

# Omniscient Platform Solution for Managing Products in Retail Omnichannel

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**Abstract:-** The omnichannel supply chain strategy is an upcoming change in the retail sector that coordinates the day-to-day retail process and digital technologies across all retail channels from supply to sales. The operations of the retail supply chain have been modified and enhanced greatly with the onset of the pandemic. The research project explains the importance of Omniscient platforms in omnichannel and the strategic use of the event-driven systems during times of drastic and fast pace changes in retail. The OMS model's adoption as an omnichannel supply chain strategy brought about the ease in the distribution of essential services. Similarly, the retailers and the companies should ensure that they strategize and change towards building the key omnichannel strategies in their system to improve customer satisfaction leading to customer loyalty. The key strategies discussed in the research include data setup reliability at a massive scale using event driven microservices that deals with hundreds of millions of products which has been one of the most important requirements of retailers who aim to keep the customers satisfied both in their brick and mortar stores as well as in their e-commerce platforms. The capabilities required in an omnichannel supply chain to maintain products by overcoming issues with multi-technology architecture like communication, managing resources, failure tolerance is discussed. A retailer with dynamic capabilities from production through client delivery can exploit performance despite all the constant changes they are subjected to. The research ends with precise conclusions and closing statements about the future of Omniscient platforms for products as a supply chain strategy.

**Keywords:-** Omniscient Platforms, Omnichannel Supply Chain Capabilities, Microservices, Event-Driven Microservices Architecture, Asynchronous Communication,

## I. INTRODUCTION

Omnichannel refers to the approach that retailers worldwide have started exploring to provide a seamless and integrated shopping experience across multiple channels, such as online, mobile, and physical stores. It aims to create a consistent, seamless, personalized and a consistent experience for customers, regardless of the channel they choose to interact with the retailer.

The concept of Omnichannel has gained popularity in recent years due to the changing consumer behavior and the rise of digital technologies. Customers now expect to have the flexibility to browse, purchase, and return products through various channels, and retailers need to adapt to meet these expectations.

The Omniscient platform is a technology solution that enables retailers to implement and manage their Omnichannel strategies effectively. It acts as a central hub that connects different channels, systems, and data sources, allowing retailers to have a holistic view of their customers and operations. Customer centric business is the key factor for any retailer to thrive in the highly competent Omnichannel market. Only this will drive high revenues for retail businesses in today's world where retail experience has to be channel-agnostic.

One of the primary reasons Omnichannel is the go-to for the retailers is the change in trend brought about by the pandemic. The product demand is traditionally higher from 2022 compared to the last two years, given the positive customer sentiment and the post-pandemic normalcy that will propel the .increased demand momentum.

## II. CURRENT OMNISCIENT PLATFORMS

There are several types of Omniscient platforms available in the market, each with its own set of features and capabilities. Some common types include:

### A. Customer Data Platforms (CDPs)

These platforms focus on collecting, organizing, and analyzing customer data from various sources to create a unified customer profile. They help retailers understand customer behavior, preferences, and purchase history across different channels. The way CDPs work can be explained with this simple example. A customer wants to buy a vacuum cleaner online, the search may have been like the below:

- Google searched, "The best vacuums for home use of the year"
- Visited a number of online review websites where people share personal reviews on the products narrowed down.
- Visited a few retailers in the physical stores that sell various vacuum cleaner brands.

- Watched a few videos on the product to learn more about the technical details of different vacuum cleaners and how the customer may or may not need it.
- When the type of vacuum cleaner to buy is decided, research proceeds to the best place to buy it from depending on the prices, promotional offers, etc.

The probability that the customer visits many additional websites to compare costs, shipping cost and duration, return policies, and more are very high. Throughout all of that, chances are that the customer visited the same website multiple times, utilized the live chat in the website or the application or contacted the retailer through email as well. With each interaction with the company, the CDP tracks all the data from the previous interaction and provides an experience that feels more personalized to the customer. The ads from social media feels extremely relevant to the customer, the website may have made minor changes to seem more connected to what the customer wants along with promotional emails, etc. This is the result of the customer using a Customer Data Platform (CDP) to tailor their marketing for every customer.

