

# Exadata White Paper

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## Oracle Data Platform

Meets Apperson Jack Rabbit:  
Different Century, Same Outcome



Exadata Cloud Powered by  
AMD EPYC™ Processors  
Redefine Expectations

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White Paper

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**ORACLE**



## Oracle Data Platform Meets Apperson Jack Rabbit: Different Century, Same Outcome



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At the 1921 National Automobile Show, 87 independent car manufacturers displayed their vehicles to a country just beginning to fall in love with horseless carriages, according to the [Saturday Evening Post](#).

Remember the Apperson Jack Rabbit? Well, neither do I but it was quite a hit at that 1921 show.

Just 10 years later and in spite of explosive demand, the car-maker universe had been crunched by more than half, with only 36 manufacturers showing their stuff at the 1931 show.

And by 1955, amid a massively expanded universe of car buyers, [only five U.S. companies](#) were still making cars.

In the late 1990s, we saw a similar [boom and bust in the "internet service provider"](#) space, according to encyclopedia.com. While there were about 160 in the United States at the beginning of 1995, in less than 3 years that number exploded to more than 4,000 in the U.S. and Canada.

Today, that market has shrunk to a relatively small number of giant corporations that have either swallowed up or blown away the small players and even some pretty big ones such as UUnet and PSInet.

Those thousands of smaller players just couldn't match the financial, technological, and customer-oriented sophistication of the giants, and in a game where size and scale and rapidly escalating multibillion-dollar investments became table stakes, the economic inevitabilities of marketplace shakeouts ground the field down with only the heavy hitters surviving.

These days, what is now a sizzling-hot market for cloud-based data platforms will almost certainly follow a similar pattern of rampant expansion followed by customer-driven contraction. While dozens of tech companies are today trumpeting themselves as full-scale data platform providers, the simple truth is that most of the early-stage and overly caffeinated dreams won't be able to survive the unforgiving demands and expectations of modern business in the data-powered digital economy.

## **Data's ascendancy and soaring expectations**

Some players in today's data-platform space were true pioneers several years ago when they first expressed their vision of a central hub that would hold, manage, and act upon an enterprise's data. But just think about how profoundly the world has changed in the past several years heck, in just the past 3 years and it becomes clear how the models and approaches of even the recent past will be unable to meet the real-world performance levels required in today's production systems.

From performance to security to multi-modal capabilities, and from integration to openness to agility, the data platforms of today and tomorrow need to be far more powerful, resilient, and future proof than anything that was sufficient to meet the needs of the recent past. Consider:

**Financial Services.** After years of considering fintechs to be their mortal enemies, big banks are beginning to hammer out strategic partnerships with or acquire them to leverage their unique data and digital capabilities in combination with the big banks' scale, customer base, and relationships.

**Retail.** The rigorous collection and analysis of data have flipped the world of "retail" on its head, with brick-and-mortar stores—traditionally the core of the retail world—now serving in some cases as showrooms where consumers can browse physical products before ordering them online. And while today we take for granted the dizzying array of new fulfillment options—curbside pickup, home delivery, pick up at another location, etc.—those possibilities were just about impossible a handful of years ago because stores did not have the data and/or related tools to orchestrate all of those outcomes. But it's the use of AI/ML in predicting next purchases that has revolutionized the online shopping experience.

**Healthcare.** Oracle founder Larry Ellison recently described how his company plus partner Ronin and customer M.D. Anderson Hospital have built “disease-specific AI models that make recommendations to doctors about care...MD Anderson has actually shown if you use this system, you reduce hospital admissions and readmissions by 30%. That’s a stunning number.”

Across every industry and every part of the world, we’re seeing innovations like these first disrupt and then transform entire markets by applying data in new and more valuable ways. And at the heart of those efforts—particularly in today’s world where innovation is constant because customers demand it—are data platforms that are helping power the digital transformation by giving businesses the ability to orchestrate the collection, aggregation, and examination of vast stores of every type of data. Plus, these data platforms—well, at least the best-in-class—can do all that while also delivering those insights and opportunities in real time.

