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A CACHE DESIGN METHOD FOR SPATIAL INFORMATION VISUALIZATION IN 3D REAL-TIME RENDERING ENGINE

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Abstract. A well-designed cache system has positive impacts on the 3D real-time rendering engine. As the amount of visualization data getting larger, the effects become more obvious. They are the base of the 3D real-time rendering engine to smoothly browsing through the data, which is out of the core memory, or from the internet. In this article, a new kind of caches which are based on multi threads and large file are introduced. The memory cache consists of three parts, the rendering cache, the pre-rendering cache and the elimination cache. The rendering cache stores the data that is rendering in the engine; the data that is dispatched according to the position of the view point in the horizontal and vertical directions is stored in the pre-rendering cache; the data that is eliminated from the previous cache is stored in the eliminate cache and is going to write to the disk cache. Multi large files are used in the disk cache. When a disk cache file size reaches the limit length (128M is the top in the experiment), no item will be eliminated from the file, but a new large cache file will be created. If the large file number is greater than the maximum number that is pre-set, the earliest file will be deleted from the disk. In this way, only one file is opened for writing and reading, and the rest are read-only so the disk cache can be used in a high asynchronous way. The size of the large file is limited in order to map to the core memory to save loading time. Multi-thread is used to update the cache data. The threads are used to load data to the rendering cache as soon as possible for rendering, to load data to the pre-rendering cache for rendering next few frames, and to load data to the elimination cache which is not necessary for the moment. In our experiment, two threads are designed. The first thread is to organize the memory cache according to the view point, and created two threads: the adding list and the deleting list, the adding list index the data that should be loaded to the pre-rendering cache immediately, the deleting list index the data that is no longer visible in the rendering scene and should be moved to the eliminate cache; the other thread is to move the data in the memory and disk cache according to the adding and the deleting list, and create the download requests when the data is indexed in the adding but cannot be found either in memory cache or disk cache, eliminate cache data is moved to the disk cache when the adding list and deleting are empty. The cache designed as described above in our experiment shows reliable and efficient, and the data loading time and files I/O time decreased sharply, especially when the rendering data getting larger.

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