

3. Instrumentos metodológicos -> definições

DEFINIÇÕES E MODELAGEM

BD Definições.xls [Somente leitura] [Modo de Compatibilidade] - Microsoft Excel

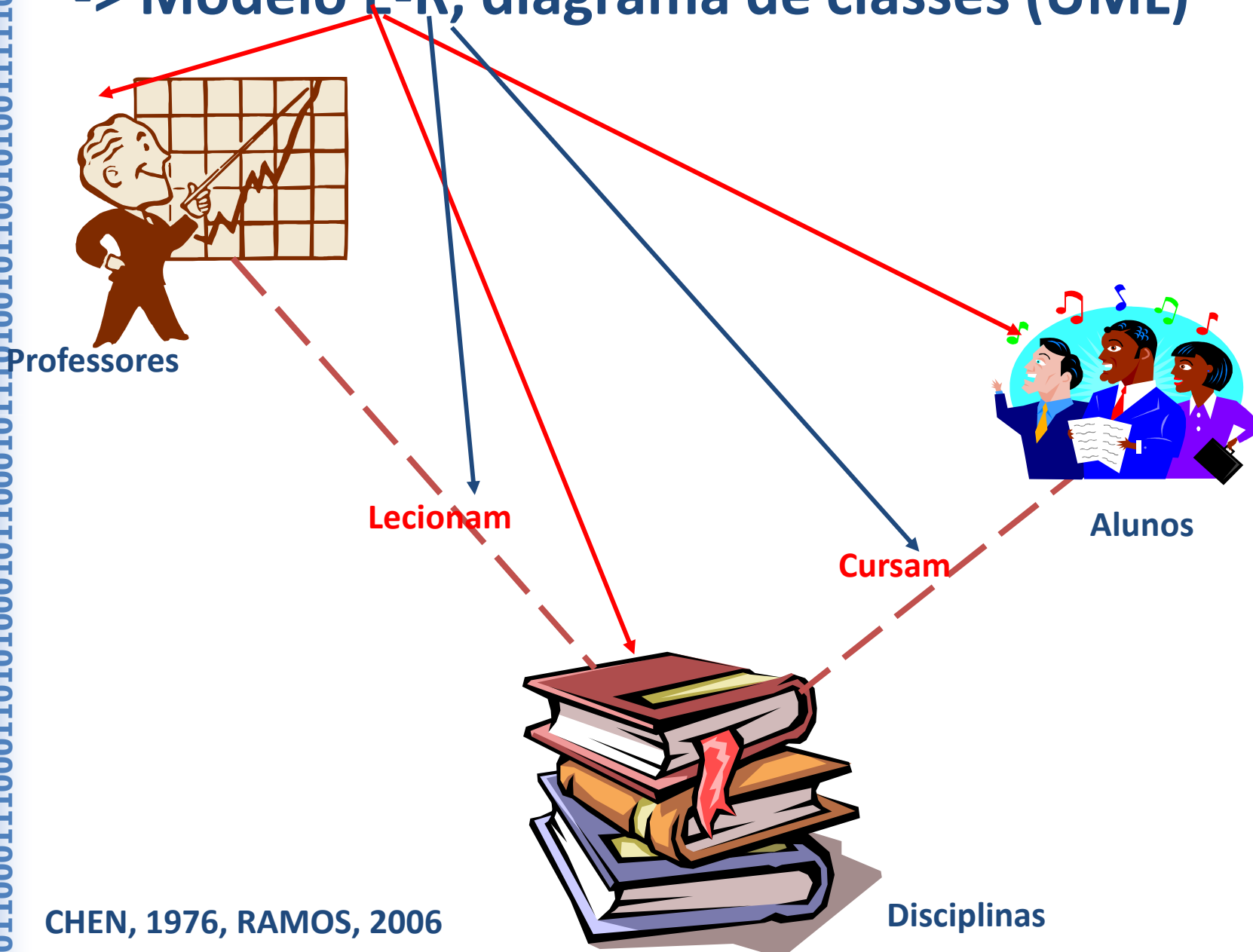
F21								
	A	B	C	D	E	F	G	H
1	TERMO	TIPO DE DEFINIÇÃO: Genérica/Partitiva/Funcional	CATEGORIA/SUBCATEGORIA FORMAL	NÍVEL DE EXISTÊNCIA	CLASSE/TUDO	DIFERENÇAS: CARACTERÍSTICAS/PARTES	TERMO NO CONTEXTO	OBSERVAÇÕES
2	Sodality	G	ENTITIES/IMMATERIAL OBJECTS	Society	Society	of Roman Catholic Church members for religious or charitable purposes		
3	Society	P	ENTITIES/IMMATERIAL OBJECTS	Society		a group of persons forming a single community		
4	Gross national product	F	ACTIVITIES/OPERATIONS	INTELLECTUAL PRODUCTS OF MAN AND SOCIETY		(compute) the total value of a nation's annual output of goods and services		
5	Octogon	P	ENTITIES/IMMATERIAL OBJECTS	INTELLECTUAL PRODUCTS OF MAN AND SOCIETY	Plane figure	with eight angles		
6	Party	G	ENTITIES/IMMATERIAL OBJECTS	CULTURAL-SPIRITUAL PRODUCTS OF MAN AND SOCIETY	Group of people	working to promote a political platform and eight sides		
7	Dependence	G	ACTIVITIES/STATES	CULTURAL-SPIRITUAL PRODUCTS OF MAN AND SOCIETY	Reliance	on support or aid from somebody		
8	Documentation	P	ACTIVITIES/OPERATIONS	INTELLECTUAL PRODUCTS OF MAN AND SOCIETY	Techniques	of collecting, analysing and storing & retrieving information		

FUNDAMENTOS COGNITIVOS, TEORICOS E METODOLOGICOS DA ORGANIZAÇÃO DO CONHECIMENTO

UNIDADE 4 – Linguagens e ferramentas de representação

Modelo E-R, diagrama de classes, bancos de dados como representação do conhecimento. A proposta da Web Semântica e a Organização e Representação do Conhecimento, RDF, OWL, Protege.

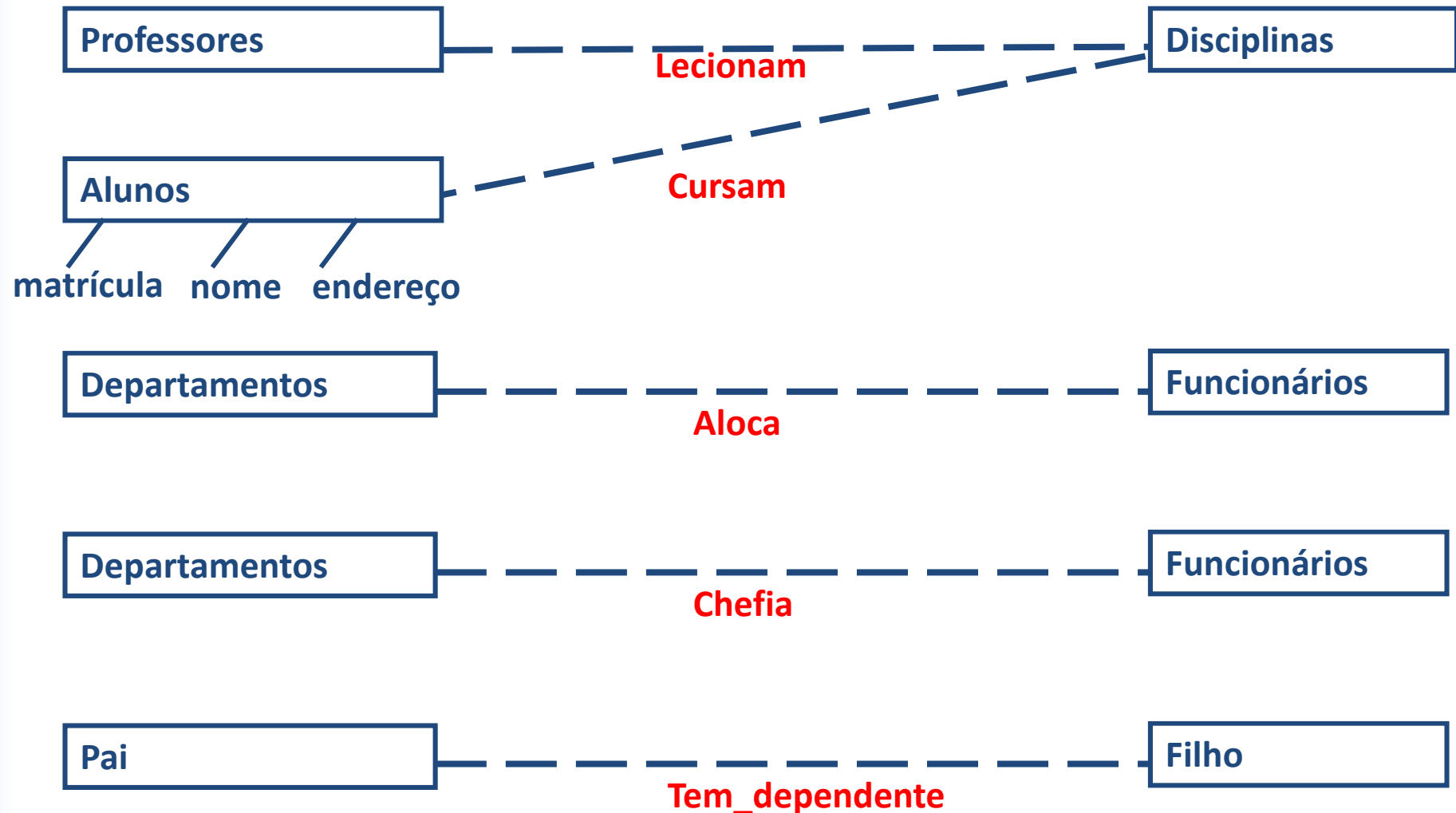
4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)



4. Linguagens e ferramentas de representação

-> Modelo E-R, diagrama de classes (UML)

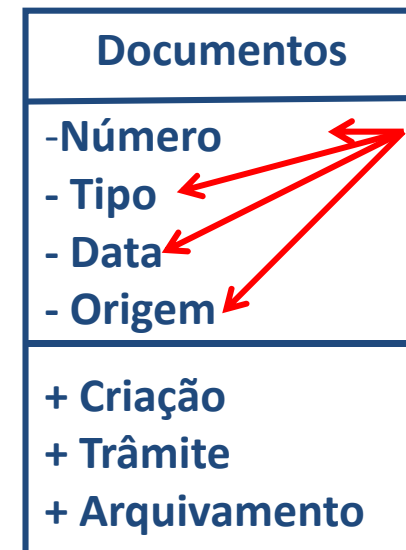
Entidades, Relacionamentos e Atributos



4. Linguagens e ferramentas de representação

-> Modelo E-R, diagrama de classes (UML)

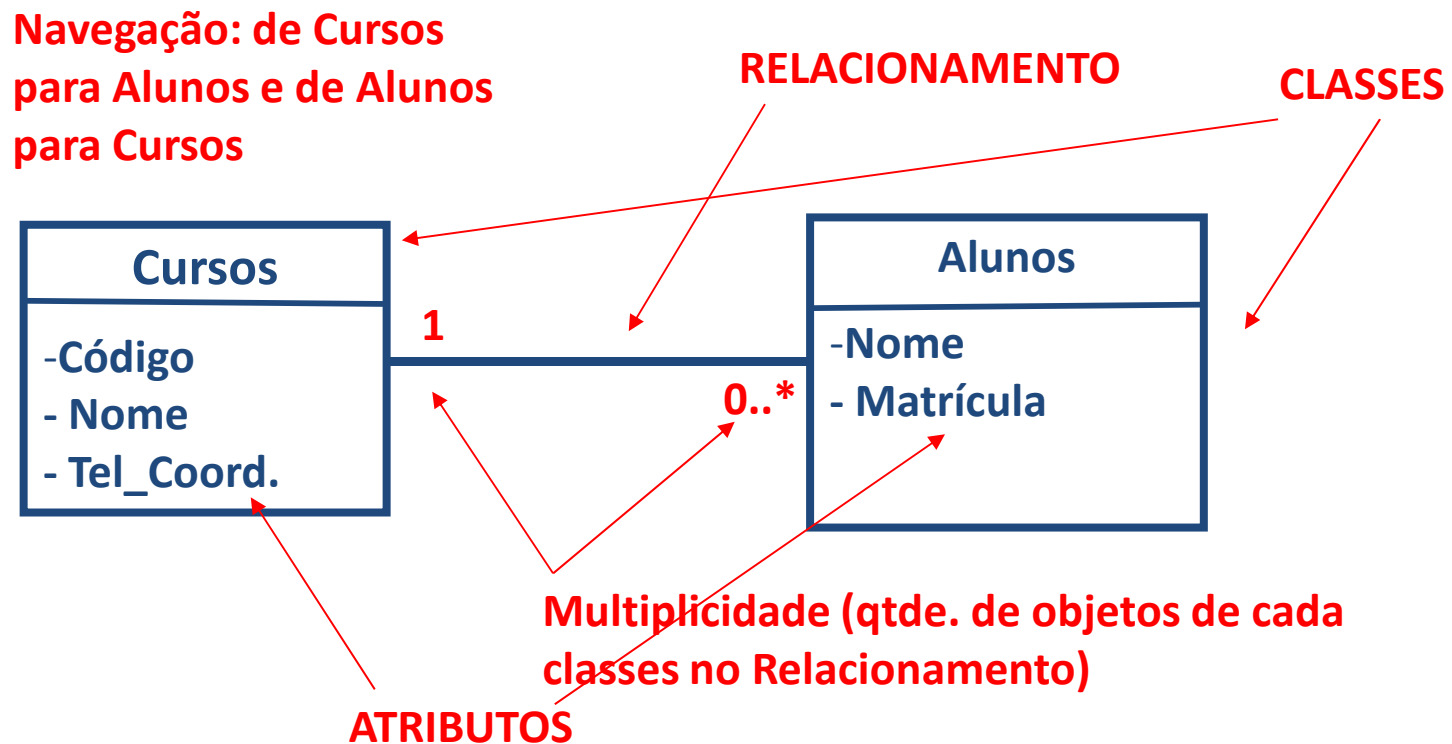
Classes (de Entidades) e Atributos



(do documento)
dependem de
Documento

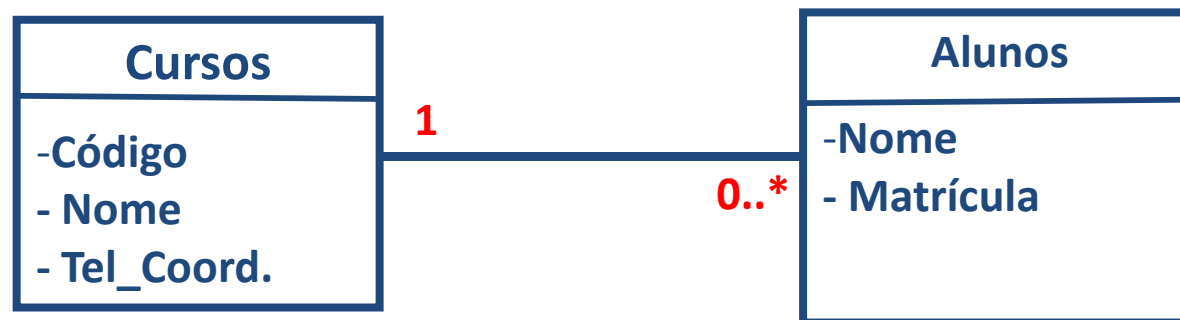
4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

Classes (de Entidades), Relacionamentos e Atributos



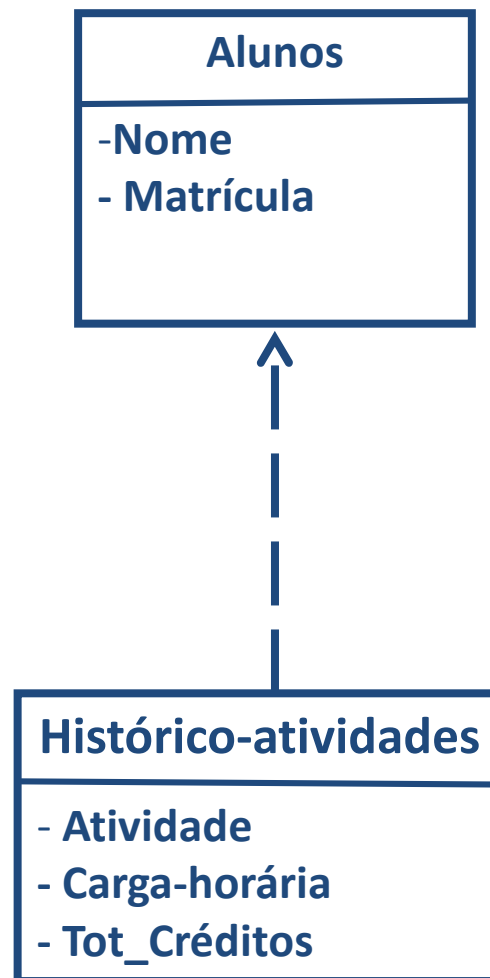
4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

