



## Designing a Web-Based Student Attendance Information System Using Extreme Programming Methods at the Bandung Praktisi Polytechnic

Yudhi Yanuar<sup>1</sup>, Ari Waluyo<sup>2</sup>

<sup>1</sup>Department of Informatics Management, Politeknik Praktisi, Indonesia, 40116

<sup>2</sup>Department of Electrical Engineering, Politeknik Piksi Ganesha Indonesia, Indonesia, 54316

[yudhiyanuar2010@gmail.com](mailto:yudhiyanuar2010@gmail.com)

<https://doi.org/10.37339/e-komtek.v7i2.1464>

Published by Politeknik Piksi Ganesha Indonesia

### Artikel Info

Submitted:

19-10-2023

Revised:

08-12-2023

Accepted:

12-12-2023

Online first :

12-12-2023

### Abstract

This research aims to design a student attendance information system. In developing the information system, we used the method of observing research objects and conducting literature studies. We used object-oriented modelling with UML tools to describe the student attendance information system. In addition, extreme programming was used to develop the student attendance information system. In creating a student attendance information system using the PHP and MySQL programming languages as the System Management Database, the test results of the student attendance information system at the practitioner Polytechnic can be used well and effectively.

**Keywords:** Information System, Attendance, Student, Web, Extreme Programming.

### Abstrak

Penelitian ini bertujuan untuk merancang sistem informasi kehadiran siswa. Dalam pembangunan sistem informasi menggunakan metode observasi terhadap objek penelitian selain itu melakukan studi literatur, sedangkan untuk menggambarkan sistem informasi kehadiran siswa menggunakan permodelan berorientasi objek dengan tools UML, selain itu digunakan Exstrime Programming sebagai metode pengembangan sistem informasi kehadiran siswa. Dalam pembangunan sistem informasi kehadiran kehadiran siswa menggunakan bahasa pemrograman PHP dan Mysql sebagai Database Manajemen Sistem, hasil pengujian dari sistem informasi kehadiran siswa pada politeknik praktisi dapat digunakan dengan baik dan efektif.

**Kata-kata kunci:** Sistem Informasi, Kehadiran, Siswa, Web, Exstrime Programming



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

## 1. Introduction

Technology is currently used in all aspects of life, including data processing in education [1]. This technology is used in all aspects, whether teaching research community service or administrative management within tertiary institutions [2] [3]. It concludes that technology is used in education, teaching, and administration [4]. Therefore, technology will constantly develop because of the many needs that are part of the life of these tertiary institutions [5].

The use of technology is part of higher education management, where the higher education institution aims to produce graduates or experts or practical staff who are experts in their field [6]. To make this happen, technology is needed, which is used to maintain data that supports production for these graduates. Therefore, an information system is required to process data that supports the goals of the higher education institution [5].

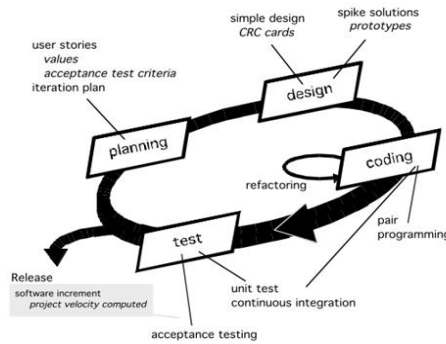
Currently, universities are competing to use technology in the field of administrative management, significantly eliminating manual recording of dismissals to automatic or digital recording by eliminating paper recordings of data stored in a database [7], whose results will produce information from the effects of processing the data that has been entered. It is one of the challenges for a university manager to create information quickly, effectively and efficiently [8].

Based on this background, the researcher took the title of his research, namely designing a web-based student attendance information system at the Bandung Praktisi Polytechnic.

## 2. Method

In every research, a method is needed where the method is used as a reference or guide in its implementation [9]. The aim of the method is for the root of the research to be more focused and well structured by the hopes and objectives of the study [8].

