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Research And Community Service Information System At LPPM Universitas MBP Medan With Unified Modeling Language (UML)

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ABSTRACT
Universitas Mandiri Bina Prestasis (UMBP) which was established in 2022 as a merger of two institutions, namely AMIK MBP with the Vocational Education program D-III Informatics Engineering and D-III Informatics Management and STIKOM with the S1 Informatics Engineering and S1 Information Systems Study Programs and the addition of 3 new study programs, namely S1 Software Engineering, S1 Accounting and S1 Entrepreneurship. Along with that, UMBP was born and developed with a commitment that was stated in the Vision of Becoming a Superior and Independent University in the field of Information Technology and Business with an Entrepreneurial Spirit at the National level in 2036 "by developing various superior programs in the fields of research, innovation, and community service, as well as the Regulation of the Minister of Research, Technology, and Higher Education (Permenristekdikti) number 44 of 2015 concerning National Standards for Higher Education, so every university must make adjustments towards meeting the standards of education, research and community service. UMBP has one institution that is tasked with research and development called the Institute for Research and Community Service (LPPM). This institution is a forum for academics to carry out research and community service. The establishment of LPPM is UMBP's strategy in an effort to realize the improvement of quality and development of technology, social and business in higher education and its implementation in the community.

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INTRODUCTION

Implementing the Tridharma of Higher Education is an obligation carried out by the entire academic community in all universities. Tridharma has 3 main points, namely education and teaching, research and development and community service. Especially in the fields of research and development and community service. UMBP has one institution tasked with research and development called the Institute for Research and Community Service (LPPM). LPPM UMBP is one of the institutions tasked with overseeing the implementation of the Tridharma of Higher Education, namely research and community service. In carrying out his

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duties in overseeing the implementation of research and community service in higher education, especially within the internal scope of the university.

LPPM UMBP Medan still uses manual methods in managing research and service data, such as managing data using Word and Excel files which are stored in various different files. Apart from that, in the activity submission process, LPPM UMBP Medan still requires lecturers to attach a print out proposal as a submission requirement. The data management and management process which is carried out manually is due to the lack of an adequate information system to handle various LPPM problems and needs in one place and makes data processing more difficult.

METHODS

Information Systems

An information system (IS) is a formal, sociotechnical, and organizational system designed to collect, process, store, and distribute information. From a sociotechnical perspective, an information system is composed of four components: tasks, people, structures (or roles), and technology. An information system can be defined as an integration of components for collecting, storing, and processing data. The data is then used to provide information, contribute to knowledge, and digital products that facilitate decision making.

Information systems can be used in a variety of contexts, including business, education, government, health, and more. "Information systems" is also the academic field of study of systems with particular reference to information and the complementary networks of computer hardware and software that people and organizations use to collect, filter, process, create, and distribute data. With an emphasis on information systems that have a definitive boundary, users, processors, storage, input, output, and communication networks. In many organizations, the department or unit responsible for information systems and data processing is known as the "information service".

Unified Modeling Language (UML)

Unified Modeling Language (UML) is a visual language used to model, plan, and document the structure and behavior of software systems. UML is used as an effective communication tool between software developers, stakeholders, and development teams to understand, plan, and design complex software systems. UML can also be defined as a set of structures and techniques for modeling object-oriented program design (OOP) and its applications. [UML is a methodology for developing OOP systems and a group of tools to support the development of these systems. UML was first introduced by the Object Management Group, an organization that has developed OOP models, technologies, and standards since the 1980s. Now UML has begun to be widely used by OOP practitioners. UML is the basis for object-oriented design tools from IBM. UML is a language used to specify, visualize, build, and document an information system. UML was developed as a tool for object-oriented analysis and design by Grady Booch, Jim Rumbaugh, and Ivar Jacobson. However, UML can be used to understand and document any information system. The use of UML in industry

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continues to increase. It is an open standard that makes it a common modeling language in the software industry and system development.

1. Use Case Diagram: Use Case Diagram is used to describe the interaction between the system and external actors that interact with the system. This diagram illustrates the functionality of the system from the user's perspective, by showing the interaction scenarios between the user and the system.
2. Class Diagram: Class Diagram is used to model the static structure of a software system by showing the classes in the system, their attributes, and the relationships between the classes such as inheritance, association, and aggregation relationships.
3. Sequence Diagram: Sequence Diagram describes the interaction between objects in the system in sequence, showing the messages sent between objects during the interaction process.
4. Activity Diagram: Activity Diagram is used to describe the work flow or activities in the system, showing the activities carried out in a process and the relationships between those activities.
5. State Machine Diagram: State Machine Diagram describes the state transition of an object in a software system, showing how the object changes its state based on events that occur.
6. Component Diagram: Component diagram is used to model the physical components or modules in a software system, showing the components in the system and the relationships between the components.
7. Deployment Diagram: Deployment diagram is used to model the physical distribution of software system components into the implemented environment, showing how system components are deployed into the computing infrastructure.

