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<http://infor.seaninstitute.org/index.php/infokum/index> JURNAL INFOKUM, Volume 10, No.1, Desember 2021 ISSN : 2302-9706 ? INFOKUM is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License (CC BY-NC 4.0) 332 IMPLEMENTATION OF THE LINEAR CONGRUENT METHOD IN INTERACTIVE QUIZ GAMES APPLICATION Tonni Limbong<sup>1</sup>, Zekson Arizona Matondang<sup>2</sup> <sup>1,2</sup> Fakultas Ilmu Komputer, Universitas Katolik Santo Thomas Medan Jl. Setiabudi No.479 F Tanjungsari Medan Email : tonni.budidarma@gmail.com , zekson.arizona@yahoo.com Abstract Article Info Received : 29 November 2021 Revised : 15 December 2021 Accepted : 27 December 2021 The implementation of the Linear Congruent Method (LCM) in the interactive quiz game based on macromedia selects the suitcase used to generate random numbers.

Generating numbers using the linear congruent method uses the formula  $x(n+1) = (axn+c) \bmod m$ . Giving variable values that continue to change greatly affects the game process and can avoid the occurrence of fixed or repeated patterns. In addition, giving a variable that changes can also prevent duplication of questions in a row.

Meanwhile, to prevent unwanted random numbers from emitting is to set the variable  $m$  as a barrier. From the results of the implementation of the above method in an interactive quiz based on macromedia flash, it can display very varied suitcases that can be played by users with each level of difficulty Keywords : Game, LCM, Interactive Quiz 1.

INTRODUCTION Game comes from the English word which has the basic meaning of the game. The game in this case refers to the notion of "intellectual agility" (intellectual playability). Game can also be interpreted as an arena for player decisions and actions [1], [2]. There are targets that players want to achieve.

Intellectual agility, to a certain extent is a measure of the extent to which the game is interesting to play to its full potential. At first, games were identical to children's games. Game is an activity carried out by children that can be fun.[3], [4] In other words, all forms of activities that require thinking, intellectual agility and achievement of certain targets can be said to be games.

Playing games is one of the activities that most people like. Their reasons for playing games are certainly different, some are to relax, some really like or have a hobby of playing games. Games are not only as a leisure time filler, but also as a means of entertainment for most people who have a lot of busyness [5].

The interactive quiz game is a game by choosing a suitcase in which there is a small nominal value and a large nominal value. The player first selects 1 suitcase for deposit and after that the player can choose 5 more suitcases, the banker will make an offer. The host offers to agree or disagree with the offer offered by the banker. In the game also need a scenario so that the flow of the game is clear and directed.

The scenarios here can include map settings, levels, storylines, and even effects in the game. Like many kinds of games on television, namely wants to be millionaire, missing lyric, family 100 game deal or no deal [6]. Linear Congruent Method (LCM) is a random number generation method that is widely used in computer programs.

LCM utilizes a linear model to generate random numbers [7]. The characteristic of LCM is that it repeats itself at a certain time period or after a number of generations, this is one of the properties of this method, and pseudo random generators in general. Determination of LCM constants ( $a$ ,  $c$  and  $m$ ) will determine whether a random number is good or not.

obtained in the sense of obtaining random numbers as if there were no repetitions [8]. <http://infor.seaninstitute.org/index.php/infokum/index> JURNAL INFOKUM, Volume 10, No.1, Desember 2021 ISSN : 2302-9706 ? INFOKUM is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License (CC BY-NC 4.0) 333 2. METHOD Methods or stages in the completion of this research is done by: 1.

Collecting data from various sources such as reference books, magazines, internet, and other sources. 2. Analyzing problems and solving interactive quiz games with the method used. 3. Applying the LCM method in the case of the game, with random data. Linear Congruent Method (LCM) is a random number generation method that is widely used in computer programs.

LCM makes use of the linear model to generate random numbers defined by:  $x(n+1) = (ax_n + c) \bmod m$  where:  $x_n$  = is number. random to  $n$ ,  $a$  and  $c$  are LCM constants,  $m$  is the maximum limit of random numbers[9]. The hallmark of LCM is that it repeats itself over a certain period of time or after a number of generations, this is one of the characteristics of this method, and of a pseudo random generator in general. obtained in the sense of obtaining a random number as if there was no repetition [10].

