Designing and Construction of Industrial Placement Electronic System (IPES) with RIA Concepts

Nooralisa Mohd Tuah¹, Dg. Senandong Ajar², and Dinna. Nina Mohd Nizam³
Labuan School of Informatics Science, University Malaysia Sabah, Malaysia
Email: alisa.tuah@yahoo.com¹, dg.ajor@gmail.com², dinna@yahoo.com.my³

Abstract—A conceptual design for an information system of industrial placement that applies to Labuan School of Informatics Labuan (LSIS) is being modeled. A Rich Internet Application (RIA) element was adapted to the system in order to promote a new style of interaction as well as improved the business process of the school. This research is continuity of the preliminary study of industrial placement problem conducted by the researchers on previous work. From this conceptual design, three main functions with additional two support functions are designed; logbook, feedback, Personal Message Box (PMB), auto search and interactive panel. Although, it is a conceptual design, it has enough specification to enable the construction of IPES’s prototype to easily establish IPES at LSIS.

Index Terms—RIA, IPES, WebML, MD

I. INTRODUCTION

Web applications environment has moved forward in line with the evolvement of technology in application development. The implementation of desktop application features used in the web application promotes a new style of communication with high level of interactivity. The level of interaction may be different depending on the function. With the emergence of Rich Internet Application (RIA) technology, its offer greatly enhanced usability and explores the technologies behind it that could present a new style of application. Several researchers [2], [4]-[7] have explored the development’s methodology on how it could ease the development process and explored how this RIA could make a system more practical and easy to be used. In educational purposes, this also can be categorized as one of an e-learning system as this system will promote the same function as online communication between the student-lecturer-coordinator as well as online evaluation process. Training management system proposed and developed by Tsujimura et al. [2] was one of the based studies of this paper. It used multimedia contents as one of the system’s elements in supporting their Plan-Do-See Cycle method.

This project was undertake to describe the design and construction of Industrial Placement Electronic System (IPES) by using RIA function and technology which will be implemented at Labuan School of Informatics Science (LSIS), University Malaysia Sabah (UMS). Previously, we have discussed the necessity of IPES [1] and towards the development, we faced so many obstacles and therefore came out with this paper to visualize in detail how practicable it could be developed. The first plan is to develop a virtual communication platform by using virtual community of practice (VCoPs). However, with the changes of IPES’s business process and the adoption to it, minor changes had been made.

In IPES, the objectives in [1] are remain and the processes are designed as follow; registration, monitoring and evaluation. Those processes will be explained in detail in the next section.

II. SYSTEM DESIGN & CONSTRUCTION

This section will explain in detail about the intended user for the system and the system itself. The outline for the systems consists of the required functions of RIA, methodology used for development and the architecture of the system.

A. Focus Group

Every semester LSIS’s student will undergo their internship at selected company for three months during the third semester of the year. The industrial placement is required for the student to be graduated and to furnish them with suitable skills needed before they go for real working environment. Therefore, Students who are in the final semester at LSIS will be the intended user for this system. They will be our main case study, from industrial placement information registration to maintaining their information (if any updates required) than updating their activities day-by-day until the process ended. For monitoring and evaluation purposes, appointed lecturer cum academic supervisor will be the focus group. Whole system is operated by the industrial placement coordinator (admin).
B. System Function

The intended functions are based on current industrial placement’s approach [1] where we are looking at a method to fasten the process without having much trouble to the user as well as the manual process itself. The functions similarly great influenced by [2]. Therefore, to promote the RIA in IPES, we considered the following functions and illustrate them as Fig. 1 and Fig. 2:

i. Auto search
This function provided differently depending on level of access. As for student, this function is beneficial for them to lookup information for forms, industrial guidelines and their particular details. As for coordinator and academic supervisor, this function will help them to find student information and particular logbook detail. The plan was to minimize manually word keying (one-by-one) by providing a suggestion to the base word to the user. It will help them by minimizing the time and error during operation [3], [12].

ii. Interactive panel
This function involves login panel and form upload/download panel. The plan was to pop out the panel when needed. Other than attractive and interactive purposes, this panel is designed to minimize the page loaded and transaction between client and server [4], [12].

iii. Logbook function
Manual Logbook is where the student has to write day-to-day plan, task, comment, problem and any related things to their industrial training. By providing it online, student will manage their logbook online, report their training’s problem online and submit their logbook to be verified online.

iv. Feedback function
Feedback function is related to logbook function. The academic supervisor will monitor the student’s activity through their logbook and give comment, appropriate advice, consult them on weekly basis until end of training.

v. Private message box
A communication function named as private message box (PMB) is designed for the user to communicate between each other (Coordinator <- student <-> academic supervisor <-> coordinator). System will trigger a message to user’s PMB and at the same time sending email notification directly to their mailbox for any comments made at feedback function.

