

US007028220B2

## (12) United States Patent

## (10) Patent No.: US 7,028,220 B2 (45) Date of Patent: Apr. 11, 2006

| (54) | METHODS FOR SAVING DATA ON THE     |
|------|------------------------------------|
|      | BASIS OF THE REMAINING CAPACITY OF |
|      | A BATTERY IN A SUSPEND MODE AND    |
|      | RESUMING OPERATIONS USING THE      |
|      | SAVED DATA                         |

| (  | 75 | ) Inventor: | Jeong | Min   | Park     | Seoul. | (KR)   |  |
|----|----|-------------|-------|-------|----------|--------|--------|--|
| ١, |    | / mvemon.   | JUUIE | TATIT | I al IX, | Scour  | (171/) |  |

- (73) Assignee: LG Electronics Inc., Seoul (KR)
- (\*) Notice: Subject to any disclaimer, the term of this

patent is extended or adjusted under 35 U.S.C. 154(b) by 191 days.

(21) Appl. No.: 10/233,406

- (22) Filed: **Sep. 4, 2002**
- (65) Prior Publication Data
- US 2003/0046503 A1 Mar. 6, 2003

05 2005/00+0505 A1 Wai. 0, 2005

### (30) Foreign Application Priority Data

| Sep. 4, 2001 | (KK) | ••••• | 2001-5417 | U |
|--------------|------|-------|-----------|---|
|--------------|------|-------|-----------|---|

- (51) **Int. Cl.** *G06F 11/00* (2006.01)

#### (56) References Cited

#### U.S. PATENT DOCUMENTS

| 5,341,503 A | * | 8/1994  | Gladstein et al 713/340 |
|-------------|---|---------|-------------------------|
| 5,345,392 A | * | 9/1994  | Mito et al 713/300      |
| 5,459,671 A | * | 10/1995 | Duley 702/63            |
| 5,485,623 A | * | 1/1996  | Kurokawa et al 714/22   |
| 5,666,540 A | * | 9/1997  | Hagiwara et al 713/323  |

| 5,708,820    | Α  | *   | 1/1998  | Park et al 713/323      |
|--------------|----|-----|---------|-------------------------|
| 5,710,931    | Α  | *   | 1/1998  | Nakamura et al 713/323  |
| 5,714,870    | Α  | *   | 2/1998  | Dunstan 713/321         |
| 5,804,894    | Α  | *   | 9/1998  | Leeson et al 307/130    |
| 5,818,200    | Α  | *   | 10/1998 | Cummings et al 320/116  |
| 5,845,134    | Α  | *   | 12/1998 | Arai 713/322            |
| 5,920,728    | Α  | *   | 7/1999  | Hallowell et al 713/340 |
| 5,990,664    |    | *   | 11/1999 | Rahman 320/136          |
| 6,006,351    | Α  | *   | 12/1999 | Peretz et al 714/751    |
| 6,049,193    | A  | *   | 4/2000  | Chien 320/132           |
| 6,101,601    |    | *   | 8/2000  | Matthews et al 713/2    |
| 6,114,836    |    | *   | 9/2000  | Hagiwara et al 320/132  |
| 6,243,831    |    | *   | 6/2001  | Mustafa et al 714/24    |
| 6,266,786    |    |     | 7/2001  | Chang 714/22            |
| 6,408,196    |    |     | 6/2002  | Sheynblat et al 455/574 |
| 6,445,088    |    |     | 9/2002  | Spitaels et al 307/66   |
| 6,445,932    |    |     | 9/2002  | Soini et al 455/556.1   |
| 6,483,274    |    |     | 11/2002 | Lee 320/132             |
| 6,643,786    |    |     | 11/2003 | Kawakami 713/340        |
| 2002/0138772 |    |     | 9/2002  | Crawford et al 713/300  |
| 2002/0138772 | Al |     | 2/2002  | Liu                     |
| 2003/0033349 | A1 |     | 2/2003  | Salomon                 |
|              |    |     |         |                         |
| 2003/0149866 | Al | ••• | 8/2003  | Neuman et al 713/1      |

\* cited by examiner

Primary Examiner—Hong Kim (74) Attorney, Agent, or Firm—Birch, Stewart, Kolasch & Birch, LLP

#### (57) ABSTRACT

The present invention discloses a method for saving data including system status data stored in a memory to a backup server via a data communication network if the remaining capacity of the battery is not sufficient, by confirming continuously the remaining capacity of the battery, in a suspend mode in a computer system. Accordingly, the present invention previously prevents important data from losing although the system-down is occurred abruptly by the perfect discharge of the battery.

