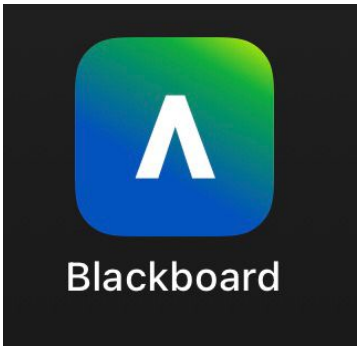

Blackboard

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Task	Assigned to
CHAPTER 1	All members
CHAPTER 2	All members
CHAPTER 3	All members

October 21, 2024

Contents

Abstract

The swift progression of technological developments in the educational sector has underscored the necessity for efficient tools to oversee and structure the learning process. Within this framework, Blackboard has emerged as a highly favored digital platform that enhances the educational experiences for both teachers and students. This software serves as a comprehensive system encompassing classroom management, student evaluation, and communication among all involved parties, extending beyond merely serving as a repository for educational materials. Be it in conventional classrooms or virtual learning environments, Blackboard represents an indispensable instrument in the ongoing digital transformation of education.

Chapter 1

Project Presentation

1.1 Overview

The education sector is the core of society's progress, primarily through the development of individuals' capabilities and knowledge. This includes all activities and practices designed to transmit knowledge and expertise across generations, from traditional settings such as schools and universities to vocational training programs. Contemporary education increasingly relies on advanced technology and adaptable pedagogical strategies, including e-learning, which greatly enhances access to digital information and promotes high-quality learning experiences.

1.2 Introduction

One of the important pillars in the growth of societies is the education sector. By organizing curricula and providing educational materials, Blackboard is a useful tool that helps facilitate learning. This blend of technology and traditional education is a reflection of the current movement to raise educational standards. First, we will review the purpose of the application and then examine similar systems, identifying their advantages and disadvantages.

1.3 PURPOSE OF THE PROJECT

Blackboard is Learning Management System (LMS) which is an essential tool for modern education, offering a versatile platform to create, manage, and deliver course content efficiently. This application aims to provide faculty and student with the skills needed to utilize application's features to enhance the teaching and learning experience, which is allows them to access:

- Syllabus
- Assignments
- Announcements
- Sessions
- Access to course materials
- Online quizzes and exam

We'll discuss the findings from the survey we ran as part of this study. The purpose of this questionnaire is to gather information on Blackboard in order to better understand the thoughts and trends surrounding it. The research objectives were meticulously considered in the creation of the questionnaire, which was completed by seven members of the target group. Appropriate statistical techniques were employed in the data analysis to guarantee the precision and dependability of the outcomes. The key findings that will help to provide a thorough understanding of the study questions are summarized below:

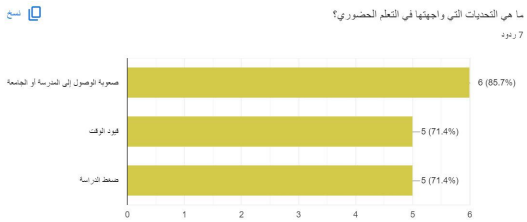

Figure 1:

Table 1.1: These results show that the biggest challenge students face in face-to-face education is access to the educational institution. This is followed by challenges related to time management and study pressure. These challenges may negatively impact the face-to-face learning experience, which may explain the increased demand for distance education, which offers greater flexibility.

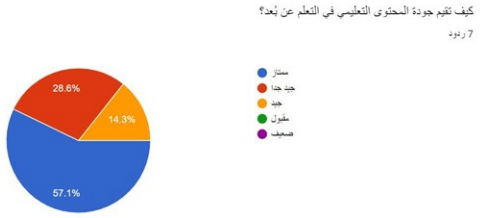

Figure 2:

Table 1.2: These results indicate that the vast majority of participants are satisfied with the quality of educational content in distance education, with more than half of them rating the quality as excellent. These results reflect a high level of satisfaction with the quality of education provided remotely.

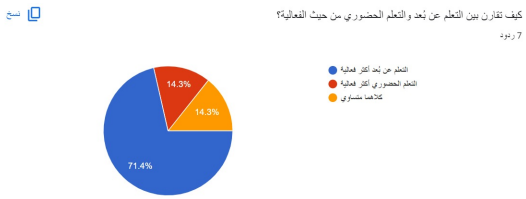

Figure 3

Table 1.3: The results indicate that most participants consider distance learning to be more effective. This preference may be due to the benefits that distance learning 5 offers, such as the flexibility of accessing educational content and the ability to learn at any time and from anywhere. On the other hand, direct interaction and immediate communication with teachers and colleagues appears to be a major advantage for those who prefer face-to-face learning.

