

E-resources sharing through Linux based Virtual Private Network (VPN): a case study

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Mahatma Gandhi University Central Library has established an SSH-based VPN (Virtual Private Network) service to share e-resources with off-campus libraries. The VPN service ensures seamless access to e-resources to the academic community at off-campus departments and Study Centre libraries. Extension of e-resources access to off-campus has increased the usage of electronic resources subscribed by the university. The article presents the first-hand experience of establishing Open Source based VPN service in a university environment.

Keywords: e-Resources; Resource sharing; Virtual Private Network

Introduction

Information resources, especially scholarly literature, are vital for education, research and development activities. The expression of Isaac Newton, "If I have seen further, it is by standing on the shoulders of giants"¹ confirm the significance of scholarly literature in on-going education, research and development activities. Providing seamless access to electronic resources (e-journals, e-books, bibliographic and full-text databases) to off-campus locations and users is an important task of the libraries. Accessing these electronic resources from off-campus locations is generally an issue and more so, where connectivity is poor. Education institutions make use of Virtual Private Network (VPN) service to enable access of the e-resources at off-campus locations.

Universities and colleges in India access e-resources mainly through e-ShodhSindhu consortium coordinated by UGC INFLIBNET. e-ShodhSindhu offers 15000 peer-reviewed journals and a number of bibliographic databases². Universities and colleges receive e-ShodhSindhu services in campuses mainly through IP-based access. IP-based access is a convenient method to make available e-resources in campuses with well-connected Local Area Network.

There are four study centre libraries located in as many colleges, in two districts that are away from the

main campus where the Mahatma Gandhi University Library is located. In addition to these four study centre libraries, a few university study departments are also located outside the university campus. Although the study centres and departments maintain their own network infrastructure and they were not in a position to access e-resources available in the main campus. The university library established the VPN service at off-campus centres to extend the access of e-resources.

Mahatma Gandhi University Library team reviewed available technological solutions suitable for the delivery of e-resources to the off-campus study centre libraries and departments. The team found that the popular e-resources sharing methods such as proprietary VPN solutions and IP-based access followed by other higher education institutions are not feasible in terms of cost and technology adoption. As the Mahatma Gandhi University Library and study centre libraries own good IT infrastructure, in-house manpower and have the experience in managing open source software, it was decided that SSH-based VPN is suited for the sharing of e-resources in terms of cost and convenience in the context of Mahatma Gandhi University Library system.

Mahatma Gandhi University Library

Mahatma Gandhi University is a state university established in 1983 in Kottayam district of Kerala

state. The library system consists of a central library, twenty-two departmental libraries and four study centre libraries. Two study departments and four study centres and their libraries are located away from the main campus. Mahatma Gandhi University Central Library serves 7597 users that include faculty members, research scholars and students from study departments and affiliated colleges. The public can also avail the library services under the Graduate Public Membership programme.

Resources and services

The university library system houses a collection of 1,94,414 books, 226 journals, 2,408 theses and 7,500 bound volumes of journals³. Mahatma Gandhi University Library is a member of the e-ShodhSindhu consortium and the academic community can access e-journals and online databases. In addition, the library has licensed or purchased e-resources including e-journals, databases and e-books based on the demand of the academic community (Table 1).

Mahatma Gandhi University Library has also developed a few in-house databases. Periodical section of the library has developed 'Kerala Studies Collection' in which index and full text of scholarly output of Kerala related studies are available. The Electronic Theses and Dissertations (ETD) section of Mahatma Gandhi University Library has archived MPhil dissertations from various study departments. A Dspace repository of MPhil dissertations has also been made available in the campus LAN. The periodical section of the university library maintains an article index called 'Journal Article Index' and it is being updated regularly. In-house developed databases are accessible only in the campus. The library maintains an online theses repository (www.mgutheses.in) to archive PhD theses and simultaneously also contribute to the Shodhganga repository of INFLIBNET. Mahatma Gandhi

University Library had received the e-Governance award of Kerala in 2010 for excellence in electronic theses archival project⁴.

Access of resources

Mahatma Gandhi University Central library and departmental libraries in the main campus are connected using campus local area network. Wi-Fi access is available in the Central Library and all department libraries. E-resources are made available to the users in the entire campus network using IP detection. Therefore, no individual website login is required to access the e-resources. Mahatma Gandhi University Library system uses Koha software for library housekeeping operations. A single instance of Koha has been deployed for the central library and all department libraries and this online union catalogue (<http://mgucat.mgu.ac.in>) is available on the Internet and is helpful for the users to know the availability the library resources.

