Research Note

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W I N T E R   C O R P O R A T I O N

MANAGED CLOUD DATABASE DEPLOYMENT OPTIONS ARE GROWING

CLOUD DATABASE SERVICES have attracted widespread interest with their promise of rapid time to value, high agility, elasticity and cost savings. But what many customers also need is a wide range of database deployment options to cope with requirements for data sovereignty, compliance, control over service levels as well as varied use cases and workloads.

WinterCorp analysis shows that Oracle provides the widest range of cloud deployment options on the market. Cloud@Customer, a new option recently introduced by Oracle, is of particular interest for its combination of cloud benefits and on-premises advantages. Oracle is the only provider to meet all four of the major challenges customers face with respect to database deployment with a single product. ●

WHY CLOUD DATABASES? Cloud database services have offered customers some remarkable advantages when compared to developing and operating database systems in the customer's own data center.

Creating a database on the customer's premises typically requires capacity planning; procurement of hardware and software; hiring or allocation of skilled system administration and database administration staff; installation and configuration; provisioning … and many more steps in a delay prone and complex process, entailing capital investment, specialized technical skills and other management-intensive approvals.

The best of the public cloud database services replace these steps with a few simple commands; require no capital expense; and provide an environment in which the natural ebb and flow in the resources required are readily accommodated.

Customers indeed do want these benefits. They just can't always enjoy them within the limits of a one-size-fits-all public cloud service.

Customer Needs and Challenges

For many customers, the complications begin with the fundamental proposition of storing the data in the public cloud. As soon as the data is stored in the public cloud, the customer

loses control over the physical location of the data and may face increased risks of unauthorized access or disclosure, depending on the specific cloud service. As a matter of law, many companies must keep their data within the country or other legal jurisdiction within which it has been created or captured. This is often the case with sensitive, highly regulated data such as personal health or financial information.

Other customers must keep data physically close to specific other computer systems so as to ensure rapid response or low data latency. This is a requirement for time sensitive trading or transaction processing systems; manufacturing and distribution control systems; and, other systems with demanding real time performance requirements.

Some customers may want the benefits of cloud but need dedicated hardware and strong isolation of data and systems from outside access. This is often the case for the most sensitive and closely guarded data.

Finally, workload requirements can vary greatly from one database or application to the next. Analytics, reporting, machine learning and complex online query require a database system designed and configured for the data warehouse. Operational processing, programmed trading, factory control and certain other use cases require a database designed and configured for online transaction processing. Many customers need both of these options to address their various workloads but also seek to control costs and skill requirements by using a single database system for all workloads.

Finally, customers are drawn to the cloud database in the first place by its fundamental advantages: rapid time-to-value, ease of change, lowered skill requirements, elasticity to deal with peaks and valleys, no capital expense, pay only for the resources you use, smoothly accommodate growth. But, they seek these benefits across the entire spectrum of database management activities. With a never ending demand for more data, and more or richer transactions and analytics, they also need to contain the demand for database administration expertise. Thus, they want a database system that automates, to the greatest degree practical, such chores as physical database design and tuning.

To summarize, many customers want to find a single database product to address all of the following challenges:

1. **Available on prem and in the public cloud**
2. **Minimize skill requirements via autonomous database self-management**
3. **Handle both data warehouse and transaction processing workloads**
4. **Maximize cloud benefits, particularly agility, even on customer premises**

That is, many customers want the benefits of cloud while also enjoying a range of deployment options to meet their diverse business, legal and regulatory needs with a single database product.

DESIRABLE CLOUD DATABASE FEATURES	Customer Challenge	Others	Oracle Autonomous Database
Available in the Public Cloud	1	Yes	Yes
Available at Customer Premises	1	Some[1]	Yes
Autonomous Self-Management	2	No	Yes
Handle Data Warehouse Workloads	3	Yes	Yes
Handle Transaction Processing Workloads	3	No[2]	Yes
Cloud Database Service at Customer Location	4	No[3]	Yes
Deployment Options	4	1–3	6

Table 1: **The Five Customer Challenges:**
Oracle Autonomous Database **vs Other Major Cloud Database Products**

1. Teradata Vantage and Cloudera Data Warehouse, which are available both on customer premises and in the public cloud, satisfy Challenge #1. *AWS Redshift*, *Snowflake* and *Google BigQuery* are not available on prem, so they do not satisfy Challenge #1.
2. Microsoft meets Challenges #1 and #3, but not with a single product. Microsoft offers three database products relevant to this analysis: *Microsoft SQL Server*, *Azure SQL* and *Azure Synapes Analytics*. The latter two are based on *Microsoft SQL Server* and all are similar, though not identical. None of the major cloud data warehouse products (other than *Oracle ADB*) handle high volume transaction processing, hence they all fail Challenge #3.
3. In terms of deployment flexibility, the others that are closest with a single product are *Cloudera* Data Warehouse and *Teradata*. These two products are available on prem, in the public cloud and in one other configuration each. *Teradata* is available on prem with consumption pricing, providing one key benefit of cloud on the customer premises (pay as you go). *Cloudera* is available on prem with a "cloudburst" capability, whereby the system will automatically run certain specified workloads in a specified cloud, providing "pay as you go" plus another key cloud benefit (cloud elasticity), for the selected workloads. So, *Cloudera* and *Teradata* are characterized in terms of this breakdown as providing three deployment options.

