

Epic Clarity and Exadata Database Machine

The Perfect Match

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Introduction

In the healthcare industry, Epic's electronic health record (EHR) system is an industry leader. The Epic software platform is used in many of the largest, most complex healthcare organizations in the country. The nature of this industry is to generate, store (forever), and analyze tremendous amounts of data. Healthcare organizations that use Epic software often store these large data sets in the Epic Clarity data warehouse, supported either by a Microsoft SQL or Oracle database.

In 2016, Infoblob Solutions—an Oracle Platinum Partner and a leader in managed IT services, enterprise application software, IT staffing and consulting, and application portfolio management—worked with Oracle to test the performance of Epic Clarity data warehouses running on Exadata Database Machine and on custom-built architectures. Oracle's Exadata hardware platform was compared to and contrasted with a custom-built architecture as it relates to Epic Clarity. This white paper presents the results of those tests and highlights the performance and efficiency reasons for using an all-Oracle stack to support Epic Clarity.

Custom-Built Architecture Versus Exadata Database Machine

The motive for performing this comparison stems from Infoblob's experience working with Epic customers in large healthcare organizations. The commonality across all healthcare organizations is their need for up-to-date information and their struggle to access it in a timely and efficient manner. Through no fault of the EHR system, data volumes continue to grow at a rate that is outpacing the capabilities of most hardware platforms.

It is important to define *custom-built Oracle architectures* before proceeding. The term refers to the familiar brands of hardware and storage systems commonly used to support an Oracle database. This table highlights the most common components used in custom-built Oracle architectures:

COMMON COMPONENTS IN CUSTOM-BUILT ARCHITECTURES

Database Servers	Enterprise SAN Storage
» <i>IBM</i> » <i>Intel</i> » <i>HP</i>	» <i>EMC</i> » <i>Hitachi</i> » <i>Net App</i>

When these servers and storage systems are combined, they provide an adequate platform for running an Oracle database. So, why bother comparing the well-known, custom-built environments to the Exadata Database Machine platform? The problem with custom-built architectures is that they are all completely unique and require significant effort to build and maintain. Having multiple technologies means having multiple, expert resources on staff to manage each component. This also guarantees separate support agreements for each component—hardware, storage, database, and network. If you have ever experienced finger pointing when troubleshooting a technical issue, you understand the complexities a custom-built architecture can introduce.

Exadata Database Machine is different. It is designed, built, and supported by the same vendor: Oracle. For this reason, you can be sure that it was built and configured properly and that yours is exactly the same as everyone else's. Because Exadata Database Machine contains database servers, a network, and storage, supporting a database environment is greatly simplified. Requests for database support are handled much more efficiently when Exadata Database Machine is in use. Oracle knows what you have because they built it and that allows them to focus on the issue, not on your custom configuration. With Exadata Database Machine's extreme performance features, you can also be sure that your Oracle database will run better on the Exadata platform than on any other custom platform.

Performance Results

Exactly how well does Epic Clarity run on Exadata Database Machine? The results can be staggering. In more than 20 proofs of concept that Infoblob has managed for Epic customers, the Exadata platform has never lost a performance contest against a custom-built architecture. In most cases, performance improves 50 times or more on the longest running Epic reports. Epic Clarity's ETL performance also improves by five times or more on the longest running jobs.

Figure 1 illustrates an example of the performance gains routinely seen when testing Epic Clarity reports on Exadata Database Machine. In this project, an Exadata Database Machine X5-2 Quarter Rack with 24 capacity-on-demand cores and 140TB useable storage was compared to a custom-built architecture using an IBM Power 770 database server with 24 cores and EMC VMAX Storage with 18 TB useable storage.

