

# The Semantic Web Technology Stack (not a piece of cake...)

Most apps use only a subset of the stack

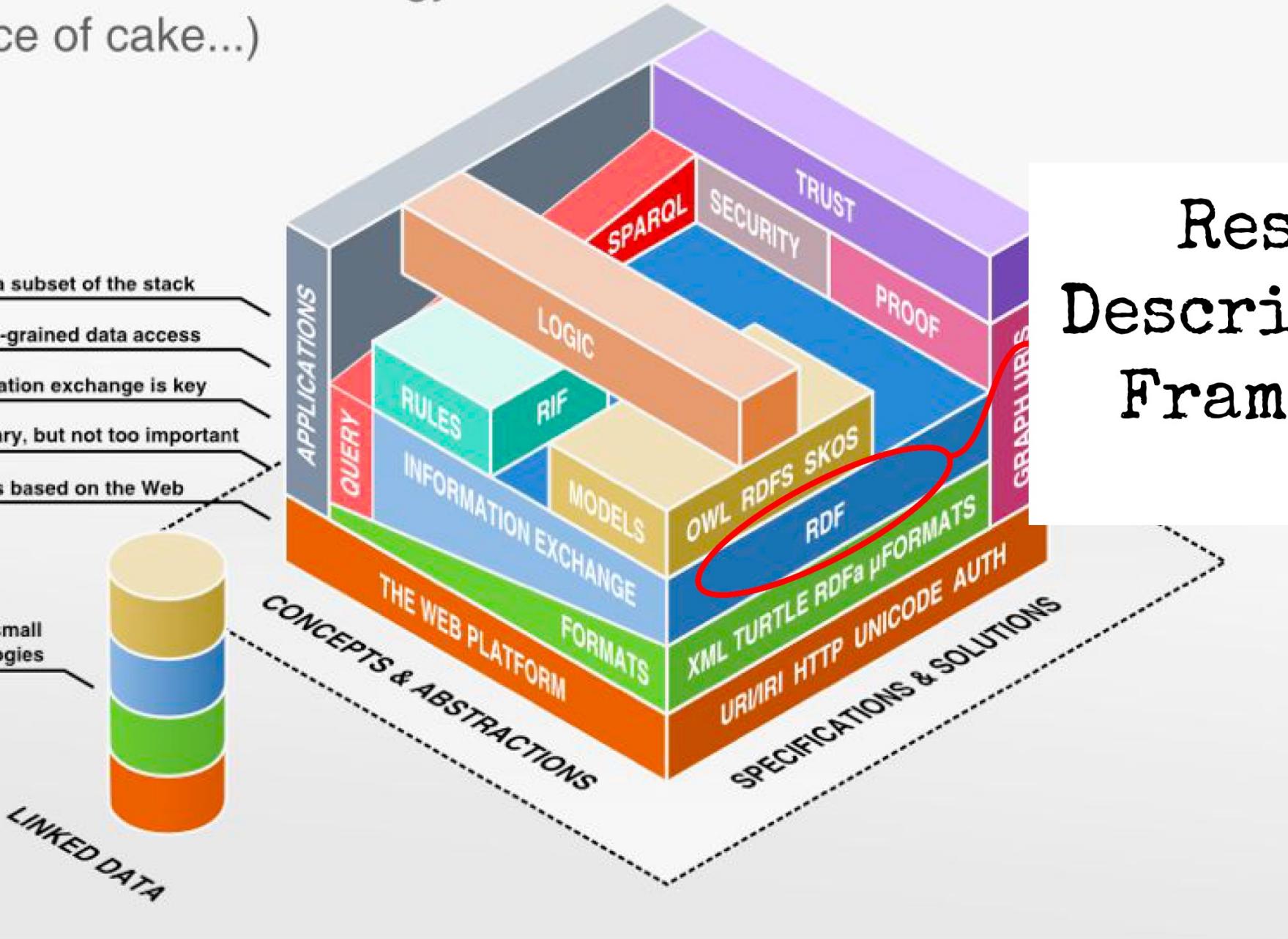
Querying allows fine-grained data access

