CS223

Code Testing

PROJECT-2

Landslide simulation

GROUP 8

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1. INTRODUCTION

This document contains the complete unit testing of our app **LAND SLIDE SIMULATOR**. Unit testing is done after each module has been coded and reviewed successfully. The code testing team in isolation tests different units and modules of the system. Different members of the code testing team have submitted their reports.

In short, this document is meant to equip the reader with the bugs and shortcomings in the working of the MSC.

2. CODE TESTING TEAM:

TESTING TEAM PROFILE:

The code testing team comprises of the following members, all of whom are Undergraduates currently pursuing Bachelor of Technology at Indian Institute of Technology Guwahati, India in the Department of Computer Science and Engineering. All of the members are currently in sophomore year.

1.Mukul Verma
2.Ekta Dhan
3.Varun Kedia

All the members are proficient in C# and have past experience with unity

3.TEST CASES FOR BLACK BOX TESTING:-

1)Special Effects Module

a) Equivalence Class Partitioning

For this module time from when the scenario starts will be the input. Hence the partitioning is based on this time.The equivalence classes for the black box testing of module special effects are as follows:

1. {**time=(0,22sec)}**
Description:-During this time the landslide has not yet started
Expected Result:-We are expecting the user not to experience any vibration and not to hear any audio of landslide

2. {time=(22,32)}
Description:- During this time the landslide has started.
Expected Result:-We are expecting the user to get both vibration and sound of the landslide

3.{time=(32,44)}
Description:- During this time the landslide has reached its ending.
Expected Result:-We are expecting the user to experience no vibrations and to hear the audio of sound of the landslide mildly

4.{time>44s}
Description:-The landslide has ended.
Expected Result:- We are expecting the user not to experience any vibration and not to hear any audio of landslide

b)Boundary Value Analysis

The boundary value test cases of different parameters for the Equivalence class I is :-

- Time = 22 sec

  Expected Result: The user will experience both vibrations and listening to landslide audio

The boundary value test cases of different parameters for the Equivalence class II is :-

- Time=32 sec

  Expected Result: The vibrations end and the landslide audio will still be playing only mildly.

The boundary value test cases of different parameters for the Equivalence class III is :-

- Time=44 sec

  Expected Result: The user neither experiences vibration nor audio of the landslide.

c)Driver

Driver module is essential for black box testing which keeps calculating the time taken and also stores the Audio Source of the landslide. The following driver

provides the environment to the module. The driver module would contain the AudioSource File, which is the required data for the Special Effects module, and have the code to call this module. The various functions of the driver performed are

1)The driver module is taking the Landslide audio.

2) The driver module also keeps updating the time to keep a track of when to start the audio

d)Stubs:-

Stubs are also as important as the driver module. Together they form the environment for the module being tested. Stubs act as a temporary replacement for the called module, which is to output the result of the **Special effects** on the screen and give the same output as the actual product or software.

The main functions performed by the stub are as follows:-

- The stub will receive the command to start vibrate and the time duration to vibrate and to start or stop the audio which will be output of the Special Effects module .
- The output of stub will be producing the vibrations and the audio of landslide

2)Virtual Movement Module:-

a) Equivalent Class Partitioning

For this module **angle of view with horizontal** and the **distance from the area of landslide** will be the input. Hence the partitioning is based on both angle with horizontal and distance from landslide .The equivalence classes for the black box testing of module special effects are as follows:

Description:- Distance < 40 => red sphere glowing in the sky.
Distance > 40 => nothing glows in the sky

I. **{angle=(-90 deg,15 deg),red sphere glowing in the sky}**

Description:- The angle of view of the user with the horizontal is between (-90,15) and the user is in the distance <40 from expected landslide.

Expected Result:-The user is not expected to move and the user is expected to see a pop-up text indicating that he is in danger zone.

II.{angle=(-90 deg,15 deg),no red sphere glowing in sky}

Description:- The angle of view of the user with the horizontal is between (-90,15) and the user is in the distance > 40 from expected landslide.

