

Notespane - A community based learning system

Pragati Bagul¹, Devarshee Thokal², Sayali Raigade³, Sanjyot Gambare⁴, Prof. P.M.Chawan⁵

^{1,2,3,4}Final Year B.Tech, Computer Engineering, VJTI-Mumbai

⁵Professor, Department of Computer Engineering and IT, VJTI-Mumbai

Abstract - Knowledge has become essential in the age of globalization. We created an e-learning platform to assist curious learners from various backgrounds. NotesPane is a community-driven web tool that was created to make learning easier for people all around the world. The goal behind this app is to have everything in one place, allowing authors to efficiently communicate their teachings to users through notes, where users can readily obtain study material without having to go through the bother of gathering study material from several platforms. It gives users access to new technology for evaluating their students' performance using a range of tools. For instance, quizzes can be used to engage students while also providing other features such as a planner, scheduler, calculator, help guide, and background music. Because of technological advancements, it is now relatively easy to share and disseminate knowledge. The study of e-learning based learning management systems is presented in this work (LMS). This system will be built with React for the frontend, Spring Boot for the backend, and AWS services for database management.

Key Words: E-learning, learning management systems (LMS), React, Spring Boot, Java, AWS, Education, distant-learning, study material, assessment tools.

1. INTRODUCTION

India has the second-highest population density in the world. There is a pressing need for E-learning to take on its full form in countries like India. Finding, creating, and growing a community of like-minded learners and educators is difficult for educators who are passionate about sharing knowledge. As a result, we founded NotesPane, a community of lifelong learners dedicated to providing a platform for the learning community. Some of India's rising learning trends include: E-learning, Open Educational Resources (OER), Cloud-based E-Learning, Big Data in E-Learning, Responsive LMS, and Massive Open Online Courses. Some of the benefits of e-learning are as follows: It encourages active and autonomous learning; it is a cost-effective method of providing courses because the resources are accessible from anywhere and at any time; and it is a cost-effective method of delivering courses.

Students can participate in group discussions and private conversations with peers from all over the world, and the study materials can be viewed an endless number of times. NotesPane is a social media app and productivity tool for students that was developed to help students all over the world learn more effectively. Users can post and download notes using this service. The following is an example of how the notes could be formatted: 1. A document in PDF format 2. Documents in Text 3. Create a powerpoint presentation .The fourth place goes to blogs. 5. Use of Hyperlinks 6. Video clips. These comments can be shared with the entire platform or with specific people. Notes left by other users can be seen, evaluated, or saved as a personal copy. This allows users to study in a more individualized manner rather than reading through other people's notes. The purpose of this platform is to build a community of learners who will have access to a diverse set of high-quality study tools that will allow them to learn without boundaries. This website includes a Notes Feed, Notebook, Mock Tests, Courses, Calculator, Help Guide, Planner and Scheduler, and background music.

2. PROBLEM STATEMENT

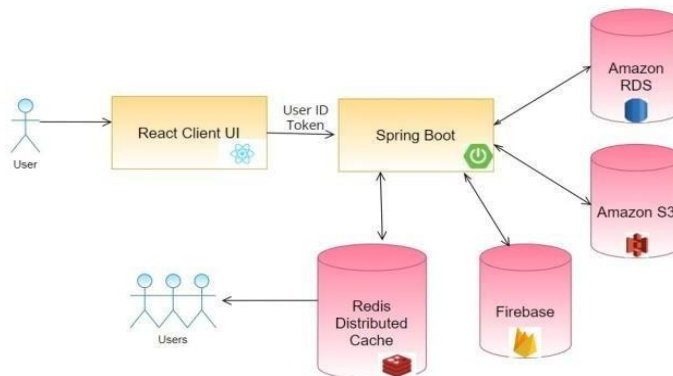
To develop a Learning Management System which will allow learners to upload, download, and share notes (PDF, text files, PPT, blogs, videos, links). The application will also provide features like notes feed, mock tests, planner and scheduler, help guide, calculator, motivational music, etc.

3. ARCHITECTURE

Frontend, backend, and database integration

When a user visits the website, he/she interacts with ReactClient User Interface. In this application, Frontend is specifically created using React JS and MUI library while Backend is created using spring boot – a java based development framework.

