UiO : Department of Informatics
University of Oslo

Bounds: Expressing Reservations about Incoming Data

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Presented by Kjetil Kjernsmo

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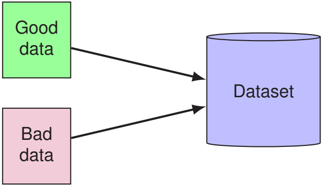
Synopsis



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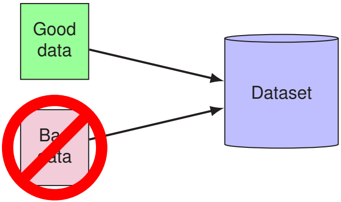

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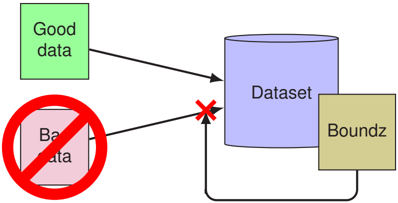

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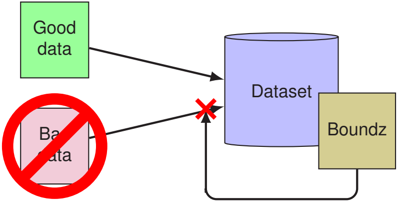

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- *Boundz*: Vocabulary for expressing reservations about incoming data
- Theory: Based on *bounded homomorphisms*

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- Suppose you have a triple store, and
- you'd like it to be community-curated
- i.e., you'd like to invite people and institutions to contribute data
- but you'd like to protect certain elements of structure

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  - don't touch the finished/perfect/imported parts

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  - Publish, re-use and combine bounds

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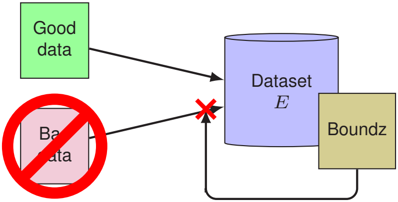
  - Write-protecting (parts of) a dataset

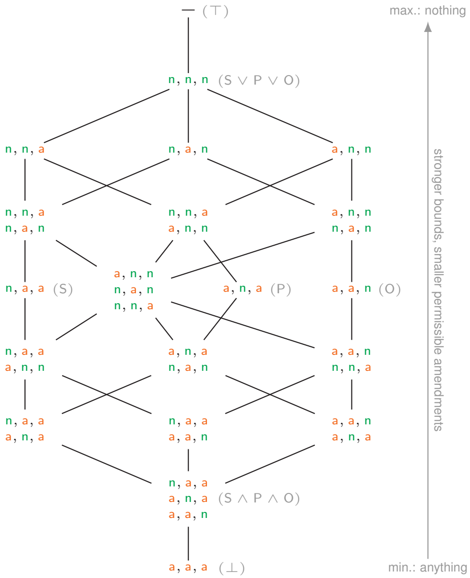
Bounds



Bounds control what new triples can be added to a dataset E based on the elements in E.

- Can express this with patterns:
  - If an incoming triple does not exist in E,
  - and matches the pattern, then add it.

- *Bounded homomorphism*



Theoretical background

- *Bounded homomorphism*
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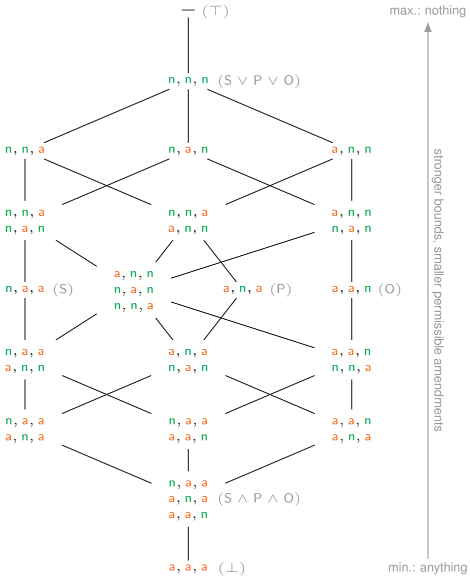

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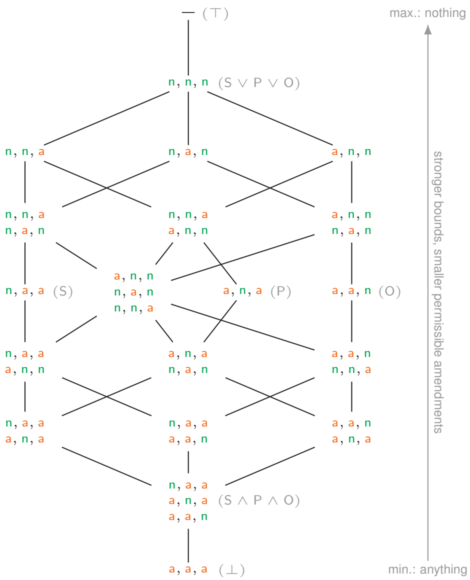

