

The Construction of Counseling Information System with Object Oriented Technology Approach

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Article Info

Article history:

Received Mar 12, 2023

Revised Apr 15, 2023

Accepted Apr 29, 2023

Keywords:

Information Systems
Counseling Information
Information system model
Object Oriented Analysis
Complexity Systems

ABSTRACT

The development of information systems in currently preserve to adjustment and it was customized according to the problem domain. In this paper, we will describe the modeling language that is applied when developing an information system. The development of information systems has become a trend for the last decade. Various methods have been proposed with different characteristics. The counseling information system in this case was developed with an object-oriented approach. The strong motivation in this research is to answer the challenges and demands of system development. Modeling in system development explains various modeling languages starting with identifying problems with use case modeling languages (Use case Diagrams), simplifying problems with structured modeling (Class Diagrams), to building communication patterns or interactions between objects with one another (Sequence Diagram). Thus, the system built is able to describe the complexity of information systems, especially counseling information.

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1. INTRODUCTION

The requirement in technology, and especially information was increasing. Improvements not only in one sector but in other sectors such as counseling services [1]. Counseling services are activities that require media as a means of delivering information [2]. Counseling currently has a need for technology that can convey information [3]. There are two users when it was connected and interacted to technology, especially information, namely the counselee as a person or client who is given services [4], while the counselor is a person who has a duty to provide moral assistance to the counselee to help the problems. The important thing is communication in addition to delivering information which requires media [5]. Therefore, counseling and information technology are new demands when faced with the millennial generation.

The method of implementing counseling is generally done face-to-face [6]. Almost all counselees can consult with a counselor. Although face-to-face counseling is considered superior, face-to-face counseling has weaknesses [7]. First, counselees sometimes have difficulty in terms of time for consultation with the counselor. Second, the undetermined planning makes it difficult for the counselee to schedule a consultation. Third, not all counselees can disclose information about personal problems to counselors in full due to high privacy demands [8]. Fourth, communication

difficulties between counselees and counselors often result in misunderstandings in the delivery and suggestion of information[9]. Thus, these problems and weaknesses will be the initial foundation for the development of a counseling information system.

Another important related to the discussion of system development is that the system is not able to meet user requirement [10]. Time in delivery is not up to standard where development takes a long time. Next comes intervention from users when in the system development period so that many need to be updated and take a lot of time.

Building and developing a counseling information system is very important, the research results proposed by Putra use the waterfall method [11]. The use of the waterfall method is considered to only have functional performance even though the application is run on a web-based. The weakness is that it only records, records data on the provision of sanctions so that it looks like a virtual counseling police. Specifically for the needs and targets, the system built is only for high school children, not for the public. Another method in system development is the use of the System Development Life Cycle (SDLC) which is almost the same as the waterfall proposed by Nike Mardia Putri et al. The main concern is how to use development techniques which are not specifically described when adopting structured development. Therefore, the results of the development are not synchronous, namely structured development but the development technique adopts an object-oriented approach. Development of object-oriented systems where systems that focus on user needs and activities are still few when applied to the field of counseling[12]. Widyawati proposes making a counseling information system run on a website which uses other structural methods such as Data Flow Diagrams.

Programming language and database system creation using PHP MySQL or using a relational database [13]. The results of observations and literature reviews almost all of the development of information systems in a structured method. The structured method still has many weaknesses, such as not explaining the activities of system users when they are involved in it. In addition, structured methods are still considered as traditional functionally oriented performance programming languages.

According to on the information and previous studies[14], the objectivity of this discussion is to build a counseling information system. Counseling information system as a virtual counseling media to assist the performance of counseling involving counselees and counselors. Counselors and counselees can use to optimize counseling services with web-based systems or applications. In an effort to create a counseling information system, an object-based approach will combine structured concepts and objects. The development will adopt the waterfall method through a unified modeling language. The UML technique will describe user needs and activities involving the counselee and counselor when interacting with the system. Modeling language and object-oriented system development and UML include Use case diagrams, Sequence Diagrams, and Class Diagrams[15].

In this paper, the structure of the content will be organized which consists of an introduction that discusses the background of the problem, the formulation of the problem, and the research objectives. The second part is a research method that discusses the process or how the research works. The next section, results and discussion includes the results of the design of the research method and is added to the results of the evaluation. The last section is a conclusion by providing answers to the problem formulation that has been described in detail in the introduction section.