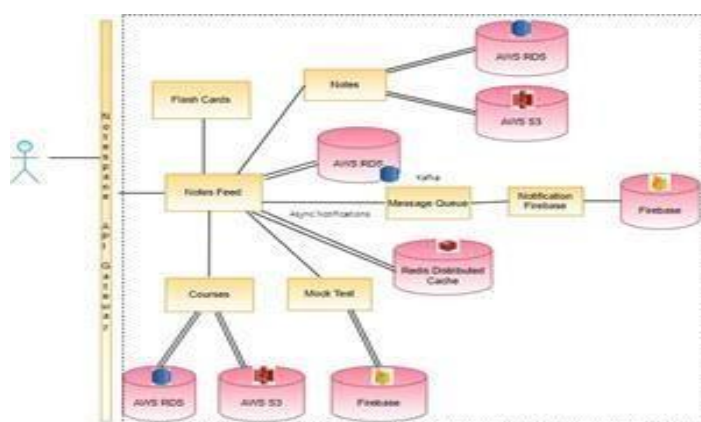
Conclusion content comes here Conclusion content comes here Conclusion content comes here Conclusion content comes here Conclusion content comes here Conclusion content comes here . Conclusion content comes here axios service is integrated inreact frontend to call APIs. React runs on port 3000 while spring boot runs on port 8080.



Because of Cross Origin Resource Sharing (CORS) security policy of spring boot, it doesn't accept requests except from apache tomcat server (which in our case runs on port8080). To overcome this problem CORS is enabled in the backend. When a user wants to communicate with database, he/she sends the request to the backend. This request is intercepted by REST controller in spring boot and the corresponding service method is invoked as per requirement. Usually, the service method invokes repository methods and performs dynamic operations on the database. As per our use-case, we are dealing withthree categories of data: row-based structured data, document-based data, and Binary Large Objects (BLOB)- for storage of images, videos, and other files. It uses different services for storing and processing data. It relies upon Amazon RDS for storing structured data, firebase for storing document-based data, and Amazon S3 for storing file data. Once this information is stored and processed, this information is stored on the Redis Distributed Cache, to make sure all the latest posts are visible to the users who are part of a follower-following network.

Notes feed

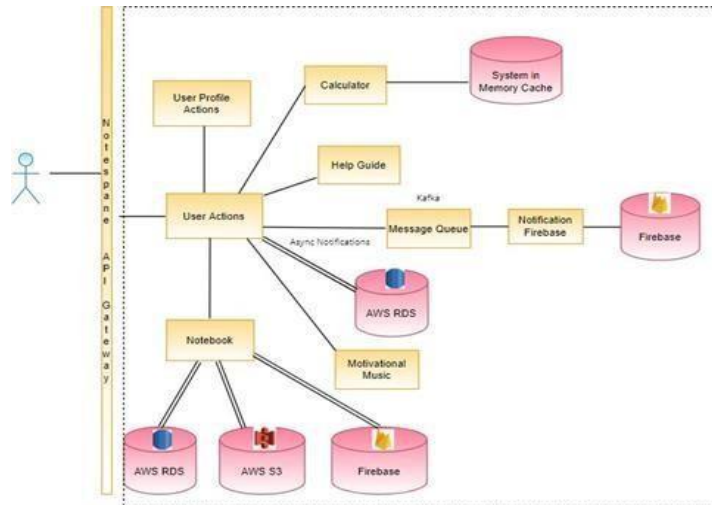
NotesPane is a social media application and a productivity tool for students which provides them all the requiredresources at a single place. Once a user has Logged into Notespane, he/she can access all the services through Notespane API gateway. Notespane consists of various features such as creating flashcards, mock tests, courses and notes. Users can publish notes in any form for eg.-.pdf,. docx,.ppt, images, videos and audios. While creatingthe notes, user needs to create a topic and then createnotes within it. This segregation is helpful, when userselects a topic and all the relevant notes will be displayedaccordingly. Besides these, users can also publishflashcards, mock tests, courses and notebooks as a form ofa note.



