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Implementation of Web-based Online Examination for High School Students

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ABSTRACT

Examination is a form of evaluation of the learning process to measure the achievement of student intelligence in schools. The implementation of conventional exams that are often carried out by schools has the potential for fraud both from students who cheat during the exam or leak exam questions before the exam takes place and also the operational costs that must be incurred by schools to duplicate questions and coupled with teachers needing additional time to check student exam results. In addition to being carried out in writing or orally, exams can also be carried out using computer aids. With the help of this study, teachers will be able to create questions without worrying that they will be leaked to students before the test and share them with other educators teaching the same subject. Students should be able to receive exam results right away after the test is over, and teachers won't have to worry about checking the results because they will be sent to them automatically. For schools, the costs incurred for paper can be reduced with this online exam system. The results of this research are in the form of a web-based application with the concept of client server using the help of a framework that already supports the model, view and controller system. This application has users, where there are several users with differentiators in the form of access rights.

INTRODUCTION

After the Covid 19 pandemic, people have become accustomed to the internet world, changing people's perspective on information technology. Coupled with the era of the industrial revolution 4.0 which makes technology a forum for information transformation in carrying out daily activities. Advances in information technology can combine the digital and physical worlds, affecting all fields of study. The industrial revolution represents a significant shift in human labor processes and lifestyle (Hamdan, 2018).

Education is essential to children's development because it helps them navigate all of their innate tendencies and attain the best level of safety and pleasure possible as individuals and as members of society (Ujud et al., 2023). Formal education is education that is carried out through educational channels in schools. This pathway has a coherent and clear level of education. Formal education, starting from primary education, continues to secondary to higher education. Non-formal education is an education pathway that is carried out outside of formal education. This education can be done in a structured and tiered manner (Syaadah et al., 2023).

The world of education must also keep up with the development of technology focused on schools, addressing the growing progress, with web technology can be designed an information system that is able to facilitate school activities (Syaadah et al., 2023). One of the school activities is exams. School exams are the final stage of a student's learning process (Bahar et al., 2021). Examinations are also a standard for maintaining the quality of students at school through evaluation in the form of exam questions given to students which are carried out conventionally using paper.

The examination activities carried out by the Senior High School are divided into several criteria, namely the Midterm Examination, the Final Semester Examination and the School Level Final Examination plus one Try Out Exam. During this time the school uses a written exam system using paper and pen, for questions there are objective and essay questions. The assessment system is carried out by the teacher concerned after finishing the exam, the teacher needs additional time to check the exam for at least three days to complete the examination of student exam results. Based on the problems that have been mentioned, an exam system design is carried out which will then be implemented in the form of a web-based online exam which is useful for preventing or reducing question leaks before the exam starts, helping teachers to get student answers quickly and reducing school operational costs incurred for the cost of paper exam questions.

LITERATURE REVIEW

Online Examination

Online exams can be interpreted as a way for someone to find out the ability of a person / examinee through cyberspace by using facilities that can connect examinees with cyberspace such as laptops / computers / smartphones, modems, wifi etc. and using certain rules to prevent examinees from cheating like a written exam and carried out within

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a certain time (Aryatama & Yunita, 2021).

Information

Information is the outcome of processing data in a way that makes it more relevant and valuable to its users which describes a real event that is commonly used for decision making (Agus Safiudin et al., 2023). Another opinion also exists saying Information can be defined as a collection of facts or data that have been processed so that they can be understood and benefit the recipient (Effendy et al., 2023).

System

According to Jimmi, a A system is made up of two or more parts that work together to accomplish a common objective (Sitorus & Sakban, 2021). Another opinion says the definition of a system is a unit made up of parts or components that work together to make it easier for information, materials, or energy to move in order to accomplish a goal (Effendy et al., 2023). When defining the system, there are two fundamental categories of approaches: those based on the component approach and those based on the process approach. Here is the explanation:

1. System approach to procedures
   A system is a collection of interconnected processes and networks that cooperate to complete a task or find a solution.
2. System approach to its components.
   A collection of components that work together in a predictable way to address a certain problem is called a system. Based on several expert opinions that have been expressed above, a conclusion can be drawn that the system is a collection of parts or several subsystems that are designed and put together to achieve a certain goal (Effendy et al., 2023).

