



The Business Value of Oracle's Recovery Appliance for Optimizing Enterprise Backup and Recovery for Oracle Database

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BUSINESS VALUE HIGHLIGHTS



Click on highlights below to navigate to related content within this PDF.

342%
five-year ROI

62% reduced
total cost of operations

6-month
payback period

56% reduction
in Database Administrators'
time spent

81% reduction
in unplanned downtime

53% reduction
in IT infrastructure costs

79% lower
recovery time

76% lower
backup time

122% more
recoveries completed
within the recovery time
objectives

64% better
recovery time objectives
performance

Executive Summary

Optimal IT infrastructure is critical for generating revenue, improving customer experience, and responding to new market opportunities. Data availability is an essential requirement of this mandate, and it is driving businesses toward technologies that can deliver ever shorter recovery point objectives (RPOs) and recovery time objectives (RTOs). Today, businesses are striving to achieve RPOs as near to zero as possible—less than 5 minutes—and 15-minute RTOs. To achieve these aggressive levels, organizations are increasingly embracing disk-based data protection technologies such as purpose-built backup appliances (PBBAs) to protect and recover their data, applications, and systems.

Oracle's Zero Data Loss Recovery Appliance (Recovery Appliance) is a data protection solution co-engineered with the Oracle Database. The appliance is focused on recovery aspects of Oracle Database data protection as well as automating many of the backup and recovery processes to help prevent human errors. This includes continuous database-aware (meaning data format awareness) validation of all backups as well as real-time reporting of current per database recovery status, which includes current data loss exposure and recovery window. Designed with RPOs and backup efficiency in mind, Recovery Appliance protects ongoing transactions, eliminating the need for periodic archived log backups and replacing periodic full backups with an incremental forever backup strategy and virtual full restores to the time of any incremental backup. Recovery Appliance also offloads most backup processes such as ongoing full backups, backup validation, and copy-to-tape operations from database servers, thereby freeing up precious production database server resources for other tasks.

The Recovery Appliance orchestrates multitiered data protection with replication and with integrated copy to cloud and/or tape. Backups are again validated during copy or replication operations and are also independently validated upon receipt on the replica, ensuring that databases are recoverable. In addition, data is secured end to end, in flight, and at rest to guard against data breaches.

IDC interviewed seven organizations using Recovery Appliance for centralized data protection for Oracle Database. The data obtained and applied to IDC's Business Value model showed that study participants realized significant value with Oracle's Recovery Appliance.

IDC calculates that these companies will achieve average annual benefits of \$9.50 million per organization, which would result in a six-month payback and an overall return on investment (ROI) of 342% by:

- ▶ Improving their ability to meet strict RPOs and RTOs
- ▶ Minimizing downtime and data loss exposure and increasing recoverability of backup, thereby lowering business risk and increasing end-user productivity
- ▶ Enabling more efficient operational processes across the entire backup life cycle, reducing cross-departmental management delays
- ▶ Minimizing infrastructure overhead related to backup and recovery to free up cycles on production database servers, reduce backup network traffic, and reduce backup storage consumption
- ▶ Reducing IT direct and indirect infrastructure costs related to data protection through automation of backup and recovery processes

Situation Overview

As data-driven digital transformation sweeps through organizations worldwide, optimized IT infrastructure is critical for generating revenue, improving customer experience, and responding to new market opportunities. In this brave new world, data availability is an essential component and businesses are being driven toward service levels that demand shorter RPOs and RTOs because the cost of downtime and data loss is sharply escalating. Indeed, today many organizations are striving for zero downtime with zero data loss—in other words, constant data availability.

Organizations that can achieve high data availability throughout the data life cycle will be able to reduce their time to insights and decrease their cost of operations. Extremely demanding service levels such as zero or near-zero data loss exposure and 15-minute RTOs are no longer uncommon, especially due to the increasing risk of cyberattacks. Backups are the last line of defense from ransomware, escalating the importance of being able to reliably restore data up to the last completed transaction. After recoverability, speed of restore is critical and, according to Oracle, a single full rack Recovery Appliance with 2 compute servers and 18 storage servers is able to support virtual full backups (VFBs) at an effective rate of up to 240TB/hour. Recovery Appliance restores equally as fast as it can back up. With predictable backup and restore numbers, customers can rightsize their appliances to meet specific requirements.

IDC is seeing businesses base their strategies for data protection and recovery on aggressive service-level agreements (SLAs), fast recovery, and ease of integration in existing environments. To this end, purpose-built backup appliances continue to be a highly utilized solution. Enterprises are increasingly recognizing the difference between protecting flat files and transactional databases, opting for a specialized appliance for greater end-to-end continuity from production

to backup to recovery. The market for PBBAs is growing rapidly and is extremely competitive with multiple vendors marketing a variety of solutions from general to application-optimized architectures.

PBBA systems are designed for the purpose of serving as a target for backup or replicated backup data sets. They include features such as data deduplication, compression, encryption, and remote replication. There are two types of PBBAs: integrated and target. PBBAs that are used with third-party backup software and in heterogeneous environments are called PBBA backup targets. PBBAs that are tightly integrated with backup software are called PBBA integrated systems. Integrated PBBAs may have master or media servers built into the system to orchestrate the backup and movement of data on backup clients to disk, cloud, and/or removable media, such as tape.

PBBAs are designed for capacity optimization through data deduplication, enabling businesses to better manage expanding volumes of backup data while keeping their data protection capex and opex under control. PBBAs can coexist quite well with an organization's existing data protection solutions, which tend to be varied and complex.

