

## AI Tools

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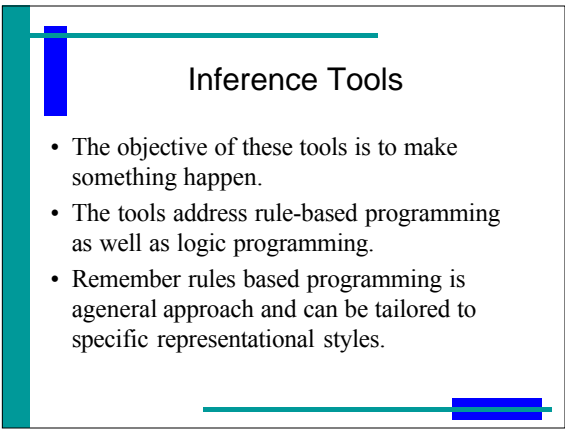
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## Inference Tools

- The objective of these tools is to make something happen.
- The tools address rule-based programming as well as logic programming.
- Remember rules based programming is a general approach and can be tailored to specific representational styles.

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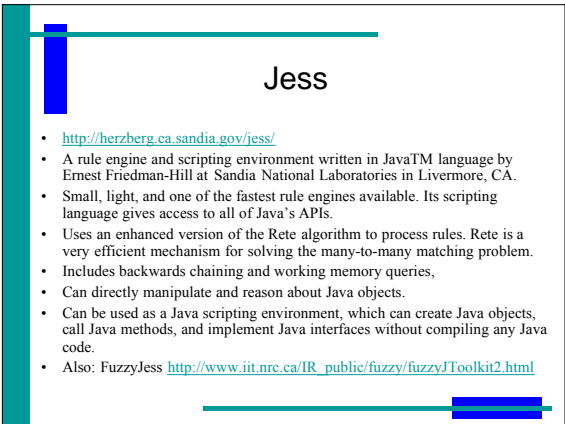
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## Jess

- <http://herzberg.ca.sandia.gov/jess/>
- A rule engine and scripting environment written in JavaTM language by Ernest Friedman-Hill at Sandia National Laboratories in Livermore, CA.
- Small, light, and one of the fastest rule engines available. Its scripting language gives access to all of Java's APIs.
- Uses an enhanced version of the Rete algorithm to process rules. Rete is a very efficient mechanism for solving the many-to-many matching problem.
- Includes backwards chaining and working memory queries.
- Can directly manipulate and reason about Java objects.
- Can be used as a Java scripting environment, which can create Java objects, call Java methods, and implement Java interfaces without compiling any Java code.
- Also: FuzzyJess [http://www.iit.nrc.ca/IR\\_public/fuzzy/fuzzyJToolkit2.html](http://www.iit.nrc.ca/IR_public/fuzzy/fuzzyJToolkit2.html)

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## CLIPS

- <http://www.gbg.net/clips/CLIPS.html>
  - A development and delivery expert system tool. Created in 1985, CLIPS is now widely used throughout the government, industry, and academia.
  - Three programming paradigms: rule-based, object-oriented and procedural.
  - Written in C and has been installed on many different operating systems without code changes.
  - Can be embedded within procedural code, called as a subroutine, and integrated with other languages. Extendable through well-defined protocols.
  - Features to support the verification and validation including support for modular design and partitioning of a knowledge base, static and dynamic constraint checking and function arguments, and semantic analysis of rule patterns.
  - See: FuzzyClips
- [http://www.iit.nrc.ca/IR\\_public/fuzzy/fuzzyClips/fuzzyCLIPSIndex2.html](http://www.iit.nrc.ca/IR_public/fuzzy/fuzzyClips/fuzzyCLIPSIndex2.html)

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## Algernon

- <http://algernon-j.sourceforge.net/>
- Algernon was developed by James Crawford and Ben Kuipers at the University of Texas at Austin Computer Sciences Department in the early 1990s. In the late 1990s it was reimplemented on top of a virtual machine for rule-based reasoning called the Algernon Abstract Machine (AAM), designed by Micheal Hewett. During 2002, Micheal Hewett at Stanford University reimplemented Algernon in Java.
- Algernon's native language is path-based, mapping directly to paths between related objects in a KB. It assumes that it is operating on a frame-based knowledge base
- Supports both forward and backward chaining rules.
- Efficient and concise KB traversal and retrieval.
- Straightforward access to ontology classes and instances

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## JBoss Rules (Drools)

