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**Glasco**

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(54) **METHODS AND APPARATUS FOR SPECULATIVE PROBING OF A REMOTE CLUSTER**

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 491 days.

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(51) **Int. Cl.**<sup>7</sup> ..... **G06F 13/14; G06F 12/16**

(52) **U.S. Cl.** ..... **709/206; 709/216; 709/217; 711/141; 711/146**

(58) **Field of Search** ..... **709/206, 213, 709/216, 217, 218, 219; 711/141, 146**

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(57) **ABSTRACT**

According to the present invention, methods and apparatus are provided for increasing the efficiency of data access in a multiple processor, multiple cluster system. Techniques are provided for speculatively probing a remote cluster from either a request cluster or a home cluster. A speculative probe associated with a particular memory line is transmitted to the remote cluster before the cache access request associated with the memory line is serialized at a home cluster. When a non-speculative probe is received at a remote cluster, the information associated with the response to the speculative probe is used to provide a response to the non-speculative probe.

**39 Claims, 15 Drawing Sheets**

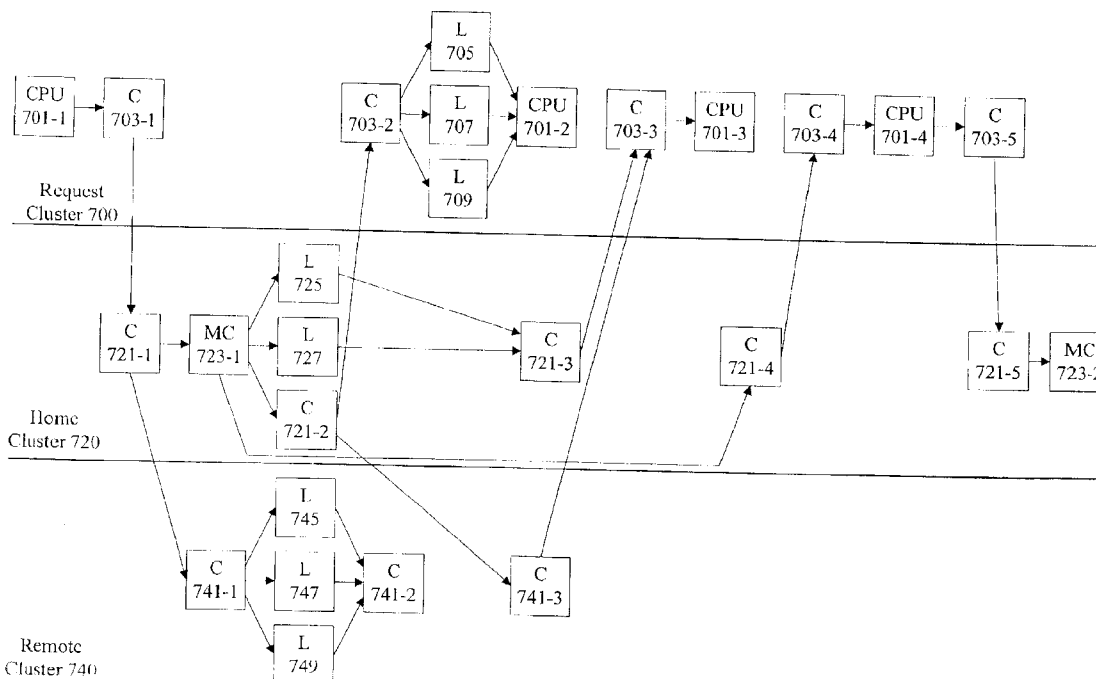


Figure 1A

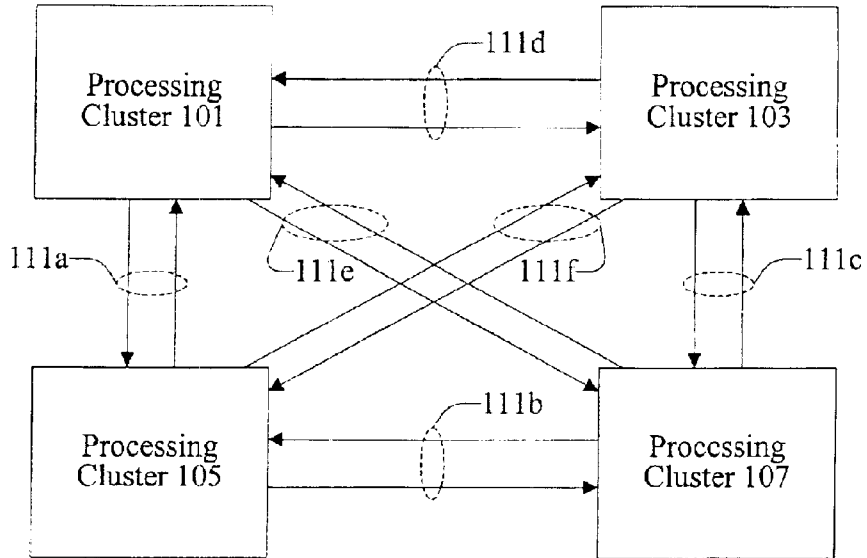


Figure 1B

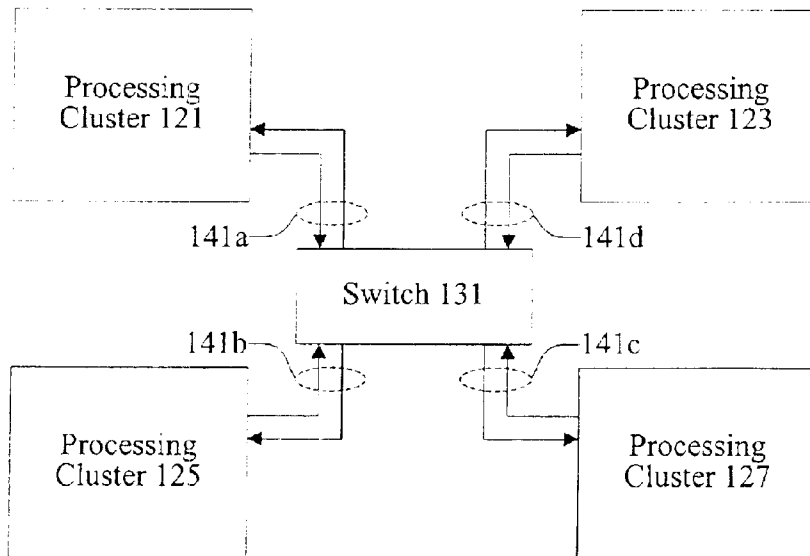


Figure 2

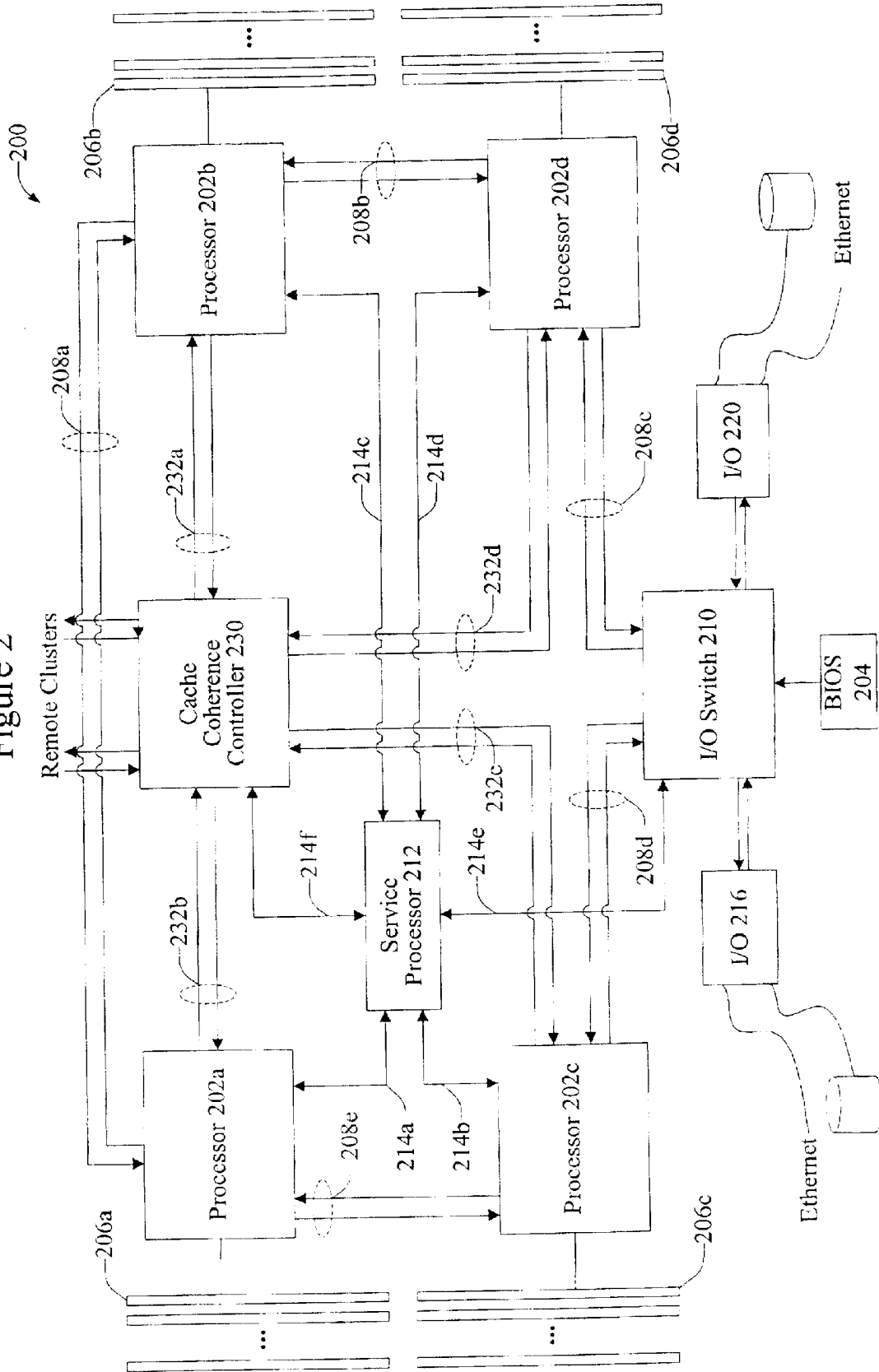


Figure 3

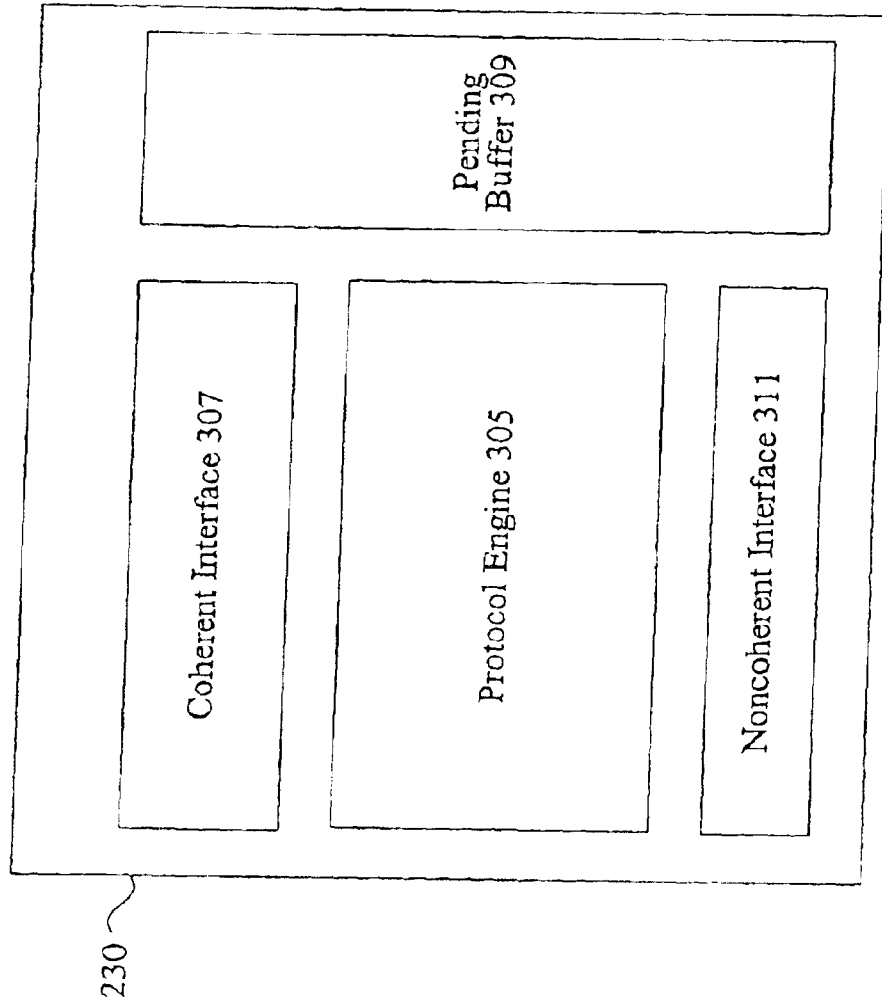
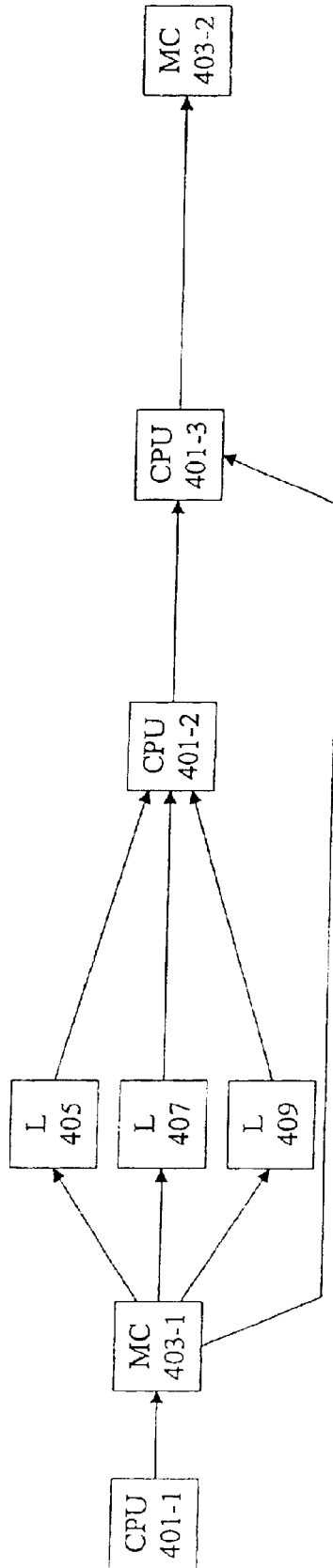


Figure 4



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