Methodology

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Purpose and Methodology for this Report

This *WinterCorp Research Note* describes the deployment options for Oracle Autonomous Database and their significance to customers. In developing this report, WinterCorp drew on its own independent research and experience, interviewed Oracle employees, attended Oracle events and analyzed Oracle documentation and literature. Oracle was provided an opportunity to comment on the paper with respect to facts, in its capacity as the sponsor of this research. WinterCorp has final editorial control over the content of this publication and is solely responsible for any opinions expressed.

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Comparison of Database Cloud Services

Table 1 (on previous page) shows a comparison between *Oracle Autonomous Database* and other major cloud database products positioned for enterprise scale data warehousing, in terms of the five major customer challenges as they relate to deployment options.

Most cloud data warehouse products positioned for enterprise scale use are available *only* in the public cloud. This is the case with *AWS Redshift*, *Snowflake* and *Google BigQuery* — none of which are available on customer premises.

> **Only Oracle Autonomous Database meets all of Challenges 1, 2 and 3 with a single database service.** In addition, via two recently introduced capabilities — *Oracle Autonomous Database* and *Oracle Cloud@Customer* — Oracle best addresses Challenge 4.
>
> Finally, as shown in the last row of *Table 1*, only Oracle offers six deployment options as described in this Research Note.
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> **With six deployment options, Oracle has twice as many as the two closest single product alternatives and six times the number of the other widely used cloud data warehouse products.**

Oracle Autonomous Database

With *Oracle Autonomous Database* (ADB) customers are relieved of all software maintenance, physical database design, tuning and other physical database administration tasks, partly via the implementation of machine learning in the Oracle cloud and database software. The result is increased agility and speed to market for customers, along with reduced skill requirements and labor costs. The cost savings can be substantial, as up to 50% of the cost of creating and maintaining a database application is the skilled professional effort to create and administer the database and its software. While WinterCorp does not believe the machine learning software will always choose the best possible option for tuning or database design, it appears to perform well in practice for a wide range of common situations. Hundreds of Oracle customers are now in production with ADB and WinterCorp believes that most are realizing good performance, substantial reductions in labor and skill requirements and large cost savings.

Oracle Autonomous Database Deployment Options

However, creation and management of the database is only part of the battle for the customer. Another major aspect is deployment: where you put the database, how it relates to the rest of your enterprise and for what workload the database is optimized. Here again, Oracle stands out, with a remarkable array of options for the customer, as shown in *Figure 1* (on next page), and with all options employing the same, fully compatible database software.
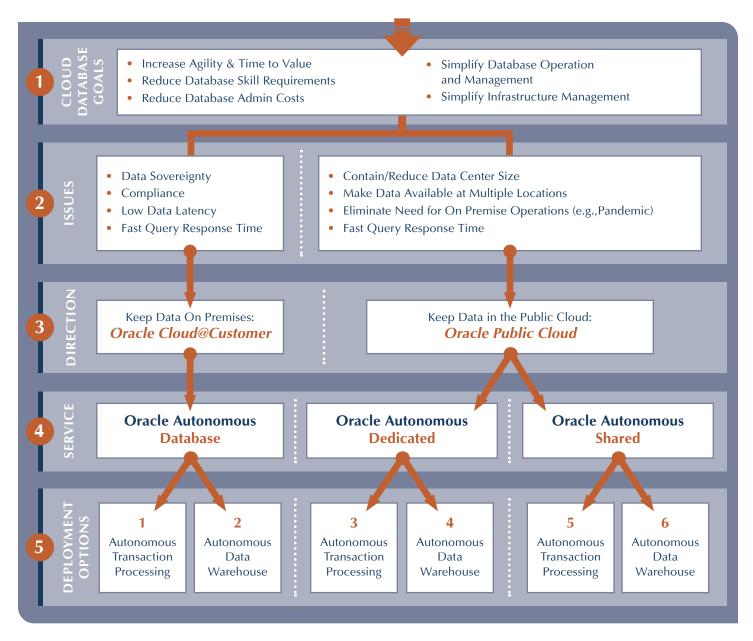
Figure 1: Six Options to Deploy Oracle Autonomous Database

Customers often struggle with the deployment decision: do we put the database in the public cloud, so as to minimize demands on our data center resources and staff? Or do we keep it on prem, to simplify approvals for compliance and security? Oracle provides both of those options along with a third choice that provides most of the advantages of both: *Oracle Cloud@Customer*.