In this research, the method used is the Extreme Programming model method where the fimodel is a software or information system development method that has clear stages and is a method that has clear steps from needs planning to implementation where each stage [10]. This stage will be tested so that before we carry out the next stage, we have tested the results of the previous stage as shown in **Figure 1** [11].



**Figure 1.** Extreme Programming Method

From the stages in the team model, the author carries out activities based on the sequence according to the stages in the Extreme Programming software development model presented **Table 1.**

**Table 1.** Research Activity

No	Stages	Activities
1	Planning	At this planning stage, an analysis of the existing needs in a system to be designed is carried out, where the following conditions are obtained: <ol style="list-style-type: none"> <li>The system intended has three users who have access as follows. The first is the administrator, where the administrator carries out administration and manages the entire system in the information system. The second is the lecturer, where the lecturer has access rights to create lecture schedules and check students attending lectures. The third is students, where students can take attendance according to a predetermined schedule.</li> <li>Administrators have access to set lecture times, which lecturers can also do. They can also return to the initial settings if undesirable things happen. Apart from that, administrators also have the function of checking and making reports on the results of activities. Attendance by lecturers as well as by students</li> <li>The system must be designed to edit the dates or times of lectures where the lecturer will set the meetings held in each lecture.</li> <li>Students have the right to take attendance for lecture activities through the system that has been created or designed</li> </ol>
2	Desain	The results of the student attendance information system design stages are as follows: <ol style="list-style-type: none"> <li>A use case diagram that describes the business process of the overall system where there are actors (Administrator, Lecturer and Student) and use cases, as well as related associations between use cases and actors</li> <li>Activity diagrams describe the activities carried out by actors (Administrator, Lecturer and Student) based on the use cases in the system</li> <li>Class diagram, which represents the objects involved in the system and the methods in it</li> <li>Sequence diagrams describe the activities carried out by actors on objects in the system</li> </ol>
3	Coding	This stage produces coding, programming, or the results of the information system design that has been created, where the design is built using the PHP programming language and also uses the MySQL database management system. Other additional tools are also used to print the data processing that has been carried out.
4	Testing	At this stage, testing is carried out starting from unit testing, namely the units related to entering data, then carrying out the attendance process for managing absence data up to the overall system in the attendance information system, where this testing is carried out by describing or using the black box method.
5	Release	In this stage, the results of the student attendance information system design at the Praktisi Polytechnic will be released.

### 3. Results and Discussion

There are three parts to the results of the implementation of the stages carried out in designing the attendance information system, where the parts consist of Design, implementation, and testing. The three stages result from implementing the stages using the software design method [2].

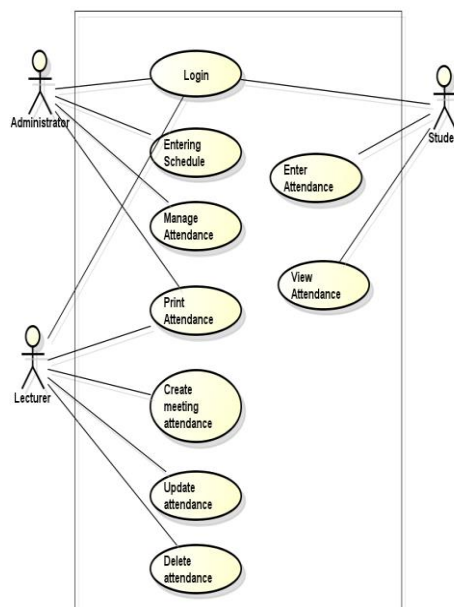
#### 3.1 Desain System

The system design will be described using UML diagrams, case diagrams, and activity diagrams, which are used to describe the behavior of the system. Class diagrams are described regarding the connections between objects in the system, followed by a sequence of diagrams that illustrate the activities carried out. By actors regarding the objects in the system based on the use case diagram [3].

##### a. Use Case Diagram

The diagram will depict the actors involved in the system and also their relationship with the use case diagram, where the use case diagram describes the behavior of the system.

