

# REWRITING THE RULES OF RETAIL WITH DIGITAL TRANSFORMATION

## INTRODUCTION

Customer expectations are changing in the digital age. As a result, retail establishments are rethinking how they serve and anticipate customer needs and to deliver exceptional customer experiences online and in person. Though key data and core applications often reside on traditional back-end information systems, selective IT modernization can create new opportunities for digital transformation. Digital transformation offers multiple ways to address the most pressing challenge for retailers: building a customer-centric commerce model. Establishing this model requires using innovative tools and methods to unify different parts of an organization into a single, fully integrated system.

Retailers faced with different roadmaps for transforming their businesses using digital technologies often find the choices confusing. For financial and practical reasons, they must preserve investments in existing business systems, while strategically adopting modern IT architectures and development methods to stay competitive.

Together, Intel and Red Hat are developing new technologies to help retailers communicate with customers as individuals, engage in their areas of personal interest, and provide positive shopping experiences. An Intel® architecture-based hardware foundation establishes effective support for hosting open source Red Hat® middleware, hybrid cloud, storage, and platform solutions to offer the security and scalability needed for retail applications and services. Additional tools and technologies can help retailers focus on their objectives, such as using data intelligently to personalize shopping, taking advantage of cross-channel marketing, using mobile applications and location-based services to communicate with customers more effectively, and applying Internet of Things (IoT) technology to enrich shopping experiences.

As a result, Intel and Red Hat provide practical paths to IT modernization to help retailers balance current investments with modern technology. With a framework based on Intel and Red Hat technology and services, retailers can discover ways to respond rapidly to market trends and focus their business model on meeting customer expectations.

## TABLE OF CONTENTS

THE CHANGING FACE OF RETAIL.....	2
DIGITAL TRANSFORMATION ENABLEMENT FROM INTEL AND RED HAT .....	3
Intelligent digital signage.....	3
Communication via mobile devices.....	3
Application development .....	4
Storage for big data.....	4
Security.....	5
Internet of Things.....	5
Cloud computing .....	8
A UNIFIED COMMERCE FUTURE .....	9

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*“More leading-edge IT capabilities will be available only in the cloud, forcing reluctant organizations closer to cloud adoption. While some applications and data remain in older technologies, more new solutions will be cloud-based, thus further increasing demand for integration infrastructure. Rigid organizations cannot produce agile IT solutions.”<sup>1</sup>*

YEFIM V. NATIS  
VICE PRESIDENT AND  
GARTNER FELLOW

## THE CHANGING FACE OF RETAIL

Large-scale online shopping venues, such as Amazon and eBay, have reshaped consumer expectations dramatically by providing convenient access to a wide choice of products.

For example, Amazon's domination of the e-commerce sector has perplexed and challenged traditional retailers. However, while an online presence is an important component of the customer experience, a more promising approach may include creating connected stores that delight customers by providing individualized, memorable experiences. The showroom presentations of toy store FAO Schwarz had a lasting effect on visitors during its golden years and included life-sized stuffed animals, a gigantic piano played with a dance mat, interactive displays, and an award-winning LED lightshow in the main atrium. The store's services included a concierge and personal shopper assistance.

Competing retailers are unlikely to overtake e-commerce giants anytime soon. However, using advanced digital tools, retailers have an opportunity to create memorable experiences by turning stores into sensory-rich experiences for customers that outperform distant online purchases.

To successfully transform stores using connectivity to digital services, analytics, and historical insights into customer behavior, retailers must establish a strategy that originates from leadership to guarantee that resources will be available. They must also choose partners wisely to ensure that the right expertise and technologies are available.

Put simply, retailers must intelligently transform their operations to ensure their long-term survival by eliminating barriers between merchandising, marketing, and operations for a unified commerce approach. This approach incorporates unique consumer personalities and characteristics using aggregated, analyzed data from multiple channels. The different aspects of commerce operations – physical stores, smart devices, self-service customer portals, and supply chain and distribution processes – are combined to produce this cohesive, customer-focused approach and:

- Streamline business processes.
- Support efficient, responsive supply using IoT technologies.
- Reduce operational costs.
- Increase visibility into business resources and assets.
- Unify commerce capabilities across consumer channels.

