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**Hölzle et al.**

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 (45) **Date of Patent:** **\*Jan. 21, 2003**

(54) **METHOD AND APPARATUS FOR MEMORY ALLOCATION IN A MULTI-THREADED VIRTUAL MACHINE**

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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 0 days.

This patent is subject to a terminal disclaimer.

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(22) Filed: **Nov. 28, 2000**

**Related U.S. Application Data**

(63) Continuation of application No. 09/108,047, filed on Jun. 30, 1998, now Pat. No. 6,209,066.

(51) **Int. Cl.<sup>7</sup>** ..... **G06F 12/00**

(52) **U.S. Cl.** ..... **711/153; 711/170; 711/173**

(58) **Field of Search** ..... 711/153, 170, 711/173; 709/104, 105, 107, 108, 312; 712/206, 215, 245, 246

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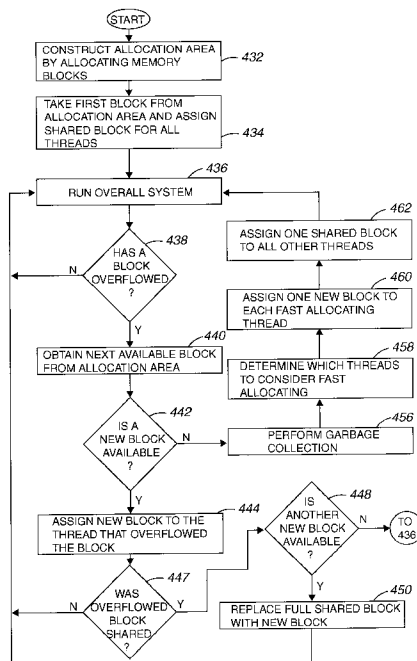
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(57) **ABSTRACT**

Methods and apparatus for the efficient allocation of shared memory in a multi-threaded computer system are disclosed. In accordance with one embodiment of the present invention, a computer-implemented method for allocating memory shared by multiple threads in a multi-threaded computing system includes partitioning the shared memory into a plurality of blocks, and grouping the multiple threads into at least a first group and a second group. A selected block is allocated to a selected thread which may attempt to allocate an object in the selected block. The allocation of the selected block to the selected thread is based at least partially upon whether the selected thread is a part of the first group or the second group. In one embodiment, grouping the multiple threads into the first group and the second group includes identifying a particular thread and determining whether the particular thread is a fast allocating thread. In such an embodiment, when the particular thread is fast allocating, the particular thread is grouped into the first group.

**19 Claims, 14 Drawing Sheets**



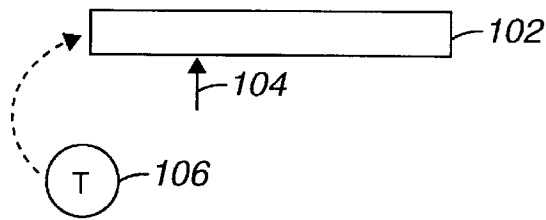


Figure 1a  
(Prior Art)

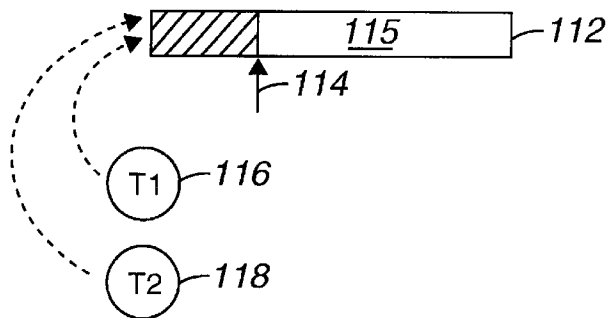


Figure 1b  
(Prior Art)

