Gartner.

Magic Quadrant for Cloud Database Management Systems

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The practice of data management, founded on DBMSs, continues to shift rapidly to the cloud — a move that is producing an increasingly complex landscape of vendors and offerings. This Magic Quadrant will help data and analytics leaders make the right choices in a complex market.

Strategic Planning Assumptions

By 2022, 75% of all databases will be deployed or migrated to a cloud platform, with only 5% ever considered for repatriation to on-premises.

By 2023, cloud preference for data management will reduce the vendor landscape while the growth in multicloud increases the complexity for data governance and integration.

By 2023, cloud DBMS revenue will account for 50% of the total DBMS market revenue.

Market Definition/Description

Gartner defines the cloud database management system (DBMS) market as being that for products from vendors that supply fully provider-managed public or private cloud software systems that manage data in cloud storage. Data is stored in a cloud storage tier (such as a cloud object store, a distributed data store or other proprietary cloud storage infrastructure), and may use multiple data models — relational, nonrelational (document, key-value, wide-column, graph), geospatial, time series and others.

These DBMSs reflect optimization strategies designed to support transactions and/or analytical processing for one or more of the following use cases:

- Traditional and augmented transaction processing

- Traditional and logical data warehouse

- Data science exploration/deep learning

- Stream/event processing

- Operational intelligence

This market does not include vendors that only provide DBMSs hosted in infrastructure as a service (IaaS), such as in a virtual machine or container, and managed by the customer.

Magic Quadrant

Figure 1: Magic Quadrant for Cloud Database Management Systems

Source: Gartner (November 2020)

Vendor Strengths and Cautions

Alibaba Cloud

Alibaba Cloud is a Leader in this Magic Quadrant. Its products are broadly focused on operational and analytical databases plus a wide range of other cloud-based services. Its operations are primarily based in China and Asia, but it also has an expanding presence in Europe and North America. It has

clients of all sizes and in all major sectors. It is continuing to expand and enhance its international presence from its headquarters in Singapore.

Operational database services include ApsaraDB for PolarDB, ApsaraDB RDS (for MySQL, PostgreSQL, SQL Server, MariaDB TX and PPAS); ApsaraDB for OceanBase; ApsaraDB (for Redis, MongoDB, HBase and Cassandra); Time Series Database (TSDB); and TSDB for InfluxDB.

Analytic database services include AnalyticDB for MySQL; AnalyticDB for PostgreSQL (based on Greenplum); Alibaba Cloud Table Store, a distributed NoSQL DBMS; MaxCompute, a large-scale serverless cloud data warehouse; E-MapReduce, an Apache Hadoop-based big data platform; and Data Lake Analytics.

Apsara Stack offers an on-premises implementation. Integrated tools provide backup, data movement, synchronization and other functions.

Strengths

- **Wide and deep range of products**: These span all the analytical and operational use cases covered in the cloud DBMS market. Alibaba Cloud offers multiple choices for both relational and nonrelational DBMSs.

- **Ability to innovate**: ApsaraDB for PolarDB was designed and developed in-house and powers the Alibaba Double 11 Global Shopping Festival, for which it has handled 1 billion orders in a single day. Alibaba Cloud contributes to innovation in open-source software.

- **Expansion into Asia and Europe**: With private funding and an international headquarters in Singapore, Alibaba Cloud is building a presence in the global market from its home in China, where it is the largest cloud provider.

Cautions

- **Limited presence in Europe and North America**: Although Alibaba Cloud has made good progress in expanding beyond China, notably in the surrounding countries of Asia, it still does not have the same level of presence in Europe and the Americas as the other large cloud providers.

- **Geopolitics**: The potential for trade wars and sanctions could hinder Alibaba Cloud's plans. However, Alibaba is self-reliant in terms of technology supply.

- **Overlapping offerings**: Although a strength in one respect, Alibaba Cloud's wide range of products can also be a source of confusion. It can make it harder for potential customers to determine which of its database services is best suited to a particular use case.

Amazon Web Services

Amazon Web Services (AWS) is a Leader in this Magic Quadrant. It offers a range of database management services. Some are aimed at operational use cases, as is the case with Amazon Relational Database Service (RDS), Amazon Aurora and Amazon DynamoDB, for example. Others are aimed at analytic use cases, as is the case with offerings such as Amazon Redshift, Amazon Athena and Amazon EMR. And some are aimed at specialized uses: for example, Amazon Neptune for graph use cases, Amazon DocumentDB for document-based use cases, Amazon Timestream for managing time series data, Amazon Keyspaces for Apache Cassandra and Amazon Quantum Ledger Database (QLDB) for ledger use cases.

AWS is the largest cloud service provider in the world by revenue, with an international presence and a global client base across all major industries.

Strengths

- **Dominant market presence:** AWS is the world's largest cloud database service provider, by revenue. It has offered production cloud services for more than 10 years, which also makes it the most mature cloud provider. It has the largest number of production customers.

- **Performance:** Reviewers on Gartner's Peer Insights forum praise multiple AWS services for their performance — Amazon Aurora, Amazon Redshift and Amazon DynamoDB, which handles billions of transactions a day for all of AWS's client services.

- **Availability and reliability:** AWS has a better track record for availability and reliability than the other "hyperscale" providers.

Cautions

- **Integration issues:** AWS believes in a "best-fit engineering" approach, with different services being designed to address different use cases. Although this approach is feasible in the cloud, large organizations will still have to wrestle with issues of data integration.

- **Reluctance to embrace a multicloud world:** AWS, being the market leader, tends to think of its own cloud as the most important. AWS's support for a world in which most organizations will have data on multiple clouds lags behind that of some other hyperscale providers and most independent service providers.

- **Vulnerability to other focused solutions:** AWS believes in offering multiple services to address multiple use cases. Consequently, its offerings, especially when first released, can face strong competition from other vendors that have a narrower focus. Over time, AWS normally adds functionality to catch up with these other vendors, but its initial releases can be vulnerable in this regard.

Cloudera

Cloudera is a Visionary in this Magic Quadrant. Its Cloudera Data Platform (CDP), which includes independently available Cloudera Data Hub, Cloudera Data Warehouse and Cloudera Machine Learning cloud services, focuses on operational and analytic uses. Cloudera Workload Experience Manager (WXM) is used to migrate, analyze, optimize and scale workloads. Cloudera Shared Data Experience (SDX) provides intercloud and multicloud unified security, governance and metadata management.

Cloudera's operations are global but strongest in North America and Europe. Cloudera has a diverse portfolio of clients, with the main industries it serves being the financial services, healthcare, retail and utilities sectors. Recent investments have focused on delivering cloud-native services, enhancing operational DBMS capabilities, and innovating on the basis of combining the former Cloudera and Hortonworks offerings.

Strengths
- **On-premises base:** With 2,000 customers in 85 countries, Cloudera has significant on-premises deployments of Cloudera and Hortonworks products. It continues to support and update these during the transition to its new CDP platform and the ongoing movement of customers to the cloud. Its hybrid architecture for management and governance will smooth this transition.

- **Open-source foundation:** Cloudera is a committer of open-source projects including Apache Flink, Hadoop, Hive ACID, Impala, Kudu, NiFi, Solr and Spark. Cloudera is a leading contributor to many Apache projects and markets them within its offerings under the Apache license, using the open-source AGPL license for its own components.

- **Competitive environment for governed hybrid, multicloud and intercloud deployments:** Cloudera's focus on cloud deployments is based on its creation of a governed architecture designed for hybrid deployments that other cloud service providers struggle to compete with. It gives customers a way to move to the cloud in a measured way at their own pace, while retaining and extending policy enforcement and security.

