

Digital Transformation by Data Fabric

J. V. Anand

Associate Professor, Department of Electronics and Communication Engineering, Siddhartha Institute of Science and Technology, Chittoor, Andhra Pradesh, India

E-mail: jvanand87@gmail.com

Abstract

Many industries, including financial sector, telecommunications, transportation, and health care, are paying increasing attention to enterprise data fabrics. The continuous data expansion that enterprises are currently experiencing is being driven by digital transformation. As businesses adopt hybrid and multicloud settings, there is a big opportunity for managing data, but it has also greatly increased complexity. A data fabric is a concept that data executives are working over more and more, when it comes to choosing an architecture that supports and improves the data strategy. Enterprise data fabrics, which offer a distributed, functional data platform positioned between software architectures and back-end datasets, are built towards high performance and reliability.

Keywords: Enterprises, data fabric, managing data, digital transformation.

1. Introduction

A data fabric is a framework that enables the automatic and intelligent end-to-end implementation of multiple data pipelines as well as cloud environments. The exponential proliferation of big data over the past few years has increased the difficulty of managing it, for businesses due to advancements in edge computing, artificial intelligence, hybrid clouds, and wireless sensor networks [1].

In order to access existing data or promote its consolidation when necessary, data fabric makes use of both human - artificial capabilities. It continuously recognises and links data from many applications to find distinctive, commercially significant relationships among the data points available. When compared to conventional data management techniques, the insight promotes restructured decision-making and offers additional value through quick access and comprehension [2, 3]. The article [12] determines the use of the emerging Data Fabric Architectural technology that may give a business a competitive edge in its industry. It

is in charge of managing many settings, including hybrid, multi-cloud, and on-premises-cloud as well as data sources and consumers. In order to increase the health of data, it offers built-in quality of the data, data pre-processing, and information governance capabilities that are enabled by machine learning and enhanced automation [13]. Additionally, with the aid of API support, it encourages data sharing with both internal and external stakeholders [11]. The data fabric operates in a manner that is strikingly comparable to the brain. Instead of using copies, it manages information via connections through a network-based design. This method makes it possible for data fabric to substitute point-to-point integration to universal access controls, remove data copying, foster collaborative intelligence, break down data silos, and establish reasonable data ownership—potentially the first time since the development of digitised data [14-15].

1.1 Architecture of Data Fabric

The below figure 1 shows the architecture of data fabrics [2].



Figure 1. Architecture of Data Fabric

Data management layer: This layer is in charge of data security and data governance.

Data integrity layer: Through discovery of relationships between unstructured and structured data, this layer starts to piece together cloud data.

Data Processing: In order to ensure that only pertinent data is exposed for data extraction, the data is refined in the data processing layer.

Data Orchestration: This layer carries out some of the data fabric's most crucial tasks such as transforming, integrating, and cleaning the data to make it usable for teams throughout the company.

Data Discovery: This layer reveals fresh possibilities for fusing various data sources.

Data Access: This layer permits data consumption while ensuring the proper rights for particular teams to adhere to legal requirements. Additionally, by utilising dashboard and other data visualisation tools, this layer aids in surfacing pertinent data.

2. Related Work

The proposed Data Fabric technology might resemble a system for gathering information on transportation-related events and be built using a tool for simulating the transport environment. The structures include gathered information regarding car-related accidents, vehicle owner reports, and roadside devices of the transportation and road complicated networks. A block chain-based autonomously Intelligent Transport Systems (ITS) environment can be developed to make greater use of existing ITS resources and infrastructure. This is especially useful for crowdsourcing technology. [5]

The Virtual Information Fabric Infrastructure (VIFI), which distributes analytics to distributed repositories without relocating the underlying datasets to a central location, enables users to conduct analytics-in-place with ease. VIFI gives users the ability to conduct, execute, and coordinate sophisticated analytics actions in-place with the data on different data repositories by enabling automated analytics scripts send to the data and managing dispersed infrastructure. [6]

The open foundation environment of data and reason sharing between the various systems that must harmoniously interact to manage the complicated and congested airspace operations necessary to realise enhanced air mobility goals, forms the basis of the DRF market. In order to provide architectures and development platforms that catalyse widespread public and private sector purchase as well as self-sustaining DRF and related standards, DRF actions will identify, test, and develop critical core technologies. These techniques, open standards design patterns, and integrated model will also be collaboratively tested with end-users. [7]

Data assimilation and collection are made possible by machine learning, artificial intelligence (AI), and sophisticated techniques such as experimental and network modelling

and evaluation, unsupervised training (includes deep learning), and AI-related hardware projects (e.g., edge computing). Science Exercise: Earth systems datasets are produced and consumed by DOE R&D, which includes the Environmental Systems Science Division (EESD) programme of DOE's Basic Energy Research (BER) and DOE's Applied Energy Research (AER) programmes (EERE, FE, and NE). [8]

It is possible for a genuine data fabric to replace conventional apps with experiences that are solely powered by metadata. Although the end user cannot tell the difference between these experiences and those provided by an API or app, creating them is as simple as manipulating data in a worksheet. A developed data fabric with a wide range of connected data sources is required for fully developed metadata-driven experiences, transforming them into state-of-the-art technology. But any modern technology that calls itself a data fabric must include the fundamentals for these experiences. It has many benefits, including quicker build times and more easily customizable solutions. [9]

This research is a first step toward understanding how a distributed manufacturing system in a smart city might alter the character and structure of the supply chain design. The article [10] focuses on the development of an integral approach for comprehending how dispersed manufacturing, big data analytics, and the industry internet of things interact with smart city initiatives to influence supply chain design. The approach demonstrated how manufacture and integrative technologies might function together in the context of smart cities and how they relate to supply chain design.

