

Multimedia Database and Design in Heterogeneous Environment

Myriam Lamolle

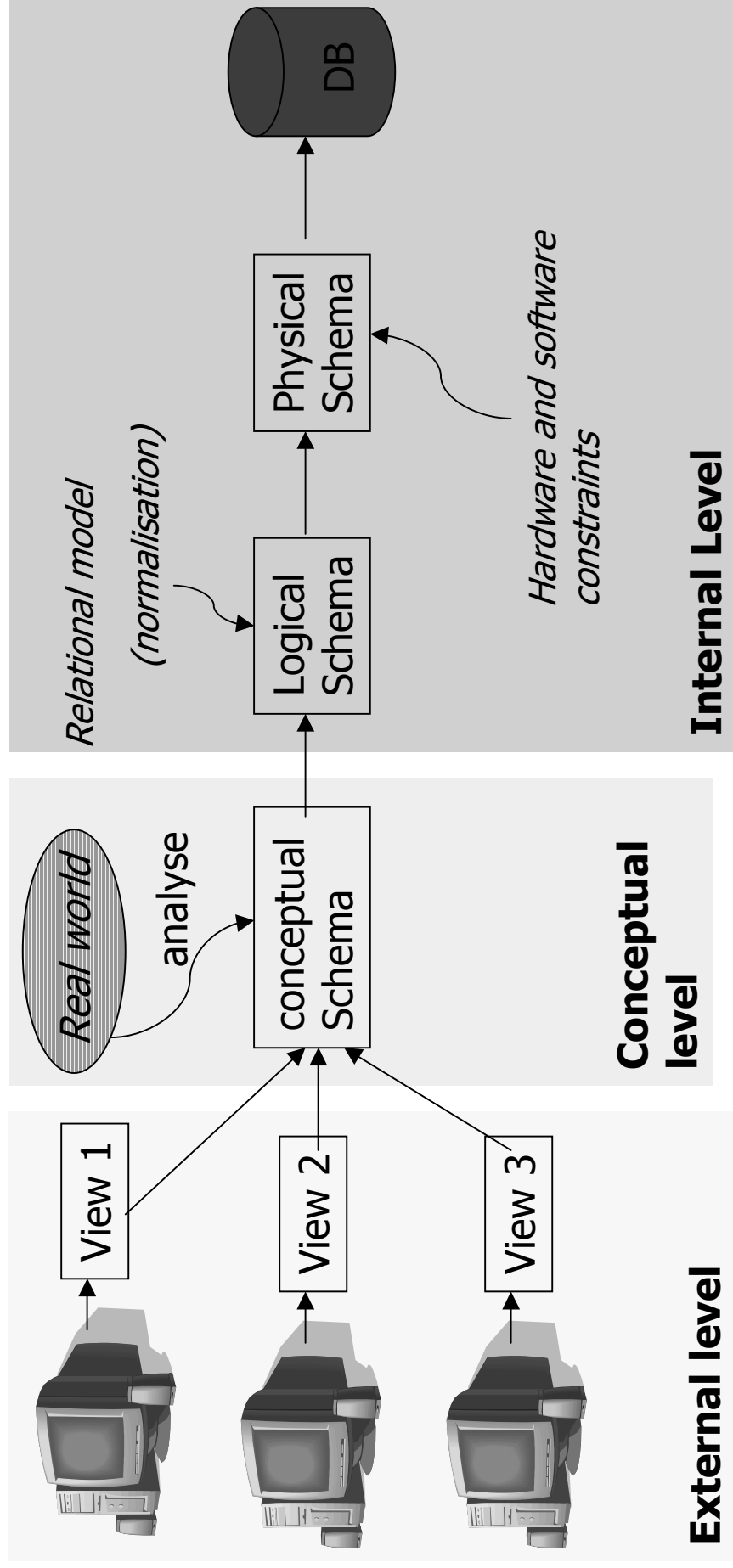
LINC / University Paris8

Email : m.lamolle@iut.univ-paris8.fr

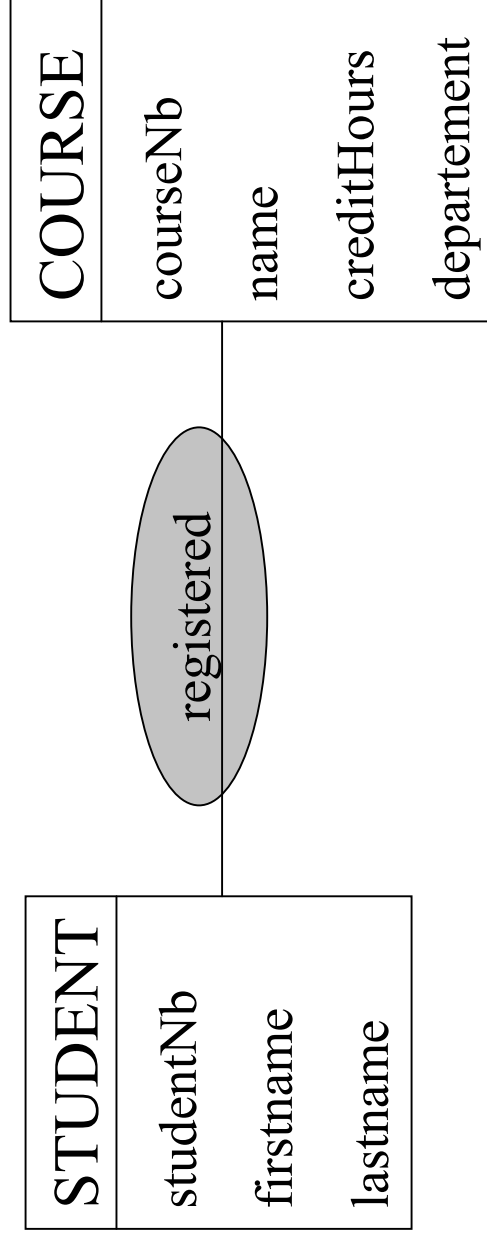
- Database
 - Properties, Data models, schemas and instance, architecture, etc.
 - Multimedia Database
 - XML
- Integration of heterogeneous data
 - Issues of heterogeneity
 - Mapping different formats XML
- Conclusion and perspective

- Data is persistent
- Data can be shared
- Redundancy can be reduced
- Inconsistency can be avoid
- Integrity is maintained by the use of integrity constraints
- Transaction (logical unit of work)

- Three main categories of data models :
 - *External level*: different views of data
 - *Conceptual level*: High-level or conceptual data models (based on entities and relationships)
 - *Internal level*:
 - Representational or implementation data models (record-based, object-oriented, etc.)
 - Low-level or physical data models



