

Prototyping For E-Learning Portal

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With the increasing demands for sophisticated Learning Management System (LMS) to deploy in diverse learning environments, the need for unique customisation in the standard LMS to manage variety of courses is extremely important and widely recognized. However, software customisation is extremely expensive and involves long duration of the software development lifecycle process. Thus, the traditional customisation software development for LMS is impractical and cost ineffective. In this paper, we propose a middleware that implements prototyping development for e-learning portal. Based on our previous work in prototyping for web development, we provide a cost-effective solution in LMS customisation and shorter the timeframe with significant improvement.

Keywords e-learning; customisation, prototyping

1. Introduction

E-learning portal includes web services compositions that are modular web applications, which can be independently deployed and invoked on the web. E-learning services typically include course management, assessment tools, asynchronous and synchronous communications, collaboration, probably billing and other related modules. We utilize the middleware to realize requirement-driven prototypes for e-learning services. The middleware provides e-learning services collection, services selection and services composition. In addition, it supports dynamic integration between services via web portal. With the successful prototyping development for learning management system, instructor can understand and identify the services requirement in the virtual campus. The LMS prototypes provide the instructor a testing space to experience in the configured e-learning environment. Thus, the instructor can better understand the actual needs in the e-learning services, and articulate other possible solutions to their problems. The prototypes have shortened the development timeframe and thus saved significantly in the cost for LMS customisation.

Today many e-learning applications achieve high standards in providing instructors to manage online courses via web technologies and database system. WebCT [1] and Blackboard [2] are the two most advanced and popular e-learning systems which provide sets of very comprehensive tools and have the capabilities to support sophisticated Internet-based learning environment. Murray Goldberg is the first started the WebCT project in 1995 when he is a faculty member at the University of British Columbia [3]. On the other hand, Blackboard was evolved from CourseInfo, which was developed by graduate students at Cornell University in 1997. Blackboard now owns CourseInfo, and it changed the name of product with version 5 [4]. Most advanced e-learning systems are considered "one-size-fits-all", meaning the same system with same functions used for different classes, subjects and institutions [5]. However, different institutions, each subject and even every individual class should have their own specific requirements for their distinct online education web system. In today web development, portal technology has played a significant role in most Internet applications systems. A portal is defined as a single, integrated point of access to information, applications and people. Portals are largely based on existing web application technology and can be categorized into public portals, enterprise portals, marketplace portals or specialized portals by according to the users they serve and the services they offer. Most current portal server products are Java/J2EE-based. The main competitive portals include the Apache Jets-

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1 peed Portal Framework, IBM WebSphere Portal Server and BEA WebLogic Portal [6]. Many advanced
2 e-learning portals are developed on these current portal server products.

3 In this paper, we proposed a web-based authoring toolkit for e-learning portal development. The
4 toolkit integrates web technology with database system and includes communication module that allows
5 developers and instructors or administrators to collaborate and communicate with each other through
6 synchronous communication channels integrated in the web-based toolkit. The toolkit is designed to
7 provide allows users to achieve the customization of unique e-learning prototype. This paper will first
8 look at the current approach of prototyping in web development. Then it continue to introduce the pro-
9 posed toolkit that is designed to create functional e-learning portal with minimum amount of time, and
10 how the toolkit can shorten the processing timeframes in the actual development.
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13 **2. Prototyping in Web Development**

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15 Prototyping is used to explore the essential features of a proposed system through practical experimenta-
16 tion before its actual implementation to make the correct design choice early in the process of software
17 development. In recent years, many researchers have realized the significant difference between the web
18 system development and conventional software development [7], [8], [9]. Researchers recognize that
19 web systems have various unique characteristics that are poorly addressed by conventional development
20 practices, and thus have acquired extra timeframes in the web application development. Among these
21 factors, the most significant of these characteristics is the client uncertainty. They found that in the web
22 system development the client having difficulty in articulating the system requirements at the com-
23 mencement of the project. This is due to the clients' poor understanding of their own needs with respect
24 to the web technology [10]. In order to further explore the issues around web development processes and
25 verify the client uncertainty characteristic, same group of researchers undertook an extensive set of in-
26 dustry interviews and surveys. The surveys concluded that the clients have a strong feeling that they did
27 not understand their own needs. They have an initially very poor understanding of their requirements
28 and this evolves during the product development. Consequently, this uncertainty characteristic causes
29 the frequency of content or requirement changes as the project being developed; this effect dramatically
30 increases the actual costs of the project. In addition, many web projects are vision-driven rather than
31 requirements-driven. This again results to an initial lack of clarity of the actual system functional re-
32 quirement. To resolve the client uncertainty in web system, the researchers have propose a generic web
33 development process that is both iterative and utilizes design prototypes to assist the client in articulating
34 possible solutions and thus formulating requirements. Throughout the process cycle, developers will
35 repeatedly build prototypes functional system and explore them with the client to obtain feedback from
36 this information on the client needs [11]. A software rapid prototype is a dynamic visual model provid-
37 ing a communication tool for customer and developer that are far more effective than either narrative
38 prose or static visual models for describing functionality. Prototyping provides clients of a proposed
39 application with a physical representation of key parts of the web system before system implementation.
40 Developers can use prototyping and iterative process development to discover the actual clients' needs
41 and their functional requirements at very early commencement of the project [12]. Rapid prototyping in
42 web system can reduce the client uncertainty. Consequently, this leads to an increasing importance of
43 the incremental and prototyping approaches.
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46 **3. e-Learning Prototyping**

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48 We utilised generic data model and synchronous collaboration to implement web prototyping develop-
49 ment for e-learning. We achieve the prototyping via the approach of generic data model in the data
50 structure for storage. The generic data model allows adaptability, extensibility and reusability of data-
51 base structure in the e-learning system. In general, forms and attributes in the system cannot be modified
52 because the data structure or the schema is often predetermined in the design phase, so as the system is

1 generally hard coded to suit the predetermined static data structure. In addition, the wordings that de-
2 scribe the field in the form interface cannot be altered unless the developers modify the source code
3 directly in the program. Thus, for any extra attributes or data structure to be altered in the form, manual
4 modification in the data model is needed and the system needs to be re-programmed and re-walked
5 through the tedious software development cycle. The traditional alternation of the e-learning system will
6 require large amount of processing time in order to adjust the system because of a small alteration in the
7 data structure. However, with the generic data model, we provided a dynamic framework for rapid cus-
8 tomisation of system structure in the prototyping development. In addition, a synchronous group web
9 browsing is implemented to provide close collaboration between developers and users (i.e. instructors).
10 With the group web browsing, the developers can demonstrate the e-learning system prototype via the
11 Internet and receive instant feedback through online chat channel. This not only improves the collabora-
12 tion work among developers themselves, but also improves the communication between the developers
13 and the instructor.

14 15 16 **4. Conclusion**

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18 This paper proposed a web-based authoring toolkit for rapid prototype in the development of today e-
19 learning portal. The toolkit is designed with the approach in generic data model and thus to achieve
20 adaptability, extensibility and reusability in the e-learning portal. The web authoring toolkit provides a
21 fast track design route for new e-learning portal to be designed and assessed by instructors or administra-
22 tors. Developers can create functional e-learning portal through rapid prototyping development with
23 minimum amount of efforts. The standard communication tools and the synchronized group web brows-
24 ing provide better collaboration among the users. Overall, with the prototyping development, the author-
25 ing toolkit delivers functional e-learning portal with minimum amount of time.

26 27 28 **References**

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