Cautions
- **Phased rollout of CDP to existing customers:** On-premises and public cloud deployments of CDP had been made at over 150 sites by mid-2020. The magnitude and complexity of the change from the old products to the new ones continues to dominate client inquiries received by Gartner. Basic cluster management for all analytics is available on AWS and Azure, but some CDP offerings for streaming analytics and operational use cases are still on Cloudera's roadmap for delivery during the next three to six months.

- **Resistance to new pricing model:** The compute and storage cloud-based pricing model is new to Cloudera's on-premises customers. Gartner's conversations with clients about contract renewals, or new planned deployments, with Cloudera have uncovered numerous complaints about higher list prices for the legacy Hortonworks Data Platform (HDP). In these discussions, clients also often

complain about additional variable pricing for computing and storage resources for new, larger nodes, especially when heavily discounted multiyear deals are expiring.

- **Competition for multiple use cases**: Cloudera faces competitors in the fields of machine learning (ML), data warehousing, data lakes and data streaming, some of which use many of the same open-source components in their offerings. Moreover, Cloudera has different competitors for different use cases — although its ability to support multiple projects from the same integrated platform, and the data context provided by SDX, give it an effective competitive argument.

Databricks

Databricks is a Visionary in this Magic Quadrant. It offers the Databricks Unified Data Analytics Platform on Microsoft Azure (Azure Databricks), AWS and Alibaba. Gartner expects availability on Google Cloud Platform in the near future.

Databricks' operations are primarily in North America, Europe and Asia/Pacific, although Databricks does have a presence globally. Its customers span a wide range of industries and enterprise sizes.

Although traditionally associated with Apache Spark and its data science focus, Databricks has invested heavily in the Delta Engine technology that powers its own massively parallel processing (MPP) engine and indexing capabilities. It aims to bring traditional data warehousing performance to semantically flexible data stores via its open-source Delta Lake offering.

Strengths

- **Depth of integration with major cloud service providers (CSPs):** Databricks' strategy is to offer a CSP-native offering on the infrastructure of major CSPs. It therefore both competes against those CSPs' native offerings and occupies a place in the broad ecosystem beside those offerings. Partnerships are in place with Alibaba Cloud, AWS, Microsoft (Azure) and pending with Google.

- **Multicloud and intercloud capabilities**: Databricks not only has a multicloud offering that provides the same core functionality whichever CSP it is deployed on. It also provides capabilities to unify the clouds. Any workspace can access data in any cloud, so any governance applied at the workspace level will work across clouds.

- **Expansion on data science and analytics foundation:** As the company behind the commercialization of Apache Spark, Databricks is a popular choice among data science communities for data lakes. Databricks has built on that foundation with its open-source Delta Lake project, in order to provide more traditional data warehouse capabilities. It has done so by adding features such as ACID consistency, an MPP engine and indexing capabilities to provide a well-articulated path to production for data science workloads. All of this is achieved on an open columnar data structure that allows data to stay in the data lake.

Cautions

- **Relational capabilities:** Although there is much to like about Databricks' Delta Engine, it is a relatively new offering. Prospective customers coming from more mature relational offerings with decades of experience should check that their most complex workloads will run efficiently, from both a cost and a performance perspective.

- **Support for operational use cases:** Although Databricks is used for some operational use cases (mostly based on its streaming ingest capabilities, such as those for real-time fraud detection), it is not optimized for traditional transactional workloads of the kind typically associated with operational relational DBMSs.

- **Competition from CSPs:** Although Databricks has partnerships with the largest CSPs, these organizations continue to develop competing products. These include some products also based on Apache Spark, Delta Lake and MLflow that may be good enough for many customers who already have a strategic relationship with their CSP.

Google

Google is a Leader in this Magic Quadrant. Its Google Cloud Platform (GCP) supports many database platform as a service (dbPaaS) products, from fully managed versions of products from third-party providers, to its own products, namely Google Cloud SQL (PostgreSQL, MySQL and SQL Server), Cloud Spanner, Cloud Bigtable, BigQuery, Dataproc, Cloud Firestore and Firebase Realtime Database.

Google's operations are geographically diversified. It has clients of every size across all industries.

Google has a broad range of managed relational and nonrelational products. Recently, it announced BigQuery Omni, a multicloud offering that enables GCP customers to run BigQuery on other CSPs' platforms.

Strengths

- **Focus on the enterprise:** Over the past two years, Google has been introducing resources and dbPaaS products for use by enterprises. It has added functionality to BigQuery and Cloud Spanner (including stronger SQL support). New pricing models (including per second billing) and stronger financial governance round out its enterprise-ready capabilities.

- **Multicloud and hybrid vision:** Google has delivered Anthos, a container-based product supporting its cloud offerings in a hybrid environment with on-premises support. Anthos also runs in a multicloud environment, today running on AWS. Additionally, BigQuery Omni will enable BigQuery to run on other CSPs, starting with AWS and with Azure coming soon. As such, Google is the first hyperscale CSP to deliver on the multicloud promise.

- **Partner-friendly ecosystem:** Over the past two years, Google has prioritized the building of a strong partner ecosystem. This reflects its broad focus on partnerships, which results in it offering

both alternative analytic services and other data management products, as well as a strong service partner ecosystem that supports and uses GCP and its dbPaaS services. This focus has also resulted in the addition of open database products in a fully managed GCP environment (featuring Confluent, DataStax, Elastic, InfluxDB, MongoDB, Neo4j and Redis Labs) with unified billing and support.

Cautions

- **Growing pains:** Through Gartner's inquiry service, we have heard from clients that there are issues with Google's service and support, particularly for new clients. This could be attributable to the fast growth in Google Cloud's customer base over the past 24 months. Google Cloud has appointed new people to senior leadership roles, scaled its customer-facing support organization, and recently launched new premium support offerings, which may help.

- **Lock-in fears regarding Cloud Spanner:** Although GCP's Cloud Spanner dbPaaS for transaction processing is a proven, high-performance service, applications written for it run only on GCP. Cloud Spanner uses physical hardware clocks found only in GCP data centers to deliver a consistent notion of time across all instances. Although this is transparent to customers and helps guarantee strong consistency, it limits Cloud Spanner to GCP's ecosystem.

- **Lack of cloud data ecosystem vision:** Like other CSPs, Google has yet to announce an integrated cloud data ecosystem brand that packages its existing offerings — ranging from databases to analytics — as a single solution, along with an end-user workbench and metadata catalog.

Huawei

Huawei is a Niche Player in this Magic Quadrant. It provides GaussDB in a range of offerings. Relational DBMS offerings include GaussDB (for MySQL), GaussDB (openGauss), GaussDB (for PostgreSQL) and GaussDB Data Warehouse Service (DWS). Nonrelational offerings include GaussDB (for Mongo), GaussDB (for Influx), GaussDB (for Cassandra) and GaussDB (for Redis). All are available on Huawei Cloud and Huawei CLOUD Stack for on-premises deployment.

Huawei's operations are primarily in Asia/Pacific, with secondary presence in the Middle East, Africa and Latin America. The public administration, telecom, and finance and insurance sectors account for more than half of Huawei's industry penetration.

Huawei is focused on providing a comprehensive hybrid stack that can accommodate the full range of data management use cases across cloud and on-premises environments.

Strengths

- **Industry strength:** Huawei has a strong presence in the telecom and networking industry. Many of the data management capabilities that are now generally available offerings were built to manage Huawei's global industry businesses.