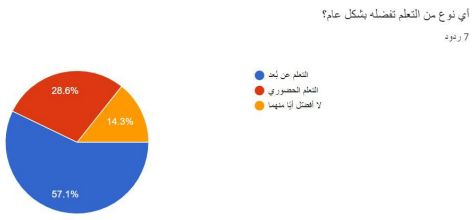

Figure 4

Table 1.4: These results show that the majority of participants are inclined to distance learning, which may reflect the impact of technological developments and the flexibility that this type of education offers. On the other hand, there is still a segment that prefers the direct interaction that face-to-face education allows. It is also worth noting that a small number of participants do not prefer either method, which suggests that there may be personal or contextual reasons that influence their preference.

1.4 Existing System

Madrasati	Advantages and disadvantages
Flexibility and smoothness in providing educational content in a manner that suits the circumstances of the student and the teacher, through virtual classes that enable the distance learning process Performing assignments and tests electronically Which ensures the continuation of the educational process effectively The platform contains all school books Allows them to communicate and conduct educational activities	Advantages
Internet-based: May be difficult for certain pupils to use because it requires a strong internet connection. Limited integration: be challenging to incorporate the platform with other teaching resources. User experience: users could have trouble navigating or using the interface.	disadvantages

Table 1.5: The best: Blackboard provides effective communication between teachers and students, and allows for the sending of messages, notes, and comments, which helps students understand concepts and solve questions. Teachers can organize the educational content in a structured and organized manner on Blackboard, and the educational lectures, educational articles, videos, and documents can be uploaded and organized into units or groups for easy access.

1.5 Conclusion

This chapter makes abundantly evident how important education is to securing people's and societies' futures. Technology has advanced to the point where applications like Blackboard are now essential to the educational process, enhancing learning and facilitating communication. These platforms improve education quality and encourage ongoing communication between students and teachers by giving users more options to access knowledge in creative and adaptable ways.

Chapter 2

ANALYSIS AND REQUIREMENT SPECIFICATIONS

2.1 INTRODUCTION

The significance of comprehending and articulating functional and non-functional requirements instantly springs to mind when we discuss designing systems or software. Any system or technological product that is designed to be successful is built upon these requirements. But what are they all of?

The functional requirements outline the functions that the system must do. Stated differently, they are the jobs or duties that the system has to complete in order to satisfy the demands of the user.

Conversely, non-functional requirements concern the manner in which the system carries out those tasks. The aforementioned requirements pertain to performance, security, and reliability, and they provide the benchmark for system quality that must be met to guarantee a positive user experience.

2.2 Functional Requirements

2.2.1 Assignments and Tests

First: For Students

Assignments Teachers submit assignments via Blackboard, and there is a deadline for submitting them. Let's walk through how to handle them one step at a time:

- To see assignments:
  - Select the course for which you wish to turn in the assignment from the main menu.
  - There is a link to assignments under the "Curriculum Content" box or in a separate area named Assignments.
  - Select the necessary task by clicking on it.
- In order to upload the homework:
  - The assignment that the teacher assigned had guidelines and specifics.
  - The assignment guidelines and the teacher's notes will be visible to the student.
  - "Submit" is the button located at the bottom of the page.
  - The student has two options: either use a text editor to compose the assignment directly in Blackboard or upload a file (Word, PDF, or PowerPoint).
  - After confirming that everything is prepared, click "Submit". Once the assignment is turned in, it cannot be changed by the student unless the teacher grants permission to turn it in again.

tests

- Access to tests:
  - The subject of the test is entered by the student.
  - The student selects "Tests" from the subject's side menu.
  - Select the necessary exam and begin to solve.
- There are several kinds of questions on the test:
  - Multiple choice: From a list of possibilities, the student selects the right response.
  - True or false: The student chooses the veracity of the statement.
  - Brief response: The pupil immediately writes a succinct response.