Standardized information exchange is key

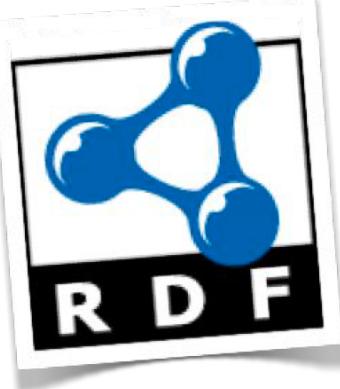
Formats are necessary, but not too important

The Semantic Web is based on the Web

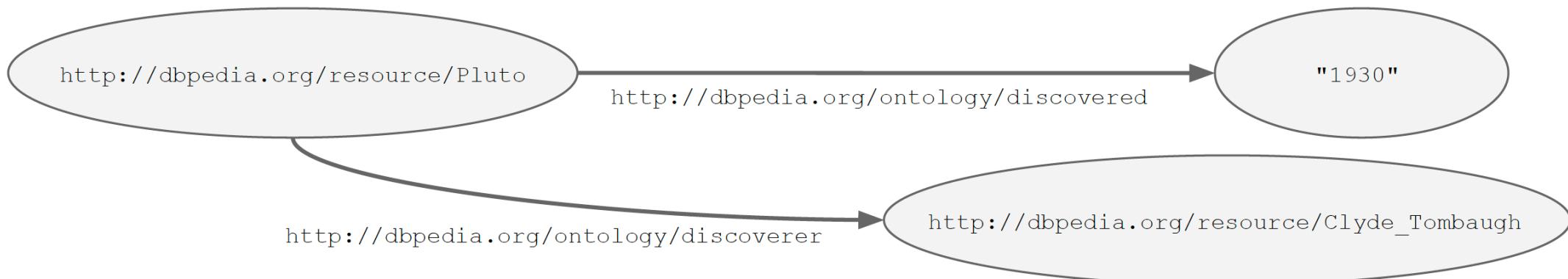
Linked Data uses a small selection of technologies



## Resource Description Framework (RDF)



# Turtle - Terse RDF Triple Language



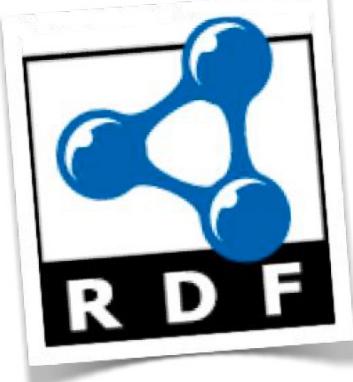
- starting with N-Triples

```
<http://dbpedia.org/resource/Pluto> <http://dbpedia.org/ontology/discovered> "1930" .  
<http://dbpedia.org/resource/Pluto> <http://dbpedia.org/ontology/discoverer>  
<http://dbpedia.org/resource/Clyde_Tombaugh> .
```

