Think Autonomous

Oracle Autonomous Database Transaction Processing

Accelerate innovation with Oracle's latest self-driving database

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Executive Summary

Intelligent autonomous systems are quickly taking hold in many industries, driving paradigm shifts in financial services, healthcare, logistics, manufacturing, IT infrastructure, and more. Oracle Autonomous Transaction Processing Cloud Service uses groundbreaking machine learning and automation to eliminate human labor, human error, and manual tuning for rapidly growing volumes of data, delivering unprecedented cost savings, security, availability, and productivity. This unique cloud service automates the entire data management life cycle. The latest service in the Oracle Autonomous Database portfolio, Oracle Autonomous Transaction Processing raises the bar by enabling self-driving, self-securing, and self-repairing databases for transaction processing, reporting, batch, IoT, and machine learning workloads. Deployed in minutes, it empowers customers to accelerate innovation, lower costs, and reduce risk.

How does this compare to the current state of affairs? Traditionally, database management systems have to be hand-assembled using standard components. The onus is on the customer to build, test, tune, secure, and operate the database management system—a labor-intensive approach that reduces economies of scale and increases runtime costs.

Oracle Autonomous Transaction Processing represents an entirely new category of service based on machine learning technology that dramatically transforms how companies use mission-critical databases, boosting efficiency and freeing IT professionals to focus on innovation. It empowers IT teams to focus on high-value data management projects—at a lower cost and with greater efficiency than is possible with other public clouds. It is **self-driving**, which means it automates database maintenance, monitoring, and tuning while also handling many infrastructure management tasks. The automation supports mixed workloads and allows for database creation in minutes, not days. It is **self-securing**, protecting itself from external cyberattacks as well as from malicious internal users. And it is also **self-repairing**, which means it will automatically recover from any glitches or failures.

- **Accelerate Innovation**: Oracle Autonomous Transaction Processing makes it easy to develop and deploy new applications—with no complex management or tuning required. Oracle's extreme performance cloud infrastructure supports any size workload, allowing for unlimited cloud flexibility.

- **Reduce Risks**: Automatic application of the latest security updates with no downtime eliminates cyberattack vulnerabilities. Protection from all types of failures including system failures, regional outages, and user errors delivers 99.995 percent availability, or less than 2.5 minutes of downtime a month, including maintenance. Database Vault prevents administrators from snooping on user data.

- **Lower Costs**: Complete automation of database and infrastructure operations cuts administrative costs up to 80 percent. The efficiency of a self-optimizing database together, with elastic pay-per-use, cuts runtime costs up to 90 percent.

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The Data Management Imperative

On average, traditional IT shops allocate more than 72 percent of their budgets to maintaining existing information systems, leaving little time or money for innovation.

72%

of IT budgets are spent on maintenance rather than innovation

A big part of this maintenance burden involves monitoring, tuning, updating, and securing data management systems. Oracle's cloud-based data management solutions can cut administration costs up to 80 percent, even as they protect sensitive data and empower IT teams to pursue new strategies—at a lower cost and with greater efficiency than is possible with other public clouds.

Dawn of a New Paradigm

Oracle Autonomous Transaction Processing can help you consolidate numerous Oracle databases into one cohesive, cloud-based system and establish a reliable, cost-effective platform for online transaction processing (OLTP) activities. Oracle's revolutionary new database platform allows IT organizations to achieve operational efficiency goals for both new and existing Oracle Database applications, including transaction processing, analytic, and mixed workloads. By eliminating administrative chores related to databases, operating systems, storage, and networks, DBAs and other IT pros have more time to implement new projects, extract value from corporate data, and work with developers to architect, model, and tune new business applications.

"The big ticket item for 2018 and 2019 is the use of ML and AI in the DBMS allowing the DBMS to maintain itself—the DBMS becomes self-driving."

