



## Demand-Adapted Service Oriented Architecture Using Lego Model

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### Abstract:

Many developments happened in Service Oriented architecture models but with no details in its technology and requirement. This paper presents a new Service Oriented Architecture (SOA) to all Service Enterprise (SE) according to their demands. Therefore, the goal is to build a new complete architecture model for SOA methodologies according to current technology and business requirements that could be used in a real Enterprise environment. To do this, new types of services and new model called Lego Model are explained in details, and the results of the proposed architecture model in analyzed. Consequently, the complications are reduced to support business domains of enterprise and to start associating SOA methodologies in their corporate software.

**Keywords:** Lego Model, Service Enterprise, Service Oriented Architecture, Demand and Flexible

### Introduction:

Currently, there are many challenges and issues need to developments and maintenance for enterprise systems [1]. For example, the traditional systems are distributed on all departments enterprise (remote facilities) because the enterprise needs all the data that obtained by the on premise systems under its internal control. However, the enterprise should either purchase special hardware devices or should pay to host an internet service. All the above is costly and the all procedures also are not easy.

In the recent years, many companies have chosen virtualization and cloud to upload the big IT infrastructure or hardware to solve some of cost-effective enterprise systems “Virtualization is constructing of a virtual place of hardware, platforms, devices, and so on. Because of the virtualization, utility computing is possible. The enterprise also should pay more for special utilities”.

In order to reduce the costs of enterprise system development, small businesses also move their systems to the private cloud storage. Actually, this will allow them to reduce time and be faster on rolling so that new services no need to be concerned for the problems such as hardware maintenance, network resources scaling, and initiating enterprise resource systems which can now be easily configured on the cloud.

BUILDING SOA SOA is “a style of multi-users computing (distributed systems) that helps organizations share logic and data among multiple applications and usage modes. Now, SOA is finally at the foreground of IT architectures and systems. The definition of SOA has converted as it was passed along in informal conversations. For the purposes of this paper will use the following definition:

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DEFINITION: Service-oriented architecture (SOA) is an architectural style for building systems based on interactions of loosely coupled, coarse-grained, and autonomous components called services. Each service exposes processes and behavior through contracts, which are composed of messages at discoverable addresses called endpoints. A service’s behavior is governed by policies that are external to the service itself.” [2]

Any design has to face some of the following challenges:

Interoperability [3, 4]

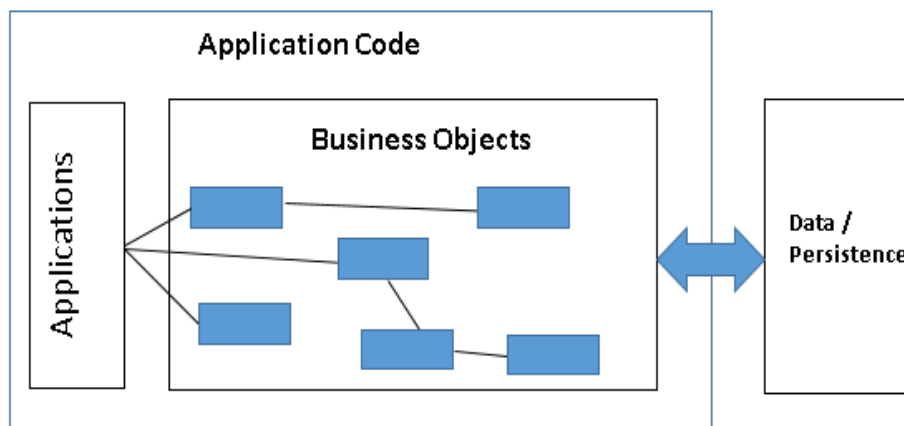
The application has to present an updated data in recent time especially if the data is a financial data to process the local currency conversion as well as to retrieve the correct information of products.

Redundancies [5].

Commonly the Some of required components is repeatedly developed in many other companies and system developer will use same technology to solve this problem or to develop a new application. In this case the efforts and cost will spent to do this development or maintenance.

