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An Investigation on the Advancement of Technology in the Field of Electronic Commerce

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Abstract: *The online business industry has experienced significant growth and has now become a regular practice after many years of development. However, in order to tackle the new challenges, the future-oriented online business solution needs to go beyond the basic features of a static website with an online catalog and shopping cart, and move towards an intelligent, dynamic, and secure trading system. In order to use their predictions and opportunities, firms need on a robust data infrastructure and streamlined business operations. The aim of this exploratory project is to investigate the potential advancements that can address these difficulties, such as data exchange and system integration. Emerging technologies such as application services, web services, cloud computing, and their combinations have been introduced. We explore the motivating elements that motivate firms to adopt e-commerce. Organizations may make more crucial decisions by utilizing information on these emerging technology trends, which will help them become more competitive and sustainable.*

Keywords: Application Service, Web Service, Grid Service, and Service-Oriented Architecture: Emerging Technology Trends

I. INTRODUCTION

According to Johnson (2005), we are currently at the toddler stage. According to figures from Forrester Research, global e-commerce revenue reached $6,790 billion in 2004. Based on a report by Jupiter Research, an analytical and research company (Business Wire, January 17, 2007), online retail sales in the United States are projected to grow by 16% in 2007, reaching a total of $116 billion. The US online retail industry is projected to grow at a Compound Annual Growth Rate (CAGR) of 11% in the following five years, with a total market value of $171 billion by 2011. These statistics strongly indicate that e-commerce has reached a state of maturity and is now widely used by the general population. Nevertheless, scholars and professionals in the business realm have identified some barriers that hinder the expansion of e-commerce and negatively impact companies' financial gains. Initially, the lack of trust and faith exhibited by customers leads to a diminished rate of successfully converting them into paying customers. The conversion rate refers to the proportion of visitors who transform into paying clients. Yen (2005) reported that the average sales conversion rate of the top 100 merchants is 4.9 percent, as indicated by a recent survey conducted by Neilsen/NetRatings. The percentage is below 1% for numerous newly established enterprises. Furthermore, the matter of e-commerce security is of great importance. Based on the Javelin Strategy & Research Survey (2007), the United States experienced a total of $55.7 billion in fraudulent activities in 2006, with an average fraud amount of $6,278 per victim. Computer attacks and events are indeed increasing rapidly. Furthermore, E-commerce incurs significant operational expenses. The exchange and acquisition of information are increasingly becoming the main obstacle to the smooth flow of information in today's e-commerce. Marianville and Brown (2006) argue that firms must provide information to their customers, suppliers, and distributors, as well as streamline business operations within storefronts and throughout the entire organization.

Currently, there is a shift in perspective where information technology and information systems are seen primarily as services rather than products. The capacity to initiate a remote call is commonly known as a "service," especially in the context of client/server architecture. Software can be remotely hosted on an application server utilizing web and

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Internet technology, allowing clients to access it as a service through a web browser. The design, architecture, delivery, and consumption of software applications are undergoing changes due to the concept of information services, the need for business integration, and advancements in distributed computing technologies. The hierarchical structure of an information service consists of multiple layers. It may refer to either individual apps or software components. Application services are a recent addition to the field of service-oriented computing.

The ASP approach allows enterprises to outsource the implementation or deployment of systems to an external vendor, while yet meeting their self-information requirements. It efficiently handles the expenses and potential dangers associated with deployment, while also simplifying the intricate nature of the conventional decision between making or buying. An Application Service Provider (ASP) has the ability to distribute expenses among all its clients, enabling it to enhance service quality, security, and risk mitigation measures that individual clients may consider too expensive. In contrast, client companies are exempt from bearing the expenses associated with conventional software implementation, including fees for license, expenditures in hardware, manpower, and training for system administration. They eliminate the necessity of entering into a contractual agreement with a technical support team, performing data backups on a nightly basis, conducting software updates on a monthly basis, experiencing data loss as a result of server or local hard drive malfunction, and other related issues. By eliminating the need to oversee software, hardware, personnel, and other resources, firms can focus on their primary activities and allocate resources more efficiently to essential applications. By removing the requirement to assess, acquire, implement, and validate hardware and software, applications can be operational within weeks instead of months or even years. Salesforce.com exemplifies a prosperous Application Service Provider (ASP). They provide tools for managing customer relationships.

As long as the practice of delegating work and investment to external sources persists, the act of contracting out software application development over the Internet will likewise gain significant prominence. The ASP model possesses a compelling advantage due to the underlying concepts of virtualization and "on-demand rent," notwithstanding its challenging beginnings. Web Services, a technology that has gained significant attention since 2003, is currently considered the most promising technology. Enterprise software companies that do not adopt the software as a service (SaaS) model may struggle to compete in an increasingly competitive market (Miranda, 2005).

