

Repository System Based on Open Archives Initiative (OAI) for Open Library System

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Abstract: So far, many repository developments have been carried out, but still in the repository analysis built by other parties (other countries), besides that, the use of complex repository software and requires expensive architecture. This research is needed so that later the research results can develop a repository architecture which is a new technology that is better and more efficient and can be used by universities in Indonesia, especially in AMIK Indonesia. This study aims to prove the existing theories of the repository and digital library architecture to be adapted to the development of current knowledge and technology by using the Big Data model and using the Open Archive Initiative (OAI) and designing a new repository to facilitate universities for online publications as needed, so that user limitations on publishing management become complex, and develop existing research results, in developing repositories that are more flexible than existing repositories and digital libraries. Broadly speaking, this research is divided into three stages, namely pre-development data collection, development and implementation, and post-development data collection. Pre-development data collection is intended to get the provision of preliminary studies about the core of the problem at hand, while the development and implementation phase focuses on modeling software design into a diagram and making programming code to implement the design that has been made. While the stages of post-development data collection are for reforming the application made, drawing conclusions, and suggestions for the topic of subsequent research. The proposed system allows users to see publication information and repositories also equipped with the Open Archive Initiative (OAI) module so that it can be crawled by indexing machines. From the results of the study, it can be concluded that pre-development data collection, development and implementation, and post-development data collection have been carried out. The use of this repository can bring benefits including the ability to send data so that it can be indexed on various indexing websites. The repository application that researchers build can be installed on web hosting. The repository is built with framework Codeigniter, node.js and uses supporting programming languages such as HTML, CSS, JQuery, JavaScript, JSON, AJAX, Bootstrap as media in designing interfaces. This repository application is named with T-REPOSITORY.

Keywords: Repository, Open Archieve Initiative (OAI), Open Source, Codeigniter, Node Js

1. Introduction

The Republic of Indonesia's Regulation on Higher Education requires universities to conduct scientific publications as a source of learning and for the development of academic culture in conducting publications [1, 2], so as to encourage lecturers and students to be more productive in producing scientific publications so as to increase competitiveness Indonesian nation at the world level in terms of publication [1, 3, 4]. The online publication makes its own popularity and trend in competition in the world of higher

education [3, 5, 6].

A repository is a good tool for publishing research results in a wider scope. This is expected to improve a good reputation for references from writers in the development of science [2]. A repository is an open source software that can be used as an archive and can store images, research data, and sound in digital form. The number of repositories that are spread like; e-prints, d-space [7, 8], Fedora [9], greenstone digital libraries, Ganesha digital libraries (GDL) and SLIMs become their own alternatives in choosing the repository that you want to use [10, 11]. But there are still some

shortcomings such as the need for a separate server to load publication data, where most universities still have problems with costs and resources [6, 7, 9].

This study attempts to build a repository model that can be used as a form of publication and publishing management and has the Open Archive Initiative (OAI) feature and handling metadata in order to be well indexed in international indexing [12, 13]. The application allows the updating of data/content and sharing from various online digital sources. The repository can enable end-user users, and still refers to the standards of international publishing management. It is hoped that this repository can increase the publication and management of publishing electronically and be fully implemented by researchers, publishers, and other universities in Indonesia.

So far the problem is many repository developments have been carried out, but still in the repository analysis built by other parties (other countries), besides that, the use of complex repository software and requires expensive architecture. This research is needed so that later the research results can develop a repository architecture which is a new technology that is better and more efficient and can be used by universities in Indonesia, especially in AMIK Indonesia.

Indexing and repository metadata are very important services in the world of research [22], the development of data in various repositories is still needed development and tested for indexation metadata [23] so that it shows relative consistency with Open Access (OA) [24]. The development of repositories is still widely developed in various research institutions, especially regarding the specificity of data descriptions, as well as the potential for integration of data management platforms with existing research management tools [25]. The repository development is also by integrating contributor marker services and similar digital library applications [26, 27], but the needs of each institution for repository services are also adjusted so that later the complexity and objectives of developing repositories remain to the Open access model for good scientific publications [27, 28]. The development of repositories by utilizing web architecture with the ability to be able to run on all server platforms needs to be conducted more specifically research [29-31]. Based on the opinions of previous studies, further development of the repository framework is needed by involving open access (OA) so that the need for each research institution becomes a complex.

