Research Management System of Third Year and Fourth Year CITE students with Similarities Referencing, Agenda Mapping and Analytics

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Capstone 1

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Research Management System of Undergraduate Students with Similarities Referencing, Agenda Mapping and Analytics

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CHAPTER 1

1. INTRODUCTION

Almost every academic year, there is always a capstone course wherein students have to do their thesis/capstone/design (Stephanie, 2021). It is one of the terminal courseworks that has to be done in college before graduating. At some point, students and faculty members do not know if the titles for their thesis are the same as the thesis that has been made in the previous years. With a growing population of students enrolling every year, professors did not recognize if the titles of each group are just the same, especially if it was done a long time ago. As a result, the titles for some thesis are redundant because faculty members do not have access to the previous thesis titles, they only have hardcopy for all the thesis that the students submitted in the past years. If they want to know all of it, the work they have will be more hassle because they will manually check it. Moreover, that's the only dilemma of the faculty members because they do not have easy access to it. And there's no easiest way for it but to check it one by one manually.

An effective research management system would assure the methodical filing, storing, securing, and retrieval of important data. A system will significantly improve an organization's business prospects through digitization of information and will practice paperless business processes. The employee can access, examine, alter, share, save, and organize data with the use of an online document management system. Additionally, it avoids wasting time on pointless document searches (Selvirahkesh, 2014).

The goal of this project is to produce a management system where theses, as well as capstones, that are submitted in the Technological Institute of the Philippines Manila will be stored in the system. The system has a record of the capstone topic and their respective titles,

adviser who approved it, capstone author/s which is/are the CITE student/s who wrote the thesis. Lastly, the system has analytics of common research titles, example word cloud and a tree diagram of related titles, listed through history of date/ date history.

New features in our system is to enable users to search for similarity between each thesis and capstone title. Additionally, the technology enables mapping with the research agenda for the college. Lastly, to create analytics for subject versioning and research productivity.

Overall, the project can be a great model for the college research repository through the system wherein it will hold all the thesis titles with its data. The system provides a web interface for the accessing of all the previous thesis titles. This is useful especially with the faculty members because they do not have to struggle if the titles of the students have already been done before or in the previous years. With the increasing number of students every year, the system will help the professors to have easy access to the website and just search for the thesis titles.

2. PROJECT OBJECTIVES

General objectives:

This project aims to develop a web application that will serve as a repository and manage documents for research output. It will employ referencing of existing undergraduate research topics and mapping research.

Specific Objectives:

1. To construct a repository and management system of capstone documents, capstone information with information tagging;

2. To integrate features of the system that allows searching the similarities of previously approved and submitted capstone topics;
3. To design a feature in the system that allows mapping of uploaded research to college research agenda.
4. Develop an analytics of research topics and its productivity, and other analytics that can help the college administrator, faculty members and students;

3. SIGNIFICANCE OF THE PROJECT

The study aims to provide a platform for the CITE TIP department to locate previous, present, and capstone projects, which also serves as a basis for proposing projects and recommendations. This study will also serve as a prototype for a better management system that future researchers can use for further improvisations and in different organizations.

CITE TIP - This study will practice technology usage by providing a platform that will cater to and manage all capstone projects. This study will also recognize capstone projects in the CITE TIP department in discovering useful systems that CITE TIP can use.

Professors - This study aims to provide professors easier access to all capstone projects. The study will aid professors in providing new project recommendations for future and present researchers. This study will also help professors recognize relevant topics and suggest improvisations for researchers willing to continue the same project.

Students - This study aims to provide students a platform to access previous capstone projects. This study will help students recognize relevant topics to their proposed system and look for improvisations that the present project lacks. This study also allows students to conceptualize

new feasible, useful ideas in different or specific organizations. This study will also help students in cross-referencing their respective capstone titles.

Future Researchers - This study will serve as a prototype or an idea for future researchers that wish to continue and use its function in providing other organizations with a better management system.

4. SCOPE AND DELIMITATIONS

This study focuses on the creation of Thesis Document Management System with searching functionality, wherein it will hold all the capstone projects with its data for the previous and present projects. The study aims to find the capstone projects by just looking for it in the web system using the search functionality. The system focuses on advanced file system capabilities, such as the ability to modify and save files online. It also provides a web interface for the accessing of all the capstone project titles.

This study, at present, will be limited to the professors as well as third year and fourth year college students of the College of Information Technology Education at the Technological Institute of the Philippines - Manila Campus. This study is limited to finding the titles, documentation of the projects, authors and professors who approved the capstone project. It will not extend to the advanced functionality such as detecting plagiarism.

5. DEFINITION OF TERMS

Analytics - is the procedure for identifying, analyzing, and expressing meaningful patterns in data.

CITE - stands for College of Information Technology Education, it is a department in TIP Manila related to technology.

Cross reference - permits linking to other sections of the same document.

Mapping -a method of matching in which the points of one set are compared to the points of another set.

Thesis - a long paper on a certain topic, especially one written for a higher college or university degree.

Title - introduces the study by summarizing the core topic, and is often brief and to the point.

Undergraduate students -these are college students pursuing bachelor's degree.

Website application - It is a computer software that carries out a certain task using a web browser.

CHAPTER 2

REVIEW OF RELATED LITERATURE

1. WEB ENGINEERING

A study by Prebreza et al. (2021) stated that Web Engineering is the process of acquiring and organizing knowledge about web application development, thereafter, using that knowledge to create web apps or solve new problems. Web application complexity and variety can also be managed through this method. Most operating systems can accommodate the web browser's hardware and software needs; they serve as user interfaces via which web programs can interact. Since the inaugural Web Engineering Workshop was held in Brisbane, Australia, in conjunction with the WWW Conference in 1998, it has been gradually gaining traction to meet the specific requirements and challenges of developing web-based solutions (Ginige & Murugesan, 2001, as cited in Prebreza et al., 2021). Web engineering aims to build a foundation for the future expansion and maintenance of a web system while fostering the online community's innovative spirit. As a result, the essence of web engineering is to manage the variety and possible complexity of web applications to avoid failures that could have this significant consequence.

The Digital age has transformed the production and use of documents worldwide. Several software developers began working on web-based document management systems as early as 1980 (Prebreza et al., 2021). Paper documents, which comprise not just printed and published ones but also images and prints, are used in these systems. Another method was developed that could handle electronic documents, such as those files written on computers and saved in the user's system's local file system (folders). Electronic documents, collaboration tools, security, work, and auditing abilities have all been added to the list of available applications. Managing

papers and reducing the number of physical copies is the primary goal of a document management system (Meurant, 2014). In an information-heavy project, document and project management are intertwined. To conclude a project, documentation is frequently created to explain what was developed or how it was recycled. A document management system can be used to track the progress of a project if the organization can identify the papers that generate the output and those that are required at various intermediary stages (Abbasova, 2020).

Since the emergence of document management systems, many businesses and companies have put forward different types of interfaces and web applications to contribute to software document management. Prebreza et al. (2021) have mentioned two document management systems that recognize a faster system for documenting and arranging files systematically without much hassle and with fewer errors in the process. Filehold and LogicalDOC are document system management software that emerged in 2019 (former) and 2006 (latter). *Filehold* order and rules for document generation, review, and approval created and used to reorganize the electronic work in progress. The management system of *LogicalDOC*, on the other hand, helps the company make better use of its resources. As a result, substantial gains in output are realized (Al-Fedaghi, 2011, as cited in Prebreza et al., 2021). This system makes it possible for everyone in the organization to access the information and knowledge generated there.

In designing a system, its architecture comes into the picture. Tables are discovered and presented, and the database's design is also developed in tandem with those. Sequentially, a comprehensive breakdown of the system is provided. Shaw and Garlan (1996, as cited in Prebreza et al. 2021) state that system architecture handles the distribution of software

components such as processes, objects, and subsystems by inserting these components into the database and the web server while also taking non-functional requirements into account: security, usefulness, and speed of the system. With this system being an application available on the web, appropriate technologies and programming languages should be considered among the pile of present databases that will fit one's framework.

The pinnacle and cornerstone of developing one's project management are to look back at the techniques and process of constructing it successfully. It is imperative and gradual to know the basics and origins of web application down to its architecture and succeeding administration to procure a web application. A tremendous and applicable system will only flourish once the system developers further understand each step, then lay a solid foundation to lessen flaws and oversight. It is deemed helpful to the application of the Capstone Management System. With advancements in information technology and the digitalization era, the goal is to create an online application for storing a record of the capstone topics and their respective titles, the adviser who approved it, capstone author/s which is/are the CITE student/s who wrote the thesis as well as it's content for cross-referencing.

Existing Thesis Management System

1. CollaborateIT: A CCS IT Thesis Portal with Electronic Document Management System

A thesis is one of the major requirements before graduating from college. The goal of a thesis is to determine students' skills based on their learning from their previous years in college. Achieving an outstanding thesis project should be done precisely and effectively as it conveys answers to present issues.

According to the study by Elin Del Rosario, Julian Del Rosario, Mirro Nieva, Tiarra Tan, and Marivic Tangkeko (2016), difficulty in time while undergoing Thesis was the one that outstands most of the problems that occurred to the interviewees. In support, they gathered relevant data and comments, which concluded them to conceptualize their system. Running out of time is stressful, especially when they have to meet specific deadlines. In specific, a whole thesis process runs from two to six months. Finalizing a topic was one of the most time-consuming during the thesis process. Multiple questions such as its feasibility and relevance mainly hinder them in proceeding to the next step.

A web portal is a system that stores different information circulating on the web (Atlantic Webfitters, 2014). It compiles data and information obtained from different resources and stored together in a single place that can be accessed by multiple users (Eldrandaly, 2009). An Electronic Document Management System (EDMS) is a software program that helps manage documents electronically. An EDMS must have basic functions such as storing documents, retrieval of documents, and document management. In order to qualify as a management system, an EDMS should provide proper security access to the information stored as it is accessible to multiple users (Minnesota Historical Society, 2012).

Combining these two concepts, researchers were able to develop a system with the components of an EDMS and a Portal, the CCS IT Thesis Portal with Electronic Document Management System. A system that solves current problems faced by most of the students that are undergoing Thesis. A system that is capable of handling the whole thesis process, as well as managing thesis documents. This type of system can be beneficial to those who are taking Thesis, as it can avoid prolonging the whole thesis process.

This study identified significant problems during the thesis process, mainly with time. Systems like this are helpful to faculty as it helps them save time in locating and reviewing thesis documents, and for the students, this system will assist them in providing a better thesis process.

Author	Application	Features	Purpose
del Rosario, E., et al.)	CollaborateIT: A CCS IT Thesis Portal with Electronic Document Management System	● Thesis Preparation ● Thesis Consultation ● Defense Scheduling ● Thesis Evaluation ● Document Management ● Report Generation	● To handle the entire thesis process and provide document management to help students maximize their time for each task.

ELECTRONIC DOCUMENT MANAGEMENT SYSTEM

A study by Estrera (2017) stated that the Electronic Document Management System (EDMS) was established to minimize loss and inconsistency regarding the way memos and information were written, saved, and sent from one area to another. This was done to avoid inconsistency and loss. According to the findings of the study, three departments at the College of the Capitol have completed and validated the Electronic Document Management System. These departments include Business Administration, Computer Studies, and Criminology. During the evaluation part of this study, time discrepancies for the documents that were reviewed were detected. These discrepancies were then monitored in order to more clearly visualize potential savings that could be achieved through cost-cutting techniques. According to the individuals who were responsible for evaluating the study, the Electronic Document Management System lives up to expectations in terms of both its level of quality and its level of effectiveness. It is highly recommended that the study be implemented across all academic divisions of the university. In addition, it has been suggested that the Electronic Document Management System will carry out additional research in order to enhance the study and bring it online in order to give a system that is both streamlined and comprehensive for the management and tracking of documents.

Nowadays, we are surrounded by digital technology. Almost the majority of the companies are already using artificial intelligence to work as an alternative for human work. It is being implemented to ease the work of humans and to avoid discrepancy because it might occur some human error when it is not monitored properly. Example to this is the storing, keeping, monitoring, and transferring of important files and documents. There are cases that as they are being processed, some problem occurs such as, losing documents or misplaced due to

inappropriate handling. And if that's the case, repetitive processes to retrieve these files might happen especially in companies and big universities. With this problem, the Electronic Document Management System was developed in the University of Science and Technology of Southern Philippines in Cagayan De Oro City. The eight-college Capitol University is promoting the use of technology to improve its processes. One of its strengths is ensuring accurate file entries or comprehensive departmental accomplishments. Students and faculty documents, instruction manuals, library files, laboratory papers, physical plans, community involvement outputs, organizational documents, and administrative files are arranged within these file entries. The use of a catalog is a component of document management systems. It is used to organize files according to which documents they contain (Estrera, 2017).

In addition, Capitol University makes use of the Cataloging system, however it is only based on the Quality Management System, with files being tagged to link numerical references. In order to establish effective quality management, Capitol University created and implemented a Quality Management System (QMS) in April 2006. This QMS encompassed all the necessary processes, procedures, objectives, responsibilities, resources, and infrastructures. Quality Policy, Interactive Processes, Quality Manual, Documented Procedures and Work Instructions, Documents Needed to Operate, Monitor and Control Processes, and Quality Records are all part of the Quality Management System (Figueroa, 2010, as cited in Estrata, 2017). The study is being carried out in three colleges such as, College of Business Administration, College of Criminology, and College of Computer Studies.

Estrera (2017) also mentioned that the accreditation committee, the Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA), has been tasked with reviewing these materials. During quality control, inspectors must quickly search

shelves for the required paperwork, they are given only thirty seconds to do so. The PACUCOA made sure that reliable records were readily available. The files must be complete, legible, and up to date within five years based on the quality of the documents. Minor inconsistencies in the application of the University's documentation policy were indicated by the non-conformances to the Quality Management System recorded by the Internal Quality Audit from 2007 through 2011. Absence of QMS number, incomplete files, lack of file organization, and dispersed records are all examples of such failures. Further, the disposition logbook's entries have been inconsistent due to issues with recordkeeping (QMS, 2011, as cited in Estrata, 2017).

The study was made to build and implement an Electronic Document Management System to support the Quality Management System of Capitol University. The researcher will also identify issues with the current documents management system at the three colleges and will then create an Electronic Document Management System to meet their needs. The next step will involve comparing the EDMS to the current document management system in terms of quality, speed, and cost, after which it will be deployed in three universities. According to Estrera (2017) Electronic Document Management System has structured design, it is used consider the needs of the system. After the enhancement of Electronic Document Management System, the program module diagram is made to precisely specify each procedure and then the entity relationship diagram (ERD) is then used to plan out the database structure of Electronic Document Management System (Shelly et al., 2009, as cited in Estrera, 2017).

The researchers from the Department of College of Information Technology Education at the Manila Campus of the Technological Institute of the Philippines will use this study as a reference for their capstone project, and with the help of this study, they will be able to use this study. The purpose of the Thesis Document Management System is to archive all of the capstone

projects along with the data pertaining to those projects, both from the past and the present. As a result of this, it will be simple to locate the capstone projects, including the titles, documentations, authors, and professors who approved the capstone projects, by simply searching for it on the web system using the search functionality. This will make it possible to find the capstone projects quickly.

