

## OPEN DIGITAL LIBRARY, IMPLEMENTATION IN OPEN EDUCATIONAL PERSPECTIVE

Sushan Dhakal

Department of Computer Science and Engineering, Kathmandu University.

Corresponding Author E-Mail: sushan@ku.edu.np

### ABSTRACT

This paper focuses on the use of Open Digital Library in present educational scenario and the technical description of the architecture. The paper is based on the research and the development done in the Digital Library Research Lab using OAI-PMH and Php based harvester. The paper is presented with the flavor of Foss and Educational Theme.

**KEYWORDS:** Digital Library, ODL KUDL, FOSS, OAI-PMH, data object, Metadata, DC.

### INTRODUCTION

*Digital Library:* Digital Library is the electronic library where all the documents to be studied are in the electronic form. As such DL can be placed at the intersection of library science, computer science, and networked information systems.

All the literature to be studied i.e. data objects are stored in a repository as the books are stored in the Library. As the books required are searched with the help of index cards, over here the literature is searched with the help of metadata. Same as being the member of Library to read the books, you have to be the member of the DL to be able to access the literature desired.

Open digital library in foss education theme: The term “open” is used in the architectural perspective – defining and promoting machine interfaces that facilitate the availability of content from a variety of providers. “The term Openness does not mean “free” or “unlimited” access to the information repositories that conform to the OAI-PMH. Such terms are often used too casually and ignore the fact that monetary cost is not the only type of restriction on use of information – any advocate of “free” information recognizes that it is eminently reasonable to restrict denial of service attacks or defamatory misuse of information.”[1]

The topic for presentation has Foss & Education Theme. The Digital Library is a tool for learning. This educational tool is implemented with the open architectural perspective provides it a FOSS and Education Theme.

### *Why open digital library?*

- If there is a single copy of the literature in the Library then only a single user can use. In open DL numerous users can download the same data object at the same time.
- The printed copy of the literature is often expensive, unaffordable to the general students of the developing countries. ODLs can solve the problem by giving e access.
- Often the Libraries of the developing nation are limited in the literature they possess. But in ODL the same literature can be searched in all the repositories connected to it.

- As such even the e-prints available in the libraries of Foreign University can be available.
- No time limitation. Any time the resource is available.
- Preservation of rare literature.

### ***Motivating scenerio***

Mr. Suresh Dhakal is a student who wants to do some research in “Ancient monuments of Nepal”. But the problem is those precious monuments are not easily available. Even if they do, they are in single form which is hard to be possessed for study. Now in the presence of Open Digital Library, he can search the e-prints of the monuments in the repository of the concerned body. Even if the required literature is not present in one repository, he can make a multiple search in repositories of TU, KU, international museums. Ultimately he finds the desired literature in one of the repository. He downloads the required e-prints and completes his desired study.

The discussed scenario shows the simplified procedure of Education. The process simplifies the process of going to individual organization, searching the records and getting the precious copy.

### ***Essence of openness in odl, multiple search***

The architecture of ODL is based on Multiple Search. In simple word, the user can search for the same literature in multiple repositories at the same time. This inherent nature has brought the essence of Openness. For example, a student of KU has access to the Library of KU. But there is not much possibility that she can get every thing she need for research in KU Library itself. As such, if she could have access to the digital resource of external university, it could be a great help to her. The ODL has the provision once the repository and interface is registered in the Openarchievs.org, all the members’ repository and interface can have the access. This is how the essence of Openness is justified in Education sector.

### ***Protocols available***

Some of the protocols available for development of DL are Z39.50, OAI-PMH, VIDI, SLDP etc. Each protocol has been devised to address particular scenario. In our scenario, where the literatures are limited and further extension is to be targeted, OAI-PMH emerges as better solution.

Similarly, a lot of harvesters are available for harvesting the metadata. These packages are open source and have been developed in Php, Java and Perl. For our case, we have taken Php based Open Source package “oai 2” for harvesting.

### ***Oai-pmh, a short introduction***

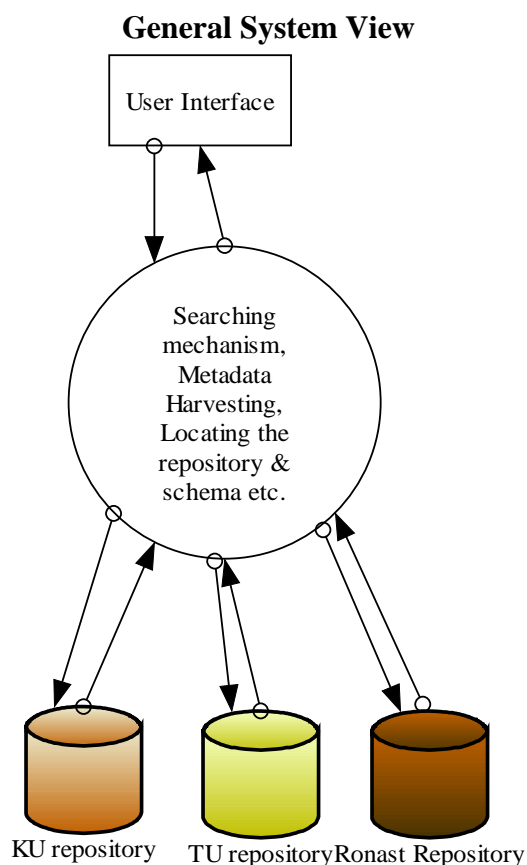
OAI-PMH stands for Open Achieves Initiative For Metadata Harvesting. “The Open Archives Initiative develops and promotes interoperability standards that aim to facilitate the efficient dissemination of content. The Open Archives Initiative has its roots in an effort to enhance access to e-print archives as a means of increasing the availability of scholarly communication.”[5]