3. Prospects within Data Fabric

- Rising business knowledge
- Data interaction with artificial intelligence
- Developing a Comprehensive Customer View
- Establishing a data market
- Escalating security

4. Conclusion

To manage their data better and more effectively, organisations must create and implement data fabric technologies. Creating a data fabric as a data design has several benefits, including accelerating data management by managing different cloud and on-premise settings, enhancing data quality, data transformation, and governance capabilities,

and enabling effortless data consumption to consumers. However, the following obstacles must be overcome: expensive and low-value information management cycles, regular upkeep of earlier integrations, increasing need for data sharing and real-time analytics.

References

- [1] <https://www.ibm.com/in-en/topics/data-fabric>
- [2] Riahi, Y, & Riahi, S 2018, 'Big Data and Big Data Analytics: Concepts, Types and Technologies', International Journal of Research and Engineering, vol. 5, no. 9, pp. 524-528.
- [3] Raza, M 2018, Data Fabric: An Introduction, viewed 22 May 2020, <https://www.bmc.com/blogs/data-fabric/>
- [4] Oyston Meriton, Rajinder Bhandal, Gary Graham, Anthony Brown. (2021) An examination of the generative mechanisms of value in big data-enabled supply chain management research. International Journal of Production Research 59:23, pages 7283-7310.
- [5] N. G. Kuftinova, O. I. Maksimych, A. V. Ostroukh, A. V. Volosova and E. N. Matukhina, "Data Fabric as an Effective Method of Data Management in Traffic and Road Systems," *2022 Systems of Signals Generating and Processing in the Field of on Board Communications*, 2022, pp. 1-4, doi: 10.1109/IEEECONF53456.2022.9744402.
- [6] A. Talukder *et al.*, "VIFI: Virtual information fabric infrastructure for data-driven discoveries from distributed earth science data," *2017 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computed, Scalable Computing & Communications, Cloud & Big Data Computing, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/CBDCCom/IOP/SCI)*, 2017, pp. 1-8, doi: 10.1109/UIC-ATC.2017.8397642
- [7] William Van Dalsem, Sandeep Shetye, Aditya N. Das, Kalmanje S. Krishnakumar, Sandy Lozito, Kenneth Freeman, Aaron Swank Peter Shannon and Luka Tomljenovic," A Data & Reasoning Fabric to Enable Advanced Air Mobility" Published Online:4 Jan 2021<https://doi.org/10.2514/6.2021-2033> AIAA 2021-2033.
- [8] Rose, Kelly, Bauer, Jennifer, Feeley, Tom, Morkner, Paige, Rowan, Chad, Sabbatino, Mike, Shih, Chung, and Van Essendelft, Dirk. Integrating Applied Energy and BER Smart Data Capabilities to Develop a DOE Data Fabric for Energy-Water R&D. United States: N. p., 2021. Web. doi:10.2172/1769726.

- [9] <https://www.iebrain.com/wp-content/uploads/2022/03/data-fabric-a-case-study-whitepaper.pdf>
- [10] Mukesh Kumar, Gary Graham, Patrick Hennelly & Jagjit Srai (2016) How will smart city production systems transform supply chain design: a product-level investigation, *International Journal of Production Research*, 54:23, 7181-7192, DOI: 10.1080/00207543.2016.1198057
- [11] Buchmann, R.A., Cinpoeru, M., Harkai, A., Karagiannis, D.: Model-aware software engineering-a knowledge-based approach to model-driven software engineering. In: *Proceedings of ENASE 2018*, SciTe Press, pp. 233–240 (2018)
- [12] Theodorou, V., Gerostathopoulos, I., Alshabani, I., Abelló, A., Breitgand, D. (2021). MEDAL: An AI-Driven Data Fabric Concept for Elastic Cloud-to-Edge Intelligence. In: Barolli, L., Woungang, I., Enokido, T. (eds) *Advanced Information Networking and Applications. AINA 2021. Lecture Notes in Networks and Systems*, vol 227. Springer, Cham. https://doi.org/10.1007/978-3-030-75078-7_56
- [13] C. -M. Liu, M. Badigineni and S. W. Lu, "Adaptive Blocksize for IoT Payload Data on Fabric Blockchain," *2021 30th Wireless and Optical Communications Conference (WOCC)*, 2021, pp. 92-96, doi: 10.1109/WOCC53213.2021.9602935.
- [14] Dr. Chinmay Chakraborty, Prof. Muhammad Khurram Khan, and Prof. Ishfaq Ahmad. Call for Special Issue Papers: Big Data-Driven Futuristic Fabric System in Societal Digital Transformation.
- [15] Zhao, R., Y. Liu, N. Zhang, and T. Huang. 2017. "An Optimization Model for Green Supply Chain Management by Using a big Data Analytic Approach." *Journal of Cleaner Production* 142: 1085–1097.

Author's biography

J. V. Anand is currently working as an Associate Professor in the Department of Electronics and Communication Engineering, Siddhartha Institute of Science and Technology, Chittoor, Andhra Pradesh, India. His area of research includes wireless sensor networks and Internet of things.