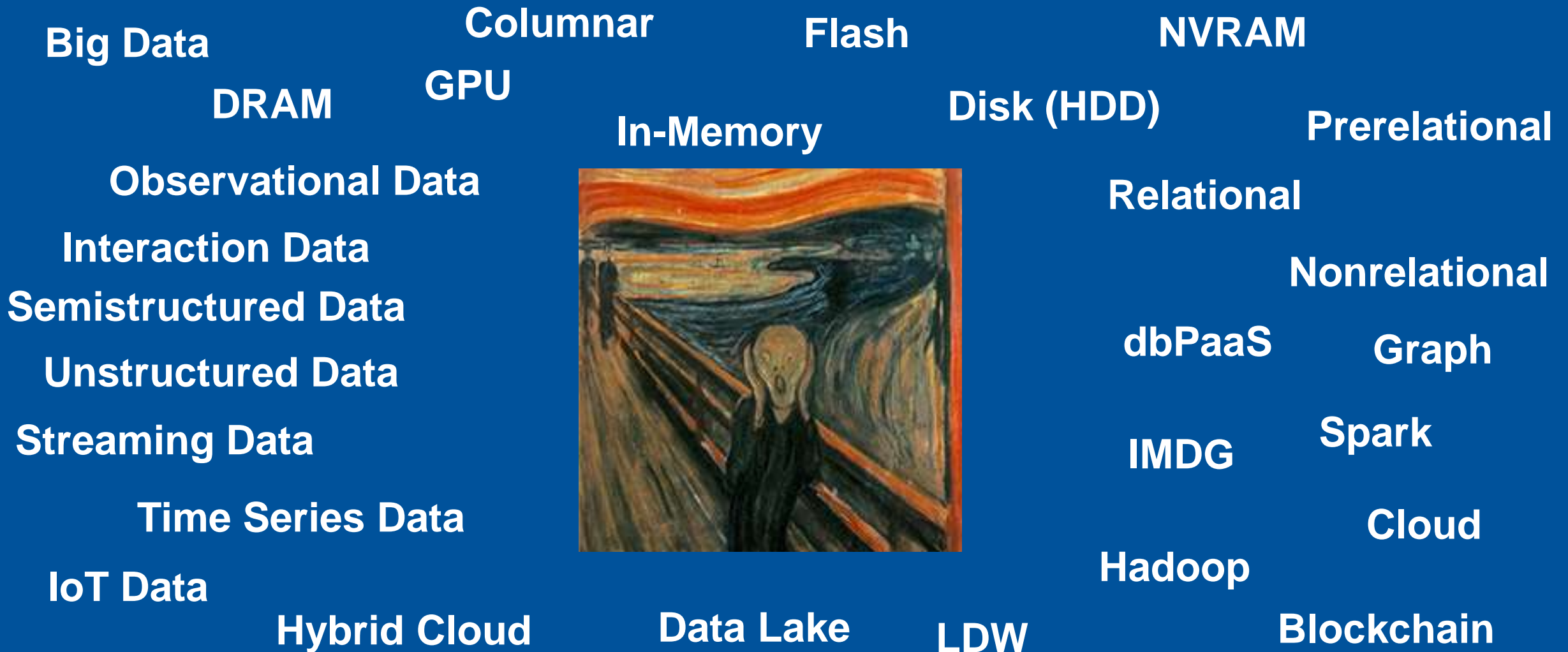


The Ever-Changing DBMS Landscape for Digital Business: How the Changes Affect You

Donald Feinberg
@Brazingo

The Data and DBMS Platform Explosion: How Do We Manage Data Infrastructure?



Key Issues

1. What are the use cases driving DBMS platform decisions?
2. What is the future DBMS architecture?
3. What are the vendors doing to support DBMS architectures?

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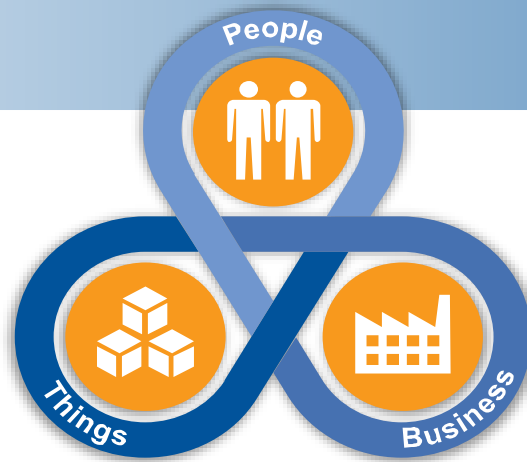
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IoT and Digital Business Use Cases Drive Data Architecture



The Internet of Things creates a digital version of physical world devices

Digital Business creates new business designs through merging the physical with the digital



We need to process data at speed and scale and we have the tools to do it.

