Simulation Lab Neuroscience launched

How the human brain works is one of the biggest scientific questions of our time. A better understanding of the brain's structure and function, in health and disease, will lead to better diagnoses and treatments of brain diseases. It may also lead to revolutionary new brain-inspired computing technologies, given that the brain is able to compute, think, and learn in a fault-tolerant way using only the power of a conventional light bulb. To investigate the vast complexity of the 100 billion-neuron network in our brain, neuroscientists increasingly rely on supercomputer simulations. As the brain models developed by the scientists are becoming more and more realistic and complex in scale, more and more computing power and memory are needed to simulate them. Ultimately, the simulation of brain models at the scale of the full human brain amounts to an exascale challenge.

The Simulation Laboratory Neuroscience [1] at the Jülich Supercomputing Centre, which was officially launched in an opening event on 14-15 January 2013, will support the computational neuroscience community in leveraging high-end supercomputing resources such as JUQUEEN for their research. Like all other Simulation Labs in Jülich, the support mission of the Simulation Lab Neuroscience is grounded on its own research work, with a special focus on the methodological aspects. Under the supervision of Prof. Abigail Morrison about ten neuroscientists, computer scientists, mathematicians and physicists work together and with external groups on highly interdisciplinary tasks such as building large-scale models and databases of brain structure, function and connectivity, developing simulation, database and virtual reality technology, developing algorithms and workflows for data acquisition and analysis, and porting and optimizing scientific codes for supercomputers.

Figure 1: From left to right: Prof. Th. Lippert (Director of the Jülich Supercomputing Centre), Prof. A. Morrison (Head of the Simulation Lab Neuroscience, INM-6), Prof. K. Amunts (Director of the Institute of Neuroscience and Medicine, INM-1), Prof. S. Schmidt (Member of the Board of Directors of Forschungszentrum Jülich)

The Simulation Lab Neuroscience is a central element of the Helmholtz Portfolio Theme "Supercomputing and Modeling for the Human Brain" [2], through which it receives the majority of its funding. As part of the Portfolio Theme it will also contribute to the European FET Flagship "Human Brain Project" [3]. Additional funding for the Simulation Lab comes from the Jülich Aachen Research Alliance (JARA) [4]. A special relationship has been established with the German National Bernstein Network Computational Neuroscience [5]. The Bernstein Network is funded by the Federal Ministry of Education and Research (BMBF) and connects more than 200 research groups in Germany and beyond. The Simulation Lab Neuroscience contributes its expertise in simulation and database technology to the network as the "Bernstein Facility for Simulation and Database Technology".

In the opening event the Simulation Lab Neuroscience was officially introduced to the scientific community. The event was attended by representatives of the Bernstein Network, the Helmholtz Association, and JARA-HPC. It gave an overview of the existing and planned activities combining neuroscience and HPC in Jülich and beyond, and featured a series of neuroscientific talks by renowned international speakers from the field.

Figure 2: Official opening of the Simulation Lab Neuroscience at the Jülich Supercomputing Centre

References

[1] http://www.fz-juelich.de/ias/jsc/EN/Expertise/SimLab/slns/_node.html

[2] http://www.fz-juelich.de/JuBrain/EN/Helmholtz%20Portfolio.html

[3] http://www.humanbrainproject.eu

[4] http://www.jara.org

[5] http://www.nncn.de

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