Architectural Components of Digital Library: A Practical Example Using DSpace

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Abstract: *Information communication technology has brought out changes in the field of digital library in handling digital library services. An electronic library is a focused collection of digital objects include text, visual, material, stored as electronic media formats. In this paper highlights technological architectural components, how the digital library software works, flow, and handle with various tools to carry out the digital library in a defined purpose and also paper highlights the technological understanding and issues involving in creating digital library.*

Key words: Digital library, architecture, system, DSpace, Open Source.

1. Introduction

Digital library is a very complex system. It is an integrated system that allows gathering, cataloging, storing, preserving, protecting and retrieving information at right time to the right user. It gives service like a physical library serve. Digital libraries provide user document with a systematic way to focus collection of digital objects that can include text, video, numbers stored as electronic media formats along with means for organizing, storing, retrieving the file and the other media content in the library collection.

2. Digital Library Components:

In the advancement of information retrieval, the systems to retrieve of any document require advanced level tools. In the field of digital library the emergences of open source software has playing major role in the field of digital object. DSpace is one of the open source software to adopt in the library and the information centers to carry out digital library

activities. Digital libraries furnish information to the user but it not in a simple way. The workflows of digital libraries are conduct with mainly four steps. The components of workflows are

1. User Interface
2. Repository
3. Handle system
4. Search System

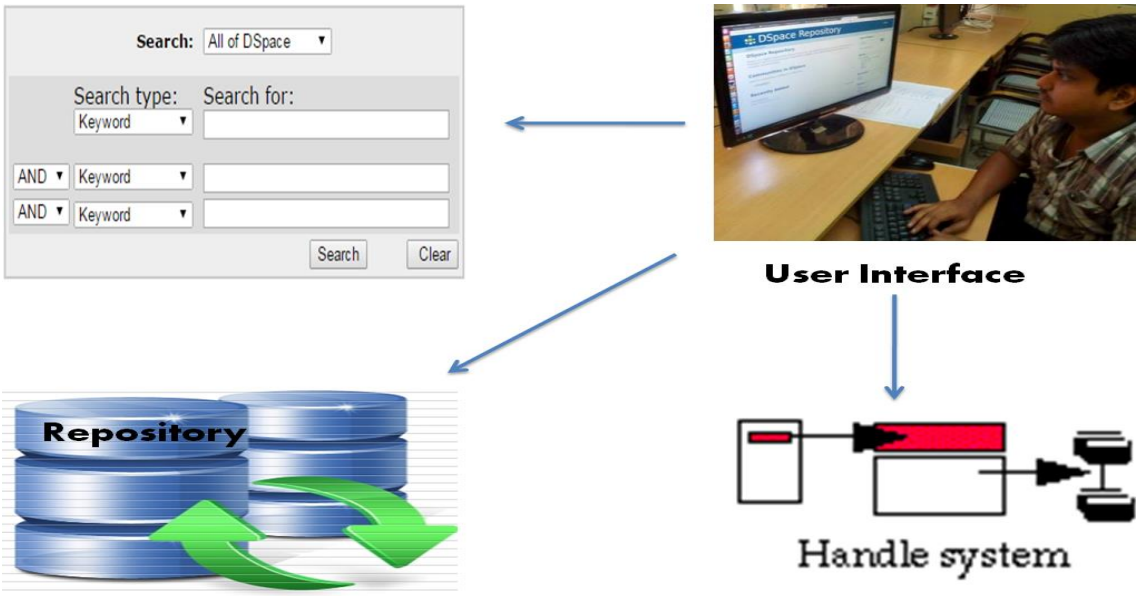

Fig 1: Major system components of digital library

How the components are work together and help user to retrieve the information we will know from one by one with practical discussion.

2.1 User Interface

User interface is the design of computers, appliances, machines, devices and software application focus on the user experiences and interaction .The goal of a good user interface is to connection between user/patron and the machine which provide valuable information. A digital library must provide a single point of access like portal to a huge quantity of digitized information that is available to a diversity of kind patrons with a different psychological, academic, social backgrounds and information needs over Internet. User interface of a digital library has two roles, one for the end-user and another for the Librarians. The end-users and

even a user from remote area will be able to access the same user interface of the library and its collection and another user interface for the librarians and administrators who manage and build the collection.

