

# Mind the Gaps in DBMS Cloud Migration to Avoid Cost and Performance Issues

Published 10 September 2020 - ID G00719582 - 14 min read

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Neglecting price/performance comparison, apps conversion and ops conversion risks the success of DBMS cloud migration, resulting in unexpected cost spikes and missed optimization opportunities. Data and analytics leaders must address these critical planning areas when migrating DBMS to the cloud.

## Overview

### Key Challenges

- Neglecting workload planning and cost controls prior to DBMS cloud migration will lead to uncontrolled cost spikes during the operation life cycle of the cloud data store.
- Failing to properly assess the costs and effort required to convert DBMS operations will result in poor performance, missed cost savings, and can potentially add data latency issues and data transfer costs (egress charges) for the related applications (such as data integration and analytics platforms).

### Recommendations

Data and analytics leaders responsible for data management solutions who are planning to migrate their DBMS to the cloud should:

- Control unanticipated cloud DBMS workload costs by building a comprehensive workload pricing model and continue to use it to monitor costs after migration. A periodic assessment of the price/performance metric becomes essential in the cloud.
- Approach DBMS operations conversion as an innovation use case by adapting the agile principle of continuous improvement (stop-start-continue doing).
- Approach DBMS applications conversion as an optimization use case by rearchitecting, or even rewriting the apps with the best-fit cloud services. Do not lift and shift existing apps to the cloud as a first resort.

## Strategic Planning Assumption

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

## Introduction

Cloud is one of the current top 10 technology trends in data and analytics (see [Top 10 Trends in Data and Analytics, 2020](#)). DBMS cloud migration is a leading use case with a high demand in the DBMS market today – including migration support for approaches, tools and professional services.

When planning to migrate an on-premises DBMS to the cloud, data and analytics leaders must cover five critical areas, namely:

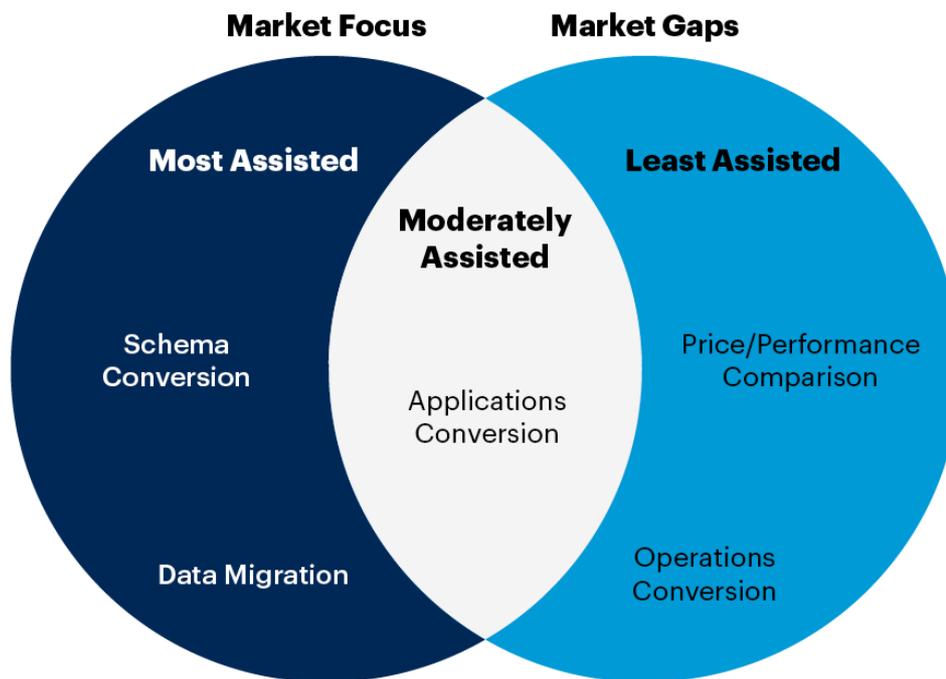
1. **Schema conversion.** Conversion of existing schema object definitions compatible with the target database engine.
2. **Data migration.** Replication of source data into the target database matching the target schema definitions.
3. **Applications (apps) conversion.** Converting the DBMS apps that are either packaged-software or custom-coded compatible with the target database engine. This includes conversion of existing SQL code compatible with the target database engine.
4. **Price/performance comparison.** The metric that compares the price you pay for the workload performance achieved.
5. **Operations (ops) conversion.** Conversion of DBMS ops activities compatible with the target database engine.

