Database Management Trends in 2022

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Historically, Database Management systems (DBMS) were simple software programs and associated hardware that allowed users to access data from different geographical locations. The system offers its users the ability to store data without concerns about structural changes, or the data's physical location. Additionally, a Database Management system (DBMS) can set restrictions on the data being used, and the services available to each user.

DBMSs are changing, however. They are expanding, taking on more responsibilities, and providing smarter answers. As new goals and problems present themselves, the desire to find new ways to use Database Management systems prompt unique solutions. Many of these innovations are available only in cloud-based DBMSs. As Database Management systems develop new features and new options, it makes sense to reexamine the organization's current system, and consider all new options.

The coronavirus pandemic, with its emphasis on isolation, has accelerated the acceptance of online shopping and working remotely. Many small businesses have made the decision to digitize and are shifting to the cloud at an accelerated rate.

The market for Database Management systems is growing fast and, according to Research and Markets, the global DBMS market was estimated to have reached $63.9 trillion in 2020, and is projected to reach $142.7 trillion by 2027.

Increasingly, organizations are merging their data warehouses and lakes into cloud storage systems. Shifting to the cloud requires a Database Management system (DBMS) for working with a broad range of new data formats.

Database Management trends in 2022 include:

- Cloud-based DBMS
- Automation and DBMS
- Augmented DBMS
- Increased security
- In-memory databases
- Graph databases
- Open source DBMSs
- Databases-as-a-service

These trends are based, to a large extent, on businesses wanting to provide access to their products and services over the internet, with the goal of maintaining (or increasing) profits during the pandemic.

Cloud-based DBMS

The Gartner report *The Future of the DBMS Market Is Cloud* predicts the use of cloud-based DBMSs will increase. The market for Database Management systems is being driven increasingly by cloud services, and no longer by on-premise systems. Certainly, there are large organizations still using on-premises DBMS solutions, however, they are combining it with a cloud-based DBMS and using a "hybrid" approach.

The choice of using a cloud-based DBMS service is being supported, in part, by a shift toward using software-as-a-service applications. This is a very reasonable alternative to the upfront expenses required for deploying an on-premise Data Management system. Improved data sharing, improved data integration, and data security are also reasons for using a cloud-based Database Management system.

Database Management Trends & Automated Services

Automated services can help streamline the process of Database Management. An automated DBMS can help significantly in sifting through the massive amounts of data generated by eCommerce, mobile applications, customer relationship management, and social media. As a consequence, organizations are experiencing enormous surges in the amounts of data being stored. These massive amounts of data can be used to the business' advantage, providing useful insights about their customers and products.

Data automation supports the uploading, handling, and processing of data by automated tools, rather than performing the tasks manually. Automating data processing improves efficiency by working much faster than could be done manually, and by eliminating human error.

Having automation as part of the data analytics process allows researchers to focus on analyzing the data instead preparing it. Automation also helps improve the integration of data from multiple data sources to a single one. Examples of DBMS automation that is used on a daily basis include:

- Customer support
- Employee analytics
- Purchase order automation
- Desk support
- Scheduling meetings

DBMS automation is also being used to provide security, data integration, and Data Governance. Most organizations must meet several compliance requirements, and DBMS automation helps to meet them. The GDPR, for instance, requires user data be anonymous and used for statistical purposes before it is shared with external partners, and this can be done with automated services.

Augmented Data Management (ADM)

Augmented Data Management uses machine learning and artificial intelligence to automate Data Management tasks, such as spotting anomalies within large amounts of data and resolving Data Quality issues.

The AI models are specifically designed to perform Data Management tasks, taking less time and making fewer errors. Todd Ramlin, a manager of Cable Compare, in describing the benefits of augmented Data Management, said,

"Historically, data scientists and engineers have spent the majority of their time manually accessing, preparing, and managing data, but Augmented Data Management is changing that. ADM uses artificial intelligence and machine learning to automate manual tasks in Data Management. It simplifies, optimizes, and automates operations in Data Quality, Metadata Management, Master Data Management, and Database Management systems. AI/ML can offer smart recommendations based on pre-learned models of solutions to specific data tasks. The automation of manual tasks will lead to increased productivity and better data outcomes."

