



# BioDynaMo Benchmarking

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# What is BioDynaMo



- ❑ Open-source, high performance, and modular agent-based simulation platform.
- ❑ Written in C++ .
- ❑ Agent - Based.
- ❑ General Purpose.
- ❑ Large Scale.
- ❑ Easily Programmable.
- ❑ Quality Assured.

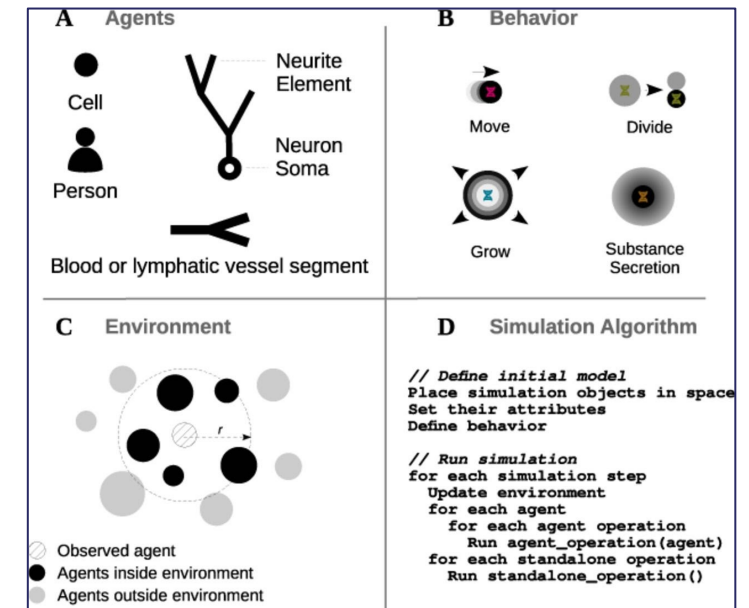


Figure 1: BioDynaMo core simulation concepts

# Use Cases

- ❑ Simulate neurite growth of pyramidal cells using chemical cues.

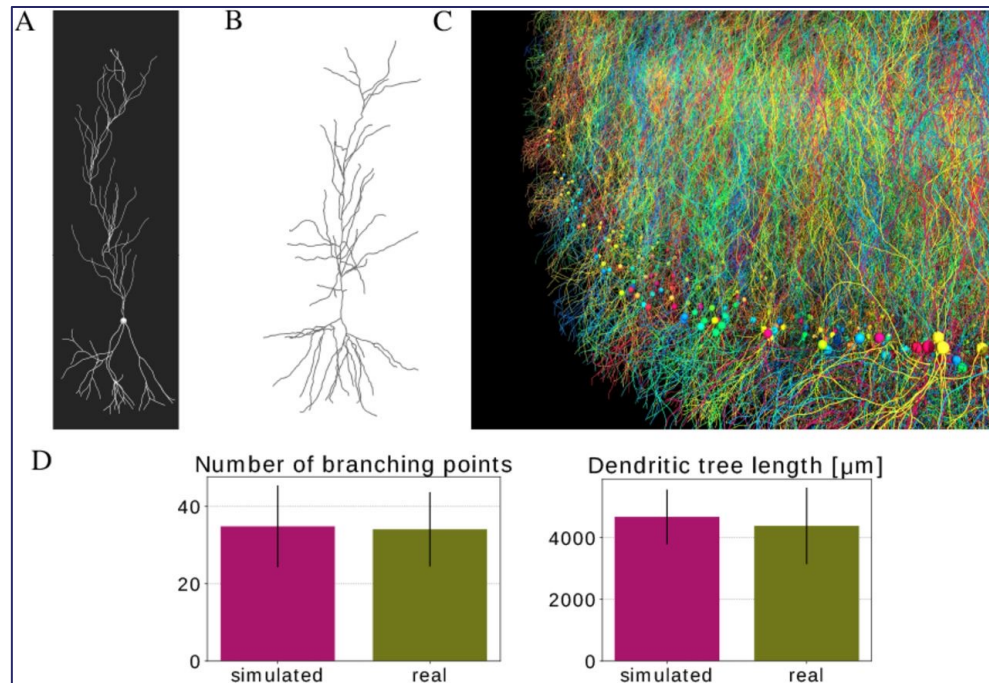
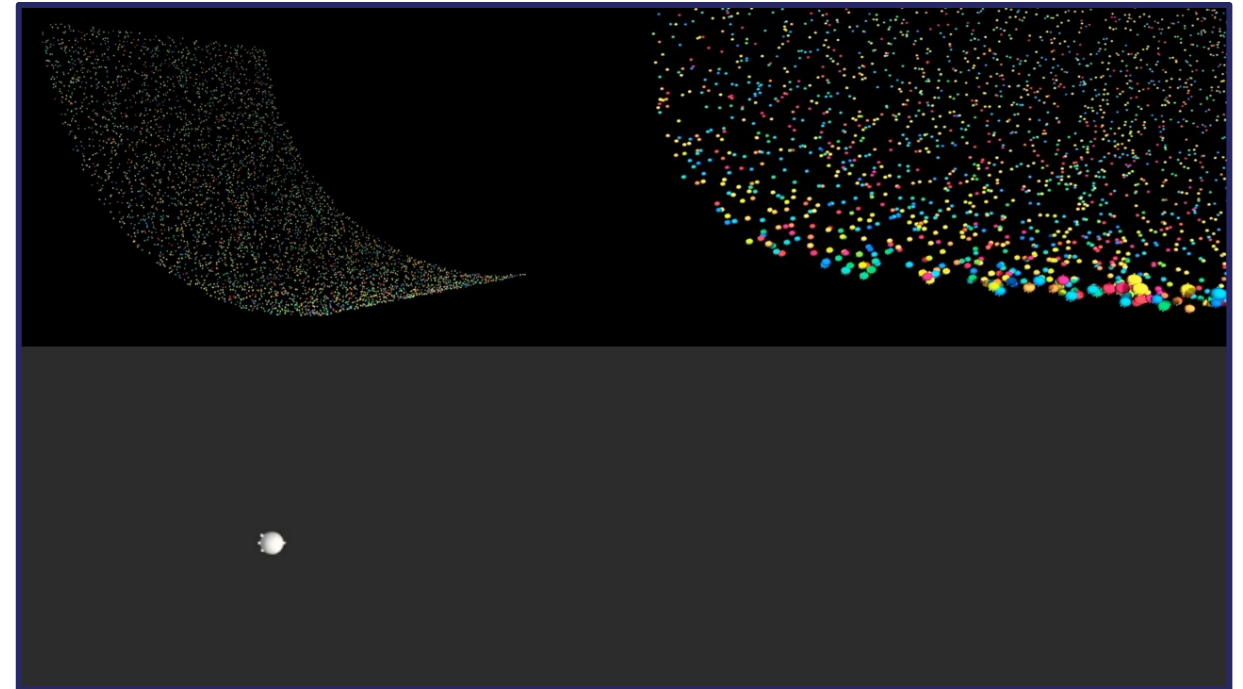


Figure 2: Pyramidal cell simulation



Video Demo

# Benchmarking

- ❑ Automated tests are important.
- ❑ Code performance, Monitoring
- ❑ Speed, Memory, hardware efficiency
- ❑ ROOT System
- ❑ Google Benchmark
- ❑ Grafana

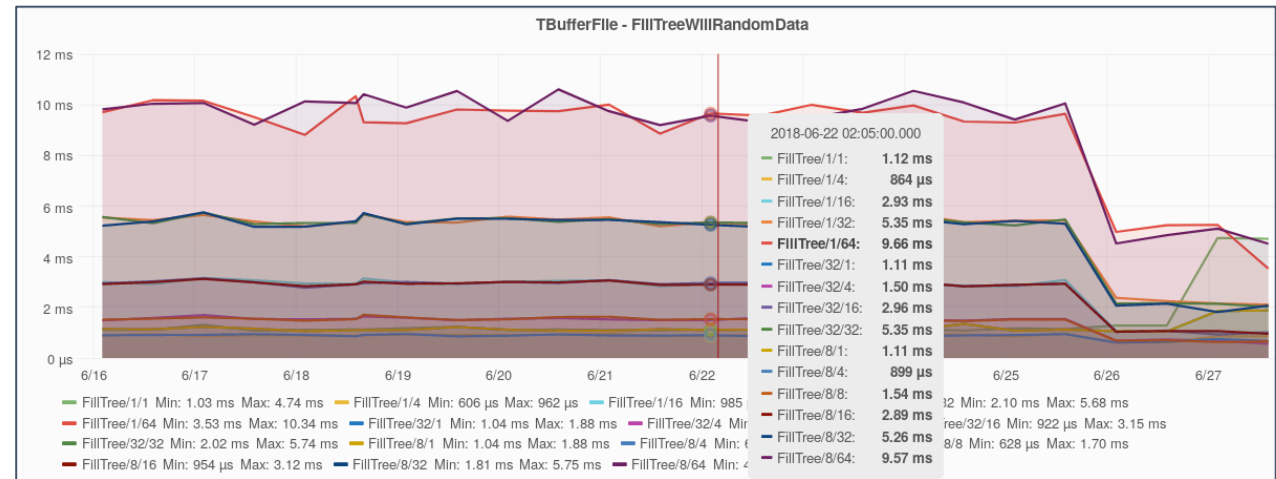


Figure 3: Example benchmarking plot.

# Conclusions And Future Work

- Management of setbacks related to new MacBook's M1 chip.
- Leveraging ROOT's benchmarking environment based on same tools.
- Increased Performance.
- Track slowdowns/speedups/memory increase/decrease between versions.
- Assign performance numbers to a user's machine in the form of BDMMARKS.





# QUESTIONS?

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# Resources

## ❑ Preprint of the BioDynaMo Paper

BioDynaMo: a general platform for scalable agent-based simulation Lukas Breitwieser, Ahmad Hesam, Jean de Montigny, Vasileios Vavourakis, Alexandros Iosif, Jack Jennings, Marcus Kaiser, Marco Manca, Alberto Di Meglio, Zaid Al-Ars, Fons Rademakers, Onur Mutlu, Roman Bauer bioRxiv 2020.06.08.139949; doi: <https://doi.org/10.1101/2020.06.08.139949> Supplementary Information: <https://zenodo.org/record/4501515>

## ❑ BioDynaMo Webpage

<https://biodynamo.org>

## ❑ Grafana Webpage

<https://grafana.com/grafana>

## ❑ ROOT Webpage

<https://root.cern>