Second: For Teachers

- Create assignments:

  - Assignments may be created by the teacher fairly easily. The following are the steps to follow:
    - How to make a task:
      * The teacher begins the lesson, adding an assignment in the process.
      * "Curriculum Content" is selected by the teacher from the "side menu".
      * The teacher selects "Assignment" after clicking "Create".
      * The assignment's title and instructions, which include the word count, format requirements, and due date, are written by the teacher.
      * Regulates the number of times permitted for submission.
  - Uploading homework and student grades:
    - The teacher can view the uploaded homework in the "Assessment" area once students turn in their assignments.
    - Directly on Blackboard, the teacher grades the assignment and provides feedback to the students.
    - If the teacher permits it, the student may return the work for revision.

- Create tests:

  - Teachers may build a wide range of assessments using the strong tools offered by Blackboard.
  - How to create tests:
    (a) Press the "Tests" link on the course homepage.
    (b) Click on "Create a new test" after selecting "Test".
    (c) Write the test name and instructions.
    (d) Add questions: the teachers can pick from multiple choice questions, true or false, essay questions, and other questions.
    (e) Define the test parameters: The test duration and the maximum number of tries are defined by the teachers.
    (f) Decide whether to let pupils come back to the questions.
    (g) The test can have a start and finish time specified by the teacher.

2.2.2 Communication

First: For Students

Email The user can send emails to instructors or students directly from Blackboard. Through these communications, which are issued by the system itself, and can make requests or ask questions.

Using Email

- Find "Email" on the Blackboard home page.

- Click "Send New Message."

- Type the name of the instructor or student you want to deliver the message to.

- Type the subject and body of the message, and then select "Send."

Second: For Teachers

Email Teachers can contact with students directly using email, for example, by reminding them of homework or providing clarification on lecture schedules.

Using Electronic Mail

- The instructor chooses "Email" from the course menu.
- Either choose "Send an email to all students" or enter individual student names.
- Compose the letter and forward it to the pupils. Their university email will get the message.

Discussion Forums Teachers can establish discussion boards and assign particular subjects for their students to talk about. Having conversations with students outside of the lecture classroom is a good idea.

Create a Discussion Forum:

- Choose "Discussion Board" from the course menu.
- Select "New Forum Creation."
- Type the forum's title and guidelines, select whether to let students reply to one another, and make your decision.

2.2.3 Educational Content

First: For Students

Access to Educational Content The foundation of the Blackboard system is its educational content, which includes presentations, documents, videos, and lectures pertaining to the lessons and study materials you are currently studying.

Organizing Content

- Visit the home page of Blackboard after logging in.
- To access the course's material, click on it.
- The "Course Content" tab may be found on the side menu. All of the files and lessons that the teacher has uploaded may be found here.

Types of Content That Can Be Found:

- Word or PDF files: These could contain assignments or lecture notes.
- PowerPoint presentations: Teachers highlight important ideas in their lectures.
- Educational films: Lecture recordings or instructive videos are available.
- Links to outside resources: Information may include references to further resources or instructional webpages.

2. Uploading Content Users have the option to download most of the resources that teachers share, allowing them to save these on their devices for future reference.

Uploading Files

- From the course page, navigate to "Course Content."
- Choose the file you wish to download, be it in Word, PDF, or another format.
- A prompt will appear to select the file's storage location, or the download might begin automatically.

Second: For Teachers

Add Educational Content With Blackboard, educators have access to a wide range of resources that may be uploaded by teachers, including text files, videos, and even links to other websites.

Adding Educational Content:

- Visit the course page after you have logged in.
- Select "Course Content" from the side menu.
- Select either "Create" or "Upload Content."
- Decide whether to add a file, link, video, or test as your content type.
- After uploading the required material or link, give it a clear title and description for students to understand.

Types of Content That the Teacher Can Add:

- Files (PDF, Word, Excel): Such as lecture notes, assignment directions, or worksheets.
- Videos: Include YouTube video links or upload lectures that have been filmed or instructional videos.
- PowerPoint presentations: Used to outline the key ideas covered in the lectures.
- External links: To other websites or electronic books or articles from scientific journals.

Organize Content Teachers can arrange material on Blackboard according to units or weeks, which facilitates students' navigation of classes and materials.

Organizing Content

- The user may utilize folders to arrange files and lessons after adding material.
- The user may design learning modules that include many materials, including assignments, discussion questions, and lectures, in one location.
- The user can decide when the information can be accessible (for example, beginning next week).

2.2.4 Virtual Classrooms

First: For Students

Access to Virtual Classrooms A program named or any other tool authorized by the institution for virtual classrooms is used to handle virtual classes on Blackboard.

