



CLABBY ANALYTICS

Advisory

Buying Criteria for x86 Servers (Blades, Rack, Towers)

Introduction

Although many information technology (IT) buyers consider x86 servers to be “all the same” — there is tremendous variability in x86 server features and functions. The more advanced servers available from Dell, Hewlett-Packard, IBM, and Sun all offer enterprise-class extensions and design features that accelerate performance, improve availability, expand memory capacity, manage memory more effectively, accelerate virtualization, improve power usage and accelerate heat dissipation, improve manageability, and improve security as compared with x86 servers made by second or third tier vendors. Further, there are major differences that exist in x86 systems designs, scalability characteristics, the extent of hardware and software manageability, virtualization capabilities, and packaging.

Failure to consider these differences could result in the purchase of behind-the-times, less-advanced, less efficient, less reliable x86 server solutions.

In this *Advisory*, *Clabby Analytics* (that’s me) examines some of the buying criteria that should be considered when purchasing x86-based servers:

1. First and foremost, I observe that application characteristics are the most important factor to consider when choosing an x86-based server environment (applications dictate what kind of x86 architecture should be used);
2. Memory management has also become a critical decision point — especially as the x86 market moves into 64-bit computing;
3. The combination of physical and virtual system management is becoming an important criteria as more and more enterprises virtualize their x86 towers, racks, and blades; and,
4. Power usage and cooling characteristics have also become critical decision factors as new emphasis has been placed on “green” (environmentally sensitive) computing.

As for advice — after reading this *Advisory*, your “take-away” should be this:

From an information technology (IT) buyer perspective, it makes good sense to understand your prospective vendor’s innovation history and roadmap. Certain vendors are driving innovation in scale-out x86 blade and rack environments and scale-up x86 servers — while other vendors are simply cobbling together standard components and shoving lackluster server designs out the door. Buying x86 servers from vendors with a solid history of x86 systems innovation and deep R&D pockets ensures that your organization is maximizing its return-on-investment on computer equipment.

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Your Goal: Get the Most Advanced x86 Server at the Best Possible Price

Your goal when purchasing x86 servers should be to get the best, most advanced x86 systems design that you can possibly find at the best price. Or, stated another way, your organization should be striving to obtain the kind of features and functions found on more advanced enterprise servers (such as RISC-based enterprise servers and mainframes), while paying the reduced costs associated with industry standard-based x86 server environments.

More specifically, you should be looking for balanced systems designs that include innovations in:

- Performance;
- Availability (five nines [99.999%] — or better);
- Memory capacity and memory management;
- Virtualization;
- Power management and heat dissipation;
- Integrated systems/storage/network/application/database management; and,
- Security.

You should also be looking for innovations in x86 systems packaging and design (such as scalability through modularization, dense packaging, ease of upgrade, and the like).

Factors to Consider When Choosing an x86-based Server Environment

Before considering which x86 system design to adopt (blade, rack, tower, or massive scale-out Internet platforms) you must understand the characteristics of the applications that you are seeking to deploy on x86 architecture. Pay particular attention to:

1. Whether the application is 32-bit or 64-bit;
2. The memory requirements for your applications;
3. Where applications will be located (central, branch office, Web-tier, ...); and,
4. What quality of service is required (availability, reliability, performance).

Application Considerations: Why the 32-/64-bit Decision Is So Important

The reason that the “bittedness” (32- or 64-bit) of an application is important has to do with the amount of addressable memory it can exploit. Most x86-based applications to date have been designed to run on 32-bit processors that make use of 2GB or less memory. But with the advent of 32/64-bit hybrid processors, a new generation of 64-bit applications is evolving. 64-bit applications can exploit “very large memory” (VLM) — enabling hundreds of gigabytes (or even petabytes) of data to be addressed in main memory where it is closer to the CPU. By being close to the CPU, data can thus be processed much more rapidly — sometimes even 100X faster).

With the ability to process more data in main memory, x86 architecture is finally able compete head-to-head with RISC and EPIC 64-bit servers when running data-intensive applications. But other improvements in x86 system design are also required to improve performance (such as advanced memory management); to ensure availability and reliability; and to simplify physical and virtual systems management. IBM, HP, Dell, and Sun all recognize this — and invest heavily in their x86 server architectures. Other vendors do not have the deep engineering and R&D capital to invest as heavily.

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Application Considerations: Memory Management

As described above, 32-bit applications generally exploit only a limited amount of memory — but 64-bit applications can address huge amounts of memory. So, the next logical consideration when choosing an x86 systems design is to examine the amount of memory that can be made available, and the vendor's memory management facilities. Some x86 designs isolate memory — so it can't be shared; other designs allow for large amounts of memory to be shared. And because there is great variability in how vendors allocate memory, it is particularly important to pay close attention to your vendor's memory management strategy and its history of memory management innovation.

Application Considerations: Location

The physical location of an application and its related database is also an important consideration when considering which type of x86 architecture to adopt. For instance, if an application and its data are located in a branch office, a towered design may be the best implementation option (because the amount of traffic sent over a network can be reduced — so performance improves while network latency is reduced). If many servers are required in that branch office, a bladed design may be the most optimal choice. If the application is in at the Web-tier constantly caching images — and if this is being done on a massive scale — a massively scalable x86 Internet server design may be the best option.

