jCOLIBRI CBR Framework

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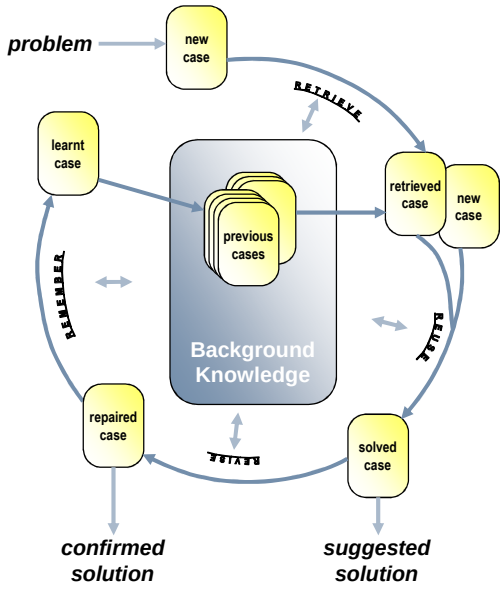
Motivation



CBR is:

- ✓ Successful AI subfield
- ✓ Mature & established

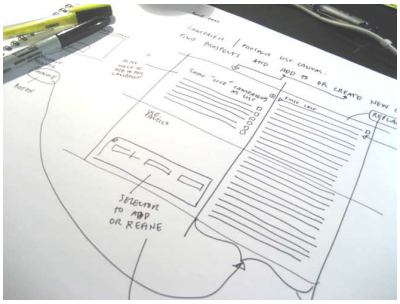
Building CBR applications requires:

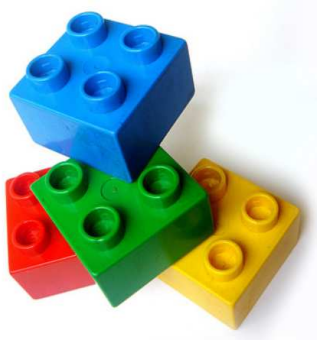
- ➢ Formalization
- ➢ Methodologies
- ➢ Implementation assistance

jCOLIBRI 2
Case-Based Reasoning Framework

Platform for developing CBR applications

Platform = Reference Architecture + Imp



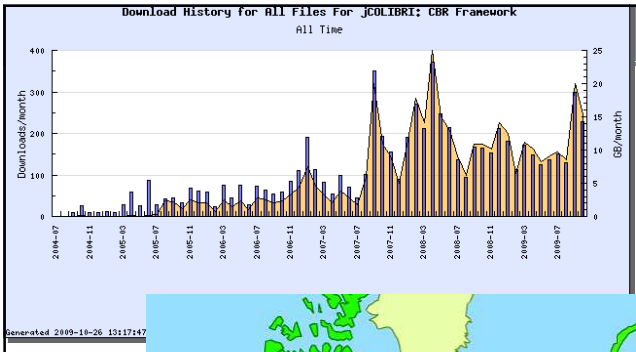


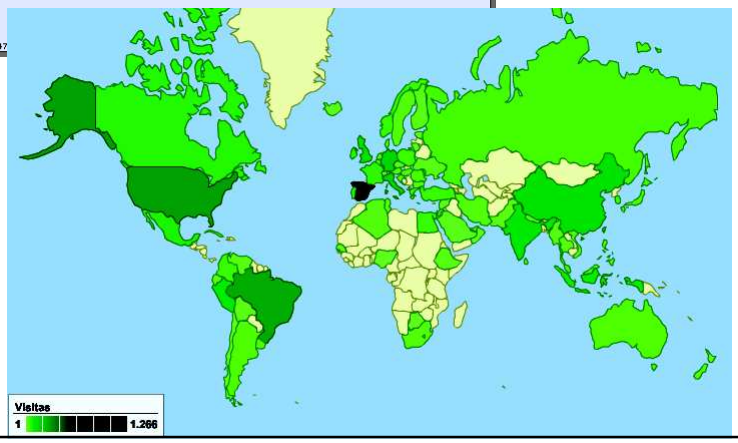
Motivation

Main features of jCOLIBRI

- **Extensible**
- **Reusable**
- Different types of **users** and different **purposes**:
  - Development, Research and/or Teaching
- Compatible with **commercial** applications and suitable for developing **large scale** applications
- Supporting different **types of CBR systems**
- It is just a .jar file → **Suitable for web applications**

Statistics





More than 8.500 downloads

5.000 visits to the web page in the last year

Visits from ~100 countries

Academic & Commercial World Usage

Many Universities using jCOLIBRI for teaching or research

- Université Pierre et Marie Curie (Paris, France)
- Georgia Institute of Technology (Georgia, USA)
- Indian Institute of Technology (Chennai, India)
- The Robert Gordon University (Aberdeen, United Kingdom)
- University College Cork (Cork, Ireland)
- …

Commercial Applications

KOBAS: knowledge management system (Romania)

Intelligence system for failure diagnostics in trains (Portugal)

Research Projects

- European Project ONE (IST-034744)

