COMPUTER HARDWARE, GRAPHICS AND GRAPHIC CARD CPU, AN IMPORTANT AND APPLIED CASE STUDY

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Abstract - Central Processing Unit (CPU), memory, and peripheral device controllers. These components all plug into a "Bus". The bus is essentially a communications highway; all the other components work together by transferring data over the bus. The active part of the computer, the part that does calculations and controls all the other parts is the "Central Processing Unit" (CPU). The Central Processing Unit (CPU) contains electronic clocks that control the timing of all operations; electronic circuits that carry out arithmetic operations like addition and multiplication; circuits that identify and execute the instructions that make up a program; and circuits that fetch the data from memory. To better understand how a graphics card physically functions, it is beneficial have an understanding of the hardware that makes-up a video card. A graphics card only has a handful of individually critical pieces, although there is hundreds of subcomponents that make-up a video card. Below is an image of a simple graphics card. The most important piece of graphics hardware is the graphics card, which is the piece of equipment that renders out all images and sends them to a display. There are two types of graphics cards:[1] integrated and dedicated. An integrated graphics card, usually by Intel for use in their computers, is bound to the motherboard and sharesRAM(Random Access Memory) with the CPU, reducing the total amount of RAM available. This is undesirable for running programs and applications that use a large amount of video memory. A dedicated graphics card has its own RAM and Processor for generating its images, and does not slow down the computer. Dedicated graphics cards also have higher performance than integrated graphics cards. It is possible to have both dedicated and integrated graphics, however once a dedicated graphics card is installed, the integrated card will no longer function until the dedicated card is removed.

Keywords - Computer, Hardware, CPU, Graphicd.

I. INTRODUCTION

Interpolation is the process of determining plausible in-between values, given explicit values atparticular points. Linear means that the values fall along a line from one known point to the next.This means the value changes a fixed amount for a fixed-sized step. Bi-linear means this process iscarried out in two dimensions. In computer graphics, bi-linear interpolation is often applied to findcolor values at the interior pixels of a primitive. The apparent color values are computed explicitlyat the vertices of a polygon and are bi-linearly interpolated in the polygon's interior. Bi-linearinterpolation of pixel color values is also called Gouraud shading. Video random access memory. This is really DRAM with additional features specifically for useas bitmap memory in display controllers. VRAM typically costs twice as much as DRAM, butallows the drawing engine full access to the bitmap independent from the video back end. This canincrease the hardware drawing rate. The cost of low end graphics boards is usually dominated by the cost of the bitmapmemory, so we'd like to reduce the amount of this memory. Three bytes per pixel letsus store any color in any pixel, but do we really need this? Unless you are doingimaging, the answer is usually "no." Look at a typical screen with a few windows, text,menus, etc. How many different colors do you see? Probably not more than 16.Suppose we numbered each of these colors from 0 to 15. We would then need onlyfour bits per pixel in the bitmap, but we'd have to interpret the color numbers into theirreal colors to generate the final RGB video signals.In practice, we usually use eight bits per pixel instead of the four in the example. Eightbits allows up to 256 different colors on the screen at the same time. That's more thanenough for the basic user interface, but also allows some way to see images, supportsgames, etc. 256 simultaneous colors requires one byte per pixel. The entire 1024x800bitmap would then fit into just one megabyte with room to spare. Note that we'vereduced the bitmap memory from four to one megabyte at a price. First we can onlydisplay 256 colors simultaneously, and second, we now have to interpret the colornumbers into real RGB colors.

The relationship between computer science and software engineering is a contentious issue, which is further muddied by disputes over what the term "software engineering" means, and how computer science is defined. David Parnas, taking a cue from the relationship between other engineering and science disciplines, has claimed that the principal focus of computer science is studying the properties of computation in general, while the principal focus of software engineering is the design of specific computations to achieve practical goals, making the two separate but complementary disciplines. The academic, political, and funding aspects of computer science tend to depend on whether a department formed with a mathematical emphasis or with an engineering emphasis. Computer science departments with a mathematics emphasis and with a numerical orientation consider alignment with computational

science. Both types of departments tend to make efforts to bridge the field educationally if not across all research.

II. WHAT'S IN HARDWARE AND WHAT'S IN SOFTWARE

At the other extreme, a system might have full hardware support for everything from simple lines to fancy 3D operations and drawing commands. This would be faster but more expensive. In practice, even low end systems usually have hardware support for simple 2D drawing. The incremental cost of adding such a drawing engine is small compared to the bitmap and the video back end cost. Such a system is sometimes referred to as a 2D display controller or graphics board, or GUI engine. GUI stands for "graphical user interface" and refers to these kinds of operations. There are systems available with just about any imaginable tradeoff between what's in hardware and what the software must do. Marketing types, however, like fancy labels to make their product sound more sophisticated than the next one. Some "standard" names have emerged for some configurations. I'll make you aware of them, but keep in mind this is a moving target since companies can (and often do) make up new names, and use old names in new ways.

That's all that's needed by most window systems for menus, text, popups, etc. A 2 1/2 D display controller is intended for drawing 3D objects, but doesn't have true 3D capability. It provides the 2D support needed for 3D drawing. This usually includes allowing the color to vary across the object being drawn, dithering, and Z buffering.

III. GRAPHICS

The screen is represented by a 2D array of locations called pixels.

