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Caligari trueSpace2 Version 2.01a. Caligari Corporation,

Reviewed by Stephen Bollinger

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Caligari trueSpace2 offers the user the ability to model and render three-dimensional representations on a desktop computer. Formerly the domain of the super-computer, 3D rendering has become possible on the desktop as RAM and more sophisticated processors have dropped in price. Until recently, however, the ability was also restricted by the astronomically high prices of rendering software. Caligari trueSpace2 provides an excellent modeling and rendering facility for a more modest sum, allowing access to a much wider audience. <p> Why Three-Dimensional rendering? <p> Three-dimensional rendering and animation was first explored in the hard sciences as a way to relate data and visualize what humans were not capable of seeing. More recent applications include "virtual reality" walkthroughs and entertainment. Other disciplines can also use three dimensional rendering to serve these purposes both in and out of the classroom. A rendered animation could serve to illustrate the change to a data set over time (an animated bar graph showing population shifts, perhaps), a complicated process (possibly how a water-wheel could power a mill), or take students to a now-defunct location (maybe the Hanging Gardens of Babylon). <p> Overview of Caligari trueSpace <p> The installation on my computer was uneventful, though there was a little confusion regarding which disks needed to be installed during the Direct3D installation. After launching the program, trueSpace places the user right into a three dimensional gridded work area with a collection of "palettes" (graphical menus of tools) and a menu at the bottom of the screen. A hallmark of the software is its rejection of the traditional orthagonal view (where the top, front, and side of the objects are displayed as 2d representations). trueSpace operates in an immersive environment which can include (if you have the computing horsepower for it) a real-time interactive shading mode where the object is rendered and will react to changes in lighting or placement. In this respect, it is best to imagine the environment as a photographic studio or motion picture set where you can arrange objects, actors, cameras, and lights. <p> Objects are the stars of trueSpace's environment. You can create, manipulate, and deform them within this interface. The best analogy is probably to imagine it as working with a lump of clay. Caligari trueSpace allows the user to shape the clay through either point manipulation (where individual points on the wireframe lattice of an object can be moved, simulating pushing or pulling to form the clay) or boolean operations (which involve subtracting or combining objects, simulating cutting a piece of the clay out with a knife or adding another lump). <p> The palette interface is entirely iconic, which may appeal to international users. Most operations are selected with the left mouse button while the right mouse button usually calls up any options for each icon. The structure and interface are uniform throughout the program and palettes can be moved and customized to the

