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THE DESIGN AND BUILD AN AUTOMATIC ASSESSMENT RESULT MONITORING SYSTEM ON SHOOTING LESSONS TO SUPPORT TRAINING RAPID MOVEMENT FORCE COMMAND

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ABSTRACT

The Rapid Action Force Command (Kopasgat) carried out shooting exercises regularly with high intensity. However, the current assessment system is still conventional, requires large human resources and tends to be prone to errors and fraud. This research aims to design and build a monitoring system for automatic assessment results on shooting ranges to support Kopasgat exercises. This system was developed using Java technology for application development, MySQL as a database for storing information on assessment results, and an executive information system for effective data presentation. The communication method between devices and systems is implemented through serial communication, ensuring fast and accurate data transmission. The advantage of this system lies in its real-time capabilities, allowing for direct monitoring of the results of the fire assessment instantly. The development process includes analyzing user needs, designing system architecture, developing applications using the Java programming language, and implementing MySQL databases. The system provides comprehensive information, including detailed assessment of shot accuracy, response time, and individual performance of personnel. With this automatic monitoring system, it is hoped that Kopasgat shooting training can be optimized, increasing the efficiency, accuracy, and effectiveness of personnel performance evaluation. The implementation of real-time technology is a key aspect in providing quick feedback to personnel, allowing for immediate improvements and improved overall fireability.

Keywords: *Communication Series, Executive Information System, Java, Monitoring System, MySQL*, *Real-time.*

1. INTRODUCTION

The Rapid Action Force Command (Kopasgat) is a special force owned by the Indonesian Air Force. The Indonesian Air Force is in accordance with MEN/PANGAU Decree No. 45 of 1966, dated May 17, 1966, ratification of the Rapid Action Force Command (Kopasgat) consisting of 3 Regiments. Kopasgat is a land combat unit with three dimensions, namely air, sea, and land. Each Pasgat soldier is required to have at least a para-commando qualification (Parako) to be able to carry out duties professionally, then added special skills in accordance with their specialization. The duties and responsibilities of the Kopasgat are the same as other combat units, namely the State Combat Unit. As an Indonesian Strike Force that is ready to be deployed in all terrains, both forests, cities, swamps, rivers, and seas to defeat all enemies who fight against the Republic of Indonesia. Kopasgat has the characteristic of additional tasks that other forces do not have, namely the Operation of the Formation and Operation of the Air Base (OP3U), namely seizing and defending the base and subsequently preparing the landing of aircraft and troop parachuting. Kopasgat is in charge of fostering the strength and capabilities of the unit. Kopasgat as an air force is always ready to operate in carrying out all military operations of war and non-military operations other than war, target capture, defense of strategic objects of the Air Force, air defense, special operations and special air operations in military operations at the discretion of the TNI Commander.(Pamungkas, 2015)

Kopasgat (Rapid Movement Force Command) soldiers are special forces that have high demands on their shooting ability. This capability is critical in ensuring the success of the mission and national security. In order to improve shooting skills, Kopasgat carries out regular shooting exercises with high intensity. However, the current assessment system is still conventional, requires large human resources, and tends to be prone to errors and fraud.

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It is hoped that the achievement of Kopasgat soldiers can have a positive impact on the success of the task, increasing efficiency in the process of evaluating the results of the shooting. With automation, it is expected that the time required to evaluate the results of the fire can be reduced, thus allowing Kopasgat personnel to focus on other operational activities. With the automatic system, it is hoped that the accuracy in assessing the results can be increased. This will help Kopasgat in making more appropriate decisions based on accurate and reliable data. Provides real-time monitoring of the shooting results. Kopasgat is expected to be able to get fast and accurate information to support instant decision-making. It can provide a high level of security for data and information related to the shooting. The reliability of the system in managing data and maintaining information confidentiality is crucial. It can be integrated with other systems used by Kopasgat, so as to create an integrated information ecosystem and can provide more comprehensive information. Provide data that can be further processed and analyzed for the purposes of strategic planning and development of military firepower capabilities. By automating the assessment process, it is hoped that there will be savings in costs and human resources, as well as reduce the potential for human error in the evaluation of shooting results. Increasing the involvement of Kopasgat personnel in the process of evaluating and improving the results of shooting, so that they can continue to optimize performance. The last hope is that scalability can be increased or adjusted to the future needs of Kopasgat in increasing effectiveness and efficiency in shooting results assessment activities. (Socialization & training on the use of the Indone korpasgat inventory application n.d., 2020).

