Solving Three Major Issues in Logistics Today Using a Modern Application Platform

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Introduction

The race to modernize the business is on. Leading logistics services companies, such as 3PLs, shippers, and freight companies continue to roll out new capabilities so they can deliver 'Amazon-like' services to customers. Wise technology investments are helping to accelerate the movement of goods, streamline supply chain functions, and improve the customer experience.

Managing IT systems in this environment requires a modern application platform.

The world of freight logistics is highly complex, with a multitude of operations taking place simultaneously, each at lightning speed. From goods pickup and delivery to the warehouse, shelf placement using AGVs (automated guided vehicles), robot-enabled picking and packing, intelligent drops on lightning speed conveyor belts, and product directed to the right loading dock, then moved onto self-driving trucks. The complexities associated with managing operations such as these are immense.

Post-pandemic, business units continue to invest in modern supply chain IT systems, while on-the-ground specialists are rolling out more and more industrial automation systems to streamline operations. Analytics, AI (artificial intelligence), ML (machine learning), AR/VR (augmented/virtual reality) are being embedded into IT and OT (operational technology) systems alike so team members and stakeholders can work smarter and faster.

Managing IT systems in this environment requires a modern application platform. A modern application platform is a comprehensive suite of tools and services that enable IT leaders to build, deploy, and manage applications. These platforms include a variety of capabilities, such as:

Cloud-native Development Support
Provide support for cloud-native development practices, such as microservices, containers, and continuous integration and continuous delivery (CI/CD).

Managed Services
Offer a variety of managed services, such as databases, messaging, and caching, which can simplify and streamline application development and deployment.

DevOps Tools
Include DevOps tools that can help teams automate their workflows, improve collaboration, and deliver applications faster and more reliably.

Security and Compliance Features
Provide security and compliance features to help teams protect their applications and data.

This report has two purposes.

1. It explores three major issues driving supply chain service providers today.

2. It helps to highlight how companies are tackling these issues using a modern application platform.

The Three Major Issues

Logistics services companies face three major challenges today: optimizing operations, protecting mission-critical processes, and modernizing legacy systems. These challenges are interconnected, and companies that can successfully address them will be well-positioned to succeed in the years to come.

1. Streamline Operations

Satisfying customers means getting the right products to the right place at the right time. To do this, supply chain companies must streamline operations by analyzing and reengineering processes to reduce unnecessary steps, bottlenecks, and delays, thereby improving productivity, reducing errors, and enhancing overall efficiency. IT and OT systems are used to streamline operations and reduce manual effort, which involves implementing software, analytics, AI/ML, robotics, or other technologies to automate bolster repetitive tasks, improving accuracy, and enhancing productivity.

Developing and managing IT and OT systems can be complex. Normally, it takes multiple people, skill sets, and many steps to deploy, scale, test, and manage these systems. This is because there typically are many moving parts and departments involved in the application management. By embracing DevOps and containerization, IT leaders can streamline application management so that updates can be made quickly and error-free.

KEY CHARACTERISTICS OF A MODERN APPLICATION PLATFORM:

▶ **Cloud-native:** Designed to run in the cloud, and take advantage of cloud-native features such as scalability, elasticity, and resilience.

▶ **Microservices-oriented:** Supports the development and deployment of microservices-based applications. Microservices are small, independent services that can be combined to create complex applications.

▶ **Containerized:** Supports the use of containers to package and deploy applications. Containers are lightweight and portable, and make it easy to deploy applications to multiple environments.

▶ **DevOps-enabled:** Supports DevOps practices, such as continuous integration and continuous delivery (CI/CD). CI/CD automates the build, test, and deployment process, which can help teams to release new features and updates more quickly.

▶ **Security-focused:** Includes security features such as authentication, authorization, and encryption to help protect applications from attack.

▶ **API-driven:** Provides a set of APIs that developers can use to interact with the platform. This allows developers to integrate their applications with other services and systems.

▶ **Managed services:** Offers a variety of managed services, such as database management, caching, and load balancing. This can free up developers to focus on building applications rather than managing infrastructure.

▶ **Monitoring and Logging:** Provides monitoring and logging tools that can help developers to track the performance and health of their applications.

▶ **Analytics:** Includes analytics tools that can help developers to understand how their applications are being used.

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In essence, the application update process can be transformed from a weeks-long, complex project involving multiple teams, to something that can be done in an hour by a single team.

Here are some specific changes that can optimize the application development and deployment process:

▶ The use of containers, supported by microservices, can make it easier to deploy changes to individual components of the system.

▶ The use of a continuous integration and continuous delivery (CI/CD) pipeline can automate the deployment process, reducing the risk of human error.

▶ The use of a Kubernetes-based platform can make it possible to deploy updates without needing to take the application down.

CONTAINERIZATION OFFERS SEVERAL BENEFITS:

▶ **Portability:** Containers encapsulate the application and its dependencies, making it easy to move and run the application consistently across different environments such as on-premise servers, virtual machines, or cloud platforms. This portability enables faster and more efficient application deployment and migration.