Relacionamento de Associação



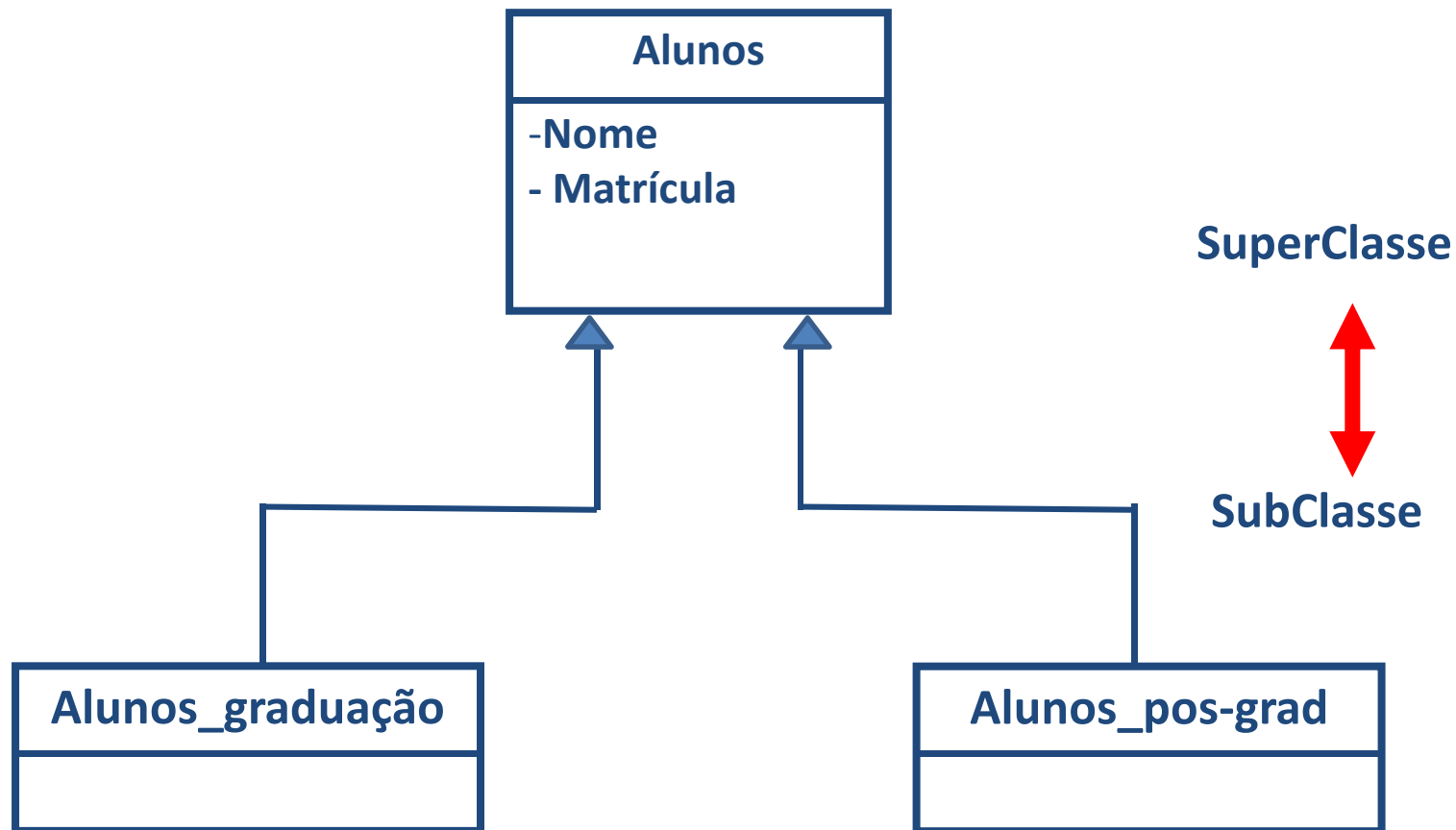
4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

Relacionamento de Dependência



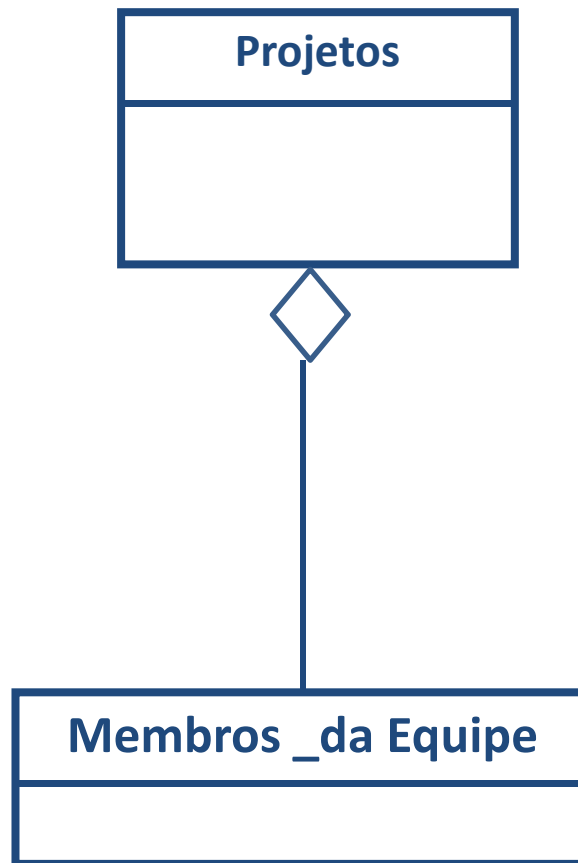
4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

Relacionamento de Generalização



4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

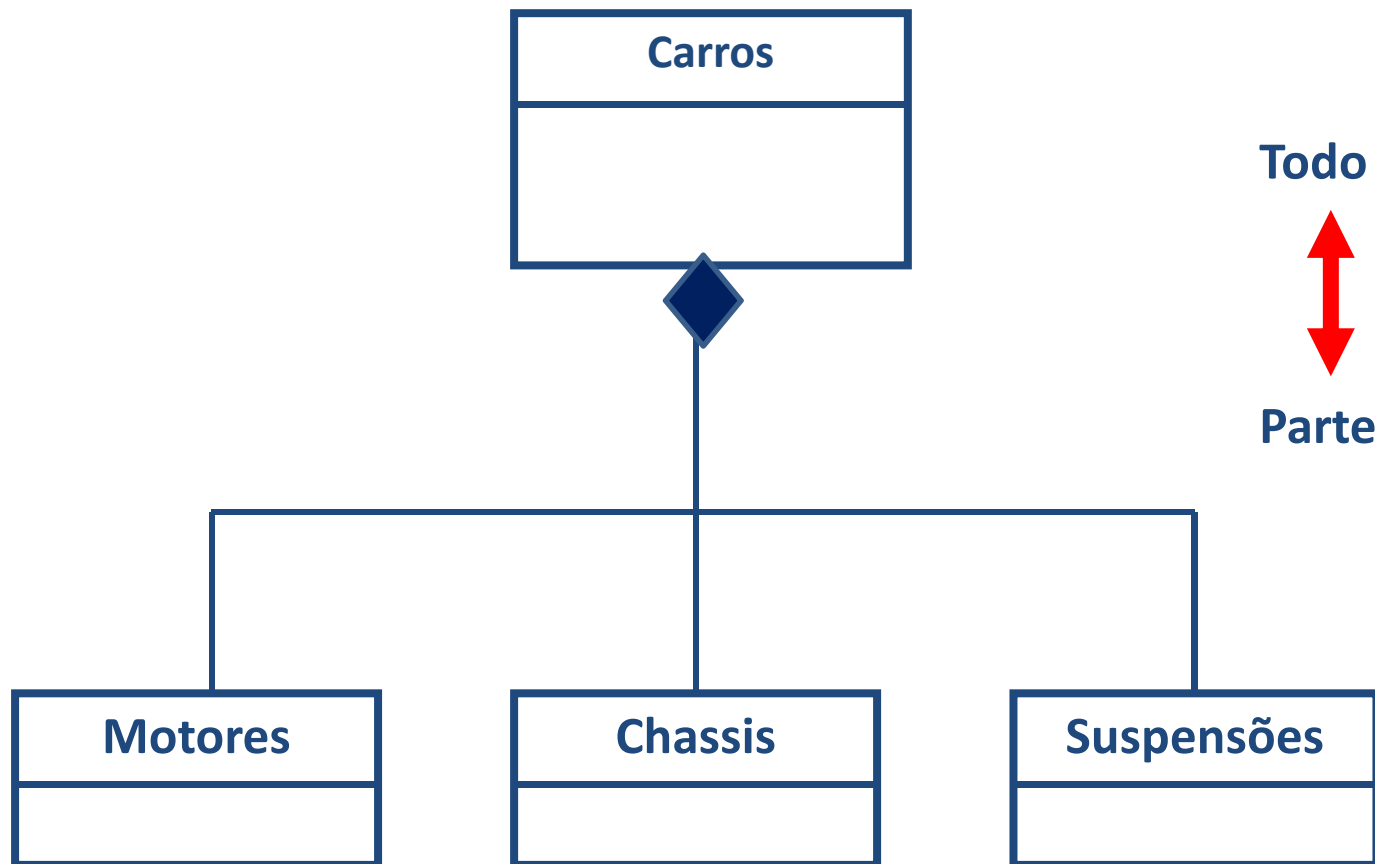
Relacionamento de Agregação



4. Linguagens e ferramentas de representação

-> Modelo E-R, diagrama de classes (UML)

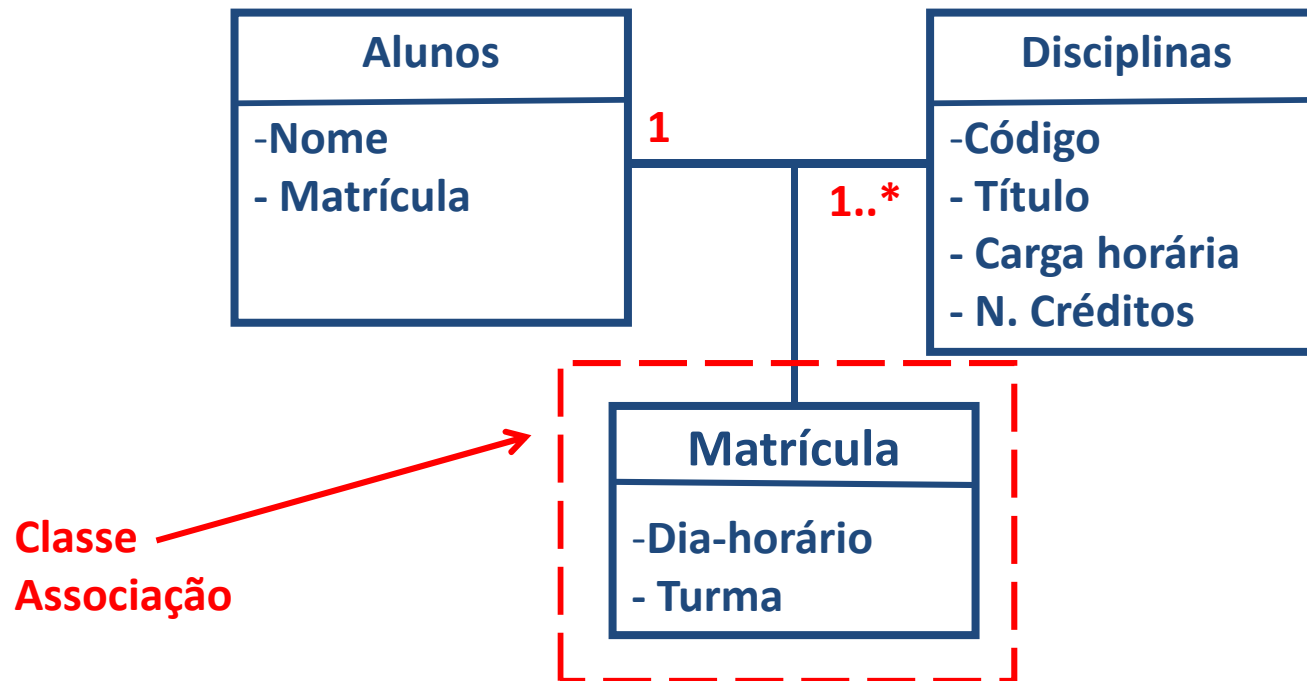
Relacionamento de Composição



4. Linguagens e ferramentas de representação

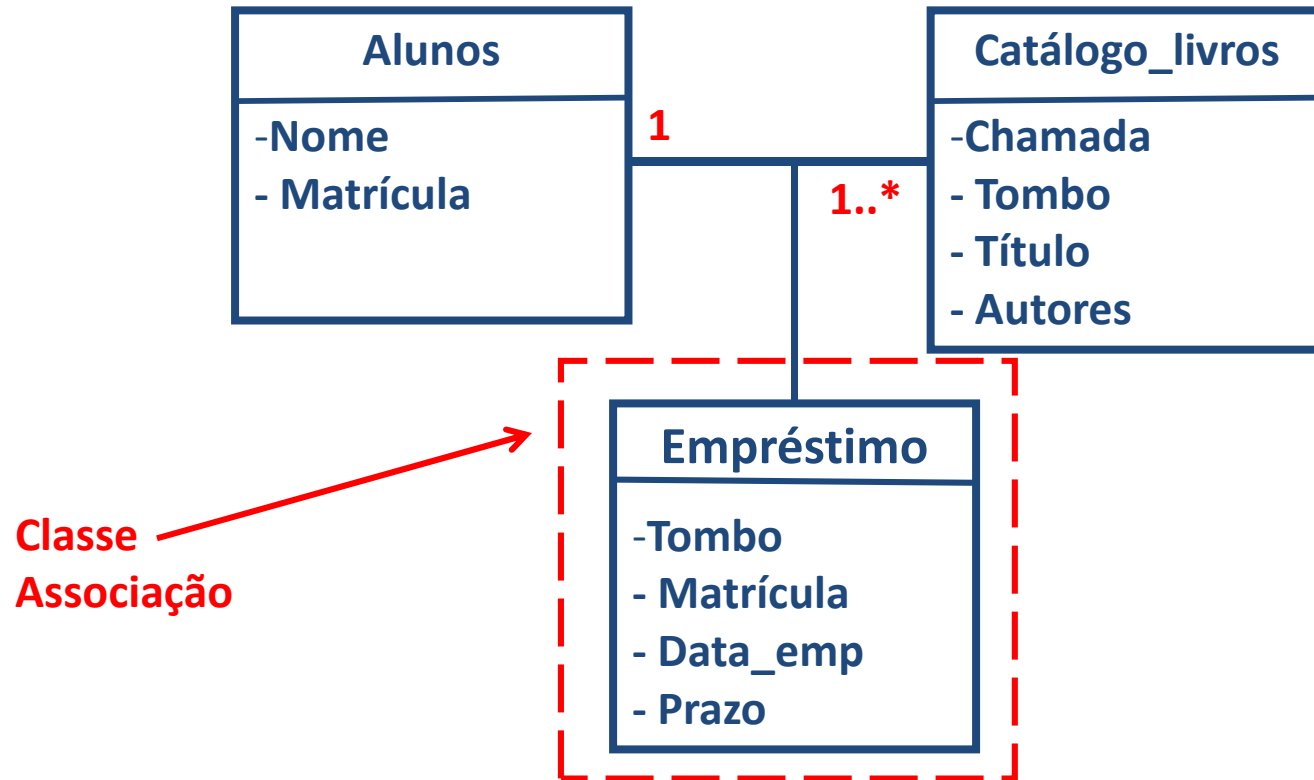
-> Modelo E-R, diagrama de classes (UML)

Classe Associação, “Matrícula”



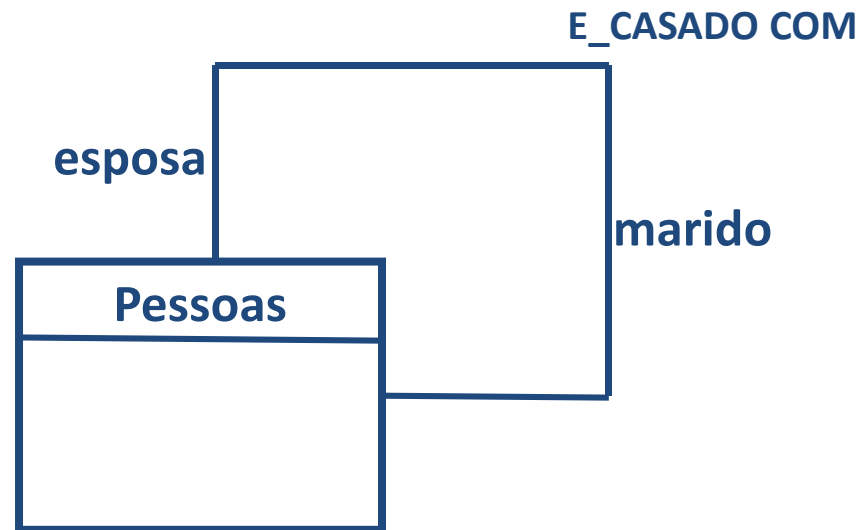
4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

Classe Associação, “Empréstimo”



4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

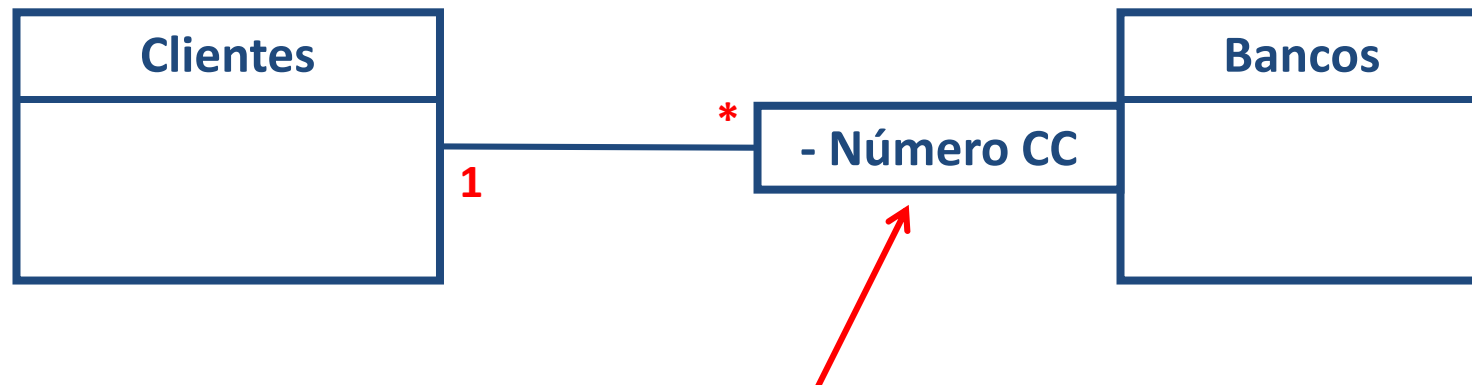
Associação reflexiva, objetos têm PAPEIS diferentes



4. Linguagens e ferramentas de representação

-> Modelo E-R, diagrama de classes (UML)

