**DEVELOPMENT LECTURE SCHEDULING APPLICATION**

**BY**

**ALMUSTAPHA ADO FAROUQ**

**BU/22B/IT/6871**

**IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF SCIENCE IN SOFTWARE ENGINEERING, FACULTY OF COMPUTING AND APPLIED SCIENCE, BAZE UNIVERSITY, ABUJA.**

**NOVEMBER, 2023**

**DECLARATION**

This is to certify that this Thesis entitled LECTURE SCHEDULING APPLICATION, which is submitted by ALMUSTAPHA ADO FAROUQ in partial fulfilment of the requirement for the award of degree for B.Sc. in Information Technology to the Department of Computer Science, Baze University Abuja, Nigeria, comprises of only my original work and due acknowledgement has been made in the text to all other materials used.

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ALMUSTAPHA ADO FAROUQ Date

BU/22B/IT/6871

**APPROVED BY**

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Dept. of Computer Science **H.O.D**

**CERTIFICATION**

This is to certify that this Thesis entitled LECTURE SCHEDULING APPLICATION, which is submitted by ALMUSTAPHA ADO FAROUQ in partial fulfilment of the requirement for the award of degree for B.Sc. in Information Technology to the Department of Computer Science, Baze University Abuja, Nigeria is a record of the candidate’s own work carried out by the candidate under my/our supervision. The matter embodied in this thesis is original and has not been submitted for the award of any other degree.

**APPROVAL PAGE**

The project titled "LECTURE SCHEDLING APPLICATION" submitted by ALMUSTAPHA ADO FAROUQ bearing registration number BU/22B/IT/6871, has been approved by the examination committee for the award of the Bachelor of Science in Software Engineering degree at Baze University, Abuja.

By

Dr. Usman Bello Abubakar

Supervisor Date

Assoc Prof. Chandrashekhar Uppin

Head of Department Date

Prof. Peter Ogedebe

Dean, Faculty of Computing and Applied Science Date

Prof. Choji Davou Nyap

External Examiner Date

**DEDICATION**

[DEDICATION PAGE]

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**ABSTRACT**

A state-of-the-art software program called the Lecture Scheduling Application was created to completely change how educational institutions organize their lecture schedules. Conventional scheduling methods frequently entail laborious manual coordination, which takes time and leads to disagreements in scheduling, waste of resources, and unhappiness among teachers and students. The goal of this program is to improve scheduling overall by offering a streamlined, automated, and user-friendly solution to these problems.

**CHAPTER ONE**

**INTRODUCTION**

**1.1 Overview**

The purpose of the lecture scheduling application is to make the process of organizing and managing lectures in educational institutions more efficient and user-friendly. With the use of this software, scheduling should be more effective and efficient, resulting in less manual labor and an overall better experience for teachers and students.

**1.2 Background and Motivation**

The creation of project scheduling apps has become apparent as a vital response to the problems brought on by the complexity of modern projects in the ever-changing field of project management. The necessity for effective task planning, organization, and management to guarantee maximum resource utilization and on-time project completion drives the development of these applications.

The intricacy of today's projects, with their multitude of tasks and complicated relationships, has made manual scheduling impractical. Projects get bigger and more complex, which increases the likelihood of mistakes and inefficiencies in scheduling. In addition, modern work environments are collaborative, which means that team members need to communicate and coordinate more efficiently.

To sum up, the need to solve the difficulties posed by complex projects is what drives the creation of project scheduling tools. These apps represent a significant progression in project management practices, supporting collaboration, maximizing resource usage, and guaranteeing timely project delivery—all of which are critical to the success and efficiency of projects in today's business environment. Project scheduling software are predicted to play an ever more significant role in the future of project management as technology develops.

**1.3 Statement of the Problem**

The current scheduling process in Baze University is time-consuming and error-prone, resulting in scheduling conflicts, suboptimal resource allocation, and dissatisfaction among stakeholders. This application aims to address these issues and provide a solution that ensures smooth lecture scheduling, minimizes conflicts, and maximizes resource utilization.