The following is **Figure 2**.



**Figure 2.** Use Case Diagram

##### b. Activity Diagram

The activity diagram describes the activities carried out by actors based on the use case diagram in the use case diagram of the student attendance information system, which is seen in **Figure 3**.

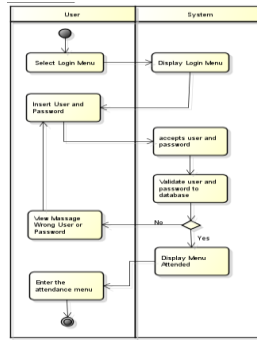


Figure 3. Login Activity Diagram

Entry schedule activity diagram can be seen in Figure 4.

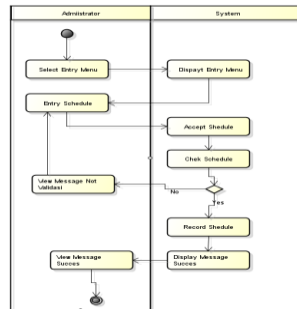


Figure 4. Entry Schedule Activity Diagram

Manage attendance activity diagram is presented in Figure 5.

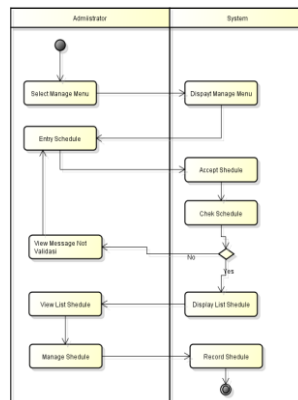


Figure 5. Manage Attendance Activity Diagram

Print attendance activity diagram is presented in Figure 6.

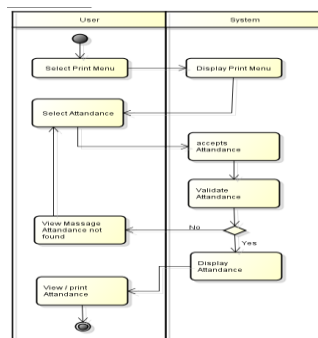
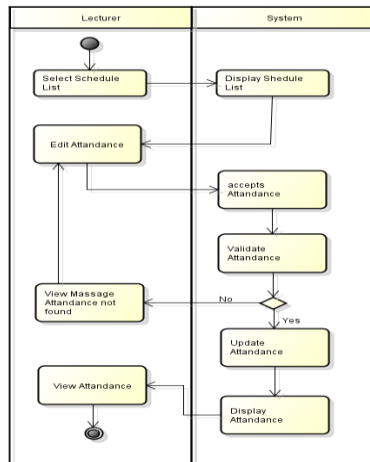
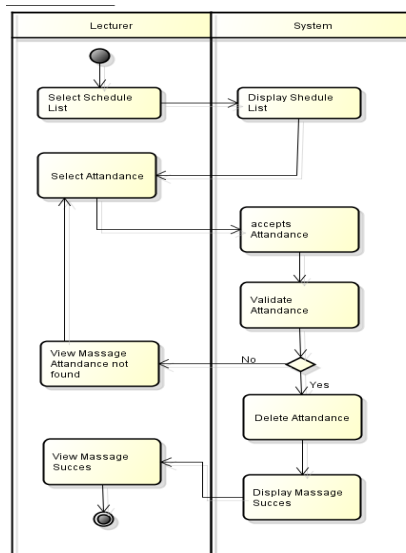


Figure 6. Print Attendance Activity Diagram

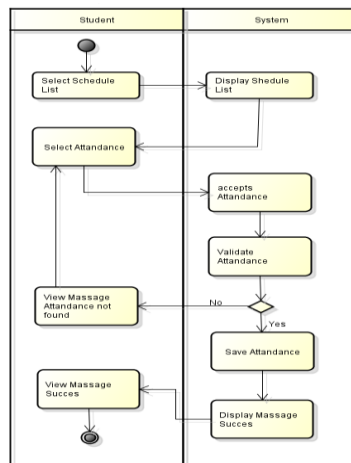
Update attendance activity diagram is presented in **Figure 7**, delete attendance activity diagram is presented in **Figure 8**, entry attendance activity diagram is presented in **Figure 9**, and view the attendance activity diagram is presented in **Figure 10**.



