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The Hierarchical Network Topology Management System based on Managed Object and View Mechanism

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Abstract

Now how to improve the developing efficiency and enhance the scalability of network management system has become a hot issue in the current research. In this paper, according to the actual demands, understanding the functional requirements and analyzing the process of network topology management, we propose the hierarchical network topology management system based on managed object and view mechanism. Using an object-based management method, it achieves the expansion of the three-layer model of network topology management; using the view mechanism, it reduces the dependence on the specific needs for the system and achieves a hierarchical network topology management system.

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Keywords: Hierarchical network; topology management; managed object; view mechanism; mapping; network management

1. Introduction

With the expansion and complexity of network scale, management and maintenance of the network has become critical. And network management systems(NMS) have become an important part of network construction and maintenance[1]. Meanwhile, network topology management(NTM) is the basic part of NMS, and most of the functions will be through topological graph to reflect.

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Network topology is the physical or logical layout, corresponding the physical or logical relationship between network nodes. Grasping the topology information accurately is the basis of a series of functions[2]. NTM is a flexible and difficult subsystem. It not only requires to design the interfaces, through graphic symbols display the connection relationship between devices and attribute, but also deals with the real-time interactions with network performance and alarm subsystem, reflecting the monitoring function[3].

2. Related Works

2.1. Life cycle

NTM has its fixed life cycle. First is the data acquisition stage. The second is the data analysis stage. And the third is presenting stage, presenting the related topological information according to the user's demand. And with the change of requirements, it can adjust the presentation of mode and content. The last is using stage. The users can configure and monitor the managed object.

2.2. Key technologies

- Hierarchical display strategy

Here we adopt the hierarchical display strategy, the following IP network as an example. The first layer shows the main topology, namely the relationship between router and subnet. The second layer displays interconnection in the subnet; if the subnet also includes router or switch, It can also go deep into the port level for the third layer of topology structure.

- Graphic coordinate allocation strategy

It is a technical difficulty to distribute coordinates to network reasonably and make them more attractive on the screen[4]. Based on the hierarchical structure, they can automatically generate the network topology, thus improve the appearance of topology in order to manage the topology intelligently.

- Data loading strategy

Ordinary loading model is generally used, because of the small amount of data. Multilevel loading model is the premise of the hierarchical network. When the system is initialized, it only presents the uppermost data. The multilevel loading model can not only save space, but also improve the speed of loading system.

In general, NTM will be developed in the intelligent and hierarchical direction in the future[8]. In the whole life cycle, the most difficult is analyzing topological data, and the large amount of work is database construction, graphic processing and external interfaces.

3. Overall Design

The design mainly includes three points: based on the design of managed object, mapping managed object to database, the implementation of functions. Architecture design adopts three-layer architecture model.

3.1. Based on the design of managed object

The managed objects are abstracted from network resources[5], namely the basic elements of network topology, such as network equipment, network type and network relationship. Various network elements can be abstracted as managed objects, and they can be viewed as an instance of managed object[6].