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Technical Aspects of Managing a Large-Scale ETD Repository - Insights from Shodhganga

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Introduction

Due to technological advancement in recent years, Electronic Theses and Dissertations (ETDs) are becoming increasingly popular.

On the other hand, due to the complexities associated with it, managing and maintaining large-scale ETD repositories is also becoming a challenging task.

The paper highlights the challenges involved in managing large scale ETD Repository

It also presents **innovative and effective solutions** to address the challenges.

Introduction

The paper highlights the challenges like

Platform and
Technology
Selection

Software
Customization

Workflow
Orchastration

Quality
Control

User
friendliness,

Performance
Optimization

Security
measures

Redundancy
and backup
strategies

Shodhganga

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a reservoir of Indian theses

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 Malayalam 662
 Kannada 1228
 Oriya 1128
 Tamil 5252
 Hindi 14053
 Sanskrit 7620
 Marathi 1723
 Urdu 1236
 Bengali 2137
 German 34
 Arabic 643
 Pali 556
 Japanese 2
 Assamese 165

THESES 489508

SYNOPSIS 12668

MRPs/PDFs/Fellowships Reports 75

About Shodhganga

A reservoir of Indian Theses
 The Shodhganga@INFLIBNET Centre provides a platform for research students to deposit their Ph.D. theses and make it available to the entire scholarly community in open access. The repository has the ability to capture, index, store, disseminate and preserve ETDs submitted by the researchers. [\[Read More\]](#)
Shodhganga Membership is not for Colleges.

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Plagiarism in Higher Educational Institutions) Regulations, 2018. [UGC Letter / Regulation](#)

>The NDLTD Leadership Award 2017 was conferred to Shodhganga Team leaders during August 7 - 9, 2017 at Washington, DC. The Award is instituted by the Networked Digital Library of Theses and Dissertations (NDLTD) since 2004. [More Details](#)

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Babasaheb Bhimrao Ambedkar Bihar University	9675	Andhra University	9400	Panjab University	8859
		V. B. S. Purvanchal University	8817		

489508 FULL TEXT THESES

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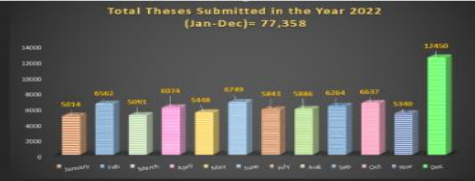
734 UNIVERSITIES CONTRIBUTING

840 Universities+CFTIs/INIs Signed MoU

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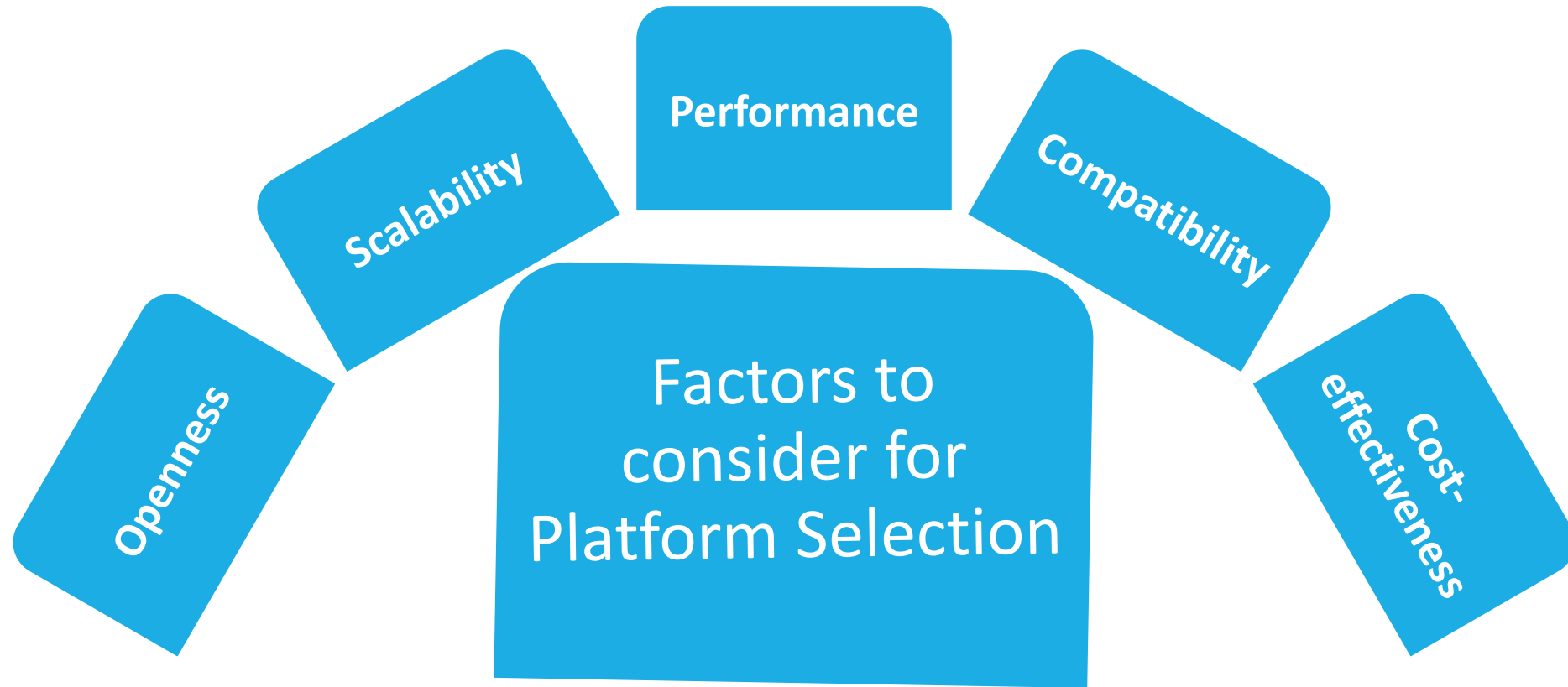
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Platform and Technology Selection