▶ **Scalability:** Containers can be easily scaled up or down based on demand; multiple instances of the same container can be deployed and managed efficiently, allowing applications to handle increased workloads and traffic spikes.

▶ **Efficiency:** Containers are lightweight and have minimal overhead compared to traditional virtual machines. They share the host operating system kernel, which reduces resource consumption and allows for higher density of application instances on a single host.

▶ **Consistency:** Containers provide a consistent runtime environment, ensuring that applications behave the same way across different environments. This consistency simplifies the development, testing, and deployment processes, reducing the chances of compatibility issues.

▶ **DevOps Enablement:** Containerization aligns well with DevOps practices by enabling continuous delivery and automated deployment. Containers can be easily integrated into CI/CD pipelines, allowing for faster and more reliable software releases.

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2. Protect Mission Critical Processes

In the supply chain world, each process, movement, and transaction are mission critical, from supplier pickup on one end, through multiple 3PL value-adding steps, to ultimately shipping and delivering to the customer. From an IT perspective this means ingesting orders, communicating with suppliers, moving goods to warehouses, possibly transforming product, packaging, and transporting for final delivery. Any equipment failure or application downtime along the way can have major ramifications for the remainder of activities, particularly when hundreds of distribution centers, several fleets of trucks, and thousands of operators are in the mix.

A modern application platform helps IT leaders configure systems with reliability, availability, zero downtime, and security in mind.

Most IT leaders cannot afford any system downtime because operations run 24/7 to support customers and partner three shift operations. This means it is up to IT to architect systems and deploy changes so that systems do not go down for any period of time. Industrial automation systems are often isolated and physically close to the place where instructions are generated and put into action.

A modern application platform helps IT leaders configure systems with reliability, availability, zero downtime, and security in mind. Scheduling lengthy maintenance windows to make updates to systems, during which the distribution center would be shut down, is not ideal for logistics companies that operate 24/7. By moving to a modern application platform, companies can securely deploy changes to systems with zero downtime. Modern application platforms built on Kubernetes can be used to deploy applications with zero downtime by gradually replacing old applications with new applications. This ensures that there is always a working version of the application available to users, even during the deployment process.

A modern application platform also protects against application failures due to unexpected increases in user demand. By architecting a system using microservices, containers, and Kubernetes, companies can use built-in commands to scale the application up and down without having to monitor the application and manually add additional hardware or compute power. This significantly reduces the risk of an application failure due to spikes in user demand, which means that logistics operators can continue working without any stoppages due to failing systems.

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3. Modernize Legacy Systems

Vulnerabilities exposed across the supply chain, including 3PLs, shippers and freight companies, during the pandemic are driving IT leaders to modernize their operations and technology infrastructures. New levels of resiliency and agility are required to support today's operations and innovate new market-leading services. Monolithic systems can be a challenge because they are tightly coupled, have a single point of failure, and are difficult to scale, test, and maintain.

Modernizing monolithic systems is the process of transforming them into more scalable, reliable, and maintainable systems.

Modernizing monolithic systems is the process of transforming them into more scalable, reliable, and maintainable systems. This can be done by breaking the application down into smaller, more manageable components, such as microservices. Microservices are loosely coupled, which means that they can be independently developed, deployed, and scaled. This makes it easier to make changes to the application and to improve its performance.

There are several critical success factors to consider when refactoring or rewriting systems for microservices and containers:

Proper Application Design: Designing applications specifically for containerization is crucial. Applications should be broken down into smaller, modular components that can be easily deployed and scaled independently. This allows for better resource utilization and flexibility.

Efficient Resource Management: Containerized applications require efficient resource management to ensure optimal performance. This includes monitoring and managing CPU, memory, and storage resources to avoid bottlenecks and ensure scalability.

Automation and Orchestration: Utilizing automation and orchestration tools, such as Kubernetes, is essential for managing containerization applications at scale. These tools automate deployment, scaling, and management tasks, reducing manual effort and ensuring consistency.

Security and Compliance: Containerized applications must be secured to protect against vulnerability and unauthorized access. Implementing security measures such as image scanning, access controls, and network segmentation is crucial. Compliance with industry regulations and best practices should also be considered.

Monitoring and Logging: Implementing robust monitoring and logging solutions is vital for gaining visibility into containerized applications. Monitoring tools can provide insights into resource usage, performance, and application health, while logging helps in troubleshooting and identifying issues.

Continuous Integration and Deployment (CI/CD): Implementing CI/CD pipelines for containerized applications enables rapid and automated deployment, testing, and release cycles. This ensures faster time-to-market, reduces errors, and improves overall efficiency.

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Scalability and High Availability: Containerized applications should be designed to scale horizontally, allowing for easy replication and distribution across multiple containers and nodes. Implementing load balancing and fault-tolerant strategies ensures high availability and resilience.

Collaboration and Communication: Effective collaboration and communication between development, operations, and other stakeholders are crucial for successful containerized application deployments. This includes clear documentation, well-defined processes, and regular communication channels.

