Currency Hub

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Abstract

This project aims to develop a comprehensive and user-friendly currency converter application using MATLAB, with one of the objectives being to address the limitations of existing converters. The application will feature an intuitive graphical user interface that enables users to convert between at least 15 different currencies in real-time. Users can input an amount, select source and target currencies from drop-down menus, and instantly view the converted amount. The converter will utilize up-to-date exchange rates that are automatically updated in real-time, with the use of Power Query in Microsoft Excel. We also have a visualization graph alongside updated every 10 minutes. The application will cater to a wide range of target users, including but not limited to international travelers, business professionals, students studying abroad, and financial analysts. By providing accurate, real-time currency conversion for multiple currencies, this tool aims to simplify financial calculations and decision-making in an increasingly globalized economy. The implementation in MATLAB showcases the versatility of this computational platform for creating practical, user-centric applications with real-world relevance.

Other key features of the currency converter will include historical exchange rate tracking, and the ability to save frequently used currency pairs, The application will also incorporate input validation to prevent errors and allow users to customize the precision of their results. These features, combined with the real-time update functionality, set this converter apart from many existing solutions. This project not only serves as a practical tool but also addresses a bunch of contemporary engineering challenges. Some of the main ones are real-time data processing, user interface design for complex data presentation, automated data updating and synchronization, and the application of mathematical and computational tools to solve everyday problems. By developing this application, we aim to demonstrate how engineering principles can be applied to create solutions that have immediate, practical benefits for users across various sectors.
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Introduction

In the digital age that we live in today, the ability to quickly and accurately convert between currencies has become an essential and crucial skill for many. From streets of places like Tokyo to the financial districts of New York, currency values will always fluctuate constantly, impacting everything from personal travel budgets to business deals that could range in the millions. While the concept of currency exchange is centuries old, the digital age has transformed how we approach this fundamental economic activity. The advent of smartphones and widespread internet access has made currency conversion more accessible than ever before. However, this accessibility has not always translated into reliability or efficiency. Many existing digital solutions fall short in various aspects, leaving users frustrated or misinformed. Some applications offer a wide array of currencies but fail to update their rates frequently, while others provide real-time data but suffer from cluttered interfaces that hinder quick calculations. Moreover, the needs of currency converter users vary widely. A backpacker hopping between Southeast Asian countries has different requirements than a forex trader analyzing market trends. This diversity in user needs presents a unique challenge: how to create a tool that is both simple enough for casual use and robust enough for professional applications.

