

Web-based Thesis Workflow Management System

by

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Web-based Thesis Workflow Management System

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Web-based Thesis Workflow Management System

Abstract

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May, 2020

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Web-based workflow management systems have been helping entities to regulate their workload more efficiently. Applying this efficiency to graduate schools will benefit both students and faculty members. There are students who have had a difficult time in the thesis/dissertation process. The reasons for this can sometimes be shown by the way of communication and uncertainty. When developing this system, we apply a web-based workflow management system to both help managing the thesis/dissertation process and to minimize the problems faced by students, advisors and committee members. Also, we aim to create a paperless thesis/dissertation submission by enabling usage of this system in higher education.

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Dedication

To Coskun Bayrak

Rest in Peace...

Chapter One

Introduction

Having a master's degree in today's educational system is an essential and sought-after qualification. According to the National Center for Education Statistics [1], three million students enrolled in master programs in 2018. In some programs, there are two options that students must choose from to complete a master's degree. The first option is to submit a thesis, and the second option is to complete a project. It is known [2] that some students experience challenges during the thesis process. One of the biggest challenges in the thesis process is uncertainty. Most of the graduate students have no idea about the thesis process when they start their master's program. After some time, they realize that they need to choose a research topic to work on, and they are required to find a topic that they are interested in studying. Getting information about the research areas of faculty members is not only the second challenge that students face but also a time-consuming one. Students continue to face challenges along the way, and it places unneeded and unwanted pressure on graduate students. Therefore, some of them prefer to leave their thesis studies unfinished and continue with the project option halfway through.

1.1 Motivation

Currently, there are many workflow management systems used in various entities for different purposes. Some of the advantages of these systems are it saves paper and time; it is more efficient; it provides a central storage space for all interested parties to access, and it gives a platform to share and edit documents. For example, a workflow management system for an automated credit card system [3] is invented to coordinate workflow for different workgroups and entities. It provides simultaneous management of various departments in the bank and applicants, which ensures saving time. Without this system, people would need to go to the bank for their credit card application and get approval from different departments, which is time-consuming both for the applicant and the bank employers. Also, web-based systems help to avoid the usage of paper, which can contribute to the protection of nature, and the bank can decrease its spending on paper. Some advantages of these systems when developed for thesis are 1) it allows automatic period extensions, 2) it provides an easy-to-use user interface, 3) it helps students, advisors and committee members to manage their time efficiently, 4) it adopts a more eco-friendly policy and creates a paperless environment, 5) it prevents uncertainty about the thesis process generally, and 6) it provides an environment for fast and efficient interaction between students and their advisors. Therefore, the purpose of this thesis is to showcase a WTWMS that resolves the inefficiencies mentioned above.

1.2 Research problem

Paper-based thesis submission is used by students and advisors to keep track of the workflow of the thesis and successfully finish the given study. This method of workflow man-

agement has some restrictions, such as the advisor and student meeting availability and flexibility. This study aims to develop a web-based thesis workflow management system to help both students and faculty members to manage the process of the student's thesis. It provides an efficient, interactive, user-friendly environment where both students and advisors can interact and complete all of the requirements of the master thesis.

Chapter Two

Literature Review

Author Turyatamba Sillian has developed a system called University Dissertation Management System (UDMS) at Uganda Martyrs University [4]. The purpose of this study is to develop a system to prevent the late graduation of a master's student because of the incompleteness of his/her dissertation on time. The system tries to make the accountability, collaboration, and reporting phases easier for both the student and the advisor. UDMS registers students and supervisors to monitor interactions between them. Also, the system lets university administration keep track of interactions between them.

In UDMS, there are four types of users, including a student, supervisor, university research coordinator, and a panel of lecturers. Each user type has its own features, as shown in figure 2.1. Students can create a topic after their registration is completed. Next, they can submit their dissertation proposal and final report if their topic uniqueness is verified by the panel of lecturers. In UDMS, supervisors can review their students' proposals and approve or reject the final reports. Another user type of UDMS is the panel of lecturers; they can verify the student's topic uniqueness and accept or reject the proposal. The last user type of UDMS is the university research coordinator, who can assign supervisors and monitor research progress.

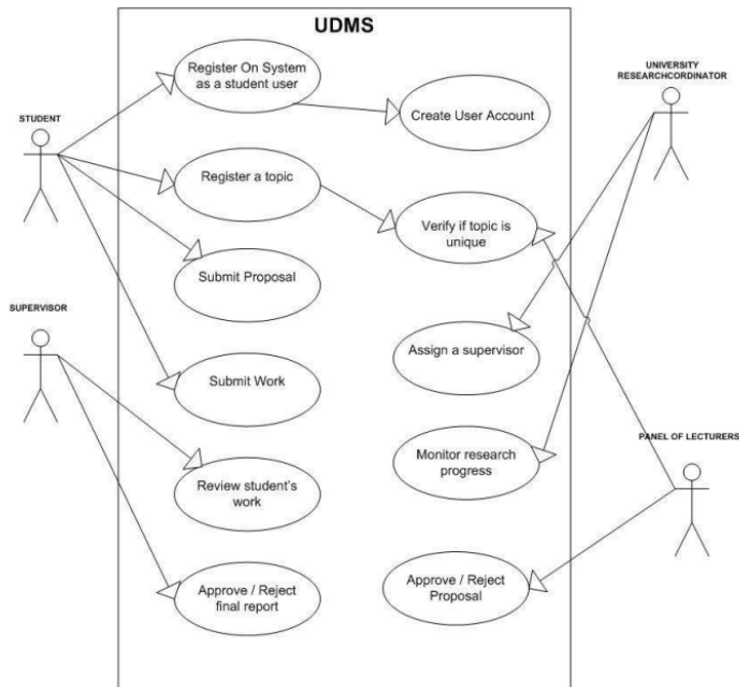


Figure 2.1 Use case diagram of UDMS [4].

UDMS is a good project to avoid failure to complete the student's work on time. However, it has some lacks in deficiency of the workflow of the dissertation/thesis. First, students do not have a chance to select their advisors in UDMS. Second, supervisors only have the privilege to make comments on their student work. They cannot revise it. Third, UDMS does not contain all workflows of the dissertation/thesis. For example, students cannot form their dissertation/thesis committee using the system.

WTWMS is proposed to solve the problems mentioned above. WTWMS contains all the workflow of a thesis. Therefore, students can finish their thesis process step by step in the system. Also, students can choose the research topic that they are interested in and their research advisor using the system.

Author Muhammad Agreindra Helmiawan and Yusup Firdaus have proposed a system called Thesis Process Automation System (TPAS) [5]. The waterfall method, as shown in Figure 2.2, is used to develop the system. By proposing to develop this system, they aimed to save time and money, and reduce the complexity of the thesis process because the purpose of TPAS is to cover the entire thesis process.

