



Lecture 2: RDF and RDFS

2.2 RDF and Turtle Serialization



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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

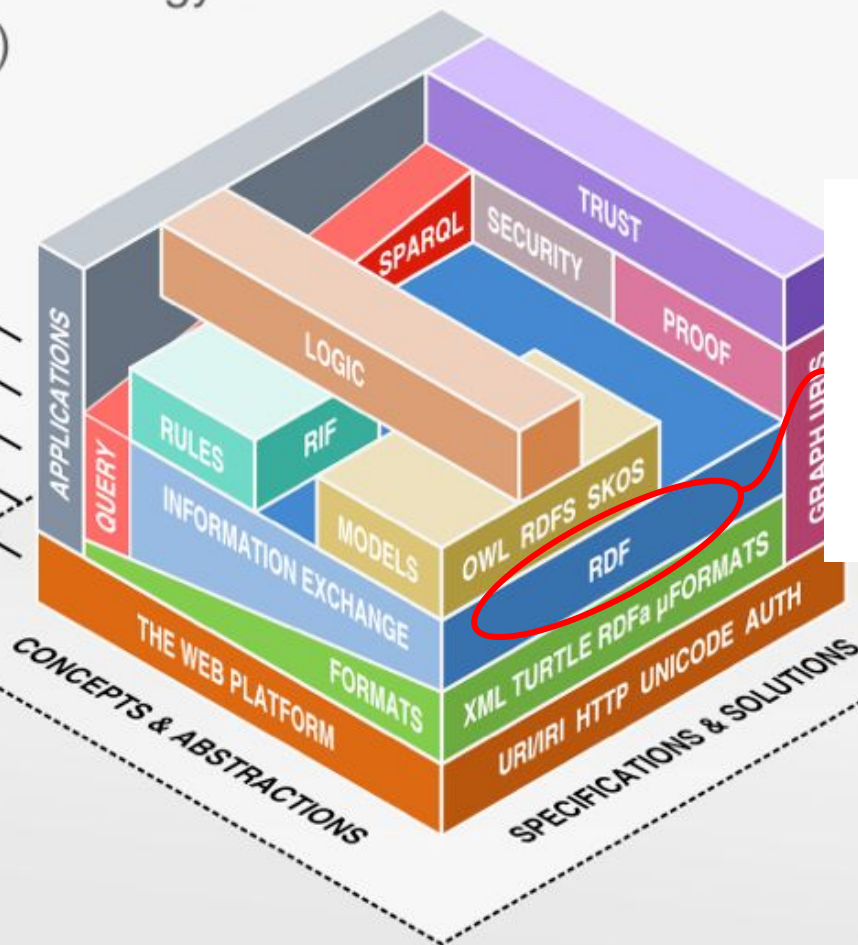
Standardized information exchange is key

