

# Bits & Bytes

A Publication of the Kern PC Users Group

Digital Cameras and More Presented by Dusty Wagoner from Henley's

Also elections tonight

Our meeting time is at 7 pm on March 11



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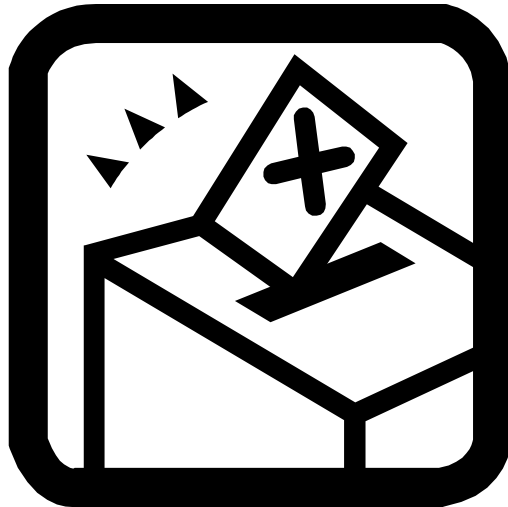
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Prez Says:

**Elections - Elections - Elections** are this March Month. Our slate of prospective officers are: Rhonda Pierce - President, Lee Lentz - Vice President, Tony Rizos - Secretary, Willie Lowell - Treasurer and our Board of Directors are: Steve Garcia, Caroline Corser, Dr. Leonard Liss and Jerry Congdon.

We will have Dusty Wagoner Manager of Henley's Photo to speak on Digital Photography for our March Program this month. I was sick last year when he came and I heard his presentation was excellent. I especially don't want to miss it this time, please come enjoy the program with us. Mark your calendar for Thursday, March 11<sup>th</sup> and I'll see you there. Rhonda [:-)



# Computer Memory

by Brian K. Lewis, Ph.D.

Member of the Sarasota Personal Computer Users Group, Inc., Florida

Occasionally the question arises as to how much memory can be put in a computer. The answer is "it depends". It depends on just what you mean by memory (RAM or hard disk), what operating system you are using and the capabilities of your computer's motherboard and its chipset. When I talk about memory I am not referring to the permanent storage of programs and data on the hard disk. Rather, I refer to the random-access memory or RAM. This is the memory provided by memory chips seated in slots on the motherboard of today's computers. Anything stored in RAM disappears when the power is turned off, so it is referred to as volatile, or temporary, memory.

If you want to upgrade the memory in your computer you have to be able to determine the memory type as well as the size, pins and speed, the number of slots available on your motherboard and the maximum amount of memory that your system can address. In general, this varies with the age of your computer. So let's look at these components in a little more detail. (Please note that although my remarks refer to Intel's Pentium series central processors, they also generally apply to the equivalent AMD processors.)

Early Pentium based computers had a CPU bus speed of 66 MHz (megahertz) and a PCI I/O bus speed of 33 MHz. These values relate to the speed of data movement within the central processor and transmission to and from peripherals such as the memory bank. In some cases transfer to and from memory was at 50 MHz. Pentium computers generally had four slots which were arranged as two banks. This meant that memory had to be installed in units of two. The memory chips were 72 pin DRAM (dynamic RAM) or SIMM (single in-line memory modules) modules. Many of these computers could support four DRAM modules of 32 MB (megabytes) for a maximum of 128 MB of RAM. There were some motherboards built for Pentium 5 systems that had 2 or 3-168 bit DIMM slots in addition to the 72 pin slots. However, you could not use both the 72 pin and 168 pin slots, only one or the other. These systems would support either 128 or 256 MB of memory. However, at the time, many Pentium/Pentium II computers were sold with only 16 MB of RAM and Windows 95. Later, with Windows 98 the basic memory was 32 MB. In both cases, this is a less than optimum amount of memory for these operating systems. The first Pentium computers had a 32 bit address space which was theoretically capable of addressing 4 GB (gigabytes) of memory. However, none of the motherboards manufactured for these computers carried any such memory capacity.

The next generation of computers carried faster CPUs and chipsets along with faster bus speeds. For example the Intel 440 series chipsets were capable of working with CPUs with speed of 233 - 333 MHz at a bus speed of 66 MHz or with 350-450 MHz processors at a bus speed of 100 MHz. These motherboards generally had 3- 168 pin slots and would support a maximum of 384 MB of RAM. As the address space of the CPU was increased to 36 bit, the maximum addressable memory was 64 GB. However, in practice some computers running Win98 would not recognize more than 256 or 384 MB of RAM. This problem has been ascribed to the chipset design and problem with the L-2 cache. So some caution is recommended if you intend to upgrade the memory in a Pentium II or older system. With some of the Pentium III class computers there was an additional increment in bus speed to 133 MHz. The motherboards had 2 to 4 168-pin memory slots. The maximum usable memory of such systems ranges from 512 MB to 1 GB. These motherboards for this CPU class are generally able to use 100 - 133 MHz DIMMs. The 133 MHz DIMMs are capable of working at the 100 MHz speed. The Pentium 4 motherboards came with a whole new array of chipsets and memory chip types and speeds. The maximum memory now ranges up to 4 GB. Intel's initial Pentium 4 motherboards required the use of RDRAM or

