International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 05 | May - 2023 Impact Factor: 8.176 ISSN: 2582-3930

A Comprehensive Review of MEAN Stack for Web Development Applications (SAKURA)

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Abstract

Social Networking: Social networking refers to the use of internet-based social media sites to stay connected. Social networking can have a social purpose business purpose, or both. Sakura is a social networking platform. Sakura is a Japanese word for cherry blossom tree, just how it holds all its flowers together, our website does the same. It is a platform where everyone can get connected and share their thoughts with everyone. However, with the variety of social networking platforms available, it can be challenging to select the most suitable one. This paper aims to present a comprehensive review of the MEAN stack for web development applications.

The paper begins by providing a brief introduction to the MEAN stack and its key components. The process of developing dynamic, interactive websites or online apps using a variety of computer languages, frameworks, and technologies is known as web development. Web design, content generation, client-side scripting, server-side scripting, and network security settings are some of the processes that are involved.

As more companies use the internet to market their goods and services, web development has become fundamental to modern corporate operations. Web developers are essential in creating and managing websites that are quick, easy to use, and available on a variety of devices due to the rising need for web applications.

In general, web development is a dynamic and complicated field that necessitates ongoing learning and adaptation to stay ahead of emerging trends and technology. Web development will remain a vital part of contemporary business operations as the internet develops, and qualified web developers will continue to be in great demand.

Keywords

Social Networking platforms, MEAN Stack, MongoDB, Express.JS, Angular, Node.JS.

1.Introduction

A web-based application known as a social networking platform named Sakura allows users to connect with one another and store education details, experience and skills. Platforms for social networking have grown in popularity in recent years, with billions of users worldwide. Users of social networking sites can set up personal profiles, connect with friends and family, and join groups based on interests or pastimes in common. They also offer functions like , updating, sharing photographs and leaving comments on the material . Additionally, some social networking sites contain tools that let businesses advertise their goods and services to clients. Social networking sites have revolutionised how individuals engage and communicate with one another. They have also developed as a source of news and information for many users, who use them to keep up with trends and current events. However, fast and effective web application development is required to support social networking platform where MEAN Stack comes into this. The MEAN stack is a well-liked technology stack for web development that is used to create stable and dynamic web applications. The acronym "MEAN" refers to the four components of the stack: MongoDB, Express.js, Angular, and Node.js.

In this in-depth analysis, we seek to examine the various MEAN stack components and how Social networking applications might make use of them. The MEAN stack is excellent for creating large-scale web applications that can manage heavy traffic and massive amounts of data because it is also extremely scalable. Developers may simply add new features and functionality. This elements advantages and disadvantages will be explained in depth. In-order to show that this technology is used in social networking platform is explained below. In this website named Sakura we are able to store any user's details like education, skills, experience and also put our thoughts on it and by uploading any pictures.

Modern web development uses the MEAN stack, a strong and adaptable technology stack.

2.An Overview of the MEAN Stack

Scalability, adaptability, and ease of use are just a few advantages provided by MEAN stack. Developers may simply add new features and functionality to their apps thanks to the stack's modular nature. MEAN stack is a great option for developing high-performance web apps because it also has exceptional performance.

Four key technologies—MongoDB, Express.js, Angular, and Node. js—make up the MEAN stack. Let us see each of these technologies more deeply and discuss how they serve the field of web development.

A) MongoDB

Popular NoSQL document-oriented database MongoDB offers modern web applications exceptional performance, scalability, and flexibility. MongoDB stores data in flexible JSON-like documents that can have a variety of forms rather than using tables and rows like conventional relational databases.

Large data quantities may be handled by MongoDB, which is made to be extremely scalable. To boost performance and provide high availability, it makes use of method for dividing data across numerous servers.

Due to its adaptability, scalability, and simplicity of usage, MongoDB is frequently utilised in web development. Here are a few applications using MongoDB in web development:

MongoDB is frequently used as the main database for web applications when storing data. It gives users access to a versatile document-based data format that makes storing and retrieving data simple. Text, numbers, dates, and arrays are just a few of the several forms of data that developers can store in MongoDB.

Scaling: MongoDB can handle high data volumes by distributing it over numerous servers because it is designed to scale horizontally. Because of this, it's a great option for online applications that need to be very scalable.

Real-time updates are supported by MongoDB through the use of its change streams feature.

