

WEB SERVICE ARCHITECTURE FOR SCHOLARLY PUBLICATION

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*To my beloved Mak and Bapak, thank you for being my no-matter-what.*

*When I look at all the good in my life inside all of it, I see both of you.*

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## ABSTRACT

The main objective of Higher Education Institutions (HEIs) in Malaysia is to become the world class university. An academic staff in a university will be assessed according to their performance metrics that consists of based on teaching performance, research performance and supervision performance. It is important for academic staff to publish as much as possible in scholarly publication activities. But, not all researchers are capable to produce scholarly publication within university target. Scholarly publication is a competitive and critical phase for researchers. The aim of this study is to assemble the incorporation of web service concept in term of architecture, development methodology and the reuse of web service itself in term of integrating them with the established information provider company. The use of Service Oriented Modelling and Architecture (SOMA) is viewed as a widely used architecture in industry that focusing on the reusing of services and provides flexibility to use legacy applications. An interview was organized to investigate the scenario and elicit the challenges in achieving the publication target of scholarly publication among academicians. The preliminary results show that identifying a suitable journal to be published on is a tiresome task. Besides, it is intricate to distinguish the journal's quartile and its impact factor (IF). This scenario affect academicians's performance metrics target for particular year. The web service architecture was extracted from six prior literature reviews of web service based architectures and four services oriented modelling techniques. The proposed web service architecture was integrated with Elsevier Scopus APIs, Elsevier ScienceDirect APIs, SCImago XML web service and Web of Science OpenURL Resolver web service. The research proposed a solution in the form of a prototype, which would serves as web service architecture in monitoring scholarly publication performance. Validation of the usability of prototype is conducted using User Acceptance Testing (UAT) among academicians in Faculty of Computing, Universiti Teknologi Malaysia.

## ABSTRAK

Objektif utama Institusi Pengajian Tinggi (IPT) di Malaysia adalah untuk menjadi universiti bertaraf dunia. Staf akademik di universiti yang akan dinilai mengikut metrik prestasi mereka berdasarkan prestasi pengajaran, prestasi penyelidikan dan prestasi penyeliaan. Adalah amat penting bagi kakitangan akademik untuk menerbitkan penerbitan sebanyak mungkin dalam aktiviti penerbitan ilmiah. Akan tetapi, tidak semua penyelidik mampu untuk menghasilkan penerbitan ilmiah yang disasarkan oleh universiti. Penerbitan ilmiah adalah fasa yang kompetitif dan penting bagi penyelidik. Tujuan kajian ini adalah untuk penggabungan penggunaan konsep perkhidmatan web dari segi seni bina, metodologi pembangunan dan penggunaan semula perkhidmatan web itu sendiri dari segi pengintegrasian dengan syarikat pembekal maklumat yang sedia ada. Penggunaan Perkhidmatan Berorientasikan Model dan Senibina (SOMA) dilihat sebagai seni bina yang digunakan secara meluas dalam industri yang memberi tumpuan kepada penggunaan semula perkhidmatan dan memberi fleksibiliti untuk menggunakan aplikasi warisan. Sesi temu bual dijalankan untuk menyiasat senario dan untuk mengenalpasti cabaran yang dihadapi oleh kakitangan akademik dalam mencapai sasaran penerbitan penerbitan ilmiah. Keputusan awal menunjukkan bahawa mengenalpasti jurnal yang sesuai untuk disiarkan didalamnya adalah satu tugas yang meletihkan. Selain itu, ia adalah rumit untuk membezakan kuartil jurnal dan faktor kesannya (IF). Senario ini memberi kesan kepada sasaran metrik prestasi kakitangan akademik bagi tahun tertentu. Seni bina perkhidmatan web telah diekstrak daripada enam ulasan sastera daripada seni bina berasaskan perkhidmatan web dan empat teknik permodelan berorientasikan perkhidmatan. Seni bina perkhidmatan web yang dicadangkan telah digabungkan dengan *Elsevier Scopus API*, *API Elsevier ScienceDirect*, perkhidmatan web XML SCImago dan perkhidmatan web *Web of Science OpenURL Resolver*. Kajian ini mencadangkan satu penyelesaian dalam bentuk prototaip, yang akan berfungsi sebagai seni bina perkhidmatan web dalam memantau prestasi penerbitan ilmiah. Pengesahan kebolegunaan prototaip dijalankan menggunakan Ujian Penerimaan Pengguna (UAT) di kalangan kakitangan akademik di Fakulti Komputeran, Universiti Teknologi Malaysia.

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

Apparently, Ong et al. (2012) said that people are used to think that the employment of innovative business solutions, for increasing the product lifecycle, should always promise an adequate return on the investment, even if the real investment benefits to the company are sometimes difficult to evaluate. More organizations depend on hundreds of software applications with numerous kinds of functionalities to run their business process. Web applications support the executives to identify trends and make decision for upcoming business. These applications were established in different platforms and operating systems with different programming languages.

Nowadays, the technological development creates strong challenge among organizations. This motivates the worldwide organization to run their company productively. Neely and Bourne (2000) observed that the productivity is related to easiness and computerization. For super scale industrial system, B. Zhang et al. (2012) addressed the number of existing data for administrative purpose by employees to encounter is also massive .

