

Reliability Analysis and Optimization of Computer Communication Network Based on Genetic Algorithm

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Abstract: With the rapid development of communication network technology, especially the development of high-speed communication networks, the scale of the network is getting larger and larger, the link capacity is getting higher and higher, the link is becoming more and more sparse, and the research on network reliability is becoming more and more popular. attention. At present, network design related to system reliability constraints or goals has become a subject of many researches, and has been widely used in related fields such as communication networks, computer networks, and electrical control. The thesis first expounds the foreign research status of computer communication network reliability, as well as my country's development background, research process and reality in this field. Computer communication networks are increasingly widely used in schools, factories, enterprises, banks, transportation, energy, communications, military and other fields, ranging from people's daily life to national security and stability. Therefore, the research topic of computer communication network reliability has huge economic value, social value and social benefit. Secondly, the thesis introduces the relevant theories of computer communication network reliability, analyzes many factors that affect the reliability of computer communication network, and points out the bottleneck problem that restricts the reliability of computer communication network. On this basis, the paper puts forward a specific plan for the reliability optimization design of computer communication network, and establishes the corresponding computer communication network cost model and computer communication network reliability model. The reliability model of the communication network is solved.

1. Introduction

With the further strengthening of social informatization, people will rely more and more on various networks, requiring the network to provide convenient, rapid, accurate and safe high-quality services. At the same time, the scale of the network continues to expand, and the connection area and network length of the network are also expanding rapidly. So far, mankind has developed many new large-scale and complex equipment and systems, such as computer communication network systems, communication systems, communication systems, automated production line systems, banking service systems, nuclear power plants, large passenger planes, and military systems. The common feature of these systems is that the structure of the system is complex and the functions are powerful; the system needs to be supported by complex hardware and software to complete the predetermined functions, and sometimes requires the participation of people; once the system fails, it will be harmful to the society, economy, and economy. The environment and other aspects cause varying degrees of losses. Therefore, the reliability of one of the most important indicators of system effectiveness has become a research direction that attracts much attention. Therefore, the research on the reliability of computer communication networks has very important theoretical significance and practical value. In order to ensure that the system can work safely and reliably, theoretical research needs to focus on optimizing the design of network reliability and taking into account other indicators of the optimization system on the basis of improving network reliability, such as link cost, maintenance cost, delay, and congestion. Rate and response time. In actual

engineering applications, designers mainly consider two aspects when constructing network systems: network performance and investment costs. Because the network system generally costs a lot of money, the cost often becomes a very important restricting factor in the network topology design. At present, as far as most networks are concerned, as long as a small improvement is made to their topology design, a certain amount of cost can be saved. Through re-optimization, the application of new ideas and new technologies without reducing system performance can achieve considerable cost savings. Therefore, it is very important to plan and design an optimized network system. Network reliability is an important performance parameter for the design and operation of computer communication networks. Its problems are becoming more and more important and have attracted widespread attention. Research on network reliability and optimize the design of network reliability have also become a major issue that network designers and users are most concerned about. Among them, the reliability of the entire terminal network can better reflect the overall reliability of the network. Therefore, it is necessary to study the optimization design of the reliability of the entire terminal network.

2. Overview and Characteristics of Computer Network Reliability

An overview of computer network reliability. The reliability of the computer network is the ability to complete the task in accordance with the specified time and scope of the system and the probability of completing the task. Computer network reliability optimization design for network security is one of the most basic requirements. If network security is not effectively guaranteed, computer network accidents will occur, and even cause the loss of important files, which will cause greater losses. At present, the reliability of computer networks can be divided into four categories: computer network connectivity, anti-destructiveness, survival, and stability of software and hardware in a multi-mode working environment. Many computer users and developers basically concentrate on the research of hardware reliability. The reliability of computer networks can be analyzed by using a probability mapping network template. The probability of computer network models can make people aware of computer network problems and improve computers. The network reliability optimization design can more effectively manage the realization of hardware and software functions, and can provide a reliable link for each user terminal. In the field of computer network reliability, the test range is very wide. You can find many faults and accidents, and solve these problems to improve the reliability of the software. In order to realize the reliability of the computing network, highly reliable components can be developed, and reasonable measures can be taken to improve the efficiency of computer network communication. The reliability of computer networks. Computer network technology is an important technology in the field of computer applications. Computer network is a system engineering. It is an organic combination of computer technology and communication technology. It can carry out data processing and data communication connections in different regions and different geographical areas, and connect some computers with independent working capabilities. The characteristics of the reliability of computer networks are as follows: (1) Effective analysis from structure and product design management: Computer networks can realize network interconnection under different network protocols and environments, and work under different software and hardware environments, thereby Realize the real resource sharing, distributed processing and data communication network, thus forming an open architecture; (2) High performance: Reliability is an important requirement of computer network security. Computers are constantly pursuing high reliability. The network has high speed and high security, using advanced multimedia technology to provide comprehensive services of text, sound, and image. Comprehensive processing of computer information; (3) Intelligence: The intelligence of computer networks can improve the performance of multi-functional services and network integration, and promote software and hardware management and the application of various commercial network technologies. It can also provide users with real services based on distribution and openness, and at the same time achieve higher cost performance.