In the case of an interactive quiz game this time, it is randomization of the value of the suitcase which consists of 1 to 26 suitcases. Where, each player will not repeat when playing the game. The value to be generated is 1 to 26 suitcases, provided that the variables  $a$  and  $c$  have been determined constant values so that:  $a = 4$ ;  $c = 6$ ;  $x_0 = 3$ ;  $m = 26$  Solution:  $X(0) = 3$   $X(1) = (4(3) + 6) \bmod 26 = 19$   $X(2) = (4(19) + 6) \bmod 26 = 2$  and so on until  $X(26) = (4(25) + 6) \bmod 26 = 26$  Random numbers generated from 1 to 26 do not appear to be repeated periodically. 3. RESULTS AND DISCUSSION 3.1

Game Model At the beginning of the game, the player who will play this game will choose the available suitcase. And in the suitcase contains the smallest nominal to the largest nominal. Players will choose one suitcase to store and later that suitcase will be offered by the banker.

After one suitcase is selected, the player will choose five other suitcases. When the suitcase has been opened, the nominal contents have been calculated, then the banker then offers the nominal bid that he determines to the player. After all 6 suitcases are open, the player will listen to the offer from the banker and choose Agree or Disagree, according to the title of the game. a.

If the player chooses Agree, the game is stopped and the player is entitled to carry the banker's bid amount (usually, the game continues as if the player chose Disagree without any risk of knowing what would happen if the player chose Disagree). b. If the player chooses Disagree, the game continues and the player must open five, four, three, two to one more suitcase.

By choosing a suitcase in which there is a small nominal value and a large nominal value. The player first selects 1 suitcase for storage and after that the player can choose 5 more suitcases. The first time this game is run, the start page will appear with the play button as the initial display.

And when you press the play button, the next screen is the suitcase selection. The number of suitcases displayed is 26 suitcases to do this game. On the left side of the

screen there are 13 available nominals ranging from \$ 0.1 to \$ 750 and on the right side of the screen there are also available nominal ranging from \$ 1000 to \$ 1,000,000.

suitcase and nominal value can be shown in table 1 below: Table 1 Suitcase Value and Nominal Suitcase Nominal Suitcase Nominal

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14 \$ 1000 2 \$ 1 15 \$ 5000 3 \$ 5 16 \$ 10000 4 \$ 10 17 \$ 25000 5 \$ 25 18 \$ 50000 6 \$ 50 19 \$ 75000 7 \$ 75 20 \$ 100000 8 \$ 100 21 \$ 200000 9 \$ 200 22 \$ 300000 10 \$ 300 23 \$ 400000 11 \$ 400 24 \$ 500000 12 \$ 500 25 \$ 750000 13 \$ 750 26 \$ 1000000 At the beginning of the game, the player who will play this game will choose the available suitcase. And in the suitcase contains a small nominal to the largest nominal.

Players will choose one suitcase to store and later that suitcase will be offered by the banker. After one suitcase is selected, the player will choose five other suitcases. And when the suitcase has been opened, the nominal contents have been calculated, then it's time for the banker to offer the nominal bid that he specified to the player. At the end of each round, the banker will make a bid. Next, the banker will ask the player whether to accept the banker's offer or reject it. a.

If the player answers Agree, then the game ends, and the player gets a prize equal to the banker's offer. Next, the game continues as if the player answered disagree. b. If the player Disagrees, then the game continues to the next round. c. If the player answers No Agree at the end of the last round, then the prize that the player gets is the one in the suitcase of his choice (the suitcase selected before the first round starts).

Because the various possible values are known at the start of each game, how much the banker offers at a point changes based on what values have been eliminated. To promote the game, the banker's offer is usually less than the expected value dictated by probability theory, especially at the start of the game. In general, the offerings at the start of the game are very low relative to the scores still in play, and approach (or even exceed) the average remaining value towards the end of the game. 3.2 Application of Linear Congruent Methods (LCM) The interactive quiz application in the game will answer questions by choosing an answer.

In this game randomization of values is very important because the nominal that appears is different. The application of the linear congruent method in the Interactive

Quis application is to randomize the values to be displayed so that the nominal that appears is not the same, so it doesn't make the players feel bored.

