# Core Code Optimization for Efficiency Improvement of College Teaching Management Information System Based on Distributed CUDA Architecture

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**Abstract**:This paper proposes an intelligent attendance design scheme based on a distributed three-tier architecture. This scheme uses the TCP/IP network to build the communication link of the attendance terminal, the control host and the server, and realizes the induction and identification of the attendance identity by running the intelligent attendance software. The technical scheme proposes the top-level design of the educational administration system of vocational colleges in the context of the digital campus. Based on the J2EE platform, the main code is developed using the Java programming language and server-side Java technologies (such as EJBs, Servlet, JSP, JNDI, JDBC, and RMI, etc.).

## 1. INTRODUCTION

At present, the artificial statistical attendance method used by most colleges and universities has obvious disadvantages such as low efficiency [1] and lagging data feedback, which has become an urgent problem for standardized management. The high-level department purchases it by itself. The parallel architecture design and [2] application show that the parallel processing capability of the system is not necessarily proportional to the overall efficiency of the system. For certain tasks, the amount of computation increases and the system efficiency may decrease [3].

To this end, an efficient distributed undergraduate teaching quality engineering information management system is established [4], which fully integrates technical means into the management work system, and cooperates with an effective performance monitoring system to collect high-efficiency, high-quality [5], and high-accuracy information. Therefore, in the process of introducing a multi-core structure to improve the parallel processing capability of the system, fully considering the attributes of the tasks processed by the system is one of the key factors to obtain [6] high system efficiency. CUDA is the unified computing device architecture, which is a parallel computing architecture launched by the company in 2009. It is also the first language-like general-purpose computing development environment and software system that does not require [7] a graphics interface. Through qualitative discussion and quantitative simulation, we can recognize the interaction and feedback mechanism of various influencing factors of the system [8], and generate corresponding countermeasures for the main problems in the process of system development, so as to promote the improvement of the level of teaching informatization in colleges and universities [9].

In production practice, scientific computing methods based on high-performance computers are, to a large extent, replacing the role of scientific experiments, and even in many cases, conducting research work that cannot be done by experimental science [10], such as quantum Quantum motion analysis and quantum force analysis in mechanics, etc., under the existing experimental conditions. With the continuous expansion of higher education work and the continuous expansion [11] of the scale of college education, the educational affairs of colleges and universities should also be supported by a large amount of data and information. , through the statistical analysis and arrangement of these data and information, to obtain the decision-making [12] of educational administration in colleges and universities. The first university to put forward the concept of "digital campus" construction was the Massachusetts Institute of Technology in the United States. They turned this concept [13] into practice. After years of operation, debugging, and upgrading with the progress of the times and technological innovation, the digital campus platform the construction is more complete [14], the functions are more abundant, the system is more stable, the technology is more mature, and the performance is more perfect.

Because the information management method in colleges and universities is still mainly composed of office software, such software has poor security [15], low timeliness, and relatively short storage period, so it is not suitable for the management of confidential parts of college work. There are new technologies [16] that use mobile phone positioning and camera to scan face, but due to the large upload traffic, it cannot be popularized and used [17], and there is no relatively mature application solution so far. On the other hand, with the acceleration of the construction of "smart campus" [18]. Accurate modeling of computer performance is complex, and the most fundamental factors include memory hierarchy, operating system, internetwork, processor technology [19], cache and storage management, latency containment or absorption mechanisms, algorithm design, and programming languages [20].

Combined with relevant research and the construction experience of our university's undergraduate teaching quality course engineering, the main requirements of the system are: first, high availability [21] and reliable security. CUDA will be used as a data-parallel computing device, making full use of the powerful floating-point computing capabilities and the characteristics of multiple computing cores, so as to complete the task of large-scale data-parallel [22] computing.

Compared with other general-purpose computing-based technologies, CUDA is developed using a quasi-language. The definition of educational informatization in the domestic education circle has not yet been unified [23]. Nan Guonong believes that "educational informatization refers to the comprehensive and in-depth application of modern information technology to the field of education, to promote the optimization of educational processes, the development of educational resources [24].

