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ISODUS Application Design for Web-Based School Academic Administration Operational System Information. Case Study: Al Alaq Islamic Middle School

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Abstract: The aim of the research is to support technological independence in educational units in processing data archives and general finances at the Al Alaq Islamic Middle School and what are the obstacles encountered in implementing such a system. In addition, the authors hope that readers can understand the use of this academic administration information system application known as ISODUS. During the research, the authors found that the Al Alaq Islamic Middle School did not have a computerized academic administrative and financial data processing system so that it could help find information quickly and effectively. This is due to the lack of human resources who know about information systems. After conducting some research, the authors conclude that Al Alaq Islamic Middle School requires a computerized system so that it can assist teachers in making administration. The author tries to create an Academic Administration system using the PHP programming language.

Keywords: Information systems; Web; Applications; Administration; Finance.

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1. Introduction

The development and execution of the web-based Academic Financial Administration Information System application for Junior High Schools initiated in response to challenges within the academic setting of Al Alaq Islamic Middle School. The absence of a functional academic data processing system led to manual handling of various tasks involving administration, finance, and assessments. This proposed information system, designed as a web application, aims to streamline the processes related to the mentioned activities. It leverages informatics technology within data communication networks, aiming to expedite and enhance data processing accuracy, while also addressing redundancy issues [1].

The realm of information technology in the domain of computers has consistently witnessed rapid advancements. Modern information technology has enabled individuals to create diverse tools to support their everyday tasks. This expansion of information technology has made its way into various sectors, including education. Many institutions, encompassing educational, governmental, and private bodies, require computer tools to facilitate their daily operations [2].

Al Alaq Islamic Middle School stands as one educational institution that has fallen behind in terms of adopting information technology. However, integrating information technology holds substantial potential to elevate the educational quality at Al Alaq Islamic Middle School. This integration extends beyond mere data processing; it encompasses managing all educational data, ranging from school and student details to faculty records, correspondence, tuition payments, and generating various reports. As computer technol-

ogy continues to advance, educational institutions aspire to effectively implement education methodologies to enhance educational quality, nurture intelligence, and prepare capable future generations. The incorporation of academic information systems within schools can be approached through several facets that influence the efficiency and efficacy of school administration [3]. The establishment of a coherent and efficient academic information system within Al Alaq Islamic Middle School will play a pivotal role in fostering educational activities, ultimately enhancing the teaching and learning processes. The academic information system encompasses the processing of diverse entities such as students, parents/guardians, teachers, staff, and principals. It also covers subjects, schedules for both students and teachers, student grades, attendance records, as well as financial aspects like payroll for teachers and staff, and monthly school fees (SPP) [4].

2. Materials and Experiment Methods

In the process of crafting and executing the ISODUS Web-Based Academic Administration Information System Application within the context of the Al Alaq Islamic Middle School case study, a range of research materials is required:

Initial Data: Information pertaining to the school's administrative framework, Data concerning students, teachers, staff, and school administrators, Details about the curriculum, subjects, and lesson timetables, Records of student and teacher attendance, Assessment data of students and their academic records, Financial data related to the school, encompassing tuition payments and salaries of teachers and staff, 1) Technological Components and Software: Programming languages (such as PHP, Java, HTML), Framework for the development of web applications (Laravel), Database Management System (DBMS) (like MySQL), Markup languages and scripting (HTML, CSS, JavaScript) for constructing the user interface, 2) Research Approaches: During the course of the research, centered on the construction and deployment of the ISODUS Web-Based Academic Administration Information System Application within the Al Alaq Islamic Middle School case study, the following approaches were employed, 3) Requirements Analysis: Identification of the principal necessities of the academic administration information system, Thorough examination of school administration workflows, encompassing procedures for managing student and teacher data, class schedules, evaluations, attendance, and financial matters, 4) System Blueprint: Designing the architecture of the database, devised to store the requisite data, Development of an intuitive and responsive user interface, Specification of application functionalities, encompassing capacities to handle student data, manage schedules, input grades, and oversee financial aspects 5) Application Creation: Selection of suitable programming languages and frameworks to create the ISODUS web application, Implementation of features that were meticulously designed, including modules for student and teacher management, evaluations, and financial tracking 6) Testing and Assessment: Rigorous testing of applications to ensure optimal performance and identification of potential errors or glitches, Utilization of simulated data prior to actual data entry, Critical assessment of interface responsiveness, speed of access, and comprehensiveness of functionalities 7) Deployment and Training: Integration of the application into the school environment, involving the establishment of necessary infrastructure (servers, network components, etc.), Provision of training sessions to acquaint school personnel with the operation of the application 8) Monitoring and Upkeep: Vigilant monitoring of application performance post-launch, with prompt resolution of any emergent issues, Routine maintenance activities, encompassing minor troubleshooting or enhancements of features in response to user feedback, This research methodology facilitates the creation and deployment of the ISODUS Web-Based Academic Administration Information System Application, tailored to the specific needs and aspirations of the school, while concurrently bolstering the efficacy of academic administration at Al Alaq Islamic Middle School.

