THE DEVELOPMENT OF VIRTUAL APPLICATION BALINESE GAMELAN BASED ON ANDROID

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ABSTRACT

Balinese Gamelan is Balinese art that must be preserved by the people of Indonesia, it is playing together usually. Lack of the means to play the gamelan music of Bali, it cannot to play the gamelan music of Bali. Maha Ganesha Gotra (MGG) is a unit of arts that focuses to art dance and tabuh, it suffered to connect the constraint means exercise that caused by a limited schedule and the distance. Therefore, it developed an application virtual Balinese Gamelan based android provides a means to play the gamelan of Bali and it helps the members of MGG to practice playing the Balinese Gamelan outside to workout schedule. The methods used in the development of this application is Multimedia Developtment Life Cycle Luther- Sutopo, it used of modeling system for Object-Oriented Programming (OOP). This application is the multiplayer feature added by using the service of Photon Unity Networking that is already integrated with Unity. Based on this research, it has obtained results, that this application can be used to play the Balinese gamelan and Photon Unity Networking can be implemented for multiplayer features within the application Virtual Gamelan of Bali
Keywords: Balinese Gamelan, Object-Oriented Programming, Luther Sutopo, Multimedia Development Life Cycle, Photon Unity Networking.

1. INTRODUCTION

Gamelan is one area of art that can not be separated from the culture of Indonesia. The art of gamelan, especially in Bali, used as accompaniment in religious rituals [1]. Gamelan is usually played simultaneously by several people to create rhythm and a good harmonisation of each tool used. Maha Ganesha Gotra is a student activity units that exist in one of the College's Bandung, which is focusing on the art of dance and tabuh.

Based on a detailed questionnaire that has been done to the 85 respondents young artists, as much as 74 respondents interested to play the gamelan of Bali, but this time to be able to play it can only be done with the groundbreaking Studio that provides the gamelan of Bali, and it's very seldom mainly outside of the island of Bali.

Furthermore, based on an interview with Chairman of Maha Gotra Ganesha, Maha Gotra Ganesha is currently experiencing constraints at the time of exercise, especially ahead of the staging. Because of the limited workout schedule and erratic, then members can not be practicing the gamelan outside exercise because of the unavailability of tools and also time. This is due to it's own gamelan instruments housed in the Secretariat, which are quite far from the boarding members. In previous research, which has been performed by Nyoman Sidarma, Made the Swastika and Made Arsa (2015) titled "Architecture of the Gamelan Gender Android-based Applications". Expressed about the implementation of gamelan gender wayang on the android platform, built using the technology of Corona. Application and development of gamelan gender it may help preserve the art and culture of Bali. [2]. the second Study conducted by Eka Udiyana, Darmawiguna and Gede Mahendra Sunarya (2015) titled "Gamelan Angklung application development Android-based Bali". Gamelan angklung posited about implementation included in the gamelan wayah or old on the android platform. Built using AndEngine. This application can help introduce gamelan angklung that not many are owned in Bali. [3] However, such research has not been able to help, because the type of tool used is different. Based on these problems, it is a medium that is expected to be used to play the gamelan of Bali and the Balinese gamelan exercises help the process. By creating a virtual application in the form of mobile, which can be played either individually or simultaneously from different places.

Based on these problems, as for the purpose of this research is to develop an application virtual Balinese Gamelan, to provide a means to play the gamelan of Bali and facilitate Member Maha Gotra Ganesha to do exercise while ahead of the staging.

2. FRAMEWORK OF THEORIES

2.1 Balinese Gamelan

Balinese Gamelan is one of the styles of gamelan in Bali. Seen from the physical form of Balinese Gamelan, there are also blades and pencon shaped, made from pure Tin and copper [4]. There are many types of gamelan in Bali, among others:

1. Gamelan Wayah

Gamelan wayah is often called the old gamelan, as well as existed before the XV century. His tool-shaped blades and yet complete with kendang. Gamelan in gamelan angklung, gender wayang, baleganjur, cenggong, bebonangan, gong beri, caruk, luwang, gambang, gong selonding.

2. Gamelan Madya

Gamelan madya, appear around the XVI-XIX. In the gamelan is already using the kendang. Included in this such as bebarongan, joged pingitan, gong gede, pelegongan, semar pagulingan.

3. Gamelan Anyar

This is the new gamelan, there are approximately XX century with further accentuates to kendang. Gamelan which exists in a gamelan anyar, like gong suling. Semaradana, jegog, gong kebyar, janger, jogged bumbung, tektekan.

