

New Frontiers of Automation: The IT Leader's Guide to Oracle Autonomous Database

Artificial Intelligence and Machine
Learning Launch a New Era of Efficiency

Oracle Chairman and Chief Technology Officer Larry Ellison didn't mince words when he took the stage at Oracle OpenWorld 2017 to announce Oracle Database 18c, also known as Oracle Autonomous Database. "This is the most important thing we have done in a long, long time," Ellison told the packed hall at San Francisco's Moscone Center, where tens of thousands of people had gathered to learn about the technologies of tomorrow.

The excitement surrounding this technical breakthrough has now reached a crescendo, powered by the growing enthusiasm of customers, partners, analysts and technology experts—several of whom are profiled in the pages that follow. Just as autonomous vehicles, robots, drones, and many types of intelligent devices have begun to transform the transportation, manufacturing, and package-delivery industries, artificial intelligence (AI) technology is fundamentally altering enterprise computing by transforming how we receive, manage, and secure our business data.

For the Oracle community, it's a time of unbridled excitement reminiscent of the early days of the Space Age, when new ideas and far-reaching technologies promised to transform society. Oracle has staked a claim in this brave new world by introducing the world's first autonomous database. In the pages that follow, you'll learn what Oracle Database 18c can do for your organization, and why an autonomous database will broaden horizons for your team.



Today's DBAs Need Automation

DBA and IT Challenges: The Numbers

Database management workloads are approaching a tipping point. According to a recent Oracle survey of database administrators, 39 percent of DBAs are managing 50 or more databases, and 95 percent of those IT professionals manually create and update these databases. A high proportion of DBAs say they experience some type of unplanned downtime over the course of their careers, and most of these individuals struggle to coordinate multiple management and backup tools.



39%

Workloads for DBAs are increasing: **39%** of DBAs handle **50** or more databases



95%

Automation is lacking: **95%** of DBAs create or upgrade databases manually



78%

78% of DBAs will experience unplanned downtime from untested database changes during their careers

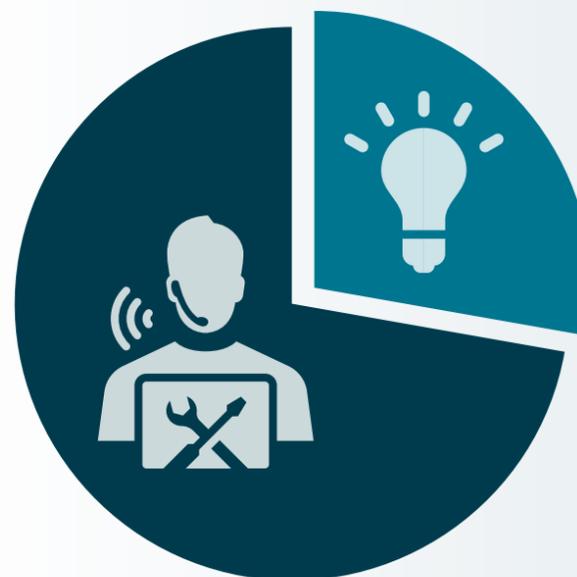


2 out of 3

DBAs and IT staff are struggling to provide full protection: **two out of three** organizations use multiple tools to back up a single database

Maintenance Versus Innovation

It's no wonder that 72 percent of IT budgets are spent merely maintaining existing information systems, leaving only 28 percent for innovation.



72%

of IT budget is spent on maintenance versus innovation



Keeping pace with service demands from lines of business



Ensuring performance SLAs, security, regulatory compliance, and availability

Expert Insight

Technology journalist David Baum spoke with Oracle Senior Vice President Juan Loaiza about intelligent database technology.

Baum: We've all heard about self-driving cars. What's a self-driving database, and will it require a similar leap of faith when DBAs have to surrender the wheel?

Loaiza: Oracle Autonomous Database automates security, provisioning, error handling, and a whole lot more. We call it self-driving because you simply define your desired service levels, and the database makes it happen. It handles failover and protects your data from any kind of failure, with 99.995 percent uptime. Most DBAs will be happy to surrender patching, upgrading, and routine maintenance activities.

Baum: Oracle has had a self-tuning database for some time. What makes this one different?

Loaiza: Oracle Autonomous Database incorporates machine learning and artificial intelligence to take performance tuning to the next level, as well as to prevent application outages and handle a huge variety of tasks that are currently handled by database administrators. It builds on years of progress with self-tuning technologies such as Oracle Exadata storage indexes and flash cache, along with powerful query optimization, automatic memory management, and automatic storage management. Basically, it automates the full lifecycle of data management for mission-critical workloads. This includes creating a fault-tolerant scale-out cluster with disaster-recovery capabilities.



