

BioDynaMo: Biological simulation in the cloud

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Besides its traditional joint R&D activities between CERN and industry, CERN openlab runs an extensive programme of knowledge sharing projects. The goal is to understand what technologies and skills from the HEP community can be applied in other sciences and conversely if any ideas from other research communities can be used to support the HEP computing and data infrastructure. Today the main focus of this programme is to take part in defining the next generation of distributed data analysis and computing platforms, exploiting the flexibility of cloud infrastructures, common sets of tools and the recent trends in machine learning.

This talk is the first part of a two-part series where we highlight the current collaborations in life science and medical research, following the recently approved CERN “Strategy for Knowledge Transfer for the Benefit of Medical Applications”. We present BioDynaMo, a platform to simulate the growth and development of tissues starting from single cells. Addressing ambitious research questions, like modelling epilepsy, would require simulations with billions of cells on a large distributed cloud or HPC system. We explain the current parallelized simulation engine, benefiting from the ongoing software modernization efforts in the HEP community, our distributed computing approach, and give an outlook on future research and development.

Summary

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