## 2. THE PROPOSED METHODOLOGY

### 2.1 The Distributed CUDA Architecture

The GPU of CUDA architecture is relatively For the CPU of the same performance level, it has a very obvious price advantage. Generally, the price of a high-performance GPU is only about two-thirds of the price of a CPU of the same level. From the bottom up, the Android operating system is mainly divided into the Linux core layer. , the operating environment layer, the application framework layer, and the application layer, each of which provides services for the upper layer on top of its bottom layer. The current typical parallel computer systems include symmetric multiprocessor SMP with shared storage, massive parallel processor MPP, distributed shared memory multiprocessor DSM, workstation cluster COW, and cross-regional use of Internet advantages to break regional restrictions and realize information The unified declaration, review and record of data improves system flexibility and work efficiency. It has arithmetic logic unit and multiply-add unit to complete the operation of single-precision floating-point numbers and bit integers. In the future, the calculation unit of double-precision floating-point number is added.

In addition, each stream multiprocessor has a physical hardware unit that performs special operations such as reciprocals, squares, and trigonometric functions. Executed on the CUDA programming environment, exhaustive simulations were performed, running on a 3 GHz Intel Pentium IV processor, comparing the performance of the BLAST and SSEARCH. The Android operating system uses the Linux core and also provides services such as network security, process management, memory management, and system security. The runtime environment layer mainly includes the runtime of applications on the Android operating system platform such as C and C++.

### 2.2 The College Teaching Management Information System

The scheme is compared with the latest published GPU implementation and a SIMD solution, and the tests show that the goal of achieving greater speed on the hardware product is achieved, and the execution cost of large-scale comparisons is also reduced. The workflow is described as follows: import basic data such as students, teachers, curriculum and identity authentication into the server layer before the school starts, and the server automatically generates class data and corresponding identity authentication data for each building for one semester according to the correlation of the basic data, and distributes them to the server. in the control host layer. NET Remoting is a solution for building distributed processing and provides a framework that allows interaction between objects in different application domains.

The control host generates the attendance sheet of each house in advance and sends it to the attendance terminal layer, and the embedded attendance machine bound to the address of each house saves the identity authentication data and waits for attendance, when the attendance is normal. The use of CUDA

to achieve high-performance computing is essentially accomplished through the division of labor and parallel operation between the CPU and the GPU. CUDA makes full use of the GPU's excellent parallel computing (Parallel Computing) capabilities, assigns tasks with strong local computing power to the GPU for execution, and uses the CPU to control and integrate these parallel calculations, thereby improving the overall performance of the program. CY mobile educational management system has a wide range of users, not only teachers and students of CY are users of CY teacher resource management system, but also teachers and students of other vocational and technical colleges, as well as the majority of users in the society with skills learning needs are CY mobile Potential user groups of the educational administration system.

### 2.3 The Efficiency of the Information System Improves the Core Code Optimization Operation

This system is built in the framework of the digital campus, and the database construction relies on its data center platform. The design and development of the educational administration system in colleges and universities takes a certain amount of time to complete and implement. It is not a very simple project. On the contrary, the development and design of the educational administration system in colleges and universities is a long-term, heavy workload and arduous task. For engineering projects, relevant research staff should be mentally prepared for long-term battles.

Although the image is two-dimensional data, it is still stored in the memory in one-dimensional form and row by row. Because it is a grayscale image, just one byte is used to store the information of one pixel point. In the image data entity, at the end Use the type pointer to point to the image in memory; for the convenience of binding to the texture memory, use the type pointer to point to the image in the video memory. The demand for computing power or processing power of the computer can be calibrated by the application system. Especially for a given scientific computing problem, the processing time required is almost predictable. For the processing of non-scientific computing problems, the time spent processing the system is often unpredictable.

## 3. CONCLUSIONS

Based on the distributed college attendance system, the three-tier architecture is designed. Through reasonable planning of tasks at each layer, the attendance terminal is mainly responsible for data sensing. From the program structure of CUDA, the idea of task decomposition in the CUDA programming, the idea of memory optimization, and the idea of multi-thread synchronization, the programming idea of CUDA architecture and the way of program optimization are introduced. Design and develop a mobile educational system APP to provide teachers and students with mobile services through mobile phones, IPADs and other mobile terminals, such as checking course selection, grades, examination room distribution and agency work reminders at any time.

## 4. REFERENCES

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