

Functional Requirement Document (FRD) for Portfolio Report

Pre-requisite

1. Risk Profiling

Risk Profiling is a crucial assessment used to determine a customer's risk tolerance and investment preferences. It helps in aligning the customer's investment strategy with their financial goals and risk appetite.

Objectives

- To assess the customer's willingness and ability to take risks.
- To categorize the customer into a risk profile, which will guide investment recommendations.

Functional Requirements

1. Data Collection:

- **Demographics:** Collect basic information including age, income, and financial status.
- **Investment Goals:** Identify the primary objectives of the customer (e.g., retirement, education, wealth accumulation).
- **Investment Knowledge:** Assess the customer's understanding of investment products and market volatility.

2. Risk Tolerance Assessment:

- **Questionnaire:** Create a standardized questionnaire covering various risk-related scenarios.
 - Example Questions:
 - How would you react if your investments dropped by 20%?
 - What is your investment horizon (short-term, medium-term, long-term)?
- **Scoring System:** Implement a scoring mechanism to quantify responses and categorize risk tolerance.
 - Scores may range from Conservative (low risk tolerance) to Aggressive (high risk tolerance).

3. Output:

- Generate a **Risk Profile Report** summarizing the assessment results:
 - Risk Profile Category (e.g., Conservative, Balanced, Aggressive).
 - Recommended asset allocation based on risk profile (e.g., equity, bonds, alternatives).

4. Documentation:

- Store the completed risk profile in the customer's record for future reference.
- Ensure that the risk profile is reviewed and updated periodically (e.g., annually or upon significant life changes).

Example of Risk Profile Categories

Risk Profile	Description	Recommended Asset Allocation
Conservative	Low risk tolerance; prefers capital preservation	20% Equity, 80% Bonds
Balanced	Moderate risk tolerance; seeks growth while preserving capital	50% Equity, 50% Bonds
Aggressive	High risk tolerance; seeks maximum growth potential	80% Equity, 20% Bonds

2. Accredited Investor

Accredited Investor status is a designation granted to individuals or entities that meet specific financial criteria, enabling them to invest in unregistered securities and other high-risk investment opportunities.

Objectives

- To determine whether a customer qualifies as an accredited investor based on financial criteria.
- To ensure compliance with regulatory requirements for offering specific investment products.

Functional Requirements

- 1. Eligibility Criteria:**
 - Verify that the customer meets one of the following criteria:
 - **Individual Income:** Must have an individual income exceeding \$200,000 in each of the last two years or joint income with a spouse exceeding \$300,000.
 - **Net Worth:** Must have a net worth exceeding \$1 million (excluding the value of the primary residence).
 - **Institutional Criteria:** Entities (e.g., corporations, partnerships) must have total assets exceeding \$5 million or be owned by accredited investors.
- 2. Documentation Collection:**
 - Request relevant documentation to verify the claims of accredited status, such as:
 - Tax returns or W-2 forms to verify income.
 - Bank statements, investment statements, or legal documents to verify net worth.
- 3. Verification Process:**
 - Implement a verification system that allows financial advisors to confirm accredited investor status.
 - Maintain an audit trail for compliance purposes, ensuring that records of the verification process are stored securely.
- 4. Output:**
 - Generate an **Accredited Investor Certificate** indicating the customer's accredited status:
 - Date of assessment.

- Criteria met (e.g., income, net worth).
- Signature of the verifying advisor or compliance officer.

5. Periodic Review:

- Set up a periodic review process to reassess the accredited status, especially in cases of significant financial changes.
- Update the customer's record accordingly.

Example of Verification Checklist

Criterion	Requirement	Documentation Needed
Individual Income	> \$200,000/year	Tax returns, W-2 forms
Joint Income	> \$300,000/year	Joint tax returns, W-2 forms
Net Worth	> \$1,000,000	Bank statements, investment statements
Institutional Criteria	> \$5,000,000 in assets	Financial statements

Integration into Portfolio Report Generation

Before generating a portfolio report for the customer, the following validations should occur:

- 1. Risk Profile Validation:**
 - Ensure that the customer has a valid and current risk profile completed. If not, prompt the customer to complete the risk assessment questionnaire.
- 2. Accredited Investor Status:**
 - Verify the customer's accredited investor status. If the customer does not meet the criteria, provide appropriate investment options that do not require accredited status.
- 3. Report Generation:**
 - Upon successful completion of both assessments, proceed with generating the comprehensive portfolio report, incorporating recommendations that align with the customer's risk profile and accredited status.