#### B. Order Management Systems (OMS)

OMS platforms enable retailers to manage and fulfill orders from multiple channels efficiently. They provide real-time inventory visibility, order routing, and fulfillment capabilities, ensuring a seamless customer experience. OMS is more than an order that is placed through the web or any digital platform. When a client shops, during the order placing, data is gathered when they use in-store, curb side pick-up or online delivery for further analysis. This data will enable the retailers to identify the customer preferred products and their preferred shopping channel. For e.g., a shopper utilizing online websites or the retailer's mobile application for shopping may activate alerts in the Order Management System when they search for an item more frequently than the others, or even place it in their in-app shopping list as a buy for later item. This is a sample of how the OMS gives the retailers information about what clients are interested in.

#### C. Point of Sale (POS) Systems

POS systems are used in physical stores to process transactions and manage inventory. Omniscient POS platforms integrate with other channels and systems to provide a unified view of customer data and inventory across all touchpoints. With Omnichannel, the POS systems can be split into legacy, tablet-based, mobile, and cloud-based POS systems. The last three of these types modern systems of systems are considered "modern" POS systems and are usually more efficient and affordable than legacy systems.

#### ➤ *Advantages of using an Omniscient platform include:*

- Improved customer experience: By having a unified view of customer data and inventory, retailers can provide personalized recommendations, targeted promotions, and consistent service across all their channels. Based on a

recent market analysis, more than 70 percent of consumers say that a seamless experience will lead to them purchasing more from a retailer, and 64 percent will spend more money depending on how fast the retail businesses resolve their issues on the channel they're currently using.

- Increased operational efficiency: Omniscient platforms help streamline processes such as order management, inventory management, and customer service, reducing manual errors and improving overall efficiency. As there's not a "one size fits all" approach, increasing customer satisfaction with the available channels is the primary goal here.
- Better data-driven decision making: With access to comprehensive data and analytics, retailers can gain insights into customer behavior, market trends, and operational performance, enabling them to make informed business decisions.

#### ➤ *Disadvantages of using an Omniscient platform may include:*

- Cost: Implementing and maintaining an Omniscient platform can be expensive, especially for small and medium-sized retailers with limited resources.
- Complexity: Integrating multiple systems and channels into a unified platform can be complex and time-consuming. It requires careful planning, coordination, and technical expertise.
- Data security and privacy concerns: Omniscient platforms involve the collection and storage of large amounts of customer data, which raises concerns about data security and privacy compliance.

To address the concerns of using Omniscient platforms discussed above, retailers can consider the solution discussed in the next section.

### III. PROPOSED OMNISCIENT SOLUTION

When a retailer has to decide on adopting an omniscient platform, the below are the points to be considered:

- Start small and scale: Instead of implementing a full-fledged Omniscient platform at once, retailers can start with a specific channel or functionality and gradually expand their capabilities over time.
- Choose the right platform: Retailers should carefully evaluate different Omniscient platform providers and select the one that best fits their business needs, budget, and technical requirements.
- Invest in training and support: Retailers should provide adequate training to their employees to ensure they can effectively use and manage the Omniscient platform. Additionally, having access to reliable technical support can help address any issues or challenges that may arise.
- Prioritize data security and privacy: Retailers should implement robust security measures and comply with

relevant data protection regulations to safeguard customer data and maintain trust.

#### IV. OMNISCIENT PLATFORM FOR PRODUCT MAINTENANCE

One of the primary goals for any retailer to become Omnichannel is to diversify the product line. In this case data setup reliability at a huge scale that deals with millions of products is one of the most important requirements for retailers that have their foot print on all types of sales channels. Microservices allowed each of the service related to the products to be scaled independently, but most of the times many features have overlaps. So, expecting the product details to be available at the end of the microservices pipeline without any issues is not dependable. So, the proposed solution will help the complex item setup process by converting the current microservice architecture which is a collection of small, loosely coupled services that operate together to support the business requirement of the product to event-driven microservices that will enable real-time communication. This will allow data to be consumed through the events as and when they are requested.

