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Application of Light Weight Directory Access Protocol to Information Services Delivery in Nigerian Tertiary Institutions Libraries

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Abstract
The study advocated for the adoption of Information and Communication Technology in information services delivery in the libraries and information centres in Nigerian tertiary institutions. Light Weight Directory Access Protocol (LDAP) is an application protocol for reading and editing directories over an Internet protocol network. Information services delivery on the hand involve all range of information work aimed at providing the needed service(s)to the customer(s) within and outside the library or information centre. Relevance literatures were reviewed on the concept of LDAP, understanding LDAP, how LDAP are organized, the need to apply LDAP to Nigerian tertiary institutions libraries and information centres were discussed. How LDAP can be applied to library and information centres for effective information services delivery was also looked at among which include Selective Dissemination of Information (SDI), Current Awareness Services (CAS) and catalogue directory of library collection etc. The study among others recommended that libraries and information centres in tertiary institutions in Nigeria should strive to create a Virtual Private Network (VPN) and use LDAP for interlibrary loan, resource sharing among themselves, creation of directory for all libraries and information centres in a consortia were identified as strategies that would improve information services delivery in libraries and information centres in Nigerian tertiary institutions.
Keywords: Light Weight Directory Access Protocol, information service, information services delivery

Background of study

In most cases and indeed Nigeria, the use of libraries and information centres is free of charge as a way of stimulating the customers to retrieve available information. Libraries and Information Centres are regarded as one of the sources of reliable information and this have made them to acquire as many materials as possible for use by the customers. A lot of Nigerian citizens cannot afford to buy books, journals and other information resource materials as a result of financial difficulties. In view of this, therefore, Libraries and Information Centres are making concerted efforts in making information recorded in books and other published materials available to customers using information and communication technology devices.

Different types of devices have been designed to collect and disseminate information to various categories of customers. Academic libraries in tertiary institutions in Nigeria are performing the duty of acquiring, organizing, repackaging and making information materials available and accessible to its customers. How these resources can be accessed and utilized by the customers timely and remotely is the major concern of the 21st century information professionals in Nigeria.

Statement of Problem

Many library customers especially research students have dissatisfaction over the inaccessibility of information resources of the library. Their complaints include inability to locate materials whose records have been found in the catalogue, scattered information materials on the shelves, staff not being able to explain the where about of some materials that is bibliographically available in the library and the administrative bureaucracy which hinders easy access to information resources.

The above situation establishes some doubts about the library's disposition in providing easy access to information resources to the researchers and other customers. Reports from studies conducted by Akobundu (2008), Oyeboade (2009) in Igbo (2012) have shown that library services in most tertiary institutions in Nigeria are not adequate enough to facilitate access to information. Thus, it is imperative that any bottleneck that will impede access to information should be removed for the library to maintain its relevance as an important supportive organ of the institution. This study therefore, is to create awareness and to sensitize the library managers on the significance of Light Weight Directory Access Protocol (LDAP) to enhance accessibility to and dissemination of available information in their libraries and information centres.

Objectives of the Study

1. To bring to limelight the tremendous benefits of using light weight directory access protocol (LDAP) in Libraries and Information Centres

2. To sensitize the Library and Information Centre managers on the need to adopt LDAP for information services delivery
3. To create room for technology implementation that will enhance effective and efficient information services delivery in Libraries and Information Centres
4. To introduce convenience in the accessibility and retrieval of available information in the Libraries and Information Centres and
5. To reveal the usefulness of LDAP and its application to Libraries and Information Centres in tertiary institutions in Nigeria

Significance of the Study

The study would help information workers with an opportunity to provide cost effective, timely and stress free information services to the customers especially in terms of specialized information service such as selective dissemination of information (SDI) and Current Awareness Services (CAS). The library customers can make use of library resources more effectively through directed and structured instructional activities since information access now takes place anywhere hence information delivery service is greater than ever with Internet. Academic libraries are beginning to realize the significance of repackaging and reformatting bibliographic instructions online which provides the customers with options of time and place for instruction (Gbaje, 2007).

Methodology

This study was based on the review of related literatures that advocates for technology adoption in Libraries and Information Centres in tertiary institutions. Journal articles and online information resources were reviewed and used for this study. These resources consulted, were duly and appropriately acknowledged.

