



Real-Time Inventory: Building Competitive Advantage with Redis Enterprise

Redis Enterprise enables retailers to adopt real-time inventory systems to optimize their inventory, yield, and supply-chain logistics—and to deliver a better customer experience.



Executive Summary

Modern multi-channel retailers are turning to real-time inventory systems to optimize their inventory, yield, and supply-chain logistics—and to deliver a better customer experience. Learn how Redis Enterprise supports real-time inventory management by providing high availability and super-fast database performance at peak scale while ensuring data consistency across multiple channels.

Meet Dave.

Dave is a suburban dad looking to buy a new instapot to make preparing his family's meals faster and more convenient. Dave doesn't have a lot of time, so he's looking online to find out whether nearby stores have the device available for immediate purchase or whether their online counterparts have ones available with guaranteed two-day delivery.

For smart retailers with real-time inventory, Dave is an opportunity to make a sale and gain an appreciative customer. But for retailers that don't know—in real time—what their stores have in stock, Dave represents an opportunity cost.

If Dave doesn't get his instapot delivered on time, or makes the long drive out to the mall across town and the item isn't actually available, he's likely to be extremely annoyed, go elsewhere to make his purchase, and perhaps even share his frustrations on social media.

Yikes! Nobody wants that!

That's just one reason why managing real-time inventories across multiple physical and digital channels and locations is so important.

But that's only the beginning of the story. What if the retailer had lots of instapots in one location, but only one left in another? To avoid losing future sales, retailers should strive to democratize inventory between well-stocked stores and those low on available-to-promise products to

Real-Time Inventory Drivers:



Enable Omni-Channel Experience



Reduce Fulfillment and Supply-Chain Costs



Increase Revenue Opportunity

Real-time inventory enables an omni-channel retail strategy, delivering a unified, seamless, and consistent customer experience across all channels.

avoid selling out the last item from a particular location.

Similarly, real-time inventory is essential for optimizing order fulfillment and shipping costs.

For example, Dave might order his instapot online or at his local store, but omni-channel retailers might be able to speed the process and reduce costs by having the device delivered from a closer store or warehouse, or even one already delivering to other locations near Dave. It's all about making sure items are in the right place, at the right time, at the right price.

But wait, there's more!

Without real-time inventory, retailers can't optimize inventory, yield management, and supply-chain management. Relying on historical data makes inventory forecasting less accurate, increasing costs from carrying excess inventory and requiring unnecessary shipping.

Retailers can also face reduced yields due to poor execution of enterprise-wide pricing and promotional strategies. For example, they can't allocate available inventory to the highest-margin locations. Real-time inventory is also an essential component of a unified national order-fulfillment strategy, letting retailers pool geographically clustered store locations and warehouses to contribute to a single inventory.

Finally, retailers without real-time inventory management risk unavailability in the face of natural events and disasters. Before the event, real-time inventory management lets companies redirect fulfillment to healthy regions or proactively stock potentially

impacted areas. For example, if a hurricane is predicted, retailers can boost inventory in the affected area of everything from food and water to sandbags and plywood. More importantly, the store database must remain available even if it becomes cut off from the enterprise.

This lets the store continue operating with assurance that all of its inventory will automatically sync with the enterprise database—without any conflicts—once connections are re-established.

In sum, real-time inventory enables an omni-channel retail strategy, delivering a unified, seamless, and consistent customer experience across all channels, including in-store, websites, mobile apps, email, and social media. A typical customer journey, for example, might begin with discovery on social media, browsing on a mobile app, purchasing in-store, shipping to a home address, authorizing return via email, and physically returning the item via snail mail.

This approach democratizes regional inventory based on geographic availability instead of limiting the sales opportunity to a single store location. And it enables retailers to implement and monitor key capabilities like shipping to and from a store, finding items in a particular store, reserving an item in store for pickup, enabling customers to buy online and pick up in store, and many more. Without it, retailers risk leaving money on the table, inflating costs, frustrating customers, and reducing the accuracy of their forecasts and planning.



The rocky road to real-time inventory

To truly understand the challenge involved in implementing real-time inventory systems, it's important to grasp the complexity involved in always being able to determine exactly what is available where.

First, as noted, an omni-channel strategy means that interactions between customers and the company happen in many different ways over multiple channels. And it's not just simple purchases: customers may buy in a store or online, and may want to pick up their purchases at the store or have them shipped to their home, office, or other site. Retailers also have to account for customers returning items by mail or to the store, no matter where they may have originally purchased the goods.

Critically, the complexity lies not just in knowing

how much of what is where, but maintaining consistency across the multiple places (typically databases) that keep a record of that information. For everything to work together, all those places must have the same count.

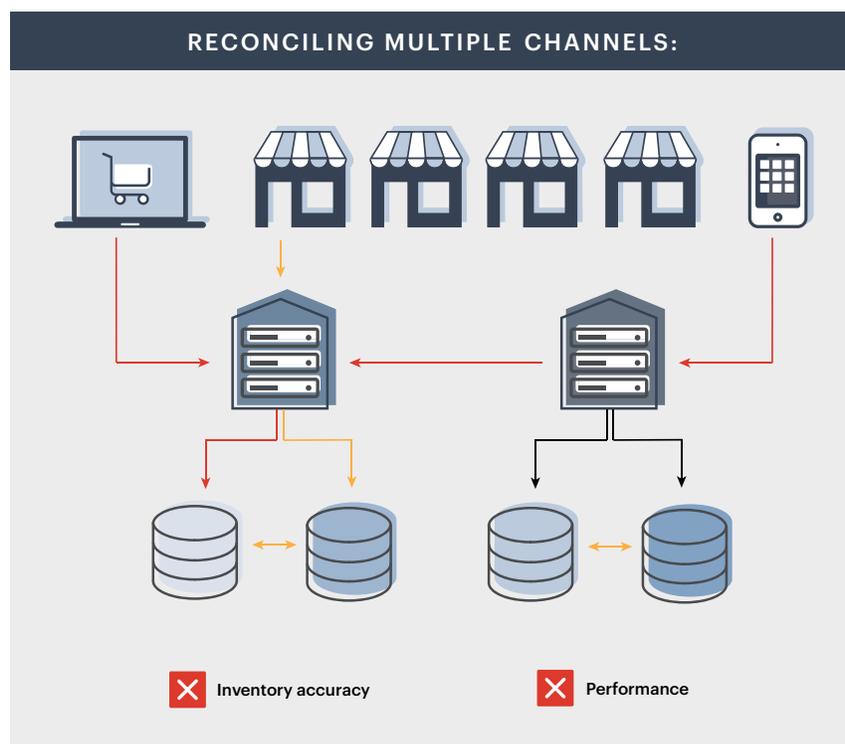
So, how do you get to real-time inventory?

A very simple deployment might consist of a single brick-and-mortar store connected to an enterprise data center, which in turn is storing the inventory in a disk-based database. A simplistic scenario like this might deliver good performance and good inventory accuracy, but of course, in the real world things tend to be a lot more complicated.

For example, when you multiply the number of stores accessing that data center—which is relying on a single disk-based database—you might encounter performance-degradation

issues even though the inventory is still accurate. If you want to be able to survive a data center failure, for example, you need to add replication capabilities, which could compound the performance problems.

When you start to mix in omni-channel approaches, inventory demand and supply can come from different places. Reconciling those channels can be difficult, and can slow performance and lower inventory accuracy. And, of course, both problems only get worse as you increase the number of channels involved.



Why is real-time inventory so complicated?

