



NEARBY
COMPUTING

Distributed Edge Case Study

Industry: Retail (Health & Beauty)

Area of Operations: EMEA and APAC

Size of Operations: 17,000+ Stores



Enhancing Service Reliability and Application Availability for Optimal Retail Operations

Edge as the Driver of Digital Transformation Across Distributed Enterprises.

Introduction

The solution we offer, leveraging Edge as a key enabler, **has been fully tried and tested in a retail store setting and it is also adaptable to a wide range of industries.** Edge computing is becoming a transformative force for organizations with massively distributed locations, providing the foundation for digital transformation across daily operations. This architecture is particularly valuable for quick-service restaurants (QSRs), pharmacies, restaurants, convenience stores, and other similar sub-verticals where distributed locations create unique challenges.

However, as companies with distributed locations attempt to scale and digitally transform, new challenges arise. The most critical challenges of managing distributed workloads stem from three factors: **scale, heterogeneity, and dependencies.** Edge environments are massively distributed, often involving hundreds of thousands of devices across hundreds of locations, making scalability a significant hurdle. Adding to this complexity is the heterogeneity of edge deployments, which involve a wide array of technologies and vendors, including hyperscalers, software providers, and ISVs, all contributing to different aspects of the Edge stack, making integration and management challenging. Finally, dependencies between workloads, networks, and infrastructure create further complexity, as Edge workloads are business critical and require real-time, adaptive network configurations to ensure business continuity and minimize disruptions.

To address these challenges, NearbyOne, a cloud-native and intent-driven orchestration platform is leveraged. **NearbyOne is built to automate the network functions, edge applications, and underlying infrastructure that support those functions.** Designed to be interoperable and vendor-agnostic, the platform is capable of managing diverse Edge environments efficiently. By automating and simplifying these operations, it allows organizations to deploy and manage applications and infrastructure at scale.

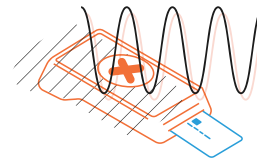
Challenges

The RETAILER faced significant difficulties managing remote stores due to existing POS system's reliance on cloud infrastructure. **RETAILER's current setup involves a backoffice server per site connected to the POS/SCO**, with each site linked to the cloud for data synchronization, centralized management, backup and recovery, and integration to other enterprise back-office applications like ERP, SCM etc. However, this setup has exposed several critical challenges, primarily due to the reliance on cloud-based POS operations, creating a single point of failure.



Single Point of Failure

The reliance on cloud-based POS operations made each store vulnerable to connectivity issues. Any disruption in the cloud link could stop POS functionality, leading to potential downtime and operational disruptions.



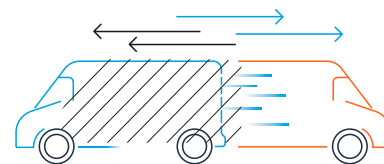
Application Lifecycle Management

The manual management of updates, patches, and upgrades for POS systems and other in-store applications was tedious and time-consuming. This challenge extended to managing drivers for POS-related hardware, such as scanners, printers, and self-checkout systems, adding complexity to maintaining the system's overall functionality and reliability.



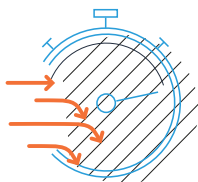
Hardware and Software Failures

Managing site-specific hardware and software failures proved difficult without incurring significant downtime. The existing architecture, with a back-office server per site linked to the cloud, lacked local redundancy, worsening the problem.



