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01. Abstract:

Virtual Classroom Management System is the online web application platform bringing together and managing the learners either local or distant and the teachers within one class through the help of web based system. It is referred as a web based system as it requires computer and internet connection. Virtual Classroom has the features of providing various sources and documents related to the particular course and topics. Also, the feature of self attendance makes the web-application a secure platform without worries of fake attendance and proxies. The students can learn distantly using this web-application. As virtual classroom is the representation of real classroom virtually, participants are fully benefited as per in the real classroom. They can share the ideas, knowledge, subject matters with the tutors and among the participants using the message feature. Virtual Classroom Management System provides a way for teachers to create their courses and add study documents to the courses.

02. Introduction:

Just as the term virtual means a simulation of the real thing, Virtual Classroom Management System is a simulated classroom via Internet, which provides a convenient communication environment for distance learner. A virtual classroom allows learners to attend a class from anywhere in the world at the time of their comfort and aims to provides a flexible learning experience. When we go to college we have a schedule of lectures, which we must attend. Student must arrive on time, and when he enters the classroom, he finds a teacher, fellow learners, a blackboard or whiteboard, LCD projector, optionally a television screen with videos. On the other hand, a Virtual Classroom Management System provides flexible timings to the user so that the user can study at their time of comfort. Virtual Classroom Management System aims to provide quality education at the fingertips of the user also keeping in mind to preserve the discipline of a classroom by ensuring daily attendance system. A virtual classroom enables to bring learners from around the world together online in highly interactive virtual classroom enviromnment while greatly reducing the travel, time, and expense of on-site teaching/training programs. It can be used as a solution for live delivery and interaction that addresses the entire process of creating and managing our teaching-learning process. It facilitates instructor and student in teaching-learning events, such as a seminar, online discussion or a training for employees in company.

Thus, virtual classroom can be visualized as a classroom where a video lectures or session form expert faculty are available to the students on the Internet. The Staff and the Student have to register in the website to use this website. The staff logs in and posts his courses, topics and the various educational documents. The student logs in and views all the classes. If he has any doubt/query, he can post it and the staff give answers of those queries. The student can learn and give assignments. The student can post messagesto course topics for clarifying His doubts online.

03. Survey of Technologies:

A virtual classroom management system is a platform designed to support online learning and teaching by providing tools for managing and organizing virtual classrooms. Here are some of the key technologies and features of virtual classroom management systems:

Learning Management System (LMS): An LMS is a software platform that provides a variety of tools for managing online courses, such as creating and sharing course content, tracking student progress, and administering assessments. LMSs are often used as the foundation of virtual classroom management systems.

Messaging: These tools allow teachers and students to communicate with each other asynchronously.

File Sharing: Virtual classroom management systems often provide a way for teachers to share files with students, such as lecture slides, assignments, and handouts.

Attendance Management: Some virtual classroom management systems include tools for tracking student attendance and participation in online classes.

Assessment and Grading: Many virtual classroom management systems include tools for creating and administering assessments, as well as grading and providing feedback on student work.

Mobile Accessibility: Some virtual classroom management systems offer mobile apps or mobile-friendly interfaces, which allow teachers and students to access course content and participate in online classes from their smartphones or tablets.

Overall, a virtual classroom management system provides a comprehensive set of tools for managing and organizing online learning environments, allowing teachers to create engaging and effective virtual classrooms and students to learn in a flexible and convenient way.

04. Front End Tools:

HTML:

HTML (HyperText Markup Language) is the most basic building block of the Web. It defines the meaning and structure of web content. "Hypertext" refers to links that connect web pages to one another, either within a single website or between websites. Links are a fundamental aspect of the Web. By uploading content to the Internet and linking it to pages created by other people, you become an active participant in the World Wide Web.

CSS:

Cascading Style Sheets (CSS) is a stylesheet language used to describe the presentation of a document written in HTML or XML (including XML dialects such as SVG, MathML or XHTML). CSS describes how elements should be rendered on screen, on paper, in speech, or on other media. CSS is among the core languages of the open web and is standardized across Web browsers according to W3C specifications.