DOCUMENT MANAGEMENT SYSTEM FOR CLOUD ENVIRONMENT

In today's information-rich society, it has become difficult to manage documents effectively, according to a study by Kao & Liu (2013). These requirements have two components: sharing and collaboration as well as universal access. Users can access all documents through ubiquitous access from any location and on any device. Users will find it simpler to browse, retrieve, and manage documents as a result. Sharing and collaboration within associations are essential and advancing as a result of globalization and the high degree of work division (Erickson et al., 2009, as cited in Kao & Liu, 2013). Colleagues may work together on a single project while sharing a specific set of supporting documents. In order to give users a quick and effective way to access, manage, and share information, a document management system is introduced. To gather, track, and store electronic documents like PDFs, word processing files, and digital images of paper-based content, a system or process known as "document management" is employed. The central repository, audit trails, access control, document security, and streamlined search and retrieval are all provided.

The two aspects of the study's focus led Kao & Liu (2013) to suggest three potential organizational solutions. Users can store data and integrate it across various platforms or devices with the help of data storage systems, content management systems, and consumer cloud storage services. Systems for storing data are in charge of making information accessible across a network for various uses. To grant users access to specific information, a number of access protocols are implemented; this makes the system complex because implementing the protocols requires advanced IT knowledge. Users can exchange information effectively through content management systems on the internet or the world wide web. Organizations can use this system to distribute particular content to particular users. Consumer cloud storage offers users easily accessible online storage space that can be accessed through the internet. Some cloud storage services enable users to download an application that quickly syncs data from their local computer to the cloud storage; this system is better suited for personal use because it can be installed on the user's device.

The document management server, which has three modules (user, device, and document), and the device agent, which has two modules (device and synchronization module), make up the architecture for the private cloud's document management system. The user, device, and document must be identified for effective data manipulation, which is the responsibility of each module in the document management server. To exchange user and device data, the device module connects to the server. The synchronization module, in contrast, verifies data accuracy going from the device to the server and back.

The document management system that met the two requirements was reviewed by faculty and students, as shown in the case study by Kao and Liu (2013). Two benefits of device synchronization include the ability to access accurate data from any device at any time. The control and management of the documents, including the changes made by a user, the timing of changes, and student collaboration, were made easier by the document sharing.

This study investigated the capabilities that a document management system for an organization should have in order to efficiently access, share, and manage documents. The case studies presented illustrated the advantages of using a dependable management system in various circumstances.

SEARCH ENGINE OPTIMIZATION TO ENHANCE USER INTERACTION

According to the study of Lemos and Joshi, websites must perform search engine optimization (SEO) in order to rank higher in search results and receive more user-requested page views. In order to let users view the most popular page out of the many pages available in the search results, this search engine ranks provides better and optimal results. In addition to helping websites rank higher on search engines, it also helps them compete with competing websites since every website owner wants to see their own website listed first. The ideas and fundamental techniques of SEO are presented in this paper. Additionally, it describes the various methods that search engines use to enhance their outcomes. Also, it has an observation part that compares various SEO strategies (Lemos & Joshi, 2017).

Search engines examine original results that are used in SEO tactics to make a website more popular. These strategies aid governmental and commercial institutions in promoting their

websites and boosting traffic in and out of them. SEO raises a website or web page's rating in the list of search engine websites by using the found search results. Additionally, SEO takes into account a number of factors to improve a website's ranking, including the speed with which a search engine responds to a particular website, how frequently users visit those sites, the kinds of search terms they enter in the URL, and the kinds of search engines they prefer (Yadav and Kumar, 2015).

To find a group of keywords that will be employed in optimization, keyword analysis is used. It is simple to ascertain which keywords are commonly entered in search URLs once the list of keywords has been determined. The results of the keyword research phase are instances of a specific keyword in URLs. There are a variety of keyword finders available that accept keywords as input and output the number of times that keyword has been used by users, or its occurrences. The strongest competition inside the search results will be a certain keyword, nevertheless, if it appears the most frequently in the search results (Lemos & Joshi, 2017).

In this study, they examined how different algorithms affect search engine results, which raises web page rank. Websites are presented in accordance with their rank, which is determined by factors including content, inbound and outbound links, and others. In a cutthroat market, this analysis will aid in enhancing search engines' overall performance.

Mapping research in student engagement and educational technology in higher education: a systematic evidence map

A study by Bond et al. (2020) stated that researchers, practitioners, and policy makers alike have paid an increasing amount of attention to both the conceptualization and measurement of what is known as "student engagement", over the past years. Several works, including Astin's

theory of involvement, Fredricks, Blumenfeld, and Paris's conceptualization of the three dimensions of student engagement (behavioral, emotional, and cognitive), and sociocultural theories of engagement, such as Kahu (2013) and Kahu and Nelson (2018), have done a lot to shape and refine our understanding of this complex phenomenon. However, there is still ongoing criticism regarding the strength and depth of student engagement theorizing. The quality of this theorizing has had a direct impact on the rigor of subsequent research, which has prompted calls for additional synthesis.

Bond et al. (2020) also have mentioned that in order to have a meaningful conversation about how to increase student engagement in the digital age, the very first thing that needs to happen is a reflection on previous research that has been carried out in the field. In support of this objective, the purpose of this article is to provide a synthesis of research on student engagement theory as well as a systematic mapping of empirical research conducted in higher education between the years 2007 and 2016 on student engagement in educational technology. This article develops "a tentative theory" by synthesizing the vast body of literature on student engagement in the hopes of "plotting the conceptual landscape possible routes to explore it" (Antonenko, 2015, as cited in Bond et al., 2020) for researchers, practitioners, learning designers, administrators, and policy makers. After that, it examines student engagement in the context of educational technology research, delving into previous literature and systematic reviews that have been carried out. The search procedure for the systematic review is then described, which is followed by the presentation of the findings and a subsequent discussion of those findings.

The incorporation of digital technology into higher education has quickly become an essential component, and as such, it inherently influences the entirety of the student experience. It has also been linked to an increase in both the behavioral and cognitive engagement of students, the facilitation of which is a primary concern of educators. This article systematically maps research from 243 studies published between 2007 and 2016, in order to delineate the complex nexus of technology and student engagement. These studies were published between 2007 and 2016. There were only a handful of studies that attempted to define student engagement, and fewer than half of those studies were guided by a theoretical framework. In the courses that were examined, blended learning and text-based tools were used the majority of the time, and the primary audience for these tools was undergraduate students. Behavioral

engagement was by far the most frequently identified dimension, with affective and cognitive engagement coming in a close second and third, respectively, as a result of the use of educational technology. This article on mapping provides the grounds for further exploration into subject-specific uses of technology to encourage student participation (Bond, 2020).

Building an effective and efficient continuous web application security program

According to Bang and Saraswat, Web Application Security is an ongoing worry for any corporation that relies on the internet to conduct business. Today, a lot of businesses only evaluate dynamic web applications. The majority of these evaluations take place once or twice every two years or longer, depending on the volume of applications from organizations and the scarcity of qualified resources to conduct evaluations. In addition, high-risk applications managing sensitive data are frequently not properly evaluated, putting the system at risk of being compromised or exploited by hackers (Bang & Saraswat, 2016).

Application development teams can quickly spot security problems. These flaws can be found early and frequently when it is least expensive to fix them by integrating automated security assessment tools with the continuous web application security process. In addition to revealing an application's true security state, vulnerability analytics also make it possible to create prediction models that can even foretell how many vulnerabilities of what kind will be added over the course of the following 1000 lines of code authored by a single person. That degree of depth is possible when employing the full program approach, and it has the dual benefits of revealing the true security posture of the entire business (from top to bottom) and assisting in the development of an efficient remediation strategy (Bang & Saraswat, 2016).

The Program provides tools and methods to enable detailed reviews of the overall architecture and corrective actions. The continuous web application security program's main goal

is to minimize the number of flaws at Go-Live in order to save time and money on addressing flaws (Bang & Saraswat, 2016).

The goal of this study is to scale up an effective web application security program for a full organization and to meet the needs of multiple business units. It is driven by an application risk score model. Additionally, it covers how this program may help the company from a security standpoint as well as how to use it to develop effective security awareness, training, internal job rotation, vendor selection, and much more.

Text mining and similarity search using extended tri-gram algorithm in the reference based local repository dataset

A study by Kumar and Tripathi specified that the academic accomplishments are represented by the work that is published in the research journals. They are recognized for their excellent work in accordance with this. When these experts publish high-quality study, they keep an eye on every modern development and uphold the originality of their work in light of this. One of the numerous criteria used to determine a research publication's quality is the current state of the literature in that field. It demonstrates how the current work is coherent and related to ongoing research. Another issue with research papers is how careful, thorough, and helpful the study is for practical applications (Kumar & Tripathi, 2015).

Our research is focused on the reference section to uncover linguistic similarities and decide whether the research paper duplicated a significant amount of information and cited it as a source, or if it copied a smaller amount of text without citing it. The test cases are offered for three major academic text content categories: (a) research articles and papers; (b) master dissertations; and (c) doctoral dissertations. The test cases show distinctive referencing patterns

for each of these copyrightable works. In these works, the strategy to similarity search and plagiarism detection has made use of the extended trigram technique and found it to be helpful (Kumar & Tripathi, 2015).

In the current research paper, references-based textual similarity search has looked into and discovered some interesting facts about the different levels of research works that have different formats. The present work seems to have future potential for the actual analysis of research works that are submitted for publication based on the referencing style and their pattern analysis.

SYNTHESIS

Web engineering is the process of gathering and organizing information about developing web applications, then applying that information to make new web applications or resolve problems. This approach can be used to manage the complexity and variety of web applications. The majority of operating systems are capable of meeting the hardware and software requirements of web browsers and act as user interfaces for web programs.

The Electronic Document Management System was created to reduce misplacement and inconsistencies in the memo and information writing, saving, and sending processes to prevent loss and inconsistency. Thesis Document Management System will save all capstone projects and the information associated with them, both from the past and the present. As a result, it will be straightforward to identify the capstone projects by simply using the search functionality on the web system. This includes the titles, documentations, authors, and instructors who approved the capstone projects.

A document management system can be used to track the progress of a project if the company can distinguish the papers that generate the output and those that are required at various intermediate stages. An organization should have a document management system in order to easily access, share, and manage documents. It is thought to be useful in the application of the Capstone Management System.

One of the key functions of search engines is to enhance its functionality and usability using a variety of methods in order to boost user interaction with a certain website. Search engines look at original results that are employed in SEO methods to increase the popularity of a website. These tactics assist governmental and commercial organizations in promoting and increasing traffic to and from their websites. SEO improves a website or web page's ranking in search engine results by utilizing the discovered search results.

An efficient web application security program that can serve the requirements of many business units as well as the entire corporation. Keeping defects to a minimum is the major objective of the ongoing web application security program.

CHAPTER 3

METHODOLOGY

SOFTWARE DEVELOPMENT METHOD

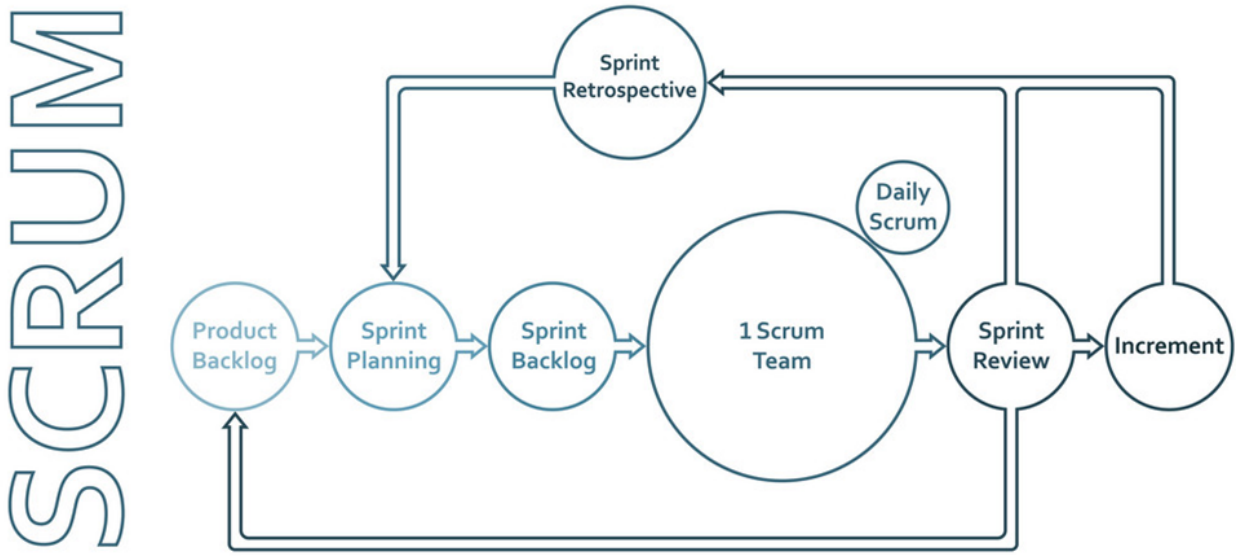


Figure 3.1 Vector Stock (Kostiantyn, 2022)

Product Backlog- it is a list of everything the product needs to please potential customers. The product owner creates it, and the functions are ranked in order of greater and lesser importance to the company. The product owner should provide a solution to the question, "What should be done?". See Figure 3.40 for the product backlog.

Sprint Planning- The purpose of the sprint planning is to specify what will be accomplished during the sprint and how. This meeting, which is held at the start of each sprint, decides how the project will be approached based on the phases and dates in the

Product Backlog. A Sprint is made up of various features. See Figure 3.2 for the minutes of the sprint planning meeting.

Sprint backlog- It is a subset of the product backlog items that the team chooses to work on during the sprint they will be working on. The team decides how long each Sprint will last. A physical board known as a Scrum board is typically used to show the sprint backlog, making the development process accessible to anybody entering the work area. Figure 3.2 presents the sprint backlog of the project.

Daily Scrum- The goal of the sprint planning is to outline the goals and methods for achieving them. At the beginning of each sprint, a meeting is held to decide how the project will be handled based on the stages and deadlines in the Product Backlog. Various features make it into a sprint.

Sprint Review- The sprint review's objective is to demonstrate the work that has been finished in relation to the product backlog for upcoming delivery. After reviewing the sprint's results, the customer should see an obvious and noticeable improvement in the final product.The minutes from the sprint planning meeting are listed in Figure 3.2.

Sprint Retrospective- In order to avoid making the same mistakes again, the team examines the sprint's finished targets and notes both the positive and the negative. From the perspective of the development process, this stage serves to implement improvements. The purpose of the sprint retrospective is to pinpoint potential process

enhancements and produce a plan to put them into action during the following Sprint. Figure 3.2 presents the minutes of the sprint planning meeting.

Increment- The total of all the tasks, use cases, user stories, product backlogs, and any other component created during the sprint and to be made available to the end user as software is the increment.

DATA GATHERING TOOLS AND PROCEDURE

Interview is a qualitative research method that seeks to gain ideas and pieces of information from any individual undergoing a capstone project. Researchers can do many interviews, structured, semi-structured, unstructured, or focus groups. These interviews can gather the information that researchers can map out to produce a solid idea. The team members planned to perform this procedure and expected to interview students that are undergoing capstone projects as well as professors that are handling the course.

Survey is a quantitative research method that collects data from a specific group of respondents. Researchers can hand out surveys either through a printed form or online tools. The team members are expected to perform this gathering technique to identify the challenges faced by the students undergoing capstone projects, specifically during project initiation. Also, for the professors to identify the advantages of implementing a research management system. Lastly, the team members aim to evaluate the importance of implementing a research management system

in providing a platform that is accessible for students that are undergoing capstone projects as well as for the professors that are handling the course. In this technique, the team members can find out concerns, comments, and thoughts on the research management system.

