DEVELOPMENT OF "SALA RANGER" GAME AS A MEDIA EDUCATION OF ENDEMIC ANIMALS RESCUE IN WEST JAVA

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ABSTRACT

Endemic species is the species which naturally inhabits a region and makes that region has a unique characteristic. The extinction of animals in wildlife can be caused by natural factor and human factor, one of the most dangerous factors is the hunt for endangered species. This can happen because of the lack of information about wild animals that are protected by the government, and endemic animals are one of them. So that a media is built in the form of a game called "Sala Ranger". Hopefully, this game can give a better information about endemic animals. As for the given contents are the identification of endemic animals, the complete information about endemic animals, and the simulation of endemic animals rehabilitation. This game consists of three gameplay, that is adventure stage, side-scrolling for rescue mission stage, and drag and drop for simulation of endemic animals rehabilitation in west java. Based on the conducted test of the game, it turns out that "Sala Ranger" Game can give a better information about endemic animals in a more attractive way so that the player can get a better understanding about endemic animals that live in West Java.

Keywords: Games, Education Games, Animal Rescue Games, Endemic Animal in West Java, Animal Rescue

1. INTRODUCTION

Endemic species naturally inhabit a region and making the region has a characteristic [1]. West Java has some kind of endemic wildlife that cannot be found in other regions although in some species the species can be found in other regions. According to data of the BKSDA (Conservation of natural resources) of West Java, there are several endemics in West Java are endangered due to poaching and trade of wild.

The cause of the extinction of wildlife in addition to natural factors there are also economic factors caused by the community such as wildlife hunting, trade endemic in West Java. According to the Non-Profit Organization by PRO FAUNA an international scale in the year 2015, there are about 200 complaints report poaching wildlife, and nearly 90% are complaints related to wildlife poaching uploaded to social media [2].

An addition to economic factors, the lack of public knowledge regarding wildlife information-endemic also affects the level of hunting and trade in wildlife endemic will affect existing populations of endemic wild habitat, and also affect other forest ecosystems. According to the conservation officers as Supreme in the IAR (International Animal Rescue) says that the Government only provides the information with the media and written slogans animal rescue that makes the information less attractive and cause not until the circulation of information among the public.

In the concept of learning according to Edgar Dale, a man given 10 percent of they read, 20 percent of which they had heard and 30 percent of they see, people will also be given 50 percent of learning if it has a role in learning [3]. to accommodate all the aspects that exist in the application of human understanding in order to be given quickly learning the views then used a media form of the game.

Based on the results of a questionnaire submitted to the community online that its spread through social media and is completed by 80 people respondents is obtained that 60 percent of the respondents know about the endemic. But 90 percent of the respondents said that the lack of information about endemic in West Java and 100 percent respondents agree with the building of a game as a medium that can provide information and education about the endemic in West Java.

To assist the Government in providing knowledge to the community about the importance of maintaining the sustainability of

wildlife-wildlife, then needed a medium that can provide information and education with a more exciting themed "development Game RANGER "SALA" As Media Education Animal Rescue Is Endemic In West Java ".

1.1 Goal and Purpose

Based on existing problems then the intent of the development of this software is to help the community get to know, get information and education related to endemic which is in West Java.

As for the goal that will be achieved from the development of this software are as follows :

a. provide information and insights about the wildlife-endemic which is in West Java in order for the community to be able to help the Government preserve wildlife-endemic.
b. Provide a medium that can be introduced providing complete information on wildlife as well as educate the public about the importance of keeping wildlife-endemic in West Java in the form of a game.

1.2 A Method of Software Development

In the software development game "Sala Ranger" software development method using MDLC (Multimedia Development Life Cycle) version of the Luther – Sutopo which consists of 6 stages namely, concept, design, collecting material, assembly, testing, and distribution as shown in Figure 1 [4].

