Version 1.0, March 1999

Overview

3D ExerciZer™ is an OpenGL™ application for use on Intel-Based" workstations running Windows™ 95, Windows 98, and Windows NT. This innovative tool provides an easy and intuitive way to test and compare the performance of different 3D graphics workstations and subsystems. This allows you to quickly investigate the effects of using different graphics cards in the same system, the same graphics card in different systems, the speed of a graphics card with and without an associated geometry accelerator, and so forth.

3D ExerciZer was created by the renowned French software explorer Mâa Berriet (www.solotusk.com). Mâa describes himself as a software explorer, because he wishes to redefine the boundaries of the graphics artist and programmer. As part of his quest, Mâa has developed a special 2D/3D real-time graphics instrument, which he uses in live performances, and which forms the basis for 3D ExerciZer.

Mâa Berriet – A self Portrait

3D ExerciZer also features 3D models, images, and textures by the leading French artists Margalit Berriet, Jacques-Elie Chabert, and Cécile Babiole.

Installing and Running 3D ExerciZer

The installation procedure for 3D ExerciZer is mega-simple. Just run **setup.exe** from the CD drive, and respond to the prompts. This copies the files to your workstation, and creates a program group in the Start menu. It makes no changes at all to the system registry. (13MB required)

To run 3D ExerciZer, open your start menu, programs, 3D ExerciZer, and click on the program icon.

Preparing your System

In order to test your graphics workstation or PC, you will want to ensure it is set up for optimal performance with OpenGL applications. Exact settings for your graphics workstation will depend on the manufacturer's recommendations for each component. The following are some suggestions to get the best out of your graphics workstation:

- Monitor settings (in desktop properties):
  - Set to maximum non-interlaced refresh rate

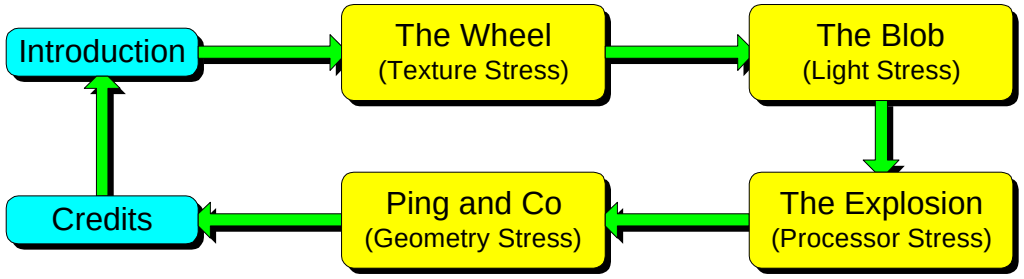
- Experiment with settings that synchronize the display refresh rate to the buffer refresh rate - find the setting giving the highest frame rates.

- Graphics driver:
  - Ensure that you have the latest driver from your graphics subsystem manufacturer.
  - Ensure that you have the latest OpenGL ICD (Installable Client Driver). We have tested 3D ExerciZer on Intergraph RealiZm II and Intense 3D Wildcat graphics subsystems at OpenGL revision 1.2.

- Your PC:
  - In order to obtain accurate and consistent results, do not run any other applications while you are performing these tests.
  - Once you have started 3D ExerciZer, expand the window, and hit the “w” key (this is the “hot key” for the full-screen display).

Using 3D ExerciZer

When you first invoke 3D ExerciZer you are presented with an Introduction, which is the first of six screens:



You can use the <Space> key to proceed to the next screen (<Shift+Space> returns you to the previous screen).

The Wheel, Blob, Explosion, and Ping and Co are “Fx” (effects) screens, each of which stresses (or exercises) a different aspect of the workstation and/or graphics subsystem:

- **The Wheel:** This effect is used to stress the texture handling capabilities of the graphics subsystem.
- **The Blob:** This animated piece of “material,” on which is displayed a texture, is used to stress the system’s ability to deal with multiple light sources (many graphics subsystems “collapse” if more than four light sources are used).
- **The Explosion:** This particle effect stresses the raw processing ability of the system, with particular emphasis on the CPU’s computational ability.
- **Ping and Co:** This effect stresses the system’s ability to process models with different geometries (numbers of polygons).

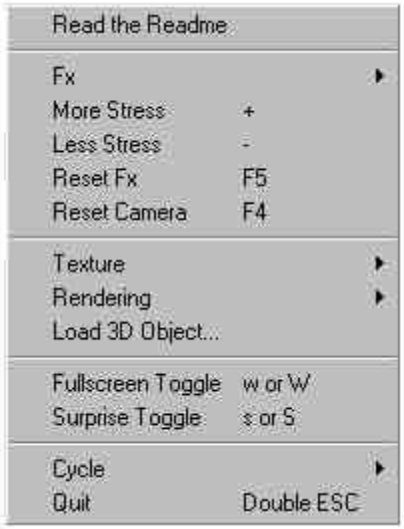
The “+” and “-“ keys increase or decrease the stress level for each test, respectively, while the type and amount of stress is displayed in the bottom left-hand corner of the screen.

