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DEVELOPMENT OF BASIC ABACUS LEARNING APPLICATION BASED ON ANDROID (CASE STUDI IN ASMA ABACUS ANTAPANI BANDUNG)

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ABSTRAK

Adil Abacus Mandiri (ASMA) is an educational institution abacus mental arithmetic largest in Indonesia that has been developing for 16 years since 2000 and has graduated thousands of students and scholars of Islam reliable counting with an abacus. The system applied learning in educational institutions Adil Abacus Mandiri is still to be face to face in a class room, the medium used is still using exercise books and ancient abacus.

From the foregoing, it is known that the ASMA require the development of learning systems that exist today in order to institute ASMA running stable even ahead of other institutions. ASMA also have other needs to add new learning media useful for helping students in the learning process ASMA or practice perform arithmetic calculations using the abacus-based android. Overcome the existing problems, the built-Based Applications Foundation Learning abacus Android, in which there is recognition feature abacus, how to use an abacus base by utilizing interactive tutorials, problem solving exercises, and exercises of the workmanship that has been done.

Based on the analysis and testing that has been done by involving the company ASMA, it can be concluded that the application is built easily understood, interesting, and fit for use by the ASMA to develop a learning system ASMA and help students ASMA in the process of learning and training perform arithmetic calculations using the abacus-based android.

Keywords: *Learning, Abacus, Android.*

1. PRELIMINARY

1.1 Background

Android is an operating system for Linux-based mobile devices that includes an operating system, middleware and applications. At this time most of the time-vendoor smartphone vendors already produce smartphones based on Android. This is because Android is open source and free platform, so freely distributed and used by any vendor [1]. The presence of a step forward in the world android mobile technology. With the android expected, users can develop or even create your own software for their own phones or gadgets.

Adil Abacus Mandiri (ASMA) is an educational institution abacus mental arithmetic largest in Indonesia that has been developing for 16 years since 2000 and has graduated thousands of students and scholars of Islam reliable counting with an abacus [2]. Application of Abacus use can establish an existing learners dibangku basic education can perform arithmetic calculations (plus, minus, multiplication and division) within a very fast time [3]. With the use of the abacus applied starting from early childhood could be a step forward in the development of learning arithmetic.

As time, the company ASMA require the development of a learning system that exists today, the basic abacus learning applications that help students perform arithmetic calculations easier, faster and precise. It is expected to have an impact on course institutions ASMA in order to run stable even ahead of other course institutions.

The process of exercises and examination of the workmanship matter is still done manually, the medium used is still in the form of paper media, books and abacus ancient, so the need for the addition of instructional media that help student of ASMA in the learning process or practice perform arithmetic calculations using the abacus , The company ASMA intends to have basic abacus learning applications with the availability of the executable file (apk) distributed to every pupil ASMA who have registered and must have Android Smartphone [2]. This is supported by the results of the analysis where users prefer operating system capable of running on the mobile brand are more varied compared with the only patented brand alone [4].

Based on the exposure that has been described, the researchers gave a solution which Abacus Basic Building Applications Android-Based Learning. In it there are features about the workmanship, the workmanship, the introduction of the abacus, how to

use the abacus, and the fundamentals of arithmetic by utilizing interactive animated tutorial.

1.2 Purpose and Objectives

1.2.1 Purpose

Based on the problems studied, the purpose of this thesis is to develop basic learning abacus-based applications in a fair android self abacus Antapani Bandung.

1.2.2 Objectives

The objectives of this research are:

1. Assist in developing a learning system in ASMA
2. Assist students in the learning process or practice perform arithmetic calculations using the abacus-based android.

2. RESEARCH CONTENT

1.1 Basis Theory

2.1.1 Abacus

The abacus is a calculating tool traditional history existed before the calculator is used, the shape of the rectangular box that contains beads in a certain amount. The shape of the abacus is on a vertical pole has only one seed is worth five in the top of the dividing line and there are four seeds worth units below the dividing line. Abacus arithmetic using the techniques faster [8].

2.1.2 Android

Android is an operating system for Linux-based mobile devices that includes an operating system, middleware and applications. Android provides an open platform for developers to create applications. Android is a new generation mobile platform, which provides development platform to develop as expected. Android application development is allowed to distribute their applications under the licensing scheme whatever they want. Most developers using eclipse provided free to design and develop android apps, android because it has a plug-in available to facilitate the development of android. In addition, the eclipse also received direct support from Google to become the Android application development IDE, as evidenced by the addition of plug-ins for Eclipse to create a project in which the android source software google directly from the official website [1].