Speed



Scale



Speed
and Scale



2018 Trends in DBMS (OPDBMS & DMSA)

- Internet of Things/Stream Processing
- Leveraging the Cloud (dbPaaS and Hybrid)
- Use of ML & AI in DBMS Management
- New Security & Compliance
- Operational/Analytical Convergence (HTAP)
- Broader Business Analytics Support (in-DBMS)
- Multimodel/Nonrelational Support
- Serverless & Containerization
- Logical Data Warehouse
- Open Source (Relational & Nonrelational)
- SMP vs. Scale-out + NVRAM

The big ticket item for 2018 is the use of **ML & AI in the DBMS** allowing the DBMS to maintain itself — the DBMS becomes **autonomous**. The DBA job evolves to use their skills for tasks with greater **business value**.

New Use Cases Drive DBMS Architectures

- Operational DBMS:
 - Traditional Transactions
 - Distributed Variable Data
 - Lightweight Events and Observations
 - Hybrid Transactional/Analytical Processing
- Data Management Solutions for Analytics:
 - Traditional Data Warehouse
 - Real-Time Data Warehouse
 - Logical Data Warehouse
 - Context-Independent Data Warehouse

Several of these use cases will merge, **simplifying** the architecture while adding **flexibility** to the data management environment.

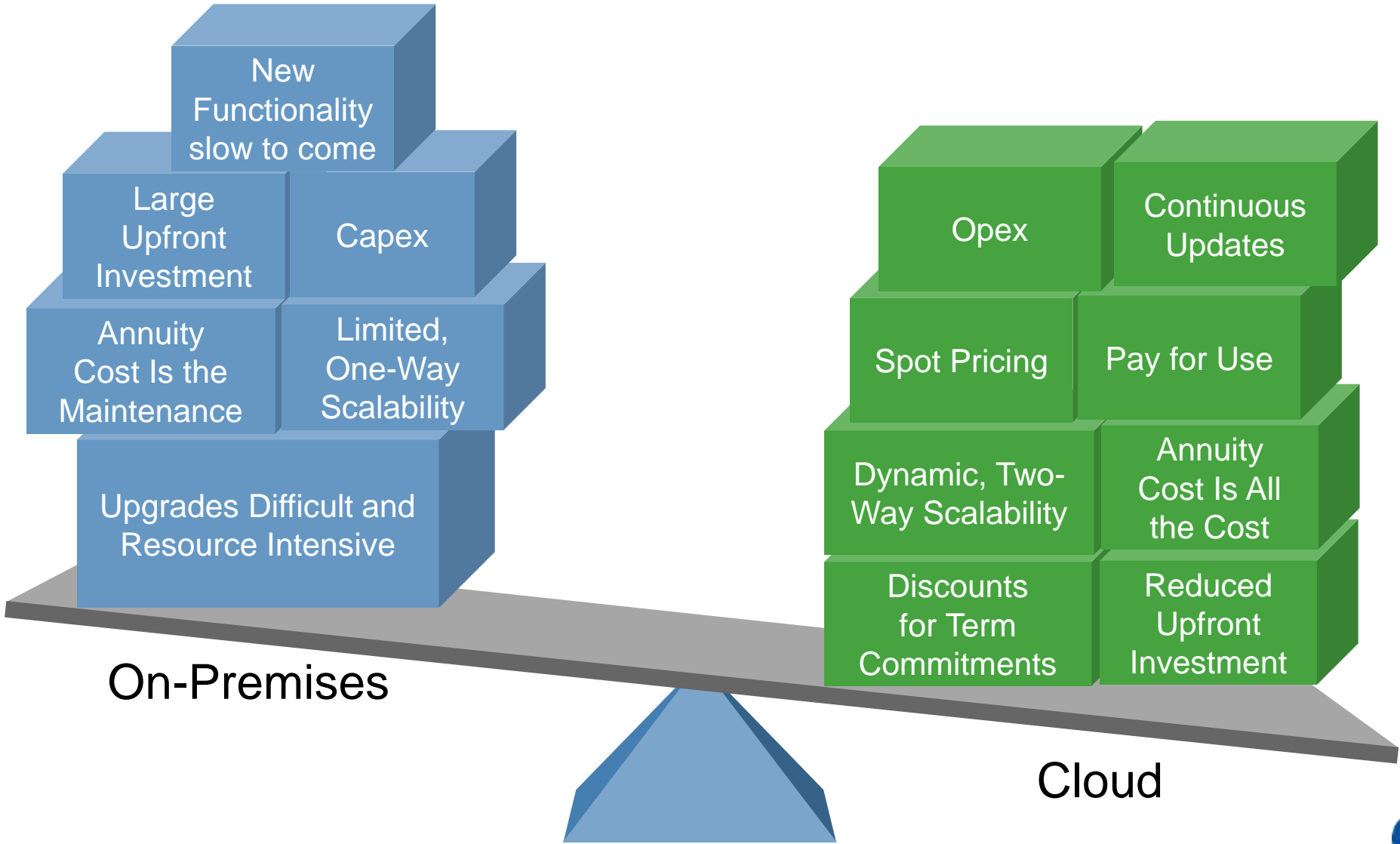
New Use Cases Drive DBMS Architectures

OPDBMS + DMSA = DBMS

- Traditional Transactions
- Traditional Data Warehouse
- Operational/Analytical Convergence (HTAP)
- Logical Data Warehouse
- Stream/Event Processing (IoT)
- Data Science Exploration/Deep Learning

Over the next five years, the OPDBMS and DMSA markets converge to a **single DBMS market**.

Cloud vs. On-Premises: Why Is Cloud Attractive?



Key Issues

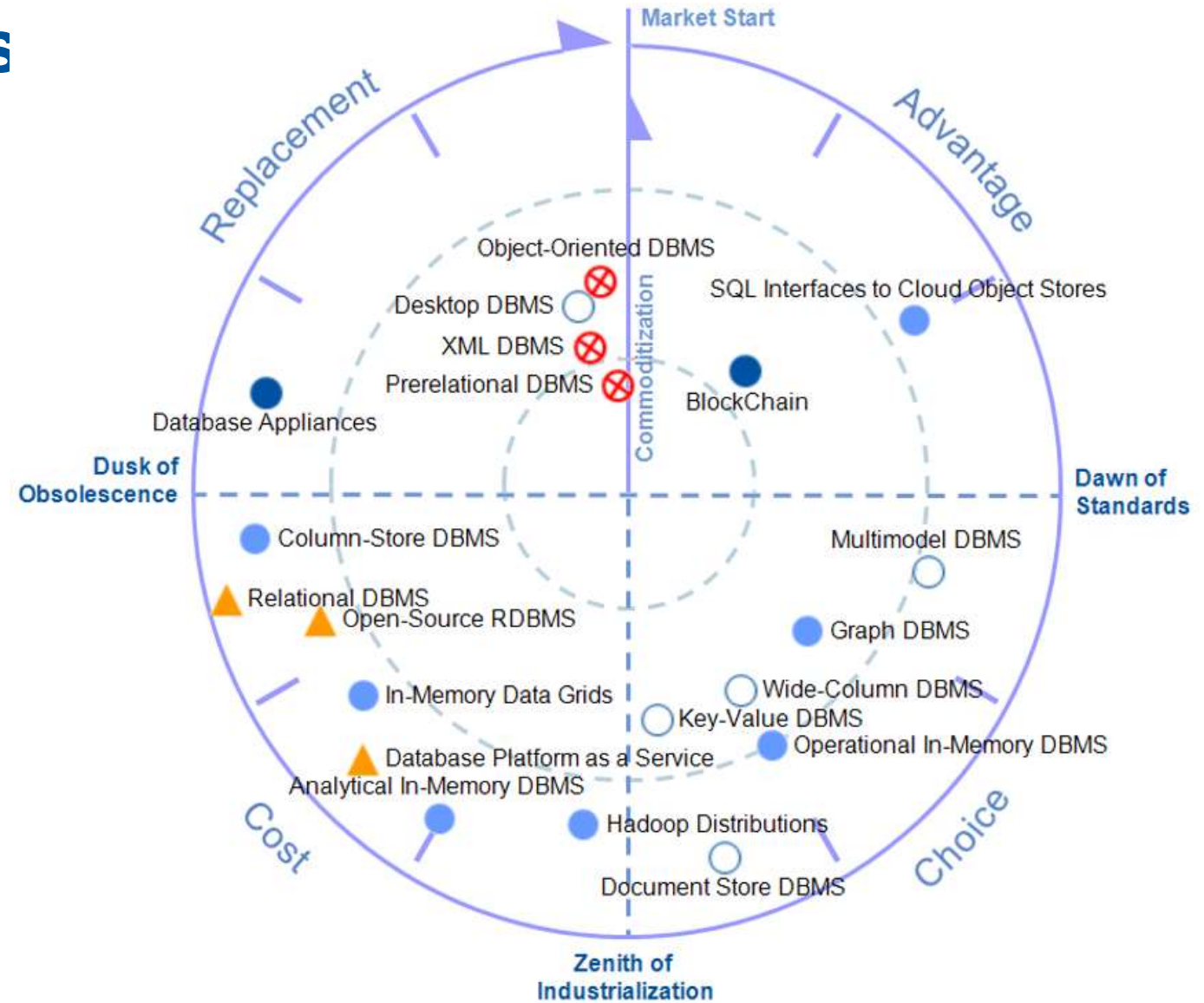
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New Architectural Choices