2. LITERATURE REVIEW

2.1 Netbeans

NetBeans is an IDE (Integrited Development Environment) made by Sun Microsystems. The application is Java-based and runs on swing. Swing itself is a Java technology to develop a desktop application that can be run on various Operating Systems. That is, Windows, Linux, Mac Os, Solaris and other operating systems that support a JVM equivalently . According to Enterprise (2015:8), "NetBeans" is an IDE (Integrated Development Environment) to create applications with Java, PHP, C, C++, and HTML5. Initially , NetBeans was intended for a Java programming development . However, the app also supports other programming languages, specifically such as PHP, C/C++, and HTML5.

NetBeans started in 1996 as xelfi which was an IDE project at Charles University in Prague. The NetBeans IDE application has been launched since 1997. In that year, the company founded by Roman Stanek began producing and commercializing NetBeans IDE publications until it was finally purchased by Sun Microsystems in 1999 and made NetBeans IDE as an open source application in the month of Juni 1999.

Figure 1. NetBeans

In 2010, Sun (and NetBeans) was acquired by Oracle. Meanwhile, the function of NetBeans IDE itself is to create and develop a desktop application, examples of NetBeans applications are applications used in stores or used at cashiers. In addition to the above uses, NetBeans applications are also used by programmers to compile , Linker, Debuger, etc. Because the IDE itself globally means editor. IDE is an integrated environment that provides all the needs of programmers.(Java et al., 2017).

2.2. MySQL

MySQL is an implementation of a relational database management system (RDBMS) that is distributed for free under the GPL (General Public License) license. Any user can freely use, distribute, and create derivative works from MySQL. MySQL is actually a derivative of one of the main concepts in the pre-existing database, SQL (Structured Query Language). SQL is a database operation concept, especially for data selection and entry, which allows data operations to be done easily automatically. The reliability of a database system (DBMS) can be known from the way its optimization works in executing the process of SQL commands made by users and application programs that use it. As a database server, MySQL supports both transactional database operations and non-transactional database operations. In non-transactional operation mode, MySQL can be said to be superior in terms of performance compared to other competitor database server software. However, in non-transactional mode, there is no guarantee of reliability of stored data, therefore non-transactional mode is only suitable for types of applications that do not require

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data reliability such as web-based blogging applications (wordpress), CMS, and the like. For the needs of systems aimed at business, it is highly recommended to use the transactional database mode, but as a consequence the performance of MySQL in transactional mode is not as fast as the performance in non-transactional mode.(Information and Practicum, 2018).

Figure 2. MySQL

2.3 Java

Java is a programming language that can be run on a variety of computers including mobile phones. The language was originally created by James Gosling while still at Sun Microsystems, which is now part of Oracle and released in 1995. The language adopts much of the syntax found in C and C++, but with a simpler object model syntax and minimal support for low-level routines. Java-based applications are generally compiled into p-code (bytecode) and can be run on various Java Virtual Machines (JVMs).

Java is a general-purpose programming language, and is specifically designed to take advantage of implementation dependencies to a minimum. Because of its functionality that allows java applications to run on several different operating system platforms, java is also known for its slogan, "Write once, run anywhere". Today Java is the most popular programming language, and is widely used in the development of various types of software.

