

K COMPUTER



Dr. Ryutaro Himeno
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the Advanced
Center for
Computing and
Communication
(ACCC)

SCIENTIST'S BEST PARTNER

ALENA ECKELMANN

“K” is short for the kanji *kei*, meaning 10 quadrillion (10^{16}) that serves as the name of fourth most powerful supercomputer in the world.

Developed by RIKEN, a Japanese natural science research institute, in partnership with the electronics firm Fujitsu, the K computer is hosted at the RIKEN Advanced Institute for Computational Science (AICS) on Kobe City’s Port Island. K computer is part of the High Performance Computing Infrastructure (HPCI) promoted by the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT).

Supercomputers have tens of thousands of processors enabling a hitherto unknown speed of calculation to develop algorithms that provide solutions to science’s most difficult problems. In the case of K computer, there are 82,944 2.0 GHz 8-core SPARC64 VIIIfx processors which are contained in 864 cabinets. Each cabinet houses 96 computing nodes and each node consists of a single processor and 16 GB of memory.

“Such a speed is almost like a miracle. It makes simulations that seem impossible come true,” says Dr. Ryutaro Himeno, Director of the Advanced Center for Computing and Communication (ACCC),

which manages RIKEN’s computing and communications infrastructure. Dr. Himeno has been involved in a K computer-related life science project, for six years. As a Project Leader, he contributed to the development of more than thirty software applications.

Operational since June 2011, the first public research projects with K computer were launched in September 2012. There are currently 62 projects, including 29 general use projects, 8 young researcher projects and 25 industry-related projects.

One recent other project was the development of advanced novel data software for the brain simulation software NEST. Conducted in collaboration with the German research institute Forschungszentrum Jülich, the Okinawa Institute of Science and Technology (OIST) and the RIKEN Brain Science Institute (BSI), the NEST team successfully simulated a brain network consisting of 1.73 billion nerve cells connected by 10.4 trillion synapses by using the 82,944 processors of the K computer. To complete the simulation of 1 second of neuronal network activity in real time, K computer takes 40 minutes.

International cooperation is an important component of these research initiatives. Four members hail from China, Korea, Germany and the United Kingdom. As Dr. Himeno observes, “Computer coding must have international acceptance in foreign scientific communities to survive. Utilization by foreign users provides proof of international support and trust in our work.”



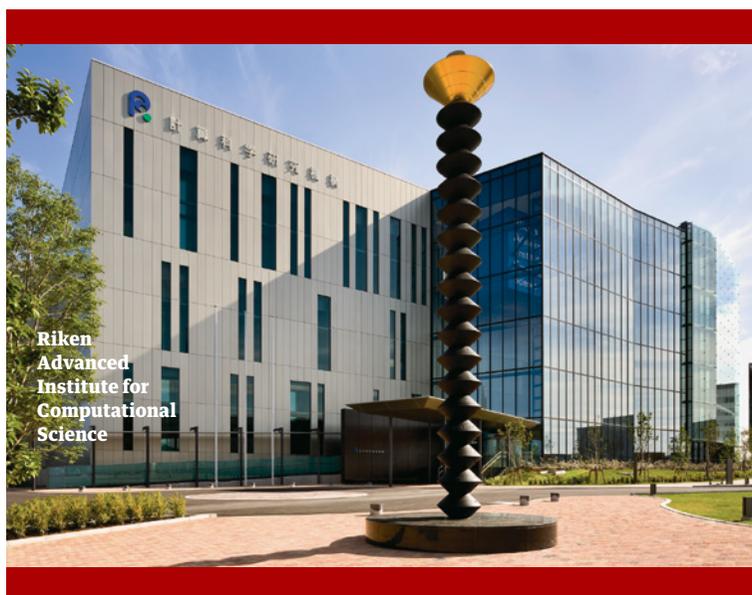
K Computer housed in Riken AICS building

One of the foreign researchers at RIKEN is Dr. Florence Tama. Originally from France, she is now a Research Unit Leader of the Computational Structural Biology unit. Her research group is trying to determine the dynamics and structure of biological molecules.

Dr. Tama notes that “Computers such as K computer provide the resources that enable us researchers to think ahead and find solutions to global problems. I can see a huge impact on society from the progress that is being made as a result of our research endeavors. RIKEN and Japan are very open to international collaboration and there are several funding mechanisms in place. Such cooperation is critical for sharing ideas within the scientific community.”

Perhaps put most succinctly by Dr. Himeno, “Different native languages exist

around the globe, but computers like K computer share one common language. Even if there are borders between countries, there are no borders in science.” 



Riken Advanced Institute for Computational Science