OTTPS: A Virtual Learning Environment

Shashwat Srivastava[1], Anany Gupta[2], Alok Puri[3], Shashwat Pratap Singh[4], Mr. Nand Kishore Yadav[5]
[1,2,3,4]*Department of Computer Science and Engineering, Raj Kumar Goel Institute of Technology, Ghaziabad, Uttar Pradesh, India*
[5]*Faculty, Department of Computer Science and Engineering, Raj Kumar Goel Institute of Technology Dr. A.P.J. Abdul Kalam Technical University, India*

Abstract **- In this project, we have proposed an E-Learning platform, which will enable students to attend their virtual classes, seminars, and other educational pre-recorded video courses on the same platform. It will also allow the teachers to give assignments, notification, share documents with their students and allow them to submit their assignments, and send messages or any query to their teachers. The OTTPS will allow only authorized users to get joined into the virtual classes. OTTPS will also solve some problems that many students should have faced, marking absence in live classes due to any connection error. And not being able to attend some class due to some technical issue or any personal problem, cause a loss in study.**

In this project, we will work upon three technologies that are mainly used: Web Application Development, iOS Application Development, Android Application Development. We are going to Collaborative Filtering Algorithm for course recommendation in this project. The goal is to provide a virtual learning platform with some special features like Live Classes, Pre-Recorded Video Lectures, Lecture Recommendation System, Messaging System, Assignment Portal, Online Test Portal, Attendance Monitoring in live classes, Downloadable Lecture Resources, and also Class, Assignment, Test, and Message Notifications. The application presents a novel approach to provide all resources to the students that are needed for online/ virtual learning.

Index Terms **- Virtual Classes, Downloadable, Authorized, Pre-recorded Courses, Collaborative Filtering Recommendation Algorithm.**

I.INTRODUCTION

E-learning refers to the use of Information and Communication Technology in education to enhance and support the teaching and learning process. In this project, an E-Learning Platform/ Virtual Learning Platform with some special features is proposed. It is a multiple operating system-based E-learning platform. It is Web Application based, Android Application based, and iOS application based. It can be accessed from various devices and platforms, on both PC and Mac, Desktops/ Laptops, as well as Android and iOS mobile devices by satisfying some basic system requirements.

In this project, we have used Web, Android, and iOS development technologies for base application development. In this project, we have integrated many other technologies to provide: Live Classes, Pre-Recorded Video Lectures/ Courses, Lecture Recommendation System, Messaging System, Assignment Portal, Online Test Portal, Attendance Monitoring in live classes, Downloadable Lecture Resources, and also Class, Assignment, Test, and Message Notification types of special features. So that instead of using different platforms for minor different purposes a student can get all that is needed for a virtual learning environment on the same platform i.e. on OTTPS.

Below are the features of our project followed by the technologies implemented to achieve those features:

1.Live Classes:

It will enable the students to attend their online classes and seminars. To implement this feature we used Reliable Multicast Transport Protocol (RMTP).

2. Pre-Recorded Video Lectures:

It will enable students to access the Pre-Recorded Courses which are present on our server.

3. Course Recommendation System:

As the name says itself, this will recommend the Courses to the students by using the Collaborative Filtering Recommendation Algorithm.

4. Messaging System:

It will enable the student to message their classmate or instructors for any kind of queries. This feature is implemented by using Oracle Glassfish Server Message Queue. Oracle GlassFish Server Message Queue is a full-featured message service that provides reliable, asynchronous messaging in conformance with the Java Messaging Specification (JMS).

5. Assignment/ Test Portal:
It will enable the instructors to add/edit questions, float the assignments and students will also able to participate in quizzes and submit their assignments. To implement this we use HTML, CSS, Bootstrap, JavaScript, PHP, MySQL.

6. Attendance Monitoring in Live Classes:
It will monitor the attendance of the students for every lecture according to their overall presence in that particular lecture. To implement this we use JavaScript, NodeJS.

7. Downloadable Lecture Resources:
It will enable the students to download the video lectures. These video lectures will be present on our server.

