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## Business Value Highlights

**429%**

Five-year ROI

**\$157,712**

Average annual benefits per 100 users

**11 months**

average time to breakeven

**\$222,000**

additional revenue per 100 users

**94%**

less unplanned downtime

**25%**

less time "keeping the lights on" in their database environments

**42%**

less staff time per application developed

# Business Value of Oracle Exadata Database Machine

## EXECUTIVE SUMMARY

Managing a large datacenter is a costly, complicated activity for any enterprise, but when that datacenter also includes a number of database servers, and when database performance is critical, those costs and complications can multiply. Every database, which includes the database server and its associated storage and network (assuming SAN or NAS configuration), must be carefully tuned. As the number of applications and their associated databases increases, the administrative costs mount, while the ability of an overstretched staff to properly maintain and tune each database and its server deteriorates.

One solution to this problem is to turn to converged systems that combine the management of hardware and software in a single unit. A better solution is to use a hardware system specifically designed for the database software to optimize database operations both for performance and for administrative simplicity. Add to that an environment that supports workload consolidation, thereby reducing the number of physical servers required for the databases in question, and you can really cut costs while ensuring optimal performance.

That's the concept behind Oracle Exadata Database Machine (Oracle Exadata), and Oracle has made some pretty interesting claims regarding the business value benefits of the system for Oracle Database. To test these claims, Oracle sponsored a white paper by IDC to interview a number of Oracle Exadata customers, gather data about the benefits they have derived from that system, and perform both quantitative and qualitative analysis on that data.

IDC interviewed eight organizations about how they are using Oracle Exadata to support their database-related workloads. These organizations reported that, by moving to an Oracle engineered system platform optimized for running database-related workloads, they better and more efficiently leverage their organizations' data to their business and operational advantage. As a result, the organizations are achieving better business outcomes and efficiencies through improved database performance, scalability, and reliability. On the basis

of these interviews, IDC projects that these Oracle customers will realize average annual business benefits worth \$157,712 per 100 users and a breakeven point of 11 months, which would result in a five-year return on investment (ROI) of 429% by:

- » Achieving better business outcomes with improved database performance and scalability
- » Making employees more productive by enabling them to make better use of data through improved performance and reliability
- » Requiring less database administrator and IT staff time to manage and deploy databases
- » Reducing costs associated with database and other licenses, as well as ongoing costs such as power and datacenter space

## Situation Overview

IDC has been examining the growing complexity crisis for a number of years now. This is the phenomenon of systems and software building up in the datacenter until the complexity of the configuration itself inhibits both maintenance of existing systems and any possibility of expanding functionality to meet the needs of the business.

Add to that the imperatives represented by digital transformation — the movement of enterprises to fully enable, improve, and make agile their business processes by digital means, and you can see that a backlog of complexity will ultimately inhibit the ability of IT to respond to critical management initiatives. In considering digital transformation and the embrace of 3rd Platform technologies<sup>1</sup>, many have discussed emerging capabilities aimed at that purpose, including Hadoop, NoSQL databases, cognitive systems, new software employing microservices, and container structures. Before these can be employed in a datacenter, and before a private cloud may be contemplated, the operational dimension of the datacenter must be simplified.

Having hundreds of database servers linked through complex networks to shared storage creates too much management overhead to permit the datacenter to grow, or to expand the database capacity in order to perform desired data management needed to engage in digital transformation. The solution to this problem is to adopt a database system architecture that accomplishes the following:

- » Reduces the total number of systems required to run the existing database load and can expand easily to support new workloads
- » Provides support for consolidation of databases on fewer servers, while making both

<sup>1</sup>The 3rd Platform is an interoperable collection of facilities designed for innovation and growth, built on cloud, mobile, social and Big Data analytics technologies.

the consolidation process and the subsequent management of the converged systems simpler

- » Is based on hardware designed and optimized for the database software it runs, so that activities such as database tuning and systems administration can be made much simpler, requiring far less staff time to carry out
- » Is supported by as few vendors as possible, to avoid finger-pointing, and to ensure a clean and consistent support experience

## Oracle Exadata

Oracle Exadata is an optimized hardware and software system designed specifically to support Oracle Database. Oracle Exadata and Oracle Database are optimized for both performance and simplicity of administration. They separate the complex SQL processing from simple SQL execution of data reads and write, with the latter encoded onto special storage systems that use a variety of techniques to greatly reduce the amount of data passed to a system in response to a query, thereby improving performance. At the same time, they are expandable at both the compute and storage levels of operation.

