A Heat Storage Device for Computer CPU Heat Dissipation

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Abstract: With the continuous development of science and technology, computer performance optimization is the development trend of the times. At present, people continue to strengthen the use of computers, which has a greater challenge to the consumption and operation of the computer itself. At present, combined with the heat dissipation characteristics and application technology of CPU, this paper analyzes the heat dissipation technology of CPU, analyzes the series of heat dissipation technology, and simply carries out the system design and data simulation. It is found that the heat storage device of CPU heat dissipation has significant heat absorption effect. This also puts forward a new mode for optimizing CPU cooling system.

Keywords: Computer; CPU; Heat dissipation and storage device; System optimization

1. Introduction

Nowadays, the application of computer is constantly strengthened, which consumes more speed for the computer itself. Therefore, in order to strengthen the design of the computer, we need to optimize the CPU. At present, the main operating temperature of CPU chip is controlled at about 80 ℃. Relatively speaking, the nature of CPU is more sensitive to temperature. In the process of daily use, the effect of temperature on the CPU is very obvious. The quality of the CPU system is directly related to the stability of the computer. In the work of computer, CPU needs to continuously discharge heat. If the heat generated by the system is not discharged in time, it will lead to a sharp decline in the efficiency of the CPU, which will seriously affect the use time of the CPU. Therefore, for the CPU, the operation of the CPU is related to the overall computer performance. If the CPU fails, the overall performance will decline. Therefore, in the process of computer system setting, we need to constantly study the relationship between temperature and CPU, and improve the working efficiency of computer hardware through reasonable heat dissipation and heat storage treatment of CPU.

2. The Operating Temperature of CPU

As a derivative of the development of modern science and technology, computer has played a very important role in people's life. With the increasing use of computer, the status of computer in daily life is also higher and higher. At present, people's awareness of computer maintenance is also constantly strengthened. CPU is the core processor of a computer. It needs to control the CPU effectively to ensure the efficiency of the computer. When the computer CPU is running, it will produce a lot of heat, which needs timely cooling to ensure the normal operation of the CPU. If the temperature of the CPU is too high, it will often lead to the reduction of the efficiency of the computer, such as card, restart, dead screen and so on. Therefore, the problem of heat dissipation has become an essential part of the current development of computer optimization.

At present, in order to better adapt to the needs of human work and life, computers will use high-frequency processors. High frequency processors are a limiting factor of CPU. Too much heat of processors will lead to insufficient heat dissipation of CPU. Therefore, the working temperature of CPU should be controlled reasonably and scientifically, and it should be controlled below 85 ℃.

3. The Cooling System of CPU

3.1. Air cooling and heat dissipation

At present, for CPU cooling technology, air cooling is the main cooling mode. A fan is installed on the processor of the cooling system, and the temperature is adjusted and controlled by the convection generated by the fan.

In the process of heat transfer, heat is transferred by heat convection, radiation and heat conduction. For the air cooling system, the principle lies in the way of convection and heat conduction. Heat radiation mainly transfers heat to the air or other substances by means of radiation. Through the waterproof design of the air-cooled heat dissipation system, the air convection and heat conduction are used for heat dissipation, which also involves the problem of heat radiation. The heat radiation is transformed into heat convection to increase the heat transfer coefficient [2]. For heat conduction, heat is exchanged by transferring the temperature of one object to another until the two temperatures are equal. On the basis of CPU heat dissipation, through heat conduction in the processor, the

CPU can transfer heat. Through the base of the radiator, the heat can be transferred to the radiator and the fin end of the radiator. Heat is released into the air by forced convection of the wind.

3.2. Water cooling and heat dissipation

CPU cooling can be realized by water cooling system. Through the circulating cooling of water cooling system, water pump, pipeline and heater, the composition of water cooling device is realized [3]. In practical application, if the water cooling block is placed in the vacuum part of the device, it is usually very infectious to contact with heat emission. The water cooling block is directly contacted with the CPU to absorb the heat generated by the CPU through heat transfer. After the heat absorbed by water cooling, the heat can be taken away by circulating cooling, reciprocating cycle, which can effectively and continuously absorb the heat generated. In the water cooling system, water cooling and heat dissipation can continuously absorb heat. Among them, the pump can force the continuous flow of circulating cooling water. In the water cooling system, the system composed of water pump and water pipe makes the circulating coolant circulate continuously, forming a circulating working system in the closed environment. The water tank is mainly used to store coolant.