2.2.3 Unified Modeling Language (UML)

Unified Modeling Language (UML) is a standard language for writing software modeling. UML can be used to visualize, specify, construct, and document-intensive parts of the software system [13].

The first version of UML allows people to communicate designs are not clear (unambiguous), conveys the essence of the design and even capture and map the functional requirements to find solutions to their software [14].

2.1.4 Construct 2

Construct 2 is an HTML5-based app maker tools developed by Scirra which is now called the Construct 2 Construct 2 is not a specific programming language, because all the commands used in the making of the application is set in a worksheet (Sheet Events) consisting of the Event and Action. To develop applications with Construct 2 users do not need to understand programming language is relatively more complex and difficult [15].

2.1.5 JavaScript Object Notation (JSON)

JSON (JavaScript Object Notation) is a lightweight data interchange format, readable and writable by humans, as well as easily translated and made (generated) by the computer. This format is based on part of the Programming Language JavaScript, Standard ECMA-262 3rd Edition - December 1999. JSON is a text format that does not depend on the programming language whatsoever for using a style that is commonly used by programmers family of C including C, C ++, C # , Java, JavaScript, Perl, Python etc. Because of these properties, making it ideal as a JSON-language exchange of data [19].

2.1.6 PhoneGap Cordova

PhoneGap is an open source development tool created by Nitobi who serves as a liaison between HTML-based applications and mobile based applications. PhoneGap works by combining HTML5 Canvas and JavaScript. Currently PhoneGap supports multiple leading mobile device operating system, namely Android, iOS and Blackberry. Making applications more efficient by using PhoneGap due simply use HTML5, Canvas and JavaScript for applications on Android, iOS and Blackberry [15].

2.2 Analysis

2.2.1 Introduction of Applications

Applications built application called Android-Based Learning Basics Abacus. Application departing from the needs of the company ASMA who wants to build an android-based application abacus. This app comes about from an exercise book ASMA customize each stage different level. Applications do not use the Internet and these applications are used by students who have android smartphone ASMA.

2.2.2 Storyline

Storyline of application basic learning abacus-based android that tells the story of app users perform charging name and unit for later displayed

at the time of the end result of workmanship matter of using the abacus, then the user performs a prayer before studying, before doing arithmetic user can select menus displayed on the main menu, in which there is free mode menu, start doing the calculations, see the tutorial, and see the results of the work that has been done about. On the menu are free, users can use the abacus can digerak move freely without calculating in advance, menu tutorial is used as a medium for the introduction of the abacus, how to use the abacus and how to perform peritungan arithmetic using the abacus, the start menu is displayed menu select level, level is 1 to 10, about the show is set the level of difficulty adjusting to the resources taken from the book ASMA, then the user can work on the problems of arithmetic calculations using the abacus-based android, in which there are doing the calculations as addition, subtraction, multiplication, and division. After work on the problems users can see the direct results of the answers that have been done, and the results of these answers can be seen again on the set of results that are useful to see the development perform arithmetic calculations using the abacus whether it is better or not.

2.2.3 Level Difficulty

In-App Android-Based Foundation Learning abacus is there are different types of levels of difficulty are divided at certain levels, starting from level 1 to level 10, about the displayed also vary. The following explanation of the level of difficulty of each level is used:

Tabel 1 Task Level Difficulty

No	Difficulty	Keterangan
1.	Level 1	At level 1 a matter of calculation shown is a matter of addition and subtraction, the line numbers are summed calculation is 3 rows of numbers.
2.	Level 2	At level 2 about the calculation shown is a matter of addition and subtraction, the line numbers are summed calculation is 4 rows of numbers.
3.	Level 3	At level 3 a matter of calculation shown is a matter of addition and subtraction, the line numbers are summed calculations are six rows of numbers.
4.	Level 4	At level 4 matter of calculation shown is a matter of addition and subtraction, the line numbers are summed calculation is 10 rows of numbers.
5.	Level 5	At level 5 a matter of calculation shown is a matter of addition and subtraction of one and two digit numbers, line numbers are summed calculation is 4 rows of numbers.
6.	Level 6	At level 6 matter of calculation shown is a matter of addition and subtraction of two-digit numbers, line numbers are summed calculation is 3 rows of numbers.
7.	Level 7	At level 7 about the calculation shown is a matter of addition and subtraction of two-digit numbers, line numbers are summed calculation is 4 rows of numbers.
8.	Level 8	At level 8 a matter of calculation shown is a matter of addition and subtraction of two-digit numbers, line numbers are summed calculations are six rows of numbers.
9.	Level 9	At level 9 about calculation shown is multiply two-digit numbers by one-digit numbers.
10.	Level 10	At Level 10 about calculation shown is about the distribution of two-digit numbers by one-digit numbers.