2.1.1 User interface designing principle:

The principles of user interface to designed to improve the quality of user interface. All the user of digital library is not equal psychology to access the information from the interface. By considering the various patron requirement, the designers has to follow the designing principle that are discuss below-

i. Simple- The digital library user interface should be simple and straightforward. A well organized simple user interface can easily provide the information that a user want.
ii. Access- The digital library user interface should provide full access facility to the user.
iii. Familiar- The user interface of a digital library should be familiar with the patrons. Users should not have to learn new things to access the interface.
iv. Prevent Errors- The user interface should be designed in such a way that patron can't make errors. The interface should provide technique to detect the error and give simple instruction that user can understand.
v. Multimedia Support-In the present day, digital libraries are not only offers the textual information but also multimedia information. So, user interface should support the multimedia information.
vi. User Profile- Digital Libraries are offering the user profiles in order to serve valuable services like SDI. The User Interface must act according to the settings specified in the user's profile and the settings should be changeable from time to time by the users.
vii. Multilingual Support-Now days, most of the digital library offers the information that are not in one language. So, user interface should support multilingual support.

2.1.2 Practical implication

In practice real world digital library system or collection of loosely coupled services made to appear integrated when accessed via a library website or repository sites. Some of the examples or listed in this paper to understand the digital library components and applications

and many other distributed across the internet. West Bengal Public Library Network offers their digital library

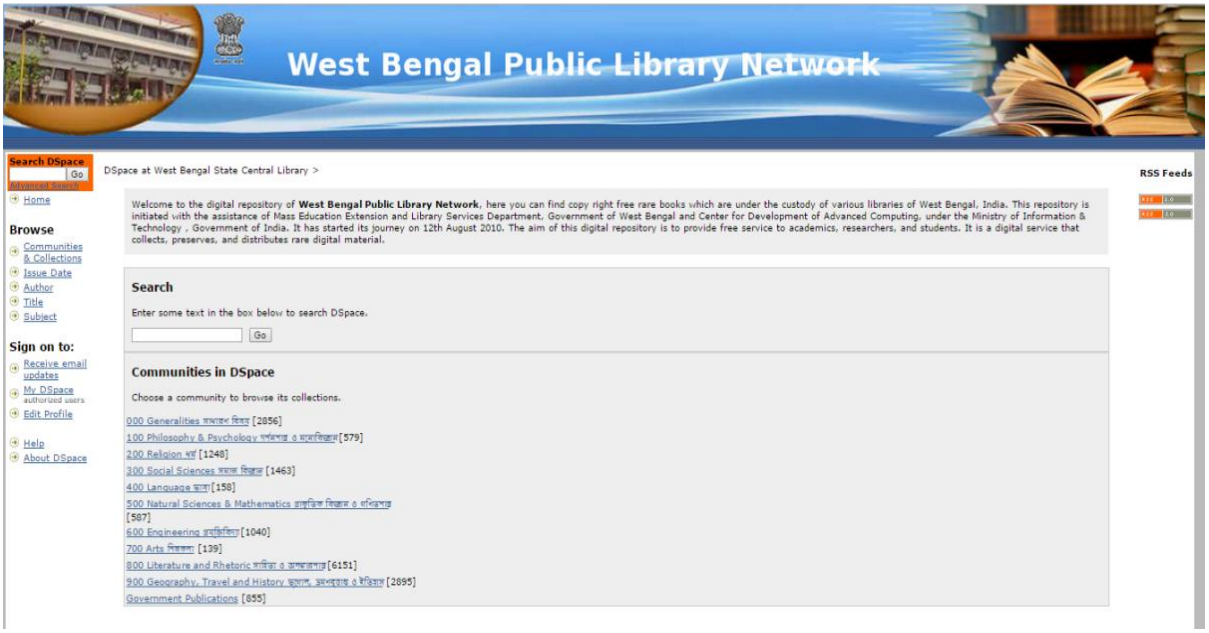

Fig 2: WBPLN User Interface

through DSpace software. This user interface follows all the principle that we discussed previously. The defining the role of digital library is a essential to incorporate the concept of implication. It should address problems making use of data in system design, language, process and model. The collaboration is a significant in which to achieve their goals. The context of use mostly interfaces of the system rather than determining how information needs could be met by using the functions by the system. The library staff on the help desk are not generally experts they need of range of skills and manage to help domain knowledge that would have led to a more rapid solution of the problem. Information searching is more complex than just deciding what user wants, working out the right query to compose and retrieve that in right way. Finally the finding of the above issues investigating the development of interfaces and functionalities to meet the needs identified user friendly.

2.2 Repository

In general, repository refers to a storage location and often for preservation. In digital library, repository stores digital contents and its metadata. The interface to repository is called the Repository Access Protocol (RAP).

2.3 Practical Example:

How to store in a Dspace repository, now we can understand with the screen shoots.

Step 1- Storage location- Select storage location under a community.

