Optimization of Moodle LMS for Improving User Response Time

M. Tech. Project Stage-1 Report

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Master of Technology

by

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Abstract
Chapter 1

Effectiveness of LMS

1. Adapting LMS architecture to the SOA: an Architectural Approach[26]

   **Abstract:** This paper presents an architectural approach to adapt the Moodle LMS to the SOA and some important issues involved in the adaptation are analyzed. Taking into account interoperability specifications, all SOA to LMS adaptation drawbacks are solved by the application of the new architecture.

   **Keywords:** SOA, Web Services, IMS LTI, OKI, interoperability

2. Effective Use of LMS: Pedagogy through the Technology[58]

   **Abstract:** This paper aims to answer one of the most common questions asked in Educational Technology is that if the media used an restrict/enhance the teaching approaches or if we can adopt a variety of approaches regardless of media we use. To do this, the question is discussed in the scope of a widely used media, Learning Management System because there are variety of Learning Management Systems which have different capabilities such as Sakai, Blackboard, Intact and Moodle. The author advocates that primarily method, the presentation way of instruction, influence the teaching/learning process not media. On the other hand, it does not mean that media, the way of delivery instruction, is not important; media also support teaching process but you can use alternative media to make the same effect. For that reason, media selection should be done by taking into account several factors such as faculty; learner readiness to use selected media; content; number of learners and instruction time.

   **Keywords:** LMS, ICT, Pedagogy


   **Abstract:** The Web Based Training (WBT) or eLearning is emerging to replace traditional training. “eLearning”, is rapidly becoming the preferred route to building and maintaining advanced performance capabilities via improved efficiencies and effectiveness. For many organizations, especially those in the developing countries, acquiring a commercial LMS could be very costly in order to host the contents. The purpose of this paper is to introduce Open Source software and how it could be used in implementing a free LMS system and to introduce how the College of Internet Distance Education at Assumption University has achieved it.

   **Keywords:** LMS, open source software, moodle
4. Enhancing Learning Management Systems to Better Support Computer Science Education

Abstract: In this report we provide an overview of current CS specific on-line learning resources and guidance on how one might best go about extending an LMS to include such tools and resources.

Keywords: Learning management system, LMS, CALMS, computing augmented learning management system, computer science education.

5. Architecture of a multiplatform virtual campus

Abstract: This paper analyzes this architecture from three different points of view: (i) software architecture; (ii) detailed software design; and (iii) hardware architecture.

Keywords: e-learning; integration; LMS, WebCT; Moodle; Sakai; Blackboard

6. E-Learning (MOODLE) Based on Service Oriented Architecture

Abstract: Web services as an example of SOA support the integration of software applications in an incremental way, using existing platforms and languages that utilize and adopt existing legacy systems. Virtual Learning Environments (VLEs) are one of the emerging domains that require to be extended to SOA. Web Services Selection involves discovering a set of semantically equivalent services by filtering a number of available services based on service metadata, and selecting an optimal service based on realtime during previous executions of a service.

Keywords: SOA, Web Services, E-Learning, VLE, MOODLE

7. Paving the Way Towards an Efficient Learning Management System

Abstract: This paper provides insight into building an effective and efficient LMS using five general principles, which are defined as the Five Elements. This leads to the creation of a dynamic, learner-centered environment which focuses on learning retention and cognitive development, juxtaposed with emerging technologies.

Keywords: LMS, Design Issues, Expert, Learner-Centered, Student Status Monitoring (SSM)

8. Web-based Learning Management System Considerations for Higher Education

Abstract: purpose of this study is to present a model which incorporates the concepts and findings from research on LMS application in higher education. The alternative model was modified based on the Technology Acceptance Model (TAM). In addition, five categories of LMS features for higher education are discussed including: (1) transmitting course content; (2) evaluating students; (3) evaluating courses and instructors; (4) creating class discussions; and (5) creating computer-based instruction.

Keywords: Learning Management System, Technology Acceptance Model, Human Effect, Human Computer Interface.