- Example of schema

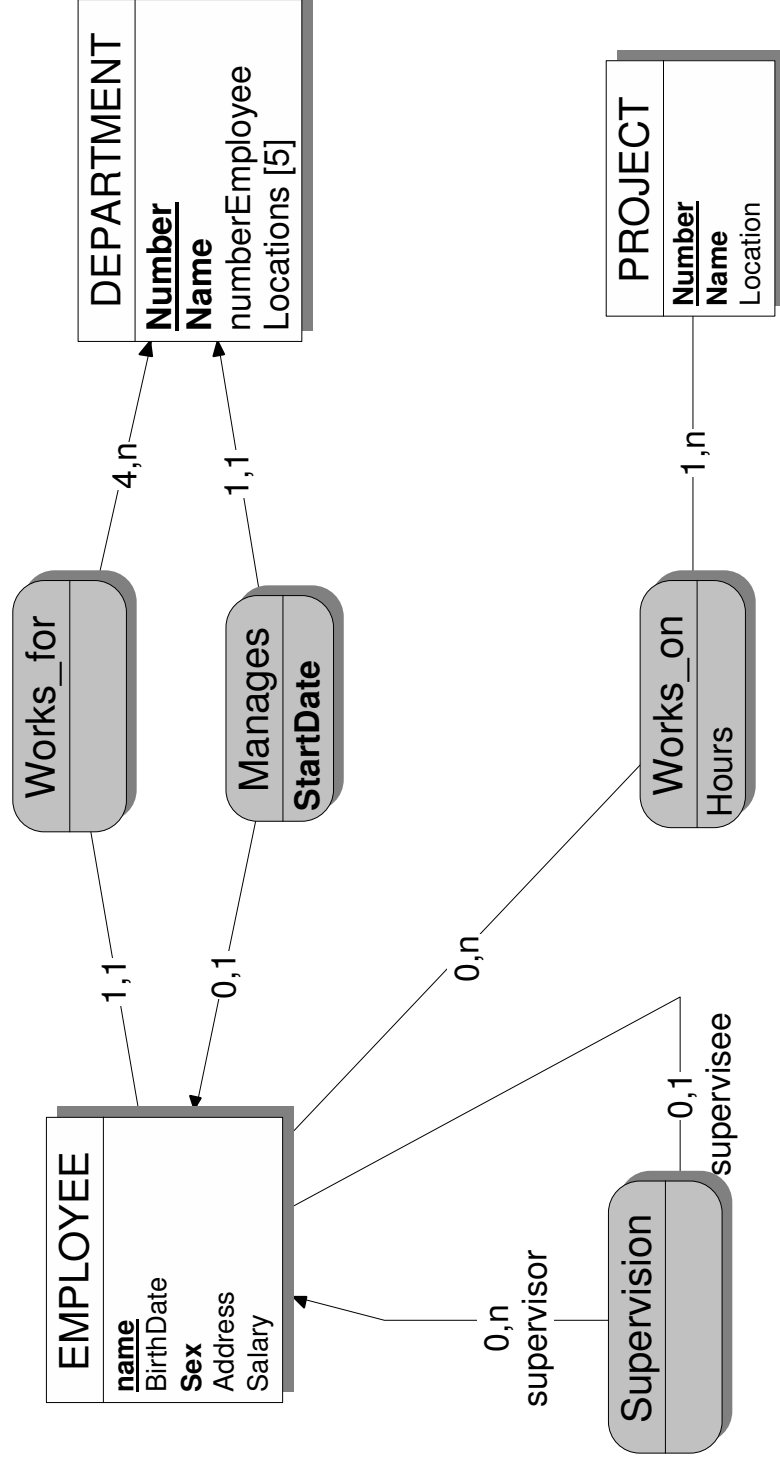


- Example of instances