*Juan Loaiza,
Senior Vice President,
Oracle Corporation*

Baum: Let's talk about database security. Security operations centers are drowning in a flood of data and events, and they need to correlate and distill vast amounts of event data into actionable intelligence to identify and mitigate potential threats. How can Oracle Autonomous Database help?

Loaiza: AI and machine learning algorithms can help security operations centers manage configurations, monitor who has access to what resources, and encrypt sensitive data to protect IT assets. These technologies bring a new level of sophistication to cybersecurity threat prediction, prevention, detection, and response. As a key part of Oracle's cloud security portfolio, Oracle Autonomous Database automatically encrypts all data to provide a secure configuration and prevent data access from outside the database. It automatically applies security updates to protect against external attacks. And it leverages well-established security technologies such as Oracle Database Vault (which separates duties to make sure data is not visible to the people who administer your systems) and Oracle Data Masking (which keeps developers and QA personnel from seeing your data).

Baum: How does Oracle Autonomous Database optimize performance for various workloads, such as managing transactions in OLTP systems versus queries in analytics systems?

Loaiza: Oracle Database 18c is a single product, specialized by workload. Customers can subscribe to Oracle Autonomous Data Warehouse Cloud for BI and analytics, including big data workloads, or to Oracle Autonomous Enterprise OLTP Cloud, which also handles mixed workloads. Developers can subscribe to a departmental Autonomous Database Cloud. It's optimized for each type of processing.

Baum: Can you sum up the primary benefits that will encourage customers to adopt this new database technology?

Loaiza: The biggest one is reduction in labor, which lowers administrative costs. Oracle Autonomous Database is also more secure and more reliable than a manually operated database. It's easy for developers to use, and it frees database administrators from tedious operational tasks so they can focus on innovation. Remember the heritage of this offering: Oracle Database, the world's number one database, running on Oracle Exadata, the world's best database platform. These are mature, industry-leading technologies for data management. Now they just got a whole lot smarter, and they are combined into a cloud service that takes nearly all the labor and guesswork out of managing enterprise data. The offering is specialized by workload, and it gives you deployment flexibility for the future, since it runs in Oracle Public Cloud or in your data center with our Cloud at Customer model.

Case in Point

AT&T Moves Databases and Applications to Oracle Cloud



For a company with more than US\$160 billion in annual sales and 260,000 employees, managing the corporate data that powers AT&T's immense global enterprise is no small undertaking. Hundreds of database administrators are tasked with backing up, restoring, scaling, patching, and monitoring these fundamental data assets, along with the underlying infrastructure.

But what if these databases could manage themselves? What if the database management system was smart enough to self-tune, self-recover, self-secure, and self-scale—without human intervention? If built-in automation could streamline these common maintenance tasks, AT&T could focus its valuable IT resources on extracting value from the data to directly influence business opportunities and outcomes.

This was reportedly just one aspect of the conversation between AT&T CEO John Donovan and Oracle CEO Mark Hurd when they discussed moving AT&T's 40,000

internal databases to Oracle Cloud. Donovan believes the AI and machine learning technology resident in Oracle Database will improve the reach and capabilities of his workforce. "There's some processes that we want in the cloud inherently because we want to capture the learnings of that function globally," he told reporters at IDG, as he described the cultural shift facing his workforce. "I feel like our enthusiasm is correlated to our skill shift and that pivot has been necessary but also really transformational for us."¹

"This is a historic agreement," Hurd added. "Oracle Cloud will enable AT&T to use Oracle technology more efficiently across every layer of the technology stack."²

Greater efficiency, through automation, was partly what motivated AT&T to migrate thousands of large-scale internal databases containing petabytes of data, plus their associated application workloads, to Oracle Cloud. AT&T's goal is to virtualize 75 percent

of its core network functions by 2020. The telecommunications giant selected Oracle Cloud at Customer, which allows AT&T to place data and applications behind its firewalls while taking advantage of cloud pricing models and technology. Keeping data onsite was important, since AT&T faces strict regulatory requirements for customer data.

AT&T now has global access to Oracle's cloud portfolio, both in the public cloud and on AT&T's Integrated Cloud, which will increase productivity, reduce IT costs, and bring a new wave of SaaS applications to its global enterprise. For example, Oracle Field Service Cloud will optimize its scheduling and dispatching for more than 70,000 field technicians. AT&T will combine its existing machine learning and big-data capabilities with this SaaS app to increase the productivity, on-time arrivals, and job-duration accuracy of its field technicians.

¹ Marc Ferranti, "Oracle's Hurd, AT&T's Donovan on their massive cloud migration deal," IT World online article, August 15, 2017, itworld.com/article/3216626/cloud-computing/oracles-hurd-atts-donovan-on-their-massive-cloud-migration-deal.html?msgid=gcp-rst-0817att.

