CCS Research Nexus: A Research Repository for Naga College Foundation, Inc.

A Thesis and Capstone Project

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Computer Studies

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Bachelor of Science in Information Systems and

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1. INTRODUCTION

In the fast-growing world of academic research, having a central place to store scholarly articles is crucial. As our collective knowledge keeps expanding, it's more important than ever to have a unified platform to hold all this valuable information. That's why our research project is dedicated to exploring and improving such a platform—a virtual hub where all the expertise from various scientific fields can come together.

Our main goal is to carefully examine how these platforms are designed, how they work, and how easy they are to use. By studying how these platforms function, we hope to find new ways to make it easier for researchers to share their work and work together. Ultimately, we want to create a future where sharing knowledge is effortless, allowing researchers to work together seamlessly and achieve academic excellence.

With more research papers accumulated every academic year, there is no doubt that hard copies of research papers pile up in a school’s library. Making them electronically available as references could provide ease of access for those looking for sources to cite in their own research. This paper emphasizes the need of a cloud-based research repository that an academic institution may utilize in order to provide a gateway for research materials, based on an online publication and subscription model for implementation. Online publication provides reading sources via the internet which is accessible and more convenient to most people. The repository will also adapt the concept of configurability, as the users may have their own

preferences with regards to how they publish or subscribe to a paper. Research materials within the repository may be referenced, cited, or downloaded, and will have a corresponding remuneration, based on the approval of the School. In this way, more researchers will continue to provide scholarly outputs. The repository has the potential to expand as more researchers will be turned in its service and would be beneficial to stakeholders. The respondents in this paper show the acceptability of the process, making them more likely to work in any educational institution.(The Development of a Cloud-based University Research Repository Software Using a Configurable Subscription Model, 2023).

Given the proliferation of the use of Information Communication Technology (ICT) and the need for global access to information in academic libraries, Open Access Institutional Repositories (OAIR) are becoming key in archiving library resources in the 21-century academic libraries. The right Information Communication Technology is required to enable libraries around the world to build Open Access Institutional Repositories for the implementation and capturing of the intellectual assets of their institutions (Ezema & Onyancha, 2016).

Open Access Institutional Repositories provide access to the world’s research by ensuring the long-term preservation of large volumes of academic outputs (Ibinaiye et al., 2015).

According to Okon, Eleberi, and Uka (2020), Institutional repositories are essential research infrastructure for research-based universities. A properly dimensioned institutional repository has the potential to increase research impact and enhance the visibility of an institution through its scholarly outputs.

The advances of technology resulting in the proliferation of mobile devices have changed the way we live and have necessitated the restructuring of the educational system. This can be employed to aid student's participation in research studies (Development of a Research Project Repository, n.d.).

Scientific data repositories are essential infrastructure for promoting open research data and enabling data sharing. They serve as a bridge between policies and researchers. Jiang et al. (2023) says that Building a trustworthy and FAIR-compliant repository is a challenge. Thus guidelines on repository selection and requirements for trustworthy repositories have been proposed. The paper analyzes Repositories registered on the re3data website and summarizes their current development. It also focuses on featured practices in domain-specific and generalist repositories.

A study about the Current Developments in the Research Data Repository RADAR (Bach et al., 2022) is a cross-disciplinary research data repository that focuses on archiving and publishing digital research data from disciplines without specific research data management infrastructures. It ensures long-term availability of datasets according to FAIR criteria and

promotes the implementation of the FAIR Principles. RADAR follows a modular system architecture and allows integration with existing systems through APIs. It uses a two-step process for data transfer and archiving. RADAR participates in the National Research Data Infrastructure and plays a relevant role as a generic infrastructure service in several NFDI consortia. The paper highlights the need for further development in terms of interoperability and discusses the potential of the FAIR Digital Object Framework to enhance data interoperability. RADAR aims to enhance its services based on the needs of different research communities, such as integrating subject-specific terminologies and providing annotation options with subject-specific metadata.

Dr. P. Naik, G.Raik (2020), conducted a case study about digital collection resulting in capturing, preserving and disseminating the intellectual output of a single university community.

Library offers both printed and unprinted materials that contain information fundamental in today's knowledge-based society. The role of the library promotes readership that interests readers to embrace technological advancements brought about by the emerging technologies of the 21st century (Dinauanao, 2013).