Isolating Business Logic

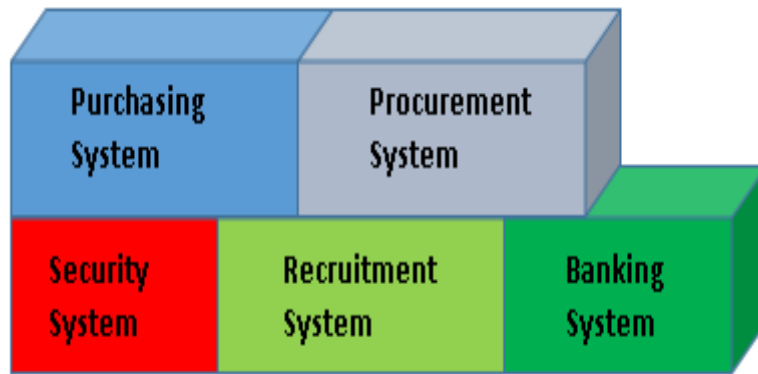
To “access and modify any database, the developer needs to know the database’s structure, like tables or queries, how to build the SQL query. The modification procedure that the developer will spend from the real work of implementing the application and business logic. Consequently, when the database’s structure modified, the application separates and the data access components need to be updated accordingly”[6, 7]. “The modified components will have to go to testing, unit and integration testing before being deployed. Again, these procedures are duplicated across the organization. In general, the typical architecture of a non-SOA system” will be similar to (Figure-1).



**Figure 1**-Architecture of a non-SOA system

**BUILD AN SOA ON DEMAND**

Flexible Scenarios means that there are many requirements from a customer or enterprise to the developer or IT company that have to meet all requirements. So, the scenario or requirement could be required from a lot of companies then this requirement will be a component which could be grouped for being integrated package has made a certain function like (Purchase system or recruitment system...). Finally, these scenarios are configuring to be a Lego of components.



**Figure 2-Lego of components**

Figure-2 Illustrates the common requirements for any enterprise and the developer can reconfigure these components to be suitable for Service enterprise. The Lego technology has the following properties:

- 1) Scalable
- 2) Flexible
- 3) Compatible
- 4) Maintainable
- 5) Integrated

### **The Methodology**

Some researches often base on “secondary research such as reviewing available literatures related to SOA, or qualitative approaches such as discussions with bank employees, bank management and more formal approaches through in-depth interviews, focus groups, projective methods, case studies or UN organization. As SOA stays a relatively new research area” [8, 9]. The “qualitative research method seems to be the appropriate approach to investigate and analyze in depth benefits affecting SOA adoption in e-banking” or ERP.

In the previous section has five challenges should be a road map to our research. So we have to explain them as the following as:

- 1) Scalable: it means that the component will cover all enterprise’s requirements and applicable as distributed system.
- 2) Flexible: it means that these components have the ability to deals with each other without middleware or supported software.
- 3) Compatible: regarding these components will be implanted under distributed system so it should be working on all operating systems which are connected to the internet.
- 4) Maintainable: these components should be fixed it easily and remotely
- 5) Integrated: IT company should submit all their components as a completed part serve a certain service in anytime without any malfunction.

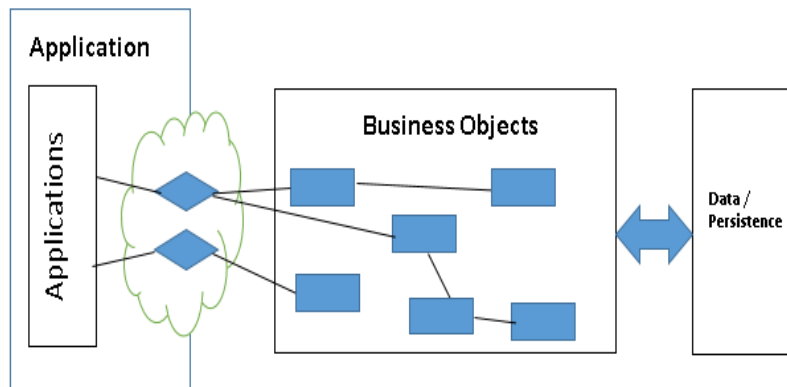
### **Results and Discussions:**

In this part of paper has two stages, the first stage is initiative attempt to find the idea’s challenges and to use the available tools via the internet like a private cloud storage and a simple useful platform. The second stage, the idea is developed to be widely used in the storage part and the presented services.

#### **The first stage:**

With SOA, the logic of business is analyzed into cleared services which will be uncovered for everyone to use. “As such, the architecture will be transformed into something similar to Figure-3.

