



BioDynaMo: Large-scale Simulation for Biological Research

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Outline

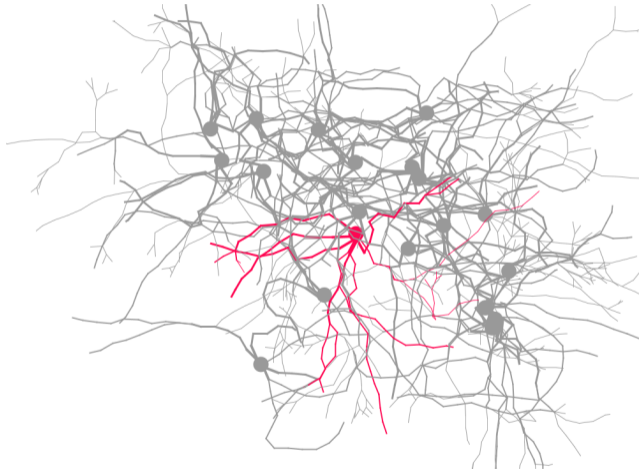
- ▶ Why Computer Simulation?
- ▶ What is BioDynaMo?
- ▶ Why at CERN?
- ▶ Why Large-scale Models?
- ▶ Current Status
- ▶ Future Challenges

Computer Simulations

Important tool in science to study phenomena too complex for a purely analytical or experimental solution

What is BioDynaMo?

- ▶ Large-scale platform for biological simulations
- ▶ Provides access to growing computational resources
- ▶ Hides complexity of distributed computing
- ▶ Promotes reproducibility of results
- ▶ Flexible system that supports different specialities





- ▶ Large-scale computing is core competency at CERN
- ▶ Offers ideal ecosystem and infrastructure

Why at CERN?



Why Large-scale Models?

Brain Disease	Estimated Prevalence (worldwide)
Epilepsy	50 million
Schizophrenia	25 million
Autism	45 million
Dementia	35 million

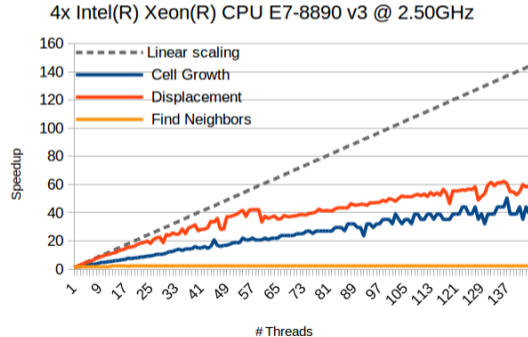
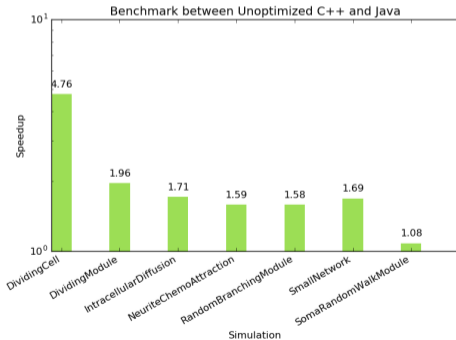


Total cost of brain diseases in Europe: 798 billion €

numbers from recent WHO reports, Elsabbagh et al. (2012) and Olesen et al. (2012)

- ▶ Started with legacy software Cortex3D
- ▶ Ported it from Java to C++
- ▶ Developed prototype to utilize parallelism

