Summary and conclusion of Computer Architecture

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Computer Architecture, also known as Computer Architecture, is composed of external characteristics, internal characteristics and micro-external characteristics of Computer structure. Classic computer system structure refers to the definition of a computer system multilevel hierarchy in the structure of the machine language level, it is the main interface of software and hardware, firmware, and is composed of machine language, assembly language source program and the source program in a high-level language translation of machine language target program that can run on the machine right should have had the interface structure and function. What is the computer system structure? Is it the appearance of a computer? Or is it the structure of the boards in a computer? Neither. So what is it? The structure of a computer system is a property seen by the machine language programmer or compiler writer of the computer. The so-called external features are the conceptual structure and functional characteristics of a computer. To use an inappropriate metaphor, like the animal, what is the "system structure" of the animal? Its conceptual structure and functional properties are analogous to the organ composition and functional properties of animals, such as chickens that have a stomach that can digest food. What the shape of a chicken's stomach is, or what its stomach is made of, is not a question of systematic structure. The system structure goes all the way down to this level. With regard to the multi-level structure of computer systems, a list of inappropriate examples of the animal "man" is presented below. Computer system, human, applied language level, serving the people level, high-level language level, reading, learning level, assembly language level, language, thinking level, operating system level, physiological function level, traditional machine level, human organ level, microprogram machine level, cell tissue level, electronic circuit level, molecular level. All machines above the traditional machine level are called virtual machines, and they are machines implemented by software. Hardware and software. Functionality is logically equivalent, that is, most of the functionality of the hardware can be implemented in software, and vice versa. External characteristic of computer system structure, generally should include the following aspects (that is, we are going to learn a few chapters) put these a few respects hammered out, the system structure is clear: (1) basic instructions data system (2) (3) count way of addressing (4) register form definition (5) the interrupt mechanism and exception condition (6) (7) the I/O storage system and management structure definition (8) machine working state and information protection switch (9). So in the future study, we will always look back and think about which aspect of the system structure this is, which is good for the overall picture. The internal characteristics of a computer system structure are the basic attributes that "logically implement" those external characteristics. So-called "logic" is on the logic of how to implement this functionality, such as chicken "god" to the design of a certain size of the stomach, the function of the stomach is digesting food, this is a chicken system external characteristic, that how to digest, will by chicken beaks to eat into the food and sandstone, again through the peristalsis of the stomach, and rely on sand grinding to digest food, eat here and creep is the characteristic operation. Another is a computer implementation, which is a physical implementation made up of computers. It focuses on device technology and microassembly technology. In the above example, what makes up the stomach are the muscles and nerves that make it move. On this basis we can distinguish the relationship between the external characteristics, internal characteristics and physical implementation of the computer system. Among all the characteristics of the system structure, the external characteristics of the instruction system are the most critical. Therefore, computer system architecture is sometimes referred to simply as instruction set system architecture. What we're going to focus on in this course is the architecture of the computer system, and traditionally, that's the description of the interface between the hardware and the software, the external properties. These inappropriate metaphors only help to understand, but should not be forced to correspond, otherwise they will damage the rigour of science. Classification of computer system structure: Classification by "stream", which is professor Flynn's method of classification by the polyploidy concept of instruction stream and data stream. A total of four categories, namely :(s-single single. D-data of I-Instruction m-multiple multiple). SISD single instruction stream single data stream, the traditional single processor belongs to SISD computer. SIMD single instruction stream multiple data stream, parallel processor is the typical representative of SIMD computer. China's YH-I model is this kind of computing model. MISD multi-instruction flow single data flow does not exist, but some scholars think it does. MIMD multi - instruction stream multi - data stream, including most multi - processor and multi - computer system. The YH-II computer of our country is this type of computer. Scalar pipelayer is generally regarded as SISD type and vector pipelayer as SIMD type. Classification by "parallelism" and "pipelining" : This is a method of classification by degree of parallelism and pipelining at the level of three subsystems in a computer system. 1. The most important and widely adopted computer design principle is to accelerate only the most frequently used components. Because speeding up the processing of frequent events has a far greater impact on the system than speeding up the processing of rare events. Amdahl's law, which is a formula. You should be able to do some calculation or analysis with this formula, so remember and understand what it means. 3. Local law of program access. The locality of program access is mainly reflected in the two aspects of time locality and space locality. Time locality means that the recently accessed information items in the program are likely to be accessed again immediately, and space locality means that those information items adjacent to each other on the access address are likely to be accessed together. The main characteristics of Von Neumann's computer are: the way of storing programs; Instructions are executed sequentially and controlled centrally by the controller. Memory in one-dimensional linear space with fixed length of element; Using low-level machine language, data is represented in binary; Single processor structure, with the arithmetic unit as the center. The improved Von Neumann computer transformed it from an algo - centric to a memory - centric machine. In terms of system structure, it is mainly to improve the performance of computer system through various parallel processing methods. Influence of software, applications and devices on system structure development. The software should be compatible and portable. In order to realize the portability of the software, the following methods can be used: simulation: using the software method to implement the instruction system of another computer on an existing computer, this method of software migration using the actual machine language interpretation is simulation. Simulation: A microprogram in Machine A (host machine) is used to interpret each instruction in the instruction system of machine B (target machine), and the method to realize the instruction system of machine B is called simulation. It involves some hardware in the interpretation process. In general, the two methods are mixed. For the instruction with high frequency, the simulation method is used, while for the instruction with low frequency and difficult to be realized by simulation. Using the method of how can say that how the system structure is consistent, as we use INTEL's 80 x86 series microcomputer and its compatibles, system structure is consistent, of course, in the process of development of its system structure be able to get a new expansion, such as the original 586 machine does not support MMX multimedia extensions instruction set, but then the chip of expanded these instructions, set to expand the instruction system, but they are still the same series of machines. This serial approach is mainly for software compatibility. Extending the instructions above will prevent future software optimized for these instructions from running (or functioning properly) on previous machines, resulting in poor forward compatibility. But it is important to ensure backward compatibility, that is, software written on machines that have been brought to market at a certain time can run unmodified on the machines that follow. On a family of machines, software portability is achieved by using the same high-level, assembly, and machine languages for each machine, but different microprograms. A unified, high-level language. Adopting high level programming language standards, such as FORTRAN and COBOL, which are independent of machine model, this method provides portability between different hardware platforms and different operating systems. Open system: it refers to a system independent from the manufacturer and established in accordance with relevant international standards, with system portability and interoperability, so as to allow users to choose the specific implementation technology and multi-vendor product channel system integration technology. The influence of application requirements on the development of system structure, the basic requirements of computer application on system structure are high computing speed, large storage capacity and large I/O throughput. We want faster motherboard Cpus and memory, we want bigger hard disks, we want bigger monitors, more colors, higher refresh rates... This is the demand) Computer application from the initial scientific calculation to more advanced and more complex application development, experienced from data processing, information processing, knowledge processing and intelligent processing this four levels gradually rise stage.\*

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