

NBP Currency Analysis System - Technical Offer

Orange project group

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1 Definitions

For the purposes of this Agreement, the following terms shall have the meanings set forth below:

- **Application** - the software system developed and delivered under this Agreement, deployed as a web-based solution accessible through supported browsers.
- **Contractor** - the party responsible for performing the obligations defined in this Agreement.
- **NBP** - National Bank of Poland (Narodowy Bank Polski), not a party to this Agreement.
- **NBP API** - the public application programming interface provided by the National Bank of Poland (Narodowy Bank Polski), serving as the sole source of exchange rate and currency data for the Application.
- **Supported Browsers** - the list of browsers and their respective versions on which the Application is warranted to provide full functionality.
- **Available Currencies** - list of currencies supported in the Application, as published on the page of the National Bank of Poland (NBP) in Table A.
- **End User** – an individual who accesses and uses the Application through a Supported Browser for its intended functionality. End Users are not parties to this Agreement.

2 Functional Requirements

The following table outlines the functional requirements for the system.

ID	Name	Description
FR-01	Available Currencies	Available currencies are listed at NBP page in Table A. All monetary values in the system are normalized to Polish Złoty (PLN). When a user selects a currency, the system performs a conversion based on exchange rate data provided by the NBP API.
FR-02	Session Analysis	The system shall calculate the number of rising, falling, and unchanged sessions for specified criteria – currency and time period.
FR-02.1	Currency Criterion (Session Analysis)	User shall choose currency from the list of Available Currencies.
FR-02.2	Period Criterion (Session Analysis)	User shall choose time period from the list of available periods of either 1 week, 2 weeks, 1 month, 1 quarter, 6 months, or 1 year back. Given period is a time range back from the moment of refresh.
FR-02.3	Refreshing Data (Session Analysis)	Data shall be refreshed on explicit request from End User.
FR-03	Statistical Measures	The system shall calculate the median, mode, standard deviation, and coefficient of variation for specified criteria – currency and time period.
FR-03.1	Currency Criterion (Statistical Measures)	User shall choose currency from the list of Available Currencies.

ID	Name	Description
FR-03.2	Period Criterion (Statistical Measures)	User shall choose time period from the list of available periods of either 1 week, 2 weeks, 1 month, 1 quarter, 6 months, or 1 year back. Given period is a time range back from the moment of refresh.
FR-03.3	Refreshing Data (Statistical Measures)	Data shall be refreshed on explicit request from End User.
FR-04	Change Distribution	The system shall calculate the distribution of monthly and quarterly changes for specified criteria – currency pair, period type, and period start date.
FR-04.1	Currency Pair Criterion (Change Distribution)	User shall choose two currencies, each from the list of Available Currencies or Polish Złoty (PLN).
FR-04.2	Period Start Criterion (Change Distribution)	User shall choose period start date of period.
FR-04.2.1	Minimal Period Start Date	The selectable start date shall not be earlier than 2002-01-02.
FR-04.2.2	Maximal Period Start Date	The selectable start date shall be constrained so that the resulting period end date does not exceed the current date (as of the moment of data refresh).
FR-04.3	Period Type Criterion (Change Distribution)	Depending on chosen period type, End User shall choose one of available time periods.
FR-04.3.1	Time Period Criterion – Monthly (Change Distribution)	For a month period data shall be showed for 31 days following selected period start date.
FR-04.3.2	Time Period Criterion – Quarterly (Change Distribution)	For a quarter period data shall be showed for 93 days following selected period start date.
FR-04.4	Refreshing Data (Change Distribution)	Data shall be refreshed on explicit request from End User.
FR-05	Histogram Visualization	The system shall display the change distribution as a frequency histogram showing value changes in specified date range.
FR-05.1	Histogram Table	The histogram shall provide an alternative display mode that presents the underlying values in a table only, without rendering the graphical chart.
FR-06	Data Export	The system shall allow End Users to export the generated statistical reports and session data into CSV format.