JavaScript:

JavaScript (JS) is a lightweight, interpreted, or just-in-time compiled programming language with first-class functions. While it is most well-known as the scripting language for Web pages, many non-browser environments also use it, such as Node.js, Apache CouchDB and Adobe Acrobat. JavaScript is a prototype-based, multi-paradigm, single-threaded, dynamic language, supporting object-oriented, imperative, and declarative (e.g. functional programming) styles.

JavaScript's dynamic capabilities include runtime object construction, variable parameter lists, function variables, dynamic script creation (via eval), object introspection (via for...in and Object utilities), and source-code recovery (JavaScript functions store their source text and can be retrieved through toString()).

05. Software and Hardware Requirements:

Software Requirements:

For Development:

- Python 3.x
- Flask, Flask-Sqlalchemy
- Mysql 0.0.3, mysql-connector-python 8.0.32, mysqlclient 2.1.1
- Qrcode 7.4.2

For Running:

- Any Modern Browser (Google Chrome, Microsoft Edge, etc.)

Hardware Requirements:

For Development:

- Processor: 3.0 GHz or above recommended
- Hard Disk Drive: 40 GB or above
- RAM: 4 GB or above recommended

For Running:

- Personal Computer or Mobile Device
- Stable Internet Connection

- The web-application is designed to run on a fairly basic computer, many people cannot afford cutting edge computer equipment for their children.
- The web-application is responsive and can scale for a variety of different screen resolutions.

06. SQL Database:

Table ▲	Column	Type	Default Value	Nullable
assignments	◇ id	int		NO
assignments	◇ course_id	int		NO
assignments	◇ title	varchar(255)		NO
assignments	◇ description	text		YES
assignments	◇ due_date	date		YES
assignments	◇ created_at	timestamp	CURRENT_TIMESTA...	YES
assignments	◇ updated_at	timestamp	CURRENT_TIMESTA...	YES
assignments	◇ user_id	int		NO
attendance	◇ id	int		NO
attendance	◇ attendance_date	date		NO
attendance	◇ status	enum('present','abse...	absent	NO
attendance	◇ user_id	int		NO
attendance	◇ course_id	int		NO
course_enrollments	◇ user_id	int		NO
course_enrollments	◇ course_id	int		NO
course_enrollments	◇ user_qr	varchar(255)		NO
course_instructors	◇ instructor_id	int		NO
course_instructors	◇ course_id	int		NO
courses	◇ id	int		NO
courses	◇ description	text		YES
courses	◇ end_date	date		YES
courses	◇ start_date	date		YES
courses	◇ name	varchar(255)		NO
courses	◇ updated_at	timestamp	CURRENT_TIMESTA...	YES
courses	◇ created_at	timestamp	CURRENT_TIMESTA...	YES
messages	◇ id	int		NO
messages	◇ text	longtext		NO
messages	◇ topic_id	int		YES
messages	◇ created_by	int		NO
topics	◇ id	int		NO
topics	◇ name	varchar(50)		YES
topics	◇ description	longtext		YES
topics	◇ course_id	int		YES
uploads	◇ id	int		NO
uploads	◇ topic_id	int		NO
uploads	◇ link_to_file	varchar(255)		NO
users	◇ id	int		NO
users	◇ username	varchar(80)		NO
users	◇ email	varchar(120)		NO
users	◇ password	varchar(80)		NO
users	◇ roles	varchar(50)	student	NO
users	◇ is_admin	tinyint	0	NO