Platform and Technology Selection

Shodhganga has adapted the robust and scalable open-source platform known as DSpace,

DSpace is an open-source digital repository software initially developed by MIT and HP Labs, and currently maintained by the Duraspace Foundation, which has merged with Lyris. DSpace is,

- Cost Effective (Hardware, Software and Maintenance)
- Technically simple to install
- Robust
- Scalable
- Open and inter-operable
- Modular
- User Friendly
- Multi-user (Both Aspects User and Administration)
- Platform independent
- Capable of handling multimedia digital objects

Customization of the Platform

Tailoring the platform to meet the specific requirements of users and institutions is a major challenge. The interface should provide,

Multilingual
Support

Flexible
Metadata
Management

Streamlined
the Workflow

Smooth
Submission
and Review
Process

Customization of the Platform

Tailormade data entry system has been developed.

Simplifies the submission process in fewer steps compare default multiple steps and easy integration with repository.

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University Details
University Name: [Select]
Department/Place: [Select]

Guide/Researcher
Name of Researcher: [Text]
Name of Guide: [Text] * eg. Gandhi, M K or Yadav, Ashish
Please enter Joint Guide Name or Co-Guide name, if any, separated by 'and'.
(E.g. Yadav, Ravi) and Sharma, Ashish

Degree
Type of Degree: [Ph.D.]
Registration Year: [Text] (YYYY) E.g. 1998
Completed Year: [Text] (YYYY) E.g. 1998
Award Year after 2019? Yes No

Thesis Details (Special Characters &{#%^(*)+=[\|\\}:/O|!/? are not allowed)
Title(with Subtitle): [Text]
Alternative Title: [Text]
Abstract: [Text]
Note: [Text] (Maximum characters: 2048) You have 2048 characters left.

Keywords
[Select 3 levels of Subject and To add more keywords press 'Add More' Button]
[---Select---]
[---Select---]
[---Select---]
(Press 'Add More from LCSH' button To add keywords from Library of Congress Subject Heading (LCSH))

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Language: [Select]
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- 01_title [Choose File] No file chosen
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- 04_abstract [Choose File] No file chosen
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- 06_chapter 2: [Choose File] No file chosen
- 07_chapter 3: [Choose File] No file chosen
- 08_chapter 4: [Choose File] No file chosen
- 09_chapter 5: [Choose File] No file chosen
- 10_annexures: (bibliography + references + questionnaire + maps + publications etc.) [Choose File] No file chosen

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Customization of the Platform

Metadata Import feature from standard format.

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Import Metadata

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IMPORT BULK METADATA

(Metadata format can be downloaded for uploading the bulk Metadata through this Interface as per Shodhganga Standards.)

Select University : --select--

Upload Metadata File : No fil...osen

Show entries Search:

Title	Guide	Researcher	University	Department	Completed Date	Action
3d finite element modelling of Indian tectonic plate to investigate the intraplate stress distribution and deformation	Shanker, D.	Bahuguna, Ashish	Indian Institute of Technology Roorkee	Earthquake Engineering (Department does not exist!)	2023	<input type="button" value="Add Department"/> <input type="button" value="Attach Files"/> <input type="button" value="Delete"/>
3d printable ceramic ink with osteoinduction and angioinduction ability for	Rath, Subha Narayan	Roopavath, Uday Kiran	Indian Institute of Technology Hyderabad	Department of Biomedical Engineering	2020	<input type="button" value="Attach Files"/>

Quality Control

Metadata accuracy and data validation becomes a significant challenge when dealing with a Large collection.

Shodhganga has implemented several QC mechanisms to maintain the integrity of its repository, The major are

- Special Characters Restriction in Metadata
- Selection of Standard Subject Keywords from Controlled Vocabulary
- Duplicate Title Checks

Selection of Standard Subject Keywords from Controlled Vocabulary

Controlled vocabulary consists of a predefined and standardized list of terms used to describe subjects or topics.

