

## White Paper

# Enabling Database Excellence: Moving the Database to Managed Services

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## IN THIS WHITE PAPER

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Enterprise IT is undergoing massive transformation led by technologies that enable the virtualization, dynamic deployment, and elastic scalability of resources. Coupled with professional management services in the cloud, these technologies offer more control and cost-effective management of IT systems than has ever been seen before. This is particularly important in the database sphere. Without cloud managed database services, databases are managed manually through fixed compute and storage resources acquired for fixed periods and maintained by the datacenter staff.

For decades, that was the only way to manage databases. But in recent years, an alternative has arisen, which is to move the database workload to a managed database service in the public cloud. In this way, while teams of professionals in the service do the work of provisioning and patching, the enterprise database staff can work to ensure that the data needs of the business are being met and that the data team can excel in supporting the enterprise mission. This white paper examines the issues involved in manually managing a database in the datacenter contrasted with either deploying a manually managed database in the cloud or subscribing to a managed cloud database service. It considers the benefits of moving to a managed cloud database service and provides actionable advice regarding how to proceed.

## SITUATION OVERVIEW

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### Issues Involved in Database Management in an On-Premises Datacenter

Managing databases in the datacenter has long been a challenge. Enterprises often overprovision to avoid being caught short of necessary resources for peak periods, resulting in wasted spending on database resources that may not be needed. They also often make mistakes configuring servers and storage, the settings of which must be constantly updated. Operations teams perform backups and system maintenance, and DBAs spend so much of their valuable time tuning the database that they are unable to provide the kind of direct support to developers and data analysts that they would like. Upgrade and security patches often go unapplied because the effort is too disruptive to datacenter operations, resulting in security vulnerabilities and software compatibility issues.

Because configuration changes, including adding or expanding databases, are slow and costly, requiring considerable staff time and hardware investment, they are done slowly and deliberately. Development teams must wait for resources to become available for test databases, and the test

databases must be set up and configured by DBAs and operations staff. This means that development teams must delay or consolidate projects, sometimes for weeks and even months. Analysts assigned to extract, organize, and analyze data for some short-term purpose, such as a marketing campaign, can't simply provision a database themselves; they need to wait for it to be provisioned and configured. By the time the database is provisioned, it may be too late to have any impact.

## Moving to the Cloud: What Does It Entail?

### *Cost Comparison*

The costs associated with running databases on premises are often underestimated. A summary follows:

- **Servers.** Enterprise databases usually require dedicated servers. They are purchased on depreciation schedules of three to five years, so the server capacity is calculated based on the anticipated requirement for peak demand at the end of the depreciation period.
- **Storage.** Enterprise databases usually also require dedicated storage volumes because competing activity can slow performance. Again, they are purchased on a three- to five-year depreciation schedule and sized to meet the expected capacity requirement at the end of that period.
- **Software.** In addition to DBMS software licenses, licenses for various tools and utilities, and for data integration packages, may also be required, depending on the configuration.
- **Standby servers and storage.** In many cases, enterprises also provision standby servers and storage in case the production systems go down. They may also replicate the data from the production server to the standby server. This could as much as double the storage and server cost.
- **Development/test systems.** Some enterprises have dedicated development systems (servers and storage) for each database, while others require the sharing of resources. In any case, it is generally true that testing can be run for just one project at a time.
- **Networking.** Some DBMSs require special private networks such as Gigabit Ethernet connecting servers and storage. These must also be maintained.
- **Staff.** Sufficient full-time staff must be employed to maintain the servers and storage, perform routine maintenance on the software including the operating systems, oversee and manage backups, and so forth. This staff is in addition to the DBAs who build, tune, and maintain the databases.

If the database is being run in a manually managed way using cloud resources, the cost factors are similar to those mentioned previously. Obviously, instead of acquiring infrastructure (servers, storage, and networking), one must pay for infrastructure services offered by the cloud services provider. Otherwise, however, the cost profile is very similar.

Let's compare these costs with the costs of a managed database service in the cloud. Those costs include:

- A subscription fee for use of the managed database service – structured to fit your needs, usually with some fixed value and variability based on usage. The subscription fee covers the deployment and management of the database software, including patch management, and often also includes the provisioning of a failover database. Additional fees may be applied to databases that are provisioned and used only occasionally, such as test databases and those for special analytic projects, but in such cases, you only pay for what you use.

