

The application of VHDL in digital integrated circuit design

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Abstract: With the continuous progress of science and technology, the modern Internet has officially entered a period of rapid development, the traditional digital circuit design has been unable to meet the rapid development of electronic technology, and we must rely on more advanced design language to drive the development of digital integrated circuits. The development trend of circuit design in the future is to assist design through hardware description language. In order to meet the requirements of the times, VHDL language is applied to digital integrated circuit design, which makes the contemporary electronic product structure more simple, functional, flexible, easy to operate, and has stronger description ability, which meets the needs of contemporary digital integrated circuits. The design of modern electronic equipment improves the design efficiency and reduces the capital investment. This paper first briefly introduces digital integrated circuit and VHDL, then introduces the advantages of VHDL application from two aspects, and finally introduces the practical application of VHDL in digital integrated circuit design from four aspects. In order to provide reference and exchange for the relevant people.

1. Introduction

With the development of science and technology, Internet technology has entered people's lives, and the digital technology corresponding to the Internet has gradually appeared in our lives. The traditional circuit design language cannot meet the rapid development of digital integrated circuit design, and must rely on more advanced high-level language to improve the digital integrated circuit design. VHDL is a high-level language for circuit design, which was developed in the late 1980s to improve the reliability of design and reduce the development cycle. With the deepening of VHDL high-level language by researchers, the high-level language has become more and more important. Compared with other circuit design languages, VHDL has stronger description ability and is the best choice in description field. Rich database, anytime and anywhere can imitate, imitate, and improve the efficiency of the computer. Layered application of the same Ip improves operational efficiency. The independent design idea is that the operation is more convenient. Human participation is reduced and fault tolerance is reduced.

2. Brief introduction of digital integrated circuit and VHDL

2.1 concept understanding

First of all, the digital integrated circuit is a system or digital integrated circuit which aggregates the wire and the original on the same semiconductor chip. The working principle of the digital integrated circuit is based on the digital logic design and operation, and is mostly used to process the digital signal of the integrated circuit. According to the scale can be divided into small-scale integrated circuits, medium-scale integrated circuits, large-scale integrated circuits and so on [1]. Secondly, in VHDL understanding, VHDL language is a high-level language for circuit design. The original purpose of this design is to improve the reliability of the design and reduce the development cycle. It is mainly used to describe the rows of digital systems.

2.2 Characteristic analysis

The digital integrated circuit unit is simple in circuit, does not need extremely high precision for the combined original, and allows a small amount of error to be allowed in two different states. As the precision demand is reduced, the requirement of the digital circuit to the component is reduced, the cost of the digital circuit is reduced, and the integration of the digital circuit is promoted. And the digital signal can be stored for a long time. The use of VHDL in the integrated circuit makes the electronic product structure simple, powerful and flexible, and the design range of the digital integrated circuit with VHDL is wide.

3. Advantages of VHDL applications

3.1 Stronger description ability and simulation technology

First of all, VHDL has a rich data library, which makes it have more sufficient language structure in description, because VHDL high-level language has multi-level design function, which can be applied to describe system-level circuits and gate-level circuits, and can not only choose register transmission description, behavior description or structure description, but also use mixed level description of the three. Secondly, the hardware circuit model can be established accurately through VHDL, and the fabrication efficiency can be improved. Because VHDL, a high-level language itself, has the two basic properties of supporting inertia delay and transmission delay, by analyzing this, the high-level language itself has the basic properties of supporting inertia delay and transmission delay. The two properties understand that we can fully exploit the advantages of VHDL in digital integrated circuit design. In addition, VHDL has a high fault tolerance, supports pre-defined and customized data types, more design schemes in the case of description and simulation, and the designer can try to create a high-level system model through different attempts and pursue the highest efficiency. Therefore, compared with other hardware description languages, VHDL not only has a stronger description capability, but also can create a high-level system model [2]. It is the best hardware description language in the field of system design. Super description.