Review of literature

The literature on ICT in libraries shows that university libraries in Kerala have a fairly good ICT infrastructure. Funding provided by the University Grants Commission is a contributing factor for the well-equipped IT infrastructure in university libraries⁵. Libraries of central government-owned institutions maintain good infrastructure and ICT facilities⁶. However, ICT infrastructure alone can't help the libraries to offer all the required services to the academic community. Availability of library professionals who can manage IT-based library services are required. A few studies have reported that LIS education in India is not fully geared up to provide candidates to fill the positions in libraries with ICT oriented services⁷⁻⁹.

There are many ways institutions can connect with each other by using network technologies. VPN is a popular network service to share e-resources to off-campus academic community. Jiaqin¹⁰ describes the implementation of Shanghai Library Remote Access to E-resource Service using SSL VPN. Proxy software is a very popular remote access tool and Guangfeng¹¹ compares three popular proxy software to check it's suitability for off-campus access to e-resources. Dan¹² describes how to use Web Access Management(WAM) system to provide remote access to licensed E-resources.

Table 1—Licensed e-resources

E-resources	Number
E-journals	350
E-journal archives	320
Online databases	3
E-books	7338

EZproxy is a very popular remote access facilitator tool from OCLC. The user authenticates with EZproxy using username and password. The system provides access to subscribed electronic resources after the user verification. EZproxy has the ability to work with different user authentication systems used by institutions. EZproxy has both locally hosted and security-enhanced cloud-based versions¹³⁻¹⁴.

A survey organised by Covey reveals that the existing technologies to connect off-campus users and library resources are problematic and the users are not satisfied. Shibboleth is a new alternative for the user authentication and obtaining secure access of e-resources. The convenience with Shibboleth is that it uses the campus's local authentication system to verify the identity of users. There is apparently no need to remember different user IDs or passwords¹⁵.

Higher education institutions in India access e-resources through E-ShodhSindhu consortium maintained by INFLIBNET, Ahmedabad. INFLIBNET Access Management Federation (INFED) has adopted Shibboleth for the remote access of e-resources. The Shibboleth-based INFED service would serve the remote access need of 6000 colleges and 180 universities¹⁶⁻¹⁷.

From the foregoing, it is seen that libraries make use of different services and tools for remote access of e-resources. Very few case studies are published on Open Source tools for remote access of e-resources in the context of developing countries. Virtual Private Network based on Open Source tools are a cost-effective and secure choice for the remote access of e-resources with service longevity. Reporting of such a case study can be beneficial for libraries to implement this solution.

Objective of the study

- To describe the method of establishing a virtual private network using open source software;

Implementation steps

In 2016, Mahatma Gandhi University Library adopted VPN (Virtual Private Network) to share e-resources with off-campus centres and department libraries. VPN is a popular technology among computer networking professionals to establish an encrypted connection to access applications and resources for the purpose of corporates¹⁸.

Infrastructure required for VPN service

A basic server class computer is required to act as Linux based SSH server. The approximate price of the server computer is Rs. 70000/-. Fortunately, Mahatma Gandhi University got the help of a Linux expert and with the guidance of him, library staff prepared the system for VPN server. The library staff familiar with Linux operating system.

Following are the main stages of the VPN implementation at Mahatma Gandhi University Library system:

Establishment of VPN server

A Linux VPN server is the main component of the resource sharing channel. VPN is a network service which helps to "establish a secure connection over the non-secure Internet"¹⁹. VPN establishes a private channel between computing devices located at two distant places and share data across a public network like the Internet. Various tunnelling protocols and encryption techniques make use for remote access authentication in VPN. Mahatma Gandhi University Library adopted Secure Shell (SSH) protocol to establish an encrypted tunnel. OpenSSH server utility in Linux facilitates secure and encrypted communication tunnel¹⁹. Data transfer happens through the SSH tunnel between remote computers. The VPN server that resides in Mahatma Gandhi University Library serves the resources to connected libraries. User account and password created for each study centre libraries to login to the VPN server.

Preparation of client computers

A client program installed in Ubuntu Linux PC in study centre libraries and Proxy details add in the web browser. Library staff in off-campus libraries login to VPN server from the client computer. After successful authentication user can open web browser to enter into e-resources websites.

Training and support

Library staff at off-campus libraries have received training in the preparation of client computers for VPN. On the spot-training includes demonstration and hands-on training on the installation of Ubuntu Linux operating system, use of Linux desktop and command terminal. Remote desktop sharing tool has installed on the client computer for remote technical assistance.

Mahatma Gandhi University Library successfully initiated VPN service in 2016. Usage of e-resources has increased after the implementation of VPN service at Mahatma Gandhi University. Importantly, Mahatma Gandhi University saved some money too by opting for the the open source solution.

Conclusion

VPN service has been found to be useful to access e-resources in educational institutions. To implement a cost-effective system, expertise in Linux operating system is essential and therefore, training on Linux is essential for library professionals.

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