Updating RDF

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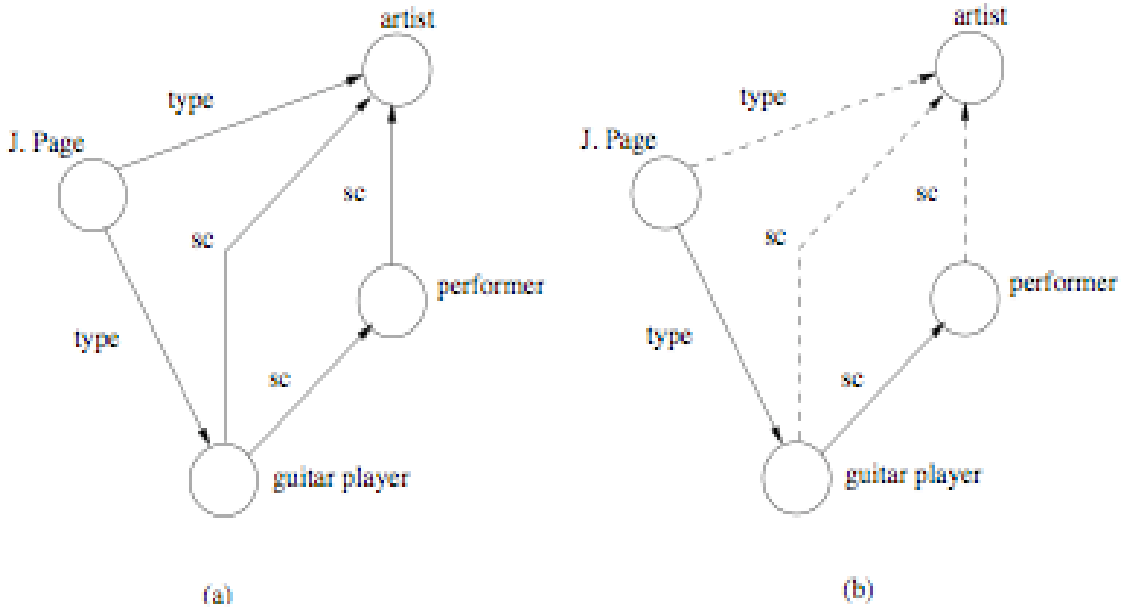
Updates in RDF

Music store example: delete all triples containing the value *artist*

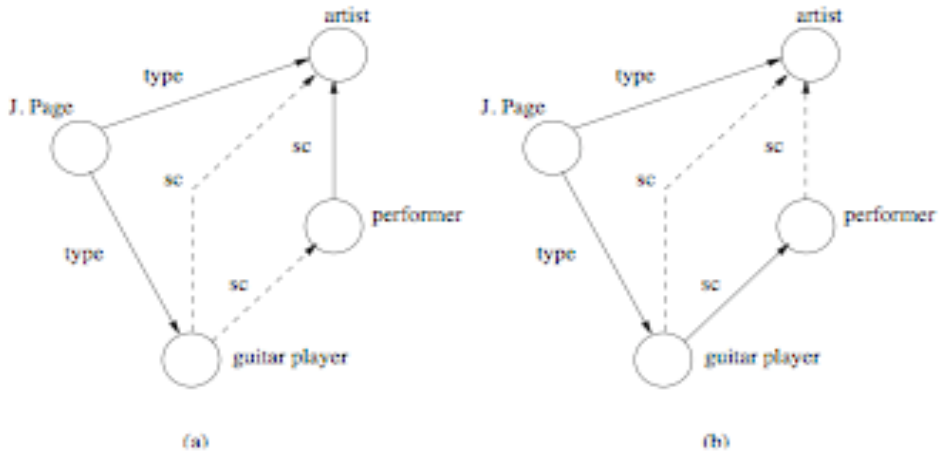


Updates in RDF

Music store example.

Want to delete the triple $(guitarplayer, \mathtt{sc}, artist)$.

- semantics: the triple cannot be deduced from the updated database.
- two possible results: (a) and (b).



Updates in RDF

Update and Revision in Knowledge Bases

- *Update*: bring the KB up to date when the world described by it changes; *Revise*: incorporate new information obtained about a static world.
- The RDF model allows distributed revisions of the knowledge base in the form of addition of information in a monotonic way.
- RDF as a database: the notion of update becomes relevant.
- We concentrate on updates and follow the approach of Katsuno-Mendelzon (1991).

