IBM's Directory Services Strategy

This white paper provides a summary of IBM's directory services strategy, which encompasses its Lotus, and Tivoli subsidiaries. After discussing the dynamics that have led to directory services becoming one of the most publicized and active battlegrounds in the network computing market, key issues will be detailed, along with IBM's strategy and product directions to address these issues.

The Need for Directory Services

A *directory service* is simply a repository of information, combined with an access method and related services, that stores location and other detailed information about resources such as users, printers, file servers and application servers.

Although directory services have been used in limited forms for decades, the explosion of distributed and Internet-based computing in the 1990s has driven the widespread proliferation of many types of directory services throughout every type of customer. For example, customers typically must define an employee in a number of incompatible directories - for the company's email system(s), network operating system(s), application servers, and corporate middleware services. Each of these directories generally features a different repository, access protocol and management interface.

Despite the obvious customer benefits that would be derived from having a single, integrated directory repository and access method, vendors have been reluctant to support such a service natively because of the loss of control that such support would engender. Because each existing directory typically features tight linkage with a specific application or operating system, vendors would rather have customers base and expand their computing environments around the vendor's directory service - the so-called "center of the universe" mentality - to theoretically generate incremental revenues and solidify the vendor in an account.

As a result of vendors pushing this "center of the universe" approach within today's politically complex firms, customers are left with a wide variety of implemented directory services today. This leads to an extensive labor burden for customers to define and consistently manage/maintain multiple definitions of resources across these typically incompatible directory services - hence the strong demand for integrated management tools to *synchronize* resource definitions across directories, and to provide a *single sign-on* to the multiple directories.

Because of the flexibility that customers demand as a result of the fast-changing business climate today, it is widely expected, even among proprietary NOS vendors, that heterogeneous networks will continue to be the rule for the foreseeable future. However, given the extensive pressure that customers are putting on vendors to solve the problems of incompatible directories within these heterogeneous networks, it is likely that many vendors will at least support a common access method - and the industry is currently revolving around the Lightweight Directory Access Protocol (LDAP) as that method. LDAP, which was first deployed and put in the public domain by the University of Michigan as a small-footprint version of the X.500 access protocol, is being

actively supported by vendors such as IBM, Netscape, Novell, Lotus and Microsoft, who want to leverage its PC-friendly (i.e.lightweight) protocol stack, universal directory access functionality, and strong momentum.

It is notable that supporting LDAP has become "in vogue" among vendors because of customer demand, with most vendors implementing some level of LDAP access on top of their existing directories. This support, however, is expected to vary widely in terms of the level of access to the underlying directory. This support ranges from Netscape, which has built a native LDAP directory server, to other vendors such as Novell who are implementing a limited mapping of LDAP requests to their proprietary back-end.

IBM Directory Strategy and Offerings

To address the proliferation of application specific directory services it is IBM's strategy is to consolidate our directory offerings onto a standards based LDAP directory service. In addition, IBM will directory enables a wide range of products to reduce the administrative effort required to maintain them and to improve the level of data consistency across our product offerings.

IBM's directory strategy has four principles:

1. **Directory enable IBM and ISV products.**
   Several product groups and selected ISVs are working to exploit the eNetwork LDAP Directory, since the customer benefits are proportionally gained as a common directory is exploited across operating systems, networks and applications. IBM offerings will be able to use this LDAP directory to store user, configuration, and security information, reducing administrative costs and improving end users access to information.

   For example, our networking products will store configuration information in the directory so that each individual device can load its configuration from a central directory service. Our firewall products will be able to store policy information in the directory so that the policy can be quickly updated throughout the enterprise. Our middleware products will exploit the directory to maintain a common base of users and security information that can be shared across applications. Once the various levels of the product stack are directory enabled, the synergy between components will be able to be leveraged to deliver powerful benefits. A user running a transaction could be given a high priority on the transaction server and priority on the network to provide improved end to end response time. This would be made possible by providing a common directory service that can be leveraged by multiple components. As more and more products become directory enabled the possibilities for providing cross product synergy becomes limitless.