9. An Approach for Identifying Affective States through Behavioral Patterns in Web-based Learning Management Systems

Abstract: In this paper, we present an approach for the detection of affective states from the
patterns of students behavior observed during an online course. By calculating the affective states and then filling that affective state data into the student model of a learning management system a basis for adaptivity is provided.

**Keywords:** Human Computer Interaction, Affective States, Adaptive Learning Systems, Confidence, Confusion, Effort, Independence.
Chapter 2

Moodle LMS and Other LMS’s to Moodle LMS

1. Why Moodle [3]

Abstract: This paper focuses on this platform and on a comparison between VLE (Moodle) and other VLE systems in order to discover their strengths and limitations. The comparative study is in two phases. The first phase is based on the features and capabilities of VLE tools and the second phase is based on the technical aspects of the VLE platforms.

Keyword: E-learning, Virtual Learning Environment, Open Source Software, Moodle

2. The application of Moodle on an EFL collegiate writing environment [64]

Abstract: This article is mainly focused on how Moodle can be effectively used in a college writing classroom. First of all, the basic installation and major functions of Moodle will be introduced. Then, social constructionist view of Moodle will also be specified. Next, the vital features related to writing instruction will be detailed. After that, the reasons to choose Moodle at Chung Hua University will be briefly talked about.

Keywords: Moodle, CMS, English writing

3. Experience of Course Migration from Blackboard to Moodle LMS – A Case Study from UDSM [27]

Abstract: These paper is discussing about shifting from Blackboard LMS to Open source software LMS which is Moodle because of high cost of annual licensing for the proprietary system and at the same time these Open source softwares LMS’s were receiving significant attention, particularly from institutions in developing countries and These open source software LMSs were developing popularity in higher education because apart from the obviously lower associated costs, they adhered to other important OSS principles such as potential for customization and are often community driven and therefore community serving.

Keywords: Higher Learning Institutions (HLIs), Learning Management System(LMS), Information and communication technologies(ICT)

Abstract: This paper is focused on the Moodle Architecture and comparative study of Moodle, thus we discusses comparisons between different virtual learning management systems and presents some authentication plug-in that Moodle supports.

Keywords: Moodle, Moodle Architecture, Virtual Learning Environment, Open Source Software, Authentication plug-ins

5. Developing a More Effective and Flexible Learning Management System (LMS) for the Academic Institutions using Moodle[46]

Abstract: basic idea of this paper is to develop a framework for a learner-centered as opposed to a course-centered Learning Management System (LMS) for the academic institutions. The paper describes the approach to develop such LMS system by integrating Web 2.0 applications into one place, which enables users to create and join communities of practice, engage in reflective learning and collaborate with peers online. This paper examines and studies the features of the open source learning management software such as Moodle.

Keywords: Learning Management System, Moodle, E-learning.

6. Adapting Moodle to Better Support CS Education[56]

Abstract: Many commercial or open-source systems for organizing courses are available, offering access to course materials, communication support, and receiving and grading student submissions. However, most of these systems are by default not ideally prepared to address specific demands of Computer Science (CS) education. We explore how Moodle as one of the most popular and free systems can be better adapted to support the needs of CS education and provide concrete guidance on features and extensions that could be explored. This report and work based on it can significantly improve courses for educators and students alike.

Keywords: Learning management system, LMS, computing augmented learning management system, CALMS, Moodle, computer science education

7. Blackboard vs. Moodle: Comparing User Experience of Learning Management Systems[38]

Abstract: This study compared the user experience between the leading proprietary solution, Blackboard, and the leading open source solution, Moodle. We established a control group that only used the proprietary solution and two study groups, a faculty group and a student group that used the open source solution, but had previous experience with the proprietary solution.

Keywords: Distributed Learning, e-Learning, Human Computer Interface, Learning Management System.


Abstract: A trial was undertaken to consider whether Moodle warranted a more formal consideration as an alternative to the institution’s current LMS. The results indicate that the product appears worthy of further consideration. This report documents the reflections of the instructor using Moodle to teach, the systems administrator supporting the system, and the students involved in a trial use of Moodle.

