

# **RESEARCH ABOUT THE EFFICIENT RECORDING STRUCTURE OF INSTALLED DATA RECORDING DEVICES**

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## **ABSTRACT**

Although the wireless data transmission technologies have evolved significantly, data recording devices are still being used because of the limitations of data rates and reliability issues over wireless environment in the avionics, military, space etc. Payload has limitation of weight. In addition, storage has limitation of capacity. So, we need to research about a data recording structure within a limited amount of memory. In this paper, we propose a new data recording structure through a condition necessary for efficient use of memory. The proposed structure has an equivalent function as other recording systems. But, it uses less memory than the other equivalent recording structures.

## **KEYWORDS**

Recorder, File System, File Structure, Health Usage Monitoring System (HUMS),

## **INTRODUCTION**

Although wireless data transmission technologies have evolved significantly, data recording devices are still being used because of the limitations of data rates and reliability issues over wireless environment in the avionics, military, space, et cetera. Air vehicle payload has the limitation of weight. In addition, storage has limitation of capacity. So, we need to research about data recording structure within a limited memory. In this paper, we propose new data

recording structure through a condition necessary for efficient use of memory. The proposed structure has equivalent function as other recording systems. But, it uses less memory than the other equivalent recording structures.

Today, digital data recorders adopt new technologies such as PCI (Peripheral Component Interconnect) Express, SATA (Serial AT Attachment), SSD (Solid State Drives). These embedded innovations include more performance and less cost [1].

But hardware form factor was unified by several processor vendors. Now software technologies are more important like data processing algorithm, file system, file structure and operating systems.

The advantage of commercial file system is compatibility with operating systems of personal computers. These are supplied with a BSP (Board Support Package) and always work with an embedded OS (Operating System). Some systems do not need an OS and may have limited memory areas requiring a special file system. Usually, minimized systems or cost dependent systems require a specialized file system.

## **APPLICATION**

General purpose recorders follow standards, but other systems need practical concept hardware and software, such as HUMS. HUMS consist of DAPU (Data Acquisition and Processing Unit), CQAR (Card Quick Access Recorder), and PIP (Pilot Interface Panel). CQAR receives data from DAPU with PCM (Pulse Code Modulation) stream (RS-422 voltage level). CQAR for HUMS require:

- 4~16GB Memory
- 512kbps PCM input

## **FILE SYSTEM**

File system is a way to record, retrieve, manage and organize the file (data) in electrical media storage [2]. When a file moves from PC (Personal Computer) to USB (Universal Serial Bus) memory, this file is reformatted and stored in the formatted file system in USB memory. Formatting the file means, erasing all of the data and reconstructing a new file system. Examples of file systems include FAT (File Allocation Table), NTFS (New Technology File System), Ext (Extended file system), and UNIX file system. Figure 1 shows a FAT32 file system structure.

