Oral.3: **14:30-14:45. Towards a Python-Based Performance-Portable Finite-Volume Dynamical Core for Numerical Weather Prediction**

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Abstract

We present recent progress in the development of a Python implementation of the next-generation finite-volume non-hydrostatic dynamical core option IFS-FVM at ECMWF and its member state partners. The main driver behind the IFS-FVM development is the suitability of the non-oscillatory finite-volume numerical schemes for convective-scale resolutions and increasing multi-level parallelism. Starting from the original Fortran code targeting CPU-based systems, sustainable implementation with respect to emerging and future heterogeneous computing platforms is addressed by a profound software redesign for IFS-FVM that leverages the GT4Py framework. The user-facing part of GT4Py consists of a domain-specific language embedded in Python which allows to express stencil-based computations in a hardware-agnostic fashion. By exploiting automatic code generation techniques, the internal toolchain of GT4Py converts the high-level definition of the stencil kernel into optimized code targeting specific computer architectures. This separation of concerns between domain scientists and performance specialists not only enables performance portability, but also improves the readability and maintainability of the application code. We report on the numerical and scientific activity which accompanied the implementation of a limited-area version of the IFS-FVM on Cartesian grids. Ongoing work towards the global model on unstructured meshes and aspects of the physical parametrizations are discussed.