8. Notification System:
This will give the notification of Assignment, Test, Messages to the user. We have implemented this feature by using Web Push Notification Protocol.

II.LITERATURE REVIEW

An online learning platform is an integrated set of interactive online services that provide trainers, learners, and others involved in education with information, tools and resources to support and enhance education delivery and management. And in this project we have implemented many technologies to provide various types of features as discussed above. To gain more knowledge about those technologies we have gone through some papers and the review of those papers are as follows:
Reliable Multicast Transport Protocol achieves reliability by using a packet-based selective repeat retransmission scheme, in which each acknowledgment (ACK) packet carries a sequence number and a bitmap. ACK handling is based on a multi-level hierarchical approach, in which the receivers are grouped into a hierarchy of local regions, with a designated receiver (DR) in each local region. Receivers in each local region periodically send ACKs to their corresponding DR, DRs send ACKs to the higher-level DRs, until the DRs in the highest level send ACKs to the sender, thereby avoiding the ACK-implosion problem. DRs cache received data and respond to retransmission requests of the receivers in their corresponding local regions, thereby decreasing end-to-end latency and improving resource usage [1]. This paper explains the designing and implementation of a multi-cast transport protocol called Reliable Multicast Transport Protocol (RMTP). It provides sequenced, lossless delivery of bulk data from one sender to a group of receivers which is very helpful for live streaming or online classes.
Collaborative Filtering Recommendation Algorithm is the most common technique used when it comes to building intelligent recommender systems that can learn to give better recommendations as more information about users is collected. In this paper, a personalized online education platform based on a collaborative filtering algorithm is designed by applying the recommendation algorithm in the recommendation system to the online education platform using a cross-platform compatible HTML5 and high-performance framework hybrid programming approach. The server side development adopts a mature B/S architecture and the popular development model, while the mobile terminal uses HTML5 and framework to implement the function of recommending personalized courses for users using collaborative fifiltering and recommendation algorithms [2].
Web Quiz and Assignment Portal is a system that enable the student to submit their assignment online without submitting any physical file & similarly attending the quiz removing the pen & paper approach. In this paper, en efficient portal has been implemented and analyzed for conducting online web quizzes and also provided the option of assignment submission [3].
In this paper, a web-based application, has been developed by using the open sources of scripting languages of PHP and backend with the MySQL database. Following are brief descriptions about the web technologies used for developing this online quiz system. Hypertext Mark-up Language is employed to specify the logical organization of a document, with important hypertext extensions. This choice was made

because many different "browsers" with very different abilities, may view the same HTML document. The detailed rules for HTML. PHP or Hypertext Pre-processor is a widely used Open Source general-purpose scripting language that is especially suited for Web development and can be embedded into HTML. MySQL is a relational database management system that stores data in separate tables rather than putting all the data in one big storeroom. MySQL is also Open Source Software that is possible for anyone to use and modify. MySQL is very fast, reliable, and easy to use.

III.SOFTWARE DEVELOPMENT APPROACH

After learning all about the technologies that are going to be used in this project, System Development Approach was decided. Software Development Approach means the approach used in developing the project. To develop the system, a software process model should be proposed and monitored at the beginning. A software process model for software engineering is chosen based on nature of the project, size requirements, methods and tools to be used. Among the many types of software process models, we choose the Iterative model to develop the OTTPS: A Virtual Learning Environment. Iterative model is also called Incremental model. It is used when the initial requirements are well defined but overall scope is not clear. During each iteration, the development module goes through five phases Communication, Planning, Modelling, Construction and Deployment. The Communication phase contain-project initiation, requirements gathering; the Planning phase contains-estimation, scheduling and tracking; the Modelling phase contains- analysis and design; the Construction phase contains- Coding and Testing and the Deployment phase contains- delivery, support and feedback.

Iterative model Advantages are:

- Risks are identified and resolved during iteration.
- We can go to one phase to another phase
- With every increment, operational product is delivered.
- Supports changing requirements.
- Testing and Debugging during smaller iteration is easy.

Iterative model disadvantages are:

- More resources may be required.
- More management attention is required.
- End of project may not be known which about risk.