Market Clock for DBMS:

Many new asset types manage new data used for operational transaction systems — interaction and observation data.

Advancing quickly toward cost.



From "IT Market Clock for Database Management Systems, 2018," 18 January 2018 (G00349343)

The Future Is Both Relational and Nonrelational

Relational

- Availability of skills, tools & products
- ACID* consistency:
 - Geographic replicas (slower)
- Multimodel
- Built-in data governance
- Traditional pricing models
- Enterprise hardened
- On-premises, cloud and hybrid

Nonrelational

- Developer friendly
- Relaxed consistency:
 - Geographic replicas (faster)
- New, more flexible data models
- Immature governance models
- More flexible pricing models
- Relatively new, maturing
- On-premises, cloud and hybrid

Nonrelational does **not** replace relational, rather **augments** it and may be a good choice for new applications.

*Atomicity, consistency, isolation and durability

DBMS Internal Use of Machine Learning & Artificial Intelligence

The Autonomous DBMS — Self-Maintaining:

- All major vendors (and many others) are adding ML & AI for maintenance & tuning
- Most dbPaaS already is autonomous
- DBA skills will be utilized for more business value:
 - Data service administrators — knowledgeable of statistics gathered, system reliabilities, data reliabilities, physical and logical data models
 - Application performance tuning

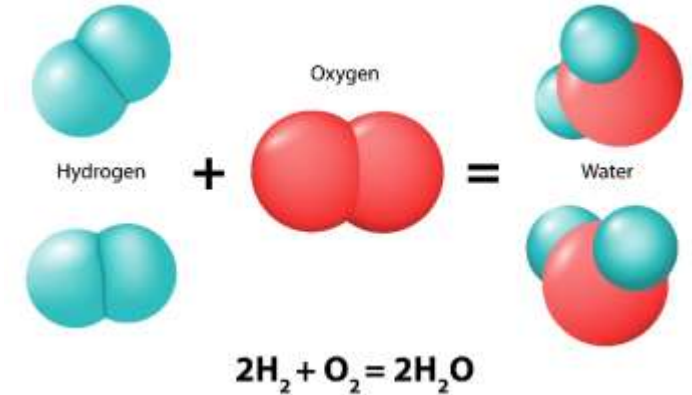
DBMS **automation** for maintenance has been around for years. With the use of ML & AI it is becoming **autonomous**.

Within the next two years, **all DBMS products** will include some ML & AI.

