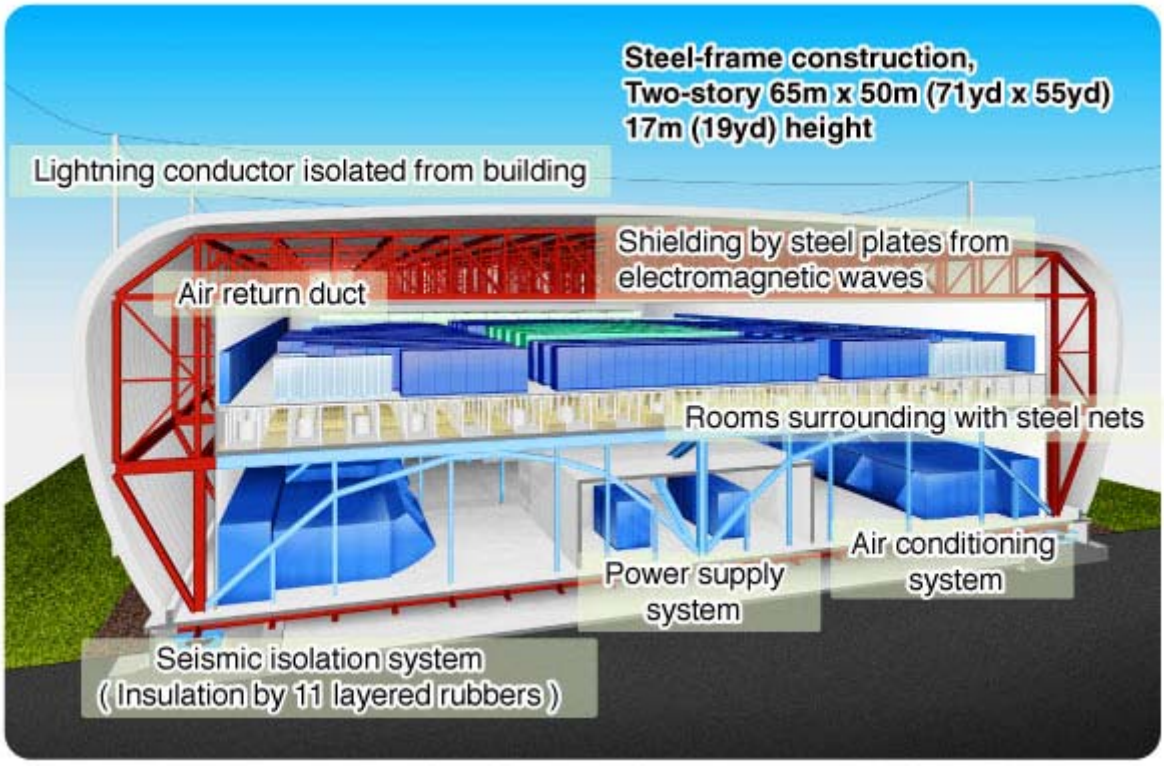
Reference

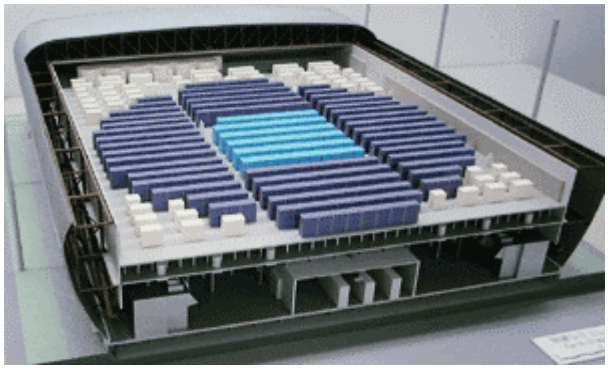
About the Earth Simulator

The Earth Simulator was developed as a national project by three organizations: the National Space Development Agency of Japan (NASDA, originally the Japan Aerospace Exploration Agency), Japan Atomic Energy Research Institute (JAERI) and Japan Agency for Marine-Earth Science and Technology (JAMSTEC, originally Japan Marine Science and Technology Center). In February 2002, the Earth Simulator system was completed in the simulator building (with floor space 50 m x 65 m, overall height 17 m) at JAMSTEC's Yokohama Research Institute, Earth Simulator Center (Yokohama, Kanagawa prefecture).

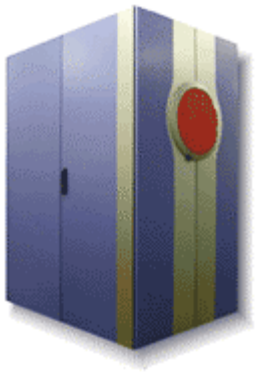
The simulator is a distributed memory parallel computing system configured with 640 nodes. Each computation node is comprised of eight vector processors (8 Gflops/CPU peak performance) sharing 16 GB of memory in a shared memory parallel configuration. The world's fastest supercomputer, Earth Simulator has 5,120 vector processors in total, giving it a peak performance of 40 Tflops and main memory of 10 TB.



(JAMSTEC)



Overhead view of Earth Simulator



Computing node cabinet

Integrated network cabinet

Terminology

Computation node: Discrete data processing unit that shares memory (array of CPU's)

Vector processor: The type of CPU in general use is known as the *scalar processor*. The scalar processor computes by fetching and storing one element of data at a time from memory. By contrast, the vector processor has multiple vector registers, can transfer many data elements at a time between vector registers and memory, and is able to operate on many data elements in its vector registers at one time. Scalar processing is analogous to moving water by using several individuals, each carrying a bucket; whereas vector processing is like having several people in line performing a bucket relay. Most personal computers and general-purpose computers use scalar processors. Supercomputers capable of performing complex, large-scale operations at high speed, such as are required in fluid analysis, etc., use vector processors.

Gflops: 1 Gfrops is one billion floating point operations per second.
Tfrops: 1 Tfrops is one trillion floating point operations per second.
B: 1 Byte (B) can hold one character of information.
GB: 1 Gigabyte (GB) is 1,024 megabytes (approximately one billion bytes)
TB: 1 Terabyte (TB) is 1,024 gigabytes (approximately one trillion bytes)