



US006012063A

# United States Patent [19]

[11] Patent Number: **6,012,063**

**Bodnar**

[45] Date of Patent: **Jan. 4, 2000**

- [54] **BLOCK FILE SYSTEM FOR MINIMAL INCREMENTAL DATA TRANSFER BETWEEN COMPUTING DEVICES**
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- [73] Assignee: **Starfish Software, Inc.**, Scotts Valley, Calif.
- [21] Appl. No.: **09/034,644**
- [22] Filed: **Mar. 4, 1998**
- [51] Int. Cl.<sup>7</sup> ..... **G06F 12/04**
- [52] U.S. Cl. .... **707/101; 707/100; 707/200; 707/205; 711/153; 711/171; 711/209**
- [58] Field of Search ..... **707/100, 101, 707/200, 205; 711/209, 171, 153**

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Primary Examiner—Jean R. Homere  
Attorney, Agent, or Firm—John A. Smart

## [57] ABSTRACT

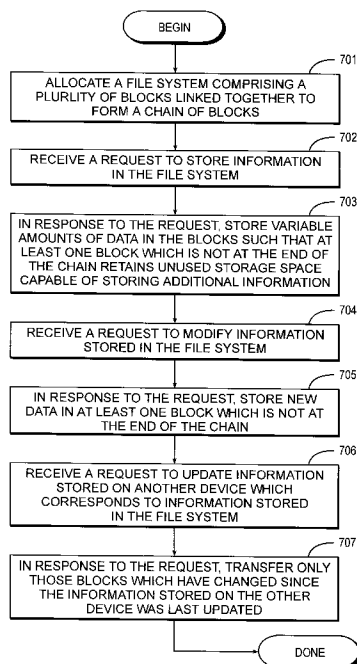
A portable computing device is described with a file system designed for providing improved data transfer methodology. The file system is implemented as a "Delta Block" File System (DBFS) comprising a file system designed specifically for the purpose of minimal delta calculation and minimum data transfer, particularly for portable storage devices which use solid state storage. The design of the DBFS minimizes the work required to compute changes to files and, hence, allows improved data transfer. Any new, removed, or modified blocks are transferred as changes. A simple checksum, CRC (cyclic redundancy checking), or similar comparison can be used to test a block for changes. Because block modifications are isolated to the proximity of the data change, only these blocks will be involved in a transfer. Furthermore, because the delta calculation is at the block level, it can be performed without knowledge of the data itself, thereby allowing any type of data to be compared and transferred. By supporting minimal transfer of data, the file system solves the problem of disproportionate data storage and communication speed situations, such as those encountered with portable computing devices.

**20 Claims, 5 Drawing Sheets**

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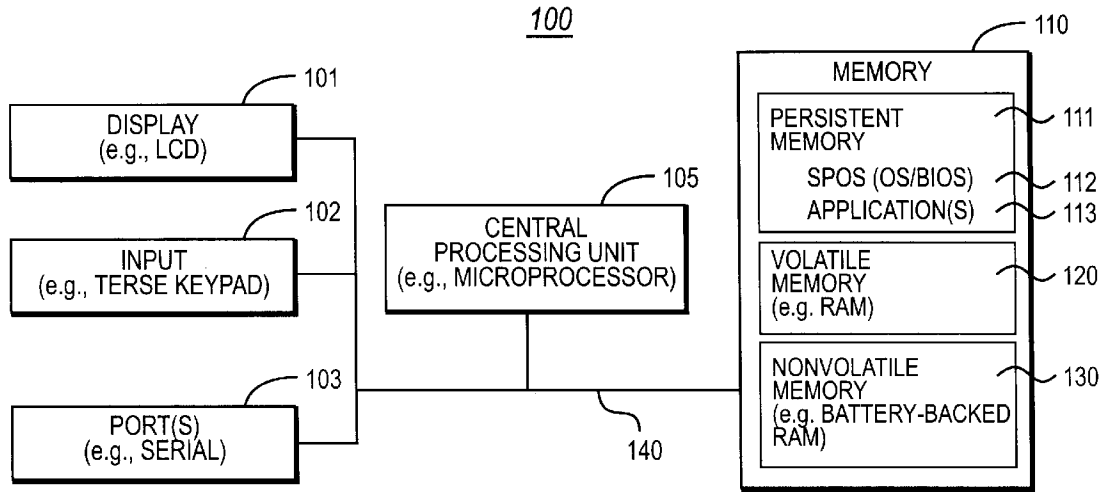


