

Modernizing Infrastructure for Reporting & Insights



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Unlocking the True Potential of Data



Businesses today have access to unfathomable quantities of data; according to some estimates, we generate roughly 2.5 quintillion bytes of data every day. This data has untapped potential — the potential to understand and even anticipate customer behavior, to forecast demand and changes in the marketplace, to identify process inefficiencies and areas for improvement, and much, much more.

In order to tap into that potential and extract valuable insights, organizations need to be able to store, process, analyze, and report on large volumes of data — something many legacy database systems simply cannot support. To take full advantage of the opportunities available to them and to maintain a leading edge, businesses must modernize.

Database modernization refers to the process of updating or replacing an existing database system to better align with the needs of a modern enterprise. It involves improving the performance, scalability, security, and reliability of the database system while also reducing maintenance costs and complexity.

Modernization can take many forms, including upgrading the hardware or software platform on which a database runs or changing the database management system (DBMS) itself to a more modern, cloud-native solution that offers greater flexibility, scalability, and agility. Modernization may also include updating data models, schemas, and data structures to better support modern application architectures, power data-driven decision-making, and ensure compliance with emerging data privacy and security regulations.

IS YOUR COMPANY RICH ON DATA, BUT POOR ON INSIGHTS?

Hitachi Solutions created a streamlined method to support our clients to rapidly centralize their data sources — in a matter of days — onto a single cloud platform called Hitachi Solutions Empower Data Platform. We wrangle your varied data, supporting more than 200 sources, where it can then be used to manifest intelligence your teams can utilize to make strategic business decisions. [Learn more about our Empower Data Platform.](#)

Ultimately, the goal of database modernization is to ensure that an organization's database infrastructure is aligned with its business needs while also providing a more agile and scalable platform for application development and innovation. In order to achieve that, organizations need to carefully consider both the technical and business challenges of modernization.

On the technical side, there's the obvious factor of upgrading or replacing legacy infrastructure — but on the business side, database modernization can

have a significant impact on an organization's broader IT system, including any systems or applications that rely on that database.

In this eBook, we'll explore the topic of database modernization in depth, including why it matters, the obstacles to overcome, and what the path to modernization looks like.



Why Database Modernization is Essential

Database modernization has become an imperative for organizations everywhere — here are just a few of the drivers behind this push:



The Power of Data: We've all heard the phrase "Data is the new oil," first devised by mathematician Clive Humby in 2006. Although some experts have [pushed back on that idea](#), data is an incredibly valuable asset for businesses which rely on data-driven insights for forecasting and decision-making purposes. Data has also been the impetus behind many digital transformation initiatives, enabling organizations to fundamentally change how they operate, deliver new value to customers, and remain competitive in increasingly crowded markets. Modern database systems deliver the processing and analytics capabilities businesses need to unlock that value and make the most of their data.



Increasing Data Volumes: Businesses are generating more data now than ever before, and traditional database systems simply aren't equipped to handle the volume, variety, and velocity of data. Modern database systems are specifically designed to handle large volumes of data and support real-time data processing and analysis, making them a vital investment for organizations of all sizes and in all industries.



Evolving Business Needs: As businesses evolve, their database needs change — and, unfortunately, legacy databases are unable to keep up with the times. Modern database systems are capable of supporting new business models, such as the subscription economy and emerging technologies, including the Internet of Things (IoT), artificial intelligence (AI), and blockchain.



The Enduring Influence of Cloud Computing: Although cloud computing is nothing new — though the term was [officially invented in 2006](#), the concept of network-based computing has existed since the 1960s — it remains a hot topic for businesses everywhere. This is due to the scalability, flexibility, and cost savings that cloud-based platforms have to offer. Many modern database systems are cloud-native, making it easier for businesses to take full advantage of all the benefits cloud computing has to offer.



Growing Cybersecurity Threats: The total number of global cyberattacks [increased by 38% in 2022](#), with education, government, healthcare, communications, and internet / managed service providers making up the most attacked industries. And according to [one report](#), security experts observed a 20% increase in cybercriminals engaging in data theft and extortion campaigns without the use of ransomware — instead, attacks are increasingly targeting and exploiting vulnerabilities.

With the increasing number — and sophistication — of cyberattacks and data breaches, it's imperative that businesses prioritize data security. Modern database systems offer more robust security features than their legacy counterparts, including encryption, access controls, and audit trails, so businesses can rest easy knowing their data is secure.