This structured approach ensures that the customer's investment recommendations are personalized, compliant, and aligned with their financial goals.

1. Knowledge and Experience Assessment

Objectives

- To evaluate the customer's knowledge and experience in investments.
- To categorize customers based on their ability to understand and engage with different types of investment products.

Functional Requirements

- 1. Data Collection:**

- **Questionnaire Development:** Create a standardized questionnaire that assesses the customer's investment knowledge and experience.
- **Categories of Products:**
 - **Simple Investment Products:** Stocks, bonds, mutual funds, exchange-traded funds (ETFs).
 - **Complex Investment Products:** Options, futures, structured products, alternative investments (e.g., hedge funds, private equity).
- 2. **Questionnaire Structure:**
 - Use a combination of multiple-choice, true/false, and open-ended questions to gauge the customer's understanding.
 - Questions should cover various aspects, such as:
 - Understanding of basic investment principles (risk and return).
 - Familiarity with specific products and their functions.
 - Previous investment experience and types of products used.

Sample Questionnaire

Simple Investment Products:

1. **What is the primary objective of investing in stocks?**
 - A. To generate fixed income
 - B. To achieve capital appreciation
 - C. To avoid market risk
2. **Have you previously invested in mutual funds?**
 - A. Yes
 - B. No

Complex Investment Products:

1. **What is an option in investment terms?**
 - A. A guarantee to buy/sell a stock at a fixed price
 - B. A type of mutual fund
 - C. A bond with a variable interest rate
2. **Have you ever used leverage in your investments?**
 - A. Yes
 - B. No
3. **What is your understanding of the risks involved in trading options?** (Open-ended question)
4. **Scoring and Categorization:**
 - Implement a scoring system based on correct responses.
 - Categorize the customer as:
 - **Beginner:** Limited knowledge, primarily suitable for simple products.
 - **Intermediate:** Moderate understanding; may engage with both simple and some complex products.
 - **Advanced:** High level of knowledge and experience; eligible for complex investment products.
5. **Output:**
 - Generate a **Knowledge and Experience Report** summarizing:
 - Score and category based on questionnaire responses.

- Recommendations for suitable investment products based on the assessed level.

6. Documentation:

- Store the knowledge assessment results in the customer's record for future reference.
- Ensure that the assessment is reviewed periodically or whenever significant changes in the customer's investment profile occur.

Example of Knowledge Assessment Categories

Knowledge Level	Description	Eligible Investment Products
Beginner	Limited knowledge of investment products.	Simple products (stocks, bonds, mutual funds)
Intermediate	Moderate understanding; some experience.	Simple and some complex products (ETFs, basic options)
Advanced	Extensive knowledge and experience.	All products, including complex products (futures, hedge funds)

Integration into Product Eligibility Determination

To ensure that customers are matched with appropriate investment products, the following process should occur:

1. Knowledge Assessment Validation:

- Ensure that the customer has completed the knowledge and experience assessment questionnaire. If not, prompt them to fill it out.

2. Product Eligibility Evaluation:

- Based on the assessment results, determine the customer's eligibility for investment products:
 - If categorized as **Beginner**, restrict them to **Simple Investment Products**.
 - If categorized as **Intermediate**, allow access to both **Simple** and certain **Complex Investment Products**.
 - If categorized as **Advanced**, provide access to all investment products.

3. Recommendations:

- Generate a tailored investment strategy and product recommendations based on the customer's knowledge and experience level.
- Provide educational resources for products that the customer may not fully understand but expresses interest in.

This comprehensive assessment and validation process ensures that customers are adequately prepared for their investments, aligning their knowledge and experience with suitable investment opportunities.