FIG. 1

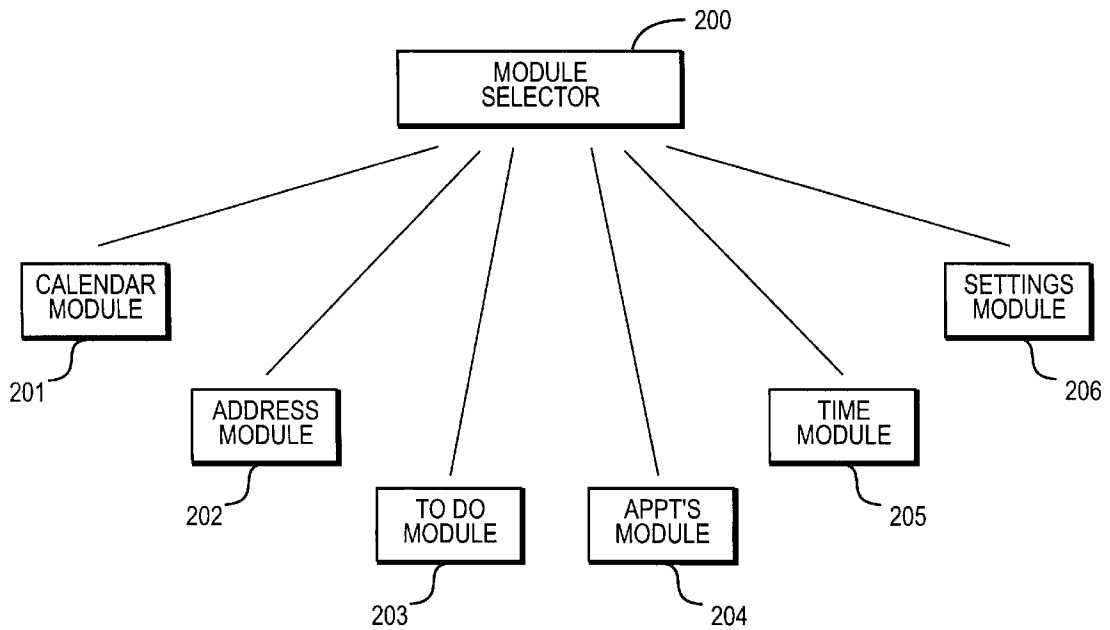


FIG. 2

300

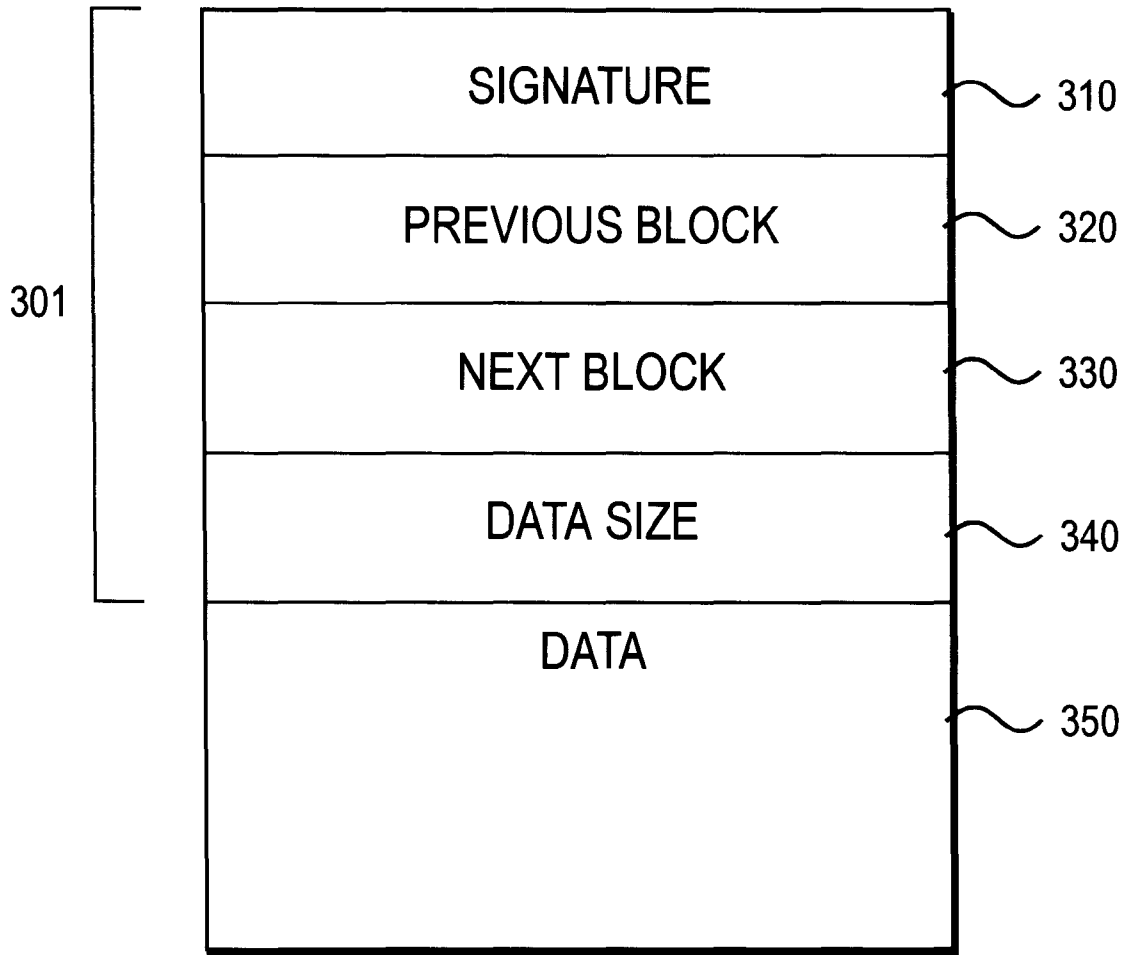