Information System

In order to provide specific external parties with the information they require for decision-making, an organization's information system combines the requirements of daily transaction processing that supports managerial operations with the strategic activities of the organization (Pratiwi et al., 2021). Another viewpoint holds that an information system is a collection of interrelated information components that gather, process, store, and disseminate information (Nitami et al., 2021).

Context Diagram

Context Diagram is an overview of the system designed (Widodo & Elisawati, 2019), while according to another opinion The context diagram is a process-based graphic that illustrates the extent of a system (Jurnal & Yunita, 2021).

Data Flow Diagram

A Data Flow Diagram (DFD) is a logical representation of the system, it is independent of hardware, software, data structure or data file organization (Widodo, 2019), while according to another opinion A data flow diagram, also known as a data flow diagram (DFD), is a modeling tool that depicts the system as a network of interconnected functional activities that use manual or computerized data flow (Ummah et al., 2019).

Website

According to Tuti, et al. A website, in Abdullah's opinion, is a collection of pages that contain digital data information in the form of text, images, animations, sounds, and videos, or a combination of all of these, and are made available to everyone worldwide via an internet connection (Susilawati et al., 2020). According to a different viewpoint, a website is a piece of media with numerous linked pages (hyperlinks) that serves the purpose of disseminating information in the form of text, pictures, sound, animation, or a mix of these media. While static websites did exist in the past, they are now uncommon, if not extinct. Today, most websites are dynamic. Interconnected pages, a domain as an address (url) or World Wide Web (www), and hosting as a means for storing large amounts of data are the primary features of a website (Kartika sari, Dian Sri Agustina, 2022).

HTML

Solichin claims that HTML is an acronym for Hypertext Markup Language. Tim Berners-Lee initially created HTML and the HTTP (Hypertext Transfer Protocol) protocol in 1989. The primary goal of HTML development is to link a single web page solely using text, unlike now. HTML is the basic language of the web that serves to display various web components (Susilawati et al., 2020).

Framework Codeigniter

Tuti claims that the PHP programming language was used to create the CodeIgniter framework. Developers frequently utilize CodeIgniter, an open-source tool, to create dynamic websites. Because Code Igniter adheres to the

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MVC code paradigm, the code can be divided into the three sections shown below: M => Model // This is where all database-related calls, including retrieval, inserting, deleting, and updating data, will be defined. V => View // View is simply a display known as HTML, as the name suggests. All information pertaining to the View (html) will be detailed here (Susilawati et al., 2020).

Bootsrap

According to Sari (Kartika sari, Dian Sri Agustina, 2022) Bootstrap is a framework to help web development using HTML, CSS, and JavaScript on the front-end of the web. Since version 3, this framework has been designed to be able to design responsive web pages by adjusting the display on mobile devices such as cellphones and tablets so that developers do not need to build separate applications to be accessed by mobile devices. According to Tuti, et al, Bootstrap is a CSS framework that is very popular among website programming lovers. By using bootstrap, the website design process is not made from scratch, so the website design process is faster and easier. Even without making any CSS scripts, we can already create a good website design (Susilawati et al., 2020).

Database

A database is a structure used to store data. Another definition of a database is a group of related data that is kept on computer hardware and can be altered using software. A database management system is necessary in order to add, retrieve, and process data that is stored in a computer database. The database system, which is often owned and controlled by an organization, is centralized (Pratiwi et al., 2021). In contrast, a database, as defined by Chairane et al., is a collection of information that is systematically stored on a computer and that can be viewed using a computer program to retrieve information from the database (Chairane et al., 2023).