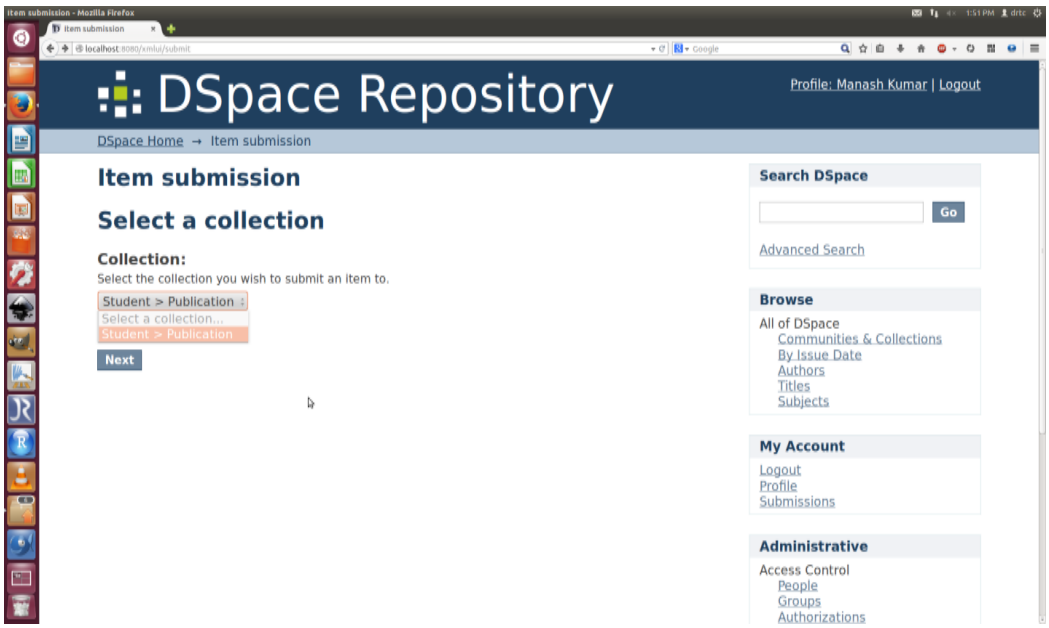

Fig 3- Submission of document

Step 2- Describe item- Describe the details of the document.

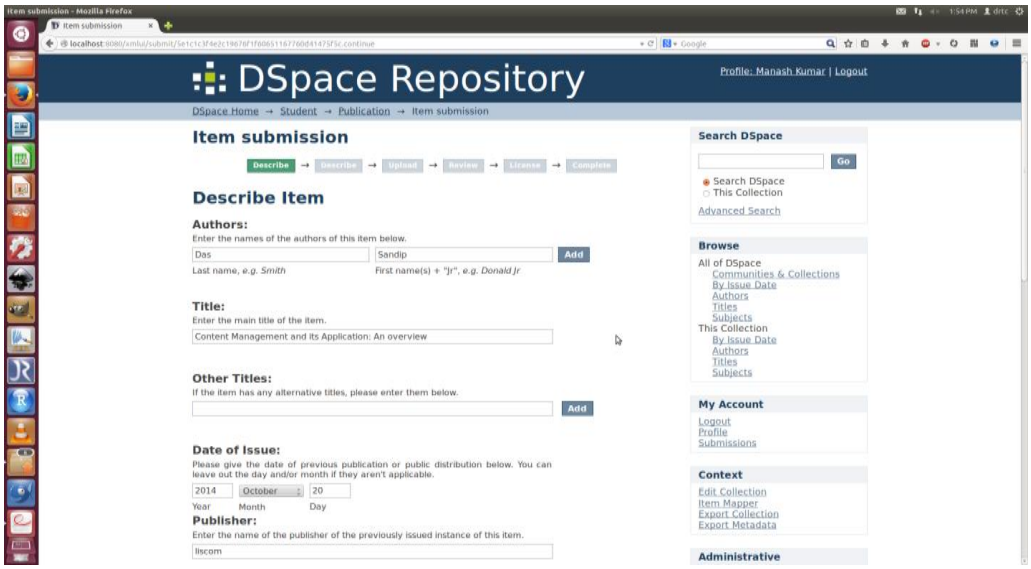

Fig 4- Submission of document

Step 3- Describe items- Give the keywords and Abstract of the document.