This study aims to prove the existing theories of the repository and digital library architecture to be adapted to the development of current knowledge and technology by using the Big Data model and using the Open Archive Initiative (OAI) and designing a new repository to facilitate universities for online publications as needed, so that user limitations on publishing management become complex, and develop existing research results, in developing repositories that are more flexible than existing repositories and digital libraries.

2. Literature Review

2.1. Software Design

Over the years people have developed many methodologies and techniques to help keep software projects running. Some of them, such as waterfall and V-model approaches, use specific specification requirements to precisely get the desired results before development begins [14]. Engineering forces scientific product development, well-formed, and systematic. Core Engineering principles must be applied to produce software that can be maintained properly within the specified time and budget [15].

Software development is the latest industry, in an industry, development and growth really need to be better [16]. The Linear Sequential Model often called the Waterfal Model is the oldest and most widely used software engineering paradigm. This model proposes a systematic and partial software development approach that starts at the level and progress of the system in all analysis, design, code, testing, and maintenance.

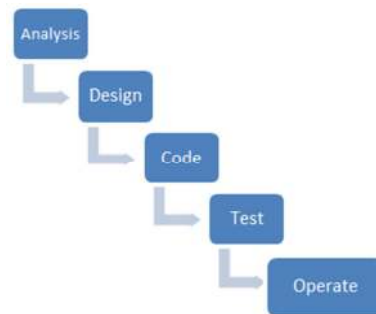


Figure 1. Stages in the Waterfall Model.

The Linear Secondary Model follows activities namely:

1. Engineering and Information Systems

Because software is part of a system, the first step starts with building the requirements of all system elements and allocating to the software by observing its relationship with humans, hardware and databases.

2. Analysis of Software Requirements

The process of analyzing and gathering system requirements that are in accordance with the domain of behavior information, performance, and interface (interfaces) are needed. These needs are documented and seen again with the user.

3. Design

The design process will translate requirements into a software design that can be estimated before coding is made. This process focuses on; data structure, software architecture, interface representation, and procedural details.

4. Coding

Encoding is a process of translating designs into a language that can be understood by computers.

5. Testing

The testing process is done on internal logic to make sure all statements have been tested. Functional external testing to find errors and ensure that inputs will provide actual results as needed.

6. Operation

It is part of complete installation, migration, support and system maintenance [16].

2.2. *Repository and Digital Library*

Digital Library (DL) is a data center in accessing information that is needed by an institution in an effort to store data in a very diverse form, namely online libraries. Therefore, interoperability between the Digital Library System (DLS) that manages digital resources from institutions is a major concern at this time [17]. Rossi and Ahmed (2016) state that the repository is a collection of historically arranged scientific data that makes data widely accessible to the scientific community, and has led to better research through comparisons, reproducibility, and further discoveries and insights [18].

2.3. *Open Archieve Initiative (OAI)*

Implementation of Open Access (OA) repositories by Office for Scientific Communication (OSC) depends on a number of standards, the Open Access Initiative Protocol for Metadata Harvesting (OAI-PMH) ensures that content can be found and can be traced [19]. Harliansyah (2016) explained that to implement the principles of Open Access (OA) idealized above, there are two main strategies that need to be developed, namely:

1. Open access publishing. That is developing an open access publishing model. This publishing material can be in the form of books, textbooks, scientific journals, and others.
2. Open access archiving (repository). That is developing an open access repository for archiving research results and other scientific activities of an institution/university (institutional repository) [20].

In the list of Open Access Repository Directories (DOAR, opendoar.org), currently, there are around 2,600 repositories from various countries and continents. Of course, there are many more repositories that have not been included in the list because DOAR submitted a specific application to include it in the Directory. This number shows that this shared conviction above has gradually manifested itself in the real form of the development of scientific communication facilities. In its place, the repository is expected to spur the development of science in various fields. Thus, successful development repositories around the world have the roots of open access to 'ideology' (OA), that is sharing ideology, an 'ideology' which campaigns for the knowledge sharing of knowledge and knowledge for others

3. Proposed System

Broadly speaking, this research is divided into three stages, namely pre-development data collection, development and implementation, and post-development data collection. Pre-development data collection is intended to get the provision of preliminary studies about the core of the problem at hand, while the development and implementation

phase focuses on modeling software design into a diagram and making programming code to implement the design that has been made. While the stages of post-development data collection are for reforming the application made, drawing conclusions, and suggestions for the topic of subsequent research. The proposed system allows users to view publication information and the repository is also equipped with the Open Archive Initiative (OAI) module so that it can be crawled by indexing machines.