07. Flowchart:

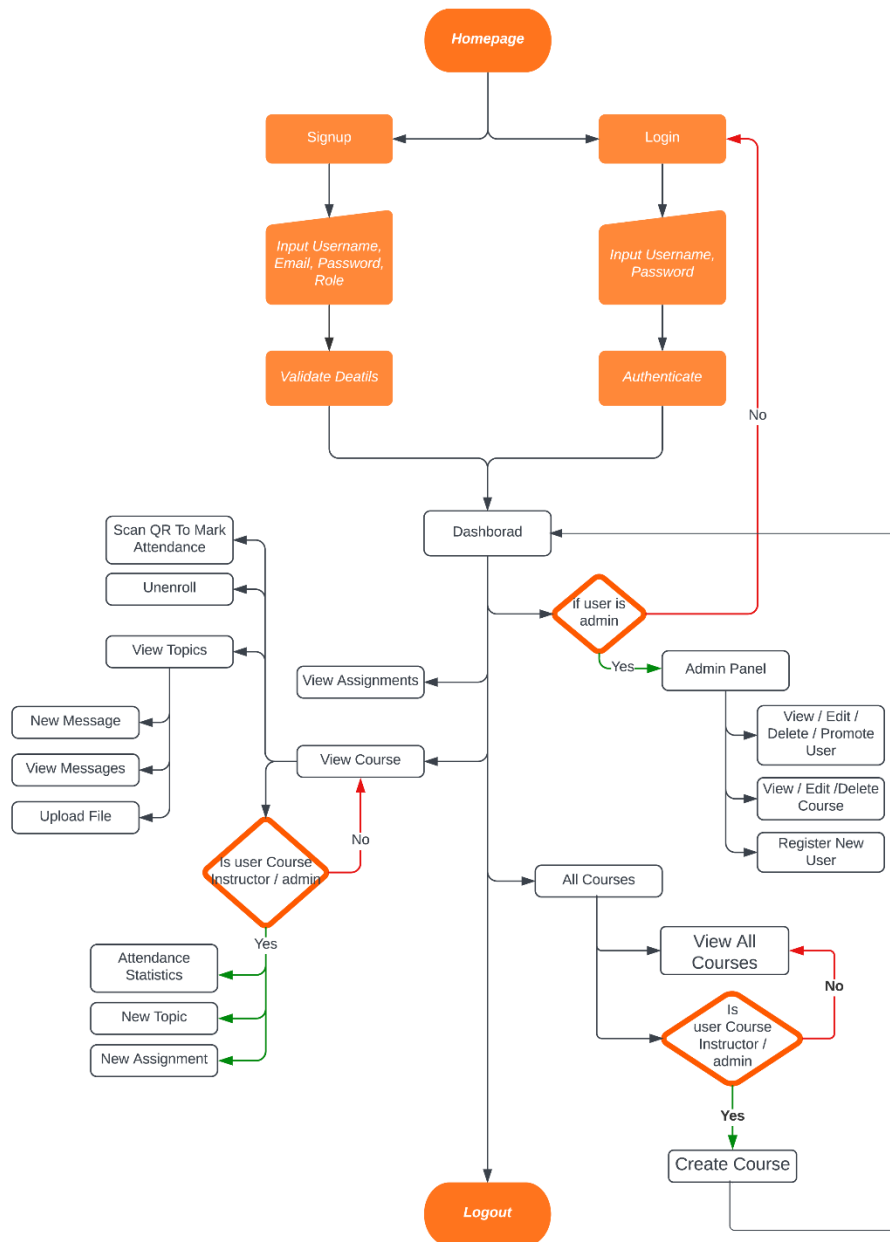


Fig: Flow chart of Virtual Classroom

Management System.

08.Source Code:

Github link: <https://github.com/Lord-Of-Victory/VirCMS>

09. Screenshots:

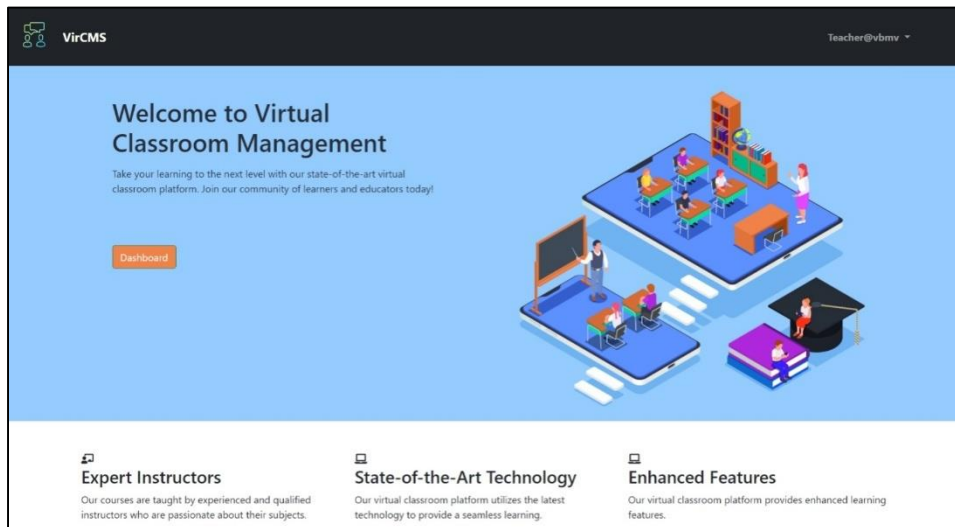


Fig: Homepage

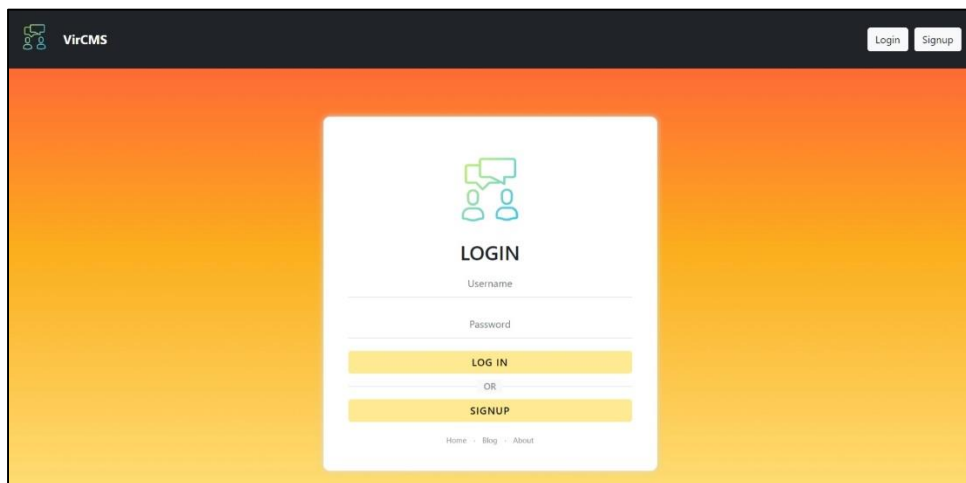
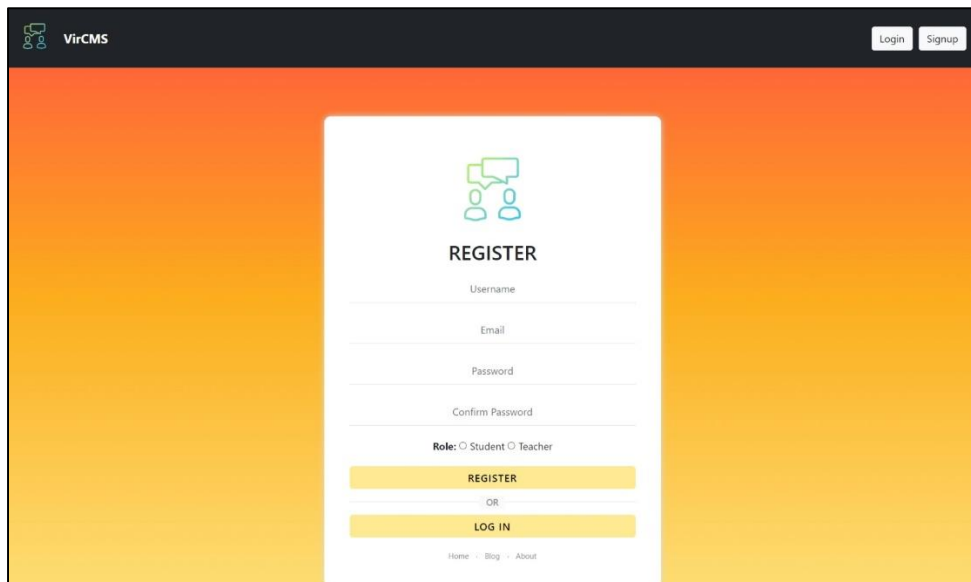


Fig: Login Page



The registration page features a dark header with the VirCMS logo and 'Login'/'Signup' links. The main content area has a white registration form centered on an orange-to-yellow gradient background. The form includes fields for Username, Email, Password, and Confirm Password, followed by a role selection (Student/Teacher), and 'REGISTER' and 'LOG IN' buttons. A footer contains links for Home, Blog, and About.