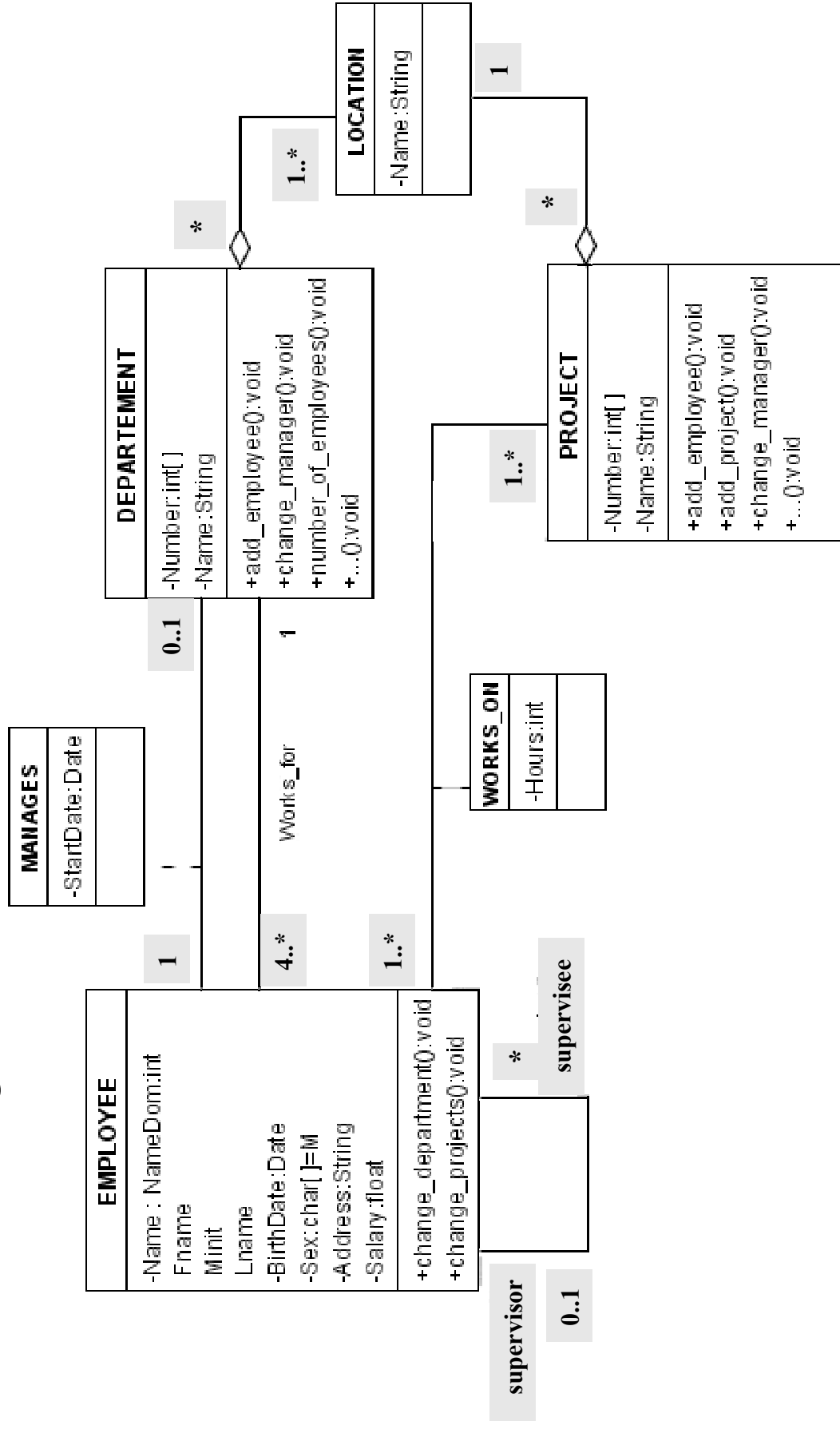
STUDENT = {(1, 'John', 'Smith'), (2, 'Jane', 'Brown'), ...}

