Toy Web based prover

Shin-ya NISHIZAKI
Tokyo Institute of Technology

Joint work with Hiroshi TAMANO and Yusuke SOYAMA.

Web based prover

Yusuke SOYAMA and Hiroshi TAMANO
Tokyo Institute of Technology

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Overview

- Backgrounds
- PDIP
- Proof Archives and DoS-attack Resistance
- On going works
  - Trackback-based Checking

Backgrounds

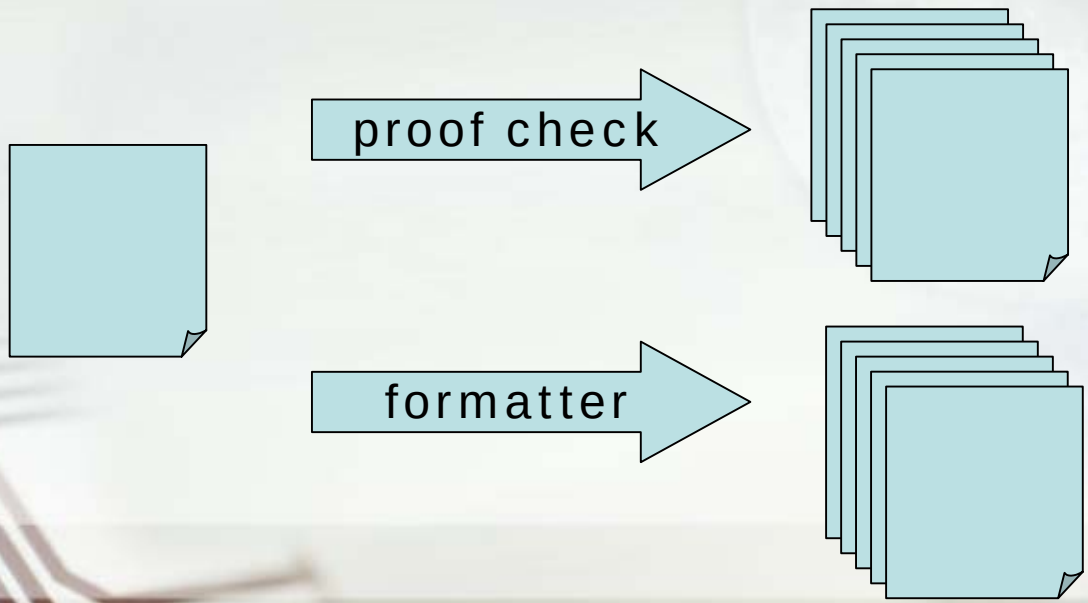
- Mizar
  - Non-interactive prover
    - ∽*editing-latex-previewing loop*
  - Proof scripts in style of natural deduction
    - ⇔ backword reasoning with tactics and tacticals
  - Amalgam of proofs and documents
    - ∽Literated programming: web, weave and tangle

⇒Isabelle/Isar is influenced by Mizar.

Amalgam of proofs and documents

- A proof script has two aspects:
  - a proof
  - a document.

