

An Evaluation of Service Development in e-Commerce Migrating To SOA

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Abstract— A service-oriented architecture (SOA) is a collection of services, which communicate with each other. The communication can involve either simple data passing or it could involve two or more services coordinating some activity. It has been observed that SOA has been proved helpful to large business enterprises while small business are reluctant towards migrating small e-commerce business to SOA. The components in a business enterprise, like order management, the store, content management system, inventory and warehouse management, payment verification systems etc. depend on the hierarchy system, data warehouse, financial system etc. Every component in this structure is so tightly coupled that it's quite complicated to change one system out another without disturbing other systems. Also, it is very expensive, as well as time-consuming, for small e-commerce business, to implement cross system replacement and re-architecture where they have limited operational resources. Here comes into picture, the role of SOA or Service Oriented Architecture, which provides a consistent set of tools to channel management – store administration, content management, payments and proper delivery efficient. This way, SOA makes migration strategy easy for e-commerce.

Index Terms—SMB, SOA e-commerce, Migration, Reusability.

I. INTRODUCTION

It has been a practice in the industry, not just the IT sector, that there is more focus on the large enterprises in the market rather than small and medium business enterprises (SMB). Despite that, the IT industry has been successful to make IT implementation on SMBs accounting for 49 % of all IT expenditure. The significance of SMBs in the entire global industry can be estimated by the IDC survey report for 2008 which states that of the total global employment, only 19 % of the organizations having SOA in place, 11% implementing, 22 % still researching the technology, SMB market accounted 70 %, with emerging market players India and China reaching 72% - 73% of employment in the SMB market. [1] Of the total growth in industry, SMB IT market segment has grown to 8.5% in 2007 exceeding even the IT market growth rate itself and outpacing large enterprises [2]. The aid of IT or software as a Service and service-oriented architecture (SOA) would push the growth of SMB IT market segment, with the ability for better integration, increased

flexibility, and cost reduction.

An important feature of SOA in development is re-use of existing services. This is vital for SMB since it reduces cost where the resources are much more limited as compared to large enterprises. In fact, Computer Economics [3], states that only a small amount of the SMB segment, have adopted SOA, but that there is a relative interest in researching the area.

As defined by Gio Wiederhold in the breakthrough article Mediator in the architecture of future information system: "A service-oriented architecture (SOA) is a flexible set of design principles used during the phases of systems development and integration. A deployed SOA-based architecture will provide a loosely-integrated suite of services that can be used within multiple business domains."

SOA is an architectural standard based on loosely coupled, self-contained software components (services), that can execute as independent entities, and cooperate together with other services to form complex business process.

SOA claims to enable a business with Agility, Flexibility, Cost reduction, Interoperability and Easy of integration. Yet, only 19 % of the organizations have SOA in place, 11% are implementing, and 22 % are still researching the technology, as stated by Frank Gens in IDC for SMB - IT market.

This paper presented here analyses service integration for small e-commerce business and compares different service development approaches (SDA) and makes an evaluation for which could be the most suitable one.

II. SQA DEFINITIONS

We use here a working definition adopted from a technical definition by Thomas Erl: "SOA is a form of technology architecture that adheres to the principles of service orientation, when realized through the Web service technology platform; SOA establishes the potential to support and promote these principles throughout the business process and automation domains of an enterprise [7]."

Here we have a widespread accepted set of principles related to service orientation, considered core to the design of service regardless of underlying technologies. These are as follows:-

- Services are reusable.
- Services share a formal contract.
- Services are loosely coupled.
- Services are composable.
- Services are autonomous.
- Services are stateless.
- Services are discoverable.

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III. SOA PARTICIPANTS

The participants of a Service Oriented Architecture are a service provider and a service requestor. The services are exposed by the service provider when it publishes its contract in a service registry. A service requestor can find/discover the available services by looking into the listing of this registry, in order to determine how to bind and communicate with the service. Further communication is done directly between the requestor and provider.

IV. WHY SOA?

- Services may be reused and reorganized to implement new business processes, as the markets and business needs may change.
- The reuse of services will lower the time and cost of new business process development.
- The service interoperability and their loosely-coupled characteristic increases flexibility and lighten the integration process with other businesses.

Carnegie Mellon® Software Engineering Institute (SEI) examined the quality attributes of SOA and states that the maturity of SOA have reached a point where the technology can help fulfill SOA promises of interoperability improving the possibilities of integration, extensibility and Modifiability, which businesses of all size may benefit from [12].