Analysis of Hardware Requirements, Hardware refers to the tangible components of a computer system encompassing input, processing, and output functions. The hardware necessary for the development of a Web-Based Academic Administration Information

System for Al Alaq Islamic Middle School involves a computer equipped with the subsequent specifications: Intel (R) Pentium (R) 4 Mobile Processor, CPU clocked at 1.70 GHz, a memory capacity of 512 MB RAM, a hard disk drive with a storage capacity of 40 GB, and a monitor with a size of 17 inches [5].

Software requirements analysis, software plays a crucial role in facilitating the functioning of this application program. Software constitutes a collection of instructions intended for the operation of hardware. This software encompasses both the operating system and application programming language. The software prerequisites to initiate the operation of this application, prior to establishing an internet connection, encompass the following components: Windows XP Professional SP2 as the operating system, PSP HTML Editor, MySQL serving as the database system, PHP and HTML for programming, as well as a selection of browsers including Mozilla Firefox, Opera, Netscape, and Internet Explorer. Furthermore, the web server utilized is XAMPP for Windows32 - version 1.7.3. Design Input (input), Process, and Output (output). Input design for the World Operational System Information ISODUS School consists of: a) Admin login, b) Profile input, c) Archive data classification input, d) Announcement input, e) Student data input, f) Education personnel data input, g) Input teacher data, h) Teacher data input, i) Financial data input, j) Billing data input, and k) Class data input.

The design of the World Operational System Information Process School employs the PHP (Hypertext Preprocessor) programming language with the incorporation of HTML. This system is structured as follows: 1) When visitors access the website of Al Alaq Islamic Middle School in Bekasi City, the browser will present the primary webpage. 2) Within the main page, visitors can select links on the left to reveal concealed information accessed through the link buttons. 3) Prior to gaining access to the primary administrative menu, the administrator in charge of managing the Al Alaq Islamic Middle School website must first log in. 4) After successful login, administrators possess the ability to oversee various aspects of the website, including entering student data, recording student attendance, inputting teacher details, and more. They can also review the outcomes derived from data input. The concerned output design pertains to the appearance of the interface. The output design within ISODUS encompasses: 1) Profile viewing, 2) Agenda viewing, 3) Announcement viewing, 4) Student data viewing, 5) Financial report management, 6) Teacher data viewing, 7) Archive management, 8) Viewing student savings data, and 9) Viewing class data.

3. Results and Discussion

Al Alaq Islamic Middle School encounters obstacles in effectively and cohesively handling academic, administrative, and financial information. Consequently, the current approach encounters substantial challenges in promptly accessing real-time information. Moreover, the project team will actively engage with a range of stakeholders, including school principals, educators, administrative personnel, and school committees, in order to grasp their requirements and aspirations for the academic information system. The Objective of Initiating a System Project [6].

3.1. Project Planning

Thorough project planning for an academic information system is essential to ensure the project's scope is managed effectively, resulting in a system that is both high-quality and efficient in its utilization. Furthermore, meticulously defining the project's timeline is crucial to prevent exceeding the allocated time limit, thereby preventing budgetary inflation due to delays in project completion.

