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# MANAGING DATA GROWTH WITH INTELLIGENT TIERED STORAGE AND DATABASE ARCHIVING



An Executive Brief Sponsored by  
EMC and Informatica

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## INTRODUCTION<sup>1</sup>

As corporate data continues to grow at a double-digit pace, few database administrators can avoid the impact. Every business, of every size, is grappling with the challenges and opportunities represented by ownership of reams of data—or will be soon.

How did we get here? The explosive growth in data is a function of advances in business processes and technology in the past few years. Each trend represents an opportunity for the business, and a challenge for data storage and management.

- **Businesses are doing more with more:** As business processes are automated, we collect, monitor and analyze more data than imagined just a few years ago. Everything from manufacturing equipment to energy consumption is being tracked on a real-time basis, with billions of bits of data fed into analytical software for real-time and trend analysis. This enables businesses to run more efficiently, by utilizing reams of data to understand their operations. But it requires data to be stored and managed in such a way as to not impact the performance of the analytical software.
- **Businesses have greater accountability for data storage and management:** Compliance regulations have stepped up enterprises' need to safely retain and store data, whether related to customer and supplier data or internal financial information. In the case of a merger, acquisition or even adoption of a new software platform, the need to maintain sensitive or critical data may lead businesses to maintain legacy applications long past their active state.

<sup>1</sup> Please note that the insights and opinions expressed in this assessment are those of Stratecast and have been developed through the Stratecast research and analysis process. These expressed insights and opinions do not necessarily reflect the views of any company executives interviewed.

- **Businesses support duplicate data environments:** Ironically, duplication of data is both a smart business move and a storage taboo. Businesses may choose to maintain multiple instances of databases to satisfy business continuity/disaster recovery plans, or to allow for test and development. However, each duplicate environment adds to the capacity and cost burden, and is likely to slow performance in the production environment where the work is actually being done.

Because the growth has been rapid and recent, most enterprises have not yet had time to absorb the full impact or to change their processes sufficiently in response. While most businesses have made some changes in processes—for example, adding software for deduplication or compression of certain databases—resource-constrained IT departments have not found the time to focus on the holistic solution required to fundamentally change the way they approach data storage.

**Unfortunately, that means that most enterprise applications and databases are run on a suboptimal infrastructure—with negative impacts to application performance (and therefore employee productivity and customer satisfaction), as well as the budget.** Worse, as structured data in enterprise databases continues to grow, these businesses will find themselves at a competitive disadvantage, as their inability to manage the growing data has an increasingly severe impact.

In this paper, we explore smart ways businesses can manage and control spiraling data growth in databases and enterprise applications. We examine alternatives to traditional data storage and management solutions: tiered storage architecture and database and enterprise application archiving solutions. Specifically, we look at how an integrated solution from EMC and Informatica can ensure the performance, efficiency, and cost control a business needs to manage data growth.

## IMPACT OF DATA GROWTH ON ENTERPRISE DATABASE AND APPLICATION PERFORMANCE

When the MIS Help Desk starts to receive complaints about enterprise application performance, IT first looks to “tune” the database, exploring partitioning and indexing schemes. Where the database has grown to the point that server resources are strained, the IT staff frequently upgrades the server hardware to add more CPUs.

While these solutions may provide some relief, for a rapidly growing database they are, at best, short-term and do not address the root cause of the problem: growing volumes in the production systems. The sheer volume of data will invariably cause a progressive slowdown in query response times that database tuning and adding more hardware cannot solve. This is merely a matter of physics. As the volume of data and number of records increase, it takes that much longer for functions to sift through the data and produce a result (just as it takes longer to find an item in a crammed closet than in an empty one). ***Even the most efficient applications will experience a noticeable decline in performance as the size of the database grows.*** Users will encounter sluggish response times and stalled database queries—wasting their time, slowing their productivity, and increasing their dissatisfaction. In fact, users have become so intolerant of delays that, after just a second or two, they are likely either to abandon their efforts—and perhaps their relationship with your company—or repeatedly pound the “enter” key (thus increasing strain as the application struggles to respond).

