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Chen et al.

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(54) **NON-VOLATILE MEMORY MODULE**

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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 638 days.

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Primary Examiner — Midys Rojas

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(74) *Attorney, Agent, or Firm* — Nixon Peabody LLP;
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Related U.S. Application Data

(63) Continuation of application No. 12/131,873, filed on Jun. 2, 2008, now abandoned.

(60) Provisional application No. 60/941,586, filed on Jun. 1, 2007.

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

(52) **U.S. Cl.** **711/104**; 711/160; 711/161; 711/162;
710/10

(58) **Field of Classification Search** 711/160,
711/161, 162, 104; 710/10
See application file for complete search history.

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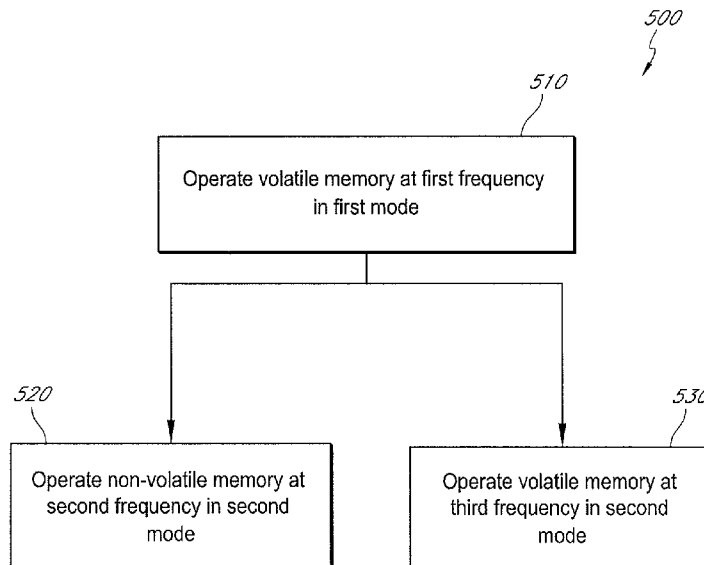
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(57) **ABSTRACT**

Certain embodiments described herein include a memory system which can communicate with a host system such as a disk controller of a computer system. The memory system can include volatile and non-volatile memory and a controller which are configured such that the controller backs up the volatile memory using the non-volatile memory in the event of a trigger condition. In order to power the system in the event of a power failure or reduction, the memory system can include a secondary power source which is not a battery and may include, for example, a capacitor or capacitor array. The memory system can be configured such that the operation of the volatile memory is not adversely affected by the non-volatile memory or the controller when the volatile memory is interacting with the host system.