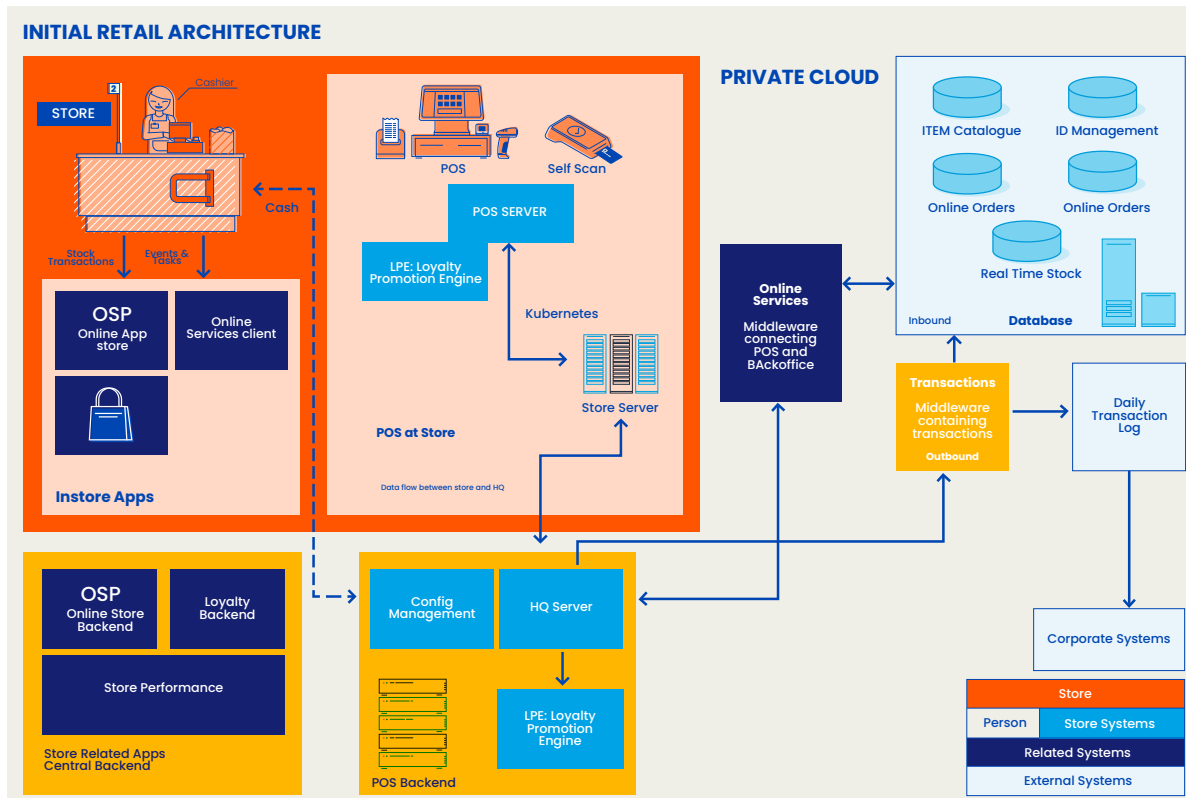
Operational and Troubleshooting Inefficiencies

The lack of remote troubleshooting capabilities meant that resolving technical issues required frequent onsite visits from the central team. This led to excessive travel, increased overtime, and severely delayed issue resolution. These inefficiencies crippled store operations during downtime, drastically reducing productivity and inflating operational costs, making it nearly impossible to maintain smooth day-to-day operations across multiple locations.



Connectivity Issues

Regular site-level connectivity cuts created frequent potential downtime. These disruptions not only stopped store operations but also complicated troubleshooting efforts.



Solution

To address the challenges, **Nearby Computing proposed decentralizing POS operations by containerizing (the virtualized) POS to run at the store level.** This will provide local redundancy and be orchestrated from a central location, ensuring continuous operations even during hardware or connectivity failures.

This new architecture will enhance central observability and management, enabling quicker identification and resolution of issues.

01. Decentralized POS Operations

The solution involves containerizing the POS to run locally at each store. This decentralization provides redundancy at the store level, ensuring that local operations can continue seamlessly even if there is a hardware or connectivity failure.

02. Central Orchestration

Despite decentralizing POS operations, a central orchestration system will manage these distributed systems. This central management will enable RETAILER's IT team to monitor and control all store operations from a single location, improving efficiency and response times.

03. Orchestration of a Centralized Hardware Driver-stack for Easy Deployment

To streamline the management of hardware components such as POS systems, scanners, and printers, Nearby Computing developed an easily deployable driver stack. This solution simplifies the deployment and lifecycle management (LCM) of hardware drivers across all retail stores. By automating driver updates and ensuring compatibility with ancillary hardware, the driver stack enables quick and consistent hardware setup at new store locations and ensures smooth operations at existing stores. The customer had previously encountered significant challenges related to driver management, but this orchestration ensures a seamless, centralized approach, reducing manual intervention and minimizing disruptions.

04. **Application Lifecycle Management**

A key improvement will be the automation of application updates, patches, and upgrades, which are currently handled manually. The new solution will provide centralized lifecycle management for all applications, including POS systems and associated hardware drivers for scanners, printers, and self-checkout systems. This ensures that updates can be rolled out seamlessly across all stores without disrupting operations, reducing downtime and improving overall system stability.

05. **Security and Compliance Automation**

The solution incorporates automated security updates and compliance checks across all POS systems and connected devices. This ensures that each store meets the data sovereignty regulations and maintains a high level of data protection, minimizing the risk of security breaches or compliance violations.

06. **Enhanced Observability and Management**

The new architecture will provide comprehensive visibility into the performance and health of all store systems. Centralized observability tools will enable the IT team to detect and address issues proactively, reducing the need for onsite visits and accelerating problem resolution.

07. **Kubernetes Cluster Deployment**

Each store will deploy a Kubernetes cluster, virtualizing the POS across the cluster to ensure redundancy. This setup also allows other applications to run as containers, facilitating scalability and flexibility.

08. **Scalability and Futureproofing**

The containerized infrastructure is highly scalable, allowing RETAILER to add new nodes or clusters as needed. This flexibility supports the integration of new applications and services, ensuring the infrastructure can adapt to future technological advancements and growing demands.

09. **Improved Customer Experience:**

By deploying new edge applications, RETAILER aims to enhance the in-store customer experience. Potential use cases include:

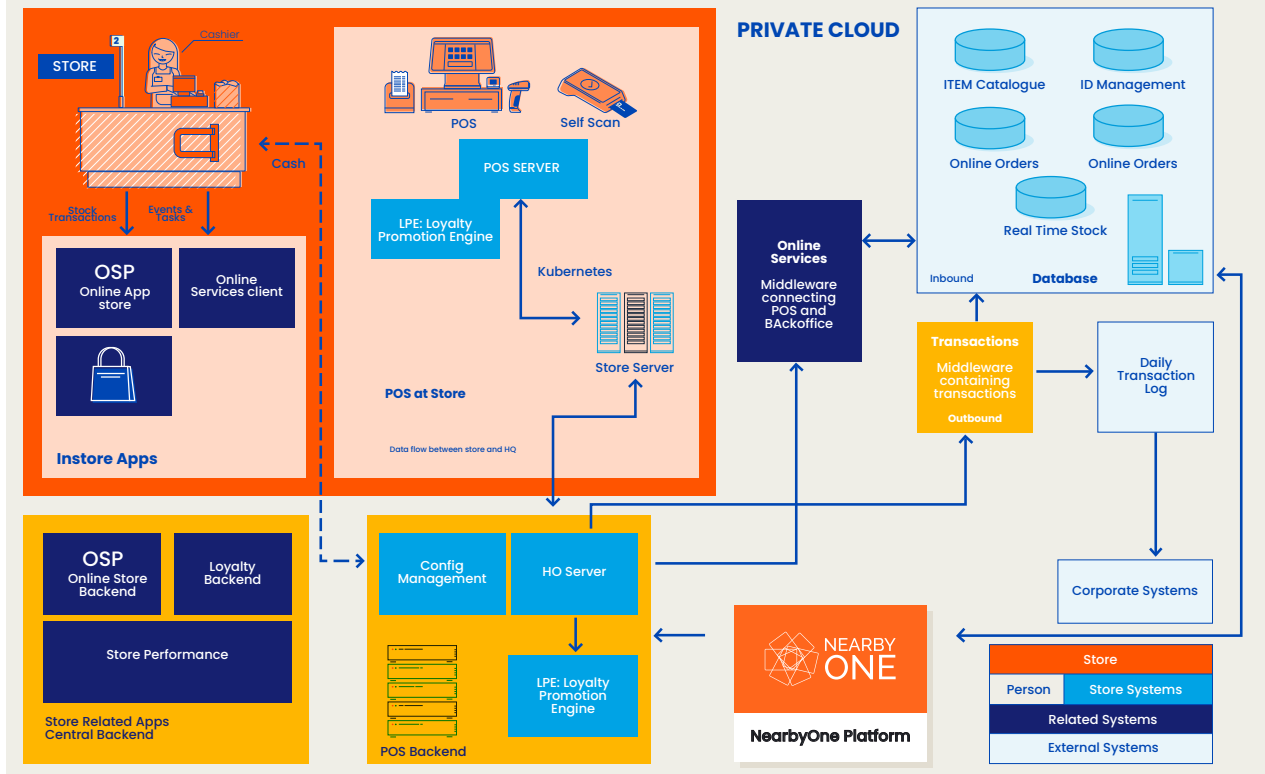
- Contactless checkout
- Real-time promotions
- Digital signage
- Flow analysis
- Inventory and fraud management
- Edge AI powered by in-house and third-party AI apps

