

PARALLEL COMPUTING OF MAP DRAWING BASED ON XML, ICE AND MEMORY GRAPHICS ENGINE

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BIOGRAPHY

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ABSTRACT

In web system, cluster technology is used widely for its advantages of high expansibility, usability, capability and performance to price ratio. Using cluster technology, the expensive computer can be replaced by many low-end PCs to save money as Google does. However in most WebGIS, high-grade PC even minicomputer is used to be server because one map is drawn just using one computer and one low-end PC requires more time than that user can accept to draw a complex map. A parallel computing of map drawing, which draws a single map in multi computers, is proposed in the article to reduce the hardware cost in a WebGIS.

The parallel computing of map drawing has several key points as follows. Firstly, map's content is formed as XML to be decomposed and transmitted conveniently. Secondly, Ice (Internet Communications Engine) is used to be the frame of distributed computing in order that the server and client can be developed using multi languages easily. Lastly, a graphics engine based on memory (MGE: Memory Graphics Engine) is developed to transfer the result of separate drawing and integrate them into a whole map image.

The WebGIS based on parallel computing of map drawing, consists of four levels including browser, web server, application server and map server. The browser and web server are similar to traditional system. Application server decomposes the map

into separate layers or regions, then calls map server with multi threads to draw a layer or a region, and last combines several memory images which map server returns. Map server receives application server's call to draw a part of map in memory image using MGE and return the memory image. The application server and web server are connected by Ice frame and can be developed by different languages easily.

A prototype system is set up to confirm the parallel computing. We achieve satisfying result that the performance of drawing a complex map is improved dramatically in multi low-end PCs than in a high-grade PC.

KEYWORDS: Map Drawing, Parallel Computing, XML, Ice, Memory Graphics Engine (MGE)

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