Functional Requirement Document

Title: WAARR Computation
Version: 1.0
Prepared by: [Your Name]
Date: [Current Date]

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1. Introduction

1.1 **Purpose**
The purpose of this document is to outline the functional requirements for the calculation of WAARR (Weighted Average Annual Rate of Return). This metric will help to provide insights into the investment's performance over a period of time, taking into account different weights of the cash flows.

1.2 **Scope**
This document describes the method, formula, and steps to compute WAARR. It covers data input requirements, constraints, assumptions, and functional specifications required to perform the calculation.

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2. Requirements Overview

2.1 **Business Requirements**
The system shall compute WAARR for a given investment portfolio. The output will be a percentage that shows the performance of the portfolio over a specific period.

2.2 **Functional Requirements**

- Input:
  - Investment Cash Flows
  - Weights (either by time period or portfolio proportion)
  - Time Period (for annual rate of return)
- Output:
  - The computed WAARR in percentage (%).

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3. WAARR Formula

The WAARR is calculated using the following formula:

$$WAARR = \frac{ \sum (R_t \times W_t) }{ \sum W_t }$$

Where:

- RtR_tRt is the rate of return for a specific time period ttt.
- WtW_tWt is the weight corresponding to the rate of return for the period ttt. This could represent the time the investment was held or the proportion of the total investment.
- ∑(Rt×Wt)\sum (R_t \times W_t)∑(Rt×Wt) represents the sum of the weighted returns for all periods.
- ∑Wt\sum W_t∑Wt represents the sum of the weights.

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4. Detailed Specifications

4.1 **Input Fields**

Field Name	Type	Description
Cash Flow	Numeric	Series of cash flows for the investment over time.
Weight	Numeric	The weight associated with each cash flow (proportional or time-based).
Time Period	Date	The time period for each cash flow (optional for specific time-sensitive calculations).

4.2 **Output Fields**

Field Name	Type	Description
WAARR	Percentage (%)	The weighted average rate of return for the given cash flows and weights.

4.3 **Assumptions**

- All cash flows are entered for the correct period.
- Weights are either based on the time each cash flow was held or based on the proportion of the portfolio.
- Negative cash flows represent losses or withdrawals.

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5. Functional Flow

1. **User Input**:
    - User enters cash flow data and corresponding weights.
    - Optionally, user enters specific time periods to associate each cash flow.
2. **System Calculation**:
    - The system calculates the return for each period.
    - The system applies the corresponding weight to each return.
    - The system computes the sum of weighted returns and divides by the total weights.

3. **Output**:
    - The system returns WAARR in a percentage format, indicating the overall rate of return adjusted for the weights of each cash flow.

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6. Constraints

- **Data Format**: All cash flow entries must be numeric.
- **Weight Calculation**: If weights are missing, the system will automatically apply equal weighting to each period unless specified otherwise.
- **Precision**: WAARR will be rounded to two decimal places.

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7. Error Handling

- If non-numeric data is entered, an error message will display: "Invalid input. Please enter numeric values for cash flows and weights."
- If the total weights do not add up to 1 (or 100%), the system will normalize the weights automatically.

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8. Reporting

- The system shall generate a report summarizing the cash flows, their weights, the individual returns, and the computed WAARR.
- The report will also include visual aids, such as charts, for better understanding of the rate of return over time.

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9. Acceptance Criteria

- The system correctly computes WAARR based on the provided input.
- The system handles invalid inputs by providing appropriate error messages.
- The system provides accurate reports with clear data representation.

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10. Glossary

- **WAARR**: Weighted Average Annual Rate of Return.
- **Cash Flow**: The amount of money being transferred in and out of an investment.
- **Weight**: A numerical value representing the importance or proportion of each cash flow in the overall portfolio.