30 Claims, 12 Drawing Sheets



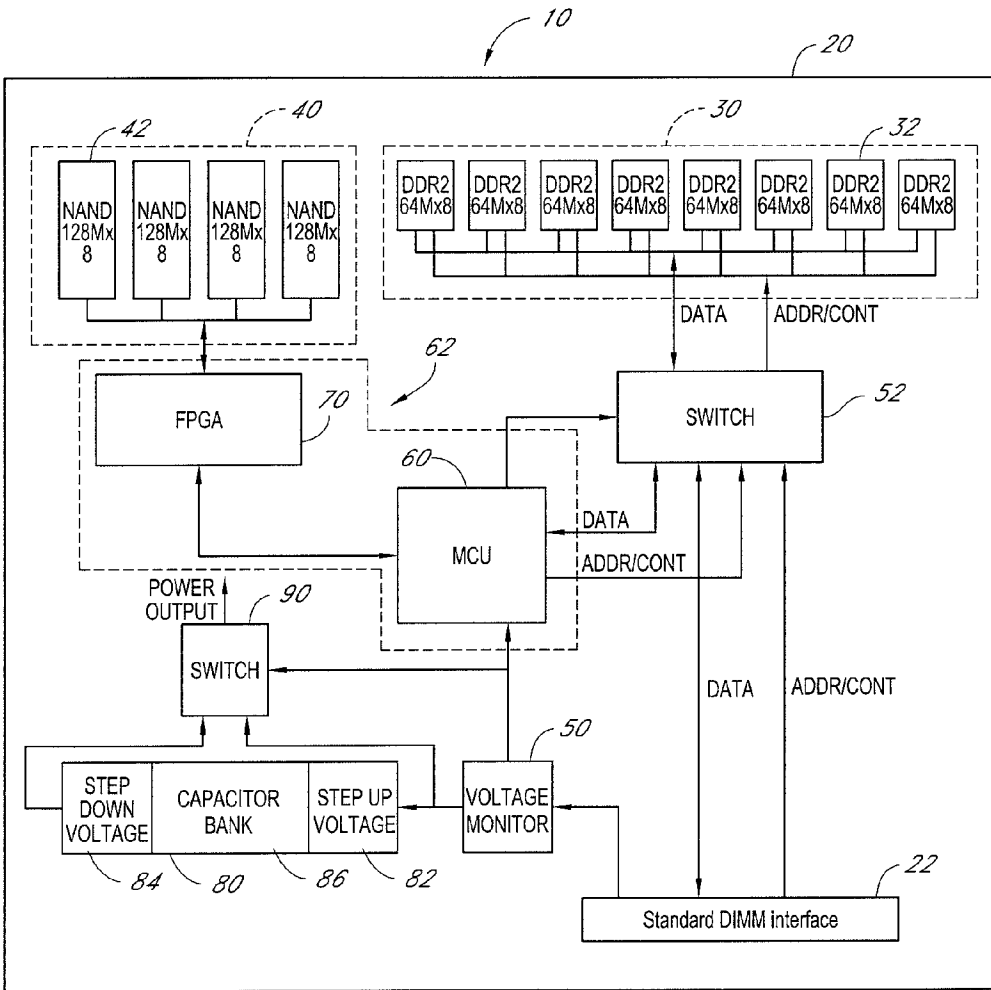


FIG. 1

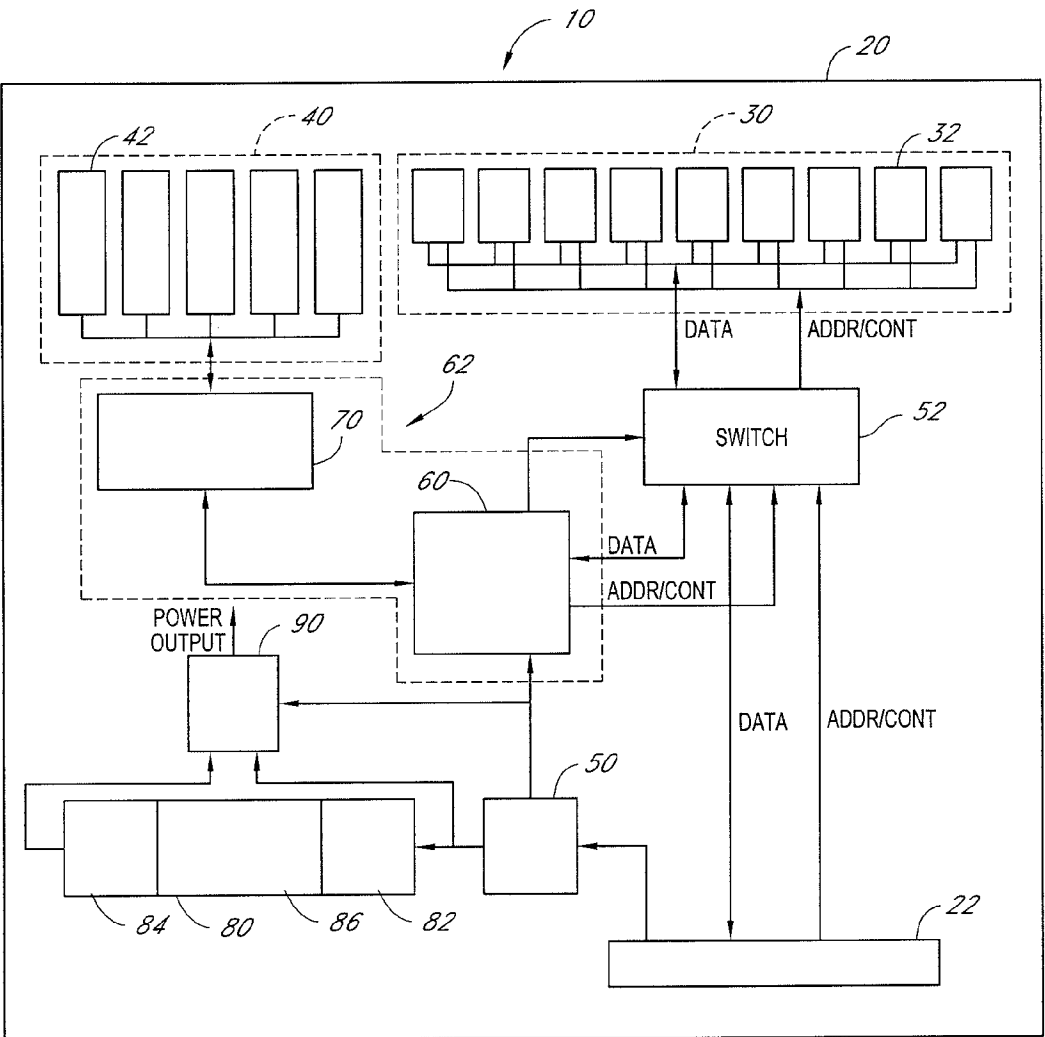