To Access the Virtual Class:

- Select the course for which you will be taking virtual classes.
- Search for "Blackboard Collaborate" or "Virtual Classrooms" on the side menu.
- Click "Join" after selecting the preferred session.

Interact in the Virtual Classroom The user will have a number of tools to interact with the teacher and other students as soon as you walk into the virtual classroom.

Interaction Tools:

- Microphone and camera: To participate in audio and video, turn on the microphone and camera.
- Chat: The user can ask questions and communicate with the teacher and other classmates through the chat tool if you would rather not talk.
- Raise hand: The user can ask a question by clicking the "Raise hand" symbol, which will allow the teacher to answer it.
- Share screen: The user can utilize the "Share screen" function to make the screen visible to everyone if the teacher requests to share a project or presentation.

Record Sessions and Attend Them Later The teacher may occasionally record online classes so the user may watch them at a later time if you were unable to attend or simply want to study the material.

How to Access Recordings:

- Return to the same Virtual Classroom or Blackboard Collaborate page after the session.
- Utilize the menu to select Recordings.
- Choose the recording you wish to watch, then click the play button.

Second: For Teachers

Create a Virtual Class: Using Blackboard Collaborate or any other platform authorized by the institution, the instructor can arrange virtual lessons for his pupils.

Create a Virtual Class:

- Open the course page where the virtual class is to be created.
- From the side menu, select "Virtual Classes". Then select "Schedule a New Session".
- Type the session name (Week 1 Lecture, for example) along with the start date and time that you wish for it to begin.
- Modify the session's parameters, such as enabling student usage of the camera, microphone, and shared screen.

Virtual Session Management The teacher has all the tools to manage and direct the virtual session once it starts.

Session Management Tools:

- Microphone and camera control: The teacher has the ability to turn these devices on and off for students.
- Public and private chat: It is possible to monitor all student conversations, including private communications.
- File sharing: The user can send presentations or PDF files to students directly.
- Virtual whiteboard: This is a tool for taking notes and drawing diagrams while in class.
- Attendance tracking: The user can track which students attended the sessions and which ones missed them.

2.2.5 Reaching the Grades

For Students

- Choose the course you want to know your grades in.
- From the side menu, tap Grades.
- You will see a list of all the assignments and tests you've done, with the score you got for each task.

For Teachers

How to Evaluate Assignments:

- Enter the course for which you want to evaluate assignments.
- From the side menu, tap Assessment Center.
- You will see a list of students' names and all their assignments or tests.
- Click on the assignment that the student handed over to start evaluating it.

Add Grades:

- After reviewing the assignment, the user can add the appropriate score in the evaluation field.
- The user can also add comments or explanatory notes to the student to understand how this degree was calculated.
- Tap Send to save the score.

Evaluation of Tests: The Blackboard system automatically evaluates certain question types (such as optional questions or TFQs). As for essay questions or long answers, the teacher must evaluate them manually. After evaluating the test, add comments or notes to the student, and tap "Send" to save the grade.

Export of Grades

How to export grades:

- From the Assessment Center, click on "Work offline".
- Select "Export".
- Choose the format in which you want to memorize the scores (Excel or CSV).

2.2.6 Log In

Access to the Blackboard Platform:

- Open the browser (Chrome, Firefox or Safari).
- Write the university's Blackboard link, which you can often find on the university's official website.
- Enter your username and password.
- Tap Sign In.

Dealing with the Forgotten Password:

- You are presented with fields to enter your password and username on the login screen.
- There is frequently a link labeled "Forgot the password?" beneath the login forms. To access the page for password recovery, click on it.
- Select your preferred password recovery method:
  - Recover via email: Log in to the Blackboard platform using the email address connected to your account.
  - Use the username: to return when inputting your username.
- Enter the necessary information, such as your username or email address, based on the method you choose. Next, select "Send" from the menu.
- An email containing directions for changing your password will be sent to you. Usually, there is a link in the email to reset the password.
- Click on the provided link in the email and open it.
- The password reset page will appear when you click the supplied link.
- Fill in the designated boxes with the new password. The term needs to be powerful and made up of a mix of numbers, symbols, and capital and lowercase characters.
- Verify that the word is saved securely.
- To apply the modifications, click "Send" after entering the new password.
- By going back to the login screen, you may now access your account using the new password.