Application Considerations: Level of Service

Determining the level of service required by an application environment is also a critical factor to consider when evaluating various x86 architectures. Office applications, for instance, are usually considered low priority applications — and hence, the level of RAS and security required to support office applications is usually pretty low. The same is generally true about page serving Web tier applications (if a server fails, then that server is simply failed-over to another server — and the broken server is then fixed at a later point). Mission-critical enterprise resource planning applications, on the other hand, require high degrees of reliability and availability — as well as strong security — and hence *require* highly-available, advanced scale-up x86 towers or scale-out blade/rack system designs.

Server Design Characteristics: Virtualization Handling

Virtualization — the process of pooling unused resources such that they can be utilized by programs that need them rather than go to waste — is one of the hottest growth areas in systems management today. Virtualization helps increase x86 systems utilization (from as little as 5% to over 40% or, in some cases, even better). Virtualization also helps reduce the cost for high availability (because spare servers can be created in the virtual pools described above); costs for setting up test environments can be lowered (because you can actually test on production machines rather than having to configure test machines); and management costs can be decreased (as servers are consolidated and virtualized on fewer, large scale-up x86 platforms or on efficient blade/rack configurations).

It is important to note that some vendors actually front-end their x86 processors with “pre-processors” that help handle resource virtualization rather than making the x86 processor do all of the work.

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Server Design Characteristics: Power and Cooling Innovations

Power usage and cooling innovations abound in the designs of IBM, HP, Dell, and Sun x86 servers. All of these vendors use advanced power supplies that do a better job of converting power from AC to DC than many second tier x86 systems makers. All of these vendors also release the latest-greatest power saving CPUs in their systems designs within months of each other. And all of these leading vendors have introduced low power memory. Some have also introduced 2.5 inch hard disks that use 40% less energy than 3.5 inch drives — while others are in the process of introducing low power/low heat flash disk.

In the cooling arena, some of the most exciting designs have reintroduced the use of water as a means to dissipate heat (water can be 4000x more efficient at removing heat than air). And several of the leading vendors have engineered cooling technologies that can isolate hot components, reassign the workload on those components, and shut down those components until they cool down — while others can redirect air to specific locations within a server to dissipate heat. The second tier vendors are generally not as sophisticated in terms of heat dissipation as their first tier competitors.

x86 Manageability Innovations

There are a lot of vendors in the x86 systems management market including Dell, CA (the former Computer Associates), EMC (and its VMware subsidiary), HP, IBM, Microsoft, Sun, and Symantec to name a few. And *Clabby Analytics* is both familiar with and has in the past written about all of these vendor's respective management environments. There is a commonality amongst these vendors in terms of overall strategy. Ultimately, they all want to make it possible to automatically provision workloads on underlying, virtualized, physical systems. But there are also major differences amongst them in terms of product depth, breadth, and integration.

When evaluating your prospective vendor's manageability innovations, look for a common graphical user interface which IT managers/administrators can use to manage entire systems environments (physical and logical systems). And look for additional management software that allows your systems administrators/managers to perform workload management, provisioning, and business process management.

In days gone by, a vendor used simple network management protocol (SNMP) agents on various devices to trap information from and capture information about those devices. Management programs could then be tucked-into a much larger management framework and the vendor could then claim to offer an integrated platform. Only, the problem was that information captured in this scenario could not readily be shared and easily integrated with other management programs running under the same framework. Vendors today are building CCMDBs (change and configuration management databases) that can federate the data that it captures and share that data amongst cooperative management programs. When considering which x86 server environment to use, ensure that it can report on its health to a CCMDB-based management environment.

Summary Observations

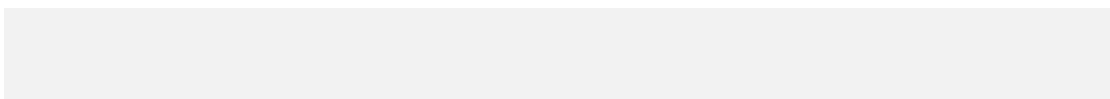
Although many information technology buyers think of x86 servers as “commodity computing platforms”, there are huge differences in x86 server implementations. Large vendors such as Dell, HP, IBM, and Sun are spending big money driving innovation on their respective x86 server designs in order to bring advanced systems functionality into the

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x86 server space. And by so doing, each is hoping to create important competitive differences that will drive customers to adopt their respective x86 offerings.

Pay particularly close attention to the requirements of applications that you intend to run on your x86 servers. If your application is 32-bit based, does not require a lot of memory, and if its service-level requirements are low (for instance, if high-availability and performance are not crucial characteristics for this particular application), then just about any x86 platform will suffice. But once your applications start to require more memory (as 64-bit applications are starting to require), then the memory management and capacity characteristics of your server become extremely important. And if those applications are mission critical, service levels also become extremely important (reliability, availability, security, and so on).

Hopefully, now that you've completed reading this *Advisory*, you'll be more sensitive to how application behaviors and service requirements contribute to the choosing the best platform possible. And, hopefully, you'll be able to identify shortcomings when comparing top tier vendors — as well as second tier vendors. Remember: your goal is to find the best x86 architecture that meets your application and management needs — and to procure it at the best price. The advice in this report should help you achieve that goal.



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