One would expect the following benefits to accrue from the use of Oracle Exadata:

- » Because Oracle Exadata and Oracle Database both come from Oracle Corporation, they are supported together, creating a purpose built platform to run Oracle databases and, making problem resolution and operational guidance quicker, simpler, and more responsive to user needs than would be the case if the hardware system came from one vendor and the RDBMS from another.
- » Because both hardware and software design contain optimizations for their interoperation, one would expect fewer operational problems, far less tuning required, and overall better performance than one would experience in a conventional build-your-own configuration of servers, storage, and software.
- » Because Oracle Exadata is designed, in part, to support consolidation of databases on fewer servers, one would expect lower operational costs derived from system maintenance, as well as from physical concerns such as floor space usage and power consumption.

This white paper, commissioned by Oracle, is intended to test these and other assumptions and expectations and determine what benefits, at least in the case of the eight organizations interviewed, were realized.

# The Business Value of Oracle Exadata

## Study Demographics

IDC interviewed eight organizations that have moved and consolidated database workloads on Oracle Exadata. Interviews were designed to capture both qualitative and quantitative feedback from these organizations on how Oracle Exadata has impacted their database-related performance, scalability, reliability, support, and costs. On average, interviewed organizations have substantial business and IT operations, with around 30,900 employees on average and a median of 13,500. The eight organizations included experiences from five United States-based organizations, as well as from the United Kingdom, Greece, and Australia, and a number of industry verticals (see Tables 1 and 2).

**TABLE 1**

Demographics of Interviewed Organizations That Use Oracle Exadata		
	Average	Median
Number of employees	30,900	13,500
Number of IT staff	1,345	450
Number of IT users	25,500	10,400
Number of business applications (total)	848	200
Countries	United States, Australia, Greece, and United Kingdom	
Industries	Financial services, healthcare (two healthcare companies), hospitality, natural resources, retail, telecommunications, and transport (airline)	

*n* = 8

Source: IDC, 2016

TABLE 2

Oracle Exadata Environments		
	Average	Median
Number of Oracle Exadata	7	6
Number of business applications supported by Oracle Exadata	47	14
Number of internal users supported by Oracle Exadata	8,091	1,000
Number of TBs used by Oracle Exadata	237	225

*n* = 8

Source: IDC, 2016

Interviewed organizations described supporting significant elements of their overall database environments with Oracle Exadata. They mentioned common reasons for moving databases to the Oracle-converged infrastructure platform, including needing improved database performance, ease of management, enabling database consolidation, and requiring the highest possible levels of database availability. According to interviewed organizations, they have been able to leverage Oracle Exadata in particular for their data warehousing, analytics, transactional, and operational workloads. These Oracle customers are dividing their capacity on their Exadata platforms relatively evenly between data warehousing (34%), production business applications (26%), development and testing (23%), and disaster recovery (17%).

## Business Value Analysis

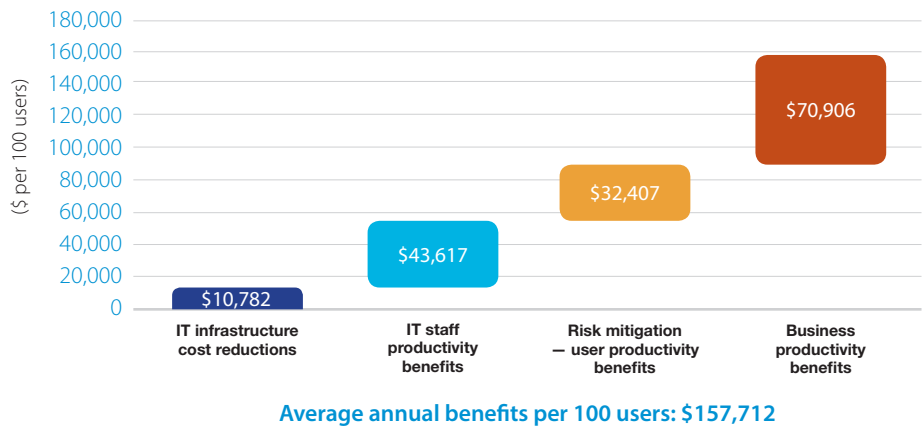
Interviewed organizations described common reasons for deploying Oracle Exadata, including needing improved database performance, greater scalability, and a more efficient and consolidated database infrastructure. IDC's interviews show that they are achieving these objectives and, as a result, are leveraging their database environments to achieve better business outcomes and operational efficiencies. IDC projects that these organizations will achieve average annual benefits worth \$157,712 per 100 users (\$12.76 million per organization) over five years in the following areas (see Figure 1):

