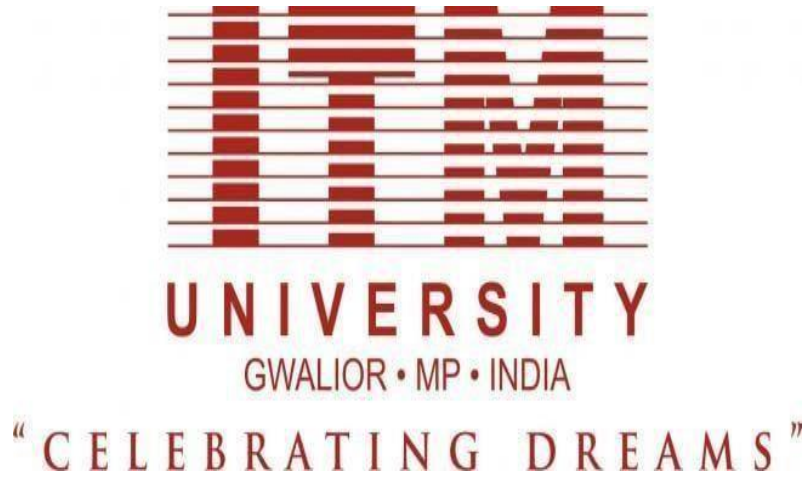
“Mortgage Calculator”

A

Report

on

Project based learning



For the partial fulfilment of

Master of Computer Application

Semester – 3rd

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Introduction

A mortgage calculator is a vital tool for estimating monthly payments on home loans. By inputting values such as loan amount, interest rate, and loan term, users can quickly determine their mortgage payments, making it a valuable resource for anyone involved in real estate or financial planning.

In this project, we developed a fully client-side mortgage calculator website using HTML, CSS, and JavaScript. The website allows users to input loan details, calculates the monthly payments instantly, and displays the results dynamically on the page.

This project focuses on the frontend technologies only, leveraging JavaScript for handling all calculations and user interactions. HTML structures the web page, while CSS ensures a clean and responsive design, creating a smooth and interactive user experience.

This approach demonstrates how essential web development skills can be applied to solve real-world financial problems, offering a quick and accessible way for users to calculate mortgage payments

Objective

1. Develop a functional mortgage calculator.

2. Learn frontend web development technologies(HTML, CSS, JavaScript).

3. Design a user friendly interface that is intuitive and responsive, ensuring a seamless experience across different devices and screen sizes.

4. Implement dynamic interactions: used JavaScript to handle real time calculations.

Literature Review

1. Overview of Mortgage Calculators
   Mortgage calculators have been widely used in the financial and real estate sectors to help individuals calculate their loan repayments. These tools are critical in providing insight into the monthly payment amount based on key factors like loan amount, interest rate, and loan duration.

2. Existing Online Mortgage Calculators
   Numerous financial websites, such as Bankrate, Zillow, and NerdWallet, offer online mortgage calculators to help users understand their monthly payments and overall loan costs. These websites use a combination of front-end and back-end technologies to provide real-time results and additional functionalities, such as calculating amortization schedules and adjusting for down payments or taxes.

3. Client-Side Web Technologies for Mortgage Calculators With the development of modern JavaScript frameworks and libraries, it is now possible to build highly interactive applications entirely on the client side. Unlike traditional mortgage calculators that rely on server-side technologies, client-side calculators built with HTML, CSS, and JavaScript handle all computations within the browser, eliminating the need for back-end processing.

4. Responsive Design in Mortgage Calculators
   Research has shown that users often access online financial tools from a variety of devices, including smartphones and tablets. Responsive design, enabled by CSS and frameworks like Bootstrap, ensures that mortgage calculators are accessible and usable on devices of different screen sizes.

Methodology

1.Project Planning and Requirement Analysis

The project began with defining the purpose and scope of the mortgage calculator. Key features, such as input fields for loan amount, interest rate, and loan term, were identified, along with the functionality for calculating monthly payments

2.Frontend Development

The structure of the webpage was built using HTML. Input elements for loan amount, interest rate, and loan term were created, along with a section to display the calculated monthly payment.

CSS Was applied to ensure a visually appealing layout. Also the pre-built classes of bootstrap is used to achieve a consistent design.

3.Functionality Implementation with JavaScript

JavaScript was used to implement the core functionality. The loan parameters inputted by the user were processed in real time to compute the monthly mortgage payment using the standard mortgage formula:

$$M = (P*r(1+r)^n)/((1+r^n)-1)$$

where:

- M is the monthly payment
- P is the loan amount (principal)
- r is the monthly interest rate
- nis the number of payments (loan term in months)

Tools &Technology Used

1. HTML (Hyper Text Markup Language)

Used to structure the content of the website, including the input fields for loan amount, interest rate, and loan term, as well as displaying the calculated results.

2. CSS (Cascading Style Sheets)

Applied for styling the website, making it visually appealing and responsive across different devices. CSS was used to create a clean layout, organize elements, and ensure a smooth user experience.

3. JavaScript

Used for the core functionality of the mortgage calculator. It handles all the calculations based on the user's inputs and dynamically updates the results on the webpage without needing to reload the page. JavaScript also provides input validation to ensure users enter valid data.

4. Bootstrap

A front-end framework that was optionally used to simplify the design process. It helped create a responsive layout and mobile-friendly design with pre-built CSS and JavaScript components.

Implementation

1. Frontend Implementation (HTML and CSS)

The web interface for the mortgage calculator is developed using HTML to structure the input fields and buttons, while CSS (with Bootstrap) is used to style the form and make it responsive.

HTML Structure:

The HTML structure consists of a form where users can enter:

- Loan Amount: The total amount borrowed.
- Interest Rate: The annual interest rate (in percentage).
- Loan Term: The duration of the loan in years.

CSS (Bootstrap):

To ensure the interface is responsive, Bootstrap is integrated. Bootstrap's grid system and form components ensure the layout adjusts on different screen sizes (desktop, tablet, mobile).

2. Backend Logic (JavaScript)

JavaScript handles the mortgage calculation and dynamically updates the result. The key part of this implementation is the formula to compute the monthly mortgage payment based on the inputs:

$$M = (P*r(1+r)^n)/((1+r^n)-1)$$

where:

- M is the monthly payment
- P is the loan amount (principal)
- r is the monthly interest rate
- nis the number of payments (loan term in months)

3. Testing & Validation

After implementing the mortgage calculator, it was important to test the functionality across different browsers and devices to ensure the calculator worked consistently and the layout was responsive. The following tests were conducted:

Functionality Test: Entering valid and invalid inputs to ensure the calculator provided correct results or appropriate error messages.

Responsiveness Test: Tested on various devices (mobile, tablet, desktop) to ensure the layout adapted and remained user-friendly on smaller screens.

Cross-Browser Compatibility: Ensured the calculator worked smoothly on Chrome, Firefox, Safari, and Edge without any performance issues.