Keywords: Learning Management System, moodle, blackboard

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9. **LEARNING IN TECHNOLOGY-RICH ENVIRONMENTS: SECOND LIFE VS. MOODLE** [23]

   **Abstract:** The paper presents a brief exploration of learning in technology-rich environments, aiming to answer the question where and which technology is appropriate to use. This is based on comparison of how two platforms are used for learning: Second Life and Moodle, addressing their theoretical groundings and methodologies.

   **Keywords:** e-Learning, Virtual world, LMS

10. **Charting a New Course from Blackboard to Sakai** [57]

    **Abstract:** This paper will chronicle the issues that led us to begin charting this course, the initial departmental recommendation, how we involved faculty in the review and decision making process, the technical review process, the pilot and the implementation.

    **Keywords:** Learning Management System, Evaluation, Process, Blackboard, Sakai, Vendor, Implementation, Pilot

11. **A Recommender System Architecture for Instructional Engineering** [47]

    **Abstract:** In this document we are centered in presenting the overall system architecture and describing their main parts. We are also reporting actual results. Due to it’s wide conception, this project involves Knowledge Engineering, Software Engineering, Machine Learning, Semantic Web Searching, ad Data Mining models and tools.

    **Keywords:** Instructional Design, Instructional System Development

12. **Developing an Effective and Efficient eLearning Platform Using Open Source Software**

    **Abstract:** The purpose of this paper is to introduce Open Source software and how it could be used in implementing a free LMS system and to introduce how the College of Internet Distance Education at Assumption University has achieved it.

    **Keywords:** LMS, Moodle, information technology

13. **Moodle E-learning Environment as an Effective Tool in University Education**

    **Abstract:** In this paper, it is argued that blended learning with computer based learning in the Moodle e-learning environment based on social constructivist learning theory is an effective tool for teaching and learning of occupational health and healthy workplaces discipline based on Ergonomic knowledge.

    **Keywords:** E-learning; Blended Learning; University Education; Convergence
Chapter 3

Benefits of Moodle LMS and Survey Details

1. **Experience of Course Migration from Blackboard to Moodle LMS – A Case Study from UDSM** [27]

   **Abstract:** These paper is discussing about shifting from Blackboard LMS to Open source software LMS which is Moodle because of high cost of annual licensing for the proprietary system and at the same time these Open source softwares LMS’s were receiving significant attention, particularly from institutions in developing countries and These open source software LMSs were developing popularity in higher education because apart from the obviously lower associated costs, they adhered to other important OSS principles such as potential for customization and are often community driven and therefore community serving.

   **Keywords:** Higher Learning Institutions (HLIs), Learning Management System(LMS), Information and communication technologies(ICT)

2. **Evaluation of a MOODLE Based Learning Management System Applied at Berlin Institute of Technology Based on ISO-9126** [4]

   **Abstract:** In this paper we will study and evaluate the Learning Management System of TU Berlin, Information System for Instructors and Students (ISIS), that has been adopted since 2006, our focus will be on three characteristics of ISO-9126, which are usability, functionality, and reliability of ISIS. Our results will be presented in this paper.

   **Keywords:** eLearning, Evaluation, Usability, ISO-9126

3. **Work in Progress: Self Evaluation Through Monitored Peer Review Using the Moodle Platform** [29]

   **Abstract:** We developed a module for the Moodle open source eLearning platform through which undergraduate students can Build, Answer and Evaluate by blind peer review questions related to a course subject. In the first learning phase the students can build and submit questions. Selected questions are candidates for inclusion in later tests. After the test a reference solution and evaluation criteria is made public. The student’s answers are then randomly distributed so that each student has to evaluate at least three of his peer’s tests using double blind peer review. After all tests are cross-evaluated by the community of students, the system grades them by majority vote in each question.

   **Keywords:** Peer Review, Web-based Learning, Moodle
4. USING MOODLE PLATFORM IN DISTANCE EDUCATION

**Abstract:** The paper underlines how MOODLE can be used to enhance the students’ understanding and enjoyment of science, how it can and will be used for future teacher preparation through a Tempus project, resuming also the authors intention and effort to coagulate the network of national MOODLE users.