C. Methodology

The IPES is adapting RIA concept. To date various methods have been developed and introduced in developing web applications with RIA such as [4]-[6], which implement the Model Driven Engineering (MDE) approach in system development life-cycle. In IPES, a web engineering model is used and to this, we applied WebML (Web Modeling Language) extension RIA as discussed by Preciado, J.C. et.al [6] for designing the application. In web engineering modeling, there are three levels of modeling such as data modeling, business logic modeling and presentation modeling [6]. Detail for each level is as follow:

D. Data modeling

The class diagram has been constructed for the system as in Fig. 3. There are three users; student, coordinator and academic supervisor. These users need to be registered to login into the system. The registered user can access the system based on their level of authorization. As for student, their main access is updating and completing their personal information, managing their logbook and PMB. For coordinator, he/she can access PMB and monitor all logbooks and feedbacks. As for academic supervisor, they can access their student’s logbook only and give weekly feedback to them as well as chat through the PMB.

Figure 1. IPES detail system design

Figure 2. IPES full system design

Figure 3. Class diagram
E. Business Logic Modeling

RIA web application structure is different from traditional web application where a page is operated with minimum number of interaction between client and server therefore, reloading the whole page is reduced and more seamless interaction is created. Francisco J. et al. [4] define RIA structure as a web application that transfers most of the processing load at user interface (client) while data request remains on server. Preciado J. C. et al. [6] provides in-depth description on RIA where it shows how a single page operation is nested and those pages able to be processed by the client or by the server. To this, the same described architecture is implemented in this project with parallel session between client and web server by using XML code.

F. Presentation Modeling

RIA UIs is what we would like to determine in this phase. Layout of each function is determined, so that it can be tailored into the system. The UIs draft is shown in Fig. 4.

G. Apparatus & Material

Various language and technology that applying RIA concepts in web content are Adobe Flash, AJAX (Asynchronous JavaScript and XML), ActiveX, Flex, Silverlight etc. These technologies were established few years back and have been explored to their best performance. Cross-platform environment made RIAs become the most wanted technology so far. Therefore, for this IPES project, Microsoft Visual Studio 2010 and Microsoft Silverlight, Expression Blend were the programming tools used to construct and develop our intended system with c#, AJAX, XML as the programming languages. In addition, MSSQL is selected to be the database for the system. Application server for initial development is Internet Information Service (IIS).

III. DISCUSSION

Industrial placement at initial process, ongoing monitoring process and subsequently process was hardly catered manually. An online application system specifically for industrial placement can help to manage the process more efficiently [1]. Therefore, the purpose of this study is to design an industrial placement system (IPES) facilitating the student of LSIS in managing their process of industrial placement at online basis. A web application system developed and used by the student at LSIS is practically limited in utilizing interactive element [10], [11]. Interactive interface [8], [9] is one of the elements provided inside RIA in order to promote a better user experience and transaction. Adoption of RIA basically would enhance the transaction as RIA basic idea is implementing desktop-like-operation [12]. With .Net platform, AJAX and XM in IPES, faster response with minimal server load is provided in the system. Users will find it easy to use and this will lead to a better interaction. The same approach implemented in IPES and to this, auto search, zoom able panel and interactive panel for PMB/logbook/feedback functions are provided in the system. The features will be upgraded from time to time. Design and construction phase of IPES is required to facilitate the development process as well as for later improvement. The idea of designing IPES using WebML extension RIA is to accommodate RIA features in designing phase. This is based on methodology comparison for web engineering process between RUX model and WebML model by Preciado J.C. et al. [6]. Although, this is a conceptual design of IPES, it has enough specification to enable the construction of IPES’s prototype to easily establish IPES to be running at LSIS.

IV. CONCLUSION & DIRECTION FOR FUTURE RESEARCH

In this study, the design of IPES has been discussed properly in order to implement it later in the next phase of
development. In IPES, a rich internet application (RIA) based on .NET and AJAX will be applied in order to promote the placement process and to this, three main functions with additional two support functions are designed; logbook, feedback, PMB, auto search and interactive panel. In conclusion, we have designed the IPES in three phases, modeling the data aspect, business logic modeling and presentation modeling. IPES would contribute to LSIS’s student as one effective system applied in the near future. We plan to extend the current work in two main directions; one is to proceed with the development of the system through prototype by applying the iteration process into it. The other one is conducting an experimental study on how it can be favorable to the placement process as well as assessing the users’ perceived usefulness of IPES.

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REFERENCES


