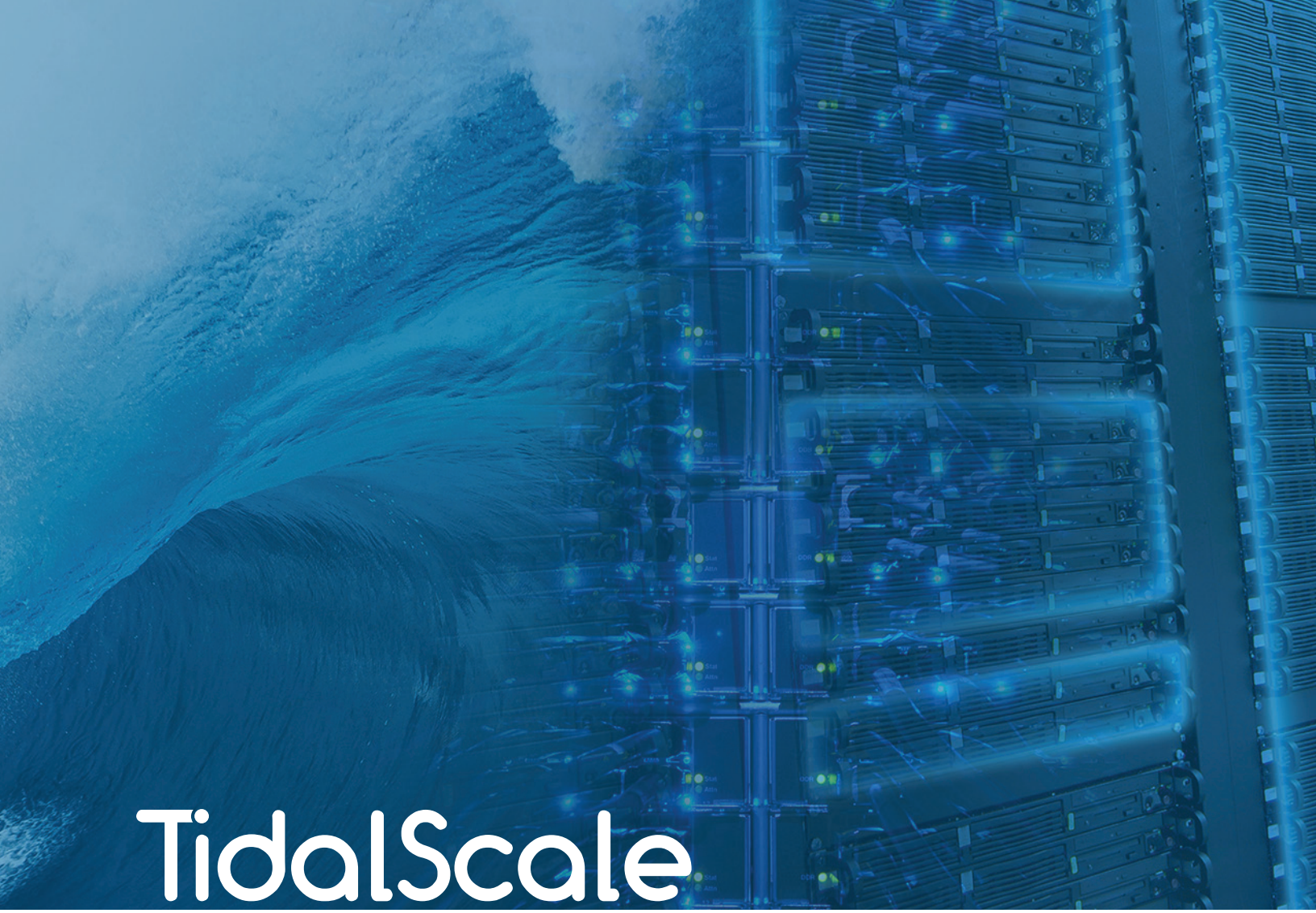

TidalScale

SIRQUL™

7 Challenges of Working with Retail IoT Data

A Sirqul | TidalScale White Paper

Footprinting the in-store shopping experience of the future

Retailers are looking for ways to increase revenue and engagement while improving the customer experience. Brands that use technology and data to offer customers personalized experiences are seeing revenue increase by 6 to 10 percent, growing two to three times faster than those that don't.[1]

It's little wonder, then, that understanding the customer journey is the subject of such intense focus among retailers. With online retail sites gathering data that reveals customer preferences, buying histories, browsing habits, social media activity and more, retailers are looking to replicate the same level of insight within their brick-and-mortar stores.