VirCMS

Login Signup

REGISTER

Username

Email

Password

Confirm Password

Role: ☐ Student ☐ Teacher

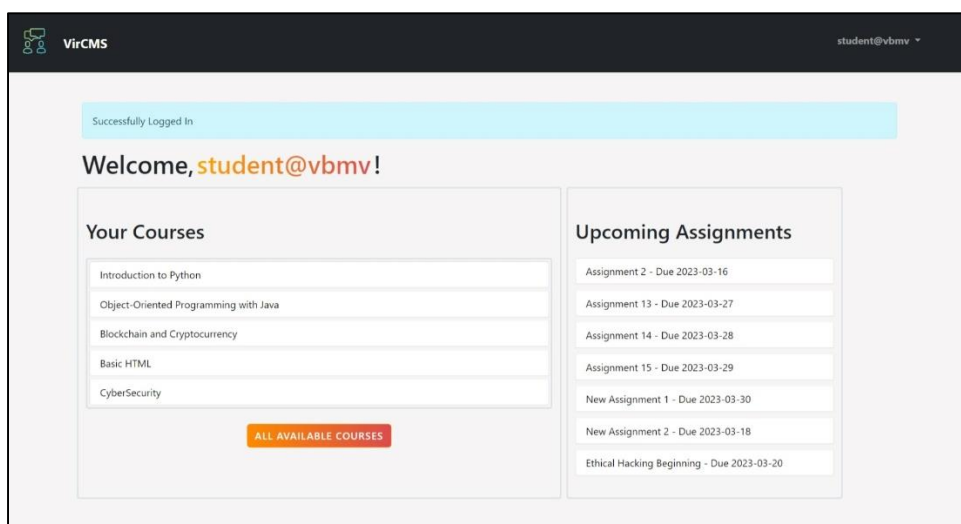
REGISTER

OR

LOG IN

Home · Blog · About

Fig: Registration Page



The dashboard shows a dark header with the VirCMS logo and the user email 'student@vbmvm'. A light blue banner indicates 'Successfully Logged In'. Below this, a welcome message 'Welcome, student@vbmvm!' is displayed. The main content is divided into two columns: 'Your Courses' on the left and 'Upcoming Assignments' on the right. The 'Your Courses' section lists five courses and includes a button for 'ALL AVAILABLE COURSES'. The 'Upcoming Assignments' section lists seven assignments with their due dates.

VirCMS

student@vbmvm

Successfully Logged In

Welcome, student@vbmvm!

Your Courses

Introduction to Python

Object-Oriented Programming with Java

Blockchain and Cryptocurrency

Basic HTML

CyberSecurity

ALL AVAILABLE COURSES

Upcoming Assignments

Assignment 2 - Due 2023-03-16

Assignment 13 - Due 2023-03-27

Assignment 14 - Due 2023-03-28

Assignment 15 - Due 2023-03-29

New Assignment 1 - Due 2023-03-30

New Assignment 2 - Due 2023-03-18

Ethical Hacking Beginning - Due 2023-03-20

Fig: Dashboard

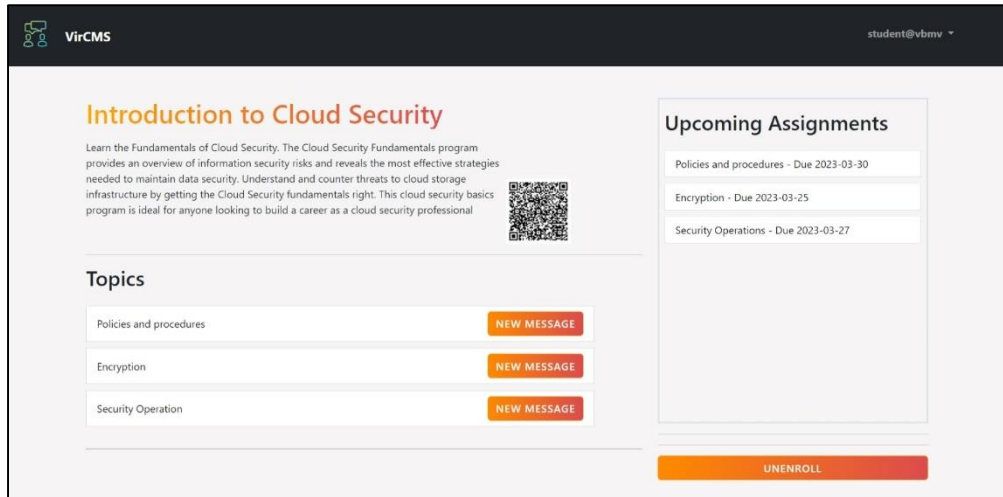


Fig: Course Page (Student View)

