Current Research Activities

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General overview

- Data integration applications
  - Ontology merging
  - Ontology-based query expansion
  - Ontology evolution

General overview

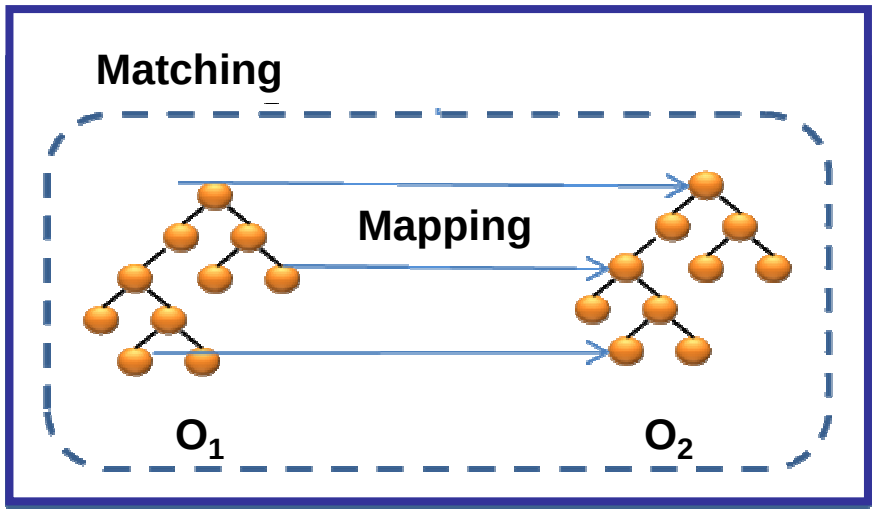
- Data integration applications
  - **Ontology merging**
  - Ontology-based query expansion
  - Ontology evolution

Ontology

- Ontologies tend to be put everywhere
- Using ontologies raises heterogeneity problems at a higher level
  - Ontology matching
  - Ontology merging

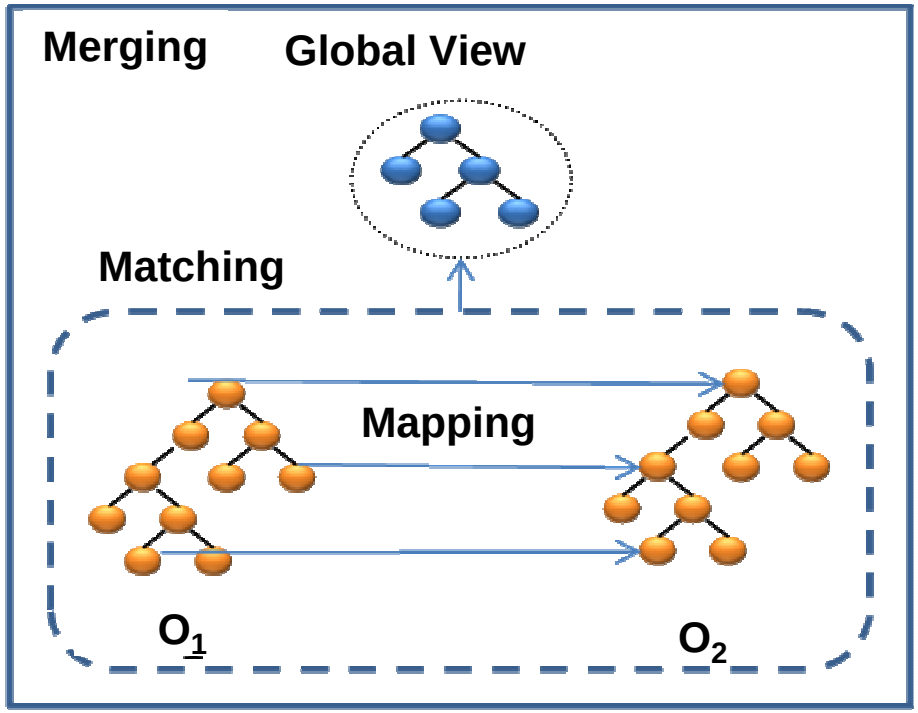
Ontology matching

- Ontology matching
  - It finds correspondences between semantically related entities of the ontologies



Ontology merging

To combine existing ontologies into a more extensive one



Ontology merging – current activities

- MeMO: a clustering based strategy for ontology merging [Araujo 2008]
- Based on the strategy for multiple DNA sequence alignment
- Twophase merging process
  - similarity matrix building
  - binary tree building