Accomplishing this shift can be challenging and complex, but new infrastructure architectures and application development processes can help. These proven technologies – such as solutions available from Intel and Red Hat – support the creation of scalable, agile IT infrastructures, offering a foundation for innovative applications and services that differentiate retailers for greater competitive advantage. Using digital workplace solutions, retail employees can gain a new understanding of customers and become more efficient and effective.

<sup>1</sup> “Gartner Says By 2020, a Corporate ‘No-Cloud’ Policy Will Be as Rare as a ‘No Internet’ Policy is Today.” Gartner Newsroom. 2016. <http://www.gartner.com/newsroom/id/3354117>

## DIGITAL TRANSFORMATION ENABLEMENT FROM INTEL AND RED HAT

To help retailers take advantage of digital transformation opportunities, Intel and Red Hat offer a wide selection of technology solutions, from standards-based hardware architecture foundations from Intel to middleware components and a mobility platform from Red Hat. These solutions make it possible to deliver instant, relevant information not only to customers, but also to sales associates.

Learn more about Red Hat and Intel technology for retailers' digital transformation in the following sections.

### INTELLIGENT DIGITAL SIGNAGE

A proven method for engaging shoppers is through digital signage powered by Intel® technology. By strategically placing large display screens in stores and dynamically changing the content – such as relevant product sale and new inventory announcements, as well as details on product features – retailers can communicate with customers in a personalized way and determine if messages are achieving the desired customer response. Intel® digital signage solutions, paired with remote content and device management, make this area of digital transformation much more accessible to retailers.

### COMMUNICATION VIA MOBILE DEVICES

Another primary source of digital disruption in the retail world is the ubiquitous presence of smartphones and other mobile devices. These devices connect browsing customers with immediate information, but can also equip associates with guidance for in-person interactions with customers and be used to complete order or sale transactions.

Red Hat Mobile Application Platform is a key tool for retailers that want to quickly develop and launch mobile apps. With this technology, retailers can accelerate the development of mobile apps that improve customer experiences and strengthen associate product knowledge, as well as integrate apps with existing systems in a streamlined manner (Figure 1).

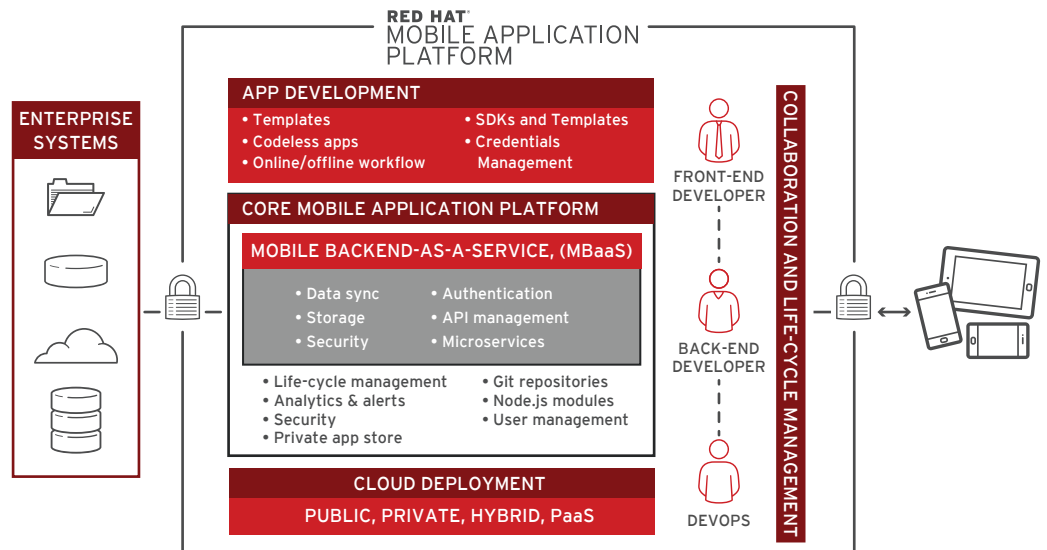


Figure 1. Red Hat Mobile Application Platform overview

Intel mobile technology for retail focuses on creating memorable experiences for customers through the use of mobile devices to communicate directly and personally. This technology helps consumers identify and find desired products in stores and simplifies the payment process.