**Keywords:** A LMS, Course Management System, Virtual Learning Environments

5. Open source learning management systems in e-learning and Moodle[7]

**Abstract:** some analyses and comparisons were made about open source learning management systems and Moodle was outstanding with many features among other LMS that aims to improve the educational quality and include the tools that an e-learning system should have.

**Keywords:** Moodle, LMS, Distance Learning


**Abstract:** The present paper highlights the efforts made by the Department of Library and Information Science, University of Pune to use an open source software, viz., Moodle for the promotion of e-learning in the department. Various utilities of the Moodle such as development of the course, blogs, wiki, question banks, notification to the students, etc., has been used. This article narrates the experience of designing, development and implementation of e-learning course for the ‘Information Technology’ paper of the MLISc curriculum.

**Keywords:** E-learning, technology-based learning, Moodle, blogs, wiki

7. Annotating Learning Materials on Moodle LMS[37]

**Abstract:** Moodle module: Learning Annotation for Moodle (LAM) was built. With this module, students can see both their own annotations and different thoughts in other students’ mind. Instructors can promote teaching by viewing students’ annotations.

**Keywords:** Collaboration; Moodle; LMS

8. Enhancing Moodle to Support Problem Based Learning [59]

**Abstract:** In this paper we describe how the Moodle Learning Management System is being used to support the development of Nucleo learning scenarios in courses with a total of more than 300 students. The approach is implemented by combining built-in tools of the LMS and specific plug-ins. Plug-ins provide support for Vermunt’s ILS (used to build the teams), for assigning roles in the teams or managing groups, among others. Although this work is focused on the Moodle platform, the paradigm can be repurposed and applied to different environments.

**Keywords:** Nucleo, Moodle, Collaborative learning, Problem-Based learning

9. The Design of Open Source Educational Games for Secondary Schools[18]

**Abstract:** Moodle is online open source software aiming at course management. This paper is focusing on the game module which has been created using php language and consisting of eight available games, which are “Crossword”, “Hangman”, “Snakes and Ladders”, “Cryptex”, “Millionaire”, “The hidden picture”, “Sudoku” and “Book with questions”. Their data derive from question banks and dictionaries or pictionary, created by their users, both teachers and students.
Keywords: Games, education, moodle

10. Extending Moodle to Better Support Computing Education[54][55]

**Abstract:** Learning Management Systems such as Moodle are popular teaching tools with a broad spectrum of features. However, several aspects relevant for computing education are typically missing. This includes the annotation of materials, such as scripts or exercises, the inclusion of slides, and the integration of algorithm visualizations. We present Moodle activities that add these features to Moodle.

**Keywords:** Moodle, activity, annotation, visualization, VizCoSH, CALMS

11. A Moodle Course: Design and Implementation in English for Academic Purposes Instruction[44]

**Abstract:** This paper focuses on the use of Moodle as a course management system in teaching General Academic Purposes English at an intermediate level of an intensive language program. After describing the Moodle course and providing examples of its content, advantages of integrating it in teaching English as a Foreign Language (EFL) will be pinpointed. Also, problems and concerns about its use will be presented. Finally, recommendations for future developments of Moodle as an e-learning component in the program and in similar EFL programs will be outlined, as informed by the described practice of designing and implementing a Moodle course.

**Keywords:** WebCT, Moodle, LMS

12. Integration of external tools in Virtual Learning Environments: main design issues and alternatives[5]

**Abstract:** This paper identifies the issues to be tackled when designing a VLE or a tool and the effects that the different alternatives may have in the integration cost. Besides, the paper discusses the advantages and drawbacks of previous research proposals when dealing with such issues.

**Keywords:** Generic Service Integration, Virtual learning environment

13. Web Tool to Support Online Inquiries: Adapting Moodle to Meet Some of Tutors and Teachers Needs[41]

**Abstract:** In this article, we will discuss a case study: the Web Tool to Support Online Inquiries created by Tutors and Teachers. This tool consists on a module implemented in PHP and integrated with Moodle. It allows teachers and tutors to elaborate online inquiries and collect answers given by students or co-workers. This tool allows the teaching community to collect information that can be used as a start point to improve results on students or even on their institutions.

