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DEVELOPING DESKTOP BASED GAME USING SCRATCH LANGUAGE

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ABSTRACT:
Current technological developments have infiltrated all sectors like economics, business, and even the entertainment world also has their own technology. The one of them is video and console game which is the technology that have successfully penetrated the entertainment sector. Playing games can indeed get rid of boredom and at the same useful for filling the spare time. The more modern technology, the easier it is for someone to play games. The *Whack Me!!!* game that we made is Arcade type. Arcade Game is a Game that are not focused on the story but are only played just for fun on the free times or just for find the highest score. This game is very suitable to be played by children because they can stimulate the brain to be more creative in solving problems in a short time. The main development of this game uses scratch and clip studio paint for the design. The controls of this game tend to be easier and simple (doesn't need many buttons).

INTRODUCTION

Game is the one of current increasingly sophisticated technology which play a large role in various aspects of life including education (Tam, 2008), entertainment, arts and socio-culture. Game also an interesting tool for delivering information., because games have several multimedia elements such as text, images, sound, animation, and video that are made interactively so the users can easily understand the conveyed information. Game is a universal part of the human experience and is present in all cultures (Kevin, 2001). The factors that determine the structure of a game often include goals, rules, challenges, and communication (Chris, 2003).

There are various types of games, one of which is an Arcade type game. Arcade game itself is a game genre that does not focus on the story, but is only played "just for fun" or to chase points (high score). Example: Pacman, Angry

Bird, Tetris, Whack A Mole, etc. Most Important when building a game is a passionate look at the game (Salen, 2014) and game design that offers the most ambitious framework for understanding it.

Whack Me!!! is very suitable and much-loved by children, because it stimulates the brain to be more creative in solving problems in a short time. Another reason is the game controls are usually easier or simpler (there are not many buttons). As mentioned earlier, this kind of game is able to make the brain, eyes and hands coordinate well. In addition, games like this can help children to concentrate more even though the way to play is relatively easy.

RESEARCH METHODS

This research begins by selecting the types of games that can be made by drag and drop through scratch to obtain data results and conclusions about the types of games to be made.

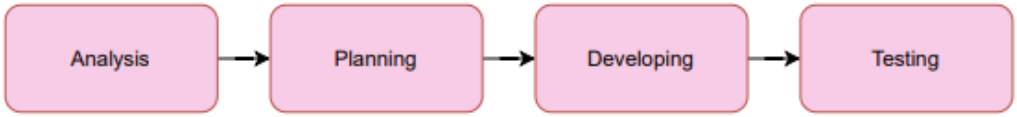

Figure 1: Research Methods

System Feasibility Analysis

a. Technology Feasibility

This game can be operated on computer devices that do not require high specifications with the Windows 7 operating system.

b. Legal Feasibility

This game context does not violate any applicable law, does not contain elements of pornography, fraud or other criminal behavior.

c. Operational Feasibility

This game is easy to use and has features that are not complicated and prioritizes entertainment elements only so that the game controls are not too complicated, and do not use many buttons.

System planning

General description

The general description of this arcade game is as follows:

This Arcade game contains about hitting a mole (target) that appears randomly on each hole and the faster the duration it appears with each level increase.

Scratch, which is a drag and drop game code, is used to build this game and Clip studio paint is software that is used to make game designs so that it looks more attractive, especially for children.

This game has four backgrounds that can be selected with different moles in each place.

At the start of the game there are three buttons consisting of start, options, and quit. If you select the start button, the user will be directed to choose the background (background) to be played.

In each game, a score, lives, and level are displayed as a measure of the progress of the game.

System Development and Testing

The system was built using Scratch software. The maker carries out testing by involving several friends and family. The testers were asked for suggestions that are used to develop the game even better.

RESULTS AND DISCUSSION

Basic Game Design

Whack Me!!! This is a game where the player collects a score by hitting a target that will appear randomly from the holes. After reaching a certain score the level will increase and the target, speed will increase according to the level you have. Players can also choose a background theme with a religion so they do not get bored with the same background.