The research steps are shown in the following figure 1

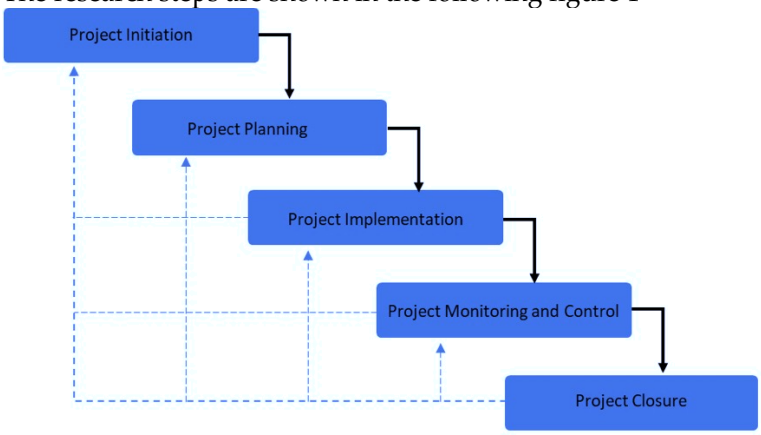

Figure 1. Research Stages - Waterfall model [7]

1. The project initiation phase examines the requirements and demands of an academic information system that is tailored to the school's needs.;
2. The project planning stage changes the software representation requirements before implementing ERD and LRS in the program code. This research uses the Unified Modeling Language (UML) to design the software system. UML is a standard set of diagrams for describing object-oriented software. Use case diagrams, activity diagrams, class diagrams, sequence diagrams are used as UML diagrams. The database design process uses Entity Relationship Diagram (ERD) and Logical Record Structure (LRS) [3];
3. Implementation Phase, that is prototyping software deployment of the Isodus World Operational Information System within Al Alaq Islamic Middle School;
4. At the project control and monitoring stage, researchers carry out system testing and system improvements to be adjusted and developed;
5. Launch and full implementation of the Academic Information System at Al Alaq Islamic Middle School.

3.1.1. Research Subjects

Research subjects can provide information about research data that can explain the characteristics of the subjects studied. The subject consists of direct subject data and indirect subject data, namely where the author can get information on the research subject without a second person intermediary [8]. Indirect subjects usually get information from other parties or other people who know the characteristics of research subjects clearly, in detail and based on existing facts.

1. Population
   The population in this study were 103 teachers, education staff and students at Al Alaq Islamic Middle School, who were directly involved in using academic information systems.
2. Sample
   The samples taken were samples that were in accordance with research needs, namely users of academic information systems
3. Sampling technique
   The sampling technique in this research uses a simple random sampling technique or a random sampling technique in the population. To measure the sample size, researchers used the Slovin formula.

   Note: n = Number of Samples

N = Number of Population

e = Critical value (error limit)

The author's desired error limit is 10%

From the formula above, the following numbers are obtained:

$$n = \frac{103}{103.(0{,}1)^2 + 1}$$

$$n = \frac{103}{103.0{,}01 \quad + 1}$$

$$n = \frac{103}{1{,}03. + 1}$$

$$n = \frac{103}{2{,}03}$$

$$n = 50{,}73$$

So the number of samples used, after rounding up, was 50 people. The operational technique for sampling is to take respondents every day for 1 week according to the respondent's working hours.

Table 1. Research Sample

Sample	Number of Samples
Educators	11
Staff	2
Student	37
Amount	**50**

3.2. System Description

In general, Al Alaq Islamic Middle School academic information system users are divided into 4, including:

- Administrator
- Mail Admin/Letter Archives
- Finance Admin/Treasurer
- Student

The technology used to build this academic information system can be broadly divided into the following sections:

Server Computer : Intel Core i3

User Computer : Intel Celeron or Android

Server Computer Operating System : Windows 10

Client Computer Operating System: Window 7

Software Development : Laragon Web Server or XAMPP.