Literature Review

Concept Light Weight Directory Access Protocol (LDAP)

Light Weight Directory Access Protocol (LDAP), is an application protocol for reading and editing directories over an IP network (Michelle & Christian, 2007). It is a standard technology for network directories. Michelle & Christian (2007) asserted that Network directories are specialized databases that store information about devices, applications, people and other aspects of a computer network. It is not limited to contact information or information about people. It is appropriate for any kind of directory like information where fast lookups and less frequent updates exist.

Donnelly (2008) revealed that LDAP was created in 1995 as an academic university project, and then commercialized by Netscape in the late 1990's. It is finding much acceptance because of its status as an Internet standard. It can also be customized to store any type of text or binary data. It is important to note that it is not a directory but a protocol. Donnelly (2008) further explained that LDAP organizes information in a hierarchical manner using directories. These directories can store a variety of information and can even be used like a Network Information Service (NIS). NIS enables anyone to access their account from any machine on the LDAP enabled network. In many cases, LDAP can be used also, as a virtual phone directory, allowing users to easily access contact information of other users. But it is more flexible than a phone directory. This is because it is capable of referring a query to other LDAP servers throughout the world thus, providing an ad-hoc global repository of information.

Understanding Light Weight Directory Access Protocol

To grasp an understanding of a *Light Weight Directory Access Protocol*, it is pertinent to understand what a directory and protocol is. Sybase (2004) stated that a directory is an organized set of records: e.g., a telephone directory which is an alphabetical list of persons and organizations with an address and phone number in each "record". A directory is also a way in which complex information is organized, making it easy to find. Directories list resources—for example, people, books in a library, or merchandise in a department store—and give details about each one. They can be either offline—for example, a telephone book or a department store catalog—or online.

Sybase (2004) traced the origin of the word protocol to a Greek word called *"protocollon"* which mean a leaf of paper glued to a manuscript volume, describing its contents. A protocol can be said to be a description of a set of procedures to be followed when communicating. Protocols are to communication what programming languages are to computations. They can also be used to describe what grammar is to language. In information technology, Berners-lee (2006) described protocol as a set of rules that end points in a telecommunication connection use when they communicate. Protocols exist at various levels in a telecommunication connection. For example, there are protocols for the interchange of data at the hard ware device level as well as at the application program level.

Berners-lee (2006) stated that in the Open Systems Interconnection (OSI), there are one or more protocols at

each layer in the telecommunication exchange that both ends of the exchange must recognize and observe. On the internet, we have the TCP/IP protocols which comprise of:

i. Transmission Control Protocol (TCP), which is a set of rules to exchange messages with other internet points at the information packet level.
ii. Internet Protocol (IP), which makes use of a set of rules to send and receive messages at the Internet address level.
iii. Other protocols include the Hypertext Transfer Protocol (HTTP) and File Transfer Protocol (FTP), each being a defined set of rules used with corresponding programs elsewhere on the internet.

With this view above one can now say in this context that a Light Weight Directory Access Protocol (LDAP) is a set of rules that enables us to read and edit organized set of records, resources or information. This is to put it in the simplest of terms for easy understanding. Donelly (2008) asserted that LDAP is not a database at all, but a protocol used to access information stored in an information directory (also known as an LDAP directory). A more precise formulation might look something like this: "Using LDAP, data will be retrieved from (or stored in) the correct location within an information directory." LDAP is a standard, extensible Directory Access Protocol. It is a common language that LDAP clients and servers use to communicate. It requires a minimal amount of networking software on the client side, which makes it particularly attractive for Internet-based, thin client applications.

Tate (2009) remarked that LDAP is a simplified version of the DAP (Directory Access Protocol) protocol, which is used to gain access to X.500 directories. Tate (2009) further revealed that LDAP was designed at the University of Michigan in 2004 to adapt a complex enterprise directory system (called X.500) to the modern Internet. At this point you may be wondering what the X500 is. X.500 Directory Service according to Donnelly (2008) is a standard way to develop an electronic directory of people in an organization so that it can be part of a global directory available to anyone in the world with Internet access. X.500 is an overall model for Directory Services in the OSI world. Such a directory is sometimes called a global White Pages directory. The idea is to be able to look up people in a user-friendly way by name, department, or organization.