—Gartner Data & Analytics Summit Presentation, *The Ever-Changing DBMS Landscape for Digital Business: How the Changes Affect You*, **Donald Feinberg, VP Distinguished Analyst**, March 5–8, 2018

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Executive Insight

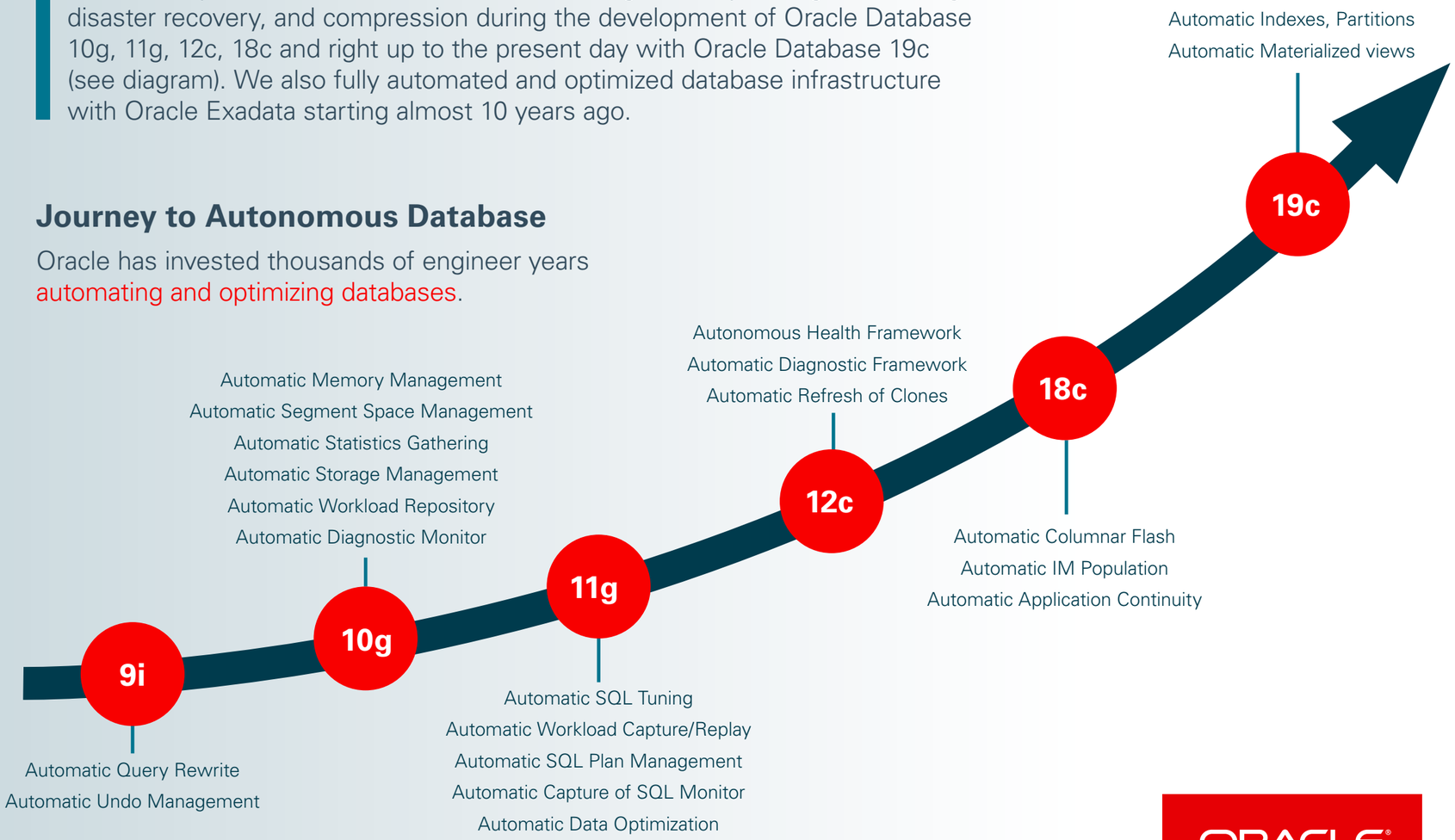
Technology journalist David Baum spoke with Juan Loaiza, Oracle's senior vice president of database systems technologies, about the unique capabilities of Oracle Autonomous Transaction Processing.

Baum: Oracle has been automating Oracle Database operations for decades. What's special about Oracle Autonomous Database?