PORTFOLIO REPORT

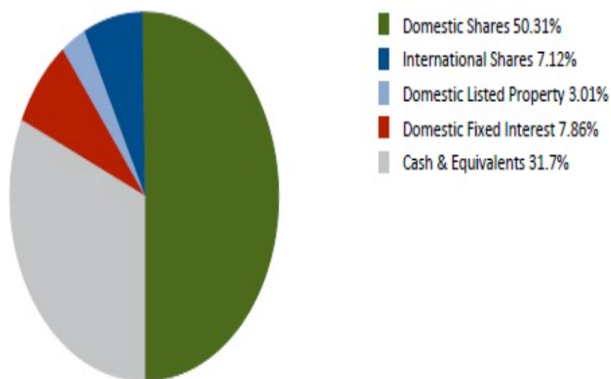
1. Overall Summary

- **Screen Description:**
 - Displays a high-level summary of the customer's total portfolio across investments, insurance, and deposits.
- **Elements:**
 1. **Total Portfolio Value:**
 - Formula: Sum of investment, insurance, and deposit values.
 - Display in both the customer's base currency and other selected currencies.
 2. **Investment Breakdown:**
 - Pie chart or bar chart showing the distribution across different investment categories (e.g., equities, bonds).
 3. **Insurance Coverage:**
 - Total insured value across all policies.
 - Display as a separate card with the insured amount and types of policies (e.g., life, health).
 4. **Deposit Summary:**
 - Total deposits value across all accounts, showing balances and currencies.

2. Investment Summary

- **Screen Description:**
 - Provides a summary of all investments, including value, return rate, and comparison against benchmarks.
- **Elements:**
 1. **Total Investment Value:**
 - Formula: Sum of values for all investment holdings.
 - Display the current market value and initial investment.
 2. **Return on Investment (ROI):**
 - Formula: $(\text{Current Market Value} - \text{Initial Investment}) / \text{Initial Investment} * 100$.
 - Display as a percentage.
 3. **Benchmarks Comparison:**
 - Allow selection of indices (e.g., S&P 500) to compare portfolio performance against the market.
- **Diagram**
 - The below diagram explains each element in detail

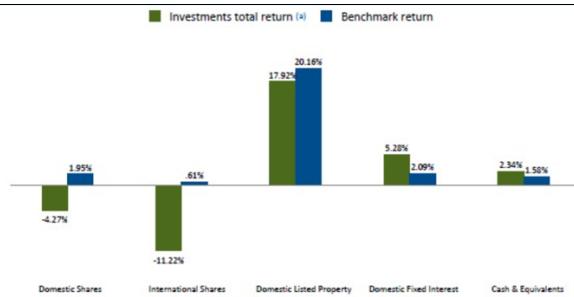
Portfolio allocation 06 Jun 2016



This pie chart provides a visual representation of the customer's investment strategy, highlighting their focus on domestic equities while maintaining liquidity and some diversification through other asset classes.

Interpretation:

- **Diversification Strategy:** The portfolio is diversified across various asset classes, including domestic equities, cash, fixed income, real estate, and international shares. This approach aims to balance risk and return, capitalizing on different market opportunities.
- **Risk Profile:** The heavy weighting toward domestic shares suggests a growth-oriented investment strategy. However, the substantial allocation to cash and equivalents reflects a conservative approach to liquidity, providing the ability to manage risks associated with market volatility.
- **Market Conditions:** Given that this allocation is from 2016, the strategic positioning may have been influenced by market conditions at that time, including interest rates, economic growth expectations, and geopolitical factors.
- **Future Adjustments:** The customer may need to reassess their allocations periodically based on changes in financial goals, market conditions, or shifts in risk tolerance. Adjusting allocations toward international shares or other asset classes could enhance diversification and potentially improve returns.



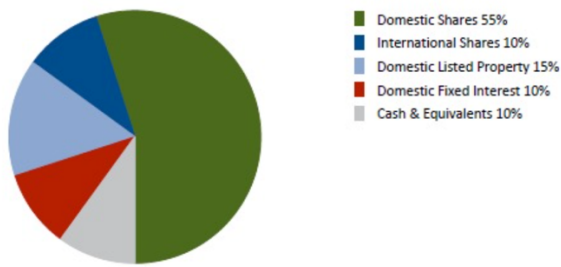
- **Total Returns vs. Benchmark:** Each investment category (e.g., Domestic Shares, International Shares, Domestic Listed Property, Domestic Fixed Interest, and Cash & Equivalents) displays two bars: one representing the total return achieved by the investments (in green) and the other showing the benchmark return for that category (in blue).

- **Performance Highlights:**

- **Domestic Listed Property** stands out with a significantly higher total return (20.16%) compared to its benchmark return (17.92%), indicating strong performance.
- Conversely, both **Domestic Shares** and **International Shares** exhibit negative total returns (-4.27% and -11.22%, respectively), suggesting underperformance against their benchmarks, particularly for international investments.
- The other categories, such as **Domestic Fixed Interest** and **Cash & Equivalents**, show modest total returns that are slightly higher than or on par with their benchmarks.

- **Overall Assessment:** The chart indicates variability in performance across different asset classes, with some areas achieving strong returns while others are underperforming. This analysis can help investors assess which parts of their portfolio are meeting or exceeding market expectations and which areas may require re-evaluation or adjustment.

