

## How Much Do You Know About Quantum Computer

With the advancement of science and technology, the traditional von Neumann architecture can no longer be satisfied with the development of modern computer science. People continue to break through the shackles of von Neumann's architecture, of which the typical representative is the quantum computer. This article will briefly introduce this type of computer and analyze its development status in China.



### 1.Introduction of Quantum Computer

A quantum computer is a physical device that follows quantum mechanics for high-speed mathematical and logical operations, and stores and processes quantum information. When a device processes and calculates quantum information, and uses quantum algorithms to run, it is a quantum computer. The concept of quantum computers originated from the study of reversible computers. Research on reversible computers is to solve the problem of computer energy consumption. Quantum computing is mainly applied to complex large-scale data processing and computing challenges, as well as quantum-based network security services. Based on the advantages of its own computing power, quantum computing has broad market potential in the fields of finance, medical treatment, and artificial intelligence. The main features of quantum computers are as follows:

- 1 It has ultra-high calculation accuracy.
- 2 It can guarantee information security perfectly.
- 3 The processing speed is fast and the efficiency is high.
- 4 It can be applied to many different fields.

In general, compared with traditional von Neumann computers, quantum computers have a qualitative leap in their ability to process large-scale information, and due to their non-clonal quantum principle, they are completely immune to virus invasion and are fully guaranteed its security.

### 2.The Development of Quantum Computers in China

As early as 2006, China promulgated the "National Medium and Long-term Science and Technology Development Program(2006-2020)", and a number of related policies afterwards also mentioned the development of quantum computers. China pays attention to the research on the carrier and control principles and methods of quantum communication, overcomes core technologies such as universal services and human-computer interaction, comprehensively breaks through 5G technology, and actively promotes the development of quantum computing and neural networks. In China, quantum computers are still in the development stage of prototypes, and there are still uncertainties in the commercialization prospects. However, many industries such as finance, petrochemicals, materials, and biomedicine have begun pay attention to the huge potential of quantum computing and have begun preliminary explorations. Tsinghua University, Sun Yat-Sen University and some research institutions have cooperated to carry out the research and layout of ion trap circuits. The University of Science and Technology of China and Southern University of Science and Technology have also cooperated with Alibaba and other companies to carry out research and layout of superconducting lines.

On September 12, 2020, Benyuan Quantum launched the quantum computing cloud platform,

which is China's first quantum computing cloud platform that is connected to a physical quantum computer. Also released at the same time are the second-generation quantum measurement and control all-in-one machine, as well as three major applications based on quantum algorithms. On October 26, 2021, China's quantum computer research has made another breakthrough, which is billions of billions of times faster than supercomputers! Specifically, the two quantum computers of the team of Academician Pan Jianwei of the University of Science and Technology of China have been upgraded, and the "Nine Chapters" and "Zuchongzhi" have both become No. 2. For this reason, my country has become the only country in the world that has reached the milestone of "quantum computing superiority" in two physical systems. These have greatly promoted the development of quantum computers in China. The prospects for the development of quantum computers in my country are bright.

### References

- [1] Shuo Xue. Overview of Computer Architecture Development Direction Breaking Through Von Neumann Architecture[J]. International Core Journal of Engineering, 2021, 7(8).
- [2] Leado. Development Status and Trend of Quantum Computer[J]. Information and Computer, 2017, (16): 30-3.

## 关于量子计算机——你知道多少？

随着科学技术的进步，传统的冯诺依曼架构已经不能满足于现代计算机科学的发展。人们不断突破冯诺依曼架构的桎梏，其中典型代表就是量子计算机。本文将简要介绍此类计算机并分析其在中国的发展现状。

### 1.量子计算机简介

量子计算机是遵循量子力学进行高速数学和逻辑运算，并存储和处理量子信息的物理设备。当一个设备处理和计算量子信息，并使用量子算法运行时，它就是一台量子计算机。量子计算机的概念起源于对可逆计算机的研究。可逆计算机的研究是为了解决计算机能耗问题。量子计算主要应用于复杂的大规模数据处理和计算挑战，以及基于量子的网络安全服务。量子计算基于自身算力优势，在金融、医疗、人工智能等领域具有广阔的市场潜力。量子计算机的主要特点如下：

- 1 具有超高的计算精度。
- 2 可以完美的保证信息安全。
- 3 处理速度快，效率高。
- 4 可以应用于许多不同的领域。

总的来说，与传统的冯诺依曼计算机相比，量子计算机在处理大规模信息的能力上有了质的飞跃，而且由于其非克隆的量子原理，量子计算机对病毒入侵完全免疫，安全性能得到充分保障。