Loaiza: You are right, Oracle's journey to autonomous computing started more than two decades ago with Oracle Database 9i features such as automatic undo management, and automatic query rewrite. The automation continued across many other areas of the database including memory, storage, clustering, disaster recovery, and compression during the development of Oracle Database 10g, 11g, 12c, 18c and right up to the present day with Oracle Database 19c (see diagram). We also fully automated and optimized database infrastructure with Oracle Exadata starting almost 10 years ago.

Journey to Autonomous Database

Oracle has invested thousands of engineer years automating and optimizing databases.



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Today, Oracle Autonomous Database builds on these previous innovations and greatly enhances them by bringing automation to complex operational tasks like provisioning, patching, and high availability. For decades, DBAs have enjoyed progressively greater degrees of automation from the database but, now, for the first time, the database itself is in the driver's seat. Most IT professionals find this to be quite liberating. By completely automating routine tasks they can focus on activities that bring strategic value to the business.

Baum: What has Oracle done to streamline and automate Transaction Processing systems?

Loaiza: Availability, scalability, and security are key attributes for transaction processing. Oracle Autonomous Transaction Processing fully automates provisioning and management of high-performance infrastructure using Exadata, scale-out using Real Application Clusters, and online patching for both security and maintenance using rolling upgrades.

Baum: How does machine learning assist with these automated operations?

Loaiza: Oracle's machine learning models apply heuristics to identify patterns, learn from day-to-day activities, and make predictions. The database becomes more efficient and reliable over time as it applies these heuristics to tuning, fault prediction, error handling, and the protection of data resources. Oracle Autonomous Transaction Processing continually analyzes diagnostic data to identify any anomalies in normal activities. If an anomaly is found, diagnostic information is quickly gathered and compared to known causes. Once a root cause is determined, the fix is quickly applied to correct the fault.

Baum: How does Autonomous Database handle scalability for fluctuating workloads?

Loaiza: The compute and storage resources can be elastically scaled to accommodate peaks and valleys in processing demands. During busy periods such as quarter closes or peak shopping days, resources can be increased online without taking the system down. During slower periods such as weekends or late nights, the resources can be dialed down to reduce costs. Resource changes happen instantly. Other cloud solutions require downtime to scale their resources, and of course taking an important transaction processing system down during a peak period is the last thing anyone wants to do.

Baum: What types of deployment flexibility do customers have when they provision their databases to this autonomous environment?

Loaiza: Oracle offers two deployment options: dedicated and serverless. In a dedicated environment, the Oracle [Autonomous Transaction Processing] instance is completely dedicated to the subscribing customer, and isolated from all other cloud tenants. It resides on a dedicated Exadata cloud infrastructure, with no shared processor, memory, or storage resources. This option allows an organization to rethink IT, enabling a customizable private database cloud. The dedicated choice will make it possible to deliver an internal self-service database capability that will align with business efforts, so different lines of business or project teams can have complete autonomy in their individual execution while the company itself gets a fleetwide simplified aggregation of overall health, availability, and cost management. This separation of fleet versus database administration allows simple budgeting controls and resource isolation without getting in the way of the line of business execution. And a dedicated database deployment will support the entire spectrum of needs from simple apps to apps that require the highest governance, consistent performance, and operational controls. In a serverless environment, more than one customer may share the resources of a single Exadata cloud infrastructure. For serverless the focus is on simplicity and elasticity. These customers enjoy instant provisioning for databases and independent scalability of compute and storage resources with no minimum term for the database service. Both deployment options ensure high availability, exceptional performance, and multilevel security

Autonomous Transaction Processing—Only from Oracle

As cloud computing enters the mainstream, many CIOs are looking for a path to optimize their legacy environments and shift skilled resources towards innovation—while reducing costs. Here are three compelling reasons to take a close look at the world's first autonomous cloud service for transaction processing:

Accelerate Innovation

Developers become more agile by instantly creating and effortlessly using databases that require no manual tuning. Integrated machine learning algorithms enable the development of applications that perform real-time predictions such as personalized shopping and fraud detection. Eliminating database maintenance allows database administrators to focus on getting more value from data. The simplicity of upgrading existing databases to the autonomous cloud enables IT to transform to a modern, agile cloud model.

