# A New Interface to PVS

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**10 September 2003**

**Calculemus 2003, Rome**

# Introduction

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# PVS/MathWEB-SB Link

- MathWEB-SB already has links for various Theorem Proving systems: Omega, many Resolution provers.
- It also contains links to CAS such as GAP and Maple.
- Even with the facilities MathWEB-SB offers it is a non-trivial task to add a new system.
- Note: addition of systems as clients and as servers are different tasks, though with some common threads.
- A prototype link was created in 2001 and details presented at FCM 2002 (TPHOLs 2002 workshop).

# PVS Overview

- PVS was primarily built for software/hardware verification, by a team at SRI.
- One of the most widely used Higher Order Theorem Provers.
- Conceived as suitable for use as a Black Box “back-end” system.
- Mostly used in interactive mode, however and the close coupling of the Emacs interface made it difficult to access externally/distributed manner.
- Initial interface showed proof-of-concept but also showed necessity of changes to PVS operation and interface to produce a solid server interface.
- Utility to Calculemus projects primarily provided by the Real Analysis library of Gottliebsen.

# Specifying the Interface

- Flexible enough to be used for automatic or interactive proving.
- Where used automatically, flexible range of requests needed.
- Automatic proof: single message sent, single result received.
- Query for “proof object” must be possible following success.
- Query includes: theory, strategy/ies, flags for negative proof attempt, flag for interactive proof. Default strategy is (grind).
- Output includes:
  errors (parse, typecheck or Lisp error)
  result: proved, disproved, unknown (no positive proof found), unproved (neither positive nor negative proof found)

# Implementation the Interface

- Done by Sam Owre of SRI
- Lisp function *prove-as-black-box* with arguments:
  *name* of conjecture
  *lemma*: PVS syntax conjecture
  Optional:
  *pos-strat*: string or list of strings
  *neg-strat*: string or list of strings
  Keyword:
  *library*: string
  *file*: string
  *interactive*: t or nil

# Future Work

- Rewriting the MathWEB-SB code to talk to the new interface.
- Testing the interface with requests from Ωmega and Maple.
- Link with OpenMath parser for PVS queries and OMDoc output for PVS proof scripts.
- Writing client interface so PVS can query other MathWEB-SB servers.