The DBMS Market Fragmentation Is Ending

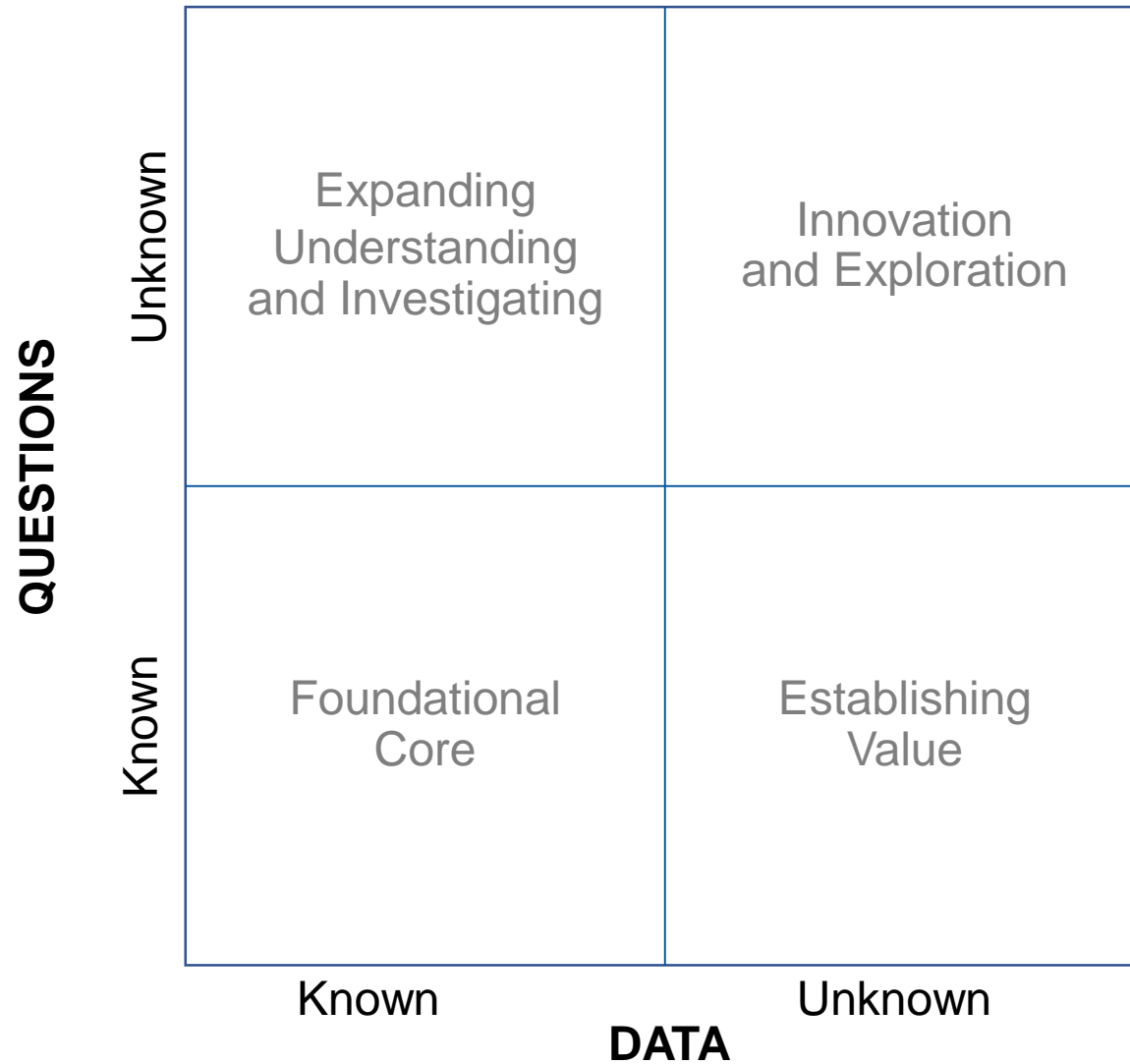
The bifurcation of the DBMS market, Operational DBMS & Data Management Solutions for Analytics is coming to an end:

- Initially, separate databases for OPDBMS & DMSA
- Ultimately, both transactions and analytics in the same database.
- dbPaaS remains separate services from same cloud service provider (CSP)