Furthermore, Davis (2008) stated that many enterprises and institutions have created an X500 directory, because these directories are organized as part of a single global directory you can search for hundreds of thousands of people from a single place on the World Wide Web. X.500 is an international standard for directories and full-featured, but it is also complex, requiring a lot of computing resources and the full OSI stack thus, making it difficult to run easily on a PC and over TCP/IP. Davis (2008) asserted that X500 is too heavy to support on desktops and over the internet, hence the need for a lightweight protocol. A lightweight protocol is any of a class of protocols designed for use on high speed internetworks, e.g. High-Speed Transport Protocol (HSTP), Xpress Transfer Protocol (XTP), and Lightweight Directory Access Protocol (LDAP). Lightweight protocols combine routing and transport services in a more streamlined fashion than do traditional network and transport layer protocols. This makes it possible to transmit more efficiently over high- speed networks, such as ATM or FDDI, and media, such as fiber-optic cable.

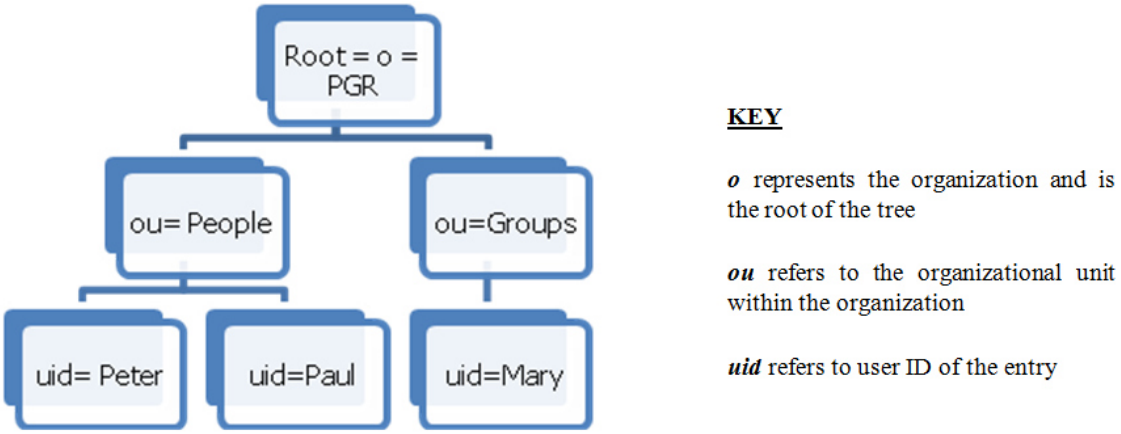
In support of Davis (2008), Michelle & Christian (2007) LDAP remarked that LDAP is considered to be lightweight because it is based on a simplified version of X.500 directories. Unlike X500, LDAP supports TCP/ICP (Transport Control Protocol/ Internet Protocol), which is necessary for any type of internet access. LDAP is an open protocol, and applications are independent of the server platform hosting the directory. However, LDAP is like X500 in the sense that it is both an information model and a protocol for querying and manipulating it. LDAP's data and name space model is essentially that of X500. The major difference is that the LDAP protocol is designed to run directly over the TCP/IP stack. The main thing about the X500 is that it defines a ***global*** directory structure. This means that anyone with an X500 or LDAP client may peruse the global directory just as they can use a web browser to peruse the global web.

Michelle & Christian (2007) clarified that LDAP as a protocol, does not define how programs work on either the client or server side. It defines the "language" used for client programs to talk to servers (and servers to servers, too). It can be used to access a standalone directory service or a directory service that is back ended by X500. The LDAP protocol is both cross-platform and standards-based, so applications need not to worry about the type of server hosting the directory. In fact, LDAP is finding much wider industry acceptance because of its status as an Internet standard. Vendors are more willing to write LDAP integration into their products because they do not have to worry about what is at the other end.