Now the code of application is reduced greatly. Furthermore, it is no longer needs to pull through the objects sequentially and the developer no needs to understand the details of domain-specific logic”.



“Figure 3-Improved architecture of system with SOA”

“SOA uncovers business functionalities as services to be consumed by applications so that developers have fewer things to concern. In fact, the service is a form of certain function or behaviour, and users are familiar with the benefits that come with these services. For comparison, our application introduced earlier might now have the following design, as shown in Figure-4, if SOA is adopted”.

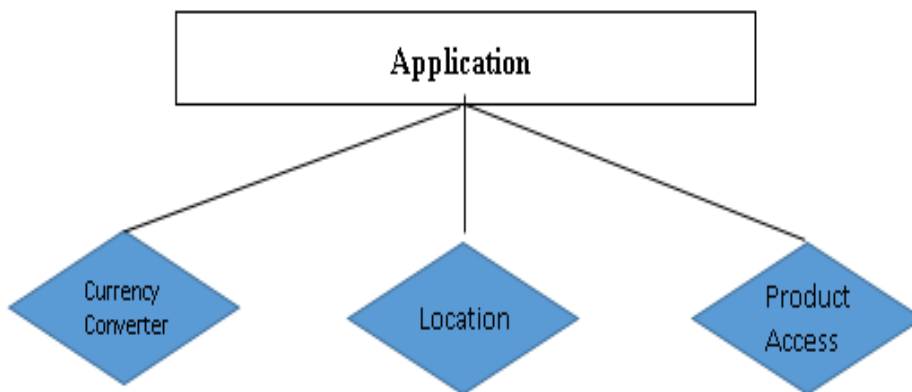
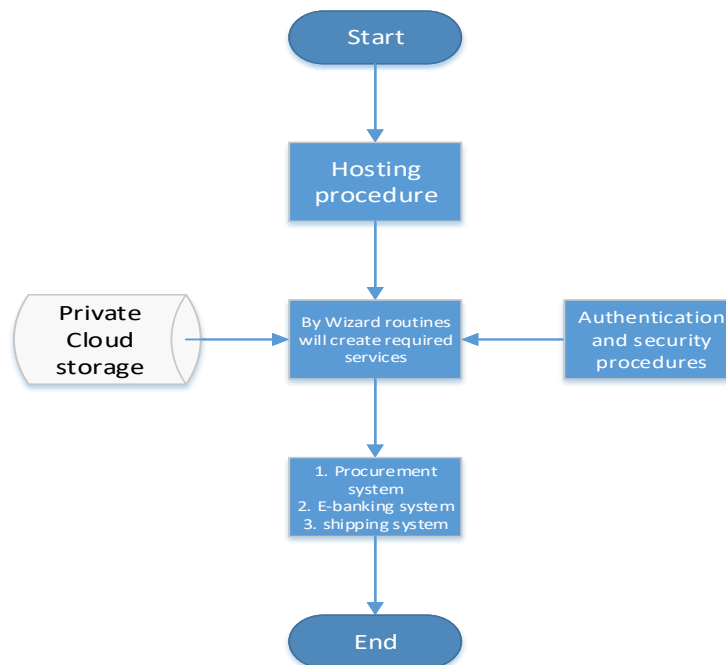


Figure 4-Improved design with SOA.

Many of users or companies have big challenges to create or develop certain services for presenting to people. They restored to some of social websites to use them as a place to present their services and product because useful and free charges but it is not correct way. These companies will face many problems like hacking and distortion to some of information and will lose a lot of professionalism. Different tests had been made to implement the research’s methodology to solve challenges and met all the possible requirements. So, the paper presents the idea with fully confident to implement any ERP system in hosting server.

**The second stage:**

The paper suggests making hosting companies more official and to give them fully control for saving and protect the accumulated data in their servers. After hosting the interfacing, web page will present its services as the below diagram to be after that as shown in Figure-5.