Even more, they aim to use sophisticated analytics to create a unified customer journey—one that presents online and in-store experiences as perfectly paired parts of a seamless, shopper-friendly whole. The goal: To optimize the shopping experience from outside in the parking lot, to store aisles, onto the shopper's mobile device, and then back at home. This approach builds on a recognition that shoppers are increasingly channel-agnostic: in-store, desktop, mobile, social media channel—they don't care where they get the item or the deal, so long as they get it.

But achieving this has proven elusive. Lacking the technology and systems needed to monitor, consolidate and analyze in-store customer information, retailers simply haven't been able keep up with their online counterparts. So executives and their store managers are left operating by instinct and best guesses, or they collect what data they can and do their best to analyze it, even as their siloed legacy systems complicate that task further.

The retail opportunity: In-store insights from IoT data analytics

The Internet of Things (IoT) represents a way to achieve this by providing accurate data to enable timely decisions. IoT replaces observant employees and guessing with actionable data and dashboards using smart devices, digital displays, tablets, consumer mobile devices, POS systems, and more to enable game-changing improvements in three areas.

1. Digital Physical Store Intelligence. On-premise devices now offer a way to collect, measure and respond to customer activity. With the right technology, retailers can:

- Visualize store traffic related to product placement and promotions
- Understand traffic patterns, dwell times, and sales correlations
- Convert more visits into sales

1. Boston Consulting Group

2. Personalized Customer Journey. IoT analytics offers a way to recreate online shopping's persistent a awareness of shopper behavior and preferences, enabling in-store shoppers to:

- Experience in-store navigation to products on shopping lists
- Connect to digital concierge or associates for immediate help
- Receive location-based promos and coupons
- Discover product information at the shelf or in the aisle with interactive displays and user-generated content
- Complete transactions without standing in long lines or even taking out their wallets

3. Connected Employees and Store Operations. IoT analytics connects the employee and sales associates to reveal helpful customer information and provide in-store efficiencies.

- Manage employee tasks and optimize staffing
- Predict, monitor, and trigger alerts to prevent costly spoilage
- Optimize planograms to increase margins
- Boost employee engagement
- Pick and pack with optimized routing for customer store pick-up

Smart retailers are investing

Recognizing the intelligent, connected opportunities introduced by IoT, retailers themselves are going shopping: They'll spend $12 billion on IoT solutions worldwide in 2020, a six-fold increase from 2015.[2] Meanwhile, Gartner expected retail IT budgets to increase 3 percent in 2017, with much attention placed on continued modernization of multichannel and analytics solutions.[3]

In other words, even if you aren't planning to invest in IoT analytics, your competitors are.

The problem: Data volumes and complexity prevent timely insight

Garnering timely, actionable intelligence from IoT data is the key to its success. But exploding data volumes and complexity sometimes make that difficult. With IoT data growing at 50 times the pace of traditional business data[4], it's not hard to see why some organizations simply aren't equipped to handle what's coming. Perhaps this is why, by 2020, 75 percent of organizations will fail to reach the full potential of IoT because of a lack of data science specialists, underscoring the need to make analytics easy, accessible and fast.[5]

Yet in a world where market conditions change daily, retailers increasingly are looking to make decisions in real time, or very close to it.

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2. Statista, IoT Spending by Vertical Worldwide
3. Gartner, Forecast: Enterprise IT Spending for the Retail Market, Worldwide, 2014-2020, 4Q16 Update, Molly Beams, Rika Narisawa, Venecia K. Liu
4. "The exponential growth of data," Inside Big Data, Feb. 16, 2017
5. Gartner, "Leading the IoT: Gartner Insights on How to Lead in a Connected World," Mark Hung, 2017

7 challenges of analyzing IoT data
(and how you can solve them)

The problems retailers face aren't insurmountable, but they can't be solved without the right technology. Following are seven increasingly common challenges presented by IoT's flood of data and analytics and what's needed to overcome them.