### 2.中国量子计算机的发展

早在 2006 年，我国就颁布了《国家中长期科学技术发展规划（2006-2020 年）》，随后的多项相关政策也提到了量子计算机的发展。中国重视量子通信载体和控制原理与方法研究，攻克普遍服务、人机交互等核心技术，全面突破 5G 技术，积极推动量子计算和神经网络发展。在国内，量子计算机还处于样机研制阶段，商业化前景还存在不确定性。然而，金融、石化、材料、生物医药等诸多行业已经开始关注量子计算的巨大潜力，并开始了初步探索。清华大学、中山大学和一些研究机构合作开展了离子阱电路的研究和布局。中国科技大学和南方科技大学也与阿里巴巴等公司合作，开展超导线路的研究和布局。

2020 年 9 月 12 日，本源量子推出量子计算云平台，这是中国首个与物理量子计算机对接的量子计算云平台。同时发布的还有第二代量子测控一体机，以及基于量子算法的三大应用。2021 年 10 月 26 日，中国的量子计算机研究再次取得突破，比超级计算机快了亿亿倍！具体而言，是中国科学技术大学潘建伟院士团队的两台量子计算机升级了，“九章”和“祖冲之号”都变成了二号。正因如此，我国成了目前世界上唯一在两种物理体系达到“量子计算优越性”里程碑的国家。这些都极大地推动了中国量子计算机的发展。我国量子计算机发展前景一片光明。

### 参考文献

[1]Shuo Xue. Overview of Computer Architecture Development Direction Breaking Through Von Neumann Architecture[J]. International Core Journal of Engineering,2021,7(8).

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## Combine English Learning with Professional Courses

Before I took a computer English course, I never realized that I would combine English learning with the computer major we studied. After the teacher's reminder, I fully realized the importance of combining our computer major with English learning.

After a semester of continuous experimentation and hard work, I have also gained something. At first, I didn't have a clue about this. I thought that Computer English was just to introduce us to some professional computer terminology, but it was not very helpful to the study of professional courses. But through the continuous guidance of the teacher and my after-class study, I gradually discovered the benefits of computer English for professional learning.

Computer English not only allows us to learn a lot of English expressions of computer terms, but also allows us to better understand professional terms. In the courses we are learning about operating systems, assembly language, and compilation principles, almost all the nouns involved are in English as the source language. In the process of translating into Chinese, there will inevitably be some deviations from the original meaning. But in English articles, by reading the context, you can better understand the original meaning of some nouns. For example, in the learning of artificial intelligence courses, the term machine learning introduced by the teacher, I did not understand it well at first. If it is translated literally, it should be "machine learning", then there may be many ways to understand it. , Are machines constantly acquiring knowledge through themselves, or are we learning through machines? But in the text "Overview of Artificial Intelligence", machine learning, also known as "robotics", is mentioned. First of all, as mentioned above, "a better understanding of AI is gained by looking at the component areas of study that make up the whole", so it can be seen that robotics is one of the areas of AI research, so it can be further understood as a subject independent discipline, thus establishing a basic concept of robotics. Then look at robotics, it is not difficult to see that its root is robot, so it must be related to robots, so the machine learning mentioned earlier is not accurate. Combined with the fact that it is an independent subject, it can be understood that robotics is a subject that specializes in robotics learning. Finally, it can be extended to specialize in the study of how computers simulate or realize human learning behaviors in order to acquire new knowledge or skills.

In this semester of computer English learning, I have re-acquainted many professional terms in the courses, which is of great help to my professional courses. Some concepts that I didn't understand thoroughly or had errors in understanding in class, this course helped me discover them in time and helped me to understand them deeply. From database principles, data structures, to AI and OS, a lot of knowledge in the courses I have learned has become interesting. Even if it is a computer network that I haven't learned yet, I have a basic understanding of its general framework.

最后，我想要感谢李春庚老师，是您不断鼓励我们，给我们信心，这才让我增强了自己对英语口语表达能力的自信，也让我敢于在其他人面前展示自己，同时也使得我加深了对专业课的兴趣。我会在课后主动查找微机原理、操作系统等课程的有关文献，去看一看我们平时所牢记的定义用英文是如何表达的。也许，学习的真正乐趣，也就在于发现不同的课程之间所产生的奇妙联系吧。希望以后有机会还能再学习李老师的相关课程！



# 我的学习笔记

## Class 5

quantum systems 量子系统

finite-temperature phase diagram in a bosonic gas with ~~one~~ one-dimensional spin-orbital coupling 一维自旋轨道耦合的玻色气体中的有限温度相图

resource allocator 资源分配器

substantial 大量的

batch systems 批处理系统

utilization 利用率

off-line operation 脱机操作

console 控制台

assembler 汇编程序(器)

defined constraints 规定的限制

pooling 脱机(Simultaneous peripheral Operation on-line)  
外部设备 联机并行操作

constraints 约束, 限制

time-shared operating systems 分时操作系统

multiprocessor system 多处理器系统

analogous 类似于

well-defined fixed time constraints  
定义明确的固定的时间约束

{ loosely coupled 松耦合的  
tightly 紧

distributed OS 分布式操作系统

本课程介绍了多种操作系统相关的英语术语, 可以与操作系统理论课相结合。

## Class 6

quantum key 量子键

springer 斯普林格期刊

The OS is a system software for a computer, which is an interface between users and applications, and a program for controlling computer resources.