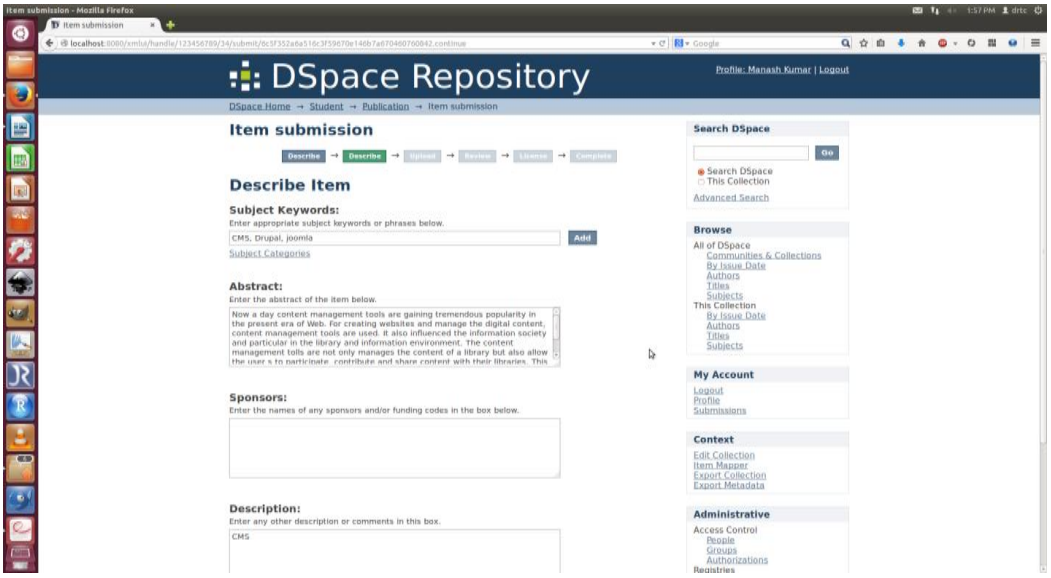

Fig 5- Submission of document

Step 4- Upload file- In this stage, upload the document.

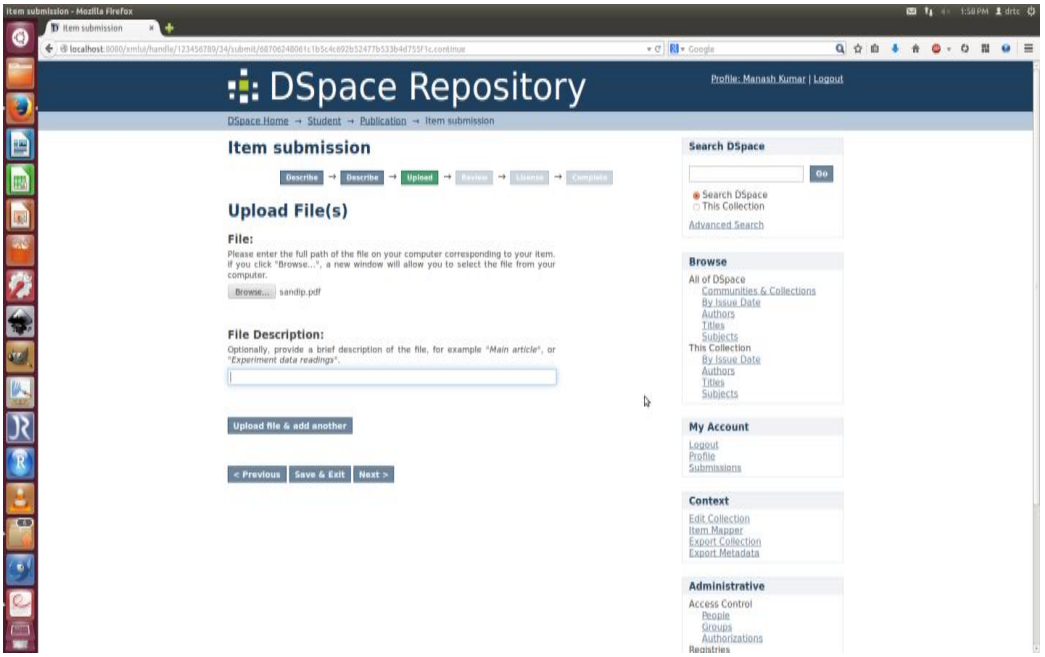

Fig 6- Submission of document

Step 5- Review Submission- check whatever you provide for the document.