3.1. *Functional Requirements*

Listed below are the functional requirements for the application repository at AMIK Indonesia.

1. Display publication information.
2. Displays downloadable content and files.
3. Content can be divided according to categories.
4. Generates user reports.
5. Produce visitor statistics reports.
6. Maintain a manager account.
7. Produce content with the OAI model.

3.2. *Non-functional Requirements*

Below are the non-functional requirements for the repository application at AMIK Indonesia.

1. User interface and human factors.
2. Documentation.
3. Hardware considerations.
4. Performance.
5. Handling extreme errors and conditions [21].

3.3. *Proposed Architecture*

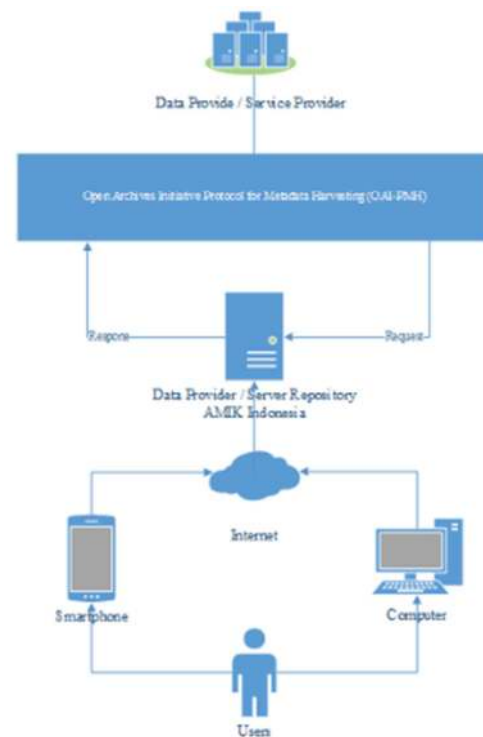


Figure 2. Proposed Architecture.

4. Implementation

Development of web pages can be made possible using a variety of technology preferences. CodeIgniter and Node.JS Framework was chosen as the web framework for this system. CodeIgniter is a powerful PHP framework with a very small footprint, built for developers who need a simple and elegant toolkit to create a full-featured web application. whereas Node.js is a JavaScript runtime that is built on the Chrome V8

JavaScript engine. Node.js uses a non-blocking I / O model that makes it lightweight and efficient, other supporting programming languages are also used for interface designs such as HTML, CSS, JQuery, JavaScript, JSON, AJAX, and Bootstrap. For the results of the repository, design can be seen in figure 3 up to 7.