2. RESEARCH METHOD

The implementation of the method in the development of this counseling information system is Object Oriented Analysis and Design (OOAD)[16]. All requirements from various points of view of classes and objects within the scope of the problem are analyzed. Information system architecture is based on the manipulation of system objects or sub-systems. Thus, OOAD as a new method of solving weaknesses or problems by making modeling refers to real-world concepts. Furthermore, the data structure and behavior in an entity become the basic concept of OOAD design [17].

2.1 Research Framework

Figure 1 shows that the framework implemented starting from the process, representation and technique. The representation phase begins with capturing system requirements, analyzing the system, and developing the system. Counseling needs were defined with the user during the interview. Next, analyze the system that will be expected through features and interfaces and develop an interaction system[18].

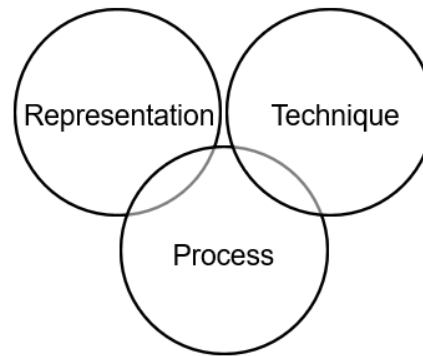


Figure 1. System Development Research Framework

Stages of the process of developing procedures and selecting appropriate modeling techniques. In this case, there are several modeling techniques using UML as the standard notation language. Use case modeling is applied to describe the needs and analysis of the system being built. Furthermore, the formation of classes includes objects in the structural analysis. Making important system interactions that involve humans and machines (counseling information systems). The last technique is to use tools in modeling, namely using the Unified Modeling Language. The modeling languages used are class diagrams, use case diagrams, and sequence diagrams.

2.2 Information System Development Method

In this case study, the method of developing an information system, especially counseling, adopts three main principles, namely process, representation, and technique. The first principle describes the process as a concept to produce a design model, namely the unified process[19]. The second principle, representation explains how to describe the design model using the Unified Modeling Language (UML). Finally, a technique that explains how the model adapts to certain problems such as procedures [20].

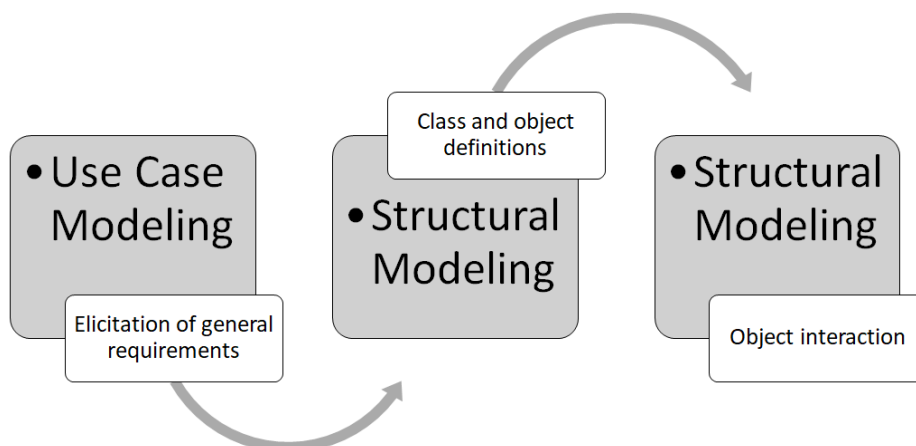


Figure 2. OOD Information System Development Method

2.3 Information System Modeling Language

The development of a counseling information system uses a method equivalent to software. Modeling is the most important thing not only in software development but in systems. Modeling can only be applied when using a modeling language. Therefore, in this study, the Unified Modeling Language was applied to describe and describe the development of a counseling information system [21]. The modeling language in the development of information systems refers to 3 main domain areas. The three areas include use case modeling, structured modeling, and dynamic modeling.

2.3.1 Use case modeling

The concept of modeling with use cases is a popular method or has been recommended by practitioners and researchers other than the field of computing. The use of use case modeling is to identify and define system requirements. In addition, use case modeling applies to all types of information systems other than software. The development of the use case model is implemented by taking into account several things. First, develop a problem statement where the counseling service case is described starting from the counselee conducting consultations until the counselee is satisfied with the services provided by the counselor. Second, identify the main actors and use cases, the main actors include counselors, counsees, admins, and admin assistance. Third, identification of use cases shows the activities or behavior of users in the counseling system such as making consultations, checking consultations, registering and canceling consultations. Fourth, create the initial use case and its description. Each use case will be given an index, use case name and description. The last is to make priority use cases where each counseling system service use case is rated starting low, medium and high.