Oracle's Recovery Appliance Overview

Oracle's portfolio of data protection solutions for Oracle Database includes the recently unveiled Oracle Cloud Infrastructure (OCI) GoldenGate service, OCI Archive Storage, Real Application Clusters (RAC), Flashback, Autonomous Data Guard (ADG), ZFS Storage Appliance, and StorageTek tape libraries, as well as the topic of this research, the Zero Data Loss Recovery Appliance.

The Recovery Appliance is a specialized, integrated PBBA for Oracle Databases delivering policy-based, centralized, multitier data protection optimized for backup and recovery of the Oracle Database. It is co-engineered with Oracle Database at the source code level and runs Oracle Database as its central logging engine. Recovery Appliance was introduced in 2014 and has since become a major offering in Oracle's database recovery solution portfolio. The platform was purpose built for centralized protection of Oracle Database with Oracle Database Recovery Manager (RMAN). Recovery Appliance's internal software, compute, storage servers, and networking are bundled within the appliance, which starts with a small base rack configuration and can be expanded up to 18 racks with linear scale-out performance, Oracle claims.

Recovery Appliance delivers database-aware deduplication, meaning that the appliance "knows" what data format it is dealing with, which enables true backup validation and deduplication for reduced storage consumption. It also delivers policy-based protection, has software capabilities to reduce RPO to <1 second, and provides real-time per-database recovery status including data loss exposure and recovery window (going beyond just retention of backup on disk). The appliance maintains recovery assurance with continuous database-aware backup validation.

Recovery Appliance combines two key capabilities: ongoing transaction-level data protection and incremental forever backup with automated virtual full restore capability to any point

in time within the user-defined recovery window. Recovery Appliance extends data protection to multiple tiers using remote appliances, thus protecting organizations from all possible data loss threats, including data corruption, transaction errors, system-level and datacenter failures, and malicious activities. As a fully integrated appliance, Recovery Appliance also simplifies deployment since fewer products need to be integrated and maintained.

Recovery Appliance continuously captures transaction information and enables businesses to restore databases at a very granular level. Oracle highlights that Recovery Appliance practically eliminates data loss exposure, has minimal impact on database performance as the system only records changes, has the ability to recover any size data set (from a single block to an entire database), and is so scalable that it can protect all Oracle Databases on any supported platform in an organization's datacenter.

Key Characteristics

Key characteristics of Oracle's Recovery Appliance are:

- ▶ Recovery Appliance is a fully integrated hardware and software appliance co-engineered with Oracle Database to automate, streamline, and accelerate backup and recovery processes.
- ▶ Recovery Appliance, together with Data Guard and RMAN, serves as the backbone of the system, providing data movement management from the database to Recovery Appliance as well as to other Recovery Appliances, cloud, disk, or tape.
- ▶ Automatic protection of ongoing transactions using real-time redo transport reduces RPO to <1 second. This capability enables recovery up to the point of the last committed transaction and provides the side benefit of eliminating the need for periodic archived log backups.
- ▶ Recovery Appliance provides built-in deduplication since only changed blocks are backed up, validated, and further compressed on the Recovery Appliance without any overhead on production database servers while also reducing storage requirements.
- ▶ Automated recovery of databases to the point of any incremental backup is enabled by recovering virtual full backups that are assembled by the Recovery Appliance and eliminate the need to apply incremental backups to the production system during recovery. This substantially reduces recovery complexity and time, requiring redo logs to be applied only for point-in-time recovery.
- ▶ A policy engine allows for very granular protection policies to meet different tiers of service for databases with different levels of importance to an organization. Policies can be uniformly applied throughout an organization by a centralized administrative team, eliminating the opportunity for rogue database administrators (DBAs) to delete important information.
- ▶ Recovery Appliance continuously tracks the recoverability of all protected databases, providing real-time status reports, an interactive dashboard for monitoring, and alerts when protection falls outside of limits.
- ▶ Recovery Appliance boosts the performance of the production database by offloading most backup processes from database servers; these offloaded backup processes may include periodic full backups, RMAN Restore Validation, copy to tape, and incremental apply processes during recovery.

- ▶ Recovery Appliance can facilitate real-time disaster recovery services thanks to flexible replication capabilities—unidirectional replication, bidirectional replication (two Recovery Appliances), or a hub-and-spoke configuration with remote sites that replicate to a single central site. Each Recovery Appliance independently validates its backups and reports real-time recovery status by database.
- ▶ The appliance's self-healing capabilities include automatic reconciliation of the backup catalogs between appliances in replicated environments, continuous backup validation, and automatic corruption repair from mirroring.
- ▶ Recovery Appliance leverages a Maximum Availability Architecture (MAA) with no single point of failure, and all backups are mirrored and striped across available storage servers.
- ▶ Oracle's Enterprise Manager provides monitoring of the backup environment as well as key metrics and alerts based on customizable triggers.

Recovery Appliance is based on the Oracle Exadata platform, providing a massive scale-out architecture with, according to Oracle, linear performance improvements as the environment grows. The result is that Recovery Appliance delivers predictable performance with scale for both backup and recovery, which are equally as fast.

A Recovery Appliance base configuration consists of two compute and three storage servers, which can be expanded in a full rack up to 18 storage servers supporting 9.5PB of VFB¹ capacity and 24TB throughput for backup or restore.

A single Recovery Appliance configuration can scale up to 18 interconnected full racks supporting 170PB of VFBs and an effective VFB run rate of 4PB/hour.

Customer Experiences with Oracle's Recovery Appliance

The Recovery Appliance customers that IDC interviewed for this business value research use Recovery Appliance primarily on premises, while at least one customer uses it as data protection for an Oracle Exadata Cloud@Customer environment. These organizations cited several reasons for choosing Recovery Appliance. For some, it was the logical continuation of Oracle Database–focused offerings; for others, it was a strategic business and technology choice. Cost optimization, operability, and easy integration with Oracle's Exadata were also mentioned.