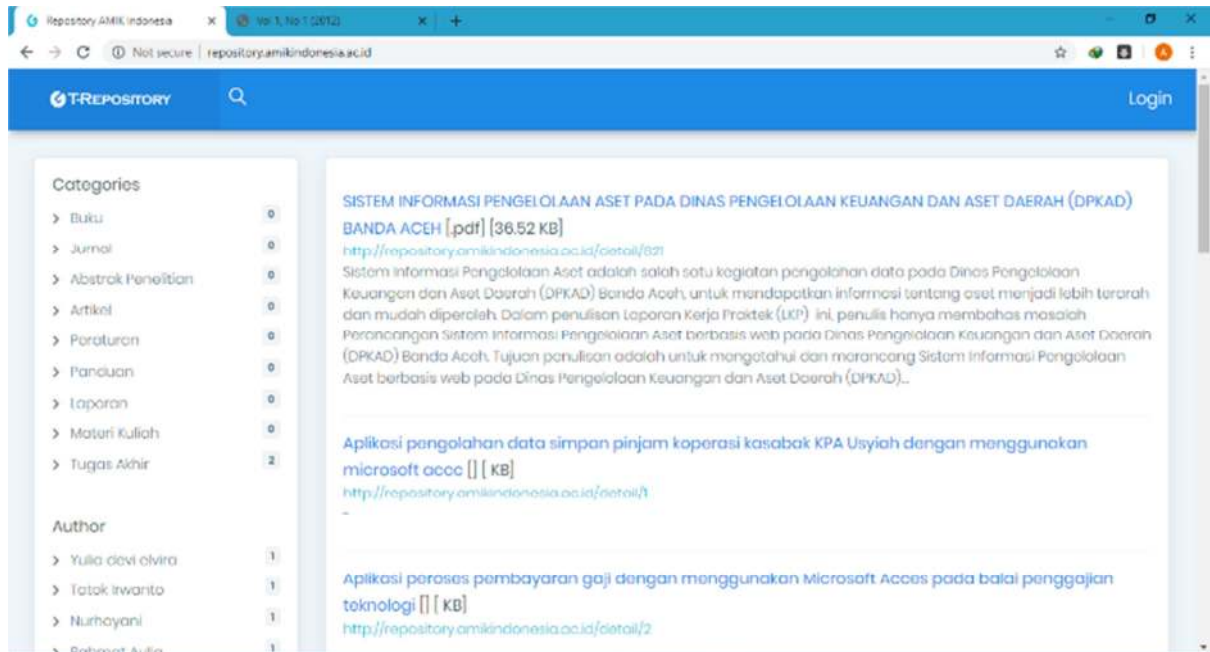


Figure 3. Main Page.

Based on Figure 3, the display can be accessed by visitors without restricted access rights. This front view provides information about the writing of research results consisting of general research information, titles, abstracts, authors, and pdf

file data that can be retrieved. On this page also shows the results of research based on categories, archives, and authors who do a lot of publications.

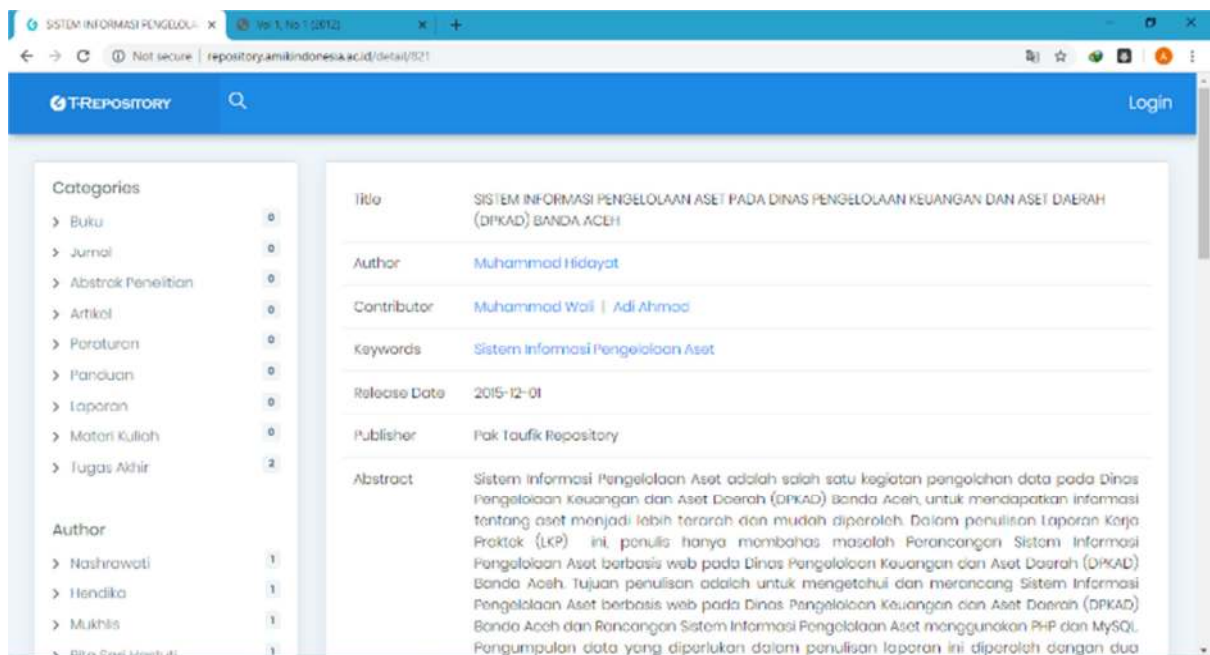


Figure 4. Data Repository Details.

For the detailed repository page, information about the title, Author, Contributor, Keywords, Release Date, Publisher, Abstract, URI, Categories, and along with the pdf file are the results of the research. To make additions and changes to the

data can be accessed through users with the library management level through the login page as shown in the following picture.