10. **Comprehensive Orchestration:**

The solution will offer 360-degree visibility, control, and lifecycle management through a single pane of glass for managing the comprehensive workload across infrastructure, applications, and connectivity fabrics.

NEW RETAIL ARCHITECTURE:

NearbyOne automates and orchestrates all in-store technologies and operations



Benefits

By leveraging containerization both at the store level and centrally at the Head Office (HO), RETAILER can significantly enhance daily operations and pave the way for the retail store of the future. The benefits include improved management, streamlined operations, scalable infrastructure, and advanced failover capabilities, all contributing to a more resilient and efficient retail ecosystem.

01. Enhanced Resilience:

Local redundancy provided by the containerized POS operations at each store minimizes the impact of hardware or connectivity failures, ensuring continuous operation and reducing the risk of store downtime. This resilience is critical for maintaining smooth daily operations.

02 Failover Capabilities:

In the event of a POS failure on-site, the system can automatically establish failover to other on-site or cloud resources, ensuring store operations continue without disruption. This safeguards revenue by preventing prolonged downtime and operational losses.

03 Ease of Management:

Centralized management at the Head Office provides a unified view of the entire ecosystem, enabling faster identification of issues and immediate response, significantly improving operational efficiency across all stores.

04. **Application Lifecycle Management**

Automating application updates, patches, and upgrades for all stores ensures that systems remain secure, up-to-date, and free of vulnerabilities. This extends to managing software and drivers for POS-related hardware such as scanners and self-checkout systems, reducing operational risk and downtime.

05. **Streamlined Operations**

Centralized access to logs, telemetry, and diagnostics from all stores allows the IT team to efficiently troubleshoot and resolve issues, optimizing resource allocation and reducing the need for manual intervention.

06. **Scalability**

The flexible containerized architecture allows for easy expansion, enabling rapid deployment and upgrading of new and existing stores through automated policies. This accelerates growth and reduces the need for extensive human and technical resources, making expansion more efficient.

07. **Future Readiness**

The new orchestration platform equips RETAILER with the ability to deploy new applications, including custom AI and ML models, seamlessly. This future-proof approach ensures RETAILER can rapidly integrate innovative technologies and adapt to new business demands without overhauling the infrastructure.

08. **Value-Added Solutions**

The containerized infrastructure supports the integration of advanced solutions, such as video analytics for security, theft prevention, and customer retention, which can be easily deployed across stores to improve operations and enhance overall customer experience.

09. **Improved Customer Experience**

The deployment of advanced edge applications, such as contactless checkout, real-time promotions, and digital signage, elevates the in-store experience, increasing customer satisfaction and driving engagement.

10. **Cost Efficiency**

Optimized IT resources and reduced need for onsite interventions lead to lower operational costs, creating significant savings across the enterprise and allowing for more strategic use of budget and resources.