Associação qualificada

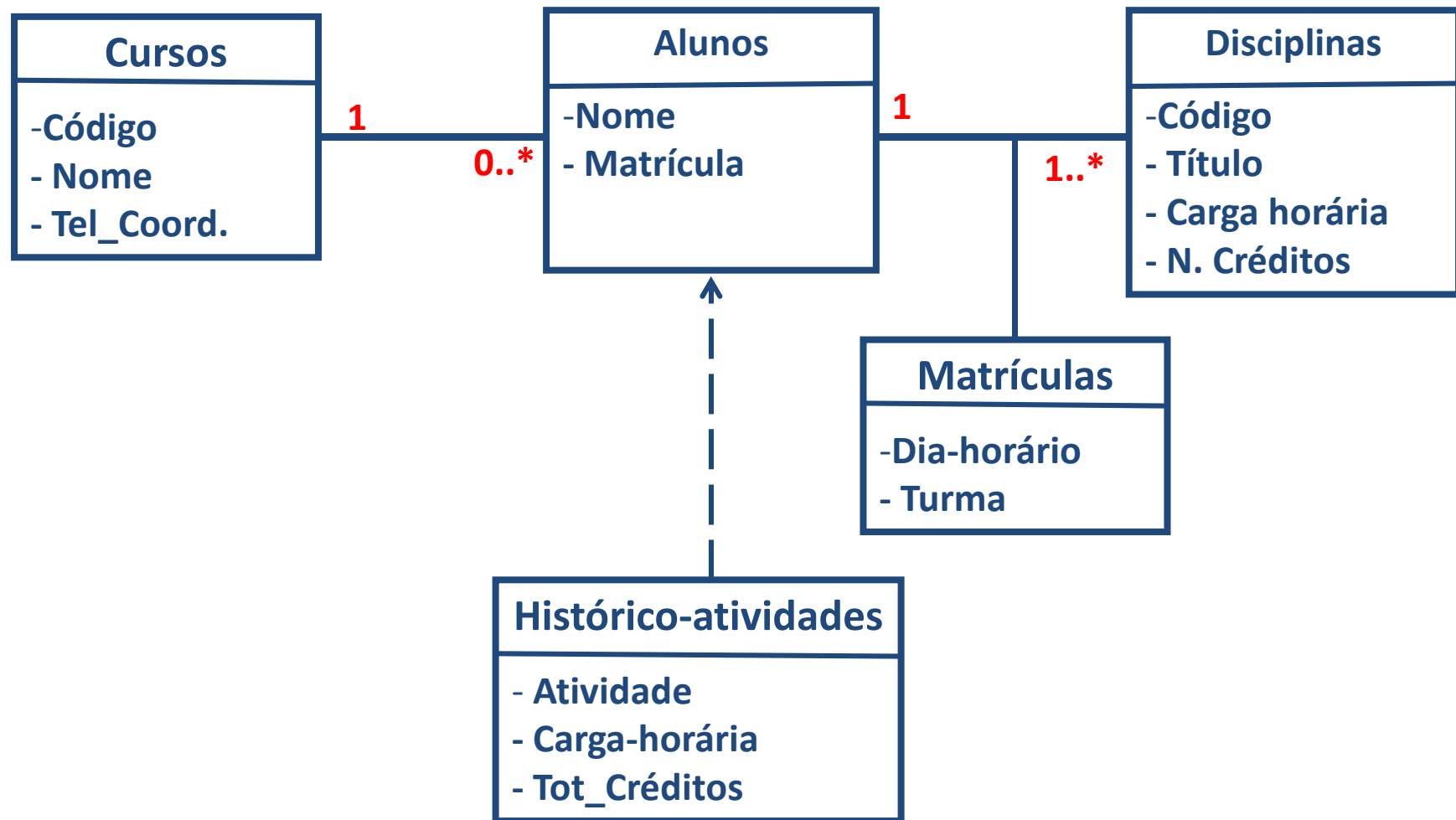


QUALIFICADOR:

que instância de Bancos esta associada a uma instância de Clientes

4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

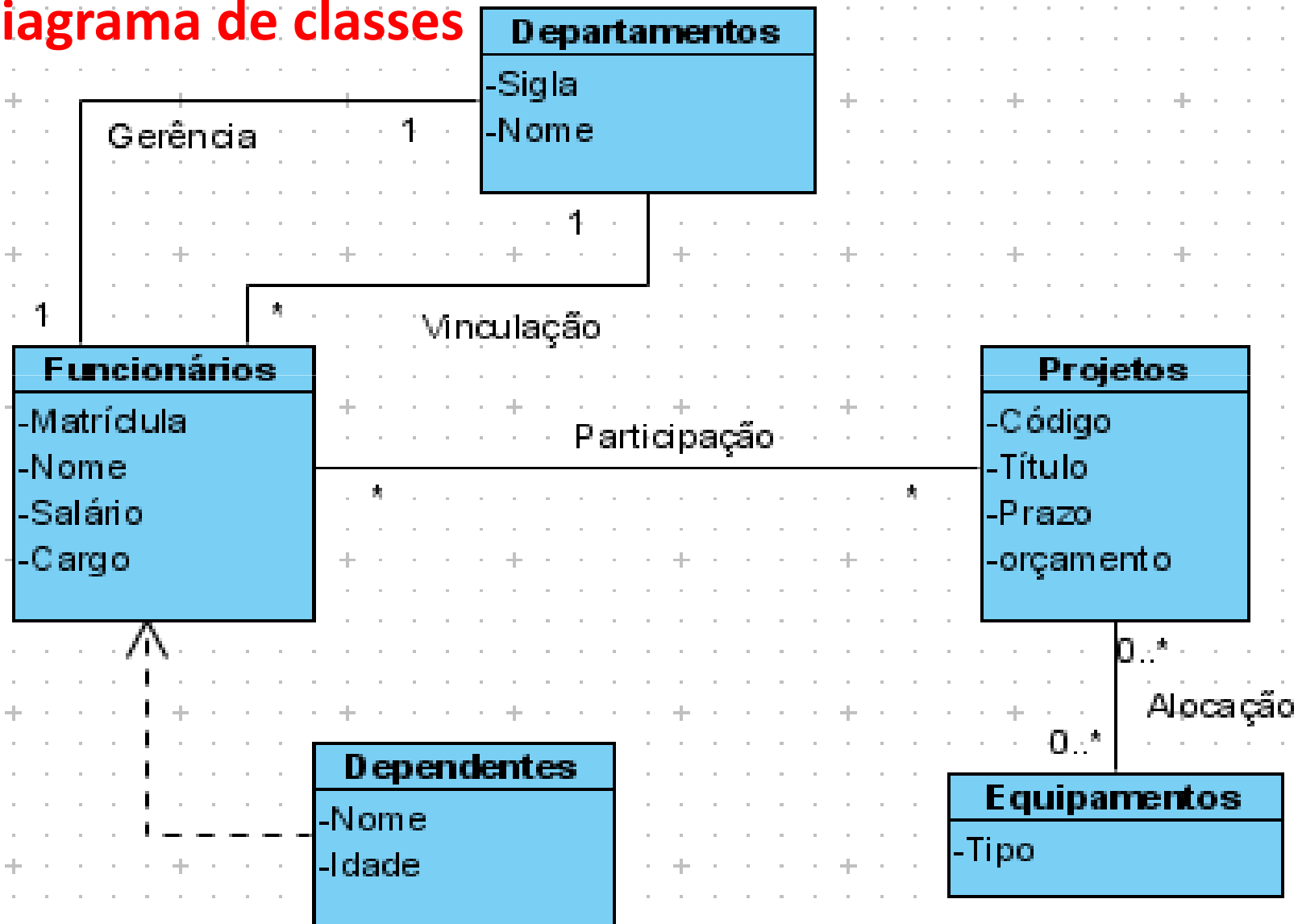
Diagrama de classes



4. Linguagens e ferramentas de representação

-> Modelo E-R, diagrama de classes (UML)

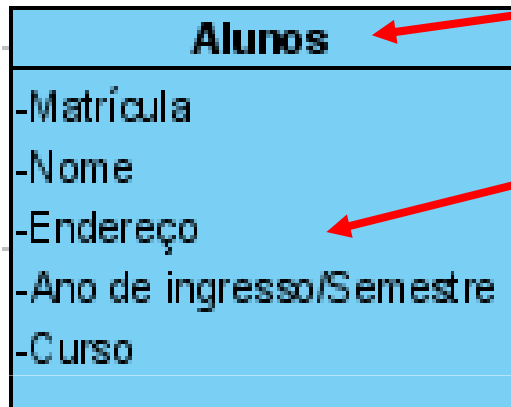
Diagrama de classes



4. Linguagens e ferramentas de representação

-> Dos modelos à implementação de BDs

*MODELO – Diagrama de Classes



Classe

Atributos

*IMPLEMENTAÇÃO BD

Tabela ALUNOS

A screenshot of the Microsoft Access application window titled 'Microsoft Access - [Alunos : Tabela]'. The window shows a table with the following columns: Matrícula, Nome, Endereço, Ano de ingresso, and Curso. The table contains three records. Red arrows point from the label 'Campos' to the column headers and from 'Registros' to the data rows.

Matrícula	Nome	Endereço	Ano de ingresso	Curso
199.14.001-6	Adriana Reguete Martins	R. Sobe e Desce, n. 5	1999/1	Arquivologa
100.14.031-6	Alessandra Santos de Carva	R. Amanhã Fui Lá Ontem, n. 6	2000/1	Arquivologa
200.14.035-4	Aline Cardoso Rodrigues	R. do Nada, n.0	2000/2	Arquivologa

Campos

Registros

(objetos
informacionais)

4. Linguagens e ferramentas de representação

-> Dos modelos à implementação de BDs

Tabela ALUNOS

Microsoft Access - [Alunos : Tabela]

Arquivo Editar Exibir Inserir Formatar Registros Ferramentas Janela Ajuda

	Matricula	Nome	Endereço	Ano de ingres	Curso
	199.14.001-6	Adriana Reguete Martins	R. Sobe e Desce, n. 5	1999/1	Arquivologa
	100.14.031-6	Alessandra Santos de Carva	R. Amanhã Fui Lá Ontem, n. 6	2000/1	Arquivologa
	200.14.035-4	Aline Cardoso Rodrigues	R. do Nada, n.0	2000/2	Arquivologa
*					

- As Tabelas (ou Base de Dados) são o principal elemento para guardar informações de um aplicativo de SGBD
- As Tabelas são formadas por linhas - os Registros - e por colunas - os Campos
- Os Registros representam Classes e Relacionamentos do mundo real
- Os Campos representam os atributos de informação relativos a cada Classes representada

4. Linguagens e ferramentas de representação

-> Dos modelos à implementação de BDs

Tabelas - Chave Primária

The image displays four screenshots of Microsoft Access tables, each with a red arrow pointing to a primary key field. The tables are:

- Microsoft Access - [tbl_museus : Tabela]**

Cod_Museu	Nome da instituição	Sigla	Situação do Mu	Virtual	Impressão
1	Centro Cultural Banco do Brasil	CCBB	Aberto	☐	☐
2	Museu de História e Artes do Estado do Rio de Janeiro - Museu do Inga	MHAERJ	Aberto	☐	☐
- Microsoft Access - [Registros : Tabela]**

CodCategoria	CodClassificação	Entrada	URL	Idioma	Descrição	Palavras-chave	Data de registro	Última
060.00	20.00	Aleph / Ex Libris	http://www.exlibris.org.br	Português	Sistema integrado	Sistema integrado	20002205	20002205
030.00		American Society for Information Science	http://www.asis.org	Inglês	O site da ASIS	Ciência da Informação	20002205	20002205
060.00		Archives Lib/WA - Corbi	http://www.wa-c.org	Portugues	Sistema integrado	Sistema integrado	20001115	
- Microsoft Access - [Atividade : Tabela]**

Codigoatividade	Tipoatividade	Identificação	CH semestral d	Curso	Grau do curso	Dia1	Horario1	Dia2
GD003007		AUTOMAÇÃO I	60	Biblioteconomia	Graduação	3a.	08-12	
GD003071	Disciplina	AUTOMAÇÃO I						
- Microsoft Access - [Candidato : Tabela]**

Identificador	Codigo do Curs	Nivel curso	Ano/semestre	Nome	Data de nascim	Identidade	Órgao expedidc	UF
1		Doutorado	2006/01	Andréa Osório Duque	1964-10-28			
2		Doutorado	2005/02	Eliane Borges da Silva	1963-11-09			

4. Linguagens e ferramentas de representação

-> Dos modelos à implementação de BDs

Entidades e Relacionamentos

Microsoft Access

Arquivo Editar Exibir Inserir Formatar Registros Ferramentas Janela Ajuda

Cursos : Tabela

	Código do Curso	Nome do Curso	Centro	Coordenador	Telefone
▶	GCA	Arquivologia	CEG	Gláucia	2629 9759
	GCB	Biblioteconomia	CEG	Sandra	2629 9758
*					

Alunos1 : Tabela

	Matrícula	Nome	Endereço	Ano de ingres
▶	100.14.031-6	Alessandra Santos de Carvalho	R. Amanhã Fui Lá Ontem, n. 6	2000/1
	199.14.001-6	Adriana Reguete Martins	R. Sobe e Desce, n. 5	1999/1
	200.14.035-4	Aline Cardoso Rodrigues	R. do Nada, n.0	2000/2
*				

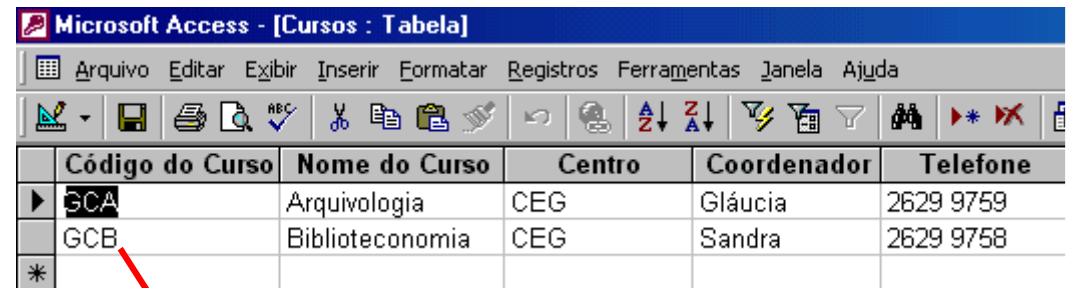
Como implementar
RELACIONAMENTOS???

4. Linguagens e ferramentas de representação

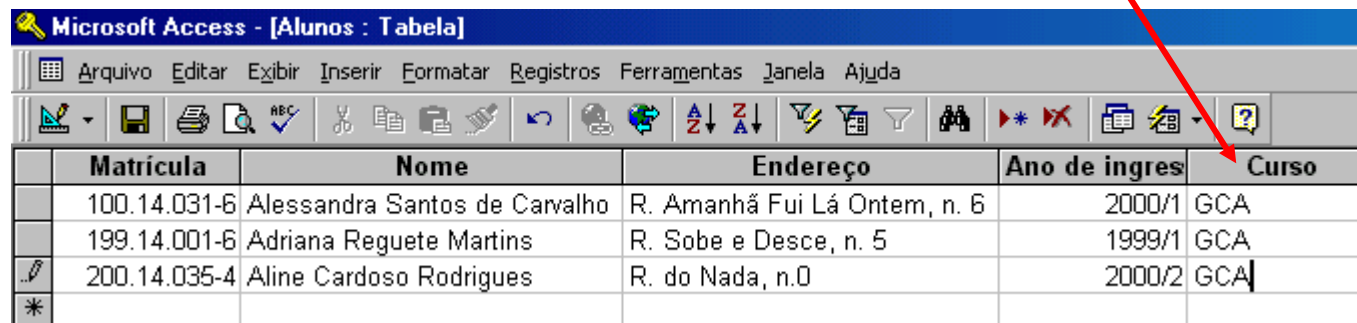
-> Dos modelos à implementação de BDs

Entidades e Relacionamentos

RELACIONAMENTOS são implementados num aplicativo de SGBD através da replicação da chave-primária de uma tabela como um campo adicional - chave estrangeira - da tabela relacionada



	Código do Curso	Nome do Curso	Centro	Coordenador	Telefone
▶	GCA	Arquivologia	CEG	Gláucia	2629 9759
	GCB	Biblioteconomia	CEG	Sandra	2629 9758
*					



	Matrícula	Nome	Endereço	Ano de ingres	Curso
	100.14.031-6	Alessandra Santos de Carvalho	R. Amanhã Fui Lá Ontem, n. 6	2000/1	GCA
	199.14.001-6	Adriana Reguete Martins	R. Sobe e Desce, n. 5	1999/1	GCA
	200.14.035-4	Aline Cardoso Rodrigues	R. do Nada, n.0	2000/2	GCA
*					

4. Linguagens e ferramentas de representação

-> Dos modelos à implementação de BDs

Entidades e Relacionamentos

Microsoft Access - [Cursos : Tabela]

Arquivo Editar Exibir Inserir Formatar Registros Ferramentas Janela Ajuda

<

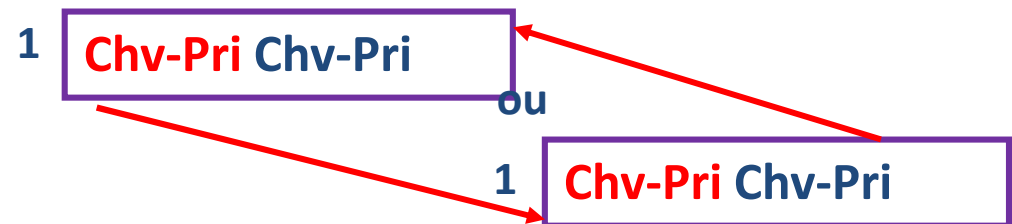
4. Linguagens e ferramentas de representação

-> Dos modelos à implementação de BDs

Classes de Multiplicidades de Relacionamentos e sua implementação

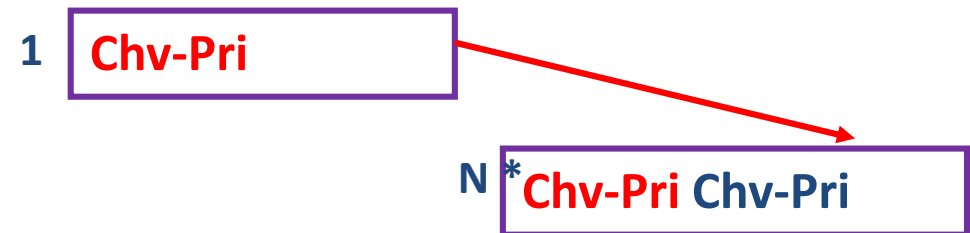
um para um (1:1)

-

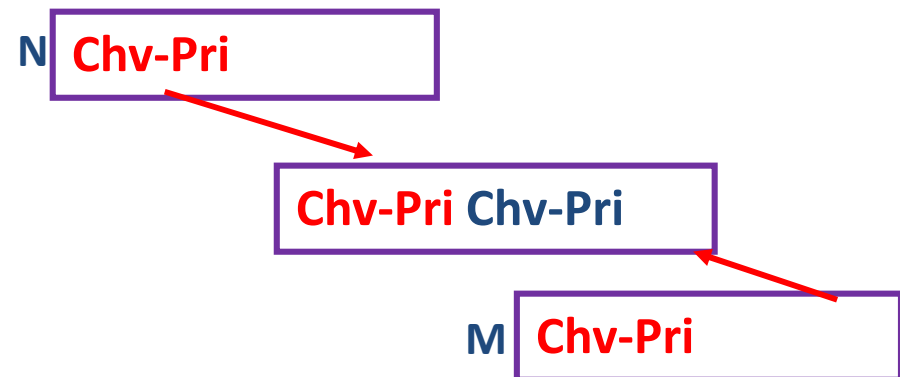


um para muitos (1:N)