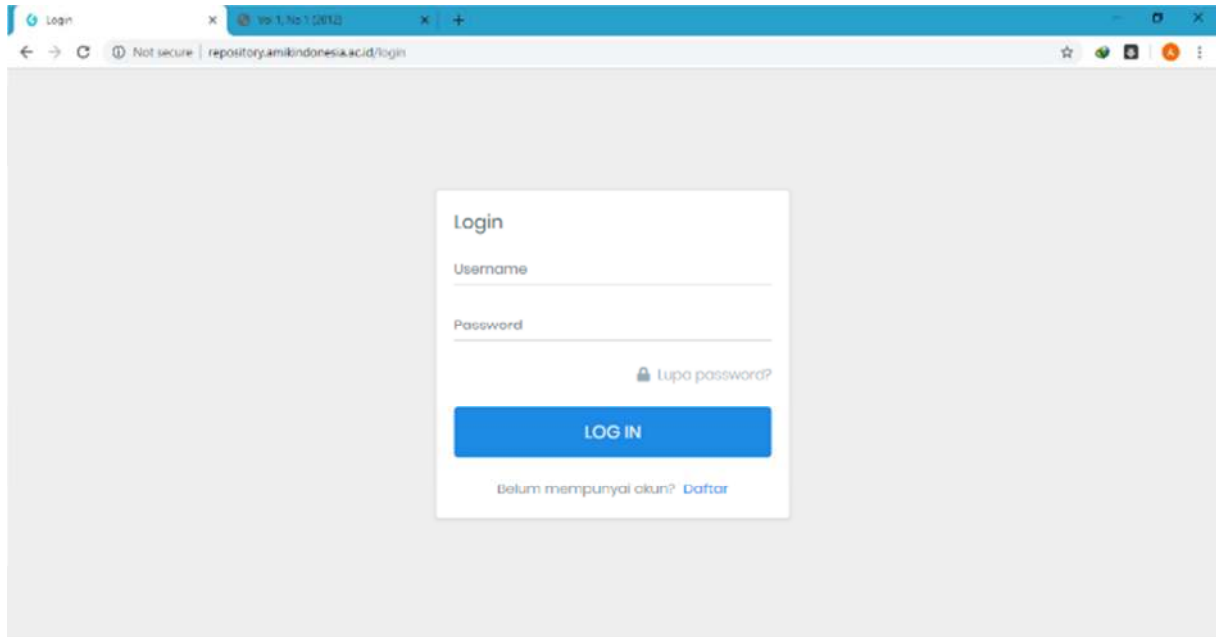


Figure 5. Login page.

After logging in by entering your username and password correctly, it will be directed to the admin page as shown in figure 6.