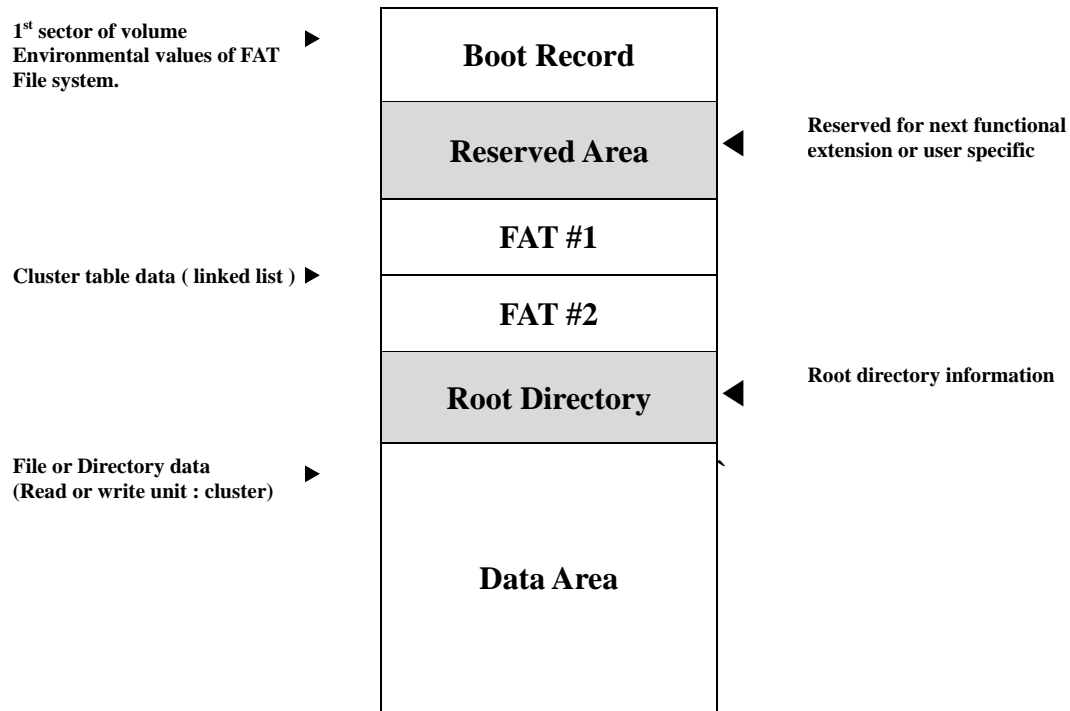


Figure 1. FAT32 File System Structure

A FAT file system consist of 4 basic area: [3]

- Reserved Areas
- FAT area
- Root Directory Area (except FAT32)
- File and Directory Data Area

This file system contains an excessive number of unnecessary information. Applied in the system, one channel input receives the input data is stored contiguously in memory, FAT is not required. Boot record area of the reserved area can be relatively simplified; it is possible to remove non-scheduled areas. The root directory of the data area is not used.

FAT system proposed in the new file system includes:

- File data information: file name, size, create time
- Input data specification: input format, channel number, transfer speed

File cluster linked list data is not needed in this system, because every data cluster will be connected continuously.

By upper requirements, designed file system structure is shown in Figure 2.

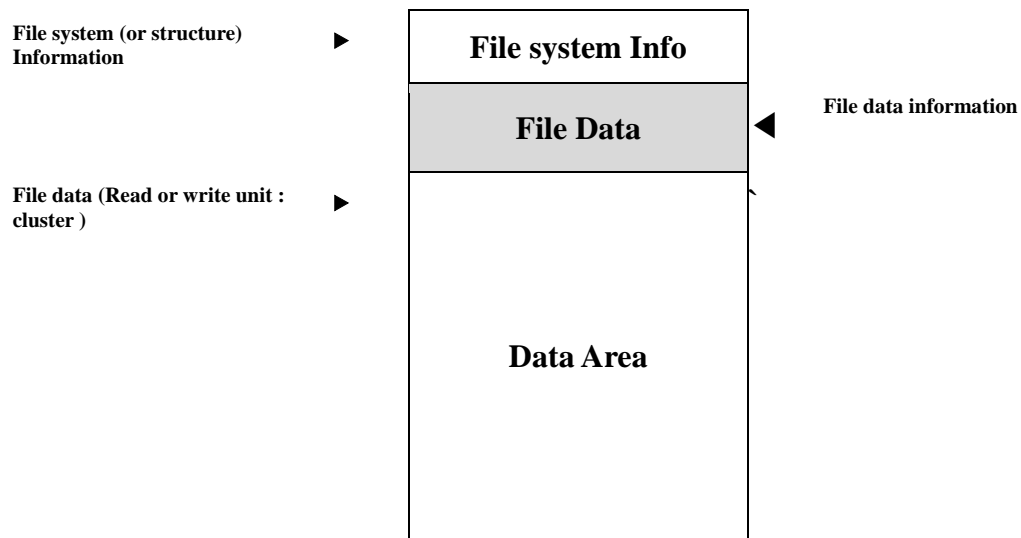


Figure 2. Designed file system

File system Information contains the file system information for each area and includes a unique identity code.

- File system code (Magic number): Unique number for file system Identification
- Cluster size: unit size of data read/write data
- File data start address
- Data area start address

Table 1 File system Information region

offset	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
0x0000	Magic Num.				Cluster Size				File Data start address				Data area start address			

File Data have detailed information about what each file contains.

- File name
- File size
- File start address
- File creation time

Table 2 File data region

offset	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
	Name												Extender			
	Create Time				Start Address				status				File Size			

File data area size can be adjusted (depending on your purpose). The input data is stored in the data area. Because it is recorded in memory continuously, this file system doesn't need linking data (or FAT).

## **CONCLUSION**

This simple file system requires a separate program for the movement of data. But it is easier to implement than commercial file systems. Simple software can provide high performance. While many developers focus on hardware solutions to improve data recording system performance, higher levels of system performance may be achieved with a little more focus on software improvements.

## **ACKNOWLEDGMENT**

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