Target allocation for Balanced



- **Target Allocation Overview:** The chart visually represents the desired percentage allocation of different asset classes within a balanced investment strategy.
- **Asset Class Distribution:**
 - **Domestic Shares** constitute the largest portion, with a target allocation of **55%**, indicating a strong emphasis on domestic equity exposure.
 - **Domestic Listed Property** and **International Shares** follow, with target allocations of **15%** and **10%**, respectively, highlighting a focus on property and some international diversification.
 - **Domestic Fixed Interest** also has a target allocation of **10%**, providing stability through fixed-income investments.
 - **Cash & Equivalents** accounts for another **10%**, ensuring liquidity within the portfolio.
- **Investment Strategy Implications:** This allocation suggests a growth-oriented approach, prioritizing domestic equities while still maintaining some level of diversification across other asset classes. The inclusion of cash and fixed interest helps balance the potential volatility associated with higher equity allocations.
- **Overall Assessment:** The chart serves as a guideline for investors looking to achieve a balanced portfolio, emphasizing both growth

	through equities and stability through fixed income and cash reserves.
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3. Investment Holdings

- **Screen Description:**
 - Shows detailed information about all holdings.
- **Elements:**
 1. **List of Holdings:**
 - Include columns such as asset name, product type, purchase price, current price, quantity, and total value.

Product Holding Index (PHI) Computation

The **Product Holding Index (PHI)** is a metric used to assess the relative performance of a specific investment product or a category of products within a broader investment portfolio. PHI is typically used to understand how well a particular product is performing compared to others or a benchmark, considering factors like returns, risk, and asset allocation.

PHI is commonly employed in wealth management, portfolio analysis, and investment performance reporting to offer clients or portfolio managers insights into how individual products contribute to overall portfolio health.

Components of PHI

The **Product Holding Index (PHI)** can be computed using a weighted average or index-based approach, taking into account the following factors:

1. **Weight of the Product:** This refers to the proportion of the investment allocated to the product relative to the entire portfolio.

$$\text{Weight of Product} = \frac{\text{Value of Product}}{\text{Total Portfolio Value}}$$

2. **Product Returns:** This is the return generated by the product during a specific period, usually expressed as a percentage. Returns could be based on capital appreciation, dividends, or interest income.
3. **Risk Factor or Volatility:** Some versions of PHI may incorporate the risk or volatility associated with the product, such as the standard deviation of returns or a beta value.

4. **Benchmark Performance:** PHI can also be computed in relation to a benchmark, assessing how well the product is performing compared to a relevant index or the overall market.

Formula for Product Holding Index (PHI)

There isn't a universal PHI formula since it can vary depending on the investment strategy or asset class being evaluated. However, a common approach is to calculate PHI as a function of the product's weight in the portfolio, its return, and its volatility (or risk-adjusted performance).

A **simplified formula** for PHI might be:

$$PHI = \sum \left(\frac{\text{Value of Product}_i}{\text{Total Portfolio Value}} \times \frac{\text{Product Return}_i - \text{Benchmark Return}}{\text{Product Return}_i} \right)$$

Where:

- $\frac{\text{Value of Product}_i}{\text{Total Portfolio Value}}$ is the weight of the i -th product in the portfolio.
- $\frac{\text{Product Return}_i - \text{Benchmark Return}}{\text{Product Return}_i}$ is the performance ratio comparing the product's return to that of a relevant benchmark or index.

Step-by-Step Computation of PHI

1. **Determine Product Value:** For each product in the portfolio, calculate its market value or current value. This is typically the current price multiplied by the quantity held.
2. **Determine Total Portfolio Value:** Sum the value of all products held in the portfolio to get the total portfolio value.
3. **Calculate Product Weight:** For each product, divide the product's value by the total portfolio value to obtain its weight.
4. **Calculate Product Return:** Calculate the return of the product over a specific period, which could be monthly, quarterly, or annually. Returns include capital gains and income (dividends or interest).
5. **Benchmark Comparison (optional):** Compare the product's return against a benchmark index. This step is important if you're using risk-adjusted or relative performance measures in the PHI calculation.
6. **Sum the Weighted Returns:** Multiply the weight of each product by its relative performance (return or risk-adjusted return). Sum these products across all portfolio holdings to compute the overall PHI.