Whenever user creates either flashcards, mock test,s or courses or wishes to upload any notes, those are displayed as a post to other users who are the part of follower- following network on the notes-feed. Notes feed manages all this data using Amazon RDS which is a cloud RDMS service. It efficiently stores and processes structured data. The redis distributed cache ensures efficient fanout of notes from the all the other users that are followed by the user. Redis is an in-memory data store which ensures fast data access by storing data that is frequently used by clients.

Notifications feature notifies the user when other users post any material on notespane. It is implemented using Firebase Cloud Messaging (FCM) service which ensures reliable connection between server and devices that allows you to deliver and receive messages and notifications.

User actions



Other than uploading notes, mock tests, courses, or flashcards, Notespane also provides productivity tools such as planner for task management, a calculator to perform mathematical operations, help guide to get additional resources, and motivational music to improve focus. Users can also update their personal details for eg., profile picture etc. These details are stored on AWS RDS. Planner is implemented using React, Spring boot, and firebase. Firebase is used because data is dynamic and it is easy to store and retrieve dynamic content in firebase.

Users can create, update, and delete tasks. Motivational music and Help Guide are built with React frontend and JSON server. Here the data is static hence JSON server is used to just fetch and display the data. Only the admin has the control to add, update or delete data. Motivational music improves focus thus increasing the quality of study while Help Guide provides a treasure of open-source resources concerning educational fields such as maths, physics, etc. created and shared by teachers and educators.

Calculator is implemented using React frontend and system in-memory cache. System in-memory cache is used to get the history of calculations. It performs basic and advanced features for fast calculations. In this way, all the productivity tools ensure that user doesn't need to surf other sites and get everything under the same hood.

Integrating Facebook's Edge Rank algorithm into Notespane

1. Notes Feed Facebook's Edge Rank algorithm

The Facebook algorithm that determines which stories display in each user's newsfeed is called EdgeRank. Boring stories are hidden by the algorithm, so if yours doesn't score well, no one will see it. When someone logs into Facebook, the newsfeed is the first thing they see. On any social media platform's news feed, this is a recap of what's been going on recently among its users.

Every action taken by other linked users has the potential to become a newsfeed story. These activities are referred to as Edges on Facebook. That implies that everytime a friend updates their status, comments on another friend's update, tags a photo, joins a fan page, or RSVPs to an event, an "Edge" is created, and a story about that Edge may appear in the news.

2. Actual working of Facebook's News Feed Algorithm

There are three main parts to EdgeRank called **affinity**, **weight** and **time decay**.



Edge Rank is divided into three parts: affinity, weight, and time decay.

Your relationship with users is defined by **affinity**. It simply means that how much a user has interacted with your Page in the past influences their likelihood of seeing your postings. EdgeRank assumes they're interested in seeing more of your content if they've clicked your links, liked or commented on your posts in the past, and gives it a higher priority in that user's News Feed.

The **weight** of your post is the priority that EdgeRank assigns to it based on the type of post. Photos and videos take precedence. Links come in second, followed by plaintext status updates. The problem with weight is that it doesn't stop there.

How old is your post in terms of time decay? The longer your Facebook post has been up, the less likely it is to be seen. Appear on the News Feed of a user This one, too, isn't quite right. However, it's a one-size-fits-all approach. Users that just come in once in a while.

Although there are those three main areas of the EdgeRank algorithm, there are actually four specific action-points that are used by EdgeRank each time you post. These aren't necessarily fool-proof guarantees that your post will hit the News Feeds of your fans, but they're all good indicators of the *likelihood* of that. The four specific points are these:

1. user's past interactions with the author
2. user's past interactions with that post type
3. reactions from other users for that particular post
4. amount of complaints or negative feedback on that post

3. Use of facebook's news feed algorithm in the Notes pane Notes Feed System

Considering the Facebook News Feed system as the backbone of the system, the following factors determine the edge score in the refashioned Edge Rank Algorithm.

1. The author's previous interactions with the user
2. Previous interactions with that post type by the user
3. Other users' reactions to that exact post
4. The number of complaints or negative feedback received on that post.

A. Database Design

There are 3 classes as follows:

1. User
 - a. userId : unique Id
 - b. Detail 1
 - c. Detail 2
 - d. Detail n
 - e. EdgeQueue: a class maintaining a stack of edges created by this user.

2. EdgeQueue

A class that keeps track of the user's stack of edges. EdgeQueue is the second option.