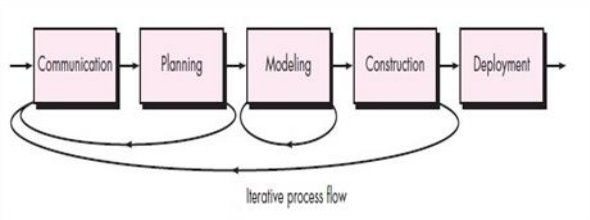

Fig. 1 Iterative Model [4]

The phases in Incremental model:

- Communication: This phase contains the Project Initiation and Requirements gathering. In this model initial requirements are well defined but overall scope is not clear. Requirements for a software to be developed are gathered. These requirements will be in a language that is understood by the customer/user. We gathered the requirements through analysis the existing and need for the new system.
- Planning: This phase contains the Estimation, Scheduling and Tracking. To do planning of overall project estimating the time to complete the project and scheduling the work for the different phases, dividing the work between the team mates. By tracking checking the progress of the project. Scheduling and distributing different tasks along with the estimation of completion for different modules. Divided the Front end and Backend part of the system among team members.
- Modelling: This phase contains the Analysis and Design. Analysis focus on problem (What) domain of the project and Design focuses on solution (How) domain of the project. The gathered requirements are analyzed from implementation point of view and the software specifications are written. Comparative Analysis on the basis of existing system and online resources & design the proposed model. Design phase involves arriving at the software architecture and implementation specifies based on technology chosen for development. The design process translates requirements into a representation of the software that can be assessed for quality before coding begins.
- Construction: Construction phase contains Coding and Testing part. Coding work is done in

the phase and code is developed. The design must be translated into a machinereadable form. Software design is translated into source code. We used different languages and frameworks for coding like for Web Application: HTML, CSS, Bootstrap, JavaScript for Frontend part, for Android Application: Java and Android Studio, and for iOS Application: Swift, Xcode and PHP, MySQL for Back-end part and represent the User Interface (UI) and page layouts with the help of web browser and web server. Each module is tested by doing different types of testing- unit testing, integration testing and system testing. The testing phase is only stage where the product defects are reported, tracked and fixed and retested, until the product reaches the quality standards defined in the SRS. For plagiarism checker we used the PHP library "Text_Diff". A few debugging steps have been taken in this phase to ensure the whole web portal are functioning properly:

- The hyperlinks and buttons of every page have been tested to ensure that every hyperlink and button is well functioning.
- The databases are tested when saving data and also reading the data from databases.