UML provides a variety of diagrams that can be used to model various aspects of a software system, from static structure to dynamic behavior. By using UML, software developers can understand, plan, and design software systems systematically and structured, thus facilitating efficient and effective software development.

RESULTS AND DISCUSSION

Design System

System design with UML tools using several UML diagrams such as Use case diagrams, Sequence diagrams, activity diagrams and class diagrams will certainly be very helpful for program designers and make maintenance easier.

Use case Diagram

The use case diagram design describes the actors involved in the designed system and interacts with each other and shows the activities of each actor in the system being developed. The identity of the actor is also described in a use case diagram. Figure 1 shows several activities that occur in the research and community service information system and the actors involved. The use case diagram consists of 3 actors, namely Lecturer, Head of LPPM and reviewer. The Lecturer actor who submits research/community service proposals,

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research/community service results seminars. The Head of LPPM actor as the admin who determines the reviewer who assesses the research/community service, announces the selection results and announces the results of the seminar. The Auditor actor receives research/community service proposals and assesses the results of the research/community service

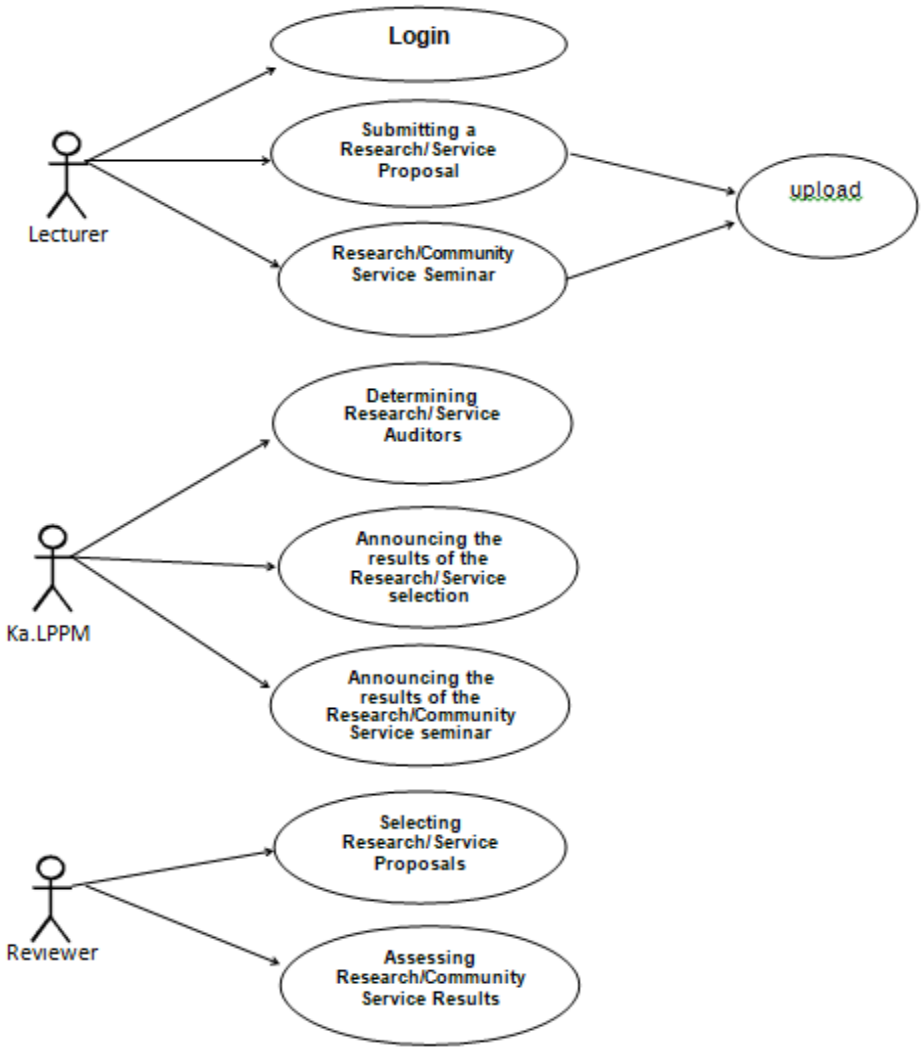

Figure 1. Use Case Diagram