Web Services, unlike ASP, do not supply the complete system or application as a service, but instead offer individual components for consumption. These parts do not have a user interface. They possess a system or application programming interface (API) instead. A network-addressable interface is available for a service. Web Services prioritize interoperability and can be dynamically identified and utilized due to their nature as autonomous components of programs that embody business operations or services and can be accessed remotely by another program.

1.1 Generally, a Web Service is required to carry out a transaction in four distinct steps:

1) A proxy class instance is instantiated upon accessing the Web page on Web Server A.
2) The proxy class serializes the list of parameters and transmits an HTTP request to the Web Service on Web Server B.
3) The Web Service subsequently executes the method, serializes the output parameters, and deserializes the incoming inputs. An HTTP response is returned containing these elements.
4) The proxy class delivers the outcome to the web page after marshalling the return parameters.

Web services technology is becoming increasingly popular as a reliable framework for enabling distributed, diverse, and constantly changing, loosely connected Internet-based applications. This has been foreseen as a noteworthy advancement in the integration and development of applications. Web services are well-suited for integrating systems that are completely different from each other since they utilize the XML-based SOAP protocol and do not have any operating system requirements. Web services technology provides a framework that is centered around processes and adheres to standards, allowing for the sharing of remote and diverse applications. By utilizing standardized interfaces, it allows pre-existing applications and application components encapsulated as web services to communicate with one other and combine to create more complex application systems.

Although Web Services technology shows potential for developing distributed applications for e-business, several unresolved challenges need to be addressed before its full utilization. Cooperations between business associations must adhere to the strategies, guidelines, security measures, and other business rules set by the associations. How can the integration of rule and business event management with Web Services be achieved? How may the existing comprehension of the Web Service business context and the Web Service infrastructure be harmonised? Effectively

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utilizing the Web Service might be a challenge due to its extensive coverage of several business disciplines and its complexities. What more functionalities need to be incorporated to make this paradigm genuinely practical in real-world applications? One notable drawback of current Web Administration methods is the absence of security features.

Grid computing is a system that efficiently handles network, processing, and storage resources to automatically facilitate business processes throughout the IT infrastructure, similar to how an electric power grid operates. Carlino, Gore, Venturini, and Warner (2006) state that while it has long been favored in academia, the utilization of this technique has recently surged in the industry. Grid computing enables an organization to transform its dispersed and complex systems into a unified virtual computer capable of effectively tackling jobs and challenges beyond the capacity of a single computer.

Grid computing aims to offer access to key resources, including computational power, networked file systems and data storage, transmission capabilities, and application software. When allocating these information resources, the user's quality of service (QoS) requirements are considered.

Grid computing has the following benefits:

1) reduced total ownership cost (TCO);
2) Integrated computing, data, and storage resources to enhance their efficiency;
3) the creation of virtual organizations to facilitate the sharing of data and applications.

Despite the considerable benefits it provides, such as cost reduction and improved performance, the extensive adoption of grid computing is hindered by many technological and non-technical challenges. The primary non-technical barriers to Grid computing, ranked as "high" or "very high," include the perceived lack of authority or access to resources (44 percent), concerns about the potential risks associated with enterprise-wide deployment (40 percent), and the perceived reduction or loss of budget funds. It is important to note that businesses will require a period of time to understand and integrate Grid computing, similar to any other technological innovation.

Service-oriented architecture (SOA) is an innovative approach to developing and integrating applications that effectively tackles these problems. To secure internal backing, it is necessary to educate workers at every level of an organization, ranging from the IT manager to the CEO, regarding the advantageous aspects of Grid computing for the firm. BPM/EAI platforms have integrated SOA, which is technically founded on XML and Web Services technology.

SOA has several significant benefits. Initially, firms have the ability to utilize the identical framework to expand the Service-Oriented Architecture (SOA) beyond the confines of the enterprise. This expansion allows for the establishment of connections with suppliers and consumers, as well as the facilitation of collaboration with other systems. Instead of establishing individual links, they can utilize Service-Oriented Architecture (SOA) to establish a singular connection to each vendor or customer organization. If one organization were to modify the internal processing of a certain function, as long as the published programming interface remained unchanged, it would not have any impact on the remainder of the system. Consequently, the expenditures associated with entering and exiting will be substantially decreased. Furthermore, SOA simplifies the process of maintenance and operation. Unlike the need for numerous specialized bridges in traditional systems, SOA merely need a single integration point for each new application or process modification. A software bus facilitates the simultaneous connection of new systems and platforms to all other systems on the bus. Themistocleous & Chen (2004) state that SOA can be utilized to integrate middleware islands and leverage existing EAI investments.