The OAI Protocol for Metadata Harvesting supports a system of interconnected components, where each component is a DL. Also, since the protocol is simple and is becoming widely accepted, it is far from being a custom solution of a single project. The OAI protocol can be

thought of as the glue that binds together components of a larger DL. However, since DLs are themselves defined only loosely, this collaborative system could be composed of individual component DLs, each with different functionality. In the extreme case, each component DL could supply the functionality of exactly one (part of a) service expected by a user. The term *achieve* is used to mean repository in scholarly papers.

### ***Architecture of kudl prototype***

For the development of prototype for Kathmandu University, the architecture and the design followed can be discussed as follows:



### ***The Two Providers***

In the KUDL Metadata harvesting model, there are two types of applications: *data providers* and *service providers*. Data providers are the archives of digital content, and are referred as repositories. Repositories expose metadata about their content using a simple, well-defined interface specified in the OAI-PMH. Service providers are applications that interface with a repository in order to retrieve metadata about the resources contained in it. Service providers can be any type of application or information system. In our prototype web based User Interface and XML parser comes under service provider. [2]

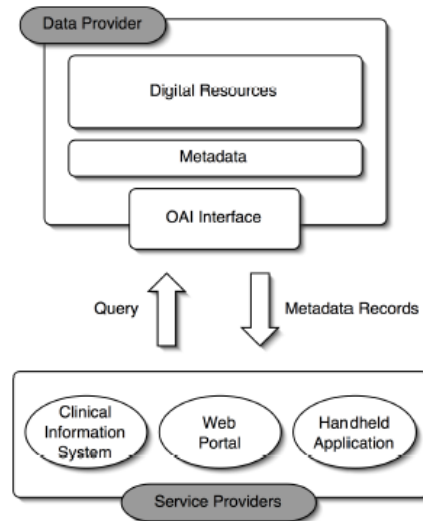


Fig: A layered representation of Data and Service provider.

### Software Architecture

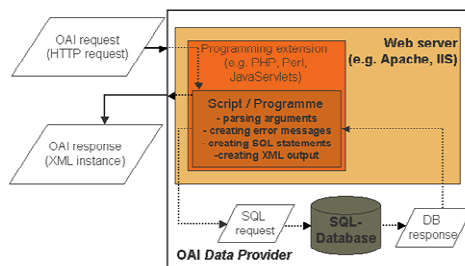
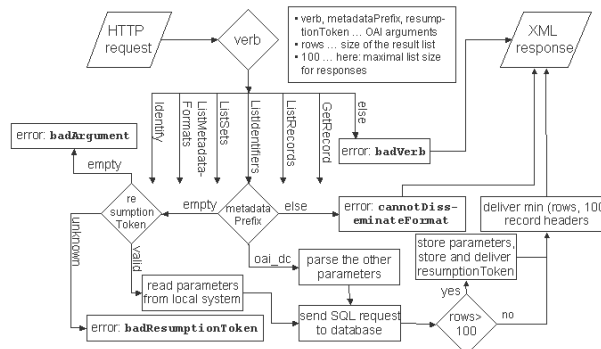


Fig: Architecture of KUDL ( same as the case of ODL in OAI-PMH)

### Flow Chart



### Metadata

Metadata in its broadest sense is data about data. The familiar library catalogue record could be described as metadata in that the catalogue record is 'data about data'. Similarly database records from abstracting and indexing services are metadata (with a different variation on location data). However the term metadata is increasingly being used in the information world to specify records which refer to digital resources available across a network and this is the definition used within this paper. By this definition a metadata record refers to another piece of information capable of existing in a separate physical form from the metadata record itself. [3]

It is required for basic interoperability and is stored in database. There are many types of metadata like Dublin Core, MARC, and SPECTRUM etc. OAI-PMH supports Dublin Core (DC). As such, the DC is used in the development of KUDL.

Dublin Core possesses 15 different elements and a flexibility to customize as per the need of the domain. The basic elements of DC are: Title, Creator, Subject, Description, Publisher, Date, Contributor, Type, Format, Identifier, Source, Language, Relation, Coverage and Rights. [6]

### **Request types**

The six verbs used for the general operation of KUDL are Identity, GetRecord, ListRecords, ListIdentifiers, ListSets, ListMetadataFormats.

*Further development:* The Open Digital Library can be further developed. The research can be directed towards inclusion of semantic search in the repository. Similarly, for the implementation of OAI in Visual System, research is ongoing in VIDDI (A Lightweight Protocol Between Visualization Systems and Digital Libraries)[7]. For development of robust multiple search, implementing z39.50 seems favorable.

### **CONCLUSION**

The KUDL developed as a Open Digital Library has initiated the process of Openness in the education sector of Nepal. A lot of work in R&D has still to be done in this sector. The Research Lab on the topic of Digital Library and Multiple Search has already been established in Kathmandu University for this purpose.

### ***Furtther Reading:***

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