The Application of Real-time Database Technology in Substation Microcomputer Line Protection

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ABSTRACT

This article analyzes the structural characteristics and the design of the real-time database, we have studied the algorithms commonly used in database technology, and the structure framework of real-time database system is proposed. This paper presents the data model and the detailed realization of the real-time database which applied in the software of the microcomputer circuit protection. Using Visual C programming on this basis, the modular programming is implemented. Testing the software that was developed, Results show that the real-time database system meet the design requirements, the performance of the system to achieve the desired purpose, can be applied to real-time demand higher integrated substation automation.

KEYWORDS

Relay Protection, Modular Programming, Real-Time Database.

INTRODUCTION

The expansion of substations integrated automation and the complexity of their structures have made the work of relay protection increasingly complex. Relay protection of electric power industry requires the information of grid structure protection configuration and equipment in service or out of service, and for such information as the correct analysis, processing, statistics, this work is very heavy and complicated. Running managers often do a lot of work such as querying setting calculating statistics, and filling all kinds of operating reports. Heavy management tasks not only cost a lot of manpower and material resources, but also brought a lot of potential safety problems, so the introduction of new type real-time database technology to improve the level of automation has become the inevitable trend of development. This paper analyzes the structure and data object of the substation automation system, expounds the structure of real-time database and the implementation of real-time database transaction management, and established the real-time database system model.

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REAL-TIME DATABASE ARCHITECTURE

This real-time database system is established based on memory database which is the kernel of system, its system structure including memory database, real-time task scheduling management, I/O scheduling history database, etc. The overall structure of the system is shown in figure 1, which is briefly described in the following sections.

The initialization module includes two parts of the content: initialize setting and Initialize starting. The real-time database system is stored in the historical database in the form of a file when it is not started. It defines the parameter values of the data table in the real-time database, such as tables, field information, etc.

This article used the priority driver algorithm and the compatibility matrix lock protocol to implement concurrent control with the purpose of resolve deadlock and priority inversion, its flowchart is shown in figure 2.

Figure 1. The real-time database architecture initialization module.
THE IMPLEMENTATION OF SHARED MEMORY

Shared memory creation has six links: Open the disk file; Set up a Shared memory area; produce a file-mapping kernel object; Pointers to Shared memory; Finding Shared memory; Clear the memory; Close the file.

In order to realize access to Shared memory blocks, we also need to implement the allocation of various data within the database to access the data in memory. This article uses a page table approach to complete memory allocation, as shown in figure 3.

INDEX STRUCTURE AND RECORD OPERATION ALGORITHM PROCESS

In this article, the T-tree index structure is used to find, insert, and delete operations like binary trees. The looking-up algorithm process is shown in figure 4.
Before the adjustment                             after the adjustment

Figure 4. Looking-up algorithm flowchart for T-tree.

Before the adjustment after the adjustment

Figure 5. Rotation operation Schematic diagram.

In the insert and delete operations of the T-tree, when we add or remove a T-tree node, we need to check the T-tree again. If the T-tree is unbalanced, we have to rotate it. As shown in Figure 5.

Real-time databases need to constantly receive data from the outside and send information to the outside, so the communication of the real-time database is particularly important. The communication of this real-time database is divided into the communication with the front-facing machine, the communication with the historical database, and the communication with the application programs.

CONCLUSION

The real-time memory database system developed by this paper is applied to the software of microcomputer circuit protection, which is very good. The overall software interface is shown in Figure 6. There are three main parts of the top machine software: the main thread, thread down cyclical, monito
t manage thread. The main thread handles interface operations; the thread down cyclical consists of three parts: Take the full remote communication cyclical, Check the time cyclical, and query cyclical. The monitor manage thread is responsible for accepting the message sent by the next machine node, subsection and distributed processing according to the different feature code. The software is generally well run, and the data is not inconsistent. The structure of the real-time memory database is
Reasonable. Ability to function normally in the upper computer software. Figure 7 is fixed value summons data that is stored in the history database via a memory database.

REFERENCES