- **Strength in Asia:** Huawei's business is largely focused on China. The company has proven itself at scale in one of the more demanding global markets. China-based deployments tend to operate on a large scale and require significant core capabilities.

- **Breadth of cloud portfolio and ecosystem:** Huawei has built a comprehensive and robust portfolio that can support almost all the use cases we have defined for this market. Many of its products are tightly integrated with its cloud infrastructure to provide enhanced performance and reliability.

Cautions

- **Geopolitical concerns:** The geopolitical situation will make it challenging for Huawei to market its products effectively in North America and Europe. The vast majority of Huawei's business remains in Asia/Pacific.

- **Inconsistent delivery and marketing:** Customers visiting the international version of Huawei's website will see different offerings from those visiting the Chinese version. The English language pages of Huawei Cloud do not yet cover GaussDB or some of the value-added components that Huawei has built.

- **Confusing portfolio:** Although Huawei has a broad range of offerings, it may be difficult for prospective customers to determine which solution is the best choice, as there are many overlaps (for example, GaussDB [for MySQL] overlaps with RDS for MySQL and Huawei Cloud Database PostgreSQL). We expect Huawei's go-to-market approach to improve as GaussDB plays a more prominent role.

IBM

IBM is a Leader in this Magic Quadrant. Its offerings include IBM Db2 on Cloud, IBM Db2 Warehouse on Cloud, IBM Cloud SQL Query, IBM Cloudant, the IBM Cloud Database family and IBM Event Streams. Additionally, IBM Cloud Pak for Data is a Red Hat OpenShift integration layer for containerized DBMS services. There are also managed services for PostgreSQL, MongoDB, Elasticsearch, Redis, RabbitMQ, DataStax, EDB and etcd. IBM Cloud Object Storage serves as a landing zone and clearinghouse to complete IBM's offerings for operational and analytic use cases. IBM's multicloud support covers AWS, Microsoft (Azure), Google Cloud, IBM Cloud and private cloud deployment (most offerings are also available on-premises).

IBM's operations are global, with significant penetration of all industries and all sizes of organization. IBM invests broadly in leading data management technologies.

Strengths

- **Rich and mature products:** IBM Db2 on Cloud augments traditional transactions, with in-database machine learning and artificial intelligence (AI) running on its engine. Db2 on Cloud acknowledges multimodel trends with support for graph and spatial analytics, and offers mature, built-in

workload management for automatic management of job scheduling and concurrency. Additional offerings from IBM and other vendors expand the possibilities for specialized requirements.

- **New CEO:** Arvind Krishna, who has a long history in the field of data and analytics, has proceeded with the Red Hat acquisition and supported a new pricing model, including a free tier and portability of usage entitlements across the IBM product family. This focus on data management from the top might do much to revive momentum for one of the industry's longtime enterprise leaders.

- **Operation as both CSP and open software competitor:** With its own cloud platform, IBM is aggressively pursuing a portfolio of partner offerings as rich as those of other Leaders, such as AWS, Microsoft and Google. In addition, its hybrid, governed Cloud Pak for Data is designed to give customers choice by enabling them to deploy IBM's offerings on those vendors' platforms as well. Its bold move to acquire Red Hat also reflects a focus on game-changing moves.

Cautions

- **Sales lag that raises customer concerns:** IBM's customers often express concern about the company's support for existing products that they feel strongly about. IBM's overall DBMS revenue remained flat in a market that grew by over 18%, according to Gartner's information. Customers must monitor IBM's roadmaps for their legacy investments.

- **Limited visibility of products and messaging:** IBM's corporate advertising has long promoted IBM's brand, not its products, although there has been a shift recently. Client inquiries received by Gartner indicate a low level of awareness of IBM's newer initiatives and products. IBM Cloud does, however, receive strong marketing support, and IBM's 2019 cloud revenue grew strongly, albeit from a small base. Customers will want to see this growth extend to IBM's data management portfolio.

- **Challenge of changing sales culture:** Shifting gears is the essence of the cloud evolution, but changing the behavior of IBM sales professionals who do not support nonmainframe products in mainframe shops, for example, has long been a challenge. Customers may need to break through organizational impediments to ensure they are offered the solutions best suited to their needs.

InterSystems

InterSystems is a Visionary in this Magic Quadrant. It sells IRIS (based on InterSystems Caché), a multimodel, hybrid DBMS supporting both relational and nonrelational data models.

InterSystems' operations are geographically diversified. Its clients tend to be of all sizes. They come primarily from the healthcare sector, but InterSystems has recently increased its presence in other industries, such as manufacturing and financial services.

IRIS is currently available as a private, fully managed dbPaaS on AWS and Microsoft Azure. A public, fully managed dbPaaS version is expected later in 2020.

Strengths

- **Reliability of proven offering:** InterSystems IRIS is a DBMS product with a long history in the healthcare industry. Reliability, scalability and interoperability are important in this industry, and IRIS has demonstrated these attributes both as a stand-alone product and as a platform for many offerings from independent software vendors (ISVs). As InterSystems has broadened its reach into new industries, the product's historical strengths have become the primary reason for the company's growth.

- **Loyalty of customer base:** Judging from discussions with users of Gartner's client inquiry service, existing IRIS customers want to use InterSystems for additional systems, mainly due to the support and functionality it offers. Customers have acquired IRIS as a platform for purchased applications and now want to extend its use to analytics tools as well.

- **Multicloud, multimodel hybrid alternative:** Given IRIS's on-premises basis, it becomes a hybrid alternative as cloud adoption grows. IRIS is also multicloud — it supports the major CSPs. IRIS stands out as a multimodel DBMS, due to its background as an object store with relational capabilities, including full ANSI SQL support.

Cautions

- **Lateness to market:** InterSystems was late to offer a managed cloud dbPaaS. Furthermore, although IRIS is available as a private, fully managed dbPaaS, InterSystems has yet to deliver a serverless and elastic dbPaaS. This may not have hurt it in the healthcare industry, which has demonstrated a general reluctance to embrace the cloud, but it is essential if InterSystems is to compete effectively in the cloud DBMS market.

- **Market competition:** As InterSystems moves into the fully managed, multicloud dbPaaS market, it will face even more competition than it did on-premises, as it will be competing with native cloud CSPs and ISVs. Customers will struggle to understand the competitive differentiators.

- **Market recognition and availability of skills:** Outside the healthcare sector, InterSystems is not well known in this market, and customers may struggle to access skilled InterSystems personnel.

MarkLogic

MarkLogic is a Visionary in this Magic Quadrant. Its MarkLogic Data Hub Platform is offered in the cloud as the MarkLogic Data Hub Service. It is available on the AWS and Microsoft Azure clouds.

MarkLogic focuses on data management, built around a transactional document store, and an integration hub. The integration hub enables users to access data stored remotely through a

universal index, which enables reduced remote data movement through optimization of remote access.

MarkLogic's operations are primarily in North America and Europe. It has customers in a range of industries, but particularly in the public/government, finance and insurance, and healthcare sectors.

Strengths

- **Product addresses a key data integration need**: MarkLogic has a unique approach to addressing the growing need to bring together data from separate sources. By using its universal index to enable query and access optimization before retrieval of remote data, it reduces the amount of data that needs to be retrieved over lower-speed connections and improves performance. MarkLogic also enables clients to move remote data to a local store without changing any of the systems that use that data.

