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Hi-OMICS, which uses Deep Learning technologies, will reduce the cost of genomic analysis and have an impact on the personalized medicine market.



The European Research Council (ERC) has awarded the Barcelona Supercomputing Center (BSC) researcher David Carrera with a Proof of Concept Grant, to explore the commercial potential of a software solution for computational genomics. The objective of the ERC Proof of Concept is to pave the way for commercialization of Hi-OMICS, a Software Defined Infrastructure (SDI) controller that leverages Deep Learning technologies, to manage efficiently Computational Genomics workloads on SDI platforms.

The goal of Hi-OMICS is to bring an advanced orchestration platform for Genomic workloads (processing genomic or transcriptomic sequences, derived mostly, but not only, from Next Generation Sequencing) in order to significantly improve the cost-efficiency of the infrastructure in comparison to existing computational genomics platforms.

Hi-OMICS has been developed in the context of David Carrera's Holistic Integration of Emerging Supercomputing Technologies (Hi-EST) ERC Starting Grant. One of the user cases developed in Hi-EST has been to explore how to improve the performance and cost-efficiency of genomics pipelines, with special focus in SMUFIN, a state of the art method to find genomic somatic mutations developed at BSC and published in Nature Biotech, under the leadership of ICREA Professor at BSC David Torrents.

The focus of this collaboration was to explore how to take SMUFIN one step forward in terms of performance and cost-efficiency by taking advantage of accelerators and non-volatile memories in the

context of disaggregated resources for Software Defined Data Centers. As a result of this work, an accelerated version of SMUFIN has been developed, which provides a reduction of energy consumption by a factor of 20x, while it still delivers a performance improvement by a factor of 2x. The researchers have filed a patent for the new and disruptive version of the software.

## Impact on the Personalized Medicine market

Due to this activity, Carrera's team observed that genomics workloads could further improve cost-efficiency, as pipelines consume system resources in different ways during their execution, which provide opportunities towards a smart orchestration of workloads across disaggregated Data Center resources. Increased performance can reduce the cost of running genomic applications, in combination with reduced energy consumption and the need for lower infrastructure investments, can improve cost-efficiency, which will have an immediate impact on the Personalized Medicine Market.

## More about David Carrera

David Carrera is the Head of the "[Data-Centric Computing](#)" research group at the Barcelona Supercomputing Center, and Associate Professor at the Computer Architecture Department of the UPC. He is also an ICREA Academia professor. His research interests are focused on the performance management of data center workloads.

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