Example of PHI Calculation

Consider a portfolio with three products:

1. **Product A:**
 - Value: \$10,000
 - Return: 8%
 - Benchmark Return: 6%
2. **Product B:**
 - Value: \$15,000
 - Return: 5%
 - Benchmark Return: 4%
3. **Product C:**
 - Value: \$25,000
 - Return: 7%
 - Benchmark Return: 5%

Step 1: Calculate Total Portfolio Value

Total Portfolio Value = $10,000 + 15,000 + 25,000 = 50,000$
 $\text{Total Portfolio Value} = 10,000 + 15,000 + 25,000 = 50,000$

Step 2: Calculate Weights of Each Product

Weight of Product A = $\frac{10,000}{50,000} = 0.2$
 $\text{Weight of Product A} = \frac{10,000}{50,000} = 0.2$
 $\text{Weight of Product B} = \frac{15,000}{50,000} = 0.3$
 $\text{Weight of Product B} = \frac{15,000}{50,000} = 0.3$
 $\text{Weight of Product C} = \frac{25,000}{50,000} = 0.5$
 $\text{Weight of Product C} = \frac{25,000}{50,000} = 0.5$

Step 3: Calculate Relative Returns (Product Return / Benchmark Return)

Relative Return of Product A = $\frac{8\%}{6\%} = 1.33$
 $\text{Relative Return of Product A} = \frac{8\%}{6\%} = 1.33$
 $\text{Relative Return of Product B} = \frac{5\%}{4\%} = 1.25$
 $\text{Relative Return of Product B} = \frac{5\%}{4\%} = 1.25$
 $\text{Relative Return of Product C} = \frac{7\%}{5\%} = 1.4$
 $\text{Relative Return of Product C} = \frac{7\%}{5\%} = 1.4$

Step 4: Calculate PHI

$\text{PHI} = (0.2 \times 1.33) + (0.3 \times 1.25) + (0.5 \times 1.4)$
 $\text{PHI} = (0.2 \times 1.33) + (0.3 \times 1.25) + (0.5 \times 1.4)$
 $\text{PHI} = 0.266 + 0.375 + 0.7 = 1.341$
 $\text{PHI} = 0.266 + 0.375 + 0.7 = 1.341$

So, the **Product Holding Index (PHI)** for this portfolio is **1.341**, which indicates that, on average, the products in this portfolio are performing 34.1% better than their respective benchmarks.

Summary

- **PHI** measures the relative performance of investment products in a portfolio.

- It is computed based on the product's weight, return, and (optionally) benchmark performance.
- PHI helps in comparing products' contributions to the portfolio's overall performance.

Asset Allocation Index (AAI) Computation

The **Asset Allocation Index (AAI)** is a measure used in portfolio management to assess how well an investor's portfolio is aligned with a desired or optimal asset allocation. It helps determine if the investment portfolio is following the intended distribution of asset classes (like stocks, bonds, cash, etc.) and if it remains on track to meet the investor's objectives.

AAI is often used in wealth management to guide rebalancing decisions or to evaluate the deviation of the actual asset allocation from a target allocation. The closer the portfolio's actual allocation is to the target, the better the alignment, indicating an effective asset allocation strategy.

Components of AAI

To compute the **Asset Allocation Index (AAI)**, several factors need to be considered:

1. **Target Asset Allocation:** The ideal or optimal distribution of investments across different asset classes as determined by the investor's financial goals, risk tolerance, and investment horizon. For example:
 - Stocks: 60%
 - Bonds: 30%
 - Cash: 10%
2. **Actual Asset Allocation:** The current or real-time distribution of the portfolio across asset classes, which fluctuates over time due to market movements or new investments.
3. **Weight Deviation:** The difference between the actual and target allocation for each asset class, which will be part of the AAI calculation.

Formula for Asset Allocation Index (AAI)

One common way to compute AAI is by calculating the deviation between the **actual allocation** and the **target allocation** for each asset class, then summing these deviations across the portfolio to get an overall index value.

The **simplified formula** for AAI might look like:

$$AAI = 1 - \sum (|Actual Allocation_i - Target Allocation_i| / 2) \quad \text{AAI} = 1 - \sum \left(\frac{|\text{Actual Allocation}_i - \text{Target Allocation}_i|}{2} \right)$$

Where:

- **Actual Allocation** is the actual percentage of the portfolio allocated to asset class *i* (e.g., stocks, bonds, etc.).
- **Target Allocation** is the target (or ideal) percentage allocated to asset class *i*.
- The factor of 2 is used to scale the deviation to a range between 0 and 1.