External Contributions

Collaborations

THE ROBERT GORDON UNIVERSITY ABERDEEN

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

ucc
Coláiste na hOllscoile Corcaigh, Éire
University College Cork, Ireland

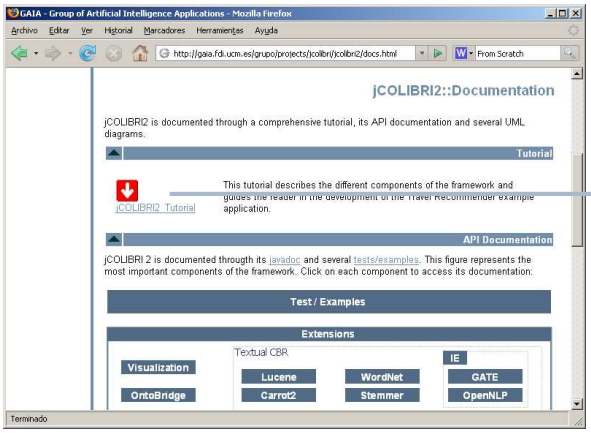
LA SALLE
Universitat Ramon Llull

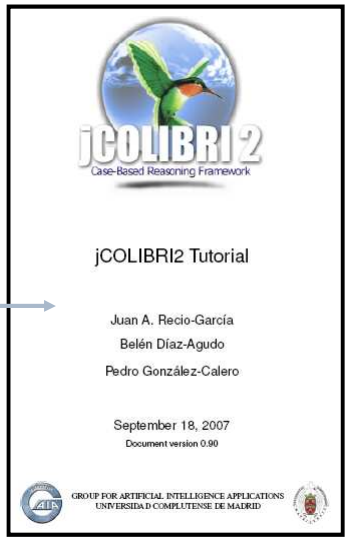
ARTIFICIAL INTELLIGENCE RESEARCH INSTITUTE - IIIA

AMEDEO AVOGADRO
università degli studi del piemonte orientale

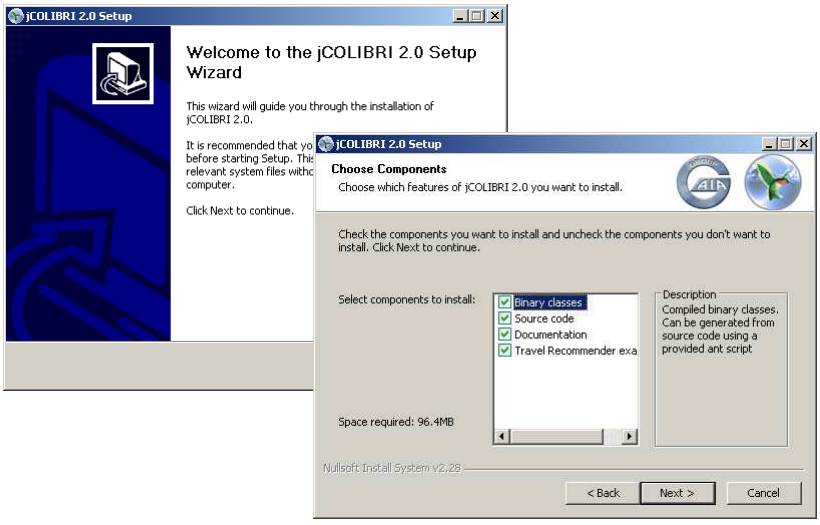
Where to start?

