AUTOMATED CONVERSION TECHNOLOGIES OF INFORMATION SYSTEMS

Switching From ISAM to SQL

SQL databases are more complex and maintenance-intensive than ISAM databases (like Btrieve / Pervasive).

Here are the top 10 reasons to make the switch to SQL anyways.

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Abstract

Many long-time users of Magic Software have ISAM databases integrated into their applications (primarily from Btrieve / Pervasive). ISAM databases have excelled at providing compact, speedy, data storage/retrieval services for many years, and will continue doing so into the future. Many Magic developers however, are in need of something more robust with better security, reliability, and scalability. For them, the logical upgrade path is to convert their ISAM databases to SQL, and this white paper lays out the top 10 reasons for doing so.

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Table of Contents

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Historical Perspective

In the last three decades, many people found it surprisingly easy to develop and deploy rather complex applications using ISAM database back-ends like Btrieve. Development of these applications required neither a lot of database knowledge (especially when using Magic Software's development tools) nor the traditional need for a Database Administrator (DBA). Performance was excellent, and for a long time Btrieve was included in the price of the Magic development and deployment licenses. Many large applications like Transcend from Trimark, which was developed for insurance companies, started with Btrieve and were a great success.

However, concerns about scalability started mounting when the volume of data in these ISAM back-ends started growing. Suddenly, the need for much better data integrity became urgent.

At the same time, enterprises started using other applications – not based on Magic - which needed concurrent access to the same ISAM database back-ends. The lack of mechanisms enabling concurrent access to ISAM databases often led to data and code corruptions that resulted in large losses, sometimes without the ability to recover. This brought a new requirement to the table – the ability to implement business rules enterprise-wide.

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Back then however, alternatives to Btrieve which had business rule functionality were expensive. Microsoft offered MS-SQL, but at the time it was not yet stabilized (leading to a lot of struggles and anguish for anyone who committed to it early). Oracle was way beyond the budget of most businesses, and Sybase was not a very good alternative for a number of reasons. The best relational database system (RDBMS) in those days was Rdb/VMS which ran on DEC's VMS systems and Informix (INFORMation on yunIX) which ran exclusively on UNIX systems (thought it started out its life based on C-ISAM).

As market demand increased for a reliable, enterprise-wide database truly capable of supporting tables holding tens of millions of records, and files over 2Gb in size, two mainstream vendors – Microsoft and Oracle – emerged as leading solution providers by improving their products and lowering their cost.

It is no secret that large enterprises cannot rely on ISAM database back-ends as a company-wide database. Magic software understood this long ago and in anticipation of this problem, developed native gateways for Oracle, MS-SQL and DB2 back-ends. These were successfully used in large implementations running millions of transactions a day, with almost no downtime.

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In order to successfully use a large RDBMS system in an enterprise, an organization needs a DBA (sometimes more than one). This is a more critical requirement for Oracle and DB2 however, than for MS-SQL.

Any IT manager pondering whether to convert to a SQL database will have to consider the following PROs and CONs, while keeping in mind that an ISAM database failure may cost a lot more in time, resources, and ultimately money than proceeding with a SQL conversion.

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Top 10 Reasons to Switch to SQL from ISAM

ISAM users accustomed to its simplicity and low overhead might be hesitant or even intimidated about switching to SQL. Though more complex than ISAM, the greater power and richer features that a SQL RDBMS provides makes the learning curve more than worthwhile. Here then are 10 top reasons to finally switch your application's database backend from ISAM to SQL.

1. Mainstream

SQL back-ends are standard, ubiquitous, and many organizations won't even consider buying an application not based on a mainstream SQL database. If you publish a Magic-based application built upon an ISAM database, you can expect increased resistance from prospective customers as times goes on.

2. Reliability

A SQL database doesn't allow direct access to data via the operating system's file manager, thus minimizing downtime from human errors & unauthorized access. SQL databases are also reliable enough to manage millions of records efficiently, perform data mirroring, and distribute data across multiple computers and websites. Having been battle-tested in mission-critical, high-throughput, enterprise environments for a couple of decades now, SQL databases have proven themselves to be ultra-dependable. Migrating your Magic application to work with a SQL database will improve its reliability while ensuring it meets the standards adopted by many organizations.