The instrument of Balinese Gamelan is :

1. Gangsa.

Generally have 10 pieces of slats, and is divided into several kinds, among others pemade, ugal, and kantilan. Pemade, kantilan and ugal would have the same shape, only would have a larger size than anything else. Gangsa shown in Figure 1.



Figure 1. Gangsa Pemade

2. Reong

In one tuguh there are several reyong pencon adapts to many tones are used. High low tone in his gamelan as seen from the big and the small size of the slats or the gamelan pencon. Reong shown in Figure 2.

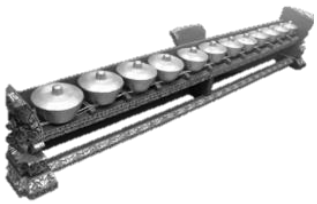


Figure 2. Reong

3. Jegogan.

The form of this own jegogan just like bronze and any size is the same, but it only has 5-6 jegogan of the slats. Jegog shown in Figure 3.



Figure 3. Jegogan

4. Cengceng

Used to accompany other instruments, shown in Figure 4.



Figure 4. Cengceng

5. Gong Lanang/Istri,

Shaped like a gong in General. Gong lanang is larger and heavier sound, while the smaller shaped gong istri and the sound is higher. Gong shown in Figure 5.



Figure 5. Gong Istri

2.2 Multimedia Development Life Cycle (MDLC)

Multimedia Developtment Life Cycle (MDLC) is a multimedia software development method. In this study using MDLC Luther who later developed again by Sutopo. Development of multimedia has six phases: concept, design, materials, assembly, testing colleting, and distribution [5], as shown Figure 6.

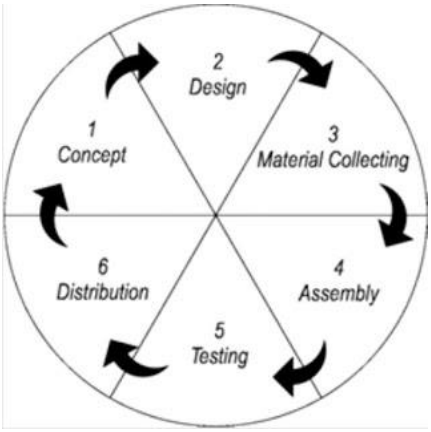


Figure 6. Multimedia Development Life Cycle

The phases in MDLC Luther-Sutopo, is as follows:

1. Concept

The phases concept that is determining the purpose of application development, the target users and the general specifications of the application being built.

2. Design

Phases design is the design phases or create detailed specifications about the architecture and the need for materials to build the application. This specification is made in detail so that at a later phases, the new decision is not required, but using that is in this phases. However, the frequent additions, or reductions in, or a change in the early work of the application.

3. Material Collecting

This phases is carried out to gather materials such as images, animation, audio, here the making of images, graphics, audio and other things needed for the next phases. Required materials can be obtained from sources such as the library, the material that already exists from other parties or special creation is done outside parties. The phases of this workable colleting materials along with the assembly phases.

4. Assembly

This phases is a phases where the whole multimedia object is created. The making of the application based on the storyboard, or navigation structure that comes from the phases of design.

5. Testing

This phases is carried out after the completion of the phases of manufacture and all data have been entered. Testing done in a modular to ensure whether the results as desired. Then conducted testing to make sure the application can run properly on the user environment.

6. Distribution

The distribution phases is a phases where the evaluation of a multimedia product is done. By doing the evaluation, will be a better system is developed at the future.

2.3 Photon Unity Networking (PUN)

Photon Unity Networking is the framework provided by the Photon Engine integrated with Unity Engine. Photon Networking features to do multiplayer on unity applications. Photon Networking to connect to a dedicated server on a Photon Cloud, which provides rooms, matchmaking API, and communication in the room [6]. Workflow Photon Unity Networking, described in Figure 7.