Step-by-Step Computation of AAI

1. **Define Target Allocation:** Establish the desired percentage allocation for each asset class (e.g., 60% stocks, 30% bonds, 10% cash).
2. **Determine Actual Allocation:** Calculate the current allocation of assets across the portfolio. For example, due to market movements, the allocation may have shifted to 65% stocks, 25% bonds, and 10% cash.
3. **Calculate Weight Deviation for Each Asset Class:** Compute the absolute difference between the actual and target allocations for each asset class.
4. **Aggregate the Deviations:** Sum the deviations across all asset classes and divide by 2 to ensure the index is bounded between 0 and 1.
5. **Compute AAI:** Subtract the aggregated deviation from 1 to compute the final AAI value.

Example of AAI Calculation

Consider a portfolio with the following target and actual asset allocations:

Asset Class	Target Allocation (%)	Actual Allocation (%)
Stocks	60	65
Bonds	30	25
Cash	10	10

Step 1: Calculate Deviations for Each Asset Class

Deviation for Stocks = $|65\% - 60\%| = 5\%$

Deviation for Bonds = $|25\% - 30\%| = 5\%$

Deviation for Cash = $|10\% - 10\%| = 0\%$

Step 2: Aggregate the Deviations

Total Deviation = $5\% + 5\% + 0\% = 10\%$

Step 3: Scale and Compute AAI

AAI = $1 - \frac{10\%}{2} = 1 - 5\% = 0.95$

So, the **Asset Allocation Index (AAI)** for this portfolio is **0.95**, which indicates that the actual allocation is closely aligned with the target allocation (a perfect AAI would be 1.0).

Interpreting AAI

- An **AAI of 1.0** indicates perfect alignment between the actual and target asset allocations.
- An **AAI below 1.0** means the portfolio has deviated from the target allocation, with the degree of deviation increasing as the index value decreases.
- A significantly **low AAI** might signal the need for portfolio rebalancing to bring the allocation back in line with the target.

Summary

- **AAI** measures the alignment between actual asset allocation and a target allocation.
- It helps investors and portfolio managers understand how closely the portfolio adheres to an investment strategy.
- AAI can be used to monitor portfolio performance and guide rebalancing decisions.

Average Unit Cost (AUC) Computation

Average Unit Cost (AUC) is a financial metric used to determine the average cost per unit of an investment, product, or asset over a given period or across multiple transactions. It is widely used in inventory management, portfolio management, and cost accounting. In the context of investments, AUC helps investors track the average price they paid per share or unit over time, especially when multiple purchases have been made at different prices.

Formula for AUC

The formula to compute **Average Unit Cost (AUC)** is:

$$\text{AUC} = \frac{\text{Total Cost of Units Purchased}}{\text{Total Number of Units Purchased}}$$

Where:

- **Total Cost of Units Purchased** is the sum of all expenditures made to purchase the units (including any fees or commissions, if applicable).
- **Total Number of Units Purchased** is the total quantity of the asset or product acquired.

Steps for Computing AUC

Here's how to compute the Average Unit Cost in practice:

1. **Record Each Transaction:** For each purchase or acquisition of units, record the following:
 - **Number of units purchased** (e.g., shares of stock, products in inventory)
 - **Cost per unit** at the time of the purchase
 - **Total cost** for that specific transaction
2. **Calculate Total Costs:** Sum up the total cost of all units purchased across multiple transactions. This includes:
 - The cost of the units themselves (price per unit \times number of units).
 - Any additional costs such as transaction fees, shipping, or taxes that are directly related to the acquisition of the units.
3. **Calculate Total Units Purchased:** Sum up the total number of units acquired across all transactions.
4. **Apply the AUC Formula:** Divide the **total cost** by the **total number of units** to get the average unit cost.

Example of AUC Computation

Let's say an investor buys shares of a company's stock over three different transactions:

1. **Transaction 1:**
 - Number of units (shares): 100
 - Price per unit: \$10
 - Total cost: $\$10 \times 100 = \$1,000$
2. **Transaction 2:**
 - Number of units (shares): 150
 - Price per unit: \$12
 - Total cost: $\$12 \times 150 = \$1,800$
3. **Transaction 3:**
 - Number of units (shares): 200
 - Price per unit: \$9
 - Total cost: $\$9 \times 200 = \$1,800$

Step 1: Calculate the Total Cost

Add up the total cost for all transactions:

$$\text{Total Cost} = 1,000 + 1,800 + 1,800 = 4,600 \quad \text{Total Cost} = 1,000 + 1,800 + 1,800 = 4,600$$

Step 2: Calculate the Total Number of Units

Add up the number of units purchased in each transaction:

$$\text{Total Units} = 100 + 150 + 200 = 450 \quad \text{Total Units} = 100 + 150 + 200 = 450$$

Step 3: Calculate the AUC

Using the formula:

$$\text{AUC} = \frac{\text{Total Cost}}{\text{Total Units}} = \frac{4,600}{450} = 10.22$$

Thus, the **Average Unit Cost** is **\$10.22** per share.