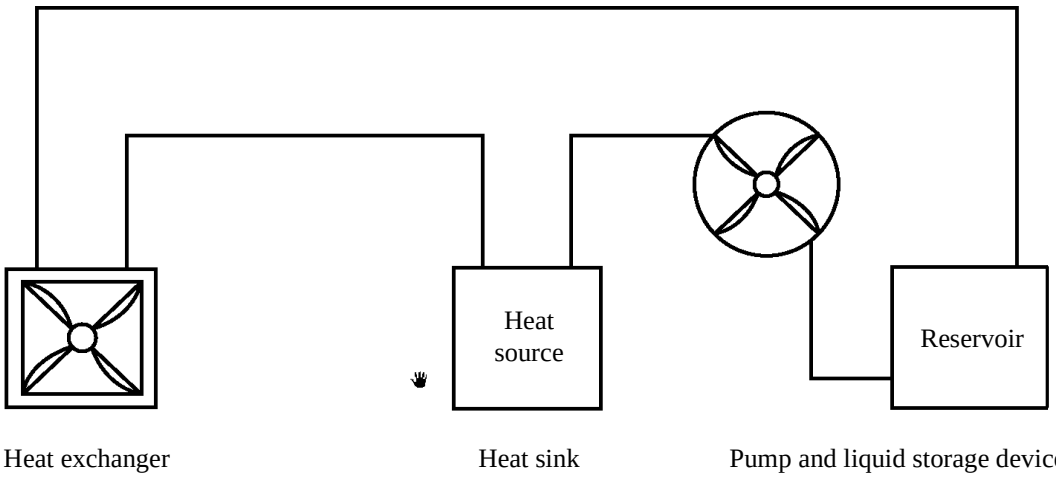

Figure 1. System device

3.3. The heat dissipation of heat pipe

Heat pipe cooling technology, using the system needs to keep the heat pipe closed. At the same time, the heat pipe is also a container, which has many structures and low boiling point working medium. When setting the heat pipe, the vacuum environment should be set to form a closed container, and the working medium to reduce the boiling point should be added [4]. When the CPU is working, the fluid will be saturated. When the container is heated, the state of the medium will change. The medium absorbs heat for vaporization, and the steam generated will condense at low temperature and flow to the original position through gravity and other factors. This reciprocating cycle will form a circulation system for heat transfer and exchange.

But at present, the research of heat pipe technology is not perfect in our country, and the technology is not mature in the application of heat pipe coefficient. For example, there is a lack of consideration for the power between the radiator and the structural elements of the cooling equipment. At the same time, because the heat pipe cooling technology is a complex operation project, it needs to consume a lot of cost in the system production process, so it is difficult to be promoted in real life.

3.4. Semiconductor refrigeration assisted heat dissipation

Although the advantages of semiconductor assisted cooling are outstanding, there are still many problems that are difficult to solve. The advantages are obvious: fast cooling, can keep the chip end at a very low temperature; increasing the temperature of the heat sink can increase the efficiency of heat dissipation to the air.

But the disadvantages are very difficult to solve: when the processor heat is small, the cold end temperature is too low, easy to dew and frost; The cooling power is limited, the low power processor is unnecessary, and the heat of the high power processor can not be dissipated; The cooling efficiency is low, and the power consumed by the cooling fin itself is often several times more than that of the processor itself; The heat resistance is not enough. Modern chips can withstand a high temperature of 100 degrees Celsius, and they also work at 40-60 de-

grees Celsius. The hot end of the semiconductor heat sink is 30-40 degrees higher than the cold end, and the hot end is easy to burn.

4. Overview of CPU Thermal Storage Device

Nowadays, there are many ways of computer cooling, such as air cooling and water cooling, heat pipe cooling and so on. Air cooling is the most widely used method at present, but it also has some defects. Too long air cooling time will lead to the accumulation of a lot of dust, which will not only bring noise, but also reduce the heat dissipation effect. The price of water cooling is higher, and the application scope is limited. Therefore, the development of a low price, high efficiency and small security risks of heat dissipation has become an important development direction of optimizing CPU heat dissipation. Through the study of heat storage materials, the use of heat storage materials for heat dissipation has become a new hot regulating and cooling system.

