HW1. Paper Reading Report

The Design Philosophy of the DARPA Internet Protocols

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This paper presents the design philosophy of the DARPA Internet, discussing the major reasons why the Internet Protocol was designed as it is today, and describes how these design decisions in order to reach different goals have led to the evolution of the Internet.

From top-level view, the fundamental goal of the DARPA is to connect heterogeneous networks. DARPA implements packet switching to reach the high utilization and relies on gateway to store and forward packets. These two determine the structure of Internet.

The author lists the seven desired goals as the second level goal of DARPA, indicating that the priority will determine entirely different network architecture. The approach DARPA takes in order to maintain the survivability of network in spite of connection loss is Fate-sharing instead of Replication. Fate-sharing only saves the states of end-points, that is to say, all the gateways are stateless, so the network can tolerate any number of intermediate failures.

On the other hand, the second goal is to support any types of service at the transport service level, which indicates the flexibility should be enhanced. Therefore, TCP and IP, originally implemented as a single protocol, are separated into two layers. And the third goal of the architecture is to support varieties of network. These three goals of the Internet architecture have made the prototype of the Internet network in the future.

In addition, the author also presents the major challenge of architectural development is how to relate realization to the proposed service, and indicates the performance issues should be dealt with.

The fundamental architectural feature of the Internet is the use of datagrams as the entity which is transported across the underlying networks. Datagrams are seemed as basic building blocks, representing the minimum network service assumption, and most important of all, there is no individual connection state maintained at routers.

In the end of this paper, the author presents many great viewpoints about the architectural development of network in the future. He not only puts much attention on the needs of accounting, resource management and operations of different ASes, but he also expects that there may be a building block which is flow-based and soft-state better than the datagram for the next generation of architecture.

The most impressing message provided by the author in this paper must be "The simplest is the best." Compared with the present Internet architecture, DARPA is quite a simple model just achieving the basic features. However, this simple and intelligent design has provided the basic application, regulation, security and high adaptability for future expansion of the network.

In addition, from the history of Internet architecture, we can find that necessity is the greatest push for the development of Internet architecture. Because of the various services needed by different networks, I think that the new building blocks will replace datagrams, becoming the entity transposed across the Internet, and the protocols in the future may be able to strike a balance between performance and the other unachieved goals. However, it doesn't seem to me that the basic Internet architecture will be dramatically changed; instead, it will still expand its features based on the historic design.

Despite the fact that Internet network changes with the rapid technology every day, this paper still plays an important role in the field of computer networking to inspire numerous researchers.