Sequence Diagram

By looking at the activities of the Use Case Diagram and Activity Diagram, the Sequence Diagram can be described in more detail and accurately. Both diagrams are used as references for compiling the Sequence Diagram, which illustrates the interaction between objects and systems in more detail. The Sequence diagram includes the stages carried out by the Lecturer, Head of LPPM and Reviewer, where the activity begins with the Lecturer submitting research/community service to the Head of LPPM, then the Head of LPPM will appoint a Reviewer to select the proposal and then provide recommendations for continued work. After the research/community service is completed, the reviewer will also assess and

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then the Head of LPPM will announce the results of the assessment that has been carried out

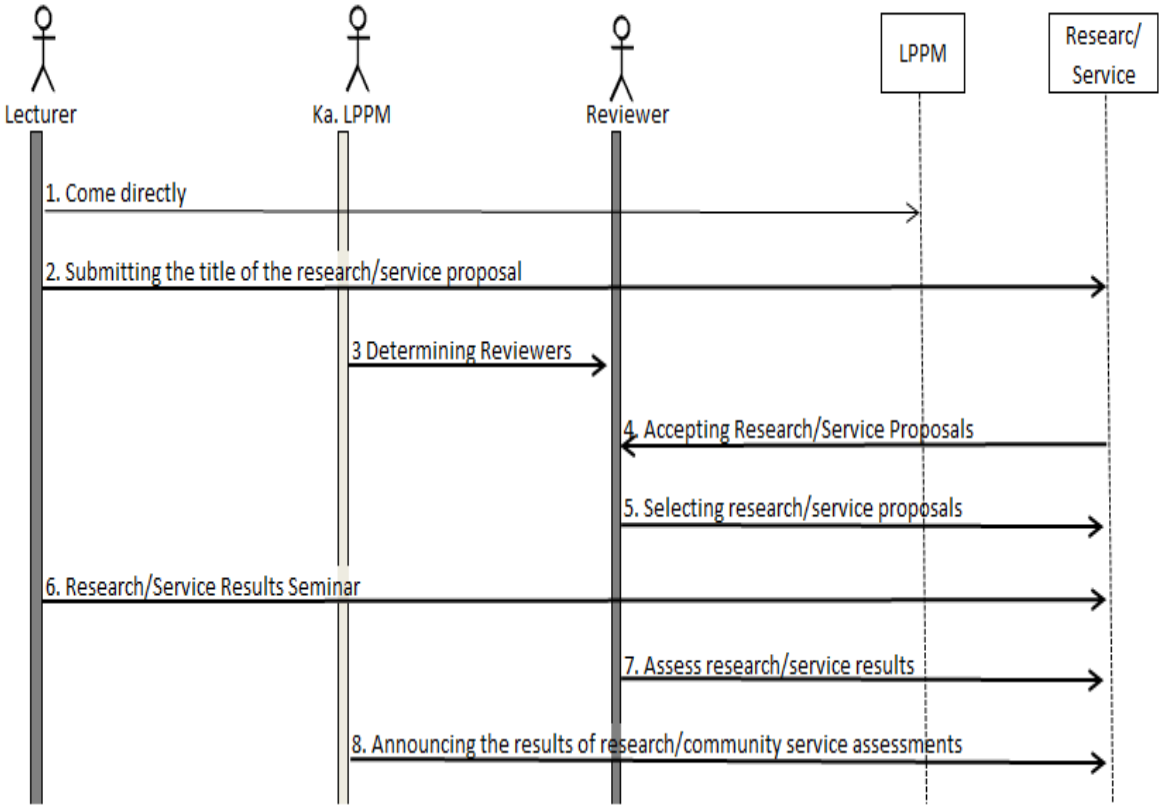

Figure 2. Sequence Diagram

Activity Diagram

Activity in the process of proposing research proposals and community service. The process of proposing both research and community service in the information system is the same, but what makes it different is the scheme. Lecturers must have an account. An account can be obtained through the LPPM admin who will create a lecturer account. After the account is created, the lecturer can log in to the system. Lecturers make research proposals or community service by filling out the form on the system, inputting the RAB, entering members, and uploading the proposal. After the proposal is submitted, the LPPM admin will select a reviewer to assess the proposal.