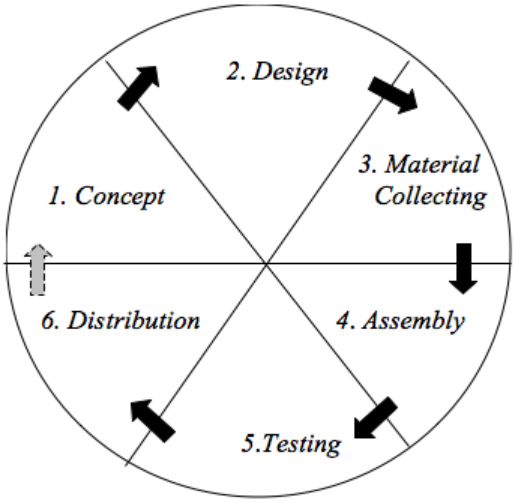


Figure 1 MDLC Luther – Sutopo Method

2. CONTENT OF RESEARCH

2.1 Theoretical Basic

The cornerstone of the theory of the construction of the software game "Sala Ranger" outlines the basic theories for process systems analysis and software development process support game Ranger "Sala".

2.1.1 Game

The game is an entertainment multimedia games made as attractive as possible which use electronic media as the media play it. Interactive Video Game was first discovered by Ralph Baer in 1966. In 1988 developing games with dominated by company Nintendo and Japan continues to evolve with the goal to many devices such as Personal Computer Games, Console Games, and Online Games. In addition to this game is distinguished into several genres that is action, adventure, action-adventure, RPG (Role-playing Game), Simulation, Strategy, Sports, Idle Games [5].

2.1.2 Trigger Detection Method

Trigger detection methods commonly used to drive the NPC (Non-Player Character) in traffic simulation game. This method utilizes sensors trigger or trigger that will detect the presence of other objects around the object that paired sensors trigger. The mechanism of the use of this method is to put some sensors around the objects NPCs and when the sensor is in contact with other objects then the sensor will send commands to the NPC to move or to do action [6].

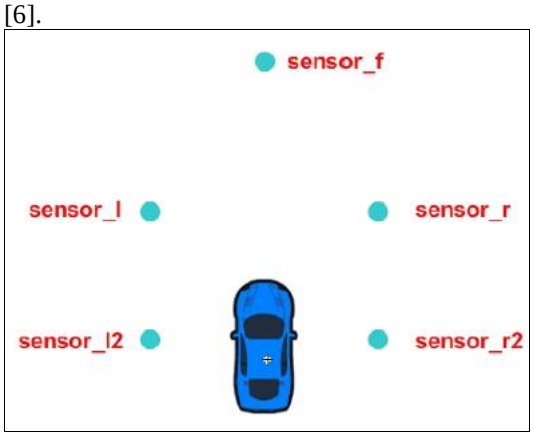


Figure 2 Trigger Detection Method

2.1.3 Collision Detection Method

A method of collision detection is the process of collision detection or collision between two or more objects. This method is used as the supporter of the method trigger detection that will drive the NPC (Non-Player Character).

A method of collision detection functioning as a trigger of an action that will be performed by the software to be built [7].

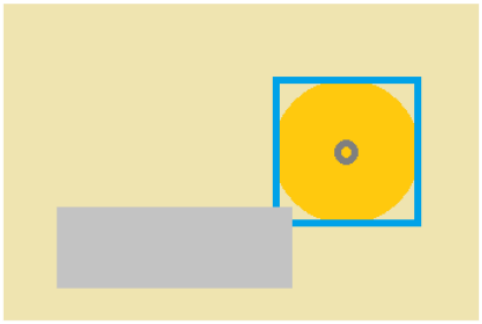


Figure 3 Collision Detection Method

2.2 System Analysis

System analysis can be defined as the description of a system or software application that will be built into parts of its components with a view to identifying and evaluating problems as well as the expected needs.