EdgeQueue is a class that stores and retrieves edges in a data structure. The following stack operations should be implemented in this class: construct(), isEmpty(), push(), peek(), pop(), and destroy() ()

The comparator is designed based on the edgerank in this maximum priority stack.

3. Edge

The Edge class keeps track of an edge's properties. This includes the following:

- a. edgeId: This edge's unique identifier.
- b. Type

: The type of activity,

- (1) like
- (2) comment
- (3) view
- (4) post

- c. objectId: The object's reference key
- d. targetId: This is the target of the object action. The homepage, for example, will be the target object when generating a post type. A target object for the 'like' edge can be a comment object or a post object.
- e. edgeRank: the score of the edgerank algorithm. It starts at zero.

4. Post

- a. Id : Unique id for this post
- b. Topic : The topic to which this post belongs
- c. postTitle : The title of the post
- d. postDescription: The post's description.
- e. contentType:

- 1. Images,
- 2. attachments (pdf),
- 3. flashcards,
- 4. mock tests are all examples of content types.

- f. contentLink: The object's link
- g. Category: The material's category
- h. TimestampOfCreation
- i. Comments: This section contains all of the comments that have been left on that particular post.
- j. Likes: All of the likes on that post.

B. Calculate Edge Rank Score

To calculate the edge rank score we need three values for each of the edges: (1) affinity score (2) weight and (3) time decay

Affinity Score

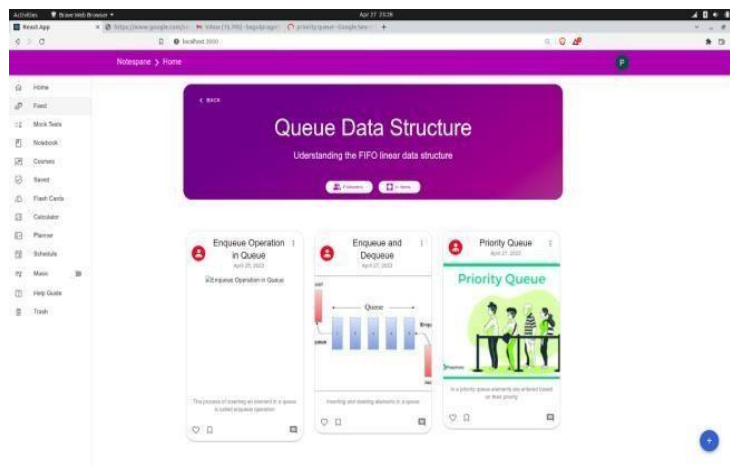
Activity Type	Weight
View	1
Like	2
Comment	3
Post	4

Time delay

Age of the NewsFeedObject in minutes	Time Delay value
0 < age ≤ 60 minutes old	6
60 < age ≤ 180 minutesold	5
180 < age ≤ 360 minutesold	4
360 < age ≤ 720 minutes old	3
720 < age ≤ 1440 minutesold	2
1440 < age ≤ 2880 minutes old	1
2880 < age minutes old(older than 2 days)	0

For each of the Feed Post, we will calculate the EdgeRankscore (Σ affinity x weight x time decay). If there are otheredges related to this edge, (comment on this post, like thispost etc), you need to add their EdgeRank scores to thisEdgeRank score. You can determine if an Edge is related toother Edge, based on the item ID of the reference item. Forexample, if your post (ID10) has the EdgeRank score of 20,and there is another item (comment on ID10) having the EdgeRank score of 10, the total EdgeRank score of your postwill be 20+10=30.

RESULT:



CONCLUSION

We looked at a variety of learning management systems (Moodle, Google-classroom, Coursera, Udemy, ByJUS, WhiteHat). As a result, we understood the power of E- Learning, which has grown over time as a result of widespread community support. Making a feature-rich application by combining available technologies and tools with a learning management system. E-learning may be accessed from anywhere in the world, and anybody, at any time, can profit from it.

In this research, we present NotesPane, a Learning Management System (LMS) that can provide quality studymaterial to learners from all over the world for free. We investigated existing Learning Management Systems in order to gain a better understanding of the efficiency of E-learning as well as the challenges andvulnerabilities that these systems confront.

