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# Agent in Ecommerce Application Based on Cloud Environment

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***Abstract*— In this paper secure dealer agent mechanism is implemented to provide market oriented approach by using cloud computing environment. Cloud by leveraging technologies, provides thought on market based resource management strategies that encompasses customer driven service management. The resources lie in a large stockpile in agent, from where it would be accessible to everyone. The Technology provided by the cloud for consider implement market oriented for providing services to the consumers. The services provided by the cloud computing to the providers pay for the services. Paper deals with ecommerce dealer agent mechanism transaction that enables business minded approach for the customers which is carried out from cloud computing. The main aim of the paper is to implement the mechanism such that the dealer is the actual ecommerce sites who will add its own product to the agent database. Agent is the one who will maintain all ecommerce sites product database and payment database. Agent searches the product in which ecommerce site the product is available. To start with web services enables the agent to service the product JAX-WS (web service) is used. Trading system is brought in a sense enabling trading. Direct payment is the default feature for buying product which then security concern is solved by PayPal sandbox implementation for secure transaction. The load impact performance of individual website is measured by using Load impact tool.**

***Index Terms*— Dealer agent evolution, Software Agent, Cloud agent based, JAX-WS**

## I. INTRODUCTION

A software agent is an autonomous system that forms part of an environment, can sense the environment and act on it over a period of time, in pursuit of its own agenda. The software agent can also perceive, reason and act by selecting and executing an appropriate action E-Commerce dealer agent mechanism transaction, that enables business minded approach for the customers which is carried out from cloud computing. A thorough investigation into software agent computing resulted in the realization that software agent technology can be regarded as a new paradigm that may be used to supported in cloud computing process. The unique requirement of cloud computing and the ways in which agent technology may address these were subsequently identified. Agents provide a natural metaphor for support in a team environment where cooperation and the coordination of actions toward a common goal, as well as the monitoring and controlling of actions are strongly supported [1]. A thorough search of current literature revealed that little or no work has been done in the incorporation of the power of agent technology in facilitating and enhancing cloud computing [2] .The main aim of this project is to implement the mechanism such that the dealer is the actual ecommerce sites who will add its own product to the agent database. Agent is the one who will maintain all ecommerce sites product database and payment database.

## II. ECOMMERCE DEALER AGENT MECHANISM

Ecommerce dealer agent system is the system for electronic business. Where the dealers are the ecommerce site and the agent is the site which maintains all the sites product details for the product selling purpose and for the convenience of customer. E-businesses may cooperate with agent-based e-businesses when they can obtain clear benefits, which are increased user convenience, lower search cost, marketing effect improvement, new business opportunities and etc. Many changes have been expected to occur in existing e-commerce paradigm by the emergence of software agent-based e-business [3]. The Internet that has grown so dramatically in the past few years would by now becomes unmanageable without this business. It is claimed that within the next decade, the Internet could be populated with billions of agents exchanging information goods and services with one another and with people. Agent-based e-commerce has been considered as a solution to information overload problem of users and broadens their bounded rationality [4]. This business has been also expected to give other to opportunities existing E-business like cost reduction, new business, etc.

### *A. Need of Agent Ecommerce System*

In this paper we consider a customer's shopping experience on e-commerce sites. In this environment, shoppers must sift through the information at the e-commerce site on their own. This is a difficult task because the type and amount information provided on e-commerce sites and how the information is presented differs from company to company. In addition whenever the product information is updated -- more products are available, or prices have been reduced the customer goes unaware unless he/she revisits the site at a later time. The goal of the paper is to create a software agent to aid a customer who is shopping for a product on an e-commerce site. E-commerce sites allow customers to identify a product by browsing an online catalog of products or by performing a search for the product. The shopping agent would take both of these activities into consideration

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while at the same time, the customer is unaware the background mechanism by agent [5]. The request for the product is given to the dealer site, if request not found, internally agent search for the requested product in some other dealer sites. Once the request is found the agent submits the product to the requested dealer and then the dealer to customer. Agent software system is very needful in terms of e-business. Agent has all the updation of new product, details, brand, and transaction details. Agent mechanism is successful mechanism in terms in ecommerce system which helps dealer site and as well as customer. It increases the productivity of the ecommerce site and aid to customer unknowingly.