2.2.1 Analysis of the problem

Based on the results of the research that has been done, there are some problems occurred so that the building of this system are as follows :

a. lack of knowledge and insight about the information society-endemic wildlife that existed in West Java.
b. the need for a medium that can introduce and provide information as well as provide education regarding the importance of maintaining the existence of wildlife-endemic in West Java.

2.2.2 Analysis of system architecture

Analysis of system architecture is the design of the system from application software game "Sala Ranger" as a media educational animal rescue is endemic in West Java.

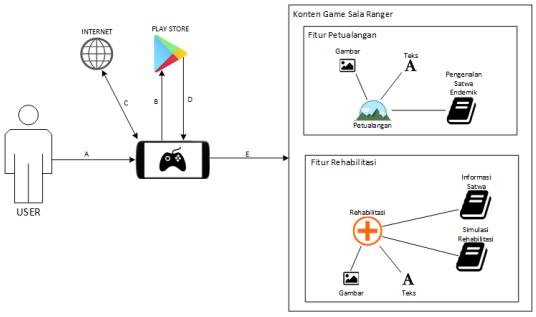


Figure 4 System Architecture

The following is a description of the architecture of the system game "Sala Ranger" as a media educational animal rescue is endemic in West Java.

a. Users access the Android smartphone
b. Smartphone connected to the internet.
c. The user uses the smartphone to access the play store and download the application “Sala Ranger”.
d. After the download s complete, a user can play the games on their smartphone.
e. In-game “Sala Ranger", there are two features that are Adventure and Rehabilitation.

2.2.3 Material analysys of Endemic Animal

Wildlife game discussed in the "Sala Ranger" is endemic in West Java are most often hunted and traded by the public. Now here is a wildlife-endemic which is displayed in the software application game "Sala Ranger".

Table 1 List Of Endemic Animal

No	Name	Scientific Name
1	Kukang Jawa	*Nyctivebus bartelsi*
2	Owa Jawa	*Hylobates moloch*
3	Surili	*Presbytis comata*
4	Macan Tutul	*Panthera pardus*
5	Kucing Bakau	*Prionailurus viverrinus*
6	Elang Jawa	*Nisaetus bartelsi*

2.2.4 Material Analysis of Rehabilitation

Rehabilitation material endemic on application software game "Sala Ranger" is divided into two phases, namely screening and Habituation Cage. Where the inspection is carried out to identify the scars or ailments suffered by the endemic wildlife-and Cage Habituation is done for giving a simulation of how to rehabilitate endemic in West Java.

The following is a table of analysis wildlife rehabilitation material-endemic which is in West Java.

Table 2 Animal Health Screening Material

No	Type of Animal	Examination
1	Kukang Jawa	-Gunshot Wounds -Broken Bones -Broken Teeth
2	Owa Jawa	-Gunshot Wounds -Broken Bones -Fur Loss
3	Surili	-Gunshot Wounds -Broken Bones -Fur Loss
4	Macan Tutul	-Gunshot Wounds. -Broken Bones. -Physical Disabilities. -Virus Infection. -Teeth Missing.
5	Kucing Bakau	-Gunshot Wounds. -Broken Bones. -Physical Disabilities. -Virus Infection.

No	Type of Animal	Examination
		-Teeth Missing.
6	Elang Jawa	-Gunshot Wounds. -Broken Wing Bones. -Physical Disabilities. -Broken Beak

Table 3 Habituation Cage Material

Tahapan	Keterangan
Cage Habituation	Animals that have been examined his physical health conditions will be placed on habituasu or cage enclosures are made to restore the mental of the wildlife in order to return to its natural habitat. Phase feeding is done in accordance with the active time of fauna and wildlife monitoring.

2.2.5 Analysis of Game Genres

Genres in the game "Sala Ranger" will have the action-adventure genre that later players will do the adventure and action to save wildlife-endemic and beat the hunters.

