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**Poznanovic et al.**

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(54) **SYSTEM AND METHOD OF ENHANCING  
EFFICIENCY AND UTILIZATION OF  
MEMORY BANDWIDTH IN  
RECONFIGURABLE HARDWARE**

(75) Inventors: **Daniel Poznanovic**, Colorado Springs,  
CO (US); **David E. Caliga**, Colorado  
Springs, CO (US); **Jeffrey Hammes**,  
Colorado Springs, CO (US)

(73) Assignee: **SRC Computers, Inc.**, Colorado  
Springs, CO (US)

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patent is extended or adjusted under 35  
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18, 2003.

(51) **Int. Cl.**  
**G06F 12/00** (2006.01)

(52) **U.S. Cl.** ..... **711/170; 711/154**

(58) **Field of Classification Search** ..... **711/170-173;**  
**712/15**

See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

6,076,152 A 6/2000 Huppenthal et al.  
6,243,791 B1 \* 6/2001 Vondran, Jr. .... 711/120  
6,247,110 B1 6/2001 Huppenthal et al.  
6,460,122 B1 \* 10/2002 Otterness et al. .... 711/154  
6,507,898 B1 \* 1/2003 Gibson et al. .... 711/168  
6,594,736 B1 6/2003 Parks

6,714,041 B1 \* 3/2004 Darling et al. .... 326/38  
2003/0046492 A1 \* 3/2003 Gschwind et al. .... 711/118  
2003/0046530 A1 \* 3/2003 Poznanovic ..... 713/100  
2003/0084244 A1 \* 5/2003 Paulraj ..... 711/118  
2003/0088737 A1 \* 5/2003 Burton ..... 711/118  
2003/0208658 A1 \* 11/2003 Magoshi ..... 711/122  
2005/0044327 A1 \* 2/2005 Howard et al. .... 711/147

**OTHER PUBLICATIONS**

"Summary: The Cache Read/Write Process," The PC Guide, 2001,  
www.pcguid.com/ref/mbsys/cache/func.htm.\*

Chien et al., "Safe and Protected Execution for the Morph/AMRM  
Reconfigurable Processor," IEEE, 1999, pp. 1-13.\*

IEEE 100: The Authoritative Dictionary of IEEE Standards Terms,  
Standards Information Network, 2000, pp. 874.\*