3.2 Independence, high efficiency

For the VHDL high-level language application, the requirement of the designer is not very high, the structure of the hardware, the target device realized by the final design is nothing to be understood by the designer, and the VHDL is independently designed, so that the designer can concentrate on the optimization of the design. And after the design description is finished, different attempts can be carried out independently with a plurality of different device structures, so that the established function is finally realized, and the practicability of the design is improved. The application of the VHDL high-level language not only reduces the requirements of the designer, but also by reducing the operation of the designer in the actual design process, reasonably using this part of time to achieve perfection. Design, optimize the purpose of design, and improve the efficiency of design at the same time. Moreover, the design method of VHDL is based on the library (Library), which can build a variety of reusable modules. This part of the template can be stored in the database. When the language design is carried out, the template in the database can be extracted directly to achieve the template effect of pre-design and use of the previous archiving, which improves the design efficiency. At the same time, designers can communicate and share the design results through database reference, reduce the time of hardware circuit design, and improve the efficiency.

4. Practical Application of VHDL in Digital Integrated Circuit Design

4.1 Design of remote Control for Air conditioning

In general, the principle of changing the temperature of the air-conditioning remote controller is based on the indoor temperature, and the corresponding temperature change signal is given to select

the refrigeration or the heating two forms [3]. According to the transfer map in different states, the program code can be converted into different forms, and the VHDL program is written according to the above state transition diagram. In the programming, the case statement is used to describe the change of the temperature state, which has the characteristics of intuitive, clear and easy to modify, and the like. In order to achieve the purpose of changing the state, different processes can be used for presentation. So the programming method is diverse, and we can choose the simplest and efficient way to apply it.

4.2 Design of the initial interface

The main function of VHDL in digital integrated circuit is to establish data analysis set, optimize and integrate program, integrate information into actual circuit operation and ensure the basic design structure of circuit. Therefore, the digital integrated circuit is designed by VHDL as the basic structure, so that it has an independent operating structure. Then by integrating the four basic functions, the design of the initial interface will be guaranteed, so that the integrated circuit has a complete function.

4.3 high-level description digital circuit

However, with the increasing scale of the digital circuit, two technical problems have to be overcome, and the first is that the large digital integrated circuit designer has not been able to directly describe it. Second, the complexity of the digital integrated circuit is becoming more and more complex, the man-made thought is not enough to meet the condition of the operation of the circuit, and a higher level of abstraction is needed. and the application of the VHDL high-level language has a multi-level design function, can be applied to the description of the system-level circuit and the two aspects of the description circuit, and can not only select the description of the register transmission description, the behavior description or the structure description, but also can be mixed with the three Mixed level description of absolutely high level functional problems [4].

4.4 multi-case electronic circuit with repeated design

The traditional digital integrated circuit design can carry out many repeated experiments to verify the integrity and excellence of the circuit. The most common practical way is the test board. Secondly, some electronic products can be made from other items for practical verification. However, in the process of verification, human thinking does not fully remember all the practical points, so that in repeated experiments, it not only wastes time but also increases the cost, but also can not consider the whole situation, and the development cycle of the product continues to prolong. In the process of competition, due to the continuous prolongation of product listing time, there is a lack of competitive advantage. And the design method of VHDL is based on the library (Library), design method, a variety of reusable modules can be established. This part of the template can be stored in the database. When the language design is carried out, the template in the database can be extracted directly, the design derivation can be carried out many times, and the problem can be constantly changed in the experiment in order to achieve the best effect.

5. Tag

From the Internet into our vision to the society has entered a highly developed information society. Electronic products have been greatly improved in terms of complexity and product performance. The extreme speed of electronic products cannot be separated from the continuous sublimation of language design, high-level language design continues to promote the replacement of electronic products. VHDL is a high-level language used to design hardware and electronic systems. It has strong description ability, independence and efficiency, which ensures that it is in an absolute dominant position in the competition with other high-level languages. Therefore, VHDL will bloom its unique light in the design of digital integrated circuits in the future.

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