INFORMATION FLOW CONTROL IN LOGISTICS NETWORK OVER CLOUD

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Abstract— Cloud computing solves the problem of real time demand information and visibility at different location by which information can be delivered with reliability, scalability and flexibility between the supplier and customer. Logistics network requires effective information flow for technical support by which logistics infrastructures can be totally utilized and tracked the information collection, transmission and operation. Cloud is fast growing technology which can effectively reduce the intermediate cost of flow of information and improve the link between the logistics partners and customers. This paper analyzes the advantages of cloud based logistics network and defines in which way a logistics network manages Information Flow Control (IFC) over the cloud, which allows the logistics network to do work effectively.
Keywords: IFC, Logistics Network, Cloud services.

I. INTRODUCTION

Logistics network manage and control the information optimally with respect to information flow, flow time, capacity, storage and distribution between the company and customer. Information flow is the flow of demand data from company to vendor, vendor to supplier and supplier to customer so that information flow is needed to be controlled by perfect planning and accuracy. A logistics network requires effective information flow for technical support by which logistics infrastructure resources can be fully utilized and tracked the information collection, transmission and operational management. In order to fulfill the task of any company, it is necessary to organize effective information flow control with effective functioning and good services. The implementation of logistics network should take into account the information needs of links between the company and customer at various level of management. Cloud Computing makes it easier to access share and process information in real time. Cloud computing also provide business to business from interaction which helps to companies to manage information flow with accurate automation. Cloud computing can manage logistics network with advance platform to design and develop web based infrastructure which can help to achieve better execution, visibility, cost reduction and collaboration for information flow control from a company to customer.

II. LOGISTICS NETWORK

A company adopts logistics network to organize its connections to the network of supplier, customer and service provider. Company focuses that which logistics tasks cannot be completed between the supplier and customer. Logistics network provides design dimension and optimization of storage and transmission system. A logistics network establishes the sources and intermediate connectivity which are provided by transport connectivity for passing the physical assets. The material flow is delivered and controlled by information flow. Some parts of information run together with the material flow and rest of information is delivered by separate information networks like Intranet, Extranet and Internet. The logistic networks can be performed as Intralog (is the internal logistic network of a logistic station), Extralog (is the external logistic network spanned between the suppliers or buyers and customers in the company) and Interlog (is the connection of the logistic networks of all households, companies, service providers on www. The logistics network and system require the operating and scheduling strategies to determine the better IT system and technology. Cloud computing can help to logistics network to improve operation efficiency of information flow control and operation cost by using cloud services which will be very effective for the connectivity of logistics network [1].

III. CLOUD COMPUTING FOR LOGISTICS NETWORK

The services of cloud computing are available for logistics management for various applications such as warehouse management systems (WMS), transportation management systems (TMS) and enterprise resource management (ERP) and also provide consistent global platforms for sharing real-time data, better decision making, improving customer service, better automation and efficiencies. Cloud computing provides systems integration and many opportunities for some firms to differentiate the security; reliability and performance issues hinder its advantages. In a cloud based logistics network there are multiple logistics stations at various tiers of the supply chain, these are connected over cloud and the centralized server or server farm is maintained by the cloud service provider. This provides facility to integrate the data of multiple logistics stations and helps in sharing the information and manages process of IFC in real time across all the logistics stations. This provides logistics managers, real time visibility on the number orders initiated and fulfilled across logistics stations at any given time. This vital information equips the logistics manager to tackle the impending stock out scenarios at any point in the supply chain, by routing the orders to an alternate to fulfill the order on time, thus maintaining the perfect order fulfillment rate so that logistics stations can be consolidated using a secured web link such as Hyper Text Transfer Protocol Secure (https) over internet, which are generally cost prohibitive [2].