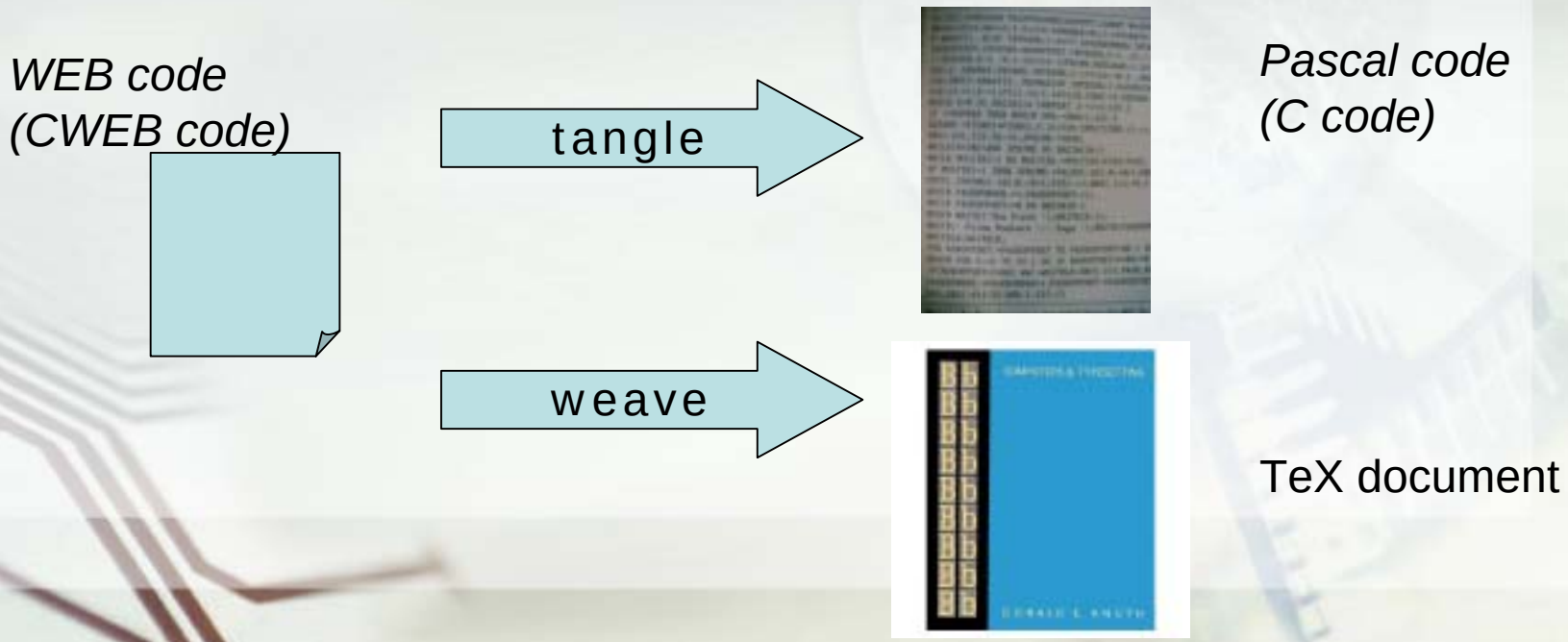
Mizar Mathematical Library
(proof library)



(LaTeX document)

Literated Programming

- A WEB code has two aspects:
  - a program
  - a document



Boomborg Project by Hagiya et al.

- Computing-As-Editing Paradigm (CAEP)
- Visibility☆
- Structure-Freedom

PDIP

- Proofs as Documents
  - ← Mizar, Literated Programming, Boomborg.
- implemented in HTML/JavaScript.
  - another possibility
    - Word/VBA: security..?

PDIP-rewrite

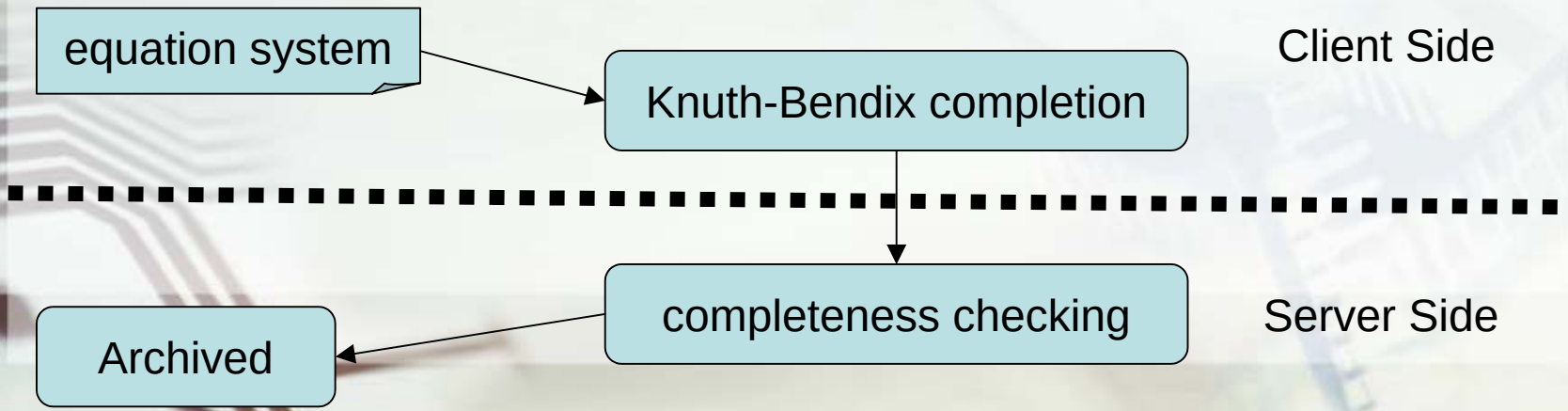
- We write an equation system and an expression to be rewrite in HTML.
- Redices appears as "buttons".
- If you push one of them, the redex is rewritten.

Points in implementaiton of PDIP-rewrite

- Stateless
  - The JavaScript code do not store states of a rewrite engin in JavaScript environments. Every states are expressed in HTML document tree.
    c.f. Visibility in boomborg.