- You still need DBAs to build, tune, and maintain the databases, but all the system and software maintenance activities are covered by the subscription fee.

## ***Moving Expenses***

Moving to the cloud is not free. It may be necessary to modify applications or even convert them into a more cloud-friendly form in order to take advantage of such cloud features as elastic scalability. If you are moving data from one type of database to another, there will also be a project involved to convert the data. Many enterprises employ consultants, who are experts in such things, to carry out these projects.

## ***Current Trends***

IDC has found that the approach to database cloud migration varies. Smaller enterprises and some departments and lines of business, which mainly depend on packaged applications, simply switch from an on-premises application to a SaaS equivalent and then migrate relevant data from the old application to the new one. Larger enterprises tend to be more cautious. They start by committing to analytic databases, which are easier to move and are not operationally interdependent with other systems. They also adopt cloud managed database services for their test and development database needs.

The largest enterprises prefer to adopt a hybrid cloud approach, converting their applications and databases on premises in a local cloud environment so that they can maintain operationally close connections with unconverted applications. This is a stepwise approach that enables a gradual, piecemeal approach to moving applications and databases to the cloud. It is the expectation of IDC that most such deployments will eventually migrate to the public cloud, and it seems likely that in time enterprises will adopt managed database services in the cloud as their preferred method of database deployment.

## ***Cloud Benefits***

The following are clear benefits from a move to a managed database service in the cloud:

- Reduced staffing concentration on operational tasks because maintenance of the software and systems is part of the service, enabling more attention to higher-value tasks involving making the database more responsive to the needs of the enterprise
- Reduced risk of human error that could impact operations because the systems are maintained by trained professionals who are intimately familiar with their own technology
- Scaling as needed, without an up-front cost associated with capacity that may not be needed for years
- Dynamic provisioning of resources for special projects and for test and development databases, enabling greater organizational agility and responsiveness to business needs and opportunities
- Timely software maintenance because bugs are fixed continuously, rather than being batched up into patch releases, and because the user organization does not need to disrupt operations by applying patches
- High availability (HA) as part of the service, including backup and, in rare cases, recovery services, with the provisioning and management of standby systems included (Some managed database services may also offer instant failover without data loss in case of an interruption of service.)

## Choosing the Right Target

Most enterprise databases migrating to the cloud are relational. If you are considering migrating some other sort of DBMS, such as document, key value, or wide column, your best option will probably be to move to either a managed database service for the same DBMS or a managed database service that is wire compatible with the DBMS you are already using. The balance of this section assumes the migration source is a relational database. Your options in this regard are discussed in the sections that follow.

### *Stick with What You've Got*

Some enterprises may choose to simply move their existing applications and databases to the cloud and run them there while executing application and database conversion in parallel. For fairly simple applications and databases, this works fine, but IDC has found that for large and complex ones, costs can get out of hand, and it's better to convert first.

### *Consider Other Commercial RDBMS Options*

Since you are making substantial changes anyway, perhaps part of the effort should involve switching from your existing RDBMS to one that is better suited to the target cloud environment. It is important to keep an open mind. Most major RDBMSs have cloud-friendly versions though, so they shouldn't be written off.

### *What About Open Source RDBMS?*

Many users are considering a move to open source. While attempting to run open source without support is not recommended, there is a wide variety of managed open source cloud RDBMS offerings out there. The positive aspect of this is that open source software is developed and maintained by armies of volunteer engineers and is very stable. The negative aspect can be that for especially demanding database workloads, the open source option may not offer the performance, scalability, or special features required.

### *Could NoSQL Be the Right Choice?*

If your database does not require support for full SQL queries, it may be a candidate for redeployment on a NoSQL database. Such databases can offer simplicity, greater developer control (and therefore development agility), high throughput, and scalability. The main drawback is that a NoSQL database puts more of the onus on developers for maintaining the consistency and integrity of the data.

## The Advantages of a Public Cloud Platform Provider DBMS

Cloud platform providers also offer DBMSs as aspects of the overall service. These can include relational or NoSQL database services, and they may be based upon open source, in some cases, usually optimized for the cloud environment. The advantage to this is that the database system is well integrated into the cloud platform and maintained in a cadence with its environment (which is not the case with a third-party DBMS). It also offers an integrated support environment so that if there is a problem, the user calls one number, not two (or three or four).