**1.4 Aim and Objectives**

The primary aim of the lecture scheduling application is to create a user-friendly, automated, and efficient system for scheduling lectures in educational institutions. The specific objectives include:

1. To develop a user-friendly interface for administrators, faculty, and students to access and manage the scheduling system.
2. To automate the scheduling process to minimize conflicts and optimize resource allocation.
3. To integrate features for requesting and approving schedule changes or swaps.
4. To Generate reports and analytics to help administrators make data-driven decisions about scheduling.

**1.5 Significance of the Project**

The lecture scheduling application is significant as it offers numerous benefits, including:

1. Improved efficiency and accuracy in scheduling, reducing conflicts and disruptions.
2. Enhanced user experience for students, faculty, and administrators.
3. Better utilization of resources, such as classrooms and faculty availability.
4. Time and cost savings due to reduced manual scheduling efforts.
5. Data-driven insights for better decision-making in scheduling.

**1.6** **Project Risks Assessment**

**Table 1.1 Project Risks Assessment**

|  |  |  |
| --- | --- | --- |
| Risk | Likelihood | Impact |
| Resource Constraints | Medium | High |
| Technology Failure | Low | High |
| Budget Overrun | Medium | High |
| Regulatory Changes | Medium | Medium |
| Data security and privacy concerns. | Low | High |
| Integration issues with existing systems. | Medium | Medium |

This table provides a starting point for assessing and managing risks specific to the development of a lecture scheduling application. It helps the project team to proactively identify and address potential challenges, ensuring a more successful project outcome.

**1.7 Scope and Organization**

The project's scope includes the development and implementation of the lecture scheduling application for a specific educational institution. The project will be organized into the following phases:

* Requirement analysis and system design.
* Application development and testing.
* User training and system deployment.
* Ongoing support and maintenance.

**CHAPTER TWO**

**LITERATURE REVIEW**

**2.1 Introduction**

In order to provide an organized learning environment and ensure effective resource use, lecture scheduling is essential in educational institutions. The need for automated solutions to expedite the lecture scheduling process is expanding as technology develops. Applications for lecture scheduling are designed to solve problems with manual scheduling, like scheduling conflicts, resource optimization, and flexibility to changing academic settings. In order to provide an organized learning environment and ensure effective resource use, lecture scheduling is essential in educational institutions. The need for automated solutions to expedite the lecture scheduling process is expanding as technology develops. Applications for lecture scheduling are designed to solve problems with manual scheduling, like scheduling conflicts, resource optimization, and flexibility to changing academic settings.

**2.2 Historical Overview**

The idea of scheduling applications including those used for educational purposes like planning lectures likely originated in reaction to the increasing complexity of overseeing educational establishments and their scheduling requirements. Early on, it's possible that crude scheduling systems were created locally and relied primarily on human input and elementary algorithms to generate schedules.

As software development progressed and the need for effective scheduling grew, specialized software solutions began to appear. These programs attempted to automate the scheduling process while accounting for variables like course needs, instructor schedules, and available rooms. During this time, desktop programs with restricted collaboration features were probably used.

Scheduling applications moved to web-based systems as internet technologies proliferated. As a result, scheduling became more collaborative and accessible, allowing administrators, teachers, and students to participate from different places. Real-time updates and notifications were added, and user interfaces became more user-friendly.

Recent developments in machine learning and artificial intelligence may have been used to improve scheduling systems. It's possible that predictive analytics was used to foresee scheduling issues, and intelligent algorithms could have learned from past performance to continuously enhance the scheduling procedure.

By 2022, applications for lecture scheduling might continue to emphasize accessibility, user experience, and integration with new technologies more than before. This could entail additional automation, insights powered by AI, and improved user interfaces to accommodate the changing requirements of educational establishments.

The use of scheduling software in education has become increasingly popular in recent years. One example is the development of an automated scheduling system for university lectures and examinations, which aims to simplify the lecture and examination timetabling process [3]

* 1. **Related Work**

Applications for scheduling lectures have evolved through a number of research and development initiatives. Prominent research has concentrated on several facets of scheduling, such as user interfaces, optimization methods, and integration with other educational systems. Some systems employ machine learning and artificial intelligence to forecast the best schedules based on past performance and user preferences. Thanks to the increasing popularity of collaborative scheduling software, administrators, teachers, and students may all communicate and participate in the scheduling process.

