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## German scientists break world record with novel data processing system

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Computer scientists in Germany have become world record holders for a system they created that uses the least amount of energy to process huge volumes of data. The record is listed in the 'JouleSort' category of the Sort Benchmark, a series of measurement standards first defined, sponsored and administered by renowned US computer

scientist Jim Gray in 1998. Securing top place in the Sort Benchmark signals a big win for small, power-efficient data processing systems.

The winners from Goethe University and the Karlsruhe Institute of Technology (KIT) beat the record formerly held by a team of computer scientists from Stanford University in the US. Work for the energy-saving system was supervised by Professors Ulrich Meyer (Goethe University) and Peter Sanders (KIT), and developed by PhD candidates Johannes Singler (KIT) and Andreas Beckmann (Goethe University).

For the competition, the researchers had to sort three data amounts of 10GB (gigabytes), 100GB and 1TB (terabyte), each comprised of 100 byte datasets. To process the largest data amount of 1TB (equivalent to a pile of paper 10 kilometres in height) the team used a mere 0.2 kilowatt hours of energy (roughly the amount needed to boil 2 litres of water).

Instead of using server processors with high-power requirements for their winning system, the team took an unconventional approach by adopting microprocessors

originally developed for notebook hardware, such as the Intel Atom processors.

The scientists compensated for the low power of the microprocessors by using highly efficient algorithms, and rather than use hard drives that consume significant amounts of power, they used Solid State Disks (SSD). These discs have the capacity to be super fast and more energy efficient.

'In the long run, many small, power-efficient and cooperating systems are going to replace the (so far used) heavy weighted ones,' explained Professor Sanders. Achieving the world record with such a small system demonstrates just how much energy could be saved in the area of information technology worldwide.

The scientists approached their research project by focusing on one of the fundamental problems in computer science: data sorting. For instance, a computer that is connected to the Internet generates large volumes of data. In order for the data to be analysed, it has to be sorted using a specific criterion. Sorting data efficiently is critical to search engines and databases, and therefore it represents a significant challenge in the field of computer science.

Since 2007, the Sort Benchmark has been overseen by a committee. The committee members for this competition included Chris Nyberg of Ordinal Technology, Mehul Shah of Hewlett-Packard, and Naga Govindaraju of Microsoft.

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Germany

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