Software used:

a. ***Clip Studio Paint***

Clip Studio Paint (previously marketed as Manga Studio in North America), informally known in Japan as Kurisuta (クリスタ) (Celsys, 2006), is a family of software applications developed by the Japanese graphics software company Celsys. It is used for digital comic creation, general illustration, and 2D animation. Clip Studio is a companion program for managing and sharing digital assets, bundled with Clip Studio Paint. This software is available in versions for Mac OS, Windows, iOS, iPad OS, Android, and Chrome OS.

This application is sold in several editions with various feature sets. The full featured edition is a page-based layered drawing program, with support for bitmap and vector art, text, imported 3D models, and frame-by-frame animation. It is designed for use with styluses and graphic tablets or tablet computers. It has drawing tools that mimic natural media such as pencils, ink pens, brushes, and patterns and decorations. It is distinguished from similar programs by features designed for creating comics (Chin, 2013): tools for creating panel layouts, perspective ruler, sketching, inking, applying tones and textures, coloring, and creating word and caption balloons.

We use Clip Studio Paint software to create game material designs, such as Background, Character, and command buttons.

b. ***Scratch***

Scratch is a visual programming language for learning environments that allows beginners (whether students, teachers, learners, or parents) to learn to program without having to think about writing syntax completely wrong. MIT Media Lab of the Massachusetts Institute of Technology created this programming language. With Scratch, users can create their own animations, games, artwork, and more.

Scratch users can create programs (called projects) by visually arranging command blocks (called blocks). In this way, students can focus on logic and programming flow (algorithm) without ever or frequently getting error errors due to writing incorrect syntax.

We use this Scratch software to create program code / commands in the game so that it can run properly and can be played.

Narration and Storyboard

Based on the general description of arcade games that have been described, the next process is making a storyboard, which is a series of visual sketches to describe a sequence or flow of the application to be built. The storyboard of this arcade game is shown as follows.