3. Optimization Measures of Genetic Algorithm in Computer Network Reliability Design

Genetic algorithm can optimize the operation process of computer network. Genetic algorithm is an algorithm that can effectively solve optimization problems. The application in computer networks can be optimized randomly and adaptively. The solution to the problem of this algorithm is to solve the process of survival of the fittest of chromosomes. Through the continuous evolution of each chromosome group through generations, including replication, crossover and mutation, it finally converges to be able to adapt. The chromosome of the environment, so as to find the optimal solution or satisfactory solution. Genetic algorithm can perform global search and develop problems in the system, so as to avoid some omissions. Genetic algorithm can improve the operating efficiency of computer networks, it can also effectively search for some problems in computer networks, take effective measures to solve these problems, and improve the reliability of computer networks. In the genetic algorithm, there is a feasible solution coding method. The design of the genetic operator needs to focus on two main issues in order to effectively construct the genetic algorithm and improve the reliability of the computer network. Specific genetic algorithms require different coding and use of different genetic operation operators for different optimization problems. Specific problems require specific analysis, so it is necessary to strengthen the understanding of what can be solved. This is a key to the successful application of genetic algorithms. factor. The genetic algorithm uses a scientific particle encoding method to improve the operating efficiency of computer networks and effectively ensure the safety and reliability of information transmission and storage.

Strengthen the design of the network hierarchy. In the computer network structure, the use of advanced network structure and architecture can maintain the best state of the computer network. Genetic algorithms can promote the optimization of this hierarchical structure design. Specific measures include: (1) Access layer: The access layer is a starting point for computer networks, allowing access points to be used later, and it can effectively control the number of user networks. It can also provide broadband exchange of computer networks to realize the efficiency and stability of computer networks; (2) Distribution layer: Computer networks need to be distributed hierarchically. The distribution layer is the boundary between the core layers of the computer network, and it is also a computer network. There is a clear boundary between the access layer and the core layer. This layer has certain aggregation characteristics; it can access each user's computer and effectively control the computer's network functions. This is a computer network security authentication model, which can improve the efficiency of computer networks and effectively ensure the security of network communication and data transmission. Sex.

Improve the design of the structural system of the computer network. In order to effectively improve the reliability of computer networks, the design of computer network architecture needs to be operated in accordance with relevant design specifications. Grounding from top to bottom, this grounding method can effectively realize the connection between the network operation layer, the network control layer, the network operating system and the network hardware four-layer structure. This structure design includes: (1) Network operation layer: it is a computer decision support system, or a teaching, scientific research, and office automation system, which can effectively realize the user's network functions; (2) The network control layer, which is the database service, Provide users with network layer services; (3) network operating system, that is, a software platform, enough to support the operation of computer networks; (4) network hardware layer, including services, clients, interconnection protocols, communication channels, topological structures, and some interactions Connected devices make up the hardware layer of the network. This four-tier system can promote the reliable operation of computer networks and improve the security of network communications.

4. Conclusion

Computer network is a mainstream technology in the world today, and all sectors of society have attracted enough attention. According to the genetic algorithm to optimize the design of computer

networks, it can strengthen the reliability of computer network management, innovate in the application, and continuously improve the safety and reliability of computer networks. The society is constantly advancing, and the research on the reliability of computer networks should also be intensified. This will help promote the design level of computer networks in our country and improve the security and reliability of computer networks.

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