Data Security (and Avoiding Data Breaches)

There have been several high-profile data breaches in the last year. For example, LinkedIn was breached in June 2021, resulting in 700 million users having their information sold online. In September, the retailer Neiman Marcus was breached, with 4.8 million customers being affected. In October of 2021, it was announced the information of 1.5 billion Facebook users was put up for sale in a hacker's forum. And those are just a few of the hundreds of data breaches taking place in 2021. In the state of Washington, the number of known breaches went up from 220 last year to 280 in 2021.

Security has always been a consideration for database administrators, but the recent breaches have made it a primary concern. As a result, increased database security has become a trending issue.

In-Memory Databases

In-memory databases are gaining popularity because they respond faster than traditional systems. An in-memory database (IMDB) eliminates the disk drive, and instead stores data in the computer's main memory – its random access memory or RAM. This tactic reduces response times.

The lowered response times is made possible because there is no need for translation and caching. The data being used remains in the same form as when it arrived, and in the same form as the application working with it. These databases are commonly used by applications that depend on rapid response times and offer real-time Data Management. The industries operating and benefitting from in-memory databases include banking, travel, gaming, and telecommunications.

The Graph Database

Graph databases provide an excellent way to establish and research relationships in a quick and easy way. They use nodes and edges to form data relationships (nodes represent entities, and edges represent their relationships). Graph databases are designed to assign the relationship between data entities with the same importance the data receives. The design results in only the data which is needed being accessed, while unnecessary data remains untouched, making data retrieval more efficient.

Currently, graph databases are being used with network and IT management. They have been used for accessing social media and providing business intelligence, and for finding anomalies and enhancing security. More recently, graph databases have started being used successfully with:

- Network management
- Telecommunications
- Impact analysis
- Data center and IT asset management
- Cloud platform management

Open Source Databases

Ten years ago, "open source" Database Management systems were not as commonly used as they are now. They are now used by 7% of the market. Open source technologies generally evolve and develop quickly, and this includes databases. Open source technologies are typically designed to minimize the barriers of adoption, and are extremely attractive to apps developers working with cloud-native platforms.

Gartner has predicted that by 2022, over 70% of the new in-house applications created will be developed using an open source DBMS (OSDBMS), or a cloud-based OSDBMS platform-as-a-service. Open source has shown itself to be a successful method for tapping into creativity and problem-solving skills. It has been used to develop and distribute useful business-critical software, and its use will continue to grow.

The Database-as-a-Service

Generally speaking, in the past databases were not designed to work with microservices. Databases were normally monolithic. Monolithic architecture is the traditional way of developing applications. Monolithic software is developed as a single, indivisible unit. Monolithic applications typically lack modularity and use one large code base.

The Database Management trend of using databases-as-a-service is based on the behavior of development teams designing and building applications, while using a microservice. When an application "interacts with a database," the data is shared by all the application's components.

With a microservices app, however, the data is not shared, but decentralized. Each microservice is autonomous and comes with its own private data storage, relevant to its functionality. One service cannot modify the data stored inside another service's database. This creates a conflict for integrating microservices with a DBMS.

Fortunately, many new database offerings (primarily NoSQL vendors like AWS DynamoDB and MongoDB) support the flexibility, redundancy, and scalability requirements, and the serverless architecture pattern needed for microservices.

Until recently, DBMSs have been considered consistent, trustworthy structures that offered reliability without drama. However, with the pandemic acting as an accelerant, databases are

evolving to process data more efficiently, while simultaneously becoming more intelligent. To access this evolution, and embrace the economic benefits offered by the cloud, businesses are increasingly shifting to cloud databases.

Currently, a large part of the DBMS market's growth is being driven by organizations moving their Database Management systems to the cloud, which provides faster integration and configuration. Additionally, improved security protocols and superior tools have made remote work a more reasonable option, and has had significant impact on the market's current growth. The increasing number of demands being made on DBMSs – and the increasing number of solutions – makes research a key step in selecting a new Database Management system.

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