2.3 Non-Functional Requirements

2.3.1 Performance

The system must be able to deal with many users effectively and quickly without any reduction in performance. This means that pages load quickly and respond quickly when submitting assignments or opening them.

2.3.2 Safety

The system must protect the confidentiality of student and teacher data from intrusion or unauthorized access. This includes data encryption, managing users' permissions, and ensuring the confidentiality of personal data and scores.

2.3.3 Reliability

The system must be permanently available and reliable, with minimal technical problems. This means that students and professors can rely on the system at all times, especially during sensitive periods such as exams or assignment delivery.

2.3.4 Availability

The system must be available around the clock (24/7) to ensure that users can access the platform anytime and anywhere. Maintenance or downtimes should be minimized.

2.3.5 Scalability

The system must be able to adapt to an increasing number of users or expanding educational content without affecting performance. If the number of students or teachers increases, the system must remain active and fast.

2.3.6 Ease of Use

The system must feature a user interface that prioritizes simplicity and accessibility, enabling both students and teachers to navigate it with ease. The design must ensure that users can operate the system efficiently without necessitating extensive training.

2.3.7 Maintenance and Updating

The system must be easily maintained and updated without any effect on users or hindering academic work. Updates should be made regularly without affecting performance or access to content.

2.3.8 Efficiency

The system must use fewer resources such as memory and processing, both on servers and on devices used by students and professors.

2.3.9 Allocation

The system must be able to adapt to the needs of diverse organizations. This means that it can be adjusted according to the requirements of each university or educational institution.

2.4 Conclusion

At the end of this chapter, the Blackboard system standards include both functional and non-functional elements. While non-functional standards, such as security and ease of use, are essential to improving the user experience, functional requirements are essential to ensuring optimal performance in meeting user needs. Additionally, easy integration and compatibility with wireless networks are essential to meeting system needs. Gaining an understanding of these basic requirements is critical to improving the broad range of graduates and outstanding educators.

Chapter 3

Design

3.1 INTRODUCTION

The architecture and design of the Blackboard platform are essential to enhance the e-learning experience and raise the level of interaction between students and teachers. The integrated educational platform is characterized by providing a comprehensive set of tools and functions, which facilitate the provision of educational materials, the organization of academic tasks and activities, in addition to evaluating student performance. The effective structure design of Blackboard is based on flexibility and ease of use, which enhances the educational process and increases student interaction with academic activities

3.2 Interfaces

3.2.1 Main interface:

The main interface is the main entrance for users, providing a comprehensive summary of activities, duties and announcements. It can be customized to display the most important information to the user, such as courses or updated materials. function: It works to provide a flexible environment that enables students and faculty to follow the basic elements of the educational process through an interactive design that allows the customization of their personal units. As shown in Figure [5]

Figure 5 Main interface

3.2.2 Course Interface:

Provides users with access to all available courses, as each course contains interactive learning modules that include lesson contents, assistive materials, quizzes, and assignments. function: It facilitates the organization of educational content in an interactive and accessible way, allowing the display of materials commensurate with the progress of students, and giving great flexibility in downloading and updating study materials. As shown in Figure [5.1] and [5.2]

Figure [5.1] Course Interface

Figure [5.2] Course Interface

3.2.3 Grade Center :

A tool that enables faculty members to manage and follow student scores, and allows students to track their academic progress and know their strengths and weaknesses. function: Provides a comprehensive view of students' academic performance during the semester with features such as displaying comparative statistics and performance analysis. As shown in Figure [5.3]

Figure [5.3] Grade Center

3.2.4 Discussion Boards :

An interactive platform for communication between students and faculty members to exchange ideas and put topics for discussion in interactive ways. function: Promotes academic dialogue and encourages interaction among students, contributing to the development of critical thinking skills. As shown in Figure [5.4]

Figure [5.4] Discussion Boards

3.2.5 Virtual Classroom Tool :

A vital tool for holding live online learning sessions includes features such as text conversations, live video, and session recording. function: It provides an integrated learning experience that combines live interaction and registration for subsequent review, which enhances the educational process. As shown in Figure [5.5]

Figure [5.5] Virtual Classroom Tool

3.3 Database

3.3.1 Organized data storage

The database becomes responsible for storing all information related to the system. In Blackboard, this information includes:

- User data such as student names, identity numbers, login information, and other personal data As shown in the figure[6].