- **Breadth and depth of product capabilities**: MarkLogic's platform has many capabilities that can help a range of use cases. They include fast ingestion, multimodel support, advanced security, graph support, and a very broad set of indexes and performance features that enable MarkLogic to address both operational and analytic use cases.

- **Pricing model**: The MarkLogic Data Hub Service has a unique pricing model that combines predictable cost with the ability to store excess credits for use for bursting requirements. This enables dynamic scalability.

Cautions

- **Mind share**: MarkLogic does not have widespread mind share. Although recognition of MarkLogic is increasing, discussions with users of Gartner's client inquiry service still indicate that even clients with use cases for which MarkLogic would be a good fit are not necessarily aware of its offering. Some customers might therefore overlook a good choice for their use cases.

- **Scarcity of expertise**: Potential customers of MarkLogic can struggle to find available resources to model with and to help them implement MarkLogic's offering optimally. This problem is especially acute in parts of the world such as Asia and Latin America.

- **International sales**: A large majority of MarkLogic sales occur in the U.S. This can increase the difficulty of finding resources and support outside the U.S., such as in Asia.

Microsoft

Microsoft is a Leader in this Magic Quadrant. It provides a broad range of cloud DBMS offerings, including Azure Synapse Analytics, Azure SQL Database, Azure SQL Managed Instance, Azure Cosmos DB, Azure HDInsight, and Azure Database for PostgreSQL, MySQL and MariaDB.

Microsoft's offerings span the full range of use cases evaluated for this Magic Quadrant. Its operations are geographically diversified, and its customers cover a wide range of industries and deployment sizes.

Microsoft is focused on delivering a cohesive cloud data management ecosystem that spans all the use cases we evaluate for this market.

Strengths

- **Cloud data ecosystem vision**: Microsoft has articulated a strong cloud data ecosystem vision with Azure Synapse Analytics. This vision is more refined and comprehensive than that of any of its main CSP competitors, and includes security and metadata aspects. Easy integration with other Azure offerings is a major selling point, and the ecosystem is open to third-party ISV offerings as well.

- **Cloud migration path**: Almost every enterprise has a business relationship with Microsoft, through the use of its data management products (such as Microsoft SQL Server), office productivity tools, identity and access management software, and other offerings. Azure represents a logical extension of this familiar Microsoft ecosystem, with a comprehensive set of cloud offerings, a strong user community and ready availability of skills.

- **Breadth and depth of portfolio with multimodel capabilities**: Microsoft Azure is the No. 2 CSP for data management by revenue (according to Gartner's estimates), and the maturity and depth of its offerings reflects this core strength. Unlike some of its CSP competitors, Microsoft has embraced a multimodel strategy for many of its data management offerings, which can simplify deployment. Azure Synapse Analytics reflects this strategy for analytics, and Azure Cosmos DB epitomizes it for nonrelational operational DBMSs. Microsoft is building links between its analytic and operational offerings as well.

Cautions

- **Maturity of cloud data ecosystem**: Although Microsoft's vision for a cloud data ecosystem has been clearly defined, the actual ecosystem is still emerging. While the core data warehousing capabilities of Azure Synapse Analytics are generally available at the time of writing, other components will not reach full general availability until later in the fourth quarter of 2020, and additional functionality is expected periodically as part of regular release cycles. Prospective users should carefully check that Microsoft's current capabilities meet their needs, and that timelines for the delivery of additional required functionality are clear.

- **Financial governance**: Contributors to Gartner's Peer Insights platform report that the move to Azure was often more expensive than their on-premises deployments had been. This reflects both a lack of maturity in relation to general financial governance practices among the end-user community and a lack of cost structure standardization across Microsoft's broad Azure portfolio.

- **Intercloud and multicloud:** Although SQL Server is available on other clouds (it is the one of the only CSP DBMS services that can run in all of the three largest public clouds), the platform as a service (PaaS)-supported versions tend to lag behind the latest releases. Although this is not in Microsoft's control, it does reflect the tendency for other CSPs to focus on their own offerings first. Additionally, licensing terms are structured (via Azure Hybrid Benefit) to make Azure SQL Database and/or Azure SQL Managed Instance more cost-effective on Azure than on other clouds. Intercloud capabilities for data management via Azure Arc are still maturing and limited to Azure SQL Managed Instance and Azure Database for PostgreSQL Hyperscale (currently in preview).

Oracle

Oracle is a Leader in this Magic Quadrant. Its Oracle Autonomous Database (including the Autonomous Transaction Processing and Autonomous Data Warehouse services) are available in Oracle Cloud Infrastructure and on an Oracle Exadata Cloud@Customer (ExaCC) private cloud. Oracle also offers Autonomous JSON Database, Oracle MySQL Database Service, Oracle NoSQL Database and Oracle Big Data Service. Oracle also offers an Oracle Dedicated Region Cloud@Customer private cloud that runs all Oracle cloud services in the customer's data center.

Oracle's operations are geographically diversified. The company has clients from all industries and of all sizes.

Strengths

- **Augmented DBMS technology:** The Oracle Autonomous Database makes use of AI- and ML-assisted tuning functionality and the advantages of Oracle's cloud infrastructure. Oracle Cloud Infrastructure technology, coupled with Oracle Real Application Clusters (RAC), enables zero-downtime patching and upgrading, a feature missing from all other DBMS products. This technology not only reduces the necessity for manual operation but also reduces the cost and increases the performance of the DBMS service.

- **Hybrid cloud:** Oracle's presence on-premises is clearly a strength. Not only is the Oracle DBMS the same in on-premises and Autonomous Database versions, but with the ExaCC private cloud, Oracle has a complete hybrid environment for sharing data and enabling migrations to the cloud. Oracle also supports on-premises deployments and ExaCC with disaster recovery in the cloud via Exadata Cloud Service (ExaCS). ExaCC also supports dbPaaS with both Autonomous Data Warehouse and Autonomous Transaction Processing.

- **Enterprise focus:** Oracle is viewed as an established enterprise software vendor and, with Oracle Autonomous Database attracting developers to its free tier, Oracle is also gaining recognition as an enterprise cloud provider. This makes Oracle Cloud a good choice for enterprises that use Oracle as a standard provider, where they can apply skills developed over many years for use in the cloud. Oracle Autonomous Database is also being adopted by customers new to Oracle who value a self-driving, enterprise DBMS.

Cautions

- **Cloud strategy:** The only managed DBMS services available on Oracle's cloud are Oracle's own DBMS services (Oracle Database, Oracle MySQL Database Service and Oracle NoSQL Database) and Oracle Big Data Service (Cloudera Hadoop Enterprise). Oracle does, however, also plan to offer a PostgreSQL managed service in 2021. Although the Oracle Database product is generally portable to other clouds, customers should be aware that (1) Oracle RAC is not supported on other clouds; (2) Oracle Database incurs a double license penalty when run on other clouds; (3) Oracle Database is not certified to run on all CSP infrastructure. Customers must consider these restrictions when planning Oracle usage in the cloud.

- **Market perception**: Oracle's on-premises products are often perceived to be expensive and difficult to manage, and customers continue to raise concerns about contract negotiations. Oracle has made some progress in these areas as it moves to a new business model on the cloud with pay-as-you-go pricing, the self-driving Autonomous Database, an Always Free ier (which includes Oracle Autonomous Database), bring your own license (BYOL), dynamic elasticity, and other pricing adjustments. Oracle must, however, continue to work to change this perception.

- **Cloud market share:** Oracle has supported hosted cloud DBMS services for many years, but it was very slow to offer a true dbPaaS managed service, and this caused many customers to use other dbPaaS offerings from CSPs and ISVs. According to Gartner's numbers, Oracle's dbPaaS revenue for 2019 was $586.4 million or 3.4% of the $17 billion dbPaaS market.