MongoDB offers web applications like social networking platforms a strong and adaptable data storage solution. MongoDB is a great option for creating contemporary, scalable, and effective web apps since it supports real-time updates, indexing and querying, caching, and full-stack JavaScript programming.

B) Express.JS

Express.js is a well-known open-source web framework for Node.js that is made for creating APIs and web apps. It offers a straightforward and adaptable method for creating web apps, making it a preferred option among developers.Node.js, which is a server-side JavaScript runtime environment, is the foundation upon which Express.js is constructed. Middleware, routing, and template engines are just a few of the tools that are offered by Express.js for creating web applications. The simplicity of Express.js is one of its key advantages. Developers can concentrate on creating the functionality they need without having to worry about the supporting infrastructure thanks to its simple approach to designing web applications.

C)Angular

Building dynamic single-page web applications (SPAs) uses the open-source Angular framework, which was created by Google. It is built on TypeScript, a superset of JavaScript that adds static typing and other capabilities to the language.

With templates, components, services, routing, and dependency injection, Angular offers an entire framework for creating web apps. Additionally, it has tools for form management, data binding, and validation.

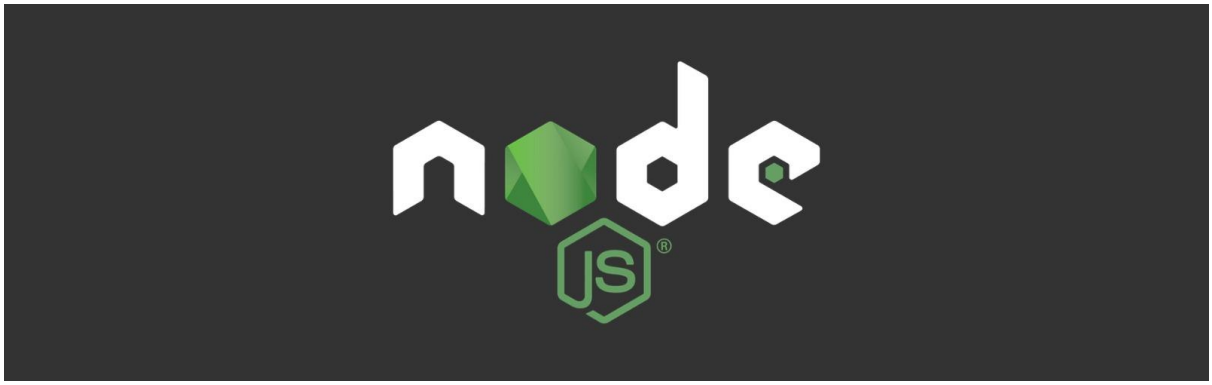
The capability of Angular to produce dynamic, responsive web apps is one of its primary advantages. When developing user interfaces that automatically update as data changes, Angular offers a robust collection of features. As a result, programmers may create intricate, interactive apps that offer a seamless user experience.

D) Node JS

Node.js is an open-source, cross-platform server-side runtime environment for JavaScript that enables programmers to create robust, scalable applications. Its event-driven, non-blocking I/O approach helps it be small and effective.

Ryan Dahl developed Node.js in 2009, and it has since gained popularity as a framework for developing microservices, real-time applications, and online apps. It makes it simple to create both the front-end and back-end of an application using the same programming language by enabling developers to use JavaScript on the server-side.

For the development of JavaScript-based server-side applications, Node.js provides a strong and flexible framework. It is a well-liked option among developers because to its event-driven, non-blocking I/O style, built-in modules, and active ecosystem of third-party modules.



3. Objectives

- Creating a user-friendly interface: The main goal of web development is to make an interface that is simple for end users to use and navigate. This involves developing typeface, colour schemes, and layouts that are aesthetically pleasing and simple to use.

- Providing an engaging user experience is a goal of web development since it motivates people to interact with the website or application. This involves developing engaging animations, interactive features, and other components.

- Making a responsive design: As the number of mobile devices used to access the internet rises, it is crucial that web development goals include making a responsive design that can adapt to various screen sizes. Users are guaranteed a seamless experience across all devices thanks to this.

- Building a scalable, high-performance application: One of the main goals of MEAN Stack development is to build a scalable, high-performance application that can handle a large amount of traffic without losing functionality. The code must be optimised and effective database queries must be used.