...

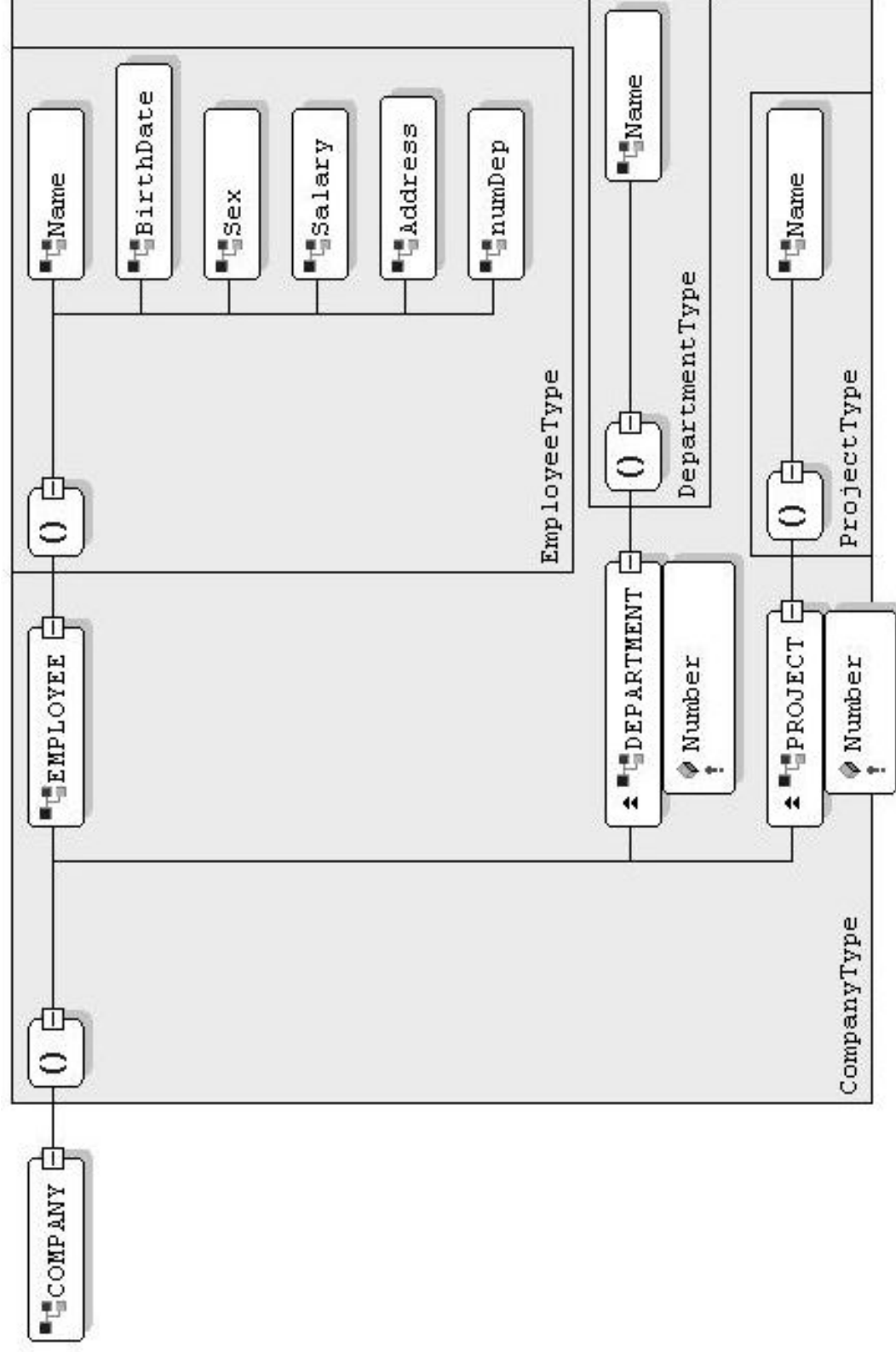
- Entity/Relation model



- UML diagram



- XML diagram



- What is different in case of multimedia DBs?
 - Conceptually \Rightarrow no change

In fact,

- Size (ex: 5' of video with 30 frames/sec \Rightarrow 54Gb)
- No temporal update
- Semantic nature of multimedia much more complex.

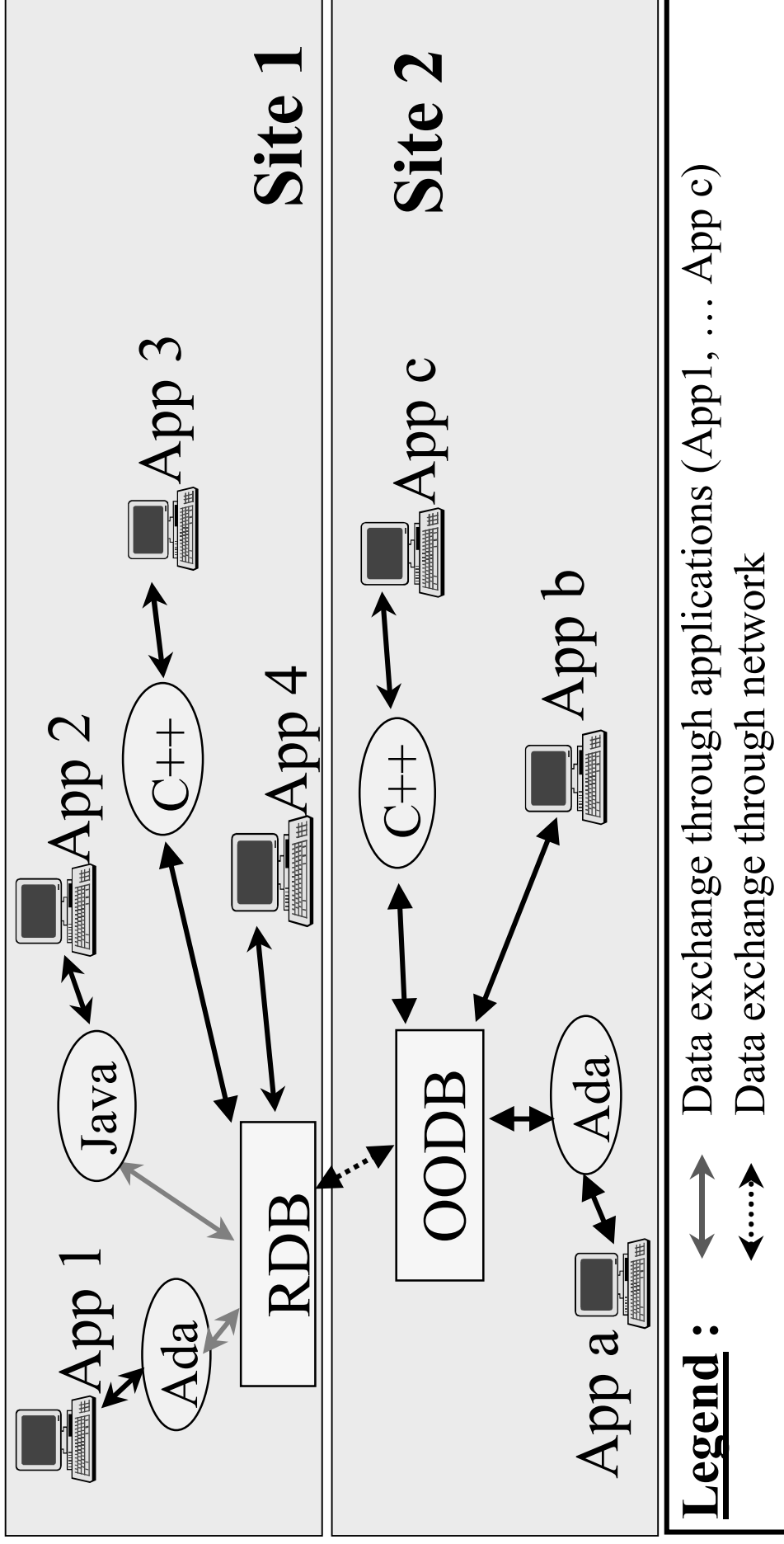
- Why is a problem?
 - Implicit semantic nature
 - Metadata can refer to information about individual objects
- Solutions by metadata (text descriptions)
 - Texture (color informations) for images
 - Frequencies for audio
 - Font size for text
 - Motion direction and lighting for video
 - Speech-keyword (e.g. identification of speakers, place, time)
 - And so on
- Generation of metadata is costly!
- Searching, updating, deleting?
- Standards : MPEG-7, MPEG-21 (work-in progress)...