Application of AUC

- **Inventory Management:** In inventory control, AUC helps determine the cost of goods sold (COGS) and the value of remaining inventory.
- **Investments:** For investors, AUC provides insight into how much, on average, was paid for an asset over time, aiding in decisions on when to sell or buy more.
- **Cost Accounting:** It is also used in cost accounting to assess production costs per unit when multiple production batches are involved.

Summary:

- AUC measures the average cost per unit over a series of purchases.
- The formula is straightforward: **Total Cost** divided by **Total Units Purchased**.
- It helps in understanding the average price paid for investments, products, or any units acquired over time.

WAARR (Weighted Average Adjusted Rate of Return) Computation Process

WAARR stands for **Weighted Average Adjusted Rate of Return**. It is used to measure the overall performance of an investment portfolio, considering the varying sizes and durations of investments. WAARR provides a more accurate reflection of the portfolio's performance than a simple average return, as it accounts for the size of each investment and the time it was held.

Here's the step-by-step process to compute WAARR:

1. Determine Individual Returns

Each investment in the portfolio has a different rate of return. Calculate the individual **rate of return (RoR)** for each investment.

Formula for individual Rate of Return:

$$\text{RoR}_i = \frac{\text{End Value} - \text{Start Value} + \text{Dividends/Income}}{\text{Start Value}}$$

Where:

- **End Value** is the value of the investment at the end of the period.
- **Start Value** is the value of the investment at the beginning of the period.
- **Dividends/Income** are any cash inflows generated from the investment (if applicable).

2. Determine the Weight of Each Investment

The weight of each investment represents its proportion in the overall portfolio. To find the weight of each investment, divide the individual investment's **initial value** by the **total initial value** of the portfolio.

Formula for weight:

$$W_i = \frac{\text{Start Value of Investment}_i}{\text{Total Start Value of Portfolio}}$$

Where:

- **Start Value of Investment** is the amount invested in a particular asset.
- **Total Start Value of Portfolio** is the sum of the starting values of all investments in the portfolio.

3. Adjust for Time (if applicable)

If investments were made at different times or held for different durations, adjustments must be made to account for the time factor. A common approach is to annualize the rate of return or adjust returns based on the number of days the investment was held.

Time adjustment formula:

$$\text{Adjusted RoR}_i = \left(1 + \text{RoR}_i\right)^{\frac{365}{\text{Days Held}}} - 1$$

Where:

- **Days Held** is the number of days the investment was held during the period.

4. Compute Weighted Rate of Return

Multiply the rate of return (adjusted for time, if necessary) of each investment by its corresponding weight. This will give the contribution of each investment to the overall portfolio return.

Formula for Weighted Return:

$$W_i \text{ Weighted RoR}_i = \text{Adjusted RoR}_i \times W_i$$

5. Sum the Weighted Returns

Add up all the individual **Weighted Rate of Returns** to get the **Weighted Average Adjusted Rate of Return** for the entire portfolio.

Formula for WAARR:

$$\text{WAARR} = \sum_{i=1}^n (\text{Weighted RoR}_i) \quad \text{WAARR} = \frac{\sum_{i=1}^n (\text{Weighted RoR}_i)}{\sum_{i=1}^n (\text{Weighted RoR}_i)}$$

Where:

- **n** is the number of investments in the portfolio.

Example:

Let's say a portfolio consists of three investments:

- Investment A: \$10,000 invested with a 10% return.
- Investment B: \$5,000 invested with a 5% return.
- Investment C: \$15,000 invested with a 7% return.

Step 1: Calculate Individual Returns:

- **RoR_A** = 10%
- **RoR_B** = 5%
- **RoR_C** = 7%

Step 2: Calculate Weights:

- **W_A** = $\frac{10,000}{30,000} = 0.333$
- **W_B** = $\frac{5,000}{30,000} = 0.167$
- **W_C** = $\frac{15,000}{30,000} = 0.5$

Step 3: Adjust for Time (if applicable):

Assume all investments are held for the same time period, so no adjustment is needed.