id	student_name	student_id	login_username	login_password	email	phone_number
1	Ahmed Mohamed	123456789	ahmed.mohamed	artcWEX35	ahmed.mohamed@example.com	1234567890
2	Sara Ali	987654321	sara.ali	TRVWtsc4	sara.ali@example.com	1234567891
3	Amal Adam	674654321	amal.adam	sqrt$^2	amal.adam@example.com	12368790439

Figure [6] Table students

- Academic data such as course materials, assignments, grades, attendance records, and discussions. As shown in the figure[6.1] and [6.2]

id	course_id	material_title	material_type	file_path
1	1	Introduction to Programming Lecture	Lecture	/materials/cs101_intro_programming.pdf
2	1	CS101 Video: Getting Started	Video	/materials/cs101_getting_started.mp4
3	2	Database Design Document	File	/materials/cs102_database_design.pdf
4	3	Web Development Tutorial	Resource	/materials/cs201_web_dev_tutorial.html
5	4	Data Structures Overview Video	Video	/materials/cs202_data_structures.mp4

id	student_id	assignment_id	grade
1	1	1	85.50
2	1	2	90.00
3	2	1	78.00
4	1	3	88.25
5	2	2	82.75

Figure [6.1] course materials and grades

id	course_id	assignment_title	due_date
1	1	Assignment 1: Introduction to Programming	2024-10-30
2	1	Assignment 2: Data Types and Variables	2024-11-06
3	2	Assignment 1: Database Design	2024-11-15
4	3	Assignment 1: Building a Basic Web Page	2024-11-10
5	4	Assignment 1: Implementing Linked Lists	2024-11-20

id	course_name	course_code	instructor_name
1	Introduction to Computer Science	CS101	Dr. Ahmed Ali
2	Database Systems	CS102	Dr. Sara Mohamed
3	Web Development	CS201	Prof. John Smith
4	Data Structures	CS202	Dr. Emily Johnson
5	Machine Learning	CS301	Dr. Michael Brown

Figure [6.2] assignments and courses

- Educational content such as lessons, lectures and files uploaded by professors and various educational resources.

All this data is stored in a central database, and databases such as SQL Server or Oracle are usually used for large and complex systems such as Blackboard.

3.3.2 Data Recovery

Blackboard relies on SQL queries to retrieve data when needed. When a user requests information such as their grades or the content of a particular lesson, a query is sent to the database that quickly returns the required data.

3.3.3 Daily operations within the database

The database manages daily operations to ensure smooth running of work:

- **Data update:** When entering new information such as registering a new student or adding content to a course, the database updates itself immediately to ensure that all information is up-to-date.

3.3.4 Access and Powers Department

The Blackboard system relies on access control to ensure that not all users can see or modify the same information. This is where databases come in:

- **Students:** Can view their own grades, lectures, and assignments related to them.
- **Teachers:** Can see the grades of all students, upload educational content, and evaluate assignments.
- **Administrators:** Have greater powers to manage the system and monitor performance.

These powers are managed through specialized tables that contain information about users and their roles and determine what each user can access.

3.3.5 Dealing with Big Data

Blackboard faces the challenges of increasing the volume of constantly escalating data, so it:

- Uses distributed storage technologies to ensure speed and efficiency.
- Applies indexing to speed up data retrieval from large tables and make the search process easier.

3.3.6 Backup and Recovery

Because Blackboard is a vital system for educational institutions, the database is regularly backed up to ensure that data is not lost in the event of any malfunction:

- Daily backup includes the entire database.
- The recovery mechanism provides quick data recovery from backups to avoid disrupting the educational process in case of problems.

3.3.7 Security and Data Protection

Protecting user data is a top priority in Blackboard, as advanced technologies are used to ensure information security:

- Encryption is used to protect sensitive data such as passwords.
- Firewalls are used as advanced defensive systems to prevent penetration attempts or unauthorized access.

3.4 Technologies

3.4.1 Content Management

Description:
Blackboard provides an educational content management system, designed to upload course materials, create lessons/reading lists, and distribute resources to study units.

Functional Analysis:
Instructors can design content and allow for a high level of interactivity and flexibility, based on a standard format that has been adapted to many language courses. Content storage is another strength as it can be easily sorted and updated over time.

3.4.2 Interactive Tools

Description:
Discussion forums, polls, and direct communication tools such as chats, etc. are some of the interactive tools available in Blackboard.