Most of the organizations use monolithic applications. While this may have suited them so far, this can prove to be a drawback as well. For eg. consider an organization that they need a new functionality which their current architecture does not support or they would like to switch from a technology for which the company is paying yearly usage costs to open source which in-turn will give them additional flexibility to store and access the data they need, then the singular monolithic code base cannot help.

Though microservices (fig 1) overcome the limitations of monolithic applications by dividing those into smaller, requirement specific services, that can be customized to solve the problem along with the flexibility to choose your own programming languages, frameworks and databases as needed, the related services intersect at many points which is not ideal for a huge business which always needs accurate data with complete control over how best to solve your business problems. A microservices architecture allows a large complex software architecture to be separated into smaller independent parts or functionalities where each functionality runs as a service. Since the services are independent of each other they can be modified, scaled independently thus making the architecture loosely coupled. In fig. 1 each of the functionalities like vendor management, DC inventory, store orders, etc are independent of each other along with the databases in which they maintain the data that is needed by the

service. This gives technological freedom to maintain each service on different technological platforms. Although there are multiple such advantages, performance issues occur due to complexity of the co-ordination between microservices and cascading failures.

##### ➤ *Why event-driven microservices?*

An event-driven microservices architecture (EDMA) is the solution (fig 2) to overcome the limitations of the microservices. Here systems will communicate by producing and consuming events. An event is nothing but an update. In terms of a product, an event can be anything from a customer purchasing an item, shipping an item to a store or home, returning an item, etc. An event can be triggered even when a customer frequently searches for a product or chooses to put the product in the online shopping cart or moves it from the cart to a buy later list. Events can either carry the state (of item purchased like availability, cost, quantity, etc) or events can be identifiers (item's status like order placed, packed, shipped, delivered). These event-driven services can consume events from input event streams (such as Apache Kafka topics) and apply their specific business logic, giving out their own output events, providing details for request-response access, communicating with a third-party applications or their interfaces, or performing any other needed functionality. The events can be tracked with a lightweight integration with the application tier thus ensuring that we don't add a massive overhead to the microservices. A platform/broker will integrate these microservices such that such that there is no dependency on the other participating microservices also taking advantage of the asynchronous communication. Consider figure 2 in which the broker manages all communications between the event producer and the consumer. The event producer which can be the web application, mobile application or the store front here will produce multiple events, which can all access a single microservice or multiple micro-services. Every event that comes in like the store order, online order, etc are received by the broker. The way the middleware event broker manages these without overlap is by facilitating the exchange of messages by routing them dynamically allowing asynchronous communication. Producers do not need to worry about how the events they produce are going to be consumed, so additional consumers or functionality can be added without affecting the existing producers. Consumers do not need to concern themselves with the background of the requests they receive as they are only tasked with handling of the events from the broker in the order received. Overall, it gives greater flexibility and agility to bring new functionality faster to the application. This in turn makes the architecture highly scalable and extensible.

