

Exadata Cloud Increases Financial Services Insight and Agility

9 of the world's 10 largest financial services firms use Oracle Exadata to run databases for core banking applications and customer analytics. Exadata's industry-leading performance, scale, availability, and security allows them to accelerate their business, reduce risks, and cut costs.

Financial services firms of all types increase their competitiveness by using Exadata in the Oracle Cloud to quickly deliver innovative services at scale and operate more efficiently. Companies also garner cloud benefits while meeting data sovereignty, security and latency requirements by deploying Exadata Cloud@Customer in their data centers.

INNOVATIONS DRIVE ADVANCED IT REQUIREMENTS

The exponential growth of financial data and the adoption of emerging technologies for querying, analyzing and visualizing multiple data types allow companies to identify new business opportunities and rapidly develop new products to address them. Conventional data processing approaches can no longer keep up with larger data volumes and higher data velocity, so financial services firms have turned to process automation, advanced analytics driven by machine learning, and other automated technologies to drive their digital transformations.

To succeed, financial services firms need scalable, high-performance database platforms and cloud services that securely process massive amounts of data in real-time. Armed with sufficient processing power, financial services firms are able to use automated data processing to enhance customer experiences, improve internal processes, and mitigate multiple types of risks.

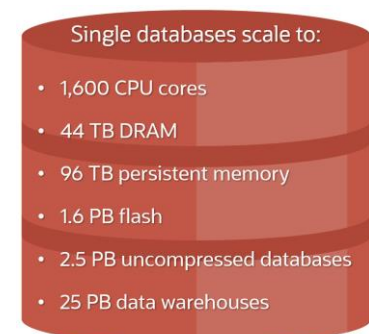


Oracle Exadata is co-engineered with Oracle Database for cloud and on-premises deployments

“With Exadata Cloud@Customer, large banks and insurance companies can modernize their data infrastructure using an OPEX model, reduce maintenance overhead, and improve total cost of ownership by up to 50%, all while keeping data on-premises to comply with regulation and internal policies.”

Omdia

No database workload is too big



THE BEST FINANCIAL SERVICES DATABASE PLATFORM

Oracle Exadata is the best platform for all financial services Oracle Database workloads. Built with ideal database hardware, database-aware system software, and management automation, Exadata allows customers' databases to run faster, scale better, be more secure, and have greater availability than when running on other cloud or on-premises database platforms.

Exadata integrates unique capabilities co-engineered with Oracle Database at the source-code level, allowing financial services firms to support more customers, process more financial transactions, and complete complex regulatory processing in less time. Exadata's scale-out architecture with optimized in-database analytics and machine learning algorithms enables companies to understand end-user needs better and prevent illegal transactions by analyzing petabyte-scale data sets in real-time. Oracle Autonomous Database runs on Exadata located in Oracle Cloud Infrastructure (OCI) regions and customer data centers, enabling financial services firms to fully benefit from Autonomous Database's auto-scaling, auto-tuning, auto-patching, and auto-securing features wherever they want, minimizing management complexity and costs.

Exadata has been used by leading financial services firms to accelerate diverse workloads and increase customer insights for more than ten years. Customers use Exadata with Oracle's portfolio of financial services applications, ISV partner applications, and with custom applications, allowing them to process more transactions, develop greater customer and market insights, and reduce costs.

Financial Services Use Cases	Exadata Benefits
Transaction processing	<ul style="list-style-type: none"> • Faster responses and richer customer experiences • More transactions and more customers • High availability with enhanced security
Customer analytics	<ul style="list-style-type: none"> • Analysis of multiple data types • Faster analysis of larger data sets • Optimized in-database machine learning
Fraud detection	<ul style="list-style-type: none"> • Real-time analytics using multi-source data • Built-in graph analytics and machine learning • Enterprise-wide analysis
Risk and portfolio analysis	<ul style="list-style-type: none"> • High-performance, in-database analytics • Optimized in-database machine learning • High-throughput for analyzing multiple scenarios
High frequency trading	<ul style="list-style-type: none"> • Low latency and high throughput • In-Memory analytics on transactional data • Reduced complexity
Back office automation	<ul style="list-style-type: none"> • High throughput • Simplified management • Continuous operations

Since Exadata is available in Oracle Cloud Infrastructure regions, in customer data centers as Exadata Cloud@Customer, and as traditional on-premises deployments, financial services firms can use it for all database workloads, no matter where they run.