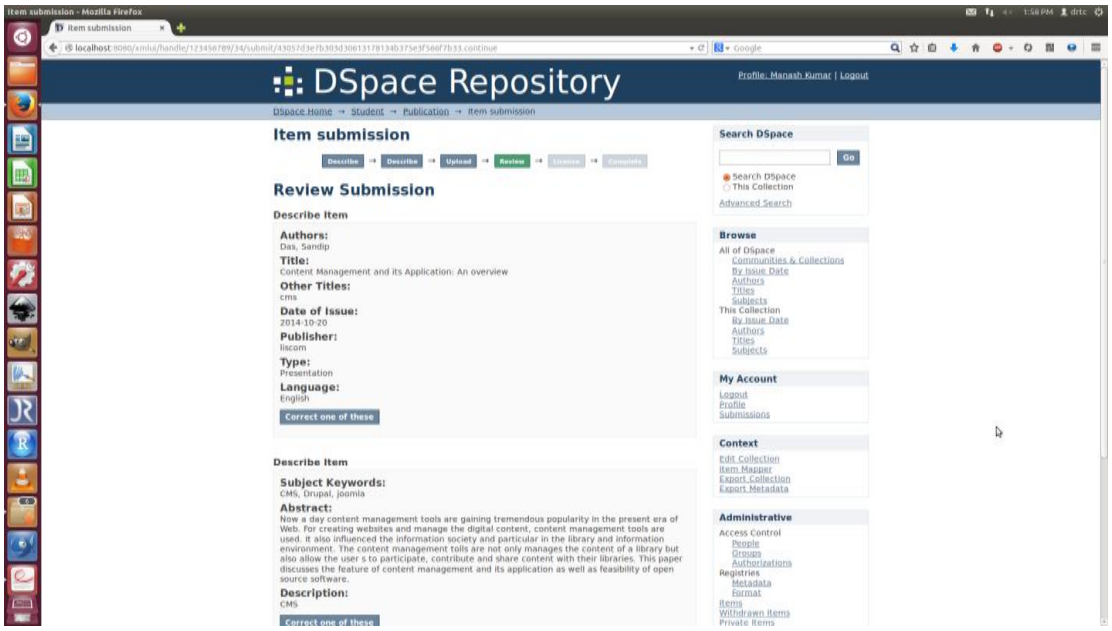

Fig 7- Submission of document

Step 6- Distribution License- Read the instruction about copyright and agree the license.