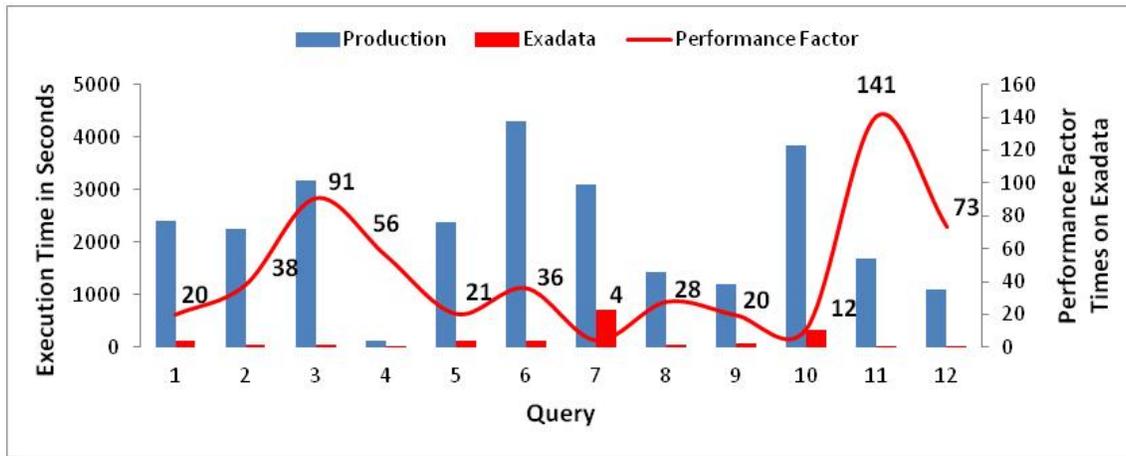


Figure 1. Performance gains are routinely seen when testing Epic Clarity reports on Exadata Database Machine. In this performance test, an Exadata Database Machine X5-2 Quarter Rack with 24 capacity-on-demand cores and 140 TB useable storage was compared to a custom-built architecture using an IBM Power 770 with 24 cores and EMC VMAX with 18 TB useable storage.

Exadata Database Machine provided an average of 45 times (4500 percent) improvement in performance across 12 reports. The red Performance Factor line in Figure 1 uses the scale on the right-hand side of the graph and shows how much faster Exadata Database Machine performed than the current production system. These results were achieved with absolutely no tuning. The data was loaded and queries were executed. No other technology that runs Oracle databases can deliver results such as these.

To provide another example: At another large healthcare organization, the job to generate the staff plan ran for more than nine hours on a custom-built system with IBM servers, EMC storage, and an Oracle database. The staff plan was accurate at the time the job was started, but during the more than 9-hour run, several staffing change requests were made. Because none of the changes could be applied to the report while it was running, the system created an inaccurate staff plan. When something like this happens and a hospital is either under- or over-staffed, efficiencies are lost. With Exadata Database Machine, this same staff plan ran in 15 minutes. The benefits are obvious:

- » Receive a more accurate staff plan
- » Run the staff plan multiple times per hour
- » Return more than 8 hours of system resources to the rest of the organization

Solid-State Storage Area Networks Versus Exadata Database Machine

Over the past few years, Oracle and Infoblox have seen a somewhat unsettling trend in the quest for Epic Clarity reporting performance. Many healthcare organizations are implementing solid-state storage area networks (SANs). The theory seems to be that faster storage will result in better Epic Clarity performance. While this is true to a degree, the limiting factor in most poorly performing database environments is the network between the database servers and the storage array. Adding faster drives is like trying to drive a Formula 1 race car on a crowded highway. The highway—not the car—is the limiting factor.

Exadata Database Machine changes the way data is processed without changing the way you deal with the Oracle database. Using the Formula 1 example, Exadata Database Machine clears the traffic off the highway and allows you to take full advantage of your race car. In addition, Exadata Database Machine contains a significant amount of solid-state storage in a feature called the Smart Flash Cache. The Smart Flash Cache is managed automatically ensuring that the most frequently accessed data is moved to the faster storage. This ensures that both the mechanical and solid-state drives are used most efficiently. This is vastly different from installing a very expensive, solid-state SAN and moving all of your data to it.