IBM experts provide a concise overview of the benefits of adopting a Service-Oriented Architecture (SOA) (Channabasavaiah et al.). 2003) through these means:

• Employ existing resources: By implementing a suitable Service-Oriented Architecture (SOA) framework, a business can create a service by combining and utilizing its current components, which can then be accessed by the company. Having knowledge of the name and interface of this novel service is sufficient for its utilization. The intricacy of the data flow within the service's components and its internal workings are concealed from external entities. The aspect of secrecy enables organizations to utilize existing projects, constructing services by combining components derived from diverse machines, operating on different operating systems, and developed in various programming languages.

Infrastructure, which is a basic necessity, will be developed and implemented more uniformly across all enterprise applications. Web Service interfaces provide a means to encapsulate and access legacy services. Components from

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various sources, including existing, freshly produced, and vendor-purchased, can be merged together inside a well-defined Service-Oriented Architecture (SOA) framework.

As a result of deploying these components as services on the existing infrastructure, the underlying infrastructure will be seen more as a commodity element. Organizational Web Services libraries will be the primary asset for firms using the SOA framework. This will lead to a reduced time to bring the product to market. By utilizing Web Services libraries to construct and implement services, the time needed for design, development, testing, and deployment can be reduced. This will lead to a substantial decrease in the time required to bring new initiatives to the market, since these initiatives can make use of pre-existing services and components.

Cost reduction through technology in E commerce:

By implementing the Service-Oriented Architecture (SOA) architecture and utilizing the services library for both existing and new applications, the expenses associated with improving and developing new services are significantly minimized as business needs evolve and new demands arise. The learning curve of the development team is also decreased.

Risk mitigation: The likelihood of bringing new failures into the process of improving or generating new business services is reduced when existing components are reused.

An SOA enables the continuous enhancement of business processes by providing a clear representation of process flows based on the sequential use of specific components of business services. This provides an optimal environment for monitoring business processes. The business service embodies process modeling. The process is controlled by reorganizing the elements in a specific arrangement (elements of a business service).

Process-centric architecture: The prevailing models and techniques for architecture primarily concentrate on the program. Programmers develop programs for their personal convenience. Process knowledge is often distributed among various components. The application lacks any level of detail or specificity beyond its own boundaries, resembling a black box. Code duplication, integration of shared libraries, and object inheritance are all essential for achieving code reuse. The application is designed for a process-oriented architecture. Every stage within the procedure represents a distinct business service, and the procedure itself is divided into several stages. Every service or component functions as a subordinate application. To fulfill the requirements of the business, these sub-applications are interconnected to establish a process flow. This level of granularity allows processes to efficiently utilize and recycle each sub-application throughout the whole business.

The main goal of the OGSA is to offer a clearly defined collection of basic interfaces for the development of Grid systems and applications that can work together. A service refers to a network-enabled entity that offers a specific functionality by exchanging messages. Within the OGSA framework, each individual resource, such as a computer, storage device, or application, is denoted as a service. OGSA enables the creation and deletion of transitory service instances, whereas Web Services only support the discovery and invocation of persistent services. A Grid service is a Web service that is represented using WSDL and can be transitory. It is built on Grid protocols. Grid services employ internal state to differentiate between several instances of a service that have the same interface.

II. CONCLUSION

Overall, this article discussed ASP, Web Services, grid computing, OSA, and grid service. The objective of these emerging technologies is to effectively handle intricacy, enable the establishment of universal languages through open industry standards, and enhance company growth by automating and virtualizing IT-based services. They are not limited or confined to each other. Conversely, they collaborate effectively. Typically, ASP provides extensive, pre-built applications that generally do not necessitate much customization. They are commonly used by the general people. Web administrations are small components designed to address specific business challenges. While the service has released programming interfaces that enhance interoperability, integrating it into apps necessitates considerable programming abilities.

Several variables impact the selection or acquisition of technology by a corporation. In addition to the technical reasons described in the study, there are other non-technical considerations. Typically, the most crucial concerns include support, funding, privacy, and safety for business leaders. Security is essential in e-commerce to ensure confidence and

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adherence to legal requirements. Nevertheless, the credit card firms have yet to reach a consensus on a unified security policy, potentially causing a delay in the implementation of anti-fraud measures.

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