Formats are necessary, but not too important

The Semantic Web is based on the Web

Linked Data uses a small selection of technologies

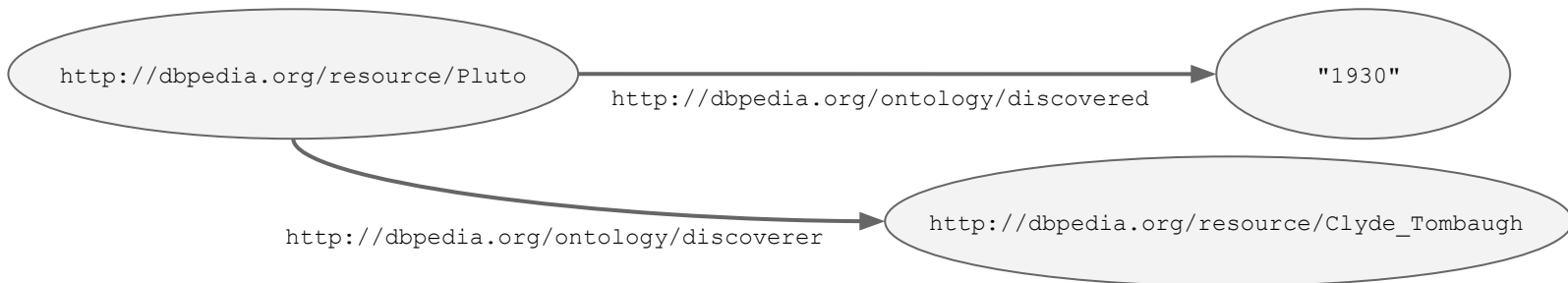
LINKED DATA



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> .
```

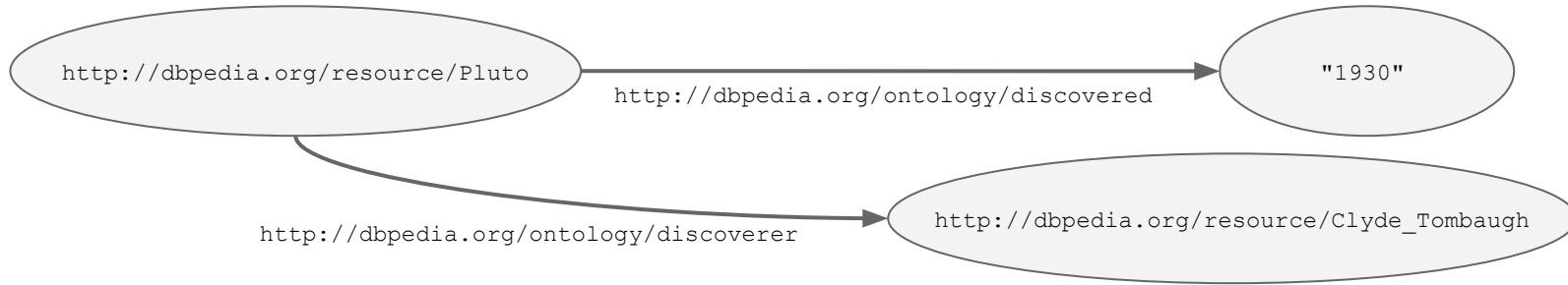
```
@prefix dbo: <http://dbpedia.org/ontology/> .  
@base <http://dbpedia.org/resource/> .  
<Pluto> dbo:discovered "1930" .  
<Pluto> dbo:discoverer <Clyde_Tombaugh> .
```

@prefix directive associates prefix-label with URI

@base directive provides URI to complement all relative URIs



Turtle - Terse RDF Triple Language



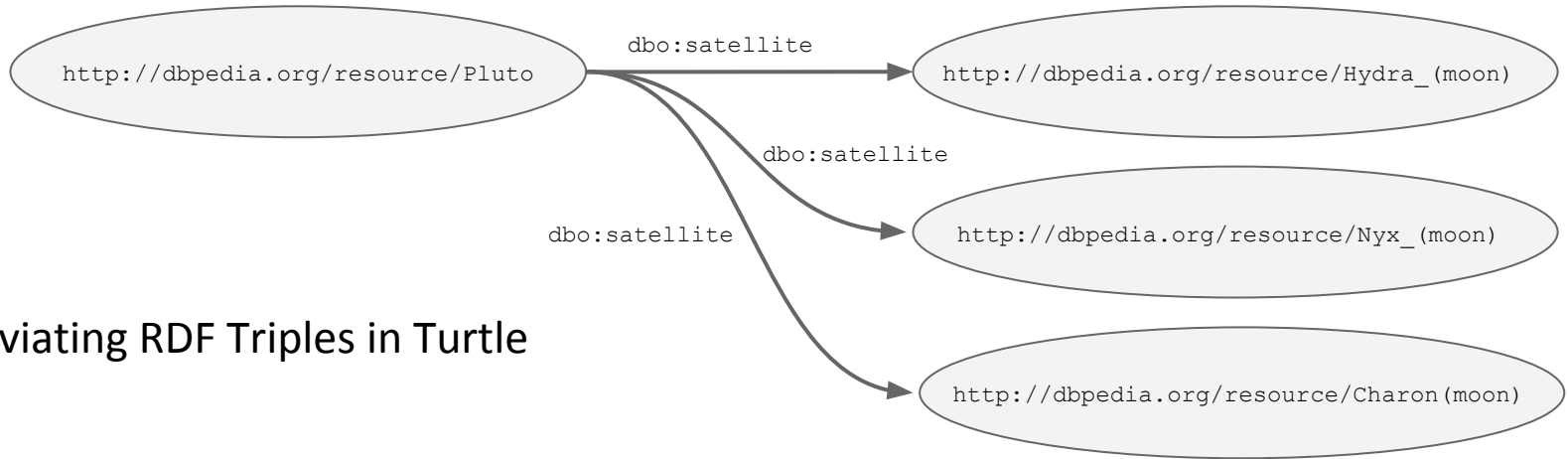
- Abbreviating RDF Triples in Turtle