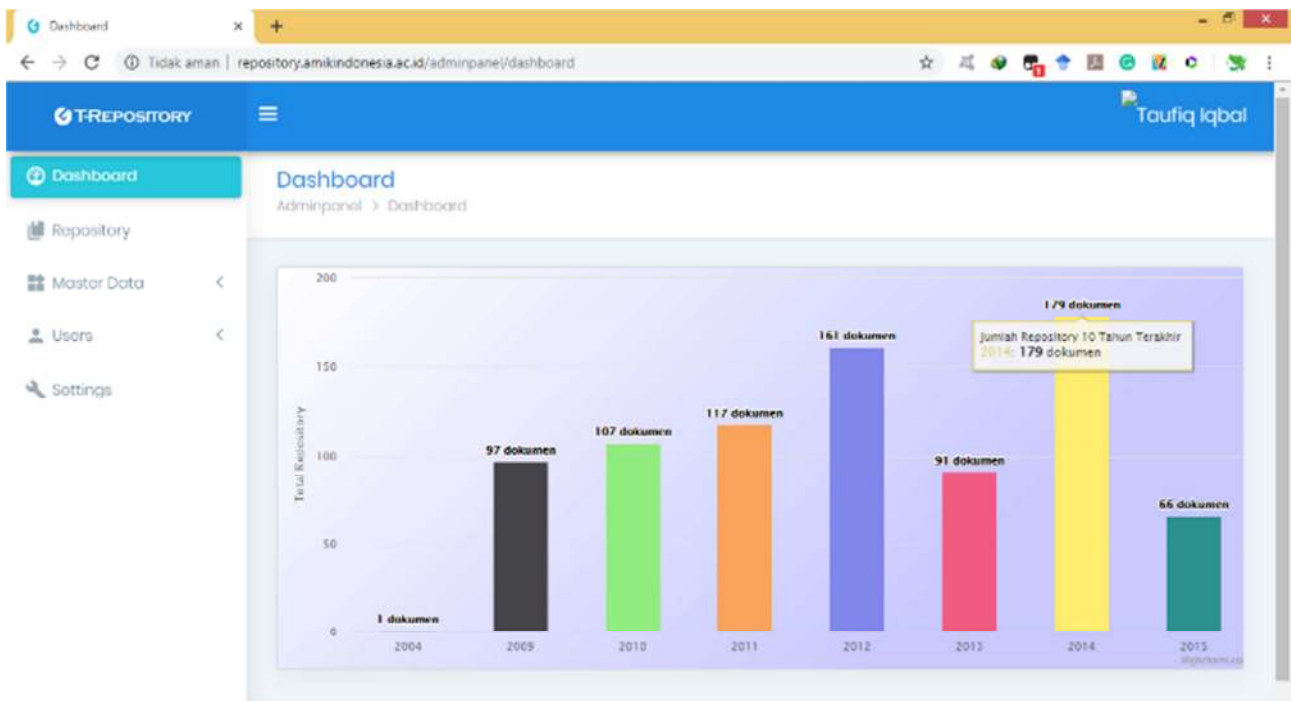
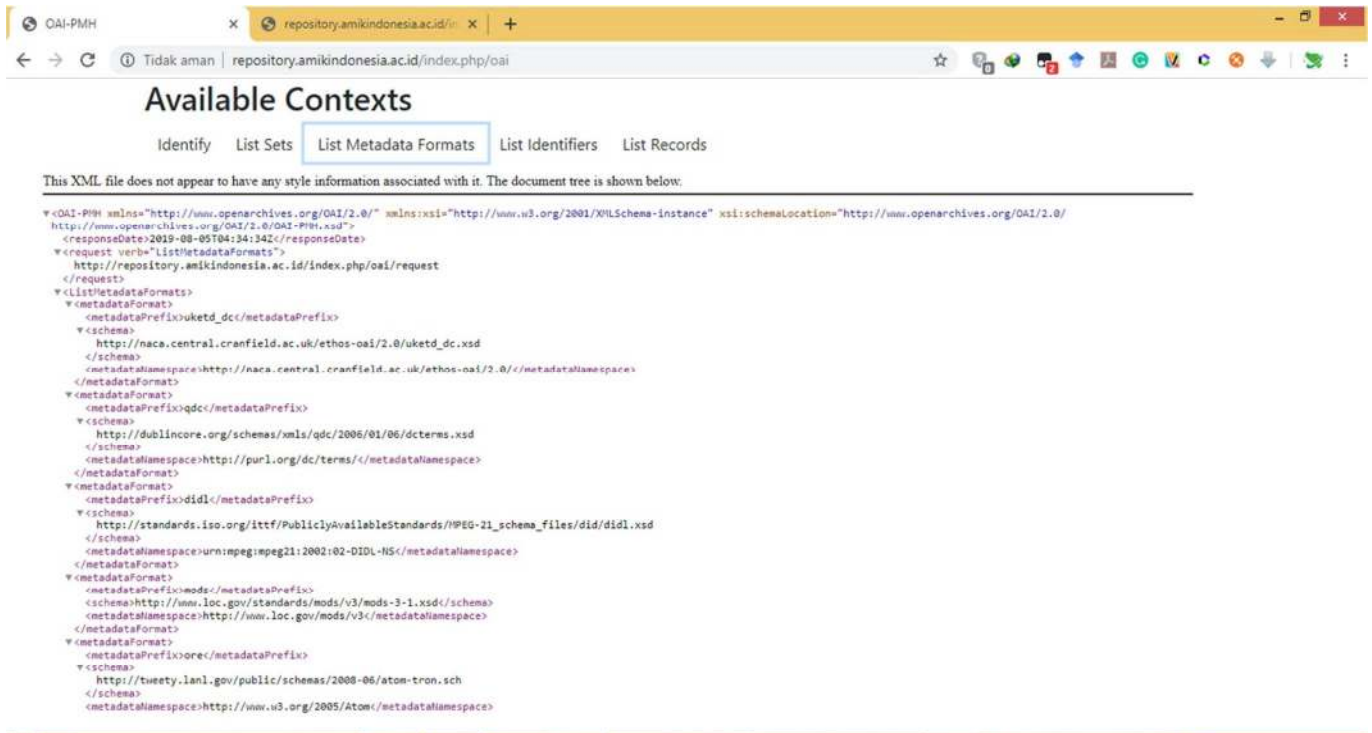


Figure 6. Admin Page.

