Course Information

The class will be hands-on: we will study and experiment with a high-performance and very flexible Java virtual machine. The VM in question is known as Jalapeño. I have been using it for some time as a research tool and have been very happy with the ease of understanding and of modification. A peculiar and helpful aspect of Jalapeño is that it is itself written entirely in Java.

Jalapeño was developed at IBM Research, and it includes the garbage collector toolkit from UMass. It was recently renamed "Jikes RVM", and its source code is now freely available. See: `http://www-124.ibm.com/developerworks/oss/jikesrvm/`.

We will start the class off by reading several research papers and tutorials from the Jalapeño project and by browsing the source code. We will then design individual or group projects, which can include performance measurements of the existing system, modifications to the compilers (there are two in Jalapeño, and no bytecode interpreter), and modifications to the run-time system (including memory management).

I especially encourage undergraduates and master's students who are looking for thesis topics, and have an interest in Java and in language implementation, to take this class. (Master's students not looking for thesis topics: this fulfills the requirement for an advanced course in system design.)

Assignments and grading

In-class presentations (30%) and an implementation project (70%).

Meetings

By arrangement: contact instructor by email before semester begins!

Instructor

Darko Stefanovic, office FEC 345C, phone 2776561, email darko@cs.unm.edu — office hours Mondays 3:00-3:50, or by appointment.

Reading material

All reading material is freely available, mostly in the ACM Digital Library.

Class Meetings

- Jalapeño (JRVM) tutorial (3 meetings)
- 18 February - Sergiy Kyrylkov - Efficient Implementation of Java[tm] Interfaces: Invokeinterface Considered Harmless ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), Tampa, FL, USA, Oct 14-18, 2001.
- 25 February - Ben Andrews - Efficient Dependence Analysis For Java[tm] Arrays; EURO-PAR 2001, Manchester, England, September, 2001.
- 4 March - Sergiy Kyrylkov - Dynamic Type Checking in Jalapeo The Usenix Java Virtual Machine Research and Technology Symposium, April, 2001.
- 18 March - Jim Inoue - Linear Scan Register Allocation ACM Transactions on Programming Languages and Systems, Volume 21 , Issue 5 (Sept. 1999), pp 895-913.
- 25 March - Anthony Vestal - Optimizing Java Programs in the Presence of Exceptions 14th European Conference on Object-Oriented Programming (ECOOP 2000), Cannes, France, June 12-16, 2000.
- 1 April - Trek Palmer - A Comparative Study of Static and Profile-Based Heuristics for Inlining 2000 ACM SIGPLAN Workshop on Dynamic and Adaptive Compilation and Optimization (DYNAMO'00), Boston, Massachusetts, January 19-21, 2000.
- 8 April - Rotem Bentzur - Escape Analysis for Java 1999 ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA'99), Denver, Colorado, November 1, 1999.
- 15 April - Yaroslav Halchenko - ABCD: Eliminating Array Bounds Checks on Demand ACM SIGPLAN 2000 Conference on Programming Language Design and Implementation (PLDI 2000), Vancouver, British Columbia, Canada, June 17-21, 2000.
- 22 April - Bryan Cheng - Getting Around Garbage Collection Gridlock ACM SIGPLAN 2002 Conference on Programming Language Design and Implementation (PLDI 2002), Berlin, June 2002.
- 22 April - Mykola Dudar - A Framework for Reducing the Cost of Instrumented Code ACM SIGPLAN 2001 Conference on Programming Language Design and Implementation (PLDI'01), Snowbird, Utah, June 20-22, 2001.
- Project Presentations (2 meetings)