

RDFS

RDF Schema

Mustafa Jarrar

[Birzeit University](#)



Watch this lecture and download the slides



Course Page: <http://www.jarrar.info/courses/AI/>

More Online Courses at: <http://www.jarrar.info>

Acknowledgement : This lecture is based on [1]

Keyword: RDF, RDFS, RDF Schema, Practical Session

Reading

1. RDF Schema (<http://www.w3.org/TR/rdf-schema/>)
2. Sugumaran, Vijayan. *Applied Semantic Web Technologies*.
Boca Raton, Fla.: Taylor & Francis, 2012. Print.

RDFS

RDF Schema

In this lecture:

- 
- ❑ Part 1: **RDFS Basics**
 - ❑ Part 2: **RDFS Practical Session**

RDF Schema

Based on [2]

RDF Schema provides the framework to describe application-specific classes and properties.

RDF Schema 'semantically extends' RDF to enable us to talk about classes of resources, and the properties that will be used with them.

Classes in RDF Schema is much like classes in object oriented programming languages. This allows resources to be defined as instances of classes, and subclasses of classes.

RDF schemas are web resources (and have URIs) and can be described using RDF

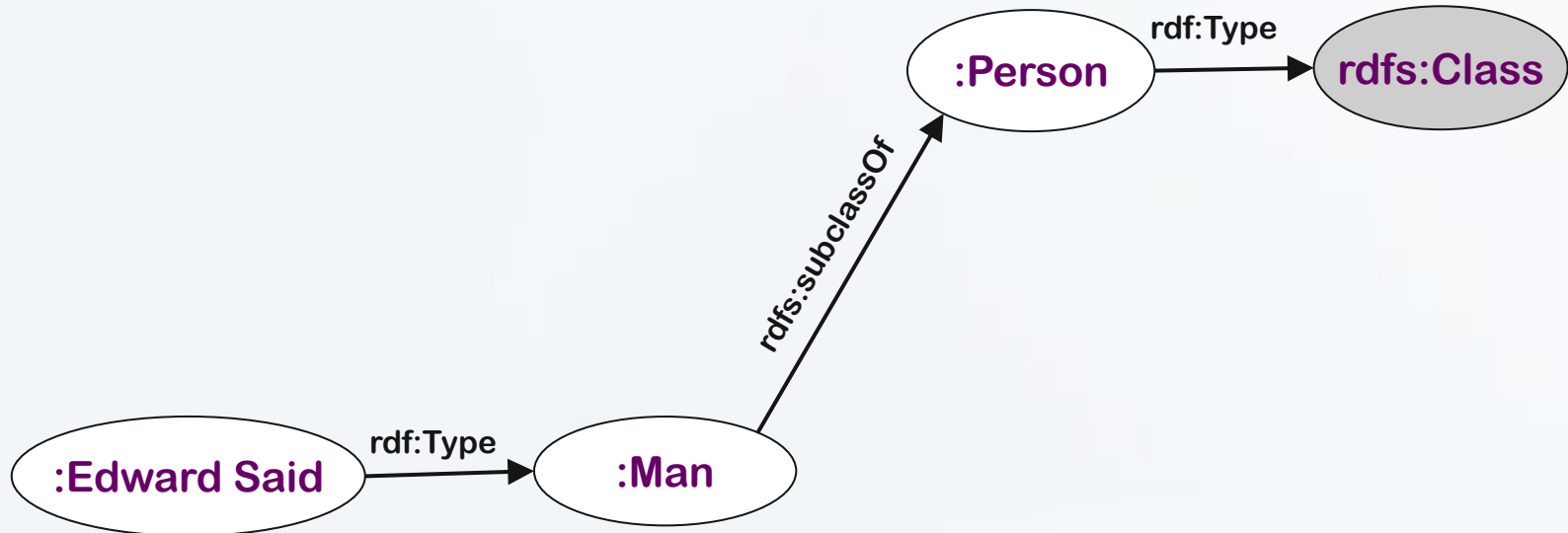
Describing Classes with RDFS

To describe classes we can use built-in RDF Schema resources:

rdfs:Class

rdfs:subClassOf

These are used in conjunction with the **rdf:type** property.