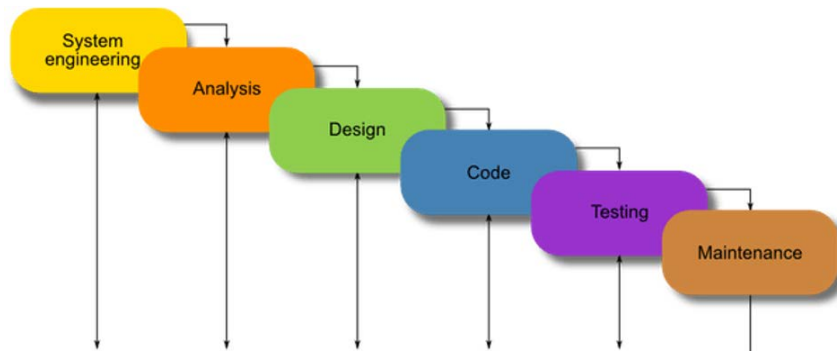


Figure 2.2 Waterfall method is used to create TPAS [5].

Even though the proposed system aims to solve some problems that paper-based thesis submissions have, the system has weaknesses in making all thesis processes automated. First, TPAS does not have an easy-to-use user interface. Some users might lose themselves in the complexity of the design. Second, TPAS does not cover all requirements of the thesis to make an automated thesis process. For example, students still must find the research topic and work on it manually. This is not matched with the purpose of TPAS.

On the other hand, one of the most essential things that WTWMS proposes is to provide an easy-to-use user interface. Thus, every user can use the system without getting confused because each step of the thesis in the system is explained in detail for each user type. Also, the system notifications show options to users for every step. Second, WTWMS covers all the thesis processes for students to complete their studies successfully.

Lastly, there is one more system called Automated Scheduling System for Thesis and Project Presentation Using Forward Chaining Method with Dynamic Allocation Resources [6], which has similar features as WTWMS. The authors have introduced the Automated Scheduling System for Thesis and Project Presentation at Institut Teknologi Harapan Bangsa (ITHB) in Indonesia. The scheduling presentation was handled by the student, department administrator, and the corresponding lecturer manually before the proposed system. Without having Automated Scheduling System, some presentations might have been canceled because of double-assignments of lecturers or unavailability of rooms. By developing this system, they have planned to minimize conflict of constraints.

In the system, there are four user types, such as students, lecturers, the session coordinator, and administrators. Lecturers will store their available dates in the system. The system will recommend an available date for students who complete all the requirements for their thesis or project presentation. Also, students must upload all the required files for the presentation. Once all files are upload, the system waits for approval from the session coordinator. For the last step, administrators can supervise the process and manage the record of the schedules.

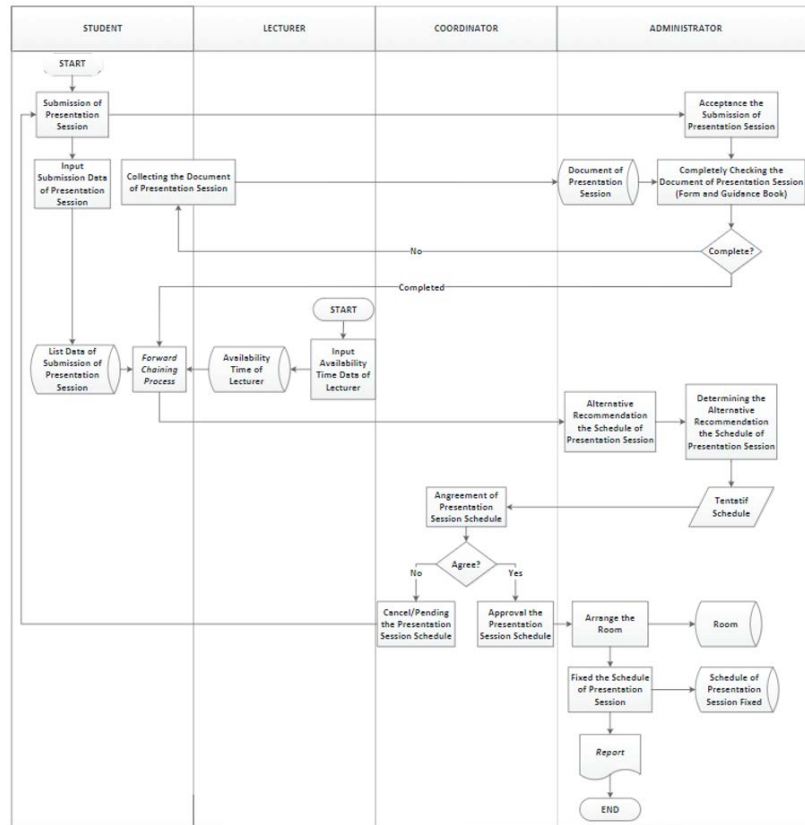


Figure 2.3 Flowchart of Automated Scheduling System [6].

Despite the proposed system solving some of the poor scheduling practices, some features need to be improved to make the system more functional. First, students cannot invite faculty members to serve on their committee by using the system. They need to ask faculty members to join their committee via email or by visiting them in their office hours. Also, they might be required to explain what their thesis or project is about. In some cases, there is a chance that faculty members might reject the student's invitation. If this happens, students need to contact another faculty member to invite him/her to serve on their committee. This process wastes the student's time even though the purpose of the proposed system is to prevent wasting time by scheduling presentations using an automated system.

I propose WTWMS to fix the problem mentioned above. In WTWMS, students can find faculty members and invite them to their committee by using the system once they complete writing their thesis and get approval from their advisor. WTWMS assigns the student's advisor as a first committee member automatically, but students need to find at least two more committee members. Students will see every faculty member who registered in WTWMS and their research area. After they send invitations to faculty members, faculty members will access to student's thesis. Faculty members can decide whether they accept the invitation or not after they read the student's thesis. If they are eager to accept the invitation, WTWMS asks them to enter their available dates for presentation.

In conclusion, systems developed before at the aforementioned higher education institutes have a similar structure with WTWMS. However, WTWMS solves and improves their weaknesses and problems. The next chapter analyzes how WTWMS works in detail.

Chapter Three

Introduction to Web-Based Thesis

Workflow Management System

In this chapter, the Web-based Thesis Workflow Management System (WTWMS) will be discussed. First, the WTWMS will be explained in detail. Then, its structure and components used in this project, such as tools, programming languages, and its framework, will be clarified thoroughly. Finally, how the system works as a whole will be demonstrated.

WTWMS is a web-based application that constructs a bridge between students and faculty members virtually. Using WTWMS, the student will be able to search for many research topics on a single page. When they find the topic that fits best for them, they will be able to contact the faculty member who posted the research topic that they are interested in. Additionally, faculty members will be able to find ambitious students who are interested in their research area. The user's role and how WTWMS works will be explained comprehensively in the next sections.