E-journalism is a powerful production publishing system that allows users to create and control their own electronic or possibly printed journals in Drupal. Users can set up many journals, and it has functions for adding

authors and editors. E-journal has modules, which allow users to manage basic user and access control, vocabularies and archives (Drupalorg, 2016).

Editorial Manageris another manuscript submission and tracking system that provides a suite of customizable manuscript tracking and reporting tools for authors, reviewers, editors, and journal office staff. This system also allows submission, peer review and production process (Aries Syscom, 2016).

The measurement of research performance has become a rigorous activity in research-based higher education institutions (Kanngieser *et al.*, 2014, pp. 302–318). This, in turn, has raised awareness to scholars and researchers into looking at enhancing the value and impact of every research paper they publish. Modern research repositories have incorporated current research information systems components and propose cutting edge, vast and interfaces that are user-friendly to researchers. Hence, they are key platforms for the management of research and online exposure of information about research outputs, current projects, research data, funding, research collaborations, research devices used, time spent on the research spent or the outcomes of the research. These platforms can also be used in the process of research data management. In addition, capturing information on the sources of data used in the research is an asset linked to publications (Jettena *et al.*, 2019). As alluded by Wilkinson *et al.* (2016), the current research landscape requires data to be findable, accessible, interoperable and reusable (FAIR) in the long-term, as it has become the expectation within the

academic community (universities, funding agencies, publishers). The implementation of FAIR principles will entrench robust management and administration of valuable digital resources that will be of benefit to higher education institutions. To enable full benefits of all the research and learning activities, that are vital to the ideal repository infrastructure used by institutions/units is a proper well-coordinated data management service that spans from the inception of the research through to collecting data, analyzing data, documentation, publishing, curing, preservation and management (Borgman *et al.*, 2015).

Research repository platforms are broadly defined as the online "cloud"-based software modules that operate as portals for research efforts. The management of these software platforms are widely classified as nesting applications that add up content often provided by the "users." Research repository platforms also involve necessary connections with offline realms. In general, repositories provide network values that otherwise lead to deliberate short-termism with strategic rationality. Digital repositories have features to ensure collaboration and communication among users. Higher Education Institutions must invest in technology resources and train staff to use the repository as an electronic repository to store ongoing faculty or departmental data related to research and learning activities (Kanngieser *et al.*, 2014).

A systematic review of the extant literature of research repositories used at higher education institutions was attempted in this research paper. It

also highlights the rationale behind the establishment of such repositories ranging from faculty learning activities, practice sharing program exercises, providing open, discoverable content, ensuring greater exposure to scholarly output, research data for sharing and re-use by students and staff in the faculty. As attributed by Sweeper and Ramsden (2020) a research repository is a critical component of establishing a new research plan and providing the incentive for fostering a research culture at a university. As universities work toward becoming leaders in research, showcasing research outputs, introducing it to a global audience becomes a priority.

Mesa, A. R. 2017 states that It is vital to keep track of all the scholarly works undertaken by the students in research universities. As a premier research university,The University of the Philippines (UP) Mindanao has produced several scholarly works made by its students, such as thesis or special problem manuscripts. Similar to typical residential universities in the Philippines, UP Mindanao students submit both hardbound and digital copies of their thesis and special problem manuscripts to their respective departments. Problems such as duplication of work and missing manuscripts are rampant with the current method.This is because printed and electronic copies stored in optical discs can easily be misplaced and are difficult to track when borrowed.

Bernstein, P., and Dayal, U. (n.d.), defines that a repository management should offer the following services such as modeling, retrieving, and managing of elements in the repository. They also tackle the

prerequisites of such a system, for example, configuration control, content management, checkout/checkin, version control, tool integration, and etc. It is highlighted that a repository manager should provide the standard amenities of a DBMS: a data model (to structure a repository), queries (to browse a repository), views (to enhance data independence of tools that access a repository), integrity control (to trap integrity violations), access control (for secure access), and transactions (for atomic multi-statement updates).

With more research that is added every year of every school calendar, there is no doubt it becomes a file or stack of research hardbound resides in the library. These researches should not only settle on the shelves, making them electronically available as references, or to be cited are the ones it truly deserves. This paper emphasizes the need for a cloud-based research repository to be implemented in every University that can be utilized to serve its purpose, Alvez , R. G. (2022).