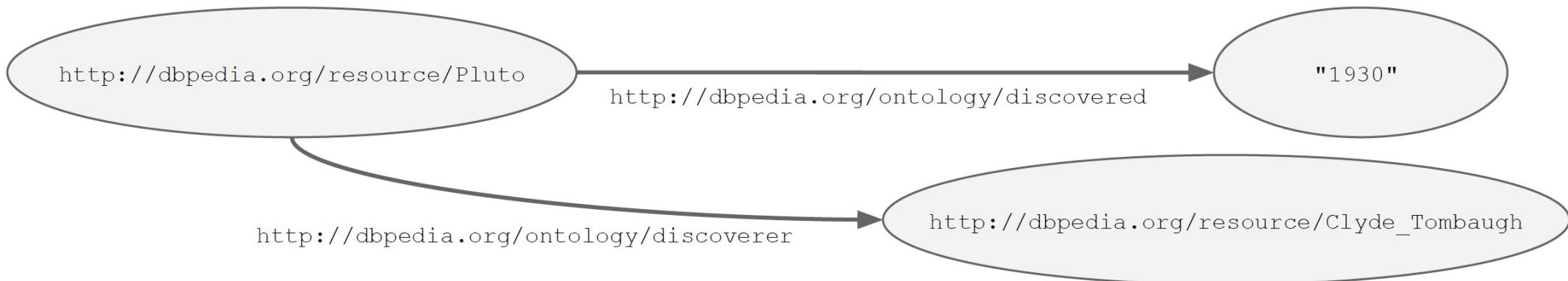
```
@prefix dbo: <http://dbpedia.org/ontology/> .  
@base <http://dbpedia.org/resource/> .  
  
<Pluto> dbo:discovered "1930" .  
  
<Pluto> dbo:discoverer <Clyde_Tombaugh> .
```

**@prefix directive** associates prefix-label with URI

**@base directive** provides URI to complement all relative URIs



# Turtle - Terse RDF Triple Language



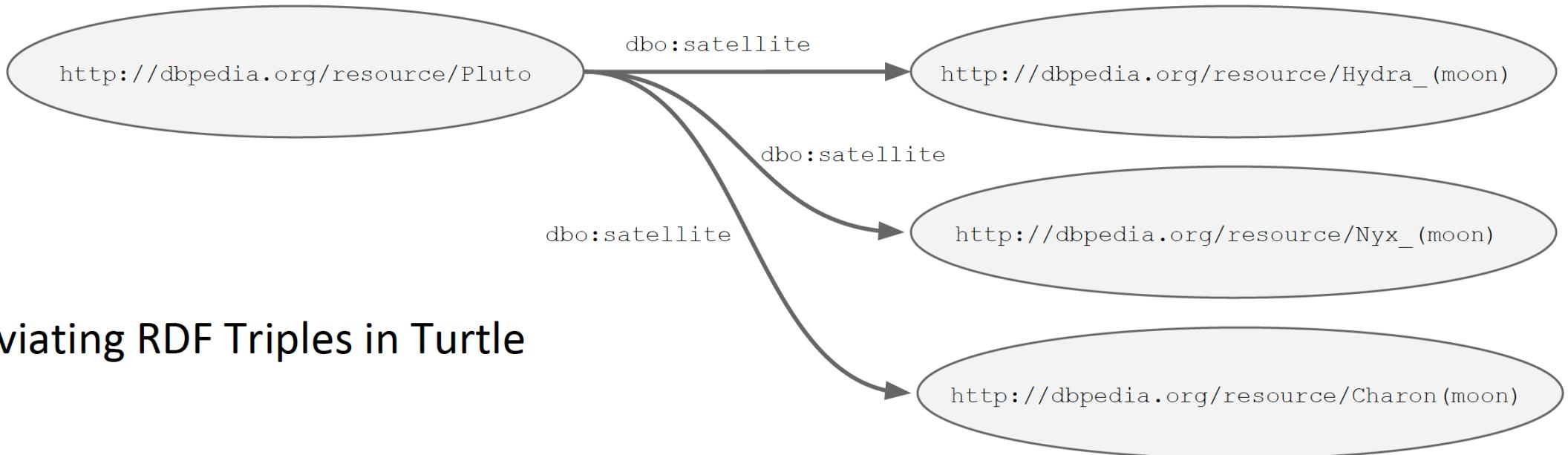
- Abbreviating RDF Triples in Turtle

```
@prefix dbo: <http://dbpedia.org/ontology/> .  
@base <http://dbpedia.org/resource/> .  
  
<Pluto> dbo:discovered "1930" ;  
      dbo:discoverer <Clyde_Tombaugh> .
```

semicolon indicates that subsequent triples have the same subject (**predicate list**)