#### 16 Claims, 3 Drawing Sheets

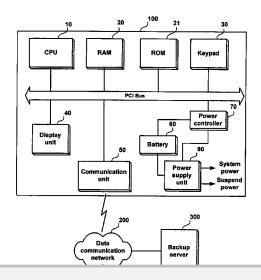




Fig. 1

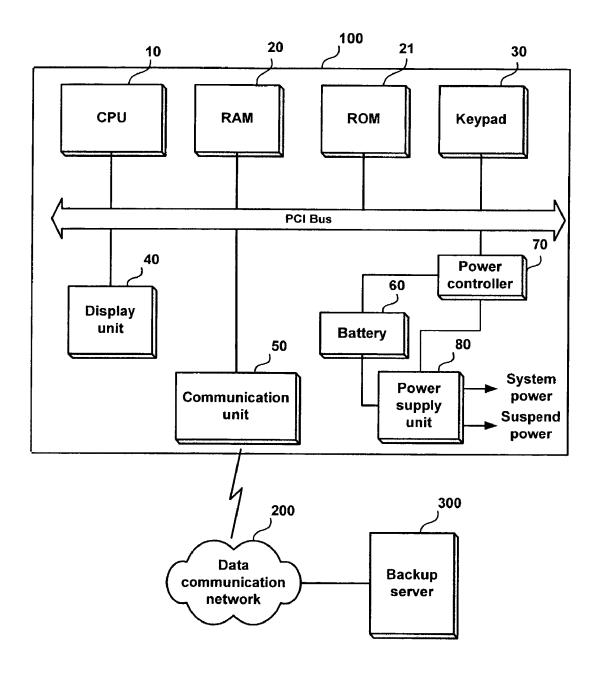




Fig. 2A

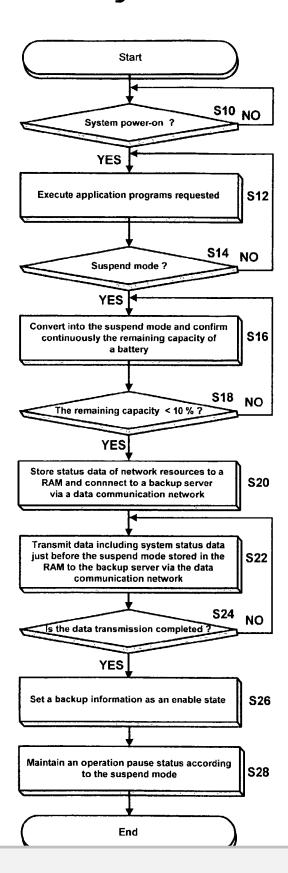
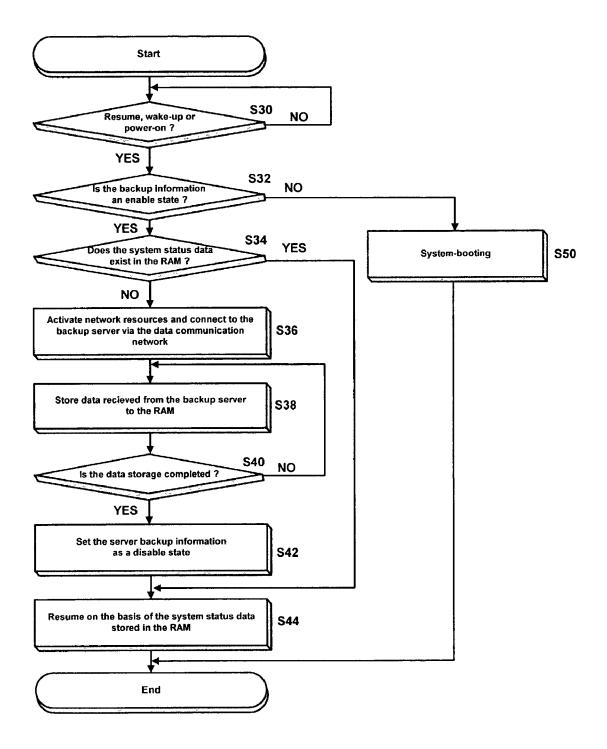




Fig. 2B



1

#### METHODS FOR SAVING DATA ON THE BASIS OF THE REMAINING CAPACITY OF A BATTERY IN A SUSPEND MODE AND RESUMING OPERATIONS USING THE SAVED DATA

#### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates to methods for saving data 10 including system status data stored in a memory to a backup server via a data communication network on the basis of the remaining capacity of a battery in a suspend mode, and resuming operations using the saved data when a resume mode, a wake-up mode or a power-on mode is occurred in 15 a computer system.