Figure 1: Exadata Deployment Options

Key capabilities:

- Greater scale and availability accelerate back-office and front-office applications
- Built-in cloud automation increases availability and simplifies IT operations
- Online consumption scaling simultaneously optimizes performance and cost
- Built-in Exadata, database, and OCI features increase security and help meet regulatory requirements
- Exadata Cloud@Customer addresses data sovereignty, security, and latency requirements
- Autonomous Database support in OCI and customer data centers enables industry-leading auto-provisioning, auto-scaling, and auto-securing capabilities

Exadata Cloud Service in action

A leading multinational insurance company servicing 30 million customers uses Exadata Cloud Service to achieve:

- 84X faster processing of 7 billion records, taking 2 hours instead of 7 days
- 8X higher overall performance
- Rapid response to pricing changes with Oracle Machine Learning

FLEXIBILITY AND LOW COST WITH EXADATA CLOUD

Many new financial services competitors are cloud-native, relying on generic infrastructure and simplified processes to run their businesses. Using cloud solutions for everything from Software-as-a-Service applications to application development and crucial databases allows financial services firms to rapidly deploy innovative applications at scale and lower costs with dynamic resource consumption.

Exadata Cloud Service enables cloud transformations by providing higher levels of performance, scale, and availability than other cloud database services. Exadata Cloud Service's unique capabilities allow it to support 35X larger uncompressed databases, provide up to 25X more processing power, and access data 50X faster than other services. Higher performance and full compatibility with on-premises infrastructure enables financial services customers to move existing workloads to Oracle Cloud Infrastructure without spending millions of dollars and years of time restructuring their environment.

However, while financial services firms want to use public clouds to increase their agility and lower their costs, they are sometimes unable to do so due to data sovereignty and security regulations or requirements for low-latency connections to existing resources. Exadata Cloud@Customer brings Exadata Cloud resources inside customer data centers, enabling financial services firms to meet data sovereignty and security requirements while using OCI automation and pay-per-use economics to streamline operations and reduce costs.

Exadata Cloud's high performance, intelligent storage servers, and online scalability minimize database server resource consumption for financial services workloads. Unlike other cloud database services which require databases to be paused in order to scale their performance, Exadata Cloud resources can be scaled up and down without interrupting operations, simultaneously optimizing performance and costs with pay-per-use economics.

OPTIMIZED OLTP WITH EXADATA CLOUD

Core banking and customer-facing applications are highly transactional and must provide continuous end-user availability. High-frequency trading environments also require databases to provide the lowest possible latency, so profit opportunities are not missed.

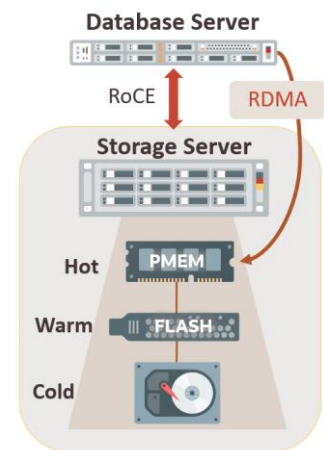
Exadata hardware, system software, and Oracle Database are engineered together, delivering high performance and low latency for all Oracle Database workloads. Database-transparent persistent memory (PMEM) combines with advanced high-speed networking and direct memory access to eliminate operating system and network stack overhead. Exadata-specific optimizations reduce data access read latencies to 19 microseconds—50X faster than on other cloud database services.

Exadata Cloud Service uses a scalable architecture that allows financial services firms to quickly scale up performance for peak needs and scale it back down to reduce costs. Unlike other cloud database services that limit the performance of a transactional database to that of a single database server, Exadata Cloud Service can scale up to 1,600 database server CPU cores to support a wide-variety of applications.

Exadata also uses machine learning to automatically optimize transactional database performance. Automatic Indexing monitors the performance of database queries, and continuously develops and tunes database indexes as underlying data and usage patterns change. Combined with fine-grained prioritization of database and IO resources, customers achieve the highest possible transaction performance and lowest latency for transactional workloads.

“Wikibon believes that the Oracle Exadata Cloud Service X8M offers the lowest cost option of moving to the cloud for enterprises with significant investments in Oracle Databases.”

David Floyer, CTO, Wikibon



Oracle Exadata with database-transparent persistent memory

OPTIMIZED ANALYTICS WITH EXADATA CLOUD

High-performance analytics allow financial services firms to understand their customers' needs better and personalize the services offered to them. Companies take advantage of Exadata's scale and high analytical throughput to identify new business opportunities and increase revenue by analyzing complex, multi-channel data.