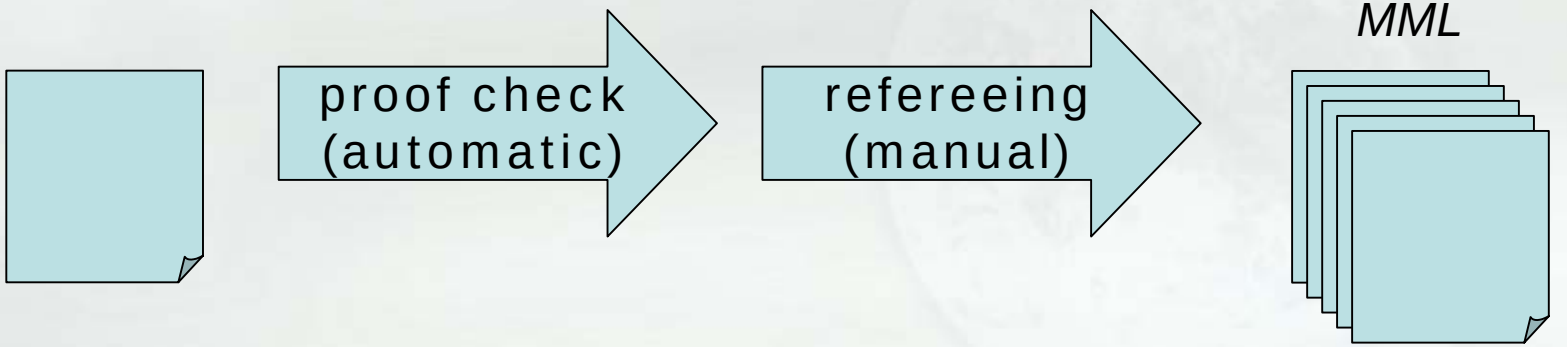
PDIP-KB and Equation Archive

- Knuth-Bendix completion with LPO is done in web browsers.
- Complete equation systems are filed in Equation Archive Server after checking their completeness in the server.

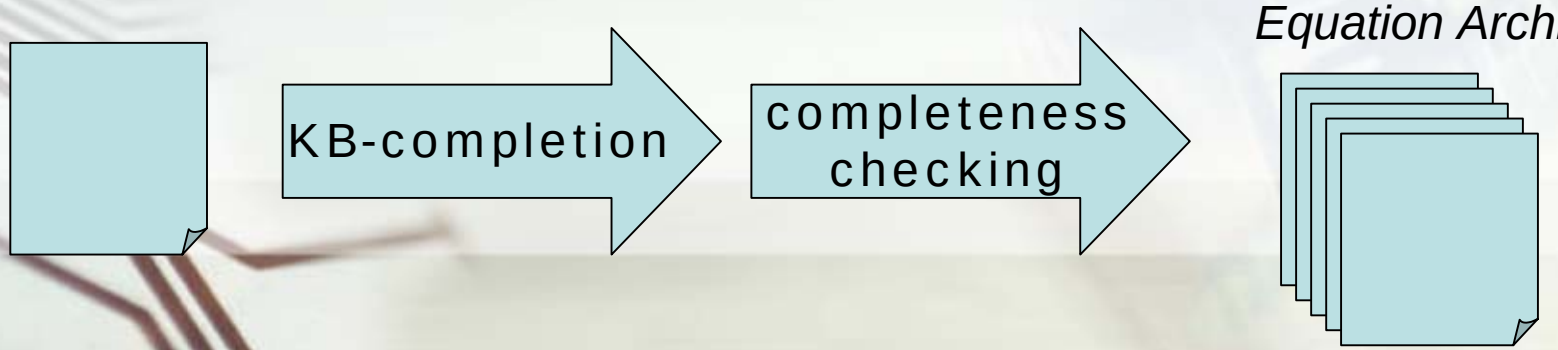


PDIP-KB and Equation Archive

- Similarity between Equation Archive and MML (Mizar Mathematical Library).



distributed with Mizar binaries.

