École Polytechnique Fédérale de Lausanne builds the first biologically accurate, functional model of the human brain.

Overview

École Polytechnique Fédérale de Lausanne (EPFL)
Lausanne, Switzerland
www.epfl.ch

Industry
- Education and life sciences

Products and services
- IBM Blue Gene

"A few seconds of computer simulation could replace days, even weeks, of wet lab research."

—Henry Markram, project head and founder, Brain and Mind Institute, EPFL

One of two higher-learning polytechnic schools in Switzerland, the EPFL has three missions: education, research and technology transfer at the highest international level. The 10,000-person campus, which is situated in an idyllic location on the shores of Lake Geneva, stimulates collaboration between students, professors, researchers and entrepreneurs.

Challenge

Scientists are advancing each year in their understanding of how the brain works, and many of their discoveries are the result of high-resolution computer modeling. Modeling the brain at the cellular level is a massive undertaking because of the hundreds of thousands of parameters that need to be taken into account. Launched in 2005, EPFL's Blue Brain project is working to develop the first biologically accurate, functional model of the human brain, with molecular-level models of neurons and cellular-level models of brain circuitry. And the school plans to do this by 2015.

Solution

An IBM Blue Gene® supercomputer running simulations of the brain down to the molecular level is helping EPFL researchers gain new insights into internal processes such as thought, perception and memory. The Blue Brain model can be thought of as a three-dimensional database receiving data about various brain regions from networked researchers around the world. Much of the pretesting and planning normally required for a major experiment can now be done "in silico" rather than in the laboratory, greatly speeding the research on brain function.

Benefits

As a result of these high-level supercomputing sessions, EPFL scientists will have the tools they need to understand brain function and advance research into neurological and psychiatric disorders. They expect to advance brain research rapidly by running simulations of the brain in close to real time.

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