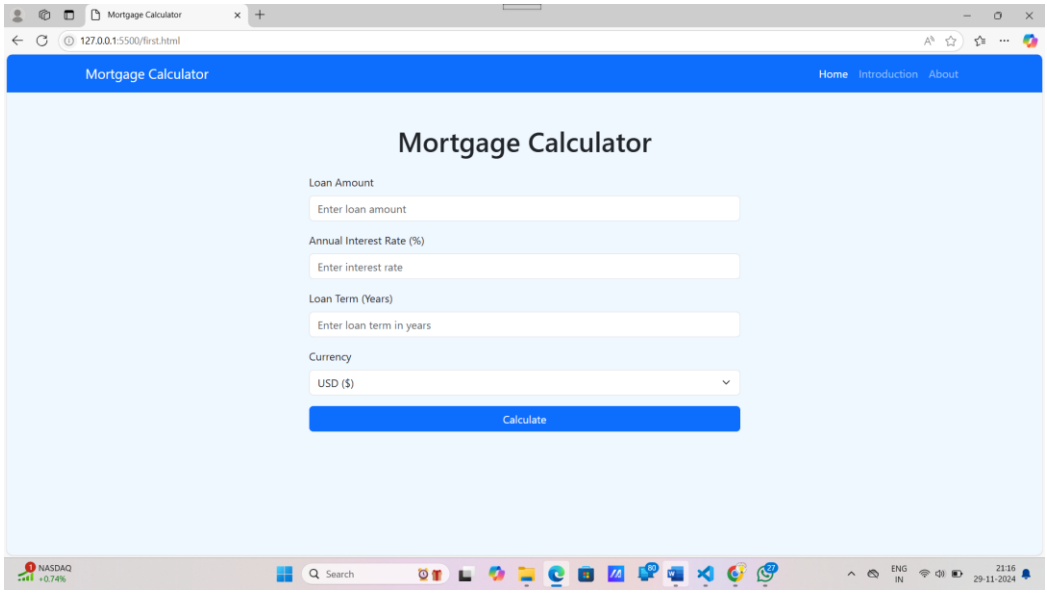
4. Challenges Encountered

- **Input Validation:** Handling edge cases, such as non-numeric values or negative inputs.
  JavaScript validation was implemented to encountered this problem and to ensure that only valid numerical values are processed.

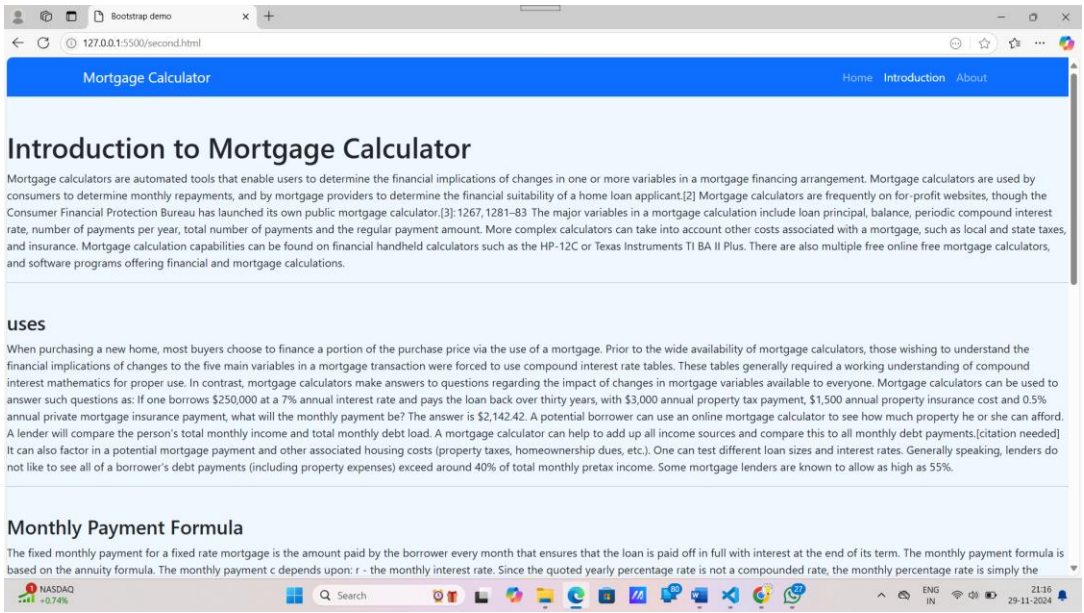
- **Accuracy of Calculations**: Rounding errors due to floating-point arithmetic in JavaScript.
  To encounter this problem the result is rounded to two decimal places using toFixed(2) for consistency in displayed monthly payments.