4.1. Advantages

The heat storage device of CPU can effectively improve the heat absorption capacity of the system. The material element of the heat storage device is mainly copper, which can be installed outside the device to store the heat storage material by slotting inside. CPU will produce a lot of heat when it is running. The heat storage device can effectively absorb the heat generated by the computer. Through the scientific parameter design of the system, the temperature of the CPU can be well controlled, so that the temperature of the CPU can be kept within a scientific temperature range, and the stability of the CPU operation can be ensured. For the heat sink, the installation process is simpler. Compared with the air-cooled system, the heat storage device will not have noise.

For heat storage material, it is a new type of material. Combined with its chemical properties, phase change can occur at a specific temperature, and with the absorption and release of heat [5, 6]. Heat storage materials can be used to absorb heat, which can effectively control the ambient temperature, and can also be used for heat storage. It can be used as a medium for heat storage. By storing the heat emitted by the computer society and releasing it when necessary, it can effectively improve the utilization rate of resources, and it is also in line with today's sustainable development, which is conducive to the energy-saving utilization of resources.

4.2. Status quo

At present, the heat storage technology has been in the stage of rapid development. The society has been paying attention to the research of heat storage materials, especially the thermal cycle, phase change and service life of heat storage materials. Nowadays, heat storage materials have been used in solar energy, energy saving and insulation, medical and health care industry, and have made some achievements.

4.3. Design of thermal storage system

At present, heat storage technology can be used to cool CPU. Therefore, for the CPU cooling process, through the design of the system structure can realize the specific data simulation. Considering the shape of CPU, in order to increase the heat storage area, it is necessary to design the shape of CPU to set the groove. The heat dissipation and heat storage device has a bottom plate and a cover plate. Through the composition between the two, the bottom plate and the cover plate are effectively combined with the grooves and fins to form a closed space.

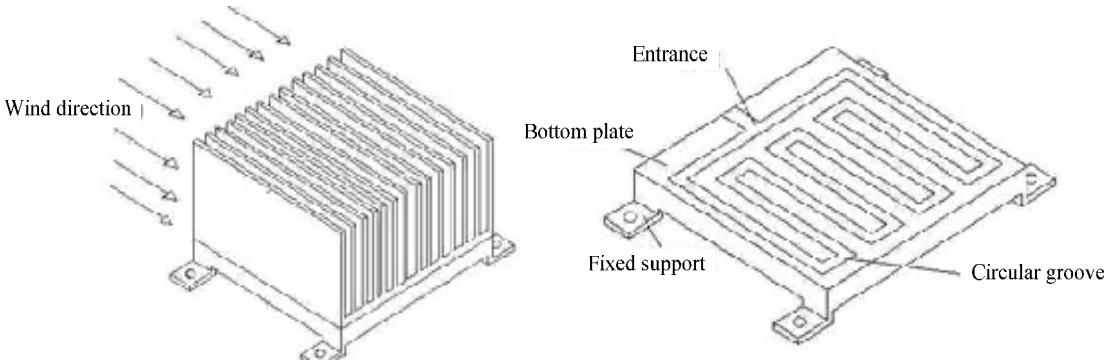

Figure 2. Diagram of heat storage device

The heat dissipation process of computer CPU is an unstable process, which lasts for a long time. With the increase of the use time of the computer, the load on the CPU is more and more heat is generated. With the increasing temperature of the bottom plate, the phase of the heat storage fluid in the groove will change. The heat absorbed from the bottom plate makes the medium phase change to ensure that the temperature of CPU is main-

tained in a certain range. For the device, the heat can be discharged through fins and fans to ensure the heat transfer in both directions.

4.4. Numerical simulation experiment device

In the data simulation, according to the N-S equation, through the simulation of turbulence model, according to the spatial dispersion of the equation, the finite volume method is used for the algorithm, and the second-order upwind scheme is used for the dynamic [7].

5. Conclusion

For this project, the heat storage material is used for a longer time and is more in line with today's development trend. Due to the low price of heat storage materials, and with good heat dissipation. In the long run, it has an absolute advantage in computer cooling. In today's life, people pay more attention to the use of computer comfort. Obviously, the use of heat storage materials can better improve the utilization rate and sense of use of computers, which has great potential and promotion value in the future.

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