2.2.6 Analysis of Gameplay

Game "Sala Ranger" will have three different types of gameplay i.e. Adventure, Side-Scrolling and Drag and Drop

a. using on Adventure Game Play features of adventure where players will find information with wildlife walk around folders.
b. the Game Play Side-Scrolling action features used in animal rescue missions in which the player has to rescue the endemic wildlife was hunted by hunters and defeated the Hunter.
c. Game Play Drag and Drop feature used in rehabilitation where players will rehabilitate wildlife-animals that have been successfully saved.

2.2.7 Analysis Rules of The Game

Game "Sala Ranger" will have a six-stage rescue mission and one stage adventure. Analysis of the rules of the game is done to find out what the rules will be applied in software applications that will be built.

a. the player can only select stage are already available or open, if the stage is not yet available then the stage is still locked.
b. When players are on the adventure gameplay so the player is required to approach the NPC gatekeepers to get permission to enter the area of conservation.
c. when the player is in the conservation area players are required to approach the NPC guards conservation area to get some information from the animals will be saved and get the mission animal rescue.
d. When players already getting animal rescue mission then the player will be directed to a side-scrolling gameplay.
e. early in the game, the player side-scrolling gameplay has 3 lives.
f. When the player is hit by falling to traps and exposed to gunfire from the Hunter then the lives of the players will be reduced 1.

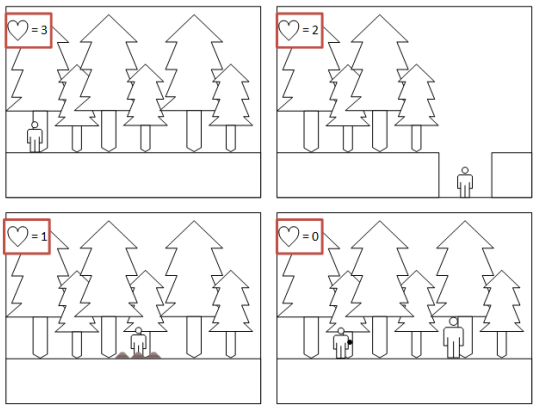


Figure 5 Side-Scrolling Rules

g. When the player runs out of lives then the player character will die and appear the display game over

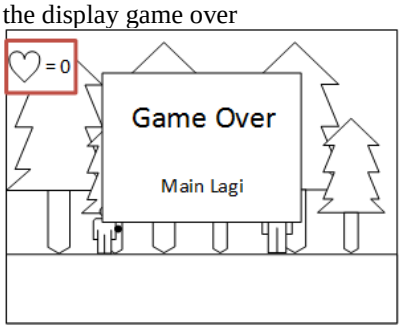


Figure 6 Game Over

h. Hunter has blood bar where will diminish ¼ if hit by the main characters.
i. the Hunter will be lost if blood runs out of the bar or the hunter was shot four times by the main characters.

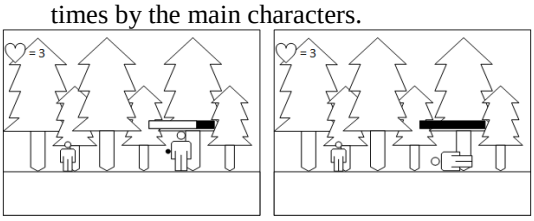


Figure 7 The Hunter Lost

j. When hunters have lost then it will appear in a pop-up menu to go to rehabilitation and when players have managed to save wildlife animal information in full and simulation wildlife rehabilitation will open.

k. When the player will rehabilitate wildlife then aka tone several indicators that must be observed by the player when rehabilitating wildlife. As for the following are some indicators that must be observed.