The integration of mobile technology has transformed various aspects of the educational system, including research participation among students (Development of a Research Project Repository, n.d.). While the potential of mobile devices in enhancing research engagement is recognized, there is a gap in understanding how to effectively leverage mobile technology to facilitate student involvement in research activities. Future research should investigate innovative approaches for integrating mobile devices into research processes to enhance collaboration and knowledge dissemination.

Interoperability and integration are critical factors in enhancing the effectiveness of research data repositories (Jiang et al., 2023). While existing literature acknowledges the importance of interoperability, there is limited exploration of specific strategies and technologies for achieving seamless data exchange and collaboration among repositories. Further research should investigate innovative approaches, such as standardized data formats and metadata schemas, to promote interoperability and integration in research data repositories.

Scientific data repositories serve as essential infrastructure for promoting open research data and enabling data sharing (Jiang et al., 2023). However, building trustworthy and FAIR-compliant repositories presents significant challenges. Existing literature highlights the need for standardized guidelines and criteria for ensuring the trustworthiness and reliability of scientific data repositories. Future research should focus on defining these guidelines to facilitate data sharing and interoperability across different research domains.

Case studies on digital collection management provide insights into the strategies and technologies employed in capturing, preserving, and disseminating institutional intellectual output (Naik & Raik, 2020). However, there is a need for further empirical research to explore the effectiveness of different digital collection management approaches and their impact on

promoting scholarly communication and collaboration within academic communities.

Digital collections are increasingly used for a variety of purposes. In Europe only, we can conservatively estimate that tens of thousands of users consult digital libraries daily. The usages are often motivated by qualitative and quantitative research. However, caution must be advised as most digitized documents are indexed through their OCRed version, which is far from perfect, especially for ancient documents. In this paper, we aim to estimate the impact of OCR errors on the use of a major online platform: The Gallica digital library from the National Library of France. It accounts for more than 100M OCRed documents and receives 80M search queries every year. In this context, we introduce two main contributions. First, an original corpus of OCRed documents composed of 12M characters along with the corresponding gold standard is presented and provided, with an equal share of English- and French-written documents. (Guillaume Chiron, Antoine Doucet, Mickaël Coustaty, Muriel Visani, Jean-Philippe Moreux, 2017).

Synthesis of the State-of-the-Art

With the accumulation of research papers in academic libraries, there is a pressing need to transition from traditional hard copies to electronically accessible formats. Electronic availability enhances accessibility and ease of citation for researchers (Alvez, 2022). The implementation of cloud-based research repositories is emphasized as a solution to manage and provide access to scholarly materials. These repositories serve as gateways for

research materials, offering an online platform for publication, subscription, referencing, and downloading (Alvez, 2022). These repositories offer a centralized platform for storing, referencing, and citing research materials, thereby enhancing their visibility and impact (Development of a Cloud-based University Research Repository Software Using a Configurable Subscription Model, 2023). Institutional repositories play a vital role in enhancing the visibility and impact of research outputs (Okon, Eleberi, & Uka, 2020). Properly dimensioned repositories can increase research impact and contribute to the visibility of an institution's scholarly outputs (Okon, Eleberi, & Uka, 2020).

Open Access Institutional Repositories (OAIR) are recognized as key in archiving and preserving academic outputs. They ensure the long-term preservation of research materials and provide global access to scholarly resources (Ezema & Onyancha, 2016; Ibinaiye et al., 2015).

The implementation of FAIR (Findable, Accessible, Interoperable, Reusable) principles in research repositories is essential for ensuring the long-term preservation and accessibility of research data (Wilkinson et al., 2016). FAIR-compliant repositories promote data sharing and reuse, thereby enhancing the value of digital resources for higher education institutions (Jettena et al., 2019).

Technological advancements have transformed repository management, with modern repositories incorporating current research

information systems components and user-friendly interfaces (Kanngieser et al., 2014). Digital repositories serve as key platforms for managing research data, promoting collaboration, and showcasing scholarly outputs (Kanngieser et al., 2014).

Effective repository management requires addressing various challenges and prerequisites, including configuration control, content management, version control, access control, and transaction management (Bernstein & Dayal, n.d.). Repository managers must provide standard amenities of a database management system to ensure secure and efficient access to repository contents (Bernstein & Dayal, n.d.).

A systematic review of existing research repositories used in higher education institutions is necessary to identify best practices and rationale behind their establishment (Sweeper & Ramsden, 2020). Research repositories serve as critical components in fostering a research culture and showcasing institutional research outputs to a global audience (Sweeper & Ramsden, 2020).