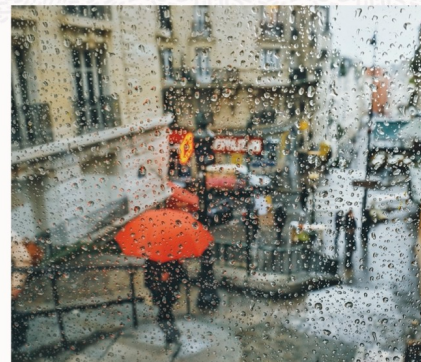
## Limitations: All Data Platforms Are Not Created Equal

In some respects, data platforms operate in part as factories that take in raw materials, do some assembly, and deliver finished products of various types. But the factories of yesterday were never intended to deliver the sophisticated and highly customized automated outputs of today—and in the same way, some data platforms might have been just peachy a few years ago but today are woefully outmatched against the requirements of an always-on digital business.

### Common limitations of data platforms

Current shortcomings include:

- Single-purpose/limited functionality, often only analytics
- Complex, requiring many services, glue, and integration
- Some (lots) of assembly required
- Extensive data movement and messaging
- Questionable availability – particularly for transactions
- Uncertain performance
- Fragmented security and data protection
- Cloud-only deployment
- Unpredictable consumption costs
- Don’t work well for existing apps and workloads
- Very high buy-in price that requires refactoring apps and changing the way you work



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(Source: Oracle presentation)

Just as you wouldn't want a factory to be limited in its ability to handle more than one 8-hour shift in a 24-hour day, so too are some data platforms unable to deliver all of the functions that an organization needs them to handle. For example: in an age where organizations need to be able to instantly analyze transactional data, some data platforms can handle only the analytics side and were simply never built to handle transactions. As a result, the customer needs to then design, scope out, acquire, install, maintain, and integrate a parallel tool or system to handle transactions and once again, the customer is put in the very unappealing spot of having to be the general contractor responsible for knitting together an ever-growing number of disparate products and technologies. As a result, those customers incur:

- More complexity.
- More need for administration.
- More need for integration.
- More exposure to cybersecurity threats.
- More cycles of time to aggregate and analyze data.
- More delays in moving data resulting in analysis of stale data.
- More cost by needing to stand up two systems one for analytics and one for transactions—because their tech vendor was unable to offer a unified solution.

A peek at the nearby chart showing “common limitations of data platforms” reveals more ugly shortcomings. While all of them are unappealing, two of the very worst in today's business environment are “uncertain performance” and “fragmented security and data protection.”

Imagine getting called into an executive committee meeting to explain why the new data-services business can't get off the ground because the expensive data platform that you selected simply can't deliver the high levels of performance on a consistent basis that the new business requires. Here come the questions: “Why would you buy something that wasn't powerful enough to meet the needs of this new business? Was it not clear to you that this new data-powered business is strategically vital to this company and its customers?”

Worse yet and yes, it can get worse a limited data platform can be a gold mine for cybercriminals. Again, the questions: “Did we know this data platform required levels of cybersecurity expertise that we either don't have or can't afford? Did we know that customer data could be exposed in certain situations? Did we decide not to integrate our security programs with this new data platform, or are you saying it is not possible to integrate them?”

## Mission Critical Means Mission Critical

Every day, as organizations continue to evolve their business models, customer-engagement models, and product-development models to be more and more fused with data, the role of data platforms becomes more incredibly important. And as obsessed as the business world seems to be already, the significance and potential of data will only grow as customers—both organizations and consumers—expect and demand that the companies that they engage with offer more and more digital products and services, digital engagement models, and digital/data innovations. So this is not the time to dabble with a limited-function data platform because it feels like it can meet some of your needs, or because its price tag seems to be correspondingly (and appropriately) low.

At Oracle, the data platform design and strategy mirror the company's long-standing approach that has made it by far the world's leading supplier of databases with unmatched capabilities in availability, performance, and cybersecurity. In contrast to the limited functionality, closed architectures, and fragmented approaches of many competitors that result in many challenges and shortcomings, Oracle Data Platform is built around three core principles complete, open, and integrated. Here's how that leads to better business outcomes for customers:

- **Complete:** Oracle Data Platform has a comprehensive set of capabilities, allowing organizations to support any app, any use case (e.g. OLTP, Analytics, ML, etc.), and any data type, including relational, spatial, graph, document, unstructured, etc. Unlike its competitors, Oracle Data Platform is not limited to a single data type or use case such as data warehousing with relational or document data, but not both. This mirrors Oracle's overall approach to its entire data-management portfolio.
- **Open:** While Oracle Data Platform enables organizations to use its comprehensive set of capabilities as-is, it also allows customers to extend or replace core elements with capabilities developed by other suppliers or the open-source community. These attributes plus the ability to economically move data to other platforms or locations underscore Oracle's overall commitment to being open and to avoiding the "gotcha" lock-in policies that some vendors employ to limit customer choice. Conversely, because Oracle Data Platform is **not** monolithic and is interoperable with non-Oracle technologies, it gives customers more choices in deploying the solution that they feel is best suited for their business.