-



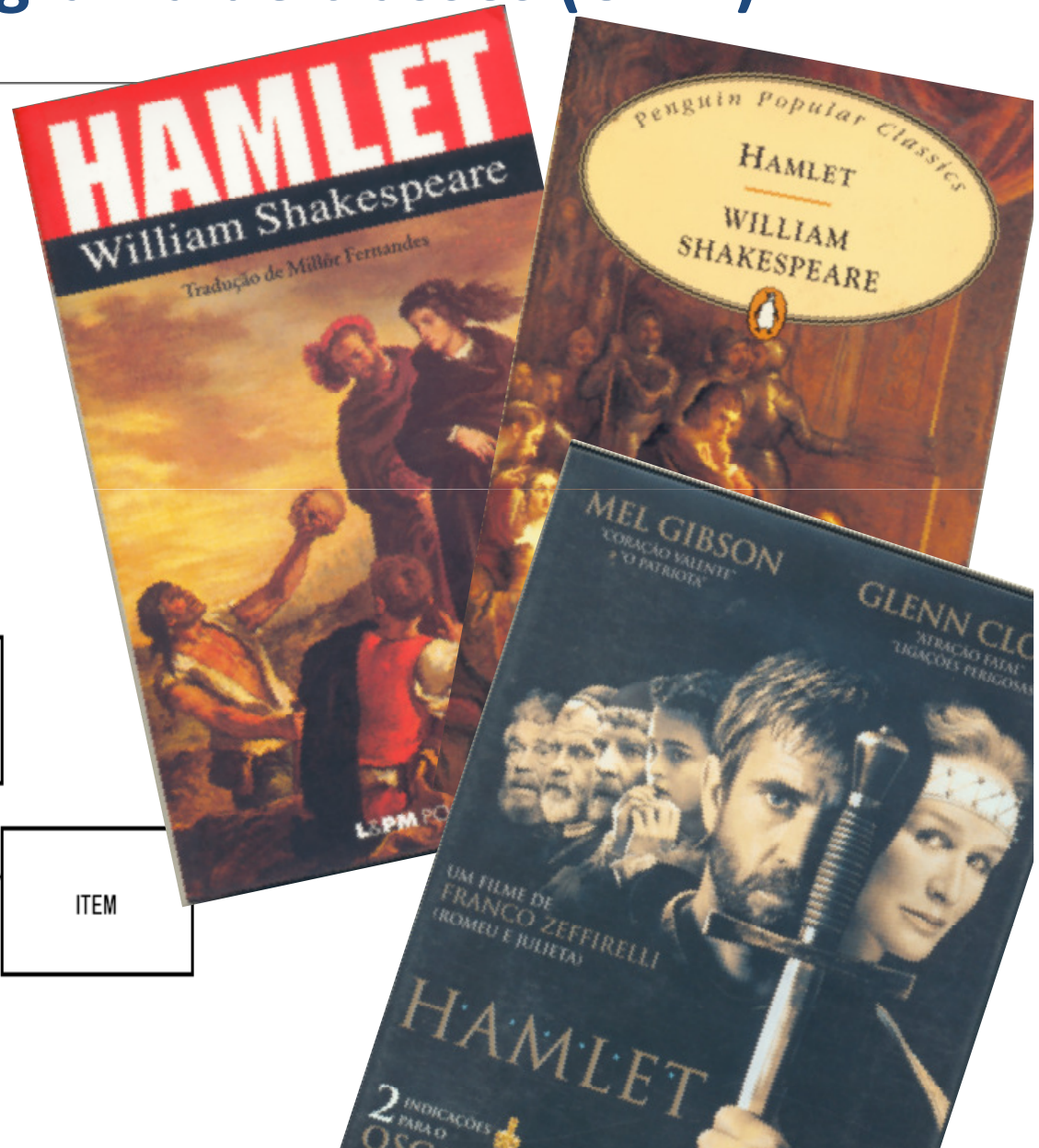
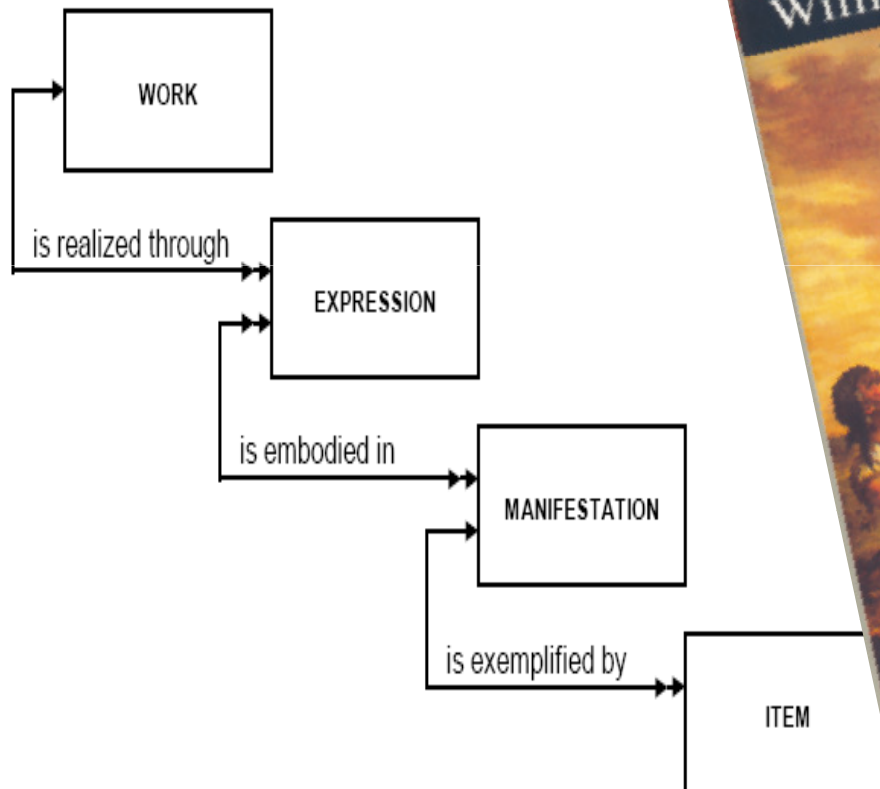
muitos para muitos (N:M) -
(Tabela adicional)



4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

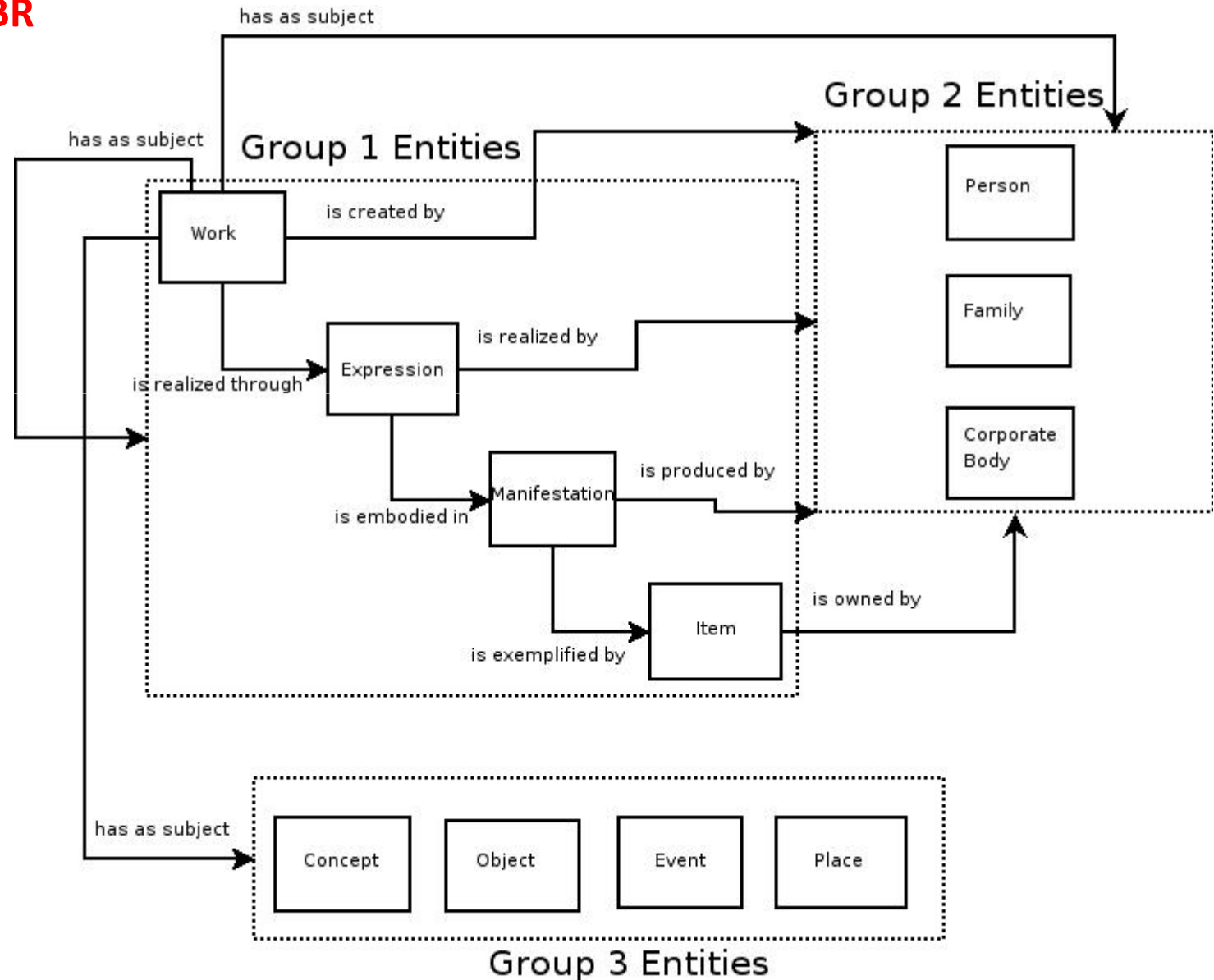
Modelo FRBR

Figure 3.1: Group 1 Entities and Primary Relationships



4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

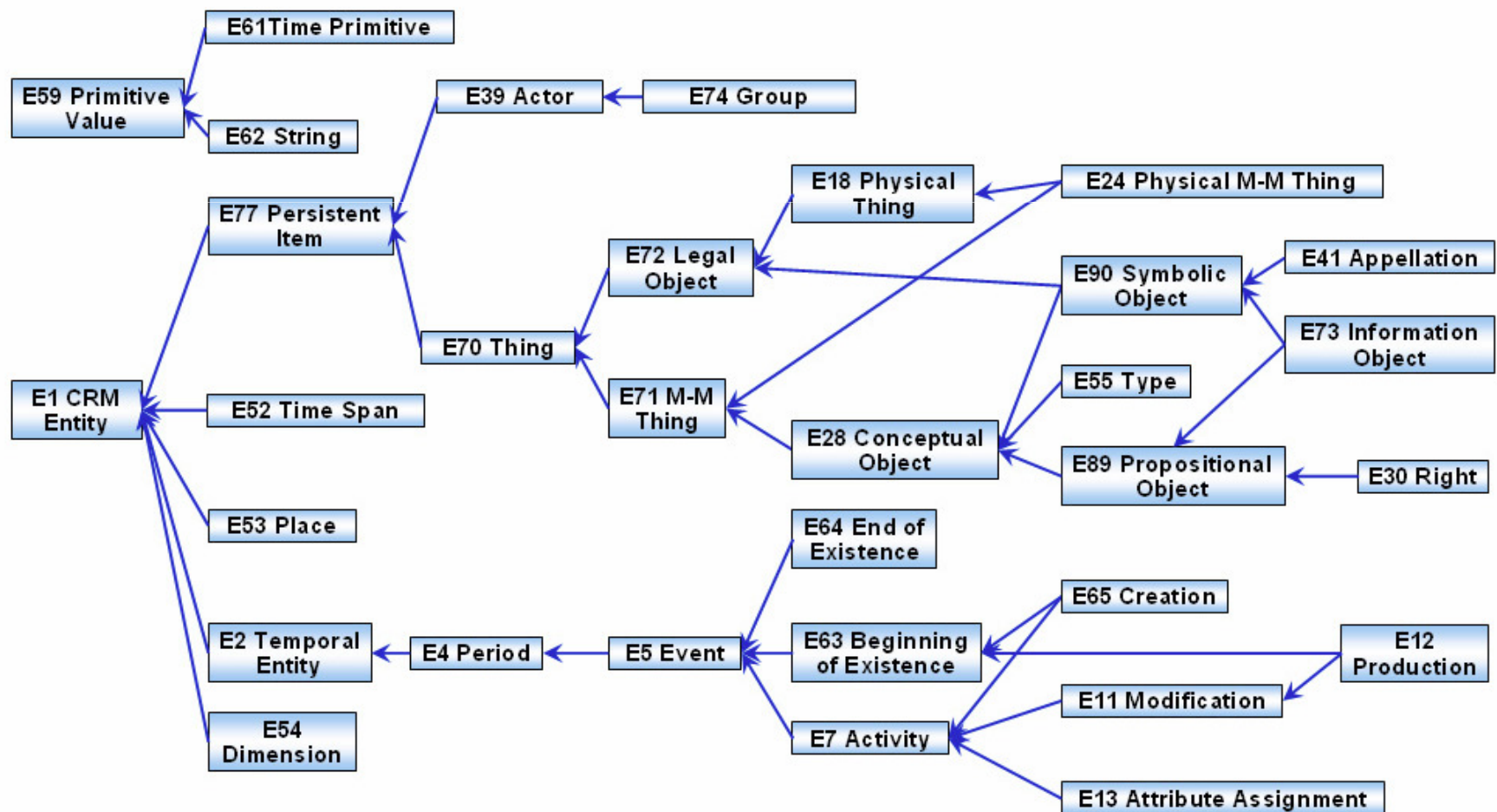
Modelo FRBR



4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

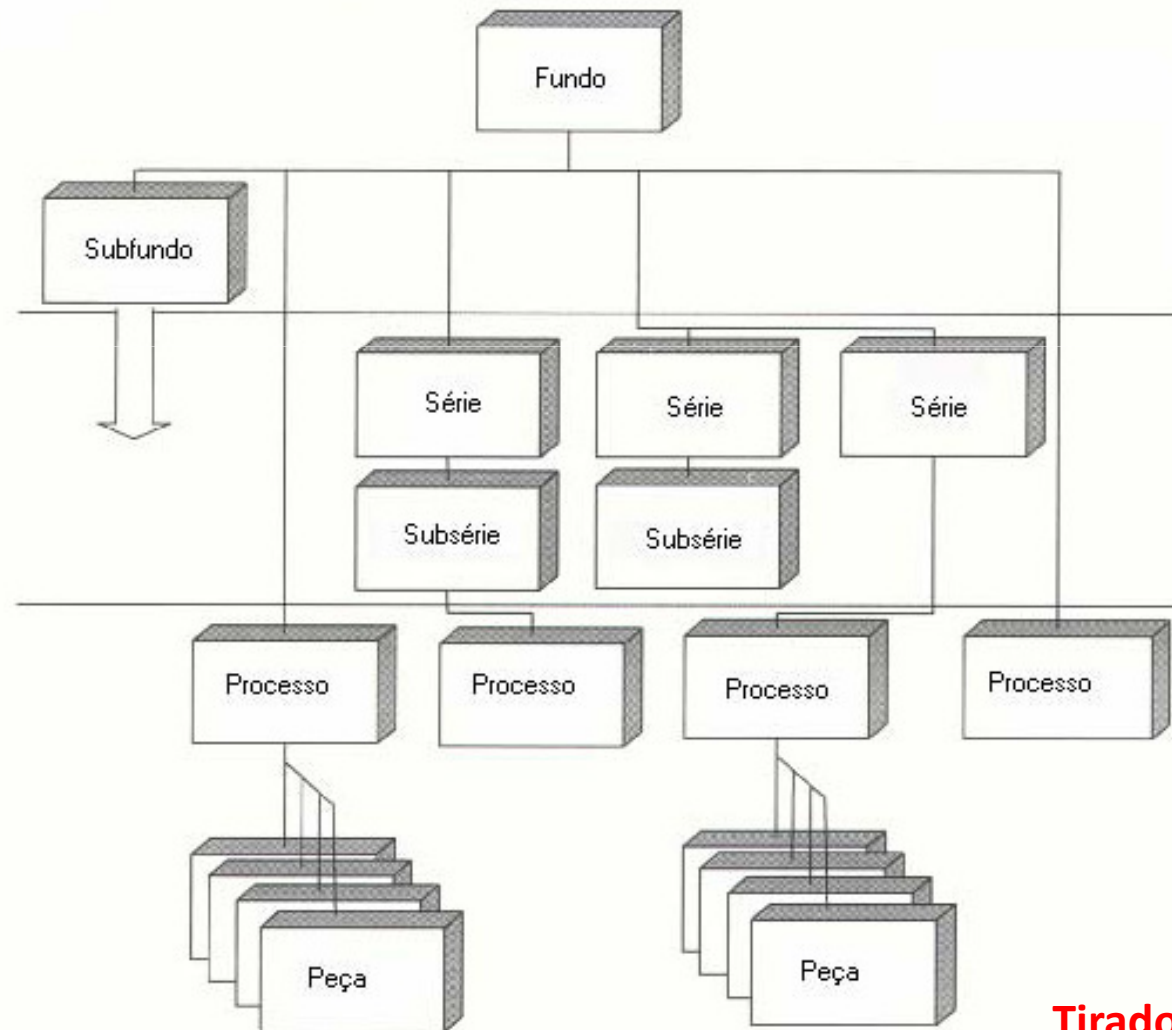
Modelo CIDOC-CRM, ICOM, <http://www.cidoc-crm.org/>