Database : MySql 5.6.51 Up To.

3.2.1. Work Breakdown Structure (WBS)

In working on the academic information system design project at Al Alaq Islamic Middle School, a Work Breakdown Structure (WBS) was formed to make it easier to map work time so that the academic information system at Al Alaq Islamic Middle School could be completed on time [9]. The following is the Work Breakdown Structure (WBS) table.

Table 2. Work Breakdown Structure

WBS	PROJECT TASK FORCE (TASK).
1.	Analyze
	Steps: 1. Identifying Problems a. Identify the cause of the problem b. Identify decision points c. Identify key personnel 2. Understanding the Working of the Running System a. Planning a Schedule b. Make Assignments c. Create an Interview Agenda 3. Analyzing Results a. Analyze system weaknesses b. Analyze user/management information needs c. Create analysis results reports 4. Defines the scope of the new system and information collection
2.	**Design**
	Designing software applications that will be created based on the analysis that has been carried out previously. Design planning focuses on representing the interface design, data structures, software architecture in the application to be created. Produce documents that programmers use to carry out system creation activities.
3.	**Coding Testing/Writing Program Code (Implementation)**
	• Translating the design into a language that the computer can recognize • Translate transactions requested by the user • Testing the system and finding errors then correcting them.
4.	**Implementation/Testing (integration & testing) (user)**
	Use of the finished system by users is supervised by a team of system analysts
5.	***Operation* & *Maintenance***

In implementing this project, time is limited, so the author is required to effectively utilize the available time and use time management which is expected to be able to sharpen priorities and also be able to increase the efficiency and effectiveness of managing this project, in order to achieve maximum results with the available resources.

