Research Challenges in E-Business - A Review

P.M. Durai Raj Vincent
Assistant professor
School of Information Technology and Engineering
VIT University, India
pmvincent@vit.ac.in

Dr. E. Sathiyamoorthy
Associate professor
School of Information Technology and Engineering
VIT University, India
esathiyamoorthy@vit.ac.in

Abstract— **Electronic business refers to the use of Internet for doing business. Rush to E-Business sites attitude affects the quality of such sites in many ways. The increase of popularity of the e business sites are creating challenges everyday for the service provider. For developing an extensive E-Business model we have to analyze the various performance affecting issues and E-Business essentials. The primary aim of this paper is to discuss the issues which are affecting the quality of e business sites. Among that some of the major issues are scalability and security. Scalability is one of the important issue because, the lack of resource allocation leads to the loss of potential customer that will lead to the revenue loss of a particular concern. On the other side security issue creates bad image to the whole business that's why trust building is an important target of every concern with proper security mechanism. In this paper we are trying to present the various methodologies involved in sorting out these issues and the future directions towards building most effective E-Business model.**

Keywords- Phishing, Trust, DNS, SSL.

I. INTRODUCTION

IBM defines e business as "a business process transformed to leverage WWW technology for business profit. Such E-Businesses are integrating themselves into e-market places which are centralized trading hubs conducting on-line trade between sellers and buyers. Internet with the agent technology is gaining widespread acceptance as a medium where E-Business technology can be designed and implemented. In the current scenario E-Business having lot of scope and business values For example, eBay the largest worldwide auction site posted US$9.2 billion in revenue and US$1.8 billion net income for 2010 (eBay 2010), while the total revenue of Taiwan's online auction market reached NT$15.3 million.

Important advantage of E-Business is the comfort of the customer. A customer cannot visit various shops for enquiring a particular product which are situated in various parts of the world. But it is possible here. So this attracts many customers towards E-Business. But there are many unsorted issues still to look after to achieve it more efficiently.

E-marketplaces having several main functions to achieve including matching buyers and sellers requirements, performing commercial transactions as well providing legal platform. If we elaborate E-Business involves various processes like electronic purchasing, processing orders electronically, customer service handling, managing entire supply chain activities etc. Such E-Business architecture consists of web server, transaction server application server and data base [10].

Web server will be connecting the user and the service provider where as the application server will manage high volume of transaction with back end database. Figure 1 shows the architecture of the E-Business environment.

If we go for logical approach there will be three layers one is presentation layer, data layer as well business logic layer. A single machine can run more than one business layers at the same time over various machines in a distributed environment.

Essentials of E-businesses are trust, payment mechanisms, Electronic product catalogs, Back office management, Workflow management, supply chain management as well service discovery. The challenge of designing an efficient E-Business model must comprise of all these essentials.

Apart from the above said essentials, E-Business brings lot of challenges to information technology, among that scalability, security, availability, maintainability, extensibility and flexibility are most important. If a site can tackle all the above said challenges dynamically, then only one can run an e-business site successfully.

Among the above said challenges security is the most important one because every business's most important part is the amount transaction and here this transaction will be taking place in electronic mode. So the security threat for this segment is huge. Hacker's main intention should be tracking this particular session to hack the credit card details of the customers. So security is the most important one.

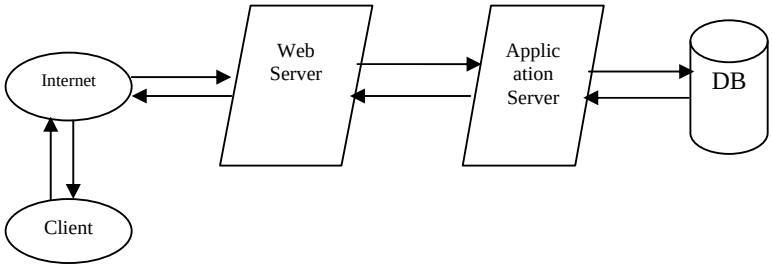

Fig 1: E-Business Architecture

Next important issue is scalability because of the increase of the popularity of the e-business sites and especially the comfortness it is providing to its customer, the numbers of e-business customers are growing day by day. This affects the scalability of the e-business server. At a particular point of time a server can provide access to 'n' number of customers. If the number of customers exceeds this 'n' value then the scalability issue comes.