\* cited by examiner

*Primary Examiner*—Gary Portka

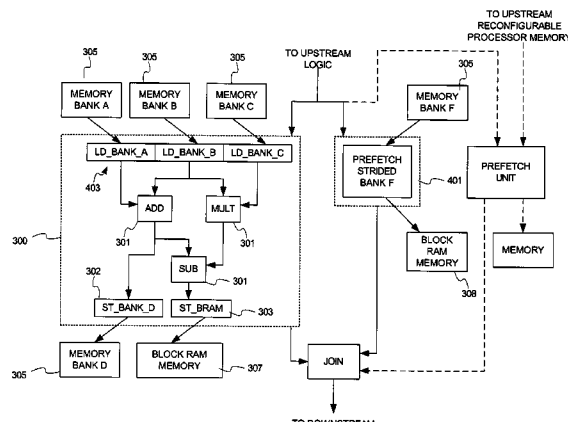
*Assistant Examiner*—Shane M. Thomas

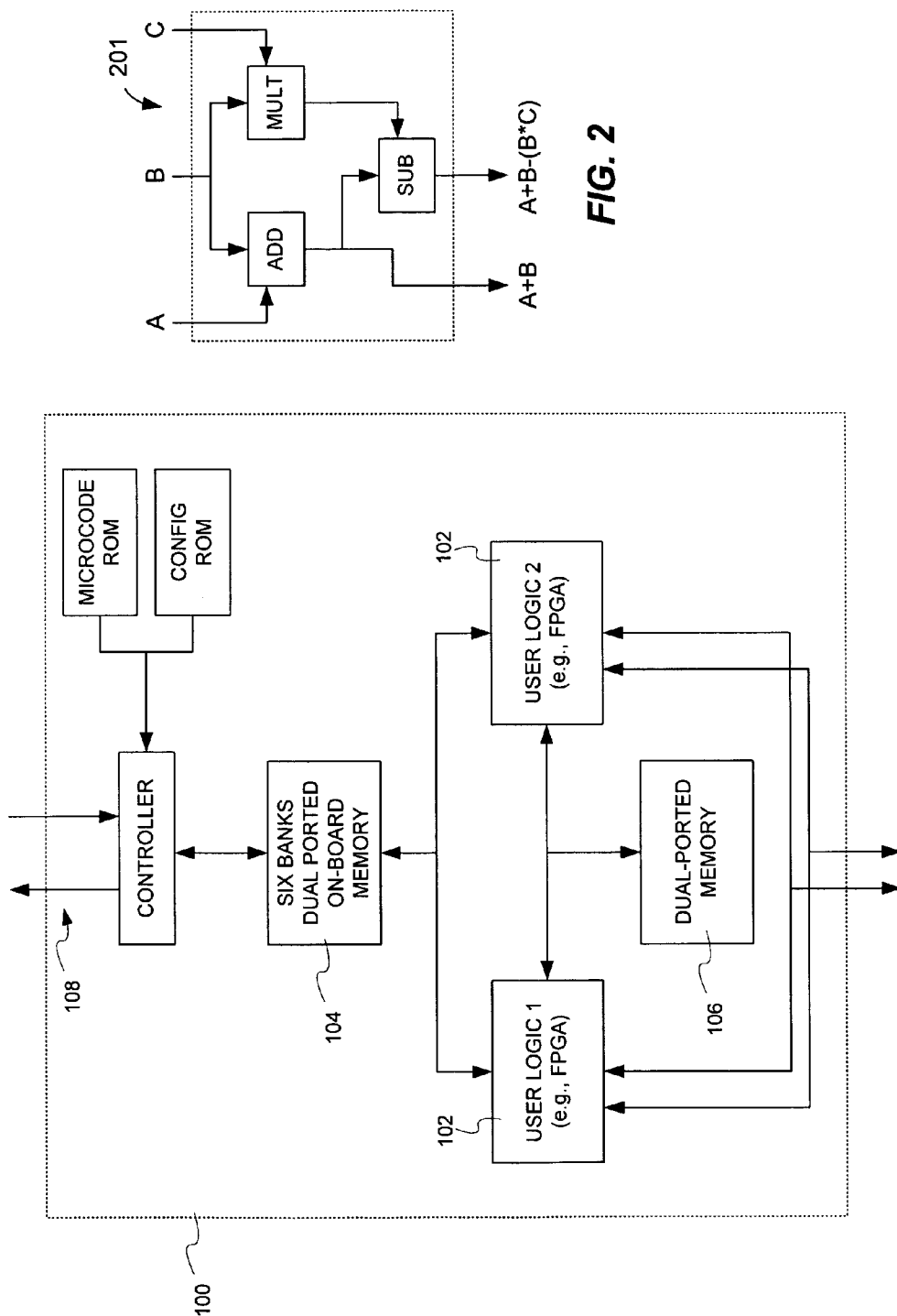
(74) *Attorney, Agent, or Firm*—William J. Kubida; Michael  
C. Martensen; Hogan & Hartson LLP

