NuBus Speed Benchmarks (1/96)

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TOPIC ---

I need NuBus specifications for speed, bandwidth, throughput, and relationship to processor speed.

DISCUSSION ---

The following specifications are not TRUE benchmarks, but can be used as a primer to understand the variables influencing the "relative" throughput of NuBus.

Though the NuBus speed is designed to be processor- and architecture-independent, it varies depending on the NuBus card and Macintosh used. We don't have specific benchmarks, but in general, the NuBus "throughput" ranges from around 7MB to 37MB per second depending on the Macintosh, NuBus card, and application used. Generally, increases in NuBus throughput are influenced more by the NuBus card's design and function than by the use of a "faster" CPU.

NuBus throughput is faster on a Macintosh IIsi, Macintosh IIci, Macintosh IIfx, or the Macintosh Quadra computers, because the processor clock rate is faster than the 16MHz for other Macintosh II computers. These Macintosh computers, therefore, are faster at bus arbitration on the processor side, and the processor responds faster to NuBus accesses. For example, the increase in speed with the Macintosh IIci is approximately 20 to 30 percent when going out to NuBus or coming back.

The typical time required to go from the processor bus to the NuBus card is about 700ns, as is the time in reverse: going from the NuBus card back to the processor. The time remains constant whether moving 1 or 4 bytes of data. (These times are representative of the Macintosh II using the Macintosh II Video Card.)

Other cards, such as the Macintosh 1-Bit Video Card, support what we call "dump and run." A Macintosh II has a transfer rate of about 20MB using this card because each 4-byte write-only takes only 200ns, and the data goes right into video RAM on each cycle. This card immediately acknowledges each cycle on a write, whereas the Macintosh II Video Card could take more than one cycle for the data to move into RAM.

Cards that support the NuBus burst mode could achieve transfer rates of up to 37.5MB when going from NuBus card to NuBus card, which is the case with some graphics accelerator cards to video cards. With these cards, the first access takes 200ns, and each subsequent access up to 16 takes only 100ns.

Because of the overhead processing video, any performance increase over one of the other Macintosh II computers is negated when using a Macintosh IIci or Macintosh IIsi with the internal video in 8-bit mode. Setting the internal video to 1-bit, or having a NuBus video card, will ensure maximum NuBus performance in these systems.

Note: For information about Macintosh computers based on the 68040 or PowerPC microprocessors, see these related articles in the Tech Info Library:

"Power Macintosh and NuBus Q&A"
"68040 CPU Architecture: NuBus Transfer Modes and Performance"

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