**Figure 7.** Update Attendance Activity Diagram



**Figure 8.** Delete Attendance Activity Diagram



**Figure 9.** Entry Attendance Activity Diagram

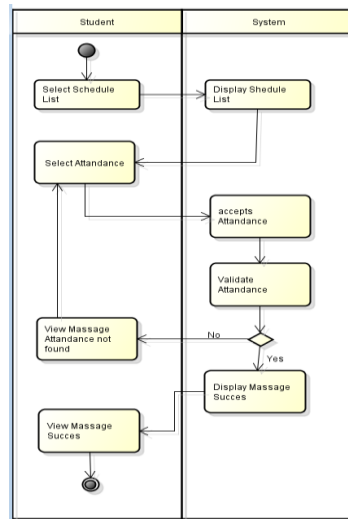


Figure 10. View The Attendance Activity Diagram

c. Class Diagram

Class diagrams are used to describe the class requirements for the student attendance information system. The description of the class diagram can be seen in Figure 11.

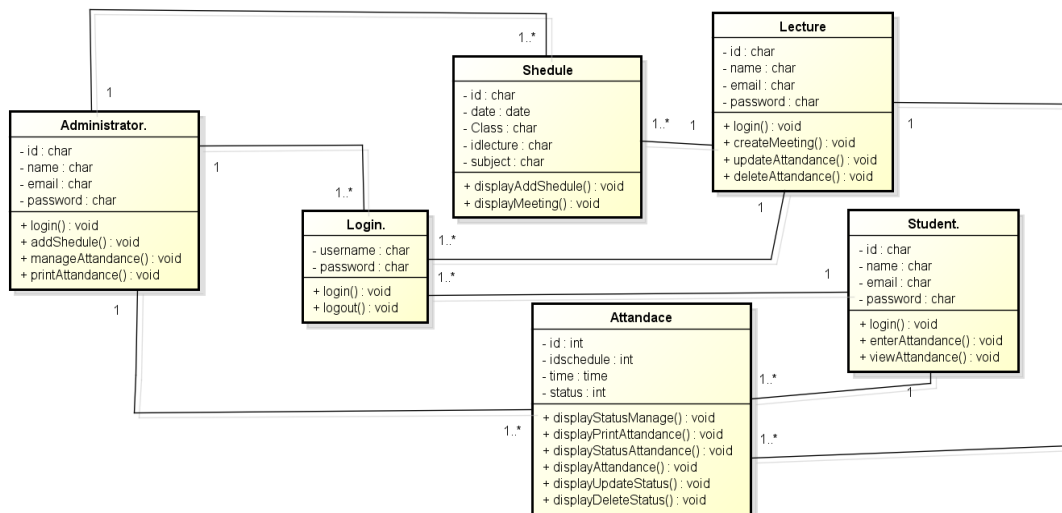
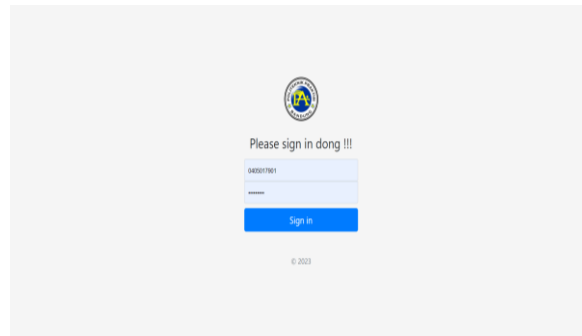


Figure 11. Class Diagram

3.2 Implementation System

In the implementation stage, the design of the program and the integrated database will be explained; this stage is one part of the method stage, namely coding. To start using the system for the first time, users must enter validation as a username and password, where administrators are expected to enter the employee identification number, abbreviated as NIP. Meanwhile, lecturers use the national lecturer identification number or NIDN, while for students to enter, The system uses a user ID, namely the student's identification number or NIM. Meanwhile, the

password uses a password that is set individually for each user. The display can be seen in **Figure 12**.