## III. Agent Based System In Cloud Computing

Agent based system provides application and services that are being announced on almost daily life. The reason for this intensive interest is that the metaphor of autonomous problem solving entities cooperating and coordinating in order to achieve their desired objectives is an intuitive and natural way of the problem solving. Moreover, the conceptual apparatus of this technology provides the powerful and useful set of computational structures and processes for designing and building the software applications [6]. The agent software technique solves the problems of service request. The agent-based software system, implemented in the e-commerce systems should help customers and e-commerce provider's dealer to avoid the problems described above.

An agent is the software agent that has the capability to determine the needs of the buyers and fulfill their objectives. An agent system that consists of dealers and the interaction between buyers and sellers takes place with the agent software. For the successful business the agent has to coordinate and cooperate with the dealers. Coordination is nothing but the implementation for the state achieving the dealer process to coordinate well with each other. The essential features of cloud computing that serves the resources to number of users. Cloud computing that establish the contract between the buyers and the sellers. Agent protocols are used to for the automation and the activities of polling resources and sharing in clouds. For the service required the query that runs against the cloud to registered service in the database of search engines that matches with the requirement of consumers. Agent search engine threads that are gathered together for collection of information for the request coming from the dealer ecommerce sites (Service to be provided .The architecture of an Agent cloud searching product services and database. It includes the following agent database, agent search engine, and dealer sites. The agent search engine extracts the match product from its database. The agent search engine maintains all the dealer ecommerce sites databases of product which then examines the match product to be matched. The ecommerce dealer site module fetcher stores the matching product services that are extracted from the cloud agent software system [7]. Agent the searches the match product by scanning the product text of all database maintained of all ecommerce dealer site product. Request is delivered based on the forwarded request and with the match of product, the product thus received to the customer followed by the transaction. Agents have to be more selective in choosing trusted dealer from their limited dealer pool, basing decisions around the established topology as well as the trust metrics [8].

The following cloud agent is as follows which includes:

### *A. Agent Services in Cloud*

Services that are concern with cloud agent are the challenging task for dynamically arranging sets of services to number of service provider for formation of single service to the customer to be delivered. For the cloud agent services following works to be adopted:

i) Record database for all the service provider sites (Dealer sites).
ii) Payment transaction for all the dealer sites.

Cloud computing based on agent is concerned with the development of software agent for service discovery of cloud. Each Service is an independent software entity with a well defined standard interface that provides certain functions over network. In the requirement phase of service, for service consumption the agent software is accomplished. The required services of buyer that gets match in the cloud agent sites. The service level agreement established between providers and the consumers, and then the service is delivered [8].

### *B. Participants of cloud*

Cloud computing for composition of service required. Participants of cloud that are (Agent, consumers, dealer ecommerce sites) required interaction and coordination between them.

### *C. Cloud Agent*

Cloud agent software for the services of cloud composition is implemented using Java (jdk 1.6) framework. The software consists of web services (WSs), Agent Resources (ARs), Service Providers (SPs), Dealer, Agent (As), Consumers.

### *D. Agent Resources*

Agent resources controls and manages the resources to access. Agent based cloud computing is concerned with designing and development of software agent for cloud service discovery [9]. SLA generation and direct payment modules are handled by enterprises effectively. The agent middle-ware is primarily designed to act as a bridge between distributed physical networks, creating an agent-friendly communication infrastructure [10]. The resources accept the ecommerce dealer site request and it then grant the requirement to consumers through the ecommerce dealer sites. It manages the resource and had to handle the resource to be organized service provider agent accepts the task for the objective to search for the service product request. It also interacts with ecommerce sites for service providing [11].

Will serve valuable resource for providing leading technologies, development, ideas, and trends[12]. Consumers, that request for the services of product required to the service provider (Ecommerce dealer sites), if request not found in the dealer site then the site request to agent and through the requested site only the product service is received to the consumers.

## IV. DEALER AGENT ECOMMERCE DESIGN

In the existing sites the product selling to the customers was as per the normal process. The recommended company product was the only product which was sold in the web site. If a customer requested for the product which is not available in that site may be because the website has no dealership with other site then the customer will not get the product.

