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Cloud architecture for the logistics business Garg Niharika^{1,*} and Vijay Ritu²

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ABSTRACT

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Keywords

Architecture, LAS, Barcodes, RFID, Tags, Label, Logistics. In this paper, we design a cloud computing supported logistics tracking information management system to support whole-ranged and real-time logistics tracking services. The logistics cloud provides customers with a way to tap into - anywhere, anytime - the power needed to more efficiently run their businesses. The logistics cloud helps in making efficient and easy processes of global supply chains. The information about shipments with suppliers, transportation providers, and end users is quicker using the cloud. One of the greatest advantages of the logistics cloud is that there is a complete balance of sharing the resources among all the business companies.

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Introduction

The increasing costs of the transport and the requirement of the in-time deliveries have made the interoperability of the logistics business a critical factor, but the high transaction costs are the bottlenecks between small and global business players.

Latest research and developments have demonstrated that cloud computing can be the best solution. The cloud architecture overcomes the cost of the business and increases the speed of the transfers between various actors in logistics networks. The cloud automates and provides a complete solution for the logistics business and also raises the efficiency level¹.

The challenge/complexities in logistics

Globalization- The process of globalization, especially geographically distributed division of labor involves a high number of entities (individuals and organizations) and results in multi staged usually highly integrated, logistics systems with more delay points and hence need for greater coordination, communication, and monitoring.

Changing Demographics- Growing world population implies increased economic activity in terms of the production and distribution of goods, which results in a growing demand for logistics services and underlying infrastructure. It changes the quality of the demand for logistics services.

Urbanization- Continuously growing cities increase volatility, uncertainty, and complexity for logistics systems.

Technological Innovation and Digitalization-the amount of data collected and processed in logistics systems will constantly grow as the virtual image of the physical world increases in detail. As this overwhelming amount of raw data cannot be processed manually by humans, efficient automatic data handling and processing routines will be required to aggregate and present data comprehensible.

Inefficiencies in transport

Tele:

• Inefficiency in road, rail, ports

• Storage infrastructure related challenges-state of warehouse is poor(not leak proof, no security system, small sizes, less number of warehouses

Complex tax structure Poor skills of logistics professionals Solutions Suggested

To increase the efficiency of the Logistics Business, technology advancements can be used. The solution proposed in this paper

is a Cloud Architecture for logistics business.¹ Cloud Architecture for Logistics Logistics cloud architecture, suggested here includes two important "markets": a market for cloud-based logistics software and a market for logistics services and logistics products. The final web-platform can be understood as a "logistics solution portal for everyone, who needs logistics"^{3,4}. The architecture suggested is shown in Fig 1.

Application Laver Manufacturers Distributors Transport Companies Warehouse Companies Banks Interface Layer User Management Location Management Data Type Management Barcode Management Supplier Management Inventory Management Invoice Management Order Management Reports Management Cloud Management Cloud Services Scheduling of Logistics Warehouse Distribution Distribution Logistics As A Service Processing Transportation Logistics Resource Knowledge Management Management Cloud Services Operating and Monitoring Cloud Users Management Information Laver Barcode/RFID Id Code Locations/Source/Destination **Operation**/Action Identification Layer Batch scanners RFID Scanners USB Scanners Mobile Scanners Wireless Scanners Label Printers

es	Container	Warehouse	Barcodes/Labels		
Fig 1. The Cloud Architecture					

Data Layer

Container

Barcodes/Labels

RFID Tags

Parts

Pallets

Boxes

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The role and functions of the various layers defined in the architecture are:

(i) *Data layer* – The data items are tracked in this layer. The source of data can be anything like Pallets, Boxes, Containers, Warehouse, Barcode or Labels, RFID Tags and the various parts. Each source of data has a unique identifier like a barcode or a tag.

(ii) *Identification Layer* - From the code (Barcode and Tags) provided by the Data Layer, a layer is required to implement the user interface. This interface helps encodes the application use of a barcode and the actual implementation of a barcode pattern on a specific device. This is composed of the hardware and interfaces to capture the data where different type of scanners can be used to read the barcodes and tags for the logistics tracking.

(iii) *Information Layer* – The data received from the barcode scanners can be used to collect multiple data or information like the Item No., Location Id, Source and Destination Id's, User Id, Quantity, Date or time. This data can be retrieved from the Barcode Patterns received from the scanners. The higher and the excellent reading performance of the scanner, more accurate will be the results.

Logistics as a Service – The cloud service provides the global visibility in logistics. In order to access to our data and services anytime, anywhere, this centralized cloud provides service to all other layers. Logistics as a Service is an independent platform for service

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1	A	В	C
1	BARCODE ITEM #	QTY	DATE/TIME
2	2345845423723	20	18032012,07:28:12
3			
4			

Untitled - Notepad

File Edit Format View Help

Comma delimited text file 2345845423723,20,18032012,07:28:12

TAB delimited text file 2345845423723 20 18032012 07:28:12

Fig 2. Output File Formats

The inventory can be put on Dropbox and Google Drive (share with other users and backup to Dropbox and Google Drive) (vi) *Application Layer* – This layer defines the application of the system corresponding to the business like banks, warehouse, logistics, retail etc.

The Implementation example

Logistics as a service shown in Fig.3 demonstrates the case study of Supply Chain Business to show the feasibility of the

Cloud Architecture. The layers of the Cloud are also shown in the implementation.



Fig 3. Logistics as Service(LAS)

The above shown example of the logistics as a service (LAS) demonstrates one of the best combination of all cloud layers to optimize the business. Similarly LAS knowledge base can be grown to provide multiple logistics business solutions with optimized combination of techniques and processes Benefits of the cloud Logistics

(i) Allows the user to lower cost, more flexible way to get high quality, efficient and timely logistics information services.

(ii) Interactive, and unified with a real-time way.

(iii) Modifications and adaptability to add new rules is easy.

(iv) Make more accurate delivery, minimize loss in inventory,

and avoid last minute emergencies i.e. help in forecasting.

(v) Maintains a balance between small firms and the global enterprises by sharing the resources equally.

(vi)Best information security for the rapid increase of business transactions.

Conclusion

The proposed architecture of the cloud for the logistics is increasing the productivity along with the automation of the work that is done manually. This framework enhances the efficiency by reducing the time and cost. The implementation example can be easily extended to provide the solutions to other businesses also.

Acknowledgement

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