Reviewers can see the proposals that will be assessed and then provide an assessment, comments and recommended budget for the proposed proposal. Then the LPPM admin can see the status of the proposal that has been assessed. The LPPM admin selects proposals that are entitled to receive the budget and inputs the budget that has been approved by the LPPM Unit. The proposing lecturer can see the status of the proposal that was submitted, whether accepted or rejected. For more details, the researcher will describe the activity diagram scheme of the research title and PkM proposal process by the research lecturer starting from the account registration process to the process of accepting or rejecting the proposal by the system after being reviewed by the reviewer as in the following image.

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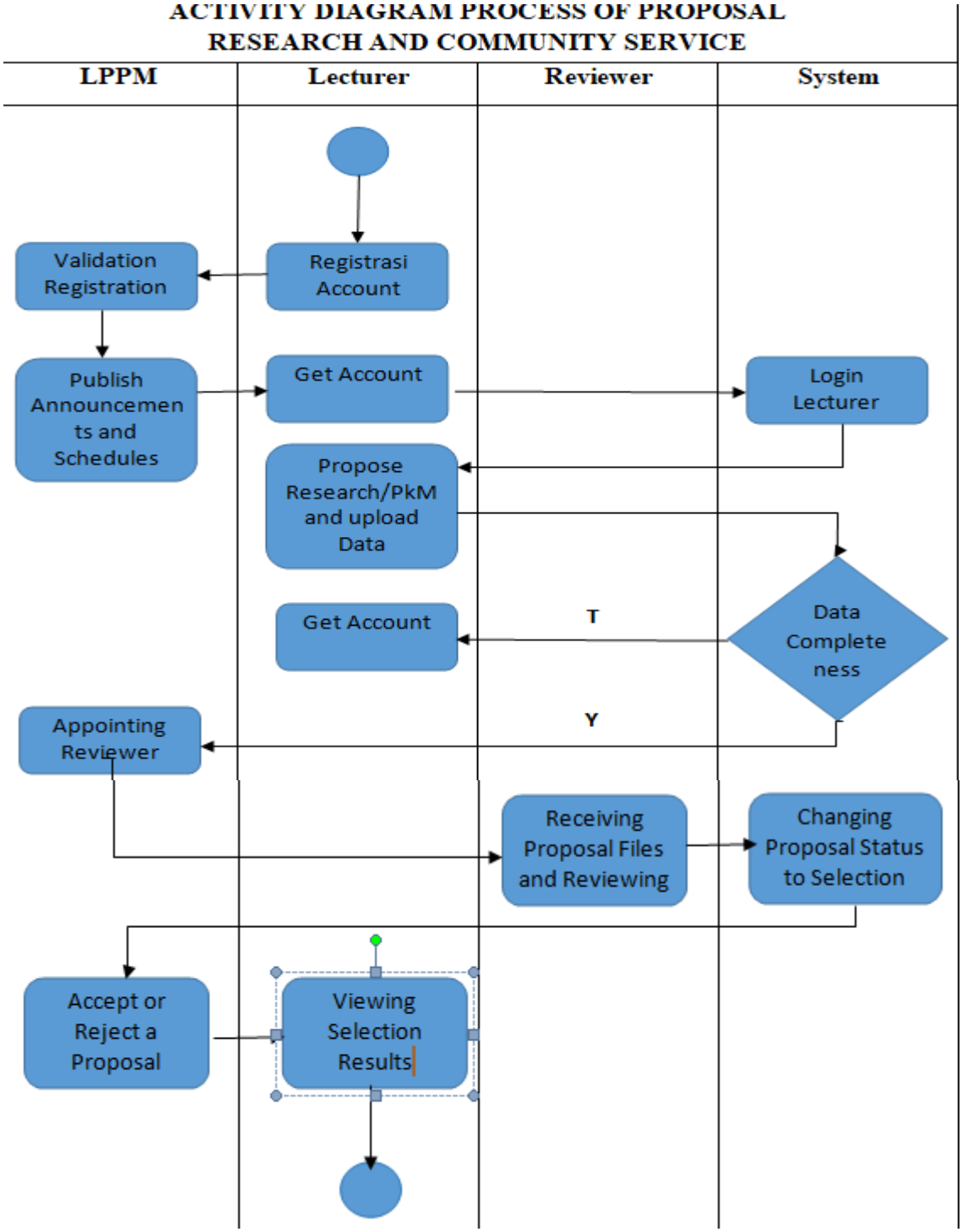