Whereas in dealer agent mechanism overcomes the problem, there is cloud agent who has connection with dealers that are ecommerce site each site has its own product which is also available in agent. When a buyer request for the product if the product is not available then the internal mechanism will start that is the agent will search the product in other websites or other dealer site if the product is found in other site then the agent will give that product to the requested dealer site. The agent site will maintain the transaction details of the requested dealer and product found from other dealer sites. The customer will not know the background mechanism from where the product is received. The communication between dealer and agent is implemented using JAX web services. Enterprise services are built applications that are running within the enterprises to fulfill the business demands. In the recent past, the concept of services in a cloud environment gained significance with services being hosted in a common cloud environment within the enterprise or outside the enterprise. In this, I have described the various steps involved in moving services from an enterprise level to cloud-based environment as part of a cloud implementation.

The Fig. 1 shows the architecture of dealer agent ecommerce transaction in cloud computing environment.

There are basically three main entities involved Agent, dealer (E-commerce sites), Consumers.

### *A. Consumers*

User or Consumers request for the services to be granted through Ecommerce sites, request that is followed from any part of the place and it is processed through cloud.

### *B. Ecommerce Sites*

The request that reach to the particular site and it is processed if the service is not found, then the request is forwarded to agent. Ecommerce system has number of other characteristics, beside purchase requisition and purchase order submission. These include actual delivery of the services, monitoring of the stages of the services and its status at any time and finally, invoicing and Electronic payment on completion of service. The Ecommerce system that provides the following information, namely Product catalogue, business role to allow automation of approval and ordering, customer service , and shipping, account receivable/ invoicing and electronic payment, monitoring of order status. The system will have business rule to ascertain if the purchase requisition is to be authorized for the particular purchaser from a given corporation with appropriate purchasing limits, if approved, the purchaser or the consumer is able to directly submit a purchase order. The Ecommerce site server will maintain a stored shopping cart of previous order for frequent buyers so that the order information from previous orders can easily be retrieved.

### *C. Agent*

The Agent acts as an interface between dealer and the consumers. Entire database of product and payment is maintained in its system. Agent that search for the request that received from ecommerce site and it is processed in order to fulfill consumers request and to gain profit and customer satisfaction and to increase the productivity of product.

## V. MULTIAGENT SYSTEM WITH DEALER AGENT SYSTEM

Dealer Agent mechanism application is created by using the following technologies; Platform used is Windows Server 2003, for designing the application, software technologies used are JavaScript and Java EE, for backend support database technology used is SQL Server 2005, AJAX is used as web services used for the application. Multi-agent systems are used to design systems that are composed of intelligent, autonomous individual components (agents) and encompass decentralized control architectures. The multi-agent approach does not provide an opportunity to approach user problem with efficient coordination. The multi-agent systems approach fails distributes the intelligence throughout the system components. Agent system is the single autonomous agent system for simulating the action and interaction with dealer. Dealer Agent system does provides an opportunity for approaching user problem more efficiently. Anticipate and explicitly describe all possible operational permutations the system may encounter. Dealer Agent system can corporate all possible factor influencing the product/ process. It provides the mechanism for product searching and providing product to respective customer through dealer. Due to dealer agent mechanism, the process is time consuming. Multi Agents can share knowledge using language, within the constraints of the system's communication protocol; the approach may lead to a common improvement. Example languages are Knowledge Query Manipulation Language (KQML) or FIPA's Agent Communication Language (ACL). Dealer Agent communication is taken place with web services, the web services which is implemented is JAX WS for business Enterprise. Reactivity of an agent helps to accomplish the analysis of complex systems that have multiple functions consisting of a number of components which could be tedious and difficult. A software agent is a computational entity that acts on another entity's behalf to perform a task or achieve a given goal. Agent systems are self-contained software programs that embody domain knowledge and behave with a particular degree of independence to achieve specified goals. They're designed to operate in a dynamically changing environment. Agents typically offer features such



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as autonomy, pro-activity, communication and cooperation, and learning [12]. Although a single agent can perform a given task, the agent paradigm was conceived as a distributed computing model