- » **Business productivity benefits:** Higher revenue and user productivity gains result from ensuring the delivery of timely and compelling data to support business operations and reducing the time required to deliver new business applications. IDC puts the value of improved operating margins and higher user productivity at an average annual value of \$70,906 per 100 users (\$5.74 million per organization) over five years.

- » **IT staff productivity gains:** Having a converged and optimized infrastructure platform for database workloads means database administrators and other IT staff can spend less time on day-to-day operations and supports application development efforts. As a result, these teams are more productive, which IDC quantifies as being worth \$43,617 per 100 users (\$3.53 million per organization) over five years.
- » **Risk mitigation — user productivity benefits:** Having fewer database-related failures mean that unplanned outages have less impact on employees and business operations. As a result, IDC calculates that interviewed organizations will realize higher user productivity and revenue worth \$32,407 per 100 users (\$2.62 million per organization).
- » **IT infrastructure cost reductions:** The consolidated Oracle Exadata platform provides a cost-effective base for database operations. IDC projects that interviewed organizations will save an average \$10,782 per 100 users (\$0.87 million per organization) in areas such as database and other licensing, as well as power and facilities expenses.

**FIGURE 1**

### Estimated Average Annual Benefits per 100 Users with Oracle Exadata



Source: IDC, 2016

### Business Productivity Benefits

Interviewed organizations depend on their database environments to provide high-quality data in a timely manner. They reported that deploying Oracle Exadata to support database operations has been instrumental in their unlocking more potential value from this data. In particular, they attributed higher revenue and employee productivity gains to Oracle Exadata, due to improved database performance and scalability.

“Oracle Exadata has increased performance across the board — batch processing has gone from taking up to 13 minutes to 5 seconds with Oracle Exadata as a result of such a substantial I/O improvement. Another example is almost a 2,000% improvement with processes related to revenue accounting.”

### Improved Database Performance

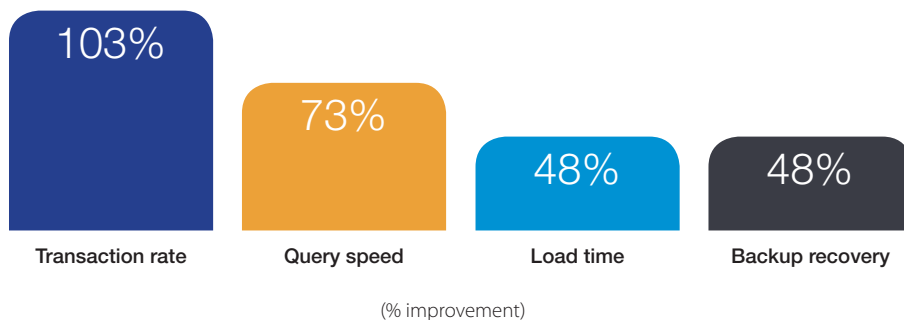
Needing to improve database performance was a common driver of interviewed organizations’ choice of Oracle Exadata as a platform for their database operations. Their legacy database infrastructures often could not meet the performance thresholds their data-intensive business operations required. For these organizations, data is becoming a more integral component of not only addressing business opportunities but also of creating high-value business applications and enabling their employees.

