

# The Multi-Model Database: Enabling Business Transformational Applications



## Introduction

More fundamental changes to information technology have occurred in the last five years than during any other period in the industry's history. Mobility, new device types, big data, the Internet of Things and other initiatives have resulted in an explosion in the amount of data being created, organized and manipulated. According to IDC, the amount of data will grow exponentially from now until 2020, from 4.4 zettabytes to 44 zettabytes (44 trillion gigabytes); in 2020, 1.7 megabytes of data will be created *every second for every person on the planet*.<sup>1</sup> As new applications leveraging this tidal wave of data are deployed, both in-house development teams and independent software vendors (ISVs) will be impacted.

These new applications are aimed at making breakthroughs or improving operations, such as providing exceptional customer service, speeding product time to market and automating costly processes. As a result, they will require the use of far more than just basic, tabular data that has historically comprised the majority of corporate information. There are new data types and a great deal of unstructured data that must be included. For many customer- or communications-centric applications in particular, the critical information is often found in new, unstructured data sources.

IT executives and their line-of-business partners must therefore complement their existing relational databases (RDBMS), which by themselves may be too limited to efficiently mine and deliver big data insights for informed decision making. To develop and deploy disruptive, game-changing applications and workloads that will provide competitive advantage and breakthroughs, organizations need tools that can support multiple data models.

The foundational component to a data platform for next-generation IT solutions is the **multi-model database**. Unifying a variety of distinct database software products with a multi-model database provides important benefits, including:

- Meeting new business requirements that include the need to leverage multiple types of data.
- Streamlining development by focusing on a single data store.

- Substantially reducing software costs.
- Improving support for real-time and transaction-based applications that are becoming far more common.
- Efficiently using scarce development resources.
- Meeting demands for substantial scalability.
- Complementing existing investments in relational databases.

## Unique benefits and capabilities

In contrast to traditional RDBMS solutions, the multi-model database supports—in addition to relational data—multiple data models with an integrated back-end storage tier. Some organizations have tried to manage the growth in the number of data types by using a unique data store for each data model. But this approach often results in inconsistency when querying the various data stores, as well as substantially greater complexity. The most desirable multi-model databases work with data modeled as objects, unstructured data, tables, documents or multidimensional arrays.

Another key feature is the ability to support data models without introducing discrete mappings among them, which substantially degrades performance. Consistent, sustainable performance is a critical buying factor, as the cross-model demands of new applications, coupled with extremely large data sets, can result in unacceptably poor service levels when many of the legacy database products are used. This is particularly problematic for new applications that are highly transactional in nature. True multi-model databases do not sacrifice transaction processing performance for the ability to support multiple data models. As the development of more real-time applications to support e-commerce, customer service, financial services or other vertical markets continues, the multi-model database becomes a practical, attractive alternative.

Scalability is also an essential requirement to accommodate the increasing numbers of users, larger data sets and deployment across many mobile devices. In fact, scalability becomes a critical capability for new

applications because the volume of new data sources is often unknown and can cause legacy system architectures to break.

## Enabling the next generation of application design and development

A multi-model database is essential for applications that support where organizations are going, not where they have been. This is especially critical for three aspects of next-generation applications that most organizations are focusing on today: applying big data analytics for informed decision making, interoperability between legacy and mobile/smart devices, and the use of complex data types to enrich existing operational processes. Legacy systems were typically not designed to meet these types of demands and workloads, and as a result, they often fall short of the goals of high performance, scalability and ease of management.