Training and Skill Development: Investing in training and skill development for teams working with containerized applications is essential. This ensures that the necessary knowledge and expertise are available to effectively manage and troubleshoot containerized environments.

Continuous Improvement: Embracing a culture of continuous improvement is vital for containerized applications. Regularly evaluating and optimizing processes, performance, and security measures helps in staying up to date with best practices and emerging technologies.

Modern application platforms support microservice-based architectures and containerized applications. Choosing a platform like Kubernetes or Red Hat® OpenShift® can help IT leaders achieve benefits such as improved scalability, flexibility, efficiency, and reduced risks and failures.

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Red Hat® OpenShift®

Red Hat® OpenShift® is a modern application platform that helps IT leaders build, deploy, and manage containerized applications. It is an open-source platform built on top of Kubernetes to facilitate the packaging of applications into containers, managing them across a cluster of servers, thus providing optimal scalability and flexibility.

Overall, Red Hat® OpenShift® simplifies the process of deploying and managing applications in a cloud environment, allowing developers to focus on building and delivering their applications faster.

Here are some of the key features of Red Hat® OpenShift®:

▶ **Automated Operations:** OpenShift® automates many of the tasks involved in managing a Kubernetes cluster, such as provisioning, scaling, and updating nodes. This frees up developers and operators to focus on building and running applications.

▶ **Integrated Services:** OpenShift® includes several integrated services that are essential for running containerized applications, such as a registry, logging, monitoring, and CI/CD. This eliminates the need to manage these services separately, making it easier to get started with OpenShift®.

▶ **Security and Compliance:** OpenShift® includes several security and compliance features, such as role-based access control, network isolation, and image scanning. This helps to protect applications from unauthorized access and data breaches.

Here are some of the unique features of Red Hat® OpenShift® that make it stand out from other Kubernetes platforms:

▶ **Operator Framework:** The Operator Framework is a way to automate the deployment and management of Kubernetes applications. Operators are packages of code that know how to deploy and manage a specific type of application. This makes it easier to deploy and manage complex applications on OpenShift®.

▶ **Service Mesh:** OpenShift® includes a built-in service mesh, which provides many benefits for running microservices-based applications. These benefits include service discovery, load balancing, fault tolerance, and tracing.

▶ **Developer Experience:** OpenShift® provides a number of features that make it easier for developers to build and deploy containerized applications. These features include a web-based console, a CLI, and support for a variety of programming languages and frameworks.

Shadow-Soft

Shadow-Soft is a leading open-source systems integrator, serving IT leaders who want to simplify and automate the deployment, scaling, and management of applications. We offer a range of services, including consulting, implementation, training, and support, to help businesses leverage open-source technologies effectively.

Our technical experts focus on various areas of open-source software, including cloud computing, DevOps, containerization, automation, and security. Based on client requirements, we incorporate popular open-source platforms and tools such as Red Hat® OpenShift®, Kubernetes, and Ansible to deploy and manage applications in a cloud or on-premise environment.

In addition to consulting and implementation services, we offer training programs to help organizations upskill their teams and gain proficiency in open-source technologies. Technology experts also provide ongoing support and managed services to ensure the smooth operation and maintenance of open-source solutions.

Overall, Shadow-Soft serves as a trusted partner for organizations looking to harness the power of open-source software. We provide comprehensive solutions and services that enable businesses to embrace open-source technologies and drive innovations in their IT operations.

New levels of resiliency and agility are required to support today's operations and innovate new market-leading services

We work collaboratively with clients to design and build a modern application platform, optimize application development and deployment processes, thereby improving overall operational efficiency. Shadow-Soft technology consultants provide guidance and expertise to ensure that solutions are scalable, secure, and aligned with business goals.

Client Benefits

Easier and simple application deployments – reduced errors, increased efficiency, no downtime; reduced security and governance risks

Increased application availability and reliability – automated allocation of resources to mitigate downtime and slow performance

Easier application portability between environments – increased flexibility to move applications and workloads across clouds and on-premise

Mitigate risks related to downtime from data center (e.g., AWS) and vendor lock in (aka not tied solely to AWS so can have more negotiating power)

Summary

To succeed in today's competitive world, 3PLs, shippers, and freight companies must streamline operations, protect mission-critical processes, and modernize legacy systems in order to tackle the key business and supply chain issues they face now and into the future. Without a modern application platform, it will be difficult for the business to compete in today's increasingly dynamic environment or innovate the services that will be required to build and sustain competitive advantage over the long term.

If you would like to learn more about how **Shadow-Soft** can help you modernize and optimize your environment, please contact us to book a meeting today!

Please email us at:
contact@shadow-soft.com

Or call: **770-546-0077**

Customer Success Case Study**:**

100-Year-Old Freight Carrier Overcomes Crisis to Transform into a Freight and Logistics Technology Leader

A surge in user demand crashed the carrier's legacy Distribution Center Operations Application, causing a three-day disruption. To solve the problem, the client rewrote the application with microservices and upgraded to Red Hat® OpenShift® application platform, resulting in a 10x increase in scalability and 99.9% uptime.

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