- Making a modular and maintainable codebase: The MEAN Stack development process attempts to make a modular and maintainable codebase, making it simpler to add new features and functionality to the application as it develops over time.

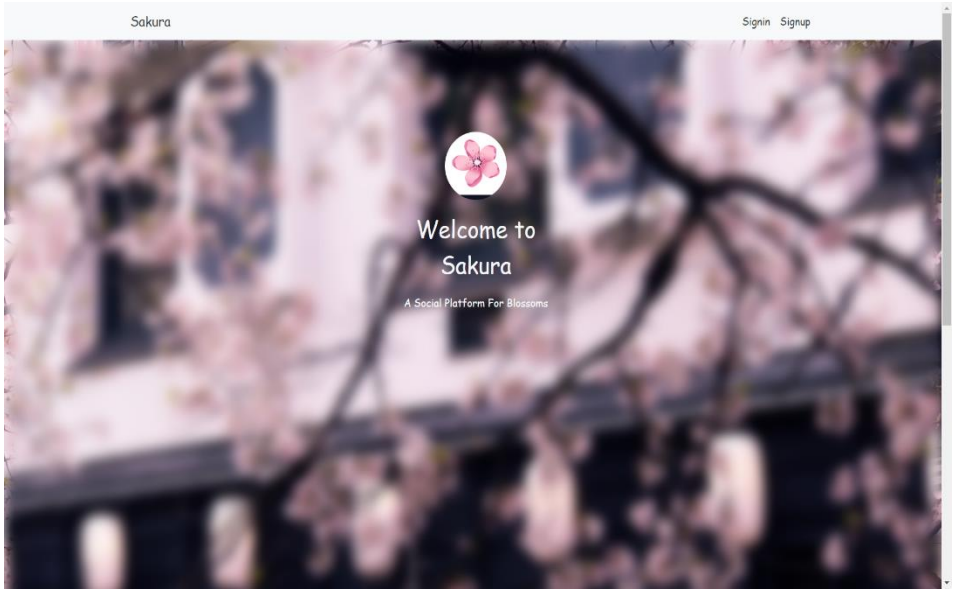
- Making a simple and responsive user interface: MEAN Stack development places a strong emphasis on making an appealing and responsive user interface that offers a consistent user experience for users across various devices.

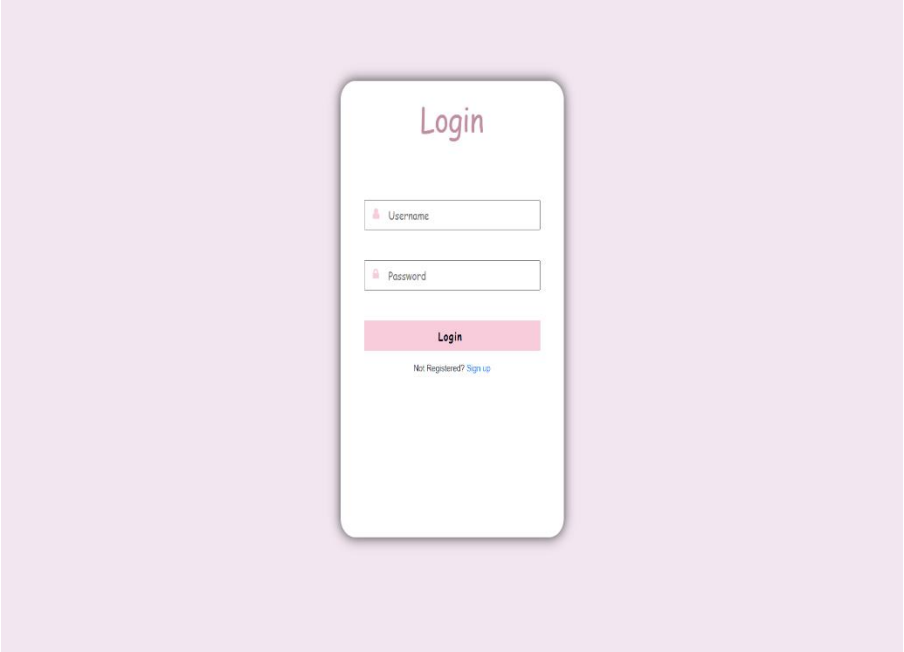
4. LITERATURE REVIEW

Paper Title	**Review**
Website Developmemt Technologies	In this paper, a method is developed that will be applied to web-based services like websites, web applications, and eCommerce
Web Development market Operating Work	Website development market is stable which has been operated for six years.