http://www.jcolibri.net

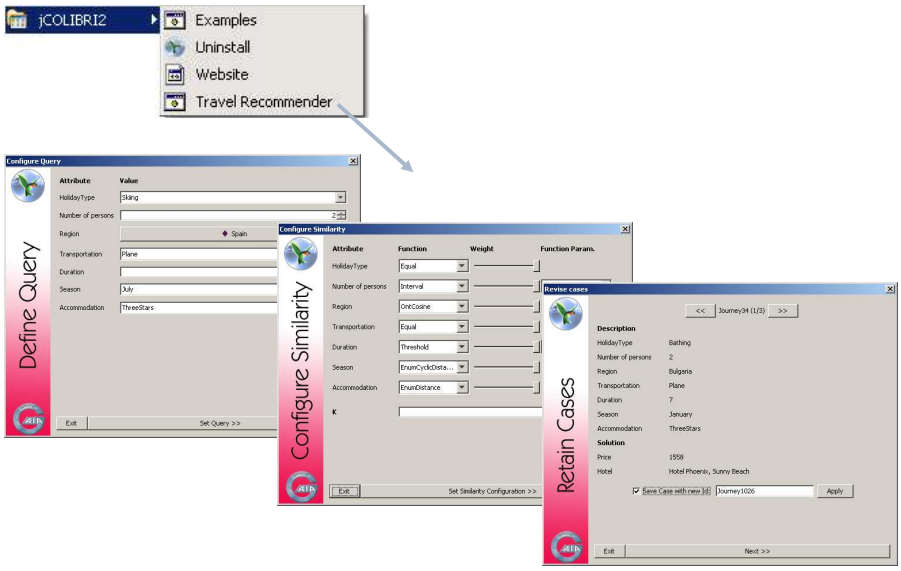




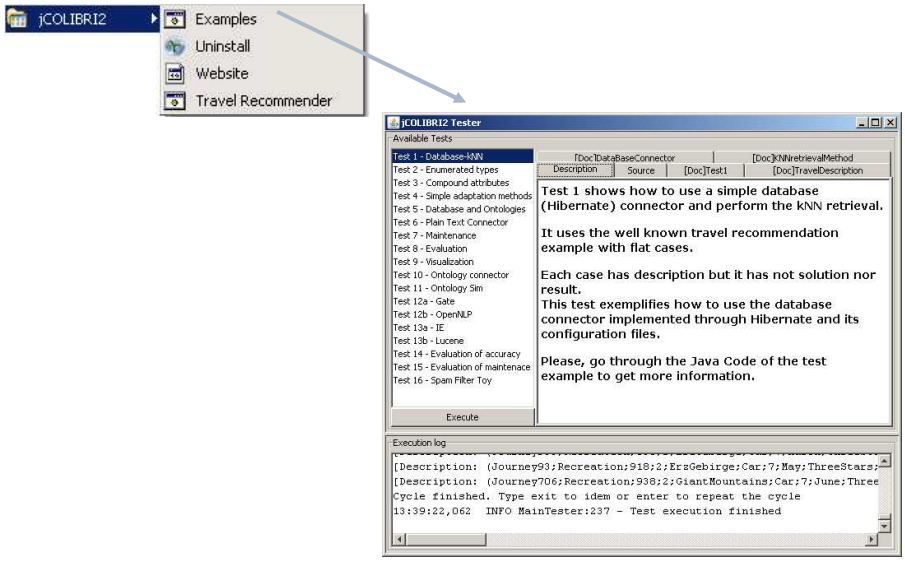
Installation



Examples

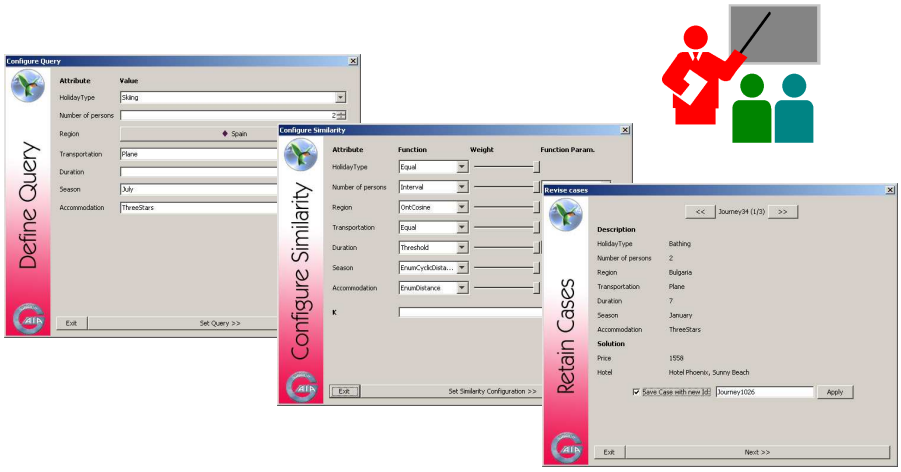


More Examples



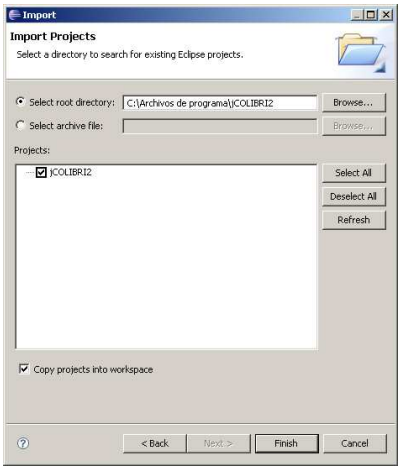
My first CBR application with jCOLIBRI

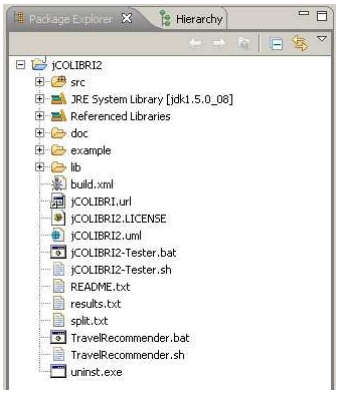
→ Tutorial shows -step by step- how to build a travel advisor system



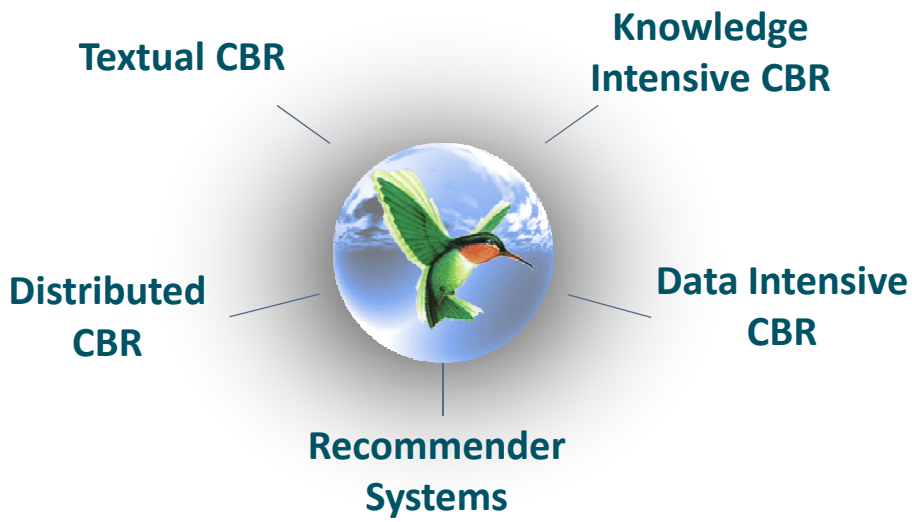
Import jCOLIBRI2 in Eclipse

❑ Just follow the steps described in the tutorial





Extensions



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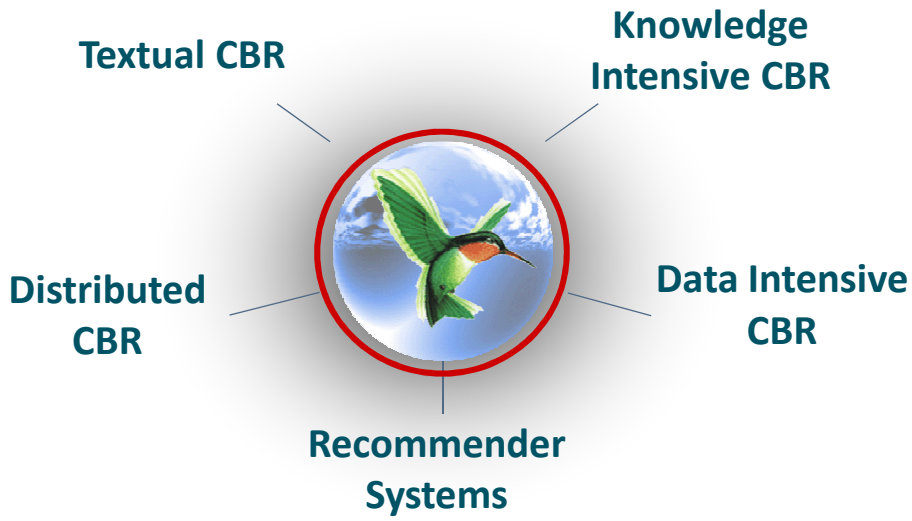
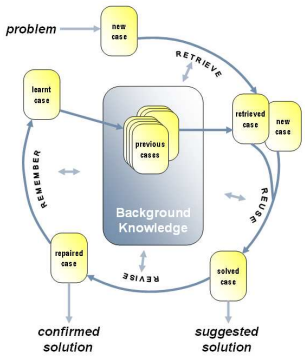


Application Structure

PreCycle

«interface»
StandardCBRApplication
- configure()
- cycle()
- postCycle()
- preCycle()

Cycle



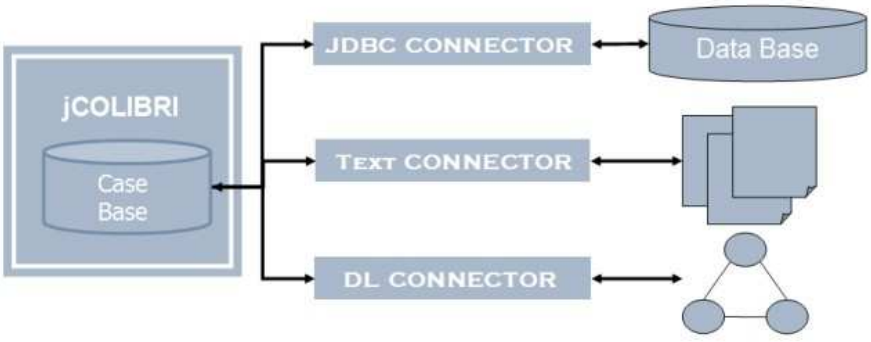
PostCycle

Cases & Persistance

Cases representation: Java Beans

- ✓ Direct & simple representation
- ✓ Easy programming and debugging
- ✓ Automatic generation of GUI
- ✓ Compatibility with Web Interfaces