To the extent, Key Performance Indicator (KPI) is required in order to measure both organizational and human performance productively. KPI is a measurement tool of performance. As testified by Xiong et al. (2010), it is frequently used to support an organization explain and assess how successful they are, normally in terms of strategic planning in making progress towards its long term organizational goals.

Bird et al. (2005) reported that the Performance Monitoring was announced across United Kingdom government during 1990s to survey the activities of public service. It was related to the application of accountability increment in public service and employee expertise. Similarly, most education administrator in United States like Texas and California is utilizing an examination in monitoring performance.

Isah and Sodangi (2013) admitted that monitoring and controlling the KPI in organizations gave the exact information about the deliverable status of every activities and the performance assessment. To ensure this ability, companies can monitor desired KPI and make suitable measures. Likewise, Breakwell and Tytherleigh (2010) also added that in Higher Education Institutions (HEIs), KPIs is symbolized as a huge agenda in enhancing the university performance.

## **1.2 Research background**

As reviewed by Masron et al. (2012) the main objective of HEIs in Malaysia is to become the world class university. Many programs were launched in order to encourage public universities to be the world top universities. Such programs were Accelerated Program for Excellence (APEX) and Malaysia Research Assessment (MyRA). MyRA marks with more than 100 will be given a title such as Research University and is provided with more financial support by the ministry.

Based on third MyRA II instrument in "Glosari MyRA II" 2015) which is Quantity and Quality of Research, there are two main criteria such as Publication and Research Grant for Academic Staff "Glosari MyRA II" 2015). It is listed in MyRA goals which is to produce high impact research publications as reported by UTM (2014). To become a recognizable as a world class centre of innovation and academic excellence, UTM is giving a remarkable response toward MyRA mechanism.

Dhillon et al. (2013) pointed out a performance measuring scheme in UTM is called *Key Amal Indicator* (KAI). It is developed with suitable targets as a measurement system. "Key Amal Indicator" 2011) served as real tools in monitoring university goal and outcome of the strategic scheme implementation. Formulating a strategy is important, but evaluating an implementation to improve business objectives is one of a supreme significance.

Usually, as mentioned by Masron et al. (2012) academic staff in a university will be assessed according to their KPI that consist of based on teaching performance, research performance and supervision performance. In order to maintain the status of Research University, it is important for academic staffs and student of UTM to publish as much as possible in scholarly publication activities.

For instance, UTM is committed to support their students and academic staffs to publish scholarly publication by subscribing the e-journals, online databases and e-books that are accessible to the registered members of UTM Library "E-RESOURCES" 2015). Among the available online databases as mentioned by Ştirbu et al. (2015), Tober (2011), Elsevier (2015a), 2015b) and Groote and Raszewski (2012) are Web of Science, ScienceDirect, Scopus and SCImago Journal & Country Rank respectively.



Plus, the existence of a searchable database of research domain interest of UTM academic staff plays a health motivation for students and academic staffs to improve their scholarly publication because they can identify whose lecturers publish how many scholarly publications with its impact factors. This database is known as UTM SciVal Experts as introduced by "UTM SciVal Experts" (2015). Other than that, School of Graduate Studies (SPS) in UTM has designed a management system for postgraduate students namely Graduate Studies Management System (GSMS). ITU (2015) described the aim of GSMS is to take care of processes such as research, scholarship, academic, recruitment, administration and examination modules.

### **1.3 Problem statement**

Being able to survive in research environment is not that easy. In any research university around the world particularly in UTM, writing academic publications is the principal indicator of great achievement. But, not all researchers are capable to produce scholarly publication within university target. Indeed, scholarly publication is a competitive and critical phase for graduate students and researchers. Plus, identify a suitable journal to be published on is a tiresome task. Besides, it is intricate to distinguish the journal's quartile and its impact factor. This scenario affect academician's KAI target for particular year.

To face the challenge of competition, a strategic monitoring tool is needed by incorporating related service into an application. Those mentioned issues above can be enhanced by applying web service architecture. John B. Oladosu et al. (2009) defined a web service is any piece of software that makes itself available over the internet which enables the application integration becomes much more flexible because a web services permits the revealing of current system role so that different system can utilize the role of the program. Hence, the study addresses the need for monitoring the unreachable KPI target in scholarly publications by academic staffs.

#### **1.4 Research aim and objectives**

The aim of this study is to assemble KPI prototype for scholarly publication with the incorporation of web service concept in term of architecture, development methodology and the reuse of web service itself in term of integrating them with the established information provider company. Additionally, the objectives of this study are:

- 1) To investigate the scenario of scholarly publication among academicians.
- 2) To elicit the challenges in achieving scholarly publication target from academicians.
- 3) To design and develop web service based KPI prototype for scholarly publication.
- 4) To evaluate the KPI prototype based on the integration of web service architecture.

#### **1.5 Research scope**

- 1) Employing the interview method to elicit challenges.
- 2) Sample of data is from Universiti Teknologi Malaysia (UTM).
- 3) Adopting the Service Oriented Architecture.
- 4) The prototype shall allow authorize user to monitor KPI target strategically based on the integration of Service Oriented Architecture.
- 5) Test the method by using sample data from Universiti Teknologi Malaysia (UTM)

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