IV. IFC IN LOGISTICS OVER CLOUD

Cloud Computing is also called distributed Computing, parallel Computing and Grid Computing which provides the large calculation of several processing program into several small sub programs automatically by the network. The large amount of data which is stored in distributed computer work together with the processor resources. The calculation of distribution is done by the distributed computer, rather than the local computer. The IT resources, data and application as a service are provided to users through the network. Cloud computing system is independently calculated which run on a server that have a large number of data. This server is cloud based which handles user requests and output. Cloud computing mainly provides three levels of services. First is software as a service (SaaS) layer which provides the application to users with a web-based way, second is platform as a service (PaaS) which provides the development and deployment of application as a service to users and the third is infrastructure as a service (IaaS) which provides various elements like virtual machine and storage re-sources as a service to users. These services layers are independent and provide are completely different, and different user-oriented. But in technical view these three layers have certain dependencies such as, SaaS products and services needs to use SaaS layer technology and deployment platform which is provided by the PaaS layer and the PaaS products and services is also likely to build above the IaaS layer services. Cloud computing center is used to run security, stability, and can be effectively managed [3].

The Logistics Company provides the different services. The functions of company are in different size, multiplicity of service and global range. It includes very large but also small firms which offer a range of services from transport services to full service of supply chain by using forwarding, warehousing, palletizing, packing, packaging. Their range of functions may comprise a region, country, continent or the whole world. To ensure that a fast and correct flow of information between individual entities of the operating system, a logistics company uses advance information technologies. The company applies information technology in order to increase efficiency and automate all the process. The goal of company is always to meet the expectations of potential and existing customers. Customers are using the various services of company which always adapt to new technologies and tools. The company lacks lot of solutions that will integrate and automate the services of different operators at one place. The company needs various resources and semantics which prevent automated data integration. Cloud computing is a universal solution which can change the condition of company which can access software and information provided to computers and other devices on demand. Cloud computing is a platform to develop the cooperation of supplier with users. This platform is easy and cheap access to information control about current demand for logistics services. The result should be more efficient information flow by providing access to entire information system from a company to supplier [4].

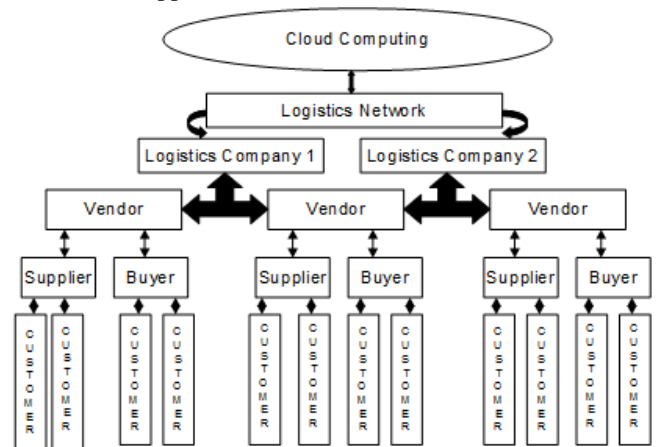In the proposed logistics network a company can connect the user with the help of different vendors and supplier at the same time at the one platform. This platform is based on cloud which supports any logistics company processes such as order processing, contract management, quotation and invoicing of the product or service to deliver the customer with help of vendors and supplier.

Figure 2: IFC performance in Logistics Network over the cloud

In the cloud based logistics network, the first network is for senior executive in Logistics Company who can understand that moving information from end to end network based on processes and systems that control the information flow between the executives, vendor, suppliers and customer. From the executive network the information is passed to vendor network to verify the production details and forward to supplier network. Supplier and buyer network makes the connectivity between the customers and vendors. At the last, from supplier and buyer network information is used and available in accurate and visible form to anywhere, anytime by using any device. This information also includes real time data which is related to logistics company's executive, vendor, supplier, buyer and customer performance details.

V. STATISTICAL APPROACH IN LOGISTICS NETWORK OVER CLOUD

There is a method of IFC in which conditions that must be satisfied for information to flow from a source A (Company) to a destination B (Customer), where A writes to object B or when B reads from object A. There are two conditions are occurred as: Information Flow Constraints on Source A (Company) and Destination B (Customer)

$$SecrecyCondition: A.Ls \subseteq B.Ls$$

$$IntegrityCondition: A.Li \supseteq B.Li$$

When these conditions are satisfied, we say that A's labels are no more restrictive than B's. A label LA is a subset of another label LB if and only if LB contains all the tags in LA. In the secrecy condition, the secrecy label of the source of the information, A, must be a subset of the secrecy label of the destination, B. In the integrity condition, the integrity label of the destination of the information, B, must be a subset of the integrity label of the source, A (or equivalently, the integrity label of A must be a superset of the integrity label of B.