Challenge No. 1

Data streaming from multiple sources can create problems for traditional analytics environments.
Some retailers have created walled gardens for data, and others maintain legacy systems that aren't built to accept new data types. This limits the options available to retailers who want to maximize their return on new investments in IoT, not to mention the systems they've had in place for years.
Solution: Retailers need a way to aggregate all types of unstructured data and automatically transform it into a canonical format that can be easily understood by the retail marketing analytics team—and by the applications they rely on. (In other words, analysts shouldn't need 10 different dashboards to make sense of data streaming from multiple sources.) It's just as crucial that the solution of choice is platform-agnostic, allowing it to perform the same valuable function for data generated by legacy retail applications. This removes any bias that naturally occurs when some sources are easier to work with than others, letting the most useful data drive the most valuable analysis. Accepting all this data puts enormous burdens on computing systems themselves—the servers that run the analysis. They too mustn't care what application is running on it. And just as importantly, they must support workloads of virtually any profile: memory-intensive, CPU-intensive, or a balance of both.
The bottom line: You should have the right resources available to handle whatever the application needs.

Challenge No. 2

Large data volumes delay insights into measuring and analyzing crucial in-store metrics like traffic patterns, dwell times, and sales correlations.
Large data volumes overwhelm the systems retailers have in place to run analytics. And data volumes grow larger as analysis adds granularity. For instance, to add more detail that could render more useful insights, retailers may extend the timeline applied to historical data. (Analyzing one Saturday's traffic patterns is helpful, but viewing the past month's Saturday traffic can be exponentially more meaningful. That, however, increases data volumes by a factor of four or five.) Many retailers (and even cloud computing providers) simply don't have systems large enough to compute those analyses as a whole, so they are forced to run their analysis in pieces and then reconstitute them in a consumable format, which delays results.
Solution: Retailers need easy, affordable access to computing resources that are capable of handling tens of terabytes of data so they can be processed entirely in dynamic random access memory (DRAM). Why? Because when all your data is held in memory, you eliminate the delays of accessing information from storage—and DRAM is 1,000 times faster than the fastest flash storage.

Challenge No. 3

Multiplying SKU counts add complexity and volume to in-store analytics and complicate task management.
With digital signage and price tags now tied into inventory management systems, some retailers are demanding the intelligence necessary to adjust item prices frequently, even more than once a day. And manual task management processes – instructing managers and employees to move products or rearrange displays – no longer are responsive enough to allow managers to act quickly based on in-store activity and other factors. Uploading these insights directly into the store's floorplan helps employees make decisions before it's too late.
Solution: Here again, more intelligence means larger data sets, which under typical circumstances take longer to process. Running analytics programs on servers that are sized to dynamically adapt to those problems return results sooner and deliver insights while they're still valuable.

Challenge No. 4

Real-time responses (location- or preference-based offers, concierge tips, directions) require real-time processing and results, but not all on-premise or cloud platforms are up to the task.

Customers now have longer digital footprints—shopping histories, social media profiles and interests—which must be combined with other information like location, weather, popularity and more to craft compellingly relevant and personalized experiences that lead to transactions and build loyalty. This includes reaching them in real time at the moment when they are considering a purchase.

Solution: Without machine learning and artificial intelligence, achieving that goal amounts to guesswork. The right solution must be able to gather all this data (through various communication platforms, including WiFi, BLE, mobile, video, apps and more), process it on the fly and deliver results that make sense, either in the form of direction to staff or guidance delivered directly to consumers. Real-time insights require high levels of compute and memory resources, and high throughput computing. Anything less, and retailers will come up short.

Challenge No. 5

Detailed predictive simulations that test, measure and iterate floorplans, product placement, staffing and in-store marketing can deliver insights prior to investing in changes, but simulations are famously data-intensive.

