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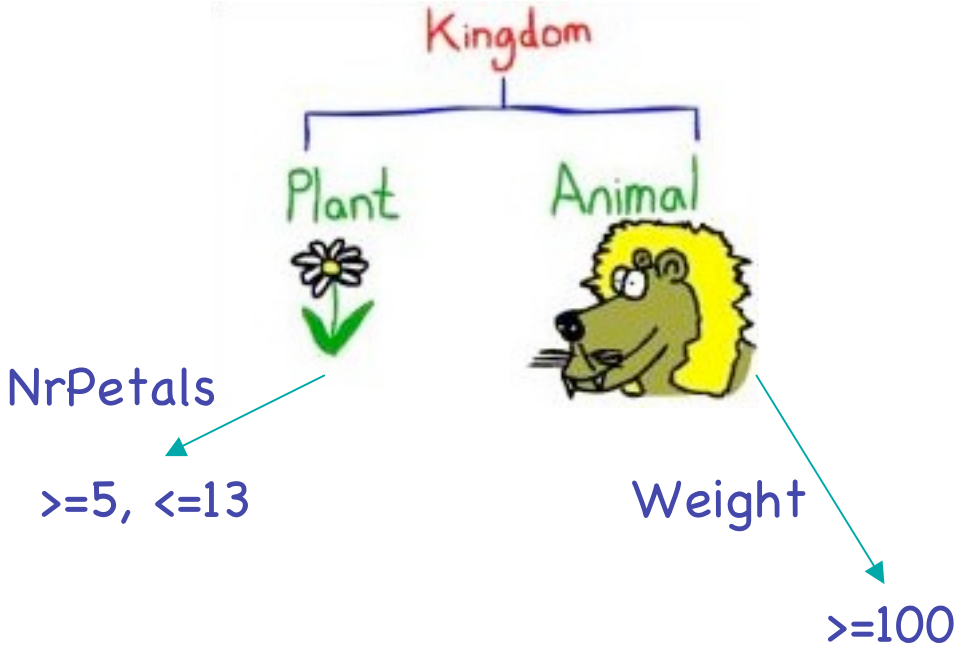
# Datatypes

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# Datatypes - in OWL now

- XML Schema datatypes:
  - xsd:string, xsd:integer, xsd:decimal, xsd:float, xsd:double, xsd:dateTime, xsd:time, xsd:date, xsd:gYearMonth, xsd:gYear, xsd:gMonthDay, xsd:gDay, xsd:gMonth, xsd:hexBinary, xsd:base64Binary, xsd:anyURI, xsd:normalizedString, xsd:token, xsd:language, xsd:NMTOKEN, xsd:Name, xsd:NCName, xsd:nonPositiveInteger, xsd:negativeInteger, xsd:long, xsd:int, xsd:short, xsd:byte, xsd:nonNegativeInteger, xsd:unsignedLong, xsd:unsignedInt, xsd:unsignedShort, xsd:unsignedByte, xsd:boolean, xsd:positiveInteger
- User-defined datatypes
  - no provision in the OWL syntax for conveying what these datatypes are
- What we can do:
  - *(range hasAge xsd:integer)* or *(range address xsd:string)*
  - *(John hasAge 18)* or *(Mary address "theBlueHouse")*

# Datatypes - in OWL now

- What we cannot do:
  - No intervals, etc.: *Adult SubClassOf (All hasAge >=18)*
    *Person SubClassOf*
    *(All address In"[A-B]Letter*")*
  - No comparisons, etc.: *Square SubClassOf (width, height, =)*
    *Person SubClassOf*
    *(SystBP, DiastBP, >=)*
  - …n-ary datatype predicates in general
  - Have rationals, e.g. 1/3
  - In OWL DL: have datatype properties as keys
    - InverseFunctional does not work for datatype properties
  - Composite keys: neither on object nor on datatype poperties
  - Many more: we post more use cases

# Datatypes - resulting issues

- n-ary
  - Issue 5: Doubts about n-ary datatypes
    - Fragile, syntax missing
  - Issue 53: Linear inequality(n-ary) xsd related
    - a use case requiring n-ary datatypes
  - Issue 29: owl:DataRange vs rdfs:Datatype
    - how to call datatypes?
  - Issue 31: Canonical URI for externally defined datatypes
    - How to name datatypes?
- Others:
  - Issue 87: owl:rational
    - Why decimal isn't sufficient and why we need rationals
  - Issue 74: xsd namespace for facets
    - Suggests to use "xsd:minInclusive" for <=
  - Issue 25: Range of values as extension of class
    - A use case for user defined datatypes/intervals
  - Issue 71: lang tag datarange
    - I didn't understand

# What we want/would like to give

The same as before, plus

1. A built datatype rationals,
   see http://www.w3.org/2007/OWL/wiki/OWL_Rational

   **ToDo**: accept

2. Comparisons with & without constants using schema "facet names" such as
   minInclusive, maxExclusive, equals, etc.

   - To be used in *Square SubClassOf (width, height, equals)*

     and *Adult SubClassOf (hasAge, 18, maxInclusive)*

   - Similar for strings: length, minLength, infix, prefix, matches

   **ToDo**: list predicates & semantics, use as in OWL1.1 proposal

# What we want/would like to give

The same as before, plus

3. A mechanism to define “fancy” datatype predicates
   - E.g., to define *Celsius-Fahrenheit* to be used in *PhysObject SubClassOf (tempC, tempC, Celsius-Fahrenheit)*
   - Mechanism for external only (not in-line), using BLD/SWRL/SPARQL syntax

   **ToDo**: choose/specify mechanism & use as in OWL1.1 proposal

# What we want/would like to give

The same as before, plus

4. Easy keys: a mechanism to
   - specify simple & composite keys for datatype & object properties
   - E.g., *(SSNr keyFor USCit)*
     *(DoB, PoB keyFor GermanCit)*
   - They will not affect classification/consistency, but only work on known individuals:

$$(x=y) \leftarrow USCit(x), USCit(y), SSNr(x)=SSNr(y))$$

See http://code.google.com/p/owl1-1/wiki/EasyKeyProposal

**ToDo**: extend syntax of OWL1.1, specify semantics