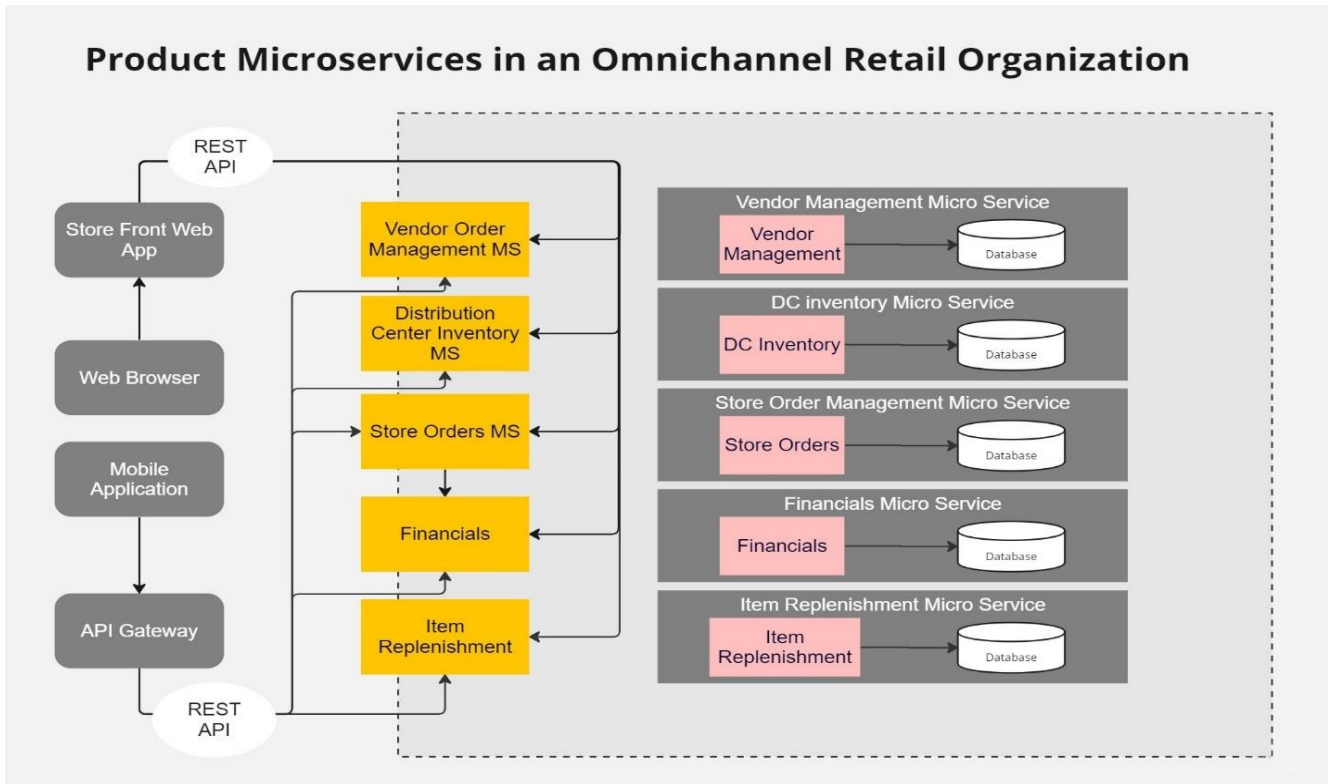


Fig 1. Current Scenario of how the products are managed using microservices.