**Keywords:** LMS, Blackboard, Moodle

14. Using Moodle, an open source learning management system, to support a national teaching and learning collaboration[34]

**Abstract:** The paper discusses MEA's adoption of Moodle as its Learning Management System. It explores the pros and cons of open source products and the strategies necessary to ensure successful adoption across multiple campuses. The paper provides a rationale for
MEA’s selection of Moodle as its LMS, the opportunities this choice provides and outlines the strategies put in place to ensure its successful uptake.

**Keywords:** Mining Education Australia, learning management system

15. **Investigation on security in LMS moodle[31]**

**Abstract:** The open source learning management, LMS Moodle has been adopted by many people and organizations around the world because it offers a tightly integrated set of tools said to be designed from a social constructive perspective. Moodle has been developed under the general public license and many of its components were developed without a specific design documentation including its security services. Object oriented model of Moodle using an analysis of its security services as well as solutions to its security vulnerabilities.

**Keywords:** Moodle, Virtual Learning Environment, Open Source Software, Web Attack, Security
Chapter 4

Performance Testing Tools

1. Jmeter
2. LoadRunner
3. HTTP Perf
Chapter 5

Performance of various servers

1. Performance measurements and modeling of database servers[20]

   **Abstract:** In this paper we present some experiments on the MySQL database server. The objective of the experiments was to investigate the high load dynamics for varying relation sizes and requests. We show that the dynamics for SELECT (read) requests can be modeled as a modified M/M/1 system, whereas, the dynamics for UPDATE (write) are completely different. Our results can be used for designing control and optimization algorithms for database servers.

   **Keywords:** MySQL database server, SELECT, UPDATE

2. Performance Issues of a Web Database[36]

   **Abstract:** In this paper we analyse the performance of a typical Web database system with different sizes of web pages and different sizes of database tables. Since a web server and a database server work simultaneously, the response time in dealing with a request to the database cannot be seen simply as the webserver service time plus database service time. The performance metrics and optimisation suggestions are made on the basis of the analysis of the relationship between them.

   **Keywords:** Transaction Processing Performance Council (TPC), Common Gateway Interface (CGI), Result Arrival Rate (RAR)

3. Models transformation to implement a Project-Based Collaborative Learning (PBCL) scenario: Moodle case study[1]

   **Abstract:** In this paper, a Project-Based Collaborative Learning (PBCL) meta-model is proposed. It allows a teacher to build up a PBCL scenario and to implement it in a learning system which is not designed to this learning method.

   **Keywords:** Model Driven Architecture, Instructional Management Systems Learning Design,

4. An Integrated Moodle System Using VM Technology to Achieve Higher Availability and Lower TCO[40]

   **Abstract:** These paper is discussing about replace Blackboard with Moodle and to introduce virtual machine technology. Moodle is an open-source software LMS and runs on LAMP/LAPP (Linux, Apache, MySQL or PostgreSQL and PHP) environment. The key ideas of our the system configurations are: (1) use two server PCs, (2) run four web servers and two database/
NFS servers on different virtual machines, and (3) introduce mirroring. The contents on NFS and database servers are assured by using "lsyncd" for real time mirroring and "pgpool" for database replication and fail over.

**Keywords:** Moodle, LAPP, High availability, Lower TCO(Total Cost Of).

5. **TOWARDS THE LEARNING OBJECT MANAGEMENT SYSTEM AND DYNAMIC USE OF METADATA** [24]

**Abstract:** In this paper we illustrate a dynamic approach in the use of the metadata and how this concept can dramatically improve the management of Learning Objects. Specifically, the ideas elaborated in this paper rise from the experiences in managing Learning Object Repositories during three European funded projects:Sloop, Tenegen, and Sloop2desc.