**Figure 12.** Login Form

The main menu is used as the primary form in the information system, where lecturers will be seen in **Figure 13**, students will be seen in **Figure 14**, administrators will be seen in **Figure 15**, and academics menu will be seen in **Figure 16**.

No	Tahun Akademik	Kode Mata Kuliah	Nama Mata Kuliah	NDN	Nama Dosen	Kelas	Opsi
1	2022/2023-2	2106	Manajemen Rantai Pasokan (RM)	042017001	Rizki Sulandari, S.E., MBA	MMB0201	Detail
2	2022/2023-2	1111	Pengolahan Data Berbasis	042015000	Ta. HandiPang. S.Kom, M.Kom, MCS, MSA	MMB0201	Detail
3	2022/2023-2	2106	Pengantar Perancangan	042015000	Diana Sunandari, S.E., M.Ed., BA, BPP, CA	PMB0201	Detail
4	2022/2023-2	MR001	Logika Aljabar dan Struktur Data	042017001	Yudhi Yanuar, S.T., M.Kom, MSA, MSc, ITS, MEd	MMB0201	Detail
5	2022/2023-2	GB001	Kewirausahaan	042010704	Yana Nugraha, S1, MEd	PMB0201	Detail
6	2022/2023-2	GB001	Sistem Informasi Manajemen	041906704	Lita Erika, S.T., M.Kom, MSA, MSc	PMB0201	Detail
7	2022/2023-2	MR017	Matematika Diskrit	042017001	Purwati Sidiyasa, L.S., MEd, MEdS	MMB0201	Detail
8	2022/2023-2	MR2001	Perencanaan Dasar	042012002	Diana Purnamasari, S.Kom, M.Kom	MMB0201	Detail

**Figure 13.** Lectures Menu

No	Tahun Akademik	Kode Mata Kuliah	Nama Mata Kuliah	NDN	Nama Dosen	Kelas	Semester	Opsi
1	2022/2023-2	MR2001	Perencanaan Analitis Enterprise	042017001	Yudhi Yanuar, S.T., M.Kom, MSA, MSc, ITS, MEd	MR0204	4	Detail
2	2022/2023-2	MR002	Logika Aljabar dan Struktur Data	042017001	Yudhi Yanuar, S.T., M.Kom, MSA, MSc, ITS, MEd	MMB0201	2	Detail
3	2022/2024-1	MR003	Perencanaan Perangkat Berbasis	042017001	Yudhi Yanuar, S.T., M.Kom, MSA, MSc, ITS, MEd	MR0204	5	Detail
4	2022/2024-1	MR010	Manajemen Proyek	042017001	Yudhi Yanuar, S.T., M.Kom, MSA, MSc, ITS, MEd	MMB0204C	5	Detail

