



The Future of Data Integration: How Real-Time Data Integration Will Shape The Future of Business



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Introduction

Data is the life of a modern business. It allows it to grow and transform in lieu of the constant changes around it. However, the true power of the company is only unlocked when it integrates the data being generated at an unprecedented rate of up to 402.74 exabytes seamlessly across diverse departments.

Traditional data integration methods struggle to deal with the high volume of data being generated today at the required speed to keep up with the ever-evolving digital landscape. The new users require the data to be produced and defined in multiple uses accurately and timely while avoiding the complexities associated with it. Thus, streaming data analytics becomes important to transform business operations and shape its future. (M. Kezunovic, A. Abur, A. . -T. Edris and D. Sobajic, "Data integration/exchange. Part 2: future technical and business opportunities," in IEEE Power and Energy Magazine, vol. 2, no. 3, pp. 24-29, May-June 2004, doi: 10.1109/MPAE.2004.1293596)



What Is Data Integration?

Data resides in multiple databases in any organization rather than in one place on both individual and departmental levels. The reasons for multiple storage spaces for data are numerous like mergers, acquisitions, constant data production, and such. Collecting all the data in one place is known as data integration. It allows for a flexible sharing of data as well as integration of data from multiple autonomous sources.

The goal of integrating the collected data is to offer uniform access to an autonomous and heterogeneous set of data sources. And while the problem of data integration is pervasive it remains a key challenge in the advancement of many sectors like science, government, as well as businesses. (Anhai Doan, Alon Halevy, Zachary Ives "Principles of Data Integration", Chapter 1.1, pp. 1-6)

The operational efficiency and optimization in today's digital landscape depend largely upon data, and streamlining data in real-time can help them to respond to the ever-changing market trends, and customer needs swiftly. The logistics of the business can be promptly handled with an optimized real-time process which is cost-effective and minimizes the downtime needed by the traditional methods.

What Is The Future Of Data Integration?

Allowing for new functions to be implemented in a business, recognizing substation automation and enhanced communication as the key ingredients but not the solution is important. To fully realize the power of data integration in the future to transform business operations and implement newly developed applications that support the following properties are important:

Power System Tracking Capabilities: Improving the capabilities of the power system to track the properties, topology, and its associated measurement of data is important to execute seamless data integration in an organization. Recognition of data sources having different properties is important during the process of data integration for seamless and correct results. Hence, the data needs to be processed using a specifically dedicated function of verification of the substation database. In addition, recognizing the dynamic changes in the topology and its associated measurements in data as the substation operation is underway is important to implement a switching sequences verification of data function. (M. Kezunovic, A. Abur, A. . -T. Edris and D. Sobajic, "Data integration/exchange. Part 2: future technical and business opportunities," in IEEE Power and Energy Magazine, vol. 2, no. 3, pp. 24-29, May-June 2004, doi: 10.1109/MPAE.2004.1293596)

Automated Analysis: Individual data like digital fault recorder, protection relay, etc. can be used to implement a comprehensive fault analysis and location of the data after it is processed and sorted into relevant groups. This develops a solid base for data integration and allows for a faster and more comprehensive result. (M. Kezunovic, A. Abur, A. . -T. Edris and D. Sobajic, "Data integration/exchange. Part 2: future technical and business opportunities," in IEEE Power and Energy Magazine, vol. 2, no. 3, pp. 24-29, May-June 2004, doi: 10.1109/MPAE.2004.1293596)