Redis Labs

Redis Labs is a Challenger in this Magic Quadrant. It offers the Redis Enterprise Cloud on the AWS, GCP and Microsoft Azure clouds, and Redis Enterprise Software on-premises. Its offerings are built on the open-source Redis product.

Redis Enterprise Cloud is an in-memory nonrelational, multimodel data store, which includes a range of capabilities suited to operational DBMS use cases and augmented transaction processing. Its flexible data structures and integrated support for in-database analytics via RedisGears and RedisAI are particularly noteworthy.

Redis Labs' operations are primarily in North America and Europe. It has limited presence in the rest of the world. It has customers — both large and small — in a broad range of industries.

Strengths

- **AI and ML use cases**: By providing very high-performance access to data, Redis Labs caters well to the growing areas of AI and ML, which require rapid and repeated access to data.

- **Active-active multicloud geoduplication**: Redis Labs' ability to span multiple cloud platforms through replication provides capabilities well-suited to some use cases.

- **Multimodel and multiplatform:** Redis Labs supports multiple data models, including JSON, graph and time series data. It runs on multiple cloud platforms and on-premises.

Cautions

- **In-memory data cache positioning:** Redis Labs' success with an in-memory data cache has made it a successful vendor, but frequently either as a supplement to an incumbent DBMS vendor or as a result of demand from application developers. This limits its perceived strength and its overall growth opportunities.

- **Pricing:** In the past, clients of Redis Labs complained that its pricing model was inflexible, but Redis Labs has adjusted in response. Clients now complain of pressure for large price increases for contract renewals.

- **Eventual consistency:** Redis Labs does not enable implementation of full consistency, which limits its applicability for some transactional workloads.

SAP

SAP is a Leader in this Magic Quadrant. Its SAP HANA, SAP Adaptive Server Platform Edition (consisting of SAP Adaptive Server Enterprise [ASE] and SAP IQ) and SAP SQL Anywhere products are focused on both operational and analytical DBMS use cases.

SAP operates on a global basis from diverse locations. It has enterprise customers of all sizes and from all industries.

SAP continues to invest in expanding its data management product portfolio to support hybrid cloud environments. It is also expanding its cloud-based analytics products with SAP Data Warehouse Cloud, SAP Analytics Cloud, SAP HANA Cloud, SAP HANA Cloud Data Lake and SAP Data Intelligence, which includes SAP Vora for Apache Spark and Hadoop processing.

SAP HANA is available on multiple public clouds, as an appliance on a virtual machine, and as software only (via the SAP HANA Tailored Data Center Integration program). For analytical use cases SAP offers SAP BW/4HANA, a packaged data warehouse solution that can be deployed on-premises and in the cloud.

Strengths

- **Breadth of functionality:** SAP HANA provides unified analytical and transactional processing against a single copy of data, embedded predictive analytics, and multimodel capability with embedded graph features, language processing, OLAP engines, data virtualization, and Hadoop, Spark and cloud object stores.

- **Track record:** SAP HANA has been generally available for 10 years. It is widely accepted by SAP customers, with steady adoption for SAP S/4HANA and SAP BW/4HANA, other applications, and

as a general-purpose analytical system.

- **Cloud database presence and infrastructure choice**: SAP HANA can be hosted on a very wide variety of platforms, including the Alibaba, AWS, Azure and GCP public clouds, and the SAP Cloud Platform. SAP HANA can also be deployed as an appliance, using hardware from a variety of vendors, on hyperconverged systems, on bare-metal installations and on virtual machines.

Cautions

- **Marketing and sales messaging**: Many SAP clients tell Gartner that they are unaware of the breadth and depth of SAP's data management offerings. This breadth and depth can be a strength, but only if customers are aware of what is available.

- **Customers' focus on "lift and shift" conversion**: For SAP HANA, one of the design aims was to enable simplification and streamlining of business processes using the new technical capabilities that it provides. However, customers often simply view conversion to SAP HANA as a simple lift-and-shift operation, and there appears to be limited adoption by organizations not already using SAP.

- **Perception of high cost**: SAP HANA suffers from the perception that it is expensive. This can sometimes be the result of misunderstandings about sizing and configuration, when hot and cold data schemes and compression factors have not been properly accounted for.

Snowflake

Snowflake is a Challenger in this Magic Quadrant. The Snowflake Cloud Data Platform, available on AWS, GCP and Microsoft Azure, is focused on delivering production-optimized delivery of semantically consistent data in a data-warehouse-as-a-service model. The platform also supports relational data lakes, document style data (such as JSON data), data sharing and a private cloud offering called Virtual Private Snowflake.

Snowflake's operations are mostly in North America, but it also has a growing presence in EMEA and Asia/Pacifc. Its customers cover a wide range of industries and deployment sizes. Snowflake has expanded its focus beyond core data warehousing and has articulated a vision for a data cloud with a multicloud focus.

Strengths

- **Cloud-native and multicloud offering**: Snowflake's platform is engineered from the ground up to be a cloud-native data-warehouse-as-a-service offering. The basic tenet that resources should be separate enables independent scaling of resources with dynamic elasticity. Snowflake has brought this capability to the three largest CSPs: AWS, Google (GCP) and Microsoft (Azure). It also permits cross-cloud replication.

- **Data sharing:** Snowflake has invested in robust data-sharing capabilities that enable enterprises to share all or a subset of their data with both internal and external consumers in a well-governed manner. These capabilities also provide the basis for the Snowflake Data Marketplace, and serve as effective means of enabling data monetization.

- **Ease of use, performance and scalability:** Snowflake customers report a small operational footprint, good performance and robust scalability. Snowflake's architecture enables many virtual compute environments to all access a single copy of data, which makes the platform very suitable for complex enterprises with multiple and conflicting demands for data access.

Cautions

- **Financial governance and cost concerns:** The ease with which resources can be added in response to changing workloads introduces variability in resource consumption and elevates the importance of cost governance and resource monitoring. These capabilities are provided by Snowflake, but must be applied effectively in order to achieve predictability in budgets. Furthermore, Snowflake's primary means of cost optimization relies on its ability to scale dynamically in response to workload variability. Sustained workloads, of the kind common with mature applications, are less likely to benefit from this approach.

- **Lack of in-database analytics:** Although Snowflake supports SQL- and JavaScript-based user-defined functions (UDFs), it does not provide libraries of prebuilt advanced in-database analytics, nor does it support in-database creation and execution of ML models. Support for Java- and Python-based UDFs is planned, however.

- **Complex integration with CSP offerings:** Because Snowflake runs in its own tenant space, it can be more difficult to integrate into a surrounding CSP ecosystem. Bifurcated security and metadata policies, and the need to copy data between tenant spaces, add to the deployment complexity.

Tencent

Tencent is a Niche Player in this Magic Quadrant. The TencentDB managed service includes CynosDB, a distributed relational DBMS (RDBMS) compatible with MySQL and PostgreSQL, and TBase, which is Postgres-based with Oracle compatibility. It also includes MySQL, MongoDB, Redis, PostgreSQL, MariaDB and SQL Server for operational use cases. There is also Tencent Distributed SQL (TDSQL), Tencent Big Data Suite (TBDS), and Cloud Time Series Database (CTSDB) for time series, Galaxybase for graph, and Oceanus for stream-processing support analytic uses. TcaplusDB, a distributed NoSQL service, is designed for games. Tencent also offers TData Appliance hardware.