Before they moved to Recovery Appliance, the interviewed organizations said they were using technologies that required much more IT staff for solutions that were not effective for storing, archiving, and distributing data to internal users. In one case, 11 storage appliance racks could be decommissioned after the business switched to Recovery Appliance. Other organizations were using generic platforms for backup that, they said, lacked in performance for backing up all their databases. In one case, Recovery Appliance was a greenfield deployment.

Reasons for Choosing Recovery Appliance

These organizations said that the relation with their digital transformation initiatives was mostly indirect. As part of their overall modernization, they needed less complexity in a 24 x 7 environment, higher performance, higher availability, and stronger restore capability.

¹ Effective capacity is calculated based on a 10% daily change rate.

The appliance also played a role in their IT modernization in terms of data protection improvements with stricter recovery and retention policies while freeing up backup staff and DBAs.

Some factors that strongly influenced their decision to select Recovery Appliance were the need for easier backup and restore with a complete single-vendor solution that would also enable application teams to be self-supporting with regard to backups, restores, and clones. Consolidation of the infrastructure played a role, as did the desire to have centralized Oracle Database backups. Most importantly, though, they said they were looking to reduce complexity while decreasing their RTOs and RPOs to reduce business risks.

Experienced Benefits of Recovery Appliance

The benefits of Recovery Appliance to IT, they said, are greater backup data availability, greater speed of backup and recovery, and the sense of having a “behind the scenes” incremental backup system. One organization mentioned the fact that it was able to shift its availability to five-nines. Several said that they had not experienced any failures with the system—in other words, 100% restore and recovery reliability. Businesses said they were able to improve their backup time, keep backups longer due to reduced storage consumption on Recovery Appliance, and restore much faster. Unplanned downtime was greatly reduced or eliminated, and planned downtime time frames were much lower (reducing tensions with the lines of business over when to schedule such downtime).

Most businesses said they required fewer staff and the remaining staff had more time for innovative projects. Some also said that the system helped them with their drive toward DevOps and agile development thanks to the standardization and modernization it offers. And as a “single box,” several said the platform is easier to manage, while cost savings were realized with the elimination of tape and with reductions in datacenter space and energy use. With a single solution, it is also much easier to identify the source of a problem than in multiple storage racks using hardware and software from various vendors, they claimed.

At some organizations, the DBAs can now handle all the backup details, businesses said, while their productivity had increased due to the elimination of “doubt” and “the cringe factor” that had haunted them with their previous solutions when it came time to restore/recover database backups. DBAs were able to spend more time on other activities such as supporting developers. Several cited massive efficiencies from Recovery Appliance as it allowed them to move from a full, 20-hour weekly backup that took away database server CPU time from other tasks to a minimum impact, faster daily incremental backup and restore for a full backup. They found the maintenance of the system to be extremely low, and they mentioned that the level of automation it represents simplifies their daily activities. One organization said that automation allowed it to meet its responsibilities with staff who are generalists as it doesn't require explicit DBA or storage expertise to manage.

The benefits to the organization's business operations were the ability to restore reliably 100% of the time, which several of the organizations said is critical for their customers, as well as speed to market due to greater market responsiveness and agility. One organization said that the appliance allowed it to have its application development team recreate staging by copying production data, with final testing on a production copy. Cost savings were also mentioned, sometimes thanks to consolidation, as was the fact that the system affords easier access to historical data.

The Business Value of Oracle's Zero Data Loss Recovery Appliance Overview

Study Demographics

IDC conducted research that explored the value and benefits for organizations in deploying Oracle's Recovery Appliance. The project included interviews with seven global organizations using this solution that had experience with or knowledge about its benefits and costs. During the interviews, companies were asked a variety of quantitative and qualitative questions about the impact of the solution on their IT and backup/recovery operations, businesses, and costs.

Table 1 presents study demographics and profiles. Organizations interviewed had an average of 41,310 employees, indicating the involvement of several large companies. This workforce was supported by an IT staff of 1,180, engaged in managing 304 business applications. In terms of geographical distribution, two companies were based in the United States, with the remainder in Germany (2), France, the Netherlands, and Switzerland. In addition, there was a good mix of vertical industries: energy (2), telecommunications (2), financial services, manufacturing, and retail. (Note: All numbers cited represent averages.)

TABLE 1
Firmographics of Interviewed Organizations

Firmographics	Average	Median	Range
Number of employees	41,310	13,000	300 to 150,000
Number of IT staff	1,180	466	70 to 3,500
Number of IT users	41,310	13,000	300 to 150,000
Number of business applications	304	150	100 to 1,000
Revenue per year	\$14.7B	\$11.7B	\$1.64–\$43.3B
Countries	Germany (2), United States (2), France, the Netherlands, and Switzerland		
Industries	Energy (2), telecommunications (2), financial services, manufacturing, and retail		

n = 7, Source: IDC In-depth Interviews, October 2020

Choice and Use of Oracle's Recovery Appliance

The companies that IDC surveyed described their usage of Oracle's Recovery Appliance and provided a snapshot of their IT and business environments. In addition, they discussed the rationale behind their choice of the Oracle solution. Interviewed customers cited several factors that influenced their decision such as allowing database administrators to successfully complete more backups and increasing their overall efficiency in routine operational tasks. Improved security via built-in functionality was also cited as a key advantage.

Study participants elaborated on these and other benefits:

▶ **DBAs have more control over backups:**

"Recovery Appliance was chosen to replace another more generic platform backing up file systems, Oracle Databases, other database, and so on. The previous platform did not give us the performance we required. As a DBA team, we were looking to enhance our backup and restore speeds. We were also looking to change the reporting hierarchy. The infrastructure team had responsibility for backup. We were in constant back and forth with them over backup performance for the Oracle Databases. The DBA team did not have a view into the storage capacity numbers—we might need a backup, but there was no storage available. Also, performance was not optimized for Oracle Databases. Those were the kinds of issues we were not grappling with. Recovery Appliance has been able to deal with those types of backup challenges."

