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Preparation of NSC Project Reports

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一、中文摘要

在我們的日常生活中網際網路已扮演了一個重要的角色，而且網際網路(Internet)上所展現的網頁文件已是一個新的通訊與商業上傳播的介質，所以網路教學也因應而生，因此建立一個教學課程的網頁文件變的更加的重要。本論文則提出了一個網頁文件(Web document)軟體發展架構，在與電腦協同作業(CSCW)結合教學課程資料庫的環境下，提供給虛擬大學課程設計者去發展和測試他們所設計的課程單元。而我們設計的課程資料庫的則支援了我們的網頁發文件發展環境(Web document developing paradigm)。

關鍵詞：網頁文件、虛擬課程資料庫管理系統、電腦協同作業、網際網路

Abstract

Web documents are increasingly playing an important role in our daily life, as the Internet has become a new medium for communication and commerce. So internet training become popular now and it is important to build a web document for learning course. In this paper, we propose not only a Web document developing paradigm as well as a CSCW(Computer Supported Collaborative Works) environment with distributed course database support for instructors of a virtual university to develop and test their course materials but also a virtual course DBMS supporting the

paradigm.

Keywords: Web document, Virtual course DBMS, CSCW, Internet

1. Introduction

In recent year, internet has become a important medium for information propagation and the learning method has become various So integrating the learning style and network is popular now. In this paper, we propose a virtual course database management system to support the learning process called distance learning in the virtual university or virtual classroom environment. The database supports object reuse and sharing, as well as referential integrity and concurrence. We also designed a web course document development architecture to develop the virtual courses. The design of our course database facilitates the Web documentation development paradigm.

2. Related Work

Software development is a complicate process. It requires a systematic approach in different phrases of the development. Many software development paradigms were discussed [5]. The linear sequential model, or so called the waterfall model, is a classical approach which has a boundary between each phrase of the development. From the analysis of system requirements, to the design of software architecture, implementation, testing, and maintenance, each step has its

goal. However, the waterfall model does not fit the need of software development for two reasons. The prototyping paradigm allows a software product to be delivered quickly. The customer validates its functionalities, gives suggestions, and requests for a new version. The advantage of this prototyping paradigm ensures an early delivery of validated software. However, it is sometimes risky to use this approach since the robustness of the software system may be sacrificed due to time constraint. The spiral model, with different variants, contains four major phases: analysis of requirements, implementation, testing, and risk analysis.

Multimedia database management system design is also an important and interesting research topic in the community of multimedia computing and networking. In order to support the production of multimedia applications, the management of multimedia resources is essential. For instance, multimedia presentation can be designed as building blocks which can be reused. To facilitate multimedia application design, many articles indicate the need of a multimedia database [1, 2, 3, 4]. A multimedia database is different from a traditional relational database in that the former is object-oriented while the latter relies on entity relations.

3. Web Course Document Development Architecture

In this section, we propose a development paradigm for web course document construction. During the web course document development, we must ensure the documents are correct. We propose a web document development architecture based on the spiral model of a traditional software development as shown in figure 1. In this model, we start from a web script phase. A web script is similar to the specification of software. The web script can be specified in natural language or in formal description. All of these descriptions are given by the web course document designer's requirements.

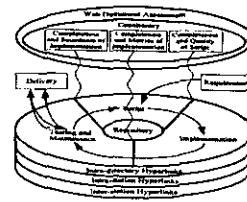


Figure 1 : Web Course Document Development Architecture

A traditional software development cycle has three basic steps: specification, implementation, testing and maintenance. Then we can design the web course document based on the specification. Finally, we must test the document. Since the web course documents are linked by URLs and are formed by multimedia resources like text, image, sound, etc. Before testing the document, we must know the structure of a web course document. We analyze the document and find basic items a web course document contains. A web course document will have the following objects:

Link: Links are logical connections among hypertext documents.

Data Objects: Data objects could be static or dynamic depending on their medium characteristics.

Add-on Control Programs: Web course documents could be dynamic in many ways.

All of the above objects must be tested and maintained. The basic item must be testing and the testing scope is also a major point. A web course document is a kind of general web document and will be browsed through the internet. So a web course document may be located in the same server, the same region (like tw.) or different servers. The testing scope will spread in local testing scope and global testing scope. The following is a brief explanation of the two testing scopes.

Local testing scope: All URLs and embedded objects within the server where the home page is developed should be tested.

Global testing scope: URLs and embedded objects in a LAN or the Internet environment are tested. The testing scope can be decided based on the following strategies:

The depth of navigation trails.

The range of network IP addresses.

be declared as an object class. And the object class can be instantiated to another object group for reuse. The basic group in the database is a set of web course documents which embedded multimedia resources and control program. We define some links to maintain the reuse mechanism:

Aggregation link (al) : The relation of a object use the other objects.

URLs : A web course document's hyperlinks.

Starting links(sl) : A course document will start from which web course document url.

4.3 Referential Integrity and Locking mechanism

The web course document database should be processed in a consistency way. Each SCI has many references and we use these references or links to maintain the referential integrity of the database. If a source object is update, the database will trigger a message which alerts the users to update the destination. Due to the locking mechanism used in the object-oriented database system, we also define an object locking rule. If a container has a read lock by a user, its components can have the read access by another user, but not the write access. However the parent object of the container can have both read and write accesses by another user.

5. Conclusion

The development architecture proposed in this paper is based on the spiral model of traditional software development. The different are, however, focused on the integration of testing and maintenance, and the activity of web course document assessment. The emphases are on the realization of a repository and its consistency checking. The SCIs proposed in the virtual course database should be organized in an effective manner for reuse. Object reuse mechanism adaptable to the paradigm and database can be prototype-based. That is,

SCIs at different levels can be organized as groups, which are basic elements of object reuse. We hope that, the contributions of this paper can draw attention of software engineering, distributed multimedia computing and multimedia database.

6. Reference

- [1] Te-Chih Chen, Wei-Po Lin, Chin-An Wu, and Chih-Sheng Shen, "A Client-Server Database Environment for Supporting Multimedia Application," in proceedings of the 18th IEEE annual international computer software and application Conference (COMPSAC'94), Taipei, Taiwan, 1994, pp215-220.
- [2] Arif Ghafoor, Ashfaq Khokhar, M. Farrukh Khan, Raymond Paul, "Issues in Database Management of Multimedia Information," The 18th IEEE annual international computer software and application conference (COMPSAC' 94), Taipei, Taiwan, 1994, pp.209 - 214.
- [3] J. A. Rody and A. Karmouch, "A Remote Presentation Agent for Multimedia Database," in Proceedings of the IEEE 1995 International Conference on Multimedia Computing and Systems, May 15-18, Washington DC, 1995, pp.223-230.
- [4] Atsuo Yoshitaka, Masahito Hirakawa, Setsuko Kishida, Tadao Ichikawa, "Knowledge-Assisted Content-Based Retrieval for Multimedia Database," IEEE Multimedia Magazine, pp.12 - 21. 1994.
- [5] Pressman, Rogers S., "Software Engineering, A Practition's Approach," 4th Ed. McGraw-Hill, 1997.