3.1 Structure and Components of WTWMS

WTWMS consists of three parts: back-end, front-end, and database. The following sections explain what languages and frameworks are used to develop a web-based application and why they were chosen, among others.

3.1.1 Back-end Development

In web development, the back-end is the place where all logic happens in the background. To run logic in the back-end, a back-end programming language is needed. Also, the framework for that programming language can be used to support the development of the web-based application. The framework provides numerous features that make the web-based application development fast and easy. In the next two sections, back-end programming languages and frameworks for the respective programming languages will be clarified in detail.

3.1.1.1 Node.js

Node.js is a runtime environment that uses Chrome's V8 JavaScript engine [7]. It has everything to execute a program written in JavaScript. The reasons for using Node.js in this project are listed below.

- According to GitHub [8], JavaScript is the most popular language in 2019, and its popularity is still rising. This means that many developers use JavaScript, and JavaScript has a big community to help people around the world. Therefore, JavaScript developers can get support easily.

- JavaScript uses Non-blocking Input/Output, which allows supporting many concurrent connections and asynchronous request handling models. It's vital that the system supports a lot of students concurrently. This feature makes JavaScript lightweight, flexible, and powerful [7].
- JavaScript has a great ecosystem called npm. npm stands for Node.js Package Manager. An enormous number of libraries and modules are available in npm. Hence, developers can install helpful libraries for their purposes with a few command lines and include their projects [7]. This helps to speed up the development process.

3.1.1.2 Express.js

Express.js is the most popular Node.js framework [9]. It provides lightweight and powerful tools for HTTP servers. The reasons for using Express.js in this project are listed below.

- Express.js makes the Node.js web application development fast and easy [10].
- It allows defining an error-handling middleware [10].
- It allows creating REST API server [10].
- It provides easy connections with databases such as MongoDB, Redis, MySQL [10].

3.1.2 Front-end Development

In web development, front-end is everything that users see visually in the web-based application. Front-end development also is known as client-side development. There are front-end libraries that make front-end development easy and fast.

3.1.2.1 React.js

React.js is a JavaScript library which was created by Facebook in 2011. React.js combines the speed of JavaScript and uses a new way of rendering webpages [11]. Figure 3.1 shows some of the reasons for using React.js in this project.

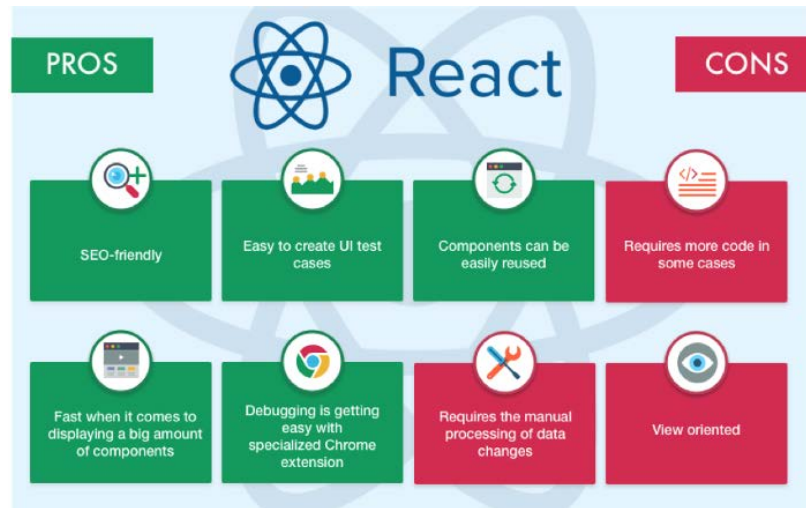


Figure 3.1 Pros and Cons of React.js [12]

3.1.3 Database

In web development, a database is used for storing, managing, and retrieving data. The database is a requirement for creating dynamic web-based applications.

3.1.3.1 MongoDB

MongoDB is one of the nonrelational database technologies. It stores data in the form of key-value pairs. The reasons for using MongoDB in this project are listed below.

- The most important feature is that MongoDB processes data very fast. [13].

- It is very easy to install and setup MongoDB. Developers who use Node.js can install MongoDB easily by using npm. [13].
- It is secure because no SQL injection can be made [13].
- It does not require a VM (Virtual Machine) to be run [13].

3.2 How the Web-based Thesis Workflow Management System Works

In this section, how WTWMS works will be explained to the finest details. The landing page, as shown in Figure 3.2, welcomes users when they visit the website for this system. New users can go to the sign-up page and to the pages where research topics are published, and the academic members are listed using navigation links in the header.



Figure 3.2 Landing page of the WTWMS.

If the person visiting the website is a new user, they might want to know more about WTWMS. When the user clicks the "Learn More" button, the button takes the user to the section, which is shown in Figure 3.3, where they can find more information about the WTWMS. If the user is satisfied with WTWMS, they can access the sign-up page by clicking "SIGN UP" button in the information section.



Figure 3.3 Information section of the WTWMS.

There is one more design feature that needs to be mentioned before moving to the logical flow of WTWMS. In WTWMS, every page has a footer section. In this section, as shown in Figure 3.4, users can find the physical and the e-mail address of YSU College of Graduate Studies. Besides that, they can find social media links of the YSU College of Graduate Studies. The design features shown so far indicate that WTWMS has a great user-friendly design, which means that every user can easily use WTWMS without experiencing any difficulty.

So far, WTWMS has been reviewed in terms of how it has a user-friendly design for new users. The logical flow of WTWMS will be explained in the next section.

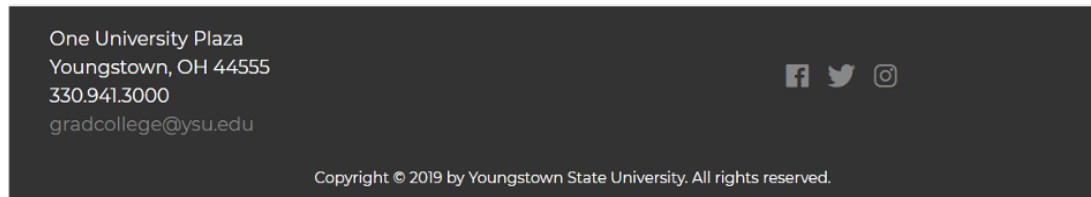


Figure 3.4 Footer of WTWMS.

3.2.1 Logical Flow of WTWMS

As mentioned at the beginning of this section, WTWMS is built mainly for students and faculty members. There are three types of users in the WTWMS, including administrators, students, and faculty members. In this section, the logical flow for each user type will be explained in detail.