The result of the test is displayed dynamically (“on-the-fly”) in terms of “Frames-Per-Second” in the bottom right-hand corner of the screen. This easy-to-understand metric provides a good measure of the total system performance for that particular stress effect. Note that a higher number is better, even when the frame rate exceeds the ability of the eye to discern the frames (this usually occurs around 30 frames per second).

Using the Mouse

3D ExerciZer ideally requires the use of a 3-button mouse (if you only have a 2-button mouse, consult your system manual for details on how to reproduce the effect of a middle mouse button):

- **Left:** Press-and-drag the left mouse button to change the camera’s point of view.
- **Middle:** Press and drag the middle mouse button can to zoom-in and out
- **Right:** Click the right mouse button to access the main menu (shown to the right).



Note that if you do use the left and middle mouse buttons to modify the camera’s point of view, you can use function key F5 to reset the camera to its original position.

Changing and Restoring Settings

3D ExerciZer allows you to experiment with a wide variety of settings, models, and textures. For example, while using “The Blob” (light stress test), it is possible to select between different textures and OpenGL rendering techniques. Similarly, “Ping and Co” (the geometry stress test) permits you to load alternative objects.

As was previously discussed, you can use the right mouse button to access the main menu, which will present you with these options (along woth “hot keys” to achieve the same effect without having to open the menu). If you do change any of these options, you can use function key F4 to reset the Fx (“effect”) to its original settings.

Note that, for the purposes of making tests and comparisons between different graphics workstations and subsystems, it is strongly recommended that you use the default (start-up) settings.

Running a Series of Tests

If you are comparing systems using 3D ExerciZer, try to construct an “envelope” of results for each of the stress tests. You can easily analyze these using a spreadsheet program to ascertain the bottlenecks in the systems you are comparing. Ensure you are

comparing systems fairly. Before drawing conclusions, be sure to check consistency of settings or configuration parameters, such as:

- Monitor resolution
- Color depth
- System memory
- Processor speed
- Processor cache size
- System PCI bus speed and other devices on the bus (any 33MHz card on a 66MHz bus will slow everything on the bus to 33MHz, including the graphics adapter)

Texture stress: 3D ExerciZer comes with 11 unique textures. By increasing the number of textures on the wheel, you load the texture buffer of the graphics subsystem progressively until you hit the physical limit (if there is one). (Note that although you may see the same textures being repeated, 3D ExerciZer is taking copies as if each is a new texture, so that the subsystem is genuinely being stressed.) When the subsystem texture buffer hits the limit, it is forced to start swapping textures to main memory, and the frame rate will reflect this point.

Lighting stress: The “Blob” appears first with a spotlight at the camera position. The lighting algorithm requires extensive use of any available geometry acceleration in order to compute path of light waves. Geometry-accelerated subsystems will show higher frame rates. You can add up to 7 moving, colored, spot light sources to the scene and observe the effect on frame rate.

Processor stress: The “Explosion” tracks the path of thousands of particles in space emerging from a core. This makes no use of texture memory, geometry acceleration or lighting capabilities, and is a pure processor-related test. The floating-point arithmetic capabilities of the processor will be reflected in the frame rates as you increase the number of particles in the picture. In our experience you will normally see an almost perfectly linear response to the stress. Similarly, between otherwise identical workstations, the frame rate curve is geometrically proportional to the processor speed difference.

Geometry stress: you begin the test with the figure “Ping”, a man floating in space. In his metallic body you see a spherical reflection of a texture. As with all tests, you can change the texture using the “T”/”t” key. You can increase the instances of Ping using the + and - keys and observe the frame rate change. You will notice that if you zoom in very close, or allow Ping to leave the scene, the frame rate will increase. This is a result of face culling and clipping, and it distorts the results. Using the right mouse key, you may load an alternative 3D model, of the type “.obj” (that is, a model in ASCII text, as written by Alias Wavefront, but also as interchange format of many other applications). All surface textures, transparency, and other material properties are ignored. The model is represented simply as a 3D model, with high reflectivity, rotating in space, and reflecting the texture. This will allow you to compare the stress response for a representative model from your own environment, across graphics workstations. Look in the directory \Data\Geo3d for some models.

Other 3D ExerciZer features: you can play with all the features as displayed via the pop-up menu accessed from the right mouse key:

- The “s” (surprise) option is there just for fun, in case you want to leave the screen running with a cool image on it.
- You can disable the texture display altogether using “0”, so that you can see the 3D object “cleanly”. Entering “1” and “2” restores the texture in one and two dimensions.
- Investigate also the different rendering options using “r/R”.
- Run a continuous demo at an event or in a shop window, using the “Cycle” option. It will cycle continuously with your last used settings.

About 3D ExerciZer

3D ExerciZer was commissioned by, and remains the property of Intergraph Computer Systems – the acknowledged industry-leader for 3D graphics on Windows NT.

For more information on 3D ExerciZer, please contact Geoff Davies at the Intergraph Computer Systems European Headquarters (Tel: +31 (23) 5666387, Email: gdavies@ingr.com) or visit the special 3D ExerciZer web pages at:

http://www.intergraph.com/ics/3DExerciZer

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