Multi-model databases offer some key capabilities that make them well suited as a platform for these next-generation applications. The most important are:

1. **Reduce or eliminate complexity:** Complexity not only elongates the development cycle, but it also increases the costs associated with a project. In addition, complexity makes test and certification activities more difficult, as problems may be hard to remediate. One of the most important features of the multi-model database is the use of a single, integrated data dictionary for access to all data models. When combined with enhanced object access, it becomes possible to eliminate a great deal of complexity in development projects that have a number of data types.
2. **Improve business agility:** The demand for agility is driven by the increasing speed of business. Responding quickly to competitive changes or customer requirements is essential. One of the tenets of supporting agility is the ability for applications and systems to utilize new and varied data types more quickly. The multi-model database can integrate emerging data types into a single data dictionary to support more rapid development and competitive response. As part of this functionality, the best-of-breed products also deliver embedded analytics to improve the speed and accuracy of business decisions and the ability to generate insights from social media data, IoT and unstructured text, which is a substantial leap forward.
3. **Increase reliability and availability:** Modern organizations are dependent on the systems and applications that drive the business. And one of the most potentially devastating impacts to the business is when the core database fails or becomes unavailable. The best multi-model database solutions will offer a number of features to drive availability; among the most important is database mirroring, which replicates between systems in real time and supports real-time failover to eliminate lost data and the time necessary to restart the system.
4. **Empower development and operations (DevOps) teams:** The importance of DevOps teams for both in-house IT and ISVs can't be overstated—they are the enablers of new and disruptive applications. The multi-model database enhances DevOps' ability to deliver and deploy new solutions in three important ways. First, it simplifies delivering enterprise-grade solutions in terms of scalability, reliability, security and data model flexibility. Second, it operationalizes the use of big data by providing the underlying performance and flexibility to more effectively use large amounts of information encompassing many types of data. Third, it provides an enhanced development environment that includes a broad range of scripting and programming languages, enhanced web services/XML, strong support for mobile development and, of course, cloud deployment.
5. **Bring SQL to the next level: SQL is an important tool for interacting with databases.** Multi-model databases provide a platform for substantially improving the performance of SQL, opening up many new possibilities for its initial or expanded use. In addition, some products offer support for both bitmap and bit-slice indexes for high

levels of performance for online transaction processing and real-time applications. It is critical for multi-model databases to not only support standard development languages such as Java and JavaScript, but also the language of the transaction processing engine, SQL.

## InterSystems Caché: A leader in multi-model databases

InterSystems Caché is one of the most advanced multi-model databases on the market. It is designed to meet the demands of next-generation applications and the organizations that are developing them. This product offers a single, integrated data dictionary that can be accessed using objects, high-performance SQL, documents and multidimensional arrays.

Caché also offers critical features required to meet the challenges of today and tomorrow. Among the most notable is very high performance for SQL queries. Further, this solution has built-in analytic capabilities to easily deliver key performance indicators in graphic format, allowing end users to better utilize the information for rapid decision making. The ability to explore text-based, unstructured data is a key feature, as the amount of textual data from social media, the web and other sources continues to increase. Database mirroring provides improved reliability, availability and data integrity. Finally, Caché is capable of meeting key security demands with features including authentication, authorization, auditing and encryption.

InterSystems Caché is proven to deliver the features and capabilities to meet the demands of developing modern, disruptive applications. For more than 15 years, Caché has been deployed in 50,000-plus client sites, powering applications that serve millions of users.

## Conclusion

As the volume of data--particularly unstructured data--continues to mount, organizations must find new ways to utilize that data, or risk being overrun by it. The need to support increased, diverse data types has put substantial pressure on legacy relational database management systems, to the point where important new applications can't fully produce the groundbreaking analytics essential to organizational success.

Multi-model databases, such as InterSystems Caché, help to deliver the performance, management facility, scalability and security essential for working with big data. With the coalescence of multiple legacy DBMS solutions into a multi-model platform, integrated back-end applications can be developed faster and less expensively. Plus, a multi-model database enables the deployment of real-time, transaction-based applications that can leverage sophisticated analytics.

## About InterSystems

InterSystems is the information engine that powers some of the world's most important applications. In healthcare, finance, government and other sectors where lives and livelihoods are at stake, InterSystems has been a strategic technology provider since 1978. InterSystems is a privately held company headquartered in Cambridge, Massachusetts (USA), with offices worldwide, and its software products are used daily by millions of people in more than 100 countries. For more information, visit [www.InterSystems.com](http://www.InterSystems.com).

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<sup>1</sup> "The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things," IDC, April 2014