



Preface



The Earth Simulator Project entered into the second year. Thirty four (34) projects are accepted for this year, among which 12 projects are in the category of climate science, 9 are in solid earth science, 2 are in computer science and 11 are in emergent science. More than 600 simulation scientists are involved in these projects. The progress of each project is described in this issue.

In the first year, most researchers paid great efforts in optimization of their codes to the Earth Simulator architecture. In this second year their efforts flowered and average performance has reached more than 30% of the peak performance. This incredibly high actual performance has two important indications to us. The first one is the fact that the Earth Simulator is really a high-quality and high-fidelity hardware as a large-scale simulator. The second one is that user's effort on optimization can readily raise the actual performance to 2 or 3 times, thus bringing the situation as if there were 2 or 3 Earth Simulators at hand.

I would like to point out two important events in this year in promoting the Earth Simulator Project.

The first event is the installation of the Mass Data Processing System (MDPS) in the Earth Simulator system.

The original ES system possessed the large storage system (about 700TB magnetic disk system plus 1.5PB magnetic tape library system) in its inside with a premise that the data produced by simulation be processed by the ES itself.

However, this concept is indeed inappropriate for such a high-quality and high-cost simulator, because the data processing is most inefficient and preposterous. Therefore, we decided to restructure the ES system so that the data produced could be transferred to the MDPS immediately after the end of each job. We provided 240 TB magnetic disk system for this purpose and the magnetic tape library of 1.5 PB was removed from the ES system to outside and connected at the back of the 240 TB magnetic disk system.

Because of this restructuring users can access to their data without disturbing the ES CPU at all, thus the total throughput of the ES becoming drastically revised.

The second event is the importation of the immersive virtual reality system, which is named "Brave". In order to comprehend complicated simulation results and grasp by intuition what is happening, it is the direct and effective way that three dimensional evolutions of massive simulation results are manually displayed around observers.

With these reinforcements of the peripheral system, i.e., mass data transformation, data storage, and data visualization system, the whole simulation environment of the Earth Simulator Center has been set up.

We are now proceeding to the establishment of the last part of the data flow, which is the connection to the external network system, Super SINET, with 2.5 Gbps. This negotiation with the National Institute of Informatics, about the connection of the Earth Simulator network with the Super SINET was already over successfully and will be connected in October, 2004.

Thus, our hardware system of promoting the Earth Simulator Project is almost provided. Our effort can therefore be totally concentrated on producing fruitful outputs that would be beneficial to the human society.



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