Figure 3.2 Minutes of the Meeting - Topic Proposal

Topic Proposal		
Type of Meeting	Assigning of tasks and Chapter 1 draft checking	
Attendees	Bello, Julia Christine O. Diaz, Vince Edward M. Princesa, Napoleon B. Riel, Angelica Pauline E.	
Discussion	The team members proposed their preferred capstone topic	
Conclusions	Each team members gave their capstone topic they are interested in developing	
Action Items	Person Responsible	Deadline
Project Initiation	Bello, Julia Christine O.	
Project Planning	Princesa, Napoleon B.	

Minutes of the Meeting - Initial Checking

Initial Checking		
Type of Meeting	Checking of Chapter 1 Draft	
Attendees	Bello, Julia Christine O. Diaz, Vince Edward M. Princesa, Napoleon B. Riel, Angelica Pauline E. Regla, Alfio I.	

Discussion	Checking of Chapter 1 Draft	
Conclusions	Revisions on Project Introduction and Objectives	
Action Items	Person Responsible	Deadline
Project Introduction	Diaz, Vince Edward M..	
Project Objectives	Bello, Julia Christine O.	
Significance of the Study	Princesa, Napoleon B.	
Project Scope and Delimitations	Riel, Angelica Pauline E.	
Definition of Terms	Diaz, Vince Edward M.	
Design Constraints	Riel, Angelica Pauline E.	
Decision Matrix	Diaz, Vince Edward M.	
Product Backlog	Bello, Julia Christine O.	
Requirements	Princesa, Napoleon B.	

Minutes of the Meeting - Second Meeting

Second Meeting		
Type of Meeting	Checking on Chapter 1 revisions	
Attendees	Bello, Julia Christine O. Diaz, Vince Edward M. Princesa, Napoleon B. Riel, Angelica Pauline E. Regla, Alfio I.	
Discussion	Checking of Chapter 1 Draft and discussion of Chapter 2	
Conclusions	Add more items in definition of terms and discussion of articles to be included in Chapter 2	
Action Items	Person Responsible	Deadline
Definition of Terms	Diaz, Vince Edward M..	
Web Engineering	Princesa, Napoleon B.	

Existing Research Management System	Princesa, Napoleon B.	
Electronic Document Management System	Riel, Angelica Pauline E.	
Document Management System for Cloud Environment	Bello, Julia Christine O.	
Building an effective and efficient continuous web application security program	Diaz, Vince Edward M.	
Synthesis	Diaz, Vince Edward M.	

PROPOSED COMPUTING SOLUTIONS

Figure 3.3 Design Requirements

Customer Requirement	Design Constraint	Design Criteria	Solution 1	Solution 2	Solution 3
The system must work the search functionality.	The system must be able to list capstone projects using a search function.	Functional Stability	The system must be able to retrieve records by title, keyword, author name, and adviser name.	The system must be able to retrieve records by topic.	The system must be able to classify all stored capstone projects.
The system must handle a high number of documents from previous, present, and upcoming capstone projects.	The system must manage all the project documents.	Scalability	The system must be able to store infinite amount of projects	All capstone projects stored from the last fifteen years can be accessible. The system will automaticall y dispose of	All capstone projects stored from the last ten years can be accessible. The system will automaticall y dispose of stored

				stored capstone projects older than fifteen years.	capstone projects older than ten years.
The system must produce analytical data of the typical dissertation and capstone titles along with their history and information.	The system must generate a history tree diagram of the thesis titles.	Functional Stability	All of the capstone titles' history dates, similarities, and differences must be collected and retrieved.	The system should start with the earliest title of the capstone/thesis connected to the topic of the next date.	The system should produce a graphical representation of the common capstone titles produced.
The system must work on different browsers.	The system must be user-friendly.	Platform Independence	Laravel Framework	PHP	Java
The system must be done.	The system must be completed in 6 months.	Time	6 months	5 months	4 months
The system is only restricted for TIP Gmail	The system is accessible only if the user is using the TIP Gmail.	Security	The system must be accessible by the faculty members and students from TIP only.	All the users must have email identification before entering the system.	The user cannot create a duplicate account using outside TIP Gmail.
The system must have a domain name and database.	The allotted budget for the software development	Cost	₱40, 000	₱35,000	₱30,000

	should not exceed ₱ 50,000 for 3 years.				

Figure _ shows the table of Design Requirements of a project needed to begin the Project Development. For each design requirement, three solutions are required to propose to satisfy the customer requirements and constraints.

System Architecture of the Proposed Computing Solutions

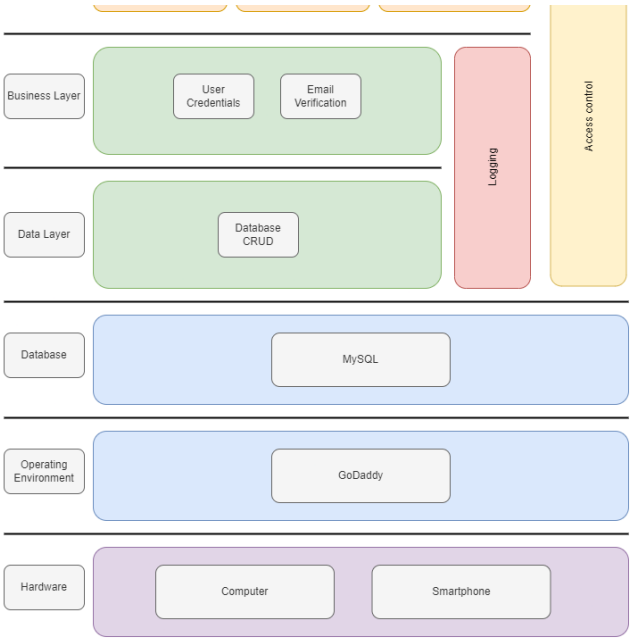


Figure 3.4 System Architecture of Proposed Computing Solution 1

Figure 3.2 shows the System Architecture of Proposed Computing Solution 1. The student, professor, and admin can access the system via a web browser using a computer or smartphone. The system will be uploaded to a Dedicated Hosting to accommodate many users daily. Godaddy is the preferred Web Hosting, making the system reliable and accessible anytime.

For the system's security features, the system will only accept registered TIP email in creating an account and the implementation of email verification to verify the user before accessing the system.

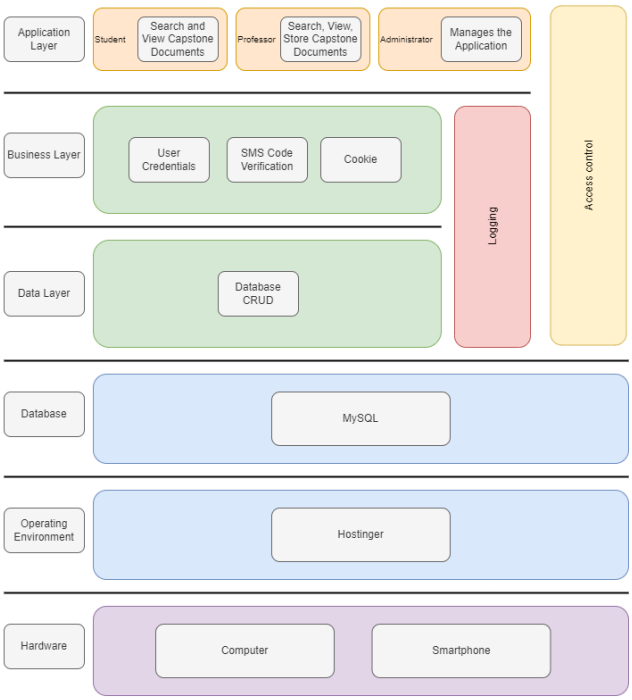


Figure 3.5 System Architecture of Proposed Computing Solution 2

Figure 3.3 shows the System Architecture of Proposed Computing Solution 1. The student, professor, and admin can access the system via a web browser using a computer or smartphone. The system will be uploaded to a Dedicated Hosting to accommodate many users daily. Hostinger is the preferred Web Hosting, making the system reliable and accessible anytime.

For the system's security features, the system will only accept registered TIP email in creating an account and the implementation of SMS verification code to verify the user before accessing the system. Lastly, we have included the cookie implementation to have easier access to the system.

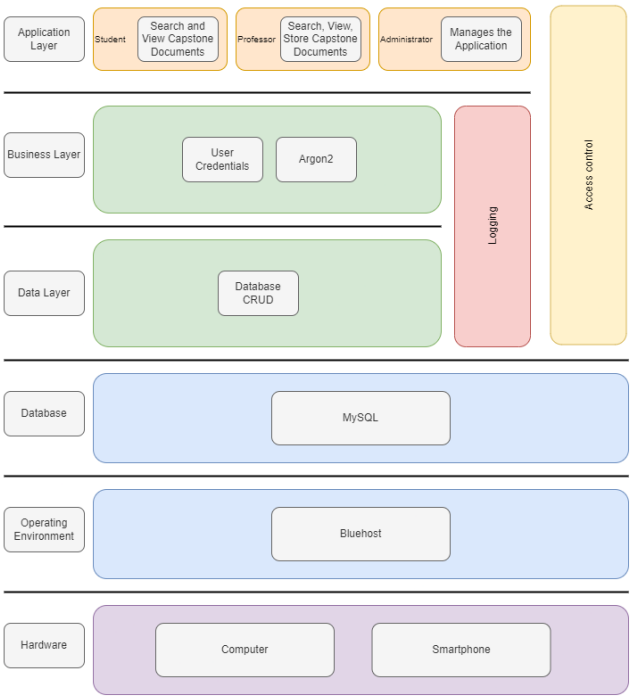


Figure 3.6 System Architecture of Proposed Computing Solution 3

Figure 3.4 shows the System Architecture of Proposed Computing Solution 1. The student, professor, and admin can access the system via a web browser using a computer or smartphone. The system will be uploaded to a Dedicated Hosting to accommodate many users daily. Bluehost is the preferred Web Hosting, making the system reliable and accessible anytime.

For the system's security features, the system will only accept registered TIP email in creating an account. We also implemented the Argon2 algorithm for password hashing to avoid exposing users' credentials that perpetrators can use on any other website that supports the said email address.

Figure 3.7 Evaluation of Proposed Computing Solutions (Decision Matrix)

Customer Requirement	Weight	Solution 1	Solution 2	Solution 3

CR1	15%	14.25%=95x0.15	13.5%= 90x0.15	13.2%=88x0.15
CR2	15%	14.25% =95.0.15	14.4%=96x0.15	14.7%=98x0.15
CR3	15%	13.5%=90x0.15	12.75%=85x0.15	12.45%=83x0.15
CR4	15%	14.85%= 0.15x99	14.25%=95x0.15	13.5%=90x0.15
CR5	10%	0.6%= 6 x 0.10	0.5%=5 x 0.10	0.4%=4 x 0.10
CR6	15%	14.7%=98x0.15	14.25%=95x0.15	13.25%=90x0.15
CR7	15%	13.5%= 90x0.15	14.7% = 98x0.15	14.1% = 94x0.15
Total	**100%**	**85.65%**	**84.35%**	**81.6%**

Figure 3.7 presents the decision-matrix containing the criterion score for each identified computing solution. The score presented in Figure 3.7 came from the literature that used the solution. The solution that has the highest criterion score among the three possible solutions for the Customer Requirements 1 to 10 is Solution 1, which has an average of 85.6%. In comparison, Solution 2 has 84.35%, and Solution 3 only has 81.6% for its criterion score.

- **Descriptive Analytics**

In this subsection, the analytics portion of the capstone project is briefly explained. In essence, the system's descriptive analytics will employ descriptive statistical methods to provide visualizations, such as charts and graphs, of the data.

Figure 3.8 Descriptive Analytics

Analytics Item	Schedule / Descriptive Technique	Visualization
1. Analytics on how common the capstone title is studied through tags.	● Annually. ● Number of tags. (Frequency, Totals, Averages)	● Figures ● Graphs ● Summaries
2. Analytics on which topics or studies are	● Year, tags, subject areas (Frequency, Totals, Averages)	● Figures ● Graphs

related.		• Summaries

The goal of descriptive analytics is to help individuals understand how common a certain topic is studied and what the things or features to improve in a certain or existing study. The summarized data shows how often each study in the system was done and what kind of relationship it had with other studies. The visualization can serve as a foundation for comparing and analyzing the similarities and differences of each study that has been studied in order to improve previous studies; it can also assist in showing which topics are rarely discussed to help in deciding which topics the under-graduated students can focus on.

Implementation Procedures of the Technologies / Approaches of the Winning Solution

Customer Requirement 1

The system must work the search functionality.

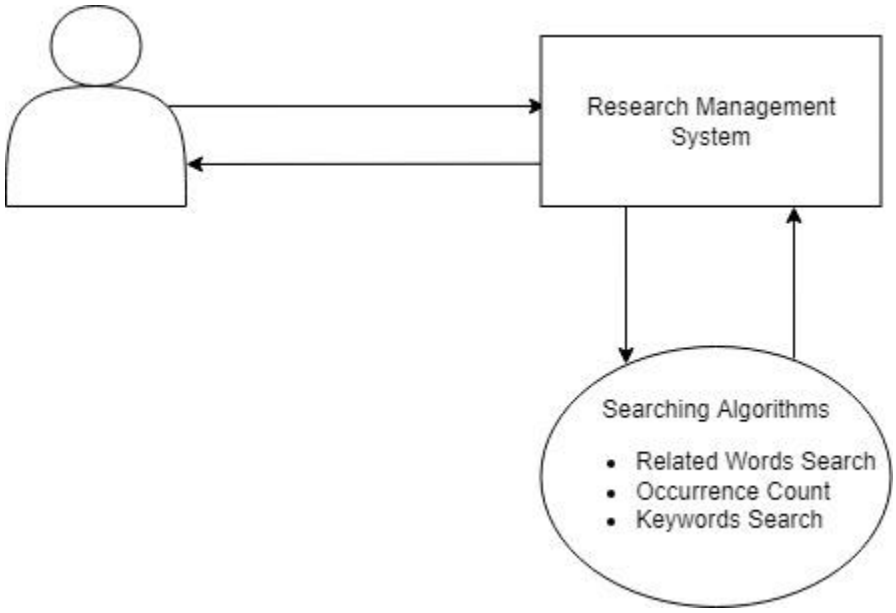


Figure 3.9 Customer Requirement 1

To implement the search function, the research management system implements a number of search algorithms to generate all related information on a topic. Related word search, occurrence count, and keyword search are examples of these types. Related word search generates data determined as part of the concept of the searched word. Occurrence count specifies that it generates a document depending on the number of times a word appears in the document to be selected. The keyword search is a basic search algorithm to generate data that returns the documents that contain the search terms. These searching algorithms are used to supply the user with all the related information.

Customer Requirement 2

The system must handle a high number of documents from previous, present, and upcoming capstone projects.