2.3.2 Structured modeling

The definition of elicitation in use case modeling is done before structured modeling. Structural modeling has a static characteristic. Thus, it is different from other modeling in object-oriented analysis. Structured modeling explains, describes, and identifies every thing in the system in the form of objects or abstracts. Objects or abstractions can be considered objects up to the class level. Structured modeling techniques are very important to determine how the model is formed. How to define class by identifying object. Thus, the counseling service case will be defined about the object and its class. Furthermore, this counseling service will contain 3 main classes which are projected to come from the use case. Class and object identification is included in preparing the problem statement. Besides, developing a data dictionary (data dictionary) to describe classes and objects in counseling. The addition is to make associations between classes involved. Associations show information on the pattern of interaction between two or more classes. For example, a counselee is given a suggestion by the counselor, then the suggestion is an association.

2.3.3 Dynamic Modeling

There is a difference between dynamic modeling and structured (static) modeling. Static modeling using class diagrams aims to model the static aspects of the system. The class diagram shows the classes and their associations. However, the class diagram does not provide information about the dynamic aspects of the system. For example, in the counseling information system, how does the counselor object interact with other objects, namely the counselee. Dynamic models can be applied to define object interactions when the use case is called. Dynamic modeling in the development of counseling information systems is developing use case scenarios based on use case diagrams. Second, develop a level 2 sequence diagram. The level 2 diagram describes the action boundary between the input from the actor and the response from the system. Third, using the same method as level 2 but optional, meaning that the development of the counseling system does not require much at level 3. Fourth, develop state machine diagrams at the sub-system level where the modeling will be analyzed with the help of state machine diagrams.

3. RESULTS AND DISCUSSION

In this section, it is explained the results of research and at the same time is given the comprehensive discussion. Results can be presented in figures, graphs, tables and others that make the reader understand easily [2, 5]. The discussion can be made in several sub-chapters.

3.1 Implementation of Use case Modeling

The counselee and the counselor are two important actors in use case modeling [16]. The counselee is a person who is given counseling services in addition to having personal problems [17]. Counselors are people who provide assistance to counselees to help solve problems personally. The counselee and the counselor have different use cases and are related to other use cases. However, the use case diagram has a weakness, one of which is that it cannot explain the interaction between the counselor and the counselee.

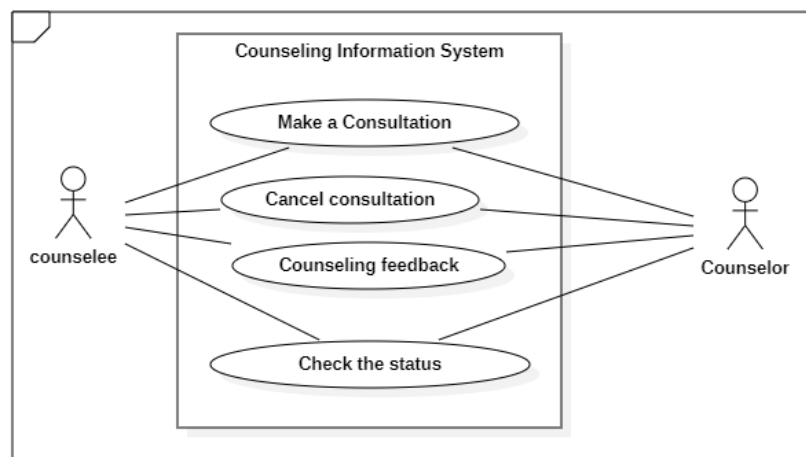


Figure 3. Modeling Of the Counseling Information System Use Case

According to Figure 3, the use case modeling stage is to explain how the use case model helps to solve the problem of general requirements definition. The general requirements are what the system does and what users need in the counseling information system. Next is to define elicitation requirements that describe the ability of the system to be in accordance with user needs. Thus, there are two main actors in the development of a counseling information system, namely the counselor and the counselee. Each actor will be given a use case explaining what the actor needs in the system.