Ariestanti et al. (2018) Implementation of Lecture Scheduling Using Method – Auto Generate Timetable: The purpose of this research is to produce Lecture Scheduling Using the Auto Generate Timetable Method that can be used effectively for lectures at Raharja Higher Education. The research problem in arranging schedule in the college are time, space and timeslots. Considering the list of hard constraints and soft constraints presented in one semester, thus no conflicts are created in allocating the schedule. Research methods used are questionnaires and fixed study cards, as well as System Development Life Cycle (SDLC) methodology and Object Oriented Analyses Design (OOAD). The tools used are UML, Xamp with Apache software support, PHP, MySql, and Yii Framework.

Ginting, et al (2021). Design of a Web-Based Lecture Scheduling Information System During Pandemic Covid-19 (Case Study: Faculty of Engineering and Science, Ibn Khaldun University) During the Covid-19 pandemic, the lecture process was carried out online, so it impacted other academic activities such as the preparation of lecture schedules. The results of observations at the Faculty of Engineering and Science found that the practice of lecture schedules was carried out manually, such as the schedule coordination process was carried out face-to-face between study programs, faculties, and lecturers to overcome conflicts in the use of rooms and teaching time. Changes in the teaching schedule need to be re-checked on the use of the room and the lecturer's teaching time because it has not been documented with the information system. Hence, this study aims to build an information system for preparing lecture schedules using the Greedy Best First Search Method based on the willingness of lecturers to teach. The system was developed using the RAD (Rapid Application Development) and testing using BlackBox testing. The results of this study succeeded in building a lecture scheduling information system that was able to generate lecture schedules automatically and quickly without having to coordinate face-to-face to support online lectures during the Covid-19 pandemic.

Arikpo et al.(2018) designed an Automated Scheduling System for University Lectures and Examinations: Scheduling has been a real-life combinatorial problem over the years. University timetabling, which is part of time scheduling, represents a difficult optimization problem, which most universities are grappling with; hence, developing software systems that automate timetabling has also been a challenging task. The aim of this study was to develop an automated system that can simplify the lecture and examination timetabling in the University. The system was designed with an object-oriented analysis and design approach using the unified modelling language. The resulting web application was implemented using the Java Enterprise Edition version 6, with MySQL Server as the backend database system. The resultant software schedules lectures and examinations interactively and in batches for the eleven departments of the Faculty of Science at the University of Calabar, Nigeria. Lectures are scheduled randomly in timeslots, satisfying the constraints provided in the system. The output of the resulting timetable is by far better than the manual approach, eliminating venue and time clashes in the process.

Agustus et al. (2014) designed a Web-Based Class Scheduling for a Collaborative Preparation of Block-Based Schedules: This work aimed to develop, implement, and evaluate a web-based scheduling application for a collaborative preparation of class schedules at the Central Luzon State University. The development integrated an algorithm for automated plotting and conflict-checking of the different scheduling entities based on their availability considering different constraints and preferences. The application was deployed using a free Virtual Private Network software, Hamachi. Four academic units in the University collaboratively created their class schedules using the scheduling application. The occurrences of problems relative to the scheduling of classes in the academic units that used the application were compared with the five academic units that did not use it. In the comparisons made, there is a significant effect of the use of the application to the occurrences of the observed scheduling problems.

Labuanan et al. (2019) designed Class Scheduling System.This paper introduced aimed to solve the poor management of schedule, one of the major problems at Isabela State University-Main Campus. Scheduling is a process conducted before a certain event would be executed. The study used and adopt the Representation and Fitness Methods of Genetic Algorithm to formulate a solution. The study showed that the adaptation of the two methods is well fitted for use in solving the stated problem. The representation method creates and generates the pre-scheduling template to be used for the plotting of schedules, and fitness method is how the pre-scheduling template generated and created. The researchers used some criterion of ISO 9126 Standard as an instrument to determine its functionality and usability. Results showed that the representation and fitness methods of the genetic algorithm make the scheduling process more accurate and reliable schedules, lessen the time-consumed and lessen the time-conflicts in the plotted schedules. For future studies to be conducted reformulation of fitness function to include the other components and variables of scheduling like individual schedules for both regular and irregular student and campus extension integration and considering the other indicator of the instrument used are significantly suggested.