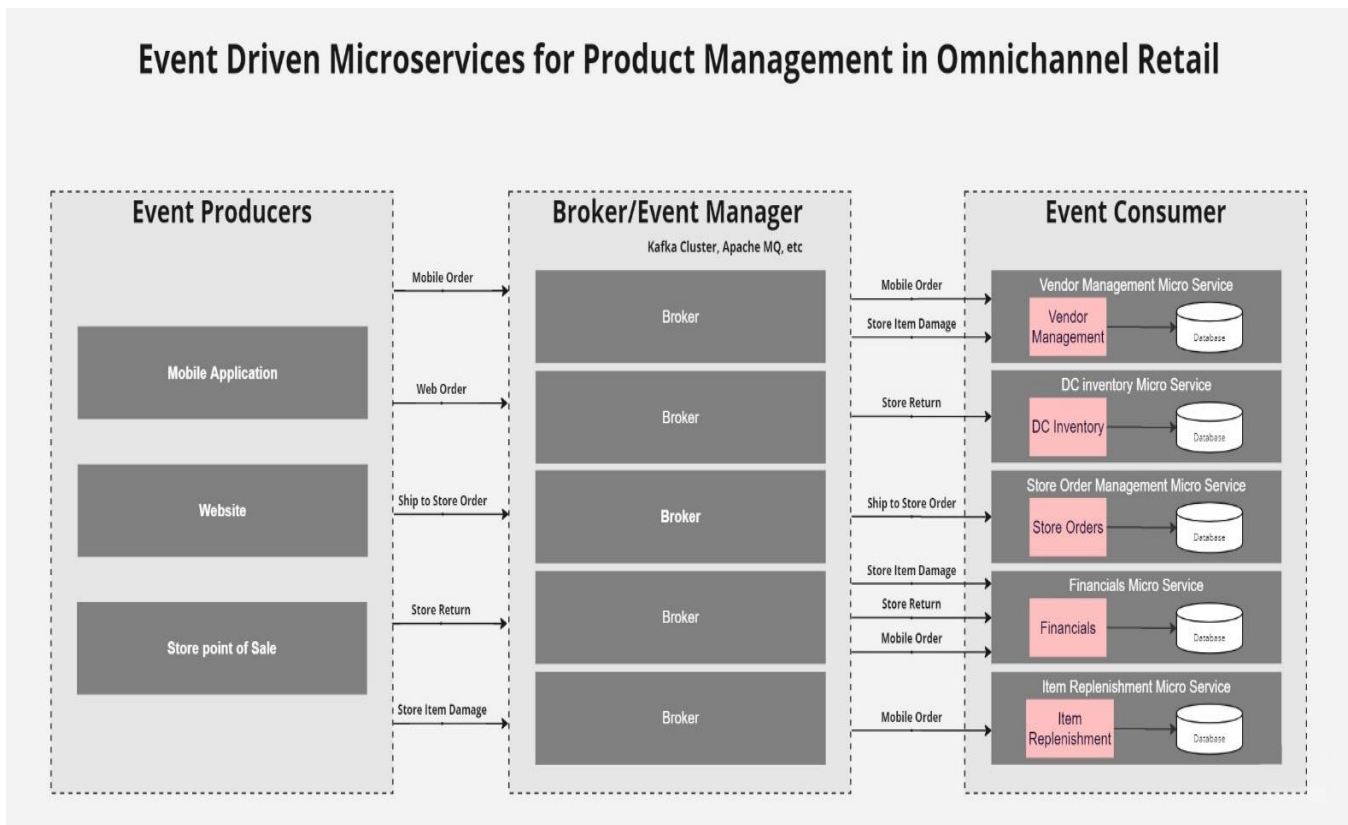


Fig 2. Proposed Scenario of how the products will be managed using event-driven microservices.

## V. CONCLUSION

In conclusion, the utilization of Event-Driven Microservices Architecture (EDMA) represents a transformative and highly effective paradigm for advancing retail product maintenance in the modern digital age. In this research paper, we have delved into the intricacies and advantages of EDMA, illustrating how it can revolutionize retail product maintenance processes and drive business success.

First and foremost, EDMA empowers retail organizations with the ability to harness real-time event data, facilitating a dynamic and responsive approach to product maintenance. This capability allows retailers to adapt swiftly to changing market conditions, optimize inventory management, and respond proactively to customer demands. By monitoring events such as product sales, inventory levels, and customer interactions, retailers can make data-driven decisions that enhance the efficiency and effectiveness of product maintenance efforts.

Furthermore, the modularity and scalability inherent to microservices architecture are amplified in the context of EDMA. Retailers can seamlessly add, modify, or remove microservices to cater to evolving business needs, all while minimizing disruptions to existing systems. This agility ensures that retail product maintenance remains adaptable to market fluctuations and emerging technologies.

EDMA also offers heightened fault tolerance and resilience. The distributed nature of microservices, coupled with event-driven communication, reduces the risk of system failures and data loss. In the event of a failure, the system can gracefully handle errors and continue processing events, ensuring that product maintenance activities remain uninterrupted.

In addition to operational benefits, EDMA contributes to the overall customer experience in retail. Personalized recommendations, timely notifications, and improved product availability are all made possible through the efficient handling of events. This leads to higher customer satisfaction, increased loyalty, and ultimately, greater revenue for retail businesses.

In conclusion, the research conducted in this paper underscores the profound impact of Event-Driven Microservices Architecture on retail product maintenance. Its capacity to enable real-time data-driven decision-making, support flexibility and scalability, enhance fault tolerance, and elevate customer experiences positions it as an indispensable tool for modern retailers. As the retail Omnichannel landscape continues to evolve, adopting EDMA is not merely an option but a strategic imperative for organizations aiming to stay competitive and deliver exceptional product maintenance in Omnichannel supply chain. Therefore, it is recommended that

retail businesses seriously consider the implementation of EDMA as a cornerstone of their digital transformation journey, poised to unlock new levels of efficiency, resilience, and customer satisfaction in the realm of product maintenance.

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