Complex Compliance Requirements: Over the last few years, lawmakers around the globe have dedicated their efforts to developing and adopting data protection laws. This trend will likely continue in 2023 and beyond, with various regions introducing or amending data protection and privacy laws. According to [Gartner](#), by year-end 2024, 75% of the world's population will have its personal data covered under modern privacy regulations.

Regulatory and compliance requirements are constantly changing and becoming more stringent, particularly in the healthcare and financial services industries. Compared to legacy systems, which lack the necessary security features for compliance and are often difficult to update or modify, modern database systems are designed to meet evolving requirements and deliver up-to-date data privacy, security, and regulatory compliance.



Cost-Saving Opportunities: Legacy database systems tend to be expensive to maintain, and businesses that rely on them often find they spend more on maintenance than on innovation. With modern database systems, organizations can put their dollars to good use by automating routine tasks, enabling greater scalability, automating system updates, and reducing operating costs. Additionally, since modern database systems are cloud-based rather than on-premise, businesses no longer need to maintain expensive hardware.

Benefits of Database Modernization

Businesses that do make the switch to modernized database systems reap numerous rewards, including:



Increased Efficiency: Modern database systems are more efficient than legacy systems by design, capable of handling larger volumes of data, processing data at faster speeds, and adapting to changing workloads and data types without the need for extensive modification. This enhanced efficiency enables businesses to optimize the performance of their database applications which can, in turn, lead to faster query response times and more efficient resource utilization.



Improved Scalability: Compared to legacy systems, which are often built on centralized architecture and require complex tuning, modern database systems leverage distributed architecture and have better performance optimization. With modern database systems, businesses enjoy greater scalability and the ability to handle increasing volumes of data and users without having to replace their entire database infrastructure.



Robust Security: In addition to data encryption, access controls, and audit trails, many modern database systems also offer two-factor or multi-factor authentication and feature built-in real-time monitoring and alerting tools. This level of security goes far above and beyond what businesses can expect from legacy systems, meaning organizations can protect their data more effectively against threats such as cyberattacks and data breaches.



Advanced Analytics: Modern database systems enable businesses to do more with their data by tapping into the power of advanced analytics and machine learning applications. By leveraging these technologies, organizations can extract valuable insights that drive operational enhancements, help them better understand customer needs and preferences, uncover new business opportunities, and tap into new markets.



Cloud-Readiness: Modern database systems offer all of the scalability, flexibility, and cost savings that only cloud-based solutions can deliver. Modern database systems save time, too: Rather than undergo a time-consuming and expensive migration — the way they would if they chose to upgrade or update their legacy database — businesses could hit the ground running on day one.



Continuous Innovation: The rise of exciting new technologies such as AI, machine learning, and blockchain translates to new opportunities for businesses — opportunities that they can only take advantage of with a modern database system designed for innovation and experimentation. Modernization provides organizations with an agile, flexible platform that enables them to test out new, data-driven business models, enabling them to continuously prove and adopt a more competitive stance.



Obstacles to Database Modernization



Before businesses can begin to take full advantage of the many benefits modern database systems offer, there are a few hurdles they'll need to clear. These include:



Legacy Systems: Many businesses continue to rely on legacy database systems that were built decades ago. These systems are often complex with many custom configurations, both difficult and expensive to maintain, cannot natively integrate with other systems and applications, and lack the modern features needed to support new business models and emerging technologies.



Data Migration: Moving data from legacy systems to modern systems can be a complicated and time-consuming process, as data often needs to be transformed, cleaned, and validated prior to migration. There's also always the risk of data loss or corruption. Bearing this in mind, businesses should fully back up their data prior to migration, use migration tools with built-in validation checks, consider migrating data incrementally, and test and closely monitor migration efforts.



System Integration: In order to get the most mileage out of modern database systems, businesses need to integrate them with other solutions and applications within their software ecosystem. Although modernized database systems are designed with interoperability in mind, integration can still be a challenging — and time-consuming — process if an organization's new database system is not compatible with its existing systems.



Broader Impact: Database modernization can have downstream effects on any systems or applications that rely on that database. To overcome this business challenge, organizations need to consider the broader impact of modernization and partner with a highly experienced technical team that can help them mitigate any potential risks or disruptions to business processes.



Complexity: Certain industries handle especially complex data structures; for example, financial services firms need to be able to process and analyze financial transactions, trade data, and risk data. This complexity can make it challenging to manage and analyze data effectively, particularly with legacy systems that lack modern analytics capabilities.



Lack of Technical Expertise: Database modernization requires a highly specific set of skills and extensive technical knowledge — something that many in-house IT teams lack. Without these particular skills or expertise, migrating to a modern database system can be exceedingly difficult.



