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BioDynaMo collaborators come to CERN [1]

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Members of the BioDynaMo project came to CERN for a technical workshop on 1-2 December. The project is a part of CERN openlab?s ongoing effort to develop methods to modernise and optimise software code. It was established in September 2015 to transfer ideas, methods, and tools from high-energy physics to the life sciences.

BioDynaMo (abbreviated from ?Biology Dynamic Modeller?) is a collaboration between CERN, Newcastle University, Innopolis University, Kazan Federal University, and Intel to design and build a scalable and ?exible computing platform for rapid simulation of biological tissue development. It foresees three main phases: the consolidation, optimisation, and further extension of biological simulation code to run efficiently on modern multi-core and many-core platforms; the deployment of a cloud-based platform using state-of-the-art HPC-on-cloud technologies; the creation of a shared ecosystem of tools, datasets, processes, and human networking in the field of biological simulation.

The project focuses initially on the area of brain tissue simulation, drawing inspiration from from existing, but low-performance software frameworks. Late 2015 and early 2016 saw algorithms already written in Java code ported to C++. Once porting was completed, work was carried out to optimise the code for modern computer processors and co-processors, so as to make the best possible use of the many available cores. The optimisations will be tested over the first months of 2017 and support for additional cell types and behaviours will be added. The next step will then be to extend the system to run in a cloud-computing environment, thus making it possible to harness many thousands of computer processors to simulate very large

biological structures.

?Many researchers currently lack suitable software for computational modelling of a wide range of biological phenomena,? says Roman Bauer, a neuroscientist at Newcastle University. ?We want to provide user-friendly software that can be used by computational scientists, as well as biologists without strong programming skills, and to demonstrate its power using simulations of human brain development.?

?Our regular technical workshops are an essential way to share information and monitor project progress,? says Fons Rademakers, CERN openlab CRO. ?It is exciting to see how the project is rapidly progressing and I am sure 2017 will see major new developments, including the first release of our optimised code.?

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