Interviewed organizations reported across the board that they have improved key database performance-related metrics with Oracle Exadata. They process transactions faster, complete queries in less time, and have decreased load and backup recovery times. As a result, these organizations are better able to leverage their databases to support their operations. Several interviewed database managers commented on these types of impactful improvements:

- » **Faster processing:** *“Oracle Exadata has increased performance across the board — batch processing has gone from taking up to 13 minutes to 5 seconds with Oracle Exadata as a result of such a substantial I/O improvement. Another example is almost a 2,000% improvement with processes related to revenue accounting.”*
- » **Reduced query time:** *“We have queries that used to take minutes and now take one second with Oracle Exadata. The sales team is most impacted by this performance improvement — they save up to an hour per day, and on average I think everyone is saving a day a month.”*

FIGURE 2

### Performance KPIs with Oracle Exadata



Source: IDC, 2016

“Scalability is huge for us, and it’s much easier to scale with Exadata . . . . I don’t even know if the other system would have scaled to the extent we needed. So I think what I’m saying is that we’re avoiding a forklift upgrade. We’re turning around in a speed boat, not the Titanic now. I don’t think the old system would have taken us where we wanted to go.”

“With Exadata supporting our database operations, we make better decisions, which is resulting in more revenue and lower costs. I’d say that we get 10% more revenue per year. Also, we’re saving money in processes like procurement and in areas like advertising — millions of dollars per year. It’s a lot of money.”

## Database Scalability

Interviewed organizations reported struggling with their legacy database infrastructure to scale database operations in a timely and cost-effective way. This sometimes resulted in spending too much on infrastructure to ensure database platform capacity and prevented them from scaling their database infrastructure to meet evolving business demand. According to interviewed organizations, Oracle Exadata has enabled them address these concerns. As a result of moving from a siloed infrastructure to a converged platform, organizations no longer experience delays in deploying resources and applications and can more easily provision capacity to meet evolving demand on their optimized Oracle Database platforms. One organization commented on the impact: *“Scalability is huge for us, and it’s much easier to scale with Exadata . . . . I don’t even know if the other system would have scaled to the extent we needed. So I think what I’m saying is that we’re avoiding a forklift upgrade. We’re turning around in a speed boat, not the Titanic now. I don’t think the old system would have taken us where we wanted to go.”*

## Achieving Better Business and Operational Outcomes

Interviewed organizations directly linked improved database performance and scalability to improved business results and operational efficiencies. These organizations also used their databases to power customer-facing services and products and underpin the business applications that enable their operations. With Oracle Exadata, these organizations can provide employees with the data, information, analytics, and performance needed to meet customer demand, which enable them to win more business (\$222,000 of additional revenue per 100 users). According to one organization: *“With Exadata supporting our database operations, we make better decisions, which is resulting in more revenue and lower costs. I’d say that we get 10% more revenue per year. Also, we’re saving money in processes like procurement and in areas like advertising — millions of dollars per year. It’s a lot of money.”*

Interviewed organizations provided a number of examples of Oracle Exadata’s business impact:

- » **Decision making:** More timely and robust delivery of data supports better strategic decision making for one organization that constantly tweaks its business and marketing strategies in a very competitive vertical, which is enabling it to capture more revenue.
- » **Freeing up staff resources:** Another organization has freed up DBA and application developer resources, thanks to efficiencies with Oracle Exadata that has helped it deliver new services.
- » **Improved system performance:** Another organization has increased its market share because its point of sale system performance has improved substantially, and customers have responded to its ability to provide high-quality service at the point of sale.



In addition to higher revenue, interviewed organizations reported that they have become more operationally efficient. In particular, improved performance of database-related workloads and the ability to deliver new data-driven applications and features in less time have led to higher user productivity. Interviewed organizations pointed to specific employees who have benefited from improved performance, faster query speed, and reduced load time with Oracle Exadata. Among the ways that these organizations mentioned benefiting include: faster report generation, better access to data to serve customers, real-time updated data to support sales efforts, and the ability to run queries without experiencing a time lag while waiting for results (see Table 3).