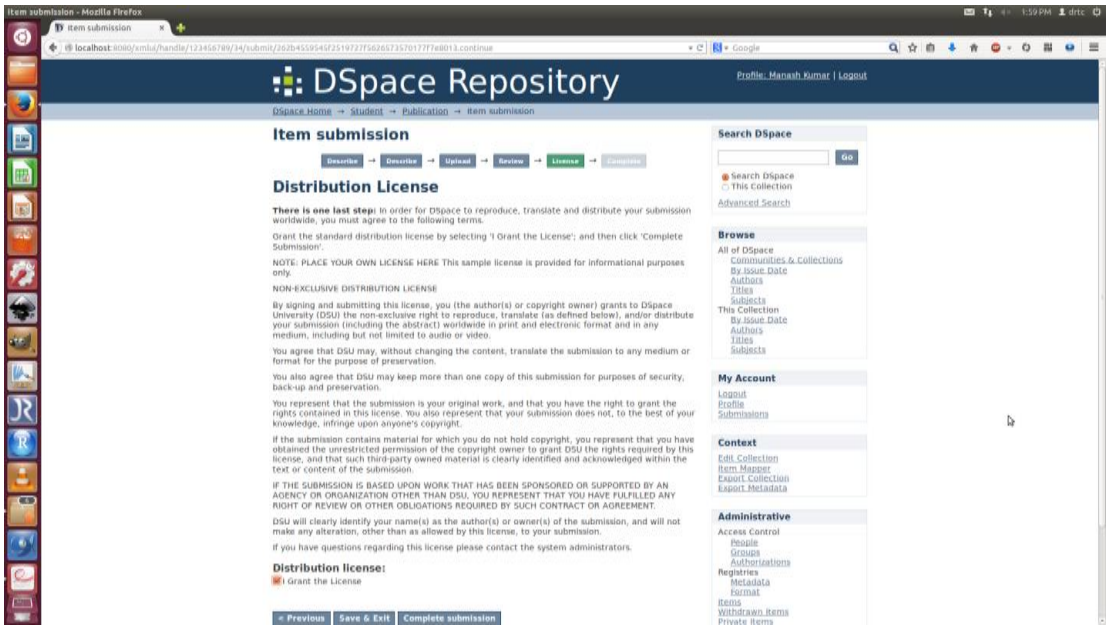

Fig 8- Submission of document

Now user can accessed the newly submitted document

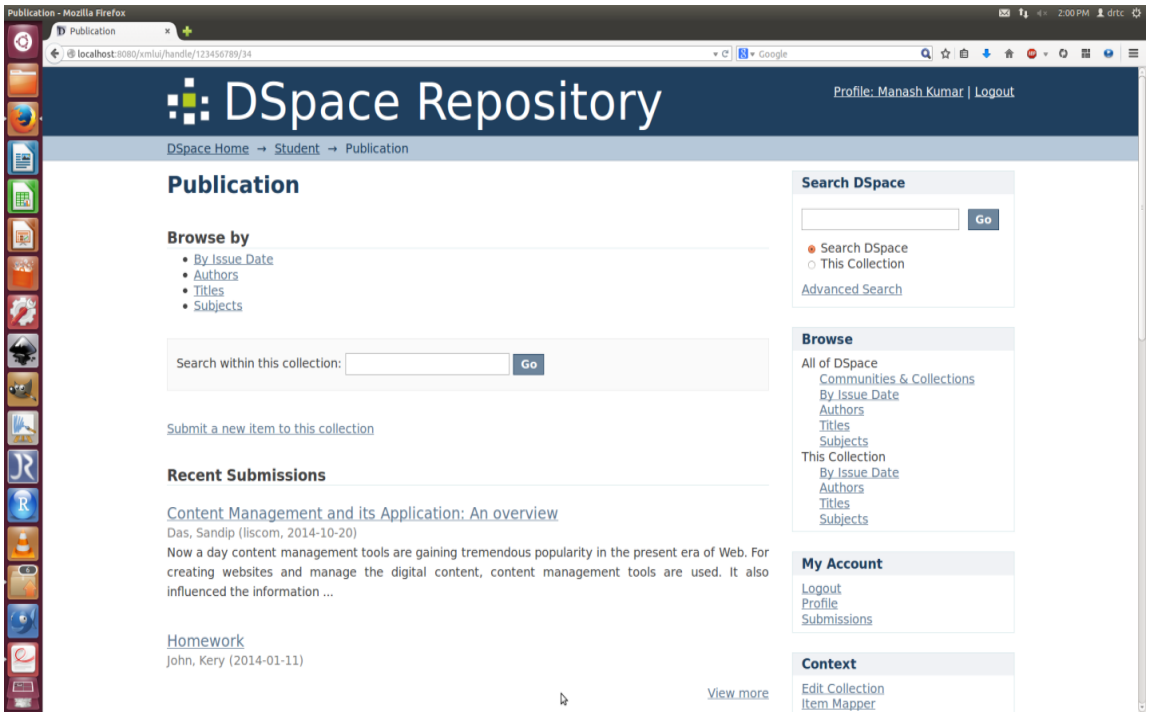

Fig 9- Recent document

3. Handle System

The most common way of locating anything in the earth is by name. Same technique is being followed by libraries to locate and retrieve any document. Library allocates call number and accession number to each document so that the document can be easily located and retrieved when needed. In this way, digital resources should have unique locator or identifier to retrieve from the web environment. Just like ISBN for books and ISSN for journals, Handle systems are for the identifier of any digital contents over long period of time and to conduct the stored in any repository and databases. Handle system consist of two parts: it's naming authority and a unique local name under the naming authority.

handle/1989/21

In this 1989 is naming authority and 21 is the item identifier.

Practical Example: It is INFLIBNET digital library (fig-10), we see the http://hdl.handle.net/1944/100.

In this, 1944 is the naming authority assigned by handle system to INFLIBNET digital library, followed by the unique local name (or item identifier i.e. 100) assigned to a

document in the repository. The naming authority identifies the administrative unit. Here INFLIBNET is the administrative unit.