2.2.4 Assessment Results

On the Application Foundation Learning abacus Android-Based are some aspects of the assessment are shown, which are as follows:

1. Assessment of the answers of questions that are answered, if the answer is entered using the abacus-value "True" or "False", then the end result will be displayed about the number, the correct answer, the answer to that question is answered worth "True" or "False ".
2. Assessment of the processing time, the end result will be displayed at the time how long a user performs a matter of workmanship.

2.2.5 Analysis Data Needs

Tabel 2 Data Needs

No	Data Name	Function	Format Data
1.	Text	Contains the text data information	.ttf .json

		user name, title menu, matter as well as the final results are displayed on the application.	
2.	Image	Contains information data images on the application	.png
3.	Animation	Contains information running animation data from any existing tutorial on the application	.gif
4.	Sound	Contains information voice data or music that exist in the application.	.m4a

2.2.6 Use Case Diagram

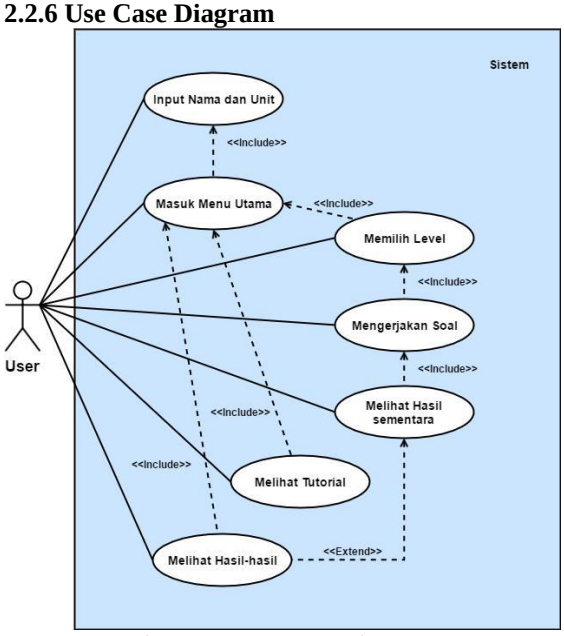


Figure 1 Use Case Diagram

Table 3 Definisi Use Case

No	Use Case	Deskripsi
1.	Input Name and Unit	Fungsional untuk input name and unit User.
2.	Login Main Menu	Fungsional to view and select the main menu on the system
3.	Memilih Level	Fungsional to select the level on level 1 to level 10.
4.	Seeing Tutorials	Fungsional to view a tutorial introduction to the abacus, how to use the abacus, addition, subtraction, multiplication and division.
5.	Working Problem	Fungsional to work on the problems that are displayed using the abacus-based android.
6.	Seeing Provisional Results	Fungsional to see the results of the work that has been done before.
7.	Seeing Results	Fungsional to see the results of workmanship questions that have been done before.

2.2.7 Activity Diagram Input Name dan Unit

This process occurs when users start using the application basic learning abacus. The following are described in the Figure below:

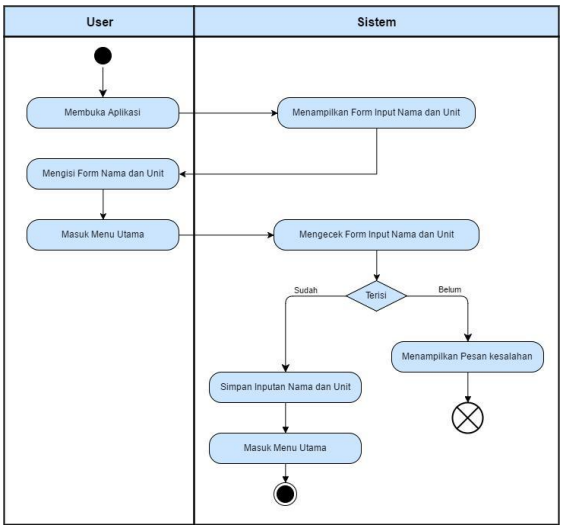


Figure 2 Activity Diagram Input Name and Unit

2.2.8 Sequence Diagram Input Name dan Unit

The following sequence diagram Figure of input names and units is:

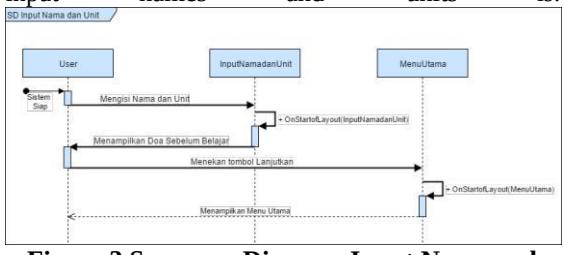


Figure 3 Sequence Diagram Input Name and Unit

2.2.9 Class Diagram

Class Diagram of the construction of basic abacus learning application based on Android are as

follows:

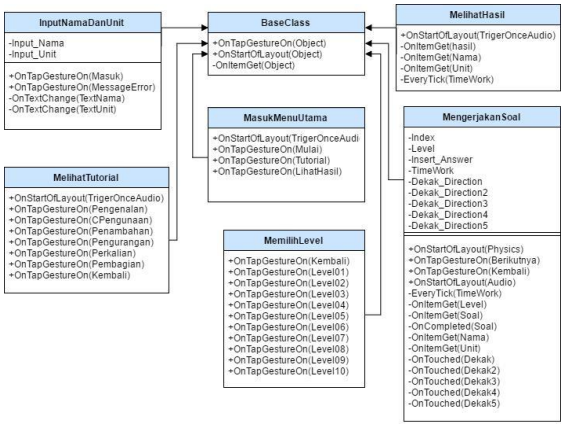


Figure 4 Class Diagram

2.3 Result of Research

1. Display Input Name and Unit

Interface input name and unit containing the corporate logo and identity of its own application form and contains the charging unit to fill in the name and identity of the user.

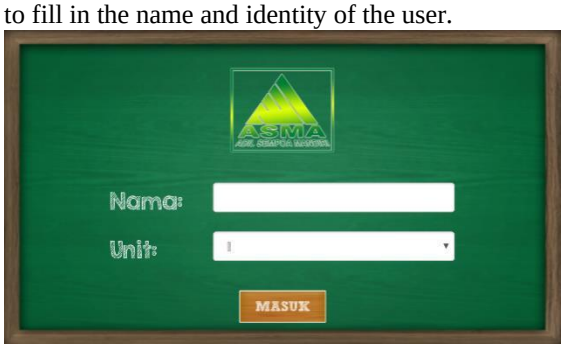


Figure 5 Interface Input Name and Unit

2. Display Prayer Before Study

Interface prayer before study contains a prayer before learning and translation



Figure 6 Interface Prayer Before Study

3. Display Main Menu

Interface the main menu contains the menu selection is a menu-free mode, start, tutorial and see the workmanship matter.



Figure 7 Interface Main Menu

4. Display Free Mode Menu

Interface free mode menu contains an abacus and a description of the numbers on the bottom row abacus, free menu useful to practice using the abacus freely without any display of questions in advance of testing capabilities.

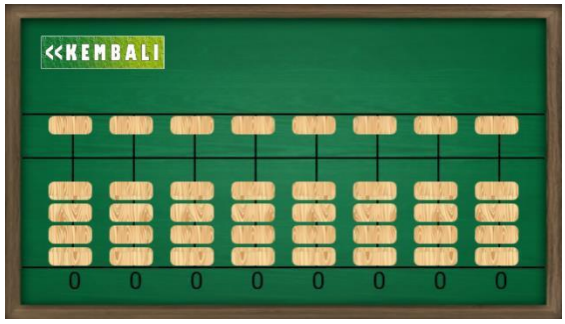


Figure 8 Interface Free Mode Menu

5. Display Menu Select Level

Interface menu select level contains selection level from one to 10 in a matter of doing the work.



Figure 9 Interface Select Level

6. Display Working Problem

Interface working problem contains an abacus, matter, and time in doing the work of practice questions using an abacus.

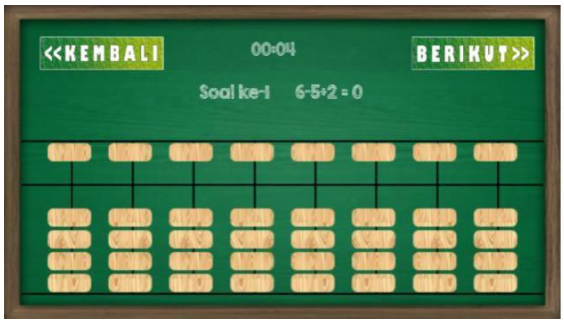


Figure 10 Interface Working Problem

7. Display Provisional Results

Interface provisional result contains as well as the name of the user units, the total processing time, the number of questions, questions that shown earlier, the correct answer, an answer that was answered by the user, and information answers answered by the user whether right or wrong is worth.