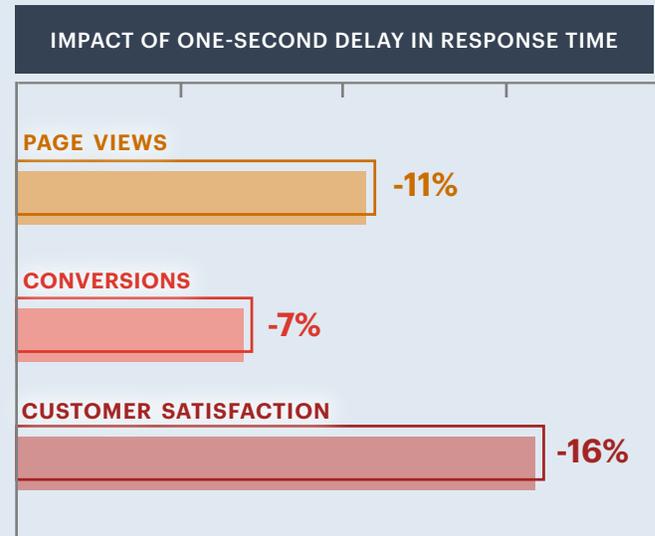
Not surprisingly, several factors contribute to making real-time inventory so complex.

The first problem is that large retailers have a lot of stores and distribution centers—many national chains operate more than 1,000 store locations and dozens of distribution centers. Making things worse, not all those stores and warehouses are created equal. They may come in a wide variety of sizes and carry varying selections of products and inventory levels. The system must also be to accommodate individual store managers who may not be fully aligned with corporate priorities. For example, store managers may want to discount their local inventory to meet their store's revenue targets, whether or not that fits into the enterprise's overall plans.

Then you have to account for the growing impact of e-commerce. Enterprise websites and mobile applications can sell tens of thousands of products but have no physical storage.

The impact of performance problems and inaccurate inventory

Poor web performance can have a big business impact, as shown in a recent report from Gomez.com in combination with Aberdeen Group. The chart below shows the average impact of a one-second delay in response time in your applications.



Delays in getting inventory information can affect customer satisfaction, which could lead to lost revenues, brand damage, more support calls, and overall higher costs. Customers quickly grow frustrated when they can't quickly find out exactly what items are available where.

Inaccurate inventory, meanwhile, can contribute to delivering a poor customer experience. This frustration can lead to shopping cart abandonment, reduced brand loyalty, and increased costs for the company as they try to make things right via remediation such as refunds, apologies, waiting lists, order cancellations, and so on.



They rely on stores and distribution centers for fulfillment. Plus, website and mobile users tend to engage more frequently than in-store shoppers. And don't forget, delivering a true, omni-channel experience requires consistency and access to cross-channel data no matter where or how the customer chooses to shop.

Backend complexity is also a challenge

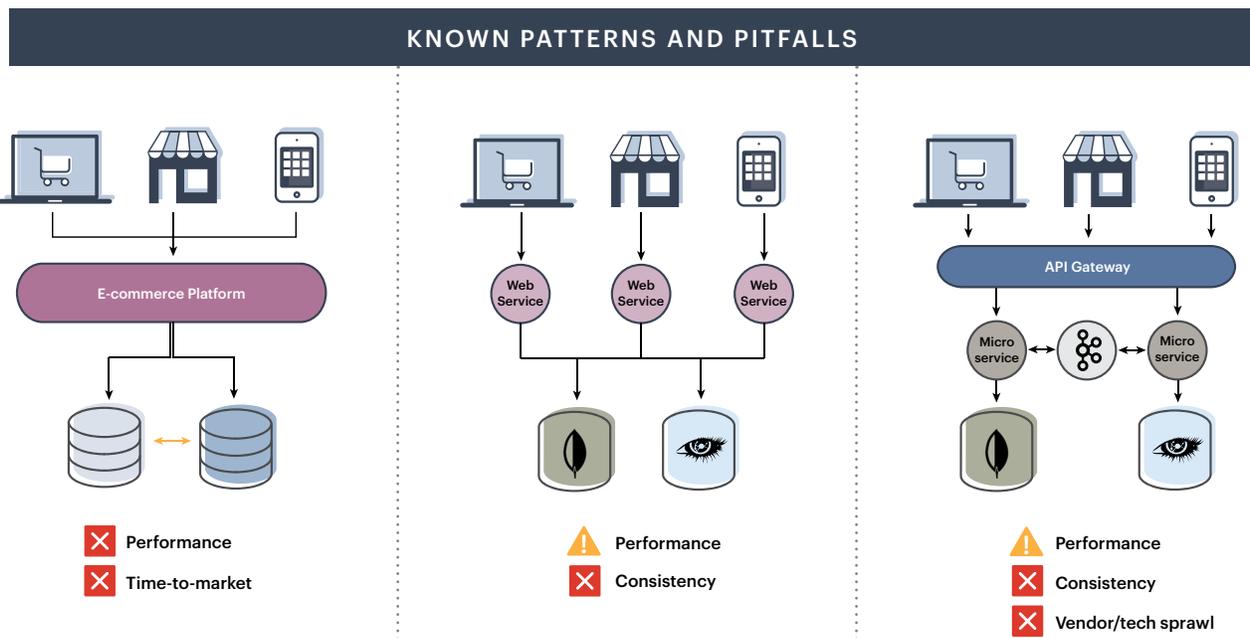
In order to build and maintain real-time inventory systems, enterprise architects must address a number of critical questions:

- **How can we maintain consistency between stores and the enterprise** if one side becomes unavailable? What happens when it recovers?
- **How can we avoid copying data**

between multiple heterogeneous databases?

- **How can stores and enterprise systems update inventory bi-laterally** without compromising on consistency and/or accuracy?
- **How can we scale to ensure inventory availability** in the face of peak Black Friday and Cyber Monday traffic without provisioning maximum infrastructure all year round?
- **How can we do all this without the hassle and costs** of technology and vendor sprawl?

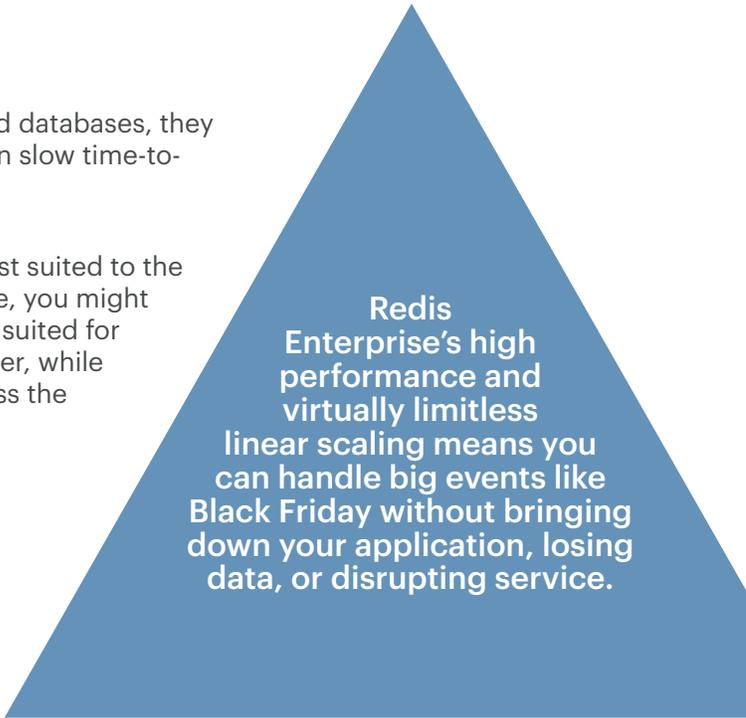
In the past, architects chose relational databases to store inventory data, but with the addition of website and mobile channels they weren't always up to the challenge. RDBMs typically cannot handle peak-throughput volume; especially during the holiday season. Segregating these databases by channel may sound like a solution, but that creates an inconsistent view of inventory. And while



e-commerce platforms may promise to unify segregated databases, they force all channels into a monolithic architecture that can slow time-to-market and increase development complexity/costs.

Another solution was to choose the database/model best suited to the needs and SLAs of each individual channel. For example, you might use MongoDB because its JSON document store is well suited for REST APIs and Cassandra for its high availability. However, while availability and performance improved, it did not address the inconsistency between disparate databases.

To remediate consistency issues, architects adopted message brokers, such as Kafka, which improved consistency at the cost of added complexity and cost due to the need for auditing, reconciliation, and data duplication. Administrative and architectural complexity was compounded when retailers began migrating to microservices architectures. In a microservices architecture, each service is bounded by business context instead of channel, and could have its own database; each with its own supporting vendor, cost structure, and so on.



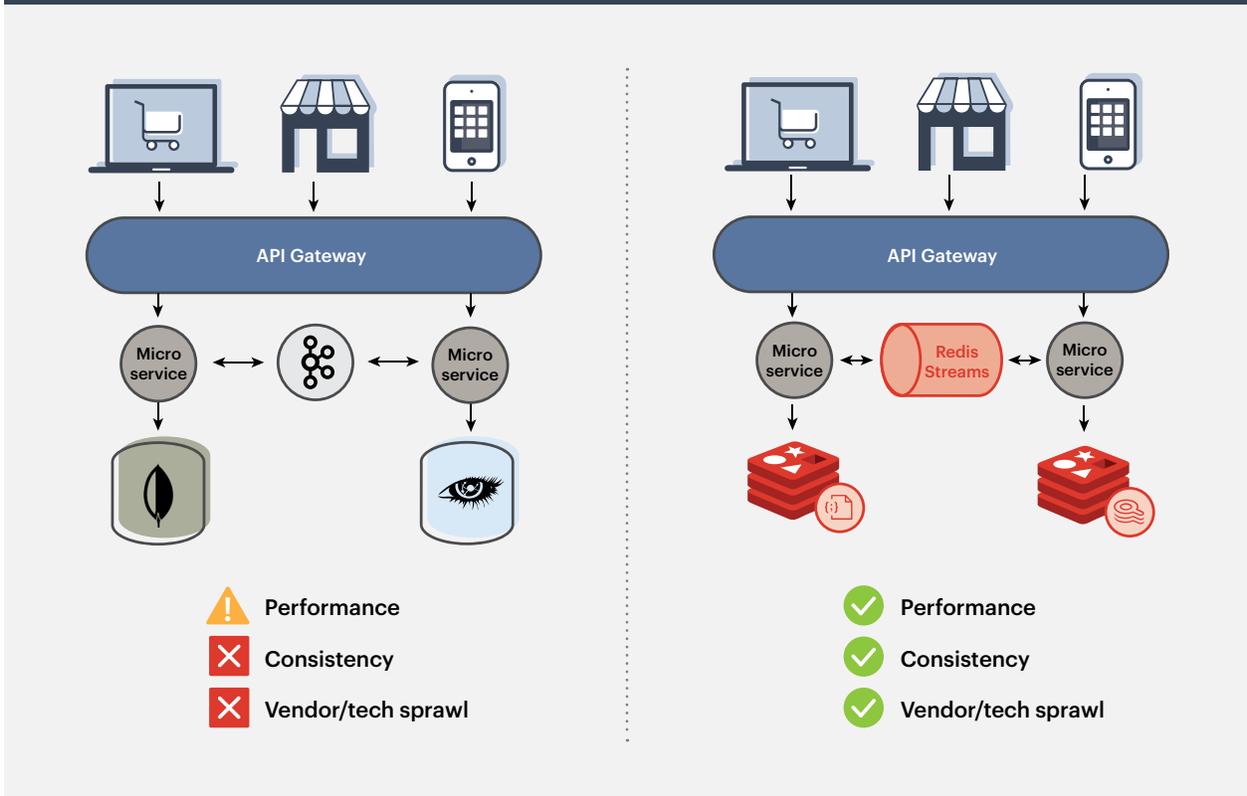
Redis Enterprise's high performance and virtually limitless linear scaling means you can handle big events like Black Friday without bringing down your application, losing data, or disrupting service.

Using Redis Enterprise for real-time inventory

Redis, the most popular in-memory database, supports a wide variety of high-performance use cases. For complex real-time inventory systems, Redis Enterprise provides the best Redis experience. Large retailers like Home Depot, Staples, Gap, and many others are already reaping the benefits.

Specifically, Redis Enterprise's [linear scalability and high performance at massive scale while utilizing minimal infrastructure](#) makes it well suited to deal with Black Friday-style peaks without over-provisioning, while its high availability lets retailers handle any failure scenario without affecting their real-time inventory efforts. That means you can scale up for Black Friday without bringing down your application, losing data, or disrupting service—no downtime required!

MINIMIZING TECHNOLOGY/VENDOR SPRAWL



Redis Enterprise offers real-time, bi-directional consistency between stores and enterprise systems without the complexity and costs of managing message brokers, auditing, and reconciliation.

Just as important, because Redis Enterprise is a multi-model database, you can create any number of databases with different characteristics on the same infrastructure, perfect for supporting a microservices architecture. For example, a key-value store, a graph database, a time-series database, a cache, a search engine, and a document store—and many others—can all coexist on the same Redis Enterprise cluster to help minimize

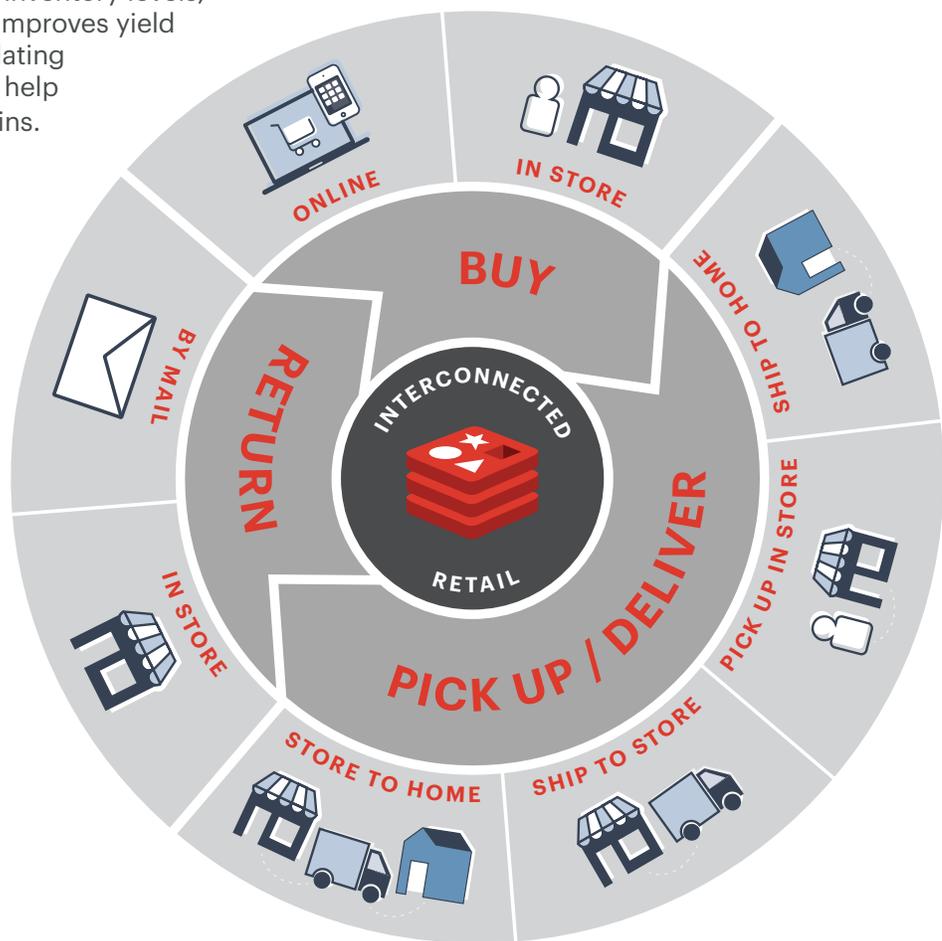
the complexity and costs of proliferation of technology and vendors, as shown above.