Table 1: List of Functional Requirements

3 Non-Functional Requirements

These requirements define the quality attributes of the system.

ID	Name	Description
NFR-01	Accuracy	All statistical measures (e.g., standard deviation, coefficient of variation) must be calculated with a precision of at least 4 decimal places.
NFR-02	Performance	Once the source data is retrieved from NBP API, the system must process it and generate the specified statistical reports and histograms within up to 10 seconds.
NFR-03	Data Integrity	Analyses defined by "last X periods" (e.g., last 1 week) must utilize data updated to the most recent closed trading session.
NFR-04	Error Handling	The system must handle errors from all sources, including user input, internal processing, and external data dependencies, by displaying an error message to the user.
NFR-05	Application Delivery	The application shall be deployed as a web-based solution accessible through supported browsers, without requiring local installation on end-user devices.
NFR-06	Supported Desktop Browsers	<p>The application shall provide full functionality, interface consistency, and official technical support on the latest stable versions of the following desktop browsers:</p> <ul style="list-style-type: none">• Google Chrome: versions 143 and 142,• Mozilla Firefox: versions 146 and 145,• Microsoft Edge: versions 143 and 142. <p>Support is limited to the two most recent stable major releases. Testing versions (Beta, Dev, Canary), mobile versions, and Extended Support Releases (ESR) are not covered by the full support standard.</p>
NFR-07	Desktop-Only Design	The application is designed exclusively for desktop environments. The layout shall be optimized for a minimum viewport width of 1024 pixels. Mobile and tablet devices are not supported, and responsive adjustments for small screens (below desktop resolutions) are not required.
NFR-08	Data Source Dependency	The Application retrieves and presents data directly from the NBP API. The Application does not store or retain such data locally. Consequently, any disruption, unavailability, or malfunction of the NBP API may affect the functionality or availability of the Application. The Contractor shall bear no responsibility or liability for any such disruptions or resulting limitations in the Application's performance.
NFR-09	Internet Access	The Application requires active internet connection to present the data.
NFR-10	Localization - Language	All text presented in the Application, including user interface, shall be provided exclusively in English (US).

ID	Name	Description
NFR-11	Historic data limitations	The application provides only currency data published by the NBP. As a result, not all currencies are guaranteed to be available for the full historical period, nor for every individual day within that period.
NFR-12	Service Constraints	The application inherits all limitations inherent to the NBP service; Contractor assumes no responsibility for constraints imposed by NBP API service.
NFR-13	Warranty Period	Contractor shall warrant that the Application meets all functional and non-functional requirements for a period of 7 calendar days following its formal acceptance.

Table 2: List of Non-Functional Requirements

4 Project Schedule (Gantt Chart)

Following initialization, the team proceeds with the simultaneous development of **Session Analysis** and **Statistical Measures**. Once these foundational elements are in place, the **Change Distribution (Histogram)** module is implemented. The timeline concludes with a dedicated **General Testing** phase to ensure data accuracy and system stability, followed by the final compilation of **Documentation**. The project timeline is estimated to take 4 weeks.