Figure 3: Information Flow Checks from source A to Destination B

The secrecy condition ensures that confidentiality is maintained as data propagates. For example, if a process has knowledge of Company A's sales information, that is, its secrecy label contains the corresponding tag, then the process can only write to a file with secrecy label containing at least this tag. So that, the secrecy condition allows a process with secrecy label (Company A Sales) to write to a file with {Company A Sales, Company B Sales} but not to one with {Company B Sales}. The integrity condition contains influences from low-integrity entities. For example, a file containing a set of verified account numbers may have the integrity label {Accounting Verified} and the integrity condition will not allow a process without this tag in its integrity label, for example, a process with an empty integrity label, to modify this file [5].

VI. BENEFITS OF CLOUD IN LOGISTICS NETWORK

Cloud computing measures the performance of the logistics network on the following parameters:

- Cloud based logistics network is cost effective for the companies compared to on-premise installations, for example the company pay one-time installation charges for the software and cost of perpetual software licenses as annual maintenance costs.
- On premise deployments company have to pay the logistics service providers for software upgrades as well as for the maintenance contracts. Logistics network upgrades the software at the end of the service provider, so company has no need to incur the software up gradation costs separately.
- Logistics network manage the software upgrades and maintenance of the system. Network infrastructure can be managed more effectively by the engineers who created the network and technology rather than own IT company.
- Cloud based logistics network application can be accessed globally by using all the stakeholders of the order management using a thin customer. Then logistics operations can be scaled up at low cost to the service providers, suppliers and customers to improve overall supply chain process.

- Cloud computing based logistics network enables for centralized backup, fault tolerance, information management and guarantee the safe and reliable.
- In logistics network over cloud, information is updated in real-time and interact with data, the coordination time can be greatly shortened, with the standardized operation and management, the system response time and efficiency have been improved between the supplier and customer.

- Cloud computing provides the centralized monitoring for logistics network, the centralized information resource center make regulators easy to analyze data, manage information and visibility of business process.
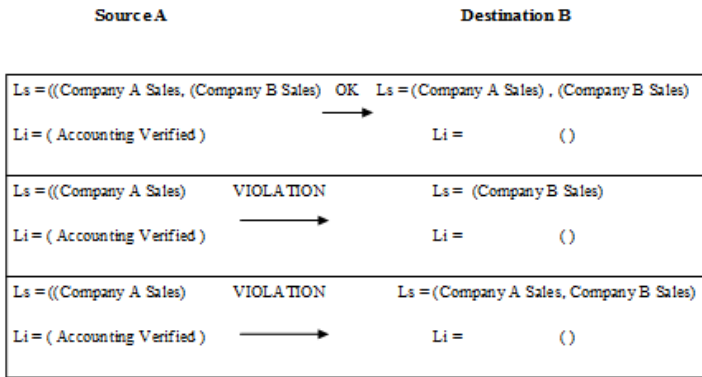
VII. CONCLUSION

Logistics Company are integrated with CRM systems, vendor payments, information handling and requirements planning and finally with the company's Enterprise Resource Planning (ERP) system. Logistics network plays a major role in organization's Supply chain. Logistics network can be used by the customers to ordering, receiving, order picking, dispatch of information, and use of IFC for controlling the flow of information across the logistics stations. Cloud based logistics network will give good effect on logistics companies to improve their competency in the market, and also has the advantage of less implementation costs and better connectivity. The continuous development of new technologies, establishment of networks logistics companies no longer must invest in self development and IT solutions. Logistics Company can use the ready-made solutions like cloud computing. The proposed logistics network over cloud will improve the process of transmission of orders, reduce eliminate the reporting process, reduce time processes to access the information, information flow control and also evaluate the processes collection, distribution and visualization at one place.

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