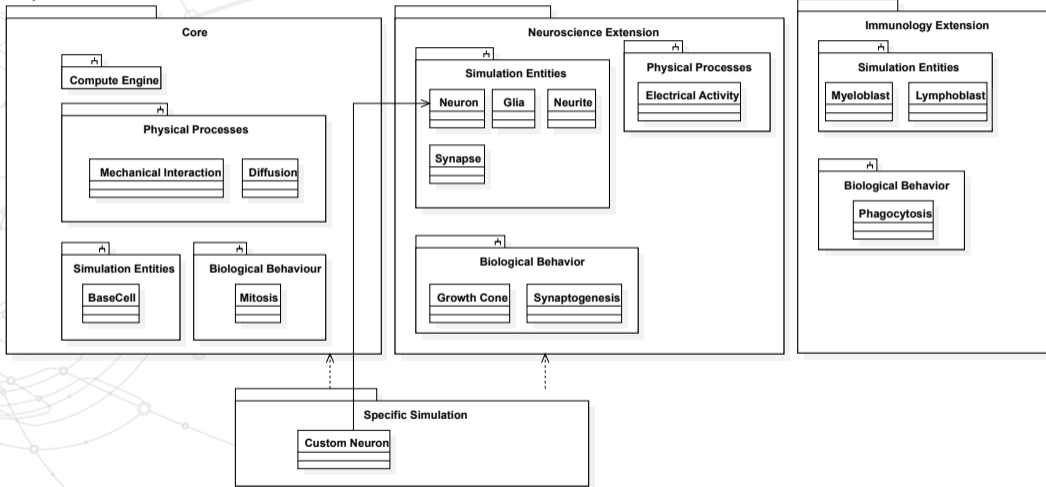
Current Status

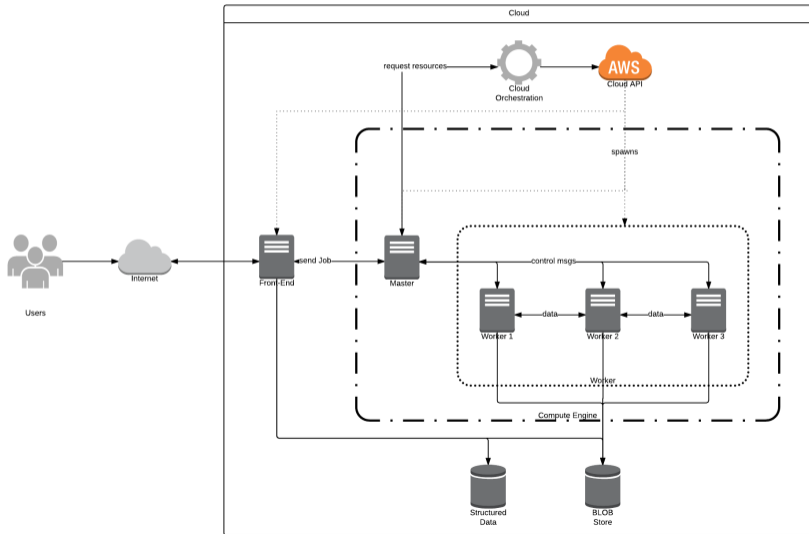




Future Challenges

Support for Various Disciplines





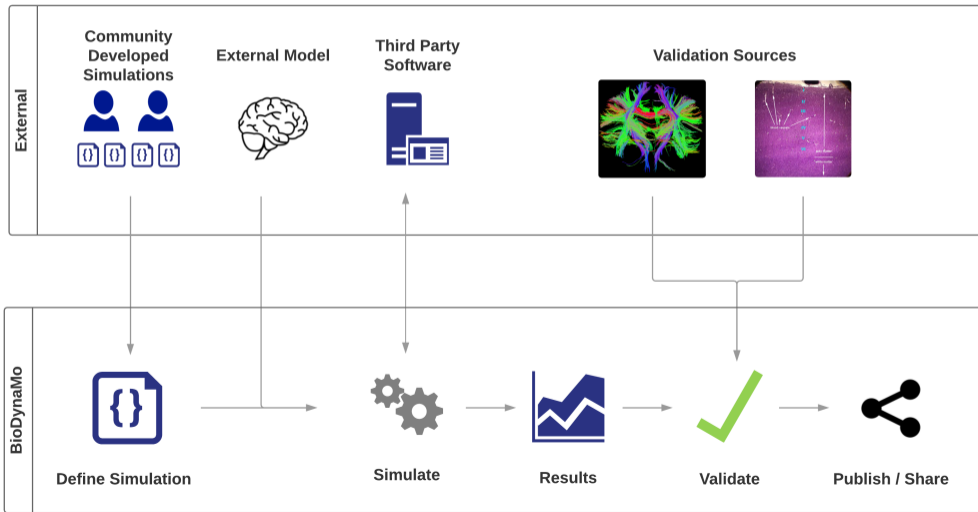


CER

Community Platform and Complete Workflow

WORKFLOW DIAGRAM

Lukas Breitwieser | December 8, 2016





Thank you!
Questions are welcome

Agent Based Simulation