#### APPLICATION DEVELOPMENT

Red Hat middleware solutions integrate huge volumes of incoming data from customer transactions and IoT links with servers that handle back-end data and core applications. Red Hat JBoss® Middleware is a suite of products that provides service and data integration, high-performance messaging, and in-memory processing, supported by Red Hat JBoss Enterprise Application Platform. Other Red Hat middleware solutions include:

- **Red Hat JBoss BPM Suite.** To help retailers gain a comprehensive view of daily business operations, this business process management (BPM) platform handles the development, deployment, and management of process-led business applications. This solution manages business process orchestration, performs complex event processing, and applies business rules to incoming data. These capabilities ensure greater consistency in the execution of key business processes and supports intelligent, automated decision making.
- **Red Hat 3scale API Management Platform.** Effective cloud application development and integration requires robust application programming interface (API) management tools. This platform provides policy management for tracking and controlling APIs across complex infrastructures and bridges IoT devices and components with the enterprise, helping retailers create new products and revenue streams.
- **Red Hat Cloud Suite.** This product suite combines a container-based app development platform, private cloud infrastructure, public cloud interoperability, and a common management framework to support rapid service delivery while maintaining governance and security.

#### STORAGE FOR BIG DATA

With the influx of data from IoT sensors and devices, combined with massive volumes of customer and product data, the digital retail workplace requires substantial storage capabilities. To address this challenge, products from the Intel® Solid State Drive Data Center Family offer power-efficient, performance-optimized capabilities, resulting in lower overall datacenter operating costs. When these drives are combined with Intel® processors, chipsets, and Intel® Cache Acceleration Software, transaction handling capabilities increase significantly compared with a typical storage environment. Support for full-disk, hardware-enhanced encryption adds extra data protection to this storage solution. For more details, visit [intel.com/content/www/us/en/software/intel-cache-acceleration-software-performance.html](https://www.intel.com/content/www/us/en/software/intel-cache-acceleration-software-performance.html).

Red Hat offers enterprise storage solutions to help retailers meet rising retail data requirements. The Red Hat Storage portfolio includes Red Hat Gluster Storage and Red Hat Ceph Storage.

- **Red Hat Gluster Storage** provides an open, cost-effective data management platform that can scale out to accommodate the requirements of public, private, and hybrid cloud environments. Retailers can securely manage high-volume data—whether unstructured or semistructured—at a fraction of the cost of traditional, monolithic storage.
- **Red Hat Ceph Storage** is a modern storage system engineered for petabyte-scale deployments associated with cloud-based infrastructures. This self-healing and self-managing platform effectively handles exponential data growth with no single point of failure.

## SECURITY

The best security practices for digital transformation address vulnerabilities throughout IT infrastructures—from endpoint devices, such as IoT sensors and smartphones, to back-end systems where vital data is stored—and find any prospective weaknesses.

At the deepest hardware level, Intel® Trusted Execution Technology helps protect the basic input output system (BIOS), operating system, firmware, and other software components by checking all of these elements against a known good launch-time configuration securely stored by the Trusted Platform Module. If any intrusions or changes are detected during this preboot check, system start-up can be halted until the problem is corrected.

Red Hat has also embedded data protections and security features within its solutions. The community-based nature of open source software offers highly responsive detection and resolution of issues with fixes, patches, and new solutions from a worldwide body of experienced, talented coders.

As one of the leading proponents of container technology, Red Hat has teamed with Black Duck Software to create a vast library of software threats for screening container contents and eliminating malicious code. As a result, users of container solutions—such as Red Hat OpenShift Container Platform—gain assurance that data and system integrity are maintained in a shared environment.

Red Hat has gained a presence in even the most security-conscious federal agencies by working with the National Security Agency (NSA) and other agencies to develop Security-Enhanced Linux® (SELinux), a Linux kernel module that incorporates NSA guidelines to deliver exceptional security in cloud-based datacenters. As a result, Red Hat solutions offer a way for retailers to gain a high level of protection for sensitive customer data.