#### 2. Description of the Background Art

In a portable computer system such as a notebook computer, a PDA (Personal Digital Assistants) and a Web PAD etc., which uses mainly battery charge power rather than 20 firm power, power management functions are prepared for extending the battery driving time (that is, for saving the battery power). There is a suspend mode as an example of the power management functions.

In the suspend mode, it is stopped to supply power to the 25 rest of the devices, except for the some devices including a memory in which the data necessary for returning to the present status of the system is stored. That is, when a suspend mode signal is occurred, the system is controlled so that the status of the CPU (Central Processing Unit) and the 30 status of various peripheral devices just before the suspend mode is saved to the memory and the power is provided to only some devices such as the memory etc. At this state, an operation pause status according to the suspend mode is maintained until a resume mode or a wake-up mode is 35 requested.

However, in the data saving method of the conventional portable system as described above, there is a disadvantage that since the battery power is continuously supplied to some devices such as the memory etc. even in the suspend mode, 40 if the suspend mode is lasted for a long time, the system-down may be occurred by the perfect discharge of the battery and thereby all the data stored in the memory may be

#### SUMMARY OF THE INVENTION

Therefore, the present invention has been made in order to solve the above problem, an object of the invention is to provide a method for saving data on the basis of the 50 remaining capacity of a battery, in which data including the system status data stored in a memory is saved to the predetermined backup server via a data communication network if the remaining capacity of the battery is not sufficient in a suspend mode, thereby previously preventing 55 the data from losing caused by the perfect discharge of the battery.

Another object of the invention is to provide a method for resuming operations using the data saved in the server by the data saving method when a resume mode, a wake-up mode or a power-on mode is occurred.

In accordance with one aspect, the present invention provides a method for saving data on the basis of the remaining capacity of a battery including: a first step for storing the present system status data into a memory in a 65

2

mitting and storing the data stored in the memory to a backup server via a data communication network when the confirmed the remaining capacity of the battery is below a reference value; and a third step for returning to the suspend mode after the data is saved to the server.

In accordance with other aspect, the present invention provides a method for resuming operations in a portable computer system which resume the operations from a suspend mode comprising: a first step for checking whether system status data just before the suspend mode is saved in a backup server; a second step for connecting to the backup server via a data communication network and receiving the system status data saved in the backup server according to the checking result; and a third step for returning to the state prior to the suspend mode using the received system status data

#### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become better understood with reference to the accompanying drawings that are given only by way of illustration and thus are not limitative of the present invention, wherein:

FIG. 1 is a view illustrating a construction of a portable system and a network to which a data saving method on the basis of the remaining capacity of a battery in accordance with the present invention is applied;

FIG. 2A is a flowchart illustrating a preferred embodiment of the data saving method on the basis of remaining capacity of a battery in accordance with the present invention; and

FIG. 2B is a flowchart illustrating a preferred embodiment of an operation resuming method in a system to which the data saving method in accordance with the present invention is applied.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A method for saving data on the basis of the remaining capacity of a battery in a suspend mode and a method for resuming operations using the saved data in accordance with preferred embodiments of the present invention will now be described in detail with reference to the accompanying drawings.

FIG. 1 is a view illustrating a construction of a portable system and a network to which a data saving method on the basis of the remaining capacity of a battery in accordance with the present invention is applied.

As shown in FIG. 1, a portable system 100, to which the method of the present invention is applied, comprises a CPU (Central Processing Unit) 10, memories 20 and 21, a keypad 30, a display unit 40, a communication unit 50, a battery 60, a power controller 70 and a power supply unit 80.

The memories comprise a ROM (Read Only Memory) 21 in which BIOS (Basic Input and Output System) routines of the system and a routine for communicating with the address of a data communication network 200 about a backup server 300 are stored, and a RAM (Random Access Memory) 20 in which various programs and data for operating the system are stored.

The keypad 30 is a device for inputting various commands or data by a user and the display unit 40 displays frames of image being implemented by the commands and data input through input devices such as the keypad 30.

The communication unit 50 is a device for performing a



# DOCKET

## Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## **Real-Time Litigation Alerts**



Keep your litigation team up-to-date with **real-time** alerts and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

### **Advanced Docket Research**



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## **Analytics At Your Fingertips**



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

#### API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

#### **LAW FIRMS**

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

#### **FINANCIAL INSTITUTIONS**

Litigation and bankruptcy checks for companies and debtors.

### **E-DISCOVERY AND LEGAL VENDORS**

Sync your system to PACER to automate legal marketing.