A. Use Case Diagram

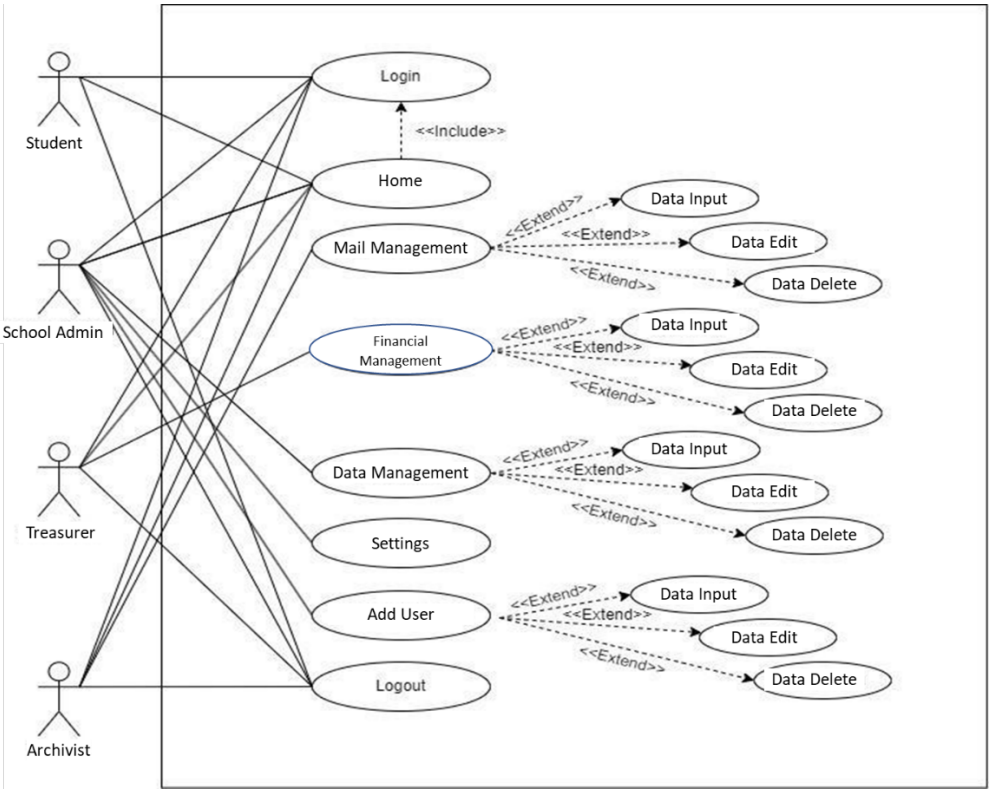

Figure 2. Use Case Diagram

The Use Case diagram consists of 4 actors, namely school admin (administrator), treasurer, archivist and students. School admins have access rights to log in, view the homepage, manage school data, settings and add users. The treasurer has access rights to login, view the homepage and financial management. The archivist has access rights to login, homepage viewing and mail management. Students have access rights to log in and view the homepage [10].

B. Flowchart

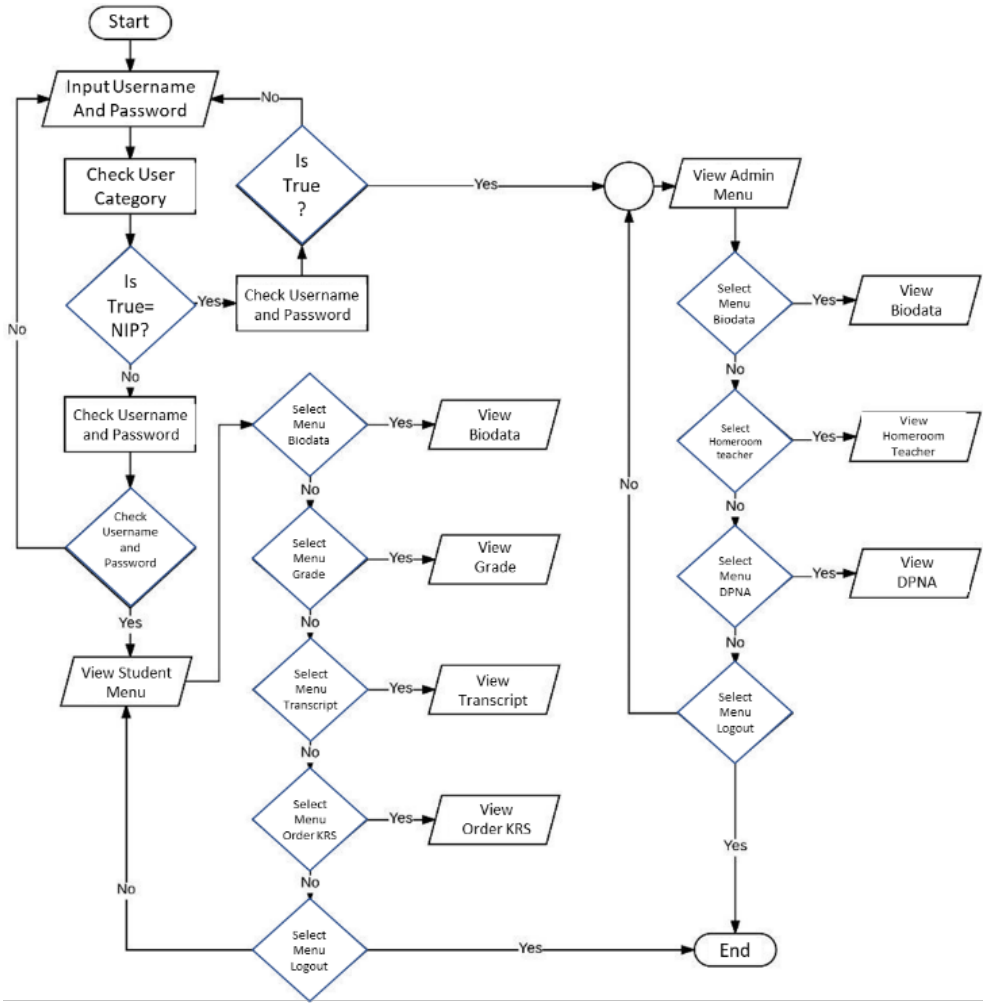

Figure 3. Flowchart

The data I have obtained through interviews and observations of users, namely teachers, parents and school operators, below is the system design.

