6th Seminar on High Performance Numerical Computing

January 23rd, 2012 – 10h30-12h15
Maison de la Simulation
Orme des Merisiers du CEA/ SACLAY – Amphi Bloch
CNRS/PRISM – INRIA Saclay – CEA/DEN/DANS

10h30-11h30 - **The K computer and XcalableMP parallel language project - Towards programming environment for peta-scale computing,** Mitsuhisa SATO, University of Tsukuba and RIKEN AICS.

Currently, Japanese petascale computing facility, named the K computer, is being developed and the installation will be finished during the year 2012 at RIKEN Advanced Institute for Computational Science (AICS) The K computer has been ranked as the top 1 in the latest top 500 list. The goals of the project are not only to develop and install the most advanced high performance supercomputer system with 10-peta flops class performance, but also development and deployment of scientific peta-scale application software, which should be made to attain the system maximum capability, in various science and engineering fields. The programming environment including programming languages is an important research topic to improve performance and increase productivity of computational sciences using the high performance computer systems. In the past Earth Simulator project, HPF was selected to be an advanced programming language. For the K computer, a PGAS parallel programming language called XcalableMP (XMP for short), which is designed by XcalableMP Specification Working Group, will be deployed by the AICS. While it adopts the PGAS model, the concept of XMP's global-view programming model reflects several experiences of HPF obtained at the time of the Earth Simulator project. In this talk, I will present the XcalableMP programming language, will be used as a programming environment for our petascale computing facility, the K computer.

11h30-12h15 – **Large-scale eigenvalue computation with PETSc and YML ,** Makarem DANDOUNA – Lab. PRISM - Univ. de Versailles St Quentin.

The increase in computational power and the diversity of hardware have prompted the inception of linear algebra methods that can exploit multiple levels of concurrency to achieve larger orders of computational and problem solving scalability. However, currently existing numerical libraries are not able to exploit the multi-level parallelism offered by these methods neither the great power in new distributed systems generations. Besides, only few of these libraries are designed on object oriented approach and they do not allow code reuse.

In this talk, we present a design model for numerical libraries allowing their reuse on parallel and distributed systems. Then, we show an application of our approach using YML scientific workflow environment jointly with PETSc library. We focus on large scale eigenvalue computation with the hybrid method MERAM . We will present, also, a scalable implementation of MERAM on the postpetscale framework combining YML and XcalaleMP language. Finally, the results of some experiments on Grid5000 plateform and NERSC computers will be given.

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