Rambus DRAM memory chips. RDRAM is a serial memory technology that arrived in three speeds, PC600, PC700, and PC800. RDRAM designs with multiple channels, such as those in Pentium 4 motherboards, are currently the fastest in memory throughput, especially when paired with the newer PC1066 RDRAM memory. A Rambus channel is 2-bytes wide, so we get a maximum 1.6GB/s transfer rate for a single RDRAM channel using PC800 RDRAM or 2.1GB/s for PC1066. The other form of memory chip is the double data rate DRAM. Intel and other manufacturers now have motherboards and chipsets that can utilize these memory modules. They are less expensive than the RDRAM. DDR memory modules are named after their peak bandwidth - the maximum amount of data they can deliver per second - rather than their clock rates. This is calculated by multiplying the amount of data a module can send at once (called the data path or bandwidth) by the speed of the front side bus (FSB). The bandwidth is measured in bits, and the FSB in MHz. Note that the RDRAM bandwidth is in bytes. One byte is equal to 8 bits.

A PC1600 DDR memory module can deliver bandwidth of 1600Mbps. PC2100 (the DDR version of PC133 SDRAM) has a bandwidth of 2100Mbps. PC2700 modules use DDR333 chips to deliver 2700Mbps of bandwidth and PC3200 - the fastest widely used form in late 2003

uses DDR400 chips to deliver 3200Mbps (3.2 Gbps) of bandwidth. You may see the term "dual channel" applied to memory. When properly used, the term refers to a DDR motherboard's chipset that's designed with two memory channels instead of one. The two channels handle memory-processing more efficiently by utilizing the theoretical bandwidth of the two modules, thus reducing system latencies, the timing delays that inherently occur with one memory module. For example, one controller reads and writes data while the second controller prepares for the next access, hence, eliminating the reset and setup delays that occur before one memory module can begin the read/write process all over again.

Consider a model in which data is filled into a container (memory), which then directs the data to the CPU. Singlechannel memory would feed the data to the processor via a single pathway at a maximum rate of 64 bits at a time. Dualchannel memory, on the other hand, utilizes two pathways, thereby having the capability to deliver data twice as fast or up to 128 bits at a time. The process works the same way when data is transferred from the processor by reversing the flow of data. A "memory controller" chip is responsible for handling all data transfers involving the memory modules and the processor. This controls the flow of data through the pathways, preventing them from being over-filled with data. Now

that you are totally confused by all this memory type and speed terminology, let's look at the next question.

How much memory should you have in your computer? The answer is: probably as much as your motherboard and chipset can handle. For the newest motherboards, that may be excessive unless you are involved in digital video editing or graphic design. For most home users running WinXP or Win2K I would recommend 512MB up to 1GB. So why those figures? I have found that WinXP uses over 200 MB of RAM for its own files, if that much is available. So on a 256 MB system that leaves very little for other applications and data. The net result is a lot of swapping with the virtual memory space on the hard drive. That slows everything down. In WinXP the Windows Task Manager (bring up by pressing CTRLALT-DEL) shows your current performance and the amount of memory available in real time. With 512 MB and several programs running, I have over 300 MB of real RAM available. That greatly increases the responsiveness (speed) of the system as moving data to and from RAM is many times faster than using a hard disk. The Page File window shows you the virtual memory swapping your system is doing. At the moment, mine is zero.

You can do similar analyses on Win98/WinMe systems. The System Monitor

application that comes with Windows can supply this information.

However, you may need to modify it to get the memory info you want. Go to Start-Programs-Accessories-System Tools and select System Monitor. If this selection is not available on your menu, then you need to install the program from your original Windows disk or from \WindowsOptions\Cabs file. You do that from the Control Panel (Add/ Remove Software) and Windows Setup. Once you have the system monitor you can ADD memory information by clicking on Edit, then add item. Select Memory Manager. The individual items that will be the most helpful are: allocated memory, unused physical memory, page files in/ out, swapfile in use or swappable memory. The kernel reading tells you how much of your CPU capacity is being used. Generally, Win98/WinME will do very well with 256 MB - 384 MB of RAM. You just have to be certain that your motherboard and chipset can support this much RAM. Most of the home computers I have worked on really don't have enough RAM for the most efficient operation. Does Yours?