On the admin page, managers can manipulate data such as additions, deletions, and changes. Here also provides a repository settings menu such as the name of the publisher manager along

with the application logo. Furthermore, on the admin page, you can also add various users or repository managers with operator level, library manager, and library leader.



The screenshot shows a web browser window with the address bar displaying 'repository.amikindonesia.ac.id/index.php/oai'. The page title is 'Available Contexts'. Below the title, there are navigation tabs: 'Identify', 'List Sets', 'List Metadata Formats' (which is highlighted), 'List Identifiers', and 'List Records'. A message states: 'This XML file does not appear to have any style information associated with it. The document tree is shown below:'. The XML content is displayed as follows:

```

<?xml version="1.0" encoding="UTF-8" ?>
<OAI-PMH xmlns="http://www.openarchives.org/OAI/2.0/" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.openarchives.org/OAI/2.0/
http://www.openarchives.org/OAI/2.0/OAI-PMH.xsd">
  <responseDate>2019-08-09T04:34:34Z</responseDate>
  <request verb="listMetadataFormats">
    http://repository.amikindonesia.ac.id/index.php/oai/request
  </request>
  <listMetadataFormats>
    <metadataFormat>
      <metadataPrefix>uketd_dc</metadataPrefix>
      <schema>
        http://naca.central.cranfield.ac.uk/ethos-oai/2.0/uketd_dc.xsd
      </schema>
      <metadataNamespace>http://naca.central.cranfield.ac.uk/ethos-oai/2.0/</metadataNamespace>
    </metadataFormat>
    <metadataFormat>
      <metadataPrefix>qdc</metadataPrefix>
      <schema>
        http://dublincore.org/schemas/xmls/qdc/2006/01/06/dcterms.xsd
      </schema>
      <metadataNamespace>http://purl.org/dc/terms/</metadataNamespace>
    </metadataFormat>
    <metadataFormat>
      <metadataPrefix>did</metadataPrefix>
      <schema>
        http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_21_schema_files/did/did.xsd
      </schema>
      <metadataNamespace>urn:mpeg:mpeg21:2002:02-DIDL-NS</metadataNamespace>
    </metadataFormat>
    <metadataFormat>
      <metadataPrefix>mods</metadataPrefix>
      <schema>http://www.loc.gov/standards/mods/v3/mods-3-1.xsd</schema>
      <metadataNamespace>http://www.loc.gov/mods/v3/</metadataNamespace>
    </metadataFormat>
    <metadataFormat>
      <metadataPrefix>ore</metadataPrefix>
      <schema>
        http://twetty.lanl.gov/public/schemas/2008-06/atom-tron.sch
      </schema>
      <metadataNamespace>http://www.w3.org/2005/Atom</metadataNamespace>
    </metadataFormat>
  </listMetadataFormats>
</OAI-PMH>

```

Figure 7. OAI Page.

In the repository built by the author, OAI features are also provided as the main purpose of the designed repository service. The results of the OAI T-Repository have been tested in the Validator & Data Extractor Tool Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) and have been refined according to the results planned in this study.

5. Conclusion

From the results of the study, it can be concluded that pre-construction data collection, development and implementation, and post-construction data collection have been carried out. The use of this repository can bring benefits including the ability to send data so that it can be indexed on various indexing websites and has been tested with Validators & Data Extracting Tools Open Archive Initiative Protocol for Metadata Retrieval (OAI-PMH). This repository application does not require server devices such as the use of repository applications such as D-Space and E-Prints, applications built by researchers can be installed on web hosting. The repository application has been successfully built and has reached and fulfilled the objectives and requirements stated in the first chapter. This repository is built with Codeigniter framework, node.js and uses supporting programming languages such as HTML, CSS, JQuery, JavaScript, JSON, AJAX, Bootstrap as a media in designing interfaces. This repository application is called T-REPOSITORY which can be downloaded on Github social coding with the URL: <https://github.com/taufiqqbal/repository>. For further research, it is necessary to analyze the data distribution on various indexing machines so that the application of this T-Repository

can be an alternative for publishers.

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