Hierarchy of core classes



4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

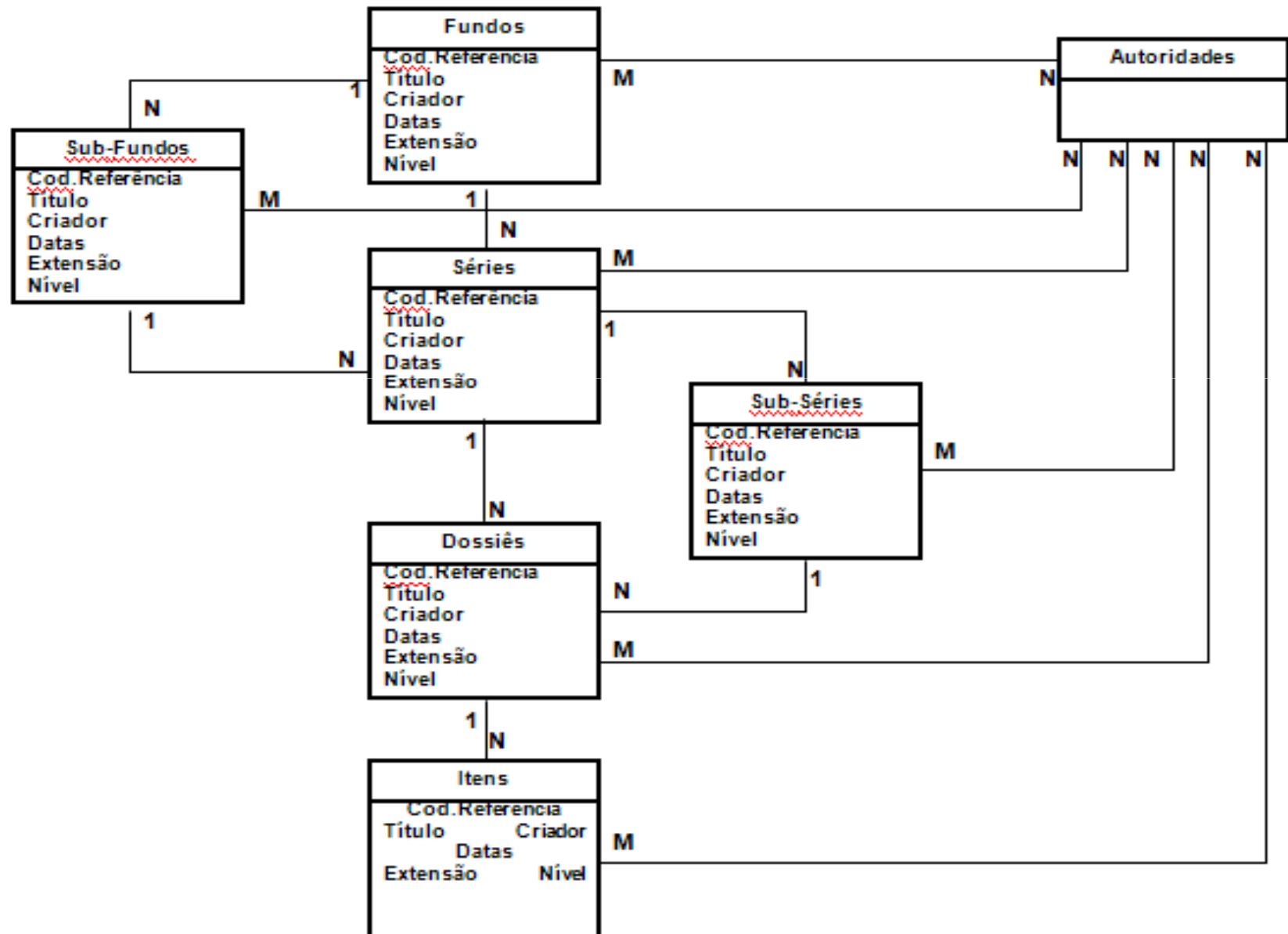
Modelo dos níveis de organização de um fundo



Tirado da NOBRADE

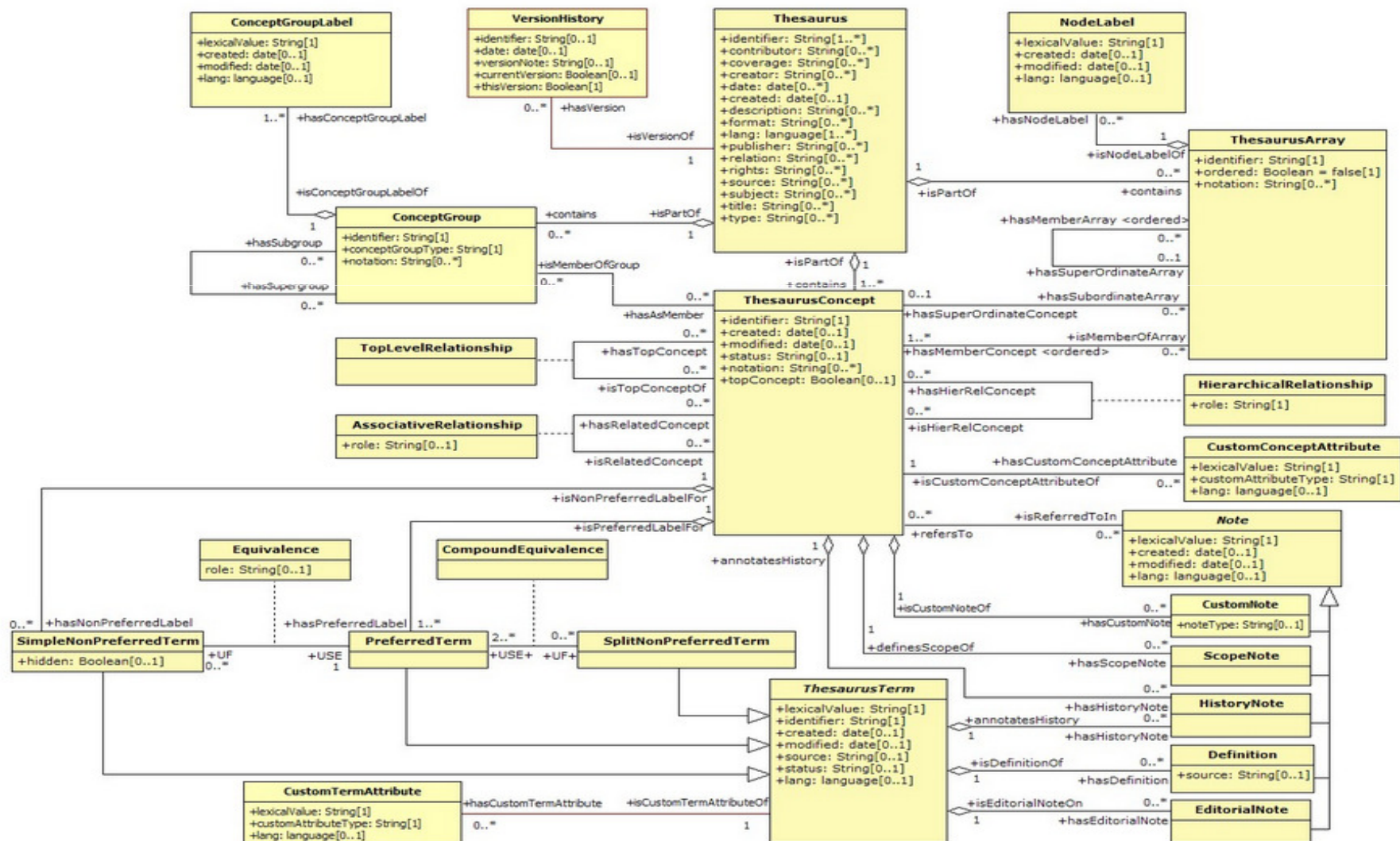
4. Linguagens e ferramentas de representação

-> Modelo E-R, diagrama de classes (UML)



4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

ESTRUTURA E RELAÇÕES EM UM TESAURUS – Norma ANSI-NISO Z39-19/2005



4. Linguagens e ferramentas de representação -> Modelo E-R, diagrama de classes (UML)

EUROPEANA DATA MODEL

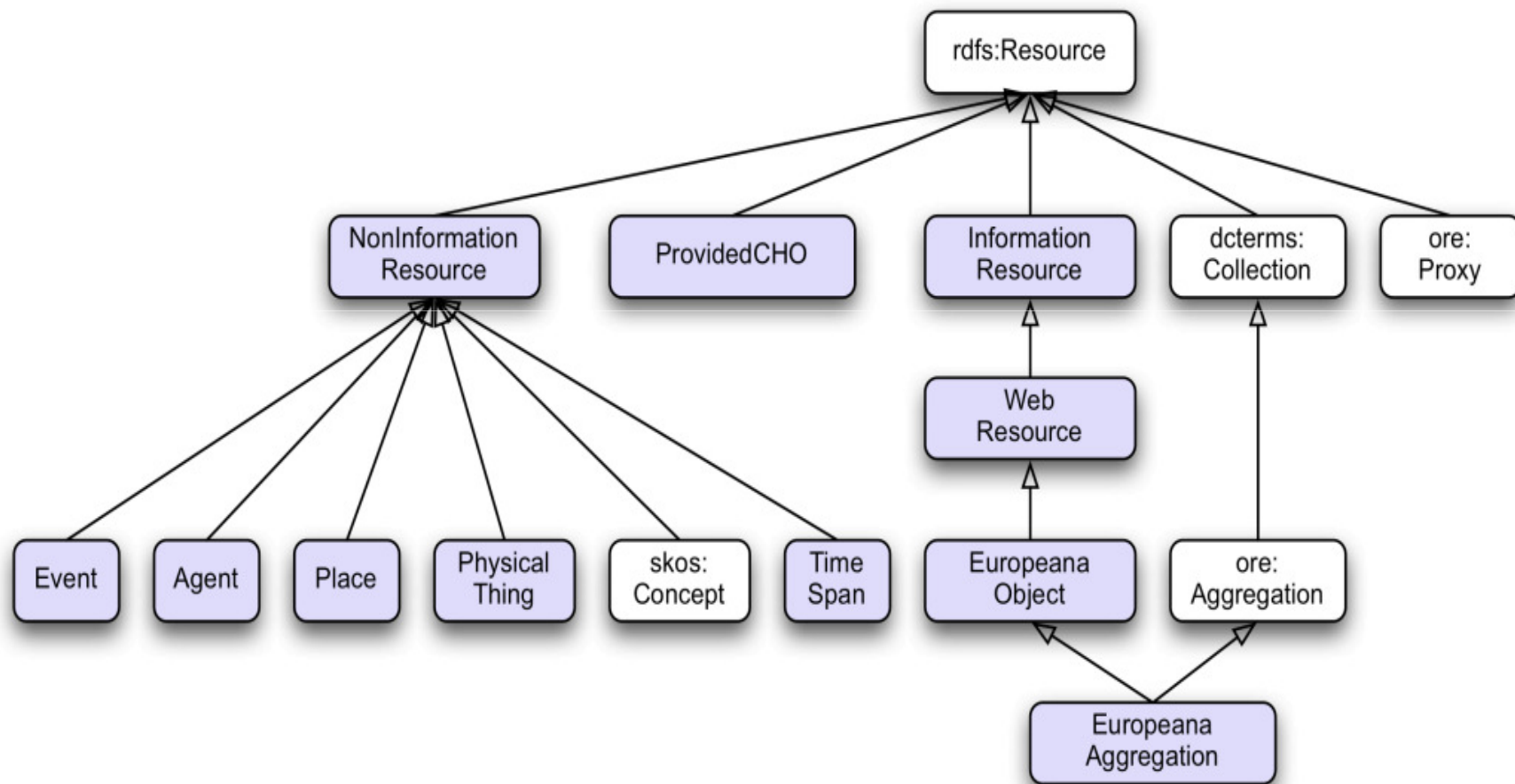
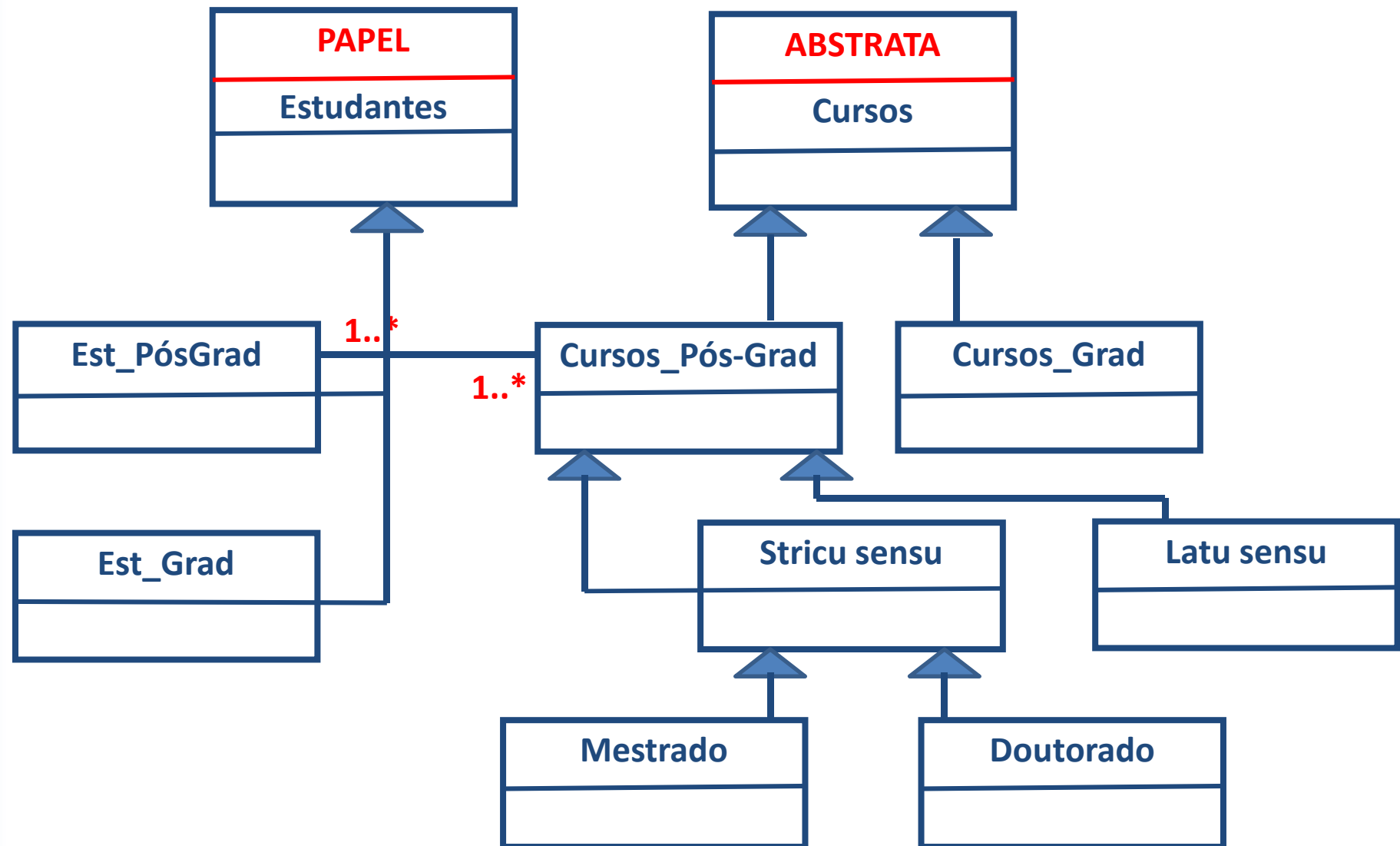


Figure 1. The EDM Class hierarchy. The classes introduced by EDM are shown in light blue rectangles. The classes in the white rectangles are re-used from other schemas; the schema is indicated before the colon.

4. Linguagens e ferramentas de representação

-> Modelo E-R, diagrama de classes (UML)



4. Linguagens e ferramentas de representação

The Semantic Web: Scientific American - Windows Internet Explorer

http://www.scientificamerican.com/article.cfm?id=the-semantic-web

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Y! Buscar na Web Meus Aplicativos

Semantic Web bern Busca 24°C f e YouTube 277 Música Jogos

The Semantic Web: Scientific American

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The Semantic Web [Preview]
A new form of Web content that is meaningful to computers will unleash a revolution of new possibilities
By Tim Berners-Lee, James Hendler and Ora Lassila | May 17, 2001 | 6

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Happy 20th Birthday, World Wide Web
CERN on March 13 celebrates the 20th anniversary of a proposal entitled, "Information Management: A Proposal," by Tim Berners-Lee, which would become the blueprint for the World Wide Web »
March 12, 2009

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4. Linguagens e ferramentas de representação

A proposta da Web Semântica

“The Semantic Web is not a separate Web but an extension of the current one, in which **information is given well-defined meaning**, better enabling computers and people to work in cooperation.” (BERNERS-LEE, 2001 p. 2).

“The Semantic Web will **bring structure to the meaningful content of Web pages**, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users” (BERNERS-LEE, 2001 p. 2).

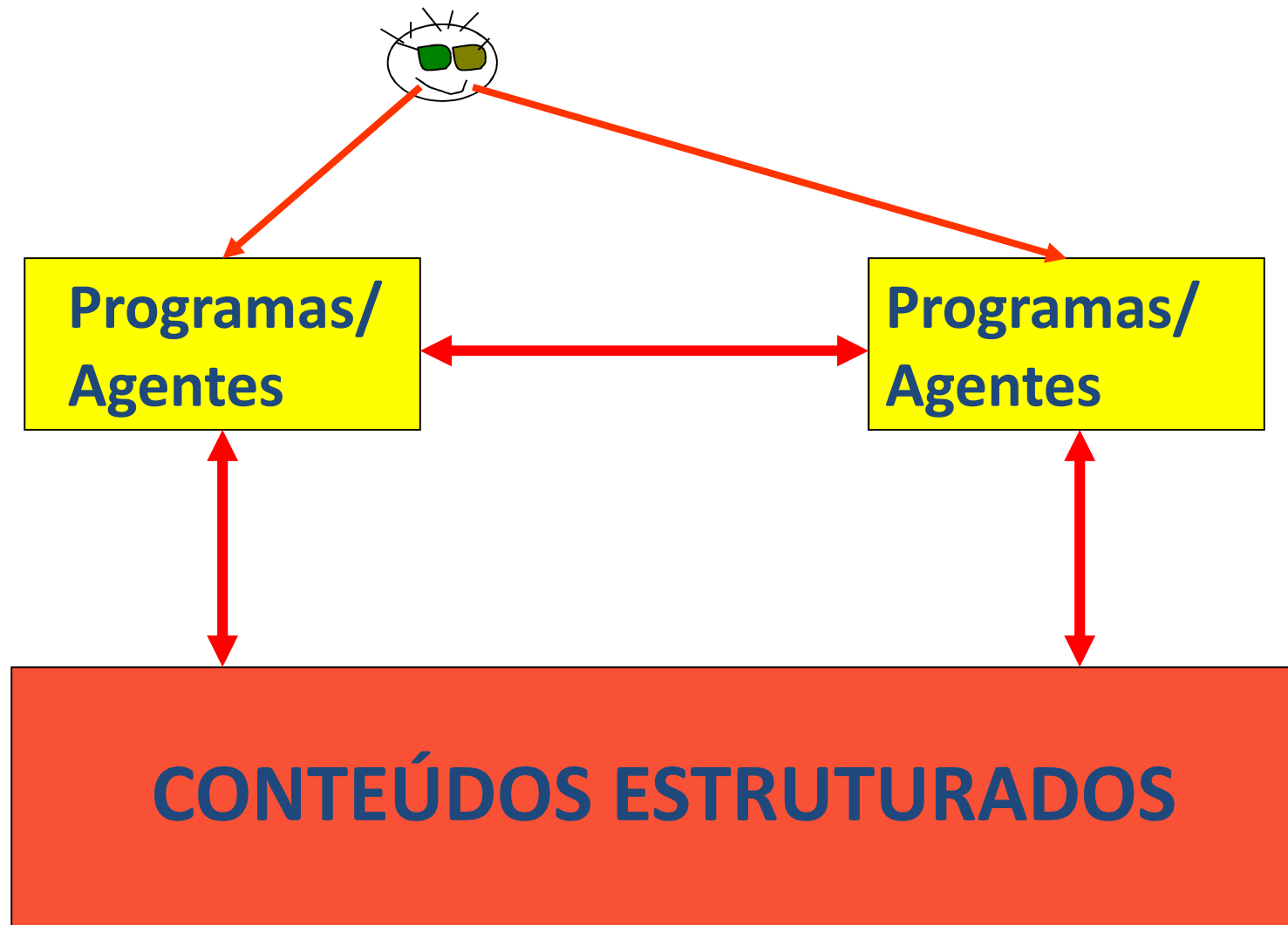
“... **self-describing documents**” (THE SELF-DESCRIBING WEB, 2000).