Result

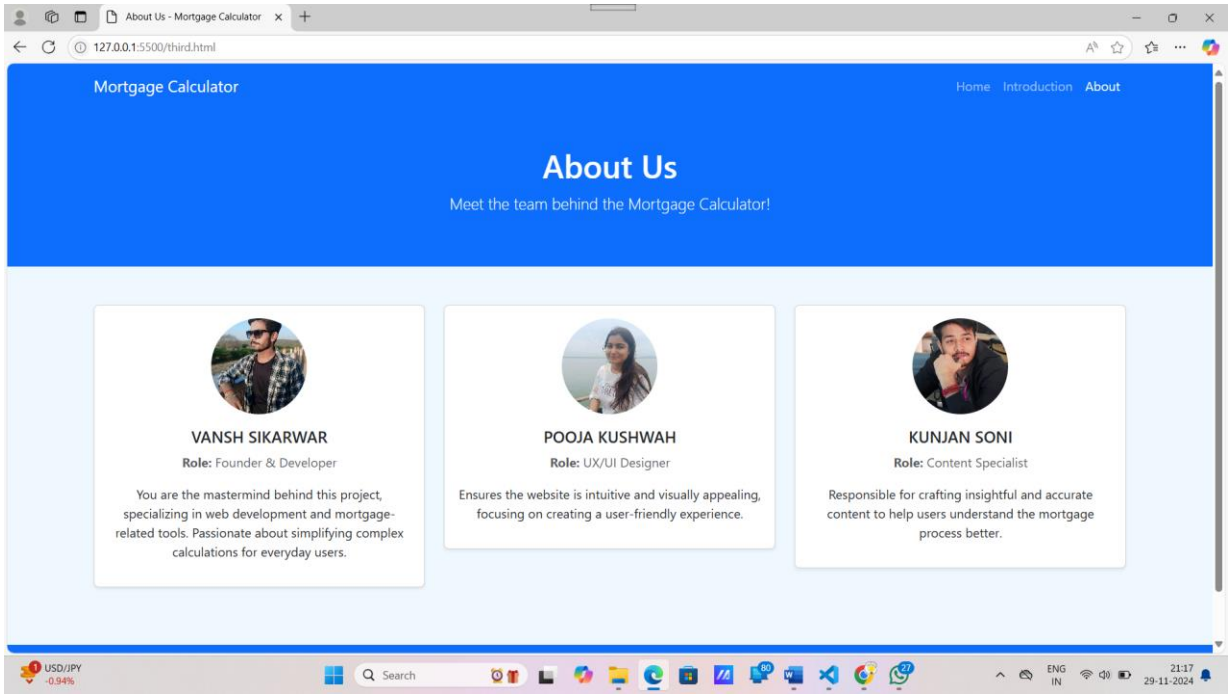
- This is the home page of website in which a form is provided to take input values for calculation mortgage in different-different currencies. Also a navbar is present in which three tabs are available Home tab, Introduction tab and About tab