## INTERNET OF THINGS

Retailers are only just beginning to realize the full potential of IoT technology to connect the different parts of supply chains, from manufacturers, warehouses, and shippers to store inventories, product sales data, and customer preferences.

Intel has built an ecosystem of partners, original device manufacturers (ODMs), original equipment manufacturers (OEMs), and independent software vendors (ISVs) to provide building blocks for full-featured IoT solutions. Through the Intel® Internet of Things Solutions Alliance, all of the components of an IoT-based infrastructure can be developed in a fast, flexible, and scalable manner.

Intel® IoT Gateway provides a secure bridge between IoT-capable devices—including automobiles, medical sensors, smartphones, factory equipment, aerial drones, agricultural monitors, and more—and appropriately filters the huge volume of incoming data for transmission to cloud-based servers.

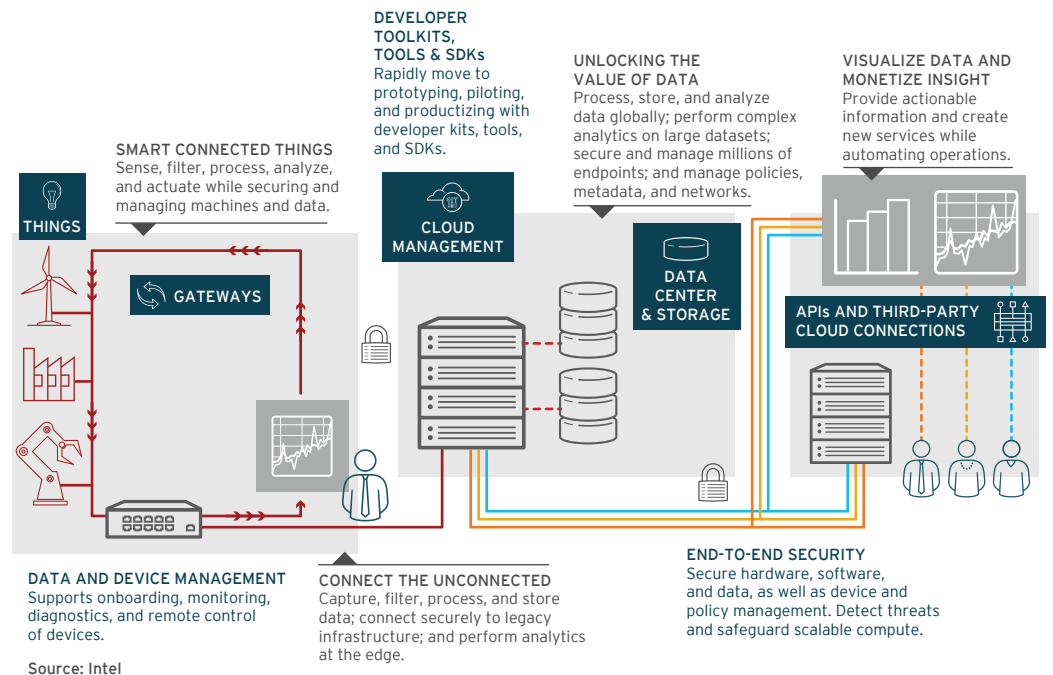


Figure 2. End-to-end overview of the Intel® IoT Platform

*“Retailers seem to be turning a corner in terms of using new technologies to better understand their business and connect with customers. In fact, Lightspeed POS recently found that, compared to last year, twice as many independent retailers are currently investing in technology that uses data analytics and software to make smarter buying decisions.”<sup>2</sup>*

JOE JENSEN  
VICE PRESIDENT OF INTEL'S RETAIL SOLUTIONS DIVISION

Innovative Intel® technologies provide a practical path to enhanced inventory control. For example, retailers can maintain inventory in real time with Intel® Retail Sensor Platform (Intel® RSP) (Figure 3).