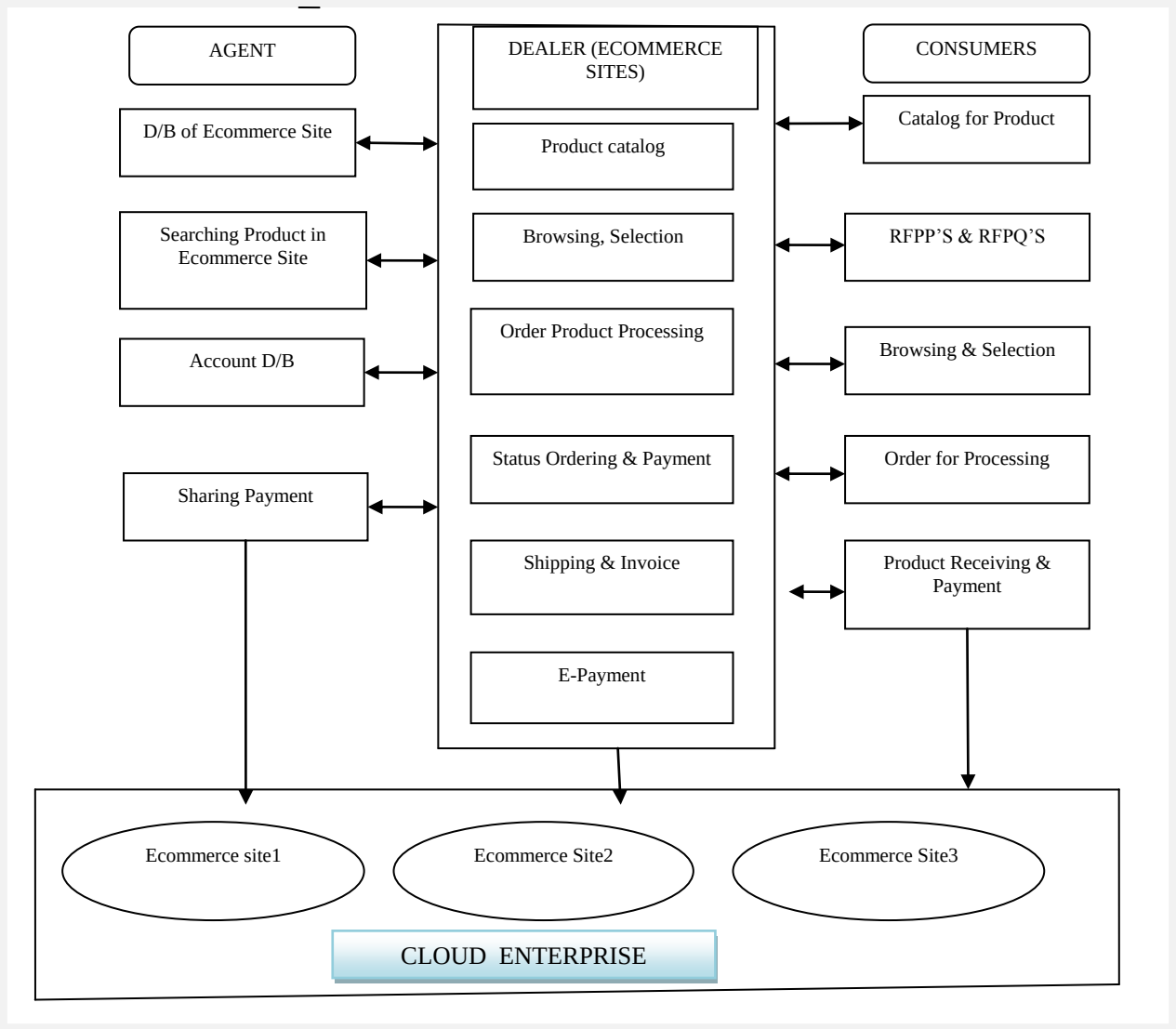


Figure1. Design Architecture for Dealer Agent Cloud

## VI. Evaluation of Dealer Agent Mechanism

The connection between the buyer and the sellers address the buyer to upload the information for the profile database and trading electronic purpose, the seller buyer mechanism process are carried out with stages of In Fig. 2, the seller buyer mechanism process are carried out with stages of

i) Connection between buyer and sellers (Algorithm)
ii) Request of service evaluated
iii) Request that matches filtered
iv) Assigning Service request to Buyers