Scientific data repositories play a crucial role in promoting open research data and enabling data sharing. However, building trustworthy and FAIR-compliant repositories poses challenges, requiring guidelines for selection and development (Jiang et al., 2023).

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FAIR-compliant repositories poses challenges, requiring guidelines for selection and development (Jiang et al., 2023).

Gap Bridge of the Study

The given literature highlights several important aspects of Information Communication Technology (ICT) in academic libraries and the role of Open Access Institutional Repositories (OAIR) in archiving and disseminating scholarly resources. However, there are notable gaps in the existing research that warrant further investigation.

While the importance of OAIRs is emphasized, there is limited discussion on the practical challenges and best practices associated with their implementation. Research should focus on identifying barriers to the establishment of OAIRs in different institutional contexts and propose strategies for overcoming these challenges effectively. The literature briefly mentions the potential of mobile technology in facilitating student participation in research studies. However, there is a gap in understanding how mobile devices can be effectively integrated into research processes to enhance student engagement and collaboration. Further exploration is needed to identify innovative approaches for leveraging mobile technology in research activities.

While scientific data repositories play a crucial role in promoting open research data and data sharing, there is a lack of comprehensive guidelines for developing trustworthy repositories. Future research should focus on defining standardized criteria and requirements for ensuring the

trustworthiness and reliability of scientific data repositories, thus facilitating data sharing and reuse across different research domains.

The literature also discusses the need for further development in terms of interoperability in research data repositories. However, there is limited exploration of specific strategies and technologies for enhancing interoperability and integration among different repositories. Research should investigate innovative approaches, such as the use of standardized data formats and metadata schemas, to facilitate seamless data exchange and collaboration among repositories. While a case study on digital collection management is mentioned, there is a lack of in-depth analysis of the strategies and technologies employed in capturing, preserving, and disseminating institutional intellectual output. Further case studies and empirical research are needed to explore the effectiveness of different digital collection management approaches and their impact on promoting scholarly communication and collaboration within academic communities.

Theoretical Framework

Academic research repositories have become essential platforms for the distribution, preservation, and accessibility of research results in the quickly changing world of scholarly communication. Comprehending the workings and consequences of these archives necessitates a multifaceted strategy based on multiple theoretical models. We present an overview of various important theoretical frameworks that serve as the foundation for the investigation of academic research repositories in this introduction.

Information Behavior Theory offers valuable insights into how individuals seek, evaluate, and utilize information. By examining users' motivations, information needs, and search strategies, this framework sheds light on the factors driving users' interactions with research repositories (Wilson, 1999).

Institutional Theory focuses on the role of organizational structures, norms, and values in shaping behavior within institutions. When applied to academic research repositories, this framework helps researchers understand how institutional factors influence the adoption, implementation, and sustainability of repository initiatives within universities and research institutions (DiMaggio & Powell, 1983).

The Technology Acceptance Model (TAM) examines users' attitudes and perceptions toward technology adoption and usage. Within the context of research repositories, TAM helps researchers understand factors influencing researchers' acceptance and utilization of repository platforms, such as perceived usefulness, ease of use, and social influences (Davis, 1989).

Conceptual Framework

The Input-Process-Output (IPO) Framework, added with Feedback as the fourth component, is the approach utilized in the conceptualization of this study.

Input:

a) **Research Data:** Raw data collected from various research projects conducted by students, faculty, and researchers.

b.) **Metadata:** Information about the research data, including author details, date of publication, keywords, etc.

c.) **External Data:** Relevant external data sources, literature, or datasets that contribute to the research repository.

Process:

1.) **Data Ingestion and Storage:** Import and store research data in a standardized format within the repository.

2.) **Metadata Tagging:** Assign metadata tags to classify and categorize research data for efficient retrieval.

3.) **Access Control:** Implement security measures to control access to the repository based on roles and permissions.

4.) **Search and Retrieval:** Develop a robust search functionality for users to easily find and retrieve relevant research data.

5.) **Analytics and Reporting:** Implement tools for analyzing usage patterns, trends, and generating reports for stakeholders.

Output. The study's outcome is the NCF Repo-C-tory: A Research Repository for Naga College Foundation, a digital platform where all the thesis or capstone projects can be restored and retrieved.

Feedback. A feedback mechanism was added to the Input-Process-Output (IPO) framework. The process of modifying software

functionalities and features will be based on feedback, demand, and criticism from the users.