3.3. Project control

The author tested the application used and tested its feasibility using a questionnaire which was distributed to several related parties including staff, teachers and students. The following is a recapitulation of the resulting questionnaire data (https://docs.google.com/spreadsheets/d/1p51N6TX-VXsWPWn-BLCYn6VlP9UtYcFdBdtsrTTsop34/edit?usp=sharing).

***USABILITY* QUESTIONNAIRE SHEET**

Answer the following questions by placing a tick (√) on each question in the answer column provided.

Information:		
STS : Strongly Disagree	**TS** : Disagree	**RG** : Undecided
ST : Agree	**SS** : Strongly Agree	

	STS	**T.S**	**RG**	**ST**	**SS**
1. I think I will use this system again.					
	1	2	3	4	5
2. I find this system complicated to use.					
	1	2	3	4	5
3. I find this system easy to use.					
	1	2	3	4	5
4. I need help from other people or technicians in using this system.					
	1	2	3	4	5
5. I feel that the system features work as they should.					
	1	2	3	4	5
6. I feel there are many things that are inconsistent (not harmonious in this system).					
	1	2	3	4	5
7. I feel like others will figure out how to use this system quickly.					
	1	2	3	4	5
8. I find this system confusing.					
	1	2	3	4	5
9. I feel there are no obstacles in using this system.					
	1	2	3	4	5
10. I need to get used to it first before using this system.					
	1	2	3	4	5

Figure 4. Usability Questionnaire Sheet

From the results of the questionnaire distributed above, it can be concluded that the academic information system running at Al'Alaq Islamic Middle School has experience using academic information systems that is easy to use and can provide useful feedback on teacher performance and student academic development [11].

Furthermore, the effectiveness of this academic information system meets the needs of users and users are satisfied in using the academic information system and makes it easier to create academic reports. The impact of academic information systems can provide relevant feedback in helping to improve users' academic performance and meet user expectations. Apart from that, the academic information system does not experience technical problems or errors in its use[12].

4. Conclusions

Based on the results of the implementation and the level of satisfaction measured in a questionnaire, an academic information system has become a necessity in the educational environment, especially at Al Alaq Islamic Middle School, Bekasi City. From the results of the research and discussions that have been carried out, it can be concluded that the existence of an academic information system at Al Alaq Islamic Middle School, Bekasi City makes various things easier, including;

1. Receiving incoming and outgoing mail is organized, easy to access and avoids data loss.
2. Tuition fees payments can be checked directly by students or guardians without needing to go to administration or wait for circulars.
3. Student savings can also be monitored in the academic information system, making it easier for students to save and check their savings balance and help admins when they want to reconcile their records.
4. School finances can also be monitored in the academic information system, so that it can be seen how the school's finances are healthy, which makes it easier for school principals and foundation heads to make policies.
5. School data which includes teacher, staff and student data can also be displayed in the academic information system, which can be used according to needs.
6. Announcements related to school policies and related matters can also be displayed on the academic information system homepage, so that all parties can directly receive the information

4.1. Suggestion

Even though this academic information system is able to provide good results, there are several things that need to be followed up after this academic information system project is completed, including:

- Managerial Aspect

  a. It is necessary to hold seminars or Focus Group Discussions (FGD), so that the academic information system that has been created can be understood and used by admin staff, teachers and students in accordance with operational technical instructions.

  b. The implementation of academic information systems is expected to be efficient so as to reduce costs and time

- System Aspects

  a. Academic information systems must be implemented or used immediately, so that problems that arise (bugs) can be immediately seen and resolved.

  b. The academic information system that has been created certainly still has shortcomings, both in terms of the system and in terms of system completeness, but this academic information system can continue to be developed and equipped according to needs.

- Research Aspect

  a. Future researchers are expected to study more sources and references related to academic information systems so that their research results can be better and more complete.

  b. Future researchers are expected to be better prepared for the data collection and retrieval process, so that their research can be carried out better.

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