Cases persistence: Connectors



Methods

5 Retrieval Strategies
7 Selection methods
30 Similarity Measures:
Texts, Ontologies, myCBR

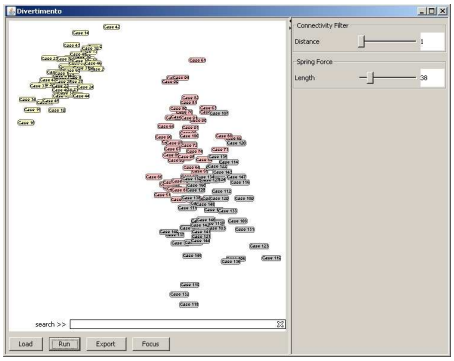
Parameter adjustment
Transformation by local search
Constructive reuse

Maintenance algorithms:
BBNR, CRR, RENN, RC, ICF, …

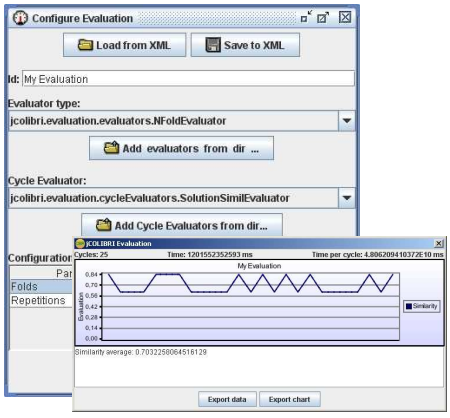
User-Based Revision
Preference elicitation

Other Features

Visualization of case bases

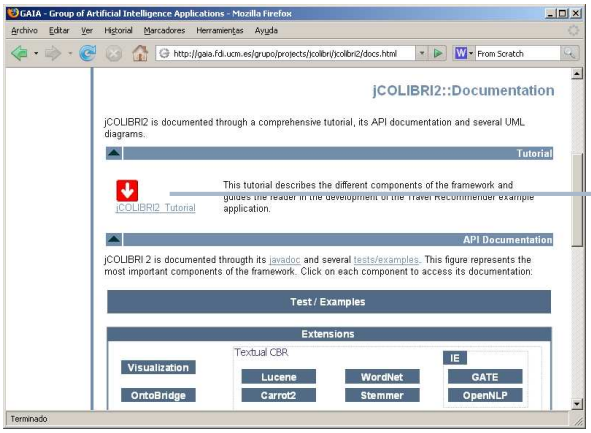


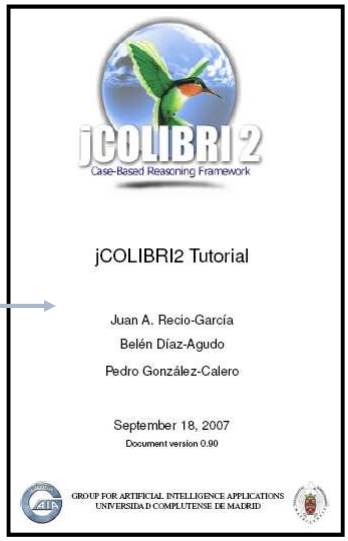
Evaluation: N-fold, Leave-one-out,…



How to continue…

http://www.jcolibri.net





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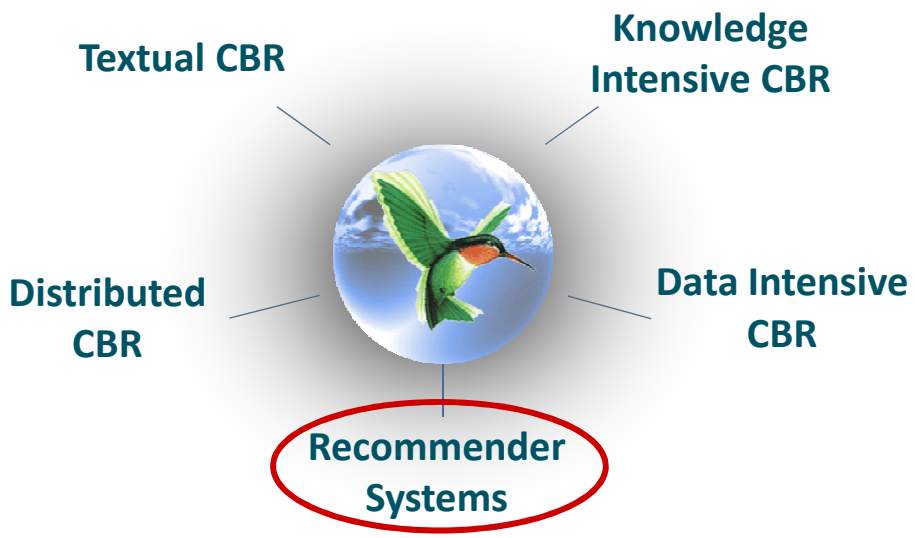
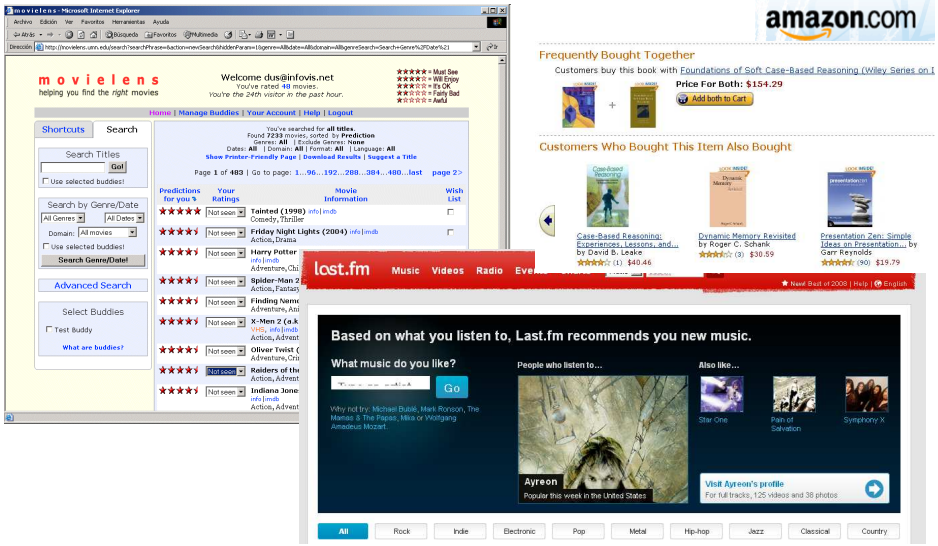
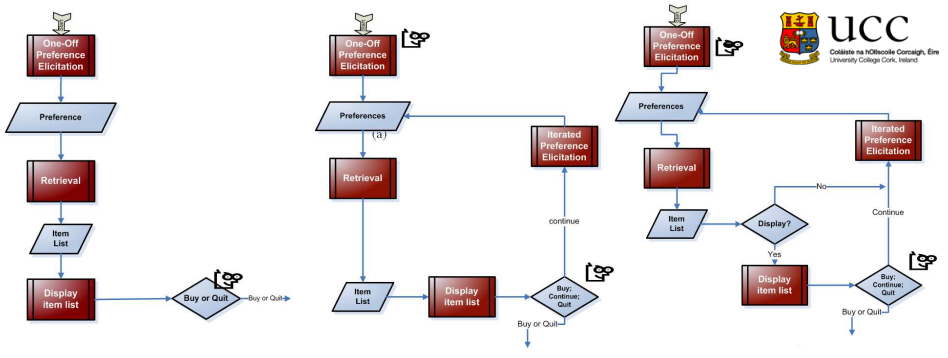


