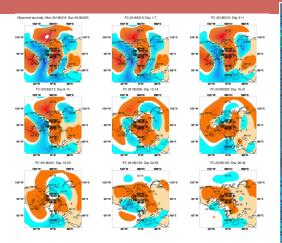
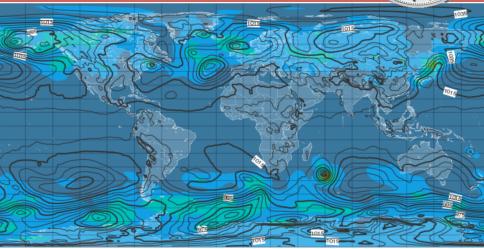
Weather Forecasting Performance Analysis on Isambard Mihail-Calin Ionescu, supervised by Simon McIntosh Smith University of Bristol, Department of Computer Science





Isambard

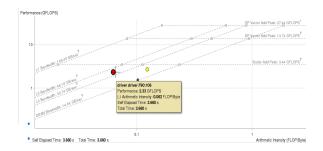
- Tier 2 Supercomputer The first ARM HPC cluster, it will have over 10.000 ARMv8 cores.
- Two Thunderx2 x 32 cores per node
- Incorporates multiple architectures: x86 (Broadwell), XeonPhi, Nvidia Pascal GPUs

Aims

- Exploring how well the code works out of the box, the higher bandwidth provided by Thunderx2 should lead to better performance compared to Broadwell
- Comparing different compilers (Cray, Intel, GNU, ARM HPC)
- Comparing vectorisation levels (AVX vs NEON vs SVE)
- Potential benefits of HBM-style memories on future CPUs

Background - ECMWF

- IFS Integrated Forecasting System provides medium (10 days) to long range (6 months) forecasts.
- OpenIFS Open source version of IFS, lacks a few of the IFS features
- ESCAPE dwarfs smaller, stand-alone programs, the building blocks for IFS
- Most codes are memory bound



- Obtained runtime analysis, roofline models for a subset of the ESCAPE dwarfs

Progress

Starting building OpenIFS on Isambard

Cavium CN99XX - 1st member of THUNDERX Family



- 24/28/32 Custom ARMv8 cores
- Fully Out-Of-Order (OOO) Execution
- 1S and 2S Configuration
- Up to 8 DDR4 Memory Controllers

- Server Class RAS features
- Server class virtualization
- Integrated IOs
- Extensive Power Management

2nd gen Arm server SoC Delivers 2-3X higher performance

CAVIUM

Issues

- ARM nodes availability offline for 3 week at the moment
- Compilation issues on ARM when using the Cray and ARM **HPC** compilers