See Figure 1 for the various critical planning areas of DBMS cloud migration overlaid against the current market focus. Currently, cloud service providers (CSPs) and independent software vendors (ISVs) are predominantly focused on the first two areas, namely, schema conversion and data migration. Apps conversion is partly assisted. See Note 2 for a representative list of migration accelerators and approaches.

However, the lack of sufficient support in the last two planning areas, namely, price/performance comparison and ops conversion has put pressure on the data and analytics leaders to invest adequate effort for addressing these functional gaps. By neglecting these critical planning areas, organizations fail to deliver their cloud migration objectives. And in a worst case, they fail to complete the migration on-time, in-full, overspend against their cloud DBMS operational budget and miss optimization opportunities in the cloud.

### Figure 1: Critical Planning Areas for DBMS Cloud Migration

## Critical Planning Areas for DBMS Cloud Migration



Source: Gartner  
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So how should organizations plan their DBMS migration to the cloud without neglecting the functional gaps in the market? This research gives the necessary insights data and analytics leaders need to address the functional market gaps effectively.

In the context of this note, DBMS is a software for managing a data store – ranging from a general-purpose database to a data warehouse, a data lake or a nonrelational database. In case your migration target DBMS is on-premises, you can follow the guidance in Note 3.

### Analysis

#### Address “Price/Performance Comparison” by a Thorough Assessment of Workloads

According to Gartner’s Cloud Adoption Survey, <sup>1</sup> there is an overwhelming agreement that use of public cloud leads to cost savings. On average, respondents who indicated that their organization saved on cost estimate savings at 21%. However, cost savings are not a guaranteed default outcome in the cloud. It takes a shift in focus – from managing scarce physical resources on-premises to managing scarce budgets in the cloud.

When planning the cloud DBMS workloads, organizations must account for two scenarios:

1. **Existing workloads.** The current consumption of system resources meeting established SLAs.

2. **Net new workloads.** The additional resources required in the cloud to meet the new business demands.

Knowing your existing DBMS workloads — such as the current query and transaction patterns, and understanding what they cost — is the basis for comparing the price/performance metric against the cloud data store. If an organization is not tracking this, there is likely to be a perception that on-premises workload is “free” (not because it is, but because it is already paid for). You need to understand the cost per workload in on-premises offerings in order to compare it against cloud offerings. Most organizations fail here. A pricing model that is misaligned to the actual consumption can result in overspending; therefore, an upfront assessment of the workloads is essential.

A typical cloud DBMS pricing model falls under one of two broader categories:

1. **Resource-based pricing.** The amount of allocated cloud resources as the pricing metric.
2. **Consumption-based pricing (also called, serverless).** The amount of work done as the pricing metric.

There are a few variants such as burst, bounded and blended pricing models. In general, consistent workloads benefit from resource-based models, while unpredictable workloads benefit from consumption-based models (see [New Pricing Models for Cloud DBMSs Provide Cost Optimization Opportunities](#)).

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*Price/performance metric comes down to the following assessment points:*

1. *Can I run my workload on this service offering?*
2. *Can I get the performance I need?*
3. *If I can do both 1 and 2, can I do it at a cost that is acceptable to me?*

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Follow the primary gating factors, as illustrated in Figure 2, by running a proof of concept on cost against a fixed set of queries. With a clear understanding of the baseline costs in the cloud DBMS, you can extrapolate these for comparison against the current DBMS licenses and operations costs over a long term such as five years. However, the order of precedence for the secondary gating factors is subjective for enterprises (for guidance with the secondary gating factors, see [Toolkit: Comparative Total Cost of Ownership Calculator for Cloud and On-Premises DBMS Deployments](#)). You can tailor the flowchart described in Figure 2 to accommodate your priorities — for example, in iterative stages with a short-, medium-, long-term view.