## THE REAL COSTS OF NOT MANAGING DATA GROWTH

Data management inefficiency comes at a price that is far higher than most enterprises realize. Storage itself is cheap—or so it appears to a generation of users that has grown up with free, unlimited storage on consumer applications like email, Facebook, and photosharing. As a result, it’s easy to respond to burgeoning volumes of data by adding more hardware, in the form of inexpensive, high-capacity servers and storage. Cloud computing Infrastructure as a Service and Storage as a Service further complicate the situation by offering “pay as you grow” pricing for leased storage capacity, thus providing a deceptively easy way for database administrators to continually add to their server processing power and storage needs without incurring capital costs at all.

There is one big problem with the belief that storage costs are negligible: it’s not true. Servers and storage may cost a fraction of what you’d have paid for the same amount of capacity even five years ago. But, with data growing at ten percent or more a year, that’s a lot of storage capacity to be added each year. Furthermore, each new server requires a host of data center build-out and maintenance costs for line items such as electrical wiring and network cabling, routers and appliances, electricity and HVAC, and staffing for server maintenance.

Also, potentially overlooked is the enormous cost of managing and maintaining the database, due to the multiplier effect of the peripheral storage environments required for each production database, e.g., backup, replication, mirroring, and system maintenance. In

fact, **EMC IT managers estimate that in their own enterprise application environment, every 1GB of storage represents an additional \$1000 in annual costs.**

For each additional 1 TB of storage, this is equivalent to \$1 million in additional annual costs—a significant budget impact for even a large enterprise. It's like the old fable about frogs that leap out of a pot of boiling water, but complacently scald to death when the temperature is increased gradually: the creep of data growth can be a silent budget-killer.

Furthermore, top-line database hardware, software and maintenance costs are only a part of the costs that the business incurs when it has a poor or incomplete data management and storage solution in place. Consider these examples:

- **An energy telemetry firm was a victim of its own success.** The company differentiated itself in the market by offering aggressive service level agreements (SLA) related to data availability and performance of its sophisticated analytics tools. Unfortunately, as more and more customers were added, and exponentially greater amounts of data were collected and processed, performance noticeably degraded. Furthermore, daily backups took the application offline for a greater and greater amount of time—to the point that the company paid out tens of thousands of dollars in SLA claims.
- **A telecom expense management (TEM) company faced a negative Return on Investment.** When the government retroactively changed its tax collection policies, a TEM company confidently contacted its corporate customers to help them collect refunds. Unfortunately, the TEM company had archived its customers' invoice data to tape, which made recovery of the specific line items time-consuming and labor-intensive. Ultimately, the company ended up losing more in personnel-hours and customer goodwill than it earned in additional fees.
- **A manufacturer reluctantly settled a case.** When a small tool and die manufacturer entered into a contract dispute with a supplier, the company was unable to meet deadlines to produce the sequence of records that would support its case from among the terabytes of data in its outdated tape-based archive. As advised by legal counsel, the company ended up forgoing thousands in fees—a decision that still rankles the company owner.

In each of these cases, inefficient data storage and ineffective archiving solutions led to business-impacting costs—and, justifiably or not, the finger was pointed squarely at the database manager.

## **BEST PRACTICES: MANAGING DATA GROWTH IN DATABASES AND ENTERPRISE APPLICATIONS THROUGH INTELLIGENT TIERED STORAGE AND ARCHIVING**

At the end of the day, database managers need to implement a comprehensive data lifecycle management approach that will simultaneously address a number of business challenges:

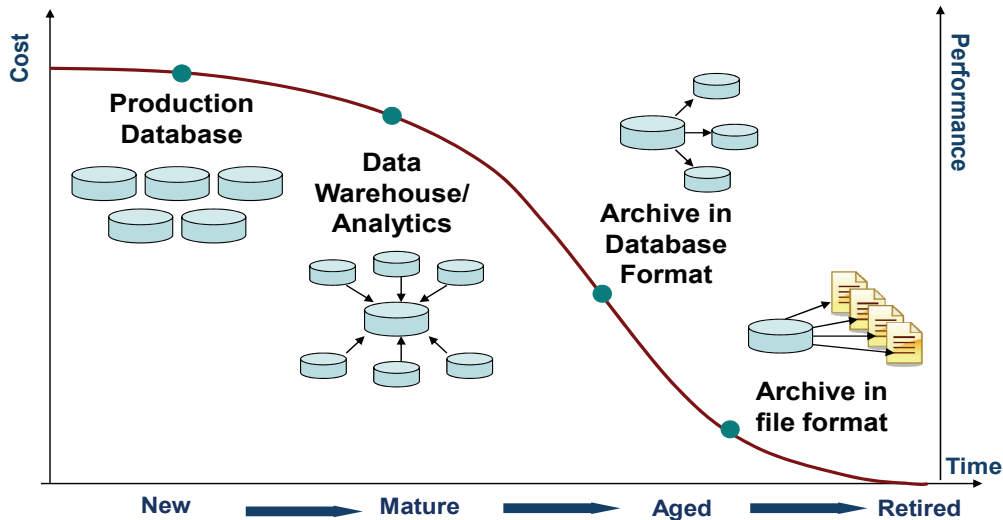
- Scalable solutions, to manage the massive amounts of data that will continue to grow
- Optimally performing applications, to satisfy multiple systems and increasingly impatient users
- Fully accessible data, that can be appropriately accessed by any user, at any time during the information lifecycle
- Data that is quickly and efficiently backed up and recovered from backup in a reasonable timeframe
- Data that remains secure throughout the lifecycle, and unaltered after archiving
- Cost effective solutions, to support aggressive ROI goals of well-managed enterprises.

**The best way to achieve the goal of managing data growth is to take a lifecycle approach:**

1. **Optimize storage through tiering**—that is, by placing data where it makes most sense from a cost and performance standpoint, without compromising accessibility. Keep the data optimized by relocating data along “tiers” of storage in the production environment, or from transactional database to historical data warehouse, as appropriate.
2. **Archive inactive data** by removing it from the production database and data warehouse and relocating it to the most cost-effective archive tier (e.g., archived database or optimized file format).
3. **Retire data** when it reaches the end of its useful life.

As shown in Figure 1 below, storage solutions provide a direct correlation between cost and performance. Thus, the most frequently accessed data (generally the newest data) should be stored in the highest-performance environment. As the data ages and becomes less frequently used—but still needs to be accessible for analytics and trending—it may be moved to a lower-cost, lower performance database environment, such as secondary storage or a data warehouse. In its final state, the data should be archived, either to another database instance or to an optimized, compressed file format to dramatically reduce storage capacity requirements. Finally, rather than left to incur costs indefinitely, unused data should ultimately be retired.

Figure 1 – Data Management Lifecycle



Source: *Stratecast*

To adequately address the issue of data management, enterprises should adopt a holistic approach to data lifecycle management—starting with understanding how data is used, and developing a tiered storage solution that culminates in data retirement. Steps should include the following:

1. **Inventory your data.** Simple as this may sound, it's not a common practice for enterprises—especially those that have been part of mergers or acquisitions—to track their database data. Start by gathering a comprehensive listing of databases, along with the category of information stored in those databases, the applications and business users that access it, and the business processes that depend on it. Determine whether applications are slated to be replaced, upgraded, or retired. Note any compliance obligations.
2. **Understand usage patterns.** A rule of thumb is that newer data—between 1 day and six months—is referenced most frequently. What are the breakpoints for your data—the point at which you can move data from primary storage to a lower cost secondary storage tier, without significantly impacting the user experience? If you are having difficulty determining the likely usage patterns for your active data, you can enlist the assistance of a software tool that provides analytics through means such as identifying hot spots on disks and identifying dormant records that are candidates for archiving.
3. **Align data with appropriate storage tiers during the production lifecycle.** Within the production database, optimize the placement of data on the appropriate disk tier; e.g., flash, fiber channel, Serial ATA (SATA). An integrated

multi-tiered storage solution will enable data to be relocated seamlessly among storage tiers to ensure the most cost-effective performance at each stage.