V. MIGRATION

Digital Libraries, by William Arms, (c) 2000 M.I.T. Press defines migration to be “Preservation of digital content, where the underlying information is retained but older formats and internal structures are replaced by newer”. This paper refers to Migration in the term “Service-Oriented Migration”, as a way of migrating from a non-service oriented system to a system where partially or full functionality can be defined as services in a SOA. The essential idea behind any migration is to preserve the current business logic, while at the same time switching into a new environment and/or architecture.

Information system migration moves the information system to a more flexible environment, while retaining the original system’s data and functionality [13].

Architectural Migration focuses on migrating from one system architecture to another in this case a service oriented.

Some migrations are pre-planned and the migration is executed in one go, while some migrations are incremental in process and come from realizations of small project feedback, showing positive results. In regards to the later, Edward Cobb, VP architecture and standards at BEA in regards to SOA implementation states: “It’s all about starting small so you can learn how to monitor the benefits and see how your business is becoming more flexible and adaptable” [15]. This is backed up by Mark Prichard, product marketing director at BEA: “The benefits of SOA grow over time... through a series of small incremental wins” [15].

VI .SOA MIGRATION

In order to attain architectural migration to SOA, it is essential to follow the SOA principles when identifying and implementing services. Identification of functionality of services is one of the vital steps when migrating to SOA, insuring the importance of reusability, interoperability and agility of the new service(s); which may be used in many different project scenarios.

VII .SMALL BUSINESS E-COMMERCE

As per the current definitions, EU has started to standardize. It categorizes companies with fewer than 50 employees or turnover under £10 million as "small", and those with fewer than 250 or turnover under £50 million as "medium". Hence forth, Small business ecommerce is the Ecommerce performed by small businesses.

Small businesses have an advantage of dynamic decision making, as they don’t require of hierarchy approval as large enterprises. Despite this dynamicity, the decision making is at times, limited by strict budgets. Small business generally don’t enjoy the opulence of large capital and therefore place their focus on maximum utilization of the existing resources and information systems. SOA does support this requirement of reusability.

Enabling or adopting e-commerce has given small business an encouragement to participate on the world wide web , and has broadened their exposure in the market via homepages, and internet directories.

VIII. MIGRATION TO SOA

For the architectural migration to SOA of any legacy system and assisting legacy code with respect to incorporating for small business e-commerce services, Zhan & Yang [23] presented 3 approaches :-

A. *Wrapping:*

The approach of wrapping, just at it name implies focuses on wrapping the system code preferably in component form with a service interface, enabling it to act as service. The wrapping approach focuses its attention on studying the interface of the code or component in order to replace this by a service interface, usually a Web service interface described by a WSDL service contract. This is seen as the quickest approach an in the literature reviewed as the preferred approach. Though this is the case, different statements state that this approach may complicate future maintenance and development, because it does not focus on deep knowledge original system in details before implementing the service/s. This is seen as a short time solution by some. The downside to this approach is that it does not focus on the identifying system logic by reengineering and requires the system as a whole to be wrapped. This is not suited for incremental migration.

B. *Redevelopment Approach:*

This approach focuses on reengineering the system, or parts of it, at some given level, in order to identify important business logic in the system code. This code must then be studied and new services are may be implemented based on

the logic extracted. Here the actual code of the system is used as guidance and, new SDAs for SOA migration code can be implemented as the developer sees best fit to fulfill the given requirements. This method requires good insight in the system to be migrated and study of the structure in order to identify and separate out a given section of logic. Zhang & Yang stated that this method “enables the developer to implement the service using new Web service techniques and languages, saves maintenance and improves efficiency for transaction, but it is highly invasive and that it is difficult to recover business logic perfectly” [23].

C. Hybrid Approach:

A hybrid approach which focuses on uncovering valuable business logic from the legacy code through reverse engineering of code and wrapping parts of the legacy system code to achieve valuable and agile service(s) for valuable business logic in a rapid and dependable way.

IX. CONCLUSION

According to the SDA proposed by Zhan & Yang, it can be argued that the third approach can bridge the gap of effective migration of legacy system to service oriented architecture and implementation, and by allowing parts of the legacy system to become independent and distributable, at the same time keep the development costs down and utilizing the important business logic of the already familiar legacy system [23].

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