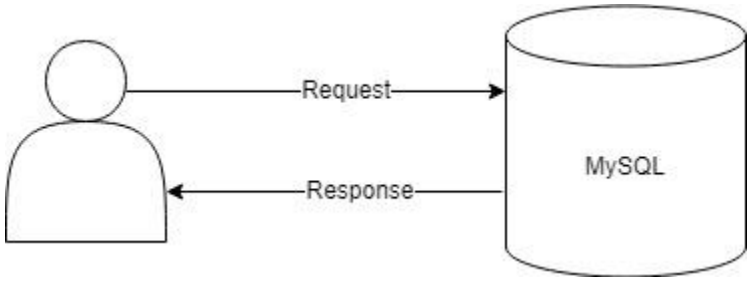


Figure 3.10 Customer Requirement 2

Customer Requirement 3

The system must produce analytical data of the typical dissertation and capstone titles along with their history and information.

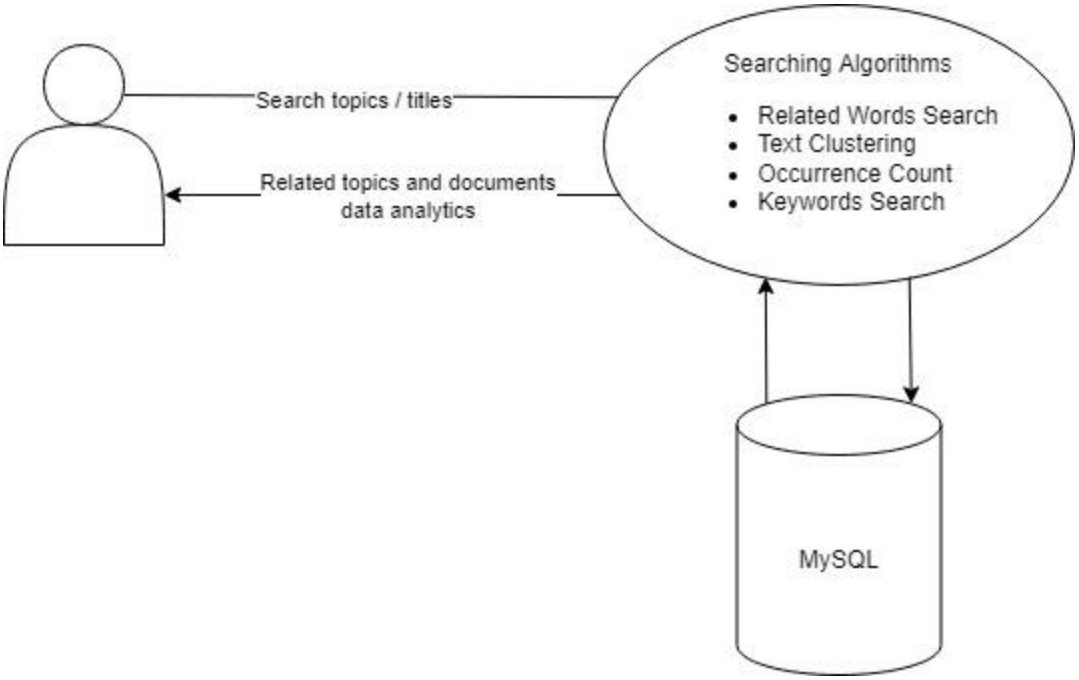


Figure 3.11 Customer Requirement 3

The user will search for a title or topic, and the system will produce graphical representations of data analytics and documents regarding that topic. To get this kind of information, the system will use searching algorithms to go through the records in the database and count the number of times, the total number of times, and the average number of times that the user's topics come up.

Customer Requirement 4

The system must work on different browsers.

The system uses PHP as the programming language, Laravel as the framework, and HTML, CSS, and Bootstrap for its frontend. Laravel is one of the most widely used frameworks for developing website applications, which makes it compatible across different browsers. HTML, CSS, and Bootstrap are the front-end frameworks when it comes to designing and making responsive websites across different browsers. This requirement can also be satisfied by performing cross-browser testing in the development phase.

Customer Requirement 5

The system must be done.

Figure 3.12 Customer Requirement 5

#	Task	Jun	Jul	Aug	Sep	Oct	Nov

1	Planning						
2	Design						
3	Development						
4	Testing						
5	Deployment						

Customer Requirement 6

The system is only restricted for TIP Gmail.

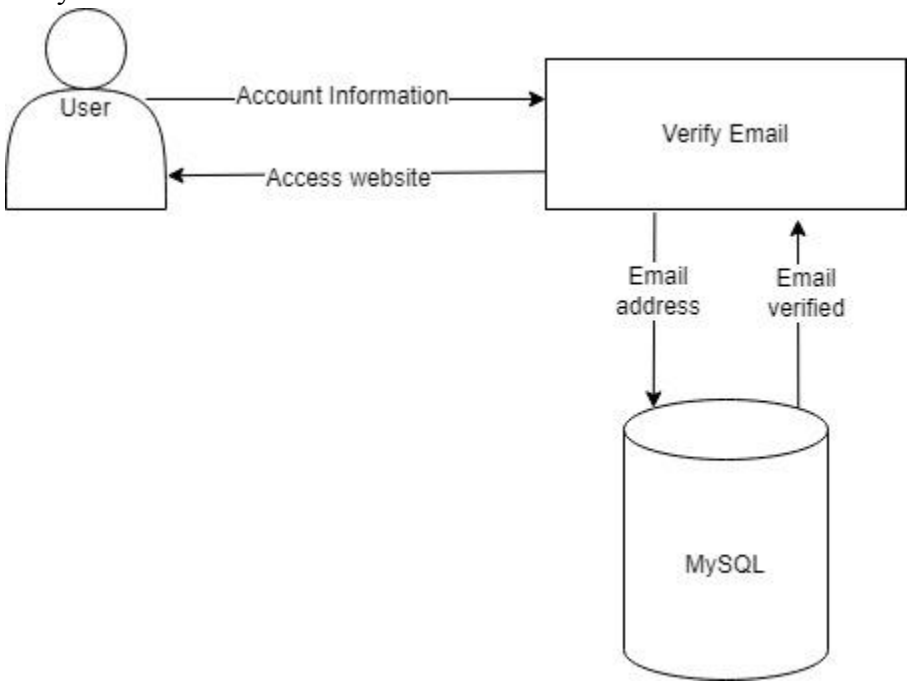


Figure 3.13 Customer Requirement 6

The organization will supply the users with their organizational email address to access the system. The user will provide his/her credentials on the system and the system will verify the email on the server. Once the email has been verified, the user can now access the system.

Customer Requirement 7

The system must have a domain name and database.

The system will be implemented on a web hosting platform by GoDaddy. The system will be hosted using its deluxe plan, which will allow it to have its own domain name and unlimited storage.

- **Software, Hardware, and People Requirements**

Figure 3.14 Software Requirements

Category	Software	Version	Proprietary / Open Source	License Type	Quantity	Item Cost	Sub Total
Project Design	Canva	Pro	Proprietary	Individual User	1	2,490.00	2,490.00
Project Development	Laravel	9.1.10	Open Source	Individual User	1	0	0
Project Development	Visual Studio Code	1.68.0	Open Source	Individual User	1	0	0
Project Development	MySQL	7.4.11	Open Source	Individual User	1	0	0
Project Testing	Selenium	Selenium 4.0 Alpha 1	Proprietary	Individual User	1 user	0	0
Project Deployment	GoDaddy	Deluxe	Proprietary	Individual User	1-year Subscription	3,948.00	3,948.00
Total							**6,438.00**

Table 3.14 shows the required software requirements in the winning solution's project development. Canva will be used in creating the User's interface. The application will be developed using the PHP programming language. The team members will use the Laravel framework for the backend development; for the frontend, Bootstrap will be used. Visual Studio Code is the preferred application that will be used with MySQL for the backend database storage in writing the code. And for testing the project, Selenium will be used to ensure that the application will run smoothly. The application will use dedicated web hosting in the deployment

of the application, and GoDaddy is the preferred web hosting service. Lastly, a total of 3,948.00 pesos for a year of service time is the total cost.

Figure 3.15 Hardware Requirements

Category	Hardware	Version	Specifications	Quantity	Item Cost	Sub Total
Project Design	Lenovo	Lenovo Ideapad 5 14	CPU: AMD Ryzen 5 5500u Ram: 8GB SSD: 512GB OS: Windows 10	2	36,990	73,980
Project Development	Lenovo	Lenovo Ideapad Slim 5	CPU : AMD Ryzen 5 5500u Ram: 16GB SSD: 512GB OS: Windows 10	2	39,995	79,990
Total						**153,970**

Table 3.15 shows the required hardware requirements in developing the project's winning solution. A total of 4 laptops will be used in the project development, which cost 39,000 pesos each.

Figure 3.16 People Requirements

Category	People	Task	Rate Per Hour PHP	Project Duration	Quantity	Item Cost	Sub Total
Project Design	Backend Developer	Create the server side of the website	277	4 months	1	2,216 = 277 x 8 hours 48,752 = 2,216 x 22 days 195,008 =	195,008

						48,752 x 4 months	
Project Design	Frontend Developer	Optimize layouts and user experience .	262	4 months	1	2,096 = 262 x 8 hours 46,112 = 2,096 x 22 days 184,448 = 46,112 x 4 months	184,448
Project Design	Database Developer	Design reliable databases.	231	4 months	1	1,848 = 231 x 8 hours 40,656 = 1,848 x 22 days 162,624 = 40,656 x 4 months	162,624
Project Design	UX Designer	Create visually appealing elements for the users.	265	4 months	1	2,120 = 265 x 8 hours 46,640 = 2,120 x 22 days 186,560 = 46,640 x 4 months	186,560
Project Testing	Quality Analyst	Perform testing of the website.	197	4 months	1	1,576 = 197 x 8 hours 34,672 = 1,576 x 22 days 138,688 = 34,672 x 4 months	138,688
Project Development	Project Manager	Manage the whole team and the project	292	4 months	1	2,336 = 292 x 8 hours 51,392 = 2,336 x 22	205,568

						days 205,568 = 51,392 x 4 months	
Total							**1,072,896**

Table 3.16 shows the required people requirements in developing the project. The application requires a backend developer for the system functionality. A UX Designer is also needed to create a template for the user's interface that the frontend developer will execute. For quality assurance, a quality analyst must perform the project testing and point out the system's performance and what is needed to add and improve. Lastly, for project management, a project manager is necessary to have proper project planning and also to manage the whole project process to avoid any problems.

- **Security Requirements**

Figure 3.17 Security Requirements

Security Requirement	Customer Requirements	Solution
Authenticity/Integrity	The system must be able to authenticate and verify its user using email verification.	Restriction of domains other than TIP email.
Confidentiality	The system must be able to encrypt user's password in the database	Hashing of Passwords using Argon2.