of late ~ state-of-art

LANs 局域网

backbone 主干

gauge 轨距

FTP 文件传输协议 HTTP 超文本传输协议

protocol stack 协议栈

It covers a lot of fields, including OS, machine control and communication. As far as I know, Kirin OS completely independently developed by China, contact our profession.

architectural framework 体系结构框架

hypertext 超文本

Internet Explorer IE浏览器

navigator 领航员

DNS 域名系统

URL (Uniform Resource Locator) 统一资源定位符

"links (pointer) to other, related pages."  
指向其他相关页面的连接(指针)。

下一句 "which then takes them to the page pointed to" 是 which 引导的从句, 用来修饰上一句的 a link, 译为 "这个连接把用户带到该连接所指向的页面。"

本课程对 Internet 作了基本介绍, 了解到了 www、服务器、TCP、FTP、HTTP、URL 等专业知识, 未来对计算机网络的专业学习可能会有帮助。

# 我的学习笔记

DATE \_\_\_\_\_

satellite 卫星

degrade 降级

relay 转播

metropolitan 大都会

firewall 防火墙

mount 安装

line-of-sight 直线

syntax 语法

line-of-sight 视线, 瞄准线

Summary: If satellite navigation systems like Beidou want to achieve positioning, 3 satellites are used to represent (x, y, z), 1 are used to represent the transformation of the object's position.

Since you are not ----, it is much less ---- manner.  
本句为先行代词, 用于代替从句 that anyone 和 短语 to either.

本课通过对基本通信的介绍, 让众学生生活中所见的设备以英语形式出现, 有助于自身对 Web 的相关学习

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## Class 8

query 查询

syntax 语法

conform to 符合 (fit into)

raw data 原始数据

nonprocedural language 非过程性语言

prescribe 规定

exceed 超过

enhancement 增强

integration 集成的

catalyst 催化剂

本次课主要介绍了 SQL 的相关知识, 虽已学完数据库的课程, 但通过这次的学习, SQL 中一些更专业的语言表述方式得到了掌握, 也有助于我理解曾经未被理解透彻的专业名词。

DATE \_\_\_\_\_

incorporate 纳入

justify 证明

prerequisite 先决条件

inherently 内在的; 本质上

manipulation 操纵

corresponding 相应的

component 组件

synchronization 同步

semantic 语义

本次课对 AI 介绍较为全面, 这其中我学到了人工智能课程上老师介绍的多个名词, 如“机器学习”、“知识表示”、“计算机推理”和“检索匹配”等, 帮助更了解其真实含义。“机器学习”(Robotics)原被我误解为“machine learning”, 实际它是以 robot 为词根, 是一门学科, 是基于大量数据训练的。

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## Class 11

integrate 集成

spreadsheet 电子表格

precedence 先后次序

sophisticated 复杂的

construct 构建

Post Script 软件名

aggregate 聚集, 集合

transportability 可移植性

joystick 控制杆

Question: Is it more than AI to change the quantum computer?

AI and quantum computers (QC) have their own characteristics the best way is to complement the advantages of the two.

本次课对电子表格的表达有了全新的认识, Excel 并非直译为“电子表格”, 而是“擅长”、“胜过”的意思。



# 我的学习笔记

## Class 12

domain 定义域

inventory 库存; 存货

algorithm 算法

syntax recognition 语法识别

For instance, syntax recognition in a compiler is stack based, as is expression evaluation.

例如, 编译程序中的语法识别是基于栈的, 表达式的求值也是基于栈的。

本句中“as”有重要作用, “as is expression evaluation”中, as代替主句中的表语意思, 在从句中作表语, 译为“也一样”。

function call 函数调用

push 进(栈) > LIFO 后进先出(栈特点)

pop 出(栈)  
linked list 链表(注意是linked, 不是link)

index 索引; 下标

equivalent 相等的

computability 可计算性

A stack is a list of items that are accessible at only one end of the list.

栈是只能在表的一端存取元素的表。

geometric 几何的

in the way of 按照...

finite 有限

indices 指标

本文介绍了数据类型和算法的一些基本概念, 此次课我学会了如何用英文来描述出入栈的详细过程; 算法部分, 我学到了计算机科学领域重点研究的一些组成, 如 sorting, searching, text processing (文字处理), performing common mathematical calculations. (执行并测试)