ACL2 Support for Automated and Interactive Proof

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Dept. of Computer Science

KeY Workshop, July 27, 2015

Outline

Introduction

Background

Demos (I)

Rewriting in ACL2

Demos (II)

Very Brief Survey of ACL2 Features

Conclusion

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- **Please ask questions during the talk!**

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- Workshop series: #13 is at UT, Oct. 1-2, 2015.

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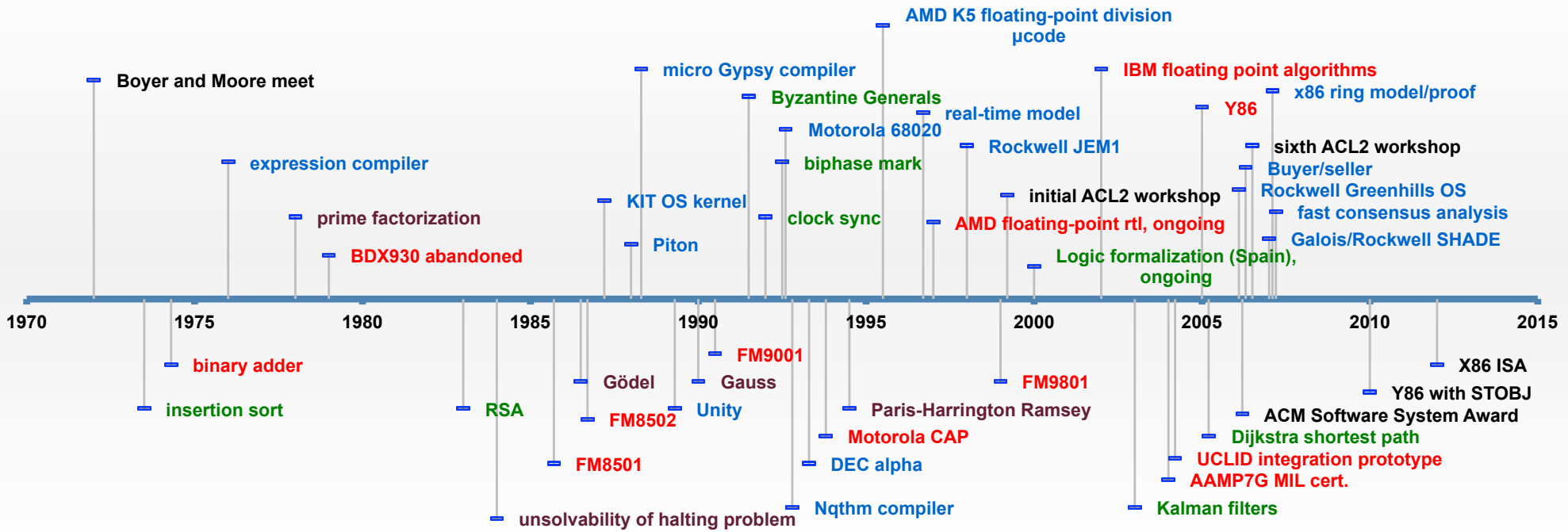
- UT Austin: x86 interpreter defined in ACL2, validation by co-simulation, proofs about x86 machine code

Partial timeline



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- See M. Kaufmann and J Moore, "Structured Theory Development for a Mechanized Logic." *Journal of Automated Reasoning* 26, no. 2 (2001) 161-203.

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A potential weakness: first-order logic with only basic quantifier support (but recursion helps).

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That talk mentions this link to several demos and their logs:

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  - . . . but lemmas are usually needed (sometimes from libraries).

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The documentation topic for rewrite shows many ways to control the rewriter (needed only occasionally). I'll mention only a few:

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                                    (SYNTAXP (QUOTEP Y)))
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B. Brock, M. Kaufmann, and J S. Moore. Rewriting with Equivalence Relations in ACL2. *J. Aut. Reasoning* 40 (2008).

M. Kaufmann and J S. Moore. Double Rewriting for Equivalential Reasoning in ACL2. *Proc. ACL2 Workshop 2006*.

M. Kaufmann and J S. Moore. Rough Diamond: An Extension of Equivalence-based Rewriting. *Proc. ITP 2014*.

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- JVM demo
- Our final demo illustrates "the method" recommended for dealing with proof failures.

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- . . . by exploring briefly the ACL2 documentation.

NOTE:
I would be very happy to elaborate on any of these topics!

Very Brief Survey of ACL2 Features (2)

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In particular, we might explore a few debugging features, as time and interest permit.

- accumulated-persistence
- break-rewrite
- cgen
- cw-gstack
- disassemble$
- dmr
- failed-forcing
- failure
- find-lemmas
- forward-chaining-reports
- guard-debug
- measure-debug
- nil-goal
- print-gv
- profile-acl2
- profile-all
- proof-checker
- proof-tree
- pstack
- quick-and-dirty-subsumption-replacement-step
- redo-flat
- remove-hyps
- set-debugger-enable
- set-guard-msg
- sneaky
- spacewalk
- splitter
- time-tracker
- trace
- walkabout
- watch

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