Project Proposal

Home Loan Monitor

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ITPR7.508 Business Application Programming

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|  | REVISION DATE: Ongoing |

Home Loan Monitor

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# Section 1. Overview

## Purpose

The purpose of this document is to propose creating a user-friendly tool for managing home loans. It will help simplify mortgage management by offering features such as calculating payments, tracking interest rates, and managing multiple mortgages. This tool will have easy-to-use navigation, a clean design, and advanced features to improve productivity and simplify the mortgage management process. It's important to note that this proposal is intended for personal use only and is not designed for financial advisers or professional consultation.

## Business Context

In today's changing real estate market, managing mortgages can be complex. Our software aims to simplify this by offering a user-friendly solution tailored to your needs. It helps individuals and businesses effectively handle mortgage obligations despite fluctuating interest rates and evolving financial products.

## 1.3 Scope

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| **Project Include** |
| A mortgage calculator module enabling users to calculate monthly or fortnightly payments based on loan amount, interest rate, and loan term. |
| Incorporate the ability to compare multiple loans and interest rates. |
| Enablement of users to input variable interest rates over specific periods and automatically update mortgage calculations accordingly. |
| Inclusion of a feature to view historical mortgage data. |
| Support for managing multiple mortgages, allowing users to handle multiple properties simultaneously. |
| Addition of a chart to display mortgage data. |
| Provision of user-friendly interface webpages. |
| Inclusion thorough testing procedures to ensure the software functions as expected and meets quality standards. |
| Implementation of authentication features for multi-user access. |
| Provision of comprehensive documentation covering usage instructions. |
| Design of the software with scalability and performance in mind to handle a growing user base and large datasets. |

|  |
| --- |
| **Project Exclude** |
| The actual deployment of the website onto designated servers. |
| Extensive SEO services such as keyword research, on-page optimization, or link building. |
| Custom graphic design services beyond the scope of interface design and layout. |
| The necessary maintenance and updates for the software post-project completion. |
| Advanced financial analysis beyond basic mortgage calculations. Such as investment analysis, risk assessment, or portfolio management. |
| legal advice related to mortgages, including contract terms, legal obligations, or regulatory compliance. Users would need to consult legal professionals for such matters. |
| Property valuation services, including home appraisals or estimates of property values |
| tax advice or calculate property taxes. Users would need to consult with tax professionals or refer to relevant tax regulations. |
| While homeowners’ insurance and mortgage insurance are integral to homeownership, the software will not calculate insurance premiums. |
| Integration with banking systems, financial institutions, or real estate databases |
| Detailed analytics or reporting features beyond basic mortgage calculations will be excluded. |
| Complex mortgage types, such as adjustable-rate mortgages (ARMs) with various index rates and margins, will be excluded for simplicity. |

## User Characteristics

The target users of the home loan monitor/calculator software are diverse and may include individuals, families, real estate investors, and financial advisors. These users may have varying levels of familiarity with financial concepts and software usage. As such, the software will be designed with an intuitive interface and comprehensive help resources to accommodate users with diverse backgrounds and skill levels.

# Section 2. Assumptions, Dependencies, Constraints

## 2.1 Assumptions

For this project, we have had to make a few assumptions to ensure an understanding of the project’s conditions are understood correctly by all parties. These are listed below:

* **Loan Terms:** We must assume that loan terms are homogenized across all potential loans that utilize the software. This means that we will assume all loans carry the same terms regarding any “hidden” fees such as insurance and tax, which will be excluded from the final product and we will also assume that mortgages run through this software will have a full amortization, meaning that the loan will be paid off in full at the end of the term defined by the user.
* **Calculator Formula:** We also assume that the accuracy of all given formulas is empirically correct, but we will also allow for a margin of error of 0.1% to allow for any minor differences between the calculation from the software when compared to the real world.
* **Regulatory Compliance:**  As this software overlaps with areas of personal finances, we assume that all data used is compliant with Privacy laws around customer information. We also assume that all information is also compliant with relevant financial information laws.

## Dependencies

We will rely on some dependencies for this project to be able to develop the software that meets the requirements laid out. These are as follows:

* **Data Sources:** This software is reliant on being given accurate and up-to-date information regarding the financial information of a given mortgage case. This information includes but is not limited to, interest rates, repayment periods, loan amounts, and loan terms.
* **Platform Compatibility:** The software will also require that the platform that it is being run on is compatible with the software’s design. This information is flexible until the agreed-upon design is settled, in which the compatible software will be locked in and discussed in the Formal documentation as well as the user documentation at the end of the project.
* **Mathematical Libraries:** If the software utilized in these projects uses any mathematical libraries, we would then be dependent on the accuracy of these libraries.

## 2.3 Constraints

There are a few key constraints to consider that will impact the project’s scope and development. These are:

* **Time:** This project will need to be completed by the 7th of June 2024, so it will be important to prioritize the key functionalities of the software to complete the project on schedule.
* **Budget:** The budget for this project will be set before the project’s start, meaning that we will need to operate within what the budget allows throughout this project.
* **Legal:** We will need to operate within all relevant laws regarding this project, which may include privacy of data and security as financial data is involved.
* **Technical:** We also need to ensure that we operate that we work within the limitations of the software used and the intended hardware for the software.

# Section 3. Requirements

## 3.1 Business Requirements

To provide software to simplify the process of mortgage calculations. This software will be delivered in full on or by the 7th of June 2024 alongside complete user documentation. This project will cost up to (number).

## 3.2 Functional Requirements

* Mortgage Calculation:

The mortgage calculator function is the process of estimating mortgage payments.

### Mortgage Calculation Purpose:

This function is to calculate mortgage payments based on user-provided input, including loan amount, interest rate, and payment frequency.

## 3.3 Mortgage Inputs:

|  |  |
| --- | --- |
| **Function input** | **Definition** |
| Principal | The initial amount of money borrowed for purchasing a home. |
| Principal Increment | An increasing value of the principle. |
| Interest | The additional amount charged by the lender for borrowing the principal amount. |
| Interest Increment | An increasing value of the interest. |
| Years | The total duration of the loan is in years. |
| Months | The specific month within the loan term. |
| Payment override option | Confirming if a payment override is included. |
| Payment override amount | The adjustment amount was used instead for mortgage calculation. |
| payment override format | The repayment timeframe the override applies to. |

## 3.4 Mortgage Operations:

* Calculate mortgage payments based on Principal, interest, and term (years and months).
* Calculate payments based on increment amounts to a set value.
* If an override is provided, calculate based on those values.

## 3.5 Mortgage Outputs:

The outputs are presented both on a fortnightly and monthly basis, providing valuable insights into your repayment structure.

There are two categories initial payment breakdown and mortgage maturity, and it will give you fortnightly and monthly outcomes.

The initial payment breakdown components include:

* Estimated Repayment ±0.1%: The estimated repayment amount with a margin of error of ±0.1%.
* Interest: The portion of the payment allocated towards the interest accrued on the principal amount.
* Principal: The portion of the payment allocated towards reducing the principal amount borrowed.
* Extra Payment: Any additional payment made towards the principal, beyond the required fortnightly payment.
* Repayment: The total repayment amount for the fortnight or monthly, including interest, principal, and any extra payment made.

In the analysis (mortgage maturity) section components include:

* Payments over full term: Total payments made over the entire duration of the loan term, inclusive of both principal and interest.
* Payments over reduced Term: Total payments made over a reduced loan term, if extra payments are made towards the principal.
* Full term to amortize: The total loan term required to fully amortize the loan.
* Estimated reduced term to amortize: The estimated reduced loan term is required to fully amortize the loan with additional payments towards the principal.
* Interest over full term ±0.1%: Total interest paid over the full loan term, represented as a percentage of the total loan amount, with a margin of error of ±0.1%.
* Principal + interest over full term: Total amount paid towards both principal and interest over the full loan term.
* Interest over reduced term ±0.1%: Total interest paid over the reduced loan term, represented as a percentage of the total loan amount, with a margin of error of ±0.1%.
* Interest saved over reduced term ±0.1%: Potential interest savings achieved by making extra payments towards the principal, represented as a percentage of the total loan amount, with a margin of error of ±0.1%
* Principal + interest over reduced term: Total amount paid towards both principal and interest over the reduced loan term.

## 3.6 Mortgage graphing function:

* Fortnightly payment breakdown for the principal amount vs. interest amount
* Monthly payment breakdown
* Total interest paid overtime
* Principal reduction over time
* Estimated repayment vs. actual repayment

## 3.7 User Case:

* User story 1: as a user, I want to input the principal amount, interest rate, and loan term in years and months, and specify whether I want to make payments on a monthly or fortnightly basis so that the system can calculate my repayment structure accordingly.
* User story 2: as a user, I want to specify whether I intend to make extra payments towards the principal beyond the regular repayment amount so that the system can adjust the repayment schedule accordingly.
* User story 3: as a user, I want to view the breakdown of my mortgage repayment, including estimated repayment, interest, principal, and total repayment, based on the input principal, interest rate, loan term, and payment frequency, so that I can understand how my payments are allocated over time.
* User story 4: As a user, I want to analyze the maturity of my mortgage, including the total payments made over the full term, the full term required to fully amortize the loan, the total interest paid over the full term, and the total amount paid towards both principal and interest, based on the input principal, interest rate, loan term, and payment frequency, so that I can assess the overall cost of my mortgage.

## 3.8 Logical Data Requirements

The logical data requirements for the mortgage calculator software include essential data elements such as loan information (amount, interest rate, term), payment details, comparison data for multiple loan options, historical mortgage data including interest rates, user profile data for authentication and preferences, multi-mortgage management capabilities, chart data for visualization, user inputs, system configuration settings, audit trail for logging user actions, documentation, and error messages. These requirements form the backbone of the software, ensuring accurate calculations, effective user interaction, and seamless operation.

## 3.9 User Requirements

Users require a user-friendly home loan monitor to accurately calculate their mortgage payments. The software should allow users to input all necessary details and display the results, including additional graphical representations.

The mortgage software should enable users to easily input their loan information and view clear repayment details. Accuracy is crucial, with repayment calculations being precise to within a 0.1% margin. Additionally, users should have access to graphical representations of their mortgage data. The software must utilize correct mathematical formulas for precise calculations and Integration with a database system is essential to safeguard user data.

## 3.10 Information Management Requirements

We require the data to be held inside a database with access done via user logins to ensure that they can only access data relating to them. We will also have the inclusion of an admin account to access overarching controls. We will also store information in the server that is more sensitive behind an encryption layer to ensure the privacy of more important data such as users’ passwords, loan amounts, repayment amounts and what user is associated with each mortgage.

## 3.11 Systems Requirements

### 3.11.1 Performance Requirements

The software will be required to operate with a fast response time as it is operating locally, also scalability issues will not be considered as it is operating locally, and it will not be designed with multiple concurrent users utilizing the software.

### 3.11.2 Quality Requirements

The software’s function will pass all available unit testing, integration testing and functional testing, with the level of accuracy of the repayments being limited to no greater than 0.1% difference.

## 3.12 Interfaces

The software will have options to log in and out, create a new user account, update, and view their current mortgages and visually see how their mortgages are progressing via a graph.

# Section 4. Budget

Total Budget Allocation:

The total budget for the project is **$32,080.00.**

*1. Labor Costs:*

Labour costs amount to $27,200.00, with two individuals working for 10 hours per week over 16 weeks.

*2. Contingency Fund:*

A contingency fund of $4,080.00 (15% of Labor Costs) is allocated to cover unforeseen expenses or scope changes.

*3. Documentation and Reporting:*

An additional $800.00 is allocated for documentation and reporting tools to ensure effective project management and communication.

No costs have been allocated for software, hardware, networking, or overheads as these are not needed for the completion of the project.

# Section 5. Conclusion

The proposed user-friendly home loan monitor aims to simplify the complexities of loan tracking, interest rate management, and financial planning. With straightforward navigation, unobtrusive design, and advanced functionalities, this monitor will greatly improve the mortgage management process, offering users a seamless experience. The inclusion of a mortgage calculator module, the ability to compare multiple loan and interest rates, and support for variable interest rates will give users the tools necessary for informed decision-making and comprehensive financial planning. Also, including support for managing multiple properties and the incorporation of historical mortgage data will allow users to have the ability to handle diverse mortgage portfolios. The project's focus on having a user-friendly design shows a focus on enhancing user experience and productivity. By including these key features, the home loan monitor will significantly improve and streamline mortgage management processes.

# Section 6. Recommendation

Recommendation: We highly recommend the decision to approve the development of our user-friendly home loan monitor, considering the substantial benefits it promises to deliver. The implementation of this project has the potential to drastically improve mortgage management for users, offering extremely useful tools for financial planning and mortgage tracking. While we acknowledge the potential complexity of implementing some of the features within this project, the long-term value and benefits that the home loan monitor will bring greatly justify this difficulty. Therefore, we hope that we can move forward to the development phase of this project because we are excited to be able to deliver such crucial and fundamentally useful software as soon as possible.

