CS 330 Milestone One  
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Introduction

This milestone aims to investigate the representation and expansion of two-dimensional (2D) shapes into three-dimensional (3D) objects. Because it enables developers to construct intricate models from basic geometric foundations, a comprehension of the relationship between 2D and 3D is crucial in computer graphics. To reach this milestone, 20 pictures with various 2D shapes must be picked, one shape must be replicated in 3D, and the conversion of the selected 2D form into a three-dimensional item must be examined. Since the box is one of the most basic and frequently used shapes in computer graphics and the building block for many larger constructions, I chose it for this assignment.

2D Images

Usually utilizing only the x and y axes, two-dimensional pictures are flat representations that exist on a single plane. These pictures have edges and vertices, but no depth. I chose 20 distinct 2D pictures that each depict at least ten distinct shapes for this milestone. They include the square, rectangle, triangle, circle, ellipse, hexagon, octagon, trapezoid, parallelogram, and star, among other basic geometric shapes. Every one of these designs shows how basic geometric shapes may be used as the basis for more intricate 3D structures.

It is evident from an analysis of these 2D designs that their structural simplicity makes them perfect for 3D duplication. Because of their equal angles and parallel edges, the square and rectangle in particular make good boxes because they provide a clear framework for increasing depth.

3D Objects: The Box

I decided to make a copy of the box for the 3D item. Due to its versatility and broad applicability, the box is one of the most important objects in 3D modeling. When paired with other shapes, boxes can be used as the basis for characters, storage containers, buildings, and furnishings in digital settings. Technically speaking, the box is also a great illustration of how 2D geometry is converted into 3D space. It starts off as a straightforward square or rectangle and acquires depth and volume through extrusion into the third dimension.

The box was chosen because it is both straightforward and practical. In addition to being sophisticated enough to illustrate the ideas of vertices, edges, and faces in three-dimensional space, it offers a clear illustration of how the fundamentals of geometry translate into 3D modeling.

3D Shape Transformation

When converting a 2D square into a 3D cube or box, the z-axis is added to give the shape depth. In three dimensions, a square with four vertices and four edges becomes a box with eight vertices, twelve edges, and six faces. Together, the square or rectangular faces of the box form a closed, three-dimensional shape.

The significance of vertices and coordinate systems in 3D graphics is illustrated by this transition. 3D objects need x, y, and z coordinates to represent their position in space, whereas 2D shapes can just use x and y coordinates. In contrast to a flat 2D square, this enables the box to be scaled, translated, and rotated. The box's structure becomes more intricate with the addition of depth, yet it still starts with basic geometry.

Its versatility and ease of building, the box is frequently one of the first shapes developers utilize in real-world applications. Combining boxes of various sizes and orientations creates a lot of intricate 3D environments, therefore this form is essential for sophisticated modeling.

Conclusion

One can learn a lot about the fundamentals of computer graphics by choosing and evaluating 2D shapes, then turning one of them into a 3D object. The box is an example of how basic 2D geometry may be transformed into a more intricate 3D form. It is made by extending a square or rectangle into the third dimension. The box illustrates the transition from flat, two-dimensional representation to spatial, three-dimensional modeling with its eight vertices, twelve edges, and six faces. This milestone demonstrates how basic shapes like the box may be used as the foundation for creating complex virtual environments, in addition to highlighting the significance of geometry in 3D graphics.