Service-Oriented Architecture and Web Service: an Overview

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Service-Oriented Architecture (SOA)

In the dawn of computing era, organisations realised that computer should be utilised more in order to automate business processes and achieved better competitive advantages. They then constructed IT infrastructures around their business practices and increased their operational efficiencies.

However, as they developed more and more sophisticated softwares, they then realised that many of the functions (service) were redundant and highly dependant to other functions. Hence, service-oriented architecture (SOA) was born. Essentially, service-oriented architecture is an IT architecture that standardise the use and communication of services that support requests from its consumers. Its goal is to achieve loose coupling among interacting software agents, thus creating more independence within each agents.

Return on investment (ROI) of SOA

There are many benefits that can be attained from using SOA. In his article, Chavda (2004) stated that SOA possessed interoperability across heterogeneous platforms. Hence, it enabled integration across intra and inter-enterprise application. This means that SOA could leverage the flexibility and reusability of software components across the organisation or even the industry (Chavda, 2004).

To follow up Chavda's comment, Bernotat (2004) pointed out the cost-benefit analysis of SOA implementation. By leveraging the flexibility and reusability of their softwares, the organisation (1) can expect implementation cost reduction, as then they can reuse their software components, which also (2) incur reduction of IT driven downtime, defects and risks. Furthermore, (3) maintenance cost reduction can also be expected as then they only need to maintain the service provider for development and upgrades. Another

benefit is (4) the simplified test automation, as then they only deal with the black box of services which have a reduced complexity. (Bernotat, 2004).

Chung, Byrd, Lewis and Ford (2005) strengthen above comments with an empirical study they have conducted in analysing relationship between IT infrastructure flexibility, mass customisation and business performance. They found that an infrastructure with reduced complexity and increased flexibility (which is possessed by SOA) leads to increased business performance. Furthermore, this infrastructure is more hospitable in supporting mass customisation, which leads to satisfied customer demands (Chung et al. 2005).

Vom Brocke and Lindner (2004) on the other hand, studied SOA from financial perspective. They argued that the financial consequence of using SOA resulted in a more transparent and more adaptable financial process. Transactions between the agents made the costing system more visible to implement and more detailed for analysis, thus resulting in better monitoring.

Concluding above discussion, SOA possess excellent benefits in its design. Not only increases the business performance (reducing cost) of the organisation, but also it leverages organisation's IT flexibility. Moreover, the design also enables better monitoring in the process. However, in implementing SOA there are still many aspects to consider and risks to take. Below section will discuss the considerations that need to be taken in SOA (web service is one type of SOA implementation).

Web services

In attempt to define meaning of "web services", there have always been debates within the W3C Web Services Architecture Working Group (W3C, 2004). However, it was generally accepted that a web service is a SOA with at least the following additional constraints: (1) Interfaces must be based on Internet protocols such as HTTP, FTP, and SMTP. (2) Except for binary data attachment, messages must be in XML (He, 2003).

Possible challenges to implementing web services

Whilst implementing web services may leverage competitive advantages to organisations, there are several points that need to be addressed during implementation.

First, the importance of alignment with business strategy. Bernotat (2004) stressed that it was important to align the SOA implementation objective with the organisation's business strategy. SOA programs must incorporate early wins for the business, i.e. effects visible for the "IT customer"side to create tangible benefits for them. Hazra (2002) supported this argument by stating that organisations must prioritised which components need to be developed in order to make the impact more significant.

Second, integration of multiple business processes or components. Hazra (2002) emphasize the need of aligning and assessing IT capabilities and available resources of the organisation in order to meet the business needs and operational needs.

Third, Hazra (2002) also mentioned about the need of an appropriate service application design that can maximise scalability, extensibility, flexibility and continuous availability in the organisation. The crucial point is in compromising with neighbouring partners. Compromises must be reached, as then the concept of interoperability in SOA can be fully established (Hazra, 2002).

Fourth, Patrick (2005) also stated the need of changing the way of thinking from data oriented to service oriented. Previous concept of design in software development mostly data oriented or process oriented. Whilst, they are still a good way to approach the design, Patrick stated that the service oriented concept would be more suitable.

He (2003) also supported Patrick's argument. It was also mentioned that in designing the messages, it must be descriptive, rather than instructive. The vocabulary and structure of messages must also be limited for any efficient communication. Extensibility is vitally important as well. If messages are not extensible, consumers and providers will be locked into one particular version of a service (He, 2003)

Lastly, security is also another issue in web service implementation. With web service implementation, it is inevitable that trade secret between organisations become vulnerable (Ohlson, 2005). Ohlson underlined the organisation's preparation to set up proper security around their business environment before taking further implementation with web services.

To summarize, while implementing web services may deliver many benefits, Organisations will still need to carefully run the implementation process. Aligning with business strategy, integrating the multiple business process, considering available resources, compromising with neighbouring partners and awareness with security aspect, all of them are several aspects that need to be addressed to ensure successful implementation. Nonetheless, one may rest be assured that through a painstaking implementation, web service and SOA will put the organisation in a better competitive position. As mentioned by Albert Einstein,

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"In the middle of difficulty lies opportunity."

-- Albert Einstein --

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