Expected Result:-The user is not expected to move and the user doesn't see any pop-up text.

III.{angle=(15 deg,90 deg),red sphere glowing in sky}

Description:- The angle of view of the user with the horizontal is between (15,90) and the user is in the distance <40 from expected landslide.

Expected Result:-The user is expected to move with speed proportional to angle and the user is not going to see any pop message as he is in safe zone.

IV.{angle=(15 deg,90 deg),no red sphere glowing in sky}

Description:- The angle of view of the user with the horizontal is between (15,90) and the user is in the distance <40 from expected landslide.

Expected Result:-The user is expected to move with speed proportional to angle and the user is going to see pop message that he is in safe zone.

b)Boundary Value Analysis

The boundary value test cases of different parameters for the Equivalence class I is :-

- **Angle** = 15deg, **red sphere glowing in the sky**
  Expected Result: user wont move as angle is 15 deg and no pop up message
- **Angle** = -90deg, **red sphere glowing in the sky**
  Expected Result: user wont move as angle is -90 deg and no pop up message

The boundary value test cases of different parameters for the Equivalence class II is :-

- **Angle** = 15 deg, **no sphere in the sky**
  Expected Result: no movement is given for angles less than 15 deg.
- **Angle** = -90 deg, **no sphere in the sky**
  Expected Result: no movement is given for angles less than 15

The boundary value test cases of different parameters for the Equivalence class III is :-

- **Angle** = 90, **red sphere glowing in the sky**
  Expected Result: user will move and pop up message displayed

The boundary value test cases of different parameters for the Equivalence class IV is :-

- **Angle** = 90 deg, **no sphere in the sky**
  Expected Result: user will move and no pop up message displayed

The other boundary value test cases of different parameters for the Equivalence class III and IV are already included in the boundary value test cases of Equivalence class I and II. Hence not being written again.

c)Driver

Driver module is essential for black box testing which keeps measures the angle and also the distance from the landslide. The following driver provides the environment to the module. The driver module would contain the angle and distance from the landslide, which is the required data for the Virtual

Movement module, and have the code to call this module. The various functions of the driver performed are

1)The driver module is taking the angle input .

2) The driver module also keeps updating the distance from landslide

d)Stubs:-

Stubs are also as important as the driver module. Together they form the environment for the module being tested. Stubs act as a temporary replacement for the called module, which is to output the result of the Virtual Movement on the screen and give the same output as the actual product or software.

The main functions performed by the stub are as follows:-

- The stub will receive the inputs from the module on how much distance the object should move in virtual world.
- The output of stub will be producing the movements in the virtual world

4. REPORTS SUBMITTED BY TEAM MEMBERS

4.1 REPORT BY Ekta Dhan

4.1.1 BLACK BOX TESTING

a)Special Effects Module

Equivalence Classes Partitioning

Now, selecting one representative value from each equivalence class in the special effects module which has time as the input, the test suit obtained is as follows:

Using stopwatch the time is measured and the observations are made at that particular instant.

- Time = 14 sec

  Expected Result:-There should not be any sound or vibration

  Observation:-There is neither sound nor vibrations at this point of time which is quite as expected

- Time = 28 sec

  Expected Result:-There should be both sound and vibration

  Observation:-There is both sound and time at this point of time which is quite as expected.

- Time = 38 sec

  Expected Result:-There should be both a mild sound of landslide but no vibration.

  Observation:-There is only mild sound but no vibration which has gone quite as expected.

- Time = 54 sec

  Expected Result:-There should not sound or vibration.

  Observation:-There is neither sound nor vibration which goes as expected.

BOUNDARY VALUE ANALYSIS

The test cases covering the boundary values is as follows:-

- Time =22sec

  Expected Result:-User is expected to experiences both sound and vibrations.

  Observation:-There is neither sound nor vibration which is not as expected.