4. **Remove inactive data from the production database with an integrated archive solution.** An automated archive solution will move data out of the database according to pre-established business rules and relocate it into secondary or tertiary storage tiers, e.g., an archive database or an optimized file format. Archiving decreases the size of the database in the primary tier, thus improving price-performance and reducing overall hardware, software, and maintenance costs.
5. **Monitor your enterprise application and database infrastructure.** As your business environment changes—for example, through business acquisitions or divestitures—it's smart to regularly inventory and evaluate acquired databases and applications. This will allow you to identify redundancies and opportunities to optimize the database infrastructure, and to consolidate, migrate, and/or retire applications. You should also regularly evaluate the efficiency of your storage and data management policies, to ensure that your data infrastructure remains optimized.

In the highly fragmented storage and archive market, in which many providers offer just a small piece of the solution, how can enterprises implement a holistic solution without straining resources? The best bet is to select an integrated solution, in which technology vendors have partnered to ensure the seamless end-to-end operation of information lifecycle management—such as the integrated tiered storage and database archiving solution offered by EMC and Informatica.

## **INTEGRATED TIERED STORAGE AND ARCHIVING SOLUTION FROM EMC AND INFORMATICA**

By combining EMC's powerful storage infrastructure technology and Informatica's robust data management software, database administrators have a sustainable solution for managing data growth while maintaining application performance and reining in costs.

### **EMC Tiered Storage**

EMC's broad storage portfolio provides the infrastructure for the solution. Through the EMC portfolio of storage systems, enterprises can manage and store their data in the optimal storage tier, for improved performance and at a lower cost. EMC offers a range of storage systems that can be interconnected as needed to serve the data lifecycle.

**Furthermore, to ensure that data always remains in the right tier, EMC offers Fully Automated Storage Tiering (FAST) software, which can be integrated with EMC storage systems.** FAST automates the seamless movement of data from the primary storage tier to lower tiers within or across systems, based on user-defined business policies. By eliminating trade-offs between capacity and performance, FAST enables continuous optimization of applications, while lowering costs and delivering appropriately

high service levels. FAST helps enterprises maximize the value of “in-the-box” tiered storage. It proactively monitors workloads and automatically moves more frequently used data to higher-performing Flash drives, and less frequently accessed data to higher-capacity SATA drives. This is all accomplished without any disruption to host operations, business continuity, or availability processes.

EMC’s storage systems are designed to work together seamlessly, enabling tiering within and across platforms. As an example, an enterprise may choose to configure an integrated solution that includes the following EMC storage platforms, enabled by FAST software.

- **EMC Symmetrix VMAX** – For active data where availability is critical, and for transactional production databases and applications that require high performance, an enterprise may select the EMC Symmetrix VMAX family of highly scalable, available, and high-performance storage systems that seamlessly expand for future growth, while increasing performance as requirements change.
- **EMC Unified Storage** – EMC Unified Storage delivers a cost-effective centralized platform, while advanced Block Data Compression reduces storage capacity requirements by up to 50 percent. EMC Unified Storage also includes new FAST Cache performance optimization technology, which enables applications to run twice as fast, with no administrator intervention required. EMC Unified Storage provides a cost-effective, high performance platform for data warehousing and data mart environments.
- **EMC Archive Platforms** – For aging data that is ready to be retired, EMC offers both on-premises storage and cloud-optimized storage solutions that are ideal for archiving data while ensuring it is still accessible. EMC Centera® is a simple, power-efficient, and secure repository purpose built for information archiving. EMC Centera keeps static and infrequently changing digital information available online for immediate access, while addressing compliance regulations and minimizing the total cost of ownership. For enterprises that are investing in a private cloud strategy, the EMC Atmos family offers a solution that combines massive scalability with automated data placement to help enterprises efficiently deliver content and information services anywhere in the world. EMC Atmos operates as a single entity, while using metadata and business policy to distribute information to users as needed, automatically.