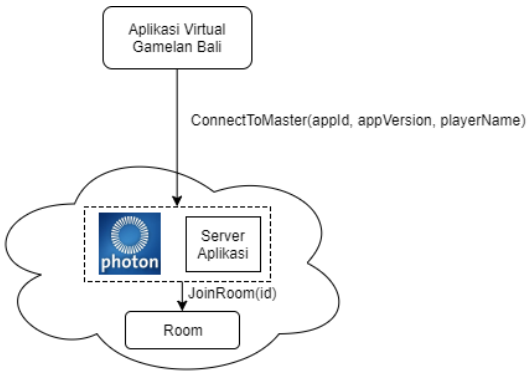


Figure 7. Alur Kerja Photon

2.4 Android

Android is a linux-based mobile operating system. In 2005 Google. Inc. took over from android Android Inc. as part of a strategy to fill the market system of the mobile operating system [7]. Android is the new generation of mobile platforms, because this platform that gives developers to do a satisfactory development in accordance with [8]. The version that has been released by the android [9]:

a. Android 1.6 Donut
b. Android 2.1 Éclair
c. Android 2.2 Froyo
d. Android 2.3 Gingerbread
e. Android 3.0 Honeycomb
f. Android 4.0 Ice Cream Sandwich
g. Android 4.1 Jelly Bean
h. Android 4.4 Kitkat
i. Android 5.0 Lollipop
j. Android 6.0 Marsmallow
k. Android 7.0 Nougat
l. Android 8.0 Oreo

3. RESEARCH METHODS

Research methodology used in this study was based on quantitative research, which are descriptive by finding, describing a situation or phenomenon in accordance with the facts [10]. The stage of this research, shown in Figure 8.

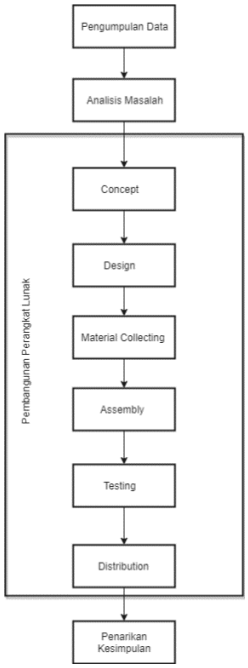


Figure 8. The Phases of Research

4. FINDING AND DISCUSSION

4.1 Analysis Of The Problem

Balinese Gamelan is currently not many owned by organizations or individuals outside of Bali. If anything, the available limited types of gamelan. This is due to the price of the gamelan itself is very expensive. To save the Balinese Gamelan, it takes place, considering the size and weight of the Balinese Gamelan that is large and heavy. To the members of the Maha Gotra Ganesha can only exercise when there are workout schedule. Outside of the schedule of members cannot play the gamelan, because the gamelan are in the Secretariat. The procedure that is currently used on Maha Ganesha Gotra, shown in Figure 9.

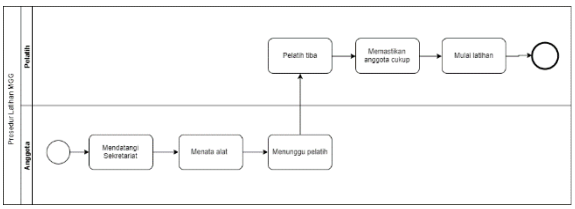


Figure 9. BPMN Currently Procedure

The procedures offered in this study, shown in Figure 10.

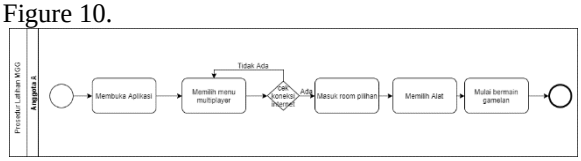


Figure 10. BPMN Offered Procedures.

4.2 Analisis Konsep Sistem

Analysis of the application to be built contains about description of the system to be built. Description of the system created using infographics that can be seen in Figure 11.

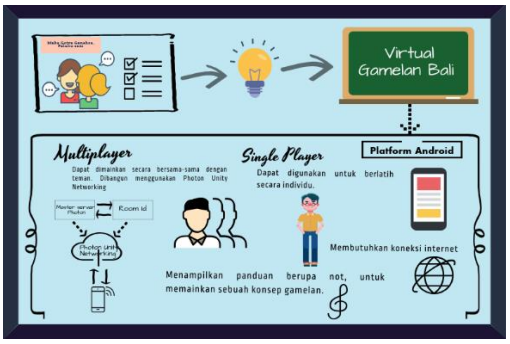


Figure 11. The Concept of System

The system was built has two types of game modes, single player and multiplayer. Multiplayer is built using Photon Unity Networking, which already features multiplayer and users live access to an existing room in a Photon. This application also provides guides, numeral notation to make it easier for users if they want to try to play a gamelan.

4.3 Navigation Structure

Navigation structure shows relationships between scene in the application. Shown in Figure 12.