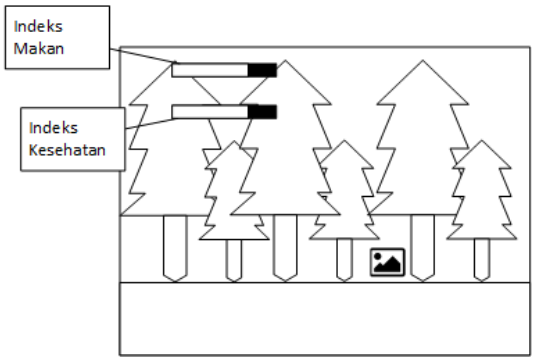


Figure 8 Rehabilitation Indicator

l. The beginning index of a meal will be started from 0 which means that the wildlife in conditions of hunger and health index will be started from 20th which means bad health.

m. Food and wellness Index Index will increase when the animals eat the food.

n. Health Index will be reduced when animals excrete feces and restart will increase when the dirt cleaned.

2.3 Non Functional Requirements Analysis

Non-functional requirements analysis is an analysis that is used to find out the system requirements specification. As for the non-functional needs analysis consists of hardware requirements, software requirements, as well as the analysis of the user.

2.3.1 Analysis of Hardware Requirements

The following are the hardware requirements of the software applications that will be built. As for the following hardware specifications are widely used by the community:

Table 4 Specifications of the hardware community

Perangkat Keras	Kebutuhan Mnimal
RAM Memory	2 GB
Storage	8 GB
Screen	5 inch

While the specifications of the hardware needed to run the applications that will be built is as follows:

Table 5 Minimum Hardware Specifications

Perangkat Keras	Kebutuhan Mnimal
RAM Memory	1 GB
Free Storage	500 MB
Screen	4 inch

2.3.2 Analysis of Software Requirements

The following are the software requirements of software applications that will be built. As for the following software requirements specification is required to build software applications.

Table 6 Specification of Software Development

Perangkat Lunak	Spesifikasi
Operating System	*Windows 7 Ultimate SP 1*
Character Creation Tools	*Game Character Hub v.2.5.4*
Tools Asset Maker	*Adobe Photoshop CS6, Adobe Illustrator*
Game Maker Tools	*Scirra Construct 2 v.1.0.227.0*
Supporting Tools	*Intel XDK, PhoneGap*

While the specification of software requirements needed to run the applications that will be built is as follows:

Table 7 Minimum Software Requirements

Perangkat Lunak	Spesifikasi
Operating System	*Android V 4.4.2* (Kitkat)

2.3.3 User Requirement

Analysis of the users intended to see what is needed by the user that will be using a software application to be built, but the following are the parameters of the potential users of the applications are categorized into 2 parts knowledge and experience as well as the characteristics of the user.

a. Knowledge and User Experience

Table 8 Knowledge and User Experience

Knowledge and User Experience	
Android Knowledge	Can operate the basic of android
Experience of System	Understand the application installation
Aplication Experience	Can use common application on android
Reading Ability	Can read well and properly
Language Capabilities	Indonesian

b. User Characteristics

Table 9 User Characteristics

User Characteristics	
Age	13 years old
Gender	Male and Female
The use of hand	Both in good condition
Disability	No

2.4 Functional Requirement Analysis

A functional needs analysis conducted to know the description of the process activities which will be implemented in the software applications that will be built. On this analysis using UML modeling (Unified Modeling Language).

2.4.1 Use Case Diagram

Use Case Diagram is a model that shows the look of the system from the perspective of the user so that it can describe what the system will do without explaining how the system does it describe the [8]. Now here is a Use Case Diagram in the game “Sala Ranger”

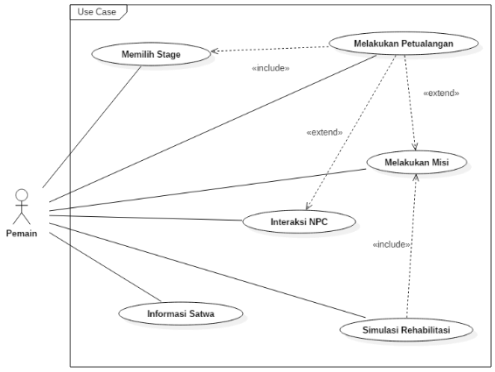


Figure 9 Use Case Diagram

2.4.2 Class Diagram

Class Diagram serves to show the static features of the system and not represent a specific process. Now here is a class diagram of the game "Sala Ranger".