Social networking Web services	Different people can connect with others throughout.
Cognitive disabilities and web accessibility	Includes diversity of conditions such as reading and understanding
Performance comparison of Web Development Technologies in Node.js	It includes all different technologies used in social network.

5. UI/UX Design

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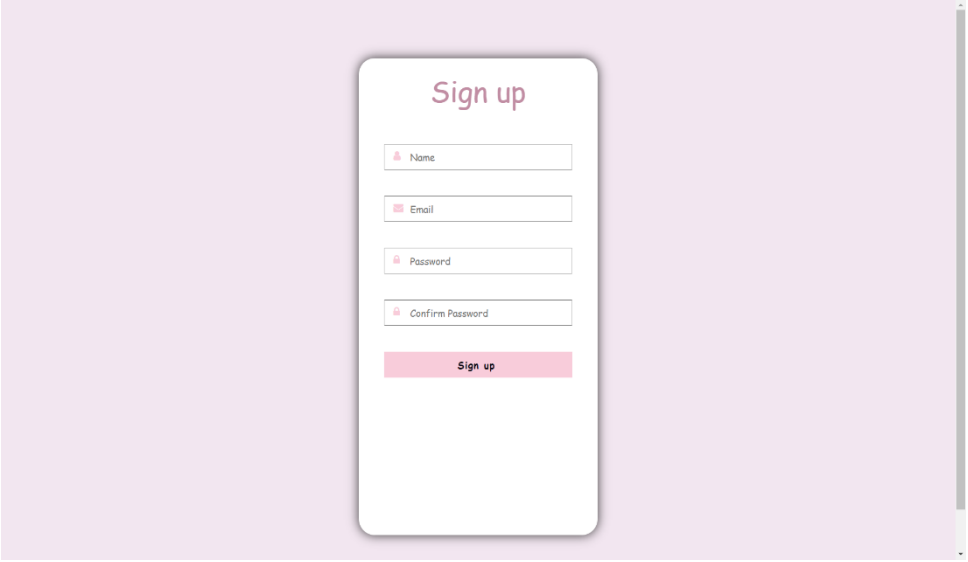
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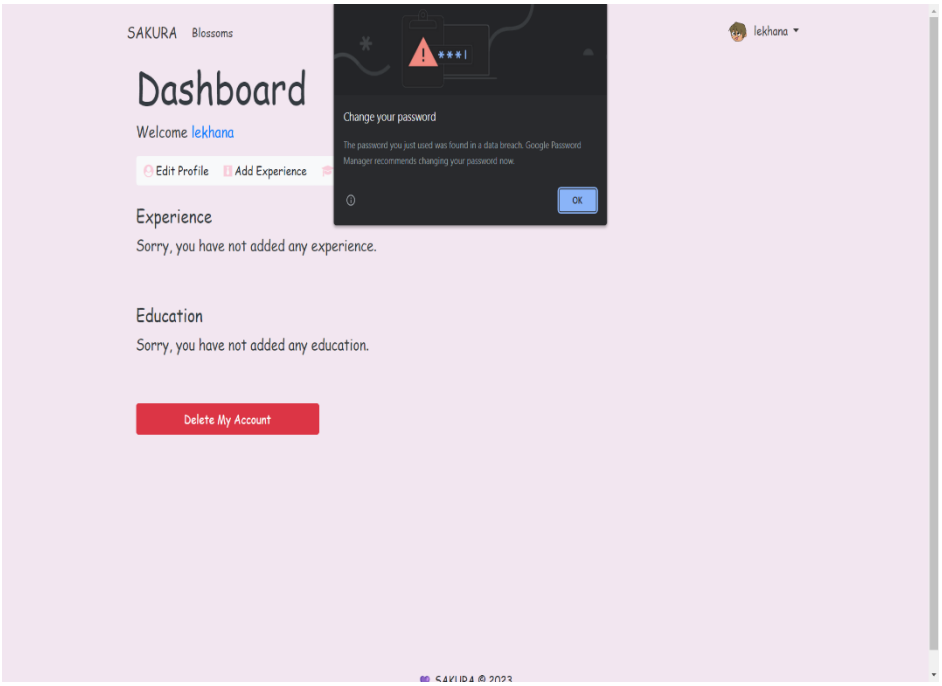

6.The Best Practices for Securing MEAN STACK Platforms

MEAN Stack platforms are popular for building scalable and robust web applications. However, when it comes to websites, security is still a top priority. In order to secure the MEAN Stack platforms, it is important to follow best practices.