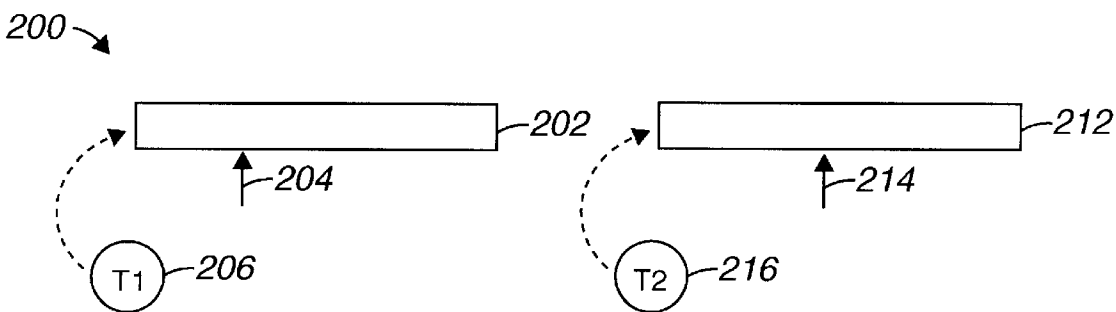


Figure 2a  
(Prior Art)

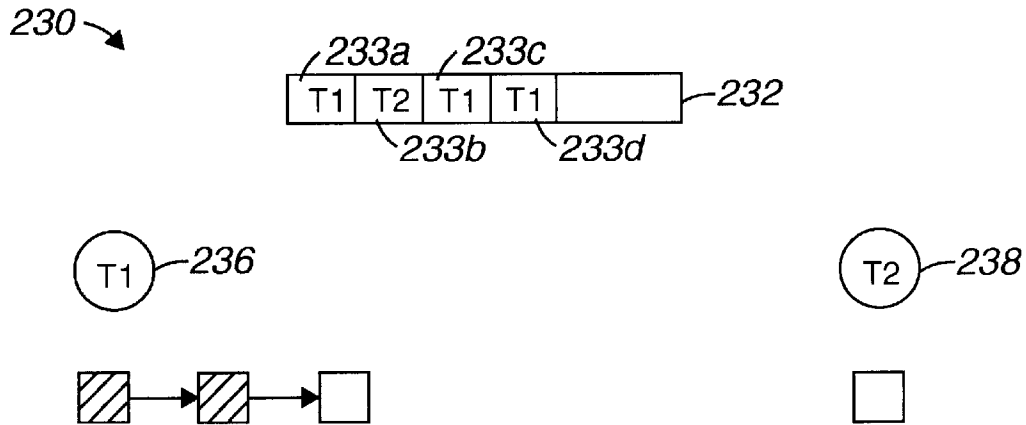


Figure 2b  
(Prior Art)