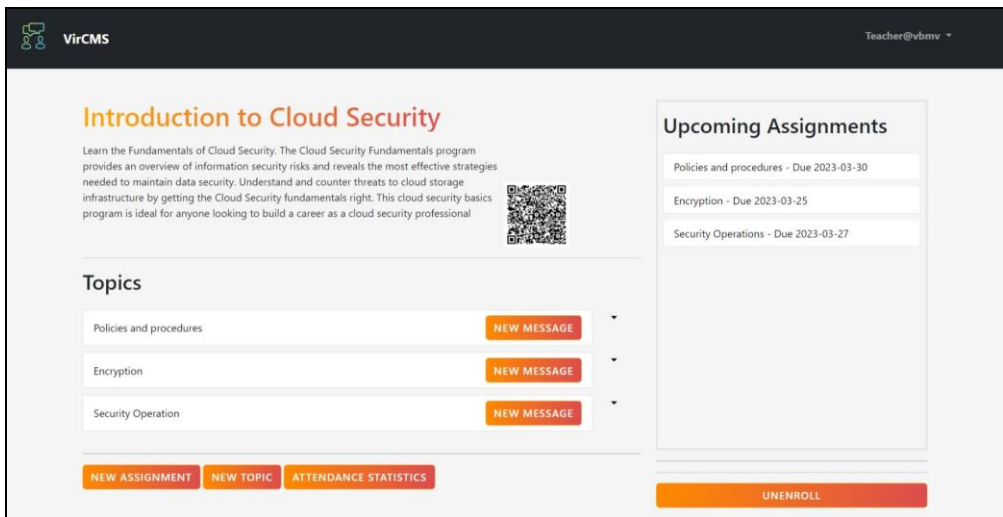


Fig: Course Page (Teacher/Admin View)

VirCMS		
Teacher@vbmw		
Attendance Statistics		
Total Students : 5		
Student ID	Student Name	Attendance
2	Jane Doe	5
3	Bob Smith	2
4	Alice Johnson	2
17	student@vbmw	2
23	Teacher@vbmw	1

Fig: Attendance Statistics Page (Teacher/Admin View)



VirCMS	
Teacher@vbmw	
<h3>Encryption</h3> <p>encryption is the process of transforming data from its original plain text format to an unreadable format, such as ciphertext, before it is transferred to and stored in the cloud. As with any form of data encryption, cloud encryption renders the information indecipherable and therefore useless without the encryption keys.</p> <p>No Messages To Show</p> <p>NEW MESSAGE</p>	<h3>Uploads</h3> <div>  </div> <p>NEW UPLOAD</p>

Fig: Topic Page


VirCMS

student@vbmw

Encryption


Good encryption will make leaked information useless for hackers. The type and number of required cryptographic services depend on the size and type of your organization. We recommend that you consider the following: Have you determined which files, databases, and networks require encryption? Is all critical data on your servers encrypted? How many encryption services do you have? Are you using a different service for databases, files, certificates, and public keys? Do you encrypt all sensitive data on servers and in transit? Have you safeguarded all private keys associated with certificates and public keys?

Due Date : **2023-03-25**

Course Details:

Course Name:	Introduction to Cloud Security
Course Description:	Learn the Fundamentals of Cloud Security. The Cloud Security Fundamentals program provides an overview of information security risks and reveals the most effective strategies needed to maintain data security. Understand and counter threats to cloud storage infrastructure by getting the Cloud Security fundamentals right. This cloud security basics program is ideal for anyone looking to build a career as a cloud security professional
Course Start Date :	2023-03-25
Course End Date:	2023-12-24

Fig: Assignment Page (Student View)


VirCMS

Teacher@vbmw

Security Operations

Make sure your cloud infrastructure is in the hands of competent experts. Note the following: Is the security team adequately trained? Does your company have a senior cloud security specialist? Has the security team implemented an appropriate cloud data security strategy? Has your organization adopted its security management to the cloud? Is everyone on the team aware of their responsibilities regarding cloud security? Do you have in-house guidance on how to stay safe in cloud infrastructure?


