

Dynamic pricing platform on LeanXcale

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Introduction

Historically, from bartering to bargaining, prices have always been dynamic and adapted to other changing factors, such as demand, cost of suppliers, stock, or competence.

Lately, prices have been more static. This is mainly owing to costs and difficulty, implying there is always the option to manually calculate the optimal price and change labels.

However, as big data and new tools based on technologies such as artificial intelligence, machine learning or business intelligence have permitted a much fresher picture of what is taking place in the business landscape, dynamic pricing has become a reality again.

Not only will e-sales be adopting this strategy, but also on-store sales thanks to intelligent labels and new IoT technologies.

However, what are the advantages of a dynamic pricing strategy?

- It gives greater control of the pricing strategy
- It allows flexibility without compromising brand value
- It increases a business's revenue

Yet, not everyone can engage in dynamic pricing as there are several technical challenges to face that require the usage of the right software and databases.

Defining a Dynamic Pricing Platform

A dynamic pricing platform's final task is to continually set and update for all the inventory of a company new prices that optimize revenue by employing all the available information. The necessary process consists of three parts:

- **Data storage:** First, the platform must collect and store all relevant information to calculate new prices. External information, like competitors' prices and demand, internal information, like stock and product sensitivity to changes in pricing rates, or use-based information, like previous purchases, web navigations or movement into the store, are imperative.
- **Data analysis and price setting:** Data extracted and stored must be processed to set a new price by a set of algorithms that selects the correct value.
- **Inventory update:** The platform should allow for the pricing update without impacting the end-user experience.

This process must be carried out as frequently as the business requires it. It could be once a day, every hour or even shorter periods, thereby getting closer to real-time pricing. It can even be calculated on a customized basis for every customer.

Top Requirements of a Dynamic Pricing Platform

Dynamic pricing platforms can avoid these issues by adopting LeanXcale, a fully ACID-compliant database with fast access and analytical capacities, and being optimized to combine writes and reads with stable performance at any scale.

Built upon the premise of ensuring database technical excellence via more than 12 disruptive technologies, LeanXcale provides a simple architecture and innovative features to tackle the individual challenges that a dynamic pricing platform faces.

These platforms must be able to:

- **Maximize the rate at which data from logs, tags, IoT devices, APIs, and other sources are ingested and aggregated with exceptional cost-efficiency.**
 - ***LeanXcale capacities:***
 - ***Fast data insertion with data directly available for SQL queries:*** The KiVi distributed storage engine is a relational key value store. It combines the efficiency and scalability of a key value with a SQL database's ease of use and ACID capabilities. All the inserted data is directly available for the distributed SQL engine.
 - ***Optimized for time-series management:*** *Most of the data for the subsequent analysis is based on a time series: i.e., the evolution of a metric, KPI, or price.* KiVi is optimized for handling this structure. Patent-pending, bi-dimensional partitioning makes smart usage of memory caches both for time-series insertion and query time for maximum efficiency.
 - ***Optimized for KPI calculation:*** In the retail business, it is common to aggregate figures according to different criteria, i.e., calculate the total purchases per customer, district, city, region, or country. Patent-pending online aggregation is enabled by an innovative semantic concurrency control, which prevents parallel query conflicts, computes aggregated KPIs in aggregated KPI tables as data is ingested. LeanXcale transparently manages aggregations efficiently. Analytical aggregation queries are costless because they are simple single-row queries from the appropriate aggregated KPI table.

- **Provide fast analytical queries that allow training models, applying deep analytics, and visualizing information to find trends, behaviors, and optimal prices.**
 - ***LeanXcale capacities:***
 - ***Real-time analytics:*** Hybrid Transactional Analytical Processing (HTAP) allows real-time analytics and visualization for fast detection of trends and changes in supply and demand as soon as data from all sources is taken in. All this information can be processed in real time. A distributed data warehouse engine supports running analytical queries directly on operational data so there is no need to perform ETLs. This can save up to 80% of the average cost of conducting business analytics and decisions can be made from the very first moment.
 - ***Easy dashboarding and advanced analytics:*** LeanXcale integration with BI tools and ML frameworks provides a strong foundation to smoothly define a pricing strategy that optimizes revenue.

- **The capacity to update inventory and adjust prices immediately regardless of the time and without affecting the end-user experience.**
 - ***LeanXcale capacities:***
 - ***Large-scale control of performance and resource usage:*** *LeanXcale has developed a brand-new store engine. Its disruptive mono-thread design avoids the usage of thread context switches, thread synchronization, and NUMA remote memory access, making it extremely efficient and cost-effective. Further, this approach offers very detailed control of all resources*
 - ***An optimal MVCC old version manager that has stable latency:*** *Modern databases use multi-version concurrency control (MVCC) to avoid conflicts between reads and writes. However, MVCC requires removing obsolete versions.*

LeanXcale's new MVCC utilizes a new approach that is almost costless and does not create issues with any update rate. This algorithm means stable throughput in a frequent update scenario, and that facilitates a good user experience for every single customer.

- **Linear scalability that grants LeanXcale usage at any scale:** The patented Iguazu technology is a single, unified system for managing transactions efficiently at any scale. It enables scaling out linearly from one node to hundreds of nodes maintaining all ACID properties. One hundred nodes deliver 100x the throughput of a single node.

- **Optimal data structure:** *Until today, there has been a duality between SQL databases and key-value data stores:*
 - *SQL databases are better performing for range queries.*
 - *Key-value data stores are more efficient for data ingestion.*

This duality results from the underlying data structures used by the SQL engines and key-value engines. SQL databases use B+ Trees, while key-value data stores employ Log-Structured Merge (LSM) trees. LeanXcale makes use of a novel data structure that is as efficient as B+-trees for range queries and as efficient as LSM trees for random updates/inserts. This innovative structure provides versatility to LeanXcale and permits having a stable performance for pricing updates along with the additional agility to analyze the stored data in real time.

Business Value of LeanXcale Architecture Simplicity

LeanXcale is a versatile database that manages multiple workloads, high-rate ingestion, SQL operational loads, or analytical queries. As it is independent of other databases, there is no need to move data among systems. It accommodates real-time data usage - and at any scale based on the Iguazu algorithm.

LeanXcale versatility has a substantial impact on the development, maintenance, and quality of a dynamic pricing platform. The central business values of this approach are:

- **Lower Time-To-Market (TTM):** The engineering team has to only develop in one SQL-based database rather than multiple technologies for a faster build.
- **Lower Total Cost of Ownership (TCO):** LeanXcale facilitates more straightforward deployment and maintenance. It can manage any volume, scaling horizontally with entirely linear behavior. LeanXcale also has a low annual subscription fee.
- **Reduce pricing actualization period:** LeanXcale enables information analysis and pricing updates without affecting the end-user experience.

Conclusion

A dynamic strategy that adapts prices to demand and supply variations, personal behavior, feelings, navigation, or previous purchases makes revenue increase.

The right pricing strategy optimizes conversion rate (CRO) and leads to a higher average revenue per user (ARPU).

Additionally, users have a better experience purchasing.

However, to develop this optimal dynamic pricing strategy, a database with certain features is needed. Those features include scalability, hybrid transactional analytical processing (HTAP), or integration with BI and ML tools as musts.

Overall, LeanXcale provides these functionalities and more, and will become a perfect tool for creating a dynamic pricing retail platform.

Resources

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