**Figure 14.** Students Menu

No	Tahun Akademik	Kode Mata Kuliah	Nama Mata Kuliah	NDN	Nama Dosen	Kelas	Semester	Opsi
1	2022/2023-2	MR2001	Perencanaan Analitis Enterprise	042017001	Yudhi Yanuar, S.T., M.Kom, MSA, MSc, ITS, MEd	MR0204	4	Detail
2	2022/2023-2	MR002	Logika Aljabar dan Struktur Data	042017001	Yudhi Yanuar, S.T., M.Kom, MSA, MSc, ITS, MEd	MMB0201	2	Detail
3	2022/2023-2	MR2002	Komunikasi Data dan Jaringan Komputer	041604706	Tavin, S.T., MEd	MMB0204	4	Detail
4	2022/2023-2	MR006	Rekayasa Perangkat Lunak	041906704	Lita Erika, S.T., M.Kom, MSA, MSc	MMB0204	4	Detail
5	2022/2023-2	MR003	Sistem Informasi Akuntansi (SIA)	042118006	Ingi Gustika, S.T., SMM	MR0204	4	Detail
6	2022/2023-2	MR004	Perencanaan Berorientasi Object	040110801	Canda Alvara Subana	MMB0204	4	Detail
7	2022/2023-2	2214	Perencanaan Web Jarak	041604706	Tavin, S.T., MEd	MR0204	4	Detail
8	2022/2023-2	MR008	Desain Grafis	040110801	Canda Alvara Subana	MR0204	4	Detail
9	2022/2023-2	MR02001	Komunikasi dan Negosiasi	03301	Isarad	MR0204	4	Detail
10	2022/2023-2	2107-1	E-Content	03301	Clara Dimpitara	MR0204	4	Detail
11	2022/2023-2	GB002	Sistem Informasi Manajemen	MR001	Fita Nurulida	MMB0202	2	Detail
12	2022/2023-2	GB002	Sistem Informasi Manajemen	041906704	Lita Erika, S.T., M.Kom, MSA, MSc	PMB0201	2	Detail

**Figure 15.** Academics Menu



Academics will have two facilities, namely managing or detailing courses and also being able to print; where to manage details can be seen in **Figure 16**. Meanwhile, for printing, it will be seen in **Figure 17**.

Tahun Akademik	Kode Mata Kuliah	Nama Mata Kuliah	NIMN	Nama Dosen	Kelas	Hari	Jam	Perkuliahan	Opsi
2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-02-24	02:11:17	Perkuliahan 1	[Detail] [Cetak]
2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	08:14:04	Perkuliahan 2	[Detail] [Cetak]
2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	12:26:14	Perkuliahan 3	[Detail] [Cetak]
2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	08:16:02	Perkuliahan 4	[Detail] [Cetak]
2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	08:15:12	Perkuliahan 5	[Detail] [Cetak]
2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	07:56:06	Perkuliahan 6	[Detail] [Cetak]
2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	07:56:44	Perkuliahan 7	[Detail] [Cetak]
2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	08:18:38	Perkuliahan 8	[Detail] [Cetak]

**Figure 16.** Detail/Manage Schedule

No	Tahun Akademik	Kode Mata Kuliah	Nama Mata Kuliah	NIMN	Nama Dosen	Kelas	Hari	Jam	Perkuliahan	Opsi
1	2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-02-24	02:11:17	Perkuliahan 1	[Detail] [Cetak]
2	2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	08:14:04	Perkuliahan 2	[Detail] [Cetak]
3	2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	12:26:14	Perkuliahan 3	[Detail] [Cetak]
4	2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	08:16:02	Perkuliahan 4	[Detail] [Cetak]
5	2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	08:15:12	Perkuliahan 5	[Detail] [Cetak]
6	2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	07:56:06	Perkuliahan 6	[Detail] [Cetak]
7	2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	07:56:44	Perkuliahan 7	[Detail] [Cetak]
8	2022/2023-2	M02001	Perencanaan Arsitektur Enterprise	0405017001	Yudhi Yanuar, S.T., M.Kom, MPA, MSc, ITS, MEI	M0204	2023-03-05	08:18:38	Perkuliahan 8	[Detail] [Cetak]

**Figure 17.** Print Schedule

The agenda-filling menu has two facilities, namely input, as shown in **Figure 18**, and a list of minutes, as shown in **Figure 19**.