Use cases like portfolio and risk analysis also highlight the need for high-performance in-database analytics. Companies run extensive studies using Exadata's built-in analytics and machine learning algorithms to create data-driven investment strategies that are responsive to various financial, economic, and external stimuli. By understanding risk and opportunity profiles for themselves and their clients, firms can more easily implement long-term and high-frequency trading campaigns.

Financial firms can run analytics workloads faster and more efficiently by using Exadata's Smart Scan capabilities to offload compute and IO-intensive SQL, analytics, and machine-learning operations from database servers to CPU cores in intelligent storage servers. By moving processing to storage servers, Exadata also reduces customers' costs by allowing database servers to perform more work per database core enabled.

Unique Exadata technologies such as Smart Flash Cache, Hybrid Columnar Compression, and Database In-Memory optimizations enable customers to accelerate analytics operations further. Financial services firms can create data warehouses with up to 25 PB of information and rapidly analyze them. Data is automatically converted to columnar formats and optimally distributed across hundreds of terabytes of flash storage on potentially dozens of storage servers so applications can run in-database analytics in real-time, enabling customization of financial services customer experiences.

FRAUD DETECTION WITH ORACLE GRAPH

The combination of legislation, market dynamics, and sophisticated criminal cyber-strategies require financial services firms to proactively detect fraud. Augmenting existing analytics with graph data science and machine learning reveals latent information that exists as direct and indirect relationships in data, increasing the accuracy of fraud detection methods and reducing financial risk.

Exadata Cloud enables financial services firms to perform fraud detection with multi-source, enterprise-wide data using optimized Oracle Graph analytics and billion-edge graphs. Oracle Graph integrates scalable property graph technologies, a powerful in-memory analysis library optimized for Oracle Exadata, and a graph query language with developer APIs so enterprises can add fraud detection capabilities to existing Oracle Database applications.

Financial services companies like Paysafe, a payment processing firm, use Oracle Graph's built-in, in-memory graph analytics to accelerate fraud detection by looking beyond individual accounts, identifying patterns of fraud without impacting its customers' real-time money transfer experiences.

EFFICIENT DATABASE CONSOLIDATION

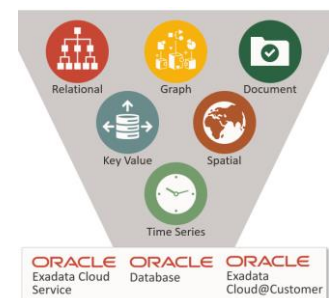
As many financial services firms have found, it's easy to create hundreds or thousands of stand-alone databases in on-premises and cloud environments, but difficult to manage them. Database and infrastructure sprawl can lead to higher hardware and software costs as well as fragmented security and compliance gaps. Converged Oracle Database capabilities running on Exadata Cloud services reduce the complexity, costs, and inconsistent security generated by database sprawl.

"With Oracle Advanced Analytics, we execute computations on thousands of attributes in parallel—impossible with open-source R. Analysing in Oracle Database without moving data increases our agility. Oracle Advanced Analytics enables us to make quality decisions on time, increasing our cash loans business 15%."

Jadranka Novoselovic
Head of BI Development
Zagrebačka Bank

"We use Oracle Graph analytics for analysis of fraud patterns. Our anti-fraud officers had to investigate really fast cases in hours, and now they can do it in 5 minutes."

Stanka Dalekova, Technical Lead, Paysafe/Skrill



Converged Oracle Database

Oracle Database supports multiple data types, database models, and development paradigms, enabling developers to quickly develop applications with rich data models without having to integrate data from multiple databases using different APIs and security mechanisms. Consolidating converged Oracle Database instances on Exadata means that all databases and use cases benefit from high performance, availability, and security, so weak links in the data chain don't take down an entire application or enable a breach of a financial firm's data.

Exadata Cloud allows organizations to more efficiently utilize software and hardware resources when running converged Oracle Databases. All databases benefit from fast Exadata performance, and the need to over-provision processing storage resources for each stand-alone database disappears, significantly reducing costs while simultaneously increasing agility.

Exadata Cloud also provide the high availability, data protection, and disaster recovery capabilities that financial services customers require to support continuous operations. Exadata's scale-out architecture integrates redundant hardware components, fault-tolerant software capabilities, and built-in Maximum Availability Architecture (MAA) best practices required for 24x7 operations. Continuously protecting Oracle Database using Oracle Database Backup Service or on-premises Zero Data Loss Recovery Appliance systems allows financial services firms to immediately protect crucial data as changes occur, enabling them to quickly recover to any point in time should a failure, cyberattack, or ransomware incident occur. In addition, Exadata Cloud virtually eliminates planned downtime with online scaling, patching, upgrading, and maintenance of crucial database hardware and software infrastructure.