Due Date : **2023-03-27**

Course Details:

Course Name:	Introduction to Cloud Security
Course Description:	Learn the Fundamentals of Cloud Security. The Cloud Security Fundamentals program provides an overview of information security risks and reveals the most effective strategies needed to maintain data security. Understand and counter threats to cloud storage infrastructure by getting the Cloud Security fundamentals right. This cloud security basics program is ideal for anyone looking to build a career as a cloud security professional
Course Start Date :	2023-03-25
Course End Date:	2023-12-24

DELETE ASSIGNMENT

Fig: Assignment Page (Teacher/Admin View)



VirCMS

Teacher@vbmvm

VIEW ALL USERS

VIEW ALL COURSES

REGISTER NEW USER


VIEW ALL TEACHERS

VIEW ALL STUDENTS

All Teachers

User ID	Username	Courses Instructing	Admin Status	Promote to Admin	Action
2	Jane Doe	SHOW COURSES ID	False	PROMOTE	EDITDELETE
4	Alice Johnson	SHOW COURSES ID	False	PROMOTE	EDITDELETE
7	Peter Lee	SHOW COURSES ID	False	PROMOTE	EDITDELETE
10	Karen Taylor	SHOW COURSES ID	False	PROMOTE	EDITDELETE
13	Robert Davis	SHOW COURSES ID	False	PROMOTE	EDITDELETE
18	teacher	SHOW COURSES ID	True	ALREADY ADMIN	EDITDELETE
23	Teacher@vbmvm	SHOW COURSES ID	True	ALREADY ADMIN	EDITDELETE

Fig: Admin Panel All TeachersPage (Admin View)



VirCMS

Teacher@vbmvm

VIEW ALL USERS

VIEW ALL COURSES

REGISTER NEW USER

VIEW ALL TEACHERS

VIEW ALL STUDENTS

All Students

User ID	Username	Courses Enrolled	Action	
3	Bob Smith	SHOW COURSES ID	EDIT	DELETE
5	Tom Brown	SHOW COURSES ID	EDIT	DELETE
6	Emily Davis	SHOW COURSES ID	EDIT	DELETE
8	Samantha Scott	SHOW COURSES ID	EDIT	DELETE
9	David Wilson	SHOW COURSES ID	EDIT	DELETE
11	Michael Brown	SHOW COURSES ID	EDIT	DELETE
12	Grace Lee	SHOW COURSES ID	EDIT	DELETE
14	Olivia Johnson	SHOW COURSES ID	EDIT	DELETE
15	William Smith	SHOW COURSES ID	EDIT	DELETE
17	student@vbmvm	SHOW COURSES ID	EDIT	DELETE

Fig: Admin Panel All StudentsPage (Admin View)

VirCMS

Teacher@vbmw

VIEW ALL USERS
VIEW ALL COURSES
REGISTER NEW USER
VIEW ALL TEACHERS
VIEW ALL STUDENTS

All Users

User ID	Username	User Role	Admin Status	Promote to Admin	Action
2	Jane Doe	Teacher	False	PROMOTE	EDIT DELETE
3	Bob Smith	Student	False		EDIT DELETE
4	Alice Johnson	Teacher	False	PROMOTE	EDIT DELETE
5	Tom Brown	Student	False		EDIT DELETE
6	Emily Davis	Student	False		EDIT DELETE
7	Peter Lee	Teacher	False	PROMOTE	EDIT DELETE
8	Samantha Scott	Student	False		EDIT DELETE
9	David Wilson	Student	False		EDIT DELETE
10	Karen Taylor	Teacher	False	PROMOTE	EDIT DELETE
11	Michael Brown	Student	False		EDIT DELETE
12	Grace Lee	Student	False		EDIT DELETE
13	Robert Davis	Teacher	False	PROMOTE	EDIT DELETE
14	Olivia Johnson	Student	False		EDIT DELETE
15	William Smith	Student	False		EDIT DELETE
17	student@vbmw	Student	False		EDIT DELETE
18	teacher	Teacher	True	ALREADY ADMIN	EDIT DELETE
23	Teacher@vbmw	Teacher	True	ALREADY ADMIN	EDIT DELETE

Fig: Admin Panel Users Page (Admin View)

VirCMS

I_am_Victory

VIEW ALL USERS
VIEW ALL COURSES
REGISTER NEW USER
VIEW ALL TEACHERS
VIEW ALL STUDENTS

REGISTER

Username
Email
Password
Confirm Password

Role: ☐ Student ☐ Teacher

REGISTER

Fig: Admin Panel Users Registration Page (Admin View)

10. Advantages:

Advantages for Students:

For students of virtual classrooms, advantages primarily concern access, time, and cost factors compared to those incurred from attending the traditional, physical classroom.