MySQL

Because MySQL is free (Free Software), we can use it for personal or professional reasons without needing to purchase or pay for a license, making it a popular database server for web application development, simple data management, has a good level of security, is easy to obtain (Kartika sari, Dian Sri Agustina, 2022). There is also another opinion saying that MySql is a DBMS application that has been widely used by web application programming (Sitorus & Sakban, 2021).

METHOD

The modeling method used for system development is the waterfall model. According to Yopi, et al (Handrianto & Sanjaya, 2020) Waterfall model is “a model providing a sequential or ordered software lifecycle approach starting from analysis, design, coding, and testing”. The following image of the waterfall model can be seen in Figure 1:

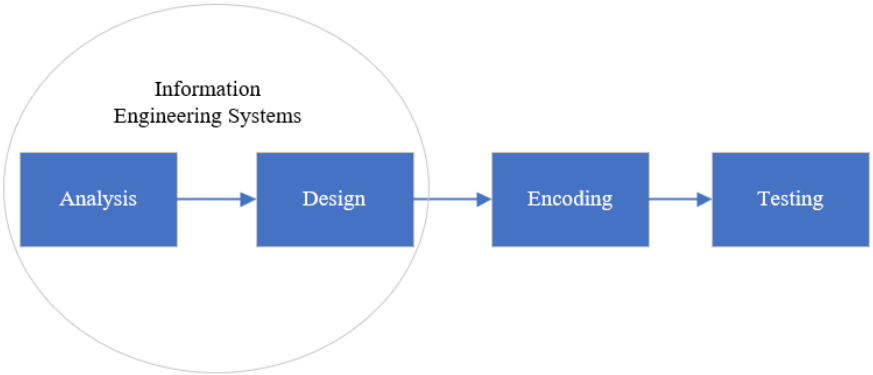


Figure 1: System Development Model

1. Analysis
   Examine the technologies utilized, software needs, web functions and procedures, web development limits, and reliability and weaknesses.
2. Desain
   The process of designing a software program involves a number of steps, such as data structures, software architecture, interface representations, and coding techniques. In order for the software requirements to be later included into a program, this step converts them from the requirements analysis stage to the design representation. The outcomes of the current software design are now recorded.
3. Coding
   A software application must be created from the design. A computer program that adheres to the design created during the design stage is the end product of this step. or the phase in which the codeigneter framework is used by the author to develop a program.

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4. Testing
   At this stage the author tests the program that has been made to find out the shortcomings of the program. Such as validating the login page, student and teacher access rights, and displaying questions whether they are as expected.

RESULT

In this section of the results will be shown the results of the research, the results will be presented in the form of images along with an explanation of the image.

System Analysis

A context diagram, which includes a process and describes the scope of a system, can be used to describe the overall system based on the findings of the analysis that has been done as follows:

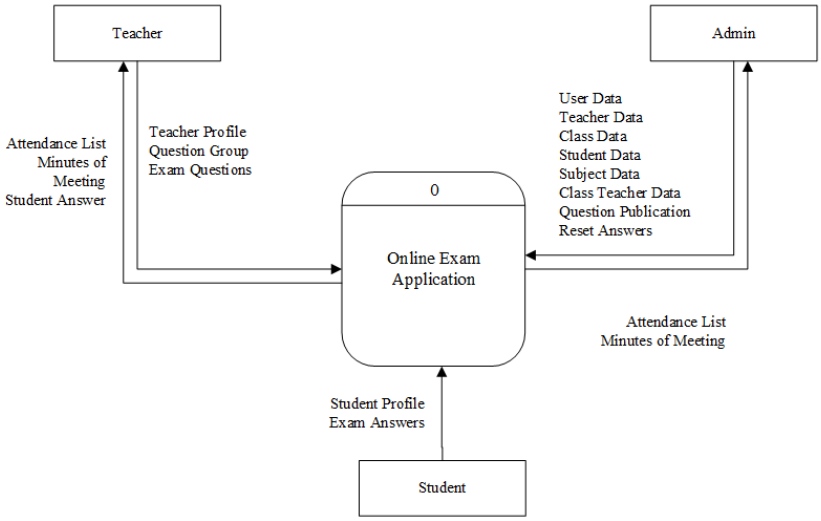


Figure 2. System Analysis

In the context diagram, it can be seen that there are several entities related to the online exam application, such as the admin entity which has several tasks to input school data, user data, teacher data, class data, student data, subject data and others. The teacher entity functions to input questions, teacher profiles and transfer questions. After completing the exam, the teacher will get data in the form of attendance lists, minutes and recap of student answers. The third entity, namely students, can only answer exam questions based on class and subject.

In this section will display the results of the online exam design using the codeigniter framework, as for the results such as the user login page, the user dashboard page which can be seen in Figure 3 below:



Figure 3. User Login

Before entering the dashboard page, users must log in by entering the appropriate username and password. The login page is a place for users or users can enter the username and password given by adim. Users who can login are admins, teachers and students.

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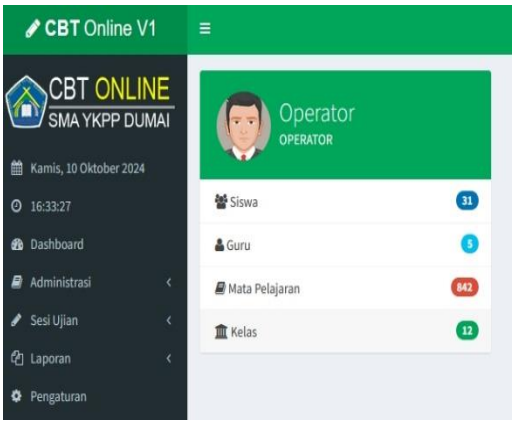


Figure 4. Page for Admin

On this page, the admin can make settings for the *online* exam application, be it publishing questions, providing accounts for users, stopping exams and monitoring students who have *logged in* or *logged out of* the application. Admins play an important role in keeping the exam running properly, monitoring the system continuously to ensure that students take the exam correctly.

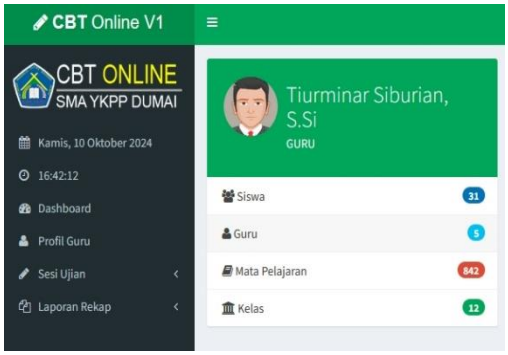


Figure 5. Page for Teacher

The teacher's page is a very important page for the running of this system, here teachers can add, edit and delete questions, not only that teachers can also share exam questions with other teachers in the same lesson. Student exam results can also be viewed and downloaded here.