3.2.1.1 Sign-Up

When a user goes to the sign-up page, they see the page shown in Figure 3.5. On this page, WTWMS asks users whether they are faculty members or students. The user clicks one of the buttons based on their status.

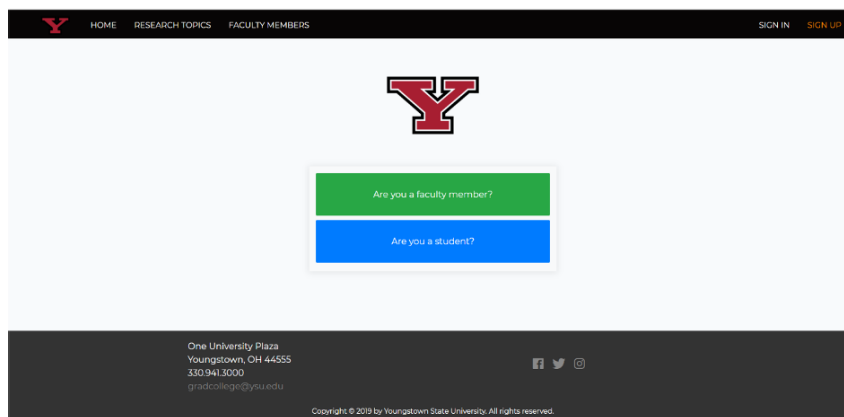


Figure 3.5 Sign up page.

When a student or faculty member wants to register, the system asks the user to fill out some information such as username, email address, password, first name, last name, and department. Besides that, WTWMS asks the faculty members to explain their area of research interest briefly. Students are asked to fill out the banner IDs.

As for admins, they do not need to register since it is done on the admin panel. The admin role will be explained after both students, and faculty members' logic are clarified in detail.

There are some limitations during registration in WTWMS. Firstly, both faculty members and students must choose unique usernames and email addresses. Besides that, students must enter their banner ID. Middleware created in the back-end, as shown in Figure 3.6, ensures that the user cannot choose a username, email address, and banner ID already taken.

```
exports.facultyMemberSignup = async (req, res) => {
  const emailExists = await User.findOne({ email: req.body.email })
  if(emailExists)
    return res.status(403).json({
      error: 'Email is taken'
    })
  const usernameExists = await User.findOne({ username: req.body.username })
  if(usernameExists)
    return res.status(403).json({
      error: 'Username is taken'
    })
  const user = await new User(req.body)
  await user.save()
  res.json({ message: "Registration Successful! Please login." });
};

exports.studentSignup = async (req, res) => {
  const emailExists = await User.findOne({ email: req.body.email })
  if(emailExists)
    return res.status(403).json({
      error: 'Email is taken'
    })
  const usernameExists = await User.findOne({ username: req.body.username })
  if(usernameExists)
    return res.status(403).json({
      error: 'Username is taken'
    })
  const bannerIdExists = await User.findOne({ bannerId: req.body.bannerId })
  if(bannerIdExists)
    return res.status(403).json({
      error: 'Banner ID is taken'
    })
  const user = await new User(req.body)
  await user.save()
  res.json({ message: "Registration Successful! Please login." });
};
```

Figure 3.6 Registration middleware.

In addition, users cannot leave the username, email address, banner ID (for students), password, first name, or last name fields empty. Also, the email address must contain the @ symbol and a minimum of three and a maximum of 100 characters. Another rule is that the password must be at least six characters and contain a number. These rules are checked by a validator shown in Figure 3.7 on the back-end side.

```
exports.userSignupValidator = (req, res, next) => {
  req.check('username', 'Username is required').notEmpty();
  req.check('fname', 'First name is required').notEmpty();
  req.check('lname', 'Last name is required').notEmpty();
  req.check('email', 'Email must be between 3 to 100 characters')
    .matches(/.+@.+\.+\.+/)
    .withMessage('Email must contain @')
    .isLength({
      min: 3,
      max: 100
    });
  req.check('password', 'Password is required');
  req.check('password')
    .isLength({ min: 6 })
    .withMessage('Password must contain at least 6 characters')
    .matches(/\d/)
    .withMessage('Password must contain a number');

  const errors = req.validationErrors();

  if (errors) {
    const firstError = errors.map(error => error.msg)[0];
    return res.status(400).json({ error: firstError });
  }

  next();
};
```

Figure 3.7 Registration validator.

After the users meet these requirements, they can complete the registration process successfully. For security purposes, the user's password is not stored in the database directly. Instead, WTWMS encrypts the password and stores the encrypted password.

3.2.1.2 Sign-In

After the user completes the registration process successfully, they need to go to the sign-in page shown in Figure 3.8 to start using WTWMS. WTWMS asks the users to enter their

username and password correctly. If users sign in successfully, WTWMS redirects to the homepage.

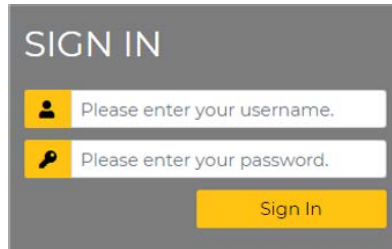
A screenshot of a 'SIGN IN' form. The form has a dark grey background. At the top, the text 'SIGN IN' is displayed in white. Below this, there are two input fields. The first field is preceded by a yellow icon of a person and contains the text 'Please enter your username.'. The second field is preceded by a yellow icon of a key and contains the text 'Please enter your password.'. Below these fields is a yellow button with the text 'Sign In' in white.

Figure 3.8 Sign in form.

3.2.1.3 Profile

Users can access their profile by using the link in the navigation bar after they sign into WTWMS. They can update their profile information and delete their profile at any time. Students can view their requests, which will be explained in the next sections, such as request to access the full version of the research problem, etc. and cancel them if they wish. On the other hand, faculty members can view the requests they have received from students and accept or reject them. Also, they can view the research topics published.

3.2.1.4 Thesis Process

The thesis process is a place for students only to keep track of their thesis process. When a student signs into WTWMS, WTWMS redirects to the homepage. On the homepage shown in Figure 3.9, a new navigation link, which is “THESIS PROCESS” is added, and the button in the header is changed to the “START YOUR PROCESS” button.