Virtual classrooms remove the need to travel to a location in which to participate in the course or lessons, thus they are an advantage to students as they can be accessed from the student's home and they do not have to pay for transport as they would if they were attending a traditional classroom. Virtual classrooms can be accessed from any computer that has the necessary software, hardware, Internet Connection, and Internet browser requirements in order to participate in the virtual classroom management system.

Advantages for Teachers:

For teachers of virtual classrooms, working part-time is a possibility because of the flexible nature of the classroom. The teacher is not required to work from an office or classroom to instruct lessons or organize material and lessons; this can be done from anywhere where they have access to a computer with an Internet connection and other necessary software/hardware, which is an advantage.

Another advantage to the teacher or instructor is that they have "time to respond to student communications" in the virtual classroom, which gives the teacher a chance to construct the best possible response to the student. In the virtual classroom time delays between student's questions and teacher's answers are expected; this is the nature of the virtual classroom.

11. Conclusion and Future Scope:

This Web application will give the flexibility to those students as well who do not have time to attend there college due to their busy schedule of job and some of the people is not able to join college due to their financial issues, so its best web application to get education in virtual platform, as we have seen so many other site who are providing online course but mostly they are providing course which may not in sequence and moreover not authorized from a particular college or university ,here we develop this application for a particular college where the person can get admission as a proper student.

This virtual classroom management system is an online platform that helps teachers manage their online classes. It includes tools for messaging, file sharing, attendance tracking, and mobile accessibility. It allows teachers to create engaging online classes and students to learn in a flexible and convenient way.

Facility for online examination can be added in future. Students can apply for special courses and online payment facilities Are also available for them. Group Discussion module will add for Students, so that Student can Discuss their doubts. Top scorer of that exam will be display of that web site they will berewarded. Solution of this examination also be available, along with explanation. Student with 80 percentiles in three consecutive exams will be given special discount. For further exam. The facility of live-interaction can be added in the future versions of this apploication.

Special features for online live interaction of students with the faculty members like video-conferencing, whiteboard, exams, assessments can be added in the future developments of this application. Overall, this virtual classroom management system is a prototype that can be enhanced with new educational features in future developments.

12. References:

- "Development of Virtual Classroom Management System" by S. S. Shete and S. R. Shinde (International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 5, May 2015): This paper describes the development of a virtual classroom management system that includes features such as video conferencing, document sharing, and real-time communication.
- "Design and Implementation of a Virtual Classroom Management System" by A. A. Al-Qatab, M. Al-Sulaiman, and M. Al-Ohali (International Journal of Computer Science and Information Security, Volume 10, Issue 2, February 2012): This paper presents the design and implementation of a virtual classroom management system that includes features such as multimedia content, real-time communication, and collaboration tools.
- "Virtual Classroom Management System for Online Learning" by J. Lee and J. Lee (International Journal of Distributed and Parallel Systems, Volume 7, Issue 3, May 2016): This paper describes the development of a virtual classroom management system that includes features such as course management, student management, and real-time communication.
- "Development of a Virtual Classroom Management System for Distance Education" by S. M. Abubakar and A. T. Abdulrahman (International Journal of Innovative Research in Computer and Communication Engineering, Volume 2, Issue 7, July 2014): This paper presents the design and implementation of a virtual classroom management system for distance education that includes features such as course management, multimedia content, and real-time communication.
- "Design and Development of a Virtual Classroom Management System for Online Learning" by S. S. Zad and S. S. Pawar (International Journal of Advanced Research in Computer Science, Volume 6, Issue 1, January 2015): This paper describes the design and development of a virtual classroom management system for online learning that includes features such as course management, multimedia content, and real-time communication.