



Discussion on Computer Development Course and New Computer

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Abstract

Computer, as an important infrastructure of modern science and technology and information society, has had a profound impact on human society. Its development process is full of technological breakthroughs and application innovation, from the early stone tools, abacus to the first electronic computer ENIAC, and then to the invention of integrated circuit and microprocessor, the advent of the personal computer era, the computer has made great development in the continuous evolution and improvement. With the continuous progress of science and technology, new computer technology is constantly emerging, which has produced a huge space for imagination in the future. In the new computer technology, quantum computer is considered a major breakthrough in the computer field. Quantum computer uses the principle of quantum mechanics, can calculate in a parallel way, has super computing power, and has a wide range of application prospects in cryptography, drug research and development, climate simulation and other fields. In addition, biological computer is a new type of computer using biomolecules for information storage and processing, with a high degree of biological compatibility and information density, with great application potential in bioinformatics, gene editing and other fields. Photonic computer is a new type of computer based on photon information transmission and processing. It has the advantages of high speed and low energy consumption, and has a broad application space in the high-speed communication, data center and other fields. This paper analyzes the history of computer development, and explores various types of new computers, hoping to provide reference for the development of computer.

Keywords

Computer, development history, new computer

Introduction

As an important infrastructure of modern science and technology and information society, computer has had a profound impact on human society. Since the birth of the first electronic computer ENIAC during World War II, computer technology has experienced many revolutionary breakthroughs, from mainframe and small computers to personal computers, computing power has been improving and application fields have been expanding. However, with the continuous progress of science and technology and the continuous change of social needs, the traditional computer technology is facing a series of challenges, such as computing power bottleneck, energy consumption problems, security risks, etc., which prompted people to actively explore new computer technology to meet the growing computing needs. In the field of new computer technology, quantum computer, biological computer, photonic computer and edge computing are considered as an important breakthrough in the field of computer. Quantum computer uses the principle of quantum mechanics, can calculate in a parallel way, has super computing power, and

has a wide range of application prospects in cryptography, drug research and development, climate simulation and other fields. Biocomputer is a new type of computer using biomolecules for information storage and processing, with high biological compatibility and information density, and has great potential for applications in bioinformatics, gene editing and other fields. Photonic computer is a new type of computer based on photon information transmission and processing. It has the advantages of high speed and low energy consumption, and has a broad application space in the high-speed communication, data center and other fields [1]. Edge computing, as an emerging computing mode that pushes computing power to the computing source, is expected to improve the efficiency of network transmission, and promote the rapid development of the Internet of animals, smart city and other fields.

1. The history of computer development

1.1 Early computational tools

The history of computers can go back to ancient computational tools such as stone tools and the abacus. Stone tools were an early computational tool for recording quantities and performing simple calculations. The abacus is an ancient computational tool that uses beads to slide on a beam for its calculation, and is widely used in commercial and scientific calculations.

1.2 The invention of the electronic computer

In the 1940s, the invention of an electronic computer marked the birth of a modern computer. In 1946, the ENIAC (Electronic Numerical Integrator and Computer) at the University of Pennsylvania became the world's first large-scale general-purpose electronic computer. ENIAC uses a large number of electronic tubes and electromagnetic relays, with a strong computing power, but a huge volume, huge energy consumption.

1.3 The coming of the personal computer era

In the 1970s, with the advent of the personal computer era, computer technology began to enter the ordinary family. In 1975, Microsoft launched the first personal computer, the Altair 8800, marking the birth of the personal computer. With the invention of microprocessor and the continuous development of integrated circuit technology, computers have become more small and portable, and the computing power is constantly improving.

1.4 Application of integrated circuits and microprocessors

In the 1960s, the invention of integrated circuit (Integrated Circuit, IC) technology made the computer hardware become smaller and more efficient. Integrated circuit is a technology that integrates electronic devices on a chip, which greatly improves the computing speed and efficiency of the computer. In 1971, Intel launched the first microprocessor (Microprocessor) Intel 4004, marking the arrival of the microprocessor era. Microprocessor integrates multiple computing devices on a single chip, becoming a key technology widely used in personal computers, servers, and embedded systems [2].

1.5 The rise of computer networks and the Internet

In the 1970s and 1980s, computer network technology developed rapidly, allowing computers to communicate and share resources with each other. In 1983, the Internet Protocol (TCP / IP) officially became the communication protocol of computer networks, marking the rise of the Internet. The development of the Internet has promoted the rapid transmission of information and the global information exchange, which has become an indispensable and important infrastructure in modern society.

1.6 Mobile computing and the development of mobile computing and wireless communication technologies

At the beginning of the 21st century, mobile computing and wireless communication technology have developed rapidly. With the popularity of mobile devices (such as smart phones, tablet computers, etc.) and the wide coverage of wireless networks, people can calculate and communicate anytime and anywhere, realizing the movement and sharing of information. The rapid development of mobile computing technology has spawned many mobile appli-

cations and services, such as mobile payment, social media, online shopping, etc., which have profoundly changed people's way of life and social communication.

1.7 The rise of cloud computing and big data technologies

With the rapid development of the Internet and mobile computing, the amount of data has shown an explosive growth, which puts forward higher requirements for computing and storage capacity. Cloud computing and big data technologies have emerged. Cloud computing is a network-based computing model, which provides computing resources to users through the Internet and realizes the way of obtaining and using computing resources on demand. Big data technology is used to process and analyze massive data, extract valuable information and insights, and optimize and improve decisions and business.