Figure 2: Price/Performance Comparison Flowchart

### Price/Performance Comparison Flowchart



Source: Gartner

<sup>a</sup> Currently, you pay a single-budget item: refreshed every five years fixed cost including server, software, storage, annual maintenance  
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As you track costs, identify what factors lead to spikes in spending and preempt them by implementing guided practices with vendor assistance, and validating contractual agreements by suitable workload tests (see Note 1). Hence, an early engagement with the DBMS vendor and/or cloud service provider is critical. You can preempt spikes in spending by implementing guided best practices to cap spending limits (see [Overcome Economic Uncertainty Through Financial Governance of Your Cloud Data Management Environment](#)).

Finally, you must regularly monitor the price/performance metric over the operational life span of the cloud data store. Analyzing price/performance trends will reveal whether this key metric is getting better or worse over time. If it is getting worse, it is likely that your workloads have changed and you are trying to do more with the same budgeted resources. The other possibility is that your workloads have changed and are no longer optimal for the service you've deployed them on. Either way, the issue needs to be addressed as part of a broader cost optimization initiative.

### Address "Ops Conversion" by Exploring Cloud Services for Innovation

DBMS ops conversion is best handled as an innovation use case — the ability to try new things. According to Gartner's Data Management Drivers Survey,<sup>2</sup> 22% of data management tasks are focused on innovation use cases. What about your organization? Are you spending enough time innovating, or are you exhausted from simply running your DBMS operations?

**Let your ops conversion planning approach follow the agile principle of continuous improvement: "What are we going to stop doing, continue doing and start doing?"**

Your current DBMS operations environment will significantly change as a result of the cloud migration. If you plan well, this change can be highly rewarding – as it can simplify your current ops activities, including:

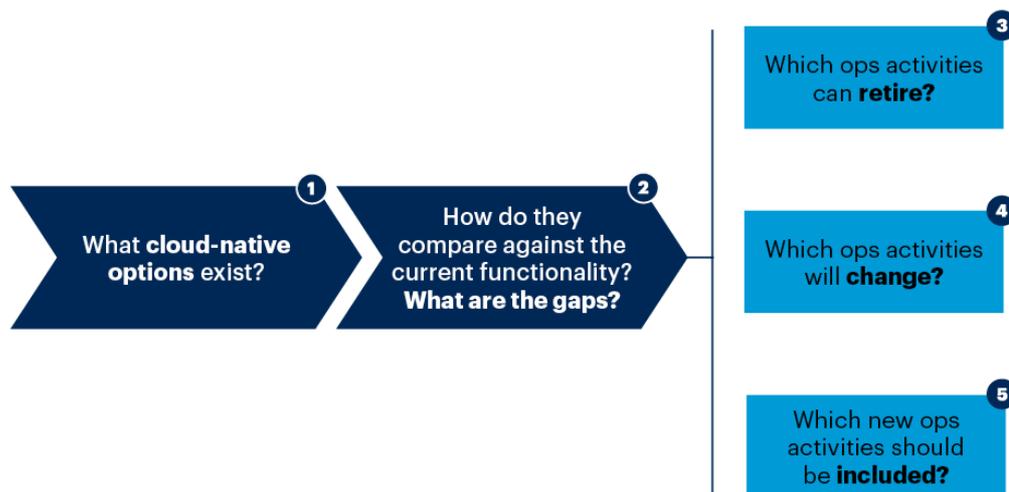
- Monitoring operations such as security, storage and audits
- Performance-tuning operations such as indexing, statistics collection and partitioning
- Housekeeping tasks related to backup cycles and recovery points
- Ongoing maintenance schedules such as version upgrades, security patches and testing version compatibilities
- Capacity planning tasks and system capacity upgrades

With a database platform as a service (dbPaaS), you do not have hardware or software to install, configure or manage. In most cases, you do not need to perform regular maintenance yourself. And in a very few cases, you do not need to performance-tune your cloud data store. Follow the gating factors as illustrated in Figure 3 to address ops conversion.