Figure 3. Java

2.4 Graphics

Graph programming in Java applications typically involves the use of graphical APIs (Application Programming Interfaces), and one of the most commonly used is Java Swing. Java Swing is a GUI (Graphical User Interface) toolkit that allows Java developers to create graphical user interfaces. Java graphics programming can become more complex depending on the needs of the application. In addition, nowadays, JavaFX is also a popular choice for the development of more modern Java graphics applications. JavaFX provides more advanced and more flexible features compared to Java Swing.

Broad Graph is a term that is commonly used in the context of data communication and presentation. Broad charts refer to a type of graph that presents data in a way that is easily understood by different layers of audiences, including those who do not have a specific background or understanding in the field related to the data. Broad charts are typically designed to provide an overview or "broad view" of trends, patterns, or comparisons in data, without deepening complex details. These graphics are often simple in design and can quickly provide core information to a diverse audience. Examples of broad charts include line charts to show time trends, bar charts for quantitative comparisons between categories, and pie charts to show proportions or parts of a whole. The main goal is to clearly communicate the message of the data without requiring the audience to have any special knowledge of statistics or data analysis.

Figure 4. Graphic Board

A line graph is a type of graph that uses lines to connect data points in a series. These points represent the values of variables at a certain interval, such as time or other independent variables. Using lines connecting these points, line charts form patterns or curves that can provide a visual representation of changes or variables.

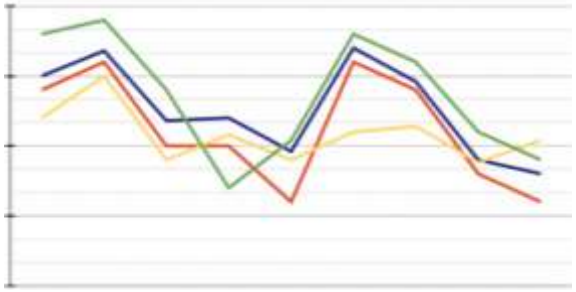

Figure 5. Line Charts

The graphical characteristics of the line using the X axis (Horizontal) indicate independent variables, such as time or a specific category. and

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the Y axis (Vertical) indicates the value of the variable being measured.

A bar chart is a type of chart that uses bars or blocks to represent data. The bars can be arranged vertically (bar chart) or horizontally (horizontal bar chart) depending on the desired data preference or layout. Bar charts are generally used to compare quantities or frequencies between different categories or groups of data. Bar charts provide clear and easy-to-understand visual representations, making them popular in a variety of contexts. The choice between vertical or horizontal bar charts depends on the design preferences and the effectiveness of the desired data presentation (Setiaji, 2016).

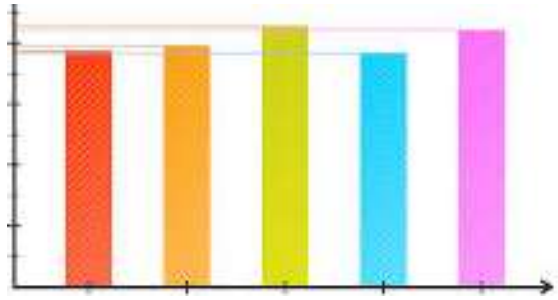

Figure 6. Bar Chart.

2.5 Real-Time

Real-Time on the system's ability to provide instant monitoring and evaluation of shot scoring results and without significant delay. The monitoring system proposed in this thesis is designed to provide a response as soon as shots are fired during the Kopasgat exercise. This allows Kopasgat trainers and soldiers to view and analyze the results of the assessment quickly, without waiting for a long time to receive information. The real-time system allows for immediate monitoring and rapid evaluation of the accuracy of shots, response times, and individual performance of personnel during the exercise. High response speed is key to providing quick feedback to soldiers, allowing them to identify their strengths and weaknesses and make immediate improvements. Real-Time is about the system's ability to provide information on the results of fire assessments instantly during shooting exercises, supporting efforts to improve the efficiency, accuracy, and effectiveness of performance evaluation of Kopasgat personnel (Guettala et al., 2022).