▶ **Need for well-performing databases:**

"Both performance and data protection are absolutely key for us. We are a manufacturing company, which means we purchase parts from other manufacturers as subcontractors. We collect through the full supply chain process a lot of data in our database cluster. Our internal engineers rely on that data to make decisions on release information to our manufacturing partners (who we consider our customers). Our database performance is key for our manufacturing business. Data protection is essential as we have patents on our IP."

▶ **DBAs are more efficient:**

"We wanted to have the capability of having a solution that DBAs can use to do backups and restores more easily while freeing them up for other tasks related to optimizing the Oracle environment."

▶ **Users more self-supported with backups:**

"Our most recent addition of Exadata with Recovery Appliance was done specifically to decrease RTO/RPO and centralize Oracle Database backups. Recovery Appliance in combination with Oracle Enterprise Manager (OEM) 13c provides application teams the opportunity to be self-supported in backups/restores/clones."

▶ **More secure and sustainable backup solution:**

"The complexity and volume of backups and archived logs previously [were] not sustainable. Plus, anybody can accidentally remove a file from the ZFS file system. And our previous solution was not secure."

Table 2 (next page) describes organizational usage associated with the Oracle's Recovery Appliance. As shown, there was a substantial platform utilization footprint indicated by a total capacity of 754TB supporting 558 databases and 78 business applications. Additional metrics are shown.

TABLE 2

Organizational Usage of Oracle's Recovery Appliance

Recovery Appliance Environment	Average	Median
Number of Recovery Appliance racks	4	3
Number of TB	754	421
Number of business applications	78	50
Number of databases	558	240
Number of servers	694	69
Number of internal users supported	31,943	5,700

n = 7, Source: IDC In-depth Interviews, October 2020

Business Value and Quantified Benefits

IDC's Business Value model explores the benefits for organizations that have chosen Oracle's Recovery Appliance to support their ongoing storage, backup, and recovery operations. The survey data obtained from Oracle customers was applied to this model to arrive at an array of quantified post-deployment benefits. Using this methodology, IDC found that companies that deployed Oracle's Recovery Appliance realized significant value for their storage infrastructure and business operations.

The use of Oracle's Recovery Appliance supported more efficient storage, backup, and recovery operations and increased the productivity of the IT teams that managed those operations. This resulted in better ability to meet RTO objectives and improved backup and recovery times. It also reduced IT infrastructure costs while minimizing the effects of unplanned downtime, thereby lowering business risk.

Study participants described these benefits:

▶ **Improved efficiency, disaster recovery, and global reach:**

"The biggest benefit is we have more efficiency using fewer staff resources. Instead of dedicating nine people to the environment, we only need four. It also changes the mindset of the engineers. By reducing the load, it allows them to take more time for innovation and helps in disaster recovery situations."

▶ **Allows IT to become more agile:**

"The biggest benefit is standardization and modernization; we are moving from conventional waterfall modes toward DevOps and agility. We are now fully agile, and we are doing DevOps full stack. Before, we had what I would call a classic organization with separate teams: backup, operations, storage, DBA. There were many moving parts to be coordinated. With Recovery Appliance, everything is encapsulated in one single box. This makes it easier for us to manage and coordinate among teams."

▶ **Savings from better performance and integration:**

"If I need to have reliable backup and I do not have it, then I am paying too much. With Recovery Appliance, when I need backup or restore, I have it. That is a savings. Also, having backup as part of the overall solution—the Exadata solution—is a savings. If I need to add separate resources for only backup, I am paying too much. Recovery Appliance is providing a lower cost, integrated solution for this resource."

▶ **Fewer interruptions and more cost-effective IT:**

"We are seeing fewer interruptions to the business. The improved RTO and RPO is a direct benefit to the business side of the operations. Oracle also saves us money on activities done by ourselves because Oracle manages it. We only need 3 or 4 people, compared with 20 previously. This reduction of staffing requirements makes overall operations more cost effective."

IDC calculated that the total value that Oracle's Recovery Appliance customers are realizing will be worth an annual average of \$9.5 million per organization, consisting of the following areas of improvement (see Figure 1):

▶ **Risk mitigation — user productivity benefits:**

Oracle's Recovery Appliance reduces overhead on database servers, enabling them to run efficiently and reduce the impact of downtime. IDC calculates the value of higher end-user productivity at an annual average of \$3.74 million per organization.

▶ **IT infrastructure cost reductions:**

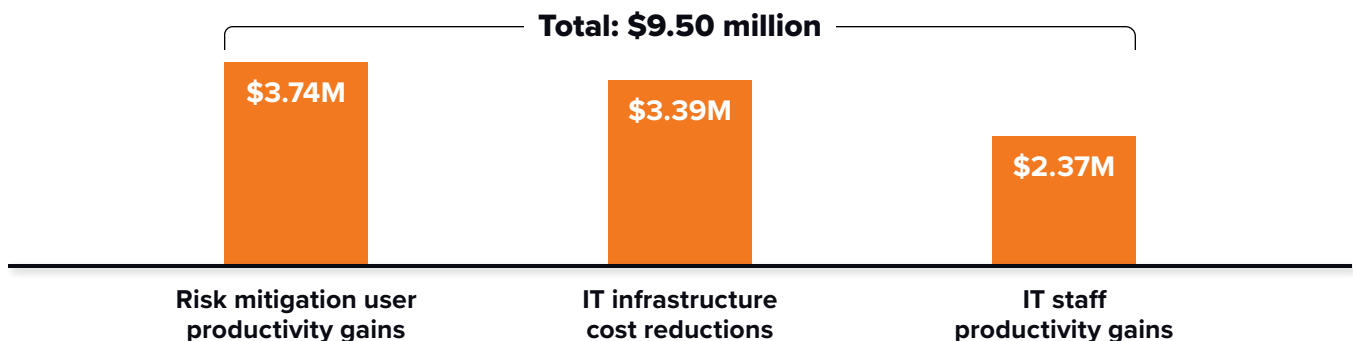
The deployment of Oracle's Recovery Appliance lowers the cost of operations for interviewed companies. IDC calculates that the solution reduces these costs by an annual average of \$3.39 million per organization.

