Tuesday 26th, 13h30 - 15h15

Session 3 : Strategy and requirements of coupled climate models for the next generation of high performance computer

- J.-C. André (CERFACS & INES Board): Context
- X. Delaruelle (CEA/DAM) : An introduction to PRACE
- E. Maisonnave (CERFACS) : Performance of ARPEGE-NEMO coupled model on IBM B/G L & NEC SX9
- Round table

Context

IS-ENES NA1

Objectives

Establish the strategy of the ENES consortium with regards to the future organisation of the climate and Earth system modelling community in Europe, concerning:

- Development, dissemination, and application of climate and Earth system models
- Use of the European high-performance computing (HPC) ecosystem
- Interface with decision makers.

Task 2: Prepare the ENES strategy with regards to the HPC-ecosystem

Access to HPC resources is crucial for the field of climate and Earth system modelling. The amount of HPC resources determines the range of problems that can be studied, the spatial resolution that can be used, the level of complexity that can be solved, the time-scales of climate dynamics that can be addressed, and the number of experiments that can be run. Several orders of magnitude in computing power are still lacking to fully address all the relevant space and time scales; progress in climate science will strongly benefit from technology improvements.

An effective European computing infrastructure for climate and Earth system modelling requires a full HPC ecosystem: from Tier-0 world-class facilities allowing high-end simulations at the top to properly nested and scaled Tier-1 national facilities to develop and optimise models and to run many lighter experiments.

Task 2 will elaborate the ENES strategy with regards to this HPC-ecosystem including high-end capability systems.

ENES and the European HPC-ecosystem

ENES has been involved from its beginning in the European project PRACE "Partnership for Advanced Computing in Europe". ENES expects PRACE to provide the top of the pyramid of the HPC-ecosystem.

ENES has participated in the elaboration of the scientific case for PRACE in 2006, emphasizing the crucial impact of accessing world-class computing resources for Europe, not only for science innovation and for solving frontier problems in climate science, but also to maintain world-class European expertise on climate change issues. ENES is considered by PRACE as the interface to the European climate and Earth system modelling community.

An essential element of the HPC-ecosystem comprises the Tier-1 facilities, typically national HPC facilities. ENES will interact closely with the European DEISA2 project, which will organise a significant portion of the Tier-1 facilities, including their relationship with PRACE.

In Task 2, ENES will prepare for PRACE and DEISA2. Task 2 will define the needs of the climate community, will define climate benchmarks, will organise the interface between PRACE and the climate scientific community, will update the scientific case in the field of climate science and, when facilities will be available, will organise the lost advanced and adapted experiments to benefit from such facilities.

Preparing for future HPC architectures

The ENES strategy for the HPC-ecosystem must also account for the preparation for the future generation of computing architectures and facilities. To benefit from the increasing number of processors will very likely require a profound revisit of the basis of most of the actual numerical models. Such research and development is on-going in the USA and Japan but has not yet been organised in Europe for climate and Earth system models. Under this task the community will be assembled in workshops to survey on-going activities, share expertise and establish the European strategy to develop the next generation of climate and Earth system models, allowing the community to benefit from the most powerful computing facilities as they become available.

Task 2 wil mainly require small workshops of experts to design the contributions to PRACE and DEISA2.

Round-Table

Representatives from the main climate coupled models

How do you see your needs with respect to HPC ?

Plans for model development wrt massively parallel computers ?

Possible access to PRACE prototypes ?

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Next step

Ad hoc expert meeting (10-12 people) convened by A. NAVARRA (CMCC, Bologna) on July 3rd:

- multi-core architecture and climate models

- langages

- …