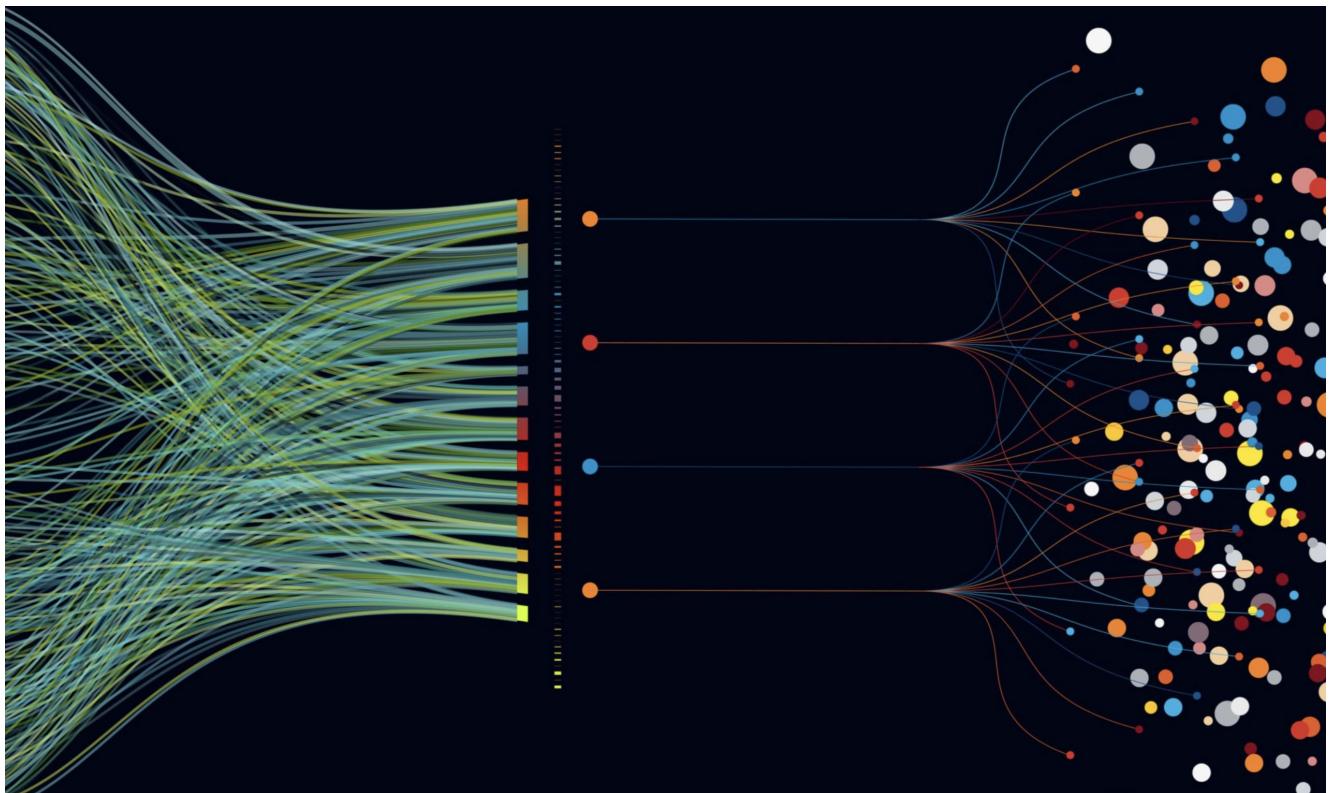
Artificial Intelligence Powered Data Integration: Using the newly developed artificial intelligence and machine learning technologies in data streamlining promises improvement in the field. The tools backed by AI can leverage advanced algorithms and predict analytics for automating and streamlining the process of data integration in real-time. As found by InformationWeek organizations with a strong artificial intelligence strategy for their data integration process are three times more likely to report an above-average success than others. McKinsey Technology has found leveraging artificial intelligence in data integration and analysis can also achieve an improvement of almost 20% in the quality of data which has led them to generate an impact of more than \$500 million.

Data Integration as a Service: Using data integration as a service platform is a comprehensive solution for data tools and capabilities to provide a centralized hub of management of workflow. From data ingestion and transformation to managing the quality of the data and its advanced analysis, the platform can leverage its expertise and infrastructure to benefit the industry. It can provide scalable resources and continuous updates as a cloud-based solution to organizations without them having to invest in expensive infrastructures and maintenance of on-site data integration teams.

Real-time streaming data collection, its transformation, and its management system allow industries to collect data from millions of devices in use seamlessly. It allows the system to maintain the speed and efficiency of the results without compromising on its quality, all the while lowering the storage cost of the data by almost 50x times. Data integration can support blazingly fast real-time queries for artificial intelligence and analytics which helps industries produce reliable results for their users while collecting and processing the data for further future use.

