IBM Programming Languages and Development Environments Seminar 2011

IBM Research – Haifa
November 21, 2011

9:00 Registration

9:30 **Opening Remarks**
Seminar organizers

9:35 **Keynote: Liquid Metal: Programming in the Age of Heterogeneous Machines**
David Bacon
IBM Research – Watson

10:45 **Session I:**
A Review of Research in Behavioral Programming
David Harel, Assaf Marron, Smadar Szekely, Gera Weiss, Weizmann Institute of Science and Ben-Gurion University

11:15 **Poster/demo session**
(light refreshments)

12:00 **Session II:**
Towards Proactive Event-Driven Computing
Yagil Engel and Opher Etzion, IBM Research – Haifa

Semantic Model Differencing for Software Evolution
Shahar Maoz, Jan Oliver Ringert, Bernhard Rumpe, RWTH Aachen University

13:00 **PLDE Madness**
Brief five-minute presentations of ideas, viewpoints, thoughts – mail us to reserve your five minutes (plde2011@easychair.org)

13:30 Lunch

14:15 **Keynote: Watson Wins Jeopardy!**
Dafna Sheinwald
IBM Research – Haifa

15:15 **Poster/demo session**
(light refreshments)

15:45 **Session III:**
Classification of Software Metrics
Yossi Gil, Maayan Goldstein, Dany Moshkovich, Technion IIT and IBM Research – Haifa

Code-Motion for API Migration:Fixing SQL Injection Vulnerabilities in Java
Aharon Abadi, Yishai Feldman, Mati Shomrat, IBM Research – Haifa and Tel Aviv University

16:45 **Concluding Remarks**
Oded Cohn, Director, IBM Research – Haifa

Invited Talks

Liquid Metal: Programming in the Age of Heterogeneous Machines

David F. Bacon, IBM Research – Watson

The goal of the Liquid Metal project is to allow a heterogeneous system of conventional processors, GPUs, and reconfigurable hardware (FPGAs) to be programmed in a single language with transparent, dynamic execution across the aggregate computing resources — to "JIT the hardware." Achieving this goal requires significant innovation across the entire system: language design, compiler technology, hardware synthesis, the run-time system, and hardware protocols. I will give an overview of the Liquid Metal language and the tool chain we have built, present some initial results, and describe challenges for the future.

David F. Bacon is a Research Staff Member at IBM's T.J. Watson Research Center. He led the Metronome project, which pioneered hard real-time garbage collection, opening the use of high-level languages like Java for time-critical systems in financial trading, aerospace, defense, video gaming, and telecommunications.

Dr. Bacon's algorithms are included in most compilers and run-time systems for modern object-oriented languages, and his work on Thin Locks was selected as one of the most influential contributions in the 20 years of the Programming Language Design and Implementation (PLDI) conference. His recent work focuses on programming language design, game-theoretic approaches to software development, and reconfigurable hardware. He received his Ph.D. in computer science from the University of California, Berkeley and his A.B. from Columbia University. He is a member of the IBM Academy of Technology, has served on the governing boards of ACM SIGPLAN and SIGBED, and is a Fellow of the ACM.

Watson wins Jeopardy!

Dafna Sheinwald, IBM Research – Haifa

Watson is an application of advanced natural language processing, information retrieval, knowledge representation and reasoning, and machine learning technologies to the field of open domain question answering. Watson is built on IBM's DeepQA technology for hypothesis generation, massive evidence gathering, analysis, and scoring. Watson runs on a cluster of 90 IBM Power 750 servers in 10 racks with a total of 2880 POWER7 processor cores and 16 Terabytes of RAM. The POWER7 processor's massively parallel processing capability is an ideal match for Watsons IBM DeepQA software, enabling it to respond within less than 3 seconds.

As a test of its abilities, Watson competed on the renowned television quiz show Jeopardy! The competition aired in three Jeopardy! episodes, dedicated to this IBM Challenge, running on February 14–16, 2011, and attracting millions of viewers, at home and at numerous "watch parties" across North America. Watson competed against Ken Jennings, the record holder for the longest championship streak, and Brad Rutter, the current biggest all-time money winner on Jeopardy!. Watson passed the test and emerged victorious.

In this talk I tell more about the challenge, Watson's architecture and technologies, IBM Haifa's contributions to them, and anecdotes from the grand match. I will also describe some of the methodologies and software development tools employed in this project.

For more background information on Watson and the grand challenge, see youtube; e.g., http://www.youtube.com/watch?v=seNkjYyG3gI

Dafna Sheinwald is a member of the Information Retrieval department in Haifa Research Lab. She earned her D.Sc. from the Technion, Israel Institute for Technology. She subsequently joined IBM and worked at the Haifa Research Lab, and for two years, at the Almaden Research Center. Dafna worked on data compression for computer systems, and in the recent years -- on Information Retrieval in the enterprise, directly contributing to several related IBM products. Dafna has taught the introductory course to Information Theory at the Computer Science Department of Haifa University. She has served on the program committee of the annual IEEE Data Compression Conference and the committee of the IEEE Conference on Software Science, Technology and Engineering.

Posters

Model Correctness Patterns as an Educational Instrument: An Experience Report
Azzam Maraee, Mira Balaban, and Arnon Sturm, Ben-Gurion University

An Overview of PathLP: A Logic Programming Language of Path Expressions
Igal Khitron, Michael Kifer, and Mira Balaban, Ben Gurion University and Stony Brook University

Pragmatic Modeling with Object-Process Programming
Arieh Bibliowicz and Dov Dori, Technion – Israel Institute of Technology

Adding Quantitative Aspects to a Conceptual Model: Simulink as an OPM Computational Subcontractor
Aharon Renick and Dov Dori, Technion – Israel Institute of Technology

Demos

A Review of Research in Behavioral Programming
David Harel, Assaf Marron, Smadar Szekely, and Gera Weiss, Weizmann Institute of Science and Ben-Gurion University

Code-Motion for API Migration:Fixing SQL Injection Vulnerabilities in Java
Aharon Abadi, Yishai Feldman, and Mati Shomrat, IBM Research – Haifa and Tel Aviv University

Show-and-Tell Play-In: Combining Natural Language with User Interaction for Specifying Behavior
Michal Gordon and David Harel, Weizmann Institute of Science

BMOCK - C++ Mocking Framework
Leonid Frenkel

Make Your Build System DRY
Yossi Zach, NDS

Tool Support for Enforcing Security Policies on Databases
Jenny Abramov, Clint Feher, Peretz Shoval, and Arnon Sturm, Ben-Gurion University