The left side of the diagram shows MongoDB and Cassandra used for two different microservices joined using Kafka. As noted, this approach can lead to sub-par performance, consistency and reconciliation issues, and vendor sprawl. With Redis Enterprise, Redis Streams handles microservice communication and the Redis JSON module is the document store. RediSearch gives you a full-text search engine and secondary index on top of Redis. This is a key benefit—you can co-locate documents and your indexes and not worry about keeping them in sync across multiple databases.

But how does all this translate into consistency between the stores and the rest of an omni-channel retail enterprise? Redis Enterprise has a small footprint, so you can deploy in individual stores decoupled from the enterprise availability. If the store loses access to the enterprise, it will remain available and works on its own. That lets you leverage the stores as an edge architecture for local mobile customers.

And with Redis Enterprise's [Active-Active geo-replication](#) among enterprise data centers, you avoid expensive duplication and still get consistency among the enterprise data centers. This eliminates the need for message brokers, auditing, or manual reconciliation of your data. You also get automatic and instant reconciliation when an enterprise data center recovers. And if a store's data center becomes unavailable, it can fail over to a replica in another region, for example.

The result? Enterprise systems get an exact view into each store and send updates as needed. That simplifies ship-from-store functionality and change management for store-based order fulfillment and ensures compliance with corporate promotions, pricing, inventory levels, and so on. Finally, it improves yield management by updating discounting plans to help ensure healthy margins.

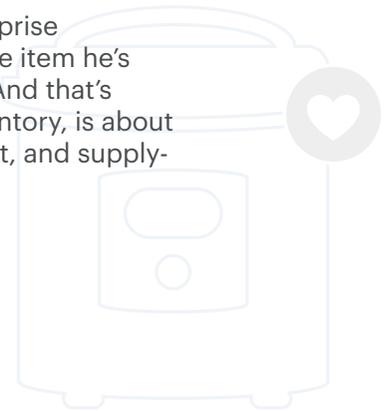


The bottom line

Real-time inventory is essential for large retail enterprises, but building and maintaining real-time inventory in the real world can be a complex, daunting task. Put simply, Redis Enterprise is very well-suited for addressing the demands of real-time inventory management.

Redis Enterprise builds on the legacy patterns used to build real-time inventory systems and leverages its unique capabilities to overcome their shortcomings. Traditional inventory systems based on RDBMS technology simply don't measure up in the modern omni-channel retail environment. Redis Enterprise supports real-time inventory management by providing optimum database performance at peak scale and ensuring deep consistency among multiple channels (stores/websites/mobile/social/more) while minimizing infrastructure and technology sprawl.

Remember Dave, the dad who just wanted to buy an instapot? With Redis Enterprise powering a modern real-time inventory system, he's much more likely to find the item he's looking for, enjoy a great shopping experience, and become a loyal customer. And that's what real-time inventory is all about, for consumers. For retailers, real-time inventory, is about powering an omni-channel strategy that optimizes inventory, yield management, and supply-chain management.



Want to learn more?

[Watch this on-demand webinar on Real-Time Inventory](#), featuring a live demo by Redis Solution Architect Julien Ruaux. And check out how these Redis customers use Redis Enterprise for real-time inventory management:

- [The Gap](#)
- [Pixlee](#)
- [The Home Depot](#)