The DISMurdered

DISMATH Final Paper Written Document

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Abstract— This document will give an overview of the subject that discusses the concepts, and lessons that will be of use when creating an application as a project requirement for Discrete Mathematics. The objective is to be able to design and develop an app using MIT App Inventor. The group members have decided to create a horror-themed story game with a twist that consists of DISMATH related questions that are crucial for the user to gather clues so that the user will be able to enter the final stage that will complete the game. The members created user-friendly application that will bring addiction to the world of app users.

Keywords—discrete mathematics; logic; algorithm; functions; relations

I. Introduction

In today's modern generation, technology has been a great help to humankind. It has evolved throughout years and its uses have become broader and broader each day. From medical technology to machineries, industries, and to many more engineering fields. To further improve computer technology, Discrete Mathematics must be used since it will be the foundation of developing all sorts of applications. Through Discrete Mathematics, one will learn to combine all the algebra taught and use this in real life application instead. This project aims

to integrate the concepts learned during class, so that they would be of use in creating a simple yet unique application. For this mobile app, different concepts of algorithms were applied. The user will have the freedom to choose which question they will answer in order to gain clues. The main objective of this game is for the user to combine all the clues gained from a set of questions in order to reach the final level to defeat your opponent.

II. Concepts

A. Logical Equivalence

Logical equivalence is a type of relationship between two statements or sentences in propositional logic or Boolean algebra.

B. Rules of Inference

Mathematical logic is often used for logical proofs. Proofs are valid arguments that determine the truth values of mathematical statements. It contains certain statements that gives you a conclusion that may be a valid or invalid argument.

C. Growth of Functions
The growth of functions is directly

related to the complexity of algorithms. In order to get a handle on its complexity, we

first look for a function that gives the number of operations in terms of the size of the problem, usually measured by a positive integer n, to which the algorithm is applied.

D. Representation of Integers
Computers usually use binary
notation (with 2 as the base) when carrying
out arithmetic, and octal (base 8) or
hexadecimal (base 16) notation when
expressing characters, such as letters or
digits. In fact, we can use any integer
greater than 1 as the base when expressing
integers.

E. Graphs

These are structures consisting of vertices and edges that connect these vertices. A graph G = (V, E) consists of V, a nonempty set of vertices (or nodes)and E, a set of edges. Each edge has either one or two vertices associated with it, called its endpoints.

F. Relations

Relationships between elements of sets are represented using the structure called a relation, which is just a subset of the Cartesian product of the sets. When two objects, qualities, classes, or attributes, viewed together by the mind, are seen under some connection, that connection is called a relation.

II. Methodology

This section will show how each screen was made and what it is for.

Screen Name: Screen1

Purpose: This is the very first screen of our

game.



```
when PLAY Click
do open another screen screenName PLAY
when QUIT Click
do close application

when ABOUT Click
do open another screen screenName ABOUT
when INSTRUCTIONS Click
do open another screen screenName INSTRUCTIONS
when CREATORS Click
do open another screen screenName CREATORS

click
do open another screen screenName CREATORS

click
do open another screen screenName CREATORS

creenName
c
```

Screen Name: ABOUT

Purpose: This is a sub screen of Screen1, it contains the story of the game.



Screen Name: CREATORS

Purpose: This is a sub screen of Screen1, it contains information about the creators of The DISMurdered.



Screen Name: INSTRUCTIONS

Purpose: This is a sub screen of Screen1, it contains the instructions for the game.



Screen Name: PLAY

Purpose: You play as "Darien", you can walk around by holding either the left or the right button.



Scenario if you click the "HOUSE" Button on the PLAY screen.



Scenario if you click the "I know it" Button on the PLAY screen.



Scenario if you enter the wrong password on the PLAY screen.



Else, you will be taken to the "HOUSE" screen

Blocks for INSTRUCTIONS screen 1 out of 4

```
when RIGHTEDGE . CollidedWith
other
do set RIGHTEDGE v . Visible v to false v
when [HOUSE ] .Click
do set HOUSE v Visible v to false v
   set LEFT . Visible to false
   set RIGHT v . Visible v to false v
   set [mageSprite1 * . Visible * to | false * ]
set [Label1 * . TextColor * to | false * ]
    call Notifier1 .ShowChooseDialog
                                         Enter the code "
                                       "(XXXXXXXXXX
                                 title
                                       " [ Know it!] "
                          button1Text
                                       " (What Password!?) "
                          button2Text
                           cancelable ( false v
when LEFTEDGE v .CollidedWith
do set (LEFTEDGE ). Visible to (false )
```