- Tools for annotation : ANVIL, TASN, etc.
- ANVIL => 2 XML files : one for specification of annotations, one for annotation (so, XML DB)
- Searching by XML Query Language (XQL)

- **Internal level**
 - Type de data (depending on DBMS)
- **External level**
 - Different applications for different uses
- **Conceptual level**
 - Different modelling tools (Entity/Relation, UML, etc.)
 - Definition of more or less complex concepts about a same domain
 - Different definitions for a same concept

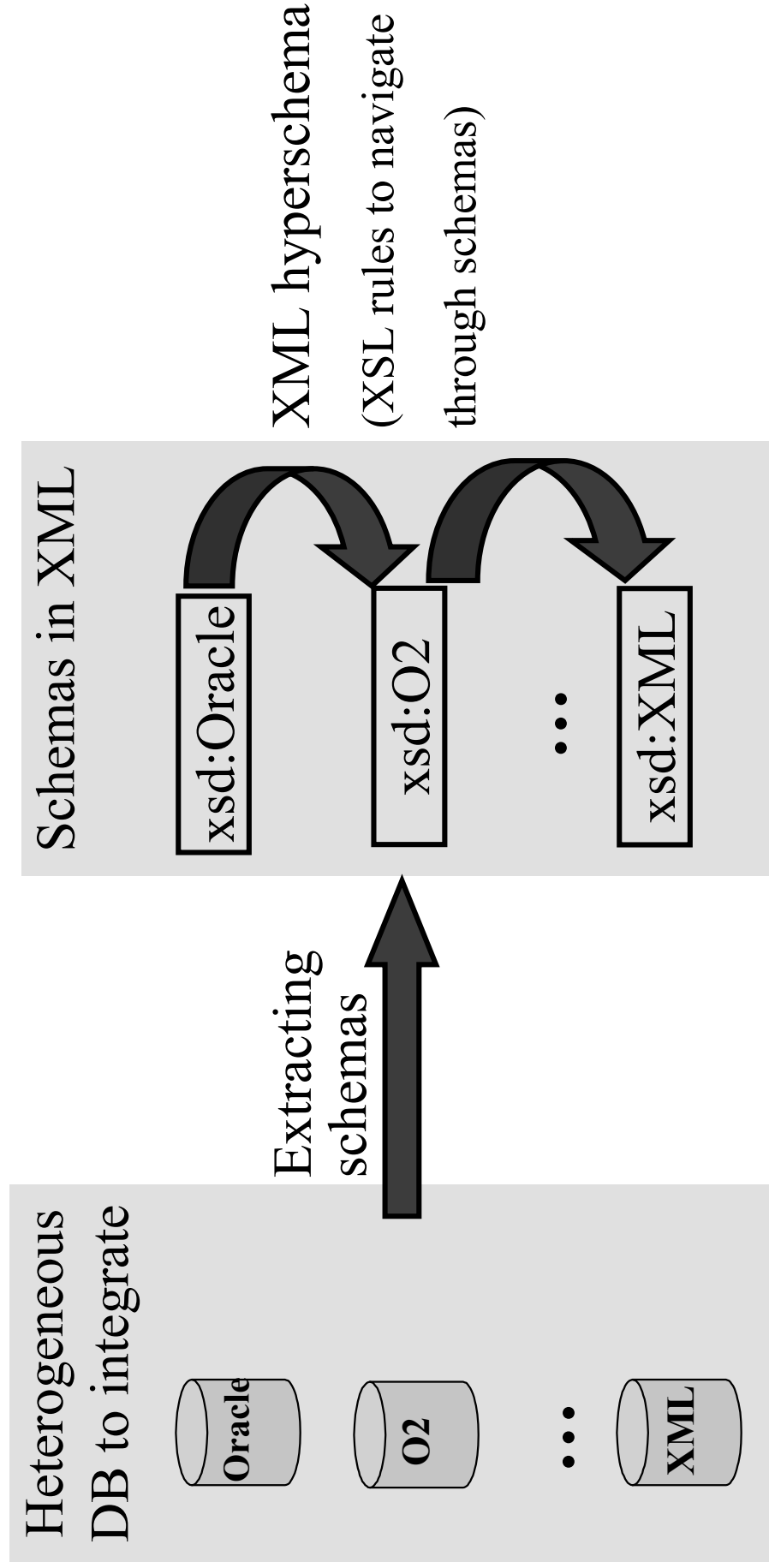
- Federation of database
 - Distributed DB with heterogeneous data, i.e. implementing in different DBMS, so different models of storage (files, networks, relational, objects, etc.)
- Interoperability of database
 - DB capable of exchanging data by understanding their semantics (schema)