# Turtle - Terse RDF Triple Language



- Abbreviating RDF Triples in Turtle

```
@prefix dbo: <http://dbpedia.org/ontology/> .  
@base <http://dbpedia.org/resource/> .  
  
<Pluto> dbo:satellite <Hydra_(moon)> ,  
                  <Nyx_(moon)> ,  
                  <Charon_(moon)> .
```

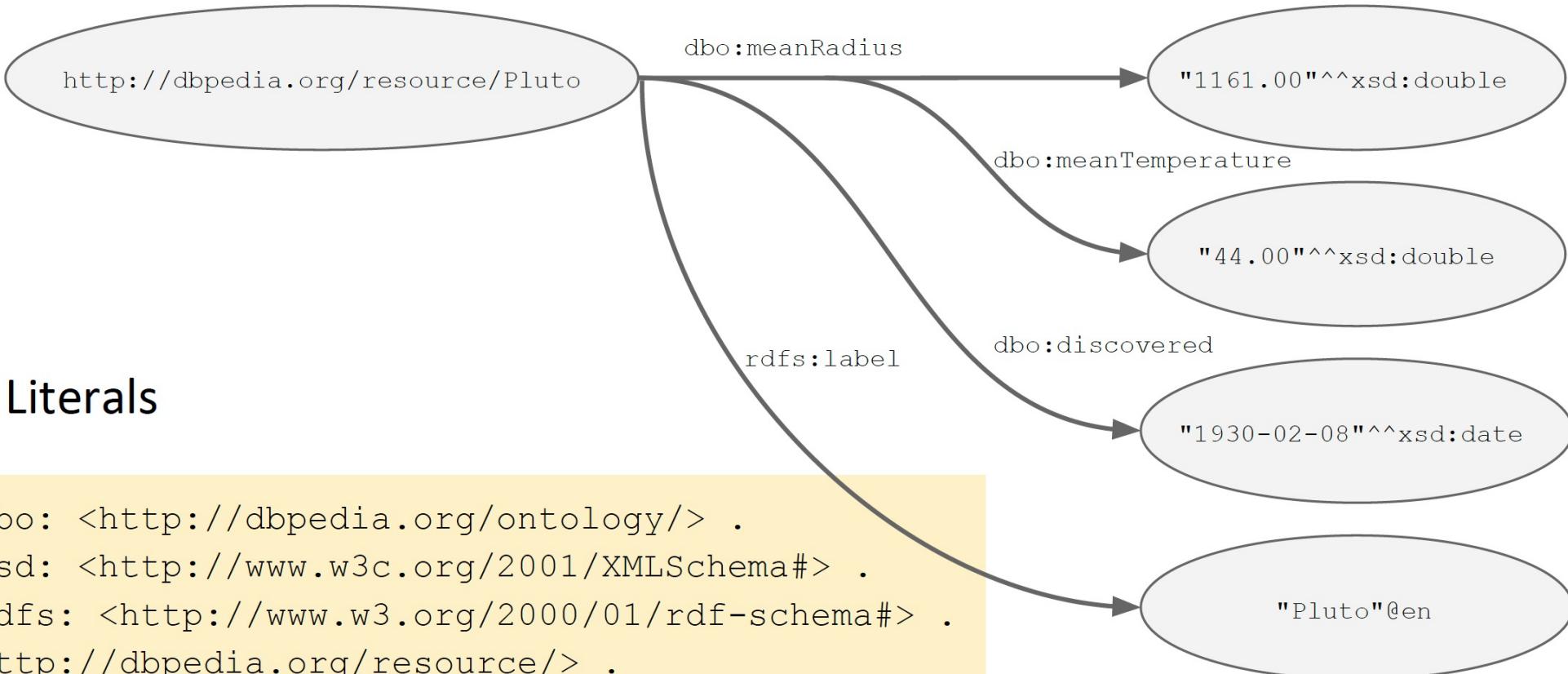
comma indicates that subsequent triples have same subject and property (**object list**)

