Test Plan

For Environment Model Building Tool (EMBT)

Version 1.0

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Esteban Guillen
CIS 895 – MSE Project
Kansas State University
Table of Contents

1. Test Plan Identifier ................................................................................................................... 3
2. Introduction ................................................................................................................................. 3
3. Test Items ...................................................................................................................................... 3
4. Features to Be Tested ................................................................................................................... 3
   4.1. Environment Model Builder .................................................................................................. 3
   4.2. Environment Terrain Builder ............................................................................................... 3
   4.3. Environment Object Builder ............................................................................................... 3
5. Features Not to Be Tested ........................................................................................................... 4
6. Approach ........................................................................................................................................ 4
7. Item Pass/Fail Criteria ................................................................................................................ 4
8. Suspension Criteria and Resumption Requirements ................................................................. 4
   8.1. Suspension Criteria ............................................................................................................... 4
   8.2. Resumption Requirement ..................................................................................................... 4
9. Test Deliverables ........................................................................................................................ 4
   9.1. Test Log ................................................................................................................................. 4
10. Testing Tasks ............................................................................................................................. 4
   10.1. Scenario for Environment Object Building Tool ................................................................. 5
      10.1.1. Test Case 1 – Testing SR12 and SR13 ...................................................................... 5
      10.1.2. Test Case 2 – Testing SR17 ...................................................................................... 5
      10.1.3. Test Case 3 – Testing SR15 and SR16 .......................................................... 5
      10.1.4. Test Case 4 – Testing SR18 ....................................................................................... 5
      10.1.5. Test Case 5 – Testing SR19 ....................................................................................... 5
      10.1.6. Test Case 6 – Testing SR20 and SR23 .......................................................... 6
      10.1.7. Test Case 7 – Testing SR14 ....................................................................................... 6
      10.1.8. Test Case 8 – Testing SR13.1 ...................................................................... 6
   10.2. Scenario for Environment Terrain Building Tool ................................................................. 6
      10.2.1. Test Case 9 – Testing SR6 and SR7 ...................................................................... 6
      10.2.2. Test Case 10 – Testing SR9 and SR10 ..................................................................... 6
      10.2.3. Test Case 11 – Testing SR11 .................................................................................... 6
      10.2.4. Test Case 12 – Testing SR21 and SR23 .......................................................... 7
      10.2.5. Test Case 13 – Testing SR8 ...................................................................................... 7
   10.3. Scenario for Environment Model Building Tool ................................................................. 7
      10.3.1. Test Case 14 – Testing SR1, SR2, SR5.1, SR5.2, SR5.3, and SR5.4 .................. 7
      10.3.2. Test Case 15 – Testing SR2 ...................................................................................... 7
      10.3.3. Test Case 16 – Testing SR3 ...................................................................................... 7
      10.3.4. Test Case 17 – Testing SR4 ...................................................................................... 7
      10.3.5. Test Case 18 – Testing SR22 and SR23 .......................................................... 8
      10.3.6. Test Case 19 – Testing SR24, SR25, and SR26 .................................................. 8
11. Environment Needs .................................................................................................................... 8
1. **Test Plan Identifier**
   EMBT-TP2004

2. **Introduction**
   This document describes the methods that will be used to test the Environment Model Building Tool (EMBT). The EMBT is divided into three modes of operation; the Environment Model Builder, the Environment Object Builder, and the Environment Terrain Builder. The three modes will be viewed as separate components of the system. Each component will be tested on an individual basis with respect to the Specific Requirements, which are described in the Vision document, that relate to them.

3. **Test Items**
   The following are the components of the EMBT that will be tested
   - Environment Model Builder
   - Environment Object Builder
   - Environment Terrain Builder

4. **Features to Be Tested**
   The following lists what features of each component that will be tested. The features reference the Specific Requirements (SR) outlined in the Vision document.

   **4.1. Environment Model Builder**
   - SR1 – Vision document section 3.1.1.1
   - SR2 – Vision document section 3.1.1.2
   - SR3 – Vision document section 3.1.1.3
   - SR4 – Vision document section 3.1.1.4
   - SR5 – Vision document section 3.1.1.5
   - SR5.1 – Vision document section 3.1.1.6
   - SR5.2 – Vision document section 3.1.1.7
   - SR5.3 – Vision document section 3.1.1.8
   - SR5.4 – Vision document section 3.1.1.9
   - SR5.5 – Vision document section 3.1.1.10
   - SR5.6 – Vision document section 3.1.1.11
   - SR5.7 – Vision document section 3.1.1.12
   - SR22 – Vision document section 3.1.4.3
   - SR23 – Vision document section 3.1.4.4
   - SR24 – Vision document section 3.1.5.1
   - SR25 - Vision document section 3.1.5.2
   - SR26 – Vision document section 3.1.6.1

   **4.2. Environment Terrain Builder**
   - SR6 – Vision document section 3.1.2.1
   - SR7 – Vision document section 3.1.2.2
   - SR8 – Vision document section 3.1.2.3
   - SR9 – Vision document section 3.1.2.4
   - SR10 – Vision document section 3.1.2.5
   - SR11 – Vision document section 3.1.2.6
   - SR21 – Vision document section 3.1.4.2
   - SR23 – Vision document section 3.1.4.4
4.3. Environment Object Builder

- SR12 – Vision document section 3.1.3.1
- SR13 – Vision document section 3.1.3.2
- SR13.1 – Vision document section 3.1.3.3
- SR14 – Vision document section 3.1.3.4
- SR15 – Vision document section 3.1.3.5
- SR16 – Vision document section 3.1.3.6
- SR17 – Vision document section 3.1.3.7
- SR18 – Vision document section 3.1.3.8
- SR18.1 – Vision document section 3.1.3.9
- SR19 – Vision document section 3.1.3.10
- SR20 – Vision document section 3.1.4.1
- SR23 – Vision document section 3.1.4.4

5. Features Not to Be Tested

Future requirements SR5.5, SR5.6, SR5.7 and SR18.1 will not be tested.

6. Approach

In order to test any feature the EMBT will have to be running a local machine. The features describe how the user will interact with the system, so the testing will require a tester to interact with the system in the same way a typical user would. To simulate a typical user’s actions a set of scenarios will be created which describe a set of actions to take in order to achieve a desired result. Each action will reflect a feature to be tested. Each component will have a scenario which will test all its features upon completion.

7. Item Pass/Fail Criteria

Each action of a scenario will correspond to a test case. A test case will pass if the feature(s) described by its action are demonstrated by the tester. A test case will fail when a feature cannot be demonstrated. A scenario passes when all the test cases for its actions have passed. If any of the test cases for a given scenario fail then the scenario has failed.

8. Suspension Criteria and Resumption Requirements

8.1. Suspension Criteria

Testing will be suspended if a test case fails. That test case will then be logged as “failed” and a description will be given which will identify at which point the test failed.

8.2. Resumption Requirement

Testing will resume if the rest of the test cases within the current scenario can be attempted. It may be the case that the failed test case will prevent the rest of the test cases from being tested; if this happens the tester will need to log the reason why each of the remaining test cases could not be tested, and then the tester will need to start testing the next scenario.

9. Test Deliverables

9.1. Test Log

The Test Log will document all test cases and record if the test case passed or failed. A test case that fails will have the reasons for failure and suggested solutions documented.

10. Testing Tasks

To perform the test cases the tester will need to have the EMBT running on a local machine. The tester should be familiar with how to use the tool. The tester will also need to have the scenarios and
test cases which are to be tested. Finally the tester will need to have the test log to document each test case.

10.1. Scenario for Environment Object Building Tool

The object builder is intended to build object from primitive shapes. For testing the tester will stack all four types of primitive shapes on top of each other. This collection of primitives will be saved to the database and then reused to build a new shape. The test cases below will provide a step by step process for the scenario.

10.1.1. Test Case 1 – Testing SR12 and SR13

Task(s)
- Load a cone, sphere, box, and cylinder onto the drawing surfaces.

Verification
- The shapes should be visible on the drawing surface.

10.1.2. Test Case 2 – Testing SR17

Task(s)
- Resize the box so that each dimension is about 3m.
- Resize the cone so that it has a radius of 1.5m and a height of 4m.
- Resize the sphere so that it has a radius of 0.5m.
- Resize the cylinder so that it has a radius of 1.5m and a height of 1m.

Verification
- Each shape has changed in size.

10.1.3. Test Case 3 – Testing SR15 and SR16

Task(s)
- Change the box to red and a weight of 5kg.
- Change the cylinder to yellow and a weight of 2kg.
- Change the cone to orange and a weight of 4kg.
- Change the sphere to blue and a weight of 2kg.

Verification
- The box is visibly red and its property box shows a weight of 5kg.
- The cylinder is visibly yellow and its property box shows a weight of 2kg.
- The cone is visibly orange and its property box shows a weight of 4kg.
- The sphere is visibly blue and its property box shows a weight of 2kg.

10.1.4. Test Case 4 – Testing SR18

Task(s)
- Position the box in the center of the drawing surfaces and have it sit flat on the surface.
- Position the cylinder on top of the box and center the base of the cylinder with the center of the top of the box.
- Position the cone on top of the cylinder with the base of the cone and top of the cylinder centered.
- Position the sphere on top of the cone with the bottom of the sphere resting on the top of the cone.

Verification
- The shapes are stacked on top of each other at the center of the building surface.

10.1.5. Test Case 5 – Testing SR19

Task(s)
- Zoom in and out to check that the primitive shapes sit flush on top of each other.
10.1.6. Test Case 6 – Testing SR20 and SR23

Task(s)
- Use the 3D view to observe what you have created. View the object from all different angles.

Verification
- All the shapes should be visible in 3D.

10.1.7. Test Case 7 – Testing SR14

Task(s)
- Save the object to the object database with a name of test-object.

Verification
- The saved object should be added to the object finder search feature.

10.1.8. Test Case 8 – Testing SR13.1

Task(s)
- Start a new object builder session. The object which was saved from the previous test case should now be available in the library. Place four of those objects on the drawing surface. Arrange the four composite objects around the center of the drawing surface. Save this new object as test-object2.

Verification
- The saved object should be added to the object finder search feature.

10.2. Scenario for Environment Terrain Building Tool

The terrain builder is intended to provide an interface to create a surface. The surface will be created by specifying the elevation for regions on the surface. For testing the tester will create a large hill in the middle of the surface.

10.2.1. Test Case 9 – Testing SR6 and SR7

Task(s)
- Select the desired regions of the building surface and specify the elevations. The selected region should be in the center of the surface and should have a rectangular shaped flat top. The region should look like a large hill.

Verification
- The selected regions should have a change of color to indicate the elevation change.

10.2.2. Test Case 10 – Testing SR9 and SR10

Task(s)
- Select the whole hill region and give it a grass surface from the properties window.

Verification
- The hill region should be covered with a textured grass surface.

10.2.3. Test Case 11 – Testing SR11

Task(s)
- Zoom in and out to observe what you have created.

Verification
- When zooming out the objects should get smaller.
- When zooming in the objects should get bigger.

10.2.4. **Test Case 12 – Testing SR21 and SR23**

**Task(s)**
- Use the 3D view to observe what you have created. View the terrain from all different angles.

**Verification**
- The terrain should be visible in 3D and the elevation changes should be clearly seen.

10.2.5. **Test Case 13 – Testing SR8**

**Task(s)**
- Save the terrain to the terrain database with the name *test-terrain*.

**Verification**
- The saved terrain should be added to the terrain finder search feature.

10.3. **Scenario for Environment Model Building Tool**

The model builder is intended to provide an interface to combine terrains and objects to form an environment. The tester will use the *test-terrain* terrain and the *test-object2* object that was created in the previous scenarios.

10.3.1. **Test Case 14– Testing SR1, SR2, SR5.1, SR5.2, SR5.3, and SR5.4**

**Task(s)**
- Select the *test-terrain* from the preview window.
- View it in 3D from the 3D preview window.
- Add the terrain to the building surface.
- Select the *test-object2* from the preview window.
- View it in 3D from the 3D preview window.
- Add 4 of them to the building surface.

**Verification**
- The terrain and objects should be visible on the building surface.

10.3.2. **Test Case 15– Testing SR2**

**Task(s)**
- Position the 4 *test-object2* objects at different locations.

**Verification**
- The objects have moved from their original location.

10.3.3. **Test Case 16– Testing SR3**

**Task(s)**
- Select a camera from the object preview window and add it to the building surface. From the camera properties window position the camera at (10,10,10) and pointing at (5,3,2).

**Verification**
- The camera should be visible on the building surface.

10.3.4. **Test Case 17– Testing SR4**

**Task(s)**
- Select a light source from the object preview window and add it to the building surface. From the light source properties window position the light at (100,100,100).

**Verification**
- The new light source can be observed in the 3D view.
10.3.5. Test Case 18– Testing SR22 and SR23
Task(s)
• Use the 3D view to observe the environment. View the environment from all different angles.
Verification
• The terrain and objects should be visible in the 3D view.

10.3.6. Test Case 19– Testing SR24, SR25, and SR26
Task(s)
• Save the environment to the database with name test-environment.
Verification
• Exit the current environment builder session and start a new session.
• Load the saved environment from the desktop and check to ensure looks correct.

11. Environment Needs
In order for the EMBT to run the testing system will be running Windows XP or Linux and have to support Java 1.3.1 or later and Java 3D 1.3.1 or later. It is recommended that the testing system have a modern video card which supports OpenGL.