User Manual
For Environment Model Building Tool (EMBT)

Version 1.0

Submitted in partial fulfillment of the requirements of the degree of MSE

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

1. Introduction ................................................................................................................. 3
2. Installation and Set-up .............................................................................................. 3  
   2.1. Required Software .............................................................................................. 3  
   2.2. Recommended Hardware .................................................................................... 3  
   2.3. Required Files ..................................................................................................... 3  
3. Object Building Tool ................................................................................................. 3  
   3.1. Running ............................................................................................................... 3  
   3.2. Creating a New Object ....................................................................................... 3  
   3.3. Saving an Object to the Library ......................................................................... 8  
   3.4. Exporting an Object to Disk .............................................................................. 8  
   3.5. Opening a Saved Object ................................................................................... 8  
4. Terrain Building Tool ................................................................................................. 9  
   4.1. Running ............................................................................................................... 9  
   4.2. Creating a New Terrain ..................................................................................... 9  
   4.3. Saving a Terrain to the Library ......................................................................... 11  
   4.4. Exporting a Terrain to Disk .............................................................................. 11  
   4.5. Opening a Saved Terrain .................................................................................. 12  
5. Environment Model Building Tool ............................................................................. 12  
   5.1. Running .............................................................................................................. 12  
   5.2. Creating a New Model ..................................................................................... 12  
   5.3. Exporting a Model to Disk ................................................................................. 15  
   5.4. Opening a Saved Model .................................................................................... 15
1. Introduction
   This document will explain how to set-up and use the Object Building Tool, the Terrain Building Tool, and the Environment Model Building Tool.

2. Installation and Set-up

2.1. Required Software
   - Java 1.4.2 or Later (http://java.sun.com/j2se/1.4.2/download.html)
   - Java 3D 1.3.1 (http://java.sun.com/products/java-media/3D/download.html)
   - Windows 2000 or Linux or Solaris or MacOS (note Linux and MacOS don’t have an official version of Java 3D provided by Sun, but ports are available).

2.2. Recommended Hardware
   - X86 compatible processor 1.6 GHz or higher
   - Video card with Opengl support and 32MB of ram

2.3. Required Files
   All the code and executables for running the software is included in “MSE – Esteban Guillen.zip”. To install just unzip to the local machine. The following is a breakdown of the included files:

   MSE – Esteban Guillen - top level directory
      |--eob.bat – batch file for starting the Object Building Tool
      |--etb.bat – batch file for starting the Terrain Building Tool
      |--emb.bat – batch file for starting the Environment Model Building Tool
      |--EMBT-0.1 - the eclipse project directory
         |--bin –directory contains all the .class files for the project
            |--object-lib – directory for the object library
            |--terrain-lib – directory for the terrain library
         |--doc - directory contains all the Javadoc for the project
         |--src – directory contains all the .java files for the project
         |--.classpath - eclipse classpath file
         |--.project - eclipse project file

3. Object Building Tool

3.1. Running
   To start the applications simply double click on the eob.bat file.

3.2. Creating a New Object
   Once the application is running you can create a new object simply select the New File menu option. The following screen shows the result of selecting the new File menu option.
There are two tabs; one for building the object, the Drawing View, and other for viewing in 3-D, the 3D View. From the Drawing view we can select objects from the list provided in the Library Objects window. Selecting is achieved by double clicking on an item in the list. Once an item is selected it will appear in the preview window next to the list. The following screenshot show the result of double clicking on the cone list item.
Once an object is selected it can be added to the drawing surfaces. This is achieved by clicking the **add** button under the preview window. Adding an object will place a 2-D representation of the object in each of the three drawing surfaces. The following screenshot show the result of adding the cone.
Once the object has been added to the three drawing surfaces, it can be modified. This is achieved by clicking on the object in any of the three drawing surfaces. Once an object is clicked, a properties window will be provided to allow the object to be modified. The following screenshot shows the properties window for the cone.
The properties window will allow you to change the size, location, color, and weight of the cone. The following screenshot shows the result of changing the size to a height of 12, a radius of 2, location (2, 2, 2), and color (0.56, 0.51, 0).

This object can be viewed in 3-D by clicking on the 3-D View tab. The following screenshot shows the result of clicking on the 3-D View tab.
Once the user is done building the object (note that more objects from the library window can be added) it can be added to the library or saved to disk.

### 3.3. Saving an Object to the Library

At any time the object being built can be added to the library. This is achieved by selecting the **Save to Library** File menu option. After selecting this option a pop-up window will be provided to name the object. After providing the name and clicking the **OK** button the object will be added to the list provided in the Library Objects window.

### 3.4. Exporting an Object to Disk

At any time the object being built can be saved to disk in XML format. This is achieved by selecting the **Export to XML** File menu option. After selecting this option a save window will be provided to select the location and name of the file to save. The user should provide a .xml extension to the file name.

### 3.5. Opening a Saved Object

After starting the application the user can open a previously saved (an XML file) object. This is achieved by selecting the **Open** File menu option. After selecting that option an open window will be provided to select the object to open. After the file is selected and the open button is clicked that object will be loaded onto the three drawing surfaces. At this point the user has all
the options that were provide when starting a new object like adding more objects and modifying the ones that are on the drawing surfaces.

4. Terrain Building Tool

4.1. Running

To start the applications simply double click on the etb.bat file.

4.2. Creating a New Terrain

Once the application is running you can simply select the New File menu option. After selecting the new option you will be provided with the following screen shown below.

The Terrain builder consists of two main tabs. The first is the Building View which consists of a grid building surface, a height selector, and a preview window. The grid building surface represents points on the surface that is being build. The building surface is an 11x11 grid and represents the points of a 10x10 grid surface. Each point is 100m apart in the actual terrain. The points have a color code for representing height. Black represents a height of 0 while light green represents 100m. Heights in between are represented as shades of green with the darker shades the lower elevations and the lighter shades representing the higher elevation. To select a height you just need to move the height selector slider bar in the upper right corner. The selected height will be displayed just above the center of the slider bar. Once a desired height is selected you can click on of the grid point, which will raise that point to height indicated by the slider bar. The grid point will also get colored to the appropriate shade of green. The following figure shows a screenshot after selecting a height of 65 and then selecting 4 points in the center of the building surface.
Clicking on the 3D View tab will show the 3-D view of the terrain as seen below.
From the 3D View the raise in elevation can be easily seen. Once the desired terrain has been created it can be saved to disk as an XML file or saved to the library.

At any point a terrain that has been saved in the library can be added. Doing this will clear any work that has already been done to that point and load the terrain from the library. Loading from the library is accomplished by double clicking on one of the items listed in the Library Terrains window in the Building View tab. After double clicking the list item it will appear in the preview window to the right. Once the terrain is loading into the preview window it can be added to the building surface by clicking the add button under the preview window. The following window shows the result of double clicking terrain-test and adding it to the building surface.

At this point the terrain can be modified just as before.

4.3. Saving a Terrain to the Library

At any time the object being built can be added to the library. This is achieved by selecting the Save to Library File menu option. After selecting this option a pop-up window will be provided to name the terrain. After providing the name and clicking the OK button the terrain will be added to the list provided in the Library Terrains window.

4.4. Exporting a Terrain to Disk

At any time the terrain being built can be saved to disk in XML format. This is achieved by selecting the Export to XML File menu option. After selecting this option a save window will be provided to select the location and name of the file to save. The user should provide a .xml extension to the file name.
4.5. Opening a Saved Terrain

After starting the application the user can open a previously saved (an XML file) terrain. This is achieved by selecting the **Open** File menu option. After selecting that option an open window will be provided to select the terrain to open. After the file is selected and the open button is clicked that terrain will be loaded onto the building surface. At this point the user has all the options that were provide when starting a new terrain.

5. Environment Model Building Tool

5.1. Running

To start the applications simply double click on the **emb.bat** file.

5.2. Creating a New Model

Once the application is running you can simply select the **New** File menu option. After selecting the new option you will be provided with the following screen shown below.

The Environment Model Building tool consists of two main tabs; the Drawing View and the 3D View. The Drawing view provides a top view of the locations of the added objects. The 3D View provides a 3-D view of the added objects and terrain. In the Drawing View objects and terrains are added in the same manner as in the Object Builder and Terrain Builder. When objects are
added they are placed in the center of the building surface grid and are represented as a square box. When a terrain is added there is nothing shown on the building surface grid, but in the 3D View the terrain is correctly displayed.

Once an object is added to the building surface it can be moved through the properties window. The properties window is provided when clicking on an object in the building surface grid. The following screenshot show the result of adding a **tank** object and a **pit** terrain.

The square box in the center of the building surface grid represents the **tank** object. The tank can be moved by clicking on it and using the controls on the properties window. The following screenshot shows the properties window for the **tank**.
Objects can be moved in any direction. The Y direction is the up direction so it will not show on the 2-D building surface grid.

The 3D View shows both the added objects and added terrain (currently only one terrain can be loaded at a time, so adding another terrain will over ride the previous one). The following screenshot shows the **tank** object and **pit** terrain.

The **tank** is hard to see because it is so much smaller than the terrain which is 1000x1000m. To see the **tank** better you can zoom-in by holding down the **Alt** key and the dragging the mouse down while holding down the **left** button. The following is the result of zoom-in in on the **tank**.
5.3. Exporting a Model to Disk

At any time the environment model being built can be saved to disk in XML format. This is achieved by selecting the Export to XML File menu option. After selecting this option a save window will be provided to select the location and name of the file to save. The user should provide a .xml extension to the file name.

5.4. Opening a Saved Model

After starting the application the user can open a previously saved (an XML file) environment model. This is achieved by selecting the Open File menu option. After selecting that option an open window will be provided to select the environment model to open. After the file is selected and the open button is clicked that environment model will be loaded onto the building surface. At this point the user has all the options that were provide when starting a new environment model.