FIG. 3

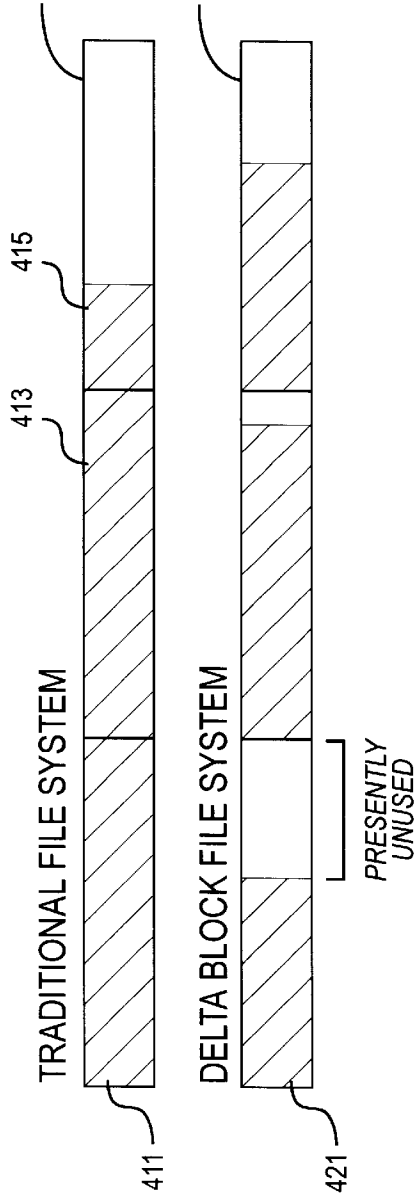


FIG. 4

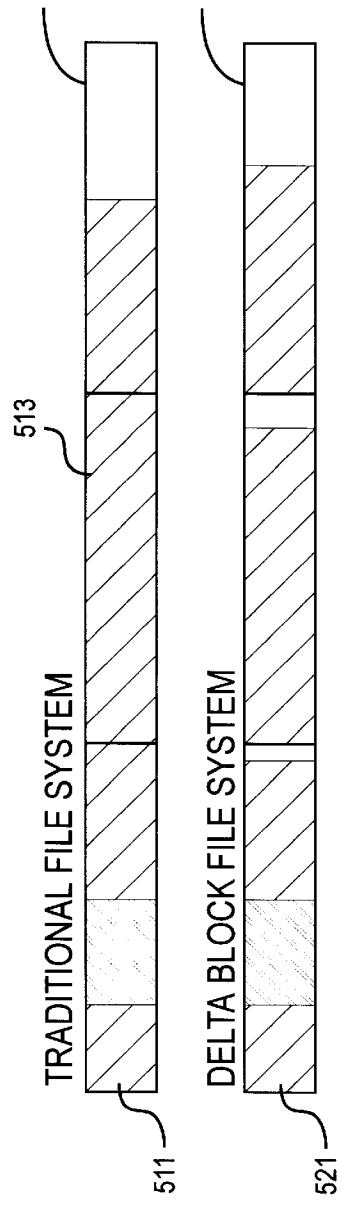


FIG. 5

