UDC 004

VIDEO MEMORY

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One of the computer components that is required of the greatest performance is the graphics controller, which is the heart of all multimedia systems. The phrase “required performance” means that some things happen as fast as the bandwidth can provide. Bandwidth is usually measured in megabytes per second and indicates the rate at which data is exchanged between the video memory and the graphics controller.

Several factors affect graphics performance:

• speed of the central processing unit (CPU)

• speed of the interface bus-bar (PCI or AGP)

• video memory speed

• graphics controller speed

To maximize the performance of the graphics subsystem as much as possible, all obstacles along the way must be minimized. The graphics controller handles computationally intensive graphics functions, which unloads the system's central processor. It provides that the graphics controller must operate with its own, “private” local memory. The type of memory that stores graphics data is called frame buffer. In systems focused on processing 3D applications, a special memory called z-buffer is also required, which stores information about the depth of the displayed scene. Also, some systems may have their own texture memory, i.e. memory for storing the elements from which the surfaces of the object are formed. The presence of texture maps has a key effect on the realism of the image of three-dimensional scenes.

The introduction of multimedia and video-intensive applications, as well as the increase in clock speeds of modern central processing units, made it impossible to continue using standard dynamic random access memory (DRAM). Modern

multimedia controllers require more bandwidth and less access time from main system memory than ever before. To meet new requirements, manufacturers are offering new types of memory, developed using conventional and revolutionary methods. Impressive improvements make the problem of choosing the right memory type for an application especially challenging.

Manufacturers have improved technologies and created new architectures in response to demands for higher memory speeds. The wide choice of new types of memory poses a problem for the manufacturers of video adapters, for which market segment or which applications to choose one or another type.

Driven by the demands of change, the semiconductor industry is offering many new interfaces. Some combine the properties of existing interfaces with a limited set of changes; others have a completely new design and original architecture.

The modern graphics subsystem requires 1 Megabyte of memory to provide a resolution of 1024x768. Although only three-quarters of this amount of memory is actually needed, the graphics subsystem typically stores cursor and shortcut information in off-screen memory for quick access. Memory bandwidth is measured by the ratio of how many megabytes of data are transferred to and from memory per second. A typical resolution of 1024x768, 8-bit colour depth and 75 Hz refresh rate, requires a memory bandwidth of 1118 megabytes per second. Adding 3D graphics processing functions requires an increase in the size of the available memory on board the video adapter. In modern video accelerators for Windows-based systems, the size of the installed memory is 4 MB. Additional memory beyond what is needed to create the screen image is used for z-buffer and texture storage.

References:

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