The next challenges are availability and maintainability. A site must be available to its customer all the time. Because, if a site's down time exceeds a threshold level then the possibility of the loss of potential customers would be more. The other one is maintenance, because the cost of maintenance is very high in e business environment especially during the downtime period. At that point of time sometimes replacement would be the better option when compared to huge maintenance cost.

The next one is extensibility, because business logic should be flexible enough to adapt to the new business logic in future. Either it should support the integration of the new one with the existing one or else a complete makeover. In this paper we are going to present the main performance issues which are challenging the e-business site efficiency in detail.

II. ISSUES

A. Scalability

Scalability is the key issue in e-business due to the unpredictable traffic and behavior of on line customers. If a system is said to be scalable then it has to provide adequate service even when the workload increases. Normally workload will increase in two ways one is overall increase of the number of customers and the other one is the peak time of usage. Scalability will be normally divided into two one is hardware scalability and another one is software scalability. Hardware scalability in the sense adding up the server along with the existing server in order to provide more access where as software scalability means without increasing the server capacity one should increase the service [12].

Dynamic resource allocation algorithms are taking care of the scalability issue. While developing an effective dynamic resource allocation algorithm some of the factors to be considered including the number of requests, current resource utilization, predicted workload and service level agreements.

When developing an algorithm for scaling the resource allocation should be done in two dimensions one is depends on the number of servers and another one is the number of applications distributed across the servers. Most of the existing techniques focus on only smaller number of servers with two applications with that less consideration only given for scalability [6].

When the number of applications increases, then the combinations also increases dramatically because of two applications format. In the general dynamic resource allocation algorithm a to z alphabets are used to represent the servers and S is the symbol used to represent the available servers count and B represent the best allocation.

Because of the exponential complexity of the above said approach a new approach is proposed for large scale applications. In this approach the whole process will be divided into three. In the first phase preprocessing will be done at system setup that is all the applications will be ranked based on a metric value and in the next phase they are analyzing the throughput of each application like the throughput will be measured through performance testing and in the last phase is about periodic reallocation of servers to applications.

In this approach first of all one thing they made as the mandatory one. More than one server can serve for one application but more than one application cannot take resources from single server. In this approach heterogeneous servers will be used and each server will be ranked based on the available resource for a particular application. From the rank list highest ranked server will be allocated. Every time this ranking process will be done dynamically.

If we go for agent based environment the agents will be taking care of this resource allocation. An agent will be exclusively taking care of all of these. Proper session management using agents will get a proper utilization of server resources. Normally threads will be used for giving access. When a user requests for a connection, a thread will be allocated to the user and it will be taking care of the complete interactions. Once it got over the thread will be returned. When free threads are not available then a user has to wait for that. But in agent based environment agents are deployed to manage the client sessions. In such case when a client enters in to the e business site a manager agent will be allotted for monitoring this particular client and it will monitor the client until it leaves the particular site [4].

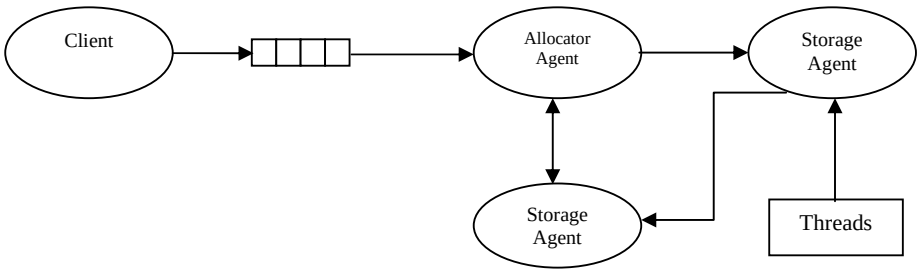

Fig:2. Agent based resource allocation

Normally these agents will handle the threads. When a client moves to some other site from one link of the current site then the monitor agent will terminate this connection and make that thread free. At that time the storage agent will store the connection details of that client for the future reference. In this approach the agents are making threads utilization more efficient that will improve the resource allocation of the server.