Functional Analysis:
These tools enable students to communicate with faculty members, share ideas, discuss topics on the platform, and communicate more regularly within the online course.

3.4.3 Virtual Classrooms

Description:
Online Classrooms are also available on Blackboard, allowing for live lectures.

Functional Analysis:
The virtual classroom provides live classes through an audio and video-based environment with text chat and file sharing facility.

3.4.4 Assessment Tools

Description:
Blackboard's assessment tools include online testing and assignments as well as an academic performance analysis tool.

Functional Analysis:
The system allows teachers to develop interactive assessments and allows for continuous evaluation along with reports on how individual students are performing.

3.4.5 Graphical Analysis

Description:
The system also provides powerful data analysis tools to track students' progress and academic results.
Functional Analysis:
These tools help educational institutions to know how students are using the platform and how they are performing compared to what is available on the platform.

3.5 Algorithms

3.5.1 Auto-grading Algorithms

Description:
Auto-grading algorithms are widely used in Blackboard, especially for tests with specific answers such as "True/False" or "Multiple Choice." **How do they work? We will explain the method:**
Process:
When a student answers a question, the algorithm compares it to the previously saved answer. If the two values match, the grade is awarded immediately.
Advantages:
- Saves time and effort for teachers, especially for long questions that require manual grading.

3.5.2 Text Analysis Algorithms

Description:
These are the algorithms used when submitting any written assignments or essays. Blackboard - can integrate them with the built-in plagiarism detection tool that depends on the type of AI algorithms used to scan the text.
How it works:
The algorithm checks the written text for similarity with text from the internet or from previously saved searches in the database. **Purpose:**
To find out if someone is copying or plagiarizing. A report is then generated showing the percentage of similarity between the texts that this user uploaded and the existing online materials that the algorithm found.

3.5.3 Recommendation Algorithms

Description:
Blackboard also autocorrects and detects plagiarism and will recommend suggestions to all students individually based on their performance, using some kind of custom building algorithm.
How does it work? :
The system looks at all the student data previous grades, number of logins, how long they've studied the material and what activities they've been involved in and comes up with a simple score. After reviewing, the algorithm suggests additional learning materials or tutoring if it thinks the student needs more help. **The Goal:**
To improve the learning experience and make content more relevant to students.

3.5.4 Pattern Recognition Algorithms

Description:
Algorithms used: These are slightly more complex algorithms, which are used to analyze patterns and behavior of students. From attendance patterns and activity participation, the system can tell if a student is likely to fail.
How does it work?
The data includes the frequency of access to the system, the learning time they spend, and the type of activities they do in it, and from there, an algorithm is created that predicts whether a student needs further guidance or assistance.

The Goal:
Increase early intervention and provide necessary support to learners who are struggling.

3.5.5 Content Management Algorithm

Description:
Blackboard's content management system uses algorithms to organize and display all the files that a teacher uploads.

How it works:
When new content is uploaded, all these files and learning materials are categorized by subject, semester, and date by algorithms. It is the same algorithm that makes searching for a lecture or file in the system simple and easy.

The Goal:
Make educational content easy to manage and organize

3.5.6 Security Algorithms

Description:
Given the nature of Blackboard, it has become extremely important to protect data related to students and faculty. Uses encrypted encryption algorithms to secure sensitive information. **How it works:**
Encrypts all communications and data via algorithms for both students and teachers regarding their grades and assignments if any even personal data.

The Goal:
Maintain privacy and security of information

3.5.7 Search and Retrieval Algorithms

Description:
Search is a core part of Blackboard, so algorithms that attempt to organize and index data in an intelligent way must work quickly.

How it works:
The algorithm searches all content for the keyword you typed and returns the most relevant result by date, title or subject.

Goal:
Access information on demand

3.6 Server

3.6.1 Web Servers

Server Description:
Server description: Used to host the user interface where you process browser requests and display educational content.

Characteristics:

- It has the ability to process a large number of requests simultaneously.
- Supports protocols such as HTTP and HTTPS.

Role:
Ensure the system's responsiveness and easy access to content for users.

3.6.2 Database Servers

Server Description:
Used to store and manage user data, content, and ratings.

Characteristics:

- Rely on database management systems such as Oracle and SQL Server.
- It can execute complex queries quickly.

Role:
Contributes to storing data securely and effectively, facilitating access and management.

