

Web Server Application on Multi-centre Embedded System

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Abstract:

By the fast development of VLSI and embedded technology its period to participate old-style data group Web equipment and servers in embedded systems Achieve outstanding reliability, reliability and real-time performance. There are still problems with this system It should be solved effectively like implementation. Multitasking consecutively in concurrent mode. This Thesis offerings a multi-core based web server request On-board system, for sample monitoring, system It is configured to run on the eCos embedded functioning system. Combined dual-core Intel Atom computer Records group unit and web server unit. We are Realize this multi-core integrated web server scheme. Power plant successful chemical nursing project The actual result is that this building It works healthier with advanced presentation than ever.

keywords: Embedded Web Server, Multi-core, Intel Atom, eCos OS

1. Introduction

Through the advance of semiconductor skill The emergence of multi-core computers in 2006 [1] [2], The multi-core period is pending and this new construction Many impacts on embedded system design After ultra-mobile devices to announcement servers In addition to ubiquitous computing [6]. Especially with the announcement Intel Atom processor in early 2008 People were interested in integrating this processor into embedded System to achieve high presentation such as low response The time of the control or monitoring system. Intel atom Processor, multi-core based integrated processor Architecture was built with the world's minimum transistor man-made using Hi-k Metal Gate 45 nm technology integrated systems with Intel Atom processors

The most integrated web server scheme for current monitoring Collected of dual separate parts [3] Checking devices and servers with industrial

fieldbus (IFB) joining each other, the checkingscheme Used to collect the converted digital signal After transmitting many analog signals from the sensor When I send data to the web server via IFB, the web server broadcasts. This data is conventional and electronic from the web generally. The most old-style web server scheme Do the transitional procedure between these two Components have a major impact on system presentation such as dependability. Accuracy, reliability, real-time demonstration, etc. Based on this new integrated multi-core knowledge this article gifts a new construction for the embedded web. Server scheme for on-board inspection and working eCos [9] The system has also been reorganized on this system. In Other analog signals from systems and sensors can be processed It is kept in parallel with other procedures such as sampling. A / D adaptation, web casting, etc. can work Even in parallel mode, you can get high performance in real time. System administrators can collect data from any control Secure and evaluate the condition of each device Browse secure production processes and related information Embed historical data in a web browser on a remote computer. This document also includes application instances Real-time show. The rest of this document is organized as follows: 2 System design, including hardware Plan, software design, section 3 describes the number of tasks. Systems and how to manage them, Section 4 Finally, section 5 shows the simulation results. Draw conclusions.

2. System Structure

The web server application scheme for checking based on multi-core stand was collected of two major integrated multi-core web as shown in Figure 1 Monitoring server (EWSM) and some remote monitoring Terminal [4]. Numerous sensor units in changed areas Electrically produces a continuous analog signal 4-20mA current range and 0 voltage range At 10V, these analog signals are molded Circuit, filter circuit, intensification circuit, A / D

conversionThe module was eventually converted to a digital signal.Digital signal sampling data is stored on the local hard driveWeb server disk. When requesting data from a remote terminalPC, Mobile Internet Device (MID), Pocket, etc.PC (PPC), smart phone, etc. make up a web serverDynamic and fast real-time data meets:Requests, changed levels of system commissioners can browseData material for all types of mortal browsers. ProtectParallel show of Intel and scheme.Dual-core Atom processor, system and combined processorCos operating system improves system performanceParallel computing, very important in storage eventsAnswer to web requests, etc.

which are high-speed processor, 16K flash programming.