Benefits Of Real-Time Data Integration And Analytics Across Industries

The benefits of data integration across industries such as retail, manufacturing, finance, etc. are:



Optimizing the Cost: As streaming data analytics and analytics is a cloud-based platform it follows the pay-as-you-go pricing policy which allows companies to optimize their costs. They can pay only for the resources and services they undertake with constant monitoring and cost-optimization strategies for their proper utilization. (Anshumali Ambasht, "Real-Time Data Integration and Analytics: Empowering Data-Driven Decision Making", in International Journal of Computing Trends and Technology, vol. 71, issue 7, pp 8-14, July 2023, doi: 10.14445/22312803/IJCTT-V71I7P102)

Access to Unified Data: Virtualization of data enables organizations to present a unified view which eliminates the need for data consolidation or duplication. This allows users to ask questions and analyze the data collected from different sources as if it were a part of a single database which enhances their agility and productivity.

Improved Decision Making: Data streamlining allows for all the available data to be stored and analysed from a single place which allows for a comprehensive analysis of it. This comprises data from various sources and departments, presenting an all-encompassing picture of the product or services offered coherently for making decisions that will improve the organization's profits.

Ease in Complex Processing: The stream processing and analysis framework allows for complex processing by detecting patterns or conditions and taking appropriate actions regarding them. This makes the complex process of data processing easy and brings the potential of data-driven automation leveraging to the users.

Flexibility and Modularity of the Data: The technologies and techniques for streaming data analytics and its analytics provide for event-driven architectures that facilitate loose coupling of components and enable their independent development, deployment, and evolution. In other words, individual services have the flexibility, and agility to develop outside of the influence of other services as the data integration process ensures the modularity of all the data is embraced and enhanced. (Anshumali Ambasht, "Real-Time Data Integration and Analytics: Empowering Data-Driven Decision Making", in International Journal of Computing Trends and Technology, vol. 71, issue 7, pp 8-14, July 2023, doi: 10.14445/22312803/IJCTT-V71I7P102)

Cloud-based Platform: The data integration service is a cloud-based platform that allows for an on-demand scalability to the organization for its resources to be used efficiently. It also allows for cost optimization of resources as it can predict and show real-time data on the volume and processing requirements of the resources. In addition, it offers a robust security measure that protects data in transit as well as in rest from external hackers. Using measures of encryption data privacy and compliance is ensured for companies to maintain their integrity.

Drives Innovation: Innovation requires constant and reliable data to recognize the current challenges faced by the company to build upon. The solutions derived by innovation can maximize seamless streaming data analytics as it can help in recognizing and analyzing anomalies and their patterns.

Service to Customer Representation: A reliable customer representation is responsible for the quality of the supply and delivery of the required products. (M. Kezunovic, A. Abur, A. Edris and D. Sobajic, "Data integration/exchange - Part 1: existing technical and business opportunities," in IEEE Power and Energy Magazine, vol. 2, no. 2, pp. 14-19, March-April 2004, doi: 10.1109/MPAE.2004.1269612) Streaming data analytics and analytics can provide important insight into the requirements of the consumers and their satisfaction with the current services provided by the organization. This review is essential to make sure the services match the customer's wants for the growth of the company. It can help organizations present a personalized customer experience through tailored recommendations, offers, and support as practiced by social media sites like Instagram. (Anshumali Ambasht, "Real-Time Data Integration and Analytics: Empowering Data-Driven Decision Making," in International Journal of Computing Trends and Technology, vol. 71, issue 7, pp 8-14, July 2023, doi: 10.14445/22312803/IJCTT-V71I7P102)

Challenges Of Real-Time Data Integration And Analytics Across Industries

The challenges of streaming data across industries like manufacturing, healthcare, transportation, etc. are:



Handling the Large Volume of the Data: The large amounts of data being constantly produced pose a challenge with its volume and velocity in real-time. Organizations need to have a scalable infrastructure and storage system for the efficient capturing, processing, and analyzing of this data. Streamlining data ingestions, leveraging cloud technologies, and implementing distributed computing frameworks are the strategies for solving this challenge of handling large volumes and velocity of data for streaming data analytics and analytics. (Anshumali Ambasht, "Real-Time Data Integration and Analytics: Empowering Data-Driven Decision Making", in International Journal of Computing Trends and Technology, vol. 71, issue 7, pp 8-14, July 2023, doi: 10.14445/22312803/IJCTT-V71I7P102)