1. **PROJECT DESIGN**

- **Use Case Diagrams of the Winner Computing Solution**

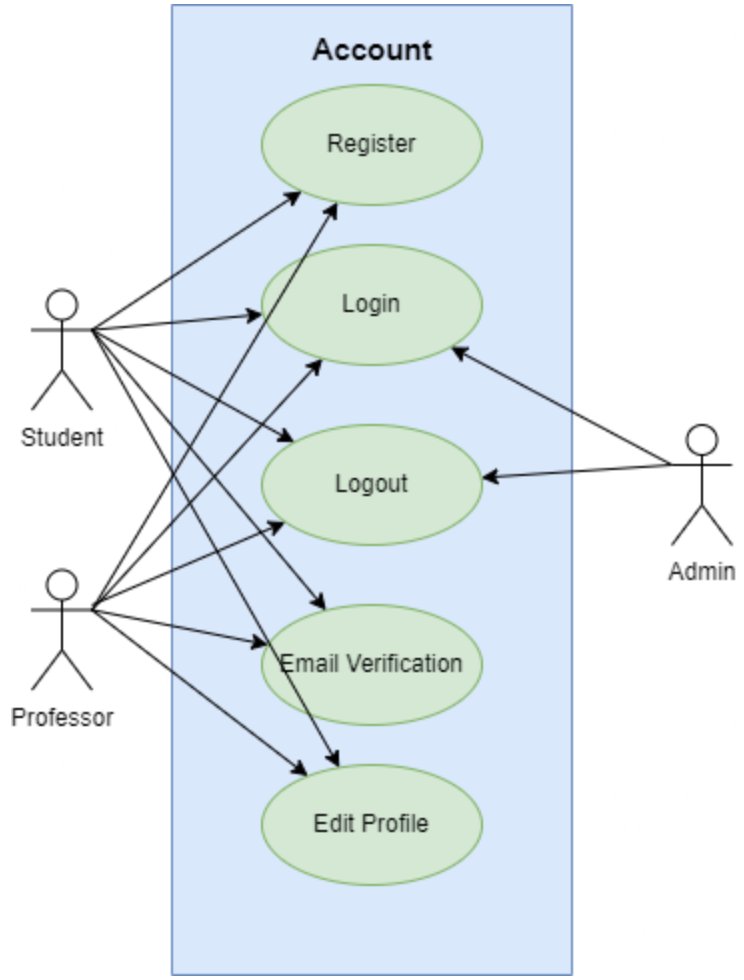


Figure 3.18 Account Module

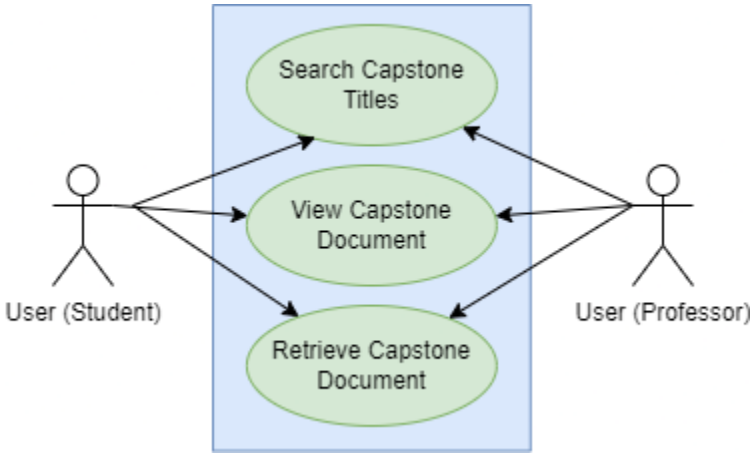


Figure 3.19 Dashboard Module

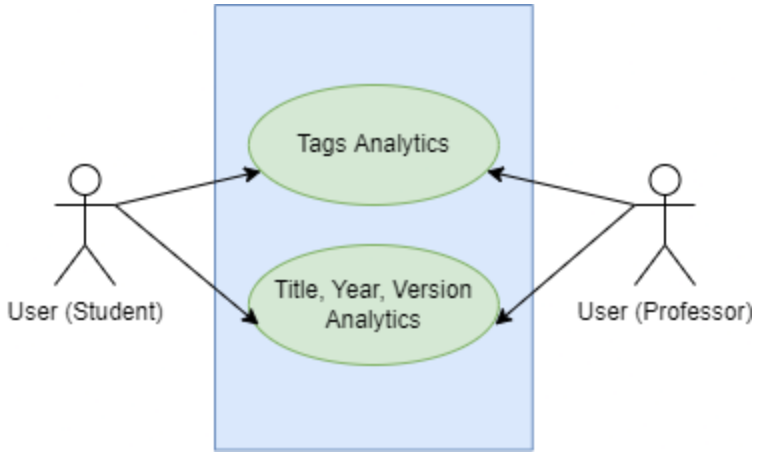


Figure 3.20 User: Analytics Module

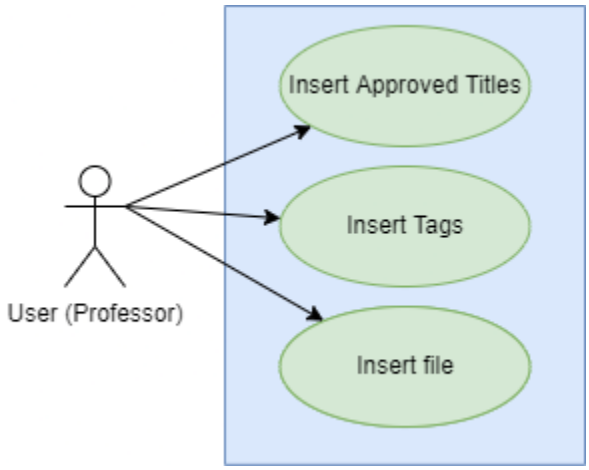


Figure 3.21 Professor Module

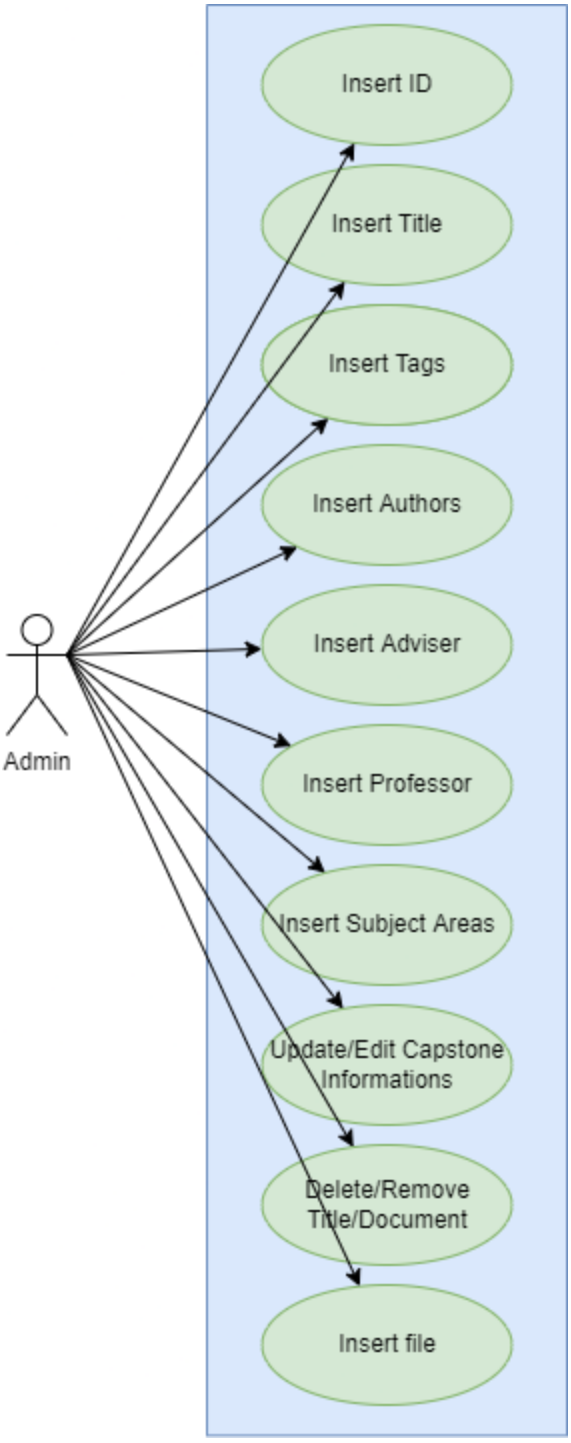


Figure 3.22 Manage Capstone Module

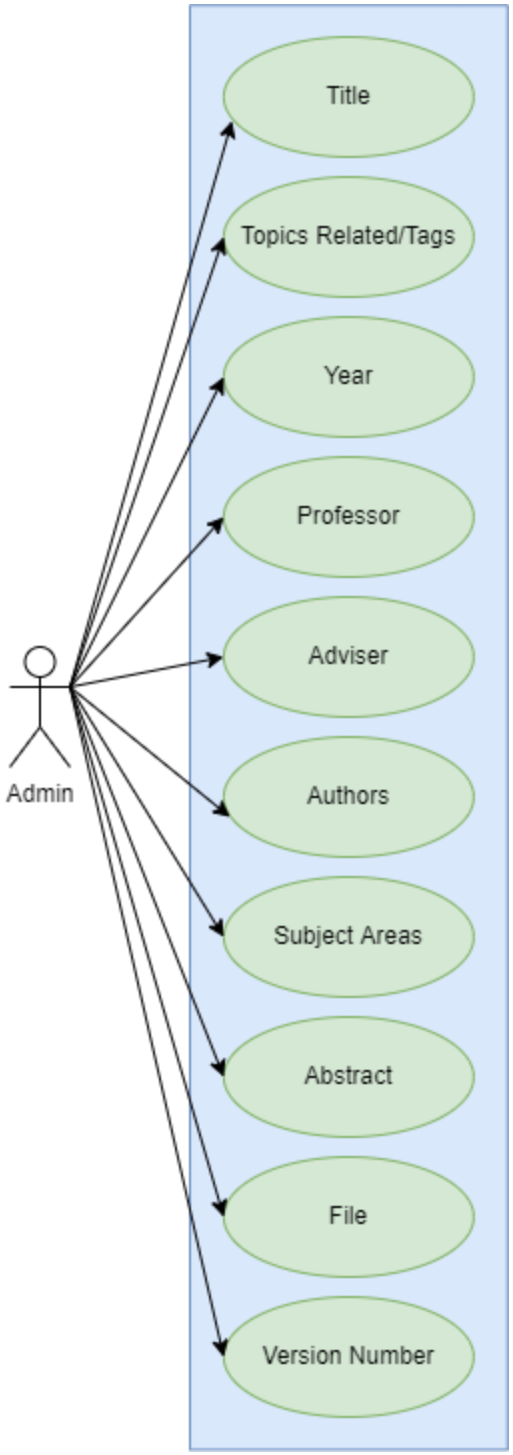


Figure 3.23 Admin: Analytics Module