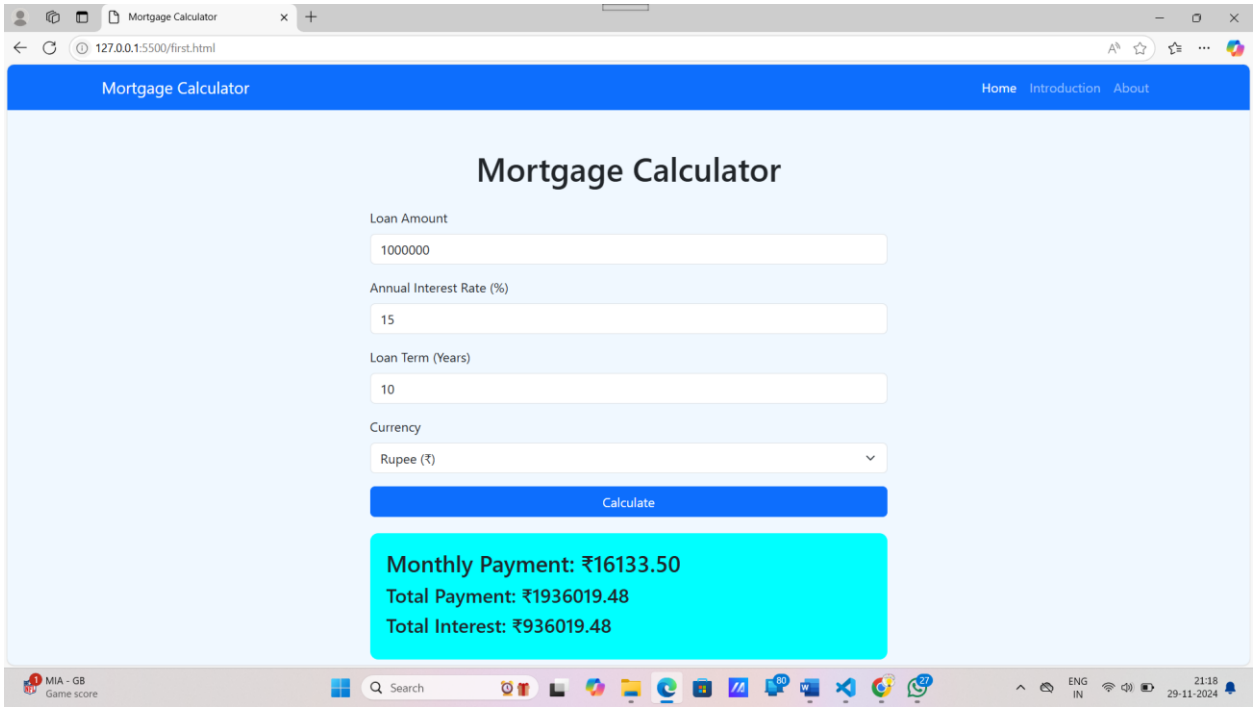
- This is the Introduction tab of the website in which information related to the mortgage calculator its uses and the formula by which mortgage is calculates has written



- Third page is about tab in which the information of Team behind the mortgage calculator is given with their roles.



- This page shows when we fill the values in calculator then how the result is shown to us.



Conclusion

The development of the mortgage calculator website marks a significant step toward providing users with a practical and accessible tool for financial planning. Utilizing HTML, CSS, Bootstrap, and JavaScript, the website combines modern web technologies to deliver an intuitive, visually appealing, and responsive interface. The integration of three key tabs—Home, Introduction, and About Us—ensures seamless navigation and a structured flow of information.

The Home tab provides users with a simple yet powerful mortgage calculation feature, enabling them to compute their monthly payments and evaluate loan options effortlessly. The Introduction tab educates users about the concept of mortgages its uses and the formula behind its calculation, while the About Us tab showcases the expertise and commitment of the development team.

This project demonstrates a successful blend of functionality and user-centered design. By leveraging JavaScript for dynamic calculations and Bootstrap for responsive styling, the website achieves both performance and usability. It serves as a reliable resource for individuals seeking to make informed decisions about their mortgages.

In the future, enhancements such as additional financial tools, user account integration, or real-time data updates could further improve the website's functionality and user experience. Overall, this project provides a solid foundation for empowering users with financial knowledge and tools.

Future Scope

1. Advance feature for the mortgage calculator

- Multiple loan comparison : allow user to compare different mortgage options side by side.
- Extend the calculator to handle other types of loans such as car loan or personal loan.
- An option for user to input additionally monthly or one time payments and see how this would reduce their loan term and total interest paid.

2. User experience enhancements

- Support for multiple languages and currencies to make the calculator accessible to a global audience.
- Develop a mobile application version or standalone app for ios and android.
- Provide users with the ability to save their mortgage calculation scenarios and export the result in pdf or excel file format.

3. Security and privacy consideration

- Implement secure data handling practices especially if the application allows users to save their calculations or input sensitive financial data.

4. Technology advancements

- AI Powered Recommendations : integrate ai to provide personalised mortgage advice based on user input such as suggesting loan terms that minimize total interest or recommending refinancing options.
- Voice assisted mortgage calculation : allow users to interact with calculator through voice commands using technologies like google assistant or amazon alexa.

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