▶ **IT staff productivity benefits:**

The use of Oracle's Recovery Appliance required less IT and DBA staff time to carry out storage and backup and recovery operations compared with legacy or alternative approaches. IDC projects that interviewed organizations will realize value through staff time savings and higher productivity worth an annual average of \$2.37 million per organization.

FIGURE 1
Annual Average Benefits per Organization

(\$ in millions)



n = 7, Source: IDC In-depth Interviews, October 2020

Improvements in Storage and Backup/Recovery Operations

Many storage solutions today are not optimized to fully protect mission-critical enterprise databases. For example, restores can sometimes result in data loss and backup operations can place heavy stress on production servers. In addition, in some cases, legacy or alternative solutions do not provide sufficient scalability to lay the groundwork for robust growth of database resources. Further, COVID-19 poses additional challenges to the business operations of most companies in terms of anticipating the need for greater agility, reliability, and inevitable and unexpected fluctuations in workloads.

For companies that have stringent database requirements, Oracle's Recovery Appliance is designed to address these challenges by providing a data protection solution that is co-engineered with Oracle Database technologies. The platform has been specifically engineered to eliminate potential data loss and reduce overhead on production servers during data protection operations while continually validating data integrity and offering high levels of scalability. Interviewed companies reported that using Oracle's Recovery Appliance increased backup efficiency and restore speeds, resulting in less burden on DBAs involved in those processes. Study participants also appreciated being able to free up time for DBAs to focus more directly on core tasks and activities and to help support application development.

Study participants commented on these and other benefits:

▶ **More efficient backup operations:**

"In a regular month, we would recover or restore hundreds of databases, and this would take three to five hours with backups on tapes. Recovery Appliance's full virtual backup is really fast: 30 minutes with the best network architecture. This frees the operations staff up from working on "monkey stuff," which is what I call restore activities."

▶ **Faster backup and restore speeds:**

"Backup speed has exponentially improved. To give some perspective, we had a 33TB DB that took 35–46 hours for the weekly full backup that now is done behind the scenes as a daily incremental that takes 54 minutes. No weekly update is required. The restore speed is greatly improved. We used to cringe when we had to do a restore not knowing if the resources would be available or recovery successful."

▶ **Less burden on DBAs:**

"In our group, the DBAs are the critical managers of these systems. This has been the greatest impact of these solutions. So much has been automated, and at the same time, RPO and RTO have improved. Finally, we can do this with a significantly reduced team that no longer needs to be so highly qualified. We are able to meet our responsibilities with people who are more generalists that have other skills. The focus is no longer solely on DBAs."

▶ **Faster and painless backups:**

"We are seeing massive efficiencies on the backup side of things. Previously we had a full backup for 20 hours once a week over the weekend. This is no longer required now because we do incremental backups daily instead."

In addition to these benefits, study participants also reported that they were able to reduce annual infrastructure costs. **Table 3** quantifies these benefits. As shown, storage efficiencies and server reductions combined to lower infrastructure costs by a significant margin (53%).

TABLE 3
IT Infrastructure Reduction

Costs	Annual Savings	Reduction
Annual value of server reduction	\$1.90M	40%
Annual value of storage (deduplication and mirroring; compression)	\$1.49M	79%
Total value of optimized infrastructure	\$3.39M	53%

n = 7, Source: IDC In-depth Interviews, October 2020

Typical enterprise-level backup and recovery operations involve a range of tasks that include managing and administering the backup recovery environment as well as patching and maintenance tasks. Study participants reported that after deployment of Oracle's Recovery Appliance, IT recovery staff productivity impacts associated with these tasks improved, as shown in **Table 4**. Considered in the aggregate, the deployment and use of Oracle's Recovery Appliance resulted in a 53% improvement in team efficiencies. This translated into an annual business value of \$1.56 million for interviewed companies.

TABLE 4
IT Recovery Staff Productivity Impact

Impact	Before Oracle's Recovery Appliance	With Oracle's Recovery Appliance	Benefit	Improvement
Managing and administering backup recovery environment (FTEs)	22.4	11.1	11.3	50%
Patching and maintenance (FTEs)	5.3	2.8	2.5	48%
Time for backup and recovery (hours)	2.88	0.68	2.19	76%
Number of backups per year	1,260	314	946	75%
Staff time for backup and recovery (FTEs)	1.93	0.11	1.81	94%
Total value of optimized IT staff	\$2.96M	\$1.40M	\$1.56M	53%

n = 7, Source: IDC In-depth Interviews, October 2020

Interviewed companies also reported that they were able to shift tasks from their DBAs to IT generalists, thereby freeing up a significant amount of DBA time for reassignment to other projects, including support for application development. As one study participant explained: *“Recovery Appliance frees up the DBAs to spend more time on other activities. It allows us to help the developers more easily.”* **Table 5** quantifies the impact on database administrators. As shown, the value of the annual savings in staff time cost per year was \$249,375, representing a 56% improvement.