```
@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



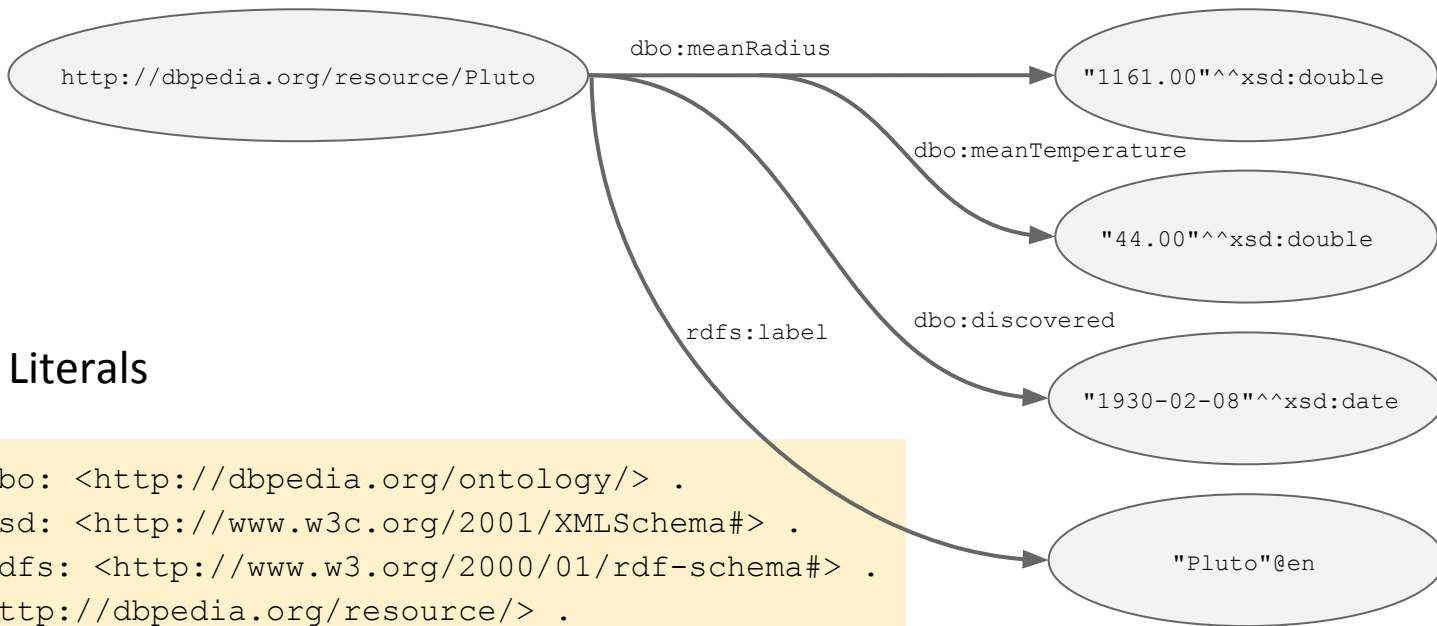
- Abbreviating RDF Triples in Turtle

```
@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



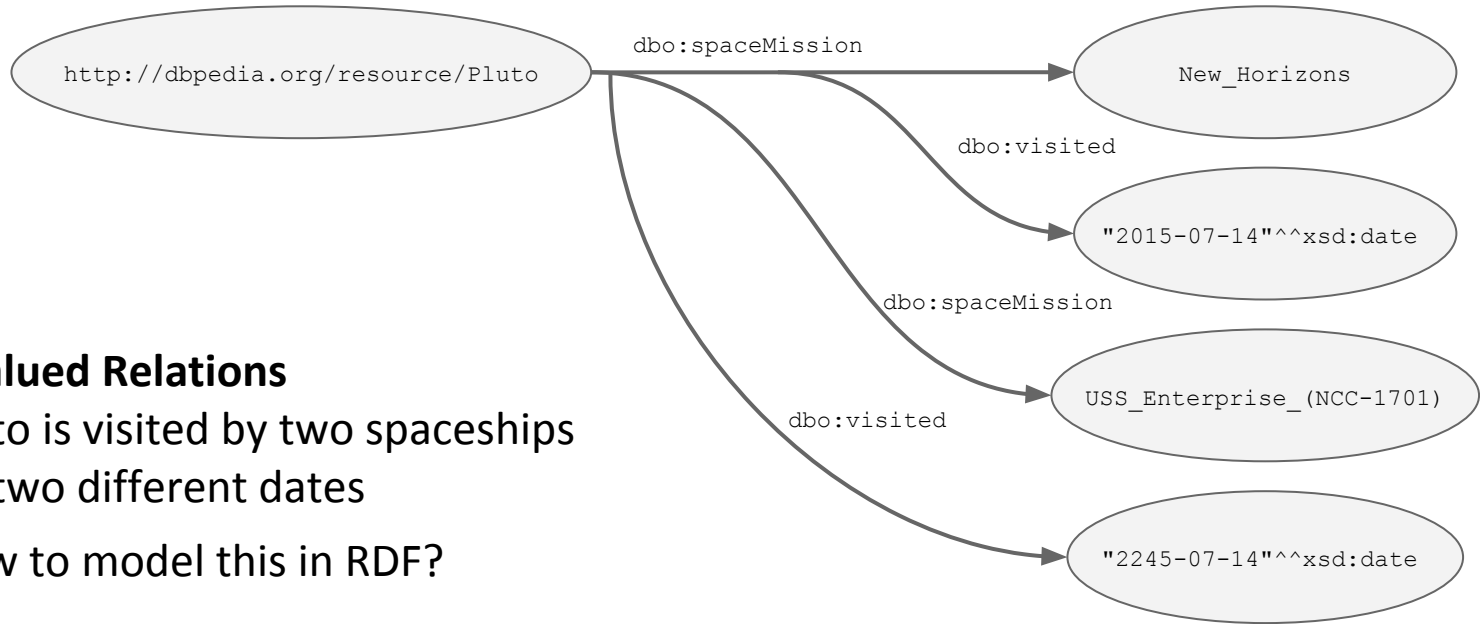
- Typed Literals