2.6 Shooting Score

In the shooting score, the display of automatic assessment results, especially in the context of a monitoring system for shooting practice, can be designed to provide clear and easy-to-understand information to users, such as soldiers or coaches. Displays the shot accuracy score for each attempt or series of shots. Accuracy scores can be expressed in percentages or other forms that are easy to understand. Indicates the response time from the moment the fire order is given to the time the shot is fired. This can help evaluate the speed and readiness of soldiers in responding to orders. Displays the overall score of the shot results during a specific training session or practice series. The overall score can provide a comprehensive picture of a soldier's performance (Alif Agung, Sudirjo and Rasydiq, 2021).

Figure 7. Shooting Lesson

2.7 Monitoring System

The automatic assessment of the results of the shooting lens to support the Kopasgat exercise refers to a set of software and hardware designed to automatically monitor, record, and evaluate the results of shooting during shooting exercises conducted by Kopasgat (Rapid Movement Force Command) soldiers. Automatically monitor the assessment results coming from the shooting lens during shooting practice. The monitored information includes shot accuracy, bullet distribution, response time, and other relevant parameters. The implementation of serial communication can ensure a fast exchange of data between the shooting lens and the monitoring system, allowing instant monitoring of the assessment results. Integrated with the firing lens, it allows data to be captured directly from the lens. This ensures the accuracy and reliability of the data obtained during shooting practice.

The assessment result data is recorded in real-time, allowing users or instructors to monitor and analyze the performance of soldiers during the exercise. It provides instant feedback that can be used for immediate improvements. In-depth analysis of the accuracy of soldiers' shots, including evaluation of firing patterns, distribution on target, and target accuracy in accordance with military training standards. With the integration of executive information systems, assessment results can be presented effectively and comprehensively. It can include graphs, reports, and other data visualizations

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for easy understanding. Given the sensitive nature of military exercises, these systems must include data security measures to protect assessment results from unauthorized access or unwanted changes.

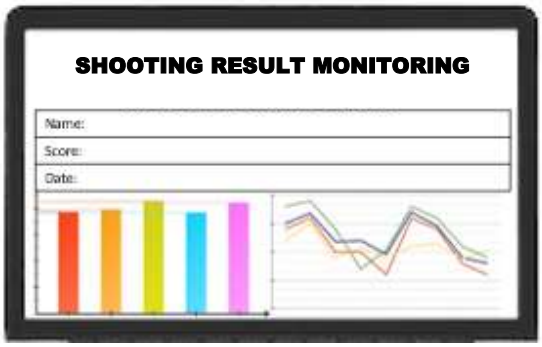

Figure 8. Monitoring System

The assessment results obtained from the monitoring system can be used to provide direct feedback to soldiers, facilitating immediate improvement and overall improvement in shooting capability. The implementation of the automatic assessment result monitoring system on the shooting lens aims to optimize shooting practice, improve evaluation efficiency, and support the improvement of Kopasgat soldiers' shooting skills more effectively. (Research, 2008).

3. ANALYSIS AND DISCUSSION

3.1 Research Design

This type of research is applied research where this research is carried out to provide solutions to certain problems in a practical way. In this study, the author uses the Java programming language and the implementation is processed by Netbeans and the data is stored in MySQL. The system provides comprehensive information, including detailed assessment of shot accuracy, response time, and individual performance of personnel. With this automatic monitoring system, it is hoped that Kopasgat shooting training can be optimized, increasing the efficiency, accuracy, and effectiveness of real-time evaluation of automatic assessment data on shooting ranges.

3.2 Time and Place of Research

The research was conducted in January - June 2024. Design and manufacture of a monitoring system for automatic assessment results on shooting ranges. The test was carried out at the Wira Braja Shooting Range – Naval Academy.