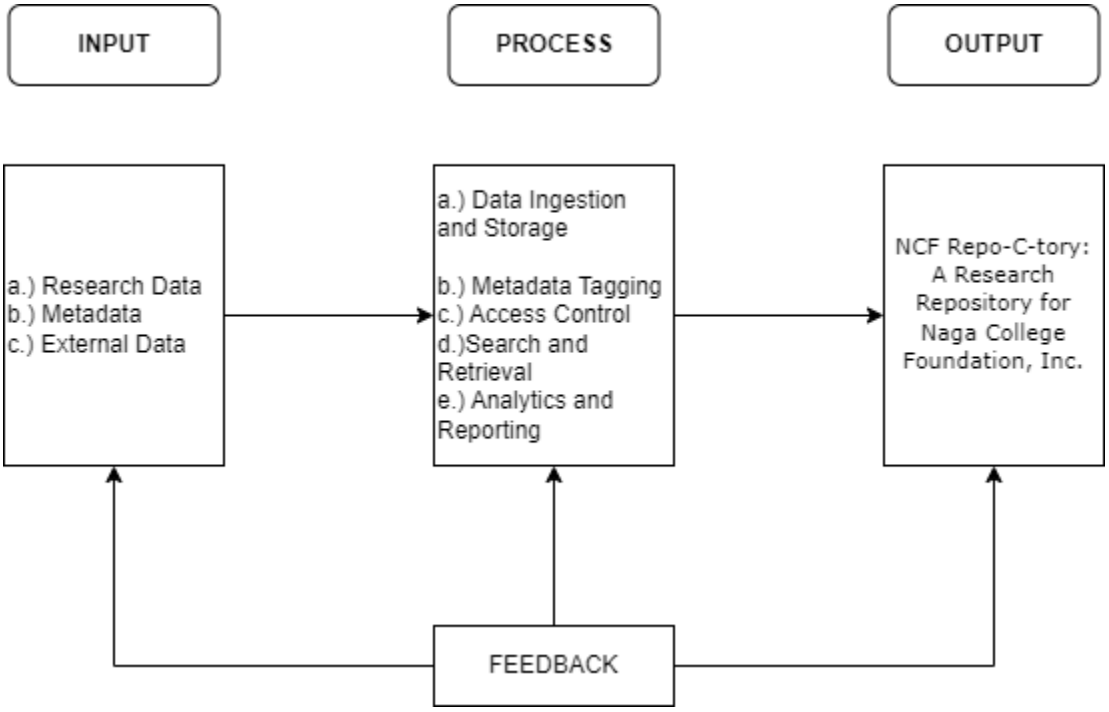

Figure 2 Conceptual Paradigm

Objectives of the Study

The main objective of the study is to design and develop the NCF Research Nexus: A Research Repository for Naga College Foundation, as well as to determine if a repository will be helpful in storing and retrieving research papers.

1. It aims to determine the current state of the system used in the storage, management, and retrieval of research documents in the research center of Naga College Foundation, Inc.

2. It aims to identify the specific challenges and limitations associated with the current system used for storing, managing, and retrieving research documents.

3. To design and develop system modules for the storage, management, and retrieval of the research documents in the research center of Naga College Foundation, Inc.

4. To assess the effectiveness and efficiency of the newly designed and developed system modules for storing, managing, and retrieving research documents.

5. To evaluate the level of post-study system usability utilizing the International Business Machines (IBM) - Post-Study System Usability Questionnaire (PSSUQ).

Assumptions

The study was anchored on the following assumptions:

1. The current state of the system used in the storage, management, and retrieval of research documents in the research center of Naga College Foundation, Inc. may have several limitations or inefficiencies. These limitations could include issues such as outdated technology, lack of integration between different system modules, difficulty in accessing or retrieving documents, and inadequate organization or categorization of research materials.

2. The current system used for storing, managing, and retrieving research documents at the research center of Naga College Foundation, Inc., may have encountered challenges and limitations that hinder its efficiency and effectiveness. These challenges could include issues such as inadequate storage capacity, lack of user-friendly interface, difficulty in document retrieval, and potential security vulnerabilities. Identifying and understanding these challenges will help in devising solutions to improve the overall functionality and usability of the system.

3. The design and development of new system modules for the storage, management, and retrieval of research documents will aim to address the identified limitations and improve the overall efficiency and effectiveness of the system. The new modules may include features such as enhanced search functionality, better document organization, improved user interface, and streamlined workflow processes.