3.2 Implementation of structured modeling

Structured modeling is more dominant to static modeling. With characteristics in class descriptions, class diagrams in structured modeling explain class names, attributes, and operations. The class name is related to the actor's name in the use case. Attributes describe the characteristics or properties of the class and operations are activities carried out by the class and related to the related class. There are several defined objects related to Figure 4. Structured modeling in this development aims to model the structural aspects with class models. Anything related to an entity will be treated as a class. Class is a collection of objects. Based on Figure 4 there are 6 classes identified, namely account, counseling, consultation_status, feedback, counselor and counselee. The class of counselees and counselors is a generalization for the class of accounts. In the class diagram in Figure 4 shows there is an association between classes. For example, the account class can only be used once to provide feedback on counseling services, which is called one-to-one. There are other associations that show one-to-many, such as account classes can be consulted more than once.

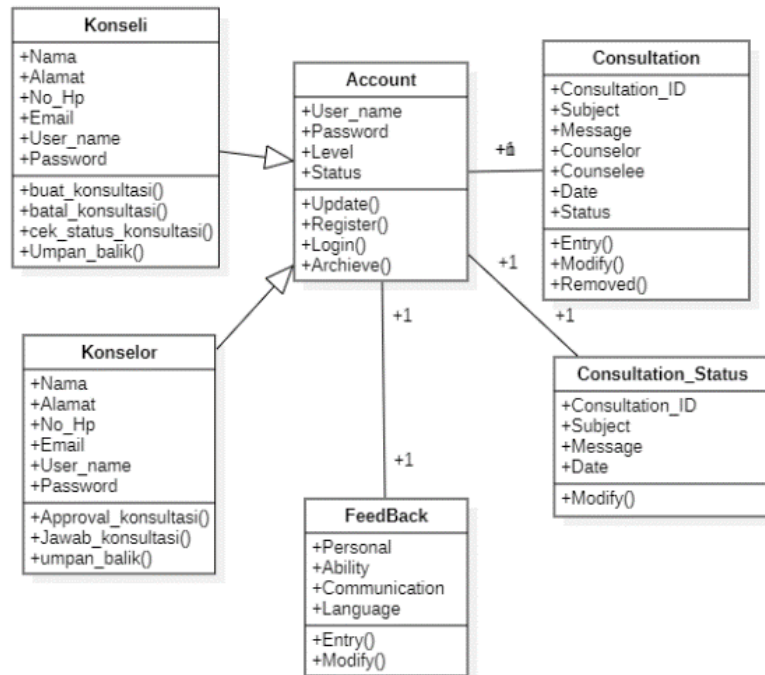


Figure 4. Structured Modeling with Class Diagrams

Account classes have been generalized, namely counselees and counselors (figure 4). The counselor class has some of the same attributes as the counselee class. But in the aspect of the operation section has different items. The counselee can interact with the counselor through consultation. Furthermore, the status of consultation as a class is designed to determine the status of consultation information by the counselee to the counselor [22]. Finally, the feedback class is a class that associates two classes of counselor and counselee to provide an assessment from the counselee to the counselor. The feedback class also has attributes including personal, ability, communication, and language.

3.3 Dynamic modeling implementation

As previously explained, dynamic modeling provides an overview of the interactions between objects with other objects in the system. Figure 5 illustrates and explains the user objects that can interact with the system when registering. The user gives the command to enter a username and password. Then the system receives the command and gives a response.

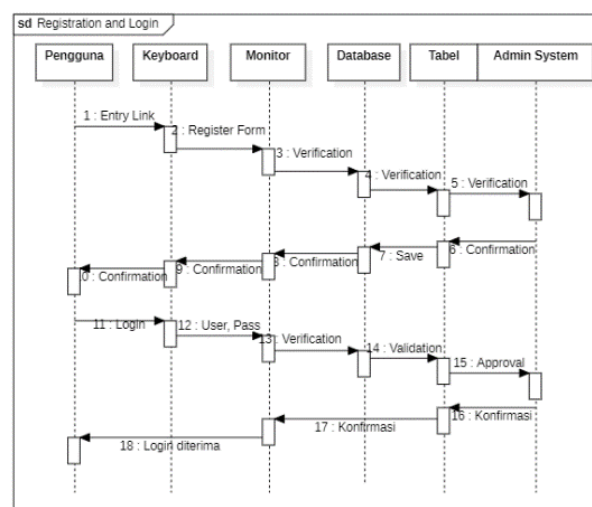


Figure 5. Dynamic Modeling with Sequence Diagram

For example, the system will respond to information that the username has been used during registration. Another example is logging into the system which is the same way as registration. The user enters the username and password then verified by matching the data in the database.