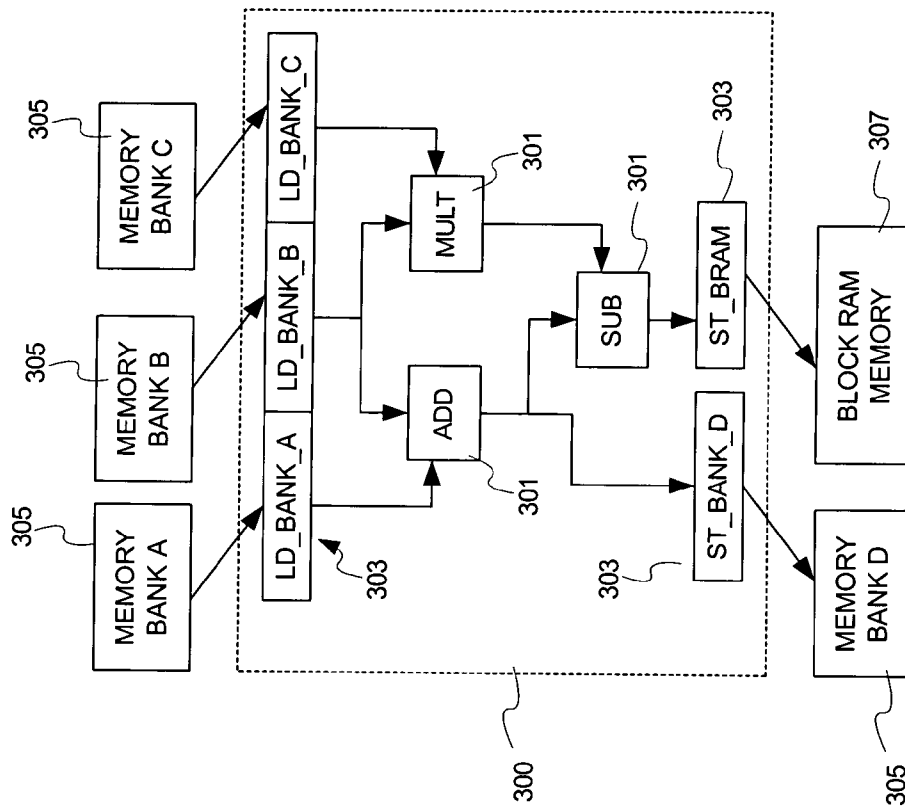
(57) **ABSTRACT**

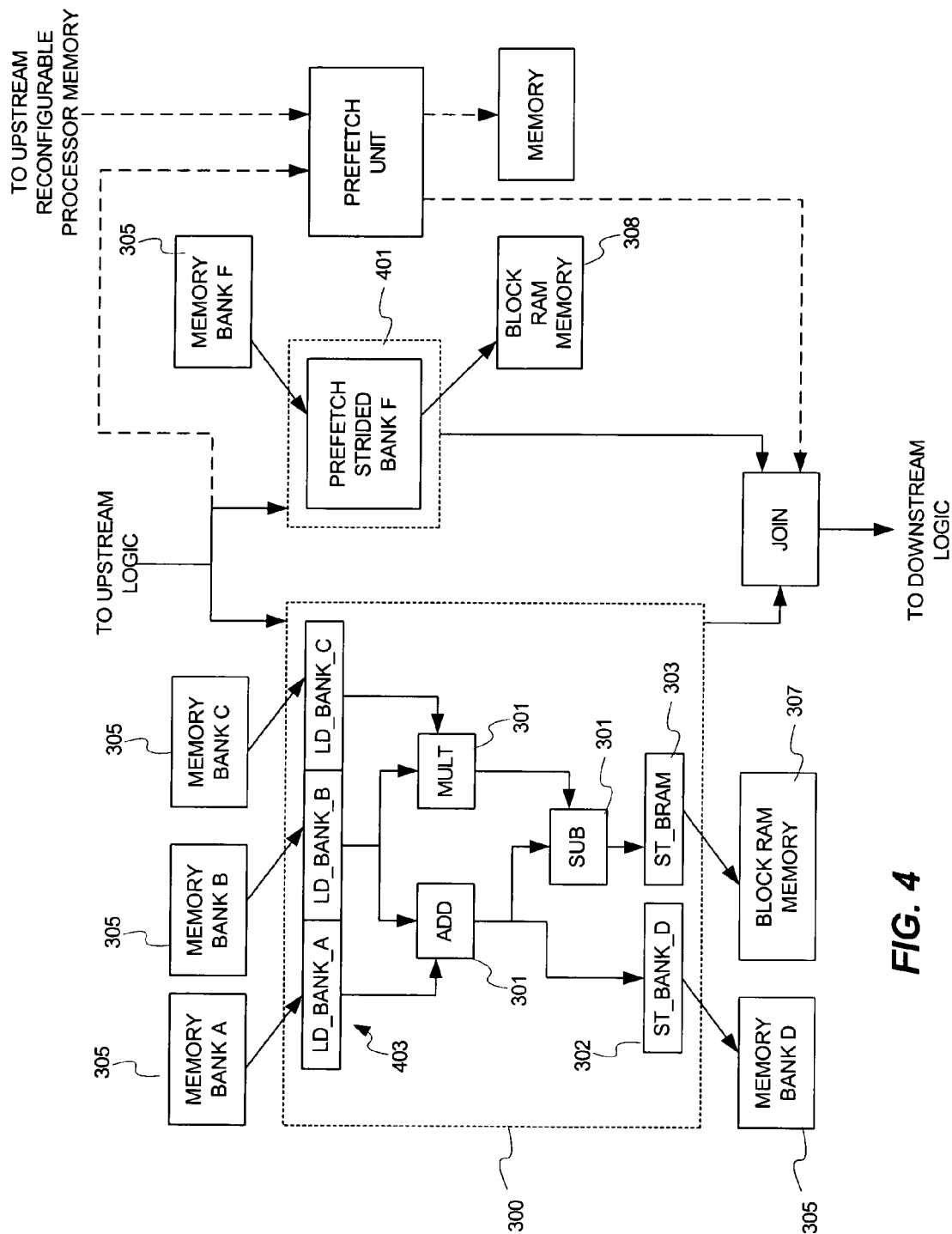
A reconfigurable processor that includes a computational unit and a data prefetch unit coupled to the computational unit, where the data prefetch unit retrieves data from a memory and supplies the data to the computational unit through memory and a data access unit, and where the data prefetch unit, memory, and data access unit is configured by a program. Also, a reconfigurable hardware system that includes a common memory; and one or more reconfigurable processors coupled to the common memory, where at least one of the reconfigurable processors includes a data prefetch unit to read and write data between the unit and the common memory, and where the data prefetch unit is configured by a program executed on the system. In addition, a method of transferring data that includes transferring data between a memory and a data prefetch unit in a reconfigurable processor; and transferring the data between a computational unit and the data prefetch unit.