In this environment the web server is having four components like connection pool, allocator agent, storage agent, manager agent. When a client requests for a connection the allocator agent will check the storage agent whether any previous session alive. Then it will assign one manager agent. If it is not freely available then the client has to wait. For overcoming this, a manager agent can be created for looking after a connection pool then it can manage 'n' client sessions. So if manager agents will be created by the threads then it can serve 'n' clients. So each manager agent will have an upper limit and that details will be maintained by the allocator agent. When each time when a client migrates or terminated it will notified to the allocator agent. Figure 2 clearly explains this complete process.

B. Security

Any distributed system is subject to security threats like eavesdropping, denial of service, replaying and repudiation. Malicious hosts as well malicious agents are available in e-business environment and the complete system should be protected against this. So there is a need for secure e-business environment.

Normally security is not a unique one in all cases but depends on situation. In an e-business environment most of the major components covered by security control layers. It includes physical, Network communication, operating system and application layer.

Security control in physical access layer is so important because all sensitive devices and data security belongs to this layer. The most difficult attacks to deal with is network attacks this layer includes the network and internet which is the backbone for e business to connect with customers. That's the reason why most of the security mechanisms applied at network layer to monitor the firewall, SSL, network traffic as well to eliminate malicious threats [23].

Operating system layers brings some of the major challenges since web browser, application server as well database server all are running over various operating systems. Two actions we must do here is to protect this layer, one is keeping the operating systems up to date and locking down the operating systems by disabling. Where as in application layer all the servers are there so we have to maintain it with up to date with all new security fixes [17]. Normally security management system consists of various phases. First and foremost one is complete risk assessment and based on the risk analysis we have to develop an action plan. In administration process we have to perform daily monitoring, log analysis as well periodic reporting.Maintaining the Integrity of the Specifications

C. Phishing attacks

Phishing websites are creating bigger threat to genuine sites especially in e-commerce sites and for internet banking sites. The main intentions of such sites are to steal user identity data and financial credentials like credit card numbers, usernames and passwords of user accounts. Such sites are attracting users to its site by using spoofing e-mails. The big drawbacks of such sites are usually internet users of average skill may not differentiate legitimate and forged websites.

Website Black list and Website White list are maintained to list the known safe websites. However, there are several drawbacks in this like lifetime of the phishing sites are low as well it's very difficult to differentiate legitimate and forged site until the phishing attack is detected[7].

Anti-Phishing Working Group is a working group to identify and eliminate fraud sites, email spoofing etc. Normally Phishing attacks can be prevented using two approaches. One is server side approach and another one is client side approach. Main source of attack is spoofed email and intercepting such mails are not easiest task. One of the solution for this is authenticating sender's email. For the prevention of such phishing Microsoft is using sender ID framework. Also Yahoo along with other industry leaders are developing a technique called DKIM (Do main Keys Identified mail).

Evaluating the security risk of a website gives better idea about every site. For evaluating this we need several factors about the site includes server name, domain life, domain age, domain famous, DNS-Ranking, website-type, security manager. Weight age will be given for each factor. With these values total security index value will calculated. From this website security index will be calculated and this will be helpful for identifying genuine site.

D. Role of agent

Introduction of agents into e-business environment due to various scenarios. Some of such scenarios are frequent interactions between user and system really used to take lot of bandwidth which will increase load. If load increases then it will eat the other user's time as well the overall efficiency will be decreased. That is the reason why mobile agents are introduced to make a move to seller's site directly to enable direct interaction.

Mainly there will be three agents will be involved in the distributed environment. They are seller agent, buyer agent and server management agent. When these agents established, first of all it has to register with management agent [3].