3.6.3 Application Servers

Server Description:
Used to run the necessary software and applications for Blackboard services.
Characteristics:

- Supports the operation of many work environments.
- Manage sessions and interact with users.

Role:
Contributes to the implementation of the necessary processes and functions of the system, which improves overall performance.

3.6.4 Storage Servers

Server Description:
Used to store large files such as videos, documents and photos.
Characteristics:

- Supports advanced technologies such as cloud or network storage.
- Provides fast and secure access to files.

Role:
Contributes to providing sufficient space to store files effectively and safely.

3.7 Languages

- **Java language:** Java is the basis of the system as a whole. Known for its high scalability and the ability to support large systems such as Blackboard by allowing the integration of new features to be easily integrated. Java also offers a high level of security, which is ideal for protecting sensitive data such as grades and personal information of students. In addition, Java supports cross-platform incidental compatibility, allowing the system to run on multiple systems such as Windows, Linux, and macOS. Java is often used to develop backend elements of the system, including database management and pivotal processes related to students and teachers.
- **JavaScript language:** JavaScript means to improve the user interface of the system. It contributes significantly to creating dynamic interactions without the need to reload the entire page, and this enhances the seamless user experience. Libraries such as jQuery and React.js help develop interfaces that respond quickly to user commands, which are necessary to activate interactive elements such as score tables, forums, and discussion boards.
- **HTML and CSS language:** used to design and format the front end of the site. HTML structures content and defines elements while CSS provides the attractive visual design of the site through the format of fonts, colors, and element distribution.
- **SQL language:** SQL is essential for managing large databases containing student data and study materials. SQL is used to efficiently create, update, and retrieve information and to implement complex queries to obtain certain data.
- **XML and JSON languages:** used to transfer data between parts of the system or with external systems. While JSON prefers to transfer data because it is faster and lighter to work between the front and back interfaces.

- **PHP language:** PHP may be employed in the backend of the Blackboard system, especially when integrating with external services or when additional flexibility is needed in some components.
- **Python language:** Python is used in analysis and artificial intelligence tools to analyze student data and provide customized recommendations. It also helps in the development of machine learning models for advanced analysis tools. The integration of these languages and technologies ensures that the Blackboard system works efficiently and supports modern e-learning processes effectively and safely.

3.8 Security

3.8.1 Encryption

Mechanism description:

The Blackboard system uses advanced encryption technologies to protect data during transmission and in its fixed state. Protocols such as SSL/TLS are implemented to secure information exchanged between users and servers, ensuring complete encryption and security.

Functional analysis:

Encryption provides protection for sensitive data from unauthorized access during network navigation, and it is difficult for attackers to intercept or modify this data.

3.8.2 Account Management and Access Control

Mechanism description:

The Blackboard system enables advanced control over access to information, where permissions are determined according to the user's role as a student, teacher, or administrator, to ensure that each user has access to only what is authorized.

Functional analysis:

Account management uses multi-factor authentication techniques, providing an additional layer of security for user accounts by dialing a password and verification code that is sent to their devices.

3.8.3 Multi-factor Authentication (MFA)

Mechanism description:

Multi-factor verification enhances the verification of users' identity by requesting more than one means of verification, such as sending a code for a mobile phone or email along with a password.

Functional analysis:

This mechanism aims to reduce the likelihood of fraud even if passwords are stolen, as the entry process needs to prove additional identity.

3.8.4 Cyberattack Prevention

Mechanism description:

The Blackboard system includes advanced tools to counter cyber attacks such as DDoS attacks, SQL injections, and phishing attempts. The system continuously monitors unusual activities and issues warnings when abnormal arrival attempts are detected.

Functional analysis:

Firewalls and intrusion detection systems provide additional protection against external attacks, in addition to providing periodic reports to officials on unauthorized activities.

3.8.5 Data Backup and Recovery

Mechanism description:

The Blackboard system relies on performing regular backups to ensure business continuity and protect data from loss in the event of any technical failure or breach.

Functional analysis:

This process makes it easy to recover data in case of problems, ensuring continuity of the educational process without delay.

3.9 Conclusion

The structure and design of Blackboard is an essential foundation for improving the quality of e-learning. Through the effective integration of learning, assessment, and management tools, teachers are able to manage the educational process very effectively, making it easier for students to access educational resources and content in an organized and direct manner. Therefore, continuous improvement of Blackboard structures and designs is a necessary step to adapt to developments in digital education and enhance the effectiveness of the learning experience.

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