Blocks for INSTRUCTIONS screen 2 out of 4

```
hen ENTERPASS . Click
  if TextBox1 v Text v = v DISCRETE v
   then open another screen screenName ( * HOUSE *
        set Label3 . Visible to true
        set PLAY . BackgroundImage . to YOUDIED.png ...
        set TextBox1 v . Visible v to false v
        set ENTERPASS . Visible to false to all Sound2 . Play
        set GAMEOVER . Visible to true
when Notifier1 .AfterChoosing
  set Label1 . Text to get choice
          compare texts get choice = * ( " | Know it! "
   then set PLAY . BackgroundImage . to . DOOR.png .
        set ENTERPASS . Visible . to true
        set TextBox1 . Visible to true set TextBox1 . TextColor to
        set [ImageSprite1 v . Visible v to [false v
        set RIGHTEDGE v . Visible v to false v set LEFTEDGE v . Visible v to false v call Sound1 v .Play
        set [HOUSE ] . Visible ] to [true ]
        set LEFT . Visible v to true v
        set RIGHT . Visible v to true v
        set [ImageSprite1 v ]. Visible v ] to [ true v ]
                           message ( " Damn it "
```

Blocks for INSTRUCTIONS screen 3 out of 4

```
when RIGHT TouchDown
do set CRIGHT TouchUp
do set CRIGHT TouchUp
do set CRIGHT TouchDown
do set CLEFT TouchDown
do set CLEFT TouchUp
```

Blocks for INSTRUCTIONS screen 4 out of 4

Screen Name: PLAYLEFT

Purpose: As Darien, you can go to "The Woods" to gather 4 out of 8 clues in order to enter the house safely.



Blocks for PLAYLEFT screen 1 out of 4

```
when (2005) Indicate speak message (*Yoursen only poto the woods once play wisely) (*Yoursen only poto the woods once play wis
```

Blocks for PLAYLEFT screen 2 out of 4

```
do set M3 v . Visible v to false v
   set Label3 v . TextColor v to
   call Notifier3 .ShowChooseDialog
                                     A relation on set A is a relation from set
                        button1Text
                        button2Text
                                   " A to B
                        cancelable (false v
 hen M4 .Click
do set M4 v . Visible v to false v
   set Label4 v . TextColor v to (
   call Notifier8 .ShowChooseDialog
                                     Also known as the tight bound
                                   .___X____
                                    " Big Theta "
                        button1Text
                                    " Big O "
                        button2Text
                        cancelable (false
```

Blocks for PLAYLEFT screen 3 out of 4

```
when Notifier1 .AfterChoosing
choice
do set Label1 . Text to get choice
   of if compare texts get choice v = v ( "Homeomorphic"
   then call TextToSpeech1 .Speak
                                   " Yes "
        call Notifier5 .ShowAlert
                notice ( X = S )
        call TextToSpeech1 .Speak
                      message ( * Damn it *
        call Notifier5 .ShowAlert
                                "You lost 1 out of 8 clues
when Notifier2 .AfterChoosing
choice
do set Label2 . Text to get choice .
   ompare texts get choice The Diskreet family is not rich or not happy
   then call TextToSpeech1 v .Speak
        call Notifier6 . ShowAlert
                    notice ( X=R "
        call TextToSpeech1 v .Speak
                        message ( Damn it "
        call Notifier6 .ShowAlert
                        notice You lost 1 out of 8 clues
```

Blocks for PLAYLEFT screen 4 out of 4

Screen Name: PLAYRIGHT

Purpose: As Darien, you can go to "Death Valley" to gather 4 out of 8 clues in order to enter the house safely.



Blocks for PLAYRIGHT screen 1out of 4

```
when PLAYRIGHT .Initialize
do call TextToSpeech1 .Speak
                                   You can only go to death forest once, play wisely!
when M3 .Click
do set M3 v . Visible v to (false v
   set Label3 . TextColor to Call Notifier3 . ShowChooseDialog
                                        The contrapositive of the converse of a conditional statement is its
                                                         X
                                        " Negation "
                           button2Text | "Inverse "
                           cancelable | false v
vhen M4 v .Click
do set M4 v . Visible v to (false v
   set Label4 v . TextColor v to
    call Notifier4 . ShowChooseDialog
                                         Find the binary expansion of the decimal number 241
                                        " [1111 0001] "
                           button2Text ( "1111 0101 "
                           cancelable false
```

Blocks for PLAYRIGHT screen 2 out of 4

```
when Notifier2 .AfterChoosing
do set Label2 v . Text v to get choice v
   o if compare texts get choice = * ( Exclusive or *
   then call TextToSpeech1 .Speak
                                    " Yes "
         call Notifier6 . ShowAlert
        call TextToSpeech1 .Speak
                         message ( " Damn it "
         call Notifier6 . ShowAlert
                notice ( You lost 1 out of 8 clues You
when Notifier3 .AfterChoosing
do set Label3 . Text to get choice
   if compare texts get choice = v ("Inverse"
   then call TextToSpeech1 .Speak
                          message ( Yes "
         call Notifier7 .ShowAlert
        call TextToSpeech1 .Speak
                          message ( " Damn it "
         call Notifier7 . ShowAlert
                       notice ( You lost 1 out of 8 clues "
```