Total Cost of Ownership Results

While performance and manageability are important, total cost of ownership (TCO) is often a major component in the decision to implement Exadata Database Machine. Hardware and software, however, are not the only inputs when calculating TCO for a new architecture. Staffing is also very important. Because Exadata is different from custom-built environments, CIOs have questions about support of the platform.

In Oracle and Infoblox's experience, Exadata Database Machine has proven to be very cost effective for many organizations and can be much easier to support than custom-built platforms. Studies show that custom-built platforms can require three employees to manage the environment because server, storage, and networking roles are distributed throughout most IT groups. Contrast this with the Exadata Database Machine that gets tested and managed as a single system; it only requires one employee to manage it. This can significantly reduce ongoing staffing costs.

Figure 2 compares the TCO of the Exadata Database Machine X5-2 Quarter Rack against the TCO of the IBM and EMC architecture used in the performance testing referenced in Figure 1. In this example, Exadata Database Machine solution costs 38 percent less over 3 years—a significant difference. This cost comparison is based on the servers, storage, networking, and headcount required for a customer that is representative of Epic's small-to-medium sized customers.

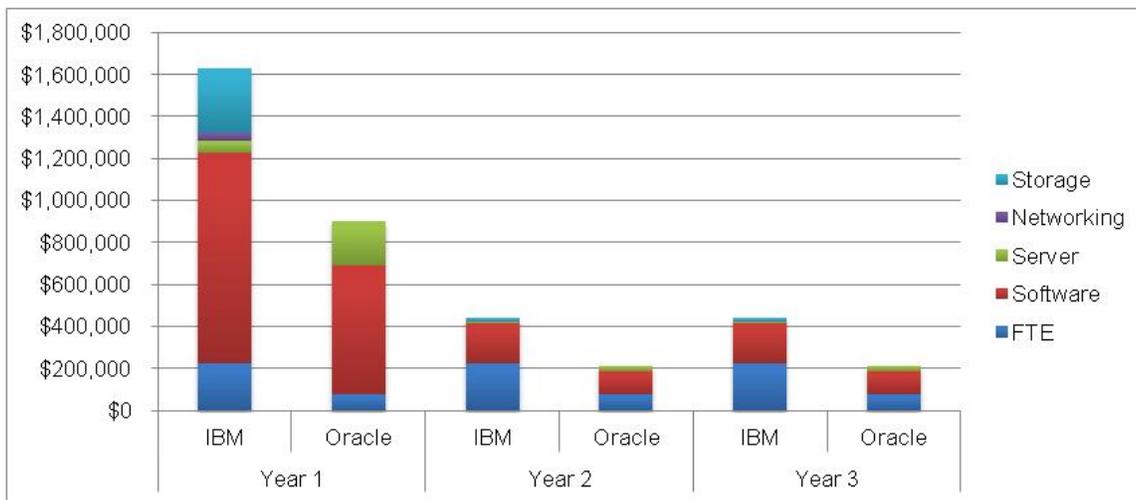


Figure 2. A comparison of the TCO of an Epic Clarity solution for a mid-sized healthcare organization. In this TCO calculation, an Exadata Database Machine X5-2 Quarter Rack with 24 capacity-on-demand cores and 140 TB useable storage was compared to a custom-built architecture using an IBM Power 770 with 24 cores and EMC VMAX with 18 TB useable storage.

When comparing Exadata Database Machine against the custom-built solutions used in enterprise-sized health care organizations, the TCO remains lower for the Oracle-only stack. Figure 3 illustrates the TCO comparison between Exadata X6-2 Eighth Rack with 16 capacity-on-demand cores and 55 TB usable storage and an IBM Power S824 with 16 cores using EMC VMAX Storage with 18 terabytes of usable storage. In this calculation, the cost for the Oracle solution is 47 percent less over 3 years.