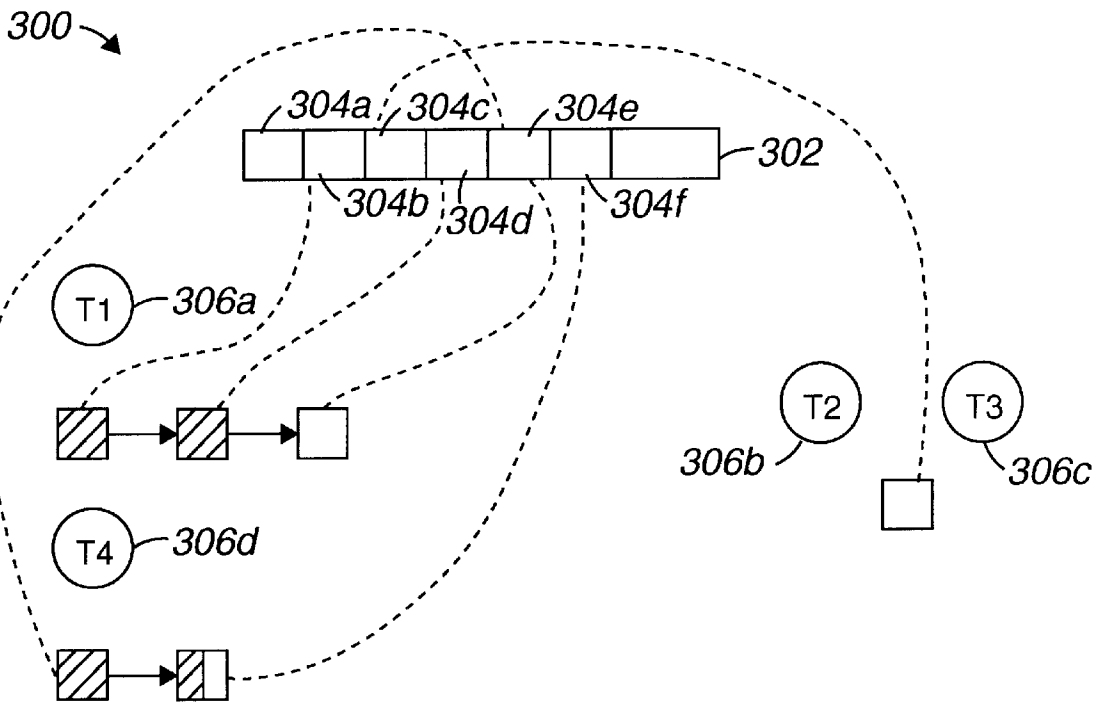


Figure 3

Figure 4

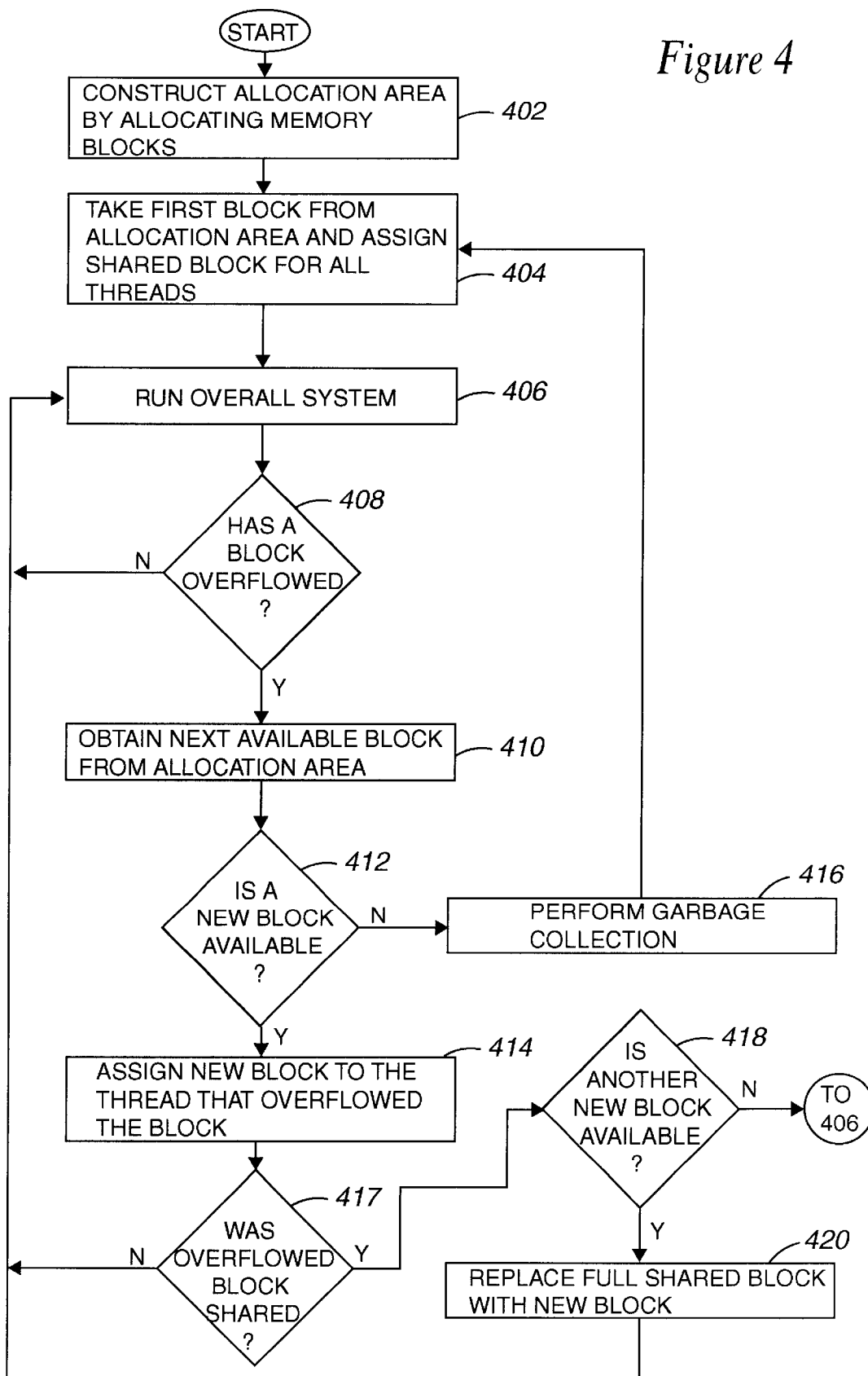