Recommender systems: Example

Cases → Items



Recommender Systems in jCOLIBRI



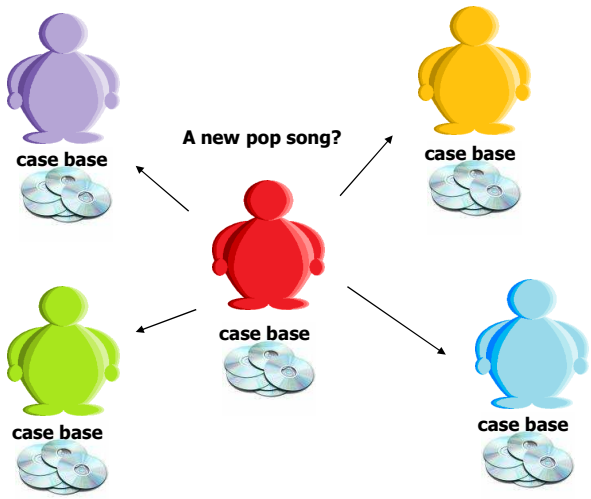
- jCOLIBRI provides 3 main templates to build recommender systems
- Can be instantiated into more than 20 different recommenders:
  - Single-shot, Navigation by Asking, Navigation by Proposing, Collaborative,…
- 15 different recommenders included as examples

RecSys'08

Extensions

Distributed CBR Systems: Example

- D²ISCO: **D**eliberative, **Dis**tributed and **Co**llaborative System for Music recommendation

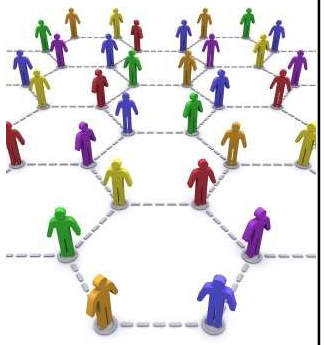


ICCCI'09
International Conference on Computational Collective Intelligence

Distributed systems in jCOLIBRI

ALADIN: Abstract LAyer for DIstributed CBR

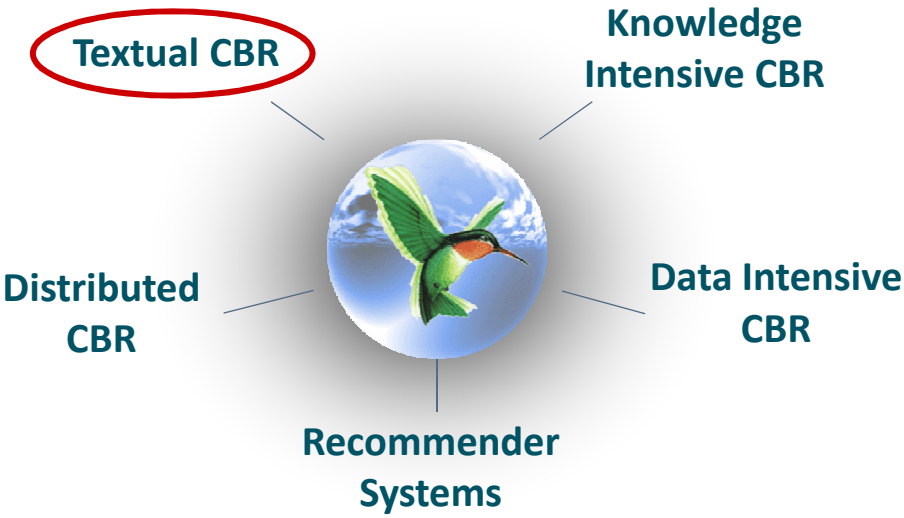
- Main interfaces required to build (almost) any distributed CBR system.
- Follows the IEEE FIPA standard for distributed systems.
- Can be implemented using different technologies:
  - Sockets, JADE, …



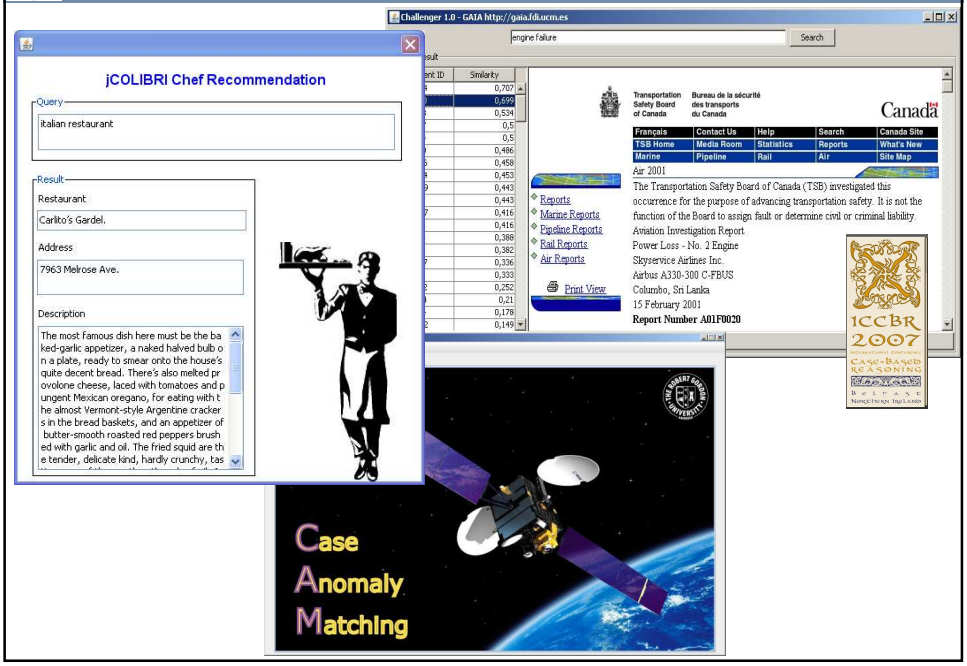
SALADIN: Sockets based implementation of ALADIN

