BSC~Microsoft Research Centre

Five years of fruitful joint collaboration

The BSC (Barcelona Supercomputing Center)-Microsoft Research Centre (BSCMSRC) in Spain is the third European joint research centre established by Microsoft Research. On Nov. 2, the centre is celebrating its 5th year anniversary.

Processor manufacturers such as Intel, AMD, IBM and Oracle are now exclusively making multi-core processors. These processors have multiple processing elements, and programmers need to write efficient parallel code to make efficient use of them. The charter of BSCMSRC is to make it easy for programmers to develop parallel processing software. The researchers are attacking this problem from two sides: at BSC the hardware researchers are looking at new computer architectures that facilitate parallel programming and at Microsoft Research the software experts are investigating new programming abstractions that are easy to embed in hardware.

One technology that the BSCMSRC researchers are looking at is transactional memory (TM). TM makes it easier to write parallel programs that frequently share data. Previous mechanisms such as locks that deal with this issue lead to complex programs and are unwieldy to use. The Centre has developed the most sophisticated TM applications to date, QuakeTM and Atomic Quake. These applications, which are based on the open-source Quake game server will be useful to evaluate the new TM-equipped chips, such as IBM's BlueGeneQ processor, that will ship in the near future. As part of the €4 million VELOX project funded by the European Commission, BSCMSRC has co-ordinated the development of a fully integrated TM system that includes hardware simulators, language runtime systems, and compiler support alongside the new TM applications,

Another technology that BSCMSRC researchers are looking at is a dataflow programming model, where data that is produced and consumed in applications automatically "flows" at program runtime, freeing the programmer from explicitly architecting data movements in his/her application, and making it much easier to develop software. The programming model, called StarsS was developed at BSC. The BSCMSRC researchers are integrating the StarsS programming model with the Barrelfish Research OS, a new message-passing open-source Operating System, being developed by Microsoft Research and ETH, Zurich.

Mateo Valero, director of BSC, comments: "I am proud of the impact of the work done by a very young team at the Centre in our 5 years of existence. With the multidisciplinary competences of our research personnel, the Centre is in a unique position to influence both hardware and software design. I am also very happy to see

Microsoft Research being a major actor in our little *Silicon Port* at Barcelona in the Mediterranean".