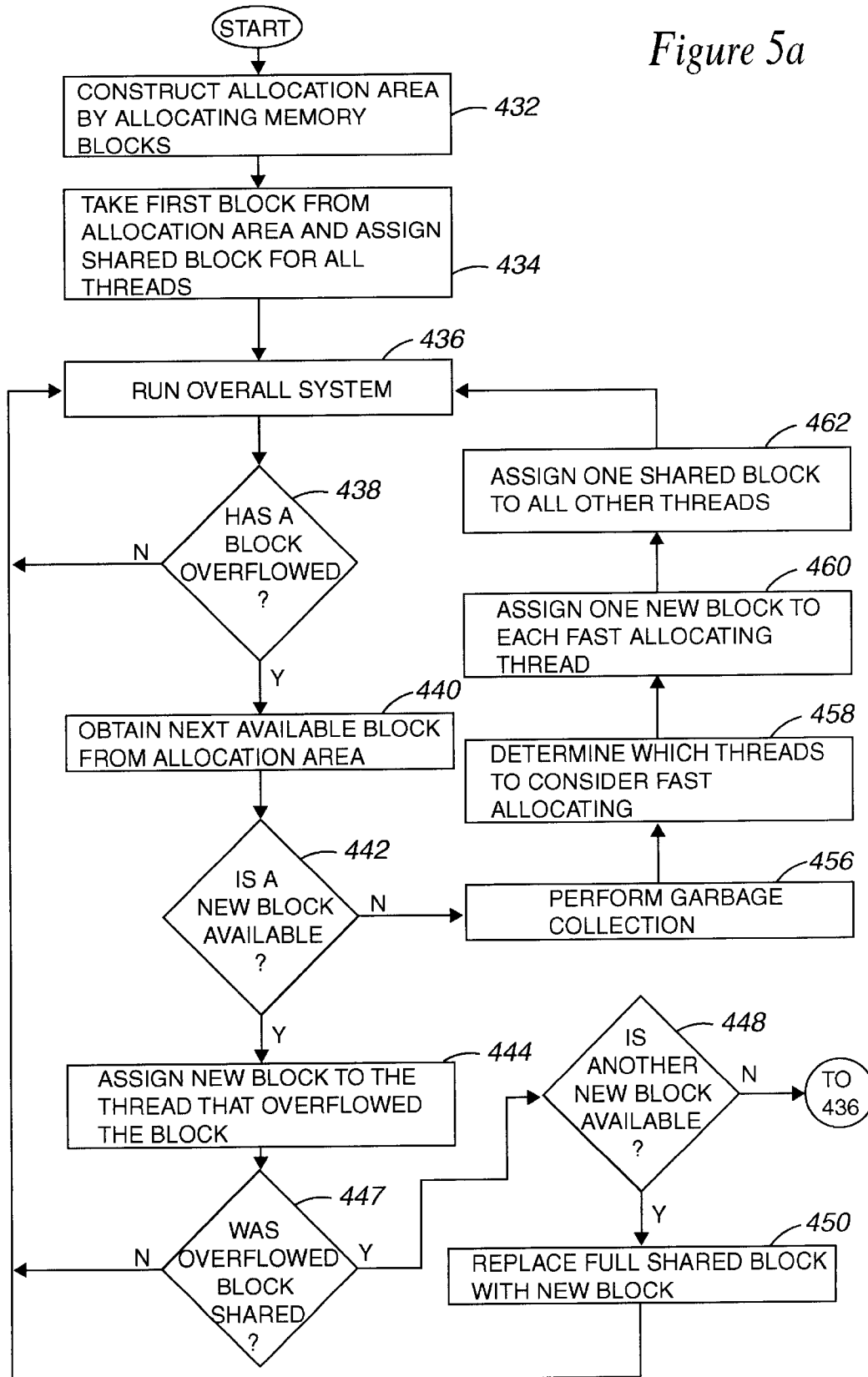


Figure 5a



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