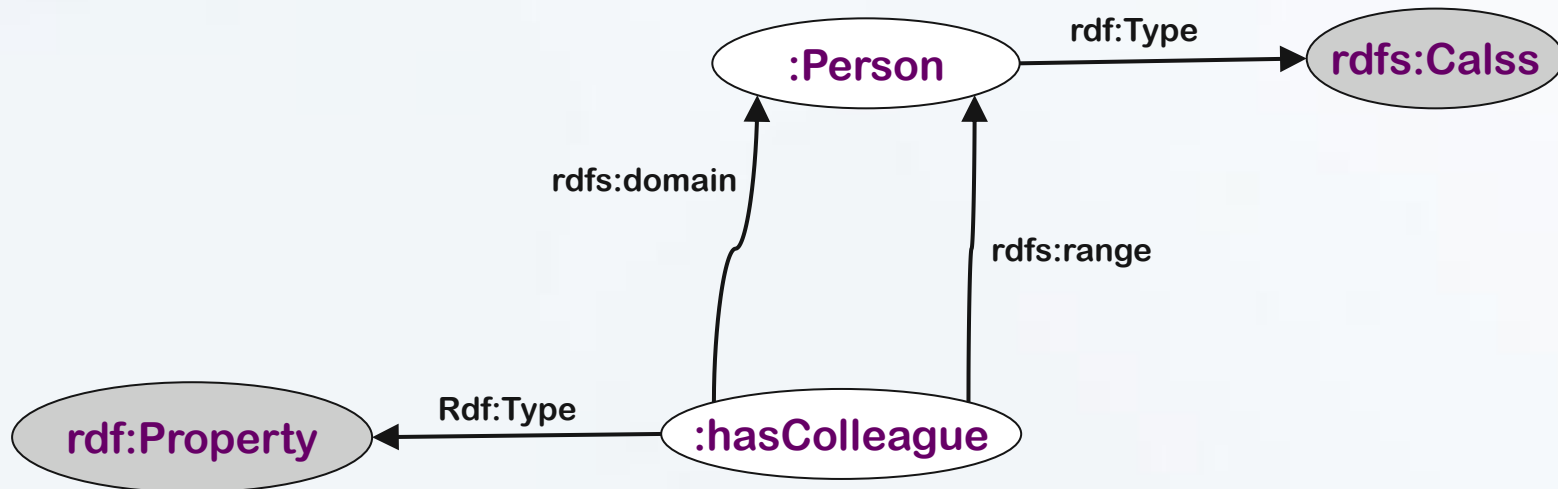


Describing Properties with RDF(S)

RDF Schema allows us to describe properties. (Properties are instances of the class **rdf:Property!**).

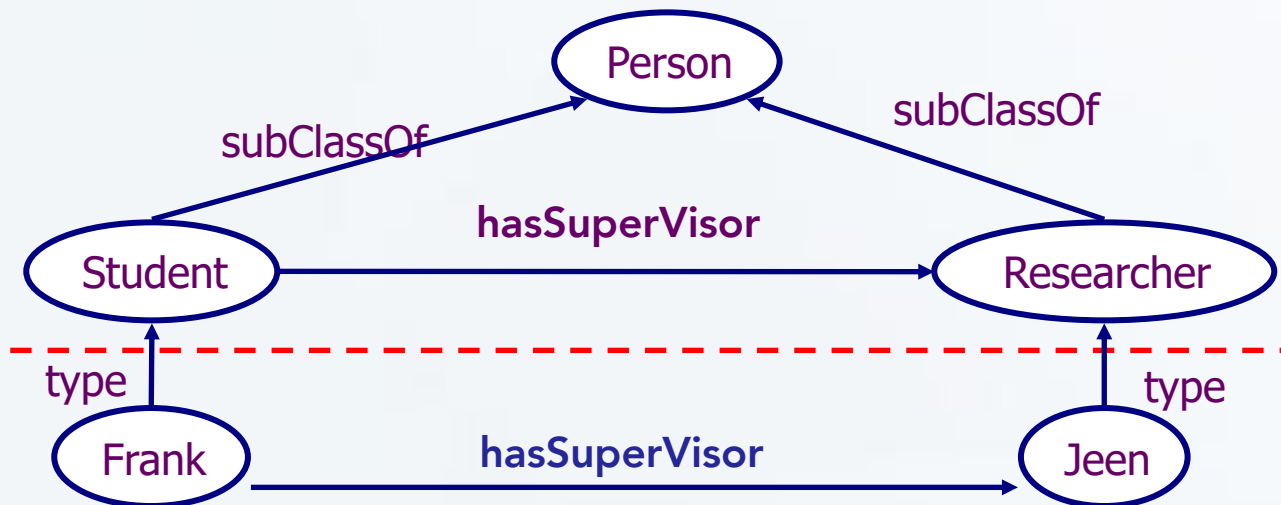
We can specify a domain using **rdfs:domain**.