2. **Provide a highly scaleable cross platform LDAP directory.**
   IBM will include a common LDAP server as a core part of our operating systems and software suites so exploiters of the directory will always be certain a LDAP directory is available. To competitively drive the LDAP exploitation just discussed, we need to provide a LDAP directory which can be bundled without charge within our operating systems, solutions

and suites we develop. To address this need, we are developing the LDAP- and DB2-based IBM eNetwork LDAP Directory. It will provide a very scaleable, high performance directory service for the wide range of directory enabled products we will be delivering as well as providing leading directory support for third party directory enabled solutions. The choice of a relational database backing store will provide unmatched levels of scaleability and reliability. In addition, it will be used as the replacement for the DCE Cell Directory Server that has been a point of customer concern among our larger DCE customers from a scalability and stability perspective.

Since e-mail is the largest use of directory services today and the Domino directory is our most widely deployed directory it is important that customers be able to leverage this large install base to deploy other directory enable solutions. Lotus is enhancing the Domino Directory so that it can be an LDAP (Version 3, the latest IETF-approved level of the specification) server for customers that want to leverage it as the directory for other solutions that require an LDAP server. For customers who will have both the eNetwork and Domino Directories, we will provide tools to enable the synchronization of these directories.

IBM also offers the eNetwork X.500 Directory for customers that need an LDAP directory that is also compliant with the X.500 standard. This directory is available on the AIX platform.

Summary: IBM/Lotus LDAP Directories

IBM eNetwork Directory - Provides LDAP server support that will be bundled with the IBM operating systems, as well as with solutions on the non-IBM platforms. It uses a highly scaleable relational backing store based on DB2. It is available today with AIX and OS/390 and will be available in 3Q98 on OS/400, NT and Solaris. LDAP V3 support will begin to rollout in 1998.

Domino Directory - Provides scaleable directory support for Domino. In Domino V5, the LDAP support will be upgraded from limited LDAP V2 support to full LDAP V3.

IBM eNetwork X.500 Directory - Supports the 1993 X.500 specification and LDAP for niche customers that require X.500 compliance. It is available on AIX today as the IBM eNetwork X.500 Directory. This offering is also used with the Soft-Switch Directory Publisher and the IBM Registry public key infrastructure.

IBM eNetwork LDAP clients - We currently provide clients for NT, Win95, Solaris, AIX, OS/390, AS/400, OS/2, HP-UX, JNDI (Java interface) and LDAP C.

3. **LDAP support across our existing directorie**s.
IBM will support LDAP across our existing directory servers to provide consistent access for application developers and clients. We will support LDAP as the interoperability protocol across our current directory servers, including the Domino Directory, DCE and X.500. This will provide customers (ISVs, corporate developers and users) with a single API and protocol for IBM/Lotus-based networks. We are also working to further improve the operational

characteristics of our LDAP support by providing a common schema across the IBM, Lotus and Tivoli directories, which we expect to be consistent with the networking-oriented schema that we are actively working on as part of the Desktop Management Taskforce (DMTF) Directory Enabled Networks (DEN) initiative.

4. **Provide directory management tools.**
   Leverage Tivoli and Lotus to provide management tools to make our directories easy to administer. As noted at the beginning of the paper management and synchronization of the multiple directory services that exist in most large customer environments is a critical requirement. We are working with Tivoli to enhance their User Administration product which provides directory management services and with Lotus to deliver directory synchronization function based on their Notespump technology.

   Tivoli supports the management of a heterogeneous directory environment though their TME User Administration component. Today, this component allows Tivoli to manage NT, NetWare, Domino, various UNIX directories and the OS/390 Security server. We have been working with Tivoli to add support for LDAP directories. With this component, customers can add, delete or modify user information across the wide range of directories that Tivoli supports with a single action, from a single administrative console.

   The Lotus directory synchronization function will provide two way directory synchronization capabilities between a number of directory services. This will include support for the IBM eNetwork LDAP Directory, Domino, NDS, NT 4.0, other LDAP directories, and relational databases. This will allow any of these directories to be synchronized with any of the others. This represents a very powerful capability for integrating the directory services in customer environments. For example, an application that stores its information in a relation database could be used to update the eNetwork LDAP Directory and the eNetwork Directory could then update the NT and NDS directories.

Summary

The combination of IBM's cross platform set of applications and services, integrated on an open standards based LDAP directory, provides the only viable alternative to NT applications and services, based on Active Directory. As the product lines of IBM and its partners becomes directory enabled we will offer services from the networking layer through the middleware to the end user applications that can be share a common base of user, security and object information based on open standard directory services. This will provide customers with the flexibility to deploy applications and services across the platforms of their choice and leverage the investment in their current install base of hardware and software. All this will be backed by the experience and reach of the IBM Global Services organization, worldwide services and support infrastructure and our experience in providing mission critical services.

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