Figure 3. Activity Diagram

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Class Diagram

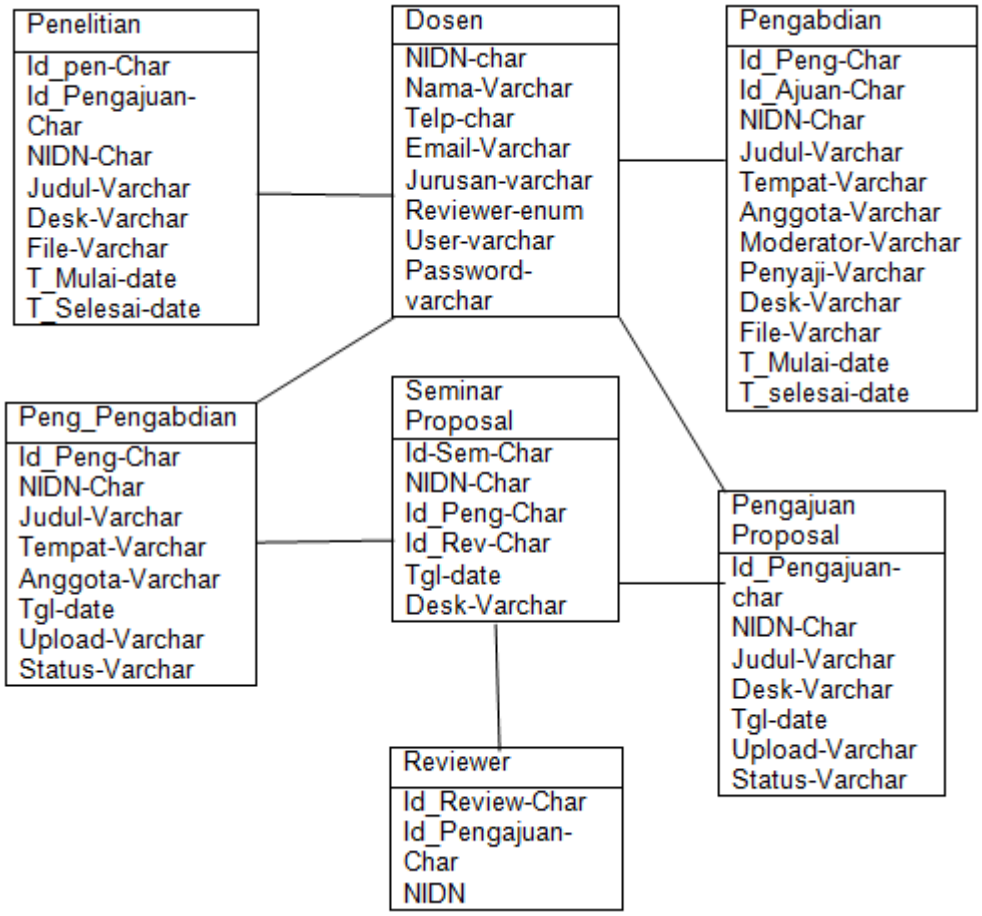

Figure 4. Class Diagram

After knowing the objects to be built in the research and community service information system, 7 classes were identified, including: Lecturers, reviewers, research, community service, community service submissions, proposal submissions and seminars. The attributes of each class are also clearly identified along with the types of attributes. And identifying the relationship between the classes using iteration, aggregation and inheritance

After the objects to be built in the research and community service information system are known, 7 classes are identified, including: Lecturers, reviewers, research, community service, community service submissions, proposal submissions and seminars. The attributes of each class are also clearly identified along with the types of attributes. And identify the relationship between these classes using iteration, aggregation and inheritance.

The lecturer class is a data structure for the lecturer entity, the reviewer class is a data structure for the reviewer entity, the research class is a data structure that explains information about research, the community service class is a data structure that explains information about community service. The community service submission transaction class is a data structure that provides information about community service submissions made by lecturers, the proposal submission class is a data structure that provides information about

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research submissions made by lecturers, the seminar class is a data structure that provides information about seminars from research/community service proposals submitted by lecturers

CONCLUSION

Using use case diagrams, sequence diagrams, activity diagrams and class diagrams in the Unified Modeling Language is very helpful in designing information systems. A complete description of each diagram will make it easier for program designers to build information systems. So that the information system that is built will help solve existing problems and is in accordance with the needs/problems faced. Use case diagrams will clearly describe who is involved in the system and what activities are carried out by each actor. In the Sequence diagram, it tells the description of the process sequentially carried out by each actor. While in the class diagram, the data for the needs of the system to be built is clearly depicted.

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