We can specify a range using **rdfs:range**.



RDF Schema

- Defines small Vocabulary for RDF:
 - Class, subClassOf, Type
 - Property, subPropertyOf
 - Domain, Range
- Vocabulary can be used to define other vocabularies for your application domain.



RDFS Example

```
<?xml version="1.0"?>
<rdf:RDF
  xmlns:rdf= "http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xml:base= "http://www.animals.fake/animals">
  <rdfs:Class rdf:ID="animal" />
  <rdfs:Class rdf:ID="horse">
    <rdfs:subClassOf rdf:resource="#animal"/>
  </rdfs:Class>
  <rdfs:Class rdf:ID="dog">
    <rdfs:subClassOf rdf:resource="#animal"/>
  </rdfs:Class>
</rdf:RDF>
```

Observe that it is
an rdf document

RDF Schema (Another Example)

```
...  
<rdfs:Class rdf:ID="Course"/>  
  
<rdfs:Class rdf:ID="Student">  
  <rdfs:subClassOf rdf:resource="foaf:Person"/>  
</rdfs:Class>  
  
<rdf:Property rdf:ID="Name">  
  <rdfs:domain rdf:resource="foaf:Person"/>  
  <rdfs:range rdf:resource="xsd:String"/>  
</rdf:Property>  
  
<rdf:Property rdf:ID="hasParent">  
  <rdfs:domain rdf:resource="foaf:Person"/>  
  <rdfs:range rdf:resource="foaf:Person"/>  
</rdf:Property>  
  
</rdf:Property>  
<rdf:Property rdf:ID="hasFather">  
  <rdfs:subPropertyOf rdf:resource="#hasParent"/>  
</rdf:Property>
```

Main RDFS constructs

rdfs:Class allows to declare a resource as a class for other resources.

rdfs:subClassOf allows to declare hierarchies of classes.

rdfs:domain of an `rdf:predicate` declares the class of the *subject* in a triple whose second component is the *predicate*.

rdfs:range of an `rdf:predicate` declares the class or datatype of the *object* in a triple whose second component is the predicate.

rdfs:subPropertyOf is an instance of `rdf:Property` that is used to state that all resources related by one property are also related by another.

rdfs:seeAlso is an instance of `rdf:Property` that is used to indicate a resource that might provide additional information about the subject resource.

rdfs:label is an instance of `rdf:Property` that may be used to provide a human-readable version of a resource's name.

rdfs:comment is an instance of `rdf:Property` that may be used to provide a human-readable description of a resource.

rdfs:Literal is the class of literal values such as strings and integers. property values such as textual strings are examples of RDF literals. Literals may be plain or typed.

rdfs:Datatype is the class of datatypes...

RDFS is not enough

In the next lecture, we shall learn about OWL, in order to be more expressive in representing the meaning.

The lecture after, we shall learn about OWL and ontologies.