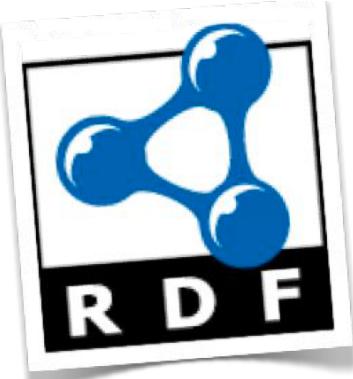


# Turtle - Terse RDF Triple Language

- Typed Literals

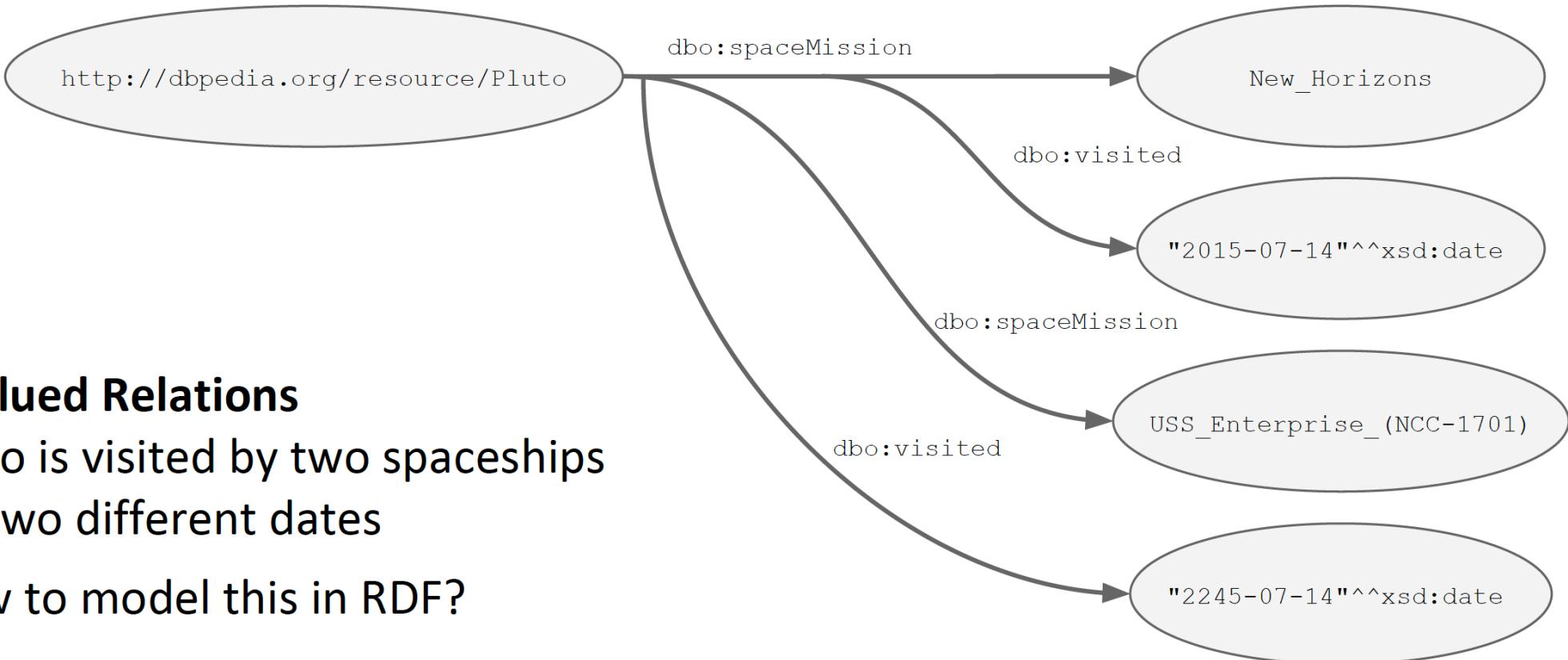
```
@prefix dbo: <http://dbpedia.org/ontology/> .  
@prefix xsd: <http://www.w3c.org/2001/XMLSchema#> .  
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .  
@base <http://dbpedia.org/resource/> .  
  
<Pluto> dbo:meanRadius "1161.00"^^xsd:double ;  
      dbo:meanTemperature "44.00"^^xsd:double ;  
      dbo:discovered "1930-02-18"^^xsd:date ;  
      rdfs:label "Pluto"@en .
```