4. The newly designed and developed system modules have been implemented successfully and are expected to improve the overall effectiveness and efficiency of document management processes. This assumption is based on the premise that the new system modules address the identified challenges and limitations of the previous system, providing enhanced features, user-friendly interfaces, streamlined workflows, and improved performance metrics.

5. The evaluation of the post-study system usability using the International Business Machines (IBM) - Post-Study System Usability Questionnaire (PSSUQ) will provide valuable insights into the user experience and satisfaction with the newly developed system modules. This evaluation will help determine whether the new system effectively meets the needs of users, improves usability, and enhances overall user satisfaction.

Scope and Delimitations of the Study

This research and development project shall store the digital formats of a wide range of research papers, theses, dissertations, and scholarly works produced by faculty, researchers, and students affiliated with Naga College Foundation. The study shall cover designing user-friendly interfaces and advanced search functionalities to ensure proper accessibility for faculty, researchers, students, and other stakeholders. It shall also include development of features that shall facilitate alumni engagement, enabling former members of the academic community to access and contribute to the repository, subject for critical evaluation and approval of the research committee, prior to inclusion into the knowledge base pool. The scope includes an administrative dashboard with tools for efficient content curation, updates, and overall management, empowering librarians and administrative staff.

This research and development project shall not include non-academic materials, ensuring a focus on scholarly works and research outputs relevant to the academic mission of Naga College Foundation. It shall also exclude non-digital formats (e.g., scanned documents) as the search algorithm greatly depends on the text content of the document. And the repository's primary focus is on the digital copy of the research documents submitted by individuals affiliated with Naga College Foundation, and it will not encompass research from external institutions unless in collaboration with NCF. For the first development phase of the system in compliance with the Thesis 1/Capstone 1 subject, the scope would only be limited to the College of Computer Studies department of Naga College Foundation.

Significance of the Study

The NCF Research Nexus: A Research Repository for Naga College Foundation will be beneficial to the following Stakeholders:

Researcher. Students, both undergraduate and postgraduate, can access a comprehensive repository of research papers, theses, and other academic resources. This aids in their academic endeavors, research projects, and enhances the learning experience.

Researchers. Faculty members and researchers at Naga College Foundation can benefit from a centralized repository by having easy access to a wealth of research materials. This facilitates their scholarly pursuits, curriculum development, and collaborative research initiatives.

Research Staff. Research staff involved in academic planning, accreditation processes, and institutional research can benefit from a well-organized repository that provides quick access to historical and current academic data.

Alumni. Alumni seeking to stay connected with the academic output of Naga College Foundation can benefit from a repository that preserves and showcases the institution's research legacy.

LRC Staff. Librarians responsible for managing and curating academic resources will find the repository valuable for efficient cataloging, archiving, and retrieval of research materials.

Other. The repository contributes to the legacy of the institution by preserving and making accessible a wealth of academic knowledge for future researchers.

Definition of Terms

The following terminologies were defined to provide clarity and understanding throughout the study, both conceptually and operationally.

Repository. A repository is a centralized location where data, information, or resources are stored, organized, and managed. It serves as a container or database that holds a collection of items, and it is designed to facilitate easy access, retrieval, and management of those items.

Nexus. A connection or series of connections linking two or more things

Configurability. Refers to the ability of a system or a software application to be easily customized or adapted to meet specific requirements or preferences without requiring significant changes to its underlying code or structure. A configurable system allows users or administrators to modify certain settings or parameters, tailoring the system's behavior to suit their needs.

Microservice. Microservices are an architectural and organizational approach to software development where software is composed of small independent services that communicate over well-defined APIs. These services are owned by small, self-contained teams.

API. API is an abbreviation for Application Programming Interface which is a collection of communication protocols and subroutines used by various programs to communicate between them. A programmer can make use of various API tools to make their program easier and simpler. Also, an API facilitates programmers with an efficient way to develop their software programs.

2. METHODOLOGY

Methods of Research

The methodology employed in this research involves a comprehensive examination of existing literature on repository design and functionality. Additionally, interviews and surveys may be conducted to gather insights

from stakeholders in the academic community regarding their preferences and needs concerning research repositories. This qualitative and quantitative data will be analyzed to inform the development of a cloud-based research repository model tailored to the requirements of academic institutions. Emphasis will be placed on the implementation of an online publication and subscription model to facilitate ease of access and utilization.