RDFS

Practical Session

(National Student Registry)

Mustafa Jarrar

[Birzeit University](#)



Practical Session (National Student Registry)

Description:

The central management of students' profiles by the ministry of education is becoming an urgent need in the last years. Many students in Palestine move from one university to another, and they need to transfer their academic records. Also, the ministry of higher education needs to certify the diplomas and mark sheets of students. Moreover, there is a need to centrally manage/monitor students financial aids. Therefore, the ministry of higher education has decided to build a national student registry, such that, each semester every university has to send the academic record (i.e., mark-sheet) of every student to the ministry of education. The ministry will then update and integrate the academic records according to the data combined from all universities into the national student registry.

The ministry wants to specify a shared ontology (in RDFs) such that all universities can exchange their students profiles in RDF format and the data can be automatically validated and integrated after that. **Build this ontology in RDFs.**

Practical Session (National Student Registry)

- Each student should work alone.
- Start brainstorming on a paper to specify what a student record contains (student, university, faculty, program, course, semester, marks, averages, and the relationships between such concepts, as well as the business rules).
- Students are required to use two different mark sheets from different universities, so to ensure that the resultant RDFs model cover the relevant exchanged information needed for this national registry.
- Further, student are required to deliver two RDF files, each file representing the data in a mark sheet. Please choose mark sheets from different universities. These RDF files must commit/use the vocabulary defined the RDFs model.

Practical Session (**National Student Registry**)

- Students will be asked next lecture to present their RDFs ontologies to other students, so to collect comments and feedback.
- Then each student will have some more time to correct their mistakes, and submit the final model.
- Students are expected to re-use standard and common ontologies such as FOAF, DOAC, etc.
- Student must validate their RDFS and RDF files using the online standard OWL and RDF validator.
- Each student must publish his/her RDFs model and the two RDF files somewhere on the Web, and send me the link. Validate the file before sending me.
- **The final delivery should include**
 - 1) **Link to the RDFs file**
 - 2) **Links to the two RDF files**

References

- [1] Mustafa Jarrar: Lecture Notes on RDF Data Model, Birzeit University, 2018
- [2] Mustafa Jarrar: Lecture Notes on RDF Schema, Birzeit University, 2018
- [3] Mustafa Jarrar: Lecture Notes on Ontology Web Language (OWL) Birzeit University, 2018
- [4] Mustafa Jarrar: Lecture Notes on Data Web and Linked Data, Birzeit University, 2018
- [5] Mustafa Jarrar, Anton Deik: The Graph Signature: A Scalable Query Optimization Index For RDF Graph Databases Using Bisimulation And Trace Equivalence Summarization. International Journal on Semantic Web and Information Systems, 11(2), 36-65, 2015
- [6] Mustafa Jarrar, Anton Deik, Bilal Faraj: Ontology-Based Data And Process Governance Framework -The Case Of E-Government Interoperability In Palestine . In pre-proceedings of the IFIP International Symposium on Data-Driven Process Discovery and Analysis (SIMPDA'11). Pages(83-98). 2011.
- [7] Anton Deik, Bilal Faraj, Ala Hawash, Mustafa Jarrar: Towards Query Optimization For The Data Web - Two Disk-Based Algorithms: Trace Equivalence And Bisimilarity . In proceedings of the International Conference on Intelligent Semantic Web – Applications and Services. Pages 131-137. ACM. 2010.
- [8] Rami Hodrob, Mustafa Jarrar: ORM To OWL 2 DL Mapping.. In proceedings of the International Conference on Intelligent Semantic Web – Applications and Services. Pages 131-137. ACM, 2010.
- [9] Mustafa Jarrar: Towards Automated Reasoning On ORM Schemes. -Mapping ORM Into The DLR_idf Description Logic. In proceedings of the 26th International Conference on Conceptual Modeling (ER 2007). Pages (181-197). LNCS 4801, Springer. Auckland, New Zealand. 2007
- [10] Mustafa Jarrar: Towards Methodological Principles For Ontology Engineering . PhD Thesis. Vrije Universiteit Brussel. (May 2005)