SECURITY AND COMPLIANCE WITH EXADATA CLOUD

Sophisticated cyber-criminals routinely target the banking industry, making it one of today's most highly impacted industries in terms of the cybercrime costs. Financial services firms have a fiduciary responsibility for data security and business continuity throughout the data lifecycle, incurring hefty penalties for failure to meet regulatory requirements. Oracle delivers the technology and framework to identify, measure, monitor, and mitigate these risks.

Exadata Cloud increases the security of customers' databases by eliminating security fragmentation caused by single-purpose, isolated databases and stand-alone database environments. Proven Oracle Database security, isolated Oracle Exadata system infrastructure, and proactive Oracle Cloud Infrastructure security management combine to protect financial services data from unauthorized access, theft, and loss. Broad support for regulatory frameworks from SOC to ISO/IEC 27001:2013 and PCI-DSS simplify the adoption of Exadata Cloud solutions by financial services companies.

Encryption with Exadata Cloud is not an option. Deployments in OCI regions and Cloud@Customer environments provide always-on encryption with customer-controlled keys, preventing unauthorized access to clear data—even by Oracle Cloud automation processes and personnel. Oracle Database technologies such as Database Vault protect against privileged user access, while Label Security, Data Masking, and Sub-setting eliminate sensitive data not needed for development, testing, and reporting purposes.

Oracle Data Safe is included with Exadata Cloud Service at no extra charge, providing financial services firms with a unified security control center to manage data security across their enterprise. Data Safe helps DBAs and security teams understand the sensitivity of enterprise-wide data, evaluate risks to that data, and address security compliance requirements.

OCI uses AI and machine learning technologies to provide continuous detection of known and novel threats. Automatic patching of Exadata Cloud infrastructure and the automatic, online application of all security updates for Autonomous Database allow financial services firms to quickly reduce potential threats once they are identified. OCI isolates compute and network resources to ensure that private data and traffic are shielded from other users. It also separates code, data, and

"Moving to Exadata Cloud@Customer from commodity hardware has led to a significant improvement across applications, database operations, and security. It has provided us with greater agility by quickly spinning off new databases and dramatically reducing our daily operational tasks."

Bader AlGazlan, CIO, Tawuniya Insurance Company

Oracle Data Safe capabilities:

- Enterprise-wide Oracle Database security visibility
- Identify the location of sensitive data
- Evaluate current data risks
- Mask sensitive data
- Implement and monitor security controls
- Assess user security and monitor user activity
- Address security compliance requirements

resources from management systems—helping prevent attackers from stealing or manipulating data in the cloud. Oracle Cloud Guard helps IT departments identify misconfigured service and reports on insecure user and administrator behaviour. Cloud Guard's embedded security expertise notifies security managers of potential threats and automates remediation based on pre-configured and customizable responder rules, allowing customers to actively reduce their threat profile.

SUMMARY

The time to transform financial services operations with cloud capabilities has come, and Exadata Cloud provide the best capabilities to support large-scale digital transformations. Full compatibility with on-premises Oracle Database and Exadata systems, and availability in Oracle Cloud Infrastructure regions and customer data centers allow customers to quickly move workloads to cloud infrastructure while addressing any required data sovereignty, security, and latency concerns.

Exadata Cloud solutions deliver the performance, scale, availability, and security financial services firms require to run crucial applications in the cloud. Oracle Cloud automation, built-in Exadata automated management, and the ability to run Autonomous Database in Oracle Cloud Infrastructure regions or customer data centers allow financial services firms to meet peak requirements while also tightly controlling costs. Companies spend less time and money managing infrastructure and more on innovations that increase customer value and reduce financial risks.

With Exadata Cloud capabilities, financial services firms have the resources they need to meet rapidly evolving customer expectations, compete against new market participants, reduce costs, and meet regulatory requirements.

“Oracle achieves the maximum identity between on-premises and public cloud, giving CxOs the peace of mind to operate workloads where they can best be run and operated.”

Holger Mueller, Vice President and Principal Analyst, Constellation Research

For more information on Exadata solutions, visit:

- [Exadata Cloud Service](#)
- [Autonomous Database](#)
- [Exadata Cloud@Customer](#)
- [Autonomous on Exadata Cloud@Customer](#)
- [Oracle Exadata Database Machine](#)

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