**19 Claims, 12 Drawing Sheets**





**FIG. 3**

**FIG. 4**

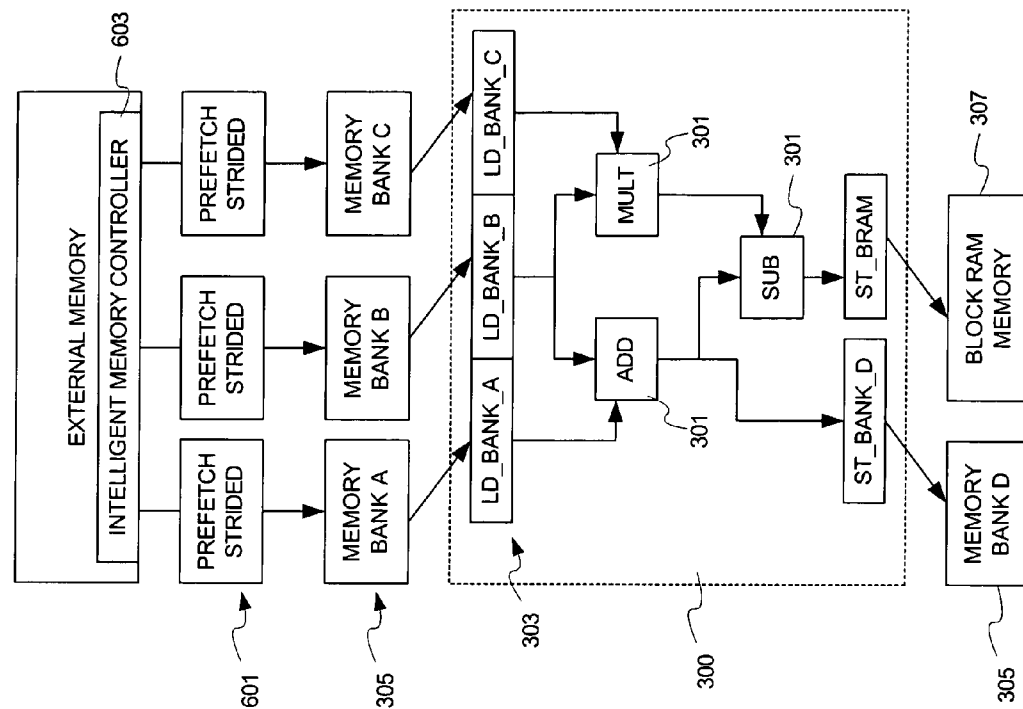


FIG. 5

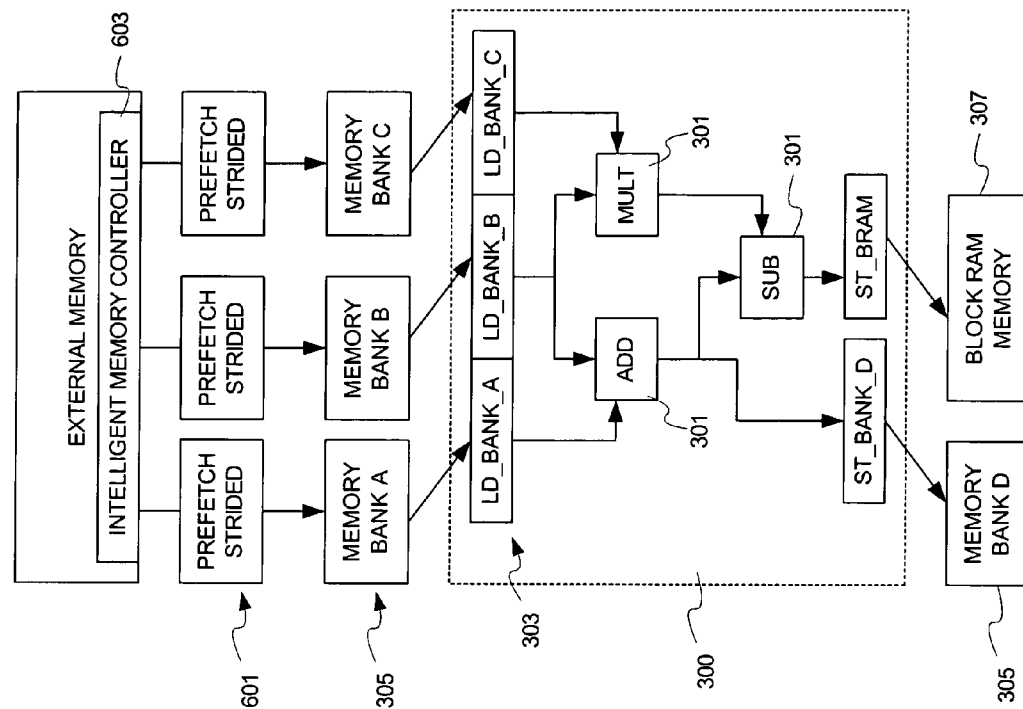


FIG. 6

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