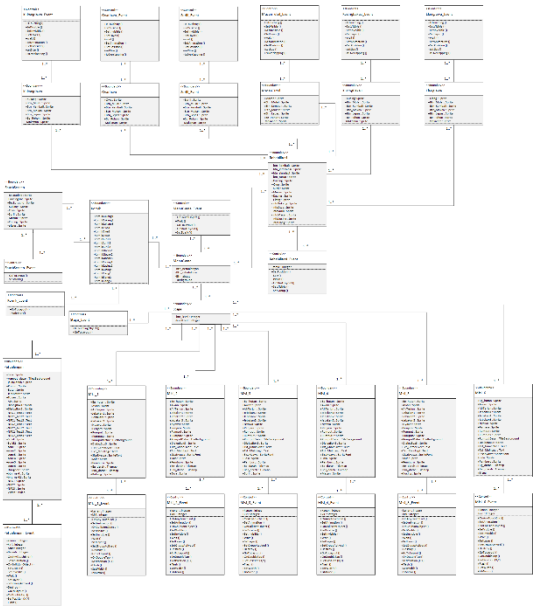


Figure 10 Class Diagram

2.5 Design of The System

The design of the system is an overview of the design and manufacture of the applications will be built, the design of application divided four IE: Menu structure, Designing Interfaces, Semantic Networks and the design Method. Now here is the menu Structure of the game "Sala Ranger".

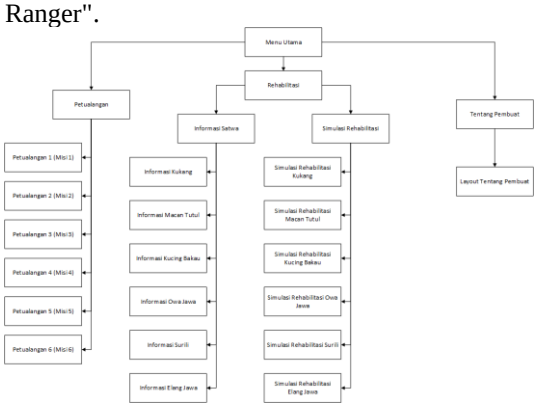


Figure 11 Design of The Menu Structure

Menu from the game "Sala Ranger" consists of three main menus i.e.: adventure, rehabilitation, About applications and two submenus in the menu are rehabilitation and Wildlife Rehabilitation Simulation Information.

2.6 Implementation of Interface

Interface implementation is done by taking a picture of an application that has been built where each image would represent the overall application has been built.

2.6.1 Implementation of SplashScreen Interface

Implementation of the splashscreen interface is :



Figure 12 SplashScreen Interface

2.6.2 Implementation of Animal Comic Interface

Implementation of animal comic Interface is :

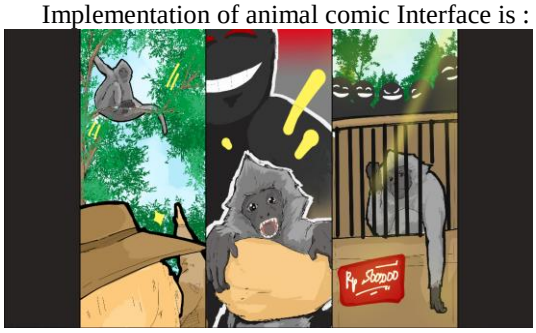


Figure 13 Animal Comic Interface

2.6.3 Implementation of Main Menu

Implementation of Main Menu Is :



Figure 14 Main Menu Interface

2.6.4 Implementation of Select Stage Interface

Implementation of select stage interface is:

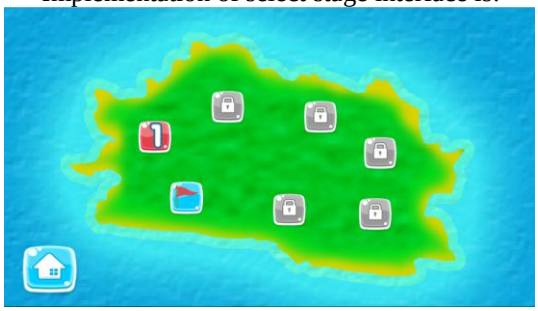


Figure 15 Select Stage Interface

2.6.5 Implementation of Adventure Interface

Implementation of Adventure Interface is :



Figure 16 Adventure Interface

2.6.6 Implementation Rescue Mission Interface

Implementation Rescue Mission Interface is :



Figure 17 Rescue Misson Interface

2.6.7 Implementation of Against Hunters Interface

Implementation of Agains Hunter Interface is :

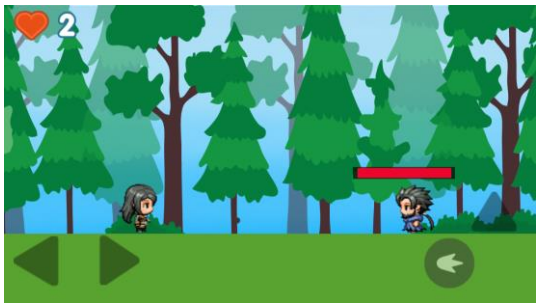


Figure 18 Against Hunter Interface

2.6.8 Implementation of Animal Information Interface

Implementation of Animal Information Interface is :

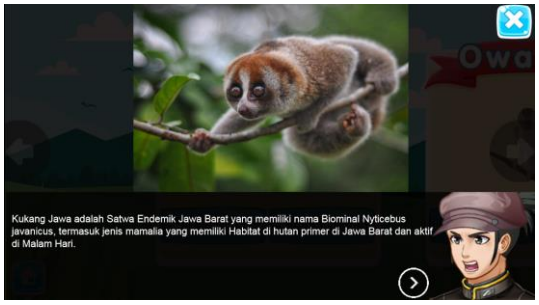


Figure 19 Animal Information Interface

2.6.9 Implementation of Simulation Rehabilitation Interface

Implementation of simulation rehabilitation interface is :

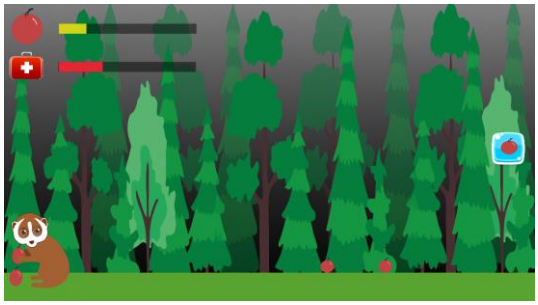


Figure 20 Simulation of Rehabilitation Interface

2.7 Testing System

System testing done to find out if the application has been built can be run. As for in testing system using three techniques testing i.e. functional testing, performance testing, and beta testing.

2.7.1 Functional Testing

Functional testing is done to see if the functionality has been designed already running or not, but here is a scenario testing functional testing.

Table 10 Testing Scenario

No	Functional	Testing Method
1	Selecting Stage	*Black-Box*
2	Do The Adventure	*Black-Box*
3	Do The Misson	*Black-Box*
4	NPC Interaction	*Black-Box*
5	Animal Information	*Black-Box*
6	Simulation of rehabilitasion	*Black-Box*

A. Case and Test Result

The Case tested staging is choosing who represent the overall testing select stage.

Tabel 11 Select Stage Test

Action	Expected Results	Test Results	Description
Selecting Stage 1	Display Stage 1	Succesful display of stage 1	Succes

B. Test Conclusions

Based on the overall functional testing done there were no errors and mistakes and all functional can be run well.

