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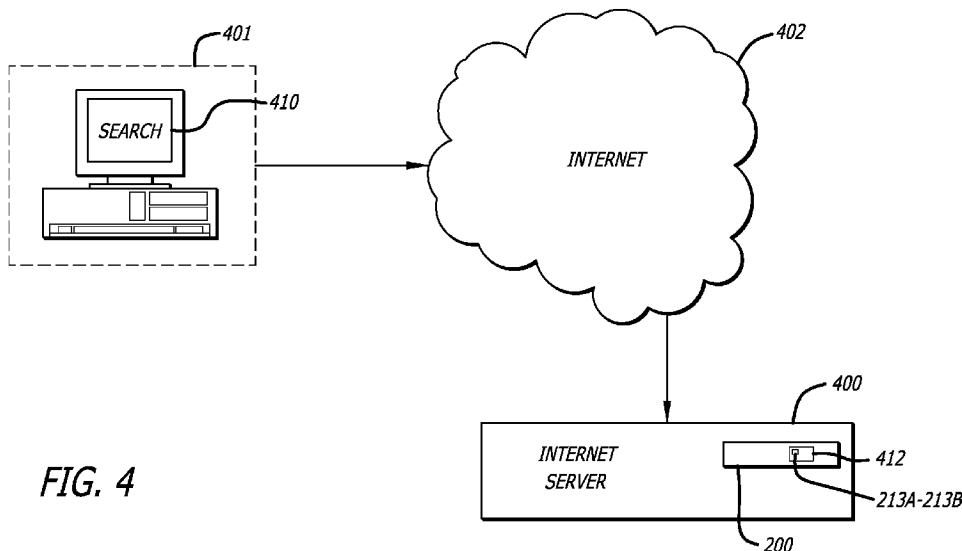
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[Continued on next page]

(54) Title: SYSTEMS, METHODS, AND APPARATUS FOR MAIN MEMORY WITH NON-VOLATILE TYPE MEMORY MODULES, AND RELATED TECHNOLOGIES



(57) Abstract: A computing system is disclosed that includes a memory controller in a processor socket normally reserved for a processor. A plurality of non-volatile memory modules may be plugged into memory sockets normally reserved for DRAM memory modules. The non-volatile memory modules may be accessed using a data communication protocol to access the non-volatile memory modules. The memory controller controls read and write accesses to the non-volatile memory modules. The memory sockets are coupled to the processor socket by printed circuit board traces. The data communication protocol to access the non-volatile memory modules is communicated over the printed circuit board traces and through the sockets normally used to access DRAM type memory modules.



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USPC - 711/105

According to International Patent Classification (IPC) or to both national classification and IPC

**B FIELDS SEARCHED**Minimum documentation searched (classification system followed by classification symbols)  
USPC - 711/105Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
USPC - 711/2,100,105,115 | 712/37Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
USPTO WEST (PGPUB ,USPAT ,USOCR ,EPAB ,JPAB), GOOGLE Scholars, motherboard, system, main board, printed circuit, processor, memory, controller, nonvolatile memory, socket, CPU, storage, trace, conductive, connector, search, DIMM, unplug, remove, search engine, buffer, slot, insert, vacant, available, empty, upgrade, replace**C DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
<b>X</b> ----- <b>Y</b>	US 2004/0193783 A1 (SHARMA et al ) 30 September 2004 (30 09 2004) entire document (especially para [0015],[0022],[0034],[0043H0045],[0050],[0061]-[0068],[0071]-[0073])	38-45 ----- 46
<b>Y</b>	US 2003/0188083 A1 (KUMAR et al ) 02 October 2003 (02 10 2003) entire document (especially para [0022],[0028],[0031]-[0032])	1-12 and 22-37
<b>Y</b>	US 6,564,326 B2 (HELBIG) 13 May 2003 (13 05 2003) (col 3, ln 4-22 and col 5 ln 5-15)	1-12 and 22-37
<b>Y</b>	US 2005/0044303 A1 (PEREGO et al ) 24 February 2005 (24 02 2005) para [0034]-[0037]	13-17
<b>Y</b>	US 2004/0186948 A1 (LOFGREN et al ) 23 September 2004 (23 09 2004) (para [0060]-[0061])	13-17
<b>Y</b>	US 2004/01 17581 A1 (LEE) 17 June 2004 (17 06 2004) (para [0033J]-[0037],[0040]-[0041])	18-21
<b>Y</b>	US 2006/0149857 A1 (HOLMAN) 06 July 2006 (06 07 2006) (para [0046]-[0049])	5, 12, 18-21
<b>Y</b>	US 2005/0166026 A1 (WARE et al ) 28 July 2005 (28 07 2005) (para [0128]-[0142])	14,15
<b>Y</b>	US 2002/0138600 A1 (SINGHAL) 26 September 2002 (26 09 2002) para [0038])	46

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