Respondents of the Study

This project will take place at Naga College Foundation, Inc. The people involved, crucial for determining the repository's effectiveness, will come from different parts of the academic community.

Firstly, undergraduate and postgraduate students will form a significant portion of the respondents. Their insights will illuminate how the repository enriches their academic journey. From accessing scholarly resources to leveraging the repository for research projects, their perspectives will shed light on how the platform contributes to their learning experience.

Additionally, researchers actively engaged in scholarly pursuits at Naga College Foundation will play a crucial role. Their firsthand experiences with the repository will provide invaluable feedback on its effectiveness in supporting their research endeavors.Their feedback will provide insights into how the repository promotes cooperation, helps with literature review procedures, and improves research dissemination.

Finally, faculty members will share their opinions as they play a crucial role in forming the academic landscape. Their responsibilities go beyond using the archive for independent study projects. They will provide information on how the platform affects curriculum development, makes it easier for colleagues to share knowledge, and encourages cooperative research projects inside the university.

Data Gathering Procedure

The methods and instruments the researcher used to collect data are listed in this section.

Surveys. It is a process for gathering information from the person or people being interviewed by asking questions and providing prompts.

Research Tool

Survey Questionnaires: The researcher can obtain vital data and specifications required for system design and development with this type of guided-response questionnaire. Questionnaires regarding the proposed system and the current system will be provided.

Software Evaluation Tool. The researcher can assess user feedback on the system and satisfaction with this tool. We'll evaluate the system's functionality, usefulness, durability, and portability.

Probability sampling methods

Probability sampling means that every member of the population has a chance of being selected. It is mainly used in quantitative research. If you want to produce results that are representative of the whole population, probability sampling techniques are the most valid choice.

Stratified sampling method. Stratified sampling involves dividing the population into subpopulations that may differ in important ways. It allows you to draw more precise conclusions by ensuring that every subgroup is properly represented in the sample.

To use this sampling method, you divide the population into subgroups (called strata) based on the relevant characteristics (e.g., gender identity, age range, income bracket, job role).Based on the overall proportions of the population, you calculate how many people should be sampled from each subgroup. Then you use random or systematic sampling to select a sample from each subgroup.

Interview. Developing a set of open-ended or semi-structured interview questions.Conducting one-on-one or group interviews with the respondents.

Descriptive Statistics. It will give the researcher the measurements of variability and averages in addition to a summary of the data.

Inferential Statistics. It allows you to extrapolate predictions and inferences about a larger population from a sample of data collected from that community.

Systems Design

The NCF Research Nexus aims to provide a centralized platform for storing and accessing the finished thesis and dissertations of the students. Hence, the proposed system is designed to handle large numbers of concurrent users while ensuring efficient search and retrieval of the documents, to achieve those aims, the system would comprise 3 components; interface layer, application layer, and data management layer.

The interface layer is designed to have a simple and user-friendly interface, ensuring an efficient and seamless user flow experience in searching, accessing and downloading documents. The search query could require varying choices such as document name, author, and other metadata.

The application layer is designed to achieve an efficient data retrieval and handling concurrency. This layer would house the APIs, search engine, and other microservices that would process the system core functionalities.

The data management layer would be responsible for the data storage and process any retrieval request sent from the other layers. This layer consists of the DBMS or the Database Management System that would store all the system information, such as user credentials, documents, and etc.

The system is also designed to offer several key features that are aimed to enhance efficiency and user experience, such as; a full-text typographic error-safe search engine, faceted or filtered search, download

and access control, document upload and management, version control, and data analytics.

For scalability and performance, the system is designed to implement asynchronous processing, and caching added with horizontal scaling powered by its backend architecture.