- **Context Diagram of the Winner Computing Solution**

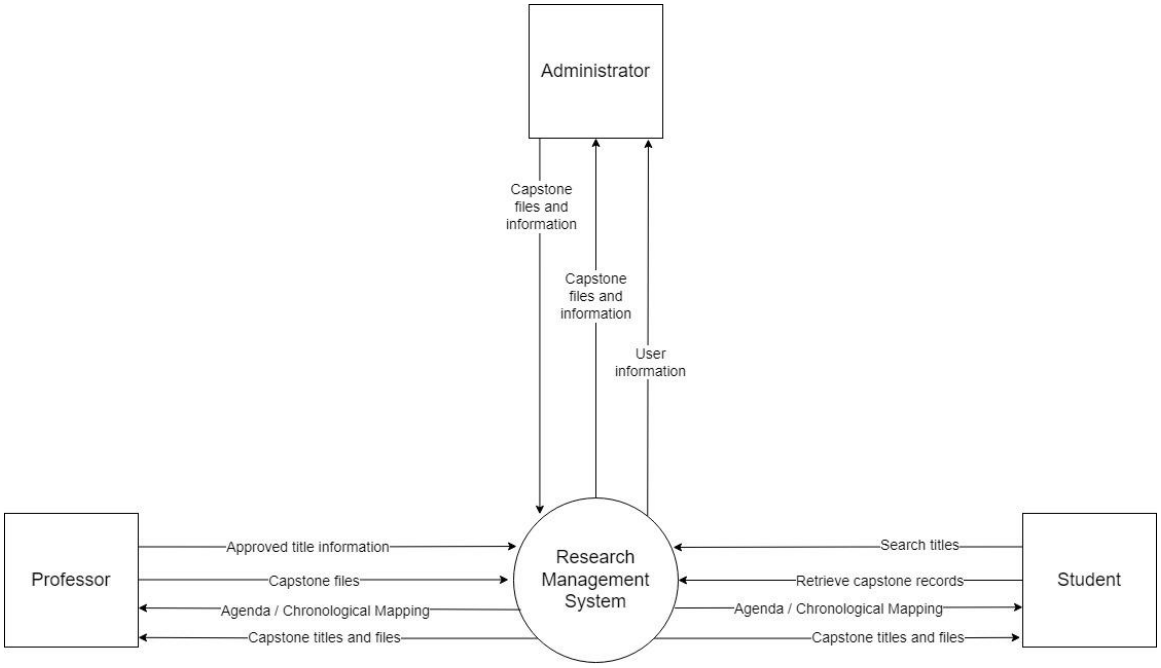


Figure 3.24 Context Diagram of the Winner Computing Solution

- **Data Flow Diagram of the Winner Computing Solution**

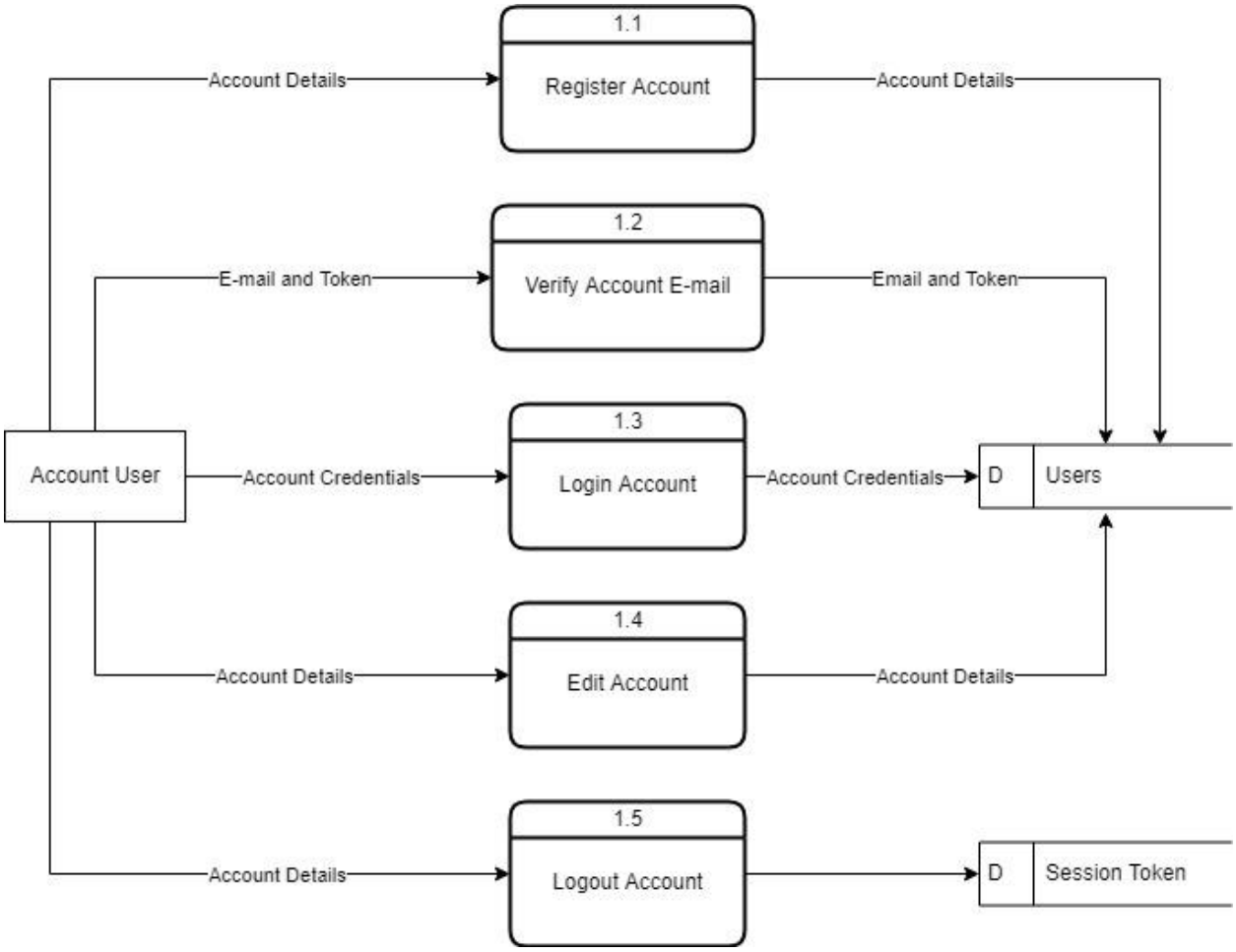


Figure 3.25 Account Module

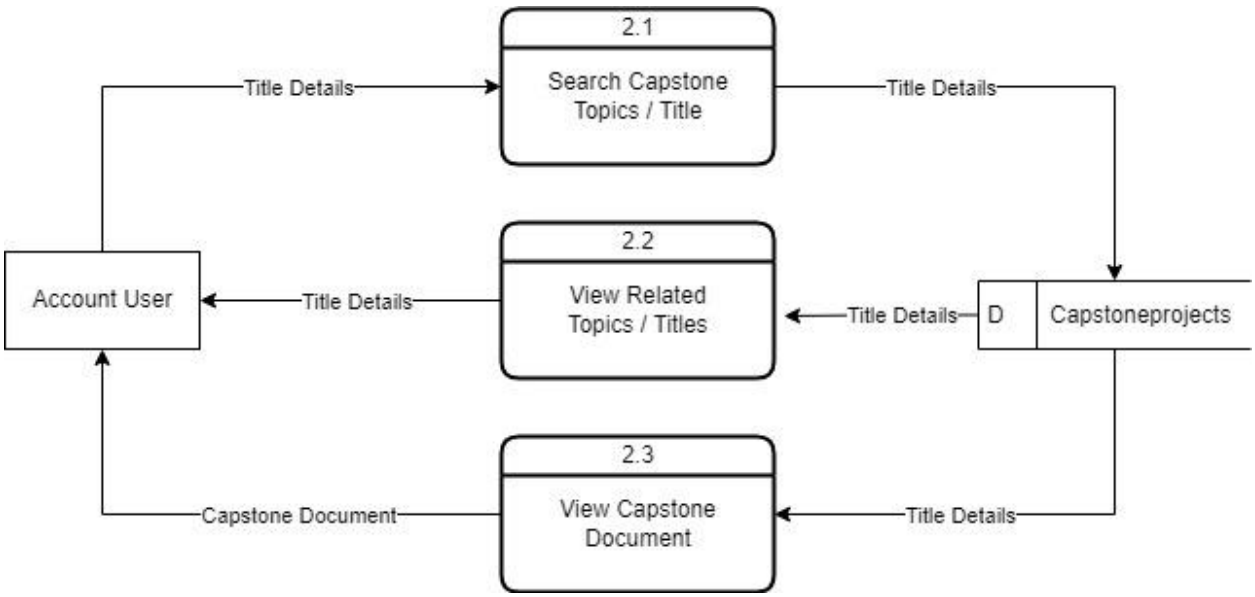


Figure 3.26 Dashboard Module

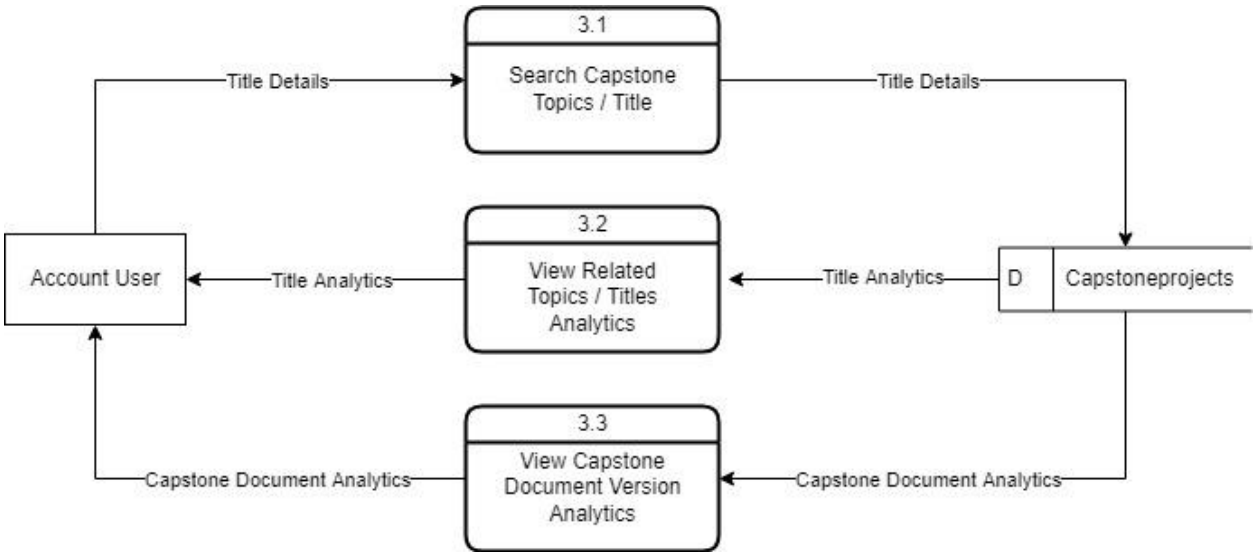


Figure 3.27 Analytics Module

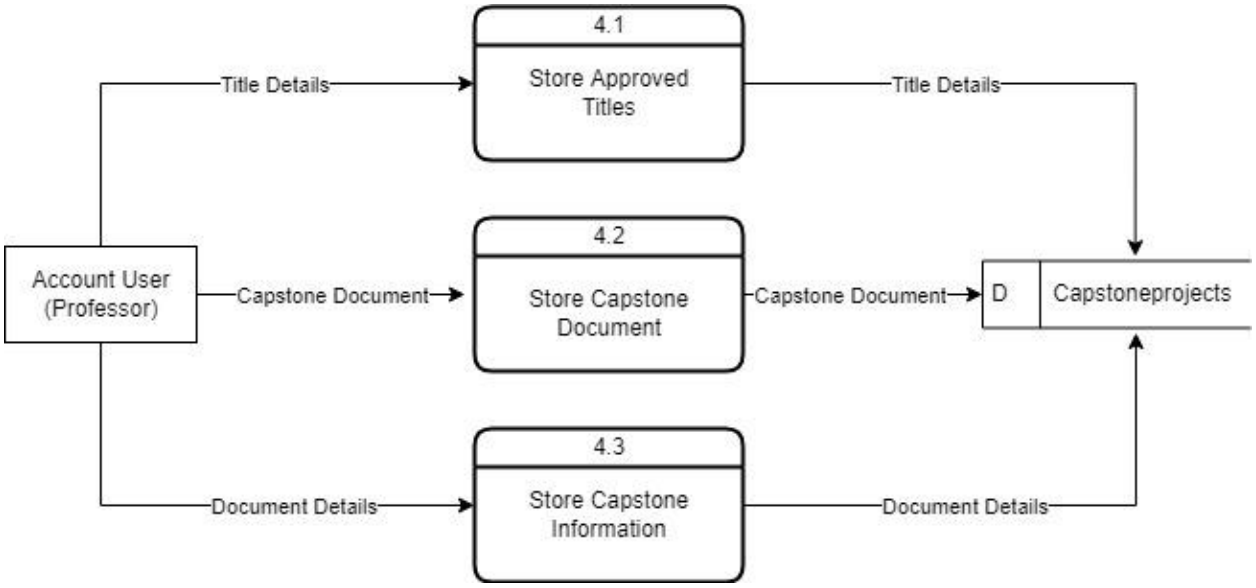


Figure 3.28 Professor's Module

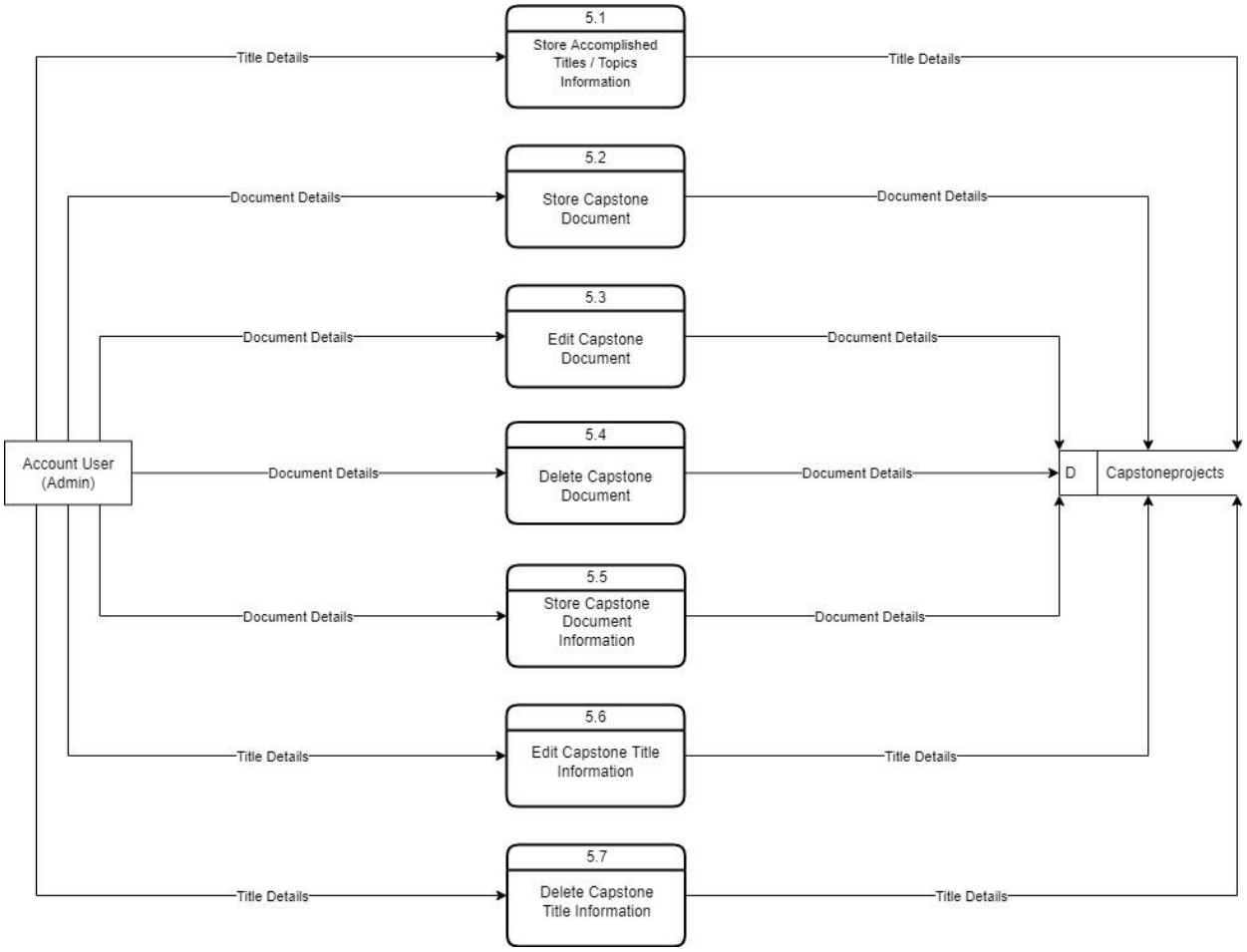


