# The EMGNet Knowledge Server

*Philippe Genoud*

**Lyon**

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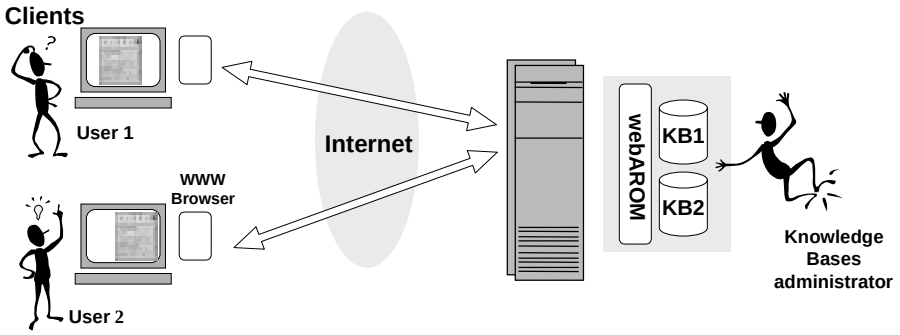
## What is EMGNet Knowledge Server ?

- Consultation , annotation, (edition) through the World Wide Web of knowledge bases in the electromyography (EMG) domain
  - *knowledge bases are expressed in the AROM knowledge representation language*
  - *EMGNetKS is based on the webAROM application*



## What is EMGNet Knowledge Server ?

- Currently two knowledge bases :
  - ***MYOSYS :*** *issued from the MYOSYS expert system developed at Grenoble University (Joseph Fourier University) in collaboration with theUniversity Hospital of Grenoble (CHU Albert Michallon), this knowledge base describes an ontology of the EMG concepts.*
  - ***MedicalCases :*** *this knowledge base decribes the structure of medical cases in EMG (is's a description of the databases data models used by CASETOOL software*
- http://arom.inrialpes.fr/AppArom/EMGNetKS



## Outline of the talk

- remind on knowledge representation in AROM
  - *classes*
  - *objects*
  - *associations*
  - *tuples*
- demonstration of EMGNetKS
- discussion about the use and evolution of EMGNetKS

## Arom Knowledge Representation

- two kinds of entities for knowledge modeling
  - *classes*
  - *associations*



## Classes

- A **class** describes a set of **objects** sharing
  - *same structure, behavior, meaning*
- Each class is characterized by set of properties called **variables** (or attributes or slots)
- Each variable is characterized by a set of **facets**
  - *domain description*
    - *type (integer, float, boolean, string, list-of, set-of)*
    - *domain restriction (list of value, interval)*
    - *cardinality (min and max number of values)*
  - *documentation (HTML text, unit…)*
  - *inferences (a mean to evaluate the variable)*

# Classes

```
class: teacher
   variable: firstName
      type: string
   variable: lastName
      type: string
   variable: socSecID
      documentation: "Social security number"
      type: string
   variable: nbOfHours
      documentation: "number of teaching hours"
      unit: "number of hours"
      type: integer
      domain: [0..250]
   ...
```

**class**

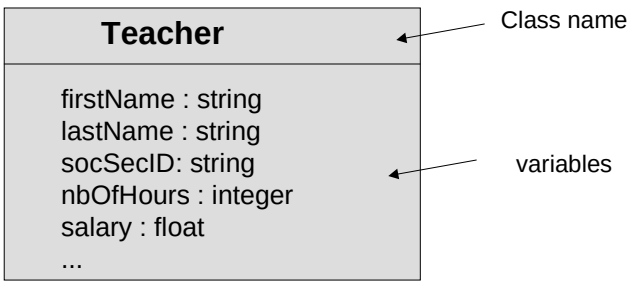
**variable** *(attribute or slot)*

**facet**



# Classes

- AROM also supports a graphical notation *à la* UML (Unified Modeling Language)



# Objects

- an **object** is an instance (element, record) of a class

```
instance: jd
   is-a: teacher
   firstName = “Jean”
   lastName = “Dupont”
   socSecID =“1570699353291”
   nbOfHours = 192
   ...
```



# Specialization of classes

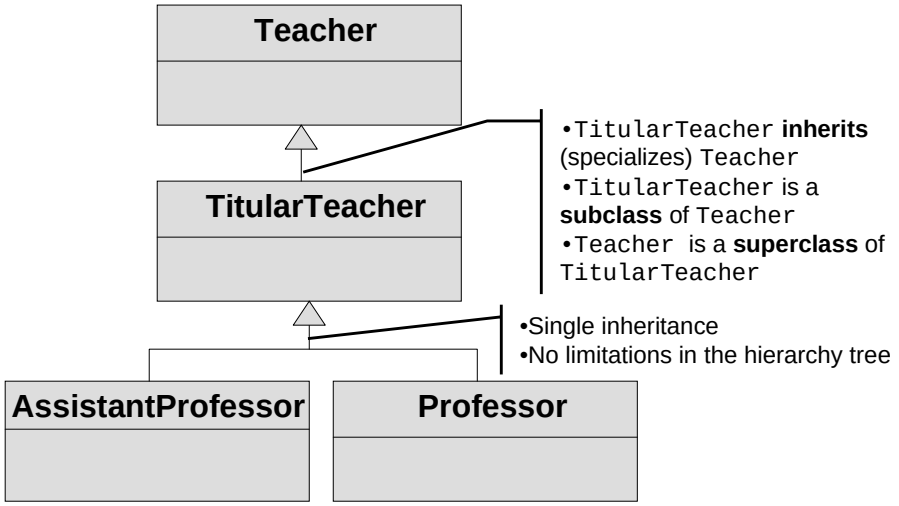
- Class can be hierarchically structured by a **specialization** relation (*inheritance*)

```
class: TitularTeacher
   super-class: teacher
   variable: tenureYear
      type:integer
   variable: nbOfHours
      domain: [192..250]
   ...
```

