Based on experiences with Directory Systems in distributed systems, the paper starts with a summary of requirements to a Distributed Directory Service. The second part describes the actual work of CCITT on Directory Service and gives an outlook to the CCITT/ISO convergence of Directory Systems. Finally an estimation of the CCITT concept and some suggestions for additional features will be given.

1 Introduction

Directory Services and Name Servers have been discussed and implemented for a number of distributed systems or networks. An example of such a national network is the 'Deutsches Forschungsnetz - DFN / German Research Network'. It is the aim of the DFN to create a communication infrastructure for all research institutions. The services offered and planned within this field will contain basic services like dialogue (remote login), file transfer, remote job entry as well as distributed services like message handling or distributed document processing. These services are based on present or oriented on future standards of CCITT or ISO.

There is a common consent today that a satisfying use of any communication service highly depends on the availability of information about the communication partners. It seems useful to provide these informations within the frame of a DFN-wide Directory System in a unified and transapplicational fashion.

Such an application independent Directory System has to be able to integrate different directories into one. This integration refers to different dimensions:

- integration of the information (directory) on communication entities (e.g. for exchange) on providers (for administration) and users (for retrieval)
- integration of information (directory) of different organizational domains
- integration of information (directory) of different communication services

This integration has to be carried out in a way that the different services or domain administrations can execute their affairs independently. A Directory System in the DFN therefore has to be able to handle different competences. These competences must be modeled in an according organization of the distributed Directory and supported by differentiated access control.
The specific need of a 'Distributed Directory System' (DDS) for the DFN-Message Handling System on one hand and the support and management of further DFN-Services on the other hand led to a DFN-project on Distributed Directory Systems (VERDI). This project has been carried out in cooperation of 'Gesellschaft für Mathematik und Datenverarbeitung' (GMD-Bonn) and Hahn-Meitner-Institut (HMI-Berlin). The results are documented in [DS-D-86] and influenced this paper.

In the second chapter, the requirements to a DDS from users' and applications' viewpoint are summarized. Chapter 3 gives an overview on standardization activities for Directory Systems, where the CCITT approach is summarized in chapter 4. Finally, the future work items of CCITT and ISO are stated and some remarks and additions to the models are given in chapter 5 and 6.

2 Requirements to a Directory System

Using network applications and services, the user must be provided with a lot of information on:

- responsible administration (to become subscriber, required authorization, etc.)
- connection establishment (names, addresses,...) and protocol management
- application specific information (File name structure, job command language)
- addresses of potential communication partners (MHS) or relevant end systems (host, server)

Normally, the user collects the necessary information from different sources in the network environment. It should be the task of a Directory System, to provide all or most of this information to the users of a communication service.

Besides the problems of application usage there is a number of problems that occur with the operation and management of applications. Providers of applications are faced to high expenditure of coordination and administration, to guarantee that the applications can be used properly. Following activities have to be carried out:

- setting-up, publishing and deleting subscribers, installations, etc.
- arrangements with subscribers (e.g. for authorization)
- arrangements between different providers / domains
- coordination of protocols used
- accounting of provided services.

The applications are embedded into organizational domains with independent responsibilities. By the definition of a Distributed Directory System with support of domains the provider of applications can be assisted in the administration of the applications and services. A unique definition of directory objects and their categorized representation in entries is required to support such as application management.

User requirements

The requirements from user's view can be summarized as follows: