Bounding Boxes

# Overview

Each object has two different types of bounding boxes that are used to define its “space” in the world. The first type of bounding box is a set of 2D bounding boxes that describe where the object makes contact with the terrain below it. The second type of bounding box is a set of 3D bounding boxes that represent the selectable volume for an object.

# 2D Bounding Boxes

A set of 2D bounding boxes is required in an object’s xml that describes the area that it takes up on the terrain. These bounding boxes are used to compute collisions between objects and are used in the path finding algorithm of units. The 2D bounding boxes are defined in the xml as follows:

|  |
| --- |
| <BoundingBox2DSet>  <BoundingBox2D>  <Point2D x=”-1” y=”0” />  <Point2D x=”1” y=”0” />  <BB2DSize width=”2” />  </BoundingBox2D>  </BoundingBox2DSet> |

Note that each 2D bounding box has its length denoted by a set of two points and a width. The set of two points are used to set the vector of the length so that both its angle and magnitude can be set. Also note that each bounding box is described as though the center of the object is at the origin point (0, 0). Because of this you can describe bounding boxes which are offset from the center. For example if we have an “L” shaped building that we want to create bounding boxes for, such that an object can walk in the empty space of the “L”, we would define it as follows:

|  |
| --- |
| <BoundingBox2DSet>  <BoundingBox2D>  <Point2D x=”-0.5” y=”-1” />  <Point2D x=”-0.5” y=”1” />  <BB2DSize width=”1” />  </BoundingBox2D>  <BoundingBox2D>  <Point2D x=”0” y=”0.5” />  <Point2D x=”1” y=”0.5” />  <BB2DSize width=”1” />  </BoundingBox2D>  </BoundingBox2DSet> |

# 3D Bounding Boxes

A set of 3D bounding boxes is required in an object’s xml and is used to describe the selectable volume that the object takes up. This will be used by the cursor ray casting system to determine if the object is being selected when the user click-selects or drag-selects. The 3D bounding boxes are defined as follows:

|  |
| --- |
| <BoundingBox3DSet>  <BoundingBox3D>  <Point3D x=”-1” y=”1” z=”0” />  <Point3D x=”1” y=”1” z=”0” />  <BB3DSize width=”2” height=”2” />  </BoundingBox3D>  </BoundingBox3DSet> |

Similar to the 2D bounding boxes, the 3D bounding boxes are described as though the center of the object is at the point (0, height/2, 0). This is so that a standard unit is described as though the feet are at the point (0, 0, 0). Note that each 3D bounding box is denoted by two 3D points that describe the direction and magnitude of the length and a width and height that are with respect to the center of the vector. The example above would create a 3D bounding box with the smallest point being (-1, 0, -1) and the largest point being (1, 2, 1).