Contribution ID: **34** Type: **not specified**

A mixed precision implementation in Numerical Weather Prediction models

Wednesday, 22 September 2021 08:40 (20 minutes)

In the past few years the Barcelona Supercomputing Center has been involved in different european projects which aimed to optimize the computational performance of oceanographic state of the art models. In this framework we developed, and successfully applied, a tool able to automatically identify the numerical precision required for each real variable present in a given Fortran code.

We will present the work that has been done to adapt this workflow to the Panther library. Panther (P-Adaptive Numerical Tool for High order Efficient discRetizations) is a discontinuous finite elements library developed at ECMWF for Numerical Weather Prediction models. It includes both a full dynamical core prototype based on the combination of the semi-Lagrangian (SL) semi-implicit (SI) time integration approach with the discontinuous Galerkin (DG) space discretization method as well as different transport schemes such as SL-DG advection. We focused on the SL-DG solver. Starting from the style of the code this work presented a great challenge: up to now we always confronted ourselves with monolithic Fortran 90 style codes (if not mixed with Fortran77), while Panther uses the most advanced features of Fortran 2018, making of this code a good example of a Fortran Object Oriented Programming style code. We will show how we were able to discriminate, among all the variables, those that are more sensitive to numerical precision and can not be demoted to single precision. Eventually we will illustrate the general gain in performance that can be achieved with this method.

Primary authors: PARONUZZI TICCO, Stella Valentina (Barcelona Supercomputing Center); RODRIGUEZ, Eloi (Barcelona Supercomputing Center); Mr ACOSTA, Mario (Barcelona Supercomputing Center)

Presenters: PARONUZZI TICCO, Stella Valentina (Barcelona Supercomputing Center); TUMOLO, Giovanni (ECMWF)

Session Classification: Session 5

Track Classification: 19th Workshop on high performance computing in meteorology