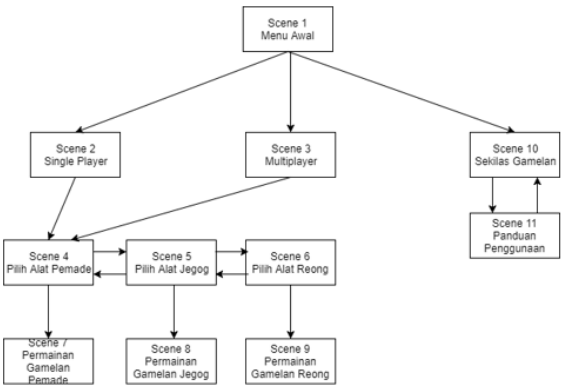


Figure 12. Navigation Structure

4.4 Analysis Of Gamelan Object

Analysis of the object it describes objects that are used in the application, and the form of the two dimensions of the object is used. The real object of the Balinese Gamelan is shown in Table 1.

Table 1. Analysis of Object

Nama	Objek	Deskripsi
Gangsa Pemade		Gangsa Pemade, berukuran 100x 100cm. Terdapat 10 bilah dalam pemade. Dengan masing-masing nada nya dong – deng – dung – dang – ding.
Jegog		Jegog, berukuran 150x100cm.. Terdapat 5 bilah dalam jegog. Dengan masing-masing nadanya dong – deng – dung – dang – ding.
Reong		Reong, berukuran 60x250cm. Terdapat 12 reong atau pencon dalam 1 buah reong. Dengan masing-masing nadanya deng - dang – dung – ding - dong

4.5 Analysis of Software Requirements

Analysis of software requirements in this application, which describes the bare minimum that must be owned by the developer in building this system, described in Table 2.

Table 2. Minimum Spescification of Software Requirements

No	Software	Specification
1	OS	Android 4.0 Ice Cream Sandwich

4.6 Analysis of Hardware Requirements

Analysis of hardware requirements in this application, which describes the bare minimum that should have to play this application, shown in Table 3.

Table 3. Minimum Specification of Hardware Requirements

No	Hardware	Specification
1	RAM	2GB
2	Screen Size	4.8 inch
3	Processor	1.2 Ghz

4.7 Analysis of Functional Requirement

1. Usecase

Use case is when a system is used to meet one or more of the requirements of the user; a use case of capturing a portion of the functionality of a given system. Use case diagram of the system is shown in Figure 13.

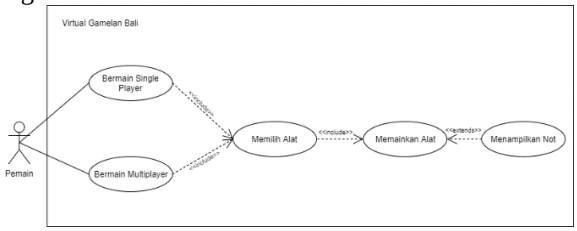


Figure 13. Use Case Diagram

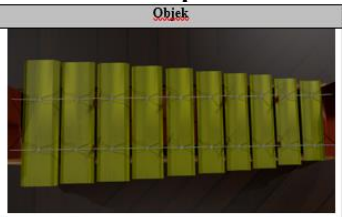
4.8 Research Result

As for the results of the research conducted, are as follows:

4.8.1 Implementation of Object

Implementation of object is the stage where the object is transformed into a real form of gamelan. Implementation of an object can be seen in Table 4.

Table 4. Implementation of Object

No	Objek	Nama	Deskripsi
1		Gangsa Pemade	Alat gamelan yang terdiri dari 10 bilah besi/tembaga.
2		Jegog	Alat gamelan yang terdiri dari 5-6 bilah, bentuknya mirip dengan pemade.
3		Reyong	Alat gamelan yang terdiri dari 12 pencon.

4.8.2 Implementation of Interface

Implementation of the interface is the look of the application already made, as follows:

1. Start Menu

Figure 14 shows the start menu interface. There are four buttons, namely single player, multiplayer button, overview buttons and button to close the application.

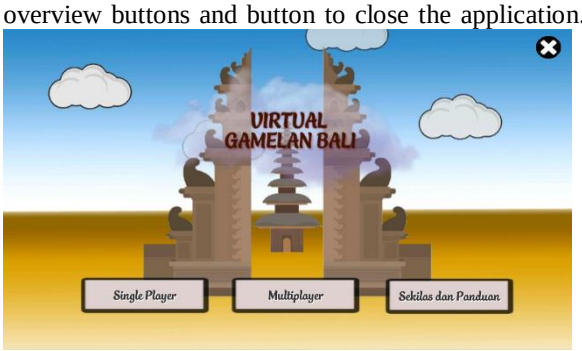


Figure 14. Start Menu

2. Single Player

In Figure 15, shows a single player interface. There is a back button to return to the initial menu, inputfield name players, and the play button.

