



Weather & Climate Data API for the Convergence of HPC and Cloud Workflows In LEXIS

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ECMWF is a partner of LEXIS, an EU-funded Horizon 2020 project which focuses on the convergence of large-scale HPC and cloud-run data analytics workflows. The emphasis of LEXIS will be on how HPC and cloud systems interact; how they can share data; and methods to compose workflows of tasks running on both cloud and HPC systems. LEXIS will develop infrastructure to enable these workflows and demonstrate its abilities through three large-scale socio-economic pilots, targeting aeronautics, weather climate, and catastrophe alert systems.

For the weather & climate pilot, there are several complex workflows each consisting of various meteorological components, including:

- Conventional observation data sources (satellite, radar, etc.)
- Unconventional observation data sources (mobile phones, personal weather stations and other IoT devices)
- Global weather models running on HPC in the UK (by ECMWF)
- Regional weather models running on HPC in Italy, Germany or Czechia (by CIMA Foundation)
- Cloud-based applications running in Germany or Czechia including:
 - Continuum hydrology simulations (by CIMA Foundation)
 - RISICO fire-risk simulations (by CIMA Foundation)
 - Limagrain agricultural impact models (by Numtech)
 - ERDS Extreme Rainfall Detection System (by ITHACA)

ECMWFs role in the project is to develop a distributed Weather & Climate Data API (WCDA) which will facilitate the interchange of data between the aforementioned components. ECMWF already has proven technology for the storage of large-scale, time-critical weather & climate data – namely the FDB5 (Fields Database v5) – and this will be leveraged in LEXIS. Specifically, modifications will be made to the FDB5 to allow it to be shared across multiple sites, and a REST interface will be built which will allow it to be efficiently and easily accessed by both HPC and cloud models. The WCDA will also provide a notification systems to trigger HPC and cloud workflows based on the availability of required datasets, thus allowing real-time operational workflows.

The WCDA will be a comprehensive solution to the problem of sharing time-critical meteorological data between HPC and cloud models. Beyond LEXIS, it will lay the foundations for the convergence of HPC and cloud at ECMWF, and facilitate data transfer between ECMWFs operational forecasts and the European Weather Cloud, developed by ECMWF and EUMETSAT. This poster will illustrate the system design of the WCDA and provide more depth on the LEXIS workflows which will utilise it.