### *A .Buyer and sellers Connection*

Algorithm for Buyer and Seller
Input: {User id} , {Password}
Output: Connection Established
Processing:
If User id & password >4 < 20
Begin
/* Criterion1 If user id & password exists in dealer d/b */
/* Dealer site will open for Access */
End
{Connection}=new connection generated
If connection generated
/* Criterion 2. Begin
Set Trading process */
Else if User id & password not match
/* Then show error message "Please enter correct user id & password".*/
End
End
End
Else
Begin
/* notify Error msg "Please enter user id & password >4 >20 */

End

Connection is issued between buyers and seller for the task to be accomplished for the purpose of electronic trading and electronic business. Predefined process that is determined for the purpose of connection, this stage receives the request from the buyer.
i) Requesting for the services of product.
ii) With profile details of consumers.

Criterion1. Before requesting for the product services the user has to sign up with their new user id and password so that the consumer's database is also maintained and connection that is established between buyers and sellers.
Criterion2. For the trading Purpose the connection get established.

*B. Service Request evaluated.*

The connection gets established service for the product request is evaluated, where the consumer or buyer enters the product detail. The product details are broke into words. The product request is done with the basis of product type, product name. Search query task take place where the product will be searched.
Algorithm for Service Request Evaluated

Input: {Product type}, {Product name}, {Product Price}.
Output: Service request evaluated
Processing
Step1: Buyer Enters Product details
Step1: Search string break into words
Step2: Compose the search query targeting known data fields like (product name, product type)
Step3: If word like product name (%Samsung %) and product type (%mobile %) found
Begin
*/Result will be displayed related to Samsung*/
End
If product type like = mobile
Begin
*/Then Notify "Result displayed for all mobiles" */
End
If product name like=%Samsung%, product type like =%mobile%, price <5000 >10000
Then display Order by Price in Ascending Order & Order by Dealer.
Begin
Result will be displayed
End
Else message display record not found
If product request forwarded
Then search query forwarded to cloud agent
Go to step 1
End
End

If the product found in the particular site then the service is forwarded in case if the product is not found then the cloud agent that maintains all the product detail will gather the information about the request to be assigned. Service that is evaluated based on the criteria the buyer set based on the price also for product price that that buyer requested is for 5000 or less than 5000 the search will be taken place accordingly.

*C. Product Search Match*

The match request is searched in the cloud agent system. The request is from the dealer site not from the customer directly. The input is product type and product model. This stage that indicates the selection cycle completes for the request and the connection between buyer and the seller. The match searching stage together provides the path that is optimized which allow buyers and sellers to go through cycles for connection. Product search is done for the site perspective so that the concern site can provide the services to consumers or buyers. The web services communicate between the applications. The service that is assigned is described with the help of algorithm.

Algorithm for Product Search Match

Input: {User id}, {Password}, {Product Price}, {Product Type}
Output: Search matched
Step1:.Enter user id and password login
Begin
If product price < = Product Price
Begin
*/ Show match found */
End
If product type =(%Videocon%) & price < = 5000
Begin
*/ Notify Match Found Detail*/
Else
Begin
*/ Notify Match not found */
End

*D. Assigning Service Request*

For the connection that is established and the search that has taken place if the product found then the buyers receives the services of product type.

Algorithm for Assigning Service Request

Input: {user id},{password}
Output: Product Service assigned
Processing:
Step1: Product added into cart
Step2: Displaying message with product type product name, product price, and quantity, total.
Step3: Gross total amount displayed
For productid = 1;
Product id < Cartlist.Size;
Begin
Total= productprice*quantity
Grosstotal= grosstotal + Total
End
Step4: Checkout.
Once the customer select the product from the catalogue the product that get added into cart. The message is displayed with product name, Product Detail, Product Price, Quantity and total. The gross total is calculated and the amount is displayed. Total is calculated


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Total= Product Price * Quantity
When the total is been calculated the consumers checkout with transaction.