```
@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

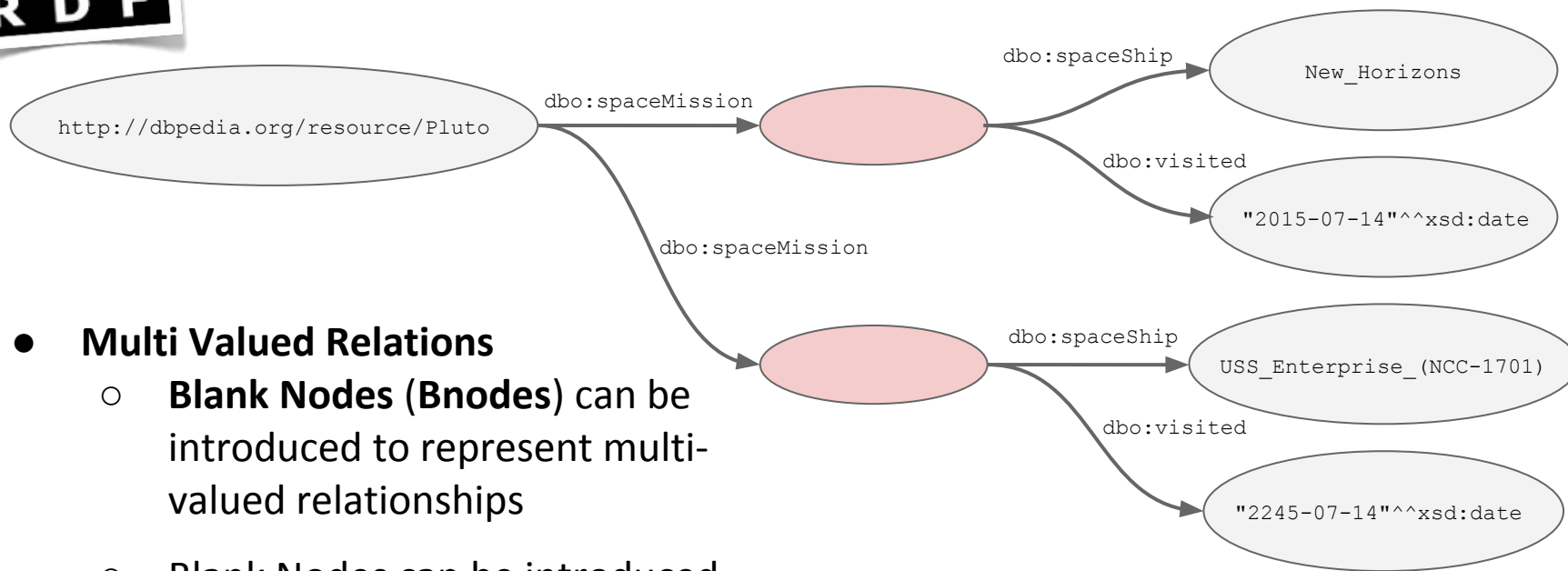


- **Multi Valued Relations**

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



Turtle - Terse RDF Triple Language

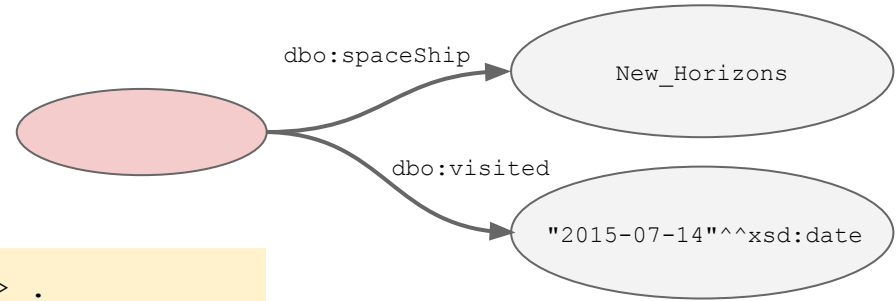


- **Multi Valued Relations**

- **Blank Nodes (Bnodes)** can be introduced to represent multi-valued relationships