Costs: Modernizing database systems can be expensive, especially for businesses that have complex legacy systems or large quantities of data to migrate over. If an organization is migrating from an on-premise legacy system to a cloud-based modern system, there are also hardware and software costs to consider, in addition to the expense of migrating data and integrating systems. Although many businesses find that the benefits of a modern database system outweigh the overall expense, it's an important consideration to make before modernizing.



Resistance to Change: Oftentimes, employees are very comfortable doing things a certain way, even if that way is inefficient or can, at times, be difficult. As a result, businesses may find that their employees are resistant to using modernized systems. To solve this problem and encourage widespread adoption, it's important that organizations invest in change enablement. This includes clearly communicating the benefits of the new system to employees, designating change leaders to spearhead adoption efforts, and providing thorough training on how to use the new system.



Heavy Customization: Many businesses have customized their legacy database systems to meet their specific needs. Generally speaking, the longer a legacy system has been in place, the more custom configurations there are likely to be. These custom configurations can add complexity to the migration process, as the new, modernized database system may not be able to support the same level of customization.



Business Disruption: Database modernization can disrupt business operations, especially if there's a need to migrate data or integrate systems. Organizations need to carefully map out the modernization process in the interest of minimizing disruption and ensuring that critical systems and applications remain functional during the transition.



Data Quality: Legacy database systems often hold poor-quality data, including inconsistent, inaccurate, or duplicate data. It's important that businesses thoroughly cleanse data before migrating it to a modern system to ensure its integrity and derive the greatest value from their investment.



Vendor Lock-In: Depending on the specific language in its contract, a business may be locked into a particular vendor for its legacy database system. This can make it difficult to migrate to a modern system, as the new system may not be compatible with the existing vendor's software or hardware.



Security & Compliance: Modern database systems must comply with internal data privacy standards and protocols, as well as data privacy and security laws and regulations. Modernizing a database infrastructure can introduce new security and compliance risks related to cloud computing and third-party integrations, particularly if sensitive data is involved. Therefore, migrating data to a modern database system requires careful planning and execution to ensure that modernized systems meet all applicable regulatory requirements and security standards.



Building Blocks of a Modern Data Infrastructure



In order to be considered truly modern, a data infrastructure should be cloud-native, data-driven, agile, secure, automated, and scalable — all in service of meeting the evolving needs of a business. Additionally, it should be able to handle large volumes of data in real-time, support advanced analytics and machine learning, and enable a business to make data-driven decisions quickly and efficiently.

Let's take a closer look at the building blocks of modern data infrastructure:



Cloud-Native: Designed to run in a cloud environment, a modern data infrastructure offers all the benefits of cloud services, including elastic scaling, on-demand provisioning, and pay-as-you-use pricing. As a result, it's able to deliver greater scalability, flexibility, and cost efficiency than legacy infrastructure.



Data-Driven: In order to get the most mileage out of modern database systems, businesses need to integrate them with other solutions and applications within their software ecosystem. Although modernized database systems are designed with interoperability in mind, integration can still be a challenging — and time-consuming — process if an organization's new database system is not compatible with its existing systems.



Agile: A modern data infrastructure is able to quickly adapt to changing business needs and can handle new data types and formats, easily integrate with new applications and systems, and support new use cases and business models.



Secure & Governed: With robust, built-in security features such as encryption, access controls, and data governance, a modern data infrastructure can easily protect sensitive data against unauthorized access, hacking, and other cybersecurity threats. In addition, data governance requires policies, processes, and controls that govern how data is managed within an organization, including data quality, data security, and data privacy.



Automated: Automation and machine learning are key components of any modern data infrastructure, enabling businesses to streamline operations, reduce manual effort, and enhance efficiency. A modernized system can automatically perform routine tasks such as data ingestion, transformation, and quality control, freeing up human resources for higher-value activities.



Scalable: A modern data infrastructure is highly scalable, meaning it can handle growing data volumes, users, and applications without significant performance degradation. It can scale up or down as needed without requiring major structural changes.





The Path to Modernization

At Hitachi Solutions, every database modernization project is tailored to the customer's unique requirements. However, we've developed a comprehensive approach to modernization that generally follows the following steps:

Assessment

We begin this initial stage by engaging with stakeholders across our customer's organization to gain a complete understanding of business needs and priorities. We then conduct a thorough analysis of the customer's existing database infrastructure, including its performance, scalability, security, availability, recoverability, and maintenance costs. Based on the results of our stakeholder engagement and infrastructure analysis, we identify areas for improvement and prioritize those areas based on business value and technical feasibility.