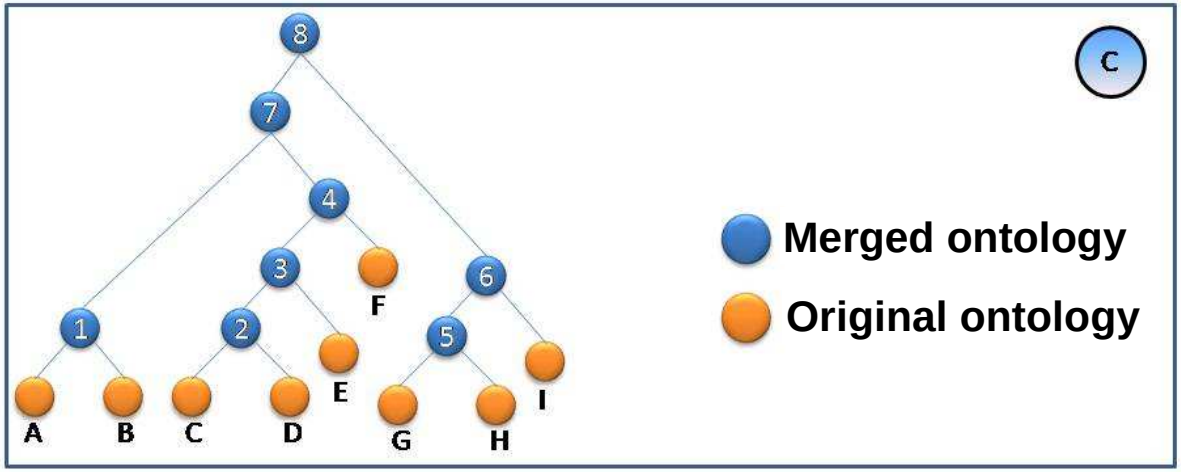
Ontology merging - – current activities

A: amino-acid
B: Substance
C: Cell_Extract
D: Eukariotic
E: Process
F: Organism
G: Ribosome
H: GO_Cell_Component
I: Sequence

A

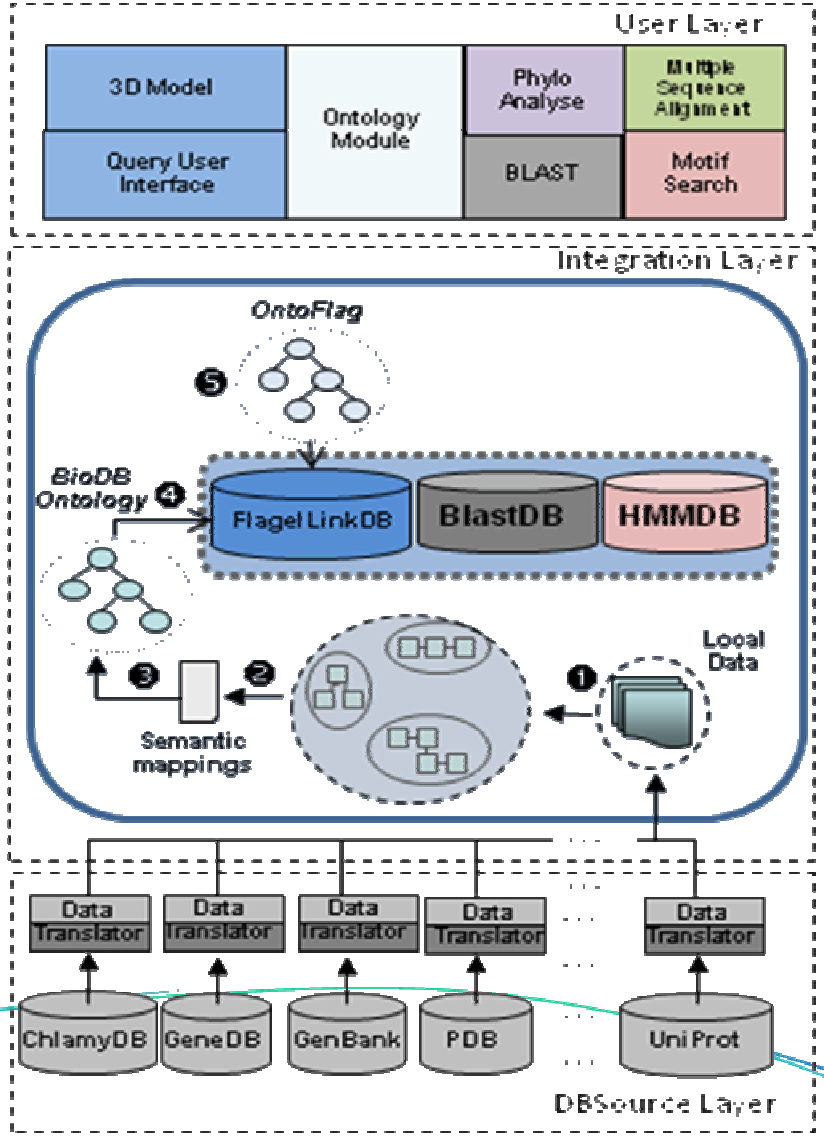
	A	B	C	D	E	F	G	H	I
A	100	10	2	0	4	1	0	0	1
B		100	4	0	0	0	1	1	0
C			100	9	8	4	0	1	1
D				100	7	3	0	0	0
E					100	3	0	0	0
F						100	0	0	0
G							100	4	3
H								100	3
I									100