- Completely functional implementation of the ALADIN architecture

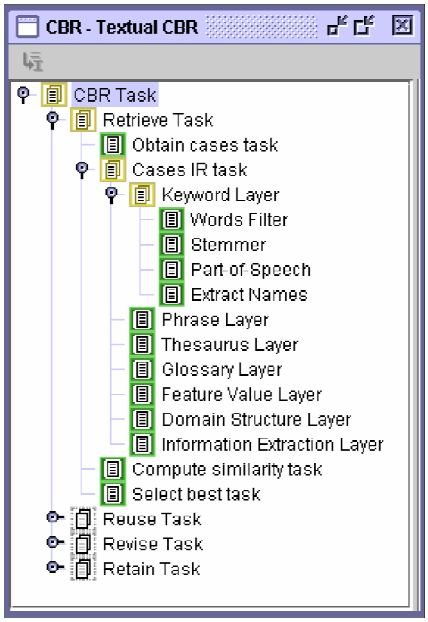
Extensions



Textual CBR: examples



Textual CBR: Semantic methods



Follow the **Lenz layered model** and includes two implementations that use **OpenNLP** and **GATE**

ICCBR'05

Textual CBR: Statistical methods

- Good results in complex domains where the knowledge required to extract the information is not available

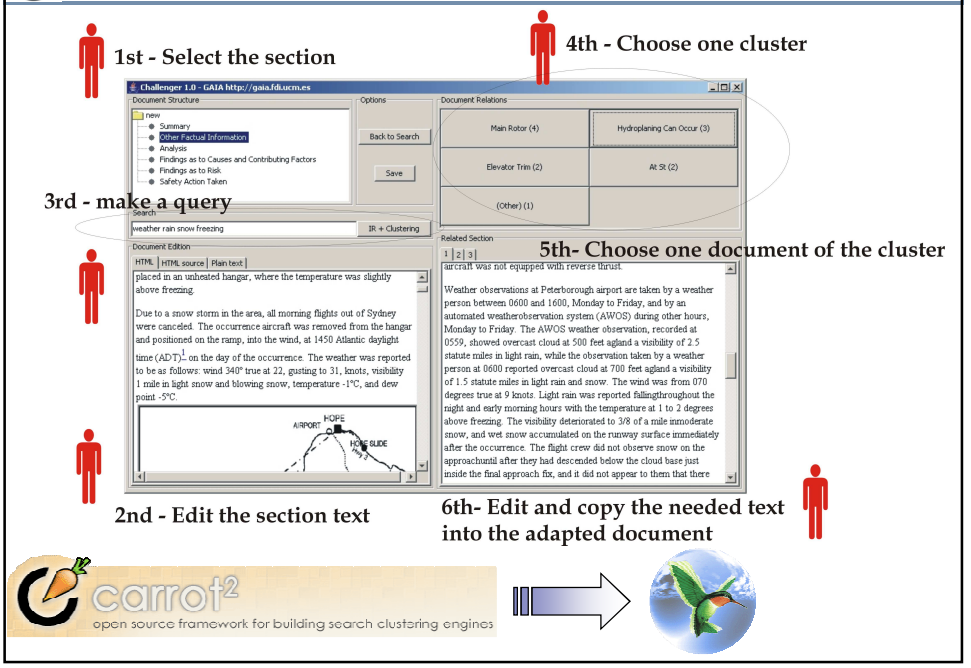
TCBR Workshop

Challenge:
Air Investigation Reports

Lucene

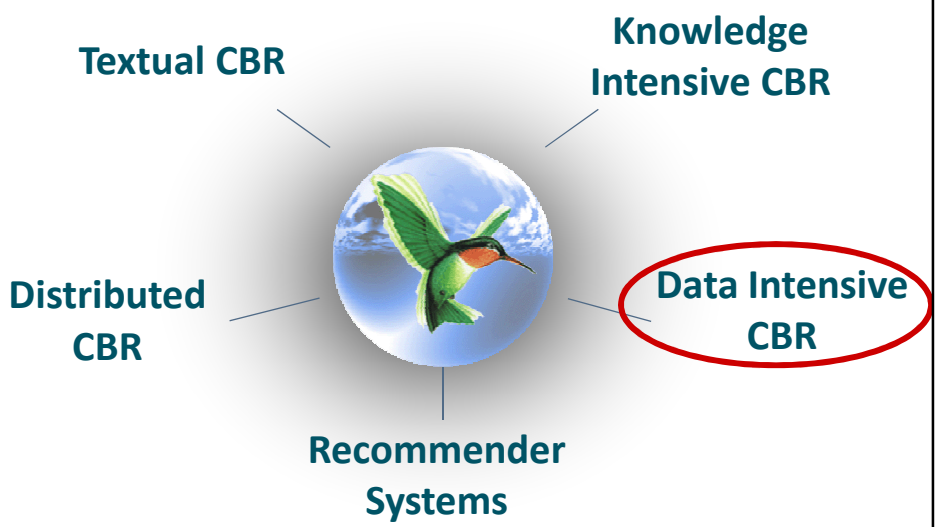
carrot2
open source framework for building search clustering engines

Statistical TCBR Application: Guided Adaptation



carrot2
open source framework for building search clustering engines

Extensions



Data Intensive CBR: example

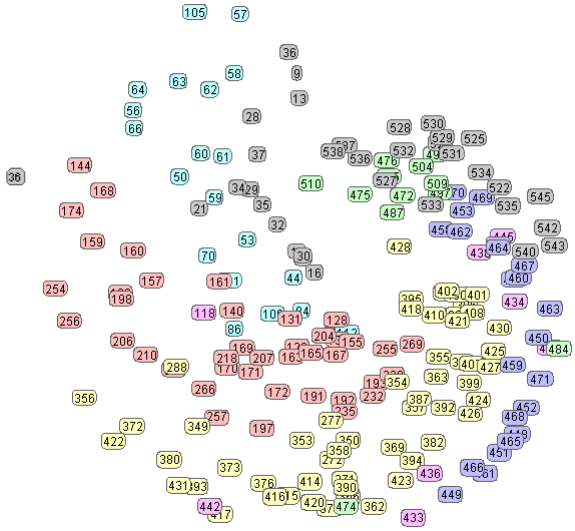
- Textual CBR application using texts from journals
- 1.500 documents / 20 categories