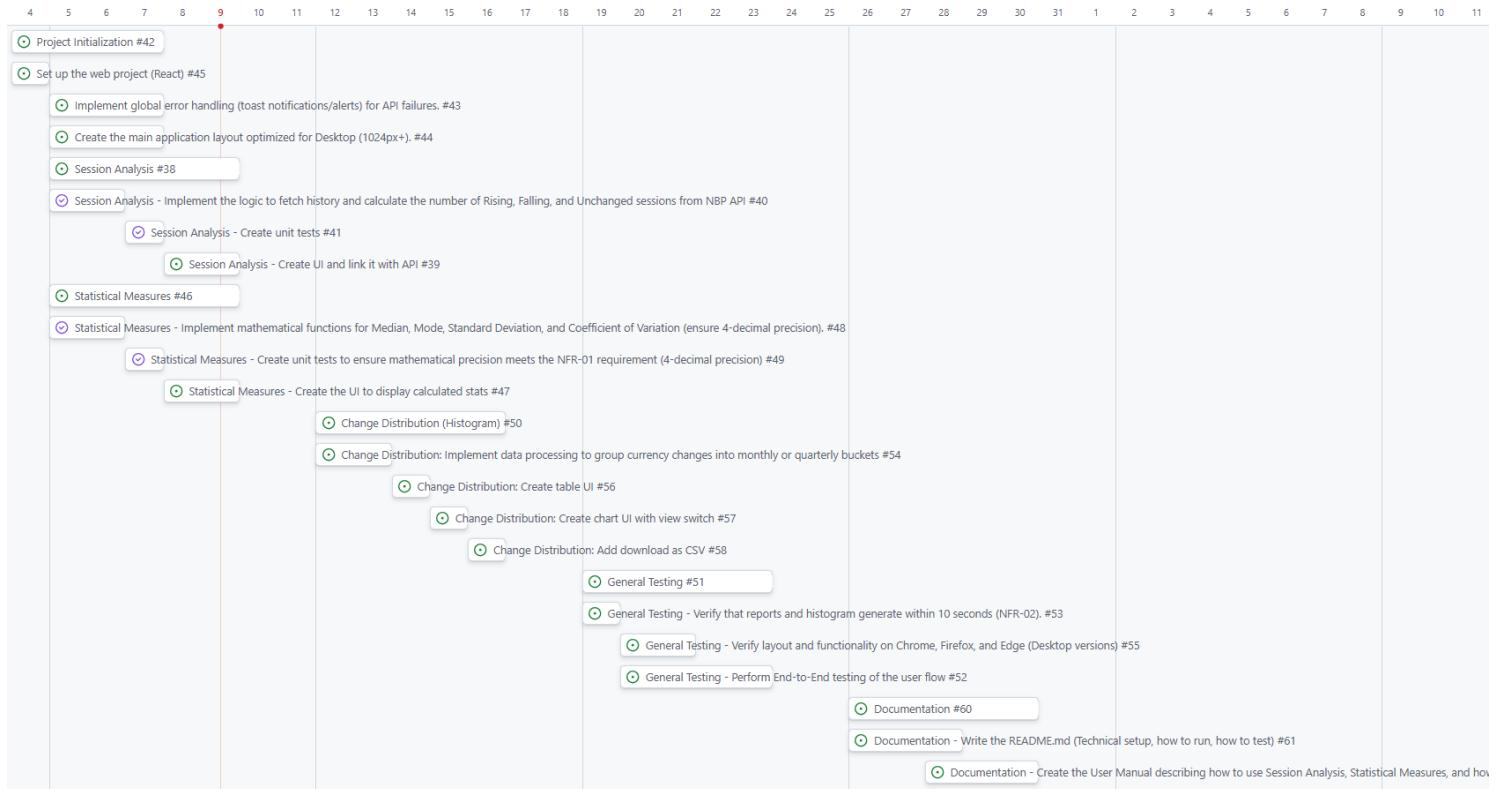


Figure 1: Project Implementation Schedule: 4-Week Timeline

5 Use Case Diagram

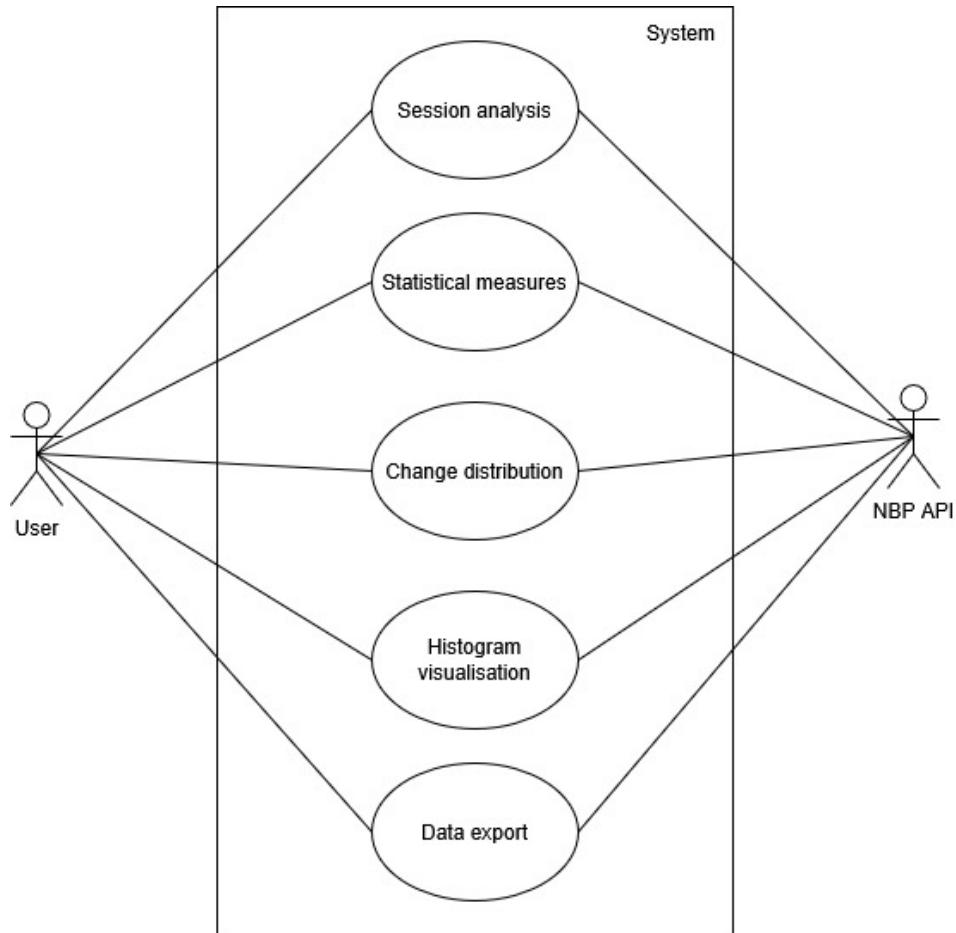


Figure 2: Use case diagram.

6 Prototype Of Application GUI

The following mockups serve as a visual representation of the functional requirements outlined in Section 1. The primary intent of this prototype is to demonstrate the user interface (UI) layout, ensuring an intuitive user experience (UX) for financial data analysis.

The mockups illustrate the integration of data filtering (currency and period selection) with real-time visualization components, such as statistical tables and frequency histograms. This design focuses on clarity and accessibility, allowing End Users to efficiently toggle between different analysis types and view modes (graphical vs. tabular) as defined in the requirements.

Note: Not all available currencies and currency pairs are shown in the mockups below; the final application will include a wider selection. Additionally, the specific names of currencies and currency pairs may vary slightly in the production version compared to these visual previews.