**Figure 18.** Input Minute of Lectures

No	Tahun Akademik	Tanggal	Perkuliahan	Kode Mata Kuliah	Nama Mata Kuliah	Berita Acara	Agenda Dosen	Agenda Akademik	Kelas	File	Opsi
1	2022/2023-2	2023-06-01	1	M002	Pengembangan Perangkat Berbasis	Pembelajaran menggunakan teknologi mobile	Agenda		M002	[Detail] [Cetak]	
2	2022/2023-2	2023-06-22	2	M002	Pengembangan Perangkat Berbasis	Pengantar Aplikasi Berbasis dan Pembuatan Aplikasi Web	Agenda		M002	[Detail] [Cetak]	
3	2022/2023-2	2023-06-29	3	M002	Pengembangan Perangkat Berbasis	Proses Perintah dalam Model Programming	Agenda		M002	[Detail] [Cetak]	
4	2022/2023-2	2023-06-26	4	M002	Pengembangan Perangkat Berbasis	Pemilihan dalam Pengembangan Mobile	Agenda		M002	[Detail] [Cetak]	

**Figure 19.** List Minute Minutes of Lectures

Then the value input is shown in Figure 20 and the grade list is shown in Figure 21.

No	Tahun Akademik	Semester	Nama Mata Kuliah	NPM	Nama Mahasiswa	Kuis	Tugas	UTS	UAS	Opil
1	2022/2023-1	5	Perencanaan Perangkat Bergerak	0223025	JAYING SAFRO BANGIS KUNCIRO	100	100	80	100	Tentukan
2	2022/2023-1	5	Perencanaan Perangkat Bergerak	0223003	GAUDAN NAUFAL HUB RAMADHAN	100	100	100	100	Tentukan
3	2022/2023-1	5	Perencanaan Perangkat Bergerak	0223002	HAJIB HASFAL L	100	80	80	100	Tentukan
4	2022/2023-1	5	Perencanaan Perangkat Bergerak	0223003	HAG AHMAD FRIDYUS	100	100	90	100	Tentukan
5	2022/2023-1	5	Perencanaan Perangkat Bergerak	0223004	DHEAN ARWANI	100	100	90	100	Tentukan
6	2022/2023-1	5	Perencanaan Perangkat Bergerak	0223005	DIARI DAMYICHI	60	80	80	100	Tentukan
7	2022/2023-1	5	Perencanaan Perangkat Bergerak	0223006	REDWAN YUSUF RIFALDI	90	100	100	100	Tentukan

Figure 20. Input Grade of Course

No	Tahun Akademik	Kode Mata Kuliah	Nama Mata Kuliah	Nilai	Opil
1	2022/2023-1	MB001	Perencanaan Perangkat Bergerak	MB001	Tentukan Nilai Cek Nilai Mata Semester Komparasi
2	2022/2023-1	MB004	Perancangan Basisdata	MB004	Cek Nilai Mata
3	2022/2023-1	MB004	Perancangan Basisdata	MB002004	Cek Nilai Mata
4	2022/2023-1	MB001	Perencanaan Web Dasar	MB001	Tentukan Nilai Cek Nilai Mata Semester Komparasi
5	2022/2023-1	MB001	Perencanaan Web Dasar	MB002001	Tentukan Nilai Cek Nilai Mata Semester Komparasi
6	2022/2023-1	2233	Praktikum Perencanaan Web Dasar	MB001	Cek Nilai Mata
7	2022/2023-1	MB001	Perencanaan Web Dasar	MB001	Cek Nilai Mata
8	2022/2023-1	MB001	Perencanaan Web Dasar	MB002001	Cek Nilai Mata
9	2022/2023-1	2233	Praktikum Perencanaan Web Dasar	MB001	Cek Nilai Mata

Figure 21. List Grade of Course

### 3.3 System Test

The next stage in this research is to test the system that has been made [4], where the test process is carried out on logins, academic guidance, lecture minutes, and lecture grades.

#### a. Login Form Testing

By testing the login form, we can determine whether the system's test results are as expected or not, as shown in Table 2.

Table 2. Testing Login Form

Description of Testing	Expected Results	Observation Result
User enters the user ID and password they have correctly	The system will display the main menu	Succes
User enters the user id and password they have incorrectly	The system will display an error message and return to the login screen	Succes

For the next test, a test will be carried out on admin management carried out by the admin, as shown in Table 3.