user's preference. Objects are manipulated in the 3D environment by left-clicking and dragging to move, rotate, resize, etc. A numeric interface also exists for precise handling of most procedures. <p> Objects themselves may be created in a number of different ways. The program allows objects to be imported from other programs' formats--including Lightwave 3D, AutoCAD, 3D Studio, Wavefront, and Imagine--allowing access to virtually all commercially available libraries of 3D objects and those circulating in public archives and the Internet. Within trueSpace, there is also a handy "primitives" panel which will load certain often-used shapes such as a sphere, cylinder, cone, and cube. The standard extrude and lathe exist in trueSpace as well as flexible deformations, point editing, boolean and/or/nor operations, and complex object hierarchies. <p> Extruding and lathing operate very similarly to their manufacturing namesakes. Extruding allows the user to draw a 2D shape, which can be imported from another program such as a paint program, and "pull" it into 3D space, such as drawing a circle and extruding it to become a cylinder. Lathing also begins with a 2D shape which is "rotated" around an axis to form a 3D object, the circle in this case would become a donut shape. <p> Once you have imported an object or created with trueSpace's tools, you can then use the point editing and deformation tools to further refine them. All objects in trueSpace (and the overwhelming majority of 3D rendering packages) exist as wireframe lattices of points. A prime example is a cube, where each of the eight corners constitute a point and each point is connected to the others by a straight line. Point editing enables the user to select one of the corners and move it inward to form a diamond-like object. The deformation feature could then be used to subdivide the diamond into smaller facets and streamline it to form a droplet or "squash" it into a flying saucer. <p> Once objects are created, the next step is to set the attributes for their appearance. trueSpace offers several ways to complete this process. Textures can be applied either to an entire object or to selected facets. The textures themselves can be texture maps, bitmap graphics created in another program such as Adobe Photoshop or Graphics Workshop, or procedural textures, which use mathematic iterations to simulate natural phenomena such as water or marble. One strength of trueSpace is that the user can edit the properties of textures with precision or simply accept the defaults and still acheive handsome results. <p> Finally, trueSpace allows you to animate your objects, cameras, and lights. While it does offer many features found in high-end renderers such as spline paths and keyframing, this area exposes some of the weaknesses of trueSpace. I found the animation interface somewhat clunky and unintuitive and the manual was not helpful. After several hours of experimentation, I was able to get it to do what I wanted, however. <p> Rendering Issues <p> Whatever the strengths and weaknesses of a program's object creation and modeling, the results will ultimately depend on the final rendering. trueSpace offers several options which allow the user to juggle final image quality and all-important render time. This program has two primary paths to follow, rendering or ray-tracing. <p> Rendering holds the fastest path to see your object or scene. Using Phong and Gouraud shading (Phong primarily simulates plastic where Gouraud is mostly used for metallic or stone surfaces), trueSpace's renderer will do a passable job for most situations, especially if you want simplified output for clarity's sake. Weaknesses of this method include poor shadow support, difficulty in portraying reflections, and limited lighting effects. Its speed is its real strength, which can be crucial if you are rendering a long animation. <p> For photorealism, raytracing is the way to go, however. Unfortunately, earlier versions of Caligari's rendering software did not include raytracing, thankfully trueSpace does. The name "raytracing" is very literal, the software will trace the path of each ray of light in a scene as it either is absorbed by an object or is reflected and refracted. This

method results in the best shadowing and reflections available. An economy with lighting is necessary, though, for even a simple cube can take hours to render if there are many light sources to compute or the object is highly reflective. Raytracing is generally not suited to long animations or highly complex scenes because rendering times can top twenty-four hours and easily fill up RAM and harddrive space. <p> For reference, I tested trueSpace on a Pentium 150MHz with 16Mb RAM and a Matrox Millenium video card with 2Mb of WRAM. This system would be considered about (if not a little below) average in comparison with desktop computers now being sold. A simple rendering of a still frame of the H-Net logo with three lights, set for highest quality ray tracing, was done in less than three minutes, which is pretty good. As far as the realtime display, I encountered only minor sluggishness in updating the screen, which did not detract from the usability of the program. Render times vary enormously depending on the level of detail, the number of objects, and which features are used. trueSpace struck me as fast on all the permutations that I tested. <p> Technical Support <p> Another hallmark of an excellent product is user support after the sale. trueSpace's support is fairly average compared to the field, yet is comprehensive for a product in its price range. Caligari maintains a web site that is sporting a recent redesign <http://www.caligari.com/>, which unfortunately requires a frame-capable browser. The web site allowed me to download a patch for trueSpace that I would have otherwise waited for them to ship to me and also allowed me to sign up to their discussion lists. The unmoderated discussion lists are not up to H-Net's standards but often replies are posted by the programmers themselves, and the overall atmosphere is helpful and friendly. <p> The Bottom Line <p> Caligari has produced a renderer with an innovative interface and features that hint at the power of much more expensive packages such as 3D Studio MAX and Lightwave 3D. Yet despite the inherent learning curve of even the most elegant interface, this program is easily worth a look for academics aspiring to present information in new ways. trueSpace certainly presents an affordable entry into the realm of rendering for the academic budget while providing the features and ease of use that elude even some of the most expensive packages. <p> The strongest feature of the product remains its modeling tools and interface. While the animation abilities are functional, their weaknesses conspire with the pressures of time and the medium of the Internet to limit their application in my use of trueSpace. This program remains an excellent first step into three dimensional rendering which will satisfy most academic users. <p>

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