How LDAP Directory is Organized

According to Sybase (2004) the LDAP directory service model is based on *entries.* An entry is a single unit within LDAP directory. Each entry consists of attributes; the attributes are information directly associated with an entry. In LDAP, directory entries are arranged in a hierarchical tree-like structure. Starting at a root and branching down into individual entries. At the top level, entries represent larger organizations. Under them in the hierarchy might be entries for smaller organization and so on down. The hierarchy might end with people or

resources. Each entry is identified by a Distinguished Name (DN). A Distinguished Name consists of a name that uniquely identifies the entry at that hierarchical level (e.g. *Peter* and *Paul* and *Mary* are different user ID's that identify different entries at the same level) and a path of names that trace the entry back to the root of the tree.



Source: University of Michigan, 2004

The need for LDAP in Libraries and Information Centres in Nigerian Tertiary Institutions

The main benefit of using LDAP in Nigerian tertiary institutions libraries and information centres is that, catalogue of information from the entire library collection can be consolidated into a central repository. That is, LDAP can be used as a central directory that is accessible from anywhere on the network. LDAP makes for ease of access across platforms. To buttress this, (Donelly, 2008) said that *"Perhaps the biggest plus for LDAP is that your customers can access the LDAP directory from almost any computing platform, from any one of the increasing number of readily available, LDAP-aware applications. It is also easy to customize your library's internal applications to add LDAP support"*.

The researcher opined that LDAP can support a number of back-end databases in which to store directories. This allows administrators the flexibility to deploy the database best suited for the type of information the server is to disseminate. Hence, it has the ability to distribute servers to where they are needed. LDAP allows you to "locate organizations, individuals, and other resources such as files and devices in a network, whether on the Internet or on an institution's intranet," and whether or not you know the domain name, IP address, or geographic whereabouts. (Donelly, 2008). Unlike many relational databases, you do not have to pay for either client connection software or for licensing. Thus, in a way it saves cost. LDAP defines Permissions set by the administrator to allow only a certain people to access the LDAP database and optionally keep certain information private. Thus sensitive data can be protected from prying eyes. LDAP servers are simple to install, easily maintained and easily optimized.

LDAP Application to Library and Information Services in Nigerian Tertiary Institutions

Libraries and information centers play an essential role in meeting society's information needs. Its primary task is to select, maintain and provide access to relevant and representative information needs. Library information services can be said to be those activities that libraries and their personnel render to meet the information needs of their users. Due to technological developments, libraries are now moving from holdings ('just in case') to access ('just in time') strategies. LDAP is gaining much ground and increasing in its popularity because it is simpler and more readily to adapt to meet custom needs. One may ask "can LDAP be used in libraries?" To this I will say a big YES! This will bring us to the question of how it can be applied to library services. LDAP servers can be set to replicate some or all of their data, using simple authentication. This is very necessary to ensure that an individual has the right to use a resource. This is to provide a form of security for the library.

> According to Banerjee (2004), "*In a library context, though, the most important function of LDAP is to authenticate users. Many products such as catalogs, proxy services, or interlibrary loan software can use LDAP to see if an individual is authorized to use a resource*".

LDAP provides all personnel and applications in a library with a single, well-defined, standard interface to a single, extensible directory service. This makes it easier to rapidly develop and deploy directory-enabled applications. Thus, LDAP standard simplifies management of directory information. Its directory services also provide a database application for the holdings of a library thereby making it easy for a user to access the library's collection. In a way one can say that it has the ability to provide indexing services for library users.

LDAP directories are designed to support a high volume of queries, however the data stored in the directory does not change often. This can be used for search purposes when looking for needed information in the library. It can be used for Current Awareness Services (CAS) and Selective Dissemination of Information (SDI). A library with its patrons contact list and information needs can easily send messages to the patron when it gets

new resources on the information needs of the patron.

Conclusion/Recommendation

An LDAP directory can be distributed among many servers on a network, then replicated and synchronized regularly. An LDAP server is also known as a Directory System Agent (DSA). Libraries in Nigeria can make use of this platform for sharing of resources. Libraries in Nigeria can create a virtual private network (VPN) and use LDAP for authenticating users. Libraries in Nigeria can integrate Remote access server (RAS), Web server, mail server can use LDAP for interlibrary loan and sharing among themselves. It can also be used as a directory for all libraries and information centres in Nigeria.

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