FIG. 2

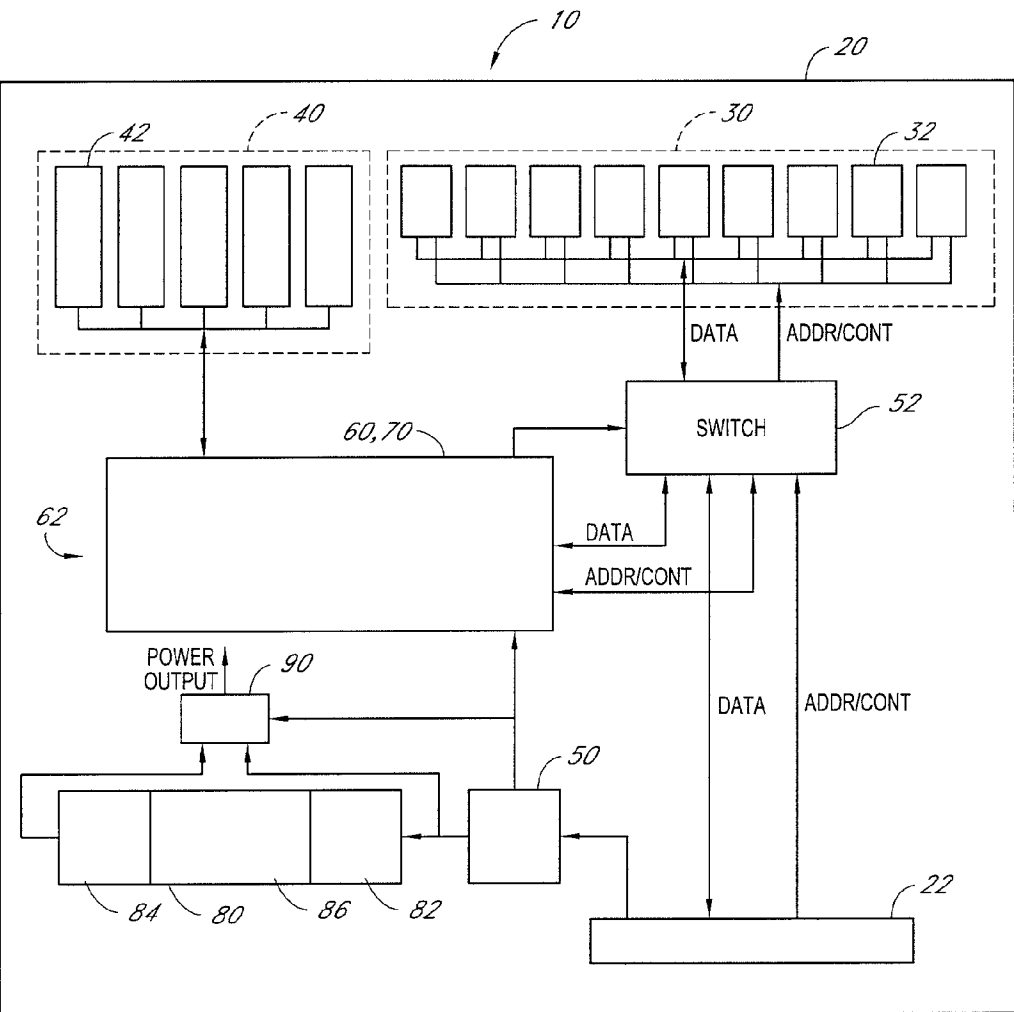


FIG. 3

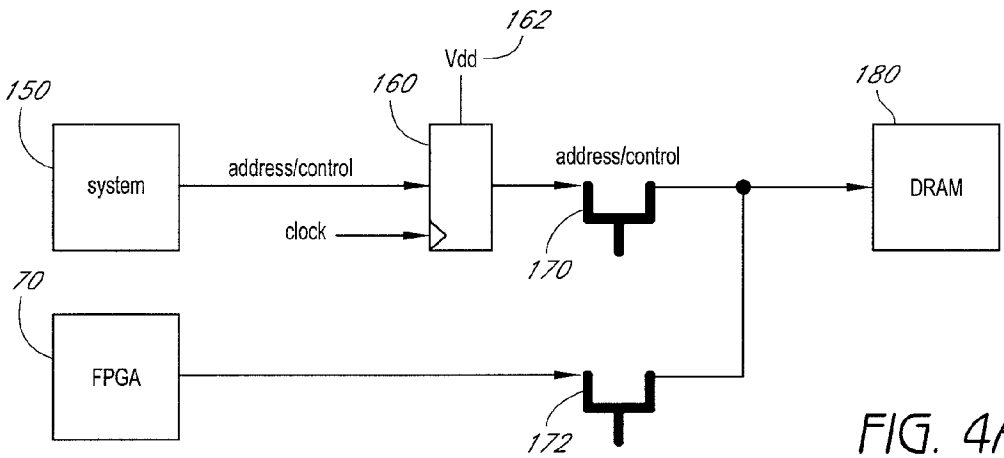