Ensuring the Quality and Consistency of the Data: Organizations face challenges because of the variety and heterogeneity of the sources of data. Maintenance of the data quality along with its consistency becomes vital for organizations to overcome this challenge and gain reliable insights from it. The data integration and analysis in real-time rely largely on the accuracy and reliability of the underlying data. Implementation of data validation and techniques for cleansing along with its governance framework, and profiling tools is important for addressing these challenges and ensuring the high-quality of data is maintained for reliable real-time insights. (Anshumali Ambasht, "Real-Time Data Integration and Analytics: Empowering Data-Driven Decision Making", in International Journal of Computing Trends and Technology, vol. 71, issue 7, pp 8-14, July 2023, doi: 10.14445/22312803/IJCTT-V71I7P102)

Management of Latency of the Data: One of the most critical aspects of real-time data integration and analysis is its timelessness. Organizations require minimal latency in data to ensure that insights derived from the data are presented promptly. Optimized data pipelines, streamed processing frameworks, and network infrastructure are required to manage this challenge effectively. In addition, implementing efficient data-capturing mechanisms and utilizing in-memory processing for employing distributed stream processing technologies makes overcoming the challenge of data latency easier. (Anshumali Ambasht, "Real-Time Data Integration and Analytics: Empowering Data-Driven Decision Making", in International Journal of Computing Trends and Technology, vol. 71, issue 7, pp 8-14, July 2023, doi: 10.14445/22312803/IJCTT-V71I7P102)

Security and Privacy Concerns: Real-time integration of data and its analysis raises security and privacy concerns among many because of the sensitive nature of the processing of data. The establishment of robust security measures for protecting data, both in rest and transit, is important for organizations to safeguard data. Some of these security measures to address the challenge posed by real-time data processing are encryption, control accesses, and comprehensive monitoring systems, along with ensuring compliance with the rules and regulations of data privacy. In addition, the adoption of the privacy-by-design principle is also essential for organizations to cover all aspects of data security and privacy. (Anshumali Ambasht, "Real-Time Data Integration and Analytics: Empowering Data-Driven Decision Making", in International Journal of Computing Trends and Technology, vol. 71, issue 7, pp 8-14, July 2023, doi: 10.14445/22312803/IJCTT-V71I7P102)

How Can Real-Time Data Integration and Analysis Shape The Future Of Business?

The application of streaming data analytics and analytics across various industries can shape their futures by offering significant advantages to them:



Healthcare

Running data analytics in the industry can play a crucial role in improving the patient's health. Optimized resource allocations and enhanced operational efficiencies allow professionals to make informed decisions at the correct time to deliver customized care to patients and enhance their safety. The hospitals can use real-time patient monitoring systems that immediately alert the staff in case a condition becomes critical to ensure timely treatment. Other ways streaming data analytics and analytics can be used is through predicting analytics for early detection of diseases, managing inventory of medical supplies, and the like (Anshumali Ambasht, "Real-Time Data Integration and Analytics: Empowering Data-Driven Decision Making", in International Journal of Computing Trends and Technology, vol. 71, issue 7, pp 8-14, July 2023, doi: 10.14445/22312803/IJCTT-V71I7P102)

Retail

In retail shops inventory management is one of the most important factors for ensuring a smooth workflow in the business. Real-time data integration can help in inventory tracking by optimizing the stock levels, deriving dynamic price ranges, personalizing marketing strategies, and overall improving the customer experience while maintaining a profit. An example of using real-time data integration in retail is Amazon which optimizes the platform and its products according to the data collected by the customer and the retailer.

Finance

Streaming data analytics in finance helps in the management of risk factors for optimizing investment decisions. It helps in detecting frauds as it allows for real-time streaming of data from various sources like market data feeds, social media, transaction logs, and more which are then analyzed to determine market trends, and anomalies for a reliable and timely trading decision. The process of data integration and analytics in real-time also allows financial institutions to provide customers with a personalized and proactive portfolio service like instant credit approvals.