### **Informatica Data Archive**

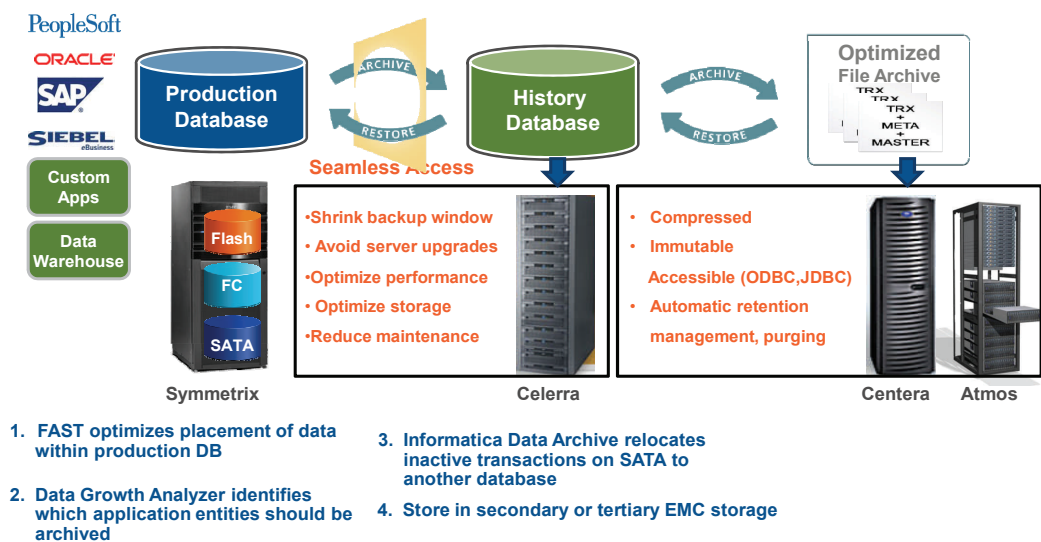
For database administrators, the challenge remains to automate the process of relocating inactive data from active databases into archived storage. ***To respond to the challenge, Informatica has partnered with EMC to offer an integrated solution for archiving databases and enterprise applications—a solution that manages data growth and facilitates management of the data lifecycle.***

Informatica Data Archive automates the relocation of inactive data from databases and enterprise applications onto the most cost-effective EMC storage tier. By using the

flexible, easy to use software, enterprises can safely and easily archive all their data, applications, and files, and readily access them when needed. The solution applies to the full range of enterprise data, including structured data in databases, enterprise applications, data warehouses, and files including reference, trans-actonal, and related unstructured data such as images, audio, documents, and other types of attachments.

Figure 2 shows a sample configuration of the integrated EMC and Informatica solution.

**Figure 2 – Intelligent Tiered Storage and Archiving from EMC and Informatica**



Source: EMC; Informatica

Informatica Data Archive offers a range of archive solutions, including:

- **Enterprise Application and Database Archiving** – Informatica Data Archive removes inactive data from the production databases and automatically stores it in an archive, according to business policies. This ensures optimal performance levels and reduced infrastructure and maintenance costs for databases, while maintaining seamless access from the original application interface.
- **Data Warehouse Archiving** – Informatica Data Archive can also relocate aged data in a data warehouse to manage data growth and optimize the infrastructure of data warehouses. Access from any reporting tool to the combined production and archived data can be maintained.
- **Legacy Application Retirement** – With Informatica Data Archive, IT organizations can safely decommission legacy applications and mainframes while retaining complete access to retired data. The solution stores data from the retired application in a highly compressed, immutable file archive, which guarantees its transactional integrity, while still enabling users to easily access it for reporting and compliance audits.

In addition, Informatica Data Archive offers the following functionality:

**Robust Archiving Methods** – Informatica Data Archive gives you the choice of the archiving format and destination based on your organization's cost, performance, and access requirements. Inactive data can be relocated to another database instance—allowing high performance and seamless access from the same application interface—or to a compressed, optimized file format, which can reduce space requirements while maintaining access based on ODBC/JDBC interfaces from any reporting tool.