- Blank Nodes can be introduced for resources that don't need a name (auxiliary nodes)



Turtle - Terse RDF Triple Language



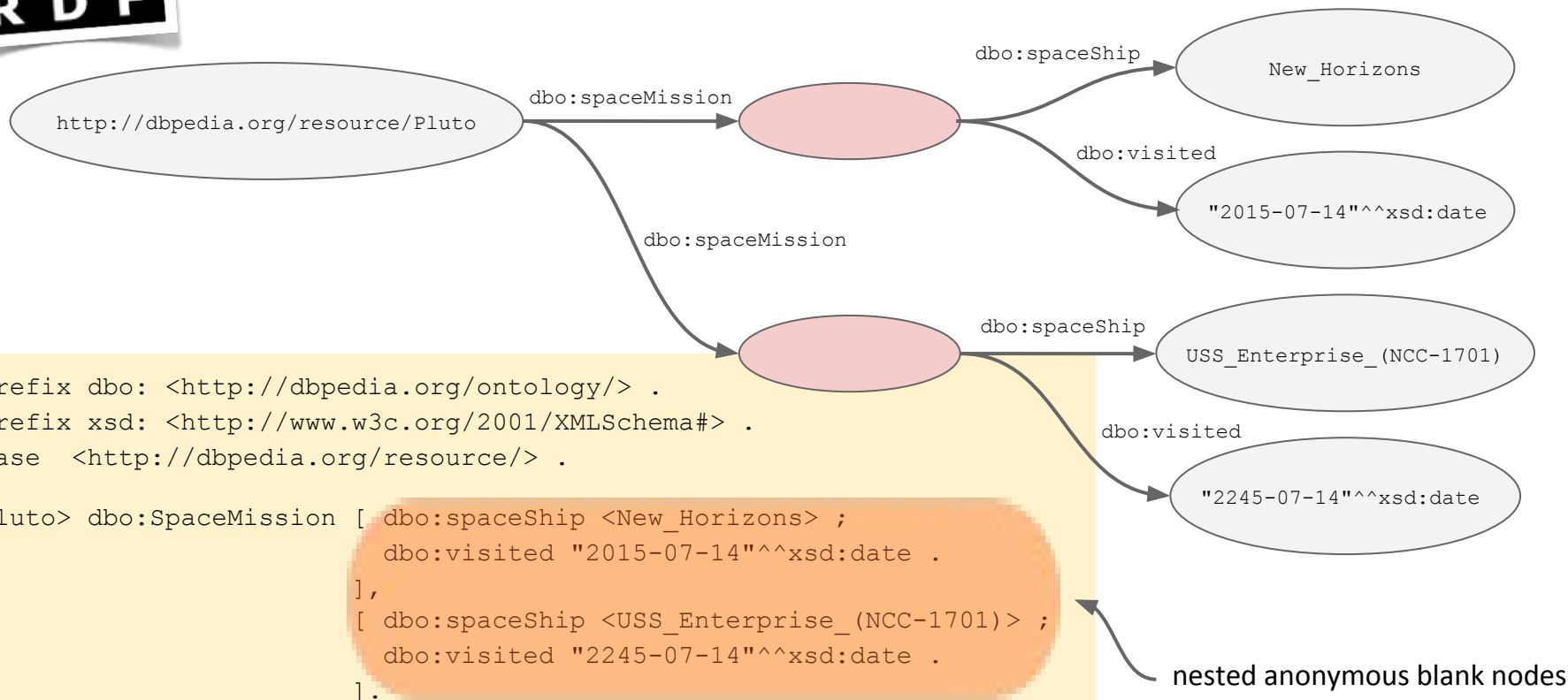
```
@prefix dbo: <http://dbpedia.org/ontology/> .  
@prefix xsd: <http://www.w3c.org/2001/XMLSchema#> .  
@base <http://dbpedia.org/resource/> .
```

```
[ ] dbo:spaceShip <New_Horizons> ;  
    dbo:visited "2015-07-14"^^xsd:date .
```