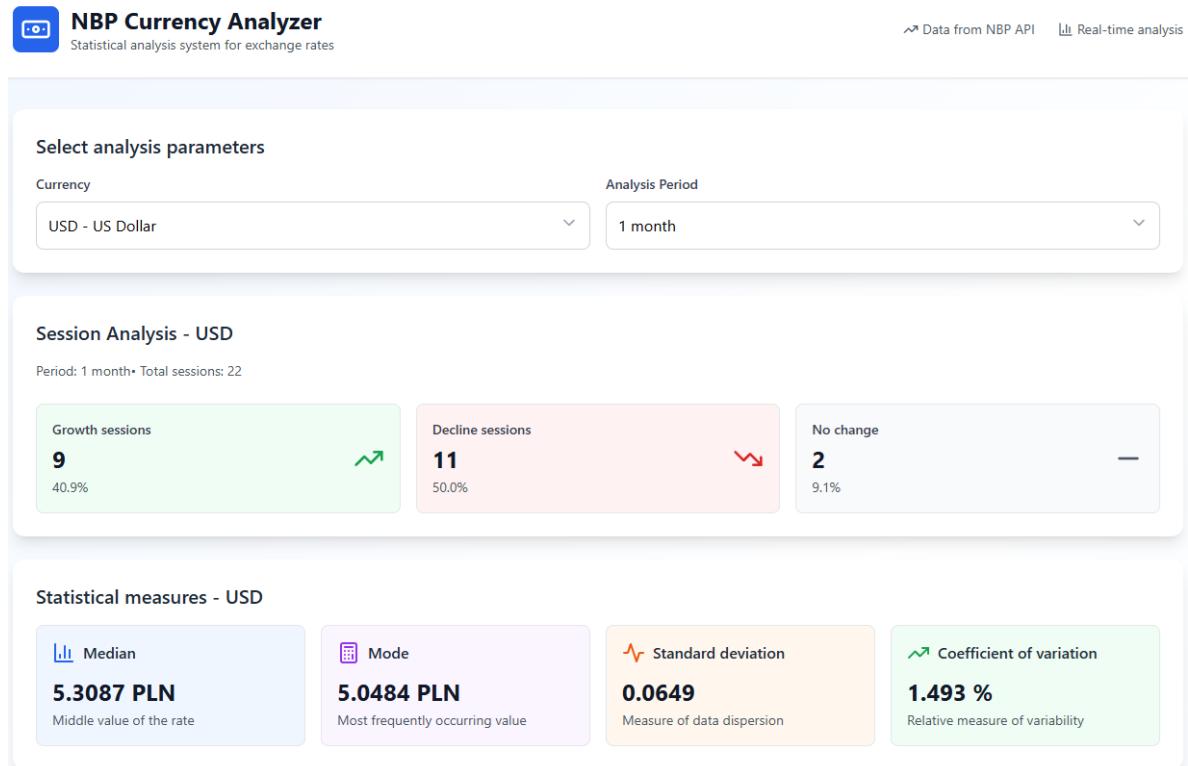


Figure 3: Application view of the analysis for a selected currency and time interval

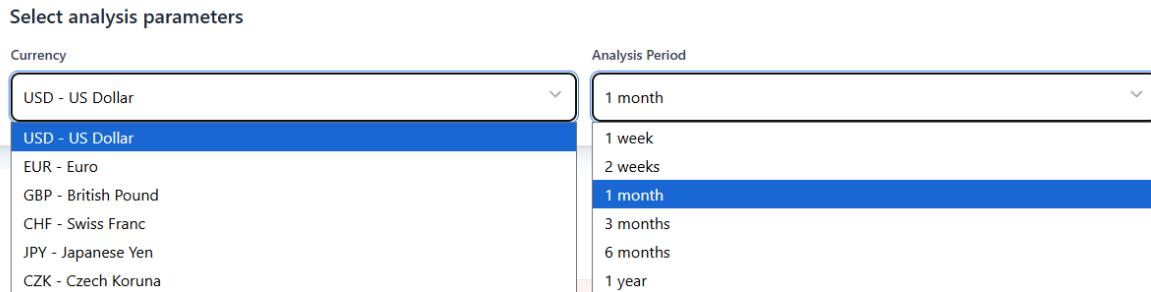


Figure 4: Available currency and period selections used to calculate the number of bullish, bearish, and unchanged sessions, as well as statistical measures: median, mode, standard deviation, and coefficient of variation



Figure 5: Frequency histogram of value changes in user-selected currency pairs within a given interval



Figure 6: Selection of the time interval used to generate the change distribution histogram

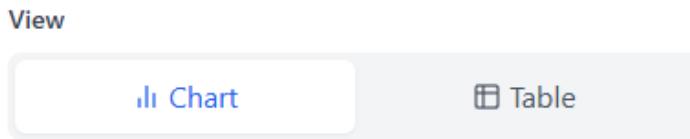


Figure 7: Application button for toggling the display mode of the frequency histogram for value changes in user-selected currency pairs