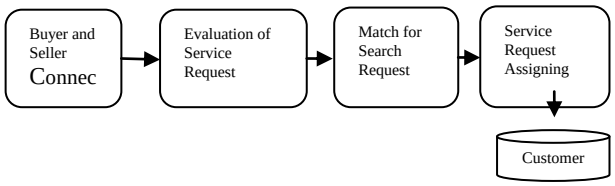



Figure 2: Stages of Dealer Agent Cloud Ecommerce.

## VII. Result Analysis

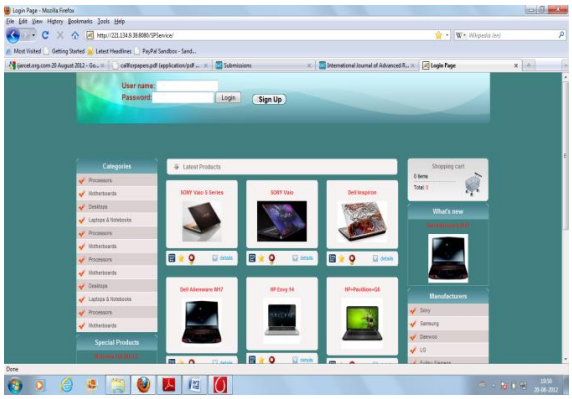


Figure 3: SPServive Website

The above shown website in Fig. 3 is one of the Ecommerce website (i.e., SalesProductService.com) where in customer can purchase products. This site maintains all types and brands of laptops. In this site the customer gets login with its user id and password. Another page will appear where in customer details need to be filled with signup option provided in this site. With this option the customer is added into this site.

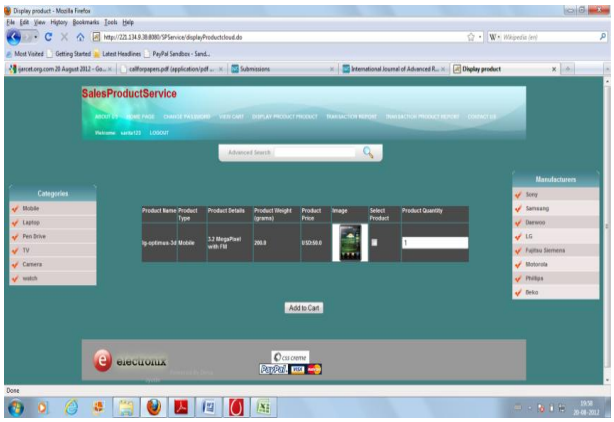



Figure 4: SPService Website displaying product

From the above Fig. 4, the above shown SPServices website is providing the requested product to the user. SPService does not have requested product with them, when the user request came for the product. Since the site maintain laptop but the request is for mobile.

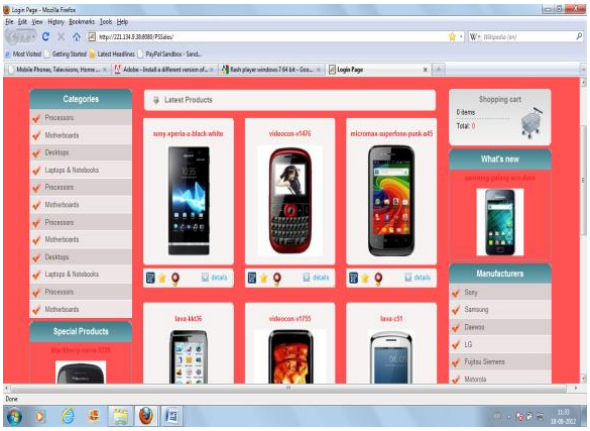


Figure 5: PSSales Website

From the above shown site in Fig. 5 is ProductShoppingSales.com where in customer can purchase product. This Site has all types and brand of mobile. The same type of transaction which is shown in SPservice.com can be shown for this website also. The agent site searches the product in the entire dealer website but the product is available in this site. The internal Dealer-Agent mechanism will let Agent to provide necessary products to the user requested website. Like-Wise Cloud environment has been established by deploying this application in cloud.

Query used in SPService_Database:

```
USE [SPService_Database]
Select * from [SPService_Database].[dbo].[ItemMaster]
Where ItemName = 'lg optimus '
```

Output:
Shows no data as there is no such product in web site.

