

[Supercomputers: a key tool for understanding the human brain](#)

A new documentary shows BSC's contributions to the Human Brain Project, which consist of use of the MareNostrum supercomputer and a set of tools.



Researchers in the Computer Sciences Department at BSC, together with other members of the SP7 team of the [Human Brain Project](#) (HBP), explain in a [new documentary](#) why supercomputers are a key tool for understanding the human brain. The film shows BSC's contributions to the HBP, which consist of use of the MareNostrum supercomputer and a set of tools (the [OmpSs](#) and [PyCOMPSs](#) programming models, the [Dynamic Load Balancing](#) (DLB) library, [Extrae](#) and [Paraver](#)) that help users to exploit the [High Performance Analytics and Computing \(HPAC\) Platform](#) to its full capacity. This documentary is the result of being one of the [two winners of the first HBP Video Selfie Campaign](#).

“This documentary has been a good opportunity to explain to neuroscientists why our tools are key for the simulation of the human brain,” says Jesús Labarta, BSC Computer Sciences Director.

In the recently started ‘SGA-1 phase’ of the HBP, BSC's main contributions are in two new areas: Dynamic Resource Management and Data-Intensive Supercomputing.

With respect to Dynamic Resource Management, the team led by Julita Corbalán is focusing on developing a novel approach for enabling and correctly exploiting malleability of applications in HPC facilities. Today's neuroscience applications demand high dynamicity in the scheduling of resources when they are run on supercomputers. This is because neuroscientists need to conduct high-demanding simulations, but are also willing to steer them by interleaving analytics or visualization jobs while the main simulation is running,

thus being able to redirect the main simulation based on those intermediate analysis tasks.

In terms of data-intensive supercomputing, the group led by Yolanda Becerra contributes with Hecuba, a framework that aims to facilitate programmers' work with an efficient and easy interaction with non-relational technologies, and Qbeast, a system that provides highly-scalable support to analytical and data-thinning queries on multidimensional data. Non-relational databases are nowadays a common solution for researchers when dealing with huge data sets and massive query workload, since they achieve scalability and availability. However, this comes at a cost: it forces the client application to use complex logics. Hecuba not only hides this complexity, but is also able to interact with well-known databases (e.g. Cassandra), and to exploit new trends in memory hierarchy, such as Non-Volatile Memories (NVMs).

Barcelona Supercomputing Center - Centro Nacional de Supercomputación

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