- **Integrated:** Oracle Data Platform has been specifically designed to minimize the number of separate services, integration points, and data transformations that customers must deal with when deploying and managing their full suite of workflows. As a result, Oracle Data Platform delivers the Holy Grail to developers in today's digital economy: it allows them to spend more time on innovation and less on integration while providing high levels of automation that reduce error-prone manual administration. And because it does **not** require customers to undertake endless DIY integration and piecemeal management, customers can focus more of their resources on customer-facing growth, innovation, and productivity.

## What Customers Want – And Don't Want – In a Data Platform

While the technological capabilities of various data platforms and their underlying components are of course extremely important, the ultimate arbiter in today's high-velocity, fast-change economy are the business outcomes that a data platform can help to generate. In that customer-centric context, let's take a look at several customer issues around data platforms, and then see how Oracle addresses each. The graphic below outlines several of those issues and explains how Oracle Data Platform handles each and helps drive the desired business outcome.

**Oracle's complete data platform offers numerous benefits**

Customer issues	Oracle Data Platform helps customers
1. "It takes too long and too many resources to do something new."	<b>Increase business agility and innovation</b> with more built-in capabilities, less integration, and rapid deployments
2. "The 'data platforms' I've seen are either incomplete or too complicated, and many of them have fragmented security."	<b>Simplify IT</b> with a comprehensive, easy-to-use data platform built on fewer, integrated services and common security
3. "We can't afford to have a bunch of app and data silos running at 15% utilization – especially as our data estate grows."	<b>Operate more efficiently and reduce costs</b> with auto-tuning, auto-scaling, and database consolidation
4. "The workloads we've moved to the cloud don't have the performance or availability we need for mission-critical applications, so they're stuck on-premises."	<b>Run mission-critical apps with greater performance and resilience</b> by with unique, database-optimized Exadata and data protection capabilities
5. "The timeliness and quality of our business insights haven't improved. We have stale results despite investing in new data sources and software."	<b>Improve business insights</b> by enabling ML-driven and advanced analytics for larger and more complex data sets, and do so in less time with higher performance
6. "We want to expand into new geographies, but some have data residency restrictions."	<b>Deploy the same solution everywhere</b> using OCI, EU Sovereign Regions, Dedicated Regions, and Exadata Cloud@Customer

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(Source: Oracle presentation)

Those issues are not trivial, and there are many others as well. Let's do a quick review of the issues posed by incomplete, limited, or under-powered data platforms : they're fragmented and only partially meet the organization's needs – so you need to have several specialized platforms and associated services and then integrate them together; they're not fast enough to keep up with demanding applications—at least not without entirely rewriting the apps, which often isn't an option; they're time- and resource-intensive just when you're trying to reduce manual, skill-intensive integration activities; they don't drive the expected real-time insights due to the inevitable time lags in moving, transforming, and analyzing data in separate, siloed services; they are inefficient and costly as each separate database and service is over provisioned to avoid downtime; and they can't be deployed in a wide range of models and geographic locations to meet rapidly tightening data residency regulations.

Conversely, because Oracle's been handling mission-critical data challenges for customers for almost half a century, Oracle Data Platform is architected to overcome all of those issues and deliver unrivaled business benefits, including:

- **Boost** business agility and innovation so that your organization can move at the speed of your customers.
- **Simplify** IT so it drives better business results and frees up resources for higher-value initiatives.
- **Increase** efficiency and speed of operations while also lowering costs.
- **Build** high-performance capabilities and culture as teammates see what can be done with unfettered access to and analysis of data.
- **Improve** the speed and depth of business insights with more access to more data in less time.
- **Deploy** fully compatible hybrid solutions across the globe and have full choices over when and where to use unique public-cloud and private-cloud solutions along with on-prem systems.