Updates in RDF

The Problem

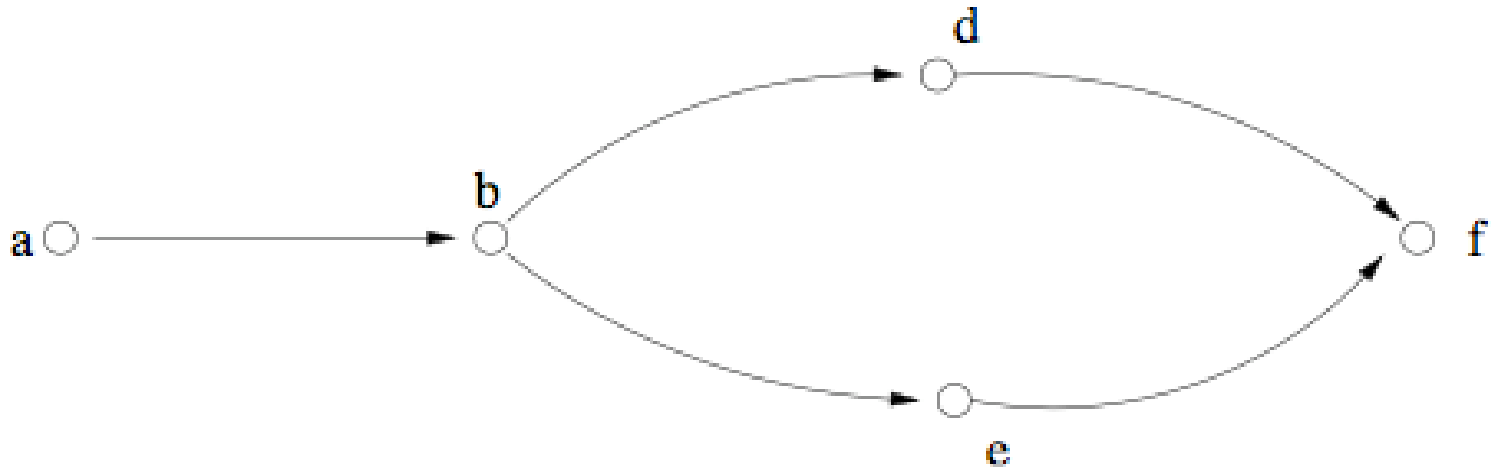
- RDF data needs a well defined notion of update.
- Characterizing these changes in RDF: complex problem, not addressed semantically so far.

Updates in RDF

Three example problems for $G = \{(a, \mathtt{sc}, b), (b, \mathtt{sc}, c)\}$.

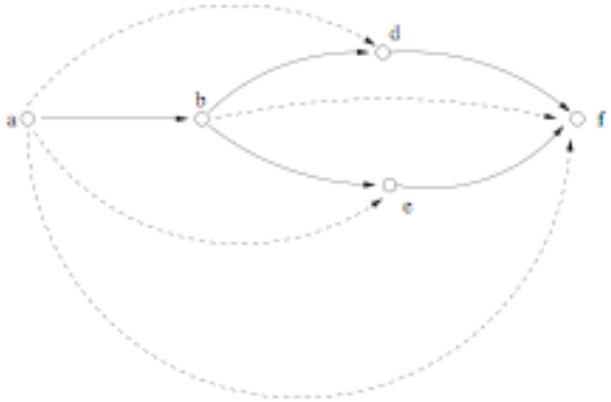
- Problem 1: Erase $(a, \mathtt{sc}, c)$ from G. Result: should $(a, \mathtt{sc}, c)$ be derivable from G after the deletion?. If not, should we delete $(a, \mathtt{sc}, b)$ or $(b, \mathtt{sc}, c)$?
- Problem 2: Erase $(a, \mathtt{sc}, b)$ from G. Result: before deletion, $(a, \mathtt{sc}, c)$ was implicit in G (it was entailed by G). Should it still be in G after deletion?. Should deletion be syntax-independent?
- Problem 3: Erase $\{(a, \mathtt{sc}, b), (b, \mathtt{sc}, c)\}$ from G. Result: is it the empty set?. Either $(a, \mathtt{sc}, b)$ or $(b, \mathtt{sc}, c)$?. Should $(a, \mathtt{sc}, c)$ be in the result?

Example: Calculating $ecand(G, H)$



- All arrows indicate SubClass
- $G = \{(a, sc, b), (b, sc, e), (b, sc, d), (e, sc, f), (d, sc, f)\}$
- $H = \{(a, sc, f)\}$

Example (Contd.)



The Algoritm for calculating $ecand(G, H)$:

1. Calculate the closure of G (in this ex. trans. closure)
2. Calculate set of minimal bases of the graph $closure(G)$, H
3. Calculate a minimal cover of set in (2)
4. In this example, (3) reduces to calculate a minimal cuts of $closure(G)$

Related Work

- RDF Updates: All proposals ignore the semantic problems.
- Sarkar *et al*(Rensselaer at Hartford TR, 2003) identified five update operators, based on the work of Tatarinov *et al.*
- Zhan (Rensselaer at Hartford TR, 2005) proposed an extension to RQL, and defined a set of update operators in an operational way.
- Ognyanov and Kiryakov (EKAW 2002) propose two basic types of updates: addition and the removal of a statement (triple).
- Magiridou *et al* (International Semantic Web Conference 2005) RUL, a declarative update language for RDF. No vocabulary issues not blank nodes considered

Related Work

- *Updates in graph databases.* GUL, introduced by Hidders, based on pattern matching, defines *addition* and *deletion* Elements not in a *core* pattern are deleted for every matching of a *base* pattern. Approach apt for implementing in RDF the semantic notions we will present here.

- *Updates in web databases.* Updates in XML: Tatarinov *et al* (SIGMOD 2001) proposed an XQuery extension.

- The W3C specified the properties required for update operators in XML.