

Re: ML370 G4 not seeing all physical RAM

Source:

<http://www.tech-archive.net/Archive/Windows/microsoft.public.windows.server.general/2008-12/msg00137.html>

- *From:* "Bruce Sanderson" <bsanders@xxxxxxxxxxxxxxxxxxxx>
 - *Date:* Tue, 2 Dec 2008 18:56:24 -0800
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PAE is a feature of the processor that requires support in the motherboard and operating system (PAE support is included in Windows XP, Server 2003 etc.). NO application changes are required as the PAE feature has no affect on application coding. PAE allows the operating system to map any part of the 4 GB (32 bit) virtual address space into physical memory pages above 4 GB.

Each process (e.g. application) on 32 bit OS is limited to a 4 GB address space – this can not be changed. Whether a system will benefit from more physical RAM and PAE will depend on the collective actual memory requirement of the workload – all the applications and system services running concurrently.

The operating system feature called AWE DOES require application changes. This feature allows an application to request that the operating system map different physical memory pages into the virtual address space of the application – this is similar to how "expanded memory" worked (expanded memory was only used for a few years when the 80386 based systems were around – ancient history now!). Applications have to be specifically coded to use this feature – SQL Server 2000 (and later versions) are designed to use this feature.

How much physical memory a 32 bit operating system can use on any particular hardware depends on the hardware details as well as the operating system. There are many motherboards (especially older ones not designed for 64 bit operating systems) that limit the RAM usable by a 32 bit OS (even when PAE is enabled) and in some cases even for 64 bit OS, because some of the hardware (e.g. video adapters) requires part of the address space. This is explained in <http://support.microsoft.com/kb/929605>.

The information in the page at <http://members.shaw.ca/bsanders/WindowsGeneralWeb/RAMVirtualMemoryPageFileEtc.htm> may also be useful.

—

Bruce Sanderson
<http://members.shaw.ca/bsanders>

It is perfectly useless to know the right answer to the wrong question.

"Dusko Savatovic" <nospamplease.savatovic@xxxxxxxxxx> wrote in message news:%23nn4MaxTJHA.4372@xxxxxxxxxxxxxxxxxxxxxxxxxxxx

Hi Brandon,

Re: ML370 G4 not seeing all physical RAM

I don't know how old you are, but we "old bones" have seen this before in the old DOS days. The original 8086 CPU had 20 address bits. $2^{20}=1\text{MB}$. DOS used 0 – 640kB. The memory between 640k and 1MB was for video, and other hw devices. When they added memory above 1MB, DOS apps didn't see memory above 1MB. DOS had to switch (map) memory above 1MB space to the memory space below 1MB.

PAE does (more or less) the same, only in the space above 4GB. $2^{32}=4\text{GB}$. Intel added four more address lines to the CPU ($2^4=16$; $16*4\text{GB}=64\text{GB}$) and added instructions to reference this memory. However, the OS coding and app coding remains the same.

One more thing.

When 32-bit OS was designed, they split the memory 50:50. Half was dedicated to OS, half was dedicated to app. They later changed it (with /3GB switch in boot.ini). What this means is that the app can now see max 3GB and OS can use max 1GB.

RTM Vista (32-bit) could (almost) never see full 4GB. 3.5GB was about maximum. They changed it in Vista SP1. Vista SP1 now reports full 4GB (but still cannot use cca 0.5GB).

32-bit Windows Servers 2003 can address 64GB using PAE, but it doesn't mean that your OS or apps will benefit from it. Like I said, the only app that I know that benefits from PAE was SQL Server 2000.

If you need more than 3GB of memory, the way to go is 64-bit OS (Win Server 2008). IMO don't waste your time on 64-bit Windows 2003 (if it will be a new installation).

"Brandon Carder" <BrandonCarder@xxxxxxxxxxxxxxxxxxxxxxxxxxxx> wrote in message news:F6FD3B33-A1FB-4B14-883C-F2A1073A8A63@xxxxxxxxxxxxxxxxxxxx

So the limit may be extended, but the actual visual is still going to show 4GB? Am I understanding this correctly?

"Dusko Savatovic" wrote:

In 32-bit OS, 4GB is the higher limit. PAE does extended this limit to 64GB, but this is not the linear space. Applications must know how to use PAE. IIRC SQL Server 2000 was aware of PAE, I don't know about other apps.

"Brandon Carder"
<BrandonCarder@xxxxxxxxxxxxxxxxxxxxxxxxxxxx> wrote in message
news:88C10FA9-FA1D-45A8-8081-4884E92651B3@xxxxxxxxxxxxxxxxxxxx
> Hi All,
>
> I have a situation where I had a client upgrade from 4GB

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to 6GB > physical

> RAM

> in an older ML370 G4. BIOS sees the full 6GB, but
Windows is still > only

> reporting 4GB. The system has Windows 2003 R2
Enterprise.

>

> The /PAE switch has been enabled in the BOOT.INI file.

>

> Is there something I'm missing?