Over 90% of Tencent's business is done in Asia, primarily in China; Tencent has hundreds of subsidiaries that use and sometimes remarket its DBMS products. More than 30 industries are represented in its user base, which includes companies of all sizes.

Strengths

- **Depth of resources**: As the world's largest gaming company, Tencent has enormous resources. It is investing heavily to establish itself as a global competitor.

- **Investment in migration utilities targeting Western offerings**: Replacing non-Chinese products is a growing strategy supported by the Chinese government. Western products, especially those of Oracle, are prime targets for replacements that will enable Tencent to continue to exploit the trend toward "homegrown" technology.

- **Leverage from engineering portfolio**: TcaplusDB dominates the gaming industry with an effective cache-assisted scalability architecture that delivers rapid response times over Tencent's network. The engineering experience behind this leading technology informs the development of Tencent's other DBMSs, and makes it more than a "fast follower" of established DBMS technology.

Cautions

- **Limited visibility outside Asia/Pacific:** The vast majority of Tencent's business is done in Asia. Establishing itself in the minds of buyers elsewhere will remain a struggle until it expands its visibility and tunes its messages and offerings to Western expectations.

- **Limited focus on public cloud:** In the Chinese market, Tencent is targeting private cloud opportunities. Its offerings for analytics use cases run only in a private cloud and omit several areas of functionality.

- **Relatively new and immature offerings**: Despite its extraordinarily rapid market entry and early growth, Tencent has much to do to strengthen and enrich its offerings, especially for analytic use cases.

Teradata

Teradata is a Leader in this Magic Quadrant. Its Teradata Vantage product is focused on a unified set of analytics capabilities, such as graph processing, ML and text processing in the Teradata RDBMS.

Teradata's operations are geographically diversified. Its customers tend to be large and demanding analytical DBMS customers, from all industries. Teradata continues to invest in its hybrid multicloud ecosystem, which integrates many different styles of analytics on a common platform. Teradata Vantage is delivered in a consistent manner across multiple public clouds, Teradata's own cloud service and on-premises.

Teradata Vantage supports SQL query with spatial and temporal support, a wide variety of ML algorithms, graph processing and support for the logical data warehouse use case. Teradata QueryGrid (part of the hybrid multicloud ecosystem) provides multisystem query support via

Teradata's own software, as well as via open-source Presto, including support for and integration with Apache Hadoop and Spark.

Strengths

- **Analytical DBMS technology:** Teradata has been a frontrunner in the analytical DBMS market for many years. It has successfully brought the entirety of its feature-rich offering to the cloud. Its technology encompases or integrates all the major analytical services and languages — SQL, machine learning, graph, multimodel and federation — in an easy-to-use system.

- **Cloud/hybrid portability:** The same portable product and codebase is used in all environments. Teradata can be used in multiple public and private clouds, and in hybrid architectures interfacing with on-premises deployments.

- **Operational efficiency and robustness:** Refined over 40 years, Teradata Vantage provides operational reliability and high throughput. Price predictability and financial governance are key strengths. Customers praise Teradata for its ability to support very large and complex workloads. Teradata performs well in terms of operational intelligence, a critical capability for cloud DBMS use cases.

Cautions

- **Exclusive focus on cloud DBMS analytical use cases**: Teradata does not aim to offer a general-purpose or operational database, although it does perform well in terms of operational intelligence. It should be considered by organizations wanting a best-of-breed analytical cloud DBMS.

- **Increased competition:** Cloud-native data warehouse vendors have added to the competition faced by Teradata, and for many organizations these vendors' offerings may be good enough. Teradata Vantage can be competitive for all needs, but its focus on the largest and most demanding requirements may offer more than customers with smaller workloads require.

- **Cost:** Teradata is traditionally perceived as a high-cost, "premium" option, for which reason some organizations for whom Teradata might be a good choice might not even consider it. However, Teradata's move to the cloud and its new "pay for what you use" pricing model, together with the transparency of cloud billing, should enable it to make its cost-to-performance benefits more apparent. Customers should run a proof of concept to understand how competitive Teradata's runtime efficiencies make it from a price/performance perspective.

Inclusion and Exclusion Criteria

Gartner Magic Quadrants identify and analyze the most relevant providers in a market. By default, Gartner imposes an upper limit of 20 vendors to aid identification of the most relevant providers. In

some circumstances, however, the upper limit may be raised when the document's value to clients would otherwise be diminished.

The following inclusion criteria represent the specific attributes that Gartner analysts considered necessary for a vendor to be included in this Magic Quadrant.

To qualify for inclusion in this Magic Quadrant, a vendor had to:

- Have generated more than $20 million in verifiable cloud DBMS revenue in the calendar year 2019. For a definition of cloud DBMS revenue, see Market Share: Enterprise Public Cloud Services, Worldwide, 2019.

- Have a cloud DBMS product with referenceable production presence in accounts at least three of the following industry sectors:

- Accommodation and food services

- Administrative and support and waste management and remediation services

- Agriculture, forestry, fishing and hunting

- Arts, entertainment, and recreation

- Construction

- Educational services

- Finance and insurance

- Healthcare and social assistance

- Information

- Management of companies and enterprises

- Manufacturing

- Mining

- Professional, scientific and technical services

- Public administration

- Real estate rental and leasing

- Retail trade

- Transportation and warehousing

- Utilities

- Wholesale trade

- Have market presence in at least three of the following regions (regional market presence is defined as a minimum of 5% of the revenue of the verified production customer base, as well as the existence of dedicated sales offices or distribution partnerships in a specific region):

  - North America (Canada, Mexico and the U.S.)

  - Central and South America

  - Europe (including Western Europe and Eastern Europe)

  - Middle East and Africa (including North Africa)

  - Asia/Pacific

  - Japan

- Support at least three of the following cloud DBMS use cases:

  - Traditional transactions

  - Traditional data warehouse

  - Logical data warehouse

  - Augmented transaction processing

  - Event stream processing (Internet of Things)

  - Data science exploration/deep learning

  - Operational intelligence

- Have a cloud DBMS service generally available as of midnight, U.S. Eastern Daylight Time on 1 June 2020. This included any new functionality added to the service(s) by the specified date. We did not consider beta, "early access," "technology preview," or other not generally available functionality or services. Additionally:

  - Any acquired product or service must have been acquired and offered by the acquiring vendor as of 1 June 2020. Acquisitions after this date were considered under their preacquisition

identities, if appropriate, and are represented separately until the publication of the following year's Magic Quadrant.

Evaluation Criteria

Ability to Execute

Product or Service: This criterion considers core goods and services that compete in and/or serve the defined market. It evaluates current product and service capabilities, quality, feature sets, skills and so on, whether offered natively or through OEM agreements and partnerships.

We examine products and services that address both operational and analytic use cases. Wel focus on features influencing performance, scalability, availability, security and integration.

Overall Viability (Business Unit, Financial, Strategy, Organization): This criterion assesses an organization's overall financial health, as well as the financial and practical success of the relevant business unit. It also gauges the likelihood of the organization continuing to offer and invest in its product(s), as well as the position of the product(s) in the current portfolio.

We use Gartner's published estimates on vendors' revenue, as well as our assessment of vendors' share of the market and of trends in revenue. Changes in organizational structure, personnel and roadmap are also included.

Sales Execution/Pricing: This criterion considers an organization's capabilities in all presales activities and the structure that supports them. Included are deal management, pricing and negotiation, presales support and the overall effectiveness of the sales channel.