B

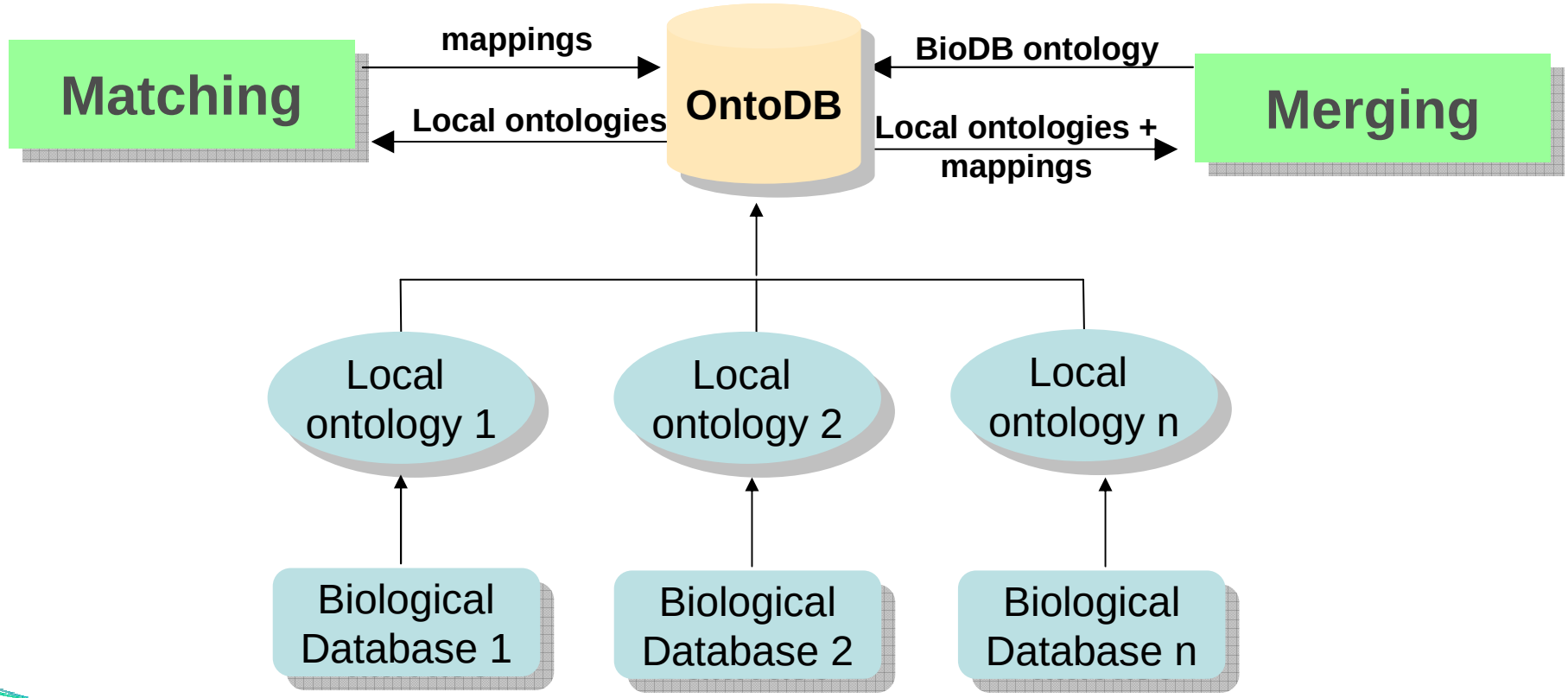


Ontology merging - Application

- FlagelLink
  - A system to provide access to a set of distributed information about a particular domain (the flagellum, a cellular organelle responsible for motility)