- <http://labs.jboss.com/jbossrules/>
- A rule engine implementation based on Charles Forgy's Rete algorithm tailored for the Java language.
- Adapts Rete to an object-oriented environment and interface allows f
- Designed to allow language implementations plugs. Rules can be written in Java, Python and Groovy.
- Provides for Declarative Programming and is flexible enough to match the semantics of the problem domain with Domain Specific Languages (DSL) via XML using a Schema defined for the problem domain. DSLs consist of XML elements and attributes that represent the problem domain

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## JTP

- <http://www.ksl.stanford.edu/software/JTP/>
- An object-oriented modular reasoning system developed by Gleb Frank in Knowledge Systems Laboratory of Computer Science Department in Stanford University.
- Based on a very simple and general reasoning architecture. The modular character of the architecture makes it easy to extend the system by adding new reasoning modules (reasoners), or by customizing or rearranging existing ones.
- The system is implemented in Java.

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## ABLE

- <http://www.alphaworks.ibm.com/tech/able>
- A Java framework and component library for building intelligent agents using machine learning and reasoning. The ABLE research project is made available by the IBM T. J. Watson Research Center.
- The framework provides Java interfaces and base classes used to build a library of JavaBeans called AbleBeans. The library includes AbleBeans for reading and writing text and database data, for data transformation and scaling, for rule-based inferencing using Boolean and fuzzy logic, and for machine learning techniques.
- Developers can extend the provided AbleBeans or implement their own custom algorithms.
- Rule sets created using the ABLE Rule Language can be used by any of the provided inferencing engines, which range from simple if-then scripting to algorithms that use pattern matching and unification.
- Java objects can be created and manipulated using ABLE rules. User-defined functions can be invoked from rules.

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## Related Engines

- Lewis <http://home.sprynet.com/~hthedick/homepage.htm>
- Isabelle <http://isabelle.in.tum.de/>
- PROVA <http://www.prova.ws/>
- TWELF <http://www.cs.cmu.edu/~twelf/>
- JADE <http://jade.tilab.com/>
- Prolog for Java <http://gnuprologjava.sourceforge.net/>
- IBM CommonRules <http://www.alphaworks.ibm.com/tech/commonrules>

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## Ontology tools

- Build a descriptive vocabulary
- Specify base relations
- Model the domain
- Support storage and inter-op languages

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## Protégé

- <http://protege.stanford.edu/>
- A tool allows users to construct domain ontologies, customize data entry forms, and enter data.
- It can be extended to include graphical components such as graphs and tables, media such as sound, images, and video, and various storage formats such as OWL, RDF, XML, and HTML.
- The API makes it possible to for other applications to use, access, and display knowledge bases.
- The Classes Tab is an ontology editor used to define classes and class hierarchy, slots and slot-value restrictions, relationships between classes and properties of these relationships.
- The Forms Tab generates a default form for acquiring instances based on the types of the slots.
- The Instances Tab is a knowledge-acquisition tool which you can use to acquire instances of the classes defined in the ontology.

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## Protégé - Pugins

- JessTab <http://www.ida.liu.se/~her/JessTab/>
- JadeJess <http://sourceforge.net/projects/jadejessprotege/>
- AlgernonTab <http://algernon-j.sourceforge.net/doc/algernon-protege.html>
- ClipsTab <http://protege.stanford.edu/plugins/CLIPSTabPages/CLIPSTab.html>
- JessAgentTab <http://www-i4.informatik.rwth-aachen.de/agentcities/main/tools/JessAgentTab/doc/jat.html>

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**Big Things**

- Implementation of theory in code
- Large projects
- Multiple paradigms
- Many facted

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**Big Things**

- Soar: a computational theory of mind  
<http://sitemaker.umich.edu/soar>
- Mozart: intelligent distributed programming  
<http://www.mozart-oz.org/>
- Poplog: declarative and procedural
  - <http://www.poplog.org/>
  - <http://www.cs.bham.ac.uk/research/poplog/free/poplog.html>

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**Language**

- Reference work
- Parts of speech
- Meaning relations
- Text engineering
- Acquisition

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## Language

- WordNet <http://wordnet.princeton.edu/>
- KBtextmaster  
<http://www.markwatson.com/opensource/>
- Ellogon <http://www.ellogon.org/>
- Gate <http://gate.ac.uk/>

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## Meta Things

- Storage and inter-op languages
- Being about something
- Logical description
- Building from documents rather than people

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## Meta Things

- DAML <http://www.daml.org/> oilED  
<http://oiled.man.ac.uk/>
- ruleML <http://www.ruleml.org/>
- Jena 2  
<http://www.hpl.hp.com/semweb/jena2.htm>
- SWRL  
<http://www.w3.org/Submission/SWRL/>
- Common Logic <http://cl.tamu.edu/>

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