“The Semantic Web ... it allows **self-describing documents**” (BERNERS-LEE, 2000).

“The Semantic Web is not “merely” the tool for conducting individual tasks that we have discussed so far. In addition, if properly designed, The Semantic Web can assist **the evolution of human knowledge** as a whole” (BERNERS-LEE, 2001 p. 2).

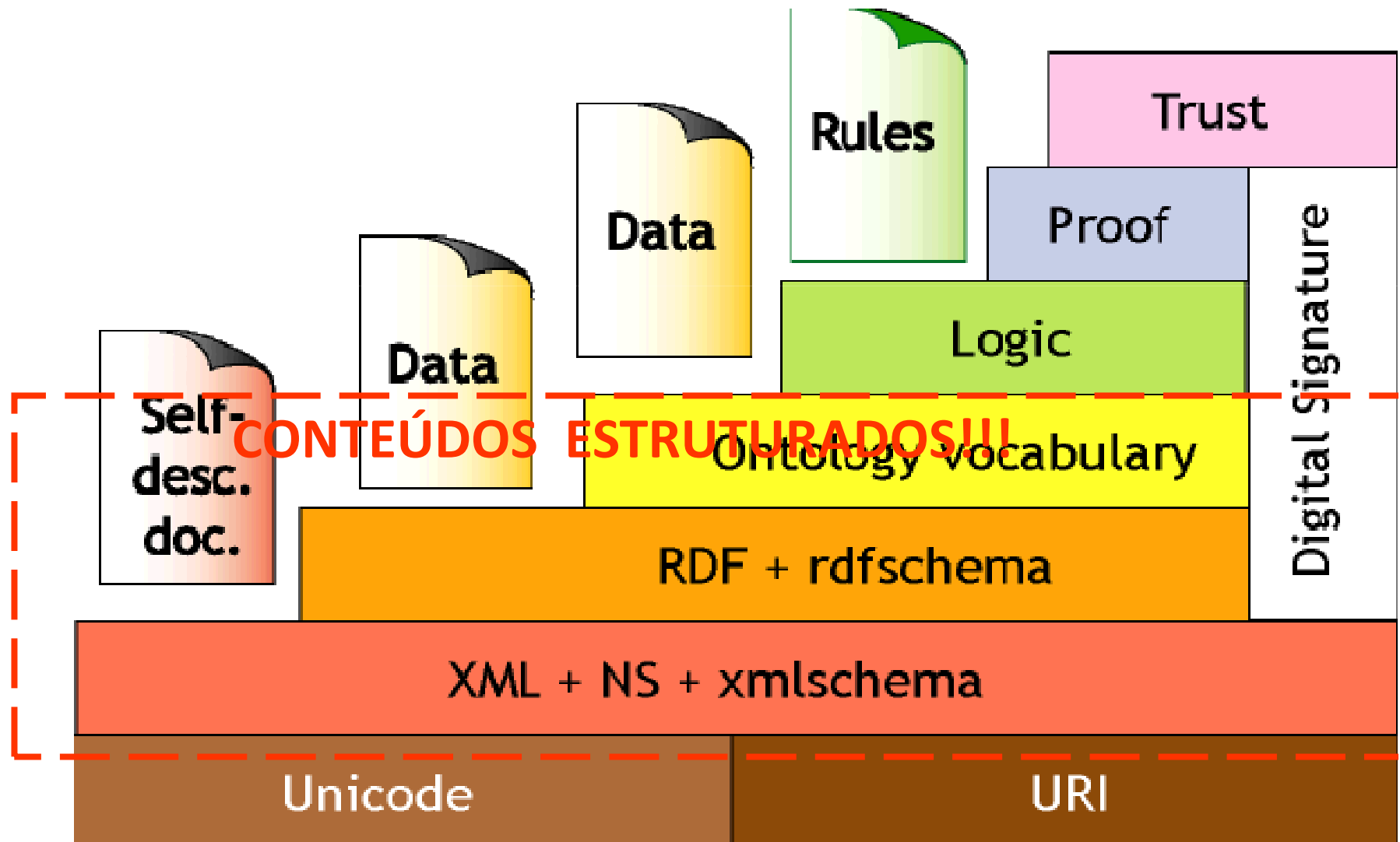
4. Linguagens e ferramentas de representação

A proposta da Web Semântica



4. Linguagens e ferramentas de representação

Arquitetura da Web Semântica



4. Linguagens e ferramentas de representação

Linguagens da Web Semântica, em ordem crescente de expressividade semântica

Primeiras “luzes” da Semântica

- XML - sintaxe para estruturar documentos. Não impõem restrições semânticas.
- XML Schema – restringe a estrutura de documentos XML
- RDF – modelo de dados para objetos e relacionamentos. Semântica simplificada
- RDF Schema – vocabulário para descrever propriedades e classes de RDF. Semântica para generalização.
- OWL – maior vocabulário para descrever classes e por propriedades (relacionamentos, e.g., disjunção, cardinalidade, igualdade): retirado e traduzido de OWL Ontology Web Language Overview, 2004. p.3).

4. Linguagens e ferramentas de representação

XML X RDF: a questão da semântica

XML

```
<livro>
  <creator>Machado de Assis</creator>
  <:title>Dom Casmurro</title>
  <publisher>Edições Melhoramentos</publisher>
  <date>1966</date>
  <coverage>Rio de Janeiro</coverage>
  <identifier>(DLC)67076436</identifier>
</livro>
```

SUJEITO

PREDICADO

OBJETO

RDF

```
<?xml version="1.0">
<rdf:RDF
  xmlns= http://www.w3.org/1999/02/22-rdf-syntax-ns
  xmlns:dc="http://purl.org/dc/elements/1.1">
  <rdf:Description rdf:about "(DLC)67076436">
    <dc:creator>MACHADO DE ASSIS</dc:creator>
    <dc:title>Dom Casmurro</dc:title>
    <dc:publisher>Edições Melhoramentos</dc:publisher>
    <dc:date>1966</dc:date>
    <dc:subject>Rio de Janeiro</dc:subject>
  </rdf:Description>
</rdf:RDF>
```

[http://\(DLC\)67076436](http://(DLC)67076436)
"Dom Casmurro"

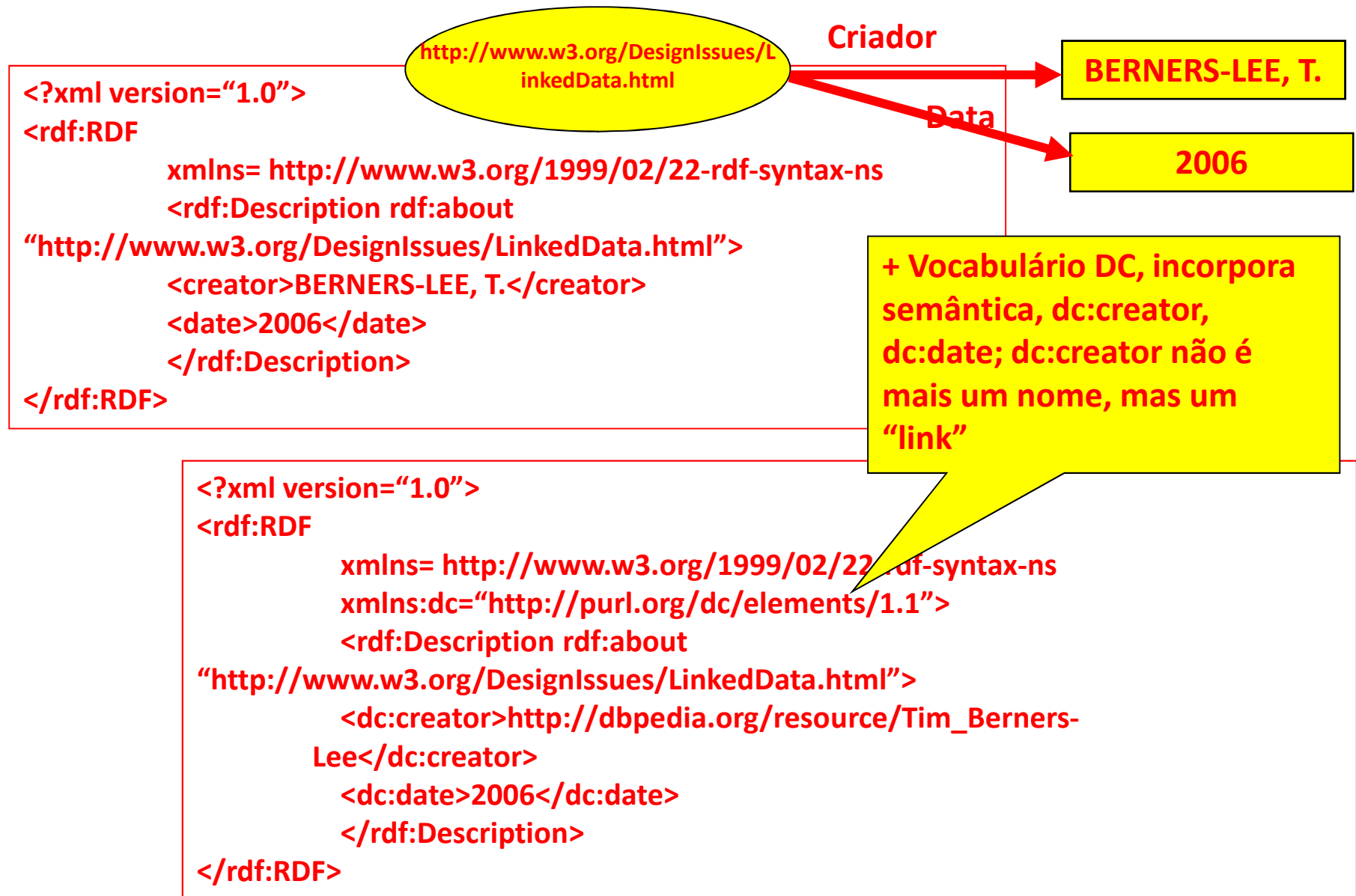
Criador

Machado

✓ RDF: Pressupostos
Semânticos: Sujeito,
Predicacao, Objeto

4. Linguagens e ferramentas de representação

RDF, Semântica: Sujeito, Predicado, Objeto



4. Linguagens e ferramentas de representação

Ontologias computacionais, codificadas em linguagens padronizadas como OWL, dispõe de vários mecanismos (vocabulário de comandos) que permitem REPRESENTAR e especificar/restringir, com grande precisão, o significado intencionalmente pretendido pelo modelador.

Esta especificação é legível por máquinas, permitindo a estas realizar “inferências” sobre o conhecimento codificado.

Exemplos de mecanismos disponíveis na OWL para especificar/restringir o significado pretendido

- classes, indivíduos, relações
- classes e subclasses
- restrição de relações (binárias) através da especificação do seu domínio e escopo
- cardinalidade de indivíduos envolvidos em relações
- transitividade de relações
- relações inversas

4. Linguagens e ferramentas de representação

Vocabulário OWL

CLASSES, SUBCLASSES (conjuntos de indivíduos)

Em OWL, além de (1) classes simples (named), é possível construir classes a partir de classes existentes

Enumerar o conteúdo

Interseção, (4)união, (5)complemento

Através de restrições de propriedades

INDIVÍDUOS

PROPRIEDADES (e subpropriedades)

Domain (domínio) X Range (escopo)

Características de propriedades

Inversa

Funcional

Transitiva

Simétrica

RESTRIÇÕES

4. Linguagens e ferramentas de representação

Vocabulário OWL

- Classes, subclasses

```
<rdfs:Class rdf:ID="Animal"/*>
```

```
<rdfs:Class rdf:ID="Animal_selvagem"/*>
```

```
<rdfs:subClassOf rdf:resource="#animal"/*>
```

```
</rdf:Class>
```

```
<rdfs:Class rdf:ID="Animal_domestico"/*>
```

```
<rdfs:subClassOf rdf:resource="#animal"/*>
```

```
</rdf:Class>
```

4. Linguagens e ferramentas de representação

Vocabulário OWL

- **Propriedades (e subpropriedades):**

Object property – relaciona indivíduos de duas classes distintas

Datatype property – relaciona indivíduos de uma classe a valores de um atributo

4. Linguagens e ferramentas de representação

Vocabulário OWL

- Propriedades (subpropriedades):

(Indivíduos) de que classes são relacionados pela propriedade?

ObjectProperty

Domain (domínio) X Range (escopo)

ObjectProperty:
domain e range

```
<rdf:Description rdf:about="#E_Componente">  
  <rdfs:domain rdf:resource="#Componentes"/>  
  <owl:inverseOf rdf:resource="#Tem_Componente"/>  
  <rdf:type  
    rdf:resource="http://www.w3.org/2002/07/owl#ObjectPro  
perty"/>  
  <rdfs:range rdf:resource="#Veículos_a_Motor"/>  
</rdf:Description>
```

4. Linguagens e ferramentas de representação

Vocabulário OWL

- Propriedades (subpropriedades):

(Indivíduos) de que classes são relacionados pela propriedade?

DatatypeProperty

Domain (domínio) X Range (escopo)

```
<owl:DatatypeProperty
rdf:about="#Capacidade_de_Passageiros">
  <rdfs:domain
rdf:resource="#Veiculos_de_Passageiros"/>
  <rdfs:range rdf:resource="&xsd:string"/>
</owl:DatatypeProperty>
```

DatatypeProperty:
domain e range

4. Linguagens e ferramentas de representação

Vocabulário OWL

```
<rdfs:subClassOf>
  <owl:Class rdf:ID="Felino"/>
</rdfs:subClassOf>
<rdfs:subClassOf>
  <owl:Restriction>
    <owl:cardinality
rdf:datatype="http://www.w3.org/2001/XMLSchema#int">
      4
    </owl:cardinality>
    <owl:onProperty>
      <owl:DatatypeProperty
rdf:ID="temNumeroDePatas"/>
    </owl:onProperty>
  </owl:Restriction>
</rdfs:subClassOf>
</owl:Class>
```

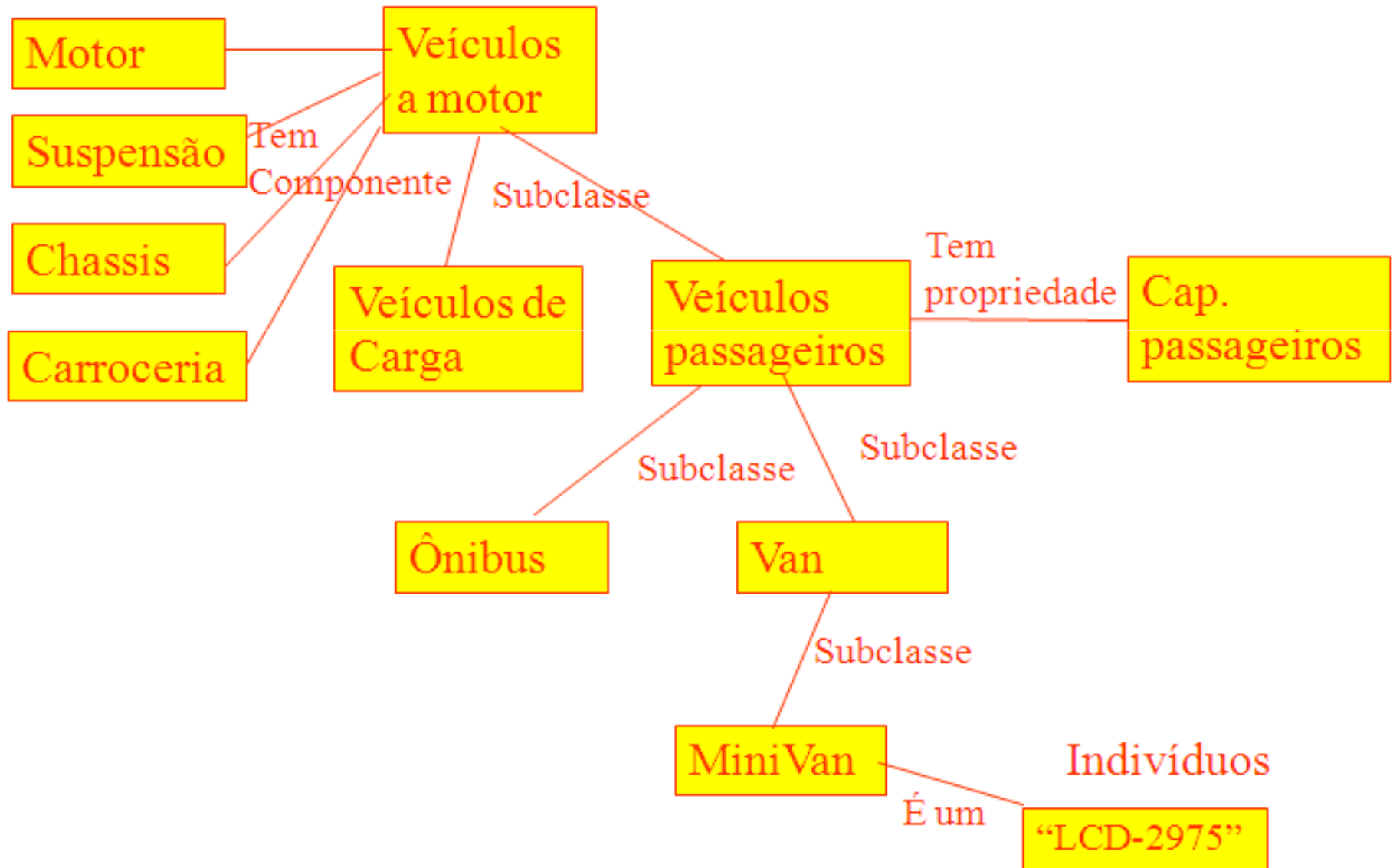
Cardinalidade

cardinality poderia ser substituído por:

minCardinality, maxCardinality, someValuesFrom, allValuesFrom

011000111000110101000101100010111010010110010100111110101010100

Um modelo de ontologia



Veículos Protégé 3.3.1 (file:V:\Arquivos%20de%20programas\Protege_3.3.1\Veículos.pprj, OWL / RDF Files)

File Edit Project OWL Code Tools Window Help

protégé

Metadata (Ontology1286908628.owl) OWLClasses Properties Individuals Forms

SUBCLASS EXPLORER

For Project: ● Veículos

Asserted Hierarchy

- owl:Thing
 - Componentes
 - Veículos_a_Motor
 - Veículos_de_Carga
 - Veículos_de_Passageiros**
 - Onibus
 - Van
 - MiniVan