3.4 Counseling Information System Implementation

Figure 6 shows the results of the development of a counseling information system. During development, the stage of writing program code is also an important part. This web-based application uses an object-oriented programming language, namely PHP. Database as a container to store data using MySQL.

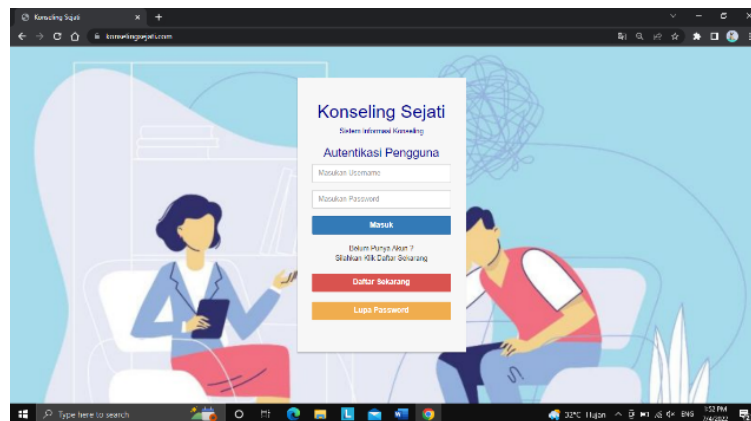


Figure 6. Display of the Counseling Information System Login Page

Users can enter their username and password when logging in. If you don't have an account, each prospective user can press the registration button. The registration page will be shown in Figure 7. The registration page contains users to enter data including personal, and other additions. On the registration page, the user first enters the username to check availability. Each username entered will be matched with the username database in the counseling application. There are two status usernames, namely used and ready to use. If the username status is used, it means that the username entered has been used by other users in this counseling system. While the status of the username is ready for use, it means that the username entered is not yet available and has not been used by other users. Thus, the user can continue charging further.

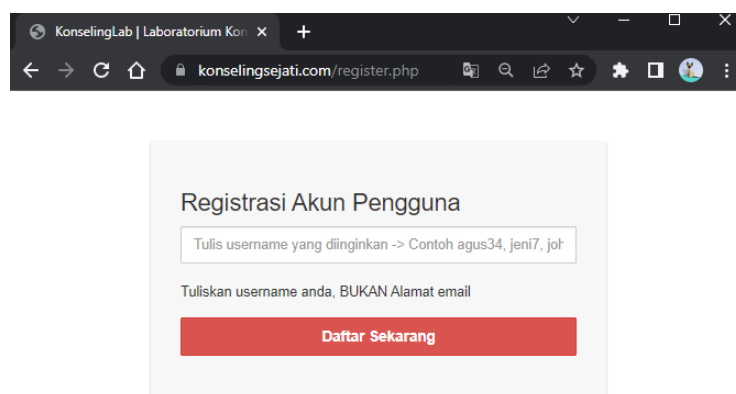


Figure 7. System User Account Registration Page

User registration is also part of the use case. Furthermore, registered users automatically have an account (Account) as a class. The Account class has a user object (counselor and counselee). Thus, this account class is the result of the design and abstraction of structured modeling and use case modeling.

Figure 8. Consultation Filling Page By The Counselee

One form of dynamic modeling implementation is shown in Figure 8. A user (counselee) uses a use case to consult a counselor. Although use cases can explain what the counselor and counselee do. Dynamic modeling uses sequence diagrams that explain the sequence of processes carried out by the counselee during consultation.

No.	No. User Konsultasi	Jenis Konsultasi	Konselor	Status	Tanggal	Tindakan
1	7000000001	Konsultasi Kaki	Ewa Marudawale	Done	04 Jul 2023 11	Red Response

Figure 9. Counseling Progress In Counselee Account

Another additional use case is that the user as a counselee can check the progress of consulting services. The consultation progress process can be accessed by the counselee to see the status of the consultation whether the counselor has responded or not. In addition, the counselor or counselee can also make a decision whether the consultation can be continued or not.

3.5 Testing and Evaluation

Testing is the most important and many time would be charge in the next stage. The evaluation as a part of development of information system that determined the suitable of requirement. In this case, the method of testing and evaluation referred to standard of software testing such as black-box testing. The black-box testing enabled the performance of information system that proposed through several step. The following is a table the design parameter in the information system testing according to the requirement. There are 12 item data were prepared in order to validation in testing. In this stage, the evaluation or testing required full time.

