

INSIGHT

Multicore Processing: Disruption or Distraction for the IT Infrastructure?

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IDC OPINION

Multicore processing (or the ability to place many general-purpose or specialized processors on a single socket) may be one of most important developments to impact the IT infrastructure since the birth of Ethernet. The ability to create very dense processing systems suddenly makes available an abundant supply of compute cycles to do new and unusual things. Recent industry announcements included AMD's dual-core demonstrations and aggressive product plans. Also, Microsoft took an early leadership position and announced that it would not seek to raise software licensing based on the number of cores, but rather target the number of sockets. In addition, Intel suggested to its customers that it was strongly recommending them to follow suit. Ultimately, such a move by two of the leading platform and operating system vendors could force the independent software vendors (ISVs) to follow suit rather than procrastinate or consider increasing licensing fees based on the number of cores and not the sockets. However, IDC believes that multicore processing capabilities could be disruptive to several incumbent technologies, while sustaining other platforms into new life cycles. IDC believes this technology will be critical in the following ways:

- ☒ Multicore processing will be useful in areas in the IT infrastructure where large amounts of compute capacity were provisioned by either a scale-up or scale-out strategy. For example, the virtualization needs for application server compute cycles could be met quickly by multicore-based systems that would provide large quantities of processor threads. These systems could potentially be more effective at providing faster compute platforms for .NET- and J2EE-based workloads and over time challenge the structure of the application server tier.
- ☒ New software licensing models could be forthcoming based on the acceptance of multicore processing. In doing so, ISV business models could be affected by customers demanding that pricing remain at a CPU or socket level and not a core level. Consequently, over time, new and larger workload processing could be performed on equal or smaller platforms than are currently being used and therefore directly affect the value or amount an ISV could charge for its products.
- ☒ IDC believes that this technology could be sustaining to large-scale symmetric multiprocessing (SMP) systems by allowing highly threaded or parallel processing systems to hold onto the installed and very lucrative database and business processing workloads. In doing so, multicore processing could extend its life cycle and offer up a lifeline to the high-end system ecosystem.

IN THIS INSIGHT

Multicore processing could be the next significant differentiator between the systems vendors and integrators. The discussion will rapidly go beyond the number of cores to focus more on the changes and impacts on IT infrastructure, workload platforms, and potentially radical compute models. This insight is the first of a series of studies to highlight these impacts.

SITUATION OVERVIEW

Multicore processing systems will bring new, challenging issues for the IT community and the infrastructure that it runs on. IDC has identified many key areas that will be impacted by the rollout and adoption of this technology. Although some observers feel that multicore processing spells an end to Moore's law, whereby processor performance is based on improved circuit density and speed, IDC believes that both initiatives provide a potentially potent one-two punch to commodity-based systems over established proprietary systems often found in the midrange and high-end systems markets.

The market dynamics affected by multicore processing include a broad array of areas, as follows:

- ☒ **Software licensing.** The value proposition that ISVs bring to software pricing is already under stress as companies are challenged to reconsider pricing models to accommodate utility-based architectures and modular (or service orientated) frameworks. Now, the hardware industry has raised that ante by allowing the consumer much more compute power within a comparable platform. Consequently, given this analysis, multicore processing systems could be disruptive to the software industry by allowing previously less sophisticated platforms to compete for established markets at a low point on a revenue/price curve.
- ☒ **Power and cooling.** One of the current challenges for blade server deployments has been the power and cooling requirements of individual blades. Consequently, systems builders have to walk a fine line to identify the breakeven point for the chassis to accommodate a cost-effective blade configuration. Given that early results for multicore processors have shown them to be good at reducing power and cooling, IDC believes that they will help to accelerate the deployment of a fully loaded blade server chassis and therefore strengthen their total cost of ownership (TCO) case. Conversely, IDC also believes that multicore processing systems will extend the life cycle of large-scale systems for the very same reason (by lowering the overall power and cooling needs as more dense systems are built).
- ☒ **Balanced systems.** Multicore systems offer up the opportunity to process workloads with specific performance characteristics (e.g., particular transaction applications that benefit from parallel processing). However, one should be cautious that the multicore systems do not dominate a workload environment without being able to keep overall systems performances in balance. Here, compute, I/O, and memory needs have to be regulated to allow the overall

system experience to be positive and not introduce systems latency. Therefore, systems architects building IT infrastructures should be on the lookout for a wide range of benchmarking results before deploying widespread multicore systems.