3. Performance

The ability to access the data in an optimized way can significantly increase performance, especially for large tables and in batch mode (more than online mode). Also better performance monitoring tools & various auto-tuning features guarantee consistent performance under variable-load conditions. Migrating your Magic application to SQL can lead to significant improvements in your application's performance. If you publish a commercial Magic application, this could have a significant positive impact on your sales relative to competing software solutions.

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4. Security

Restricting access to data is essential and security controls can be implemented inside the database starting with as basic a control as requiring a password to the database itself. Both MS-SQL and Oracle support Transparent Data Encryption (TDE) to support regulatory compliance or corporate data security standards. Furthermore, TDE requires no modification to the application in order to be implemented, and there's a robust 3rd-party market of utilities such as auditing tools that work with these standards. Finally, SQL databases also include the ability to control tracking and recovery of all changes made in the database and data by enforcing logging of these changes.

5. Integrity& Transactions

SQL databases allow embedded business integrity rules and support transactions which are essential for any financially-related applications. A set of commands can roll back transactions in case something goes wrong, flag the user, and ensure no partially updated data gets written to the file. Triggers can automatically execute commands on an action, while stored procedures can manipulate the data inside the database when called. All of this is implemented in the database itself with no dependence on the accessing application.

6. Free Software License

Unlike Pervasive, Microsoft and Oracle both provide free versions of their database (SQL Server Express& Oracle XE, respectively). Although both have some limitations, they can certainly provide a viable solution for some organizations who don't want to make a large financial investment. In addition there are now also free, open-source SQL databases (i.e., Firebird, MySQL, etc.) that have no restrictions on how they're used. MySQL is particularly popular, and is used by many high-profile, large-scale websites, including Wikipedia, Google, Facebook, and Twitter.

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7. Enterprise Data Access& Concurrency

In a SQL database, data can be accessed by any application or device, while locking and transactions features ensure data integrity is not compromised. This advantage allows an organization the ability to connect to the database using any language or device without the need for a Magic developer's involvement. SQL databases let you define what privileges and content they'll provide independent of the Magic application. In addition, modern RDBMS back-ends allow hundreds, or even thousands, of simultaneous connections to the data, allowing applications other than Magic to access the database, including web services and XML requests. Once again, the ability to allow this concurrency frees up Magic developers from having to get involved in data access issues.

8. Programming Logic into the Database

The ability to create triggers, stored procedures, views, functions, and other SQL objects that save the need to write and replicate code, is a big advantage of using SQL databases. Also, Magic supports DIRECT SQL and WHERE clauses, letting you offload tasks to the back-end, another big advantage over ISAM databases. In addition RDBMS back-ends like MS-SQL and Oracle support creation of scheduled jobs (including live database backups) which can run independently of your Magic application.

9. Big Databases

Many ISAM databases have file size limitations (with Pervasive for example it's 2Gb), and try overcoming them by splitting big tables into smaller physical files, which tends to generate a multitude of problems, particularly performance-related. Standard SQL RDBMS back-ends can handle much larger databases, and are more likely to be restricted by the size of your hardware.

10. Future Support

The companies behind the biggest leading SQL databases (Oracle & Microsoft) are big firms who pour large investments into their products, ensuring they will continue to innovate and evolve to meet not only today's business challenges, but tomorrow's as well. In recognition of this fact, Magic Software Enterprises distributes up-to-date GATEWAYS with new capabilities that support any version of those SQL databases so Magic developers can take advantage of all the features available anytime a new version of those SQL databases is released.

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Conclusion

If your application is currently running an ISAM back-end, there are many good reasons to at least start thinking about transitioning to SQL. If that ISAM back-end is built upon Pervasive Btrieve, then the need to start thinking about a possible transition is even more urgent, at least according to Pervasive. As their website states:

"*Business owners care more about functionality and performance than software version numbers and bleeding edge technology. They also care about investing in solutions that improve productivity – which is why everybody upgrades eventually. Clients may not care about upgrading your application if it's working, but they will care if they can't use your application with the latest hardware or operating systems. Don't get left behind.*"

Putting off the decision to migrate off of ISAM might be justified by some with the old axiom
”if it ain’t broke, don’t fix it.”, but if Pervasive themselves are encouraging their customers not to get
left behind, then it would certainly behoove ISAM users to begin considering a migration to an industry standard SQL back-end.

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