TABLE 5
Database Administrator Impact

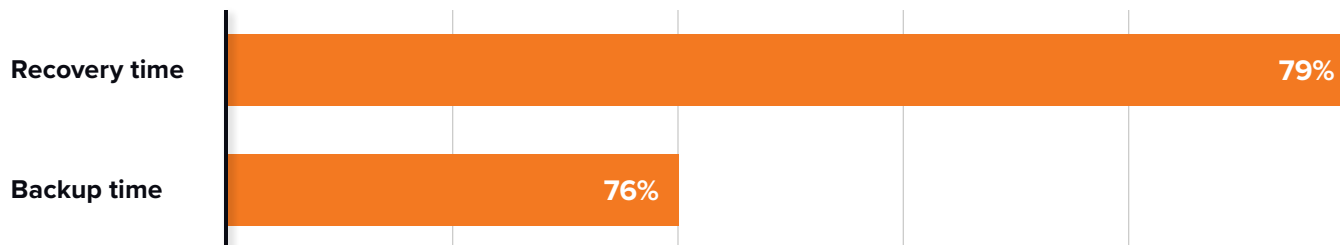
Impact	Before Oracle's Recovery Appliance	With Oracle's Recovery Appliance	Benefit	Improvement
Database administrator, FTE equivalent per organization per year	14.6	6.4	8.2	56%
Staff time cost per year	\$525,000	\$275,625	\$249,375	56%

n = 7, Source: IDC In-depth Interviews, October 2020

IDC also evaluated the performance KPIs associated with typical backup and recovery operations in environments heavily dependent on database resources. After deployment of Oracle's Recovery Appliance, database performance with respect to backup and recovery times showed significant levels of improvement. **Figure 2** quantifies these improvements. As shown, recovery time and backup time were reduced by 79% and 76%, respectively.

FIGURE 2
Database Backup Time and Recovery Time Reduction

(% reduction)



n = 7, Source: IDC In-depth Interviews, October 2020

IDC then evaluated recovery performance improvements, finding that Oracle's Recovery Appliance enabled 100% of recovery completions within both RTO and RPO goals and frameworks. As shown in **Table 6**, RPO completion time, measured in hours, improved 55%, with 94% of recoveries completed within the RPO window. Similarly, RTO improved 64%, with a very significant improvement in meeting RTO goals (122%).

TABLE 6
Recovery Performance Improvements

Improvement	Before Oracle's Recovery Appliance	With Oracle's Recovery Appliance	Improvement
Recovery point objective (RPO) time (hours)	8	3.57	55%
Recoveries completed within the RPO (%)	52	100	94%
Recovery time objective (RTO) time (hours)	12.33	4.45	64%
Recoveries meeting the RTO (%)	45	100	122%

n = 7, Source: IDC In-depth Interviews, October 2020

Interviewed companies also experienced operational improvements with respect to unplanned downtime as the result of smoother and more efficient backup and recovery processes and procedures. **Table 7** (next page) quantifies these improvements. As shown, after deployment of Oracle's Recovery Appliance, there was an 81% reduction in the time involved in resolving disruptive events. Therefore, these organizations were able to reduce previously lost productivity hours and lost value by 81%.

TABLE 7
Unplanned Downtime Impact

Impact	Before Oracle's Recovery Appliance	With Oracle's Recovery Appliance	Benefit	Improvement
Time to resolve (hours)	5	1	4	81%
Hours lost per employee	10.69	2.07	8.62	81%
FTE impact, lost productivity due to unplanned outages	65.92	12.52	53.40	81%
Value of lost productivity per year	\$4.61M	\$876,736	\$3.74M	81%

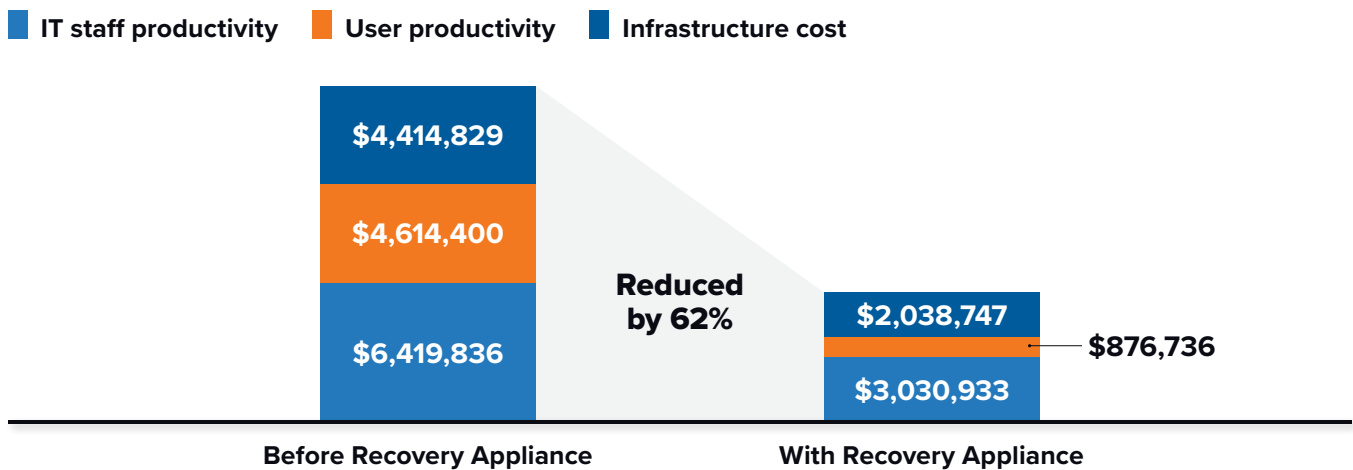
n = 7, Source: IDC In-depth Interviews, October 2020

IDC also looked at impacts on operational cost. This analysis typically includes three factors:

- ▶ Staff productivity
- ▶ End-user productivity
- ▶ Infrastructure costs

IDC analysis shows that deploying the Oracle's Recovery Appliance helped interviewed companies cut their costs by a significant margin. As shown in **Figure 3**, the annual cost of operations was reduced by 62%.