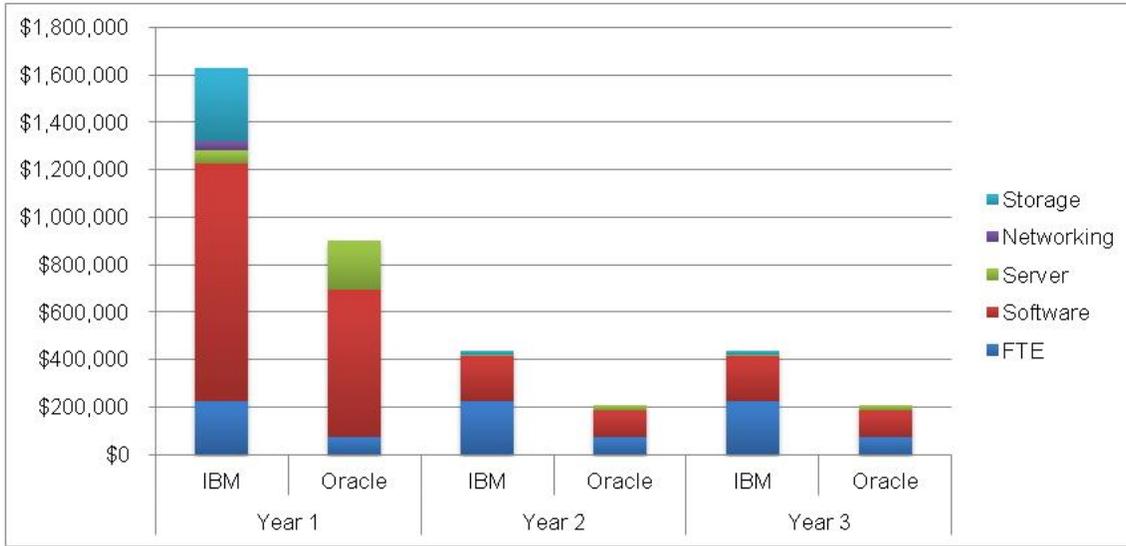


Figure 3. A comparison of the TCO of an Epic Clarity solution for an enterprise healthcare organization. In this TCO calculation, an Exadata X6-2 Eighth Rack with 16 capacity-on-demand cores and 55 TB usable storage is compared to an IBM Power S824 with 16 cores using EMC VMAX with 18 terabytes of usable storage.

Both the mid-sized and enterprise scenarios demonstrate significant cost savings that enable hospitals to invest in other areas of the business while getting improved performance from their Epic Clarity environment.

Conclusion

Having accurate, timely information allows hospital administrators to better address the needs of the business. In today's fast-paced, information-everywhere world, the window to be proactive closes quickly. Waiting hours or even days for information to appear is no longer acceptable. This is precisely why technical efficiency in reporting and analytics is no longer a nice to have, but a necessity.

Exadata Database Machine provides the technical efficiency that most organizations are seeking—delivered by simply changing the hardware. Since Exadata Database Machine runs the Oracle Database, migrating is as easy as migrating to a new custom-built platform. All the tools and processes familiar to the IT team apply to Exadata Database Machine just as they do to any other Oracle environment.

The faster you can access your data, the faster you can affect change. If a database grows to the point that the technical architecture can no longer provide timely access to information, the goal of making the right changes at the right time will become increasingly hard to reach. Spending capital on architecture that has proven to be inadequate only compounds the problem. Exadata Database Machine can greatly improve performance at a cost lower than your current solution. Isn't the choice obvious?



Oracle Corporation, World Headquarters

500 Oracle Parkway
Redwood Shores, CA 94065, USA

Worldwide Inquiries

Phone: +1.650.506.7000
Fax: +1.650.506.7200

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Authors: Infob Solutions and Oracle