Research on Protocol Migration

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Abstract

This paper elaborates the concept and model of protocol migration in network interconnection. Migration strategies and principles are discussed and several cases are studied in detail which show the basic procedure and techniques used in protocol migration.

Keywords: Protocol migration, interconnection.

Nowadays, the request for interconnection becomes more urgent with the wider use of computer networks. More and more “information islands” appear because of various featured hardware, software and network products supplied by various vendors. In order to solve the problem of “information islands”, network techniques are demanded to be open, integrated and standardized. Confronting heterogeneous network interconnection, protocol migration is one effective way.

1 Concept of Protocol Migration

Protocol is one of the most important concepts in network technique. It is a set of rules to control information exchange between two entities. Because of the isolation among computer and communication vendors and large network organizations, there are several different communication protocols and communication system architectures such as TCP/IP of DoD, SNA of IBM, DECNet of DEC, which cannot communicate with each other originally. In the early 80’s, ISO issued OSI/RM (ISO 7498), which forms the common basis to coordinate the development of system interconnection standards. Since then, TCP/IP suite has become the “de facto standard” and has got vast applications and users. However, OSI suite is far from perfection. Migration techniques must be studied because quite a few protocols coexist and they need to cooperate.

Protocol migration, in brief, is a procedure to accomplish communication among different protocols by using certain means. There are two viewpoint - the user’s view, and the protocol designer’s view. Suppose that there are two systems A and B, which use PA and PB as their communication protocols respectively. A cannot communicate with B because of the differences and incompatibilities between A and B in spite that their services SA and SB supported by PA and PB respectively are

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the same or similar. Then A is migrated to B. In the user's viewpoint, the available communication area of users in A is expanded without any change, while in the protocol designer's viewpoint, a new and possible stack PM (A,B) is set up between A and B. Fig.1 shows the model of protocol migration.

The key feature of protocol migration is that logically there is no change in the end systems, nonetheless they can communicate instead of mismatching and misunderstanding.

Note: Pxx: the protocol whose function is xx; Lx: the lower layers' services of x; Ix: the interconnection layer in system x; PM: the new migration protocol.

2 Migration Strategies and Principles

2.1 The Strategies of Complete and Partial Migration

Suppose that A is migrated to B. Complete migration is to implement all the services in SA which can be supported by SB in the new protocol stack, while partial migration is just to implement part of services in SA necessary to guarantee the appointed communication.

It is very important for protocol designers to determine the type of migration. Generally, complete migration has the advantage that the gap between A and B can be bridged mostly, but the developing load may be huge and the whole system efficiency may be reduced. As to partial migration, it is suitable for some instances in which supporting all the services in SA is not necessary. And in such circumstances, it is quite easy to realize the migration although services out of the scope of migration services are not supported.

We can find many examples to which protocol migration is applied. If the two end systems are homogeneous, partial migration is often used. The reasons are that the heterogeneous networks which are passed just provide a path for the end system communication, and the relay systems are not required to explain the meaning of transferred data. Products such as routers, bridges and repeaters are popular examples of partial migration. What's more, the interconnection software or devices appear in pairs in systems.

If the two end systems are heterogeneous, complete migration is usually put into use because apart from the difference of protocol syntax, semantics is different and the interconnection part needs to explain packets. In addition, if applications of the end systems are the same or similar, but the supporting network protocols are clearly different, complete migration implementation usually finds itself above the top layer of the heterogeneous protocols. Thus the interconnection software and devices often manifest themselves as gateways.