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Belgian researchers develop desktop supercomputer

How much computing power can you cram into a single desktop PC? Researchers from the University of Antwerp in Belgium have developed a special PC that can perform their computations just as fast as hundreds of normal PCs. Using this super PC, which mainly consists of gaming hardware and costs less than 4000 euro, they can carry out their computations on three-dimensional images within a few hours, compared to weeks on a regular PC.

The research group Vision Lab at the University of Antwerp focuses on the development of new computational methods for tomography. Tomography is a technique used in medical scanners to create three-dimensional images of the internal organs of patients, based on a large number of X-ray photos that are acquired over a range of angles. As these 3D images can be quite large, advanced reconstruction techniques can sometimes require weeks of computation time on a regular PC.

Fortunately, these computations can be carried out in parallel, for example using a cluster consisting of hundreds of PC's. Employing a large cluster has some drawbacks as well: it is quite expensive, is not always available, takes a lot of space and requires considerable maintenance.

The scientists now develop software for reconstructing 3D images with the aid of 3D graphics cards that are supposed to be used for playing 3D games. In fact, graphics cards are highly suitable for tomography computations. By appropriate programming of the graphics processors (GPUs) on these cards, many calculations can be performed simultaneously.

For their most demanding computations tasks, the researchers developed the FASTRA: a desktop superPC, which contains four dual-GPU graphics cards. Having eight graphics processors work in parallel allows this system to perform as fast as 350 modern processor cores for tomography computations, reducing the reconstruction times from several weeks (on a normal PC) to hours. The Vision Lab is now planning to build a cluster of such systems, which will allow for real-time reconstruction of large 3D volumes.

Additional information:

Website: <http://fastra.ua.ac.be>

Contact: Prof. Dr. Jan Sijbers

jan.sijbers@ua.ac.be

tel. +32 (0)3 820 2464

Dr. Joost Batenburg

joost.batenburg@ua.ac.be

tel. +32 (0)3 820 2449