# Section 7. Appendix

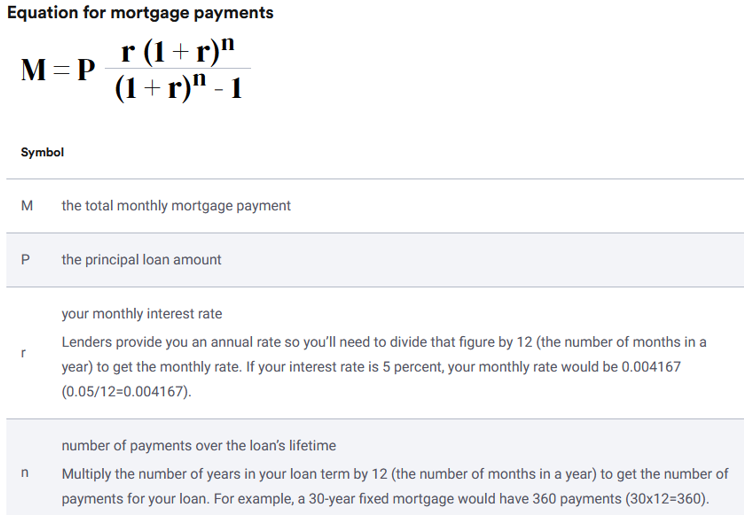
## 6.1 Requirements Traceability Matrix

|  |  |  |
| --- | --- | --- |
| ID | Selection | Requirement Description |
| *REQ1* | Mortgage ranges | prevent users from changing the loan term once it has been initially set. |
| *REQ1-1* | provide input options for the payment override |
| *REQ1-2* | restricting input lengths to prevent buffer overflows. |
| *REQ1-3* | perform range checking for numeric input fields to ensure that values fall within the predefined minimum and maximum limits. |
| *REQ1-4* | if a value exceeds the allowed range, display an error message and prompt the user to enter a valid value within the specified range. |
| *REQ1-5* | set the input for payment override as 'y' or 'n' and only interact with this function when it is 'true' for further calculations. |
| *REQ2* | Initial payment | displaying estimated repayment, interest, principle, extra payment, and total repayment. |
| *REQ2-1* | ensure that the estimated repayment amount is calculated accurately based on the user-provided inputs. |
| *REQ2-2* | calculate the interest component of the payment accurately, considering the current interest rate and principal amount. |
| *REQ2-3* | calculate the principal component of the payment accurately, reflecting the portion of the payment that goes towards reducing the loan principal. |
| *REQ2-4* | include any additional payments made towards the principal as part of the calculation for total repayment. |
| *REQ2-5* | implement error handling to handle any calculation errors and display informative error messages to the user. |
| *REQ3* | Analysis | showing payments over the full term, payments over the reduced term, full term to amortize, estimated reduced term to amortize, interest over the full term, principal + interest over the full term, interest over the reduced term, interest saved over the reduced term, and principal + interest over the reduced term. |
| *REQ3-1* | ensure accuracy and precision in all calculations to provide reliable and informative analysis results |
| *REQ3-2* | calculate the total payments made over the entire duration of the loan term, inclusive of both principal and interest. |
| *REQ3-3* | calculate the total payments made over a reduced loan term if extra payments are made towards the principal. |
| *REQ3-4* | calculate the total loan term required to fully amortize the loan. |
| *REQ3-5* | estimate the reduced loan term required to fully amortize the loan with additional payments towards the principal. |
| *REQ3-6* | calculate the total interest paid over the full loan term, represented as a percentage of the total loan amount. |
| *REQ3-7* | calculate the total amount paid towards both principal and interest over the full loan term. |
| *REQ3-8* | calculate the total interest paid over the reduced loan term, represented as a percentage of the total loan amount. |
| *REQ3-9* | calculate the potential interest savings achieved by making extra payments towards the principal, represented as a percentage of the total loan amount. |
| *REQ3-10* | calculate the total amount paid towards both principal and interest over the reduced loan term. |
| *REQ4* | Projected payments per month/ fortnight | specifies the format for presenting projected mortgage payments on a monthly or fortnight basis. include details such as interest rates and associated payment amounts for each month or fortnight. |
| *REQ4-1* | display projected mortgage payments for each month or fortnight based on the provided inputs and current interest rates. |
| *REQ4-2* | ensure that the format for presenting projected payments is clear and easy to understand for the user. |
| *REQ4-3* | include the applicable interest rate for each month or fortnight alongside the corresponding payment amount. |
| *REQ4-4* | implement error handling to handle any calculation errors and display informative error messages as necessary. |
| *REQ4-5* | validate the accuracy of payment projections |
| *REQ5* | Other | graphing interface displaying mortgage calculation results. |
| *REQ5-1* | validate user input to ensure that only numeric values are accepted for numerical input fields. |
| *REQ5-2* | ensure that all user inputs are properly validated to prevent errors and maintain data integrity. |
| *REQ5-3* | provide informative error messages to users in case of invalid inputs or errors during mortgage calculation |
| *REQ5-4* | provide comprehensive documentation and help resources to assist users in understanding and using the application |

## 6.2 Mortgage Calculation Formula

A screenshot of a computer screen

Description automatically generatedThe software will need to utilize the following formulas to calculate all the required values to correctly track the mortgage over time.

A math problem with black text

Description automatically generated with medium confidence