Our project, named Currency Hub, seeks to address these challenges by utilizing the computational power of MATLAB. By choosing this platform, we aim to demonstrate that complex financial tools need not be limited to specialized software or cumbersome enterprise solutions. Instead, we envision a currency converter that marries the precision of financial software with the user-friendliness of a mobile app. The significance of this project extends beyond mere convenience. In a world where economic borders are increasingly blurred, a reliable currency converter serves as a bridge between different economic systems. It empowers individuals to make informed financial decisions, whether they're negotiating an international business contract or simply trying to stick to a vacation budget. Furthermore, this project touches on several key areas of modern software engineering. It involves real-time data processing, requiring us to consider issues of data reliability and synchronization. The user interface design challenges us to present complex financial information in an intuitive manner. And the need for accuracy pushes us to implement robust error-handling and validation systems.
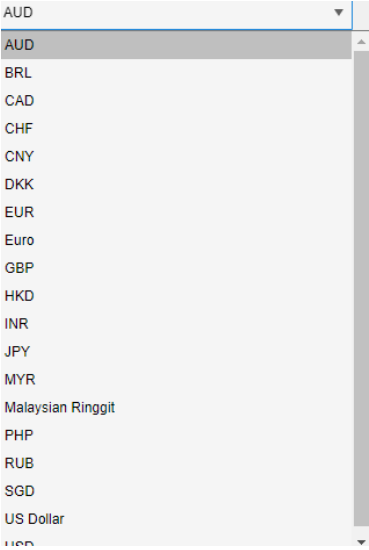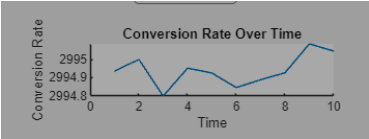
By pushing through with this project, we're not just creating a useful tool; we're exploring how engineering principles can be applied to solve everyday problems. We're investigating the intersection of finance, technology, and user experience design. And perhaps most importantly, we're contributing to the broader goal of making financial information more accessible and understandable to everyone. As we go more in depth into the specifics of our currency converter, we'll explore how each feature and design decision ties back to these broader themes. From the selection of currencies to include, to the method of presenting historical data, every aspect of this project reflects our commitment to creating a tool that is not just functional, but truly valuable in our interconnected global economy.
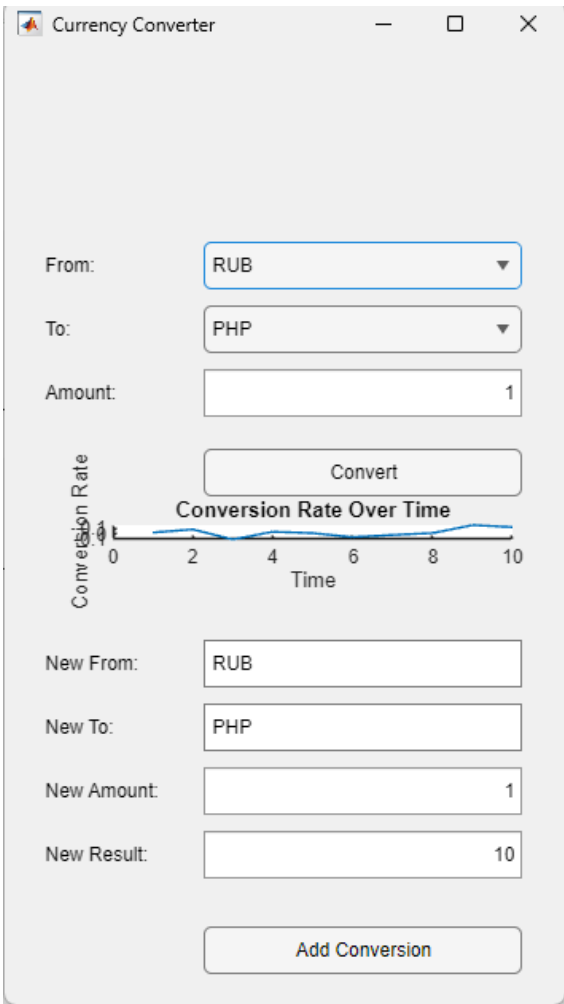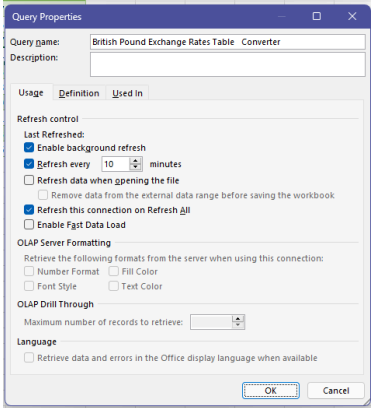
Functionalities

This section describes the list of functionalities that you want to build as part of the application. Preferably, this list should be as granular as possible.

You can create these sets of functionalities by formulating a table as shown below

TABLE I.   Table Type Styles

Persona	Description	Benefit	Documentation
International Travelers who travel often on business trips	Convert between 15 available currencies	Can facilitates financial planning and transactions while abroad	
Financial Analyst	View conversion rate (graph)	Has a detailed analysis of trends and fluctuations in currency rates before making financial decisions	

| Business Student / Professional | Save new conversion added | Streamlines transactions by providing quick access to common conversions | |
| Foreign Exchange Trader | Real time conversion updates | Provides the most up-to-date information, which will be crucial for market strategies | |

Walkthrough

A. Starting the Application

1. Download the assets and source code of the CurrencyHub program (will be in google drive) before anything else
2. Launch MATLAB and run the Currency Hub script.
3. The GUI window of Currency Hub will open.

B. Convert Between 15 Available Currencies
1. In the 'From' dropdown, select the currency you want to have, such as GBP (Great British Pound)
2. In the 'To' dropdown, choose the currency you want to convert it to, such as Malaysian Ringgit.
3. In the 'Amount' field, enter the amount you wish to convert, for example, 500.
4. Click the 'Convert' button to perform the conversion.
5. The result of the conversion will be shown in the box below.

C. View Conversion Rate (Graph)
1. Below the conversion section, there's a graph labeled 'Conversion Rate Over Time'.
2. This graph displays how the exchange rate has varied over time, which helps in understanding market trends.
3. The graph is based and updated every 10 minutes using the database created in Microsoft Excel using the Power Query method

D. Additional Features:
- Real-time Updates and Saving Conversions: These functionalities are not visible in the current interface snapshot. If implemented, make sure users know:
1. How updates are received and indicated on the interface.
2. Where and how to save conversions for easy future access.