Figure 3: Operations Conversion Flowchart

### Operations Conversion Flowchart

Primary Gating Factors



Source: Gartner  
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Encourage your teams in both the learning and the unlearning aspects as part of the cloud transition. It is essential to let go some of the old ways of working in order to use the cloud effectively. Build your team competency by deep exploration of the ops capabilities in partnership with your cloud DBMS vendor. Avoid knowledge gaps by upskilling your team with suitable training

and certification plans, and by testing those skills while building prototypes and live systems. The most essential factor in scaling data infrastructure modernization is to go for quick wins that build your team's confidence (see [Overcoming Resistance to Data Infrastructure Modernization](#)).

## Address “Apps Conversion” by Exploring Cloud Services for Optimization

DBMS apps are either a packaged-software or a custom code serving specific business purposes – varying between operational and analytical use cases. Your decisions must be guided by a thorough assessment of your apps' workload (see [Liberate Applications for Migration by Disentangling Data](#)).

**Your overall objective should be to reduce the license costs of the underlying DBMS, followed by the decision point: Do the migration costs justify the ROI?**

When assessing apps conversion, you must cater for two primary gating factors:

1. **The cost to convert apps.** A combination of various approaches including migration, rewrite or replace.
2. **Prioritizing apps rollout.** Determining the migration order of apps with a positive ROI (effort vs. business value) in two to three years, three to five years and over five years.

Apps conversion planning must cater for conversion of the existing SQL code – either predefined scripts like stored procedures, or runtime-generated scripts by applications such as a data integration tool or a reporting tool – compatible with the target database engine.

With packaged apps, your choices are limited by the vendor support for target cloud data stores. These may be better replaced in the cloud as SaaS if the vendor does not support a suitable cloud DBMS. But when you have written the app, you have the possibility to migrate to a dbPaaS. Custom code written specifically for one DBMS is migrated either by converting or by rewriting for the target DBMS. In such cases, you will need to explore further gating factors, including:

- How much custom code is there?
- How complicated is the code?
- Can I benefit from third-party SQL compatible database engines?
- What's the effort required for rewriting the app?

- How do I test for migration accuracy, etc.?

With a data warehouse (DW), usually there are multiple apps within the cluster – the current set of analytics and business intelligence tools that consume data from the DW, the ETL tools that provide data, the related metadata management solutions, etc. In most cases, it would be endpoint changes and addressing any gaps due to lack of SQL compatibility against the preferred cloud data store. Sometimes, the syntax for the SQL may be the same but there can be subtle semantic differences; hence, testing is an essential step in app conversion.

If compatibility can be proven, then it becomes a case of understanding data latency (delay between user request to DBMS and receiving data at the consumer end like a BI application) and egress costs (charges applied by CSPs for the volume of data leaving the cloud) as a result of moving your DBMS to the cloud. The decision to move all the members of a cluster (not just the DBMS) as a cohesive whole to the same cloud region will typically result in the best overall performance by reducing the potential impact of latency due to an architecture spanning hybrid cloud deployment (see [Understanding Cloud Data Management Architectures: Hybrid Cloud, Multicloud and Intercloud](#)).

Moreover, moving DBMS to the cloud enables new deployment models such as spinning up sandbox environments. Though such capabilities may lead to additional costs in the cloud, they could potentially accelerate the development and deployment cycles. These costs are not quantifiable until you practice them, but will eventually contribute to the overall ROI.

