IBM

Celebrating the difference: How the mainframe delivers consistently greater value

Has there ever been a more adaptable machine than the mainframe? The proven technology that handles most of the world's transactions has evolved from the early datacenter to modern SOA server. IBM software brands have invested just as heavily, and mainframe customers are recognizing that the mainframe is a critical platform for modern applications running in service oriented architectures.

Today's highly interconnected applications demand a lot from a platform: The platform must be totally reliable, very efficient in processing transactions and must be flexible across its whole architecture to handle ever-changing demands from new Java™ applications, portals and Web services. The mainframe has developed to meet all these demands.

A compelling reason for its longevity is the value it delivers, says Steve Mills, Senior Vice President and Group Executive of IBM's Software Group. "If the mainframe can continue to deliver real value, it can sustain a business forever."

What are the factors that contribute to the mainframe's continuing value? They include its utilization, its physical characteristics and its operating system - the very things that make it such an obviously different type of computer from the UNIX® and Intel® servers to be found throughout the typical business. The mainframe's highly evolved hardware and decades of experience in software differentiates it from other platforms, but doesn't isolate it – it stands above the others, but has complete interoperability with them.

Throughput

"It's a throughput machine," says Mills of the mainframe. Typically, mainframes have a utilization approaching 100%. This is in stark contrast to other computer architectures: Most UNIX machines don't exceed 20%, while Intel machines are usually less than 10%. Mainframes deliver maximum throughput per unit cost. According to Software Strategies, zSeries® offers the lowest total cost of ownership (TCO) and cost per user (TCU) for mid-large workloads: less than 50% of the TCO/TCU of UNIX or Windows®. (*Source: Software Strategies "PR" White Paper, April 2005 Analysis. Based on Mercer Survey data.*)

It's the physical differences that count. Distributed systems use a lot of CPU cycles for data input and output (I/O). The System z9™ uses hundreds of processors that are preengineered to work together, allocating different types of work – like I/O, operating system functions and application execution – to dedicated processors. The result – a highly efficient system in which all the components are fully utilized.

Compare this with distributed systems where, for I/O performance reasons, applications are often split across dedicated servers. While this approach may be attractive to programmers, who like their own systems for testing, quality assurance, production and so on, it can lead to as many as five times the number of physical systems.

Resources

Does a large number of physical systems matter if the computers themselves are cheap? It does matter: Not only do large numbers of distributed systems consume vast amounts of space and energy but, even more importantly, they need a lot of people to keep them running.

Many organizations have spent money on a lot of low-use machines, trading off asset efficiency for an inefficient labor-based model. System z™ offers a far more efficient asset-based model, with clear financial advantages. In a recent study, a typical customer thought they had only 24 UNIX servers – but these were just the *production* servers. In addition, they had 49 other servers for development, test and disaster recovery. And, to support these servers, they needed 44 people and $7 million in software. The servers were running at 20% utilization. A comparable System z implementation would have required just 20 servers, $6 million software and 16 support staff. The customer had thought that their Solaris environment was 20% of the cost of the mainframe … but, the total cost of ownership of the System z was 37%

less than the Solaris systems.

One reason that the mainframe is so labor-efficient is that the high utilization and versatility of the mainframe means you can consolidate work from different platforms into System z. For instance, a typical highly interactive Web-based environment might have tiers for HTTP and proxies, a tier for application servers and a tier for the database. Here, it becomes very cost-effective to consolidate the application and data serving tiers in System z – the logical tiers don't disappear, but they converge in the physical mainframe. The advantages can be numerous, but transactional integrity, audit ability and security are some of the obvious ones – along with reduced operations costs.

z/OS® operating system

The System z operating system is "probably the greatest piece of computer science work ever done," according to Mills. "It's an amazing piece of software, with an extraordinary ability to deal with managing all the resources ... and tremendous recovery services." Mills has a robust view of the priorities for the operating system that's at the core of the enterprise hub: If one application breaks the OS rules, it's far better that it is summarily stopped than have the whole system die. If you're operating your business 24x7, your system absolutely must stay up and running.

Unlike other operating systems, z/OS is designed for task management. It deals with the arbitration and scheduling of work so that every part of the hardware is working at its optimum utilization. Because of its unmatched I/O capabilities, data can sit on disk, rather than in memory, and memory can be allocated in small increments to different tasks and allocated time slices, so the system can run thousands of concurrent applications, to reach 100% utilization. "It's not a high-performance calculator," says Mills, "it's a supercomputer for classical commercial workloads."

Transaction processing in mixed commercial workloads

The essential life-process of the corporate body is to complete transactions. Transactions underpin the way the world works, and it's essential that they are handled with absolute assurance that you and your customers' interests are protected. You need to be sure that transactions either fully complete or back out with absolute data integrity. And you need to be able to maintain a full audit trail for legal compliance.

System z has transaction management systems that can deliver that assurance. CICS® and WebSphere® Application Server for System z both provide rock-solid transactional deployment platforms, fully aligned with service oriented architecture (SOA) technologies. You can build Web services from CICS applications with no change to existing code while the common code base that WebSphere Application Server for System z shares with versions on other platforms allows application portability and consolidation to System z, while using open standards to prepare for the future.

With its Java programming environment, the application server enables applications from other platforms to take advantage of the unique availability of the mainframe and the performance lift offered by the System z Application Assist Processor (zAAP), a mainframe processor dedicated to running Java workloads at dramatically lower cost under z/OS. WebSphere Application Server on System z delivers full transactional integrity, so offers the opportunity to mission-critical applications to the core of the business. (The System z Integrated Information Processor, zIIP, offers the same sort of processing advantage for DB2® resources, especially in SAP environments.)

Total cost of ownership

Today, it's the human cost of computing that's the most significant factor in the CIO's budget: of the typical spend, 70% is labor, and it's increasing. And of the labor costs, by far the greatest part is operations, not development of new applications or administration. Inevitably, there is a decrease in efficiency as IT spending shifts to operations labor.

System z offers a way of countering this trend. Because of the way that labor costs differ between the environments, the cost per unit of work on the mainframe goes down as workload increases, while it scales out on distributed systems. Most businesses have a workload pattern that makes System z extremely cost-effective.

Summary

Modern mixed application workloads demand more from computers. System z has the precise attributes that make it a great match for these new workloads. It can connect enormous number of users, run tens of thousands of programs per day, with amazing total workload handling and reliability that's second to none. Combined with far less

floor space, typically only 5% of the energy needs and 20% of the administration overhead, System z running mixed applications has in many cases the lowest true total cost of ownership of platform for the greatest benefit.

The factors that make System z different from other platforms make it, as Mills says, “A system designed to get a lot of work done in a short time, and keep going and going.” Its full and integrated set of software capabilities are tightly focused on the requirements of customers who “ …. need the value the System z delivers – and the resulting business outcomes.” And that’s exactly what System z delivers, cost-effectively and without interruption.

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