## What Additional Benefits Can AWS Bring to the Table?

Amazon Web Services (AWS) offers a variety of managed database services for various purposes. These include the following:

- Amazon Relational Database Service (Amazon RDS), a managed database service for commonly used commercial RDBMSs, including Oracle Database and Microsoft SQL Server
- Amazon RDS for open source RDBMSs, including PostgreSQL, MySQL, and MariaDB
- Amazon Aurora, an RDBMS optimized for the AWS environment that can be used with either MySQL or PostgreSQL protocols, managed under the RDS umbrella
- Amazon DynamoDB, a key value store especially useful for high-volume transaction data, "edge" data, customer experience data, and the like
- Amazon DocumentDB (with MongoDB compatibility), a document DBMS with a MongoDB-compatible interface for managing JSON document, especially useful for session data management, device data management, and high-performance business applications
- Amazon Redshift, an RDBMS with a PostgreSQL-compatible interface for use as a data warehouse platform.

In support of the adoption of these database services, AWS offers a data migration capability called AWS Database Migration Service that enables users to move and, if necessary, transform their data to build managed database service instances of the types listed previously from existing enterprise databases. AWS offers these managed database services together with the full richness of its cloud platform, configurable using an easy-to-use configuration manager. In addition, AWS offers a hybrid cloud enabling appliance-like service called AWS Outposts that allows for physical systems to be placed in the datacenter; those systems operate in the AWS environment and integrate with the AWS cloud platform.

## FUTURE OUTLOOK

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The cloud is becoming a key platform of the future, and while IDC believes that some workloads will always remain either in the on-premises datacenter or, in some cases, in the field, most database workloads that are not location dependent will end up in the cloud, running on one of the major managed cloud platforms. The choice of cloud platform is key, and it is up to the user to decide which has the best long-term potential for the user's business. Cloud databases will also advance, and AWS, with its multifaceted approach, has a strong strategy for future DBMS development.

## CHALLENGES/OPPORTUNITIES

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AWS faces challenges from the other major managed cloud platform providers and, in the database realm, from managed cloud database service providers. Of course, a large portion of the latter will find themselves supporting databases that run on AWS. To win over customers to the AWS database services, AWS must not only succeed with its DBMSs individually but also demonstrate the synergies across DBMSs and show how, for users, the sum is greater than the parts.

## CONCLUSION

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Enterprises around the world, both large and small, are engaged in an inexorable process of migration toward the cloud, with the ultimate destination for most production data being in the public cloud.

These enterprises are taking different paths: some are switching key applications to SaaS versions and using their managed database services, some are redeploying their databases as manually managed databases using cloud infrastructure services, some are redeploying their database in locally managed (private) cloud configurations, and some are migrating straight to managed database services in the public cloud. Most are likely to end up moving most production data to managed database services in the public cloud because the economics of such a move are extremely compelling.

Enterprises considering such a move should take into account the following:

- Moving data to a manually managed database in the public cloud is at best a short-term option because the savings from such a move are not compelling and, in some cases, could actually prove more expensive than keeping the data on premises.
- Moving data to a managed service in the public cloud relieves the enterprise of the responsibility of managing the database server instances, including software upgrades and patches; the responsibility of maintaining backup and recovery facilities; and the responsibility of handling high availability/disaster recovery (DR) issues; and frees staff time for more high-value work that serves directly the needs of the enterprise.
- Managed database services offered by the public cloud service provider often include optimizations built into the environment that ensure better performance, more flexible deployment, and more cost-effective operations than those offered by third parties, though such a move also represents a significant commitment to that public cloud.
- In planning any such move, one should consider factors such as SQL compatibility, stored procedures migration (if one has stored procedures), the ability of staff to adapt to the new DBMS, issues with application code conversion, and whether this move fits into a larger strategy of public cloud adoption.

It seems clear that the public cloud is the platform where most enterprise data will reside and that a managed database service is the most sensible path for managing such data. Choosing the right managed database service must be done carefully, with an eye to the long-term implications of such a move.

## About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

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