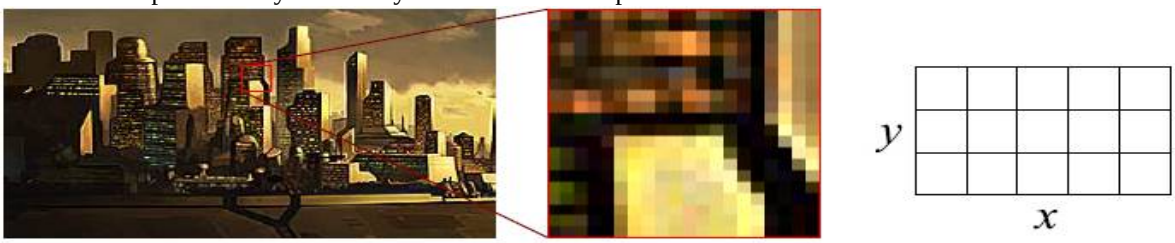


Fig.1 griphics for processing in the computer system

The convention in these notes will follow that of OpenGL, placing the origin in the lower left corner, with that pixel being at location (0, 0). Be aware that placing the origin in the upper left is another common convention. One of 2N intensities or colors are associated with each pixel, where N is the number of bits per pixel. Greyscale typically has one byte per pixel, for 28 = 256 intensities. Color often requires one byte per channel, with three color channels per pixel: red, green, and blue. Color data is stored in a frame buffer. This is sometimes called an image map or bitmap.

Primitive operations:

- setpixel(x, y, color) Sets the pixel at position (x, y) to the given color.
- getpixel(x, y) Gets the color at the pixel at position (x, y).Scan conversion is the process of converting basic, low level objects into their corresponding pixel map representations. This is often an approximation to the object, since the frame buffer is a discrete grid.

IV. COMPUTER REQUIREMENTS

A personal computer that does not have embedded Bluetooth can use a Bluetooth adapter that enables the PC to communicate with Bluetooth devices. While some desktop computers and most recent laptops come with a built-in Bluetooth radio, others require an external adapter, typically in the form of a small USB "dongle." Unlike its predecessor, IrDA, which requires a separate adapter for each device, Bluetooth lets multiple devices communicate with a computer over a single adapter.

V. COMPUTER NETWORK

A computer network or data network is a telecommunications network which allows computers to exchange data. In computer networks, networked computing devices pass data to each other along network links (data connections). The connections between nodes are established using either cable media or wireless media. The best-known computer network is the Internet. Network computer devices that originate, route and terminate the data are called network nodes.[1] Nodes can include hosts such as personal computers, phones, servers as well as networking hardware. Two such devices are said to be networked together when one device is able to exchange information with the other device, whether or not they have a direct connection to each other. Computer networks differ in the transmission media used to carry their signals, the communications protocols to organize network traffic, the network's size, topology and organizational intent. In most

cases, communications protocols are layered on (i.e. work using) other more specific or more general communications protocols, except for the physical layer that directly deals with the transmission media. Computer networks support applications such as access to the World Wide Web, shared use of application and storage servers,printers, and fax machines, and use of email and instant messaging applications.

VI. CHARACTERISTICS

A computer network facilitates interpersonal communications allowing people to communicate efficiently and easily via email, instant messaging, chat rooms, telephone, video telephone calls, and video conferencing. Providing access to information on shared storage devices is an important feature of many networks. A network allows sharing of files, data, and other types of information giving authorized users the ability to access information stored on other computers on the network. A network allows sharing of network and computing resources. Users may access and use resources provided by devices on the network, such as printing a document on a shared network printer. Distributed computing uses computing resources across a network to accomplish tasks. A computer network may be used by computer Crackers to deploy computer viruses or computer worms on devices connected to the network, or to prevent these devices from accessing the network (denial of service). A complex computer network may be difficult to set up. It may be costly to set up an effective computer network in a large organization.

VII. COMPUTATIONAL TECHNOLOGIES

Recent advances in vehicle electronics have led to a move towards fewer, more capable computer processors on a vehicle. A typical vehicle in the early 2000s would have between 20 and 100 individual networked microcontroller/Programmable logic controller modules with non-real-time operating systems. The current trend is toward fewer, more costly microprocessor modules with hardware memory management and Real-Time Operating Systems. The new embedded system platforms allow for more sophisticatedsoftware applications to be implemented, including model-based process control, artificial intelligence, and ubiquitous computing. Perhaps the most important of these for Intelligent Transportation Systems is artificial intelligence.

Its subfields can be divided into a variety of theoretical and practical disciplines. Some fields, such as computational complexity theory (which explores the fundamental properties of computational and intractable problems), are highly abstract, while fields such as computer graphics emphasize real-world visual applications. Still other fields focus on the challenges in implementing computation. For example, programming language theory considers various approaches to the description of computation, while the study of computer programming itself investigates various aspects of the use ofprogramming language and complex systems. Human–computer interaction considers the challenges in making computers and computations useful, usable, and universally accessible to humans.

CONCLUSION

In this paper we have described a programming environment for writing applications for next-generation programmable GPUs. This environment was designed by surveying a large number of data parallel applications and articulating future hardware constraints. Many programs can be run on current hardware, although still not efficiently. However, as the floating point instruction issue rates rapidly increase, there will be strong motivation to port programs to this platform. Looking further towards the future, many questions remain. There are interesting micro-architectural questions that deserve further research. For example, in the Imagine processor, the stream register file is exposed just as a vector register file is exposed in a vector processor. This has advantages, but makes it much more difficult to write an optimizing compiler. Another interesting issue is how to combine multiple streaming processors, or multiple GPUs, into a larger machine. Such a machine might have a huge costperformance advantage over existing supercomputers. Providing such computational power within consumer graphics hardware has the potential redefine the GPU as not just rendering engine, but the principal compute engine for the PC. Each fragment provided by triangle setup is fed into fragment processing as a set of attributes (position, normal, texcoordetc), which are used to compute the final color for this pixel.The computations taking place here include texture mapping and math operations.

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