**Keywords:** Open Educational Resources, Open Learning Objects, Communities of practice, Learning Object Management Systems, Web 2.0

6. **The Care and Feeding of a Moodle Campus** [63]

**Abstract:** These systems require a little more care and support to encourage faculty to adopt and utilize them as a tool for their classrooms. In order to avoid the pitfalls of neglect and indifference that was exhibited towards our previous learning management system, the Client Services department at Lewis & Clark College had to embark on a mission of evangelism to excite the faculty about using Moodle. This paper will discuss the choice to move to Moodle, and the process to move faculty and students towards accepting Moodle as a part of not only the campus learning environment, but the campus community as a whole.

**Keywords:** Moodle, Learning Management System, Support, Faculty.

7. **Moodle-Integrated Open Source Synchronous Teaching** [48]

**Abstract:** This paper introduces an open source capability that combines the popular Moodle asynchronous learning management system with a new synchronous online teaching/conferencing system called MIST/C. This combination is supporting online delivery of the Master’s programs in our Computer Science Department effectively.

**Keywords:** Internet distance education, synchronous, asynchronous
Chapter 6

Different techniques

1. **SQL Server Query Optimization Techniques: Tips for writing efficient and faster queries** [33]

   **Abstract:** SQL statements can be used to retrieve data from any database. To get same results we need to write different SQL queries. For better performance we need to use best, faster and efficient queries. So we need SQL query tuning based on the business and user requirements. This paper covers how these SQL queries can be optimized for better performance. Query optimization subject is very deep but we will try to cover the most important points.

   **Keywords:** Database administrator, User defined functions

2. **NAM: A Network Adaptable Middleware to Enhance Response Time of Web Services** [25]

   **Abstract:** A Web Service may employ a loss-less compression technique, e.g., Zip, XMill, etc., to reduce the size of an XML message in order to enhance its transmission time. This saving might be outweighed by the overhead of compressing the output of a Web Service at a server and decompressing it at a client. The primary contribution of this paper is NAM, a middleware that strikes a compromise between these two factors in order to enhance response time. NAM decides when to compress data based on the available client and server processor speeds, and network characteristics.

   **Keywords:** Network Adaptable Middleware (NAM), Web Service Description Language (WSDL)

3. **Improving Response Time and Throughput of Search Engine with Web Caching** [6]

   **Abstract:** Caching is a useful technique for Web systems that are accessed by a large number of users. It enables a shorter average response time, it reduces the workload on back-end servers, and it reduces the overall amount of utilized bandwidth. This paper can be split into two parts. In the first part, we proposed Cached Search Algorithm (CSA) on top of the multiple search engines like Google, Yahoo and Bing and achieved the better response time while accessing the resulting web pages. In the second part, we design and implemented the Cached Search Engine and the performance evaluated based on the training data (WEPS dataset [1]) and the test data (Mobile dataset). The Cached Search outperforms the better by reducing the response time of search engine and to increase response throughput of the searched results.
4. **Solid State Disk: A New Storage Device for Video Storage Server** [51]

**Abstract:** This paper discusses the architecture and the advantage offered by SSD in using the drive as a storage device in video server.

**Keywords:** Solid state disk, continuous media, universal serial bus (USB)

5. **Flash SSD vs HDD: High Performance Oriented Modern Embedded and Multimedia Storage Systems** [52]

**Abstract:** In this paper, the performance is evaluated and compared of both types of NAND flash memories with HDD. Experimental results based on two modern real-time benchmarks are provided and discussed to give the better idea to users for suitable storage devices for their embedded and multimedia applications.

**Keywords:** flash memory; SSD; SLC; MLC; HDD; performance evaluation; embedded systems; multimedia applications

6. **Moodle Integration of an Automated Account Enabling System and a User Status Collection System** [39]

**Abstract:** In this paper, we present a Moodle integrated system that combines an automated account enabling subsystem (AAES) and a user logon status collection subsystem in a computer lab (CULS). These tools help us reduce educational costs, increase services, and increase computer system security.

**Keywords:** Design, Management, Experimentation.

7. **Web Applications: A Proposal to Improve Response Time and Its Application to MOODLE** [65]

**Abstract:** This paper covers some of the most advanced optimization techniques for web servers and web applications applied to a Modular Object Oriented Distance Learning Environment based on PHP 5 and Apache 2.