Agustus et al(n.d.) designed a Class-Scheduling System for the Central Luzon State University(Abridged): This work designed and developed a class-scheduling system that will allow collaborative preparation of schedules among several users. The system integrated five components: the data management module, course assignment module, scheduling module, result storage module, and the report module. It has an engine that uses the greedy algorithm for creating schedules and detecting conflicts. The algorithm mainly executes this sequence of processes; selecting available time, finding available room, and looking for an appropriate faculty while considering different constraints and preferences set by users.

Emmanuel et al. (2019). DESIGN OF AUTOMATED DEPARTMENTAL LECTURE TIMETABLE SYSTEM. A lecture timetable is a tabular list showing the times which a particular lecture is scheduled to hold and the venue in each day of the week. Its content includes the course code for each course, the coded lecture venue, and the time for each lecture. A lecture timetable is designed every semester. In this era of technological advancement, virtually every aspect of human enterprise has been automated (the use of machines especially computers instead of human to accomplish a task). Now students can pay their school fee, register their courses and even check their results on the internet. This is the drive that gave birth to this research work: the design of an automated lecture timetable for the department of mathematical sciences, Kogi State University Anyigba. The project presents the automated design of lecture timetable. The principle of operation is simple and employs the use of computer technology. A

program is written in Visual Basic which produces the output in an error free tabular form displaying the courses/venues for each particular lecture schedule.

Perera (n.d.). propose a LECTURE HALL SCHEDULING AND TIMETABLE MANAGEMENT SYSTEM this is to propose to develop an automated system. It is consisting of student enrolment, lecture hall scheduling, and virtual learning environment. By using this proposed system lecturers can reserve the lecture hall by their preference and students may get an email notification with the venue and the time of the lecture each day.Fiarni, et al. (2015). The output of this research will be an automatic set of presentation schedule alternatives that will take into account all the constraints. The proposed algorithm for this automatic scheduling system could generate optimal presentation timetable and enables direct interaction with lecturers in order to gather data of their availability time among other its functionalities. The proposed system performs satisfactorily in term of accuracy, data handling and adaptability on helping the faculty to arrange presentations more easily, yield a reliable record and increase efficient use of resources.

Hambali et al. (2020). This paper present a combination of genetic algorithm (GA) and simulated annealing (SA) to have a heuristic approach (HA) for solving course timetabling problem in Federal University Wukari (FUW). The heuristic approach was implemented considering the soft and hard constraints and the survival for the fittest. The period and space complexity was observed. This helps in matching the number of rooms with the number of courses.

**2.4 Summary**

In summary, the creation of lecture scheduling software has progressed from laborious manual procedures to complex, technologically driven solutions. The transition from desktop apps to paper-based systems in the past created the foundation for today's intelligent, collaborative, and sophisticated scheduling solutions. Novel strategies for streamlining scheduling procedures, improving user experiences, and integrating with larger educational systems are still being investigated through ongoing research. The need for sophisticated lecture scheduling software is expected to continue as more educational institutions come to understand the value of effective scheduling, which will spur additional innovation in this area.

**CHAPTER THREE**

**REQUIREMENTS, ANALYSIS, AND DESIGN**

**3.1 OVERVIEW**

This chapter focuses on determining the requirements, performing analysis, and developing the system design for the proposed Lecture Scheduling Application. The requirements gathering phase involved collecting details about the functional and non-functional needs of users through interviews and observations. Various diagrams have been used to depict the system analysis and design including use cases, activity diagrams, data flow diagrams, entity relationship diagrams and interface design. The methodologies and tools used have been selected to deliver an optimal system design within ethical guidelines.

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