In this Interactive Quis application there are 3 levels, at each level there are 26 suitcases to shuffle and only 5 suitcases will be displayed for each level. The value of a suitcase consisting of 1 to 26 suitcases. The value to be generated is from 1 to 26 suitcases, provided that the variables a and c have been determined constant values. Formula:  $X(n+1) = (a \cdot x_n + c) \bmod m$  where  $a=4$ ;  $c=6$ ;  $x_0=3$ ;  $m = 26$  Solution:  $X(0) = 3$   $X(1) = (4(3) + 6) \bmod 26 = 19$   $X(2) = (4(19) + 6) \bmod 26 = 2$   $X(3) = (4(2) + 6) \bmod 26 = 15$   $X(4) = (4(15) + 6) \bmod 26 = 13$   $X(14) = (4(22) + 6) \bmod 26 = 14$   $X(15) = (4(14) + 6) \bmod 26 = 9$   $X(16) = (4(9) + 6) \bmod 26 = 16$   $X(17) = (4(16) + 6) \bmod 26 = 17$

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International License (CC BY-NC 4.0) 335  $X(5) = (4(13) + 6) \bmod 26 = 5$   $X(6) = (4(5) + 6) \bmod 26 = 0$   $X(7) = (4(0) + 6) \bmod 26 = 7$   $X(8) = (4(7) + 6) \bmod 26 = 8$   $X(9) = (4(8) + 6) \bmod 26 = 12$   $X(10) = (4(12) + 6) \bmod 26 = 1$   $X(11) = (4(1) + 6) \bmod 26 = 11$   $X(12) = (4(11) + 6) \bmod 26 = 24$   $X(13) = (4(2) + 6) \bmod 26 = 22$   $X(18) = (4(17) + 6) \bmod 26 = 21$   $X(19) = (4(21) + 6) \bmod 26 = 10$   $X(20) = (4(10) + 6) \bmod 26 = 20$   $X(21) = (4(20) + 6) \bmod 26 = 6$   $X(22) = (4(6) + 6) \bmod 26 = 4$   $X(23) = (4(4) + 6) \bmod 26 = 23$   $X(24) = (4(23) + 6) \bmod 26 = 18$   $X(25) = (4(18) + 6) \bmod 26 = 25$   $X(26) = (4(25) + 6) \bmod 26 = 26$   
Random numbers generated from 1 to 26 do not appear to be repeated periodically.

Sample case : A player has been selected to play an interactive quiz game, and while the player is playing the game the player starts selecting a suitcase. The player chooses a suitcase with a random number, namely no. 11 that the player chooses to save. After that, the player chooses suitcases number 22, 14, 5,6,17. And one by one when the suitcase is selected it opens with a nominal size in it.

The following is table 2 of randomization on the value of the suitcase that has been completed by the above formula using the linear congruent method. So that the results obtained do not appear to repeat the value of the suitcase: Table 2. Randomization of Suitcase Value Number Nominal Number Randomization Number Nominal Number Randomization 1 \$ 0.1

19 14 \$ 1000 14 2 \$ 1 2 15 \$ 5000 9 3 \$ 5 15 16 \$ 10000 16 4 \$ 10 13 17 \$ 25000 17 5 \$ 25 5 18 \$ 50000 21 6 \$ 50 0 19 \$ 75000 10 7 \$ 75 7 20 \$ 100000 20 8 \$ 100 8 21 \$ 200000 6 9 \$ 200 12 22 \$ 300000 4 10 \$ 300 1 23 \$ 400000 23 11 \$ 400 11 24 \$ 500000 18 12 \$ 500 24 25 \$ 750000 25 13 \$ 750 22 26 \$ 1000000 26 After the randomization

has been completed using the linear congruent method and the result is no repetition, the first player who has selected the 22,14,5,6,17 suitcase gets a nominal value as shown in table 3 below: Table 3. First Player Suitcase Player's Suitcase Nominal Earned 22 \$ 600 14 \$ 1000 5 \$ 25 6 \$ 200000 17 \$ 250000

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International License (CC BY-NC 4.0) 336 After the suitcase is opened with the value listed in the table, the banker offers the nominal value shown to the player. If, the player chooses Agree then the player will bring the money given by the banker to the player. 4. CONCLUSION From the discussion above, several conclusions can be drawn as follows: 1.

Interactive Quis Game based on Adobe Flash can be used as a means of entertainment and add insight for its users. 2. The Linear Congruent Method Algorithm can be used to randomize questions in the Interactive Quiz application by presenting the values of the suitcase in the form of nominal in it. 3.

In order for the randomization to run smoothly or so that the same question will not reappear, it is recommended that the number of questions (question bank) should be more than the questions that will be raised in the game. Reference [1] KMe"Game - basLearand rnsiMotvaton," Calif. State Univ. Fullerton, IDT 520, Sect. 09, 2011. [2] P.- M. Noemímo, "Educati Gamesor Lear Univers. J. Educ. Res., vol. 2, no. 3, pp. 230 – 238, 2014, doi: 10.13189/ujer.2014.020305.

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