**Data Growth and Dormant Data Analysis** – The data growth analysis tool identifies the largest and fastest growing tables and modules and assists in defining an archiving strategy. The tool analyzes data growth trends, forecasts future data growth in an application, simulates the impact of the Informatica/EMC solution on an application, and calculates the expected ROI. A dormant data analysis tool is also available to monitor data usage and provide reports on unused tables and records that are candidates for archiving.

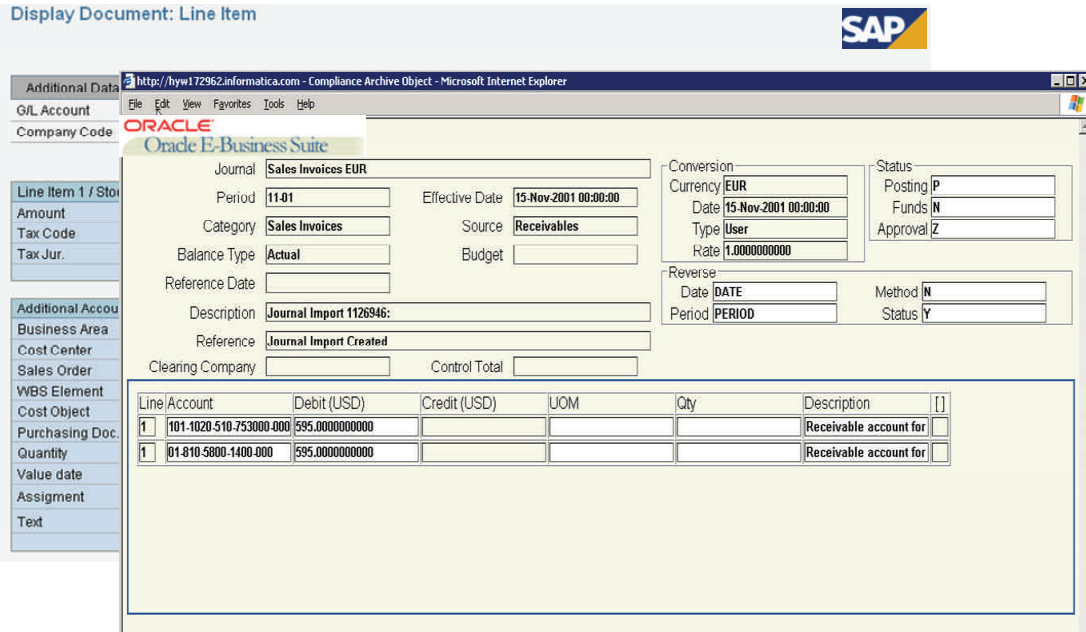
**Broad Connectivity and Extensibility** – Informatica Data Archive can access and relocate data from any relational database, mainframe systems, and retire hundreds of enterprise and legacy applications, including (but not limited to) Oracle, IBM DB2, Microsoft® SQL Server®, Sybase, Teradata, IMS, VSAM, JD Edwards, and Amdocs.

**Compliance Support** – Informatica Data Archive includes built-in compliance capabilities that allow enterprises to classify data housed in databases and enterprise applications, assign retention policies, and enforce the disposition of archived data once the retention period expires. Automatic purging of expired data can be done on a scheduled basis, following an approval process, to ensure that non-relevant records are deleted. Responsive records that are relevant to legal cases and compliance audits can be placed on legal hold to ensure that they are not deleted. Informatica Data Archive also enables the establishment of a chain of custody by providing a complete audit trail of all access to data stored in the file-based archive, ensuring that archived data is immutable, and providing granular access control to archived data.

**Easy Access to Archived Data with Complete Context** – Informatica Data Archive supports multiple ways for users to access their archived data. For live archiving, users can access archived data from the original application interface. For easy access to data from retired applications, Informatica offers a thin-client application-independent interface, called the Data Discovery Portal. Users can search for archived data, based on business entities, rather than just tables in the database. Furthermore, they can view the data in a user interface with a similar look and feel as the original application. Figure 3 below shows how data accessed from the file-based archive is displayed via the Data Discovery Portal. In addition, archived data can also be accessed via any reporting or business intelligence tool.