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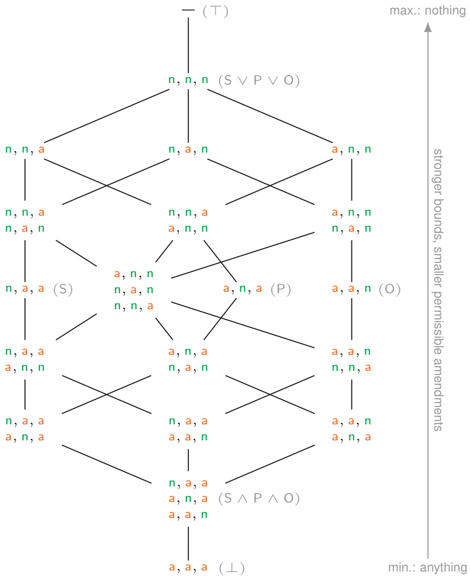

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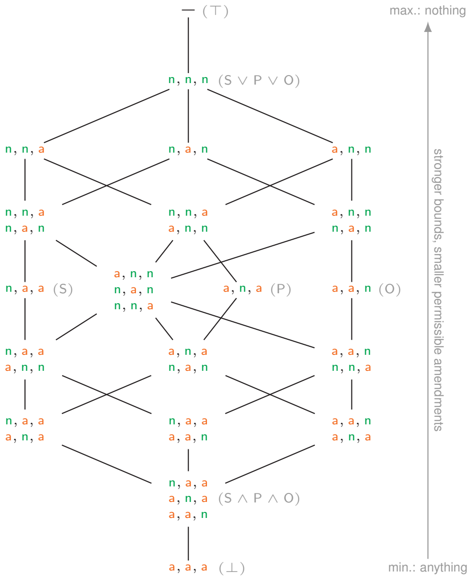

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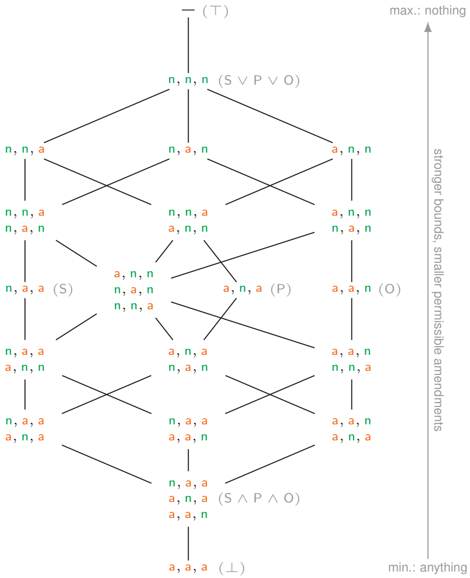

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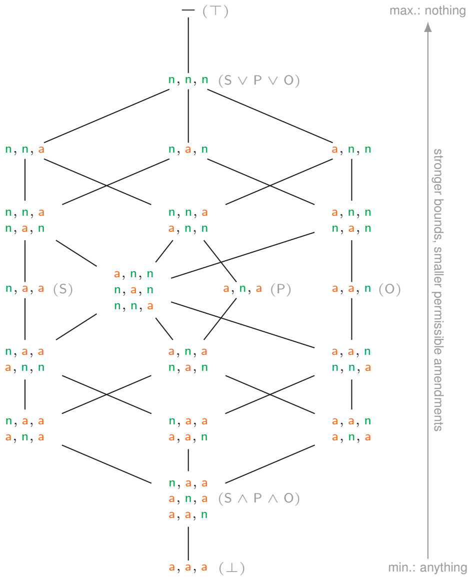

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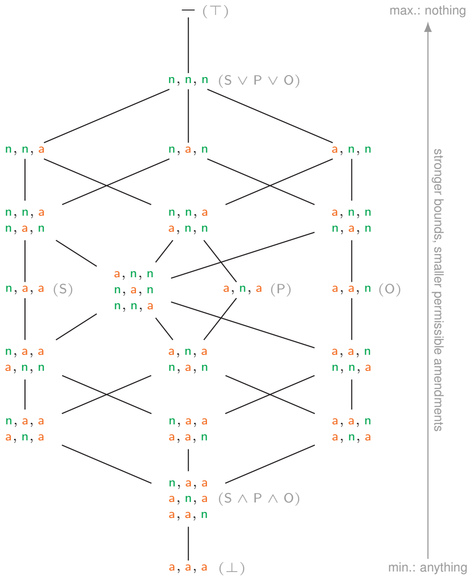

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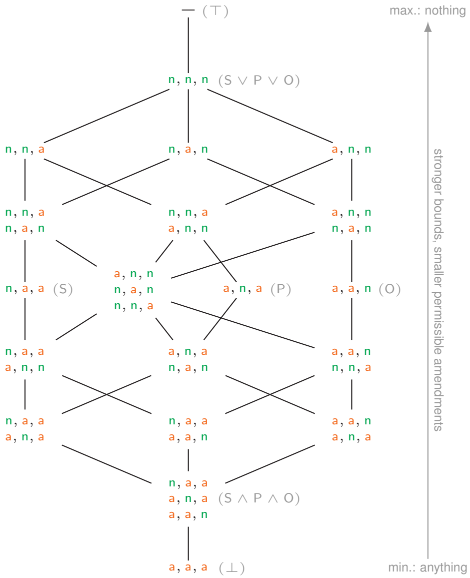

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  - Prevents basic ontology-hijacking, protects vocabulary.