Dr. Lewis is a former university & medical school professor. He has been working with personal computers for more than thirty years. He can be reached via e-mail at [bwsail@yahoo.com](mailto:bwsail@yahoo.com) or voice mail at 941/925-3047. :

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## **The author of a cultural icon retires**

**Hero to computer users everywhere is retiring from IBM after 28½ years**

**David Bradley spent five minutes writing the computer code that has bailed out the world's PC users ever since.**

**He programmed one of the most well known key combinations around: Ctrl-Alt-Delete. It forces obstinate computers to restart when the no longer follow commands.**

**"I didn't know it was going to be a cultural icon," Bradley said. "I did a lot of other things than Ctrl-Alt-Delete, but I'm famous for that one."**

**Bradley, 55, is retiring from IBM Corporation on Friday Jan. 30<sup>th</sup> after 28½ years.**

**In 1980, Bradley was one of 12 people working to create the IBM PC. The engineers knew they had to design a simple way to restart the computer should it fail. Bradley wrote the code to make it work.**

**It is interesting that Ctrl-Alt-Delete is used to "Login" on Windows 2000 Server.**

**Bradley, who will continue teaching at North Carolina State after retirement, was once mentioned as a clue in the TV game show "Jeopardy."**

**Submitted by Stuart Ree**

## PCI Express: Say Goodbye to AGP and PCI Slots

By Timothy Everingham, TUGNET  
teveringham@acm.org

Those of you who have been around personal computers for a while might remember plug in cards slots referred to as ISA, EISA, Microchannel, and VESA Local Bus. ISA, EISA, and Microchannel were replaced by PCI.

VESA Local bus was primarily for video cards, which was replaced by PCI, then AGP slots. It was a fun time during these card slot transitions because many times you could not use the plug in cards from your old machine in your new computer or motherboard or if you did it could slow down the entire system. Well guess what, its time to do it all over again. Intel has come up with a new slot standard PCI Express, which will start to show up in computers/motherboards this spring.

PCI came out in 1992. Today these slots and its data bus technology are used for things not envisioned when it was under development over 12 years ago. PCI has its limitations and the PCI pro slots never became popular.

The limitations are coming to the forefront in delivering multimedia content and Gigabit Ethernet. Of course getting higher frame rates at higher resolution and quality for video games also is an issue. PCI has been evolving over time increasing its speed to five times the original, but it has reached its limits of development. Many say that stretching out the AGP to 8x speed might be pushing at its limit too.

First let us look at the current PCI architecture you will find on most motherboards. The CPU/Microprocessor communicates with the first of two data bridges, normally referred to as the Memory Bridge or Northbridge. The Northbridge not only communicates with the CPU; but also communicates to the AGP port, which is where your main graphics card is (usually the only graphics card). It also communicates with your RAM. The fourth thing it communicates with is the second data bridge, known as the Input/Output (I/O) Bridge or Southbridge. The Southbridge also communicates to your plug in slots/cards, drive controllers, and USB, Fireware/1394, parallel, serial, game, keyboard and mouse ports. The theoretical speed limit of the Southbridge

communication to I/O including the PCI slots is 133 MB/second. All of the communications in the system are parallel with none of the data having any priority over any other. Blocks of data have to be sent one at a time and cannot be done concurrently. Therefore the data is transferred from one section of the motherboard to the next section based on the order received, not the importance or whether a piece of data arriving by a certain time to its destination is critical.

PCI Express, instead of using a parallel bus architecture, uses serial networking typology with only two wires for each direction. At higher speeds, it allows concurrent transfer of data while having a similar look and the same type of Northbridge/Southbridge architecture as currently in desktops and laptops.

However, in servers the Southbridge is eliminated producing greater data throughput. The PCI slots initially have a 250 MB/second throughput, but the scalable width technology (increasing the number of wire pairs) enables slots and cards to communicate at 32 times that speed in later implementations using longer slots. But the typology can also use network

switching type technology, giving data priority and quality of service functions. Hot plug/swap of components is a native part of the architecture.

The PCI Express Graphics Port, replacing the AGP Port, will have a 4GB/second transfer rate in its initial configuration, double that of the current 8x AGP ports. For laptops units there will be a new plug-in card to replace PCMCIA called ExpressCard. It will come in two forms, one that more looks like a PCMCIA card referred to at the 34 module form factor (34 x 75 x 5 mm) and a more oversized L looking card called the 54 module form factor (54 x 75 x 5 mm). This new architecture is compatible with existing operating systems. Also the new PCI Express slot is capable of being placed alongside current type PCI slots so a choice can be made which type of card can be used in a motherboard just like was done with ISA slots and current PCI slots. The standard PCI Express slots being put in motherboards this spring (1x) will be a lot shorter than the standard PCI slots.