In seller environment there are many agents having its own role like advertising agent will be taking care of reaching a product detail to various search agents of customer's on the other hand it will reach through e-mail of all the registered users. Service agent is taking care of personalized services once the transaction is getting over. Negotiation agent takes care of all kind of negotiation dynamically with the buyer agent for making the transaction successful. Transaction agent responsible for secure transactions includes e banking and verifying certificates.

Purchase agent environment is also a multi agent system in which we have search agent, comparison agent, negotiation agent etc [4]. Among these search agent will perform searching based on user requirements after obtaining the various relevant seller agents. Comparison agent will perform comparison with the various search results by search agent and it will select few based on comparison result. Based on number of seller agents selected by comparison agent the negotiation agent will depute same number of sub negotiation agents to interact with all seller agents simultaneously.

This system is becoming complex because of the existence of the various agents. In such complex scenario there is a need of protecting all the agents from any kind of malicious attack and also from the phishing sites [3]. In that way there is a new introduction of agent called as credit assessment agent which will assess the credibility of the host and it has to select a secure seller agent also at the end of the successful transaction it will update its data base about the credibility of this current seller.

E. Trust

Trust is the foremost important thing in any business. When it comes to E-Business then this is going to be the backbone. Both seller and buyer may be unfamiliar about each other in an internet environment. One good example for such uncertainty is a seller wants to sell his used car but he is claiming more than its current condition. In this juncture "seeing is believing" plays a vital role. So, there is a need for coming out from any kind of uncertainty and build trust over all kind of e transactions.

Many leading e transaction sites like eBay, Amazon and many now allows to evaluate its platform after each transaction [8]. Every such site must have a kind of effective reputation system to help the users who are new to the system. Its effectiveness purely depends on what trust model it has adopted to. Normally trust models are of two types one is Central model and another one is Transitive model. But these traditional trust models have few drawbacks. Among that Important one is lack of dynamics. That is it will accumulate the entity's long term behavior. Also traditional approach is prone to any kind of attacks.

When designing a effective trust model one needs to keep some important aspects in concern that are trustworthiness of a concern will increase slowly based on its genuineness but it has to drop in a faster manner in bad behavior. Also if a peer often done un genuine transactions then immediately it has to be announced as a unauthentic one. These trustworthiness calculations will be calculated from the direct experiences of its previous users.

Such feedback score about a concern includes quality of the product, price of the product, delivery time etc. This feedback score depends on various factors like reliability of the evaluator, Value of transaction, Decay factor and Risk factor. Reliability of evaluator is so important because each evaluation feedback is more important for the concern as well the value of transaction is also equally important because a user may gain good reputation from a transaction for small amount but that may not be equal to some other user spends much more than from the previous user. Decay factor's concern is about recent transactions over all other past transactions [5].

One of such effective trust model calculates direct reputation. It is derived from all the transactions done by the service provider. It includes transaction satisfaction degree, transaction date and transaction amount. For calculating this value they are taking only 100 days transactions in to account since recent history is the deciding factor of one's trust. In this calculation every concern can fix one norm value. That is if a transaction amount is greater than a particular value then only that details will be taken in to account for calculation. After these calculations they are fixing a trustworthiness threshold value for recommendation reputation out of 1. If the trustworthiness value is lesser then 0.7 then the system will be disqualified from further evaluation. The final global reputation calculated from these calculations. One more factor involves in this that is transaction successful ratio. We are calculating this from number of successful transactions out of total number of transactions. A system is more effective if it is having higher transaction ratio.

CONCLUSION

In this paper various performance issues in e business like scalability, security are discussed. Since e business having lot of advantages like it is dealing with customers directly, it is providing legal platform for its customers and lot of comfortness to its customer like they can search various products from their home itself and select the most appropriate one based on their requirements, They can read the reviews of other customers regarding a particular product they are interested in etc. Because of the given reasons the numbers of customers are increasing day by day. As the customers increases the issues are also increases on the other side. So, there is lot of scope of research in this direction towards building an effective e-business model especially in scalability and security areas.

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