## Acronym Key and Glossary Terms

Apps	applications
CSP	cloud service providers
DBMS	database management system
dbPaaS	database platform as a service
ISV	independent software vendor
Ops	operations
SaaS	software as a service
SLA	service-level agreement

## Evidence

1. Gartner's Cloud Study 2018. This survey was conducted online from October through November 2018, among 1,200 qualifying participants, of which 1,000 worked in organizations that currently invest in cloud, and 628 work in organizations that use public cloud. The respondents were interviewed in native language across the U.S. (18%), Canada (8%), U.K. (13%), Germany (13%), France (8%), China (13%), India (8%), Australia (8%), Mexico (8%) and Brazil (8%). The survey was developed collaboratively by a team of Gartner analysts who follow these markets and was reviewed, tested and administered by Gartner's Research Data and Analytics team.
2. Gartner's Data Management Drivers 2019. This survey was conducted online from August through September 2019 with Gartner Research Circle Members in the form of a Gartner-managed panel. There were 129 respondents for this survey. The survey was developed collaboratively by a team of Gartner analysts and was reviewed, tested and administered by Gartner's Research Data and Analytics team.

## Note 1: Quick Determination of Suitability of the Target Cloud Store

Migrations are often more expensive and disruptive than initially planned. Many organizations would not want to commit weeks of investigation for a project that may turn out to be too expensive to undertake, especially when the goal is to end up with a positive ROI. The most important determinations for a go/no-go decision for a migration are: if the target platform can run challenging workloads, if the target platform can scale reasonably as workloads increase, and how costs will increase with increased workloads. You can make these determinations by following a straightforward approach as shown below:

1. Select a highly challenging workload and run it on the target platform. This test will determine if the target platform can address the demands of your difficult jobs.
2. Run this same workload simultaneously multiple times. This test will demonstrate how the target platform will scale for concurrency.
3. Add additional workloads into the mix, running each of them multiple times. This test will demonstrate how effectively the target platform uses resources with workload management.

## Note 2: A Representative List of Migration Accelerators/Approaches

Simplify cloud DBMS migration efforts by taking the assistance of various accelerators and approaches from cloud service providers (CSPs) and independent software vendors (ISVs). Here is a representative list:

1. AWS Database Migration Service

2. Azure Database Migration Service
3. CompilerWorks Transpiler Solutions
4. Datometry software approach to replatforming
5. Denodo data virtualization for cloud migration
6. EnterpriseDB compatibility with Oracle database
7. Informatica cloud-first application modernization assistance
8. migVisor Cloud Database Migration Assessment Services
9. PeopleSoft on Oracle Cloud
0. Varigence BimlFlex metadata-driven automation
1. WANdisco LiveData Cloud Services

**Caution: No tool can do it all – accelerators can minimize the migration effort and reduce manual errors.**

### **Note 3: Applicability of the Critical Planning Areas for On-Premises DBMS Migration**

The five major planning areas covered in this research – schema conversion, data migration, apps conversion, price/performance comparison and ops conversion – are also applicable for DBMS migration on-premises. However, some areas are more important in cloud than on-premises migration. For example, the price/performance metric is far more important when migrating to the cloud, requiring continuous monitoring due to the potential variability of costs. Whereas with on-premises migration, once you have invested in a solution, you will have consistent costs for several years to follow. Also, with on-premises migration, the operating systems and other system-level functions (such as scheduling) are likely to remain unchanged; whereas all of them will change when moving to the cloud.

### **Recommended by the Authors**

[Understanding and Planning for Database Management Transformation to the Cloud](#)

[How to Succeed at Database and DBMS Migration](#)

[Cloud Data Warehouse: Are You Shifting Your Problems to the Cloud or Solving Them?](#)

### Recommended For You

[How to Succeed at Database and DBMS Migration](#)

[The Future of the DBMS Market Is Cloud](#)

[How to Avoid Data Lake Failures](#)

[Cool Vendors in DataOps](#)

[There Is Only One DBMS Market](#)

### Supporting Initiatives



[Data Management Solutions](#)



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