Retailers are in a constant quest to find where the most lucrative business is. At a time when operators of physical stores are facing headwinds from online shopping, being able to predict trends and shopper behavior and interests is becoming an existential issue for some retailers. But that requires more data, from more sources, and all of it processed in a way that's timely, easily consumable, and relevant to each shopper.

Solution: A flexible, powerful solution capable of analyzing data from any source and on a timely basis is the only way retailers can confidently anticipate where their next sale will come from. That requires an advanced analytics platform and, when needed, a massive computing resource.

Challenge No. 6

Retailers are concerned that data from their legacy systems may no longer be relevant in an IoT world.

Retailers have long put in place various data-driven systems (temperature monitoring, RFID asset tracking, etc.) to improve efficiency, gain better insights into inventory levels, and more. The data from these systems now is being used to analyze and optimize the customer experience, improve the employee experience, and boost engagement. As they move forward, retailers want to ensure that they don't have to abandon their existing systems.

Solution: Retailers should be able to confidently pursue any opportunity that improves the customer journey, no matter how much data there is or where it comes from. A scalable software and hardware solution capable of ingesting and processing virtually anything a retailer's IoT and legacy systems produce is, simply, an absolute must.

Challenge No. 7

Based on their experience with legacy retail software, some retailers are rightly worried that new IoT analytics solutions will lock them in and leave them unable to take advantage of new technologies, data types, and developments.

If the IoT is teaching us anything, is that there always will be another data source, another format, another layer to have to capture, ingest, and process. In this market especially, new technologies will emerge.

Solution: The only reasonable path forward to retailers is to choose an IoT analytics platform that is open and standards based, and capable of accommodating various new sources of data, and new technologies as they are introduced. And as these new developments proliferate, they'll need to run their analytics workloads on computing platforms capable of keeping up with larger and more complicated data sets.

The solution: Sirqul + TidalScale

From combining unstructured and structured data formats to massive datasets and the need for real-time insight, these challenges can be enough to warn newcomers off the notion of getting the most from retail IoT.

Fortunately, two technology pioneers – Sirqul and TidalScale – have joined forces specifically to address these challenges.

Sirqul Aileen
The IoT engagement platform for retail

Sirqul's solution for retail, Aileen, allows retailers to optimize and personalize the shopping experience throughout the customer journey. Aileen is an all-in-one retail solution that can guide customers from bedside to aisle or a table at a restaurant. It also provides for a touchless approach for consuming goods that enables shoppers to complete transactions without taking out their wallets or waiting in line.

Using Aileen, retailers can:

- Discover shopper location, identity, and intent
- Create situational geofences
- Guide customers through the shopping experience no matter where they are
- Enable customers to purchase without even taking out their wallets or standing in line
- Optimize planograms to increase margins
- Boost employee engagement through gamification
- Integrate POS systems

Like all Sirqul solutions, Aileen is device, protocol and cloud agnostic. This fosters an interoperable system for building future-proof solutions focused on a range of applications where IoT analytics adds value.

