Relational Joint Algorithms and Program on GPUs

Researchers at the University of South Florida have created a novel algorithm which improves query processing performance by ten fold.

The relational joint is the most important operation in database management systems. It is also the most expensive in terms of computing time and resources needed. Current Graphic Process Unit (GPU) algorithms are designed for earlier architecture. Using existing GPUs with new hardware and software causes delay in processing, therefore increasing response time. With hardware and software that is continually being improved, there is a need for an updated and faster algorithm to fully utilize GPUs.

USF inventors have created a novel algorithm to improve relational joint speed and query processing performance by taking advantage of the computing power and hardware features of modern GPUs. Our technology provides a 10X improvement to current central processing unit (CPU)-based join programs and shows up to 14X speedup over best known GPU-based join algorithms. The technology optimizes various stages of sort merge and hash joins on the latest GPU architecture to achieve higher multiprocessor occupancy, higher shared memory bandwidth utilization, and better cache locality. It also reduces I/O overhead with input tables that cannot be stored in GPU memory. This algorithm has the potential to improve GPU usage and databases for multiple applications and fields.

ADVANTAGES:
- 10X improvement in query processing performance
- Up to 14X faster than existing GPU join technology
- Fully utilizes GPUs

Tech ID # 16B186