We also evaluate the variety and suitability of a vendor's pricing models.

Market Responsiveness and Track Record: This criterion considers a vendor's ability to respond, change direction, be flexible, and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. It also considers the vendor's history of responsiveness to changing market demands.

We also look for timely creation and fielding of a cloud offering, and competitive feature development and delivery in a "cloud release cadence."

Marketing Execution: This criterion considers the clarity, quality, creativity and efficacy of programs designed to deliver an organization's message in order to influence the market, promote a brand, increase awareness of products, and establish a positive identification in the minds of customers. This "mind share" can be driven by a combination of publicity, promotional activity, thought leadership, social media, referrals and sales activities.

We compare the consistency, channels, volume and differentiation of marketing messages heard by prospective customers with those presented to Gartner analysts.

Customer Experience: This criterion considers products, services and programs that enable customers to achieve anticipated results with the product(s) evaluated.

Specifically, this consideration includes the quality of supplier-buyer interactions, technical support and account support. It may also include ancillary tools, customer support programs, availability of user groups and SLAs, and so on.

Operations: This criterion considers an organization's ability to meet its goals and commitments.

We assess factors including the quality of the organizational structure, skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently.

<h3 style="text-align:center; color:#E8540C;">Table 1: Ability to Execute Evaluation Criteria</h3>

Evaluation Criteria ↓	Weighting ↓
Product or Service	High
Overall Viability	Medium
Sales Execution/Pricing	Medium
Market Responsiveness/Record	Medium
Marketing Execution	Medium
Customer Experience	Medium
Operations	Medium

Source: Gartner (November 2020)

Completeness of Vision

Market Understanding: This criterion concerns the ability to understand customers' needs and to translate that understanding into products and services. Vendors that show a clear vision of their

market listen to, and understand, customers' demands, and can shape or enhance the market with their vision.

We look for awareness of customers' concerns about such issues as price transparency, license portability, migration assessment, execution and cost, security gaps, and intercloud and hybrid operations.

Marketing Strategy: This criterion looks for clear, differentiated messaging consistently communicated internally, and externalized through social media, advertising, customer programs and positioning statements.

We assess the clarity and consistency of messages that articulate the value of the cloud DBMS, especially as compared with similar on-premises products (where they exist) and other cloud DBMS offerings.

Sales Strategy: This criterion looks for a sound strategy for selling that uses appropriate networks, including direct and indirect sales, marketing, service and communication networks. It also considers any partners that extend the scope and depth of a vendor's market reach, expertise, technologies, services and customer base.

We evaluate relationships between CSPs, ISVs and system integrators, use of app stores and co-marketing, and the degree of focus on the ease of onboarding.

Offering (Product) Strategy: This criterion looks for an approach to product development and delivery that emphasizes market differentiation, functionality, methodology and features, in relation to current and future requirements.

We evaluate whether a vendor's product strategy builds on existing product strengths and helps it address emerging market needs. Our evaluation includes the vendor's response to issues such as the separation of compute and storage resources, CSP-managed instance definitions and availability, and security requirements for object storage.

Business Model: This criterion considers the design, logic and execution of an organization's business proposition to achieve continued success.

We consider the vendor's relationships to CSPs, financial model changes, geographic and vertical adjustments driven by cloud opportunities, and design of engineering and support in relation to cloud realities.

Vertical/Industry Strategy: This criterion considers a vendor's strategy to direct resources (sales, product, development), skills and products to meet the specific needs of individual market segments, including vertical markets.

We look at the breadth and depth of a vendor's vertical and industry focus.

Innovation: This criterion considers direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or preemptive purposes.

We judge a vendor's innovativeness by the extent of its truly new capabilities or combinations in the market, rather than by its matching of the capabilities of existing products from other vendors.

Geographic Strategy: This criterion considers a vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside its "home" or native geography, either directly or through partners, channels and subsidiaries, as appropriate for the geography and market.

We examine such factors as local language support, on-the-ground resources, and the marketing focus on multiple geographies.

Table 2: Completeness of Vision Evaluation Criteria

Evaluation Criteria ↓	Weighting ↓
Market Understanding	High
Marketing Strategy	High
Sales Strategy	High
Offering (Product) Strategy	High
Business Model	Medium
Vertical/Industry Strategy	Low
Innovation	High
Geographic Strategy	Medium

Source: Gartner (November 2020)

Quadrant Descriptions

Leaders

Leaders generally demonstrate the most support for a broad range of DBMS use cases, based on support for a wide range of data types and diversity of deployment models (such as multicloud, intercloud and hybrid). These vendors demonstrate consistent customer satisfaction and strong customer support. Many have mature products created for the cloud or migrated to be cloud-native. Hence, Leaders generally represent the lowest risk for customers in the areas of performance, scalability, reliability and support. As the market's demands change, Leaders demonstrate strong vision in support not only of the market's current needs, but also of emerging trends. These include requirements for multicloud, intercloud and hybrid models, native-cloud serverless DBMS, containerization, and financial governance with diverse pricing models. Finally, the marketing messages, product research and development, and delivery of Leaders suit today's market for public and private cloud services.

Challengers

Challengers are stable vendors with strong, established offerings, but somewhat lacking in vision for the cloud DBMS market. While it can be difficult for some vendors to improve both vision and execution at the same time, it is normal for some to have high scores for Ability to Execute one year and high scores for Completeness of Vision another. Challengers normally show strong corporate viability and financial stability, and demonstrate strong customer support. However, they lack some features to support the latest trends in the cloud DBMS market, such as support for a broad set of use cases and a roadmap for moving to multicloud/intercloud implementations. Although they may be lacking in relation to some of the market's innovative concepts, Challengers have strengths in relation to many of the Ability to Execute criteria.

Visionaries

Visionaries have a strong market understanding and a robust roadmap for the cloud DBMS market. They have innovative ideas about functionality and demonstrate advanced use of new deployment models. Typically, they have fewer customers and are smaller than Leaders. Although they may lack the market momentum of Leaders, they have potential for growth in the market, due, in many cases, to market-leading vision. Although Visionaries are often young and small vendors, they have innovative ideas that push the market — and the Leaders — in new directions.

Niche Players

Niche Players generally deliver a highly specialized product with limited market appeal. They frequently do not support all cloud DBMS use cases, but they often support fewer use cases well. Niche Players may lack one or all of the following:

- A strong or large customer base

- The breadth of functionality of Leaders

- Penetration of a broad industry or geography

- Proven, mature products that present a low risk

Context

This Magic Quadrant evaluates vendors that supply fully managed cloud DBMS services (dbPaaS offerings) for some or all operational and analytical use cases. It should therefore interest anyone involved in defining, purchasing, building or managing a cloud environment involving data management — notably, CIOs, CTOs, data and analytics leaders, infrastructure managers, database and application architects, database administrators and IT purchasing managers. Data management is becoming increasingly important with the realization that data and analytics are at the heart of digital business.

For the past few years cloud-managed DBMS service revenue has been outgrowing on-premises DBMS revenue. Most of the DBMS vendors with on-premises offerings have shifted their innovation and development efforts to managed cloud services. To gain a better understanding of this shift, see [Understanding and Planning for Database Management Transformation to the Cloud](#).

As this is the first edition of the Magic Quadrant for Cloud Database Management Systems, we cannot compare previous years or shifts in the market in relation to specific vendors. However, we can say that the DBMS market's shift in focus toward the cloud has opened up many opportunities for DBMS vendors to innovate, especially for public and private clouds and, in some cases, hybrid clouds. This focus also creates opportunities for end-user organizations either to migrate to the cloud or to use the cloud as a platform for new applications.