**Definition of new variables**

**Redefinition of inherited variables**

# Classes specialization

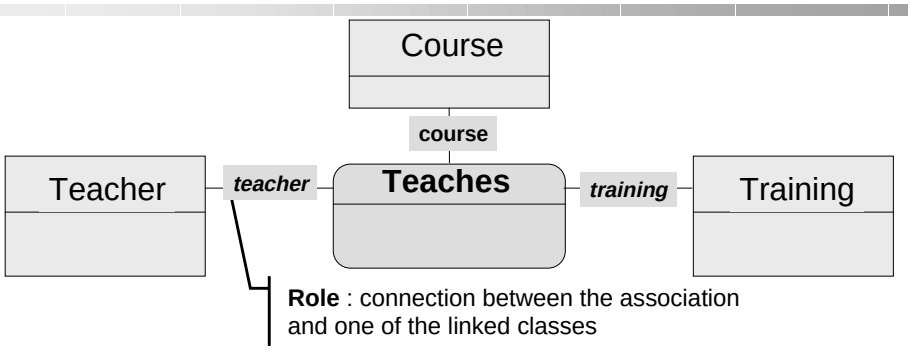





# Associations

- Associations are used to link objects
- An association connects some or all of the objects of n (n >=2) classes (not necessary distinct)
- example :
  - *"a Teacher teaches a course in a given training" => there is an association between* `Teacher`, `Course` *and* `Training` *classes*

# Associations



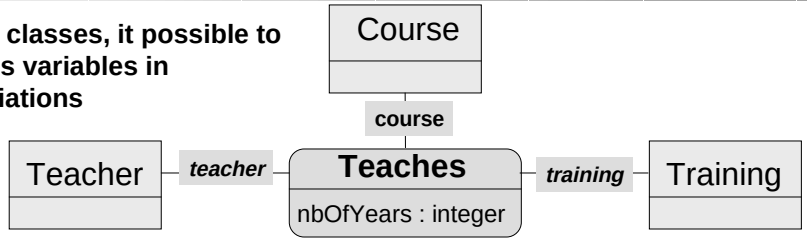

**Role** : connection between the association and one of the linked classes

```
association: Teaches
  roles:
        role: teacher
                type: Teacher
                multiplicity: min:0  max:1
        role: course
                type: Course
        ...
```



# Associations

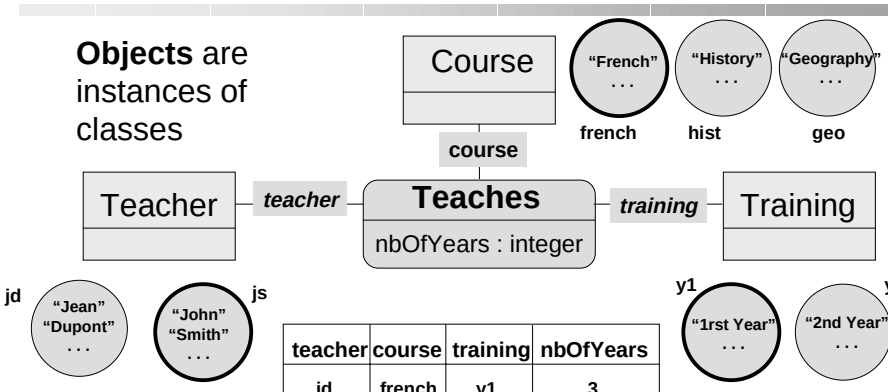
**As for classes, it possible to defines variables in associations**




```
association: Teaches
  roles:
        role: teacher
                type: Teacher
                multiplicity: min:0  max:1
        …
variables:
        variable: nbOfYears
                documentation: "the number of years the teacher
                        has teached this course in this training"
                type: integer
```

# Tuples

**Objects** are instances of classes



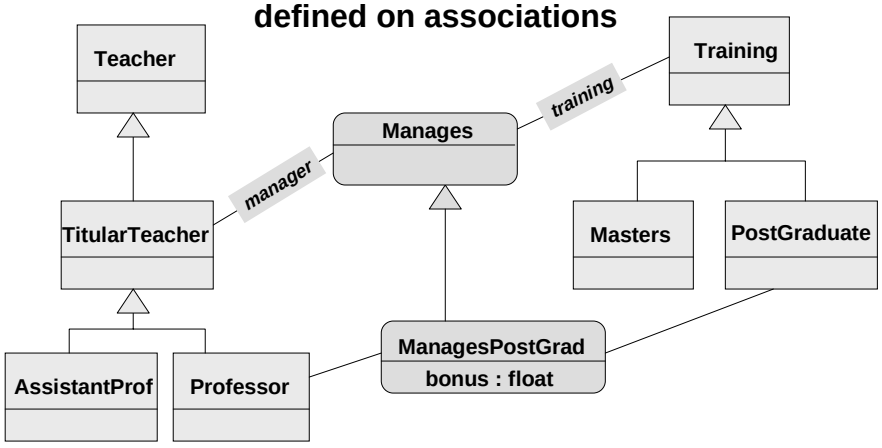

| teacher | course | training | nbOfYears |
|---|---|---|---|
| jd | french | y1 | 3 |
| js | hist | y1 | 4 |
| js | geo | y2 | 2 |
| ... | ... | ... | ... |

**Tuples** are instances of associations



# Specialization of associations

**As for classes, a hierarchy of specialization can be defined on associations**



- To learn more about AROM knowledge representation language : **http://www.inrialpes.fr/romans/arom**

- no let's switch to a demo/tutorial of EMGNetKS