**Figure 5-Website services [10]**

- 1) Save some of useful ERPs that will be easy to use by customers or investors
- 2) Design ERPs in intelligent ways and have the abilities to develop them easily.
- 3) Build a powerful security systems to take any hosting company the full responsibilities to protect the huge data as bank.
- 4) Unified software standardization to implement the rules of this work scientifically and legally.
- 5) Hosting companies should give guarantees to attract business companies as the following as
  - a) Web designing
  - b) Security and authentication
  - c) Data recovery and backup
  - d) Email boxes
  - e) Applying distributed system strategies

**Conclusion**

In this paper, the authors have been presented a new SOA architecture proposal that comes from business analysis to SOA architectural design.

The future work of this research is to implement the developed SOA in ASIC or FPGA hardware [11-16] for modern implications.

**REFERENCES**

1. Lin GC, Desmond KE, Htoon NT. And Thuat NV. 2011. A Fresh Graduate's Guide to Software Development Tools and Technologies. Chapter-10: Service Oriented Architecture, School of

- Computing, National University of Singapore.
2. Rotem-Gal-Oz A, Bruno E. and Dahan U. **2012**. SOA patterns. Shelter Island: Manning; 2012 Sep.
  3. Khanjani A., Rahman WN. and Ghani AA. **2014**. Feature-based Analysis into the Trend of Software Technologies from Traditional to Service Oriented Architecture and SaaS Cloud. *JCS*. 2014; **10**(12): 2408-14.
  4. Basias N, Themistocleous M, Morabito V. **2014**. An investigation of benefits affecting SOA adoption in e-Banking. *International Journal of e-Education, e-Business, e-Management and e-Learning*. 2014 Jun 1; **4**(3): 174.
  5. Diirr T., Azevedo LG., Santoro F. **2014**. SOA Governance from an Enterprise Architecture Viewpoint. In X Brazilian Symposium on Information Systems (SBSI 2014), May, Londrina, Brazil 2014.
  6. Jabr MA, Al-omari HK. **2010**. e-Learning Management System Using Service Oriented Architecture 1; 2010. *J. Comput. Sci.*, **6**: 285-295.
  7. Khanjani A., Rahman WN. **2013**. Concepts and derivatives of web services. *J. Comput. Eng.* 2013; **12**: 74-8.
  8. Wauters P., Declercq K., van der Peijl S. and Davies P. **2011**. Study on cloud and service oriented architectures for e-government final report. *Framework*. 2011 Dec 5; **5**: 12-2011.
  9. Marston S., Li Z., Bandyopadhyay S., Zhang J. and Ghalsasi A. **2011**. Cloud computing—The business perspective. *Decision support systems*. 2011 Apr 1; **51**(1): 176-89.
  10. Hassan S. and Aziz OS. **2018**. Flexible scenarios to build a service oriented architecture on demand. *Journal of Fundamental and Applied Sciences*. 2018; **10**(5S).
  11. Hasan S., Boussakta S. and Yakovlev, A. **2010**. parameterized efficient FPGA implementations Improved of parallel 1-D filtering algorithms using Xilinx System Generator. In The 10th IEEE International Symposium on Signal Processing and Information Technology 2010 Dec 15 (pp. 382-387). IEEE.
  12. Hasan S, Boussakta S, Yakovlev A. **2011**. Parameterized FPGA-based architecture for parallel 1-D filtering algorithms. In International Workshop on Systems, Signal Processing and their Applications, WOSSPA 2011 May 9 (pp. 171-174). IEEE.
  13. Hasan S. **2016**. Performance-vetted 3-D MAC processors for parallel volumetric convolution algorithm: A 256× 256× 20 MRI filtering case study. In 2016 Al-Sadeq International Conference on Multidisciplinary in IT and Communication Science and Applications (AIC-MITCSA) 2016 May 9 (pp. 1-6). IEEE.
  14. Humaidi AJ., Hassan S. and Fadhel MA. **2018**. Rapidly-fabricated nightly-detected lane system: An FPGA implemented architecture. *The Asian International Journal of Life Sciences*. 2018; **16**(1): 343-355.
  15. Humaidi AJ., Hassan S. and Fadhel MA. **2018**. FPGA-based lane-detection architecture for autonomous vehicles: A real-time design and development. *The Asian International Journal of Life Sciences*. 2018; **16**(1): 223-237.
  16. Humaidi AJ., Hasan S. and Al-Jodah AA. **2018**. Design of Second Order Sliding Mode for Glucose Regulation Systems with Disturbance. *International Journal of Engineering & Technology*. 2018; **7**(2.28): 243-7.