Power system performance book pdf

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A useful amount of work performed by a computer in calculation, the performance of the computer is the useful amount of work done by a computer system. Outside the specific contexts, the performance of the computer is estimated in terms of accuracy, efficiency and speed of execution of the computer program instructions. When it comes to high performance for computers, one or more of the following factors may be involved: short response time for a given job. High throughput (work processing rate). Low use of computing resources. Compression and decompression of fast (or highly compact) data and decompression. High availability of the processing or application system. High bandwidth. Short data transmission time. Technical and non-technical definitions The performance of any computer system can be evaluated in measurable technical terms, using one or more metrics listed above. In this way performance can be compared to other systems or the same system before / after changes in absolute terms, e.g. To meet a contractual obligation, while the above definition refers to a scientific, technical approach, the following definition provided by Arnold Allen would be useful for a non-technical public: the word performance in computer performance means the same thing that performance means in other contexts , that is, "how much is the computer that does the job that should do?" [1] As a aspect of the performance of software quality computer software, in particular the time of response of the software application, is an aspect of the quality of the software that is important In humans, computer interactions. Performance engineering of performance engineering within systems Engineering includes the set of roles, skills, tasks, practices, tools and results applied at each stage of the lifecycle of system development which ensures that a solution will be designed, implemented and supported operationally to meet the performance requirements defined for the solution. Performance engineering is continually dealing with compromises between performance types. Occasionally a CPU designer can find a way to create a CPU with better overall performance improving one of the performance aspects, presented below, without sacrificing CPU performance in other areas. For example, building the CPU from better and faster transistor. However, sometimes pushing a performance type for an extreme advantage to a CPU with worse general performance, because other important aspects were sacrificed to get an impressive appearance number, for example, the chip clock rate (see the megahertz myth). Application Performance Engineering Main article:Performance Engineering Application Performance Engineering (APE) is a specific methodology within the performance engineering designed to meet the challenges associated with application performance in movable, cloud and terrestrial environments more distributed. Includes roles, abilities, activities, practices, tools and e Applied at each phase of the application life cycle that guarantees an application will be designed, implemented and supported by the settings settings to meet unfunctional performance requirements. Aspects of Performance Performance Performance Metrics (Things to measure) include availability, response time, canal capacity, latency, completion time, service time, bandwidth, throughput, relative efficiency, scalability, performance for watts, compression ratio , length of the education path and accelerate. The Benchmarks of the CPU are available [2] Availability Main Item: Availability Availability of a system is typically measured as a factor of its reliability - since the reliability increases, then the availability (which is, less downtime). The availability of a system can also be increased by the focusing strategy on the increase in verifabilities and maintainability and not on reliability. Improving maintainability is generally easier than reliability. MANUTENIBILITY estimates (repair rates) are generally more accurate. However, since the uncertainties in reliability estimates are in most very large cases, it is likely to dominate the problem of availability (forecast uncertainty), even while maintenance levels are very high. Response time Main article: Response time (Technology) Response time is the total amount of time required to respond to a service request. In the calculation, that service can be any work unit from a simple IO disk to upload a complex web page. The response time is the sum of three numbers: [3] service time - how long it takes to do the job requested. Wait for time - how long the request must expect lateral requests before this before it arrived. Transmission time Â ¢ â,¬ "How much does it take to move the request to the computer doing the job and response to the applicant. Processing speed Main articles: Instructions for second and flop Most consumers choose computer architecture (normally Intel Ia32 Architecture) To be able to perform a large pre-compiled pre-existing software base. Being relatively disinformed on computer benchmarks, some of them choose a particular CPU based on the operational frequency (see MyGaHertz Myth). Some system designers who They build parallel computers choose CPUs based on speed per dollar. Channel capacity Main article: Channel capacity Channel capacity is the higher upper limit on the information speed that can be reliably transmitted on a communication channel. from Theorem of the noisy channel coding, the capacity of the channel of a determin Ato Canale is the rate of Limiting (in unity of information per unit of time) that can be obtained with the probability of arbitrarily small error. [4] [5]. Information theory, developed by Claude E. Shannon during the Second World War, defines the notion of canal capacity and provides a mathematical model with which you can calculate it. The key result states that channel capacity, as defined above, is given maximum information between the entry and exit of the channel, channel, Maximization is compared to the distribution of the inputs. [6] Latency Main article: Latency (Engineering) Latency is a time delay between the cause