- Deploy new applications in minutes versus months
- Orchestrate your infrastructure and database in seconds

Reduce Risks

Automatic application of the latest security updates with no downtime eliminates cyberattack vulnerabilities. Protection from all types of failures including system failures, regional outages, and user errors delivers 99.995 percent availability, or less than 2.5 minutes of downtime a month, including maintenance. Database Vault prevents administrators from snooping on user data.

- Database-aware replication prevents corruption.
- Machine learning technology detects and prevents cyberattacks.

Lower Costs

Putting your transaction processing workloads in Oracle Cloud ensures limitless performance. You can instantly and transparently scale up or scale out as demand increases, making it easy to accommodate peak processing workloads. Elastic and independent scaling of compute and storage resources controls costs and enables true pay-per-use. You can deploy new apps in minutes versus months. But the real cost savings come from a reduction in human labor, allowing your team to improve productivity by focusing on innovation rather than administration.

- Complete automation of database and infrastructure operations cuts administrative costs up to 80 percent
- Cut your Amazon bill in half when you run the same database workload on Oracle Autonomous Transaction Processing as compared to running on Amazon AWS
- Oracle's Bring Your Own License program allows you to apply your on-premises software licenses to equivalent Oracle services in the cloud

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One Autonomous Database—Two Deployment Options

You can deploy Oracle Autonomous Database in two different ways, depending on the level of isolation you require from other cloud tenants.

Serverless Exadata Cloud Infrastructure

In a serverless environment, Oracle Autonomous Transaction Processing is placed on Exadata cloud infrastructure, with each instance placed in a customer-specific region. These deployments are characterized by simplicity and elasticity, with Exadata and Oracle Real Application Clusters providing exceptional performance, online scaling, rolling updates, and fast failover. Customers can start small, with as little as one CPU and 1 terabyte of storage, and be up and running within minutes. Oracle completely manages all deployment, lifecycle, and software versions.

Dedicated Exadata Cloud Infrastructure

Oracle's dedicated environments enable the creation of a private cloud within the public cloud. Dedicated environments are ideal for delivering a self-service database capability, deploying databases onto Exadata cloud infrastructure with customer policies for database lifecycle and isolation. Autonomous dedicated deployments offer greater control over database lifecycle and isolation, aligning autonomous operations with customer application lifecycle and organizational structure. Customers receive Exadata cloud infrastructure that is completely dedicated to their use, accessible via a dedicated virtual cloud network. The minimum term for subscribing to this dedicated infrastructure is one month. Database software usage is billed hourly, based on the number of CPUs activated. Customers can control the density of their cloud environments to avoid overprovisioning. Elastic scalability allows for instant upsizing of cloud resources.

Serverless: Simplicity and Elasticity

- Instant provisioning of Oracle Database, regardless of database size
- Independent scalability of compute and storage resources
- No upfront infrastructure required

Dedicated: Customizable Private Cloud in a Public Cloud

- Private customizable self-service database
- Complete hardware isolation from other tenants
- Hardware-enforced virtual cloud network
- Policies governing the operational lifecycle

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Put Security on Autopilot

Mitigating security threats and protecting enterprise data is a daunting responsibility. According to one recent estimate, security teams receive an average of 17,000 alerts per week—only 4 percent of which they have time to investigate.[1] It's a dismal success rate—with potentially catastrophic consequences. In some instances, data breaches have resulted in regulatory fines, legal fees, and class action lawsuits totaling hundreds of millions of dollars. And when it comes to data privacy regulations such as EU General Data Protection Regulation (GDPR), organizations can face fines of up to 4 percent of annual revenue for noncompliance.

As data and applications proliferate, it becomes increasingly difficult for security and management teams to keep up. Large organizations, on average, use 46 different security tools to address today's sophisticated attacks,[2] yet 84 percent of IT professionals interviewed for a recent cloud security report said that these traditional security solutions either don't work at all in cloud environments or have limited functionality.[3]

Oracle Autonomous Transaction Processing automates nearly every aspect of security. It detects new security patches as soon as they are available and automatically applies them—without downtime. This is much sooner than most manually operated databases, narrowing an unnecessary window of vulnerability. Patching can also occur off-cycle if a zero-day exploit is discovered. Again, these patches are applied in a rolling fashion across the nodes of the cluster, avoiding application downtime.