Planning

The planning stage involves many important steps. We conduct an assessment of the customer's current infrastructure, security, cloud adoption, and technical skills to support modernization. We also consider any legal or compliance requirements that might impact the project, such as data privacy regulations, data residency, or industry-specific regulations.

Armed with this information, we develop a comprehensive modernization plan that outlines the project goals, scope, technical requirements, timelines, and budget. We also identify and involve any stakeholders across the organization who will be impacted by the project and develop a communication plan to keep them engaged and informed. Finally, before moving on to the next phase, we validate that the plan we've created aligns with the organization's overall business and IT strategies.

Architecture Design

For this stage, we begin developing a detailed architecture design — one that incorporates modern data management and analytics tools — for modernizing the customer's database infrastructure. This involves defining data models, schemas, and structure and then choosing the appropriate cloud platform and DBMS to meet business needs and technical requirements. We also consider key factors when designing this architecture, including:

- Data security
- Data privacy
- Compliance
- Data integration strategy
- Disaster recovery
- Business continuity
- Performance optimization
- Scalability
- Flexibility
- Stakeholder communication

Security and Governance

At this stage, it's essential to prioritize security and governance as foundational elements of the modernization journey. In doing so, we're able to help organizations better protect their data, meet regulatory requirements, and maintain data quality by ensuring that security and governance are designed and deployed in tandem with infrastructure and data modernization efforts.

To achieve this, we work with the organization to develop a comprehensive security and governance strategy that aligns with its business objectives and compliance requirements. This strategy includes policies and procedures for data access, data sharing, and data storage, as well as measures for data protection, such as encryption and access controls. Additionally, we help organizations deploy governance tools that enable them to manage their data effectively throughout their lifecycle, including tools for metadata management, data quality management, and compliance monitoring.

Implementation

With an architectural design firmly in place, we're ready to begin deploying the customer's modernized data infrastructure. This entails configuring the hardware and software, setting up the new database environment, and migrating data from the legacy system to the new environment. Every aspect of the implementation process is carefully executed to minimize disruption to business operations, and we follow best practices for data migration, including data cleansing and validation, to ensure accuracy and integrity. We also implement the appropriate testing and validation procedures to ensure that the new system meets business needs and technical requirements.

Testing

Once implementation is complete, we need to thoroughly test the customer's new system to ensure that it is working properly. We develop a comprehensive testing plan that covers all aspects of the new system, including data accuracy, functionality, performance, and security. We then use automated testing tools to improve efficiency and reduce the risk of human error. Finally, we conduct user acceptance testing to ensure that the new system meets user needs and expectations.

Optimization

The path to modernization doesn't end at go-live. We stay onboard to continuously monitor the performance of the customer's new system, reviewing performance metrics and benchmarks to flag any areas that may require further optimization. We also collect and analyze feedback from end users and stakeholders to identify potential areas for improvement. Based on our findings, we iterate upon the new data infrastructure, fine-tuning database settings, implementing automation and machine learning to improve efficiency and reduce manual labor, and optimizing queries and algorithms to enhance performance and scalability.

Maintenance

During the final stage of the modernization process, we develop a comprehensive maintenance and support plan to ensure that the new system remains secure, compliant, and up to date. The maintenance phase includes a plan for disaster recovery and business continuity in the event that unexpected issues affect the system's availability and functionality.

We then provide training to end users to ensure that they fully understand the new system and can use it effectively, implement the appropriate data quality and governance procedures, monitor system performance, resolve any issues that may arise, and apply updates and patches as needed.



Modernize Your Infrastructure with **Hitachi Solutions**

Ready to take the first step on the path to modernization? Hitachi Solutions is here to help you through every stage of the journey.

At Hitachi Solutions, we understand the critical importance of infrastructure and data modernization in today's rapidly evolving business landscape. That's why our mission is to partner with our customers to provide tailored, cutting-edge solutions that solve their unique infrastructure and data challenges.

By gaining a deep understanding of our customer's businesses, we work collaboratively to develop a flexible and scalable digital strategy that aligns with their business goals. Our solutions are designed to empower our customers to transform their infrastructure and modernize their data management systems to drive innovation and stay ahead of the competition. Our team of experts helps our customers choose the right solutions to support their evolving business needs. We provide ongoing support and change enablement to ensure maximum value and return on investment.

Ultimately, we aim to help our customers achieve a modern, streamlined, and efficient infrastructure that enables them to make data-driven decisions and grow their businesses in the digital age.

Start your modernization journey today!

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