3.3 Research Tools and Materials

The tools and materials used in the study will be explained, starting from the equipment of the monitoring system, the results of automatic assessment on the firing range in sequence are listed as follows:

a. Hardware

Hardware as supporting tools in the automatic assessment result monitoring system on shooting marks. *Hardware.*

1) Laptop, Specifications: ASUS CORE i3 Laptop, Graphics 2.3 GHz System Type 64-bit, Windows OS x64-Based Processor & 4 GB RAM.

Figure 9. Laptop

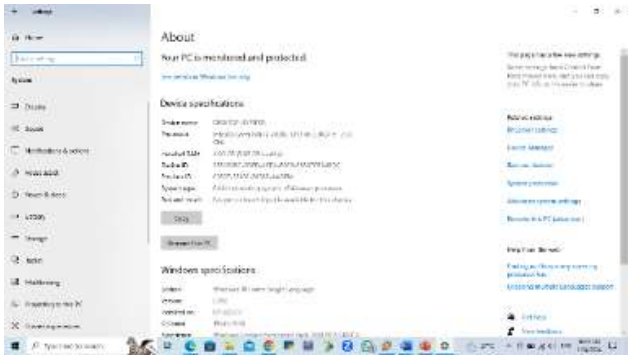

Figure 10. ASUS Laptops and Specifications

2) Splitter

A device or apparatus used to divide or separate a signal from a single source into multiple directions or paths. The main function of a splitter is to connect a single device or signal source with multiple receiving devices.

Figure 11. *Splitter*

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3) USB cable

A USB (Universal Serial Bus) cable is a cable used to connect electronic devices to one another, usually for the purpose of transferring data or charging. USB in a variety of electronic devices, including computers, laptops, and more. The main functions of the USB cable include: data transfer, charging, connection of additional devices, audio and video and power settings.

Figure 12. USB Cable

b. Software

Software as a program command in a computer that when executed by a username will provide functions and perform as expected by the username. In other words, the software functions to give commands to the computer. The software used is:

Table 1. *Software* Design and Functions

***Software* Design**	**Function**
***Install Apache NetBeans* IDE 10**	As a data processor
Install MySQL	*Query* SQL (*Structured Query Language*) is for storing data
Install Java	Monitoring System Design Serial Programming Graphics Programming

.

3.4 Research Design

The discussion of the position of Performance The design of the research begins with designing a software and function, followed by the manufacture of hardware as explained in the research design as in Figure 13 below.

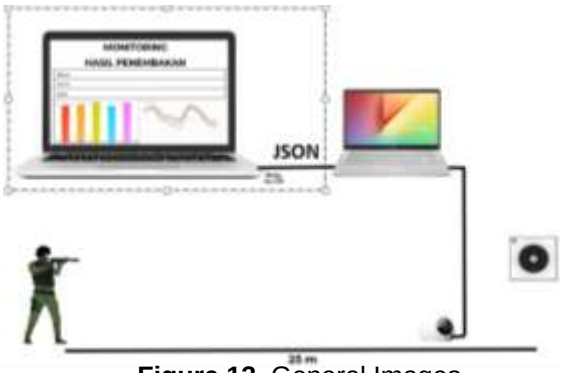

Figure 13. General Images

JSON data is customized to display the graph according to the path or lesan that has a username. The processed data is then formatted into a structure that can be used to create gauge-charts, line graphs, and bar graphs. Once the data has been formatted correctly, this step involves using graphs to display the results. This display can be used to achieve the user's achievement on a specified range. Furthermore, the last step of the completion action is that the data is stored through MySQL and the assessment results can be printed to present a report to the superior. In the research design as shown in Figure 14 below.