We will design a system based on this research that will enable rapid and easy access to study material, enhancing not just the E-learning process' quality but also its effectiveness and learning outcomes. The system will reducethe gap between educators and students all across the world.

Modern machine learning algorithms are being usedto boost user interaction. The latest trends, user actions, andhistorical activities are studied by ML algorithms, which provide a curated personalized feed thatgives users targeted and directed content.

REFERENCES

- [1] Nor Azura Azharuddin and Lee Hwei Ling, Member, IACSIT, "Learning Management System (LMS) among University Students: Does It Work?", International Journal of e-Education, e-Business, e-Management and e-Learning, Vol. 3, No. 3, June 2013
- [2] Chirag Patel, Mahesh Gadhavi, Dr. Atul Patel, "e- learning based learning management Systems (LMS)", International Journal of Scientific & Engineering Research, Volume 4, Issue 6, June-2013 ISSN 222
- [3] Naveen Kumar, Mohamad Arif Wajidi, Yong Tai Chian, Vishroothi S, "The Effect of Listening to Music on Concentration and Academic Performance of the Student: Cross-Sectional Study on Medical Undergraduate Students.", Research Journal of Pharmaceutical, Biological and Chemical Sciences, ISSN:0975-8585
- [4] Hossein Khodabakhsh Zadeh, Reza Zardkanloo, Iman Alipoor, "The Effect of Mock Tests on Iranian EFL learners' Test Scores", International Journal of Education & Literacy Studies, Volume 5, Issue 3, July- 2017 ISSN 2202-9478
- [5] Moylan, W. A. (2002). Planning and scheduling: the yin and yang of managing a project. Paper presented at Project Management Institute Annual Seminars & Symposium, San Antonio, TX. Newtown Square, PA: Project Management Institute.
- [6] M.P. Cuéllar, M. Delgado, M.C. Pegalajar, Improving learning management through semantic web and social networks in e-learning environments, Expert Systems with Applications, Volume 38, Issue 4, April 2011, Pages 4181-4189, ISSN 0957-4174, 10.1016/j.eswa.2010.09.080.
- [7] Cybulski, J.L.; Linden, T.; , "Learning systems design with UML and patterns," IEEE Transactions on Education, vol.43, no.4, pp. 372- 376, Nov 2000, doi:10.1109/13.883344
- [8] Xin Li and Shi-Kuo Chang, "A Personalized E-Learning System Based on User Profile Constructed Using Information Fusion," in 7th International Conference on Communication (ICC), Beijing, China, 2007.
- [9] Pragati Bagul, Devarshee Thokal, Sayali Raigade, Sanjyot Gambare, Prof. P.M.Chawan, "Notespane - A community based learning system", International Research Journal of Engineering and Technology (IRJET), Volume: 08, Issue: 05 Nov 2021, e-ISSN: 2395-0056 p-ISSN: 2395-0072.

BIOGRAPHIES :



Pragati Bagul, B.Tech Student, Department of Computer Engineering, VJTI-Mumbai



Devarshee Thokal, B.Tech Student, Department of Computer Engineering, VJTI-Mumbai



Sayali Raigade, B.Tech Student, Department of Computer Engineering, VJTI-Mumbai



Sanjyot Gambare, B.Tech Student, Department of Computer Engineering, VJTI-Mumbai



Prof. Pramila M. Chawan, is working as an Associate Professor in the Computer Engineering Department of VJTI, Mumbai. She has done her B.E.(Computer Engineering) and ME.(Computer Engineering) from VJTI College of Engineering, Mumbai University. She has 28 years of teaching experience and has guided 80+ M. Tech. projects and 100+ B. Tech. projects. She has published 134 papers in the International Journals, 20 papers in the National/International Conferences/Symposiums. She has worked as an Organizing Committee member for 21 International Conferences and 5 AICTE/MHRD sponsored Workshops/STTPs/FDPs. She has participated in 14 National/International Conferences. She has worked as NBA Coordinator of the Computer Engineering Department of VJTI for 5 years. She had written a proposal under TEQIP-I in June 2004 for 'Creating Central Computing Facility at VJTI'. Rs. Eight Crore were sanctioned by the World Bank under TEQIP-I on this proposal. The Central Computing Facility was set up at VJTI through this fund which has played a key role in improving the teaching learning process at VJTI.