The following are some top tips for protecting MEAN Stack platforms:

- HTTPS offers a secure route for sharing data between the server and client. It encrypts the data in transit and prevents any third party from intercepting it. Therefore, it is essential to use HTTPS for all websites built on MEAN Stack.
- Implementing access control guarantees that only users with the proper authorization can access the web application's resources. Access control should be implemented at all levels.
- Secure the Server: The MEAN Stack platform's server is its beating heart. It is crucial to ensure that the server is appropriately secured and hardened against possible attacks. This include doing routine software updates, setting up firewalls, and controlling access to sensitive files.
- Clean User Input: User input is one of the most popular ways for attackers to access a web application. It is essential to sanitize all user input to prevent cross-site scripting (XSS) and SQL injection attacks.

- Use strong authentication mechanisms to help stop unwanted access to the web application. These mechanisms include multi-factor authentication. All user accounts should employ robust authentication methods, and access logs should be periodically checked for any unusual activity.
- Implement monitoring and logging: Monitoring and logging can assist in real-time detection and response to possible security threats. All MEAN Stack platform components need to be monitored and logged for, and logs should be regularly checked for any suspicious activity.
- Update Software Frequently: Updating software frequently is crucial for sustaining the MEAN Stack platform's security. The operating system, web server, database, as well as all third-party libraries and frameworks, must all be updated.
- You may contribute to the security of your MEAN Stack platform and shield it from potential security threats by adhering to these guidelines.

7. Technologies Used

- In web development, a variety of technologies are employed, including:
- Hypertext Markup Language (HTML) is used to organise content and design a web page's fundamental structure.
- Cascading Style Sheets, or CSS, are used to specify the look and feel of a web page, along with its positioning, colours, and fonts.
- JavaScript is a computer language that may be used to develop interactive web page features like pop-up windows, visuals, and form validation.

- For storing and retrieving data, MongoDB is a NoSQL database that is frequently employed in web development.
- Angular is a JavaScript framework for building single-page and dynamic web applications.
- Express.js is a Node.js web application framework that offers a number of tools and capabilities for developing reliable web apps.
- Node.js is a JavaScript runtime that enables programmers to execute JavaScript on the server side, enabling the creation of extremely effective and scalable online applications.

Hence these are the technologies used to do the Social Networking Website.

8. Optimization while building a Social Networking platform

A. Caching frequently used Data

For social networking platforms, caching frequently used data is a good optimisation approach because it can lower the number of database queries needed and boost platform speed. In a social networking platform, you can cache frequently used data by following these recommendations:
Determine whether data may be cached to increase efficiency by identifying the data that is frequently viewed, such as user profiles, news feeds, and comments.
Select a caching method: Several caching methods are available, including distributed caching, in-memory caching, and caching based on files. Select the caching technique that best meets your requirements.
Check the performance of the cache: To make sure the cache is operating efficiently, check the performance of the cache frequently. For the purpose of keeping track of cache performance and spotting any possible problems, use technologies like New Relic or AppDynamics.
Cache invalidation is necessary when: To ensure that the cached data is updated, invalidate the cache as needed. For instance, you can invalidate the cache if new or updated data is added.
Cached-tag usage to group relevant data together and remove certain data sets from the cache, use cache tags. This makes it easier to make sure that just the essential data is cached and updated.
You may greatly increase platform speed and give users a better user experience by integrating caching in your social networking platform.

B. Optimizing Database Queries

To ensure quick and effective data retrieval on a social networking site, database query optimisation is essential. Here are some pointers for streamlining database searches on a social networking site:
Apply indexes: Indexes can improve the efficiency of database queries. Indexes enable the database to locate the requested data fast, cutting down on the time needed to access the data. For the columns that are often used in queries, make sure that indexes are generated.
EXPLAIN is a command that can be used to analyse queries and find performance problems. EXPLAIN offers details about the query's execution and can assist locate performance snags.