anonymous blank node as subject

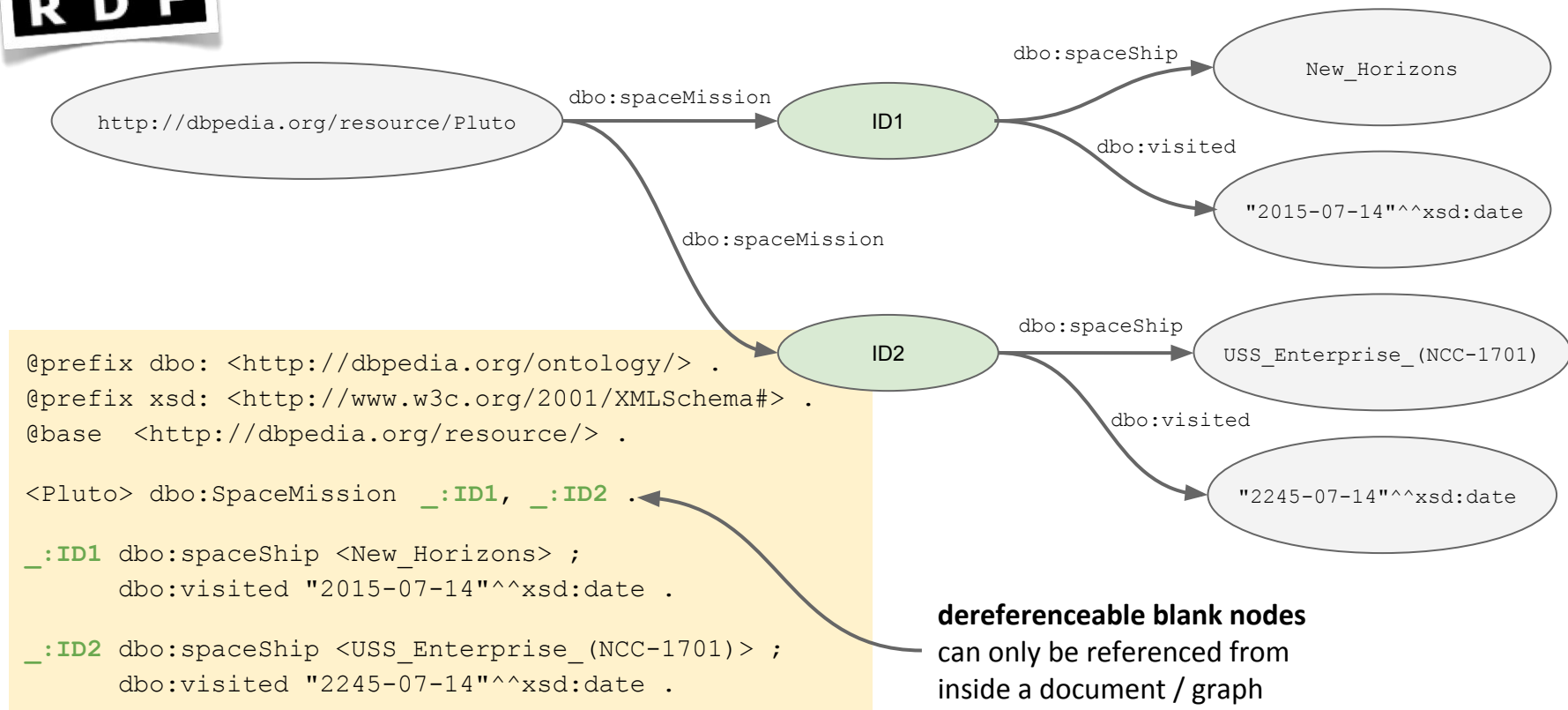


Turtle - Terse RDF Triple Language





Turtle - Terse RDF Triple Language





Next: Lecture 2: RDF Based Knowledge Representation

OpenHPI - Course Knowledge Engineering with Semantic Web Technologies