ICCBR 2009

Huge case bases with uncertain/incomplete

Retrieval from a clustered case base

Use a clustering method to organize the case base



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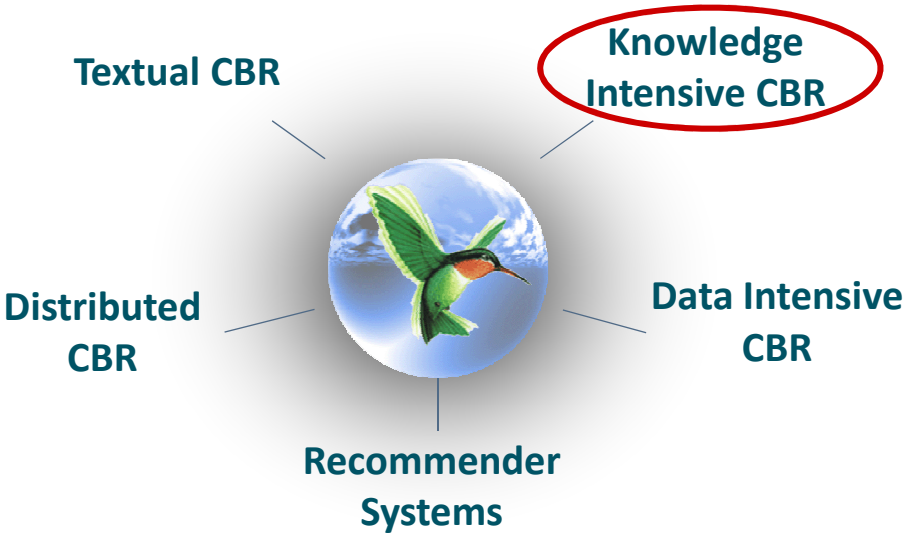
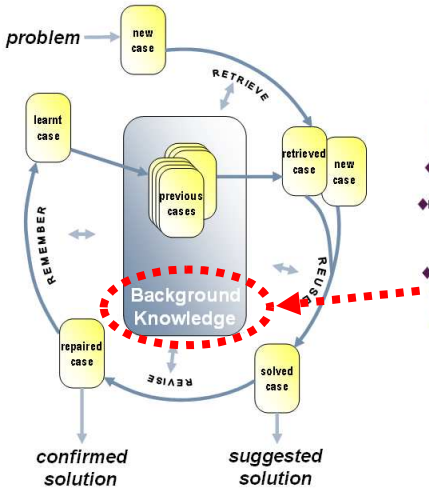
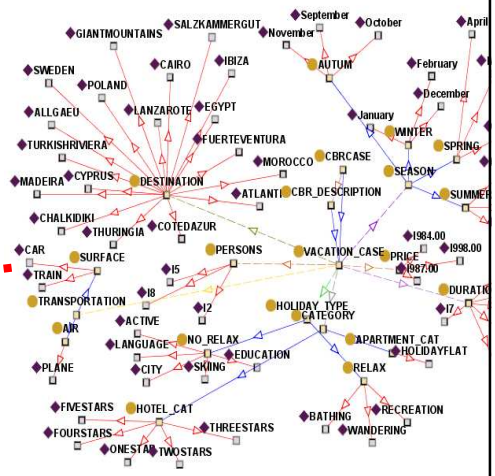


Knowledge Intensive CBR applications

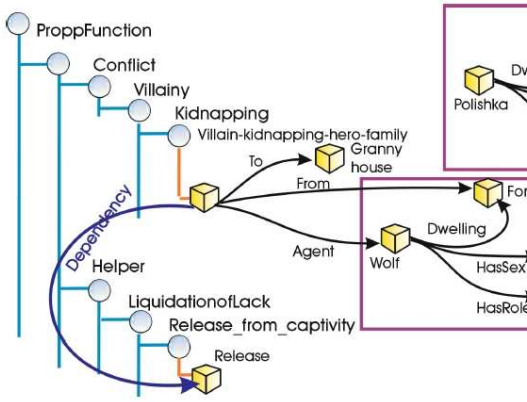
Complement the knowledge required by CBR applications by means of ontologies





Knowledge Intensive CBR Example

Tale generator

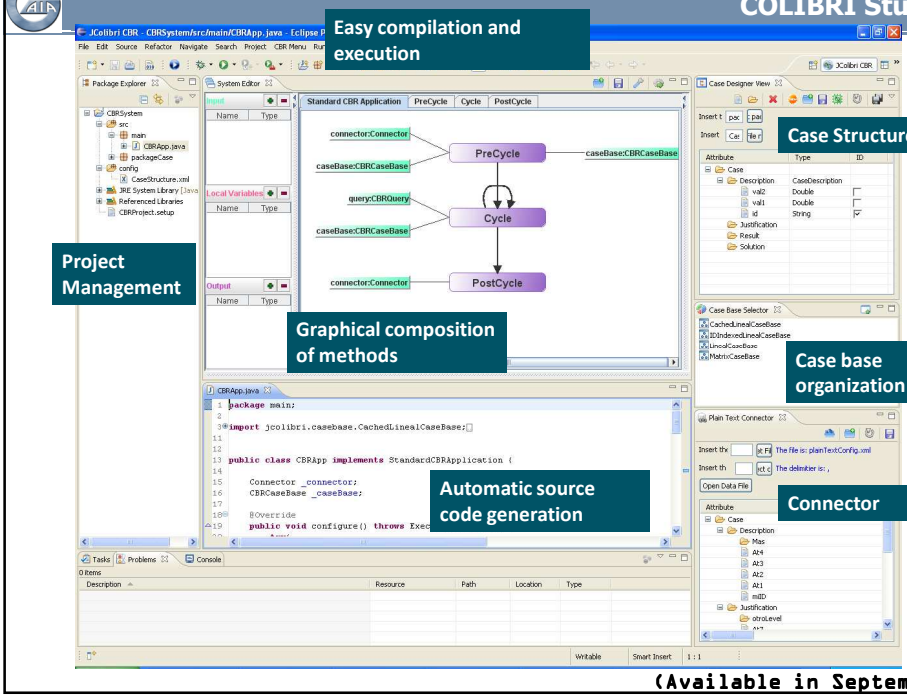


Needs graphical tools ...