But patching is just part of the picture. Oracle Autonomous Transaction Processing also protects itself with always-on encryption. This means data is encrypted at rest, but also during any communication with the database. Customers control their own encryption keys to further improve security.

Oracle Autonomous Transaction Processing also secures itself from Oracle's cloud administrators using Oracle Database Vault. Database Vault uniquely allows Oracle's cloud administrators to do their jobs but prevents them from being able to see any customer data stored in Oracle Autonomous Transaction Processing.

Additionally, customers can choose to deploy Oracle Autonomous Transaction Processing on dedicated Exadata Infrastructure. This deployment option provides isolation from other tenants at the hardware level.

Oracle Autonomous Database

Self-Driving
Automates database and infrastructure management, monitoring, and tuning

Self-Securing
Protects from both external attacks and malicious internal users

Self-Repairing
Protects from all downtime, including planned maintenance

Enabled by Applied Machine Learning

[1] Ponemon Institute, "The Cost of Malware Containment," 2015.
[2] "Oracle and KPMG Cloud Threat Report", 2018.
[3] Crowd Research Partners, "2018 Cloud Security Report," 2018.

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Case in Point

QMP Delivers Cost-Cutting Efficiencies for Healthcare Providers

Organization

Quality Metrics Partners (QMP) is a Dallas-based healthcare holdings company specializing in ancillary service management. QMP performs diagnostic screening, medication monitoring, pharmacogenomics, molecular pathogen testing, billing analysis, and other services for healthcare providers. Its services impact hundreds of thousands of patients throughout the United States. Oracle Autonomous Database provides an intelligent, self-driving platform to process database transactions and quickly deliver lab results to patients, physicians, and other stakeholders in the patient lifecycle.

Challenge

Patient data comes from many sources, including electronic medical records (EMRs), laboratory information systems, billing software, laboratory machines, ERP systems, and CRM systems. One of the big challenges for smaller businesses such as QMP involves finding a way to collect that data into a single platform, then to process it fast enough to deliver value quickly—especially during critical life-and-death healthcare scenarios.

Solution

QMP built a healthcare technology platform called CAREiQ using Oracle Autonomous Database technology. It pulls client data from various sources including multiple types of electronic medical records systems, laboratory information systems, and billing systems. The inherent automation within Oracle's database cloud service makes it easy for QMP to add capacity as workloads increase, minimizing IT costs.

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Quality Metrics Partners

Success

Oracle's fully managed database service provides a scalable platform for processing lab transactions. QMP can pull data from a clinic or hospital directly into its database cloud. Built-in adaptive machine learning technology automatically tunes, upgrades, and patches the database while it's in operation, even as workloads increase and decrease.

"With our Oracle-based CAREiQ platform, we have reduced the turnaround time for delivering lab results from two weeks to 48 hours, and often to same-day results. That is not only a key factor in staying competitive in the market; it can be a life-or-death situation when a patient requires fast diagnosis."

-**Michael Morales**, CEO, QMP

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Focus on Your Business, Not on the IT Underpinnings

Oracle architected Autonomic Transaction Processing for enterprise-scale, mission-critical transaction processing applications—with performance, versatility, and governance that often exceeds what is commonly found in on-premises data center environments.

Like all Oracle Cloud services, Oracle Autonomous Transaction Processing features optimized hardware designed to provide instant elasticity governed by a true pay-per-use model, cutting runtime costs up to 90 percent. This service is especially attractive to Oracle Database customers that want to get out of the business of database management by standardizing on a self-driving, self-securing, self-repairing database.

Oracle has everything you need to upgrade your Oracle Database applications to Oracle Autonomous Transaction Processing with no architecture changes.

Unlimited Support

You can maximize your IT investments with a support policy that covers your entire Oracle technology environment, from database to middleware to applications. With Oracle Premier Support you will automatically receive the technical assistance, security patches, and technology updates you need—now and in the future. Oracle's Lifetime Support Policy puts you in control of your upgrade strategy by allowing you to add functionality continuously as Oracle releases new capabilities.