**TABLE 3**

Business and User Impact with Oracle Exadata		
	Per Organization	Per 100 Users
<b>Revenue Impact</b>		
Additional revenue per year	\$17.96 million	\$222,000
Assumed operating margin	15%	15%
Higher operating margin per year	\$2.69 million	\$33,300
<b>User Productivity Impact</b>		
Number of users impacted	387	5
Average productivity gain	22%	22%
Additional productive hours	92,437	1,142

Source: IDC, 2016

### IT Staff Efficiencies

Interviewed organizations also reported that their Oracle Exadata platforms make their IT teams more productive and efficient. In particular, application development teams can deliver more value, and database administrator teams are more efficient.

### Enabling Application Development Teams

Application development teams better support business operations and thus deliver more value, because Oracle Exadata allows them to be more agile and deliver higher-value applications. According to interviewed organizations, Oracle Exadata minimizes the extent to which provisioning infrastructure impedes application development efforts and ensures that higher-quality and robust data flows through to business applications. According

to one organization: *“The continuous delivery platform we’ve been able to put in place with Oracle Exadata helps us to be more agile. The reason that this helps the developers is that the environments are easier to provision, so turnaround time is better on applications and features . . . . We’ve got around 600–700 application developers who are now at least 30–40% more productive.”* Overall, application development teams deliver more applications and new features in less time, increasing the value of their efforts (see Table 4).

**TABLE 4**

Application Development KPIs with Oracle Exadata				
	Before Oracle Exadata	With Oracle Exadata	Difference	Benefit (%)
Number of applications developed per year	11	17	6	49
Time to develop/deploy per application (weeks)	12.9	8.5	4.3	34

Source: IDC, 2016

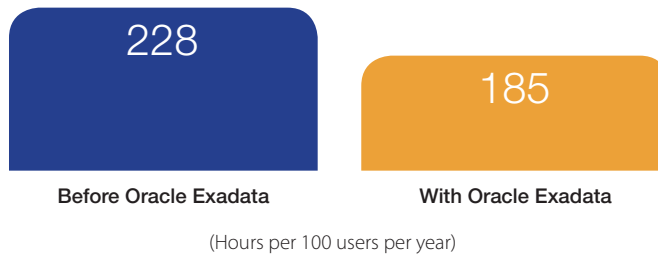
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### **Ease of Ongoing Management and Administration**

Interviewed organizations indicated that Oracle Exadata platform can be managed and operated more efficiently than legacy infrastructure environments. They attributed efficiencies to the consolidated and optimized nature of Oracle Exadata. As Figure 3 shows, this means that their DBA teams spend 19% less time per 100 users supporting database operations, which is the time that can be reinvested in supporting their business operations, especially to link databases to data-driven applications and services. One organization evinced skepticism that it could have even succeeded using another approach given how it uses its Oracle Exadata platform: *“I spend 100% of my time doing innovation with Exadata, and there’s no time spent keeping it up. It’s never crashed in two years. I suspect other systems would struggle with the volume of data and the kind of transactions we do against the database. The resilience built in at the lower levels of Exadata mean that it keeps the lights on 24 x 7.”* Another explained: *“We’ve gone from needing five DBAs to three because Exadata has a single instance of storage which allocates to the database itself, so we don’t need to connect servers to storage. Also, connectivity is far less complicated, we don’t have distinct boxes to maintain, and we now have a single technology to maintain.”*

**FIGURE 3**

### Database Administrator Efficiencies with Oracle Exadata



Source: IDC, 2016

### Risk Mitigation and Availability

Interviewed organizations also view the reliability of Oracle Exadata as a key factor in their choice of it. In the context of supporting critical database workloads that underpin customer-facing services and important business applications, these organizations cannot afford disruptions (see Table 5). On average, with Oracle Exadata, interviewed organizations reported experiencing 94% less user-impacting unplanned outages, and six of the eight organizations have yet to experience an unplanned outage. One organization commented: *“We haven’t had even one unplanned outage with Exadata — before it potentially breaks we get notifications so we have the chance to fix the issue before downtime occurs; along with redundancy within the Exadata box, this ensures that we don’t have outages or lose performance.”*