FIGURE 3
Annual Cost of Operations Impact



n = 7, Source: IDC In-depth Interviews, October 2020

Improvements in Business Operations

The use and deployment of Oracle's Recovery Appliance fostered significantly better business results for interviewed companies. Study participants cited specific benefits such as having more agility to respond to market conditions. Protecting the integrity of customer operations from disruption and improving the ability to handle mergers and acquisitions (M&A) situations were also called out.

Study participants commented on these and related benefits:

▶ **Improved time to market:**

"Recovery Appliance allows us to have a more enterprise-grade environment. We have more agility to respond to what is required in the market and from our key customers. Changes can be made in one day instead of multiple days and even weeks. The key business benefit for us is speed to market."

▶ **Protects customers from disruption:**

"Recovery Appliance helps how we support our customers. We might need to restore about five times per year. Before the Oracle solutions, sometimes I could not, maybe once per year. With the Oracle solution, I can restore 100% of the time. Our customers, which are financial services firms, do not want to show up on the front page of newspapers. Therefore, backup is an essential service for us."

▶ **Can serve customers with more confidence:**

"Our engineers are better able to serve our customers with design solutions. IP security for those designs has been improved. This has built confidence in the data we provide both internally and to our customers in the manufacturing space."

▶ **Helped with M&A-related data:**

"We recently merged two companies into one. The integration of Exadata and Recovery Appliance helped with the acquisition. One of the companies brought Exadata to the system. They had already upgraded to Exadata. The performance improvements from Exadata combined with the backup improvements resulted in the freeing up of resources and CPUs. This in turn helped with the transition and consolidation away from our previous solution and allowed us to move more quickly toward having a consolidated company."

ROI Summary

IDC's analysis of the financial and investment benefits related to study participants' use of Oracle's Recovery Appliance is presented in **Table 8** (next page). IDC calculates that interviewed organizations will achieve total discounted five-year benefits of \$19.54 million per organization based on IT/storage staff efficiencies, improved performance/reliability, better business results, and lower costs as described. These benefits compare with projected total discounted investment costs over five years of \$4.42 million per organization. At these levels of benefits and investment costs, IDC calculates that these organizations will achieve a five-year ROI of 342% and break even on their investment in 5.9 months.

TABLE 8
Five-Year ROI Analysis

Five-Year ROI Analysis	Per Organization	Per 100 Users
Benefit (discounted)	\$19.54M	\$47,304
Investment (discounted)	\$4.42M	\$10,710
Net present value (NPV)	\$15.12M	\$36,594
ROI (NPV/investment)	342%	342%
Payback period	5.9 months	5.9 months
Discount factor	12%	12%

n = 7, Source: IDC In-depth Interviews, October 2020

Challenges/Opportunities

For Businesses

Businesses and other organizations are going through tremendous change driven by the competitive opportunities offered by the vast amounts of data that they ingest and produce. This data is extremely diverse and of varying importance, but transactional data, which is recorded in an organization's core databases, represents the critical engine of an organization's operations. This data, which for many businesses is generated at transaction rates in the tens of thousands per second, demands the highest possible levels of protection for hardware, middleware, and applications. Should something still go wrong, though, then the organization's backups are the last line of defense for the business to remain operational and not potentially lose millions of dollars in revenue, become noncompliant with regulatory requirements, or suffer a dramatic loss of reputation. These backups must be up to date, instantly available, fully validated, and quickly recoverable because in today's lightning-fast, data-driven business climate, there is no tolerance for any amount of downtime, any type of data loss, or any form of data corruption.

Many businesses, however, are struggling to achieve the kind of comprehensive backup strategy that would enable them to restore their transactional database quickly and with data that is up to date and uncorrupted. They are often dealing with a hodgepodge of solutions that slow them down; force disruption; lead to departmental finger-pointing; cause expensive, hard-to-manage infrastructure sprawl; and—most importantly—don't provide the RPOs and RTOs that the business demands. For these businesses, it is important to understand that Oracle's Recovery Appliance provides a cost-effective opportunity to do a complete overhaul of their backup

stance — one that will remove complexity, reduce sprawl, free up staff, reduce opex, and provide the RPOs and RTOs that have become the sine qua non — an absolute necessity — of a modern organization.

For Oracle

IDC lists Oracle as one of the few vendors of a platform — its Exadata Database Machine — that provides Availability Level 4 (AL4), the highest possible level and synonymous with full fault tolerance. This engineered system co-engineered with the Oracle Database is one of several such platforms that Oracle produces based on a philosophy of full hardware and software stack control and optimization. The Recovery Appliance has an important role to play in this product family as the backup and recovery appliance that ensures that no data is lost or corrupted and that data is recovered quickly if there is a — rare — problem with the Exadata system, other supported servers, or the Oracle Database.

The challenge for Oracle is to keep these systems, including Recovery Appliance, relevant in the fast-changing dynamics between on premises and cloud that are playing out today. Cloud-based backup services are offered by all cloud providers, including Oracle Cloud, but they do not offer the incremental capabilities that Recovery Appliance provides and that today's speed of business requires. At the same time, on-premises cloud infrastructure offerings are becoming more popular, such as Oracle's own Cloud@Customer solutions. Oracle enables the Recovery Appliance to offload data to the Oracle Cloud and to replicate to a remote Recovery Appliance or to tape. Furthermore, Recovery Appliance can be used for backing up an Exadata Cloud@Customer deployment, which is a capability of increasing importance for customers. IDC expects Oracle to continue focusing on making its engineered systems available either as an on-premises cloud or in Oracle Cloud Infrastructure, or both, thus providing a continuum that gives customers the flexibility to deploy where they deem best.

