Over Twenty Years of Virtual Machine Development and Debugging Through Simulation

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Abstract

Fork from Dan Ing VM Dev in Restr St, Comp through C, simulation by interpreting the Slang. Evolved through the years with processor simulator and various extensions We explain how we generate the prod VM and how we simulate it for dev and debugging. We go through 2 experience example, GC and JIT, and show why we believe how valuable it the infra

Keywords Just-in-Time compiler, Virtual machine, Managed runtime, Tools

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1 Introduction

2 Virtual Machine Simulation & Production Infrastructure

2.1 Generating the Production Virtual Machine

2.2 Simulating the Virtual Machine

3 Garbage Collection Development

default behavior, cloneOnSavenge/GC Lemming debugging

Levels of Assertions: ST only (debugging code in St), Slang/C, Node.

4 Just-in-Time Compiler Development

Back-in-time debugging of mahcine state Conditional stepping.

5 Virtual Machine Analysis

Analysis of caches

Analysis of machine code zone

Analysis of the heap

6 Discussion, Related Work and Conclusion

6.1 Discussion

Simulation perf and its limitations Out of the simulation, FFI calls and call-backs

6.2 Related Work

Maxine inspectors

RPython toolchain, though it seems they don't do it (Balance abstraction and time to compile/simulate)

Conclusion

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