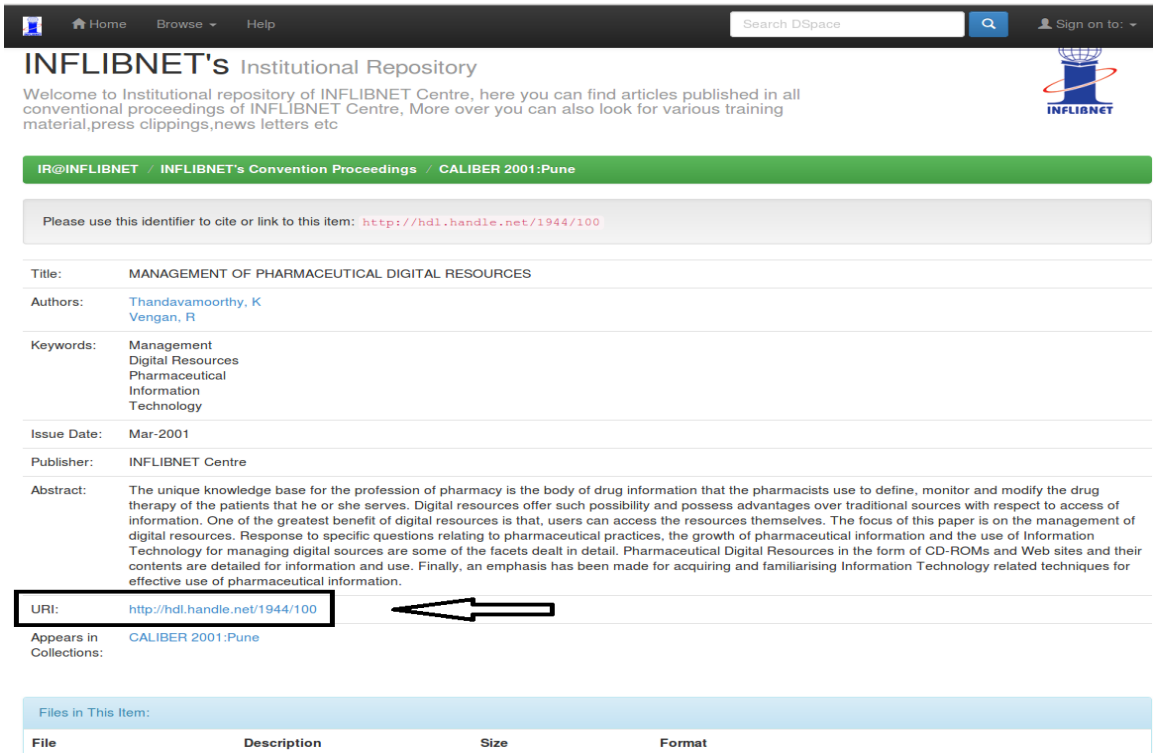

Fig 10- Handle system

4. Search System

Search system is a software system that is designed to search for information on the World Wide Web, the search system results are generally presented in the line of results often referred as search system. The information may be a mix of contents; type of files, directories also maintains real time information running an algorithm on a web environment. The first tool used for searching on the content or topic on the topic was archive. In this study the DSpace software using Lucene search engine to search the documents in effective manner. Lucene is a free and open source toolkit for text indexing and searching. It is the one of project of Apache Jakarta. It was developed by Doug cutting during 1997.

4.1 Browsing and searching in DSpace

In this section we will discuss about the browsing and searching facility in DSpace.

4.1.1 Browse in DSpace:

Browse allows you to access the list of items in some specified orders. DSpace allows you to browse through