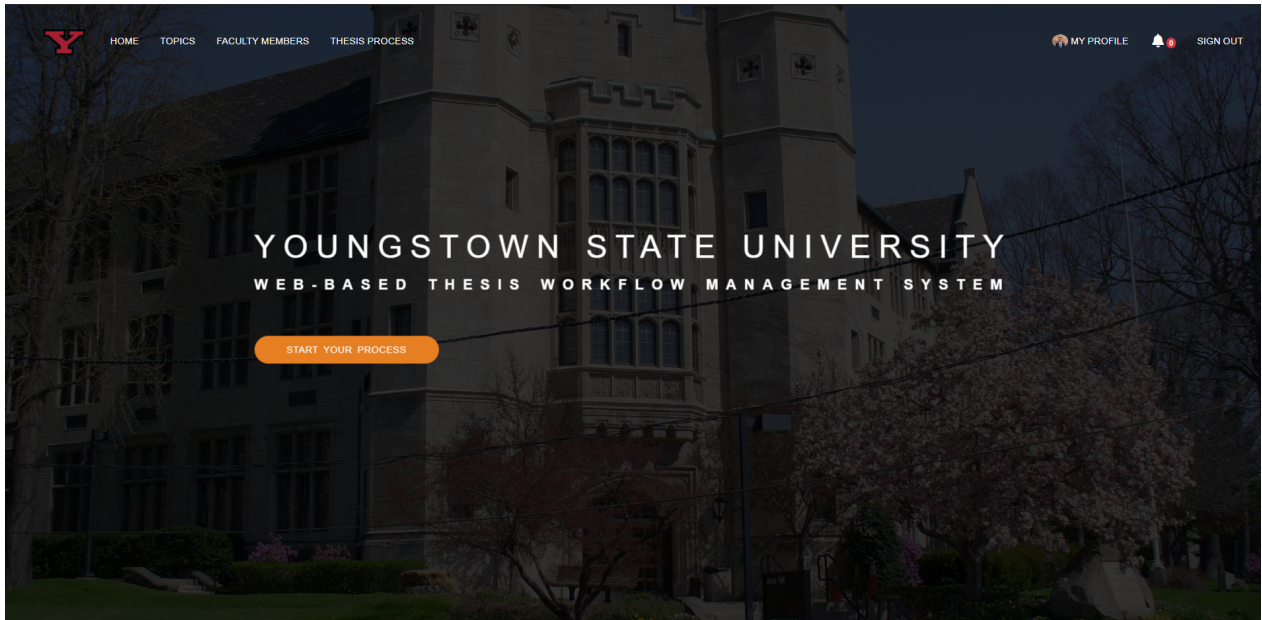


Figure 3.9 Landing page after student signs into WTWMS.

Students can go to the thesis process page, where they can keep track of their thesis process. On this page shown in Figure 3.10, they need to start their thesis process by clicking the “Start Your Process” button. In Figure 3.11, the use case scenario of WTWMS from the perspective of students is shown.

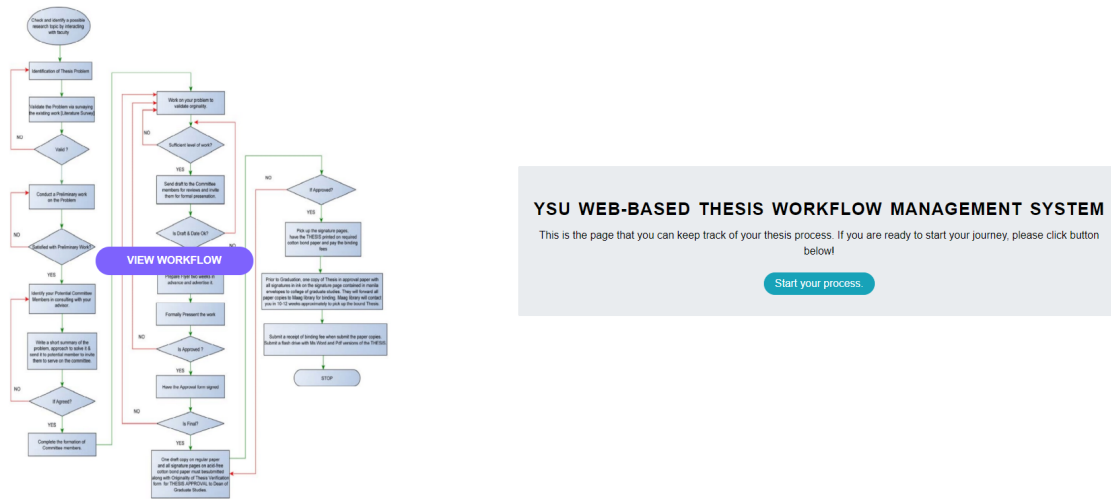


Figure 3.10 Thesis process page.

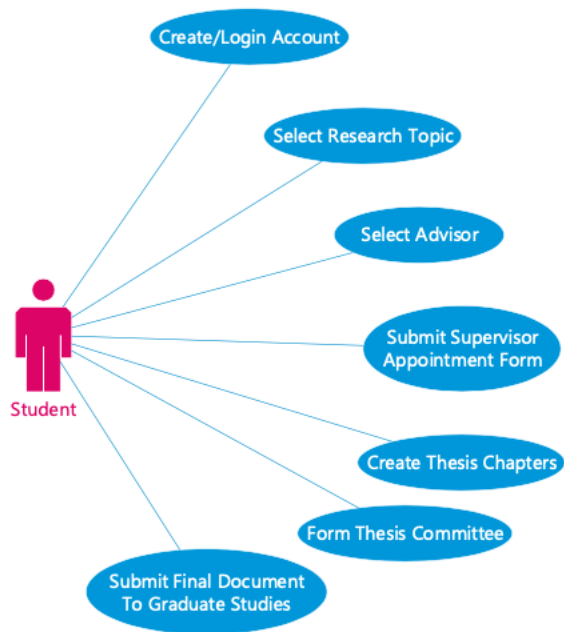


Figure 3.11 Use case scenario of WTWMS in the perspective of students

After that point, students start to complete their thesis process step by step. The next step is not displayed until the current step is completed. Some steps require approval from the advisor or committee members. Completed steps turn green, as shown in Figure 3.12.

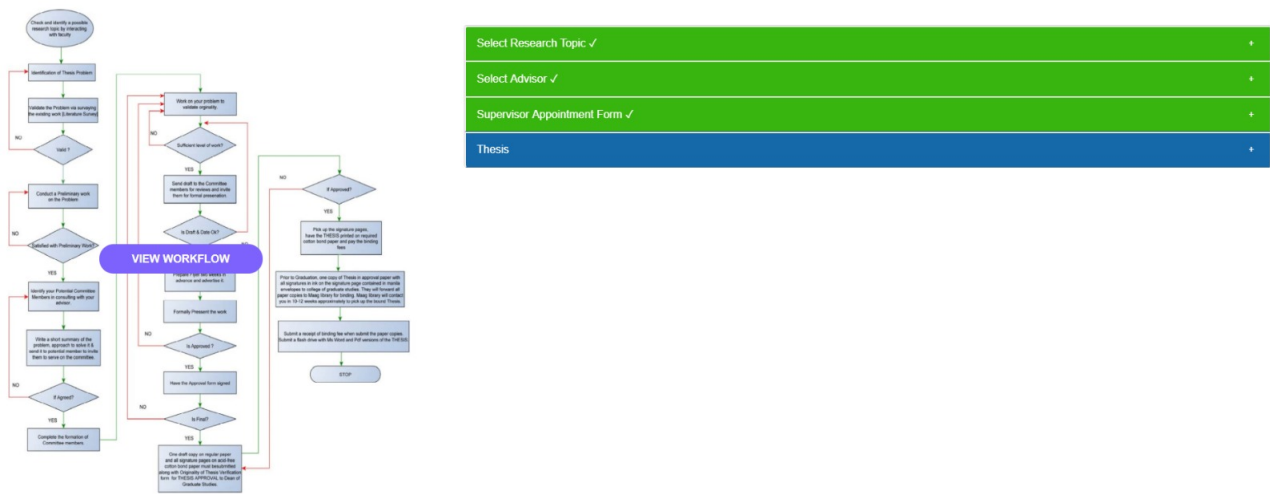


Figure 3.12 Thesis process page with a few completed steps.

