PROPOSAL FOR A POST DOCTORAL POSITION AT METEO-FRANCE

Participation in ESCAPE PROJECT :
Design and implementation of performance simulation software

Duration : 18 months

Applicants are invited for a 18 month post-doctoral position starting on 01/05/2016, or asap after that date, on the following subject: "Design and implementation of performance simulation software in the framework of the participation of Météo-France in the ESCAPE project".

The deadline for application is **20 May 2016**.

Context:

The position will be funded by the ESCAPE project. ESCAPE (Energy-efficient Scalable Algorithms for Weather Prediction at Exascale) is a European project designed to develop world-class, extreme-scale computing capabilities for European operational numerical weather prediction (NWP) and future climate models. The biggest challenge for state-of-the-art NWP arises from the need to simulate complex physical phenomena within tight production schedules. Existing extreme-scale application software of weather and climate services is ill-equipped to adapt to the rapidly evolving hardware. This is exacerbated by other drivers for hardware development, with processor arrangements not necessarily optimal for weather and climate simulations. ESCAPE will attempt to redress this imbalance through innovation actions that fundamentally reform Earth system modelling.

The goal of this post-doctoral position is to design a set of tools and libraries to assess the time required by different NWP algorithms to produce the solution (that is a forecast). The development of a full NWP system is long and should be designed to last for several decades; it is therefore of utmost importance to make the right choices when designing a dynamical core or any other part of a NWP system. The development of simulation methods and tools could allow for assessing and comparing the performances of different prototype algorithms, and eventually select the most appropriate.

Work description:

The ESCAPE project will provide different programs that transcripts different dwarfs. A dwarf is an algorithmic method that captures a pattern of computation and communication typical of a NWP model such as 2-dimensional spectral transforms or horizontal derivative computation in grid-point space.

The objective is to model the response (in terms of time to solution) of the different hardware components involved in running each dwarf. These hardware components are processors, memory, Infiniband fabric.

The successive tasks to be done will be :
1) Get familiar with NWP dwarfs and traditional NWP algorithms.
2) Get an advanced knowledge of MPI, OpenMP, profiling tools.
3) Learn how to use already existing software (like Simgrid) for modeling message passing and time to solution of MPI applications.
4) Look at GNU OpenMP library and understand how to adapt it to make simulations of OpenMP loops.
5) Understand how to use the previous software components can help to model the time to solution of NWP dwarfs; build simulation prototypes.
6) Derives coding standards for instrumenting new code, so that time to solution simulation be part of newly developed software.

Following other developments in the ESCAPE project will be crucial in this work; NWP dwarfs will be developed and shall be studied and modeled by the applicant. Tools and optimization techniques developed in the project will need to be looked at in detail.

Required qualifications:
Ph.D. in computer science, atmospheric sciences, or a French engineer diploma obtained before the date of the application.
- Expertise in C, C++, Unix, scripting (Perl or Python), system programming (threads, compilers, etc...), and high performance computing
- Basic knowledge of Fortran
- Fluency in English language
- Experience of teamwork

Practical information:
The successful applicant will be based at the CNRM (National Meteorological Research Centre) . The position will start on the 01 May 2016 for 18 month duration. The gross

monthly salary will range between 2000 and 3200 euros before taxes, depending upon qualifications .

Movements are possible, essentially on Reading (UK).

For full consideration, an application letter including a detailed statement of research interest, along with a curriculum vitae (including technical experience, publications and conferences, computing skills and different language practice) and the names, telephone and email address of 2 referees.

The package should be sent by email before the 01 of April 2016 to:
philippe.marguinaud@meteo.fr

For more informations, please contact:

Philippe Marguinaud
Météo-France.
CNRM
42 avenue G. Coriolis
31057 Toulouse Cedex 1
France
Tel. : +33 (0)5 61 07 84 21
Fax : +33 (0)5 61 07 84 53
Email : philippe.marguinaud@meteo.fr

For more details about CNRM please visit: www.cnrm.meteo.fr, for a description of the ESCAPE project, see http://www.ecmwf.int/en/research/projects/escape .