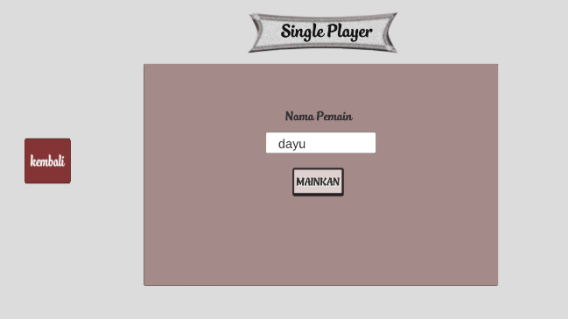


Figure 15. Single Player

3. Multiplayer

Figure 16 shows the multiplayer interface. There is a back button to return to the start menu, the player's name, inputfield combo box for room and key joins. In this page there is also a text status to find out if the player is already connected to the server and enter the Photon or not.

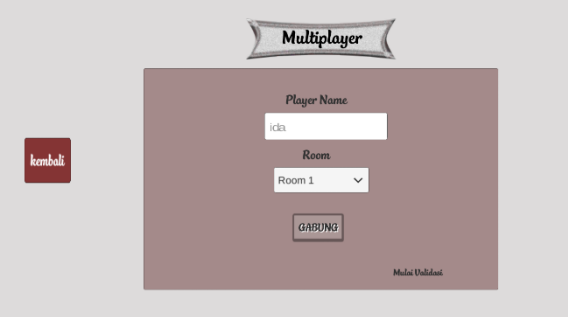


Figure 16. Multiplayer

4. Overview

Figure 17 shows the interface page contains a brief description, overview on Balinese Gamelan, and a photo of the Balinese Gamelan.



Figure 17. Overview Interface

5. User Guide

Figure 18 shows the interface of user guide, contains a description of the procedures or steps to use this application.

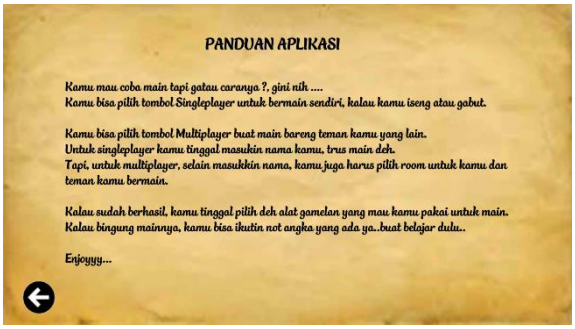


Figure 18. User Guide Interface

6. Select Instrument (Pemade)

Figure 19 shows the interface of selecting instrument, showing the first option of intrument, is a pemade. There is a button next to see other tools.

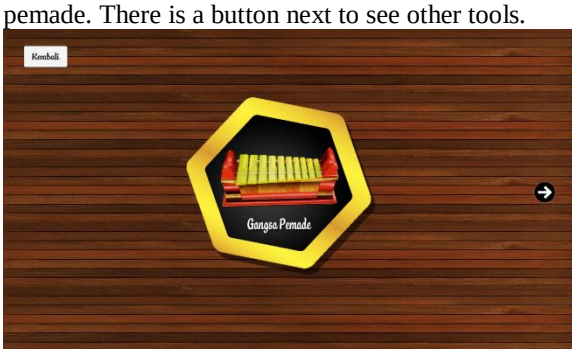


Figure 19. Select Instrument (Pemade)

7. Select Instrument (Jegog)

Figure 20 shows the interface of this page showing the options the second instrumentl, namely tool jegog. There is a button next to see other instrument, and also the buttons prev.



Figure 20. Select Instrument (Jegog)

8. Select Instrument (Reong)

Figure 21 shows the interface of this page showing the options the third instrument, namely tool reong. There are the buttons prev to go back to previous view instrument. .



Figure 21. Select Instrument (Reong)

9. Pemade

Figure 22 shows the interface it displays objects from the pemade gamelan instruments, and also as guides, numeral notation if the player wants to play a brief concept of gamelan.