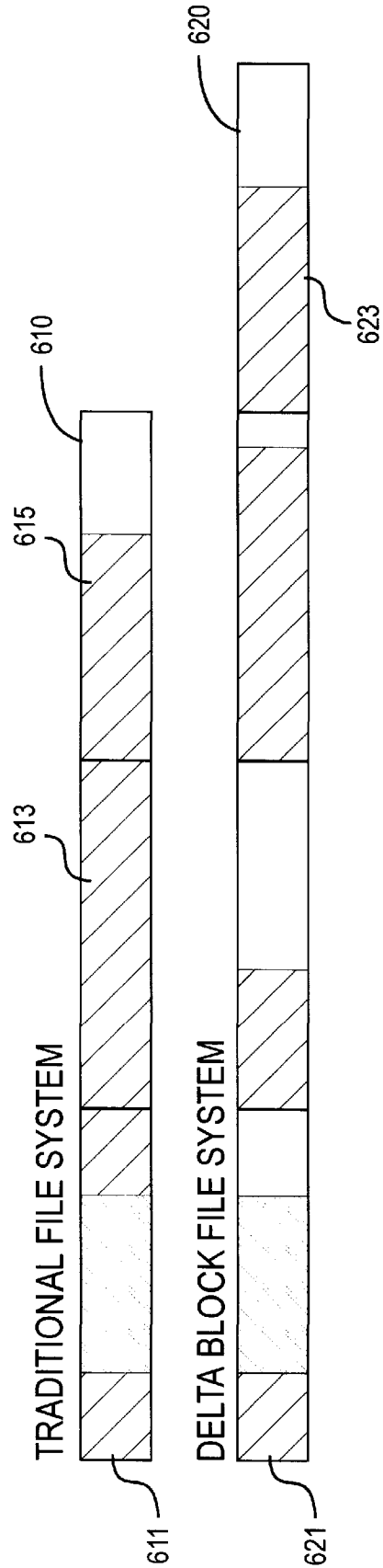


FIG. 6

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