Conclusion

Data-driven digital transformation is compelling businesses worldwide to overhaul their IT infrastructure to support new business models and serve as the foundation for digital products that deliver an optimal customer experience. This fast-spreading new mandate has raised data availability to a strategic and mission-critical requirement, elevating backup technology to serve as the last line of defense in the war against accidental and intentional disruption while pushing IT toward delivering ever-shorter RPOs and RTOs.

Businesses that can guarantee high data availability throughout the data life cycle gain critical insights that drive real-time business decisions faster and reduce their cost of operations. Data availability is so important that businesses are increasingly aiming for service levels of zero or near-zero data loss exposure with an RPO of five minutes or less and with a minimal RTO. Businesses are recognizing the difference between protecting flat files and transactional databases, and they want to be able to reliably restore data up to the last committed transaction — and do so fast. Therefore, they are increasingly opting for a specialized appliance, or PBBA, that can provide end-to-end continuity from production to backup to recovery.

IDC conducted a quantitative and qualitative study of the business value of one such PBBA, namely Oracle's Recovery Appliance. The study consisted of in-depth interviews with seven global organizations in which IDC asked the participants to quantify the impact of moving from a previous backup solution to Oracle's Recovery Appliance on dozens of IT and business-related factors. The aggregate results demonstrate that these organizations saw a dramatic improvement after they adopted Recovery Appliance. They experienced on average 76% lower backup time, 122% more recoveries completed within the RTO, 79% lower recovery time, and 64% improved RTO performance.

The interviewed businesses also enjoyed infrastructure, operational, and staffing improvements, such as an 81% reduction in unplanned downtime, a 53% reduction in IT infrastructure costs, a 62% reduction in total cost of operations, and a 56% reduction in time spent by DBAs on backup and recovery processes. To achieve these benefits, businesses made investments that, on average, yielded a six-month payback period and a five-year ROI of 342%.

IDC believes that businesses can gain important benefits from PBBAs in the battle against disruption and data loss, and this study unequivocally shows that Oracle's Recovery Appliance provides a broad set of distinct advantages that enable businesses to win that battle.

Appendix

Methodology

IDC's standard ROI methodology was utilized for this project. This methodology is based on gathering data from current users of the Oracle's Recovery Appliance solution as the foundation for the model.

Based on interviews with organizations using it, IDC performed a three-step process to calculate the ROI and payback period:

- 1. Gathered quantitative benefit information during the interviews using a before-and-after assessment of the impact of Oracle's Recovery Appliance.** In this study, the benefits included staff time savings and productivity benefits and operational cost reductions.
- 2. 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's Recovery Appliance and can include additional costs related to migrations, planning, consulting, and staff or user training.
- 3. Calculated the ROI and payback period.** IDC conducted a depreciated cash flow analysis of the benefits and investments for the organizations' use of Oracle's Recovery Appliance 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.

IDC bases the payback period and ROI calculations on several assumptions, which are summarized as follows:

- ▶ Time values are multiplied by burdened salary (salary + 28% for benefits and overhead) to quantify efficiency and manager productivity savings. For purposes of this analysis, based on the geographic locations of the interviewed organizations, IDC has used assumptions of an average fully loaded salary of \$100,000 per year for IT staff members and an average fully loaded salary of \$70,000 per year for non-IT staff members. IDC assumes that employees work 1,880 hours per year (47 weeks x 40 hours).
- ▶ The net present value of the five-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.
- ▶ 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.

About the Analysts



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Harsh V. Singh is a Senior Research Analyst for the Business Value Strategy Practice, responsible for developing return-on-investment (ROI) and cost-savings analysis on enterprise technological products. Harsh's work covers various solutions that include datacenter hardware, enterprise software, and cloud-based products and services. Harsh's research focuses on the financial and operational impact these products have on organizations that deploy and adopt them.

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Peter Rutten is a Research Director within IDC's Enterprise Infrastructure Practice, covering research on computing platforms. In this role, Peter focuses on high-end, accelerated, and heterogeneous infrastructure and their use cases, which include supercomputing, massively parallel computing, artificial intelligence (AI) and analytics, and in-memory computing. His research on high-end servers includes mission-critical x86 platforms, mainframes, and RISC-based systems as well as their operating environments (Linux, z/OS, Unix). His research on accelerated computing includes servers with GPUs, FPGAs, ASICs, and other accelerators that are deployed in the cloud as well as on-premises. Peter also examines emerging technologies and platforms such as quantum computing, neuromorphic computing and others that have the potential to disrupt mature infrastructure markets. As part of his role, Peter performs market sizing in these areas as well as custom market sizing for IDC's clients.

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Randy Perry is Vice President of the Sales Enablement Practice at IDC WW Custom Solutions. He is responsible for helping IT providers sell their products and services to C-level decision makers through tying technology initiatives to improved business outcomes. He is currently working on multiple projects linking IT initiatives (cloud, mobility, AI, social, and IoT) to improving business outcomes such as increasing agility, improving customer experience, and becoming more innovative; and quantifying the financial impact in terms of business metrics (revenue growth and lower operational costs). In his previous role, he developed and has led IDC's Business Value Strategy practice for over twenty years. As IDC's thought leader in promoting the financial benefits of IT, he has pioneered Return-on-Investment and cost of ownership methodologies and Business Value sales tools development and sales training, completing more than 1000 studies.

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