Example



- Language of tags, easy to use
 - Unicity of representation for :
 - exchanges between DB (query language XQL)
 - schemas (Definition by DTD file or XSD file)
 - Parser XSLT to transform schemas
 - Transformation rules in XML
 - Genericity feasible

Integration via XML



- Map between two XML schemas
- XSL stylesheet = representation of a transformation from one model into another
- Using XSLT to process the transformation
- Example :
 - Multimodal Score (I. Poggi et al. - LREC-04)

Example Anvil : match(M1, M2)

Model M1

```

...
<valuetype-def>
<valueset name="movementType"/>
  <value-el>lexical</value-el>
  <value-el>emotional</value-el>
  <value-el>prosodic</value-el>
  <value-el>paralinguistic</value-el>
  <value-el>paralinguistic+linguistic</value-el>
  <value-el>linguistic</value-el>
  <value-el>other</value-el>
</valueset>
...
<body>
<group name="Head Movement Analysis">
  <track-spec name="Movement Type"
    type="primary" height="0.25">
    <attribute name="value" type="String" />
  </track-spec>
  ...
</group>
...
</body>
</annotation>

```

Model M2

```

...
<valuetype-def>
<valueset name="movimentoType"/>
  <value-el>lessicale</value-el>
  <value-el>emotivo</value-el>
  <value-el>prosodico</value-el>
  <value-el>paralinguistic</value-el>
  <value-el>paralinguistico+linguistico</value-el>
  <value-el>paralinguistico</value-el>
  <value-el>altro</value-el>
</valueset>
...
<body>
<group name="Analisi del movimento della testa">
  <track-spec name="Tipologia del movimento"
    type="primary" height="0.25">
    <attribute name="tipo" type="String" />
  </track-spec>
  ...
</group>
...
</body>
</annotation>

```

- XSL Match => semantic equality between elements

```

...
<xsl:template match="valueset/@name=movementType">
  <xsl:for-each match="value-el">
    <xsl:variable name=elem select="text()" />
    <xsl:choose>
      <xsl:when test="$elem='lexical' ">
        <value-el>lessicale</value-el>
      </xsl:when>
      <xsl:when test="$elem='emotional' ">
        <value-el>emotivo</value-el>
      </xsl:when>
      ...
      <xsl:otherwise>
        <value-el>altro</value-el>
      </xsl:otherwise>
    
```

...

- Common description of gestures
- But description of emotions too various
- Issues of emotional annotation?
- What sort of transcription rules do you wish?