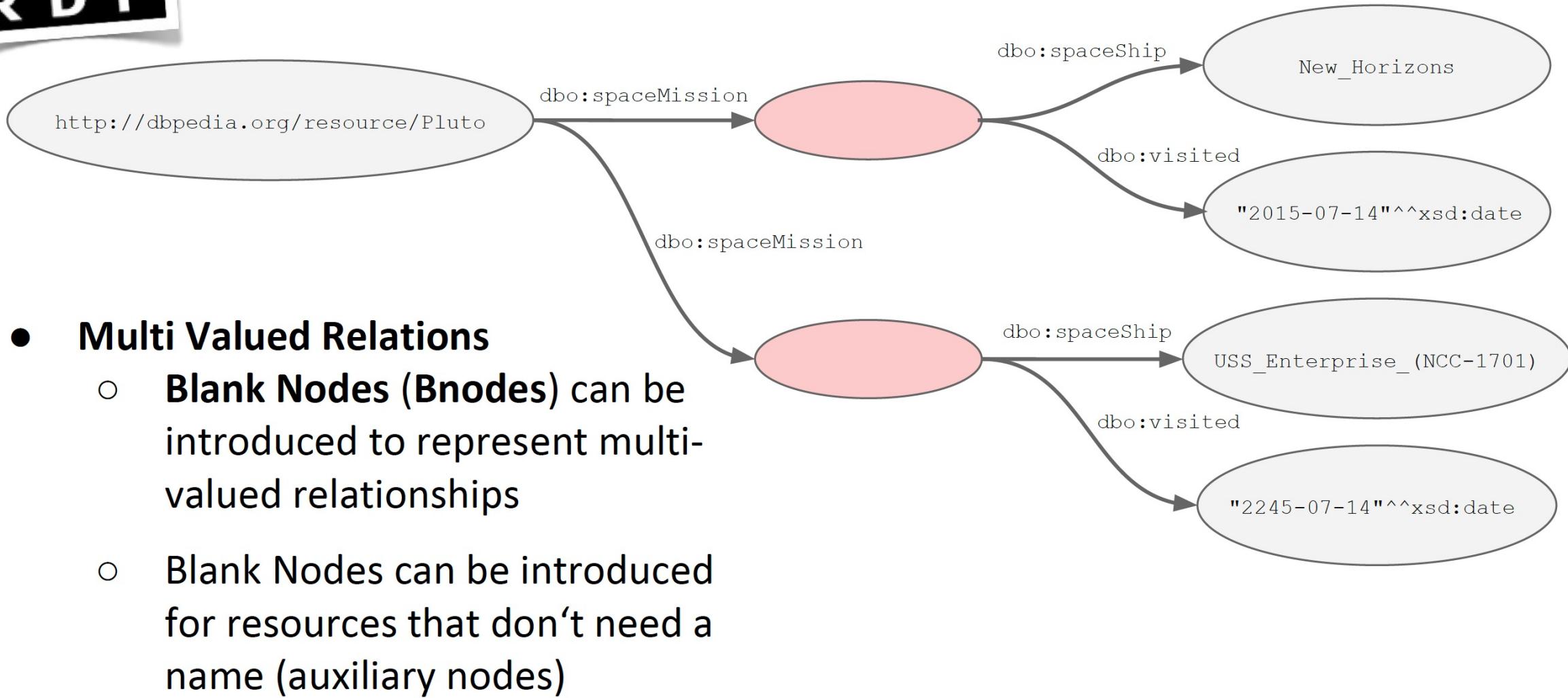
# Turtle - Terse RDF Triple Language

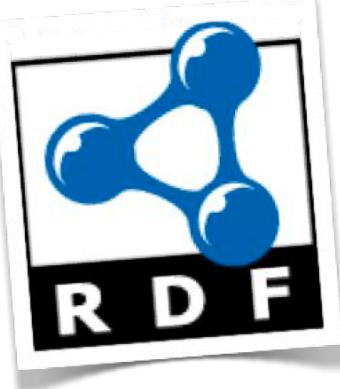
- **Multi Valued Relations**
  - Pluto is visited by two spaceships on two different dates
  - How to model this in RDF?
  - **Problem:** unique association