All of this will mean that a lot of issues having to do with multimedia on desktop and laptop computers will

have been solved. It also opens wider use of Gigabit Ethernet on local area networks. It also enables the prospects of new motherboard form factors and computer case designs. As the transition from ISA to PCI was an interesting transition with computer buyers having to do more research and planning on their purchases, the move from PCI to PCI Express will do the same. However, as was with the previous transition, the performance and capability increases of computers will be profound. Further information on PCI Express can be found at [www.express-lane.org](http://www.express-lane.org).

Timothy Everingham is CEO of Timothy Everingham Consulting in Azusa, California. He is also Vice Chair of the Los Angeles Chapter of ACM SIGGRAPH and is also on the Management Information Systems Program Advisory Board of California State University, Fullerton. In addition he is the Vice President of the Windows Media Users' Group of Los Angeles. He is also part-time press in the areas of high technology, computers, video, audio, and entertainment/media and has had articles published throughout the United States and Canada plus Australia, England, & Japan. Further information can be found at

<http://home.earthlink.net/~teveringham>

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#### **Twelve Thoughts for the Day**

12. Never take life seriously. Nobody gets out alive anyway...
11. Life is sexually transmitted...
10. Health is merely the slowest possible rate at which one can die...
9. Give a person a fish and you feed them for a day; teach a person to use the Internet and they won't bother you for weeks...
8. Some people are like Slinkies . . . not really good for anything, but you still can't help but smile when you see one tumble down the stairs...
7. Health nuts are going to feel stupid someday, lying in hospitals dying of nothing...
6. Whenever I feel blue, I start breathing again...
5. All of us could take a lesson from the weather. It pays no attention to criticism...
4. Why does a slight tax increase cost you two hundred dollars and a substantial tax cut saves you thirty cents???
3. In the 60's people took acid to make the world weird. Now the world is weird and people take Prozac to make it normal...
2. Politics is supposed to be the second oldest profession. I have come to realize that it bears a very close resemblance to the first...

#### **AND THE # 1 THOUGHT FOR THE DAY:**

You read about all these terrorists, most of whom came here legally, but they hung around on these expired visas, some for as long as 10-15 years. Now, compare that to Blockbuster: You are two days late with a video and those people are all over you. I think we should put Blockbuster in charge of immigration & Homeland Security...Rhonda



## Membership Application

Annual Dues \$30.00 Mail to:  
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I'm a:	I'm Willing to:
<input type="checkbox"/> Beginner	<input type="checkbox"/> Serve on a committee
<input type="checkbox"/> Intermediate	<input type="checkbox"/> Assist the Editor
<input type="checkbox"/> Advanced	<input type="checkbox"/> Help at Meetings
<input type="checkbox"/> Hobbyist	<input type="checkbox"/> Join a SIG
<input type="checkbox"/> Professional	<input type="checkbox"/> Do Whatever..

The Software I use is	
<input type="checkbox"/> WIN 95	<input type="checkbox"/> WIN 2000 ME
<input type="checkbox"/> WIN 98	<input type="checkbox"/> WIN NT
<input type="checkbox"/> WIN 98 SE	<input type="checkbox"/> Other _____

The Kern Independent PC Users Group — KIPUG is a nonprofit organization of computer users — novices, experts, professionals and hobbyists. KIPUG welcomes all new members interested in computers. A General Meeting is held on the second Thursday of the month at the Kern County Superintendent of Schools Building, City Center, at 17th and L streets in Bakersfield. Meetings run from 7:00 PM until 9:00 PM and include a business meeting along with product demonstrations, door prizes and a drawing.

### Membership Information and Benefits:

General Meetings are open to the public, free of charge. The public and guests are welcome but certain benefits apply to members only.

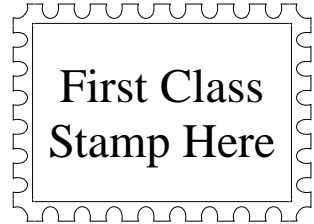
To become a member, complete the form above and mail your check to KIPUG.

#### Member Benefits Include:

- A monthly newsletter — *Bits & Bytes* — a place to publish your articles!
- Free ads to buy or sell computer items.
- One free month's business card ad for corporate members.
- Web Site with free Listserv and access to the newsletter on-line.
- User group product discounts and special offers.
- Networking with computer enthusiasts who share common interests.
- Special Interest Groups (SIGs) to help you solve problems.
- All general memberships are family memberships, bring the family.
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- Product evaluation/review program — write an evaluation — keep the product.

Visit KIPUG's Web Site: <http://www.kipug.org/>





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Bakersfield, CA

*We are on the web at*  
**WWW.KIPUG.ORG**

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**Sarah Perelli-Minetti Webmaster**

Meetings are held on the second Thursday of the month  
at the Kern Superintendent of Schools Building.  
17th and L streets Downtown  
Meeting Time is 7 pm