

Porting Jikes RVM to Linux running on IA64

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BongSuk Ko

Programming System Laboratory

Gwangju Institute of Science & Technology (GIST)

bsk@gist.ac.kr

Jikes RVM: award winning software



To explore programming language concepts and tools focusing on design, implementation and efficient use.

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2012: Jikes Research Virtual Machine (RVM)

The SIGPLAN Software Award for 2012 goes to the Jikes Research Virtual Machine (RVM), an open-source virtual computer implemented in the Java programming language, and capable of running programs written in Java and many other languages that compile to JVM bytecodes.

The award nomination names 32 contributors to the Jikes RVM project, but the project actually has more than double that number of contributors. Jikes RVM was the first Java-in-Java virtual machine and contains many innovations, especially on adaptive optimization and memory management.

<http://www.sigplan.org/awards/software/2012>

Prevalence in research community

2000.

1999

Implementing Jalapeño in Java

- Bowen Alpern, Dick Attanasio, John J. Barton, Anthony Cocchi, Susan Flynn Hummel, Derek Lieber, Mark Mergen, Ton Ngo, Janice Shepherd, and Stephen Smith.
- "1999 ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA '99)", Denver, Colorado, November 1, 1999.
- ""(Source code available as of version 2.0.0 of Jikes RVM.)""

Efficient and Precise Modeling of Exceptions for the Analysis of Java Programs

- [Jong-Deok Choi](#), [David Grove](#), [Michael Hind](#), [Vivek Sarkar](#).
- "1999 ACM SIGPLAN-SIGSOFT Workshop on Program Analysis for Software Tools and Engineering (PASTE '99)", Toulouse, France, September 6, 1999.
- ""(Source code available as of version 2.0.0 of Jikes RVM.)""

Dependence Analysis for Java

- [Craig Chambers](#), [Igor Pechtchanski](#), [Vivek Sarkar](#), [David Grove](#).
- "Workshop on Languages and Compilers for Parallel Programming (LCC)", San Francisco, California, October 1, 1999.
- ""(Source code available as of version 2.0.0 of Jikes RVM.)""

The Jalapeño Dynamic Optimizing Compiler

- Michael Burke, [Jong-Deok Choi](#), [Stephen Fink](#), [David Grove](#).
- "1999 ACM Java Grande Conference", San Francisco, California, October 1, 1999.
- ""(Source code available as of version 2.0.0 of Jikes RVM.)""

Jalapeño — a Compiler-supported Java Virtual Machine

2012

Work-Stealing Without The Baggage

- Vivek Kumar, Daniel Frampton, Stephen M. Blackburn, David Grove, Olivier Tardieu
- ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications, Tuscon AZ, October 2012

A Black-box Approach to Understanding Concurrency in DaCapo

- Tomas Kalibera, Matthew Mole, Richard Jones and Jan Vitek
- ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications, Tuscon AZ, October 2012

Down for the Count? Getting Reference Counting Back in the Ring

- R. Shahriyar, S. M. Blackburn, and D. Frampton
- ACM SIGPLAN International Symposium on Memory Management, ISMM '12, Beijing, China, June 15-16, 2012
- Source code available in the Jikes RVM repository as of August 2012 (see [RVM-979](#))

Barriers Reconsidered: Friendlier Still!

- Xi Yang, Stephen M. Blackburn, Daniel Frampton, Antony L. Hosking
- ACM SIGPLAN International Symposium on Memory Management, ISMM'12, Beijing, China, June 15-16, 2012

2011

100+ papers in conferences including PLDI and OOPSLA from 1999 to 2014

<http://jikesrvm.org/Publications>

Jikes RVM의 현재 상황

- Jikes RVM의 컴파일러는 baseline과 optimize compiler 2가지 종류가 있다.
- 현재 Jikes RVM은 IA32에서 작동
- IA64환경에서 baseline compiler는 불안정하게나마 porting이 되어있다.
- 그러나! 벤치마크가 실행되지 않으며, optimize compiler는 아직 porting이 되어있지 않다.

뭐 하나?

- Jikes RVM을 64bit 환경에 포팅한다.
 - baseline compiler
 - optimizing compiler
 - garbage collection

왜 하나요?

- 32bit 환경은 메모리 공간을 최대 4GB까지만 이용 가능
- 64bit 환경은 메모리 공간을 더 많이 이용할 수 있다.
- 그렇기에, 대형 어플리케이션을 32bit환경보다 더 효율적으로 실행 가능.
 - big data analytics
 - many core garbage collection for very large heap space
- 32 bit와 64bit 프로세서 성능 실험

연구 진척

- 현재는 기초 데이터들을 수집하는 단계
 - Dacapo 벤치마크를 IA64환경에서 실행
 - Jikes RVM내에서 IA32와 IA64의 호환성 조사



Thank you!



연구 진행 중의 문제점

- IA64 환경에서 Dacapo 벤치마크가 실행되지 않음

연구 진행 중의 문제점

- IA64 환경에서 Dacapo 벤치마크가 실행되지 않음
- IA64 환경에서 optimize compiler 실행 불가
- 대형 application을 실행할 경우 코드 사이즈가 매우 크기 때문에 이를 줄일 수 있는 방법 고안이 필요.

연구 진행 중의 문제점

| Benchmark | IA32 | IA64 | 비고 |
|------------|------|------|-----------------------|
| avroa | O | X | |
| batik | X | X | |
| eclipse | X | X | |
| fop | X | X | |
| h2 | X | X | |
| kython | O | X | |
| luindex | O | X | |
| lusearch | O | X | |
| pmd | O | X | 특정한 config 내에서는 실행 가능 |
| sunflow | O | X | |
| tomcat | X | X | |
| tradebeans | X | X | |
| tradesoap | X | X | |
| xalan | O | X | |

BaseBaseCopyMS, BaseBaselmmix, FastBaseAdaptiveCopyMS, FastBaseBaseSemiSpace. 총 4개의 config에서 pmd는 통과하지만 4개의 공통점을 찾지 못함.