Query used in PSSales_Database:

```
USE [PSSales_Database]
Select * from [PSSales_Database].[dbo].[ItemMaster]
Where ItemName = 'lg optimus'
```

OutPut:
Shows item data as the item is found in the database.

From the above query we can show that Database "SPService_Database" does not have 'lg Optimus' item, where as Database "PSSales_Database" has the item. Database "PSSales_Database" belongs to PSSales web site and Database "SPService_Database" belongs to SPService web site. User request for 'lg Optimus' item came to SPService web site, but SPService web site doesn't have the item so agent web site using dealer agent mechanism searchs user requested item in other web sites in cloud environment. Here agent web site provides the user requested product from PSSales web site. Like-Wise cloud environment has been established.

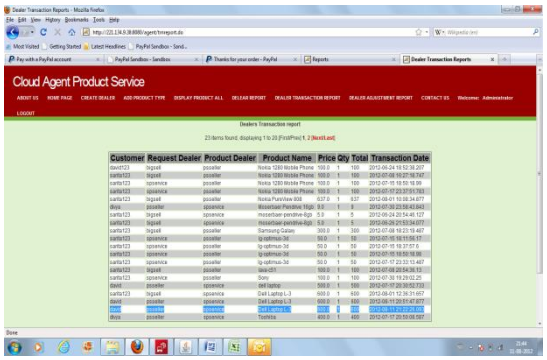



Figure 6: Agent Website Transaction Dealer Report

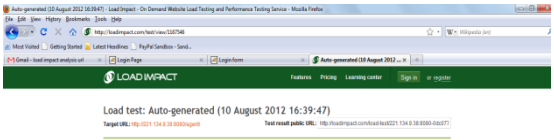
From the above shown site in Fig. 6 is Agent website. After product is been assigned to dealer the above report displays the report of requested dealer and product dealer with product name, quantity, total price and transaction date. This report is generated by this site for payment between dealer website through Agent website.

## VII.LOAD IMPACT MEASURE

This is used to check the load impact of the website. The load testing tool generates simulated user traffic to a website. Users can simulate virtual users who are trying to load the web pages at the same time. While simulating the traffic, the tool records how fast pages are loaded from the server. This lets users know how fast the site is experienced by a user when it is being accessed by many users at the same time. Results are displayed in real time throughout the test process. The tool is cloud-based and provides on-demand load testing.


Figure 7: Load Impact Performance of SPService Website

From Fig. 7, we will see the load impact of one of the dealer website http://221.134.9.38:8080/SPService/.The above graph shows that the user load time is 1.16 seconds for 50 Client who are active



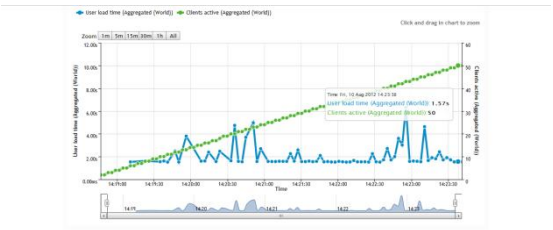



Figure 8: Load Impact Performance of Agent Website

From Fig. 8.shows the load impact of the agent website where 50 client accessing the website at the same time with 1.57 seconds user load time.

## VIII. CONCLUSION

The paper focuses on developing business service because of core concept of cloud computing revolves around providing software as service. The services handled request and responses by using AJAX web services. Our paper involve services namely web services, trading system and direct payment. The payment transactions have been integrated with PayPal sandbox, which provides in-built security for secure transaction. The system is highly scalable and user friendly. Almost all the system objectives have been met. All phases of development were conceived by using methodologies. The paper is executed successfully by fulfilling the objectives. The application is deployed in cloud publicly which provides access to this application from any part of the world. Through this project we have explained how websites are in cloud environment. If a user comes to the websites, the website provides the features which will not let the user to be dissatisfied. As all range of products will be found through the websites which are in cloud. The cloud represents one of the most significant shifts that computing has gone through. As we move towards the cloud, we will discover a new service-based world, where many words that were once common in the average IT shop – like servers, data centers, OS, middleware and clustering – will get erased.

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