1.8 Breakthroughs in artificial intelligence and machine learning

In recent years, artificial intelligence (Artificial Intelligence, AI) and machine learning (Machine Learning, ML) technology have made breakthrough progress, and has become a hot research and application direction in the field of computer. Artificial intelligence and machine learning technologies enable computers with learning, reasoning and decision-making capabilities similar to human beings, which are widely used in image recognition, speech recognition, natural language processing, intelligent recommendation and other fields, greatly promoting the application and development of computers in human society.

1.9 The rise of Edge computing and the Internet of Things

Edge computing (Edge Computing) is a computing mode that brings computing and storage resources close to data sources and terminal devices, aiming to provide low-latency, high-efficiency computing and communication services. With the development of the Internet of Things (Internet of Things, IOT) technology, more and more devices and sensors are connected to the Internet, generating large amounts of data. Edge computing technology can process and analyze the data on the device side, reduce the pressure on the cloud, and provide real-time response and decision-making capabilities, which has become one of the key technologies in the development of the Internet of Things [3].

2. New computer technology

2.1 Quantum computing

Quantum computing is a computing mode based on the principles of quantum mechanics. Using qubits (qubit) as the basic unit of computing, it has the computing power to surpass the traditional computing in some specific cases. The core idea of quantum computing is to make use of quantum superposition and quantum entanglement to make full use of the polymorphism and parallelism of quantum states in computing, so as to realize the computational power of exponential acceleration in some problems.

The development of quantum computing has several important stages as follows. Early research stage: In the late 1980s and early 1990s, quantum computing, as a new computing model, began to attract the attention of researchers. The research at this stage mainly focuses on the theoretical and experimental research of qubits and the preliminary exploration of quantum computing algorithms. Experimental verification stage: In the early 2000s, with the progress of experimental technology, researchers realized a series of small-scale quantum computing experiments in the laboratory, including the verification of key technologies such as quantum bit control, quantum gate operation and quantum entanglement. Medium-scale quantum computing stage: In the early 2010s, researchers began to implement medium-scale quantum computing experiments in the laboratory, including multi-bit quantum entanglement and quantum gate operation. The research at this stage mainly focuses on the control and entanglement of qubits, quantum error correction, quantum communication and so on. Commercial stage: In recent years, some technology companies and laboratories have begun to launch commercial quantum computing platforms to meet the application needs of different fields. These platforms are mainly aimed at scientific research, finance, drug research and development and other fields, and have gradually attracted the attention of enterprises and investors.

2.2 Light calculation

Optical computing, also known as photon computing, is a new type of computing technology based on photons (photons are the quantum of light) as an information carrier. Optical computing utilizes the advantages of high-speed light transmission, parallel processing and low energy consumption, and has the potential to achieve performance beyond traditional computing in some specific application fields. The development of optical computing mainly includes the following aspects. Optical computing devices: Optical computing devices are the basis of realizing optical computing. In recent years, with the development of nanotechnology and optical materials, many new optical computing devices such as optical switches, optical resonators, and optical delay lines have been widely studied and applied. These optical computing devices can realize the optical interference, diffraction, coupling and other effects, which are used for logical operation and signal processing in optical calculation. Optical computing algorithm: Optical computing algorithm is the core of optical computing. Optical computing algorithms use the characteristics of interference, phase, polarization and other of light for information processing and calculation. Currently, researchers have proposed many optical computing algorithms, such as optical logic gates, optical adder, and optical Fourier transform, to implement different types of computational tasks. Optical computing applications: Optical computing has a wide range of potential applications in many fields. For example, in the fields of image processing, pattern recognition, optical communication, quantum computing, optical computing can provide high-speed, high-precision and low-consumption computing solutions. At the same time, optical computing also has application prospects in artificial intelligence, big data processing and other fields, and is expected to lead the development direction of computing technology in the future [4].

2.3 Natural calculation

Natural computing is a kind of new computing technology that imitates the computer system and calculation method in biological nature. Natural calculation mainly includes the following aspects. Biological computing: Biological computing is a method of computing by using biomolecules (such as DNA, RNA, protein, etc.) or biological processes (such as cell metabolism, genetic evolution, etc.) in living organisms. Biocomputing has a wide application potential in bioinformatics, biomedicine, bioengineering and other fields, such as DNA computing, protein folding computing, cell computing, etc. Quantum computing: Quantum computing is a new computing technology based on the principle of quantum mechanics. Quantum computing makes advantage of quantum superposition of qubit (qubit) and quantum entanglement, which is better than traditional computing in certain cases, such as potential applications in factorization, optimization problems, analog quantum systems and other fields. Neural computing: Neural computing is a computing method based on the computing model of neural network and neural system. Neural computing draws on the information processing methods of the human brain, and has the potential to have advantages in image recognition, speech recognition, natural language processing and other fields. Quantum biological computing: Quantum biological computing is a research field that combines quantum computing and biological computing. It aims to use the advantages of quantum computing to solve complex problems in biology, such as protein folding, biomolecular interactions, etc.

Epilogue

The development process of the computer has experienced many stages from the early mechanical computing equipment to the electronic computer, the personal computer, the Internet era of the network computer and so on. New computer technologies such as quantum computing, optical computing and natural computing are increasingly emerging, bringing new opportunities and challenges to the field of computing science and application. With the continuous development of science and technology, the computing capacity, storage capacity and processing speed of computers are constantly improving, and the application fields are also expanding [5], from scientific research, engineering design, business management to social services and other fields are inseparable from the support of computers. The popularization and development of the Internet has also greatly promoted the transmission of information and exchanges and cooperation on the global scale, and had a profound impact on modern society. The development process of computer and the rise of new computer technology have brought profound impact to human society, but also provided great potential for the future development of science and technology and social progress. We look forward to making new breakthroughs in computer science and technology in the future and promoting the continuous development of human society.

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