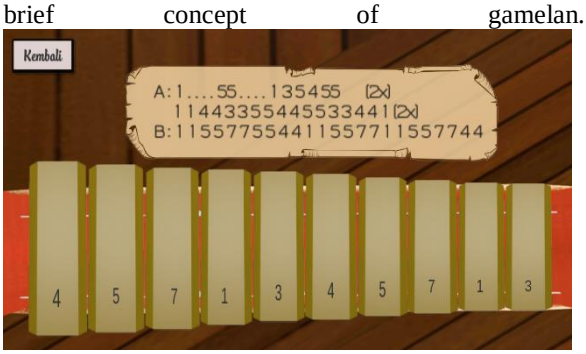


Figure 22. Pemade

10. Jegog

Figure 23 shows the interface it displays objects from the gamelan jegog instruments, as well as guides, numeral notation if the player wants to play a brief concept of gamelan.



Figure 23. Jegog

11. Reong

Figure 24 shows the interface it displays objects from the gamelan reong instruments, as well as guides, numeral notation if the player wants to play a brief concept of gamelan.

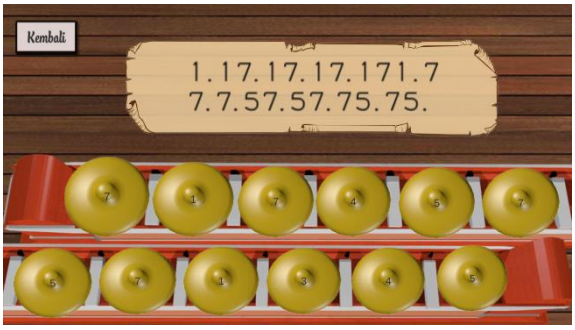


Figure 24. Reong

12. Exit Message

In Figure 25, shows this interface displays a message when the player will exit the application.



Figure 25. Exit Message

4.8.3 Black Box Testing

This black box testing is the testing that was performed to test the functionality of the software has been built.

1. Navigation menu Testing

Results from testing the menu navigation, shown in Table 5.

Table 5. Navigation Menu Testing Result

Cases and Test Results				
No	Description	Expected Result	Result	Description
1	Choose Menu	The navigation menu switch in accordance with selected menu.	The menu shown in accordance with the selected menu.	[√] Accepted [ ] Rejected

2. Object Gamelan Instrument Testing

Result from testing the object gamelan, shown in Table 6.

Table 6. Instrument Gamelan Object Testing Result

Cases and Test Results				
No	Description	Expected Result	Result	Description
1	Choose Instrument Gamelan	The object of the gamelan instruments, in accordance with the selected instrument.	Gamelan instruments are displayed in accordance with the selected instruments.	[√] Accepted [ ] Rejected

3. Not Testing

The Result of not testing shown in Table 7.

Table 7. Not Testing Result

Cases and Test Results				
No	Description	Expected Result	Result	Description
1	Showing not	Showing notation panel	Showing notation panel	[√] Accepted [ ] Rejected

4. Gamelan Sound Testing

The result of sound testing shown in Table 8.

Table 8. Gamelan Sound Testing Result

Cases and Test Results				
No	Description	Expected Result	Result	Description
1	Sound	Sound, according to the slats pressed	Sound, according to the slats pressed	[√] Accepted [ ] Rejected

5. Photon Connection Testing

The result of Photon connection testing shown in Table 9.

Table 9. Photon Connection testing

Cases and Test Results				
No	Description	Expected Result	Result	Description
1	Join *Lobby*	Dropdown shown the room	Dropdown shown the room	[√] Accepted [ ] Rejected
2	Join *Room*	Go to the selected page in the choosen room	Go to the selected page in the choosen room	[√] Accepted [ ] Rejected

4.8.4 User Acceptance Test

Based on the testing that was done to 35 users, the conclusion of testing is :

1. Instruments of gamelan that is provided can be used as a means to play Balinese Gamelan.
2. The guidelines not provided makes it easy for respondents to play Balinese Gamelan.
3. The explanation given on the application to make the respondent learned of the Balinese Gamelan.
4. The display on this application can be made respondents recognise the Balinese Gamelan.
5. This application can help in the process of practicing or playing a Balinese Gamelan.

Thus it can be concluded that the system has met the purpose built construction.

5. CONCLUSION

After the analysis, design and testing, then it can be drawn the conclusion that this system can be used as a means to play Balinese Gamelan, and able to assist the user in Balinese Gamelan playing and practicing.

The advice for Balinese Gamelan Virtual application development so that better in the future, the design of the application and also the guide not be made to make it more interesting, then add features to record and make more multiplayer features real-time and interesting.

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