3.2.1.5 Research/Thesis/Dissertation Topics

Research/Thesis/Dissertation topics can be published by faculty members only. Faculty members can publish a topic by clicking the “Publish a Research/Thesis/Dissertation Topic” button on the page where research/thesis/dissertation topics are listed or from their profile. Also, they can update and delete their topics at any time they want. When they go to the page where they can publish a topic, WTWMS asks them to fill out the title, brief description, area of the research, and a whole description of the topic. WTWMS does not allow the user to leave these fields empty. In Figure 3.13, the use case scenario of WTWMS from the perspective of faculty members is shown.



Figure 3.13 Use case scenario of WTWMS in the perspective of faculty members

A brief description of the topics will be accessible to users and every person who visits the website. Students can access full information about the topic after sending a request to the publisher of the topic, and their request is accepted. Every user can view the publisher profile by clicking the name of the publisher shown in Figure 3.14.

On the other hand, students can search for many topics on a single page. After they find the topic that they are interested in, they send a request to the publisher of the topic to access the full version. If they want to send an e-mail to get in touch with a faculty member, the e-mail address of the faculty member is displayed on their profile page. Students can send only one request at a time. This prevents sending multiple requests and having access to all the topics listed on the website. They need to wait for permission from faculty members.

+ Publish a Research/Thesis/Dissertation Topic

RECENT RESEARCH/THESIS/DISSERTATION TOPICS

Periodic Performance Analysis to Predict Students Success Rate

"At vero eos et accusamus et iusto odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias excepturi sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedita distinctio. Nam libero tempore, cum soluta nobis est eligendi optio cumque nihil impedit quo minus id quod maxime placeat facere possimus, omnis voluptas assumenda est, omnis dolor repellendus. Temporibus autem quibusdam et aut officiis debitis aut rerum necessitatibus saepe eveniet ut et voluptates repudiandae sint et molestiae non recusandae. Itaque earum rerum hic tenetur a sapiente delectus, ut aut reiciendis voluptatibus maiores alias consequatur aut perferendis doloribus asperiores repellat."

Submitted By:  [Abdu Arslanyilmaz](#)

Department: Computer Science & Information Systems


4 days ago

Figure 3.14 Page where research/thesis/dissertation topics are listed from the faculty member point of view.

If they want to change a topic without getting access to the full version, they can cancel the request by clicking the "Click here to cancel it" link on the same page.

Lorem Ipsum

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Submitted By:  Alina Lazar


Department: Computer Science & Information Systems

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9 months ago

Web-based Thesis Workflow Management System

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Submitted By:  Coskun Bayrak

Department: Computer Science & Information Systems

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Figure 3.15 Page where research/thesis/dissertation topics are listed from the student point of view.

After students get permission to read the full version of the topic, the “Read More” button appears, as shown in Figure 3.15. After they click the button, WTWMS redirects to the page where full information about the topic is displayed. After they read everything about the topic, they can decide if they want to choose the topic as their thesis/dissertation.

On the page, there are two buttons where students indicate their intention about this topic, as shown in Figure 3.16. If students click the “Do Not Select This Topic” button, they lose access to that research topic and can request access to another topic. If students click the “Select This Topic” button, the first step of their thesis process will be completed. Then, they are going to determine who’s going to be their thesis advisor.

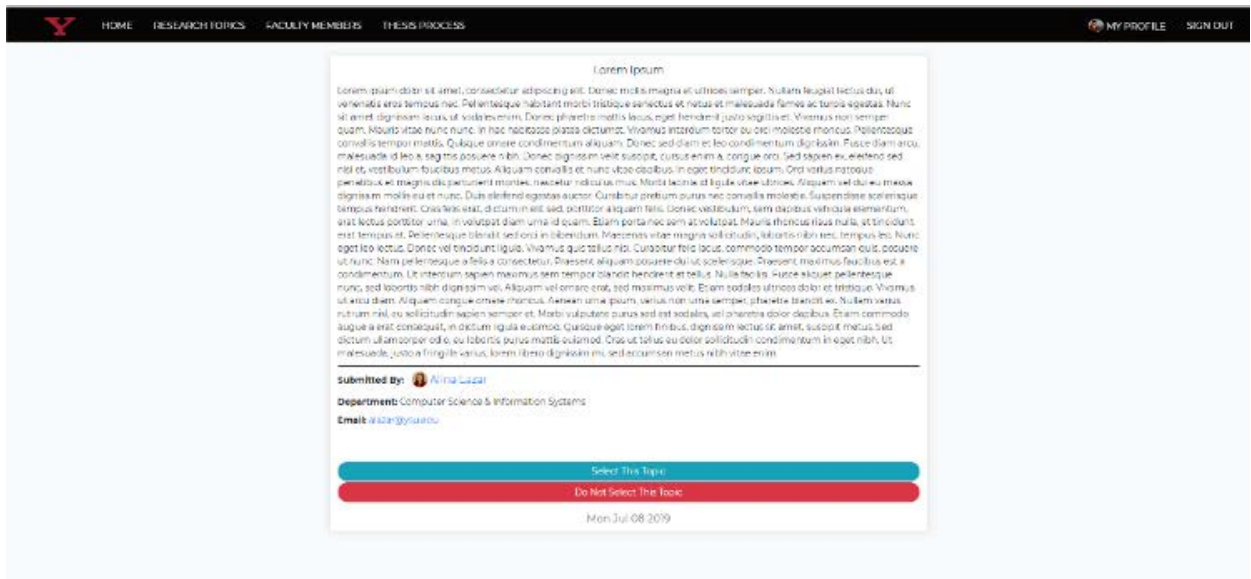


Figure 3.16 Full version of the research/thesis/dissertation topic.