- By Community/Collection,
- By Title,
- By Author,
- By Date and
- By subject

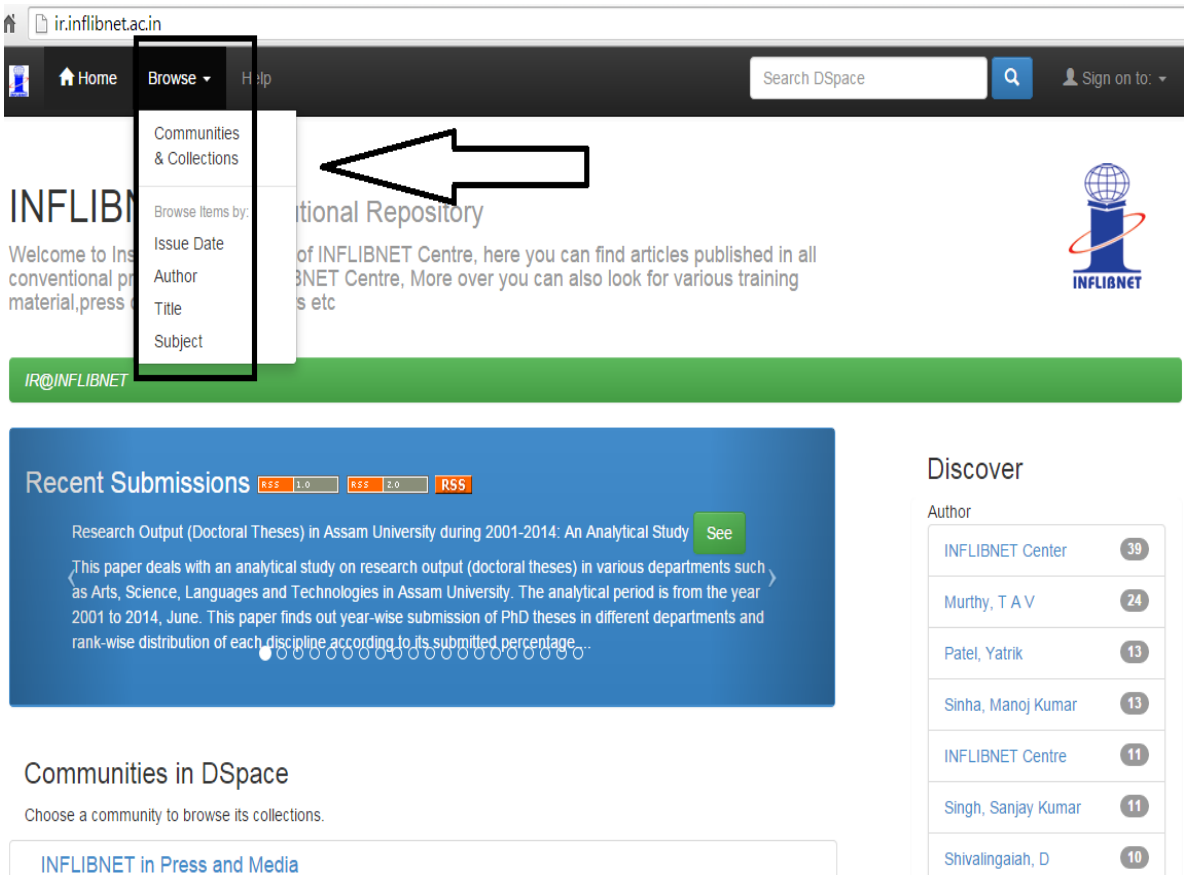

Fig 11- Browse facility

4.1.2 Searching in DSpace:

To search in DSpace repository, use the search box at the top right position of interface (see Fig-12). The query words you enter in the search box, it will be search against the Title, Author, Subject and Date of each item records.

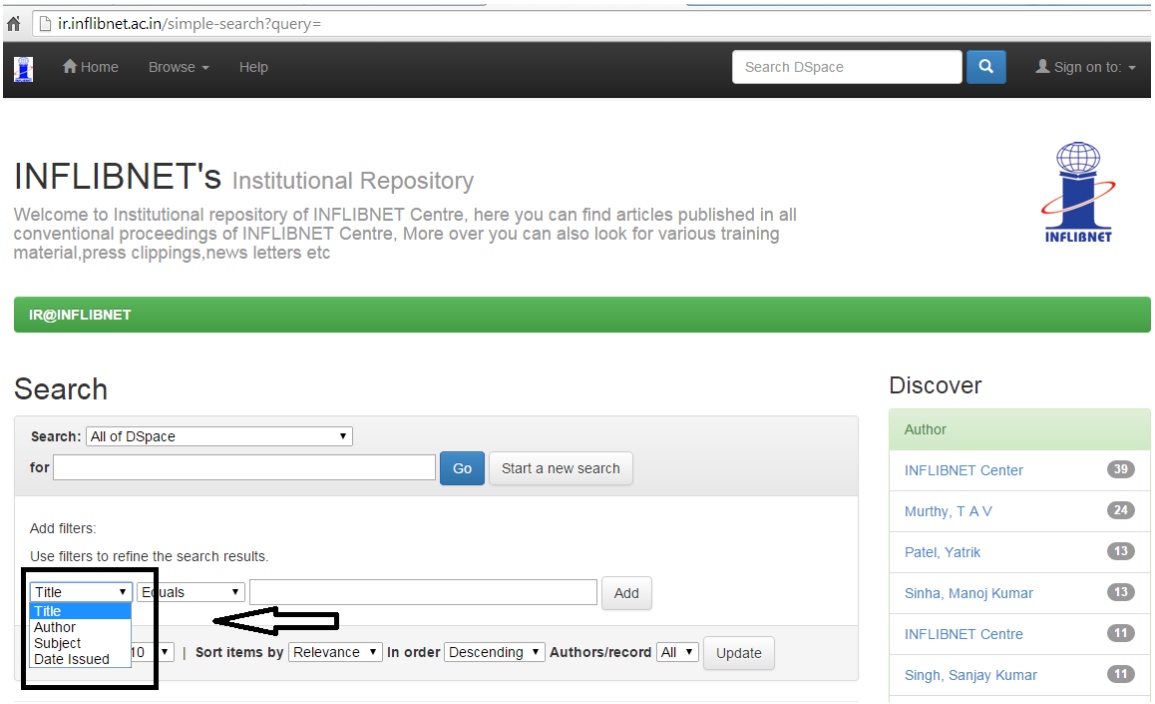

Fig 12- Search Facility

5. Current Trends

Recent literatures on developments in the repository software including the benefits possible obstacles including setting digital library software. The policy makers and designers have to look into the problems and crucial difficulties in implementing repository software. In spite of all the obstacles to successful implementation, including associated negative preservations repositories have been increasingly recognized as vital tool for scholarly communications and important sources for institutional visibility and viable communication tool for knowledge management. The update-ness of this software is taking place timely with the group of people comprising technology, edition and patches and the current version of DSpace 5.0 is releasing in the month of November 2014.

6. Conclusion

In the conclusion the components for digital library software constructed from various modules connect to users with connect content collection building upon OAI-PMH to get to the metadata and then the data. It shows any modules requires systematic architectural components to workflow, integrity, interoperability and user interface design is very important in any digital library software to get input from other sources in similar passion to harvest and to provide data.

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