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  - Keeping amendments separated from receiver’s data

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- Implements "conservative extensions" for RDF graphs
- Good fit for OWL LD (Linked Data) profile
  - OWL LD = OWL RL $\cap$ single triple statements

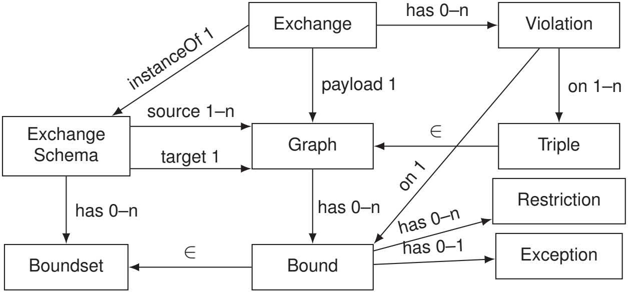
Thanks

Implementation available:

- Prototype implementation: checks bounds, computes payloads
- Complexity: P

- More info/material on the web:
  - `http://sws.ifi.uio.no/project/boundz/`
  - `http://sws.ifi.uio.no/vocab/boundz`

Boundz vocabulary



Simplified overview of:

`http://sws.ifi.uio.no/vocab/boundz`

Vocabulary example

BBC Music dataset restrictions:

1. The vocabulary that the BBC uses must not be hijacked by adding new superclasses or superproperties.
2. Adding new `foaf:made` relationships is not tolerated, unless both artist and record is new to the BBC dataset; their current library is regarded as complete with respect to the albums of enlisted artists, but is open for extensions with new artists.
3. More fanpages may be added, but an existing fanpage cannot be related to more artists.
4. No new information about existing genres may be added.
5. Also, assume the BBC keeps a special dataset about the Beatles which is not under their management, so they want to disallow any new information using only elements from this dataset. However, new information may *relate* to the Beatles dataset.

```
ex:bbcmusic a bz:BoundedGraph ;
  bz:hasBound bzs:RDFS ,
              [ a bz:Aso ;  bz:predicateValue foaf:made ] ,
              [ a bz:o ;    bz:predicateValue mo:fanpage ;
                            bz:hasException bz:ignoreViolations ] ,
              [ a bz:T ;    bz:subjectClass mo:Genre ] ,
              [ a bz:T ;    bz:objectClass mo:Genre ] .
ex:beatles a bz:BoundedGraph ;
  bz:hasBound [ a bz:KKspo ] .
```

Boundz output example

```
<file:///test/test>
      a       :ExchangeSchema ;
      :hasBound _:b1 , _:b2 , _:b3 , _:b4 , _:b5 , _:b6 , _:b7 , _:b8 ;
      :hasSource <file:///test/uni1_0.ttl> , <file:///test/uni1_1.ttl> ;
      :hasTarget <file:///test/uni500_2.ttl> ;
      :outputPayload "false"^^xsd:boolean ;
      :outputViolations "false"^^xsd:boolean ;
      :sourceReasoning "false"^^xsd:boolean ;
      :targetReasoning "false"^^xsd:boolean .

<http:///test/test/1372168337206/31381>
      a       :Exchange ;
      :hasPayload   [ :noOfTriples "6498"^^xsd:long ] ;
      :hasViolation [ a       :Violation ;
                      :hasSource <file:///test/uni1_1.ttl> ;
                      :noOfTriples "566"^^xsd:long ;
                      :onBound _:b7 ] ;
      :instanceOf <file:///test/test> ;
      :timestamp "1372168337206"^^xsd:long .

_:b7  a       :T ;
      :classRestriction ub:University ;
      :hasException :ignoreViolations ;
      :hasRestriction ub:University ;
      :objectClass ub:University ;
      :objectRestriction ub:University .
```

Excerpt of `http://sws.ifi.uio.no/project/boundz/impl/outputExchanges.ttl`

SPARQL query

SPARQL representation of `bz:KKspo`:

```
CONSTRUCT
  { ?s ?p ?o .}
WHERE
  { GRAPH <SOURCE>
      { ?s ?p ?o
        GRAPH <TARGET>
          { { { { ?s ?_5 _:b0 } UNION { _:b1 ?s _:b2 } UNION { _:b3 ?_6 ?s } }
              { { ?p ?_3 _:b4 } UNION { _:b5 ?p _:b6 } UNION { _:b7 ?_4 ?p } } }
            {   { ?o ?_1 _:b8 } UNION { _:b9 ?o _:b10 } UNION { _:b11 ?_2 ?o } }
          }
      }
    MINUS
      { GRAPH <TARGET>
          { ?s ?p ?o }
      }
  }
```

References

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