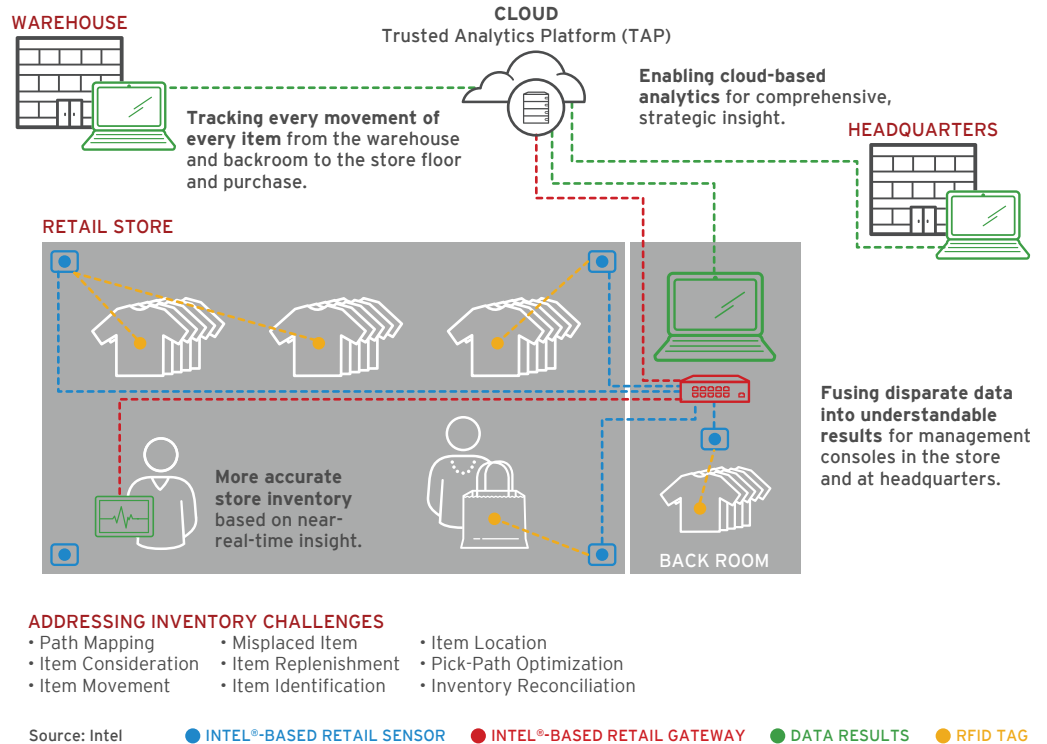
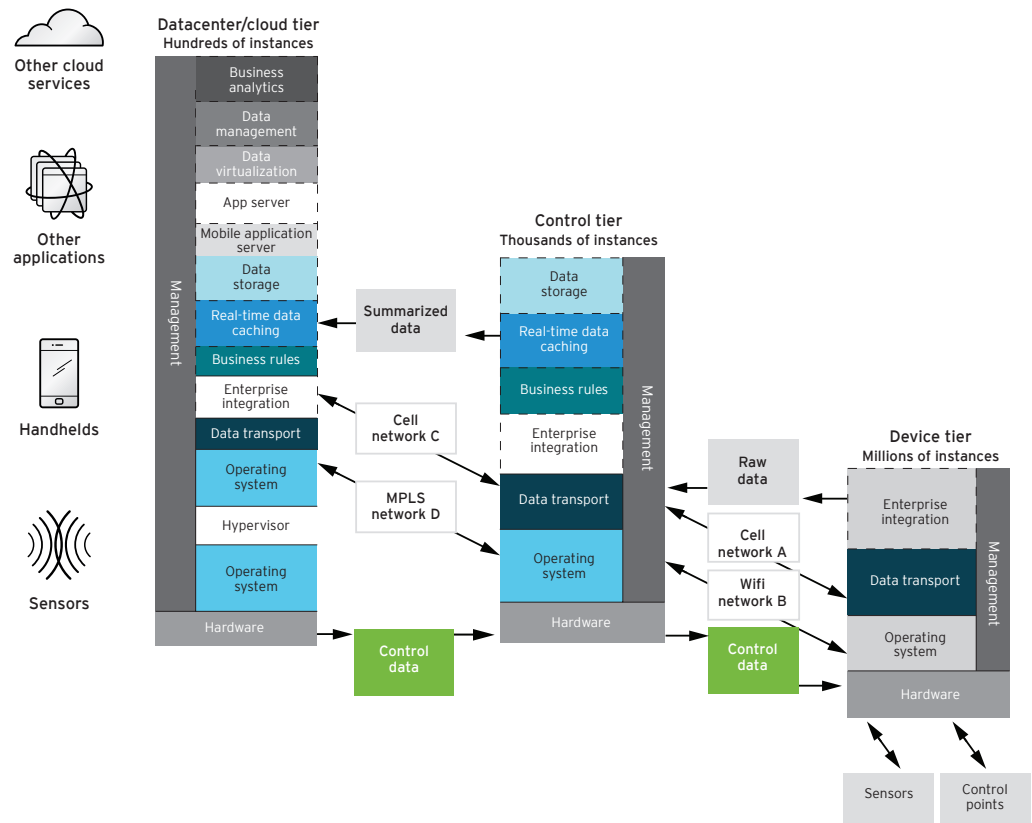


