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## **Multiprocessor Based Real-Time Data Acquisition Systems**

### **ABSTRACT**

Equipment for data collection and recording has widespread use in a variety of engineering applications. This paper deals with the use of multiprocessor-based architectures in digital data acquisition systems, emphasizing advantages in terms of flexibility and overall system throughput, and the characteristics of the embedded operating system.

An overview of the basic architecture of typical data acquisition systems is first presented, followed by a description of a multiprocessing architecture for data acquisition in real-time environments where multiple sampling rates are employed to monitor analog and digital data from different sources. Software and hardware techniques are covered, including the multiplexing of analog signals, digital signal processing, use of masking techniques in the processing of serial data streams, and the use of multi-point buses for communications with peripheral devices.

The characteristics of a real-time multi-tasking operating system are analyzed. This is the core of the software in any data acquisition system which must meet real-time constraints. In turn, the core of the operating system is the real-time kernel. Emphasis is put into the organization of the kernel, covering issues such as kernel primitives, service calls, interrupt service routines, process scheduling, memory management, and communications and synchronization between processes