and the effect of some physical changes in the system that is observed. The latency is the result of the limited speed with which any physical interaction can take place. This speed is always less than or equal to the speed of light. Therefore, each physical system that has different spatial dimensions from scratch will experience a sort of latency. The precise definition of latency depends on the observed system and the nature of stimulation. In communications, the lower latency limit is determined by the means used for communications. In reliable two-way communication systems, latency limits the maximum rate that information can be transmitted, since there is often a limit on the quantity of information that is "in flight" at any time. In the field of man-machine interaction, perceptible latency (delayed between what the user commands and when the computer provides results) has a strong effect on user satisfaction and emerging. Computers perform instruction set called a process. In operating systems, process execution can be postponed if other processes are also performing. Furthermore, the operating system can plan when performing the action that the process is commanding. For example, suppose a process command that the voltage output of a computer card is set to high-high-high-low and so via a speed of 1000 Hz. The operating system can choose to adjust the planning of Each transition (high-low or low-high) based on an internal clock. The latency is the delay between the process instructions that command the transition and the hardware actually transition the voltage from high to low or low at high. System designers who build real-time calculation systems want to guarantee the worst response. This is easier to do when the CPU has low interruption latency and when it has a deterministic response. Bandwidth Main article: Band width (computing) in computer network, bandwidth is a bit-rate measurement of data communication resources available or consumed, expressed in bits per second or multiple of it (bit / s, kbit / s, mbit / s, gbit / s, etc.). The bandwidth sometimes defines the net rate (aka. Peak bit rate, information rate or useful physical level bit rate), the canal capacity, or the maximum throughput of a logical or physical communication path in a system of Digital communication. For example, bandwidth tests measure maximum throughput of a computer network. The reason for this use is that according to the law of Hartley, the maximum data speed of a physical communication link is proportional to its bandwidth in That sometimes it is called frequency bandwidth, spectral bandwidth, RF bandwidth, signal bandwidth or analogue bandwidth. Main article: Power in general terms, throughput is the production rate or the rate to which something can be processed. In in Networks, throughput is essentially synonymous with bandwidth digital consumption. In wireless networks or cellular communication networks, spectral system efficiency in bit / s / hz / area, bit / s / hz / site or bit / s / hz / cell, is the maximum throughput of the system (Aggregate throughput) divided by analogue bandwidth and a certain size of the system coverage area. In integrated circuits, often a block in a data flow diagram has a single input and a single output, and operate on discrete information packages. Examples of these blocks are FFT modules or binary multipliers. Because throughput units are the mutual of the unit for the propagation delay, which is 'seconds per message' or 'seconds for output', the throughput can be used to connect a computational device that performs a dedicated function as a ASIC or incorporated processor to a communication channel, simplifying system analysis. Main article: The relative efficiency scalability Main article: Scalability Scalability is the capacity of a system, a network or a process to manage a growing amount of work in a capable way or its ability to be expanded to accommodate that growth la Quantity of electricity used by the computer (energy consumption). This becomes particularly important for systems with limited energy sources such as solar, batteries, human energy. Performance for watts Main article: Performance for watts System designers who build parallel computers, such as Google's hardware, choose CPUs based on their power to watts, because the cost of feeding the CPU exceeds the cost of CPU itself. [7] For spacecraft computers, the processing speed for Watt ratio is a more useful performance policy for RAW processing speed. [8] Main article compression report: data compression is useful because it helps reduce resource use, such as data storage space or transmission capacity. Because compressed data must be decompressed to use, this extra treatment imposes computational or other costs through decompression; This situation is far from being a free lunch. Data compression is subject to a trade-off of space-time complexity. Dimensions and weight This is an important feature of mobile systems performance, from intelligent phones that are held in pocket to portable built-in systems in a probe. Additional information: green income The effect of a computer or computer on the environment, during production and recycling, as well as during use. The measurements are adopted with the objectives of reducing waste, reduce hazardous materials and minimize the ecological footprint of a computer. Transistor account Main article: Transistor account The transistor count is the number Transistors on an integrated circuit (IC). The transistor count is the most common measure of the IC complexity. Benchmarks Main article: Benchmark (Computing) Because there are so many programs to test a CPU on all aspects of performance, benchmarks have been developed. Benchmark. The most famous benchmarks are the Specint and SpecFP benchmarks developed by Standard Performance Evaluation Corporation and the Mark Certification Benchmark developed by the Embedded Consortium Microprocessor Benchmark Consortium Eememb. Software performance test Main article: software performance tests in software engineering, performance tests are carried out in general to determine how a system performs in terms of reactivity and stability under a particular