Figure 3 –

**Data Discovery Portal: Archived Data with Look and Feel of Original Application**



Source: Informatica

**Application Accelerators** – Informatica Data Archive enables businesses to quickly deploy archiving solutions with prebuilt accelerators for pre-packaged applications such as Oracle E-Business Suite, SAP, PeopleSoft, and Siebel. The metadata templates ensure data integrity in the archive by defining business entities, the relationship between tables and entities, and business rules to determine which records can be safely archived. These relationships and business rules are not available in the database itself. In addition, users can employ a simple graphical user interface to view, edit, and extend existing application accelerators to tailor business rules and entities to meet specific business requirements or develop new accelerators for custom applications.

**Benefits of the Informatica/EMC Integrated Solution**

The Informatica/EMC tiered storage solution solves the primary challenges facing database administrators.

- **Cost savings** – By ensuring that less frequently accessed data is archived and always placed in the most cost-effective storage tier, enterprises can reduce the top-line operating and maintenance costs associated with data storage and management. By removing inactive data from the production database altogether, businesses experience significant savings associated with server, databases, applications, storage purchases, backup, recovery, and maintenance costs.

- **Improved database performance, increased business productivity** – By regularly removing non-critical or aged data from the production database, applications respond faster and more efficiently to user queries. This leads to streamlined workflows that can measurably improve productivity of workers and systems.
- **Increased data management efficiency** – By automating key functions—including archiving data, enforcing data retention and disposition, and movement of data across storage tiers—routine data management operations are performed faster, more efficiently, and with fewer errors. Furthermore, by retiring legacy applications, enterprises are freed from associated maintenance contracts, management, and operational costs—while still retaining access to data.

## **SOLUTION IN ACTION: EMC TRANSFORMS ITS DATA STORAGE WITH INFORMATICA DATA ARCHIVE**

As an industry leader in storage solutions, EMC Corporation knows first-hand the challenges associated with exponential data growth. An active Mergers & Acquisitions strategy led to the absorption of 40 companies over the years, each with its own databases, data warehouses, applications, and associated information. As a result, EMC found itself responsible for managing a staggering volume of data, which was growing at an unsustainable rate of 50 terabytes and \$5 million per year.

In addition to spiraling costs, the company faced challenges associated with application performance degradation—which impacted business productivity—as well as potential regulatory compliance issues and data center inefficiencies.

EMC worked with Informatica to develop an integrated, two-pronged plan to bring the data under management oversight and decrease costs. First, the company adopted Informatica Data Archive to manage overall data growth by intelligently relocating inactive data from production servers and high performance storage to middle and archive storage tiers, based on age and data classification. For its massive and high-usage Oracle 11i integrated Customer Relationship Management (CRM) solution, which serves 50,000 users, EMC chose to maintain the most recent six months of quotes data, fifteen months of service records, and three years of sales contracts on the production server of its database. Older data in these three areas of focus were relocated to middle and archive storage tiers by Informatica Data Archive to reduce the size of the production database.

Second, EMC implemented Informatica Data Archive for legacy application retirement projects. The company mapped out the decommissioning of 21 Oracle and custom applications, while retaining the data as needed. This process saved licensing and maintenance fees for legacy applications, enabled servers and storage to be repurposed for more critical business needs, and freed IT personnel to work on higher priority projects.

## The Results

By implementing the solution, EMC has met its objectives for management of data growth—including application performance improvement, operational efficiencies, and cost reductions. The company has seen rapid and measurable signs of success, including:

- **Payback in Six Months** – EMC projects its total cost savings from the Informatica Data Archive solution at \$3 million annually in hardware, software, and maintenance—boosting its total operational savings in the first year to \$4 million. For both initiatives—legacy application retirement and intelligent relocation of data—**EMC Corporation’s investment in Informatica technology had a payback period of 6 months**, ensuring a rapid and significantly positive return on investment (ROI) in the first year alone.
- **Retirement of Legacy Applications** – Using Informatica Data Archive, EMC Corporation has been able to map out a long-term application retirement strategy that enables on-demand access to retired application data, while saving hundreds of terabytes of storage by highly compressing the data during relocation at a ratio of 20:1. **The savings from application retirement alone is projected to reach at least \$1 million** as a result of eliminating legacy application maintenance and repurposing servers and IT personnel for more business critical projects.
- **Live Application Archiving** – The benefits of using Informatica Data Archive to manage data growth in the live Oracle E-Business Suite application, and intelligently relocate data at EMC Corporation have been even more compelling than EMC’s application retirement initiative. As a result of actively managing data growth across production and non-production environments, **EMC has been able to reduce annual data growth by 37.5 terabytes, a 75 percent reduction in growth.**
- **Productivity Improvement** – Leveraging Informatica Data Archive for intelligent relocation of data in the Oracle database environment has benefited thousands of EMC employees through **20 percent less downtime for planned maintenance and by a 50 percent increase in production database performance**, which translated into enhanced productivity across the organization. It also allowed for additional repurposing of IT personnel, servers, and storage for higher value business needs.

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- \$3 million saved annually by archiving data from Oracle E-Business Suite
  - Planned maintenance downtime reduced by 20%
  - Oracle application performance increased by 50%
  - \$1 million in savings from application retirement
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## Stratecast The Last Word

In many enterprises, database managers are too busy coping with the burgeoning volume of data to actually take time to implement a sustainable solution. Despite implementation of stopgap measures, data costs—both direct and indirect—are skyrocketing, and application performance is decreasing.

**Fortunately, a comprehensive storage and database archiving solution is available that can manage data growth and enhance productivity.** Of great value to budget-constrained database managers, the solution can achieve a positive Return on Investment in as little as six months.

The Intelligent Storage Tiering and Database Archiving Solution from EMC and Informatica seamlessly integrates products from two market leaders. EMC's robust line of storage products provides the infrastructure, allowing enterprises to align data to the appropriate tier based on frequency of access and performance requirements. By implementing Informatica Data Archive, inactive data can be automatically moved from active to archival stores. Informatica Data Archive ensures that data is accessible to users at each layer—even when converted to a highly compressed format. The application further facilitates the archival of infrequently accessed data from live applications, as well as retirement of legacy applications.

**The integrated solution from EMC and Informatica allows enterprises to manage their data according to best practices, while achieving benefits associated with cost containment, application performance, regulatory compliance, and data center efficiency.**

Businesses run on data, and a poor or unsustainable data management solution threatens productivity and competitiveness. Growth of data in enterprise databases needs to be managed, and legacy applications need to be rationalized and eliminated as appropriate, using technology and processes that are sustainable. As the types and volumes of data collected continue to increase, and as enterprise applications continue to proliferate, the problem will only increase. Database managers need to take steps today to manage their companies' data using a proven integrated tiered storage and database archiving solution.

### **Lynda Stadtmueller**

Program Manager – Business Communication Services

Stratecast (a Division of Frost & Sullivan)

[lstadtmueller@stratecast.com](mailto:lstadtmueller@stratecast.com)

## CONTACT US

Beijing  
Bengaluru  
Bogotá  
Buenos Aires  
Cape Town  
Chennai  
Delhi  
Dubai  
Frankfurt  
Kolkata  
Kuala Lumpur  
London  
Manhattan  
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Paris  
Rockville Centre  
San Antonio  
São Paulo  
Seoul  
Shanghai  
Singapore  
Sydney  
Tel Aviv  
Tokyo  
Toronto  
Warsaw

**Silicon Valley**  
331 E. Evelyn Ave., Suite 100  
Mountain View, CA 94041  
Tel 650.475.4500  
Fax 650.475.1570

**San Antonio**  
7550 West Interstate 10, Suite 400,  
San Antonio, Texas 78229-5616  
Tel 210.348.1000  
Fax 210.348.1003

**London**  
4, Grosvenor Gardens,  
London SW1W 0DH, UK  
Tel 44(0)20 7730 3438  
Fax 44(0)20 7730 3343

**877.GoFrost**  
myfrost@frost.com  
<http://www.frost.com>

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