Table 1. Parameter of Information system testing and design

ID	Scenario of Test	Description of parameter on the Test	Expected Result
B001	Registration of Account	Fill in the username and password on the account registration page. Then press the continue button	The proposed username (submit) is read by the system
B002	Filling in registration data	Users or testers fill in detailed data after the username is declared ready and valid	Each data or data item is stored in parameter variables before being recorded in the database

B003	Username check Stage 1	The username is submitted at the beginning of registration, then checks the availability of the username in the database, especially the user table	The username can be read and detected when it is used
B004	Username check Stage 2	The system displays messages in 2 modes, namely the username is ready to use and the username has been used by another user	Messages on the system are displayed on the user side
B005	Biodata User profile	The system will read information based on username and will display on the profile page and user biodata (counselee and counselor)	Data is displayed based on database
B006	User data changes	User changes identity, supporting information and authentication information (username and password)	Applications can change data and display changes
B007	Upload user profile photo	Fill in and select photo files with file types GIF, PNG, JPEG, JPG. The maximum size is 2 MB. Free type or color of photo (black or color)	System can filter file type and size.
B008	Consultation submission	The user (counselee) submits a consultation. (1) fill in the subject or title of the consultation, (2) Counselor Name, (3) Consultation message.	Consultation information is stored in a consulting database
B009	Check the counselee consultation	The counselor enters the Consultation ID or consultation ticket in the text column	The system displays consultation information based on the ticket ID
B010	Check Counseling Progress	The user (counselee) clicks the counseling progress menu on the counselee's biodata page	The system displays consultation information and progress
B011	Enter the system (Login)	The user enters the username and password in the login column or login page	Username and password are stored in database
B012	Enter the system (Login) Stage 2	The program code checks the username and password on the database whether the username and password match or are the same or identical	Username and password detected in database

According to table 2 can display the result of information system that confirmed status in the testing. Almost the case was tested in evaluation process to ensure reliability the system.

Table 2. Parameter of result information system testing and design

ID	Test Scenario	Expected results	Test result	Conclusion
K001	Account registration	The proposed username (<i>submit</i>) is read by the system	Read success	In accordance
K002	Filling in registration data	Each data or data item is stored in parameter variables before being recorded in the database	The data has been recorded	In accordance
K003	Username check Stage 1	The username can be read and detected when it is used	Results can be displayed	In accordance
K004	Username check Stage 2	Messages on the system are displayed on the user side	Results can be displayed	In accordance
K005	Biodata User profile	Data is displayed based on database	Success display	In accordance
K006	User data changes	Applications can change data and display changes	Successful change	In accordance
K007	Upload user profile photo	System can filter file type and size.	Successful filtering	In accordance
K008	Consultation submission	Consultation information is stored in a consulting database	Successful recording	In accordance

K009	Check the counselee consultation	The system displays consultation information based on the ticket ID	Information is displayed	In accordance
K010	Check Counseling Progress	The system displays consultation information and progress	Information is displayed	In accordance
K011	Enter the system (Login)	Username and password are stored in database	Successful recording	In accordance
K012	Enter the system (Login) Stage 2	Username and password detected in database	Success detection	In accordance

4. CONCLUSION

The development of information systems has challenges and is admittedly time consuming. Modeling with use cases, structured and dynamic is evidence of how the system can be developed by reducing time and costs. Use case modeling and structured modeling are tools to simplify complex systems. In addition, the two models help the system designer to understand the problem domain in counseling services. What is more important is when building communication where dynamic modeling is the key to how to relate objects to other objects. Objects can communicate with machines or humans as system users. The user object can receive a response from the machine even if it is programmed in a programming language.

This information system has been built with an object approach. However, there are still some limitations. Thus, future research needs to be developed on how to build object-oriented databases. The reason for this is based on the current database pattern applied to relational databases. Although relational databases are more dominant and widely used, the development of object-oriented systems needs to be aligned with the development of object-oriented databases.

ACKNOWLEDGEMENTS

The research team would like to thank several parties. First, I would like to thank the Institute for Research and Community Service, especially the Research Center for IAIN Syekh Nurjati Cirebon, for funding this research. Second, thank you to the Counseling Guidance Department for the mandate to create a cyber counseling concept through this research. Finally, I would like to thank the information systems research community for their contribution and support to this research.

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