**TABLE 5**

Risk Mitigation: Unplanned Downtime with Oracle Exadata				
	Before Oracle Exadata	With Oracle Exadata	Difference	Benefit (%)
<b>Unplanned downtime productivity impact</b>				
Number of instances of unplanned downtime per year	7.1	0.7	6.4	90
Mean time TR (hours)	2.9	0.4	2.5	86
Productive hours lost per 100 users per year	1,021	66	955	94
FTE impact	44	3	41	94
<b>Revenue impact of unplanned downtime</b>				
Percentage of unplanned downtime instances impacting revenue (%)	40	40		
Revenue impact per hour	\$51,100	\$51,100		
Revenue impact in total per year	\$423,700	\$5,900	\$417,800	99

Source: IDC, 2016

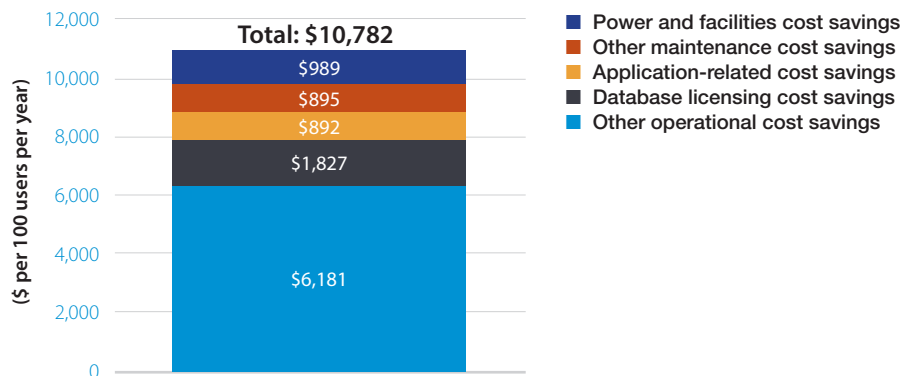
## IT Infrastructure Cost Reductions

Interviewed organizations further benefit with Oracle Exadata from having a consolidated and efficient infrastructure for supporting their database workloads. Several organizations reported that they have consolidated their database environments to a significant extent in terms of both number of databases and servers, limiting infrastructure- and licensing-related costs associated with their database environments. Meanwhile, several interviewees expressed doubt that they could have even achieved the same results in terms of performance and scalability for their database environments with another infrastructure approach, even assuming they had taken on substantial additional costs. Moreover, interviewed organizations indicated that Exadata allowed their organizations to reduce database related costs in several ways:

- » **Database licensing:** By consolidating their database infrastructure, organizations can reduce the number of cores to which they must license and thus reduce licensing costs.
- » **Maintenance:** Several organizations have moved from more distributed environments and have retired servers or storage, thereby eliminating maintenance fees.
- » **Power and facilities:** Oracle Exadata provides an efficient platform in terms of power consumed and space required, especially compared with more distributed environments.
- » **Other operational savings:** Several organizations spoke of reducing spending through better use of analytics on their Oracle Exadata platforms.

FIGURE 4

### IT and Operational Cost Savings per Year with Oracle Exadata



Source: IDC, 2016

## ROI Analysis

IDC carried out interviews with eight organizations running database workloads on Oracle Exadata and recorded their results to inform this white paper's analysis. IDC used the following three-step method for conducting its return-on-investment analysis:

- » **Gathered quantitative benefit information during the interviews using a before-and-after assessment.** In this white paper, the benefits included staff time savings and productivity gains, user productivity increases, increased revenue, and database infrastructure-related cost reductions.
- » **Created a complete investment (five-year total cost analysis) profile based on the interviews.** Investments go beyond the initial and annual costs of using Oracle Exadata, and it can include additional costs related to the solution, including migrations, planning, consulting, configuration or maintenance, and staff or user training.
- » **Calculated the ROI and payback period.** IDC conducted a depreciated cash flow analysis of the benefits and investments for these organizations' use of Oracle Exadata over a five-year period. ROI is the ratio of the net present value (NPV) and the discounted investment. The payback period is the point at which cumulative benefits equal the initial investment.