CLASS EDITOR

For Class: ● Veículos_de_Passageiros (instance of rdfs:Class) ☐ Inferred View

Property	Value
rdfs:comment	

rdfs:subClassOf

- Veículos_a_Motor

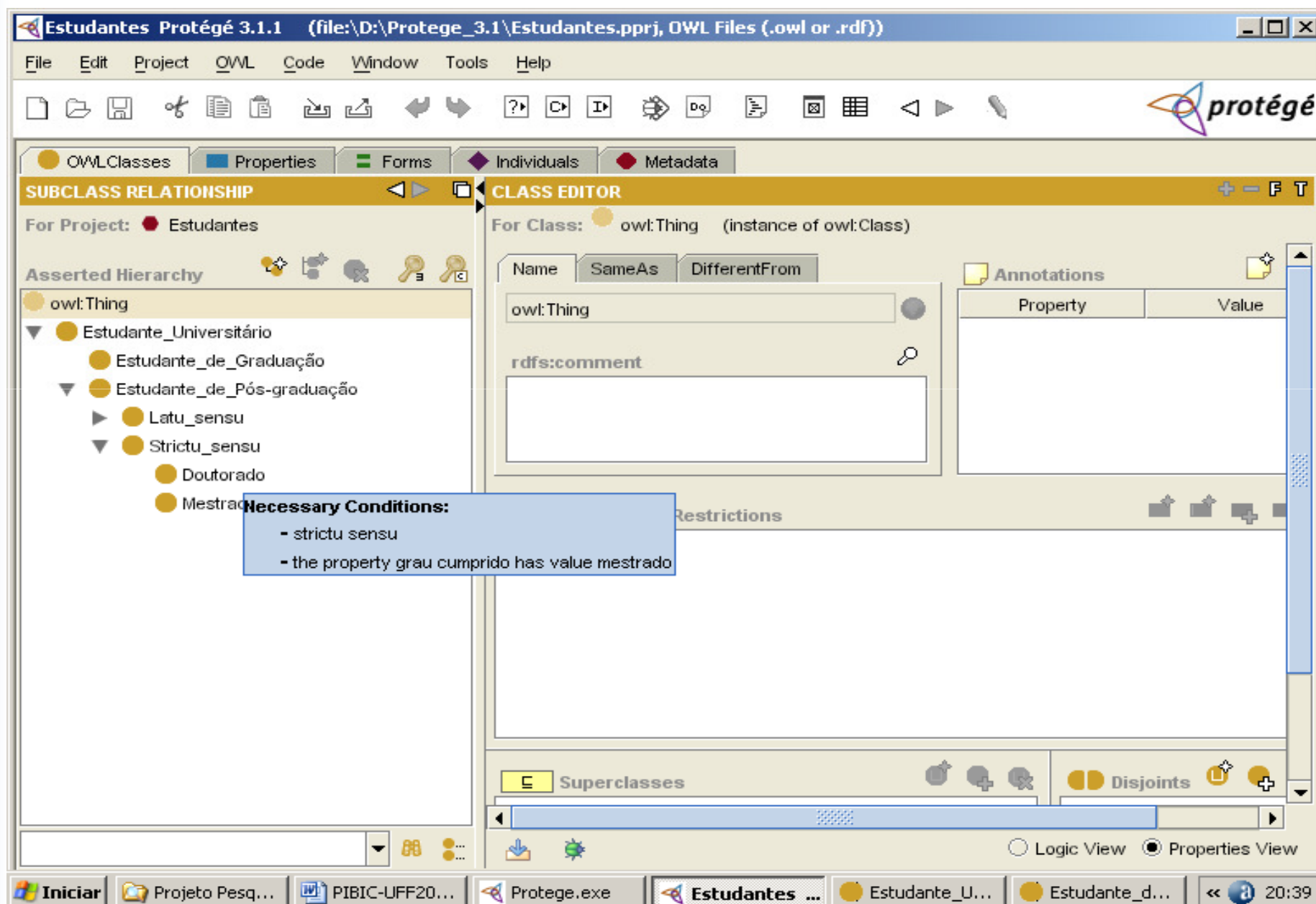
Properties

Property	Cardinality	Type
Capacidade_de_Pas...	Multiple	string
Tem_Componente ←...	Multiple	Componente

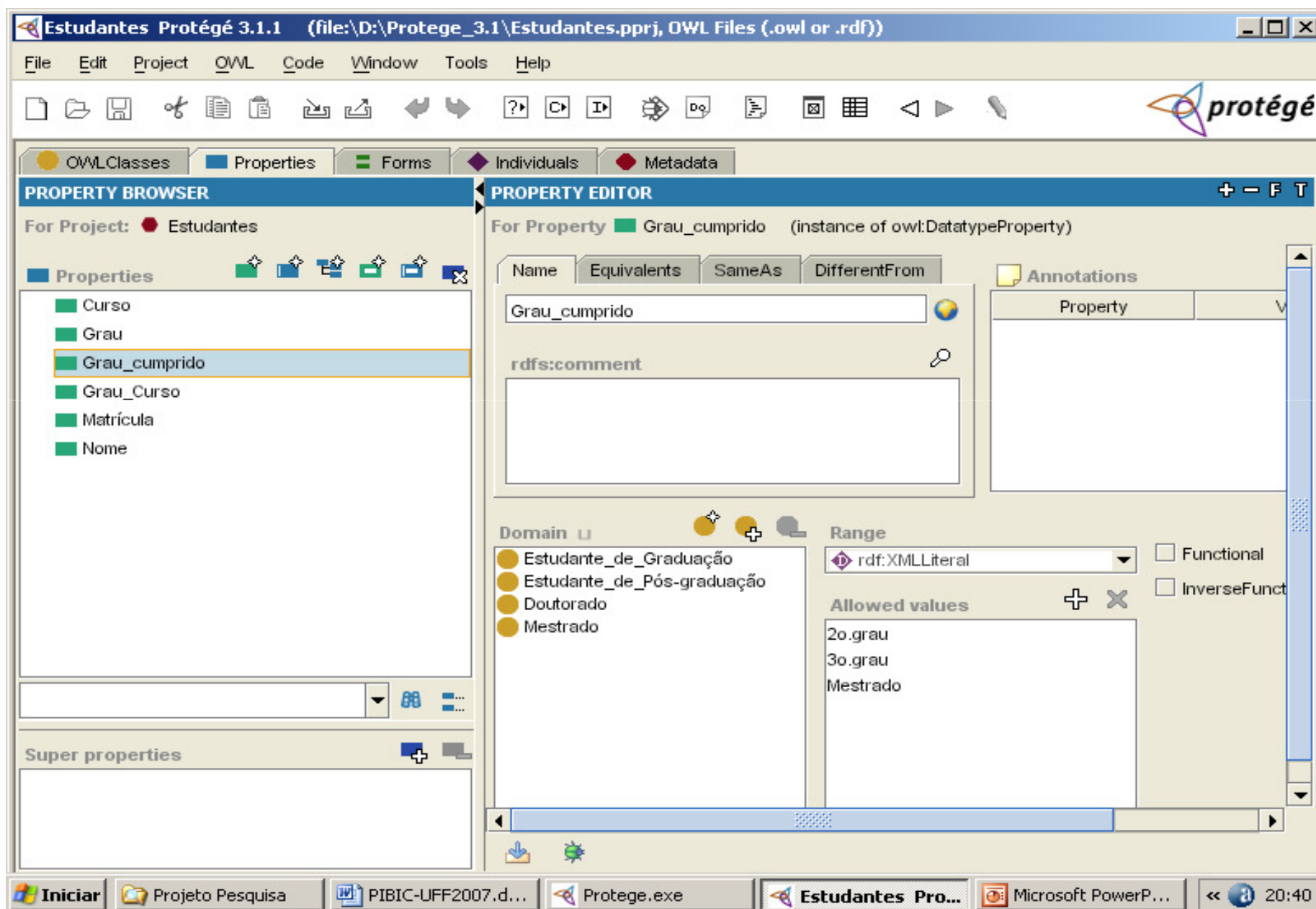

```
<?xml version="1.0"?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:p1="http://www.owl-ontologies.com/assert.owl#"
  xmlns="http://www.owl-ontologies.com/Ontology1286908628.owl#" xml:base="http://www.owl-ontologies.com/Ontology1286908628.owl" > |
  <rdf:Description rdf:about="">
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Ontology"/>
  </rdf:Description>
  <rdf:Description rdf:about="#Veiculos_a_Motor">
    <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
  </rdf:Description>
  <rdf:Description rdf:about="#Veiculos_de_Carga">
    <rdfs:subClassOf rdf:resource="#Veiculos_a_Motor"/>
    <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
  </rdf:Description>
  <rdf:Description rdf:about="#Veiculos_de_Passageiros">
    <rdfs:subClassOf rdf:resource="#Veiculos_a_Motor"/>
    <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
  </rdf:Description>
  <rdf:Description rdf:about="#Onibus">
    <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
    <rdfs:subClassOf rdf:resource="#Veiculos_de_Passageiros"/>
  </rdf:Description>
  <rdf:Description rdf:about="#Van">
    <rdfs:subClassOf rdf:resource="#Veiculos_de_Passageiros"/>
    <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
  </rdf:Description>
  <rdf:Description rdf:about="#Minivan">
    <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
    <rdfs:subClassOf rdf:resource="#Van"/>
  </rdf:Description>
  <rdf:Description rdf:about="#Minivan_LCD_2089">
    <rdf:type rdf:resource="#Minivan"/>
  </rdf:Description>
  <rdf:Description rdf:about="#Capacidade_de_Passageiros">
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
    <rdfs:domain rdf:resource="#Veiculos_de_Passageiros"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  </rdf:Description>
  <rdf:Description rdf:about="#Tem_Componente">
    <rdfs:domain rdf:resource="#Veiculos_a_Motor"/>
    <owl:inverseOf rdf:resource="#E_Componente"/>
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#ObjectProperty"/>
    <rdfs:range rdf:resource="#Componentes"/>
  </rdf:Description>
  <rdf:Description rdf:about="#E_Componente">
    <rdfs:domain rdf:resource="#Componentes"/>
    <owl:inverseOf rdf:resource="#Tem_Componente"/>
  </rdf:Description>

```

4. Linguagens e ferramentas de representação



4. Linguagens e ferramentas de representação



4. Linguagens e ferramentas de representação

```
Estudantes - Bloco de notas
Arquivo  Editar  Formatar  Exibir  Ajuda

<owl:Class rdf:ID="Estudante_de_Graduação">
  <rdfs:subClassof rdf:resource="#Estudante_Universitário"/>
  <rdfs:subClassof>
    <owl:Restriction>
      <owl:onProperty>
        <owl:DatatypeProperty rdf:about="#Grau_cumprido"/>
      </owl:onProperty>
      <owl:hasvalue rdf:datatype="http://www.w3.org/2001/XMLSchema#int">2</owl:hasvalue>
    </owl:Restriction>
  </rdfs:subClassof>
</owl:Class>
<owl:Class rdf:ID="Aperfeiçoamento">
  <rdfs:subClassof rdf:resource="#Latu_sensu"/>
</owl:Class>
<owl:Class rdf:ID="Doutorado">
  <rdfs:subClassof>
    <owl:Restriction>
      <owl:hasvalue rdf:resource="#Mestrado"/>
      <owl:onProperty>
        <owl:DatatypeProperty rdf:about="#Grau_cumprido"/>
      </owl:onProperty>
    </owl:Restriction>
  </rdfs:subClassof>
  <rdfs:subClassof rdf:resource="#Strictu_sensu"/>
</owl:Class>
<owl:ObjectProperty rdf:ID="ObjectProperty"/>
<owl:DatatypeProperty rdf:ID="Matricula"/>
<owl:DatatypeProperty rdf:ID="Curso"/>
<owl:DatatypeProperty rdf:ID="Grau"/>
<owl:DatatypeProperty rdf:ID="Grau_Curso">
  <owl:versionInfo rdf:datatype="http://www.w3.org/2001/XMLSchema#string"></owl:versionInfo>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:about="#Grau_cumprido">
  <rdfs:range>
    <owl:DataRange>
      <owl:oneOf rdf:parseType="Resource">
        <rdf:rest rdf:parseType="Resource">
          <rdf:first rdf:parseType="Literal">Segundo</rdf:first>
          <rdf:rest rdf:parseType="Resource">
            <rdf:rest rdf:parseType="Resource">
              <rdf:first rdf:parseType="Literal">Mestrado</rdf:first>
              <rdf:rest rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#nil"/>
            </rdf:rest>
            <rdf:first rdf:parseType="Literal">Doutorado</rdf:first>
          </rdf:rest>
          <rdf:rest>
            <rdf:first rdf:parseType="Literal">Terceiro</rdf:first>
          </rdf:rest>
        </owl:oneOf>
      </owl:DataRange>
    </rdfs:range>
  </owl:DatatypeProperty>
</owl:Class>
```

4. Linguagens e ferramentas de representação

Animais Protégé 3.4.8 (file:VC:\Documents%20and%20Settings\LMendes\Meus%20documentos\Ontologias\Animais.pprj, OWL / RDF Files)

File Edit Project OWL Reasoning Code Tools BioPortal Window Collaboration Help

protégé

Metadata(unnamed.owl) OWLClasses Properties Individuals Forms

SUBCLASS EXPLORER

For Project: Animais

Asserted Hierarchy

- owl:Thing
 - Animais
 - Mamiferos
 - Felinos
 - Gato
 - Jaguatirica
 - Leao
 - ParticaoDeValores
 - Perigo
 - Arriscado
 - Perigoso
 - Seguro

CLASS EDITOR for Felinos (instance of owl:Class)

For Class: <http://www.owl-ontologies.com/unnamed.owl/#Felinos>

☐ Inferred View

Annotations

Property	Value	Lang
rdfs:comment		

Asserted Conditions

NECESSARY & SUFFICIENT

NECESSARY

Mamiferos

Disjoints

Logic View Properties View

16:22

4. Linguagens e ferramentas de representação

Animais Protégé 3.4.8 (file:V:\Documents%20and%20Settings\L.Mendes\Meus%20documentos\Ontologias\Animais.pprj, OWL / RDF Files)

File Edit Project OWL Reasoning Code Tools BioPortal Window Collaboration Help

protégé

Metadata(unnamed.owl) OWLClasses Properties Individuals Forms

PROPERTY BROWSER

For Project: Animals

Object Datatype Annotation All

Object properties

temGrauDePerigo

PROPERTY EDITOR for temGrauDePerigo (instance of owl:FunctionalProperty, owl:ObjectProperty)

For Property: <http://www.owl-ontologies.com/unnamed.owl#temGrauDePerigo>

Property	Value	Lang
rdfs:comment		

Annotations

Domain Animals

Range Perigo

☒ Functional
☐ InverseFunctional
☐ Symmetric
☐ Transitive

Inverse

16:21

4. Linguagens e ferramentas de representação

Animais Protégé 3.4.8 (file:V:\Documents%20and%20Settings\L.Mendes\Meus%20documentos\Ontologias\Animais.pprj, OWL / RDF Files)

File Edit Project OWL Reasoning Code Tools BioPortal Window Collaboration Help

protégé

Metadata(unnamed.owl) OWLClasses Properties Individuals Forms

PROPERTY BROWSER

For Project: Animais

Object Datatype Annotation All

Datatype Properties

peso

PROPERTY EDITOR for peso (instance of owl:DatatypeProperty, owl:FunctionalProperty)

For Property: <http://www.owl-ontologies.com/unnamed.owl#peso>

Property	Value	Lang
rdfs:comment		

Domain

- Gato
- Jaguatirica
- Leao

Range

string

☒ Functional

Allowed values

- 3 kg
- 20 kg
- 250 kg

Windows taskbar: Iniciar, FUNDAMENTOS CO..., SISTEMAS DE REPR..., Animais.owl - Googl..., C:\Documents and ..., Protege.exe, Animais Protégé 3..., PT, 16:35

4. Linguagens e ferramentas de representação

Animais Protégé 3.4.8 (file:IC:\Documents%20and%20Settings\L.Mendes\Meus%20documentos\Ontologias\Animais.pprj, OWL / RDF Files)

File Edit Project OWL Reasoning Code Tools BioPortal Window Collaboration Help

protégé

SUBCLASS EXPLORER

For Project: Animais

Asserted Hierarchy

- owl:Thing
 - Animais
 - Mamíferos
 - Felinos
 - Gato**
 - Jaguaritica
 - Leao
 - ParticaoDeValores
 - Perigo
 - Arriscado
 - Perigoso
 - Seguro

CLASS EDITOR for Gato (instance of owl:Class)

For Class: <http://www.owl-ontologies.com/Unnamed.owl#Gato>

Annotations

Property	Value	Lang
rdfs:comment		

Asserted Conditions

NECESSARY & SUFFICIENT

NECESSARY

- Felinos
- temGrauDePerigo some Seguro

Disjoints

Logic View Properties View

FUNDAMENTOS COGNITIVOS, TEORICOS E METODOLOGICOS DA ORGANIZAÇÃO DO CONHECIMENTO

Windows Taskbar: Iniciar, FUNDAMENTOS COG..., SISTEMAS DE REPRE..., Herre, H., Heller, B.,..., D:\Apresentações, Protege.exe, Animais Protégé 3.4..., PT, 16:17

4. Linguagens e ferramentas de representação

Animais Protégé 3.4.8 (file:VC:\Documents%20and%20Settings\L.Mendes\Meus%20documentos\Ontologias\Animais.pprj, OWL / RDF Files)

File Edit Project OWL Reasoning Code Tools BioPortal Window Collaboration Help

protégé

Metadata(unnamed.owl) OWLClasses Properties Individuals Forms

SUBCLASS EXPLORER

For Project: Animais

Asserted Hierarchy

- owl:Thing
 - Animais
 - Mamíferos
 - Felinos
 - Gato
 - Jaguaririca
 - Leao
 - ParticaoDeValores
 - Perigo
 - Arriscado
 - Perigoso
 - Seguro

CLASS EDITOR for Jaguaririca (instance of owl:Class)

For Class: http://www.owl-ontologies.com/unnamed.owl#Jaguaririca

Property Value Lang

rdfs:comment		
--------------	--	--

Annotations

Asserted Conditions

NECESSARY & SUFFICIENT

NECESSARY

- Felinos
- temGrauDePerigo some Arriscado

Disjoints

Logic View Properties View

SISTEMAS DE REPRESENTAÇÃO E ORGANIZAÇÃO DO CONHECIMENTO.pptx

Windows taskbar: Iniciar, FUNDAMENTOS..., SISTEMAS DE R..., USP-Aula Inaug..., Herre, H., Helle..., D:\Apresentações, Protege.exe, Animais Protég..., PT, 16:15