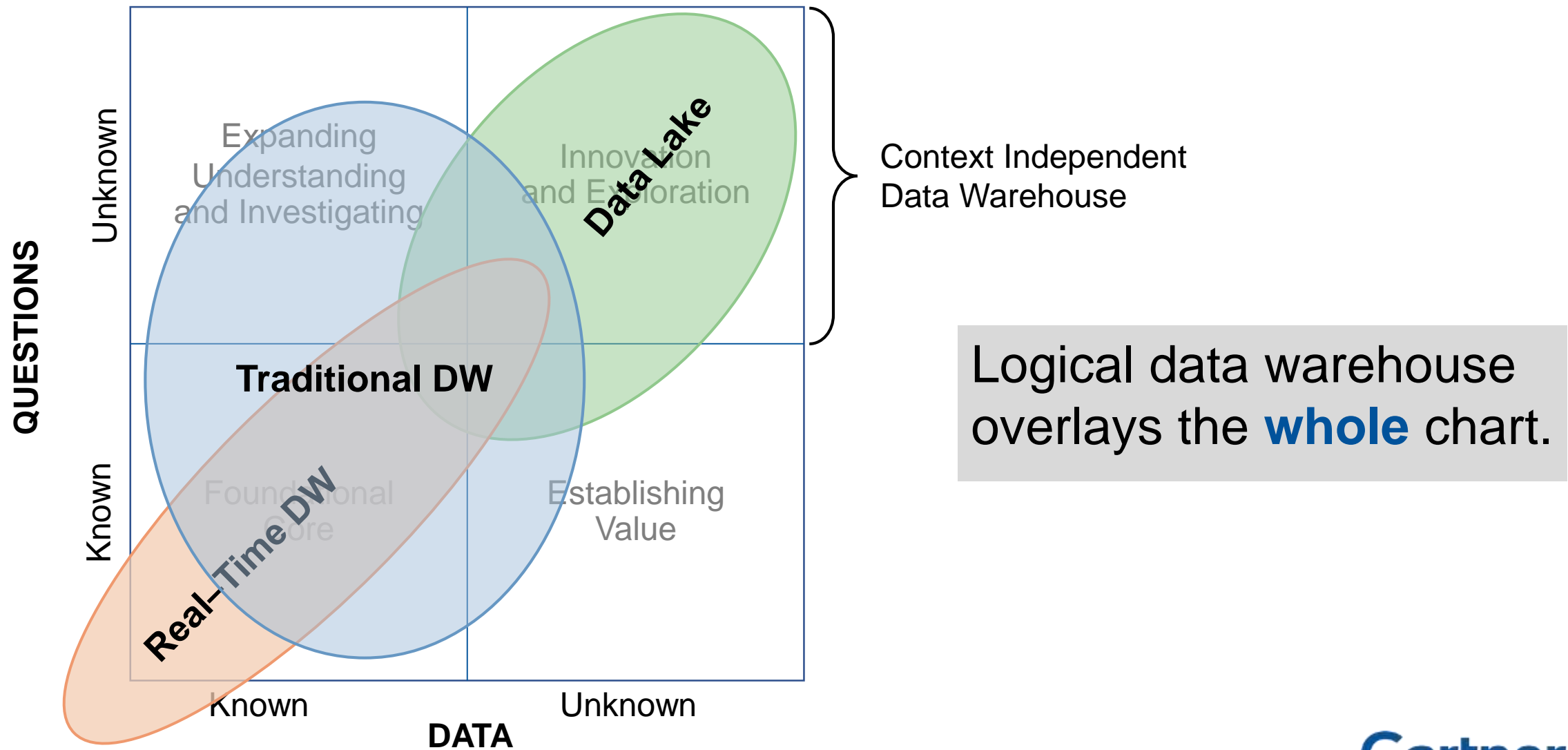


Look to your operational DBMS vendor for **both** transactional and analytical workloads.

The Data Management Infrastructure Model and the LDW



The Data Management Infrastructure Model and the LDW



Strategic Planning Assumption

By 2020, 30% of data lakes will be built on standard relational technology at equal or lower cost than Hadoop.

Why It Will Happen:

- RDBMSs are the enterprise standard and the ecosystem is very mature
- Application performance is superior
- Most RDBMSs support nonrelational data in multiple formats and can support a schema-on-read approach
- Not all "native format" data is nonrelational
- Most data going into data lakes is relational, from operational systems
- RDBMSs are not more expensive