TidalScale
Time is of the essence: Size your computer to fit any workload

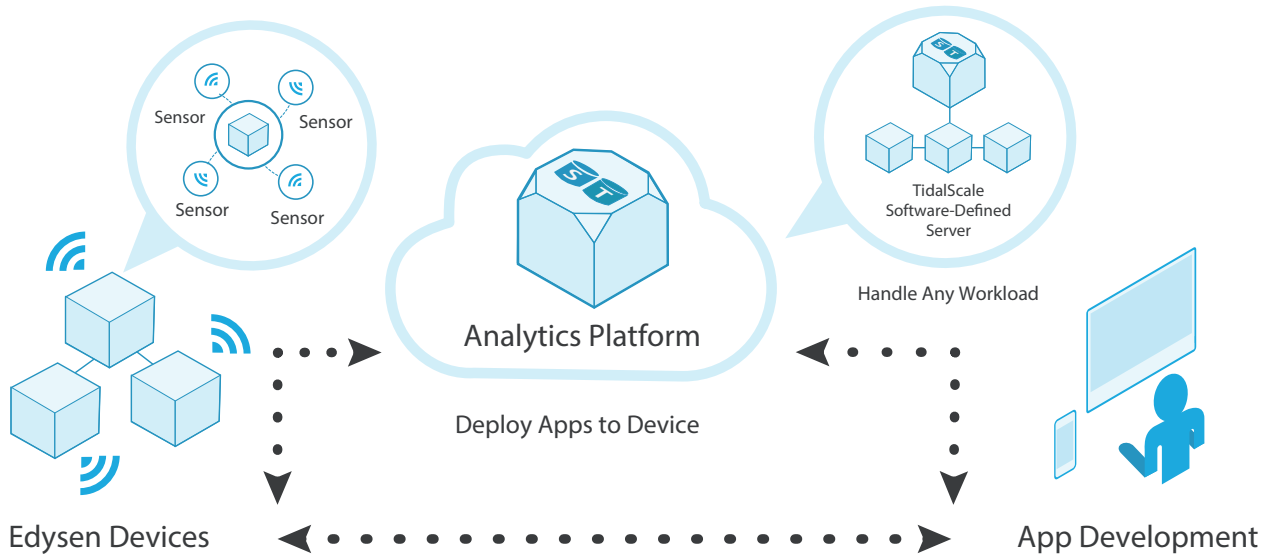
When IoT analytics problems overwhelm your largest server (or even your cloud provider's largest server), TidalScale delivers precisely what's needed: a server configured to handle your increased IoT workload from Sirqul at any point in time. TidalScale's Software-Defined Server combines multiple commodity servers into one virtual server, so you can take advantage of all the memory, CPUs, storage and I/O associated with those servers.

The bottom line: You'll never have an analytics problem too big, too complex, or too time-consuming to handle.

- Easily size your computer to fit your problem
- Get up and running in just 5 minutes
- Derive insights faster with up to 65TB of memory and hundreds of cores
- No software or OS changes
- Use existing commodity servers
- Pay only for the cloud resources you need, when you need them

And like Sirqul, TidalScale is data, application and cloud agnostic, so it can handle anything you throw at it.

SIRQUL™ + TidalScale



How it works

Collect: Sirqul's software platform and patented smart mesh Edysen devices deliver Identity, Location, and Intent. Collect intelligence anonymously and without a mobile app, and collect data from virtually any external source.

Analyze: Feed IoT data into Aileen's web dashboards for visualization and customization of triggers, actions and messages.

Scale: Run Sirqul workloads of any size on TidalScale's Software-Defined Servers. With Sirqul and TidalScale, there's no such thing as too much data.

Sirqul + TidalScale in Action: Measuring In-Store Traffic for a Multinational Retailer

Sirqul first began working with TidalScale to solve the problem of measuring physical store traffic to enable wayfinding, simulations, and personalized interactions.

After manufacturing a smart device called Edysen to detect customers' location, Sirqul went to market to help retailers find data patterns and relationships inside a retail environment, including wait times, dwell times, frequency, and more.

Working with a top multinational retailer, Sirqul mapped inventory locations, POS data, and customer behaviors to create geofences, triggers, alerts, and staff notifications with accuracy down to within a few feet.

Because the retailer operates thousands of global stores, popular cloud platforms limited the customer's ability to tie in multiple stores simultaneously, thus making it impossible to discover trends.

But by running those analyses on large Software-Defined Servers created using TidalScale, the retailer accessed the insights it needed—without having to invest in large systems.

Sirqul + TidalScale: Better together

The combination of Sirqul and TidalScale enables a loyalty-building customer experience that cost-effectively delivers all the in-store insights retailers need, when they need them, and at cost they can afford.

From Sirqul, an engaging shopper experience via its groundbreaking ability to analyze insights from smart IoT devices and deliver relevant, personalized experiences at any given moment. And from TidalScale, the ability to scale the data processing to the size of the problem so insights come as quickly as you need them.

This integrated, powerhouse solution is:

- Data and platform agnostic
- Real-time that's ready for prime time
- Ready for data extremes (now there's no such thing as too much data)
- Right-sized to run your largest analytics
- Fully future-proofed

Learn more

Find out how you can put IoT analytics to use to increase revenues, improve retail operations, engage customers and employees, and more. Contact us at tidalscale@sirqul.com