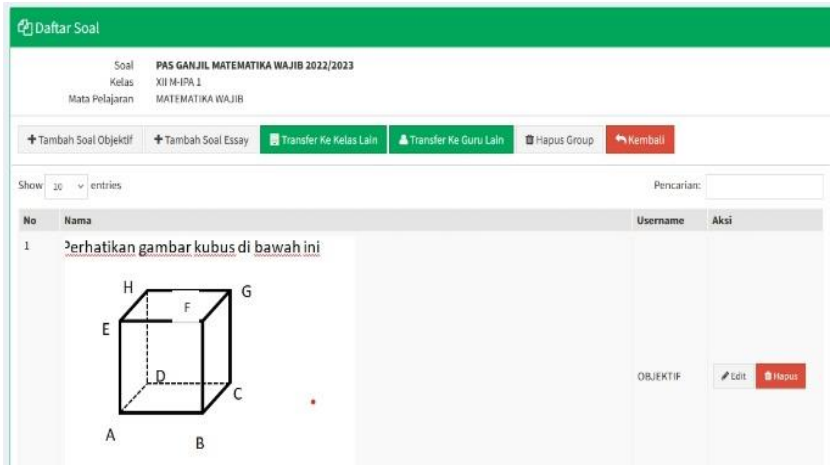


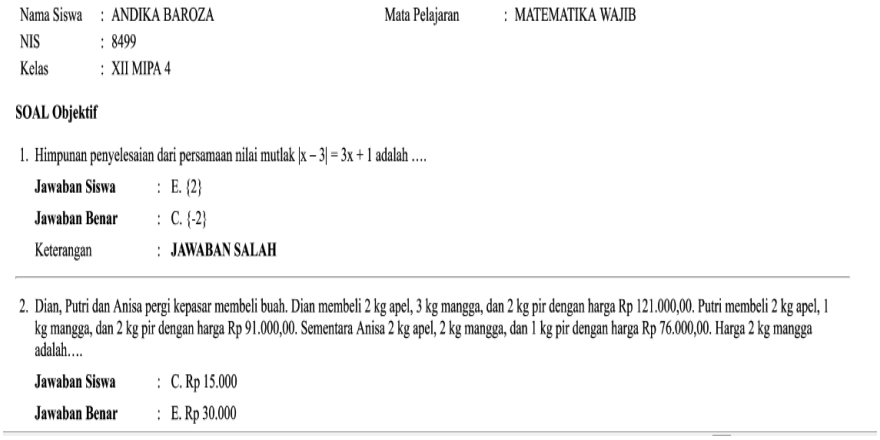
Figure 6. Page for teacher

This page is an added question page that allows teachers to set questions according to the needs of their respective subjects, changing or replacing questions can also be done by teachers on this page, not only that teachers can also transfer questions to other teachers with the same subject in different classes.

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Nama Siswa : ANDIKA BAROZA
NIS : 8499
Kelas : XII MIPA 4

Mata Pelajaran : MATEMATIKA WAJIB

SOAL Objektif

1. Himpunan penyelesaian dari persamaan nilai mutlak $|x - 3| = 3x + 1$ adalah ....

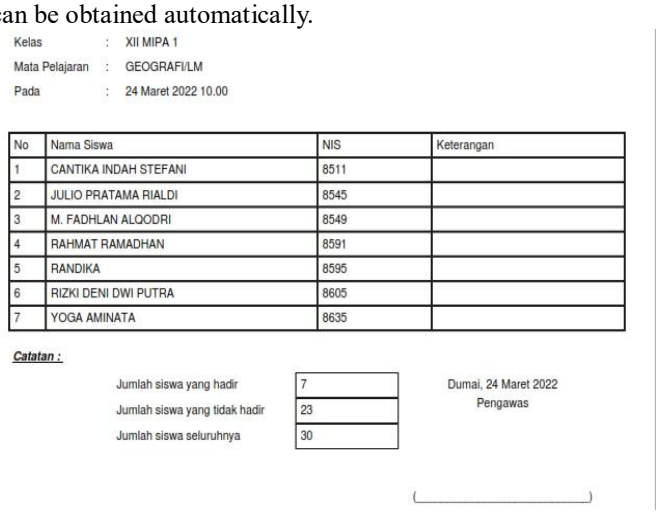
   Jawaban Siswa : E. {2}
   Jawaban Benar : C. {-2}
   Keterangan : **JAWABAN SALAH**

2. Dian, Putri dan Anisa pergi kepasar membeli buah. Dian membeli 2 kg apel, 3 kg mangga, dan 2 kg pir dengan harga Rp 121.000,00. Putri membeli 2 kg apel, 1 kg mangga, dan 2 kg pir dengan harga Rp 91.000,00. Sementara Anisa 2 kg apel, 2 kg mangga, dan 1 kg pir dengan harga Rp 76.000,00. Harga 2 kg mangga adalah....