An Easy Upgrade Path to the Cloud

Oracle Autonomous Transaction Processing is fully compatible with existing applications and tools, enabling an easy and safe transformation to a modern autonomous cloud model. It runs the same Oracle Database you are accustomed to running on premises. Existing Oracle Databases can be easily upgraded to Oracle Autonomous Transaction Processing using Oracle Data Pump and Oracle GoldenGate if you need to replicate data and keep critical database online when upgrading your data management assets to the cloud. You can easily convert MySQL, PostgreSQL, SQL Server, and other databases to Oracle Database using Oracle's proven data migration tools.

"Cloud computing is changing the mission and purpose of data management. Within a few years, most data management functions will be in the cloud."

-Unisphere Research

The Great Escape

With Oracle Autonomous Database, DBAs can move beyond generic maintenance tasks such as:

- Infrastructure maintenance, including server, network, and storage resources
- Database provisioning, patching, updates, and tuning
- Database backups, H/A, and disaster recovery

This frees them to focus on high-level activities that directly benefit the business:

- Architecture, planning, data modeling
- Data security and lifecycle management
- Application-related tuning to fulfill end-to-end service level agreements

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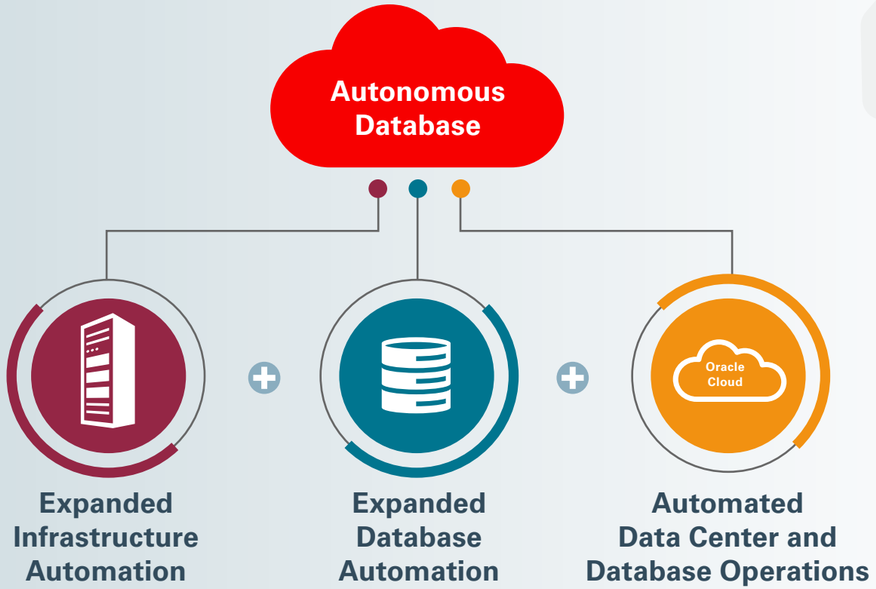
Oracle Autonomous Database



Your Autonomous Future

Machine Learning (ML) is fundamentally altering enterprise computing by transforming how organizations receive, manage, and secure business data. By 2020, Oracle predicts that 90 percent of every application and service will incorporate ML at some level—and that more than half of all enterprise data will be managed autonomously.

Oracle Autonomous Database represents an entirely new category of software based on machine learning that dramatically transforms how companies innovate by simplifying processes, boosting efficiencies, and freeing IT resources to focus on innovation. Oracle Cloud puts these emerging technologies to work by allowing customers to establish new IT capabilities quickly, affordably, and securely, and it leverages the power of machine learning.

Intelligence at Every Layer

Oracle's complete, integrated cloud platform includes intelligent solutions that span the SaaS, PaaS, and IaaS layers. For example, Oracle embeds intelligence into all of its apps. Oracle also extends intelligence into the platform, making it available for any developer to build upon. The goal is to make cloud technologies simpler to access, easier to create, and more efficient to secure, manage, and run—so you can achieve real business outcomes.

The Leader in Enterprise Cloud

- Cloud customers in more than 195 countries
- More than 7,000 cloud operations professionals
- More than 72 million weekly active cloud users
- More than 62 billion cloud data transactions per day
- More than 118,000 cloud enterprise tenants
- 27 data center regions

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Sign up for a free trial

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