3.2.1.6 Thesis Advisor

Students can find all the faculty members who have registered in WTWMS by clicking the “FACULTY MEMBERS” link in the navigation bar. They can discover their area of research interests by visiting their profiles. After students decide who they would like to have as their thesis advisor, they can click the “Send Request” button on the faculty member’s profile page. When the button is clicked, a pop-up modal appears, as shown in Figure

3.17. To send a request, students must write a short summary of their research problem. Also, they can write a message to describe their intention in detail.

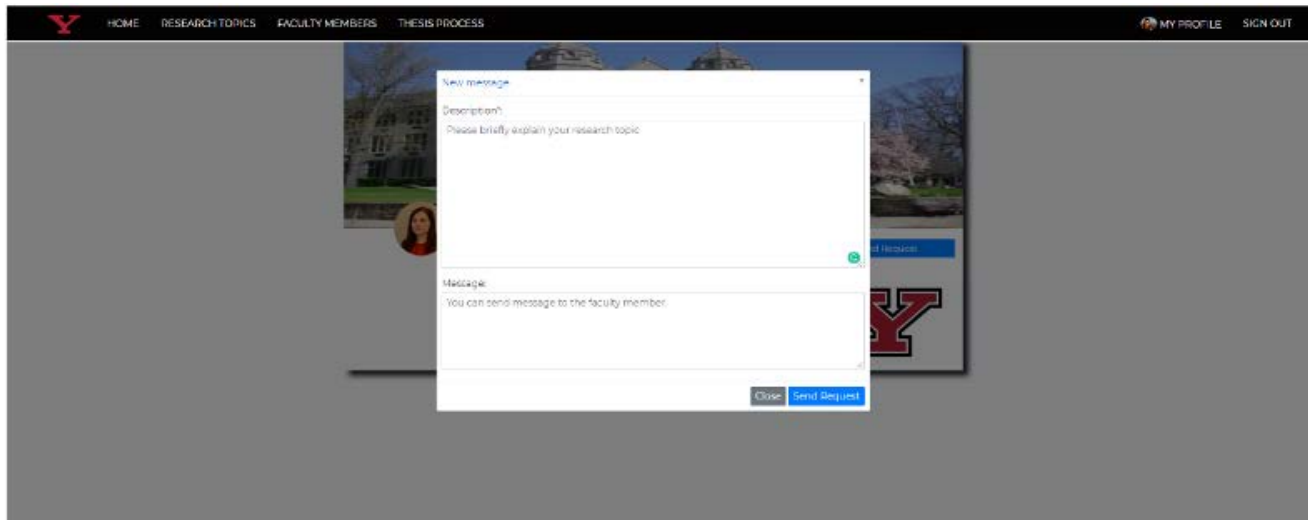


Figure 3.17 Sending request to the potential thesis advisor.

After sending the request, students wait for the faculty member’s approval to complete the second step of their thesis process. Faculty members can either accept or reject the requests after reviewing them. If a faculty member denies the request, then the student needs to find another faculty member.

3.2.1.7 Supervisor Appointment Form

After students choose their thesis advisors, they need to fill out a “Supervisor Appointment Form,” as shown in Figure 3.18. They can reach this form from the thesis process page, as shown in Figure 3.12. When they open the form, WTWMS asks students to fill out their physical address, including the city, state, and zip code, as well as the proposed title of the thesis and the anticipated completion date. These fields are required. After students fill out

the form, they can move to the next step.

Y

SUPERVISOR APPOINTMENT FORM

Banner ID: Y00801245

Student Name: Selcuk Senol

Adviser Name: Alina Lazar

Address:

City: State: Zip Code:

Proposed title of thesis/dissertation/portfolio: Anticipated Completion Date:

SUBMIT FORM

Figure 3.18 Supervisor appointment form.

3.2.1.8 Writing a Thesis

At this step, students can begin writing the thesis, creating as many chapters as they wish. While writing these chapters, WTWMS asks the student to enter the title of chapters and to write the body for each chapter one by one. These fields cannot be left blank. Also, students can add references for each chapter. The reference field is optional. All they need to do is to write a reference and press the enter key, as shown in Figure 3.19. Students cannot create any other chapters until their advisor approves the current chapter. Students must send each chapter to their advisor for revision. The advisors can make changes to each chapter and approve it when their revision is completed. After the adviser approves

each chapter, all chapters and references will be compiled as one thesis.

The screenshot shows a web-based writing interface. At the top, there is a 'Title' field containing the text 'Introduction'. Below the title is a 'Body' section with a rich text editor. The editor's toolbar includes options for Paragraph, Bold (B), Italic (I), Link, Bulleted List, Numbered List, Image, Video, Table, and Undo/Redo. The main text area contains two paragraphs of placeholder text (Lorem ipsum) with various words underlined in red. Below the text area, there is a citation reference: '[1] R. E. Ziemer and W. H. Tranter, Principles of Communications: Systems, Modulation, and Noise, 7th ed. Hoboken, NJ: Wiley, 2015.' Underneath the reference is a prompt: 'Please write references here and press enter!'. At the bottom of the interface is a blue button labeled 'SAVE AND CLOSE'.

Figure 3.19 Writing a chapter for the thesis.

Students need to start with writing the first chapter of their thesis. An example is shown in Figure 3.16. After students finish their introduction, they need to click the “SAVE AND CLOSE” button. WTWMS redirects them to the page where all created chapters are listed. After that, students either continue writing the introduction or send it to their advisor for revision. If students change something after getting approval from their advisor, they need to send it back to the advisor for approval again. The same procedure applies to all the chapters that students create.

3.2.1.9 Form A Committee

The next step in the thesis process is to form a committee. Students must have at least three committee members on their committees. One of their committee members must be their thesis advisor. Therefore, WTWMS adds the student's thesis advisor as their first committee member automatically. Students need to choose at least two more committee members. After students select their committee members, the committee members receive the student's thesis. Committee members can give feedback on the student's thesis. They can also provide a date range when they are available for the student's oral presentation if they are satisfied with the student's study. After that, students need to choose a date according to the date ranges given by the committee members, when the oral presentation will be held. Committee members might request to change the date if they are not available at that time. The final step will be completed after the oral presentation has been made and approved by the committee members.

3.2.1.10 Final Step

After the student's work is approved by the committee members, students have to take the compiled thesis from WTWMS and convert it to a PDF file with proper format. Students can learn more about formatting from their advisors or committee members. After that, the student needs to upload the PDF file to WTWMS. Next, the Dean of the Graduate College can review the student's thesis from the admin panel, which will be explained in the next section. The Dean of the Graduate College might ask for resubmission if more substantial changes are necessary. If this is not the case, then the final document will be uploaded to WTWMS from the College of Graduate Studies. Then, students need to upload their thesis to Ohiolink. WTWMS has a link that redirects to the page where more information

is displayed about this step. Students get more information by getting in touch with the College of Graduate Studies.