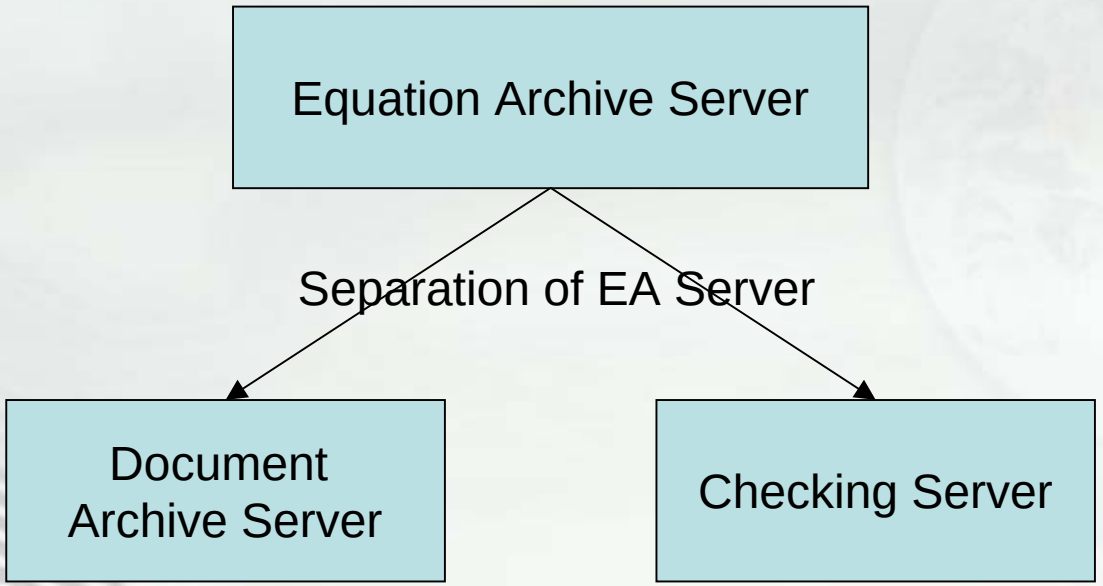


DoS Attack Resistance

- Completion is not decidable.
- Completeness checking is decidable.
- C.f.
  - Proving is not decidable.
  - Proof checking is decidable.
- If a client attaches a completeness proof with a equation system, then a server can estimate the computational cost.

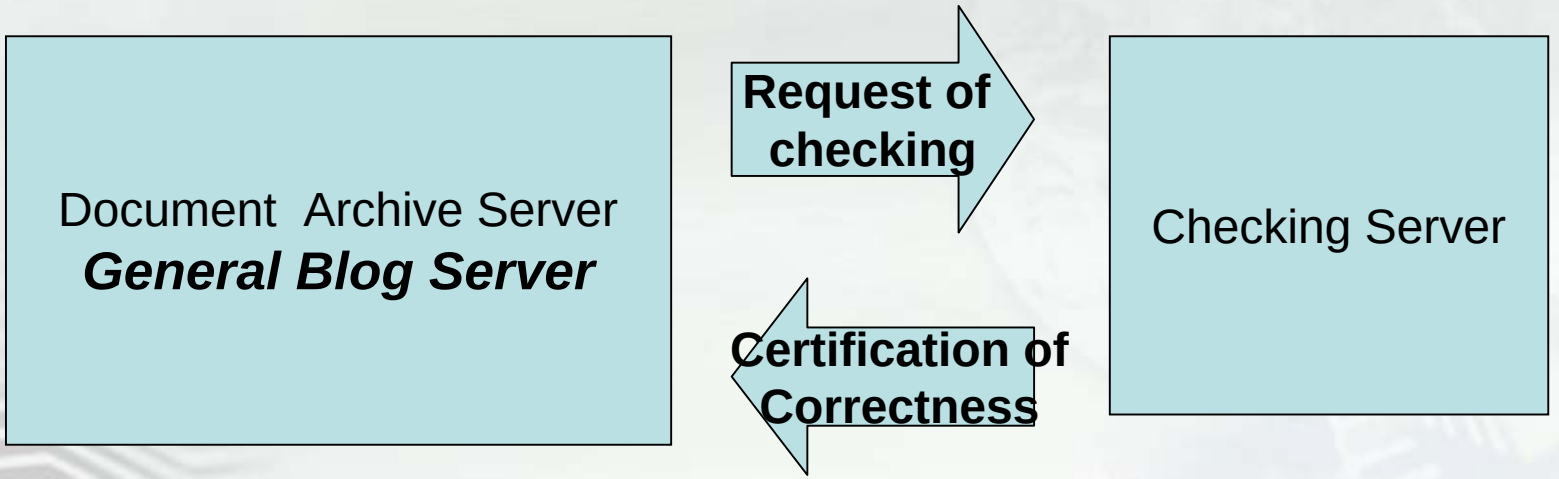
On-going work

- *Separation of Archiving and Checking*



Separation of Archiving and Checking

- *Cerifying Trackback*



Trackback Protocol

Future works

- Completion
  - Current implementation is too naive.
- Other logical systems
  - **prover!**
- PDIP on Wiki
- Proof checker on OpenOffice/JavaScript or MS Office/VBA.