Quantifiable & Measurable Results:

Implementing this solution **has led to significant improvements in performance, efficiency, and cost savings**. Below are some of the key measurable results achieved:

- 1. 100% service continuity** during cloud outages, ensuring no disruption in business operations.
- 2. 80%+ improvement in application uptime**, ensuring that critical in-store systems continue to operate even during cloud disruptions.
- 3. 70%+ improvement in AI model deployment and management**, enabling seamless execution of customer owned AI applications and ML models across all stores, with centralized control and minimal infrastructure adjustments, driving real-time insights and operational efficiency at scale.
- 4. 65%+ reduction in manual effort in application deployment and management**, due to automated lifecycle management, resulting in smoother operations and fewer disruptions across all stores.
- 5. 60%+ reduction in IT operational costs** due to fewer manual interventions and on-site visits required for application troubleshooting.
- 6. 50%+ reduction in lost sales** caused by cloud dependency and network outages, particularly during peak hours.
- 7. 50%+ improvement in transaction processing speeds** by reducing reliance on cloud infrastructure.
- 8. 50%+ reduction in update deployment time**, allowing for faster rollout of features and patches across all stores.
- 9. 40%+ increase in customer satisfaction** due to faster, more reliable service at the stores.
- 10. 40%+ reduction in time to set up new stores**, enabling faster expansion and operational readiness.

As-Is Setup vs. New Setup:

Aspect	As-Is Setup	New Setup	Benefits of the New Setup
Infrastructure	Back-office server per site with POS/SCO connected, each site linked to the cloud	Each store deploys a Kubernetes cluster, virtualizing the POS across the cluster	Increased resilience and local redundancy
Retail Tech Stack	Back-office server per site, cloud-linked services	Kubernetes clusters at each store, containerized applications	Modern, flexible, and scalable technology infrastructure
POS Operations	Centralized, cloud-based POS	Decentralized and containerized virtualized POS	Increased resilience and local redundancy
Redundancy	Lacks local redundancy	Local redundancy with Kubernetes clusters	Reduced downtime and continuous operations
Connectivity	Single point of failure due to cloud dependency	Local operations continue despite connectivity failures	Enhanced reliability and operational stability
Management	Limited central observability	Central orchestration with comprehensive visibility	Improved management and quicker issue resolution
Troubleshooting	Requires frequent onsite visits	Enhanced remote troubleshooting	Reduced travel costs and faster resolution
Scalability	Limited scalability	Highly scalable with containerized infrastructure	Flexibility to add new services and applications
App Lifecycle Management	Separate systems for updates, patches, and hardware drivers. Manual intervention and on-site visits by ITOps team are needed to do these updates.	Centralized, vendor-agnostic management of applications, including LCM	Streamlined application management and lifecycle control
Future Readiness	Difficult to deploy new technologies quickly	Seamless deployment of new apps, AI/ML models, and tech advancements	Ready for AI/ML applications, and scalable innovation
Infrastructure Management	Separate management per store, high maintenance, limited vendor compatibility	Centralized management of all devices and vendors' servers and POS systems in one view	Comprehensive visibility and control, multi-vendor support
Operational Efficiency	High travel costs and overtime due to troubleshooting	Optimized IT resources with fewer onsite interventions	Cost savings and better resource allocation
Customer Experience	Basic POS functionalities	Advanced edge applications (e.g., contactless checkout, real-time promotions, digital signage)	Enhanced customer experience and engagement



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About NearbyComputing

The company was founded in 2018 and operates globally from its headquarters in Barcelona, Spain as **global leader in Edge Orchestration**.

Nearby Computing has been Named a **2023 Gartner Cool Vendor in Edge Computing** and helps Telcos & Enterprise customers unleash the potential of Edge Computing through Orchestration and Automation of MEC and 5G.

NearbyOne is an orchestration platform that goes beyond market standards to manage all tiers of the network, from Cloud and Data Centre to Edge, from a single pane of glass. Using a cross-domain approach that is fully agnostic, NearbyOne manages hybrid networks at scale through domain-specific as well as comprehensive end-to-end orchestration. The solution covers all critical elements of deployment automation - from the initial Edge node provisioning to application on-boarding, to lifecycle management and monitoring.



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