3.2.1.11 Administrator Users

WTWMS also has a user-friendly dashboard for administrator users. The College of Graduate Studies will be responsible for the dashboard. There are four types of administrators, including system administrator, department administrator, and Dean of Graduate Studies. Dean is responsible for reviewing the student's thesis and likely give feedback on it. Also, the dean can ask for re-submission if significant changes are required. Otherwise, he/she approves the student's thesis. Each department will have an admin account. Department administrators are responsible for arranging a room for oral presentation. They will be notified by WTWMS when students form their committee and choose dates for oral presentation.

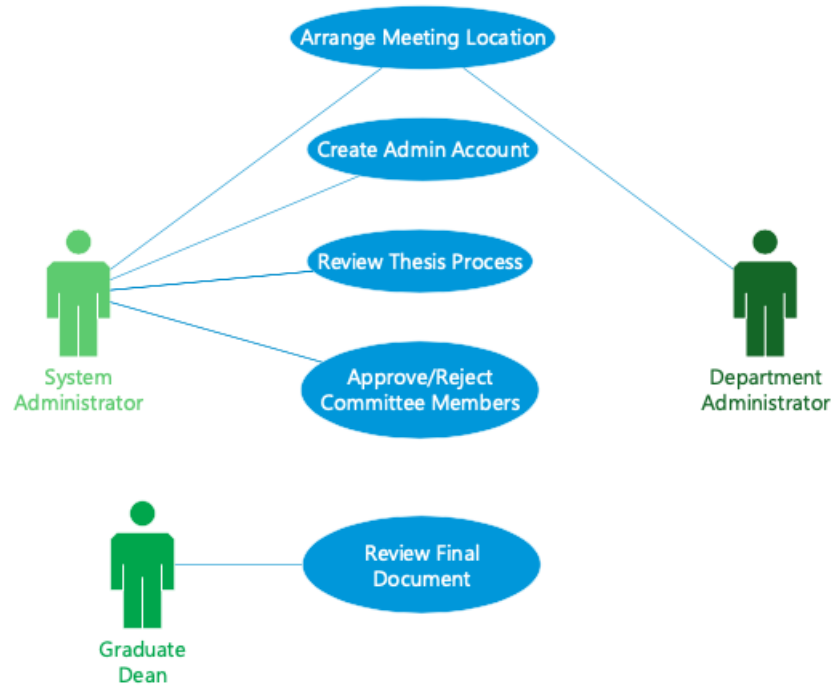


Figure 3.20 Use case scenario of WTWMS in the perspective of administrators.

System administrators can see the student’s thesis process along with their advisor, committee members, and the date when the oral presentation will be held. They also have the authority to make changes in the students’ thesis process if necessary. For example, the College of Graduate Studies needs to approve the student’s committee members. They might request some changes in the students’ committee. Also, they can create, update, or delete an administrator account.

Chapter Four

User Testing

In this chapter, my experience with the use of WTWMS will be explained during the completion of the thesis/dissertation workflow from the perspective of the student account. First, I've created some faculty member's account along with research/thesis/dissertation topics to perform user testing. The first step was to create a student account and sign in to the system. While creating the student account, I didn't face any difficulties. This step might be one of the easiest steps in the system. All users need to do is to fill in fields and fulfill the validation rules such as entering a unique username and e-mail address. The system cannot send an e-mail confirmation currently because it does not have a domain for e-mail.

After creating an account and signing in to the system, "START YOUR PROCESS" button appeared on the landing page. When I start my thesis process by clicking the button, WTWMS asks me to select the topic to work on. I requested to access full information about the topic from the publisher of it. I selected the topic when I have access to it. Then, I send advisee a request to the faculty member that I created for test purposes. After selecting my advisor, I filled out the "Supervisor Appointment Form" which is a next step in the thesis workflow. I believe that these tasks can be completed without getting confused.

After these steps, there are two more steps left in WTWMS to complete the thesis workflow. The next step is to start writing chapters for my thesis and to get approval for each chapter from my advisor. After completing my thesis, I've sent it to my advisor for final approval using WTWMS. Even though WTWMS guides users what they have to do next some users might be confused in this step according to their experience in information systems. According to users' feedback, this step might need to be improved to provide more smooth usage of WTWMS for each user because this step has many constraints.

Lastly, I formed a thesis committee by sending a request to the faculty members and schedule a thesis presentation date according to the given date range by committee members.

In conclusion, I didn't face any problem while completing the task mentioned above. However, WTWMS is open for advancement based on feedback from users as declared above.

Chapter Five

Conclusion AND Future Works

This work has introduced an approach to a Web-based thesis process workflow management system in higher education. WTWMS is a web-based application that constructs a bridge between students and faculty members virtually. Attempts have been made to include all the components required in the web-based system for students to pass their thesis process as easily and smoothly as possible. WTWMS aims to develop a system that provides an environment for fast and efficient interaction between students and their advisors and also to prevent wasting time and paper that students will make during their thesis process.

Future work will explore how this web-based system work as a mobile application for both iOS and Android operating systems. Mobile applications make lives easy. With just one click, users can be informed about many things or take action. A mobile application will provide many benefits besides a web-based application. When thinking in terms of accessibility, a mobile app has advantages over a web-based system. For example, students can be informed directly when they receive any notifications from WTWMS, such as getting approval from their advisor for their thesis. Hence, a quick return can be made thanks to these notifications.

Secondly, communication between the student and the advisor is essential. Messaging and video conferencing is as valuable as are other future works in terms of improving the project. Using the messaging feature, users will be able to contact each other without using different ways such as email or face-to-face meetings. This feature aims to accelerate the process by creating communication among users from the WTWMS. Video conference is another way to create communication among users. In some cases, the student's advisor might want to conduct a meeting with his or her student. A video conference feature will help both students and their advisors to communicate without having installed any third-party software such as Skype.

5.1 Maintenance and Deployment of WTWMS

WTWMS requires a cloud platform to get delivered to the end-users. Heroku is one of the companies that provide a cloud application platform and it will be used to deploy WTWMS for test purposes. Later, It can be changed based on requirements. WTWMS is built using the Git version control system that helps to maintain the system. The stable version of WTWMS is stored in the master branch of Git. When a new feature needs to be implemented in the system, a new branch is created and is merged with the master branch after the feature works solidly in the system. Thanks to Git, the system can be converted to the previous version if an error occurred or maintenance is required. The types of software maintenance will be explained in the next section.

The types of software maintenance used in the system are corrective and perfective maintenance. Each maintenance type has different purposes and they are and will be used to improve WTWMS.

Corrective maintenance is used to fix errors found while the system is in use. For example, design or logic errors can occur in some cases because of incorrect implementation. In most cases, the end-users report these errors. They need to be fixed to provide an operable system. Perfective maintenance is used to increase the system's performance while making functional enhancements.

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