**Keywords:** web, optimization, web application, Moodle, PHP, Apache, javascript, HTTP, DNS, CSS, XHTML, HTML, minification, cookies.

8. **Comparative Studies of Load Balancing With Control and Optimization Techniques** [21]

**Abstract:** In this paper we formulate load balancing as a constrained optimization problem and investigate two load balancing controllers based on feedback control theory and optimization theory. We show the difference and equivalence between their design methods and criteria. Furthermore, our studies on a DB2 Universal Database Server reveal their performance difference regarding to system noise and workload variations.

**Keywords:** online transaction processing (OLTP) workload, Decision support systems (DSS) workload, load balancing.
9. **Self-Tuning Database Systems: A Decade of Progress**[11]

**Abstract:** In this paper we discuss advances in self-tuning database systems over the past decade, based on our experience in the AutoAdmin project at Microsoft Research. This paper primarily focuses on the problem of automated physical database design. We also highlight other areas where research on self-tuning database technology has made significant progress. We conclude with our thoughts on opportunities and open issues.

**Keywords:** Index Tuning Wizard (ITW), Universal Database

10. **Scheduling Strategy to Improve Response Time for Web Applications**[13]

**Abstract:** We propose a tunable scheduling strategy that lies between FIFO and shortest, based on the value of a Alpha. If Alpha is set to zero then this strategy is just FIFO. Larger Alpha gets us closer to shortest strategy which is known to provide optimal response time. However, unlike the shortest, proposed scheduling strategy is starvation free. This scheduling strategy, called Alpha scheduling with no preemption, allows to improve overall response time per HTTP request more than 3 times under heavy load.

**Keywords:** HTTP Requests, Scheduling, response time

11. **Managing Databases with Binary Large Objects**[12]

**Abstract:** We present recommendations on Performance Management for databases supporting Binary Large Objects (BLOB) that, under a wide range of conditions, save both storage space and database transactions processing time. The research shows that for database applications where ad hoc retrieval queries prevail, storing the actual values of BLOBs in the database may be the best choice to achieve better performance, whereas storing BLOBs externally is the best approach where multiple Delete/Insert/Update operations on BLOBs dominate. Performance measurements are used to discover System Performance Bottlenecks and their resolution.

**Keywords:** Binary Large Objects (BLOB),

12. **SQL Query Optimization Methods of Relational Database System**[35]

**Abstract:** This paper introduces the SQL Tuning Advisor to help you tune SQL statements. You can then use the recommendations of this advisor to rewrite poorly performing SQL code. I begin the chapter with a discussion of how to approach performance tuning. More than the specific performance improvement techniques you use, your approach to performance tuning determines your success in tuning a recalcitrant application system.

**Keywords:** Query optimization, SQL Server, Relational database

13. **Carrying on the eLearning process with a Workflow Management Engine**[10]

**Abstract:** In this paper we present Virtual Campus, a research project sponsored by Microsoft Research (UK) and developed at Politecnico di Milano, that exploits a workflow engine to enact the fruition of structured courses. Our platform provides both an authoring and a fruition environment. The former allows teachers to define and customize learning paths, publishing them as workflows. The fruition environment enacts the workflows and guides learners.
through the related learning paths. We also describe an experience in using the platform during a Software Engineering course composed by heterogeneous activities (lectures, studying activities, cooperative sessions of work, and exams).

**Keywords:** Workflow Mgmt Systems, E-Learning, Learning Objects


**Abstract:** The present paper presents a realization of a block for organizing and applying the Jigsaw collaborative learning method in the Moodle system. The didactic and organizational characteristics of the Jigsaw method are introduced. A model is offered for the realization of the method in an e-learning environment. Discussed is the modification of the database schema of Moodle needed for the application of the Jigsaw method. The functionalities are described of the block offered for the realization of the method. Finally, possible applications of the method are presented.

