



FIGURE 1. Processor-Memory Performance Gap.[Hen96].

The split into two camps has its disadvantages as well. Figure 1 shows that while micro-processor performance has been improving at a rate of 60% per year, the access time to DRAM has been improving at less than 10% per year. Hence computer designers are faced with an increasing “*Processor-Memory Performance Gap*,” which is now the primary obstacle to improved computer system performance.

System architects have attempted to bridge the processor-memory performance gap by introducing deeper and deeper cache memory hierarchies; unfortunately, this makes the memory latency even longer in the worst case. For example, Table 1 shows CPU and memory performance in a recent high performance computer system. Note that the main memory latency in this system is a factor of four larger than the raw DRAM access time; this difference is due to the time to drive the address off the microprocessor, the time to multiplex the addresses to the DRAM, the time to turn around the bidirectional data bus, the overhead of the memory controller, the latency of the SIMM connectors, and the time to drive the DRAM pins first with the address and then with the return data.