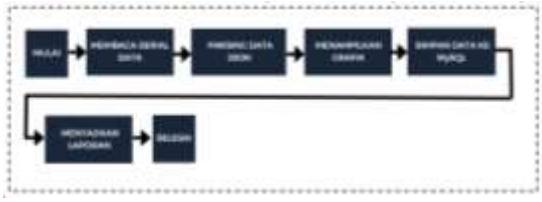

Figure 14*.* Monitoring System

3.5 Research Data Collection

The data collection method is a method that aims to find out what data must be used and how to use it which will later produce the final results in accordance with the research objectives. In the research, the results of automatic assessment on shooting shots for data collection were carried out by the Observation, Experiment and Documentation methods. Observation aims to pay attention to the phenomena that occur around during the research so that they can feel the response to the changes that occur to conduct an experiment or research sample of research data collection for automatic assessment results on shooting shots.

3.6 Data Processing

In the data collection method for valid and reliable sources of information, there are several stages of data collection.

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4. ANALYSIS AND DISCUSSION

4.1 Data Analysis

Data analysis as the first step in this research is to take data from the monitoring system. The results of this data analysis will later be used as input data in the system so that the data will later be presented in an application program monitoring the results of automatic assessment on the shooting range.

The purpose of data analysis is to describe the data so that it can be understood and drawn conclusions. Regarding the characteristics of the data to be retrieved from the device through serial communication. This is based on hypothesis testing.

4.2 Design

Design is a process that aims to analyze, assess, improve and arrange a system, both physical and non-physical systems that are optimal for the future by utilizing existing information. The purpose of general design is to provide a general or global overview to the user of the system to be developed and serves as preparation for the detailed design stage, where the general design of the system will identify components with the aim of communicating with the user. A good analysis will make it easier to complete the project, resulting in a system that configures the hardware and software, so that it can solve the problem to the maximum. The system to be designed is expected to be able to transmit secure data via JSON and be received in its entirety from the recipient's side. Figure 4.2 shows the design model of the system to be created.

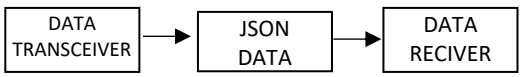

Figure 15. Monitoring System Design Model

The monitoring system design model consists of two main parts, namely the sender who will process the initial JSON data and send the data from reading the data series and also the receiver who is in charge of receiving the data and carrying out the decryption process to restore the original form of the data

5. CONCLUSIONS AND SUGGESTIONS

5.1 Conclusion

As for the results of this research trial, the following conclusions can be drawn:

a. Automatic assessment result monitoring system sent through communication series. The data is sent in a JSON data packet. The results of the automatic assessment will be parsed to get *username, score, date* and *ranking* data as well as the progress of the shooter.

b. The results of the design of the automatic assessment monitoring system on the shooting range are carried out by calculating the results and presenting a graph display in *real time.*

c. Overall, the study succeeded in achieving the goal of designing and building an effective and efficient automatic assessment result monitoring system to support the shooting training of the Kopasgat Force (Rapid Movement Force Command). Automatic assessment result monitoring system sent through communication series. The data is sent in a JSON data packet. The results of the automatic assessment will be parsed to get *username, score, date* and *ranking* data as well as the progress of the shooter.

b. The results of the design of the automatic assessment monitoring system on the shooting range are carried out by calculating the results and presenting a graph display in *real time.*

c. Overall, the study succeeded in achieving the goal of designing and building an effective and efficient automatic assessment result monitoring system to support the shooting training of the Kopasgat Force (Rapid Movement Force Command).

5.2 Suggestion

The suggestions from the author for this research are:

a. In the process of sending serial data to *Java*, it still uses a USB cable as a *transmission medium.* This is an opportunity so that in the future this research can be developed and refined again, especially in data *communication* access in *Java*, it can be tried to use *wireless* (WiFi) which can be installed around the shooting range area so that the use of this tool is more flexible and safer.

b. At this time, the researcher enters and displays 1 (one) shooter in the monitoring system application, then it is necessary to increase the number of shooters that can be displayed and the *hardware* tools provided are multiplied so that the needs of shooters can be improved in *real time.*

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