**Keywords:** e-learning, collaborative learning, “Jigsaw method”, Moodle

15. **Highly reliable low power Solid-State Drives (SSDs)**[60]

**Abstract:** This paper provides a comprehensive review on various state-of-the-art memory system architectures and related memory circuits for the green high performance computing.

**Keywords:** SSD; NAND flash memory ; storage class memory ; signal processing ; ECC

16. **Maze—Moodle Module for Games of Exercises**[61]

**Abstract:** This systems paper describes an activity module “maze” for the Moodle open source learning environment. This can be used to turn collections of exercises into a problem solving game. Presentation of exercises as a game has some potential to increase the time spent by students on problem solving.

**Keywords:** Educational games, Moodle, activity module.

17. **Digital CS1 Study Pack Based on Moodle and Python**[49][50]

**Abstract:** This demonstration reveals instructor and student perspectives to the ”Python First” digital pack. In particular, we demonstrate how instructors can use standard Moodle functionality to customize and manage digital packs. We also demonstrate several Moodlesupported,Python-based self-guided labs.

**Keywords:** Python, Moodle, course management system, active learning

18. **Peer Assessments Using the Moodle Workshop Tool**[22]

**Abstract:** In our junior-level Software Development course, students are required to read and review several journal articles, producing a written review of 2-4 pages. Students are then required to use the Workshop tool to read and assess the work of several of their peers using an instructor supplied rubric. In this Tip we describe the Workshop tool, how it is set up for student use, and the results of several experiences with this approach.

**Keywords:** Software development, Computer science education, Peer review, Assessment, Moodle.
19. **Development of a New MOODLE Module for a Basic Course on Computer Architecture**

*Abstract:* The new module inherits a part of its functionality from a specific LMS previously developed by the authors, that has been in use from academic year 2004, widely proving its usefulness. It has been re-designed according to the Moodle philosophy, making possible to easily extend its application to other similar subjects. The choice for Moodle is motivated by its modular organization based on free software like PHP and MySQL. From the developer point of view, this allows to add new modules using well-known interfaces. As Moodle is currently used by the Virtual Campus of our university, this new module breaks the isolation of the previous platform as refers to activities like forums, messages or event signaling.

*Keywords:* LMS, Moodle, Computer Architecture, automatic assessment.

20. **Program Animation Activities in Moodle**

*Abstract:* This poster introduces a Moodle module oriented to include program animation activities using Jeliot 3. By installing it, teachers can easily define animation activities that students are requested to complete within the moodle environment.

*Keywords:* Program Animation, LMS, Jeliot 3, Moodle

21. **Applicability of Data Mining Algorithms for Recommendation System in E-Learning**

*Abstract:* In this paper we consider the applicability of data mining algorithms such as clustering & association rule algorithm for recommending the courses to the student in E-Learning System e.g. the student who liked to study the course “Operating System” is quite like to study the course “Distributed System”. We develop the algorithm in java which is the combination of Simple K-means clustering & Apriori association rule algorithm. The result we obtained using these combinations are compared with the result we get using open source data mining tool, Weka & present the same. Results using this developed algorithm contain more number of association rules as compare to the result we obtained using the Weka.

*Keywords:* Weka, Apriori Association Rule Algorithm, Simple Kmeans Clustering Algorithm, Moodle.

22. **Can Learning to Use Moodle Alter Teachers’ Approaches to Teaching?**

*Abstract:* The findings indicate that teachers with more teaching experience may have more confidence to use OLEs in a constructivist way. In this study, OLEs, especially with the use of Web 2.0 tools, were expected to provide a process for negotiation of student control and expression in a way that motivates students and supports learning.

*Keywords:* Moodle, pedagogy, social constructivism, professional development community

23. **A service oriented architecture to provide data mining services for non-expert data miners**

*Abstract:* This work joins both facets. It describes a data mining service addressed to non expert data miners which can be delivered as Software as a Service. Its main advantage is that by simply indicating where the data file is, the service itself is able to perform all the process.

*Keywords:* Analytics service BI-as-a-Service Knowledge discovery database Data mining Service-oriented architecture Web Services
Chapter 7

Conclusion


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