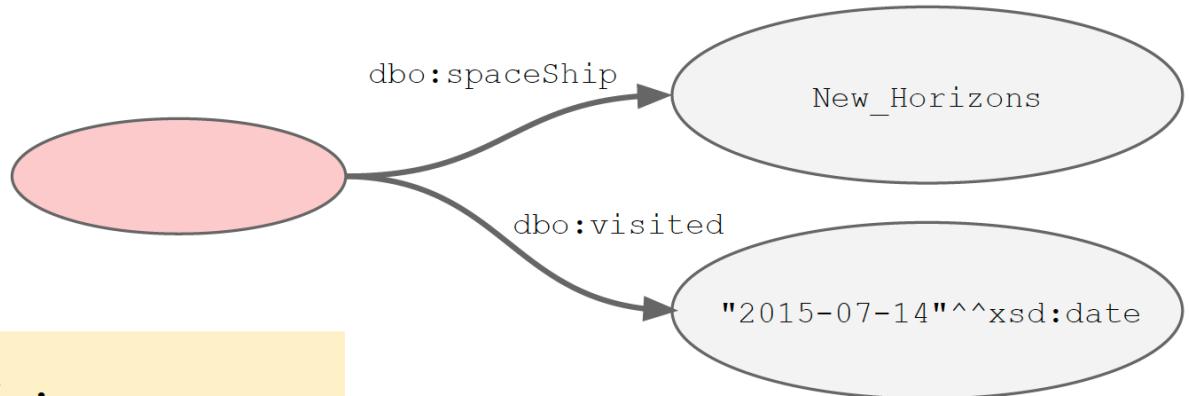


# Turtle - Terse RDF Triple Language



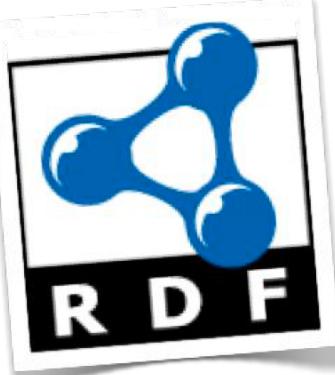


# Turtle - Terse RDF Triple Language

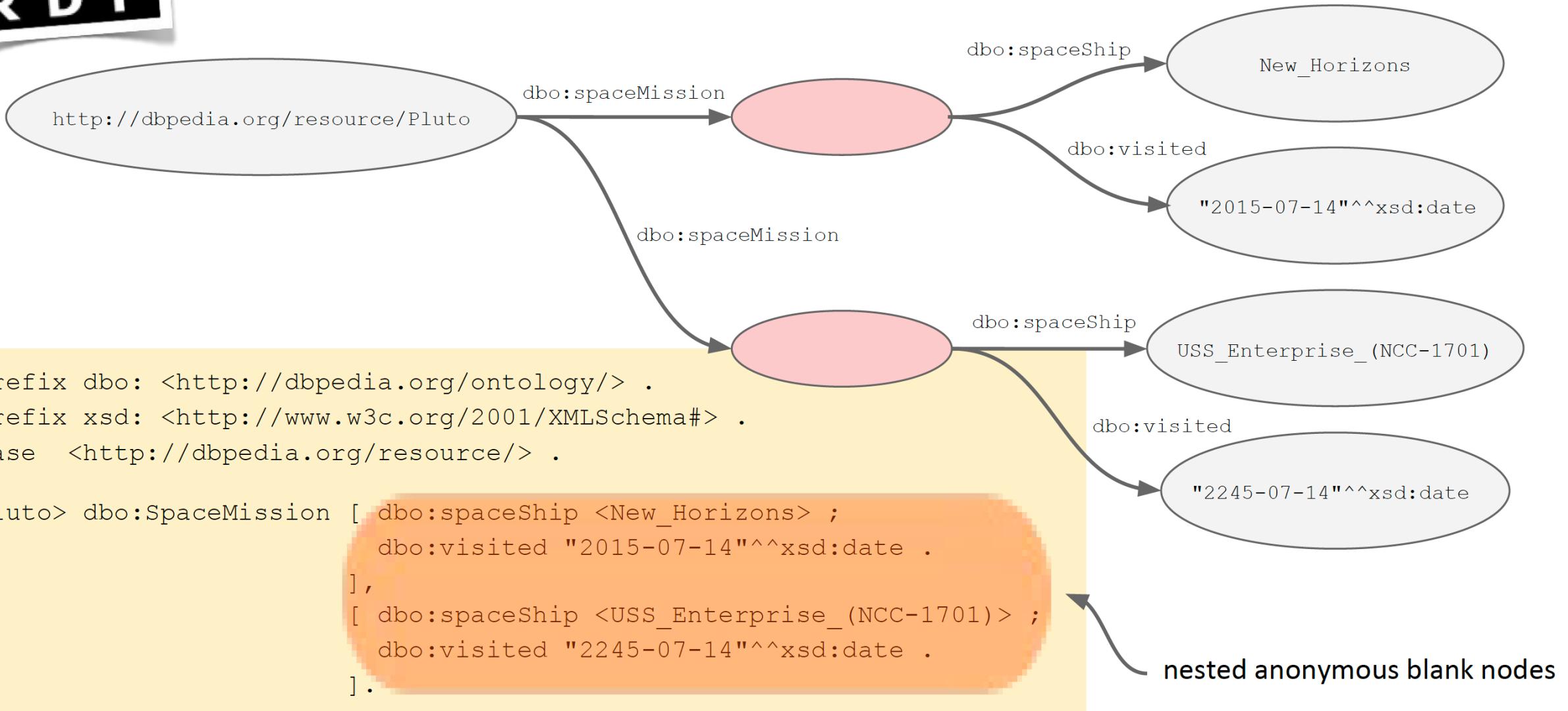


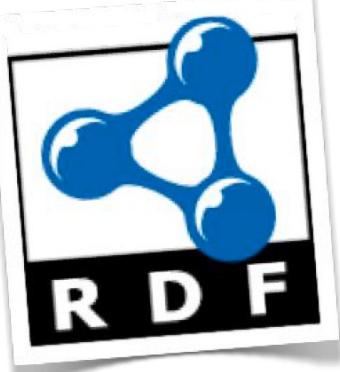
```
@prefix dbo: <http://dbpedia.org/ontology/> .  
@prefix xsd: <http://www.w3c.org/2001/XMLSchema#> .  
@base <http://dbpedia.org/resource/> .  
  
[] dbo:spaceShip <New_Horizons> ;  
dbo:visited "2015-07-14"^^xsd:date .
```

**anonymous blank node as subject**



# Turtle - Terse RDF Triple Language





# Turtle - Terse RDF Triple Language