Oracle Autonomous Database Cloud@Customer

With *Oracle Cloud@Customer*, Oracle installs one or more Oracle systems on the customer's premises, but manages them exactly as they would be managed in the Oracle Public Cloud. *Oracle Cloud@Customer* can enable the customer to comply with data sovereignty requirements, privacy requirements and other regulatory requirements that may be impossible or impractical (e.g., subject to unacceptable approval costs and delays) in the public cloud — while still getting the cost savings, simplicity and agility of the public cloud.

Oracle Cloud@Customer also has another benefit: physical co-location with other systems. For example, some systems must react to an external event in milliseconds. With sufficiently low response time requirements, it is not possible to do the processing in

the public cloud because it would add substantial network latency. *Oracle Cloud@Customer* makes it possible to put the database in a physical location that will minimize any communication delays. Thus, an Oracle Autonomous Database can meet requirements that are impossible with other cloud databases.

Autonomous Database *Shared* is the simplest and most agile option for the customer. The customer creates the database without concern for what hardware it will run on. The Oracle Public Cloud assigns hardware when the database is running and frees up hardware when it is not, automatically.

With Autonomous Database *Dedicated*, the system runs on hardware that has been isolated and reserved exclusively for that particular customer. This provides the customer more complete control over system resources, maintenance schedules, backup and security.

Use Cases

As shown in the bottom row of *Figure 1*, above, each of the three major deployment options is available for either transaction processing (ATP) or data warehousing (ADW).

Table 2, below, shows the key use cases for each deployment option. ATP is a cloud database service for online transaction processing and real-time analytical workloads using a row-based data storage format. ADW is a cloud database service optimized for analytical processing, using a columnar data storage format. ADW is best for analytical data marts, data warehouses, IoT event stream processing, data labs for machine learning and many other similar applications. ATP is best for enterprise class transaction processing, mixed workloads and other operational database applications, as shown in the table.

Oracle has particular strength in handling mission critical transaction processing and outshines other cloud databases in this area, and such requirements may be a deciding factor for many customers. In addition, recent Oracle innovations such as *Autonomous Database* and *Cloud@Customer* provide distinctive value in the cloud arena.

ORACLE AUTONOMOUS DATABASE	
KEY USE CASES:	**KEY USE CASES:**
Enterprise Transaction Applications	Analytical Data Marts
Mixed-Workload Applications	Enterprise Data Warehouses
Cloud-Native Applications	IoT Event Streaming Processing
Low-Code Applications	Data Labs for Machine Learning
ORACLE AUTONOMOUS TRANSACTION PROCESSING (ATP)	**ORACLE AUTONOMOUS DATA WAREHOUSING (ADW)**
A cloud database service based on Autonomous Database platform for OLTP and real-time analytical workloads using row-based data format.	A cloud data warehouse service based on Autonomous Database platform optimized for analytical processing using columnar data format.

Table 2: Key Use Cases for Oracle Autonomous Transaction Processing and Oracle Autonomous Data Warehouse

About WinterCorp

*WinterCorp is an independent consulting firm expert in the **strategy, architecture and scalability of the modern analytic data ecosystem**.*

Since our founding in 1992, we have architected and engineered solutions to some of the toughest and most demanding analytic data challenges, worldwide.

We help customers define their data-related business interests; develop their data strategies and architectures; select their data platforms; and, engineer their solutions to optimize business value.

Our customers, with our help, create and implement cloud, multi-cloud and hybrid cloud architectures; they create the data foundation needed for data science, artificial intelligence and machine learning.

Our customers get business results with analytics in which their return is often ten or more times their investment.

When needed, we create and conduct benchmarks, proofs-of-concept, pilot programs and system engineering studies that help our clients manage profound technical risks, control costs and reach business goals.

We're expert with structured data, unstructured data, and semi-structured data — with the products, tools and technologies of data management for data analytics in all its major forms.

With our in-depth knowledge and experience, we deliver unmatched insight into the issues that impede scalability and into the technologies and practices that enable business success.

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Recommendations

MANY CUSTOMERS WILL FIND that they need a range of cloud database deployment options to handle their various business needs and workloads.

In evaluating cloud databases, WinterCorp recommends that customers take a look at *Oracle Autonomous Database* (ADB). *Oracle Cloud@Customer*, featuring onsite deployment of ADB, is a new and distinctive option that should be given particular consideration by customers seeking a mix of cloud and on prem benefits.

With Oracle ADB, customers can deploy databases according to a wide range of business needs and use cases. This provides customers the opportunity to move to the cloud in stages; to keep databases on prem when that is the best option while realizing the benefits of autonomous database technology; and, to separate such issues as physical location and operational control.

To a greater extent than with any other vendor, Oracle customers can thus calibrate their choices around cloud implementation and cloud migration, while satisfying needs for data sovereignty, compliance, low latency and fast response. •