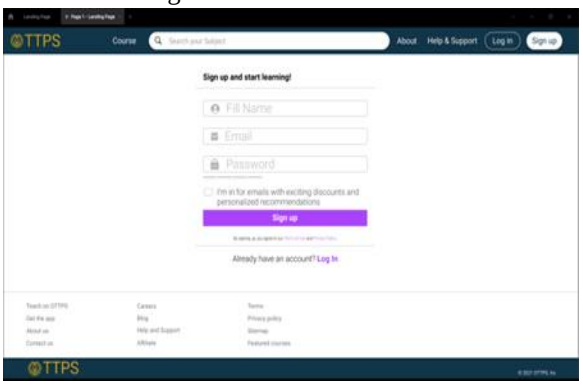

Fig. 2 Sign up Page

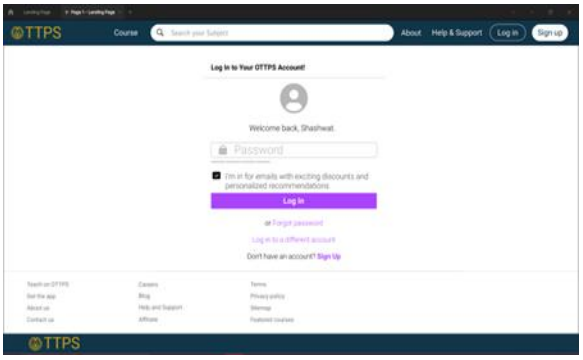

Fig. 3 Login Page

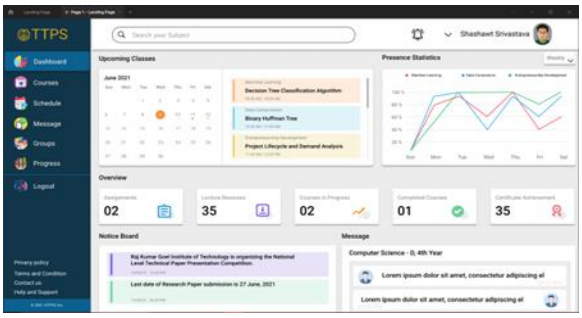

Fig. 5 Dashboard

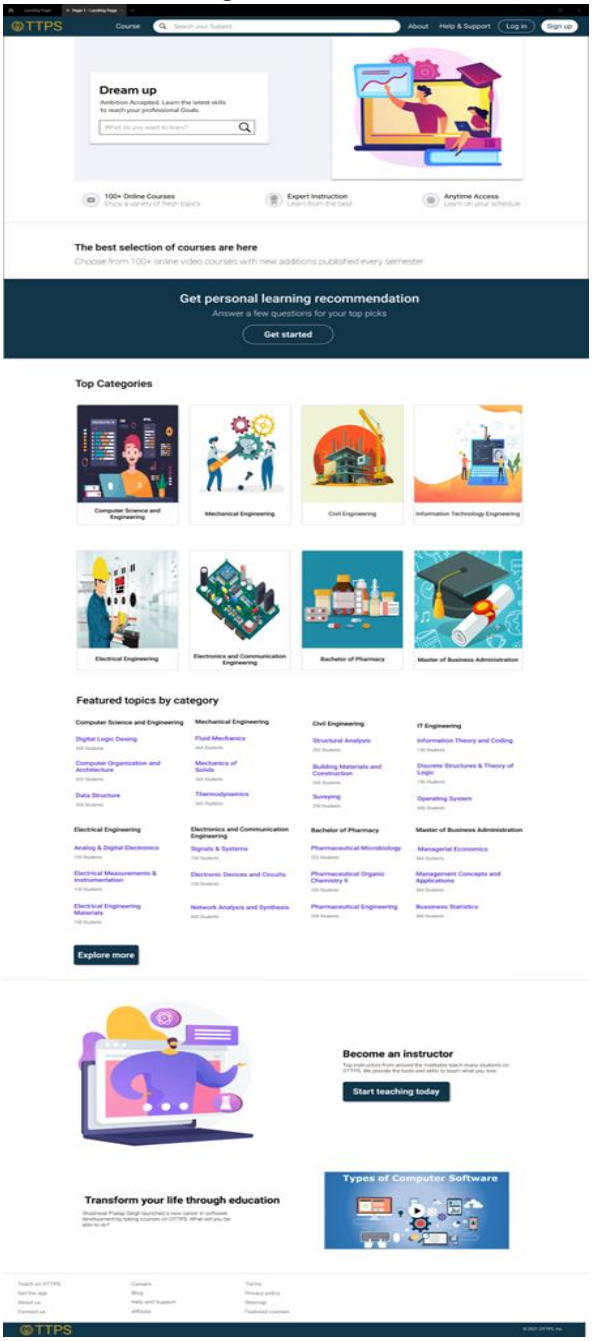

Fig. 4 Landing Page

IV.CONCLUSION

This paper, we have discusses about an overview of our project OTTPS, which is an E-Learning platform and we have discussed a study of some research papers on those technologies which is used in this project. Some technology that is used in this project are: Reliable Multicast Transport Protocol (RMTP) which will be used to make Live Classes system, Collaborative Filtering Recommendation Algorithm which is used to make a recommendation system for courses, Oracle Glassfish Server Message Queue, which is a full-featured message service that provides reliable, asynchronous messaging in conformance with the Java Messaging Specification (JMS), Web Push Notification Protocol which is used to make a notification system. For Front-end we have used HTML, CSS, Bootstrap, JavaScript, and Swift for iOS, Java for Android. For back-end we have used PHP, NodeJS, MySQL.

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