Ontology merging - Application



General overview

- Data integration applications
  - Ontology merging
  - **Ontology-based query expansion**
  - Ontology evolution

Ontology-based query expansion

- Users submit queries using terms that represent some real world aspect and expect as result all database items that represent those aspect

- The answers to these queries might not meet the user intension, because some problems may arise as, for example, conflicts between terms synonyms and homonyms

Ontology-based query expansion

- For better answers, it is necessary to reformulate the initial query using some semantic knowledge on the database
- Ontologies have emerged as the source for obtaining such knowledge

Ontology-based query expansion

It is the process that add or remove terms of a query in such a way that the semantic relationships in the ontologies help to find the words that best represent a particular concept

Ontology-based query expansion – current activities

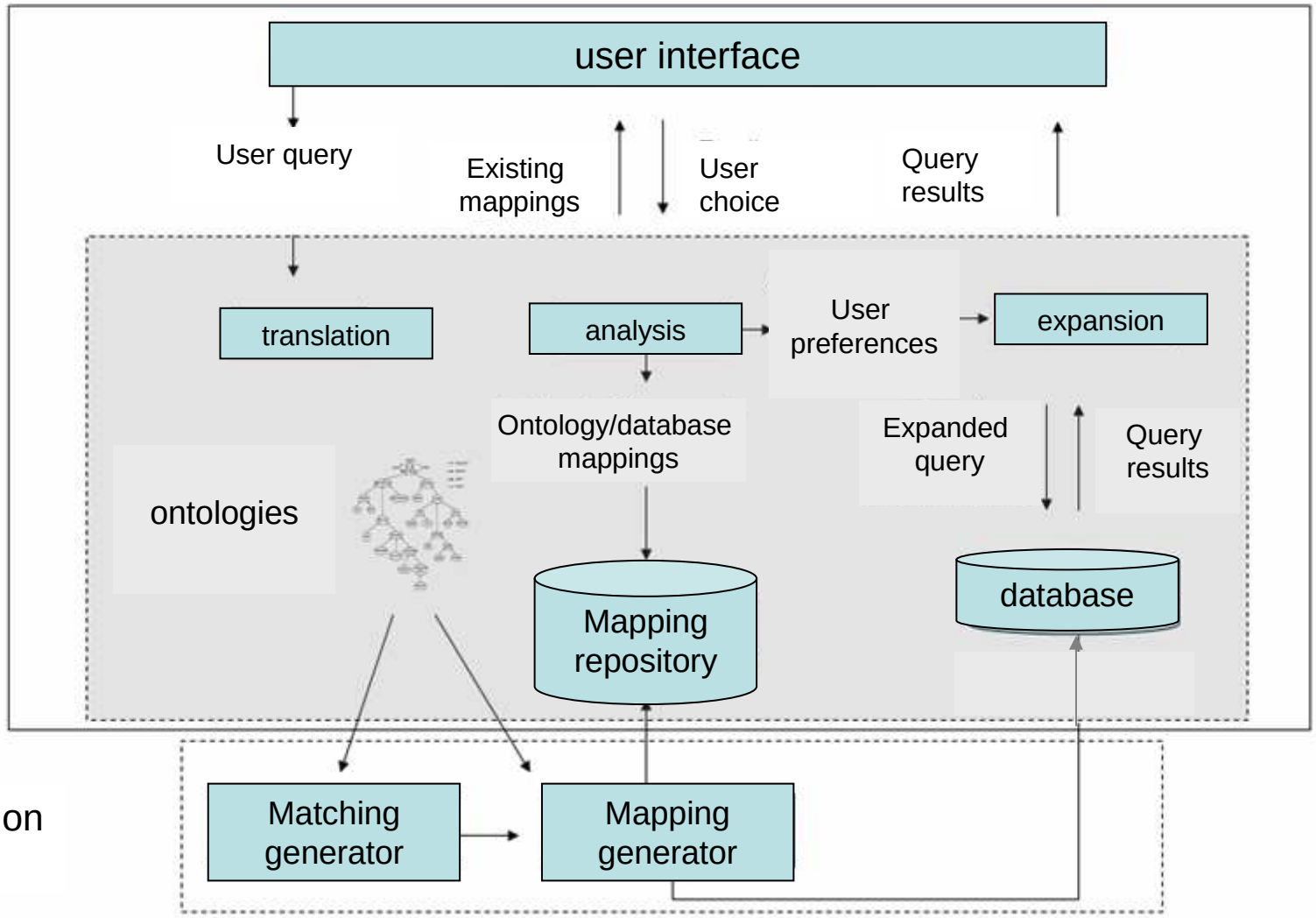
User application

user level

query level

configuration level

Expand System



Ontology-based query expansion - Application

- FlagelLink
  - A pre-formatted flagellar ontology (OntoFlag) is used to describe detailed, specific and manually curated information about flagellar genes / proteins
  - A particular adding is the use of OntoFlag to expand user queries