## **How Oracle Data Platform Overcomes All Those Customer Issues**

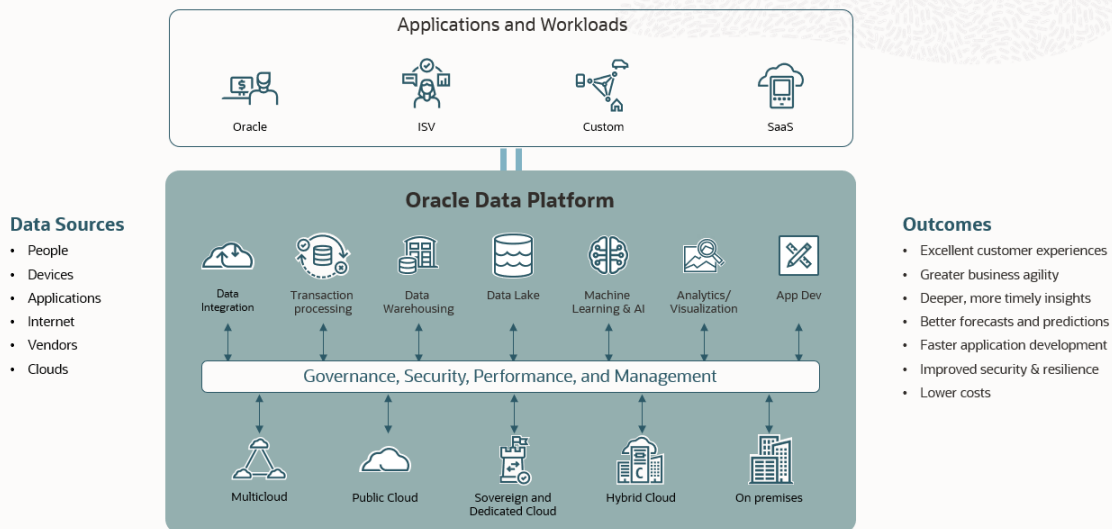
At this point, you might be asking, "Okay—so if I should avoid the limited or incomplete data platforms out there, then what does a full-function and end-to-end solution look like?"

Driven by its three design principles —complete, open, and integrated—Oracle Data Platform takes into account all of the different types of architectures and systems that an enterprise is likely to be using (multicloud, public cloud, sovereign and Dedicated Cloud, hybrid cloud, and on-premises), PLUS all the various input sources and related outputs and functions, PLUS the broad range of workloads and apps modern enterprises are deploying, PLUS the increasingly proscriptive realms of governance, security, performance, and management.



And to ensure all that technological goodness is delivering exceptional ROI, let's take another look at the business outcomes that this unique data-platform approach has been built to deliver:

## The complete Oracle Data Platform for all your apps and data



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(Source: Oracle presentation)

- Excellent customer experiences because organizations can focus on driving business innovation and dazzling their customers instead of patching, integrating, plugging holes, moving data, and administering everything.
- A more agile organization that can explore ideas with data-driven insights more rapidly and therefore be able to make better decisions more quickly and pounce on opportunities before its competitors.
- The ability to analyze and act on bigger data sets quicker with more-probing questions to enable better predictions and forecasting.
- More internally-generated innovation by developing apps more quickly with a standard end-to-end architecture and advanced low-code tools.
- A more-rigorous cybersecurity profile based on Oracle's "security first" approach, an attribute that boosts operational resilience and reduces surface area exposures.
- On top of all that, lower costs—due to all the automation, self-scaling consumption; the lack of any need for integration, and the high-performance capabilities embedded in the data platform architecture.

## Turbocharging Oracle Data Platform: Autonomous Database on Exadata Cloud Infrastructure

In today's customer-centric world, every organization in every industry has to accelerate its decision-making, operations, and the ultimate delivery of great experiences to customers. And as we've discussed, purpose-built and complete data platforms are the modern engines for those capabilities.

With those outcomes in mind, Oracle has brought together key elements from across its cloud portfolio to bring unmatched power and performance to Oracle Data Platform. Oracle Autonomous Database forms a core element of Oracle Data Platform and is the company's most advanced and most powerful database ever. Under the covers, Autonomous Database is the combination of Oracle Database, AI-driven automation, and Oracle Exadata system infrastructure within an OCI public cloud region, Cloud@Customer environment, or Dedicated Region.

