SERVICE ORIENTED ARCHITECTURE (SOA) IMPLEMENTATION FRAMEWORK FOR HETEROGENEOUS INFORMATION SYSTEMS INTEGRATION

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Abstrak

Kepelbagaian sistem maklumat (IS) menyukarkan untuk menyatukan data secara automatik dalam persekitaran IS yang berlainan. Keadaan ini telah menyebabkan kos operasi and penyelenggaraan meningkat dan juga pembaziran ruang simpanan data, yang berpunca daripada data yang bertindan. Semenjak kemunculan aliran terkini pembangunan IS, iaitu Senibina Berasaskan Perkhidmatan (SOA), ramai pengkaji telah mencadangkan pelbagai model konseptual dan rangka kerja SOA. Objektif utama usaha ini adalah untuk menjadi panduan untuk mengaplikasi SOA dengan jayanya. Di Malaysia, banyak institut pengajian tinggi telah mengambil satu inisiatif untuk melaksanakan sistem berasaskan SOA untuk meningkatkan kualiti persembahan IS. Walau bagaimanapun, kebanyakan rangka kerja SOA yang sedia ada masih kekurangan dari segi reka bentuk yang bagus untuk menyokong penyatuan kepelbagaian IS. Dalam mengisi kekurangan ini, kajian ini dijalankan untuk mencari ruang bagi menambahbaik rangka kerja pelaksanaan SOA yang sedia ada dalam integrasi kepelbagaian IS. Satu kombinasi kepelbagaian rangka kerja yang sedia ada dan persetujuan dari para pakar telah menghasilkan satu rangka kerja baru SOA. Kaedah kajian kes di sebuah universiti awam Malaysia telah diaplikasikan untuk menguji dan mengesahkan rangka kerja tersebut dengan menjalankan ekperimen prototaip dengan memfokuskan kepada beberapa sistem maklumat pelajar. Penilaian dari para pengguna menunjukkan rangka kerja yang diusulkan itu telah memenuhi beberapa kriteria SOA seperti berasaskan perkhidmatan, kemaskini data dalam masa yang nyata serta kebolehan capaian dan dibuktikan dengan jayanya melalui ekperimen prototaip. Dengan penemuan dan hasil dari kajian ini, satu penambahbaikan rangka kerja pelaksanaan SOA telah dipenuhi dengan memfokuskan di dalam integrasi kepelbagaian IS. Ini adalah satu sumbangan baru kepada badan pengetahuan dalam bidang SOA dalam aspek penyatuan kepelbagaian IS di universiti awam Malaysia.

Kata kunci: Senibina Berasaskan Perkhidmatan, Penyatuan Kepelbagaian, Sistem makluma.

Abstract

Heterogeneous information systems (IS) creates difficulties to automatically integrate data in different IS environment. These situations have increased operating and maintenance costs as well as wasteful data storage, which is caused by data redundancy. Since the emerging of Service Oriented Architecture (SOA), the latest trend in IS development, many researchers have proposed various SOA conceptual models and frameworks. The main objective behind these efforts was to provide a guideline for a successful SOA adoption. In Malaysia, higher learning institutions have taken some initiatives to implement SOA-based systems to improve the quality of IS performance. However, most of the existing SOA frameworks available are still lacking of good design to support an integration of heterogeneous IS. In order to fill this gap, this study was conducted to seek for an opportunity to enhance the existing SOA implementation frameworks of heterogeneous IS integration. A consolidation of the existing related frameworks and consensus from experts yield a new SOA framework. A case study approach in a Malaysia public university was applied to test and validate the framework by conducted prototyping experiments with the focus on several student information systems. The evaluation from the users shows that the proposed framework has met SOA criteria like service based, data update in real time and accessibility. This finding has been proven with successful prototype experiments. With the findings and results of this study, an enhancement of SOA implementation framework was fulfilled by focusing on integrating heterogeneous IS. This is a new contribution SOA domain in the context of heterogeneous IS integration in Malaysia public universities.

Keywords: Service Oriented Architecture, Heterogeneous integration, Information systems.

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Table of Contents

List of Tables

List of Figures

List of Appendices

List of Abbreviations

ADX	Advance Data Exchange
ASIS	Academic and Student Information System
CORBA	Common Object Request Broker
DCOM	Distributed Component Object Model
EA	Enterprise Architecture
ebXML	Electronic Business using eXtensible Markup Language
ERP	Enterprise Resource Planning
ESB	Enterprise Service Bus
GAIS	Graduate Academic Information System
HLI	Higher Learning Institution(s)
IS	Information System(s)
IT	Information Technology
JSP	Java Script Programming
LMS	Learning Management System
LZS	Learning Zone System
PHP	Hypertext Pre-processor
QoS	Quality of Service
RPC	Remote Procedure Call
RUP	Rational Unified Process
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SIS	Student Information System
UDDI	Universal Description Discovery and Integration
SoSIS	Services oriented Student Information Systems
OS	Operating System
WSDL	Web Services Description Language
WS	Web Service
XML	eXtended Markup Language

CHAPTER ONE
INTRODUCTION

Service-oriented architecture (SOA) approach was emerging as a popular design concept of an information system (IS) development in recent years. SOA is an architectural style that is based on service concept (Erl, 2009). Many people have begun to talk about SOA and its advantages in contributing to agile IS development and efficient management on a number of articles have been published a year after year (Mohammed Al-Khannaq, 2009; Perniu, 2010; Yihui, 2011; Börner & Goeken, 2012). However, since SOA is still new for most organizations, many stakeholders of the organizations are concerned on appropriate way to implement SOA approach for their organizations' IS (Balk, 2008; Li, Chen, Zhu, & Chung, 2010; Ma & Liu, 2013). To overcome this shortcoming, the related researchers such as Roach, Low and D'Ambra (2008), Alghafri et al. (2009), Jabr and Al-omari (2010), and Razavian and Lago (2010) had published their conceptual models and frameworks as a guide to help peoples understand SOA adoption and implementation. Nevertheless,, there are still lack of a good framework design for SOA implementation (Moody, 2005; Pansa, Walter, Abeck, & Scheibenberger, 2010; Aydin & Yalcinkaya, 2011). This issue also was suggested to be solved by Pansa, Walter, Abeck, and Scheibenberger (2010) and Trkman, Kova, and Kardeljeva (2011) that claimed a framework of SOA implementation should be presented in details and clearly.

Previous studies (Lupu, Bologa, Sabau, & Muntean, 2008; Pasatcha & Sunat, 2008; MohammedAl-Khannaq, 2009) found that in education domain, many higher learning institutions (HLI) has seen an increased numbers of stakeholders, who are interested in exploring and implementing SOA into their organizations' IS to leverage SOA

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