General overview

- Data integration applications
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  - Ontology-based query expansion
  - **Ontology evolution**

Ontology evolution

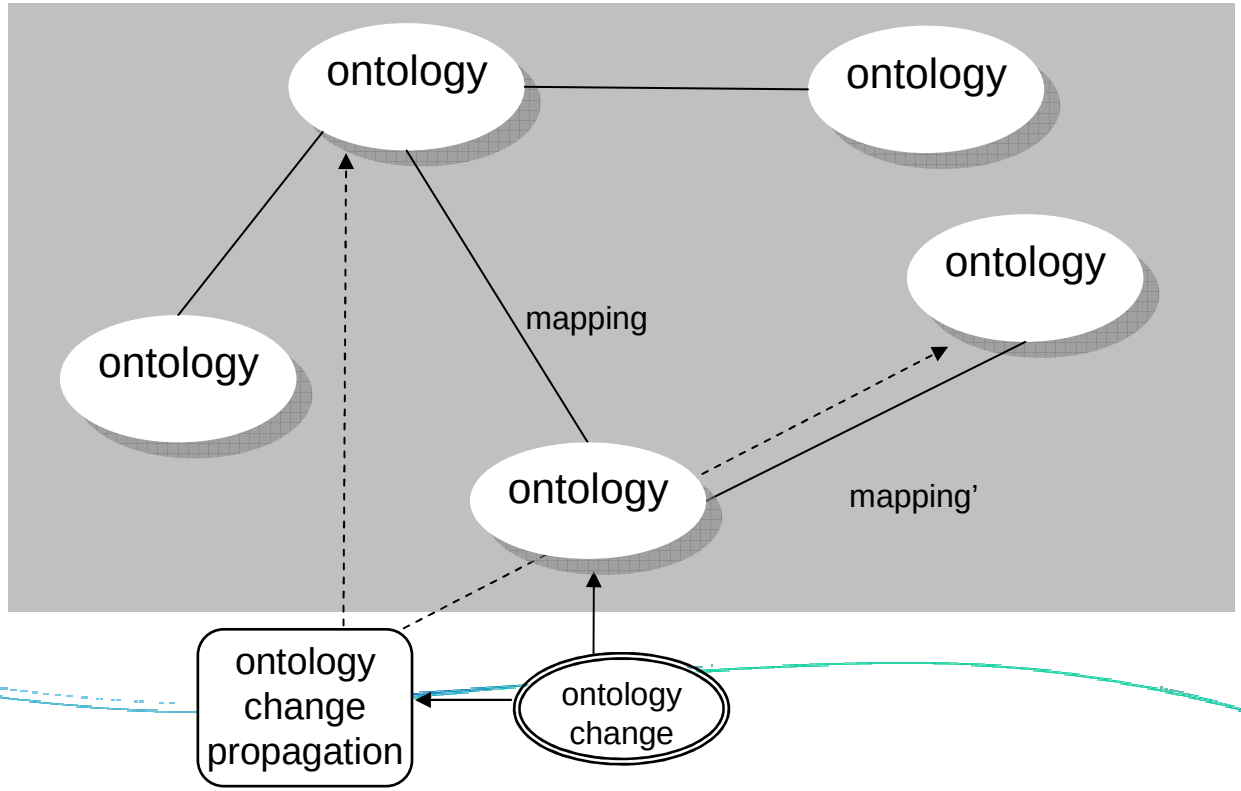
It is the timely adaptation of an ontology to the arisen changes and the consistent propagation of these changes to dependent artefacts

Ontology evolution

- Six-phase evolution process [SMMS02]
  - Change capturing
  - Change representation
  - **Semantics of change**
  - Change implementation
  - **Change propagation**
  - Change validation

Ontology evolution – current activities

A General Framework for managing Ontology Change Propagation



Current activities

- Research projects
  - MMS: Managing Semantic Mappings Evolution (FUNCAP) 2007-2008
  - OnTools: an environment for managing ontology matching, merging and evolution (CNPq) 2008-2009
- Students
  - 03 master
  - 05 undergraduate

Future research activities

- Semantic Web Applications 

- 2008.2 courses
  - Goal: to develop semantic web applications using technologies such as OWL, RDF, RDFS and Web Services