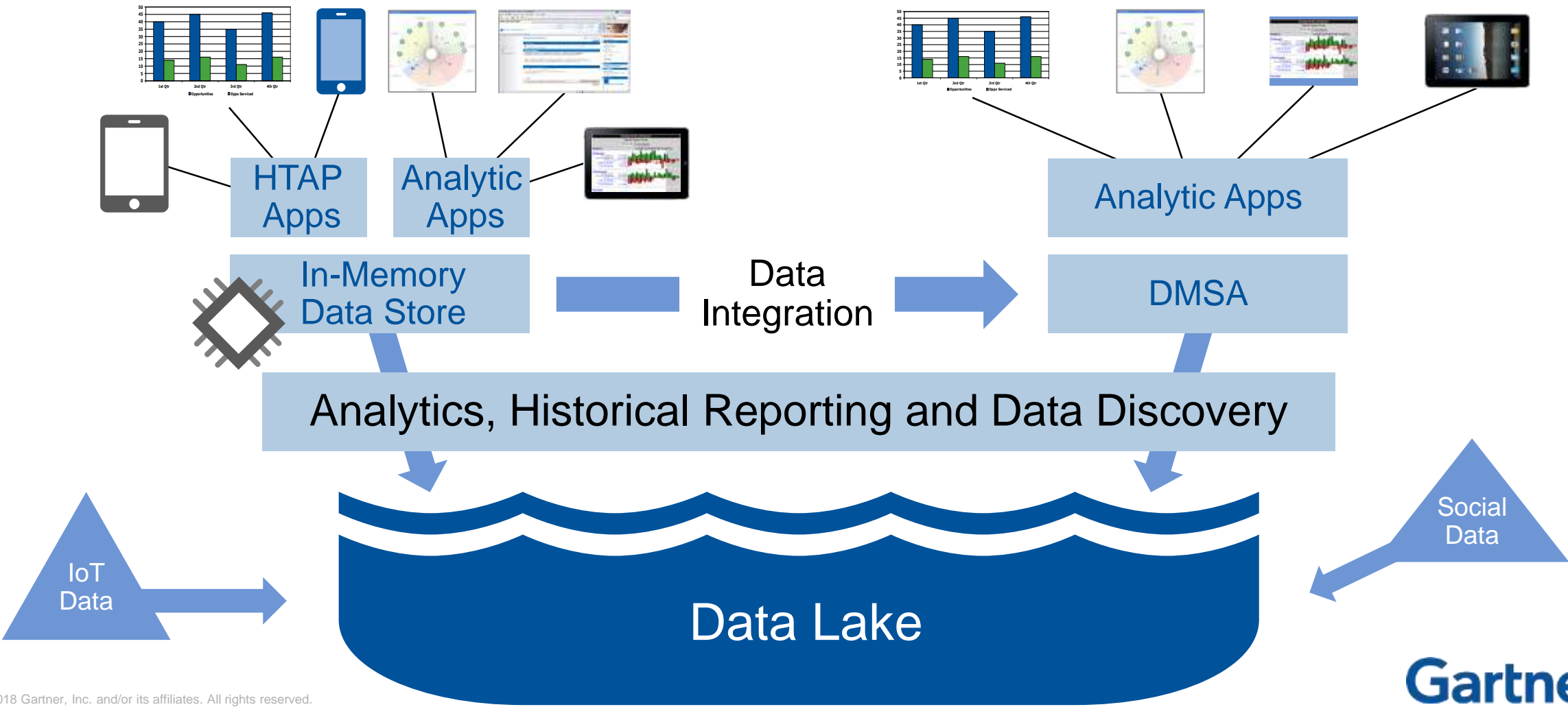
Why It Won't Happen

- Rapid ingest of data into schema-on-read platforms is easier than conforming to a relational model
- Increasing demand for analysis of nonrelational data that does not fit easily (or efficiently) into an RDBMS
- Cloud object stores replace HDFS

Traditional (With DMSA) → Future Data Architecture

Transactions + Operational Analytics

Traditional Reports and Analytics



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Magic Quadrants for Database Management Systems

Operational DBMS



From "Magic Quadrant for Operational Database Management Systems," 2 November 2017 (G00317993)

Data Management Solutions for Analytics



From "Magic Quadrant for Data Management Solutions for Analytics," 13 February 2018 (G00326691)

Nonrelational and Hadoop Distribution Vendors

Nonrelational Vendors

Document Stores:

MongoDB, IBM Cloudant, Couchbase, MarkLogic

Graph Databases:

DataStax, IBM, Neo4j, Titan

Key Value Stores:

Aerospike, Oracle, Redis Labs

Table-Style Databases:

Apache HBase, DataStax, Amazon DynamoDB

Hadoop Distributions

Megavendors:

Amazon, Google

Megapartners:

Dell, Hewlett Packard Enterprise, NetApp, Microsoft, Oracle, SAP, Teradata

Pure-Plays:

Cloudera, Hortonworks, Huawei, MapR Technologies, Transwarp

Specialists and pure-plays are **increasing but risky**; megavendors are acquiring, partnering or adding functionality (**multimodel**).