² Ibid



Being able to guarantee prompt, reliable service is a big deal for a company that helps millions of people all over the world connect with leading entertainment, business, mobile, and high-speed internet services. AT&T is also one of the world's largest providers of pay TV services.

AT&T's massive redeployment of Oracle Databases will be provisioned entirely from Oracle Cloud Platform, including Oracle Database Exadata Cloud Service.

"We believe that the future of the network is to be data-powered, to be software-centric, and to be fast and responsive," said John Donovan, chief strategy officer and group president of AT&T Technology and Operations. "It's all about enabling a seamless and intuitive network experience for our customers. This collaboration with Oracle accelerates our network transformation and migration to the cloud to expand efficiency and performance, and reduce cost while improving overall customer service."

AT&T leads the industry when it comes to virtualizing its infrastructure and using intelligent software to control its wide area network. The company's goal is to virtualize 75 percent of its core network functions by 2020.



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A photograph of Larry Ellison, Oracle Chairman and Chief Technology Officer, speaking at a conference. He is wearing a black long-sleeved shirt and a watch on his left wrist. He is holding a microphone in his left hand and gesturing with his right hand. The background is a blurred stage setting with a red arrow pointing right. The image is overlaid with a decorative graphic of white concentric arcs and dots on the left side.

*“We are completely transforming
the way all companies buy and
use [the] cloud.”*

Larry Ellison, Oracle Chairman
and Chief Technology Officer

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Bring Your Own License to Oracle Cloud

New Licensing Programs Accelerate the Transition to Oracle Database Cloud

Many organizations are eager to adopt Oracle Database in the cloud but are unsure how to balance spending among various types of deployment options. Oracle recently introduced two new programs to make it easier to buy and consume cloud services, helping you get more value from your hardware and software investments.

Oracle Universal Credit Pricing allows you to access current and future Oracle Cloud Platform and Oracle Cloud Infrastructure services under a single umbrella contract. In addition, Oracle's new **Bring Your Own License** program allows you to apply your on-premises software licenses to equivalent Oracle services in the cloud.

Rapid Consumption of Cloud Resources

Now that it's so easy and affordable to move your Oracle assets to the cloud, you have greater flexibility than ever around how, what, and where you use cloud services. This is a unique opportunity to attain license mobility and unlock greater value from your Oracle investments. Customers with on-premises licenses can now use Oracle Database Cloud at a fraction of the old PaaS price. Oracle Database running on Oracle Cloud Infrastructure delivers unmatched performance at the lowest cost.

Watch the video →

In addition to the convenience, reliability, and scalability of operating your database management systems in Oracle Cloud, you'll be able to apply Oracle's universal credits to all current and future PaaS and IaaS services. This allows you to establish a complete cloud platform for development, migration, and management of your critical hardware and software assets.

Learn more →

Flexible Buying and Consumption Choices for Oracle PaaS and IaaS

- One contract gives you unlimited access to all current and future Oracle PaaS and IaaS services, with the flexibility to upgrade, expand, and move services across data centers
- Access new services with existing cloud credits, including Oracle Database, Oracle Middleware, Oracle Analytics Cloud, and more
- Broaden your access to Oracle technology by taking advantage of competitive PaaS pricing to get started quickly
- Utilize interchangeable licensing for three different deployment models: on-premises, Oracle Public Cloud, and Oracle Cloud at Customer

AWS Can't Beat Oracle Cloud

Some companies subscribe to cloud services from a commodity cloud vendor, and then realize that they need advanced platform capabilities that the vendor can't offer. Commodity cloud vendors such as Amazon offer generic infrastructure services that are useful for basic computing activities, but performance is lacking for enterprise workloads. In addition, Amazon customers quickly find that their cloud deployments lack compatibility with on-premises deployments, leading to increased complexity and hidden operational costs.

Oracle Autonomous Database requires no administration, making it easy to define tables and load data, and it includes automatic compression, caching, and indexing. By contrast, AWS requires substantial administration and tuning, adding considerable labor and technology costs. Plus it's lacking critical database capabilities that Oracle has been offering for 20 years.



To learn more about the differences between Oracle and Amazon in the cloud, watch this short video from Oracle Senior Vice President Steve Daheb.

“Be careful what you click to when you accept and deploy services from Amazon.”

Steve Daheb, Oracle

Three Essential Ingredients of Data Warehouse Automation

Oracle Senior Vice President Çetin Özbütün discusses the distinguishing characteristics of Oracle Autonomous Data Warehouse Cloud, a historic breakthrough in turnkey analytics.



Easy

With Oracle's new autonomous database, creating a data warehouse is a simple "load and go" process. Users simply specify tables, load data, and then run their workloads in a matter of seconds. All management tasks are fully automated, including all database-tuning chores. All data is automatically compressed and encrypted.