**Table 3.** Testing Management of attendance Form

Description of Testing	Expected Results	Observation Result
Select courses and lecturers based on the lecture schedule in the academic year	Displays attendance detail pages based on lecturers and courses	Succes
Select attendance details at the existing meeting in academic year	displays attendance detail pages based on lecturers, courses and session	Succes
Select print attendance at existing meetings in academic year	displays a print page of attendance based on lecturers, courses and session	Succes

For the next test, a test will be carried out on lecturer management carried out by the admin, as shown in [Table 4](#)

**Table 4.** Testing Lecturer Management of Attendance Form

Description of Testing	Expected Results	Observation Result
Select courses and lecturers based on the lecture schedule in the academic year	Displays attendance detail pages based on lecturers and courses	Success
Select attendance details at the existing meeting in the academic year	displays attendance detail pages based on lecturers, courses and sessions.	Success
Select attendance on the student attendance list based on meetings	Display attendance on the student attendance list based on meetings	Success
Select print attendance at existing meetings in the academic year	displays a print page of attendance based on lecturers, courses and sessions.	Success

For the next test, the admin will carry out a test on student management will be carried out by the admin, as shown in [Table 5](#).

**Table 5.** Testing Student Management of Attendance Form

Description of Testing	Expected Results	Observation Result
Students choose to attend lecture meetings	The system will store attendance on the database	Success
Students see attendance at lecture meetings, and the	System will display attendance.	Success

#### 4. Conclusion

This study concludes that the attendance information system design is running well, and no errors were found in its operation.

#### References

- [1]. Alfian Agefiftien, Yudhi Yanuar, "Perancangan Sistem Informasi Buku Tamu Berbasis Web Di Praktisi Politeknik Bisnis Digital" *Jurnal Teknologi dan Informasi*, vol. 5, no. 2, pp. 13–18, 2021.
- [2]. Lilis Emalia and Faizal Adstori i Mahendra, "Perancangan Sistem Informasi Pemasaran Kopiberbasis Web Di Serantau Bandung," *Jurnal Teknologi dan Informasi*, vol. 1, no. 1, pp. 11–21, 2019.
- [3]. Yudhi Yanuar, Lilis Emalia and Novia Surya Ghani, "Design Information Consentpasiment Competition of Desktop Based Dental Poly Information System In Palkesmas Talagabodas Bandung," *IJISTECH (International Journal of Information System and Technology)*, vol. 1, no. 3, pp. 43–48, 2019.
- [4]. M. Salahudin and A. S. Rosa, *Rekayasa Perangkat Lunak*. Bandung: Pustaka Setia, 2014.
- [5]. S. A. Rosa and M. Salahuddin, "Pemrograman Berorientasi Objek," Modul. Bandung, 2010.
- [6]. Jogiyanto, 2010. *Analisis dan Desain Sistem Informasi [Edisi IV]*. Andi Offset. Yogyakarta
- [7]. Yudhi Yanuar. (2017). *Perancangan Sistem Informasi Kelengkapan Pengisian Formulir Informed Consent DI RS Al Islam Bandung*. *Jurnal E-Komtek (Elektro-Komputer-Teknik)*, 1(1), 112–131.
- [8]. Sugiyono. 2009. *Metode Penelitian Kuantitatif dan Kualitatif*. CV. Alfabeta. Bandung
- [9]. Sutanta, Edhy. (2003). *Sistem Informasi Manajemen*. Graha Ilmu. Yogyakarta
- [10]. Ladjamudin, bin Al-Bahra. (2005). *Analisis dan Desain Sistem Infomasi*. Graha Ilmu. Yogyakarta.
- [11]. Setiawansyah, Heni Sulistiani, Asri Yuliani and Fikri Hamidi, "Perancangan Sistem Informasi Akuntansi Upah Lembur Karyawan Menggunakan Extreme Programming" *TMJ (Technomedia Journal)*, vol. 6, no. 1, pp. 1-14, 2021.