Shodhganga's controlled vocabulary is established by combining Library of Congress Subject Heading (LCSH) keywords with other standardized terms.

Search Keyword From Library of Congress Subject Heading (LCSH) ✕

(Note: Add keyword through auto suggestion list or directly press search button.)

Keyword :-



Perfect Term

- Computer science.
(Used For: Informatics)

Broader Terms

- Science
- Science

Narrower Terms

- Semantic computing
- Women in computer science
- Reversible computing

Computer science|Science|Semantic computing|Reversible computing

Duplicate Titles Check

Shodhganga, the system conducts duplicate check,

- To **identify duplicate** titles to prevent repetition of data.
- To **ensure uniqueness** within repository.

Check Duplicate Thesis X

Show entries

Sr.No.	Title	Researcher	Guide	Handle Id
1	Philosophical perspectives in artificial intelligence	Rajmohan, S	Dr Radhakrishnan, C V	10603/108386
2	Artificial Intelligence in Business Decision Making	Madhavi	Vijay Kumar	10603/384942
3	Automated guided vehicle artificial intelligence	Agrawal, Himanshu	Dewangan, M S	10603/44162
4	Mechanism for Artificial Intelligence in Different Systems	Mamta Sharma	Dr Kavita	10603/482920
5	Artificial Intelligence and Machine Learning Techniques for Diabetes Healthcare	Mastoli M M	Pol U R	10603/331628

User-friendliness and Performance Enhancement

User friendliness is crucial to enable end-user to easily access and navigate the repository, conduct efficient searches, and retrieve information promptly.

Enhancing performance is vital to optimize the speed and minimizing delays.

The screenshot displays the Shodhganga website interface. At the top, there are navigation tabs: "Universities Contributed in Shodhganga" (selected), "ShodhShuddhi", "Shodhgangotri", and "Colleges". Below the tabs, a "Top 10 Universities Contributed" section is shown, with a "Show All Universities" button on the right. The table lists the following universities and their contribution counts:

Anna University	14667	University of Madras	14564	University of Calcutta	14058
Savitribai Phule Pune University	12358	Chhatrapati Sahuji Maharaj University	10153	Aligarh Muslim University	9852
Babasaheb Bhimrao Ambedkar Bihar University	9675	Andhra University	9493	Panjab University	8859
		V. B. S. Purvanchal University	8822		

Below the table, four performance metrics are displayed in large digital-style numbers:

- 490637 FULL TEXT THESES
- 12745 SYNOPSES/MRPs/PDFs/Fellowships
- 734 UNIVERSITIES CONTRIBUTING
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User-friendliness and Performance Enhancement

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Title of the Thesis	Development of Knowledge based expert system for Retrofitting of Buildings
Name of the Researcher	Dongre, Ashish
Name of the Guide	Chauhan, J.S. and Tiwari, D.R.
Completed Year	2013
Name of the Department	Department of Civil
Name of the University	Rajiv Gandhi Proudyogiki Vishwavidyalaya Created and maintained by INFLIBNET Centre

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Security

Safeguarding ETDs against **unauthorized access, data breaches, and cyber threats** is a major challenge to maintain the **confidentiality and integrity**.

Fail2ban is configured to combat **malicious activities and suspicious connections**.

Open-Source Tool to enhance the security of servers, against **brute-force attacks and unauthorized access attempts**.

Continuous monitoring of server-generated **log files** to detect **suspicious patterns like repeated login failures**.

Dynamically updates firewall rules to **block malicious traffic**.

Email alert about **security threats** and the **corresponding actions taken**.

Security

Shodhganga uses **robots.txt** to manage **web crawlers** and **prevent site overloads**.

Robots.txt is used to **instructs crawlers** on **which parts of the site to access** and **which to avoid**.

Enhances privacy and provides **more effective online presence**.

It should be employed carefully to **avoid unintended SEO consequences**.

Database and **SOLR indexes** are configured on **local port** only using **proxy_ajp** directives.

Additionally, comprehensive security measures are managed by the **Network department**.

Redundancy and Backup Strategies

Crucial to prevent data loss.

Involves implementing redundant systems, conducting regular backups, data replication and creating disaster recovery plans.

Shodhganga maintains redundant servers and conducts regular data backups to safeguard its valuable contents.

pg_dump is scheduled to create database backup.

Rsync command-line utility is scheduled to synchronize the backup to additional server.

Rsync is used to take incremental backup and delta transfer.

To address disaster recovery, Shodhganga is in the process of establishing a mirror site at a remotely located data center.

Conclusion

This paper has examined the challenges associated with the management of large-scale (ETDs) based on the experiences of Shodhganga.

The insights provided various practical aspects that are critical for efficient ETD management.

Addressing these challenges is necessary for effective ETD management.

It not only enhances the overall user experience but also facilitates broader access to valuable research findings.

In doing so, they significantly contribute to the advancement of academic research and the dissemination of knowledge.

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THANK YOU