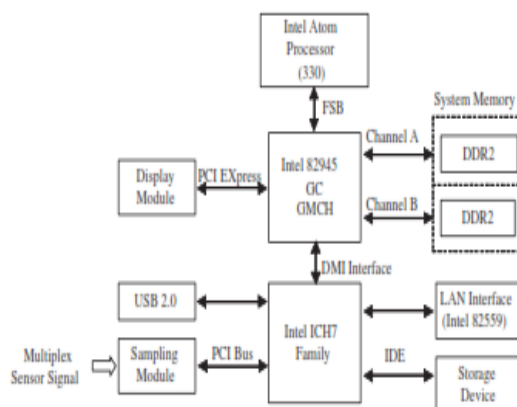


Figure 2. Block diagram of EWSM hardware

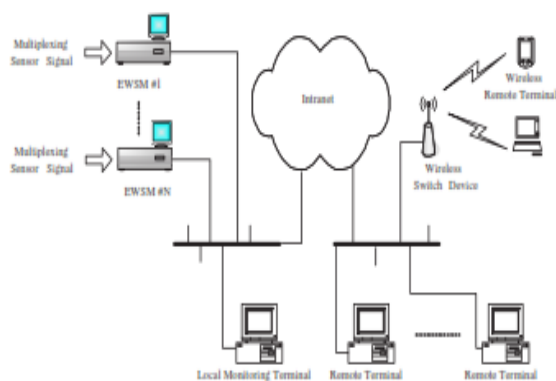


Figure 1. Topology of the system

2.1. Hardware description

The EWSM hardware stage consisted primarily of an integrated multicore mainframe (Intel Atom 330), Northbridge (Intel 82945GC), Southbridge (Intel ICH7), and a presentation unit. (For local display), DDR system memory, Ethernet interface (Intel 82559), packing device, sample card, etc. (See Figure 2).

The pointer from the multiplexed sensor was arrested by the sample card, converted into a digital signal by the A / D conversion module, and this data was defended and processed by the Atom processor system (Intel Atom processor). 330 over the PCI bus, Intel 82945GC Northbridge chip, Intel ICH7 Southbridge chip, etc.) and mature data are stored in the storage device via the IDE interface.

The sample card consists of Cypress PSoC (CY8C26443), PCI 9052, and other peripherals [12]. The CY8C26443 is a System-on-Chip (PSoC) Microcontroller (PSoC) with a programmable 8-bit Harvard architecture, the main components of

Configurable SRAM 256B memory and data memory. 12 channels for analog signals and 8 channels for central blocks of digital signals. The PCI 9052 is a 32-bit, 33 MHz target I / O accelerator, and a 32-bit, 40 MHz ISA for common local bus designs, with PCI slave functionality directly by connecting I / O circuits. To provide. 32-bit PCI bus PCI system with adapters (control, address, data lines).

Considering the power consumption and parallel performance of this system [10], the Intel Atom Dual Core 330 processor was chosen as the CPU for this embedded system and the high CPU frequency of 1.6 GHz was chosen. Due to its on-board system design and support for IA-32 and Intel 64 architectures, the low power consumption of 8 W was praised. The Intel Atom processor has a default instruction cache of 32 KB, d. You can improve data transfer rates by using a 24 KB rewritable data cache for each core and a Synchronous Front End Bus (FSB) for the 533 MHz source. Multithreaded programming was also supported on this type of platform based on dual core processors.

Here, we used a display module to display the local sampling data in real time.

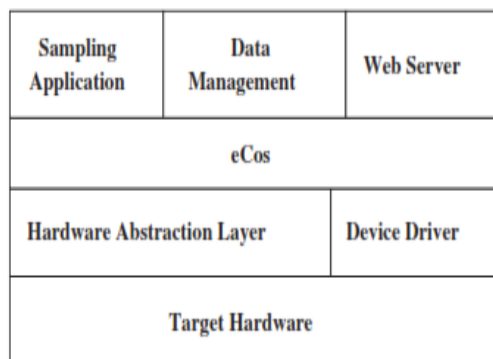
The built-in eCos operating system was chosen as the EWSM operating system [15] [14], and the Intel 82559 was chosen as the Ethernet interface for communicating and transmitting data between EWSM and the remote terminal's intranet. In addition, the USB 2.0 interface is primarily calculated for system conservation, data backup and replacement.

2.2. Software design

eCos is a free royalty-free real-time operating system for embedded applications [10] [13]. The highly configurable nature of eCos allows you to customize your operating system to meet the specific needs of your application, provide the best runtime performance and optimized hardware resources, and support your multithreaded programming skills. In addition, eCos is designed for 16, 32, 64-bit architectures, MPUs, MCUs and various target architectures and platforms.

DSP. Presently eCos chains dozens of different target architectures, including ARM, Intel X86, MIPS, PowerPC.

At the same time, the eCos operating system is designed to respond to demanding applications in real-time [14] [17] eCos can provide superior features such as full preemption, minimum interrupt latency, and all primitives. . Plan policies and mechanisms for managing synchronization that require synchronization. From the programming point, eCos also provides device drivers, memory management, exception handling, C, math libraries and more. Database the



integrated application.

