HOL.88 and the future of HOL

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This document consists of the overheads for a presentation on HOL.88 and the future of HOL, prepared for the ‘compusec’ meeting in APRIL 1989.

NEW FEATURES IN HOL.88

FUTURE PROJECTS INVOLVING HOL

‘THE’ IED PROJECT
NEW FEATURES in HOL88 VERSION 1.05

LOOSE SPECIFICATIONS OF CONSTANTS
(as requested by ICL)

MULTIPLE CONSTANT INTRODUCTION

RECURSIVE TYPE DEFINITION PACKAGE
(developed by Tom Melham)

INTRODUCTION OF LIBRARIES

CUSTOMISABLE USER INTERFACE

IMPROVED ERROR MESSAGES

UNIX SYSTEM CALLS
FUTURE PROJECTS INVOLVING HOL

INTERFACING HOL to CATHEDRAL II
(ESPRIT BRA, CAMBRIDGE, PHILLIPS, IMEC)

TOTALLY VERIFIED SYSTEM
/software compiler and hardware/
IED, INMOS, SRI, OXFORD, CAMBRIDGE

INTERFACING HOL to ELLA
(IED PRAXIS BA CAMBRIDGE)

DOCUMENTATION for HOL
AUSTRALIAN MOD, CAMBRIDGE, SRI

FOUNDATIONS and TOOLS
for FORMAL VERIFICATION
IED, ICL, PVL, CAMBRIDGE, KENT

HOL IMPLEMENTATION in SML
at CALGARY
FOUNDATIONS and TOOLS for
FORMAL VERIFICATION

PARTICIPANTS:

ICL Defence Systems

Program Validation Limited

University of Cambridge

University of Kent

OBJECTIVES:

High Quality, High Assurance re-implementation of HOL (in SML)

Improvements to usability and productivity

Extension to software verification

Link with SPADE tools

Development of Libraries

Foundational Studies
HIGH ASSURANCE IMPLEMENTATION of HOL

following LCF paradigm
SEPARATE OUT CRITICAL CODE
into abstract data type

FORMALLY SPECIFY SYNTAX (in HOL) and SEMANTICS (in ZF-HOL)
of ABSTRACT HOL LOGIC

FORMALLY SPECIFY (in HOL)
ABSTRACT PROOF SYSTEM

INFORMALLY PROVE SOUNDNESS
of PROOF SYSTEM

IMPLEMENT CORE PROOF CHECKER
in HOL/ML

INFORMALLY PROOF CORRECTNESS
of IMPLEMENTATION
APPROACHES to CODE VERIFICATION
using
HOL

WRITE and VERIFY PROGRAMS
in INTERSECTION of HOL and ML

ADAPT SPADE TOOLS
to GENERATE
VERIFICATION CONDITIONS in HOL

define
PROGRAMMING LANGUAGE SEMANTICS
in HOL and
EMBED PROGRAM LOGICS
into HOL
(see MJCG paper)
TINKERING with the LOGIC

SCOPING of NAMES
(by using compound names)

OVERLOADING of NAMES
(disambiguation by type)

OVERLOADING of JUXTAPOSITION
MORE RADICAL CHANGES to LOGIC

FULL SUPPORT for MODULARITY
(with ML-like Polymorphism)

INTRODUCTION
of
DEPENDENT TYPES

RETREAT to PSEUDO-TYPES

REFLEXIVE FOUNDATIONS

CONVERGENCE with METALANGUAGE