1st Public Presentation ICCBR 10

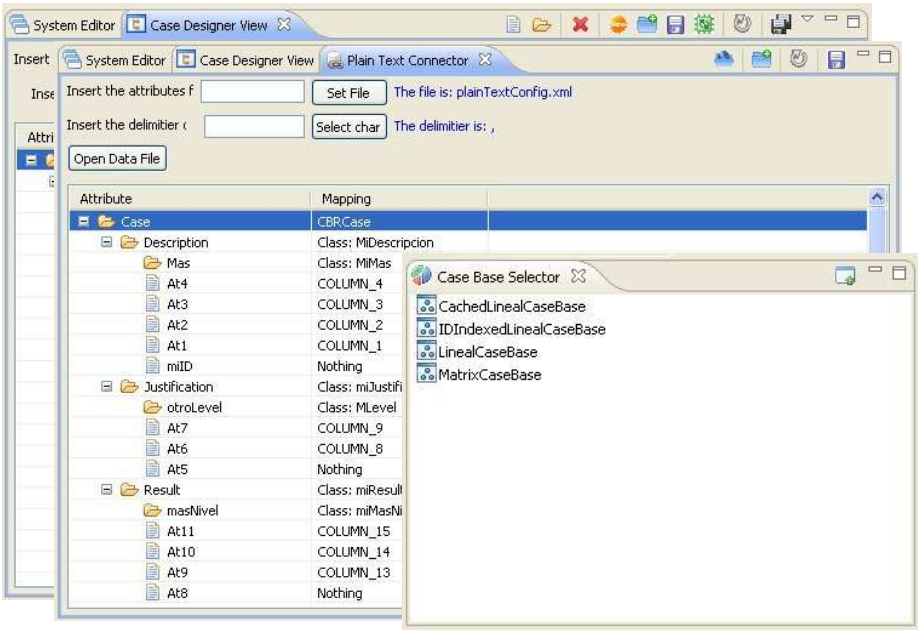
- Complete Graphical Development Environment for CBR applications
- GUI for jCOLIBRI2 integrated into Eclipse IDE

COLIBRI Studio



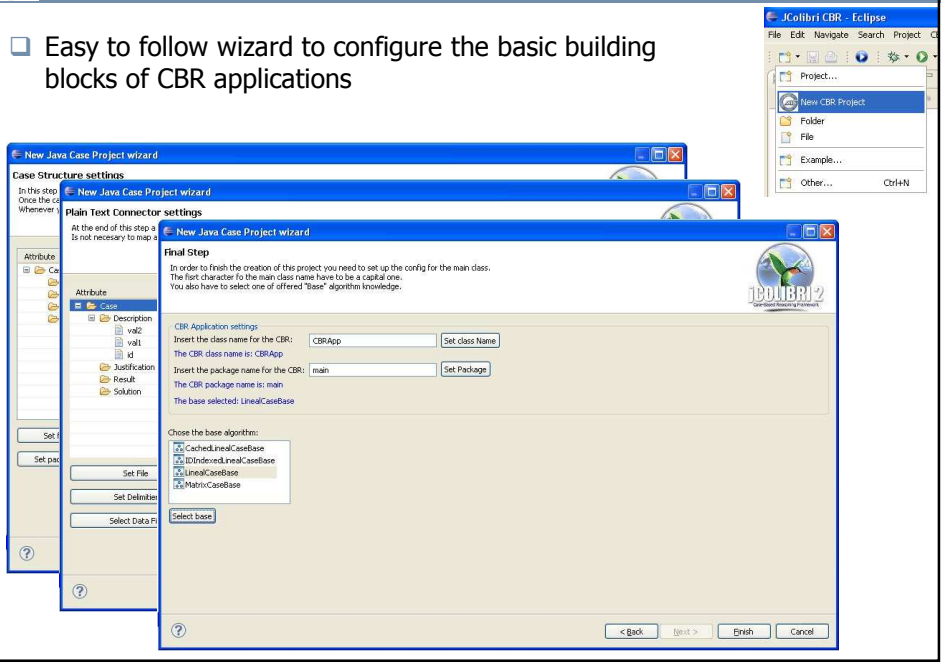
(Available in September)

COLIBRI Studio



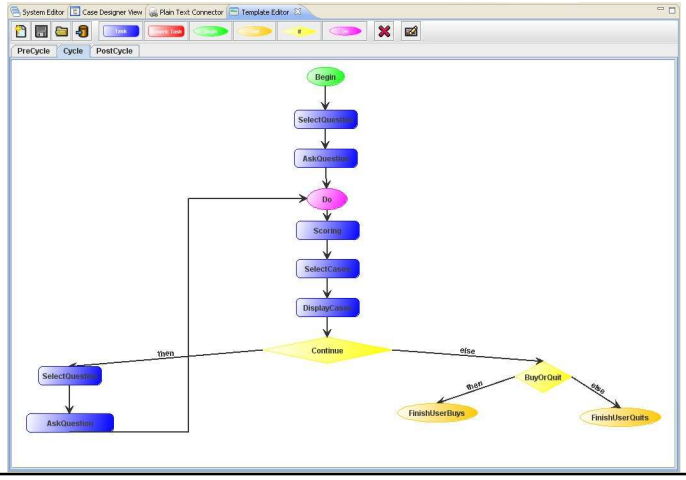
Wizard

- Easy to follow wizard to configure the basic building blocks of CBR applications



COLIBRI Studio

- Graphical configuration of the CBR system through templates.
- Templates are abstract representations of common CBR applications that can be customized.
- COLIBRI Studio will provide templates for standard CBR systems, Textual CBR applications and recommenders.



CBR for CBR: A Case-Based Template Recommender System for Building Case-Based System. ECCBR08, 2008

Semantic Templates for Case-Based Reasoning Systems (2009), in: The Knowledge Engineering Review, 24:Special Issue 03,

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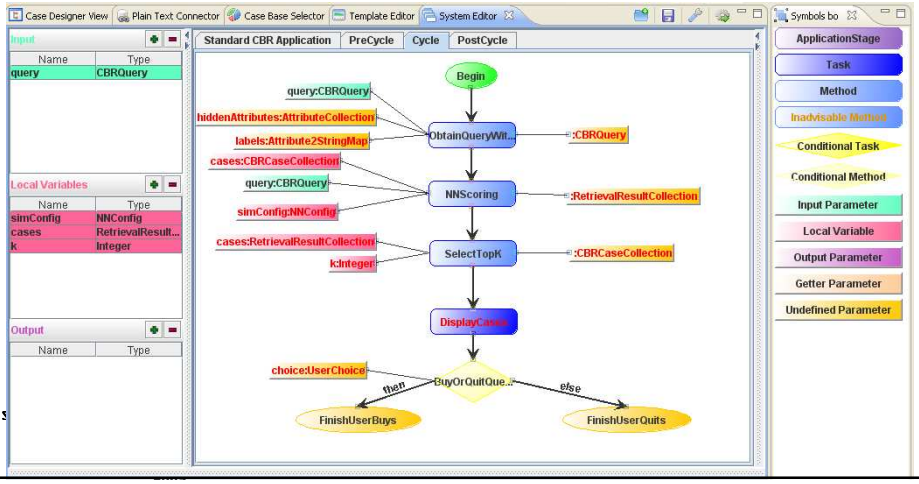

COLIBRI Studio

Coming soon at www.jcolibri.net

Questions?

http://www.jcolibri.

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