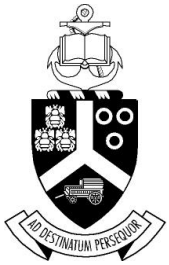

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An object oriented model for IPv4/IPv6 network management

COS 236 essay submitted by
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1 Introduction

In world of rapidly developing technologies a centralized architecture that IPv4 uses is no longer sufficient. Flexibility, reliability and scalability are key to moving forward. A distributed object oriented network management model has been proposed to accommodate the transition from IPv4 to IPv6. The passage outlines the key concepts of such a transition and explores the components that are used to achieve this.

2 Problem Area

2.1 Centralized Network management

As it currently stands the traditional centralized network management can't meet the need of network management any more. This is because of the rapid development of network technology, which require the network model to be more flexible, scalable and reliable.[3]

2.2 IPv4/IPv6 Coexistence

Since the remaining IPv4 address space is very limited, it is necessary for IPv4 and IPv6 to coexist and eventually to be completely replaced by IPv6. This means there is a transitioning phase currently running. The problem with this being that most network carriers have different technologies prepared for this transition. This provides a problem of diversity and complexity.

2.3 Monitoring and Mapping

Currently it is critical to monitor resources available, such as disk space, CPU load and how long a web page will take to download. This challenge is meeting this requirement. Object to relational mapping becomes an issue when there are many different types of objects that needs to be mapped, there will need to be a better way of mapping, considering the challenges and complexity of transitioning that lies ahead.

3 Solution to IPv4/IPv6 Trasition

3.1 Proposed Management Model

There is a proposed database management model to cope with the coexistence of IPv4 and IPv6. This entails a distributed object-oriented database and hierarchical network management architecture. It mainly comprises of three particular components, namely, the Monitor, Collector and Distributed Object- Oriented Database. These basically provide an insfrastructure for different IPv4/IPv6 configurations and abstracts the dependence on the underlying architecture. Also incorporated into the this management model is the REST architecture and the Perspective Broker protocol. [5]

3.1.1 Monitor

Basically, the Monitor simultaneously listens on IPv4 and IPv6 connections. Therefore facilitating effective management of purely IPv4, IPv6 and dual stacks without any extensive overhead. This is achieved through a number of components that, together, compose the Monitor. These are the modeling module, performance collecting module, SNMP/SSH channel module, events module and user interface. The user interface. The monitor can be found below the Distributed Object-Oriented Database and above the Collector on the proposed hierarchy of componenets that form the management model. It is therefore effectively a link between the two. [1]

3.1.2 Collector

A collector is a device responsible for collecting a devices network information using SMTP and SSH channels in an IPv4/v6 framework. As the collector is located directly under the monitor from the proposed hierarchy, this implies that the collector is managed by the monitor, only receiving refined configuration information and requests from the monitor though the relay module of the collector. The collector stores performance data in a local relational database RRD (Round Robin Database), and is therefore always available for use on the monitors request. The collector is said to also have the functionality of preventing attacks on a network, it supposedly does this by attracting and trapping degenerate attempts to penetrate the network. [2]

3.1.3 OOD (Distributed Object Oriented Database)

The OOD in this IPv4/v6 topology is used by the monitors to store the devices objects and classes that have been abstracted from the configuration data retrieved from the collectors. The monitors do this by connecting to the OOD servers through OOD clients in each monitor instance. Using OOD clients prevents any local OOD faults from affecting the actual OOD server. The reason for using OOD in this scenario is to simplify relational mapping of the managed devices as well as the sharing thereof.

4 Opinion on Advantages and Disavantages

The hierarchical and distributed architectures when utilized, avert single point of failure of the management center, which means management center is available most of the time if not always. Availability is not the only quality requirements the model offers. IPv4/IPv6 network management can utilize hierarchical management to improve reliability, employing distributed management to obtain scalability and use object-oriented modelling to enhance flexibility.

Twisted is an event-based and asynchronous network communication framework which allows programs to keep response when handling events without using threads, as thread require mechanisms to in order to process resources, thread may return invalid and inconstant responses if not properly implemented. Twisted also avoids single point failure and overcomes the network bottleneck of C/S model.

For centralized architectures maintenance is simple, one person or a team looks after all of the knowledge stored in a single file or database , but the model uses a distributed architectures and maintenance is more difficult. Since the model is Object-Oriented database based and OODB's are not mature nor extensively tested, vast amounts of data is in relational format already and lastly programmers know how to optimize for high-speed retrieval of such data. Finally the use of threads would have made the system faster through concurrency

5 Relevance of database systems in COS 326 and business organisations.

The IPv4/IPv6 network management model makes use of an Object-Oriented Database (OODB) which was taught in this module, COS 326. The concept of an object oriented database, is that it stores objects instead of data. It encapsulates combinations of data structures together with associated functions. Because of this, arbitrary data types can be stored within the "database." The OODB makes use of a management system (OODBMS) that provides data integration, overall control, and DBMS support facilities for all types of objects. Additionally, it emphasises the necessary characteristics to support large, shared, persistent object stores; which include efficient processing over large secondary storage organisations, concurrency control, recovery facilities, and efficient processing of set-oriented requests also known as queries. [4]

6 Conclusion

The proposed management model is well-thought and effectively abstracts any potential complexities by using a Distributed Object-Oriented Database approach as opposed to a Centralized approach. This has proven to give the prototype flexible, reliable and scalable in the complex IPv4/IPv6 network environments. This seperation of concerns successfully solves the problem of the co-existence of the IPv4 and IPv6 protocols and minimizes the complexity of this consensus.

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