- Time =32sec

  Expected Result:-User should experiences sound but no vibrations.

  Observation:- There is sound but no vibration which is as expected.

- Time =44 sec

  Expected Result:-User is expected to experience neither sound nor vibrations.

  Observation:- There is neither sound nor vibration which is as expected.

b)Virtual Movement Module

Equivalence Classes Partitioning

Now, selecting one representative value from each equivalence class in the special effects module which has **angle of view with horizontal** and **distance of user from landslide** as the input.

The test suit obtained is as follows:

1. **Angle of view with horizontal= -45 deg and 'no' glowing sphere in the sky:-**

The absence of glowing sphere in the sky indicates that the distance from landslide < 40 .

Expected Result:- User is expected to be static and a pop-up text is expected indicating the user in danger Zone.

Observation :- There is no movement to the user and text message is displayed "**You are in danger Turn around and run**" .

2. **Angle of view with horizontal= 5 deg and glowing sphere in the sky:-**

The glowing sphere in the sky indicates that the distance from the landslide > 40

Expected Result:- User is expected to be static and and there should be no pop-up text.

Observation :- There is no movement in the user.

3. **Angle of view with horizontal= 45 deg and 'no' glowing sphere in the sky:-**

The absence of glowing sphere in the sky indicates that the distance from the landslide < 40

Expected Result:- User is expected to be moving with constant. speed and a there should be no pop-up text indicating the user in danger.

Observation **:-** The user is moving with constant speed and a pop-up message suggesting "**You are in danger Turn around and run**".

4. **Angle of view with horizontal= 60 deg and glowing sphere in the sky:-**

The glowing sphere in the sky indicates that the distance from the landslide > 40

Expected Result:- User is expected moving with constant speed and and there should be no pop-up text.

Observation **:-** User movement is present with no pop-up text.

Boundary Value Analysis:-

- **Angle** = 15 deg, **round sphere glowing in the sky**
  Expected Result: The user is expected to remain static and no pop-up text generation.
  Observation:- The user is in rest and no text message displayed

- **Angle** = 15 deg, **'no ' round sphere glowing in the sky**
  Expected Result: The user is expected to remain static and pop-up text generation indicating he is in danger zone.
  Observation:- The user is in rest and a pop-up message displayed **"You are in danger Turn around and run ".**
- **Angle** = 90 deg, **round sphere glowing in the sky**
  Expected Result: The user is expected to move and no pop-up text generation.
  Observation:- The user is in motion and no text message displayed

- **Angle** = 90 deg, **‘no ’ round sphere glowing in the sky**

  Expected Result: The user is expected to move and pop-up text generation indicating he is in danger zone.

  Observation:- The user is in motion and a pop-up message displayed **“You are in danger Turn around and run ”.**

- **Angle** = -90deg, **round sphere glowing in the sky**

  Expected Result: The user is expected to remain static and no pop-up text generation.

  Observation:- The user is in rest and no text message displayed

- **Angle** = -90 deg, **‘no ’ round sphere glowing in the sky**

  Expected Result: The user is expected to remain static and pop-up text generation indicating he is in danger zone.

  Observation:- The user is in rest and a pop-up message displayed **“You are in danger Turn around and run ”.**

4.2 REPORT BY MUKUL VERMA

4.2.1 BLACK BOX TESTING

a)Special Effects Module

Equivalence Classes Partitioning

Now, selecting one representative value from each equivalence class in the special effects module which has time as the input, the test suit obtained is as follows:

Using stopwatch the time is measured and the observations are made at that particular instant.

- Time = 21 sec

Expected Result:-There should not be any sound or vibration this point.

Observation:-There is sound of landslide and also vibrations at of time which is not the expected

- Time = 24 sec

  Expected Result:-There should be both sound and vibration

  Observation:-There is both sound and vibration at this point of time which is quite as expected.

- Time = 40 sec

  Expected Result:-There should be both a mild sound of landslide but no vibration.

  Observation:-There is only mild sound but no vibration which has gone quite as expected.

- Time = 60 sec

  Expected Result:-There should not sound or vibration.

  Observation:-There is neither sound nor vibration which goes as expected.

Boundary Value Analysis:-

The test cases covering the boundary values is as follows:-

- Time =22sec

  Expected Result:-User is expected to experiences both sound and vibrations.

  Observation:-There is both sound and vibrations.

- Time =32sec

  Expected Result:-User should experiences sound but no vibrations.

  Observation:- There is no vibration but there is a mild sounds.

- Time =44 sec

  Expected Result:-User is expected to experience neither sound nor vibrations.

  Observation:- There is neither sound nor vibration.

b)Virtual Movement Module

Equivalence Classes Partitioning

Now, selecting one representative value from each equivalence class in the special effects module which has **angle of view with horizontal** and **distance of user from landslide** as the input, the test suit obtained is as follows:

The test suit obtained is as follows:

1. **Angle of view with horizontal= -60deg and red sphere glowing in the sky:-**

The glowing sphere in the sky indicates that the distance from landslide > 40

Expected Result:- User is expected to be static and a pop-up text is expected indicating the user in danger Zone.

Observation :- User is static and is not moving. A pop up message saying "**You are in danger Turn around and run**" .

2. **Angle of view with horizontal=-45deg and 'no' glowing sphere in the sky:-**

The absence of glowing sphere in the sky indicates that the distance from the landslide <40

Expected Result:- User is expected to be static and and there should be no pop-up text.

Observation :- User is static and no pop up message is Displayed

3. **Angle of view with horizontal= 60deg and red sphere glowing in the sky:-**

The glowing sphere in the sky indicates that the distance from landslide >40

Expected Result:- User is expected to be moving at a speed and and there should be no pop-up text

Observation :- User is moving and no pop up message is Displayed

4.Angle of view with horizontal= 60deg and nothing glowing in the sky:-

The glowing sphere in the sky indicates that the distance from landslide >40

Expected Result:- User is expected to be moving at a speed and and there should be no pop-up text

Observation :- User is moving at and no pop up message is Displayed

Boundary Value Analysis:-

- **Angle** = 15 deg, **round sphere glowing in the sky**

  Expected Result: The user is expected to remain static and no pop-up is displayed.

  Observation:- The user is in rest and no text message displayed

- **Angle** = 15 deg, **‘no ’ round sphere glowing in the sky**

  Expected Result: The user is expected to remain static and pop-up text generation indicating he is in danger zone.

  Observation:- The user is in rest and a pop-up message displayed **“You are in danger Turn around and run ”.**

- **Angle** = 90 deg, **round sphere glowing in the sky**

  Expected Result: The user is expected to move and no pop-up text generation.

  Observation:- The user is in motion and no text message displayed

- **Angle** = 90 deg, **‘no ’ round sphere glowing in the sky**

  Expected Result: The user is expected to move and pop-up text generation indicating he is in danger zone.

  Observation:- The user is in motion and a pop-up message displayed **“You are in danger Turn around and run ”.**

- **Angle** = -90deg, **round sphere glowing in the sky**

  Expected Result: The user is expected to remain static and no pop-up text generation.

  Observation:- The user is in rest and no text message displayed

- **Angle** = -90 deg, **‘no ’ round sphere glowing in the sky**

  Expected Result: The user is expected to remain static and pop-up text generation indicating he is in danger zone.

  Observation:- The user is in rest and a pop-up message displayed **“You are in danger Turn around and run ”.**

4.3 REPORT BY VARUN KEDIA

4.3.1 BLACK BOX TESTING

a)Special Effects Module

Equivalence Classes Partitioning

Now, selecting one representative value from each equivalence class in the special effects module which has time as the input, the test suit obtained is as follows:

Using stopwatch the time is measured and the observations are made at that particular instant.

- Time = 12 sec

  Expected Result:-There should not be any sound or vibration this point.

  Observation:-There is no sound nor vibration at this time which quite is the expected.

- Time = 30 sec

  Expected Result:-There should be both sound and vibration

  Observation:-There is sound but no vibration at this point of time which is not quite as expected.

- Time = 35 sec

  Expected Result:-There should be both a mild sound of landslide but no vibration.

  Observation:-There is only mild sound but no vibration which has gone quite as expected.

- Time = 70 sec

  Expected Result:-There should not sound or vibration.

  Observation:-There is neither sound nor vibration which goes as expected.

Boundary Value Analysis:-

The test cases covering the boundary values is as follows:-

- Time =22sec

  Expected Result:-User is expected to experiences both sound and vibrations.

  Observation:-There is both sound and vibrations at this point of time which tallies with the expected result.

- Time =32sec

  Expected Result:-User should experiences sound but no vibrations.

  Observation:- There are both sounds and vibrations of landslide which does not tally with the expected one.

- Time =44 sec

  Expected Result:-User is expected to experience neither sound nor vibrations.

  Observation:- There is neither sound nor vibration at this time which tallies with the expected result

b)Virtual Movement Module

Equivalence Classes Partitioning

Now, selecting one representative value from each equivalence class in the special effects module which has **angle of view with horizontal** and **distance of user from landslide** as the input.

The test suit obtained is as follows:

1. **Angle of view with horizontal= 0 deg and 'no' glowing sphere in the sky:-**

The absence of glowing sphere in the sky indicates that the distance from landslide < 40 .

Expected Result:- User is expected to be static and a pop-up text is expected indicating the user in danger Zone.

Observation :- There is no movement to the user and text message is displayed **"You are in danger"**

2. **Angle of view with horizontal= -30 deg and glowing sphere in the sky:-**

The glowing sphere in the sky indicates that the distance from the landslide > 40

Expected Result:- User is expected to be static and and there should be no pop-up text.

Observation :- The user is static(no movement).

3. **Angle of view with horizontal= 60 deg and 'no' glowing sphere in the sky:-**

The absence of glowing sphere in the sky indicates that the distance from the landslide < 40

Expected Result:- User is expected to be moving with constant. speed and a there should be no pop-up text indicating the user in danger.

Observation :- The user is moving with constant speed and a pop-up message suggesting "**You are in danger Turn around and run**".

4. **Angle of view with horizontal= 75 deg and glowing sphere in the sky:-**

The glowing sphere in the sky indicates that the distance from the landslide > 40

Expected Result:- User is expected moving with constant speed and and there should be no pop-up text.

Observation :- User movement is present with no pop-up text."**You are in danger Turn around and run**".

Boundary Value Analysis:-

- **Angle** = 15 deg, **round sphere glowing in the sky**

  Expected Result: The user is expected to remain static and no pop-up is displayed.

  Observation:- The user is in rest and no text message displayed

- **Angle** = 15 deg, **'no ' round sphere glowing in the sky**

  Expected Result: The user is expected to remain static and pop-up text generation indicating he is in

danger zone.

Observation:- The user is in rest and a pop-up message displayed **“You are in danger Turn around and run ”.**

- **Angle** = 90 deg, **round sphere glowing in the sky**

  Expected Result: The user is expected to move and no pop-up text generation.

  Observation:- The user is in motion and no text message displayed

- **Angle** = 90 deg, **‘no ’ round sphere glowing in the sky**

  Expected Result: The user is expected to move and pop-up text generation indicating he is in danger zone.

  Observation:- The user is in motion and a pop-up message displayed **“You are in danger Turn around and run ”.**

- **Angle** = -90deg, **round sphere glowing in the sky**

  Expected Result: The user is expected to remain static and no pop-up text generation.

  Observation:- The user is in rest and no text message displayed

- **Angle** = -90 deg, **‘no ’ round sphere glowing in the sky**

  Expected Result: The user is expected to remain static and pop-up text generation indicating he is in danger zone.

  Observation:- The user is in rest and a pop-up message displayed **“You are in danger Turn around and run ”.**

5.WHITE BOX TESTING

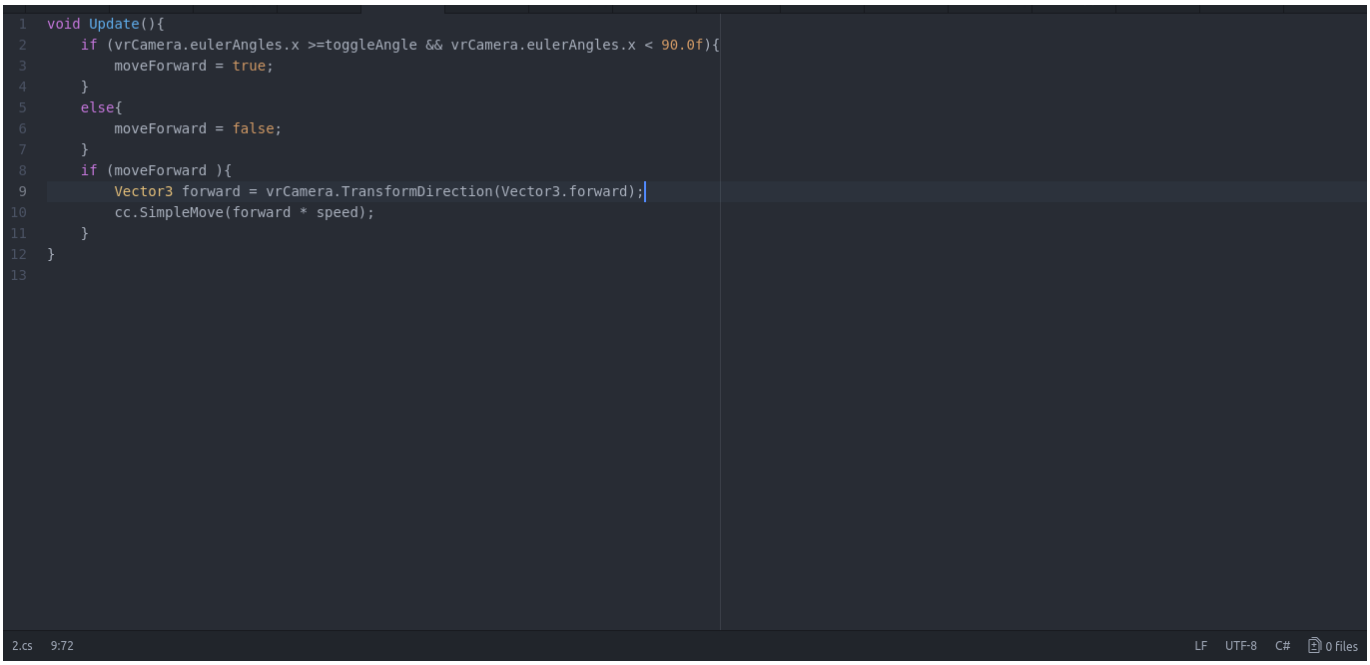
5.1 Virtual Movement

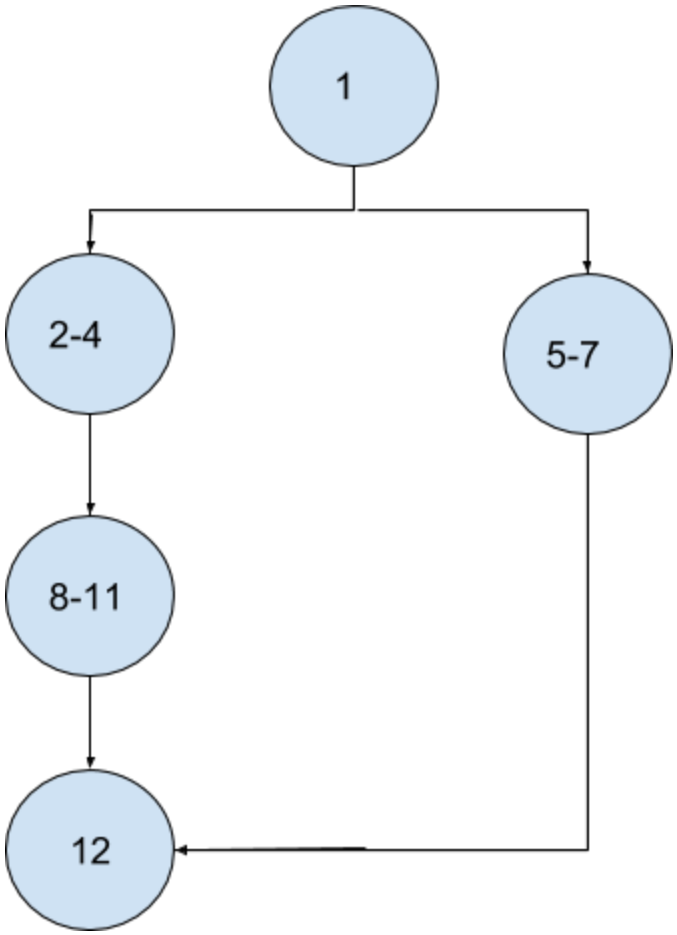
In this module the following functions are tested. The control flow graphs for each of the function given along with a brief overview of the function. The control flow graphs are also given for each of these functions.

a)Update in VrLookWalk

Description

This function is used to calculate the distance of movement of the user in virtual world. First we calculate whether we want to move or not based on the angle inputs and make the moveForward variable as true or false.If true then the direction of movement is stored in the forward and vector and then a move is made in the same direction.





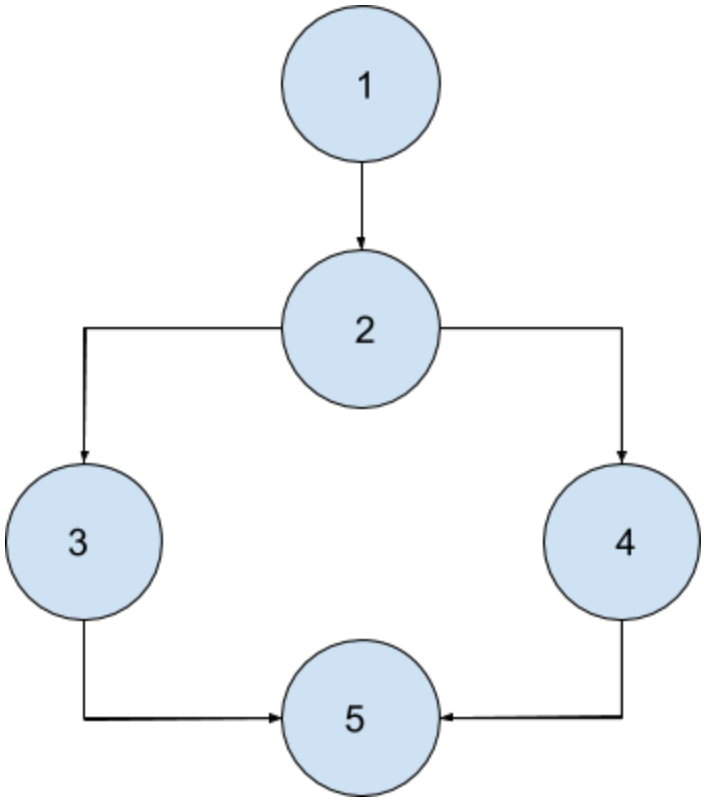
The number of linearly independent paths=2
Therefore the number of test cases to be considered for path coverage testing =2
Test Cases are

1)Angle of view with Horizontal=45
2)Angle of view with Horizontal=-45

b)Update function

Description:-This function is used to display pop up messages whenever the distance from the landslide area < 40. Here textMesh is enabled in such case and the popup is displayed.

```
function Update (){
  if (Vector3.Distance(transform.position, player.position) < showOnDistance)
    textMesh.enabled = true;
    else textMesh.enabled = false;
}
```



The number of linearly independent paths=2
Therefore, the number of test cases to be considered for path coverage testing=2

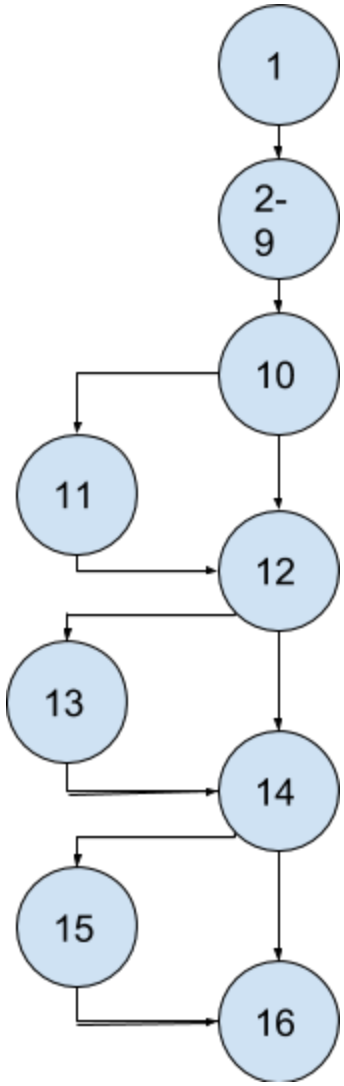
Test Cases are

1)Distance of user from the landslide area=35
2)Distance of user from the landslide area=50

5.2 Special Effects

In this module the following functions are tested. The control flow graphs for each of the function given along with a brief overview of the function. The control flow graphs are also given for each of these functions.

a)OnGuI function in TestAudioConfiguration class
Description
We get the audio source and configure it. Whenever it is modified the modified bool becomes true and we reset the audio source. When start button is clicked source starts playing. When stop button is clicked source stop played



The number of linearly independent paths=8

Therefore the number of test cases to be considered for path coverage testing=8

Test cases are

1. modified=’True’,GUIlayout.Button(‘start’)=’True’,GUIlayout.Button(‘start’)=’True’
2. modified=’True’,GUIlayout.Button(‘start’)=’True’,GUIlayout.Button(‘start’)=’False’
3. modified=’True’,GUIlayout.Button(‘start’)=’False’,GUIlayout.Button(‘start’)=’True’
4. modified=’True’,GUIlayout.Button(‘start’)=’False’,GUIlayout.Button(‘start’)=’False’
5. modified=’False’,GUIlayout.Button(‘start’)=’True’,GUIlayout.Button(‘start’)=’True’

6. modified=’False’,GUIlayout.Button(‘start’)=’True’,GUIlayout.Button(‘start’)=’False’
7. modified=’False’,GUIlayout.Button(‘start’)=’False’,GUIlayout.Button(‘start’)=’True’
8. modified=’False’,GUIlayout.Button(‘start’)=’False’,GUIlayout.Button(‘start’)=’False’

5.CONCLUSION

The white-box testing and the black-box testing were very successful.

In the **black-box testing**,

- We found that we are able to hear the audio of the landslide 20sec but the expected value is 22 sec.Thus there is need to be check the boundary conditions in the code for errors. The algorithm used to produce audio needs to be reviewed again

In **white-box testing**

- Various test cases were selected to cover different linearly independent paths in the control flow graphs of all the functions in the module “Virtual Movement” and “Special Effects”. It was found that every statement was covered for atleast some of the test cases.