Here's a quick rundown of why Autonomous Database has earned the moniker of Oracle's most advanced database:

- As the name states, it is completely self-driven: it manages itself, updates itself, configures itself, secures itself, and repairs itself.
- It eliminates huge expanses of expensive, tedious, manual database administration and the possibility of human errors of commission or omission that manual efforts entail.
- Because it is self-tuning and self-scaling, Autonomous Database can reduce runtime costs by up to 90% compared to conventional database deployments as described in Oracle's story and video on [Impos Solutions](#).
- Autonomous Database's converged capabilities enable customers to consolidate fragmented databases with the same or different data types, workloads, and development styles so that they can significantly reduce costs and cybersecurity risks by using a single, strong security model.
- By offering up to 99.995% uptime, Autonomous Database is unmatched in availability and supports all major types of enterprise workloads.
- It gives customers the enormously valuable ability to redeploy talented IT people to higher-value tasks such as customer-facing innovation, analytics, and ML instead of low-value administrative drudgework.

To ensure customers have a wide range of deployment options for Autonomous Database, Oracle offers it in all of its OCI public cloud regions—currently 41 and counting, EU Sovereign Regions, OCI Dedicated Region in customers' data centers, with Exadata Cloud@Customer in 60+ countries, and for multicloud access from Azure—in 12 geographic locations.

In OCI regions, Autonomous Database runs on Exadata Cloud Infrastructure—the public cloud variant of Oracle's extremely popular Exadata system. This purpose-built cloud platform is optimized to give customer applications using Autonomous Database and its somewhat less automated Exadata Database Service sibling unmatched levels of speed for online transaction processing and the related analytics that have become indispensable in today's digital world.

For some customers moving more and more of their IT systems to the cloud, Autonomous Database on Exadata Cloud Infrastructure is an ideal option because it has been designed from the ground up to be fully compatible and optimized for Oracle Database, which is a central element of many Oracle Data Platform deployments.

The graphic below illustrates a few key attributes of Exadata Cloud Infrastructure, the underlying system powering Autonomous Database in OCI:

1. It supports a wide range of workloads, including those requiring exceptional performance for compute, memory, latency, storage, or I/O.
2. It powers both Autonomous Database and Exadata Database Service and allows them to run concurrently on the same system to increase operating efficiency and IT agility, while reducing costs.
3. It's the first in Oracle's extensive family of Exadata systems to be powered by AMD EPYC™ processors for the database nodes.

By employing 64-core AMD EPYC processors, Exadata Cloud Infrastructure X9M in offers 2.5X as many cores per database server as the previous X8M model in OCI. And with Autonomous Database now supporting up to 32 database servers in a single Exadata, organizations can use it with more than 4,000 database cores—40X more than previously available. That huge leap in core count shows how Oracle, with the help of its partner AMD, will continue to drive the highest possible levels of performance for business customers whose futures are increasingly tied to their ability to manage and analyze soaring volumes of data instantly, simply, and securely.

## Exadata Cloud Infrastructure X9M in OCI

The first Exadata powered by AMD EPYC processors

### Supports any workload:

- Compute intensive workloads
- Memory intensive workloads
- Latency intensive workloads
- IO intensive workloads
- Storage intensive workloads



### Single Database scales up to:

- 4,032 CPU cores in database servers
  - Using 64-core AMD EPYC CPUs

2.5x the cores  
of Exadata X8M

- 44 TB DRAM

- 96 TB low-latency cache

- 1.6 PB NVMe Flash

- 3.2 PB Database Size



Exadata Storage

- Up to 3,072 CPU cores
- PCIe 4.0 for Flash, IO, and Networking

**Runs Autonomous Database and Exadata Database Service**

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(Source: Oracle presentation)

## The Power of AMD EPYC Processors

Again, we come back to the enormous business value that can be created by being able to rapidly access, evaluate, and gain insights from volumes of data that, only a few years ago, would have been considered impossibly large.

Today, pharmaceutical companies are using large amounts of data to cut the time required to develop a new drug from 10 years to 4 years; insurance companies are analyzing customer preferences found in massive data stores to create new types of products and services that greatly expand the addressable market; big retailers are analyzing employee feedback and retention data to improve their employee's experiences, improve career opportunities, and reduce front-line employee churn; car companies are moving into the dynamic "mobility" category with personalized experiences co-created with customers; and airlines are able to reduce fuel consumption, flight delays, and unused capacity by optimizing operations and passenger options. In these and many other industries, the insatiable appetite for data and analytics based up on it are driving new innovations and business models. Oracle is working closely with AMD to meet these growing needs.