Market Overview

The cloud DBMS market is not new. What is new is the growth in cloud revenue, the percentage of revenue in the cloud versus overall DBMS revenue, and the decreasing interest in on-premises products, according to Gartner's client inquiry service.[1] Gartner's DBMS market numbers,[2] and Gartner's 2019 figures for the enterprise public cloud sector,[3] show overall DBMS market revenue of $55.4 billion, with $17 billion coming from cloud DBMS products (31% of the total DBMS market). More importantly, the cloud DBMS sector generated $6 billion of $7.6 billion total for DBMS revenue growth (70% of total DBMS revenue growth). We forecast that, by 2023, cloud DBMS revenue will account for 50% of the total DBMS market revenue.

Several trends in the cloud DBMS market account for much of the white space at the top and to the right of the Magic Quadrant:

- **Multicloud, intercloud and hybrid cloud:** This trend differentiates various vendors in terms of both vision and execution. Multicloud support is much more in evidence among the ISVs — vendors that are not CSPs — as they must support multiple CSPs. The CSPs, by contrast, appear to be less interested in multicloud or are only just beginning to grasp its importance. Early examples of CSPs' support for multicloud are Google's BigQuery Omni, available for AWS, and IBM's Cloud Pak for

Data, available on both Microsoft Azure and AWS. This is in contrast to Cloudera, Databricks, SAP, Snowflake and Teradata, which support multiple CSPs. Intercloud capability, which enables a product to support data within more than one CSP in a DBMS instance, is still in its infancy. Products such as CockroachDB can have nodes in multiple CSVs and on-premises (hybrid). Hybrid support is much more prevalent, not only from the vendors with on-premises products but also from those with private cloud capabilities (such as those of AWS Outposts) and container-based offerings (such as Google Anthos). For more information, see The Future of Cloud Data Management Is Multicloud.

- **Flexible pricing models and financial governance:** This trend is emerging as a major focus of customers and vendors. Gartner's client inquiry service has seen a sharp increase in the number of inquiries about financial governance (cost control, monitoring and optimization), especially as every cloud vendor has different pricing models.[1] The ability of the customers to understand and control their total spend, while managing complex workloads, is quickly becoming a major competitive differentiator among vendors. For more details, see Overcome Economic Uncertainty Through Financial Governance of Your Cloud Data Management Environment.

- **Open-source software:** Open-source software, specifically DBMS software, is affecting dbPaaS offerings. License fees for dbPaaS in the cloud include compute and storage resources, software and maintenance in pay-as-you-go or fixed-charge arrangements. As a result, explicit software license fees are bundled into the overall cost of a service. This puts commercial dbPaaS products on a more equal footing in relation to open-source dbPaaS. The emerging advantage of open-source dbPaaS (such as PostgreSQL and MySQL), however, is the portability of applications written to the open-source API (or front-end). This front-end compatibility is growing in most offerings, whether from CSPs or ISVs. Many offerings use an API from an open-source DBMS with a CSP-specific back-end for performance, high availability, use of a cloud object store and serverless architecture. The result is growing demand among customers to use open-source dbPaaS APIs for new systems and for migrations from existing on-premises systems. See further State of the Open-Source DBMS Market, 2019.

- **Serverless and cloud object stores:** This trend has been present for a few years. It is becoming more important as products, originally migrated from on-premises environments, are being reengineered to support separation of compute and storage resources. Many vendors have PostgreSQL services, using the full open-source PostgreSQL distribution, including the underlying storage layer. These are being reengineered to use the PostgreSQL API front-end with the CSP's back-end storage model, including the use of cloud object stores. Snowflake was one of the first to offer a product engineered for the cloud with cloud object store support from the outset. Other vendors are now following suit.

- **Multimodel versus "best-fit engineered" dbPaaS:** The debate about best-fit engineered services and multimodel services is gaining prominence in the cloud DBMS market. Some vendors have separate services for different types of data and use case, while others have a single dbPaaS with

multiple data types. Some clients argue that separate services add flexibility, while others argue that the multimodel approach reduces the need for data and application integration. We are beginning to see vendors offer both models. For more information, see Choosing Between Multimodel DBMS and Multiple Specialized Engines.

- **Cloud data ecosystems:** Cloud data ecosystems are emerging as an integrated set of services, primarily for analytics workloads, for business users. They are built around a metadata catalog, with data services used to find and use data from multiple sources. They include an end-user workbench to enable business analysts to bring together desired data for use with analytics tools. Although different vendors have different sets of tools, cloud data ecosystems generally include integrated data access, data virtualization, a metadata catalog, user workbenches, and connections to various sets of analytics tools and platforms. See further Cloud Data Ecosystems Emerge as the New Data and Analytics Battleground.

Evidence

[1] Gartner inquiry service data recorded from June 2019 through June 2020.

[2] Market Share: All Software Markets, Worldwide, 2019.

[3] Market Share: Enterprise Public Cloud Services, Worldwide, 2019.

Evaluation Criteria Definitions

Ability to Execute

Product/Service: Core goods and services offered by the vendor for the defined market. This includes current product/service capabilities, quality, feature sets, skills and so on, whether offered natively or through OEM agreements/partnerships as defined in the market definition and detailed in the subcriteria.

Overall Viability: Viability includes an assessment of the overall organization's financial health, the financial and practical success of the business unit, and the likelihood that the individual business unit will continue investing in the product, will continue offering the product and will advance the state of the art within the organization's portfolio of products.

Sales Execution/Pricing: The vendor's capabilities in all presales activities and the structure that supports them. This includes deal management, pricing and negotiation, presales support, and the overall effectiveness of the sales channel.

Market Responsiveness/Record: Ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. This criterion also considers the vendor's history of responsiveness.

Marketing Execution: The clarity, quality, creativity and efficacy of programs designed to deliver the organization's message to influence the market, promote the brand and business, increase awareness of the products, and establish a positive identification with the product/brand and organization in the minds of buyers. This "mind share" can be driven by a combination of publicity, promotional initiatives, thought leadership, word of mouth and sales activities.

Customer Experience: Relationships, products and services/programs that enable clients to be successful with the products evaluated. Specifically, this includes the ways customers receive technical support or account support. This can also include ancillary tools, customer support programs (and the quality thereof), availability of user groups, service-level agreements and so on.

Operations: The ability of the organization to meet its goals and commitments. Factors include the quality of the organizational structure, including skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently on an ongoing basis.

Completeness of Vision

Market Understanding: Ability of the vendor to understand buyers' wants and needs and to translate those into products and services. Vendors that show the highest degree of vision listen to and understand buyers' wants and needs, and can shape or enhance those with their added vision.

Marketing Strategy: A clear, differentiated set of messages consistently communicated throughout the organization and externalized through the website, advertising, customer programs and positioning statements.

Sales Strategy: The strategy for selling products that uses the appropriate network of direct and indirect sales, marketing, service, and communication affiliates that extend the scope and depth of market reach, skills, expertise, technologies, services and the customer base.

Offering (Product) Strategy: The vendor's approach to product development and delivery that emphasizes differentiation, functionality, methodology and feature sets as they map to current and future requirements.

Business Model: The soundness and logic of the vendor's underlying business proposition.

Vertical/Industry Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including vertical markets.

Innovation: Direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or pre-emptive purposes.

Geographic Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the "home" or native geography, either directly or through partners, channels and subsidiaries as appropriate for that geography and market.

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