   Jawaban Siswa : C. Rp 15.000
   Jawaban Benar : E. Rp 30.000

Figure 7. Students' Answer Result

The following is a form of student answer results that have completed the online exam. the results can be downloaded and saved in pdf form, the system will match the answer results with the existing answer key so that the results of objective questions can be obtained automatically.



Kelas : XII MIPA 1
Mata Pelajaran : GEOGRAFI/LM
Pada : 24 Maret 2022 10.00

No	Nama Siswa	NIS	Keterangan
1	CANTIKA INDAH STEFANI	8511	
2	JULIO PRATAMA RIALDI	8545	
3	M. FADHLAN ALQODRI	8549	
4	RAHMAT RAMADHAN	8591	
5	RANDIKA	8595	
6	RIZKI DENI DWI PUTRA	8605	
7	YOGA AMINATA	8635	

Catatan :

Jumlah siswa yang hadir	7
Jumlah siswa yang tidak hadir	23
Jumlah siswa seluruhnya	30

Dumai, 24 Maret 2022
Pengawas

(_____)

Figure 8. Attendance List

The attendance list can also be downloaded on the teacher's page to find out the number of students who are present and absent during the online exam. These results are obtained when students login and work on questions, which will automatically be recorded in the system.



Pada hari ini **Rabu** tanggal **tujuh** bulan **dua belas** tahun **dua ribu dua puluh dua**, yang bertanda tangan dibawah ini menyatakan bahwa :

A. Telah diselenggarakan **Penilaian Akhir Semester Ganjil** dari pukul **10.45** WIB sampai dengan pukul **12:15:00** WIB.

Pada Sekolah	:	**SMA YKPP Dumai**
Kelas	:	X M-IPA 1
Mata Pelajaran	:	BAHASA INDONESIA
Alamat	:	Jalan Cilacap - Bukit Datuk, Dumai.
Jumlah peserta seharusnya	:	34 Orang
Peserta yang hadir	:	33 Orang, yakni (lampiran dalam Daftar Hadir Peserta Penilaian Akhir Semester Ganjil)
Peserta yang tidak hadir	:	1 Orang

B. Catatan selama Pelaksanaan Ujian Sekolah:

.....
.....
.....

Demikian Berita Acara ini kami buat dengan sesungguhnya

Yang Membuat Berita Acara,
Pengawas,

1. Tanda Tangan, : _____
2. Nama, : _____

Figure 9. Reports

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To support the report to the exam supervisor, the system also provides minutes that can be downloaded on the teacher or admin page. The minutes will automatically be filled in according to the number of test takers who are present, absent and the number of participants who take the exam.

DISCUSSION

The administrator can easily keep an eye on students who log in and out of the system, according to the results of tests done on the features included in the application. The system will also ask students random questions to make sure that no one is cheating. Admins can also publish exam questions, reset answers and stop the exam in progress if something happens. Teachers can add questions easily with the help of a web-based editor, enter images on questions if needed. questions entered by teachers are also guaranteed not to leak as long as the teacher's account is not given to other users. The results of the exam in the form of objective questions will be immediately visible, the results of the recap of student answers can be downloaded in pdf format. Students can work on exam questions after logging into the application, the exam schedule will also be visible to students making it easier for students to see the exam schedule.

CONCLUSION

Students can take online tests based on the subjects covered in their classes and with questions that seem as random questions, according to the results of system analysis that was tested during the midterm exam. While the results obtained for the teacher are in the form of input questions based on subjects and if needed in other classes, the teacher can transfer questions according to the class, subject and to the teacher who requested the question. The existence of an online exam system can reduce the leakage of exam questions and reduce operational costs incurred for paper in the form of photocopying exam questions and help teachers to get answers quickly. For future research, methods for randomizing exam questions can be added or a server for online exams can be created so that data is always stored properly.

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