2.7.2 Perfomance Testing

Performance testing was done using the third application assistance i.e. GameBench [9], as well as the results of the assessment were taken from an average FPS from any smartphone that has paired game "Sala Ranger".

Following are the results of the calculation of the average of the testing that has been done to the three android smartphone namely the Samsung C7, Xiaomi Redmi Note 4 and Asus Zenfone 5.

Table 12 Performance Testing Result

RAM	CPU	GPU	FPS
257 MB	12%	41%	45 fps

After going through stage performance testing using the GameBench application assistance then mobilising that the average FPS game "Sala Ranger" is 45 frames per second and if it refers to the penilatain of the GameBench itself brings about that game Ranger "Sala" located on the category of Smooth Performance.

2.7.3 Beta Tesing

Beta testing is done by way of disseminating a questionnaire to respondents to the appropriate target users who've designed before, and the questions asked are the questions referring to the research objectives to be assessed whether the making of game application "Sala Ranger" to resolve the issue that is occurring or not. Now here is a scenario assessment of beta testing which consists of a list of questions to which users are taken using the technique of sampling snowball with the number of respondents 15 people as well as the weighting of assessment questionnaires that have been filed with the using the Likert scale

A. Likert Scale Assessment Scenarios

To conduct the assessment of the answers to the questionnaire using Likert scale was used the following formula :

$$I = \frac{\sum s}{Jumlah\ Responden}$$

The above formula is used to calculate the interval of each answer obtained from the respondents, while for interval judgments used are as follows:

Table 13 Liker Scale Interval

CATERGORY	WEIGHTS	INTEVAL	CONCLUSION
No	1	0 – 0,99	Not Reached
Enough	2	1 – 1,99	Sufficiently Achieved
Yes	3	2 – 2,99	Reahed

B. Result Of The First Objective Assessment

Based on the results of the calculation of the first objective questionnaire is obtained that the average value of an assessment questionnaire first goal is 2.69 and is in the category

"Achieved". Taken from each value of each question that consists of 4 questions covered.

C. Result of The Second Objective Assessment

Based on the results of the calculation of the second objective questionnaire is obtained that the average value of an assessment questionnaire the second objective is 2.96 and is in the category "Achieved". Taken from each value of each question that consists of 4 questions covered.

D. Conclusion of The Beta Testing

Based on the results of beta testing is done using question form (questionnaire) which was presented to the 15 respondents using the method of sampling snowball with the age range of 13 years and under.

Obtained for testing the first purpose of the respondents said that the game "Sala Ranger" has provided information and insights about the wildlife-endemic which is in West Java with reference to the results of the average value of the interval on each question with conclusions "Reached", and for the purpose of testing the two respondents said that the game "Sala Ranger" can educate the public to keep wildlife-endemic which is in West Java with reference to the results of the average value of the interval on each question with the conclusion "Reached".

3. COVER

3.1 Conclusion

Based on the deliberations of the analysis, design, implementation and testing phase there are some conclusions from the development of the game "Sala Ranger" as a media educational animal rescue is endemic in West Java. As for the conclusion of the results of this research are as follows:

a. Development game Sala Ranger can provide information and insights about the wildlife-endemic which is in West Java.
b. Development of games can provide educational Ranger Sala to society to maintain endemic in West Java.

3.2 Suggestion

The authors are aware of the proposed software development is still far from perfect and not optimal said in the application, therefore there are some suggestions that can be made into consideration in its development. As for the advice given in order that the system can be built for the better of which are:

a. Maximizing the delivery of education in the rehabilitation of the simulation features are limited due to the lack of data sources how to rehabilitate wildlife since it must be collected from each region conservation rehabilitation endemic that exists in Java-West.
b. the test insufficient due to the limited time in finishing the writing, making retrieval conclusion against beta testing a society has a very large population became difficult.
c. work closely with animal rescue or community forums so that the data required for the delivery of education regarding the activanity.

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