FIG. 4A

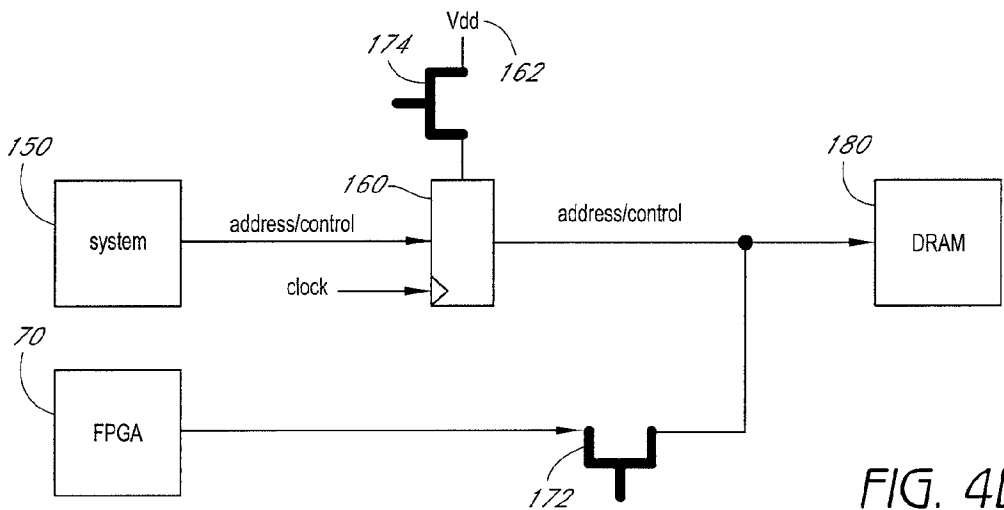


FIG. 4B

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