

The University of Tokyo and Sun Microsystems Commence Joint Research Projects on High Performance Computing and Web-based Programming Languages

*Improving Efficiency and Simplicity of Fortress, Ruby and JRuby Languages
is Current Focus for Unique Academic-Corporate Collaborative Model*

TOKYO and SANTA CLARA, Calif. -- February 27, 2008 -- The University of Tokyo and Sun Microsystems, Inc. (Nasdaq: JAVA) today announced two joint research projects that will focus on High-Performance Computing (HPC) and Web-based programming languages. These research projects are a direct result of the joint development agreement signed in June 2005 to establish a new university-corporate collaboration model. The research projects will be the first international collaboration that comes out of the Proprius21 scheme advocated by the University for producing visible results from research collaborations with private enterprises.

The two research topics are:

- Development of a library based on skeletal parallel programming in Fortress
- Implementation of a multiple virtual machine (MVM) environment on Ruby and JRuby

“We are very pleased to announce the commencement of two research projects with Sun Microsystems. We believe our close relationship can create knowledge contributing to both industrial and academic fields,” said Koichi Yamada, Managing Director of the University of Tokyo.

“We are delighted to be backing the work at the University of Tokyo, which we expect to help enable a quantum leap in the scaling abilities of modern Web frameworks like Ruby on Rails,” said Jim Parkinson, Vice President Developer, Tools and Services, Sun Microsystems Inc.

Development of a library based on skeletal parallel programming in Fortress

A group led by Professor Masato Takeichi and Associate Professor Zhenjiang Hu at the Graduate School of Information Science and Technology, the University of Tokyo will collaborate with Dr. Guy Steele and his team at Sun Labs to develop a library based on skeletal parallel programming in Fortress (a programming language designed by Sun for high-performance computing). The collaborative research is expected to significantly enhance the convenience of parallel programming, and the results will be disclosed under an OSI-approved license.

Skeletal parallelism is a programming method that uses pre-defined components (skeletons) extracted from general-purpose parallel processing constructs to make parallelization process simpler and more scalable, while shielding programmers from the complexity of parallelism such as task communication and synchronization. In addition, the use of constructive algorithmics is being studied to mathematically understand the structure of programs to facilitate program generation and improve the efficiency through program transformation.

Fortress is a new programming language being created “to do for Fortran what Java™-based technologies have done for C” by enabling highly productive programming constructs. The wide-ranging language constructs of Fortress and the knowledge gained from the study of skeletal parallel programming are expected to produce a synergy effect. Once the theoretical and implementation issues of the programming language are clearly defined, development of a library will be attempted.

The collaborative research is scheduled to continue until the end of March 2009. For the first year, Sun will contribute funding to the research which will be conducted at Sun Labs and at the University of Tokyo. The University will hire a postdoctoral researcher to conduct the research.

Implementation of a multiple virtual machine (MVM) environment on Ruby and JRuby

A group led by Professor Ikuo Takeuchi at the Graduate School of Information Science and Technology, the University of Tokyo will collaborate with Sun's Tim Bray (Director of Web Technologies) and the members of the JRuby team to implement a multiple virtual machine (MVM) environment on both Ruby and JRuby. The MVM environment is expected to make Ruby programs run more efficiently than was previously possible. The results of the research are scheduled to be open sourced via the broader community of Ruby developers, which could inspire further innovations.

Previously, running more than one application simultaneously on Ruby required multiple interpreters, leading to excessive memory consumption. The proposed MVM environment could generate multiple VM instances on a single interpreter, allowing applications to run more efficiently. The collaborative research aims to clarify such technical issues as the definition of common interfaces for using MVM, parallelization of VM instances and memory sharing, and then to implement technologies that can be used on Ruby and JRuby. While Ruby has already been widely in use in commercial and other environments, the research on MVM will further enhance the performance and utility of Ruby.

The collaborative research is scheduled to continue until the end of September 2009. For the first year, Sun will contribute funding to the research. In addition to the principal researchers from Sun's JRuby team and Professor Takeuchi's group, various other researchers and programmers will be invited to join in this research.

For many years, the University of Tokyo and Sun have been collaborating in IT research in such areas as microprocessors and high-speed networking. With the inception of the latest collaborative research, the two organizations are strengthening their relationships even further. They will explore the possibility of conducting joint R&D into next-generation technologies in the fields of digital campuses, e-learning, and computer sciences. Specifically, collaborative research projects on security, compilers, HPC tools, and mobile technologies will be contemplated to satisfy the market needs in the near future.

About the collaborative research agreement based on the new University-corporate relations model

The University of Tokyo has been advocating Proprius21 -- a scheme designed to produce visible results from research collaborations with private enterprises -- which has proven successful with many private enterprises in Japan. The joint research agreement with Sun was the first instance where the Proprius21 scheme was applied to a foreign enterprise, and the two initial projects represent the first overseas research collaboration under this scheme. For further information and case studies of Proprius21, please visit <http://www.ducr.u-tokyo.ac.jp/en/proprius21/>

The press release on the research collaboration agreement between the University of Tokyo and Sun Microsystems (June 2005) can be found at <http://jp.sun.com/company/Press/release/2005/0620.html>
(The press release is available only in Japanese language)

About Sun Microsystems, Inc.

A singular vision – “The Network Is The Computer”™ -- guides Sun in the development of technologies that power the world's most important markets. Sun's philosophy of sharing, innovation, and building communities is at the forefront of the next wave of computing: the Participation Age. Sun can be found in more than 100 countries and on the Net at <http://sun.com>.

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