Blocks for PLAYRIGHT screen 3 out of 4

```
when Notifier4 AfterChoosing
choice

do set tabel4 itext to get choice items and itext of the compare texts get choice items and itext of the compare texts get choice items and itext of the call extrospeecht in speak message itext of the call extrospeecht in speak messa
```

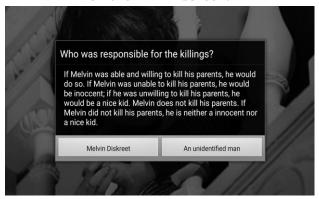
Blocks for PLAYRIGHT screen 4 out of 4

```
when Notifical Affecthooming
choice
do set (Encount) (rest to get Chocon)
then and Encount (rest to get Chocon)
the and Encount (rest to get Chocon)
the
```

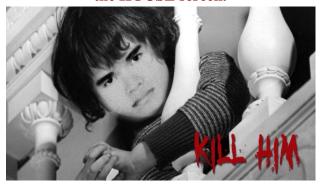
Screen Name: HOUSE

Purpose: As Darien, once you approach the front door of the house, you need to enter the password in order to enter safely.

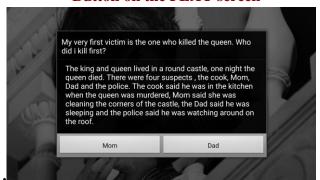
Scenario if you enter the correct password on the PLAY screen.



Scenario if you enter the correct answer on the HOUSE screen.



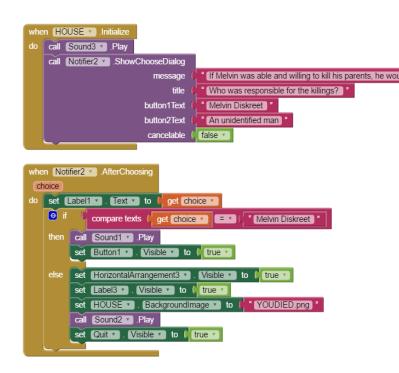
Scenario if you click the "KILL HIM" Button on the PLAY screen



Scenario if you enter the correct answer on the HOUSE screen.



Blocks for HOUSE screen 1 out of 2



Blocks for HOUSE screen 2 out of 2

```
when Button1 v. Click

do set Button1 v. Visible to false v
set Label1 v. TextColor v to false v

set Label1 v. TextColor v to false v

when Notifier1 v. AfterChoosing

choice

do set Label1 v. Text v to get choice v

of false v

when Notifier1 v. AfterChoosing

choice

do set Label1 v. Text v to get choice v

of false v

when Notifier1 v. AfterChoosing

choice

do set Label1 v. Text v to get choice v

of false v

set HorizontalArrangement2 v. Visible v to false v

set House v. BackgroundImage v to false v

set HorizontalArrangement3 v. Visible v to false v

set Label3 v. Visible v to false v

set House v. BackgroundImage v to false v

set Guit v. Visible v
```

III. Examples

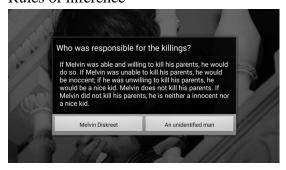
A. Logical Equivalence



Let p = rich q = happyBy applying De Morgan's Law: $\neg(p \lor q) = \neg p \land \neg q$



B. Rules of inference



Let a= able to kill his parents

w = willing to kill his parents

k = kill parents

i = innocent

n = nice kid

e = did not kill

P1
$$(a \land w) \rightarrow k$$

P2 $\neg a \rightarrow i$

P3 $\neg w \rightarrow n$

P4 ¬ p

P5 $e \rightarrow \neg i \land \neg n$

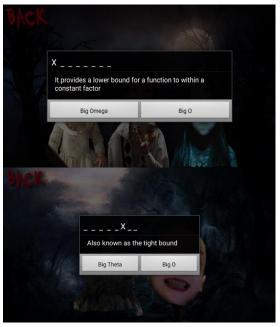
Solution:

$$\begin{array}{lll} P4 & \neg k \\ P1 & \underline{(a \land w) \rightarrow k} \text{ (Modus Tollens)} \\ &= \neg (a \land w) \\ &= \neg a v \neg w \text{ (De Morgan's)} \\ P2 & \underline{a \lor i} \\ &= \neg w \lor i \\ P3 & \underline{w \lor n} \\ &= i \lor n \\ P5 & e \rightarrow \neg i \land \neg n \text{ (Modus Tollens)} \end{array}$$

not e

(Therefore melvin did kill his parents)

C. Growth of functions



D. Representation of integers



E. Graphs



C. Relations



IV. Acknowledgement

Both members worked very hard and were able to contribute well. Since Danielle Espiritu has a background in programming, she was the one who did the coding. On the other hand, Marien Go, given that she has quite a skill in editing and design, was the one responsible for the graphics of the game. Both members used their advantages very well and incorporated it into one app.

V. References

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