AMD EPYC processor-powered Exadata systems in OCI offer I/O latency that is as low as 19 microseconds, 25X to 50X faster than the typical latency cited by AWS and Microsoft. And they offer up to nearly 3TB/second of analytics scan throughput, which is 100X to 200X that offered by the same vendors. These are great peak numbers, but how can they help someone trying to solve business problems? Let me give you several examples:

- **Smoother operations:** Organizations often have a periodic need for peak performance that's much more than their normal requirements. Events like Black Friday shopping, the shipping that follows those sales, and peak travel seasons are cases where organizations need to scale up resources to meet peak demand and scale them back down to save money when demand subsides. As opposed to some other cloud database services that require downtime to scale resources—something you wouldn't want in the middle of Black Friday—Autonomous Database does this scaling automatically, and the increased processor count available with AMD EPYC processors allows this scaling to happen without impacting other database workloads.
- **Improved customer experiences:** Today's customers are well informed, want more and context-sensitive information, and want to be able to drill into it before making decisions. The high level of integrated processing power provided by AMD EPYC processors in Exadata OCI systems allows organizations of all sizes to easily access multiple types of data to create a 360-degree view of customer needs and incorporate advanced capabilities like recommender systems into their transactional workflows to deliver the experiences customers want.
- **Deeper insights and better predictions:** Organizations are always looking to better understand what has happened and more accurately predict future needs so that they can run their businesses with maximum efficiency. One current trend is to use advanced analytics and AI/ML algorithms to identify data relationships and anomalies that might not show up with traditional analytics. However, an AI/ML-based approach often requires multiple separate cloud services and data movement and transformations—making them complex and time-consuming to use. Users of Autonomous Database can use built-in ML algorithms for training and analytics, or they can bring their own Python and R algorithms and run them inside the database using the compute power provided by AMD EPYC processors in Exadata Database Servers—all without having to export and transform their data for use on another service.

- **More efficient operations and lower costs:** All organizations want to reduce the amount of money that they spend on computing and deploy scarce resources to operate more efficiently. The combination of Autonomous Database with AMD EPYC processor-powered Exadata systems in OCI help them achieve this goal by running analytics faster (you pay for what you use in the cloud, so shorter run times lead to lower costs), consolidating databases on smaller systems (running workloads on Exadata Database Servers with more compute cores that you can allow to be shared amongst your workloads increases operational efficiency and reduces costs), and fully automated database operations reduces administrative costs and allows organizations to redirect scarce people resources toward growth and customer-facing initiatives.

Of course, users of Oracle Data Platform need to do more than just run a database. They need to run various open-source databases, use data lakes and virtualize the applications that generate or consume the data. Organizations running in OCI can take advantage of AMD EPYC processors in more ways than just with Autonomous Database.

- MySQL HeatWave in OCI uses AMD EPYC processors to provide industry-leading performance for open-source in-memory query and machine learning acceleration.
- Oracle's Big Data Service can take advantage of AMD EPYC processor-based shapes to accelerate Hadoop and Spark workloads.
- Oracle VMware Cloud Solution can make use of powerful AMD EPYC processor-based shapes to scale virtualized applications to high levels of performance and connect to Exadata systems in OCI to meet their mission-critical database needs.
- And OCI compute shapes based on AMD EPYC processors offer a wide range of flexible configurations and Confidential Computing capabilities that increase security by isolating in-use data and applications processing it.

Based on Oracle's commitment to an ongoing partnership with AMD customers can feel confident that their investments in the underlying Oracle Exadata and cloud infrastructure will be protected well into the future.



## If Data Is the New Currency, Then Data Platforms Are Banking Systems

When you consider the list of unmatched capabilities Oracle Data Platform provides significant business value. From its complete, open, and integrated design to AMD EPYC processor-powered Exadata in OCI, bear in mind that all of this world-class technology is being pulled together to help you achieve your highest-priority business outcomes:

- **speed:** the ability to move faster than your industry and customers, and in line with their expectations.
- **innovation:** the ability to see over the horizon and be fully prepared for the future as it arrives.
- **optimal deployment of resources:** get not only world-class performance but also the ability to shift highly capable people to higher-value positions.
- **transformation:** become the data-driven digital business your customers will require you to be.

Whether you're looking for a complete, open, and integrated way to meet the data platform needs of your entire organization, running into limitations with your existing single-purpose platform, or just looking to find out more about how a data platform can help you, you definitely need to learn more about [Oracle Data Platform](#). It makes the "data platform" offerings from the likes of Snowflake, Databricks and AWS look incomplete by comparison.