workload. It can also be used to investigate, measure, validate or verify other system quality attributes, such as scalability, reliability and use of resources. The performance test is a subset of performance engineering, an emerging computer practice that strives to build performance in implementation, design and architecture of a system. Profiling (performance analysis) Main article: Profiling (computer programming) in software engineering, profiling ("Program ProfiLang", "Profiling software") is a form of dynamic analysis of the program that measures, for example, Space (memory) or the temporal complexity of a program, the use of particular instructions, or the frequency and duration of function calls. The most common use of profiling information is to help program optimize. The profiling is obtained by means of the program of the source code of the program or its binary executable form using a tool called Profiler (or code profiler). A number of different techniques can be used by the Profilers, such as simulation, statistical, instrumental and event-based methods. Tuning performance Main article: Performance adjustment is the improvement of system performance. It is generally a computer application, but the same methods can be applied to economic markets, bureaucracies or other complex systems. The motivation of this activity is called a performance problem, which can be real or anticipated. Most systems will respond to an increase in load with a certain degree of decreasing performance. The capacity of a system of accepting a higher load is called scalability, and modifying a system to manage a higher load is synonymous with performance tuning. Systemic harmony follows these steps: to evaluate the problem and establish numeric values that classify acceptable behavior. Measure the performance of the system before editing. Identify the part of the system that is fundamental to improve performance. This is called the bottleneck. Change that part of the system to remove the bottleneck. Measure system performance after editing. If the change improves performance, adopt it. If the change worsens the performance, put it back to the in which it was. The main article: Perceived performance, in computer engineering, refer to how quickly a software function seems to perform its task. The concept applies mainly to the acceptance aspects of users. The amount of time an application requires to start, or a file to download, is not faster by displaying a boot screen (see splash screen) or a file progress dialog. However, it meets some human needs: seems faster for the user, as well as providing a visual signal to let them know that the system is managing their request. In most cases, increasing real performance increases perceived performance, but when real performance cannot be increased due to physical limitations, techniques can be used to increase perceived performance. performance equation the total amount of the time (t) required to perform a particular benchmark program is t =n c f {\displaystyle t={\tfrac {NC}{f}}} , or equivalent p = i f n {\displaystyle P={\tfrac {If}{N}}} [9] where p = 1 t {\text actually P= {\frac {1}{t}} terms the n value can be determined exactly by using an instruction set simulator (if available) or by estimate—is based partly on the estimated or actual frequency distribution of input variables and examining the machine code generated by a hll compiler. cannot be determined by the number of hll source code lines. n is not influenced by other processes running on the same processor. the significant point here is that the hardware normally does not track (or at least make available) a n value for the executed programs. the value can therefore be determined only accurately by the simulation of the instruction set, which is rarely practiced. f {\textstyle f} is the clock frequency in cycles per second. c = 1 i {\textstyle C={\frac {1}{ I}}} is the average cycle for education (cpi) for this benchmark. i = 1 c {\textstyle I={\frac {1}{ C}}} is the average cycle (ipc) instructions for this benchmark. even on a machine, a different compiler or the same compiler with different compiler optimization switches can change n and CPI—the benchmark is run faster if the new compiler can improve n or c without worsening the other, but often there is a trade-off between them—is it better, for example, to use some complicated instructions that require a lot of time to run, or to obstruct that they run very quickly, even if it takes more a cpu designer is often necessary to implement a particular set of instructions, and therefore cannot change no. at times a designer focuses on performance improvement, bringing significant improvements in f (with techniques such as deeper piping and faster caches,) while (lost) not sacrificing too much C—which prove to be a fast-demon cpu design. sometimes a designeron performance improvement, bringing significant improvements in the ICC (with techniques such as out-of-order execution, super-scale CPUs, larger caches, improved success rates caches, improved branch prediction, speculative execution, etc.), while (sold) not sacrificing too much watcha design CPU Brainiac. [10] For a certain set of instructions (and therefore fixed n) and semiconductor process, the maximum performance of the wire (1 / t) requires a balance between drinking-lines and speetracer techniques. [9] See also Algoritmic Efficiency Computer Performance for order of magnitude Network Performance Processor latency oriented architecture optimization (informatics) RAM Update Full update Rate Hardware setting Acceleration Cache Acceleration Cache Cache Upgrades Computer Performance Analysis with Mathematics by Arnold O. Allen, Academic Press, 1994 . Every computer performance book, Chapter 3: Read useful. CreateSpace. ISBNÂ 1482657759. "Capacity of the channel." Conference notes for m.sc. Data communication networks and distributed systems D51 - Basic communication and networks. Archived from the original of 2007-08-21. Jim Lesurf. "The signals look like noise!" Thomas M. Cover, Joy A. Thomas (2006). Elements of information theory. John Wiley & Sons, New York. "Fixed copy." 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