Figure 3. Key components of the Intel® Retail Sensor Platform

<sup>2</sup> “New Intel-Powered Retail Experiences to Hit Stores This Year.” BusinessWire. 2016.  
<http://www.businesswire.com/news/home/20160118005416/en/Intel-Powered-Retail-Experiences-Hit-Stores-Year>

Red Hat also offers open standards-based software solutions that can help retailers accelerate deployment, optimize performance, and address scalability, reliability, and security demands for IoT deployments (Figure 4).



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Figure 4. Red Hat Internet of Things architecture

Learn more about Red Hat intelligent system solutions for IoT at [redhat.com/en/resources/intelligent-systems-solution-internet-things](https://redhat.com/en/resources/intelligent-systems-solution-internet-things).

## CLOUD COMPUTING

Red Hat and Intel contributions to cloud computing have helped enterprises in the retail sector modernize their IT infrastructures. Red Hat Cloud Infrastructure is a suite of integrated Red Hat technologies that streamline the transition to cloud-ready architecture. With this solution, enterprises can develop and deploy a comprehensive Infrastructure-as-a-Service (IaaS) cloud and effectively manage it.

Intel technologies provide a foundation for building cloud architectures using software-defined infrastructure (SDI). SDI-enabled clouds increase business agility, help enterprises control strategic on-premise assets while extending services to the cloud, and support fine-grained control of network security policies.



Amazon has partnered with Red Hat to offer Red Hat Enterprise Linux on Amazon Elastic Compute Cloud (EC2), supported with updates through Amazon Web Services (AWS). Retailers can also explore cloud-based opportunities with Quick Start for Red Hat OpenShift on AWS, an automated reference deployment for using containers and orchestrating resources for specific workloads. The AWS cloud uses Intel Xeon processors for Amazon EC2 users to conform with their unique requirements.

## **A UNIFIED COMMERCE FUTURE**

Digital transformation of the retail industry is gaining momentum through technological advances that power cloud computing and connect the full spectrum of IoT devices. Retailers that want to stay competitive in this rapidly changing world must intelligently adopt these technologies to gain market advantages and measurable business results.

Achieving unified commerce will require initiating a value proposition that is a combination of products and services, aligning with customers as they view retail offerings across different channels, and presenting a cohesive brand image. Establishing positive brand sentiment across multiple channels is a strategic imperative.

Technology solutions from Intel and Red Hat that support modern hybrid cloud infrastructures offer retailers a way to deliver innovative services and customer experiences while continuing to take advantage of traditional systems and resources. These solutions can help retailers strengthen security, enhance operations, improve supply chain efficiency, and use IoT and data analytics for better decision making.

To learn more about how Red Hat is helping retail transform, visit [redhat.com/en/resources/retail-internet-things](https://redhat.com/en/resources/retail-internet-things)

To learn more about retail solutions from Intel, visit <https://www-ssl.intel.com/content/www/us/en/retail/retailsolutions.html>



**TECHNOLOGY PERSPECTIVE** Rewriting the rules of retail with digital transformation

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