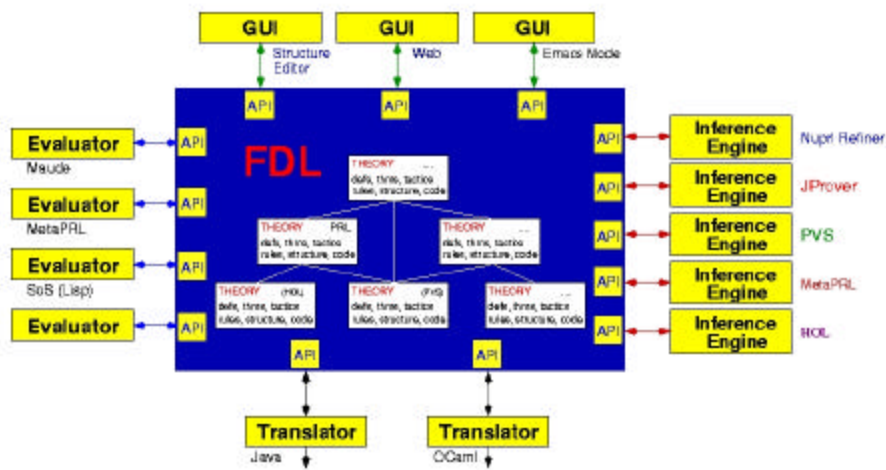


Building Interactive Digital Libraries of Formal Algorithmic Knowledge



New Ideas

- The project is creating mechanisms to account for the correctness of proofs that use knowledge from several different formal logics
- The project is creating mechanisms to guarantee that formal mathematics created by interactive theorem provers is **stable** knowledge with respect to consistent extensions of provers
- The project is creating tools to conduct **logic in the large**, i.e. tools that manipulate connections among many tens of thousands of definitions, facts and theorems
- The project is creating new means of automatically organizing and retrieving information in formal digital libraries
- The project is testing these mechanisms and tools in a prototype formal digital library (FDL)

Impact

- Increased capability to protect the nation's critical software infrastructure based on access of verification tools to a formal knowledge base of relevant algorithmic mathematics
- Increased capability to create correct-by-construction software
- New mechanisms for increasing the rigor and value of the scientific basis for algorithms and systems
- Basis of an extraordinary potential accomplishment for computing and information science, namely, the creation of a world-wide repository of all formal algorithmic knowledge

Schedule

- | | |
|----------------|---|
| Spring
2001 | Elaborate conceptual basis for FDL
Implement Prototype Formal Digital Library
Add content specific to critical software infrastructure protection
Demonstrate use of the FDL in critical verifications
Implement and connect JProver , a prover for constructive logic
Develop API's connecting the FDL with Nuprl, MetaPRL, PVS |
| Winter
2002 | Migrate Nuprl, MetaPRL, PVS libraries into common repository
Develop mechanisms for producing LaTeX and Web documents from formal library content |
| Spring
2003 | Implement XML interface to connect FDL with systems linked by OpenMath/OMDoc
Explore migrating Coq and LP content into FDL
Connect the FDL to external proof systems
Design and implement library services for linking formal theories |
| Spring
2004 | Design a web-based editor for remote use of the FDL
Demonstrate impact of the FDL in a major application
Integrate FDL into a basic digital library service |