"No configuration parameters or tuning parameters are exposed to the customer," says Özbütün. "You simply tell us which data center, how many CPUs, and how many terabytes you would like to provision, along with an administrator's username and password. After that, the databases will be provisioned in seconds."



Elastic

Both computing and storage capacity are instantly elastic. That means you can scale up or down instantly, with no downtime. Because it is built on Oracle Database, all business intelligence tools and services and all data integration tools and services that support Oracle Database also support this service. You can use existing development tools or the new version of Oracle SQL Developer, which includes enhanced support for Oracle Autonomous Data Warehouse Cloud.

"If you need more storage, you can scale up instantly, with no downtime," Özbütün continues. "If you need less, you can scale them down or shut off the computer service to save money, and then restart on demand when necessary."



Fast

Oracle Autonomous Data Warehouse Cloud is fast because it is built on Oracle Exadata and Oracle Database, a highly optimized and proven database infrastructure. In addition, adaptive machine learning automatically tunes the database, helping to deliver unmatched performance.

Learn more →

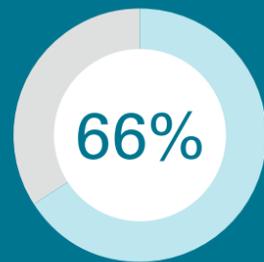
"It's a highly available and scalable service delivering speed, simplicity, and flexibility for faster time to value and savings," Özbütün explains. "Your data is automatically compressed and encrypted. You don't need to create indexes, partitions, or materialized views to optimize your workload—all necessary statistics are collected automatically."

Watch the video →

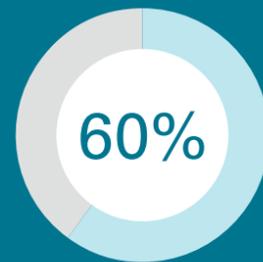
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Data Warehouses Are Moving to the Cloud

According to the respondents of a recent CIO Research report, two-thirds of organizations had difficulty managing the growth of data and users, and 60 percent of them claimed that their data warehouses were too complex to manage effectively. Many of those surveyed complained about high IT acquisition and maintenance costs, while other respondents said their data warehouse solutions were too slow, were difficult to deploy, or lacked the flexibility necessary to handle varying data types.



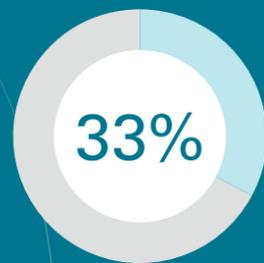
of respondents report difficulty managing the growth of data and users



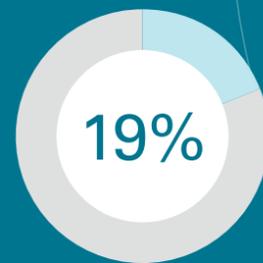
of respondents said their data warehouse was too complex to manage



are crippled by high up-front acquisition and maintenance costs



of respondents said solutions were too slow and took too long to deploy



of respondents said they were unable to handle all the varying data types

Many of these organizations are looking to the cloud for better solutions. Popular use cases for data warehouse clouds include sandbox environments, line-of-business data marts, and database backups. Other use cases include high-performance data management projects, data warehouses coupled with cloud computing analytics, and big data cloud implementations.

Common Use Cases	New Monetization Use Cases
 Migration of on-premises data warehouse or data marts	 High-performance analytics
 Consolidation of disparate data sources	 Publish big data to the data warehouse
 Integration of new data sources	 Integration of new data sources

Oracle can handle all of these use cases, and many more. Its revolutionary Autonomous Database for Data Warehouse Cloud is the industry's first solution for delivering business insights with unmatched reliability. This fully automated database cloud service is self-tuning and preconfigured for automated patches and upgrades, helping organizations to eliminate manual, error-prone management processes that characterize their former data warehouse implementations.



Looking to the Future with Oracle Cloud

For many customers, adopting Oracle Autonomous Database Cloud is just one step on a multi-step journey. Oracle offers a complete path to the cloud that encompasses integrated IaaS, PaaS, and SaaS solutions. You can simplify your IT infrastructure and minimize capital investments by utilizing Oracle Cloud services for infrastructure, data management, applications, and business intelligence. All Oracle Cloud solutions allow for flexible deployment models, enabling you to seamlessly migrate your IT workloads from an on-premises data center to the cloud and back again. Best of all, Oracle offers competitive cloud pricing for all types of businesses in every industry, with affordable solutions for companies of all sizes.

For more information, visit oracle.com/autonomousdb
or sign up for a free trial at cloud.oracle.com/tryit.