00110001110001101010001011000101110100101100101001111101010100



011000111000110101000101100010111010010110010100111110101010100



4. Linguagens e ferramentas de representação

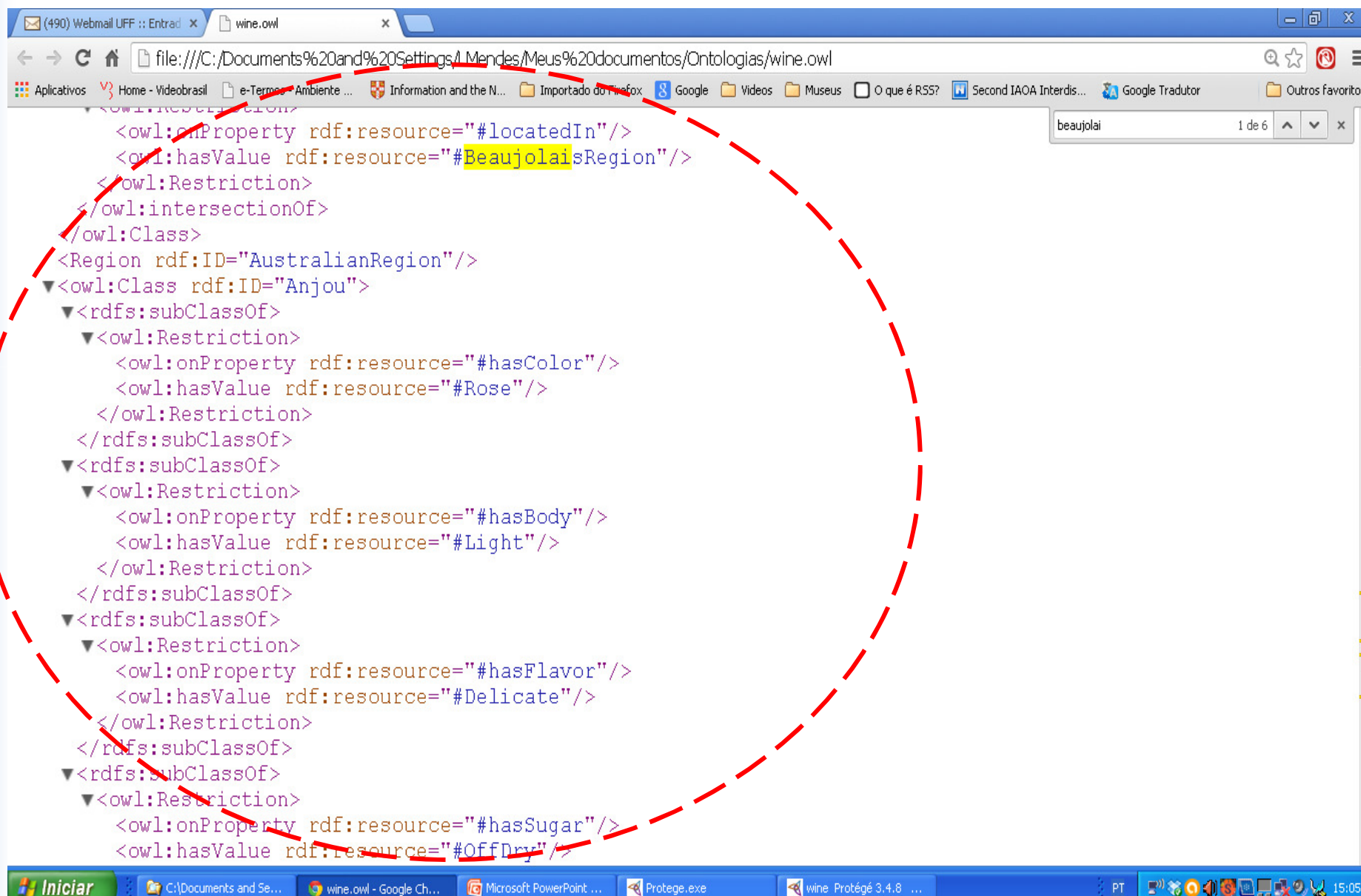
The screenshot displays the Protégé 3.4.8 interface for editing the 'wine' ontology. The window title is 'wine Protégé 3.4.8 (file: \\C:\\Documents%20and%20Settings\\LMendes\\Meus%20documentos\\Ontologias\\wine.pprj, OWL / RDF Files)'. The menu bar includes File, Edit, Project, OWL, Reasoning, Code, Tools, BioPortal, Window, Collaboration, and Help. The toolbar contains icons for file operations, reasoning, and navigation.

The interface is divided into several panes:

- SUBCLASS EXPLORER:** Shows the hierarchy of classes. The 'vin:Wine' class is expanded, showing subclasses like 'vin:AlsatianWine', 'vin:AmericanWine', 'vin:Beaujolais', 'vin:Bordeaux', 'vin:Burgundy', 'vin:CabernetFranc', 'vin:CabernetSauvignon', 'vin:CaliforniaWine', 'vin:Chardonnay', 'vin:CheninBlanc', 'vin:DessertWine', 'vin:DryWine', 'vin:EarlyHarvest', 'vin:FrenchWine', 'vin:FullBodiedWine', 'vin:Gamay', 'vin:GermanWine', 'vin:ItalianWine', 'vin:LateHarvest', 'vin:Loire', 'vin:Meritage', 'vin:Merlot', 'vin:PetiteSyrah', 'vin:PinotBlanc', and 'vin:PinotNoir'. The 'vin:Beaujolais' class is highlighted.
- CLASS EDITOR for vin:Beaujolais (instance of owl:Class):** Shows the class definition. The 'For Class' field is set to 'http://krono.act.uji.es/Links/ontologies/wine.owl#Beaujolais'. The 'Inferred View' checkbox is checked. The 'Annotations' table is empty. The 'Asserted Conditions' section shows the following conditions:
 - vin:Wine
 - vin:locatedIn **has** vin:BeaujolaisRegion
 - vin:hasBody **has** vin:Light
 - vin:hasColor **has** vin:Red
 - vin:hasFlavor **has** vin:Delicate
 - vin:hasSugar **has** vin:Dry
 - vin:madeFromGrape **has** vin:GamayGrape
 - vin:madeFromGrape **max** 1
 - vin:hasBody **exactly** 1 [from vin:Wine]
 - vin:hasBody **exactly** 1 [from vin:Wine]
- Disjoints:** The 'Disjoints' section is empty.

The status bar at the bottom shows 'Logic View' and 'Properties View' buttons. The taskbar at the bottom displays the Windows taskbar with the 'Iniciar' button and several open applications: '2 Windows ...', '(490) Webma...', 'Microsoft Pow...', 'Protege.exe', and 'wine Protégé...'. The system clock shows '14:59'.

4. Linguagens e ferramentas de representação



The screenshot shows a web browser window with the address bar displaying the file path: `file:///C:/Documents%20and%20Settings/Mendes/Meus%20documentos/Ontologias/wine.owl`. The browser's address bar also shows the text "beaujolais" and "1 de 6". The main content area displays the XML code of the ontology, which is partially highlighted by a red dashed circle. The XML code includes the following elements:

```
<owl:Restriction>
  <owl:onProperty rdf:resource="#locatedIn"/>
  <owl:hasValue rdf:resource="#BeaujolaisRegion"/>
</owl:Restriction>
</owl:intersectionOf>
</owl:Class>
<Region rdf:ID="AustralianRegion"/>
<owl:Class rdf:ID="Anjou">
  <rdfs:subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#hasColor"/>
      <owl:hasValue rdf:resource="#Rose"/>
    </owl:Restriction>
  </rdfs:subClassOf>
  <rdfs:subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#hasBody"/>
      <owl:hasValue rdf:resource="#Light"/>
    </owl:Restriction>
  </rdfs:subClassOf>
  <rdfs:subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#hasFlavor"/>
      <owl:hasValue rdf:resource="#Delicate"/>
    </owl:Restriction>
  </rdfs:subClassOf>
  <rdfs:subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#hasSugar"/>
      <owl:hasValue rdf:resource="#OffDry"/>
    </owl:Restriction>
  </rdfs:subClassOf>
</owl:Class>
```

The taskbar at the bottom of the screen shows the following applications: "Iniciar", "C:\Documents and Se...", "wine.owl - Google Ch...", "Microsoft PowerPoint ...", "Protege.exe", "wine Protégé 3.4.8 ...", and "PT". The system clock in the bottom right corner indicates the time is 15:05.

4. Linguagens e ferramentas de representação

The screenshot displays the Protege ontology editor interface. The title bar indicates the file is 'untitled-ontology-5' located at 'C:\Documents and Settings\Meus documentos\Ontologias\Tesauro.owl'. The menu bar includes File, Edit, View, Reasoner, Tools, Refactor, Window, and Help. The main workspace is divided into several panels:

- Class hierarchy:** Shows a tree structure starting with 'Thing'. Under 'Thing', there are two main branches: 'Atividades' and 'Objetos'. 'Atividades' includes 'Agricultura' and 'Pesca'. 'Pesca' includes 'Instrumentos', which further branches into 'Instrumentos_agriculas' and 'Instrumentos_de_pesca'. 'Instrumentos_de_pesca' includes 'Anzois' and 'Rede'. 'Objetos' includes 'Cultivares' and 'Peixes'. 'Peixes' includes 'Atum' and 'Sardinha'.
- Annotations:** A panel for adding annotations to the selected class.
- Usage:** A panel for viewing the usage of the selected class.
- Description:** A panel for adding logical axioms to the class. It includes buttons for 'Equivalent To', 'Sub Class Of', 'Sub Class Of (Anonymous Ancestor)', 'Members', 'Target for Key', 'Disjoint With', and 'Disjoint Union Of'.

The bottom status bar shows 'No Reasoner set. Select a reasoner from the Reasoner menu' and a checkbox for 'Show Inferences'. The Windows taskbar at the bottom shows the 'Iniciar' button and several open applications: Microsoft PowerPoint, a web browser (http://webmail.uff.br...), 'Meus documentos', 'Protege.exe', and the current 'untitled-ontology-5' window. The system clock shows 10:00.

4. Linguagens e ferramentas de representação

untitled-ontology-5 (http://www.semanticweb.org/ontologies/2014/4/untitled-ontology-5) : [C:\Documents and Settings\LMendes\Meus documentos\Ontologias\Tesauro.owl]

File Edit View Reasoner Tools Refactor Window Help

untitled-ontology-5 (http://www.semanticweb.org/ontologies/2014/4/untitled-ontology-5) Search for entity

Active Ontology Entities Classes Object Properties Data Properties Individuals DL Query

Object property hierarchy: É-objeto_da_pesca

- topObjectProperty
 - Termo_relacionado
 - É-objeto
 - É-objeto_da_abricao
 - É-objeto_da_pesca
 - É-instrumento
 - É-instrumento_agrícula
 - É-instrumento_de_pesca

Annotations Usage

Annotations: É-objeto_da_pesca

Annotations +

Characteristics: É-objeto

- ☐ Functional
- ☐ Inverse functional
- ☐ Transitive
- ☐ Symmetric
- ☐ Asymmetric
- ☐ Reflexive
- ☐ Irreflexive

Description: É-objeto_da_pesca

Equivalent To +

SubProperty Of +

- É-objeto

Inverse Of +

Domains (intersection) +

- Peixes

Ranges (intersection) +

- Pesca

Disjoint With +

SuperProperty Of (Chain) +

No Reasoner set. Select a reasoner from the Reasoner menu ☒ Show Inferences

Windows: Iniciar, Microsoft PowerPoint ..., http://webmail.uff.br..., Meus documentos, Protege.exe, untitled-ontology-5 (...), PT, 10:01

4. Linguagens e ferramentas de representação

untitled-ontology-5 (http://www.semanticweb.org/ontologies/2014/4/untitled-ontology-5) : [C:\Documents and Settings\L.Mendes\Meus documentos\Ontologias\Tesauro.owl]

File Edit View Reasoner Tools Refactor Window Help

untitled-ontology-5 (http://www.semanticweb.org/ontologies/2014/4/untitled-ontology-5) Search for entity

Active Ontology Entities Classes Object Properties Data Properties Individuals DL Query

Object property hierarchy: É_instrumento_de_pesca

- topObjectProperty
 - Termo_relacionado
 - É-objeto
 - É-objeto_da_abricultura
 - É-objeto_da_pesca
 - É-instrumento
 - É-instrumento_agrícula
 - É_instrumento_de_pesca

Annotations Usage

Annotations: É_instrumento_de_pesca

Annotations +

Characteristics: É_insti

- ☐ Functional
- ☐ Inverse functional
- ☐ Transitive
- ☐ Symmetric
- ☐ Asymmetric
- ☐ Reflexive
- ☐ Irreflexive

Description: É_instrumento_de_pesca

Equivalent To +

SubProperty Of +

- É-instrumento

Inverse Of +

Domains (intersection) +

- Instrumentos_de_pesca

Ranges (intersection) +

- Pesca

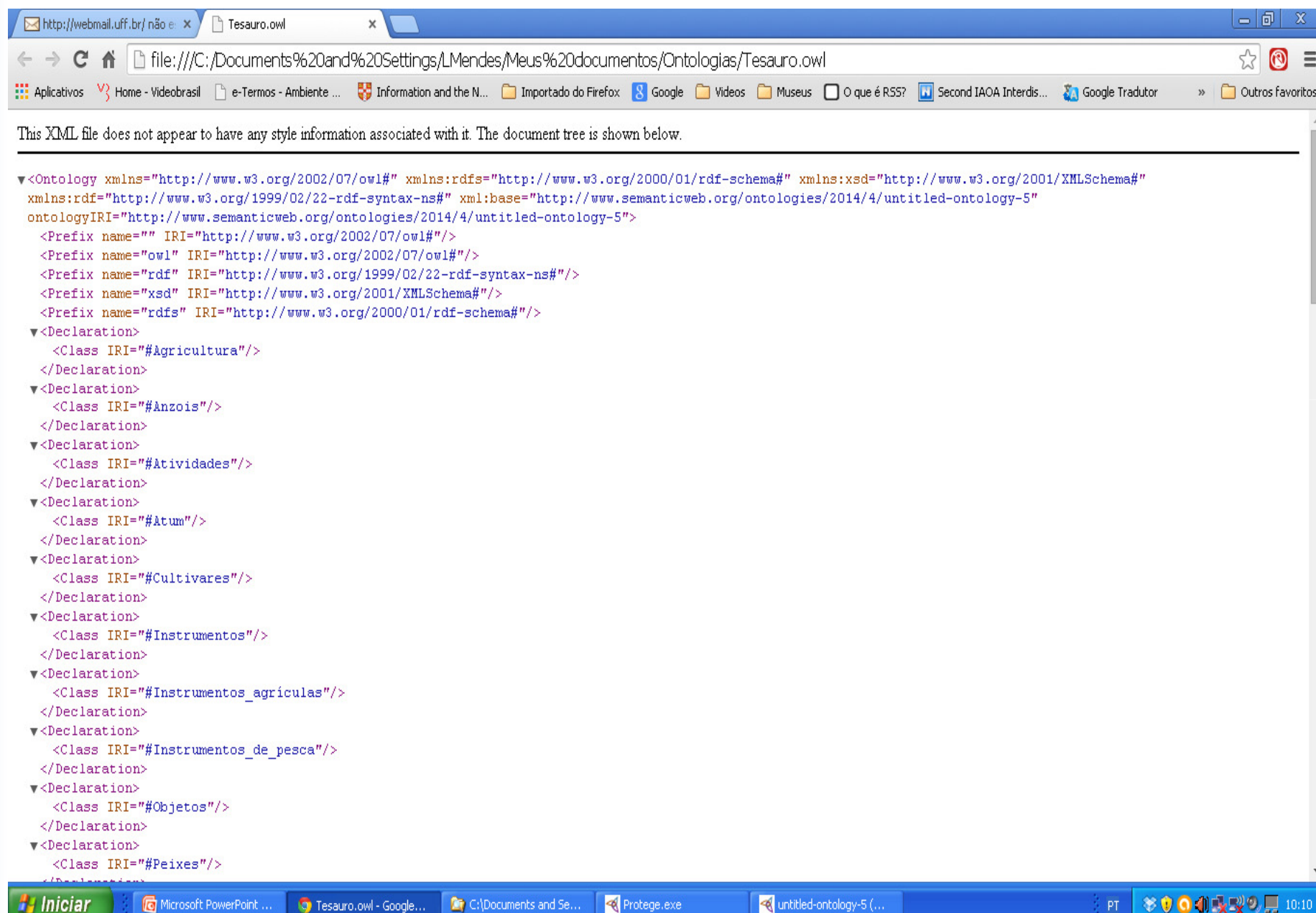
Disjoint With +

SuperProperty Of (Chain) +

No Reasoner set. Select a reasoner from the Reasoner menu ☒ Show Inferences

Windows: Iniciar, Microsoft PowerPoint ..., http://webmail.uff.br..., Meus documentos, Protege.exe, untitled-ontology-5 (...), PT, 10:02

4. Linguagens e ferramentas de representação



The screenshot shows a web browser window with the address bar displaying the file path: `file:///C:/Documents%20and%20Settings/LMendes/Meus%20documentos/Ontologias/Tesouro.owl`. The browser's address bar also shows the page title "Tesouro.owl". The browser's toolbar includes various icons for navigation and search, and the address bar shows the file path.

The main content area displays the following message: "This XML file does not appear to have any style information associated with it. The document tree is shown below."

The XML document tree is shown below:

```
<?xml version="1.0" encoding="UTF-8" ?>
<Ontology xmlns="http://www.w3.org/2002/07/owl#" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#" xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xml:base="http://www.semanticweb.org/ontologies/2014/4/untitled-ontology-5"
ontologyIRI="http://www.semanticweb.org/ontologies/2014/4/untitled-ontology-5">
  <Prefix name="" IRI="http://www.w3.org/2002/07/owl#" />
  <Prefix name="owl" IRI="http://www.w3.org/2002/07/owl#" />
  <Prefix name="rdf" IRI="http://www.w3.org/1999/02/22-rdf-syntax-ns#" />
  <Prefix name="xsd" IRI="http://www.w3.org/2001/XMLSchema#" />
  <Prefix name="rdfs" IRI="http://www.w3.org/2000/01/rdf-schema#" />
  <Declaration>
    <Class IRI="#Agricultura" />
  </Declaration>
  <Declaration>
    <Class IRI="#Anzois" />
  </Declaration>
  <Declaration>
    <Class IRI="#Atividades" />
  </Declaration>
  <Declaration>
    <Class IRI="#Atum" />
  </Declaration>
  <Declaration>
    <Class IRI="#Cultivares" />
  </Declaration>
  <Declaration>
    <Class IRI="#Instrumentos" />
  </Declaration>
  <Declaration>
    <Class IRI="#Instrumentos_agriculas" />
  </Declaration>
  <Declaration>
    <Class IRI="#Instrumentos_de_pesca" />
  </Declaration>
  <Declaration>
    <Class IRI="#Objetos" />
  </Declaration>
  <Declaration>
    <Class IRI="#Peixes" />
  </Declaration>
</Ontology>
```

The taskbar at the bottom shows the following applications: Iniciar, Microsoft PowerPoint..., Tesouro.owl - Google..., C:\Documents and Se..., Protege.exe, untitled-ontology-5 (...), PT, and a system clock showing 10:10.

4. Linguagens e ferramentas de representação

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