Figure 2. Game Main Menu Storyboard

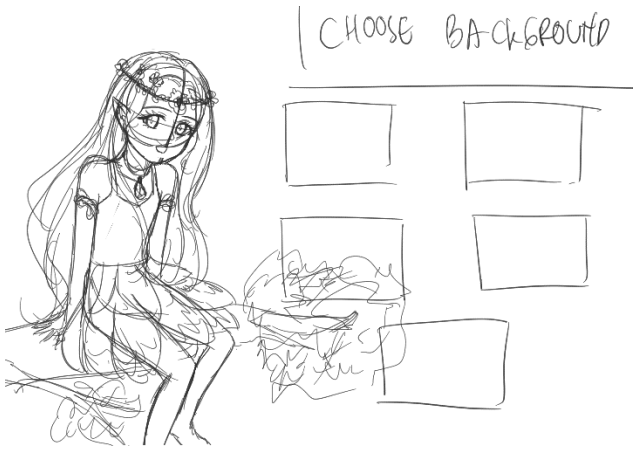

Figure 3. Storyboard for Background Selection

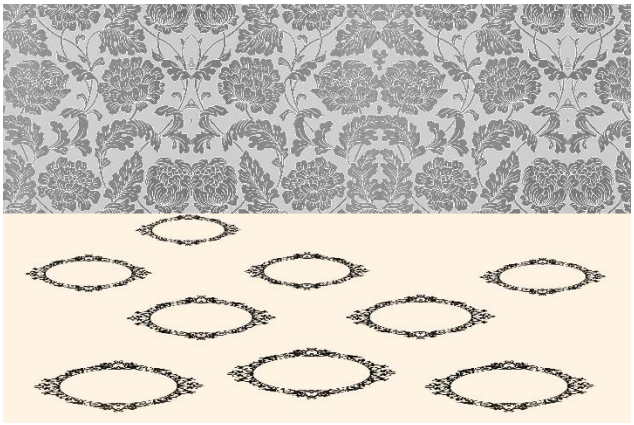

Figure 4. Storyboard of Classic Themed Background game

Figure 5. Storyboard of Halloween Themed Background game

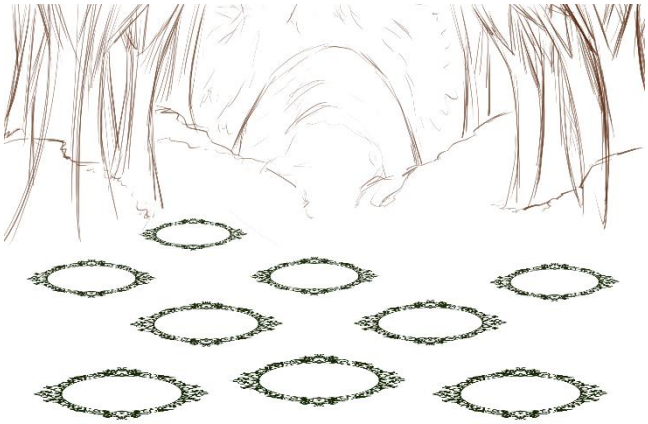

Figure 6. Day and night version of the Nature Themed Background game storyboard

Figure 7. Storyboard Game Over

Table 1. Explanation of Storyboard

Component	Description
Game Theme	Game hitting random moving targets
Game Type	Arcade
Language	English
Control System	Scratch
Game System	This game consists of 4 different backgrounds with different targets. Classic themed background 1 with the target of a girl with classic themed clothes. Halloween themed background 2 with the target of a girl in a witch costume. Nature-themed backgrounds 3 and 4 with day and night modes with the target of a forest elf girl.

Specifications of Functional Game Requirements (SRS Functional)

Specifications for functional game requirements in Game *Whack Me!!!* Is as shown in the Table 2:

Table 2. Specifications of Functional Game Requirements (SRS Functional)

Level 0	Level 1	Level 2	Level 3
Whack Me!	Play	Choose Background	Play Game
			Game Over
	Option	Setting Volume	
	Quit		

Flowchart

Flowchart is an image that shows the sequence and relationship between processes and instructions. With the flowchart the game sequence becomes clearer. Flowchart depiction of the Whack Me!!! game can be seen in Figure 8:

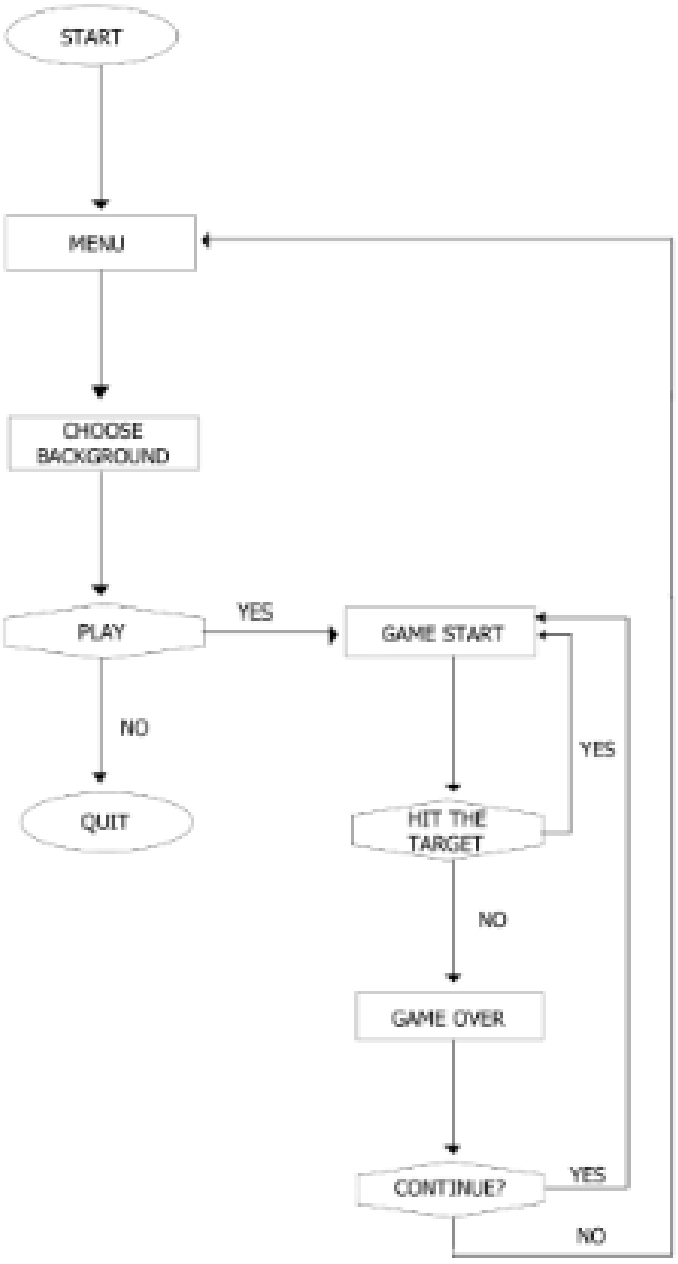

Figure 8. Flowchart Game

Game Implementation and Evaluation

In the Whack Me!!! game it has 3 different backgrounds with different themes as well. The themes include Classic, Halloween, and Nature. For the nature theme, there are two different modes, namely daytime mode and night mode. In the Whack Me!!! game there are only 10 levels, each level increase, the speed and difficulty of hitting the target will increase. At the beginning of the game the player will be directed to choose a background that has been prepared on the Choose Background Menu.

Implementation of Main Menu, Background Selection Menu, Display While Playing, and Game Over

Figure 9. Main Menu Game Display

At the start of the game, a main menu consisting 3 buttons in displayed, namely:
a. Play Button: To start the game and then the player is directed to the next screen.
b. Option Button: To set the game play (in here we only provide volume buttons only).
c. Quit Button: End all codes (Game stops).

Figure 10. Background Selection Display

After click the play button, the player will be directed to choose an available background and then start the game.

Figure 11. Game Display on a Classic Themed Background

If in the background menu player selects the classic background, then the game display is like the picture above. The target that was hit is a girl character with dark purple hair in vintage clothes.

Figure 12. Game Display on a Halloween Themed Background

If in the background menu player selects the Halloween background then the game display is like the picture above. The target that was hit is a girl character with pink hair and little witch costume.

Figure 13. Game Display on a Nature Themed in a Daytime Mode Background

If in the background menu player selects the Nature background in the daytime mode then the game display is like the picture above. The target that was hit is a little elf girl with blonde hair in the costume decorated with leaves.

Figure 14. Game Display on a Nature Themed in a Night Mode Background

If in the background menu player selects the Nature background in the night mode then the game display is like the picture above. The target that was hit is a little elf girl with blonde hair in the costume decorated with leaves.

Figure 15. Game Over Display

The player's life will decrease if there is a miss target. If the player's life runs out, the game will automatically end (Game Over). The game over view can be seen in Picture 14. In this Game Over view, there are 2 buttons, the play button to play the game again in the same background, and the quit button to return to the main game menu.

Black Box Testing

Black box testing is also known as behavioral testing. This method is a test of the functionality or usability of an application. Black box testing is sufficient to review the input and output of the software system without knowledge of the internal program. Black box testing is so called because it describes the perspective of the examiner as seeing only a black box. (Liang, 2021) Black box testing in training making games it is full of limitations.

Black box itself can be any software or system you want to test, for example, an operating system like Windows. The black box testing method is used for most of the applications we can find today. This test is important to find bugs or glitches in the application before it is officially released.

Table 3. Tester Device Detail

Specification	***Lenovo IdeaPad 320***	***HP***
Processor	AMD A9 Series.	Intel (R) Celeron(R) N3060
RAM	4 GB DDR4.	4 GB
VGA	AMD R5.	Intel (R) HD Graphics
Screen Size	14 Inch 1366 x 768 - HD.	1366 x 768
Operation System	Windows 10	Windows 10

To test and analyze this game according to the design we used black box testing model. Testing is in the form of performing existing functions whether they match the expected output in the design and implementation stages of both devices. In testing using two laptops, device details can be seen in the table above.

Table 4. Test Result

No.	***Function***	***Type***	***Result***	
			Lenovo	***HP***

			IdeaPad 320	
1	Scene	Menu, Select BG, Game Screen, Game Over	√	√
2	Gameplay	Hit the target	√	√
3	Sound	BG music, SFX	√	√
4	Control	Left mouse click	√	√

This testing is done by making a check list table that lists the functions in the application and then testing it on the device and then giving a description of the test results.

CONCLUSION

Based on the results of research and testing of this game, it can be concluded that arcade game technology is very useful for entertainment in spare time and this game has no addictive impact so it does not affect eye health. This game is also useful for honing the brain's ability to focus and train body reflexes to get a high score.

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