(Anshumali Ambasht, "Real-Time Data Integration and Analytics: Empowering Data-Driven Decision Making", in International Journal of Computing Trends and Technology, vol. 71, issue 7, pp 8-14, July 2023, doi: 10.14445/22312803/IJCTT-V71I7P102)

Manufacturing

Predicting maintenance based on sensor data from machinery can minimize downtime while optimizing the production process in the manufacturing sector. This is possible through real-time data collection, processing, and analysis which allows for improved operational efficiency, enhancement of quality control, and improved response time from supply chain partners and sales channels.

About Mongrov

Mongrov is a digital consultancy organization that strategizes and facilitates fast, valuable, and enriching digital transformations with data-driven AI, IoT, and cloud solutions. It provides solutions for reshaping the future of businesses by pushing the boundaries of current technology with its cutting-edge IT solutions that seamlessly manage real-time data streams. Mongrov aims to build a diverse, inclusive community upholding the values of innovation, future-mindedness, and collective responsibility.

Conclusion

The need for data integration was ever present but the rise of the Internet of Things (IoT) has now introduced a new layer of complexity as it generates a large amount of data from multiple sensors, devices, and systems which need to be seamlessly integrated and analyzed for realizing unabridged benefit. Implementing data integration into a business is the need now as the global market size of the Internet of Things is projected to surpass even \$1.6 trillion by 2025. The continuous growth in data volume and velocity points to the need for specialized data integration tools that address the current challenges faced by organizations for their cost-effective and prompt growth.

Unlocking the true potential of companies' data integration with the use of tools of AI, serverless architecture and more can drive the decision-making of the companies. They have the chance to change the way a company approaches data for collection, processing, and analysis for easier leverage of the power of data. However, the ethical considerations of data privacy and bias need to be dealt with sensitively for reliable results through data integration practices.



Frequently Asked Questions

1. What is data integration?

Collection of all the data from various devices, sources, and systems in one place is known as data integration. For flexible data sharing as well as data management from and to multiple autonomous sources, real-time data integration is implemented by organizations.

2. How can the quality and consistency of data be managed in real-time data integration?

Constant surveillance of the data modularity and developing tools that understand the data variations are important for maintaining the quality and consistency of data management in real time. Implementation of data validation and techniques for cleansing along with its governance framework, and profiling tools is important for addressing the quality and consistency challenges of data and ensuring reliable real-time insights.

3. How can artificial intelligence help in data integration and analysis?

The tools used by companies that are backed by artificial intelligence can leverage advanced algorithms along with predicting analytics which are useful for automating and streamlining the process of data integration in real time. They improve the chances of reliable data integration results while ensuring the efficiency of the process and its analysis is maintained.

4. What are the best techniques for adopting streaming data analytics?

streaming data analytics and analysis have become imperative for organizations to gain insights into the market and make decisions backed by data. The best practices to follow while using real-time data integration are establishing a scalable infrastructure of the data processing, ensuring the security of the data collected along with its reliable governance, and continuously monitoring and refining the techniques to stay ahead of the evolving market requirements.

5. Which companies have adopted real-time data integration and analysis in the US?

Multiple companies have adopted streaming data analytics and analysis in the United States because of its benefits in dealing with the vast amount of data. Some services that currently use real-time data integration analytics in the US are Facebook Inc., Google, Vertiv, and McKinsey Technology.

6. Can streamlining data and its analysis help the healthcare sector in any way?

Yes, data integration in real-time can help various sectors including healthcare by optimizing the resources employed in it. Its features can help doctors and nurses to give timely attention to patients ensuring correct treatment as it can provide immediate alert in case of critical conditions. It also helps hospitals in maintaining inventory in real-time inventory which ensures the availability of reliable equipment at the needed time.

7. What are the benefits of data integration in real time?

Real-time data collection, transformation, and management allow companies to collect data from millions of devices while maintaining the speed and efficiency of the results produced by it. It lowers the storage cost of the data by almost 50x times and supports blazingly fast real-time queries for artificial intelligence and analytics which helps industries produce reliable results for their users while collecting and processing the data for future use.