Apply query tuning strategies to improve queries: To optimise database queries, utilise query tuning strategies including improving the query structure, utilising the right data types, and utilising fewer functions.

Reduce database requests with caching: Utilise caching to keep frequently used information and reduce the need for searching databases. This may significantly improve the platform's performance. You may enhance the efficiency of your social networking platform and give your users a better user experience by optimising database queries.

C. Using Server-side Rendering

A social networking platform can gain a lot from server-side rendering (SSR) through enhancing user experience, performance, and search engine optimisation (SEO). The following are some pointers for utilising server-side rendering in a social networking site:

Determine which pages should be rendered server-side: Decide which pages, such as the home page, user profiles, and news feeds, can be rendered server-side. Typically, the static content on these pages can be pre-rendered.

Utilise a framework for server-side rendering: Create a social networking platform using a server-side rendering technology, like Next.js or Nuxt.js. These frameworks make it simple to build server-side rendering and have built-in support for it.

Use server-side rendering when loading the first page: To enhance platform performance, use server-side rendering for the initial page load. The user may access the content more quickly and the website loads more quickly thanks to server-side rendering.

When creating dynamic content, use client-side rendering: For dynamic material that requires immediate updates, such as comments and chat messages, use client-side rendering. For dynamic content, client-side rendering can offer a quicker and more responsive user experience.

Utilise progressive enhancement to make sure that users with varying levels of JavaScript support may access the platform. Starting with a page that has been produced by the server, progressive enhancement includes adding client-side functionality as necessary.

D. Minifying Code

A popular optimisation method that may be utilised to enhance the efficiency of a social networking platform is code minification. In order to reduce the file size and speed up page load time, minification involves eliminating unused characters from the source code, such as white spaces, comments, and line breaks. Listed below are some pointers for minifying code in a social networking site:

Use a tool for minification: To automatically minify the code, use a tool like Closure Compiler. To reduce the file size, these programmes can eliminate extraneous characters, improve the code structure, and carry out other optimisations.

JavaScript and CSS files should be minified to reduce file size and speed up page loading.

Minify HTML files: Minify HTML files to reduce the file size and improve the load time of the page. A tool like HTML Minifier, which eliminates superfluous characters and optimises the HTML file's structure, can be used for this.

So minifying code in your social networking platform, it reduces the file size and improves the load time of the page

E. Utilize Lazy Loading

By only loading content when it is required, the method of lazy loading helps social networking platforms perform better. This can improve user experience overall, speed up the initial page load time, and reduce the quantity of data transferred. The following advice will help you make use of lazy loading in a social networking site:

Determine the content that will be loaded slowly: Determine the media files, such as pictures and movies, that can be loaded slowly. The initial page load can be severely slowed down by these files because they are frequently huge.

Use a library with lazy loading: To incorporate sluggish loading into your social networking platform, use a library like Lazy Load. These libraries can aid in content loading for better use.

Implement lazy loading for images and videos to shorten the time it takes for a page to load initially. This might greatly enhance platform performance and give users a better experience.

Check the performance: Check the performance of the lazy loading solution to make sure it is operating as intended and bringing about the expected performance gains. To evaluate the platform's performance, utilise tools like Lighthouse or WebPageTest.

You may enhance the functionality of your social networking platform and give your consumers a better user experience by using slow loading.

9.Conclusion

In conclusion, creating a social networking platform may be a thrilling and fulfilling project as well as a difficult and complex undertaking. User experience, scalability, security, and speed must all be prioritised while developing a social networking platform.

Because it directly affects user engagement and retention, user experience is essential. It's crucial to create a simple and user-friendly interface that enables people to interact with content and communicate with one another.

Because social networking platforms are anticipated to grow quickly, scalability is essential. It's critical to create a platform that can manage high volumes of users and traffic.

Social networking platforms handle sensitive user data, thus security is essential. Strong security measures must be put in place to safeguard user data against hacker assaults and unauthorised access.

Performance is crucial since sluggish page loads and poor performance can annoy users and reduce engagement. It's crucial to speed up the platform by employing strategies like caching, minification, lazy loading, and server-side rendering.

You may create a successful social networking platform that offers your users a useful service and endures by keeping these criteria in mind and adhering to best procedures.

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