

Executive Summary

The original vision of the Mont-Blanc project when started in 2011 was to leverage embedded commodity technology for performing high performance computing. This translated into enabling ARM in high performance computing, deploying ARM-based clusters for running scientific applications using a system software as similar as possible to the one used in “standard” high performance computing clusters. These objectives have been achieved during the Mont-Blanc 1 project. The main objective of the Mont-Blanc 2 project has been to complement the effort, started with Mont-Blanc 1, in developing a comprehensive, stable, and accessible system software stack for ARM-based scientific computing systems, as well as testing new ARM-based platforms appearing on the market.

The consortium has ported to ARM and consolidated a development toolchain including debugging tools (Allinea DDT and Temanejo), performance analysis tools (Score-P, Scalasca, Cube, Extrae, Paraver, and MAQAO), a performance prediction tool (Dimemas), and a tool for automated kernel optimization (BOAST). Mont-Blanc 2 has also substantially contributed to the definition of the OpenMP Tools Interface (OMPT), part of the upcoming OpenMP 5.0 standard.

Studying the memory reliability of the Mont-Blanc prototype allowed to enhance system resiliency. The consortium also deployed an end-to-end fault tolerance demonstrator at scale of real applications running on the Mont-Blanc prototype detecting and recovering from real memory faults using integration of Application Based Fault Tolerance (ABFT) and multiple software-based fault tolerance techniques.

In order to enable a faster and more reliable development of the system software, the project has deployed five mini-clusters using cutting-edge ARM-based technology. The platforms are installed at the Barcelona Supercomputing Center and are up and running since January 2016. More than 200 users have accessed them, including members of the Mont-Blanc 2 consortium developing system software and applications, industrial representative members of the Mont-Blanc End-User Group, students, and members of projects working in collaboration with Mont-Blanc.

Last but not least, the project has worked as catalyst in enabling ARM in the high performance computing community with several successful dissemination and educational events, conferences, tutorials, and workshops. The last of these activities has been the workshop *ARM: on the road to HPC* organized in Barcelona on January 16–17, 2017. During the event more than 120 people gathered together to listen and comment the words of the most influent IT companies that are sensible to the Mont-Blanc ideas worldwide. The consortium considered this closing event as the most important acknowledgement given to the Mont-Blanc project.

Mont-Blanc ideas are not finished with this report: they continue in fact in the third phase of the Mont-Blanc project under the guidance of Bull/ATOS who will commercialize the first high performance computing system based on high-end ARM server technology.