Figure 3.29 Manage Capstone Module

- **Entity Relationship Diagram of the Winner Computing Solution**

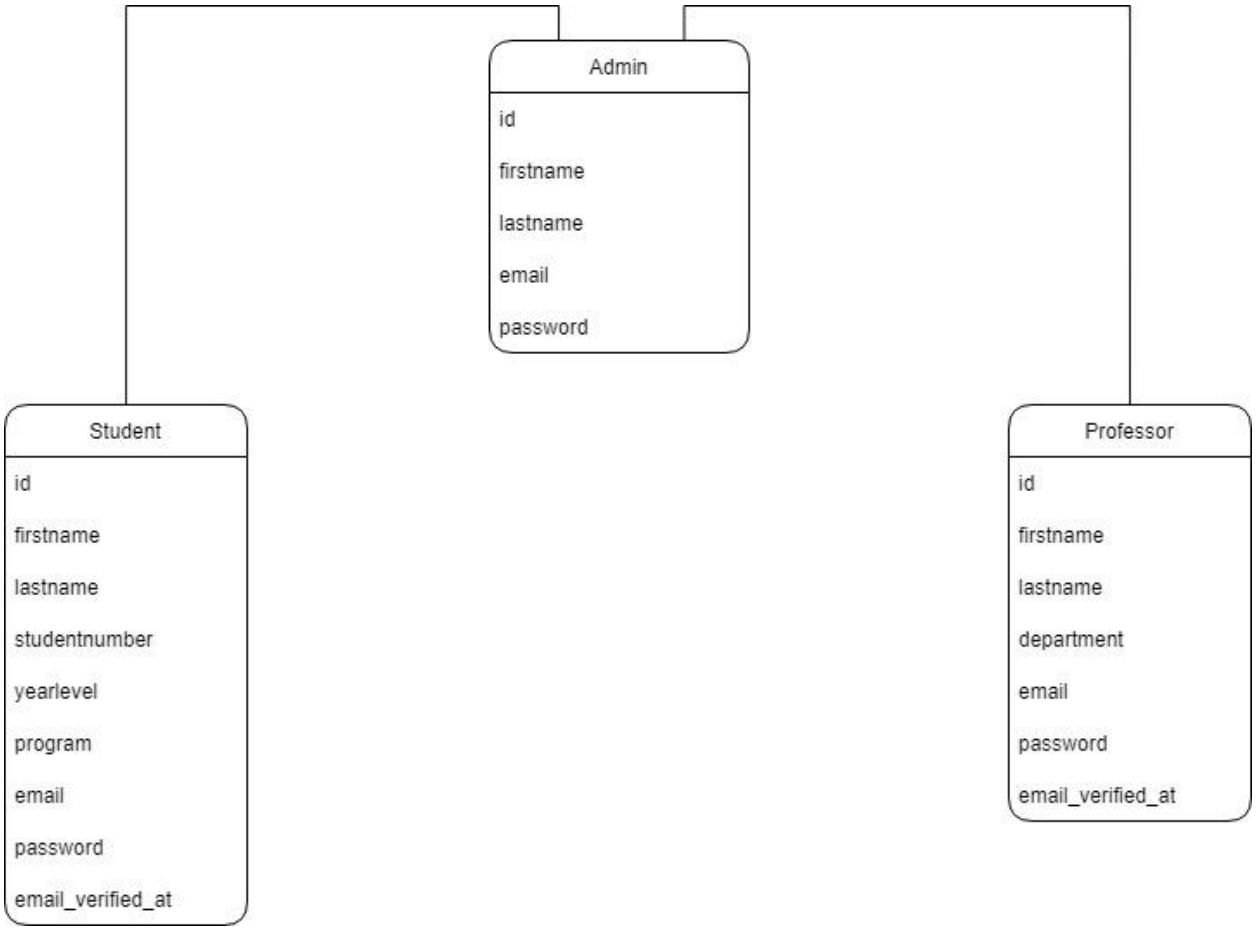


Figure 3.30 Database Schema

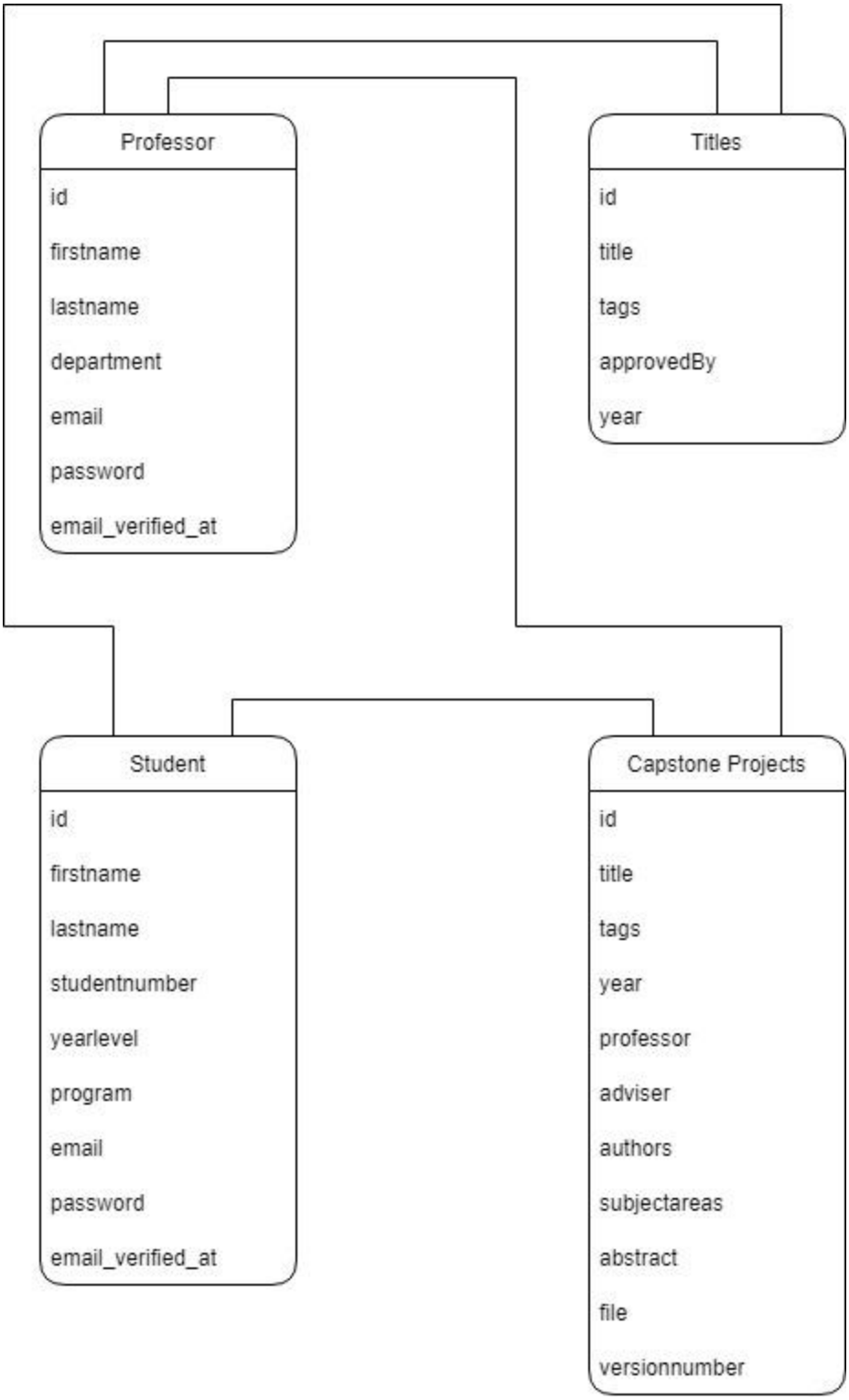


Figure 3.31 Database Schema

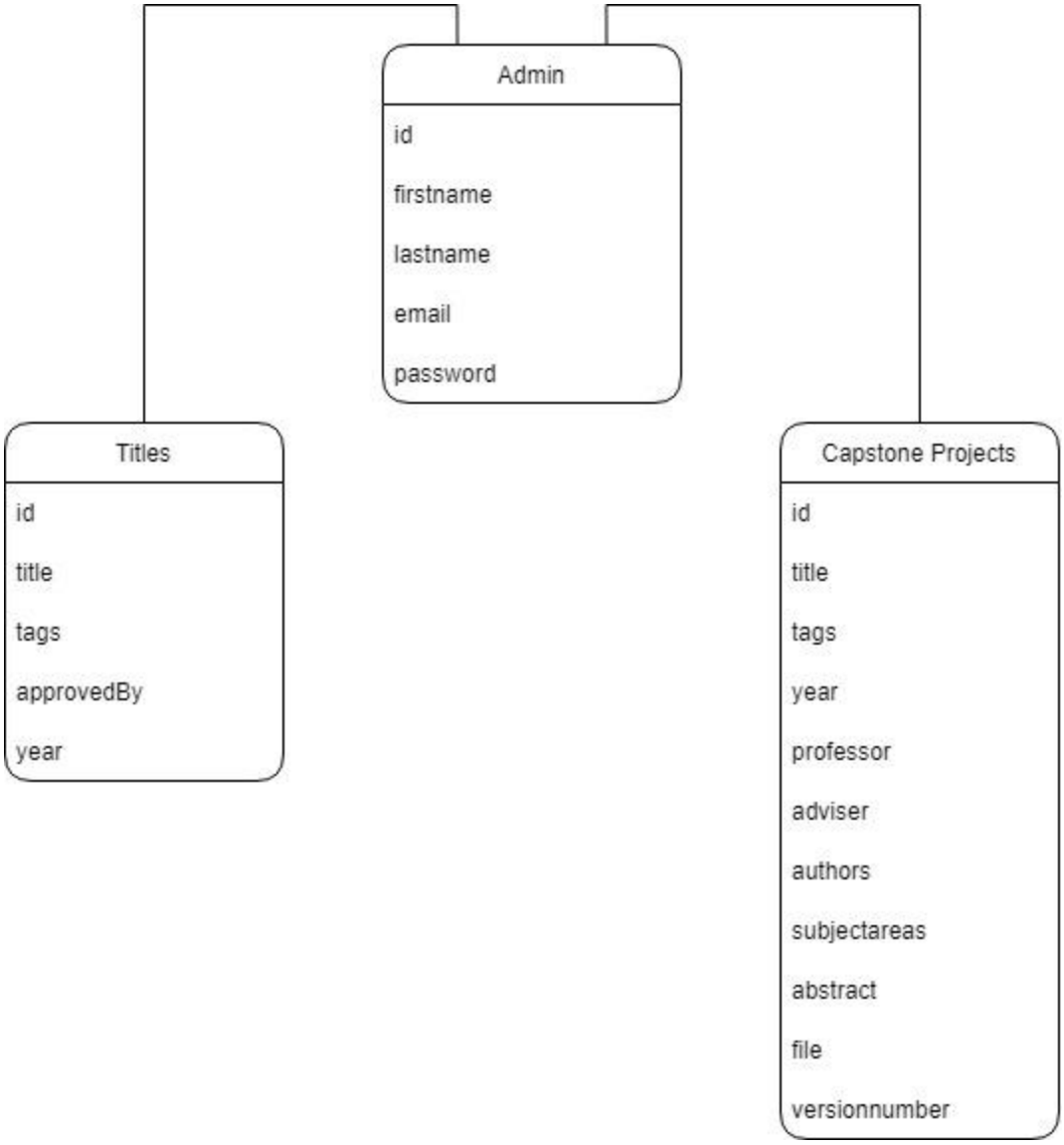


Figure 3.32 Database Schema

- **Swimlane Flowcharts / Process Charts of the Winner Computing Solution**

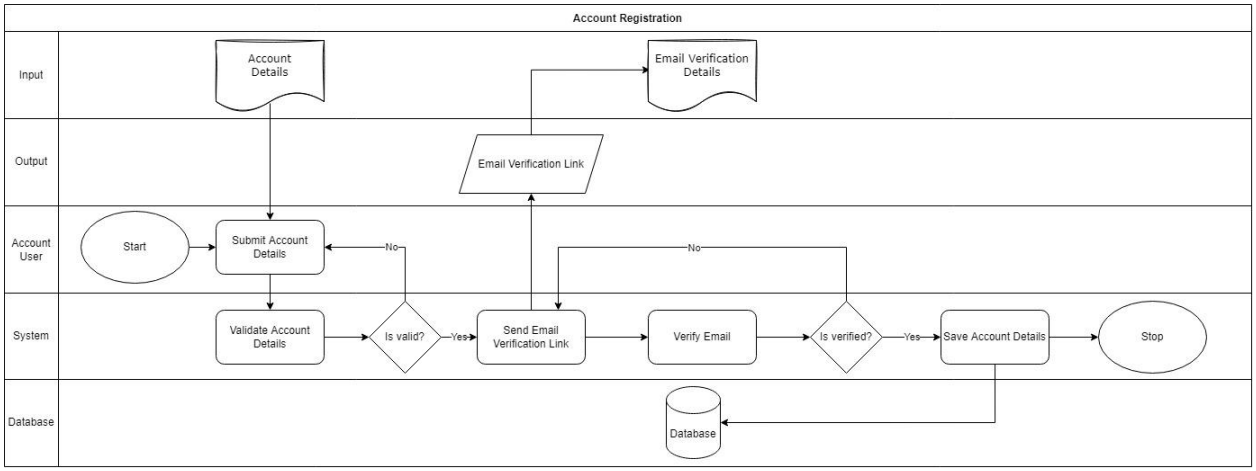


Figure 3.33 Account Registration

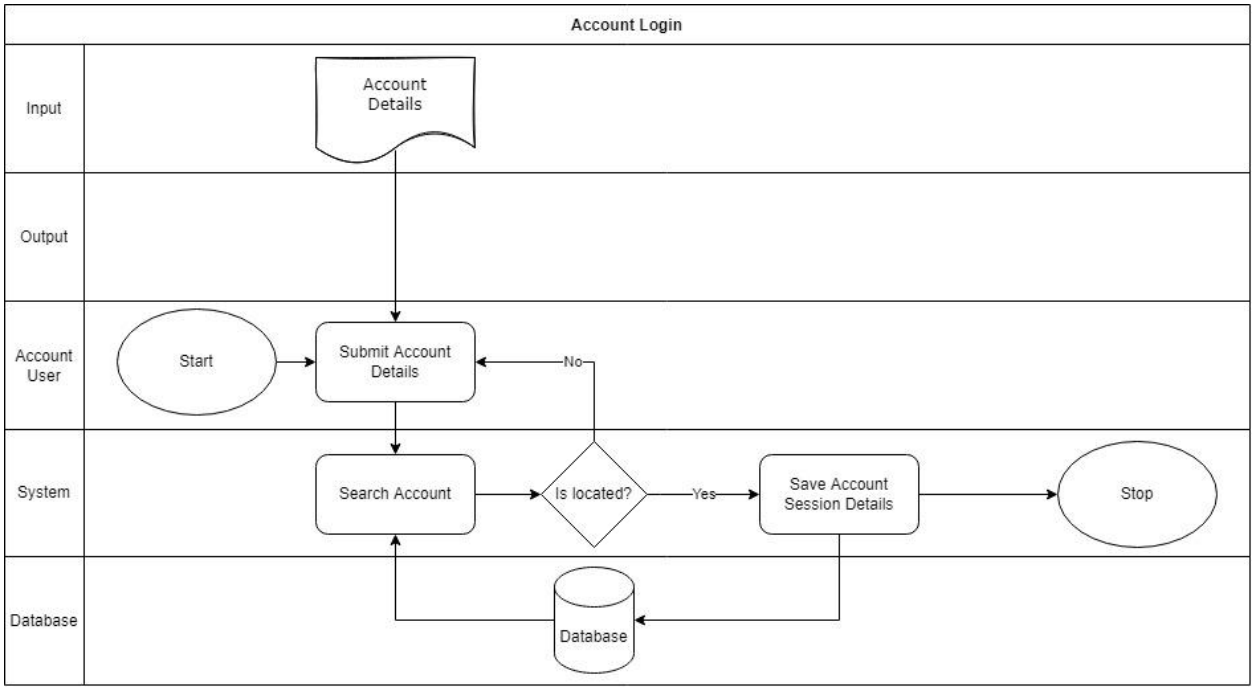
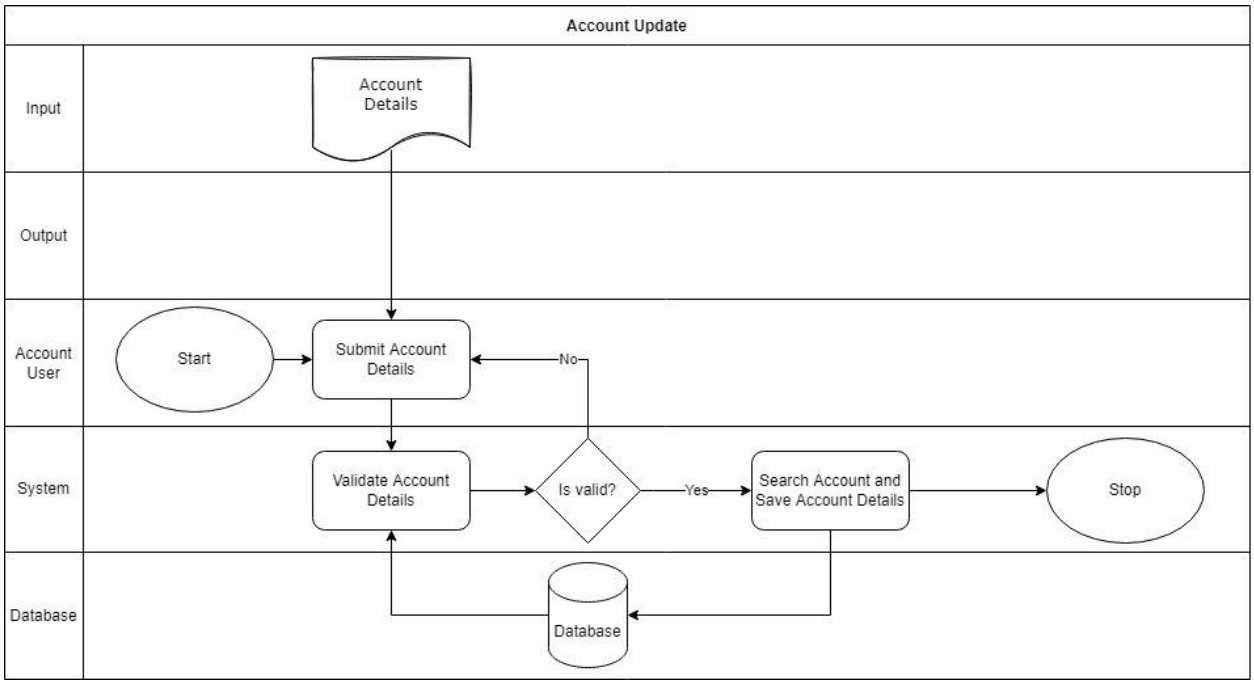