Table 6 presents IDC's analysis of the average discounted benefits, investment, and return on investment that the Oracle customers using the Exadata platform are achieving. In total, IDC projects that these organizations will invest \$104,354 per 100 users (\$8.44 million per organization) over five years in Oracle Exadata, which includes investment in staff time associated with Exadata deployment and use. In return, IDC calculates that these organizations will realize benefits worth \$551,642 per 100 users (\$44.64 million per organization) over five years in the areas described in this white paper. This would result in a five-year average ROI of 429% for these organizations, with breakeven in the investment in Oracle Exadata occurring in an average of 11 months.

**TABLE 6**

Five-Year ROI Analysis	Per Organization	Per 100 Users
Benefit (discounted)	\$44.64 million	\$551,642
Investment (discounted)	\$8.44 million	\$104,354
Net present value (NPV)	\$36.20 million	\$447,288
Return on investment (ROI)	429%	429%
Payback period	11 months	11 months
Discount rate	12%	12%

Source: IDC, 2016

## Challenges and Opportunities

There are multiple vendors offering converged systems designed to support Oracle Database. They all claim capabilities that offer benefits matching or exceeding Oracle Exadata for various technical reasons. Of course, they can't claim the single vendor solution point that belongs to Oracle alone. They also can't claim that the hardware and software are designed for each other, since they don't control the software. So Oracle has the advantage there as well.

Nonetheless, Oracle must continue to develop its systems to keep ahead of these competitors. Oracle must also continue to evolve Oracle Exadata to meet the changing needs of cloud deployment, including both private and hybrid cloud, in order to ensure that Exadata continues to meet the needs of customers engaged in the process of digital transformation.

## Summary and Conclusion

Enterprise datacenters are constantly getting more complex and therefore more difficult and expensive to manage. Expansion of capability to meet the requirements of digital transformation, with its emphasis on huge data volumes and new data types, may be impossible without optimizing the data management environment that currently exists.

This white paper demonstrates the considerable value that Oracle customers are achieving by moving to and consolidating their database operations on the Exadata platform. In particular, these organizations are better able to leverage their database environments to achieve better business outcomes and operational efficiencies through improved database performance, scalability, and reliability.

Although Oracle customers interviewed for this study were not using cloud services, Oracle now offers cloud services, deployed on Exadata. There are three consumption models: Oracle Exadata Express (which is the low-cost developer option), Exadata Cloud Service (a fully dedicated cloud service driven by Exadata and running in the Oracle Cloud), and Exadata Cloud Machine (combining Exadata with the Oracle Cloud for use in the datacenter behind the firewall).

## Appendix

IDC utilized its standard ROI methodology for this project. This methodology is based on gathering data from current users of Oracle Exadata as the foundation for the model. On the basis of these interviews, IDC performs a three-step process to calculate the ROI and payback period:

- » Measure the savings from reduced IT costs (staff, hardware, software, maintenance, and IT support), increased user productivity, and improved revenue over the term of the deployment.
- » Ascertain the investment made in deploying the solution and the associated migration, training, and support costs.
- » Project the costs and savings over a five-year period and calculate the ROI and payback for the deployed solution.

IDC bases the payback period and ROI calculations on a number of assumptions that are summarized as follows:

- » Time values are multiplied by burdened salary (salary + 28% for benefits and overhead) to quantify efficiency and manager productivity savings.
- » Downtime values are a product of the number of hours of downtime multiplied by the number of users affected.
- » The impact of unplanned downtime is quantified in terms of impaired end-user productivity and lost revenue.
- » Lost productivity is a product of downtime multiplied by burdened salary.
- » Lost revenue is a product of downtime multiplied by the average revenue generated per hour.
- » The net present value of the three-year savings is calculated by subtracting the amount that would have been realized by investing the original sum in an instrument yielding a 12% return to allow for the missed opportunity cost. This accounts for both the assumed cost of money and the assumed rate of return.

Because every hour of downtime does not equate to a lost hour of productivity or revenue generation, IDC attributes only a fraction of the result to savings. As part of our assessment, we asked each company what fraction of downtime hours to use in calculating productivity savings and the reduction in lost revenue. IDC then taxes the revenue at that rate.

Further, because IT solutions require a deployment period, the full benefits of the solution are not available during deployment. To capture this reality, IDC prorates the benefits on a monthly basis and then subtracts the deployment time from the first-year savings.

*Note: All numbers in this document may not be exact due to rounding.*

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