Systems Architecture

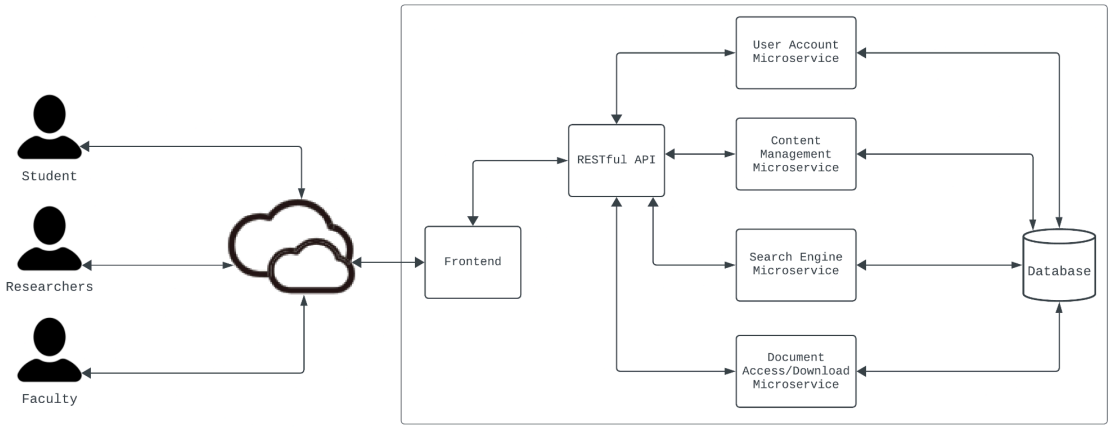

Figure 1.1. System Architecture

The proposed system for NCF Research Nexus encompasses a hybrid approach by combining a Client-Server and Microservice Architecture wherein the core functionalities are subdivided into several microservices, such as User Account, Search Engine, and Document Access/Download Microservices.

User Account Microservice: This microservice houses the account creation, and management features of the system. It would be responsible for processing of user credentials to store and retrieve data from the database.

Content Management Microservice: This microservice would be responsible for document upload, store, update, archive, and report. The results processed by these microservice would be displayed back to the frontend for the user's view.

Search Engine Microservice: This microservice would be responsible for processing the search query of the user. It would be the one to implement the searching algorithm, and results filtering. The results processed by these microservice would be displayed back to the frontend for the user's view.

Document Access/Download Microservice: This microservice would be responsible for the content access control and download control that would limit content access and download via authorization, preventing unwanted user access on certain documents.These microservices are designed to deliver NCF Research Nexus' core functionalities efficiently and effectively. Meanwhile, these microservices would deliver the data to the frontend using the RESTful API.The proposed system is expected to be developed using Flutter for the frontend, Node JS for the backend, and MySql for the DBMS(Database Management System).

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Responsibilities of a Thesis Adviser

1. Serve as an advocate for the student.
2. Guide the student in the planning and implementation of an original research topic that can be successfully completed within the expected time frame for the degree program.
3. Establish with the student a realistic timetable for completion of various phases of the program.
4. Be accessible to give advice and provide feedback both on the manuscript and system development, while also establishing for the student a realistic timeline for receiving feedback. Feedback should be professional and constructive and provide concrete guidance for improvement.
5. Ensure that students understand the relevant theories and the methodological and technical skills necessary for the research, including provision of information through an ethical review process where applicable. Ensure that students adhere to responsible conduct of research standards for your field.
6. Communicate in a timely manner if the student's academic performance is not meeting expectations, providing an outline for what actions need to be taken.
7. Provides a written report of the student's progress on a regular basis.
8. Advise the student on seeking additional funding, as needed.
9. Encourage participation in seminars and colloquia.
10. Encourage and assist students to attend and present work at local, national, or international conferences and to publish their work in appropriate journals.
11. Contribute to the student's professional development through letters of reference and general advice.
12. Be sensitive to academic needs and concerns that may arise in the conduct of the study.

NOTICE OF ACCEPTANCE

I acknowledge the role of being an Adviser together with the duties and responsibilities that comes with it.

Conforme:

JOHN RYAN B. LORCA
Signature over Printed Name/Date

Naga College Foundation, Inc.
COLLEGE OF COMPUTER STUDIES
PACUCOA Level 2 for BS Computer Science

January 19, 2024

John Ryan B. Lorca, BSIT
Instructor, Naga College Foundation Inc.

Dear Sir/Madam,

Greetings!

We/I, the/a third-year student(s) of the College of Computer Studies pursuing a degree in BS Computer Science/BS Information System is/are currently enrolled in Thesis Writing 1/Capstone Project 1. I/We have successfully passed my/our Proposal Defense last (indicate the date). My approved Research Title is (indicate the title of your research project).

We/I are/am writing to humbly request your service and expertise to serve as our/my Thesis Adviser. We/I believe that your knowledge and insights will be valuable and will greatly enrich our/my research work.

Thank you very much for your consideration and we/I hope you will be able to fulfill our/my humble request.

Respectfully,

John Rey Tolosa, Arnel Almario Jr.
The Researcher(s)