"The Clash of the Titans": Megavendors Embrace DBMS in the Cloud



- IBM Cloud PaaS Offerings
- Representative Products:
 - Db2 Warehouse on Cloud
 - Cloudant (Nonrelational dbPaaS)
 - Db2 on Cloud
 - Informix on Cloud



- Oracle Integrated Cloud
- Vertical Industry Solutions (SaaS)
- Representative Products:
 - Autonomous DW
 - Database Schema Service
 - Database Cloud Service
 - Database Exadata Cloud Service
 - Big Data Cloud Service
 - MySQL Service



- Perennial Leader in Cloud Services
- Mix of IaaS/PaaS/SaaS Offerings
- Focus on Pure Cloud, Not Hybrid
- Representative Products:
 - Redshift (DWaaS)
 - Amazon Aurora:
 - MySQL
 - PostgreSQL
 - Relational Database Service (RDS):
 - Oracle
 - SQL Server
 - PostgreSQL
 - MariaDB
 - MySQL
 - DynamoDB
 - Amazon EMR



- Azure Cloud Platform
- PaaS and IaaS Options
- "Cloud First" for New Features and Offerings
- Representative Products:
 - Azure SQL Database
 - Azure SQL Data Warehouse
 - CosmosDB (Nonrelational dbPaaS)
 - HDInsight (Apache Hadoop)
 - Azure Data Lake



- Deployment Choices for On-Premises and Cloud
- SAP Applications in the Cloud
- Easy Entry Point With Hana One
- Representative Products:
 - SAP Hana Enterprise Cloud
 - SAP Cloud Platform
 - SAP Hana One (on AWS)

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Megavendors establish cloud offerings and platforms to:

– Augment their on-premises offerings

– Defend against new cloud-focused vendors and cloud giants

Database PaaS Offerings in the Cloud

dbPaaS Examples

Analytics and Warehousing:

- Alibaba Analytic DB, HybridDB, MaxCompute
- Amazon Redshift, Amazon Athena, Amazon EMR
- Cloudera Altus
- Google BigQuery, BigTable
- Hortonworks Data Cloud for AWS
- IBM Db2 Warehouse on Cloud
- MemSQL Cloud
- Microsoft Azure SQL Data Warehouse
- Oracle Autonomous Data Warehouse Cloud
- Qubole Data Service
- SAP Cloud Platform
- Snowflake
- Teradata IntelliCloud

Operational:

- Alibaba ApsaraDB for RDS, ApsaraDB for Redis, ApsaraDB for MongoDB
- Amazon Aurora, Amazon DynamoDB, Amazon RDS
- CockroachDB
- Google Cloud SQL, Cloud Datastore, Spanner
- IBM Cloudant, IBM Db2 on Cloud
- Microsoft Azure SQL Database, Azure CosmosDB
- MongoLab MongoDB-as-a-Service
- Oracle Database Cloud Service
- Redis Labs Redis Cloud
- Salesforce Heroku Postgres

Recommendations

- ✓ Initially, consider cloud-based DBMS approaches for new applications or existing on-premises applications where:
 - Agility is required.
 - Data sizes are manageable.
 - Security concerns are minimal.
- ✓ Evaluate the nonfinancial benefits of dbPaaS and cloud implementations, such as greater flexibility, elasticity, global accessibility and built-in redundancy.
- ✓ Do not assume that nonrelational DBMSs (including Hadoop) must be used for unstructured data and data lakes.
- ✓ Begin to use new technologies, such as in-memory and HTAP, to manage data and implement new applications.

Action Plan for CDOs

Monday Morning:

- *Begin* a DBMS cost optimization plan to free resources for a transition of the data management infrastructure to support digital business transformation
- *Evaluate* specific use cases in your organization that can benefit from cloud

Next 90 Days:

- *Plan and begin* implementation of pilot projects using new architectures such as cloud, in-memory computing and nonrelational technology

Next 12 Months:

- *Build* an overall data management strategy for transforming the data infrastructure of the organization
- *Build* a business case and plan for implementing new data management use cases

Recommended Gartner Research

- ▶ [The State of Open-Source RDBMSs, 2015](#)
Merv Adrian and Donald Feinberg (G00273643)
- ▶ [Toolkit: Comparative Total Cost of Ownership Calculator for Cloud and On-Premises DBMS Deployments](#)
Adam M. Ronthal, Donald Feinberg and Rick Greenwald (G00309335)
- ▶ [How Will the Cloud Impact Your Choices for DBMS Deployment?](#)
Adam M. Ronthal and Donald Feinberg (G00274507)
- ▶ [When to Use New RDBMS Offerings in a Dynamic Data Environment](#)
Adam M. Ronthal (G00279241)
- ▶ [Are DBMS Appliances in Your Future? Don't Bet on It!](#)
Donald Feinberg and Adam M. Ronthal (G00274952)

For information, please contact your Gartner representative.