle Rhine Hospital

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transfer

Sticky Log

creat

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Sticky Log:

```
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step (record, {mrh}, {}, update, examination, 2, {1})
reduced (record, hidden, hidden, update, hidden, 4, {2})
step (record, {mrh}, {}, de-identified, privacy, 5, {4})
attribute (record, de-identified, true, 5)
step (record, {mrh}, {ukob}, transfer, research, 6, {5})
```

CONCLUSION

Data Value lies in

Past

- Knowing what happened to your data
- Knowing why it happened to your data

Present

- Drawing the right conclusions from your data

Future

- Deciding upon the destiny of your data

Your Strategy is based on Provenance!
You better take care!

Core References

Provenance in RDF

- R. Dividino, S. Sizov, S. Staab, B. Schüler. Querying for Provenance, Trust, Uncertainty and other Meta Knowledge in RDF. In: *Journal of Web Semantics*. Special issue on "The Web of Data". Elsevier, 7(3), 2009, pp. 204-219.

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- C. Ringelstein, S. Staab. Provenance-aware Policy Definition and Execution. In: *IEEE Internet Computing*, special issue on Provenance in Web Applications, Jan/Feb 2011, pp. 49-58.

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Thank You!

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WeST
People and Knowledge Networks

See you again at…