Figure 3.34 Account Login



Account Update

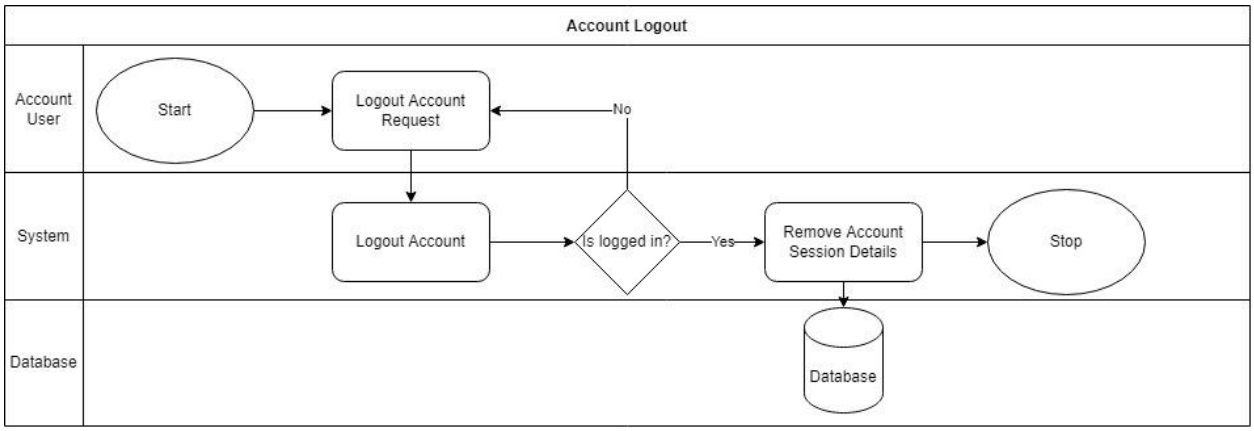


Figure 3.35 Account Logout

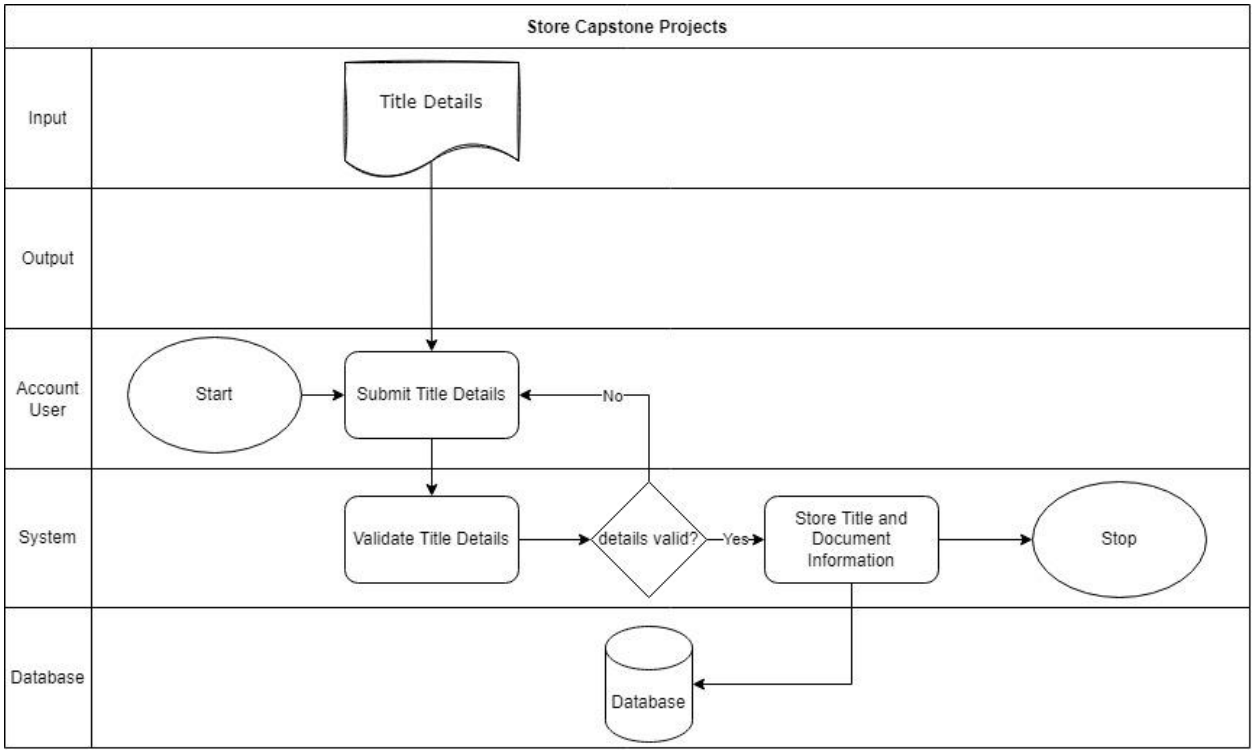


Figure 3.36 Store Capstone Titles

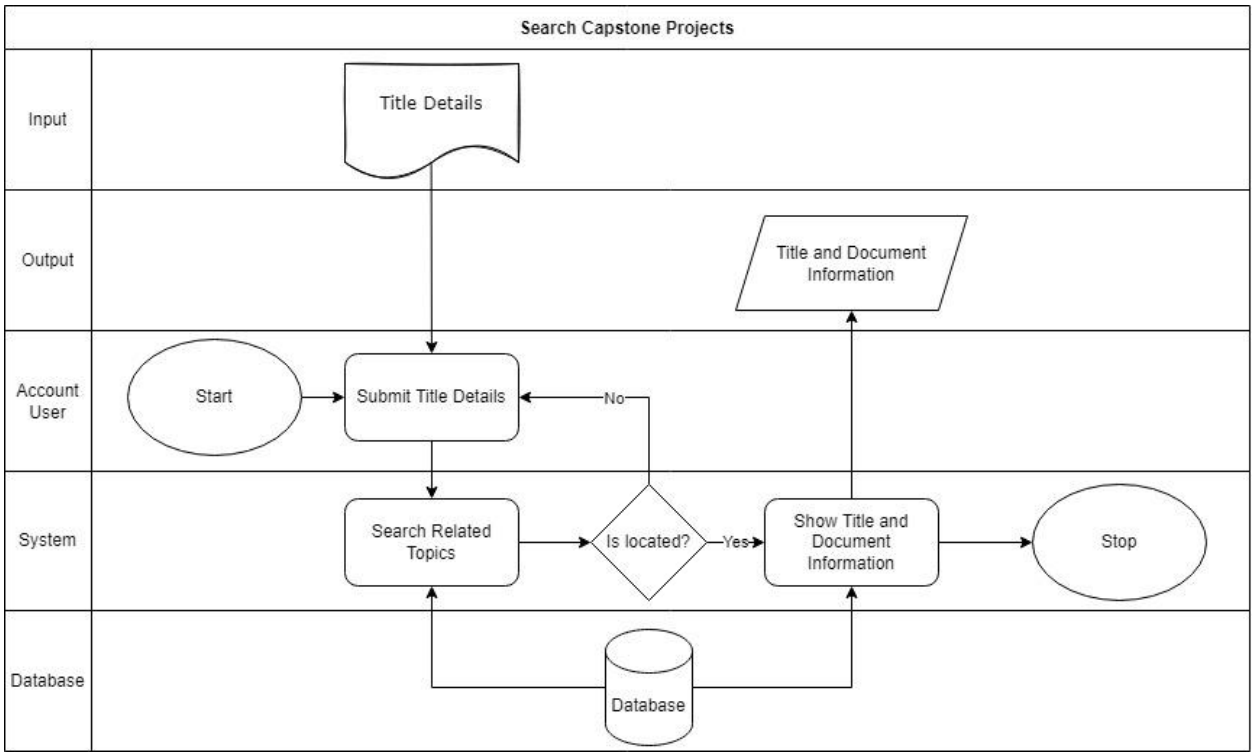


Figure 3.37 Search Capstone Projects

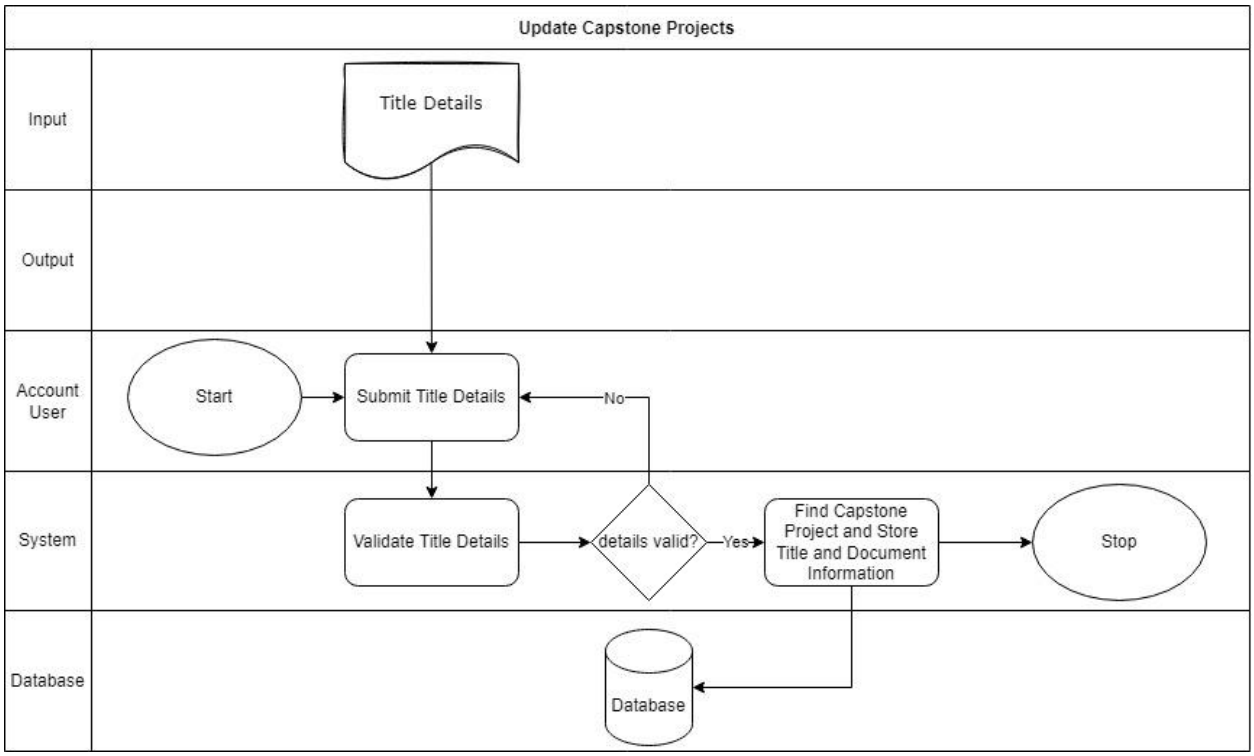


Figure 3.38 Update Capstone Titles

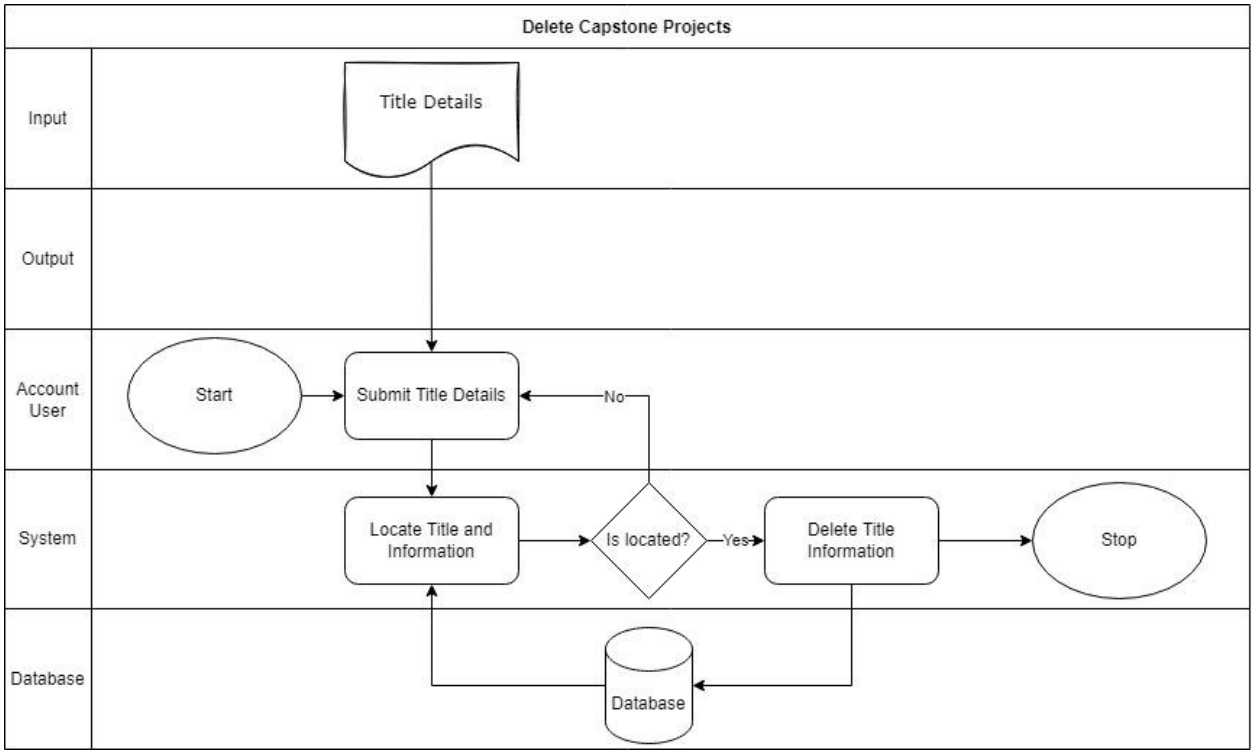


Figure 3.39 Delete Capstone Titles

- **Product Backlog**

Figure 3.40 User type: Student

Backlog Item	Estimated Hours
Account Module	
I should be able to register an account using TIP email	
I should be able to login to my account through email verification	
I should be able to edit/update any of my information	
I should be able to logout my account	
Dashboard Module	

I should be able to search capstone title	
I should be able to see a list of capstone titles	
I should be able to view capstone documents	
I should be able to retrieve capstone files	
Analytics Module	
As an user, I should be able to view the analytics of capstone tags	
As an user, I should be able to view the analytics of capstone title, year, and version	

Figure 3.41 User type: Professor

Backlog Item	Estimated Hours
Account Module	
I should be able to register an account using TIP email	
I should be able to login to my account through email verification	
I should be able to edit/update any of my information	
I should be able to logout my account	
Dashboard Module	
I should be able to search capstone title	
I should be able to see a list of capstone titles	
I should be able to view capstone documents	
I should be able to retrieve capstone files	
Analytics Module	
As an user, I should be able to view the analytics of capstone tags	
As an user, I should be able to view the analytics of capstone title, year, and version	

Professor Module	
I should be able to insert approved capstone titles	
I should be able to insert capstone tags	
I should be able to insert capstone file/document	

Figure 3.42 User type: Admin

Backlog Item	Estimated Hours
Account Module	
I should be able to login to my account	
I should be able to logout my account	
Manage Capstone Module	
I should be able to insert capstone ID	
I should be able to insert capstone Title	
I should be able to insert capstone tags	
I should be able to insert capstone author	
I should be able to insert capstone adviser	
I should be able to insert capstone professor	
I should be able to insert capstone subject areas	
I should be able to update and edit capstone informations	
I should be able to delete/remove capstone file/document	
I should be able to insert capstone file/document	
Analytics Module	
As an admin, I should be able to view the analytics of capstone titles	
As an admin, I should be able to view the analytics of capstone topics related/tags	

As an admin, I should be able to view the analytics of capstone year	
As an admin, I should be able to view the analytics of capstone professor	
As an admin, I should be able to view the analytics of capstone adviser	
As an admin, I should be able to view the analytics of capstone author	
As an admin, I should be able to view the analytics of capstone subject areas	
As an admin, I should be able to view the analytics of capstone abstract	
As an admin, I should be able to view the analytics of capstone files	
As an admin, I should be able to view the analytics of capstone version number	

- **Sprint Backlog**

Figure 3.43 Sprint Backlog

Module	Task(s)	Pending	In Progress	Done	Estimated Hours
Accounts Module	As a student, I should be able to register my account using a TIP email.	✓			
	As a student, I should be able to login to my account	✓			
	As a student, I should be able to verify my account through email	✓			
	As a student, I should be able to edit my information	✓			

	As a student, I should be able to logout my account	✓			
	As a professor, I should be able to register my account using a TIP email	✓			
	As a professor, I should be able to login to my account	✓			
	As a professor, I should be able to verify my account through email	✓			
	As a professor, I should be able to edit my information	✓			
	As a professor, I should be able to logout my account	✓			
	As an admin, I should be able to login to my account	✓			
	As an admin, I should be able to logout my account	✓			
Date: TBD					
Dashboard Module	As a student, I should be able to search for capstone title	✓			
	As a student, I should be able to view capstone document	✓			
	As a student, I should be able to retrieve capstone document	✓			
	As a professor, I should be able to search for capstone title	✓			
	As a professor, I should be able to view capstone document	✓			
	As a professor, I should be able to retrieve capstone document	✓			

Date: TBD					
User: Analytics Module	As a student, I should be able to view capstone tags analytics	✓			
	As a student, I should be able to view capstone Title, Year, Version analytics	✓			
	As a professor, I should be able to view capstone tags analytics	✓			
	As a professor, I should be able to view capstone Title, Year, Version Analytics	✓			
Date: TBD					
Professor Module	As a professor, I should be able to insert approved capstone titles	✓			
	As a professor, I should be able to insert capstone tags	✓			
	As a professor, I should be able to insert capstone file/document	✓			
Date: TBD					
Manage Module	I should be able to insert capstone ID	✓			
	I should be able to insert capstone Title	✓			
	I should be able to insert capstone tags	✓			
	I should be able to insert capstone author	✓			
	I should be able to insert capstone adviser	✓			

	I should be able to insert capstone professor	✓			
	I should be able to insert capstone subject areas	✓			
	I should be able to update and edit capstone informations	✓			
	I should be able to delete/remove capstone file/document	✓			
	I should be able to insert capstone file/document	✓			
Date: TBD					
Admin: Analytics Module	As an admin, I should be able to view the analytics of capstone titles	✓			
	As an admin, I should be able to view the analytics of capstone topics related/tags	✓			
	As an admin, I should be able to view the analytics of capstone year	✓			
	As an admin, I should be able to view the analytics of capstone professor	✓			
	As an admin, I should be able to view the analytics of capstone adviser	✓			
	As an admin, I should be able to view the analytics of capstone author	✓			
	As an admin, I should be able to view the analytics of capstone subject areas	✓			
	As an admin, I should be able to view the analytics of	✓			

	capstone abstract				
	As an admin, I should be able to view the analytics of capstone files	✓			
	As an admin, I should be able to view the analytics of capstone version number	✓			
Date: TBD					

1. **ALGORITHMS**

2. **PROJECT TESTING**

- **Unit Testing Method**
- **Functional Testing Method**
- **User Acceptance Testing Method**

3. **PROJECT IMPLEMENTATION**

- **Software Implementation Plan**
- **End User Training Plan**

4. **PROJECT EVALUATION**
5. **ALGORITHM EVALUATION**

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