Nomor	Soal	Jawaban Benar	Dijawab	Hasil
1	6+5+2	3	0	salah
2	5+2+6	1	0	salah
3	6+3+6	3	0	salah
4	7+2+7	2	0	salah
5	5+2+7	0	0	benar
6	7+1+6	2	0	salah
7	8+1+8	1	0	salah
8	5+3+8	0	0	benar

Figure 11 Interface Hasil jawaban Sementara

8. Display Menu Tutorial

Interface menu tutorial contains abacus tutorial introduction, how to use the abacus, arithmetic addition, arithmetic subtraction, arithmetic multiplication, and division arithmetic calculations.



Figure 12 Interface Menu Tutorial

8. Display Menu Seeing Result

Interface seeing result contains the results of workmanship questions that have been done by the user are stored on the menu see results.



Figure 13 Interface Menu Seeing Results

2.4 Software Testing

2.4.1 User Acceptance Test (UAT)

User Acceptance Test A formal testing performed in connection with the user's needs, requirements, and business processes that aim to determine whether the software is built already meet or acceptance criteria and to enable a user, customer or other entity that is authorized to determine whether software is already eligible received or no [20].

2.4.2 Test Case Design

test case design environment builders held by a group of users to perform multiple tests on the basis of an abacus learning application based on Android. The builder (developer) assist and record any errors or problems experienced by users of the application.

The test methods contained in the test test case of this design is the use of black box testing method, because the black box testing focuses on the functional requirements of the software and tried to find the functions that are incorrect or missing, find fault with the interface, found errors in the data structure or access to external databases, as well as errors in the application program performance tested [21].

2.4.3 Alpha Testing

Based on the results of application testing has been done it can be concluded that the Application Foundation Learning abacus-Based Android built already running as expected and accepted by the users of the application, of it to maintain and care for applications that face-accepted and used by the user, it will be done further development and maintenance of the applications Android-Based Learning Basics Fair Abacus Abacus Mandiri.

2.4.3 Beta Testing

Beta testing is done the user environment, this test is a direct environment of real users. Users make an assessment of the application, the methods used were interviews and questionnaires, interview method done only with the company, while the method of questionnaires carried out by the actual application users or students abacus fairly independent. From interviews and questionnaires

was then conclude whether the application has been built in accordance with tujuaan or not.

Based on data obtained from the results of the questionnaire research that has been done before, it can be searched percentage of answers by using the following formula:

Y = P/Q x 100

% Information:

P = The number of respondents answer question Q

= Number of questionnaire respondents

Y = The percentage value

Based Beta Testing has been done before by using interviews and questionnaires, it can be concluded as follows:

1. Application basic learning abacus-based android ASMA interesting to use.
2. Application of basic learning abacus android based ASMA easily understood in its use.
3. Material abacus given to the user is easy to do and understood by users.
4. Application of the basic learning abacus-based android ASMA helps the user in viewing the matter directly workmanship done and help review the user's ability to perform calculations using the abacus-based android.
5. Application of basic learning abacus-based android ASMA assist the user in terms of learning outside the hours of tutoring.

3. CLOSING

3.1 Conclusion

Based on the results obtained in the research and thesis preparation Application Development Foundation Learning abacus Android-based well adapted to its purpose, it could be concluded as follows:

1. Application Foundation Learning abacus-based Android built mostly been representing the features to meet user needs and requirements to develop a learning system in Adil Abacus Mandiri (ASMA).
2. Application Foundation Learning abacus-based Android built mostly been representing features the addition of instructional media Adil Abacus Mandiri (ASMA).

3.2 Suggestion

FoundationLearningApplicationsbuilt Android-based Abacus is the first android application development in Fair Abacus Mandiri. The author realized, in spite of the advantages of a soft perangakat surely there are deficiencies, and therefore for the development of further applications, suggestions that will be presented are as follows:

1. Improving the quality of the user interface more interactive applications.
2. Improving the quality of questions displayed as well as take advantage of the limited time feature in workmanship matter.
3. Developing an application into an online application that can be used by other users outside the institution pupil Adil Abacus Self useful to introduce educational institutions abacus Abacus Fair Mandiri (ASMA).

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