- ☒ **Threads and parallel processing.** Applications, operating systems, and databases are developing their ability to take advantage of multithreading and parallel processing systems, and IDC believes that this is a key area for which disruptive and sustaining views will be expressed. IDC believes that multicore processing systems will be sustaining to existing processor architectures such as x86, POWER, and SPARC. By giving these platforms additional thread and parallel processing capabilities, their place in the infrastructure environment is sustained. However, platforms being built by companies such as Azul Systems and Clearspeed show that they could be disruptive to specific areas such as the Java Virtual Machine and computational processing, respectively.

- ☒ **Disk storage subsystems.** The storage industry may provide a good reference point for multicore processing systems by comparing the storage capabilities of the disk subsystem. Disk capacity expanded rapidly and allowed new industries to be created (storage area networks and network attached storage). IDC believes that the server and systems market could face a similar expansion by proper use of the added compute cycles that multicore processing systems bring. Equally important is today's development of server capabilities being inserted into storage subsystems (e.g., IBM's POWER chipsets) to raise their intelligence and functions. IDC believes that, in the future, if multicore processing systems are placed into storage subsystems, new capabilities (e.g., security and encryption) or functions could be more easily performed by placing huge computing power very close to huge I/O subsystems.

- ☒ **Workload platforms.** It is clear that if multicore processing systems are accepted by the IT industry at large, there will be a shift in workload processing. IDC believes that workload migrations happen slower than systems vendors hope for, but multicore processing systems could be a major catalyst for such shifts. Reasons include the ability of blades to do more work, industry standard server platforms to move further in the enterprise, the simplification of grid computing networks (once a resource is found to do repetitive processing, that resource can do a lot more than today's server configuration), shifts in the application server tier (expansion in capability, but contraction in complexity), and, finally, changes in the size and capability of clustering farms.

- ☒ **Virtualization.** Multicore processing systems will drive the need for systems vendors to expand their systems virtualization capabilities. In doing so, virtualization at a hardware level (partitioning) will take on a new meaning, with the potential need to partition the processing cores too. This function could add value to the virtualization stack and therefore create revenue opportunities.

- ☒ **Scale up, scale out.** Multicore processing systems will force new discussions on the merits of a scale-up or scale-out infrastructure, given that both directions will have more compute capabilities. IDC believes that the position that supporters of both infrastructures will need to take is showing the value that these new

systems can bring to the IT infrastructure. CIO and IT management will not be ready to accept these systems unless the vendor can build a strong value proposition for either buildout direction.

FUTURE OUTLOOK

Multicore processing is not a new phenomenon for the server industry. Intel and other vendors tried this approach many years ago. IBM currently ships its POWER-based servers with dual-core architectures. This time multicore will substantially impact the volume x86 server market, as both AMD and Intel plan to rapidly convert their product lines to dual-core. However, given that this time around so many of the moving parts of the Infrastructure ecosystem are being affected, IDC believes that the impact will be significant. In looking at the market space through the disruptive and sustaining innovation lens, one can see many challenging issues on the horizon, including:

- ☒ A shift in the profit pools in the server market value chain
- ☒ The need for ISV software revenue to be more value oriented
- ☒ A renewed and more complicated drive in the virtualization stack
- ☒ The change and introduction of a new server form factor that will impact the IT capacity planning and infrastructure buildout
- ☒ A race to embed functionality and intelligence in the multicore processors across the server, storage, and network markets, therefore forcing further technology convergence

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