

Collision Detection Algorithm Based on Data Parallelism

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Abstract : Modern computing technology enters the era of parallel computing with the trend of sustainable and scalable parallelism. Single Instruction Multiple Data (SIMD) is an important way to go along with the trend. It is able to gather more and more computing ability by increasing the number of processor cores without the need of modifying the program. Meanwhile, in the field of scientific computing and engineering design, many computation intensive applications are facing the challenge of increasingly large amount of data. Data parallel computing will be an important way to further improve the performance of these applications. In this paper, we take the accurate collision detection in building information modeling as an example. We demonstrate a model for constructing a data parallel algorithm. According to the model, a complex object is decomposed into the sets of simple objects; collision detection among complex objects is converted into those among simple objects. The resulting algorithm is a typical SIMD algorithm, and its advantages in parallelism and scalability is unparalleled in respect to the traditional algorithms.

Keywords : data parallelism, collision detection, single instruction multiple data, building information modeling, continuous scalability

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