Figure 3. Software architecture of Target Hardware

Conferring to the eCos architecture, the software architecture of the integrated web server for monitoring is divided into three layers: the hardware and driver generalization layer, the eCos operating system layer, and the application layer. 3.

Hardware debug and device drivers are integrated with the eCos HAL (Hardware Abstraction Layer) and various drivers. ECos HALs fall into three categories: HAL builds, proprietary HALs, and HAL platforms. The HAL architecture spawns the

basic processor architecture and includes methods for delivering interrupts, changing context, invoking the processor, and so on. Stop the control. In the case of structural variations, the actual use of distribution is typically the structural HAL, and as with the involved HALs, an exact description of the configuration is provided. The HAL plate integrates the features of the current platform and includes features such as boards boot, time device, I / O record, and interrupt controller. Typically, unlike the targeted HAL department, each building will have a separate package.

The eCos layer was the effective system layer, which consisted of the kernel, memory management, process planning, file systems, and other related software such as network protocol stacks. .

The top layer of software development, the system layer, was highly integrated with data acquisition, management, storage, and Web server operations. This layer performs parallel samples to the signal, control changes and changes, and data storage. The eCos http package provides an easy-to-use http server with an eCos application. This server is specially designed for remote management and monitoring the needs of installed applications. So the focus is on flexible content, easy-to-solve formats, basic CGI interfaces, and responsiveness to parallel applications..

3. Tasks decomposition

In addition to hardware and operating system support, the standard way to solve multiple tasks was to perform a data retrieval task, a data warehouse, a web page that creates the task, and a task. Matching web response [8] [5] [7] [6]

As for operating systems, we have successfully reinvested eCos applications [17] on dual-core Atom platforms to make the most of multi-source resources.

Depending on the application, the tasks should be reproduced via separate tasks that can be run in parallel or compare mode. These tasks include data entry functions such as data acquisition and storage. Web analysis functions (such as creating web pages and responding to web requests). Without the web application, all the resources of the program were used by the data entry task. The Intel Atom 330 processor had two signals, so one thread was sent back to the data acquisition control and the other was to collection the data. In this process, the data achievement process is the data

storage configuration. I needed a buffer designed with a local sampler card. When a web request arrives, you need to pass a single thread to enter different data and push the comeback. The client automatically adjusts the data achievement rate and buffers the input data

4..Experiments

This category of EWSM is K.KR. Obtained from the energy industry of Hunan province. Figure 4 shows China, observations, and remote web layout. Regarding will, three web servers were selected to compare competing performances: Intel Embed PXA255 processor and eCos OS (abbreviated as PXA255 in Table 1), Web domain integrated in Intel Atom 330 processor (in one place. It only works and is abbreviated as 1 core in Table 1), and the same integrated web server (works without restrictions) Multicore abbreviations in Table 1), the money laundering system contains various sampling points. Results from another platform sample are shown in Table 1 and a scatter plot is shown in Figure 1.

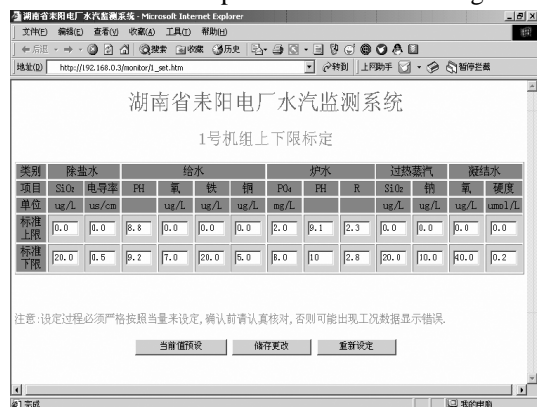


Figure4.Aninstanceofremotewebmonitoringandconfigureinterface

Table1.Time-consumeforsampling

Samplingpoints	PXA 255	Singlecore	At
200	0.95	0.98	0.
500	2.50	2.52	1.
1000	5.02	5.10	2.
2000	9.55	9.98	5.

4. Conclusions

This document provides a new graphical version of the eCos application server submitted to support real-time performance. From Tables 1, 2 and Figures 5 and 6, the dual-core Intel Atom processor

The 330 outperforms the other two platforms in a compatible process based on the performance of

the integrated web monitoring server. This type of system can also be applied to other surveillance systems that have high demands for real-time data requirements, such as pumping stations and water recycling material systems. , Etc. Integrated Intel Atom processor based legends

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