Step 4: Compute Weighted Returns:

- **Weighted RoR_A** = $10\% \times 0.333 = 3.33\%$
- **Weighted RoR_B** = $5\% \times 0.167 = 0.835\%$
- **Weighted RoR_C** = $7\% \times 0.5 = 3.5\%$

Step 5: Compute WAARR:

- **WAARR** = $3.33\% + 0.835\% + 3.5\% = 7.67\%$

The **WAARR** for the portfolio is **7.67%**.

Summary:

WAARR offers a more accurate representation of portfolio performance by weighting each investment's return based on its size and duration. It helps investors evaluate how well their portfolio has performed on a weighted average basis, making it particularly useful for portfolios with diverse investments held for varying durations.

XIRR (Extended Internal Rate of Return) Computation

The **XIRR (Extended Internal Rate of Return)** is a financial metric used to calculate the annualized rate of return for a series of cash flows that occur at irregular intervals. XIRR is an extension of the regular **IRR** function, which assumes that all cash flows occur at regular intervals (such as monthly or yearly), whereas XIRR accounts for cash flows occurring on any specific dates.

XIRR is commonly used in portfolio management, wealth management, and financial analysis to evaluate the performance of investments with varying cash flow timings (e.g., investments, withdrawals, dividends).

Components of XIRR Calculation

1. **Cash Flows:** These are the investments made (outflows) and the returns received (inflows) over time. For example:
 - Negative cash flows: Initial investments or additional contributions.
 - Positive cash flows: Dividends, interest, withdrawals, or the sale of the investment.
2. **Dates of Cash Flows:** The exact dates on which the cash flows occur. These dates are irregular and must be considered in the XIRR calculation.
3. **Final Value:** The value of the investment at the end of the period. This is usually included as a positive cash flow in the calculation.

Formula for XIRR

The XIRR is derived by solving for the rate rrr that satisfies the following equation:

$$\sum_{i=0}^n \frac{CF_i}{(1+rrr)^{t_i - t_0}} = 0$$

Where:

- CF_i is the cash flow at time t_i .
- t_0 is the date of the first cash flow (typically the date of the initial investment).
- t_i is the date of each subsequent cash flow.
- rrr is the XIRR, the discount rate that makes the net present value (NPV) of all cash flows equal to zero.

- n is the total number of cash flows.
- The fraction $\frac{t_i - t_0}{365}$ adjusts for the exact number of days between cash flows.

Step-by-Step Computation of XIRR

1. **Identify Cash Flows and Dates:** Collect all the cash flows (both inflows and outflows) and the corresponding dates when they occurred.
2. **Choose an Initial Guess for r :** Start with an estimated rate of return, as XIRR uses iterative methods (like Newton's method) to converge to the solution.
3. **Iterate to Solve the Equation:** Using numerical methods, solve the equation iteratively until the sum of discounted cash flows equals zero. Most software (such as Excel or financial calculators) does this iteration automatically.

Example of XIRR Calculation

Consider the following investment scenario:

Date	Cash Flow (\$)
Jan 1, 2021	-10,000 (Initial Investment)
May 1, 2021	2,500 (Dividend)
Aug 1, 2022	3,000 (Withdrawal)
Dec 31, 2023	15,000 (Final Value)

Step 1: Identify Cash Flows and Dates

Date	Cash Flow (\$)
Jan 1, 2021	-10,000
May 1, 2021	2,500
Aug 1, 2022	3,000
Dec 31, 2023	15,000

Step 2: Set up the XIRR Equation

The XIRR formula becomes:

$$-10,000 \cdot (1+r)^0 + 2,500 \cdot (1+r)^{\frac{120}{365}} + 3,000 \cdot (1+r)^{\frac{277}{365}} + 15,000 \cdot (1+r)^{\frac{1095}{365}} = 0$$

$$-10,000 + 2,500 \cdot (1+r)^{\frac{120}{365}} + 3,000 \cdot (1+r)^{\frac{277}{365}} + 15,000 \cdot (1+r)^{\frac{1095}{365}} = 0$$

Step 3: Solve Iteratively

Using a financial calculator or Excel's **XIRR function**, you input the cash flows and corresponding dates:

In Excel:

```
excel
Copy code
=XIRR({-10000, 2500, 3000, 15000}, {"2021-01-01", "2021-05-01", "2022-08-01", "2023-12-31"})
```

The result gives an XIRR of approximately **35.14%**.

Using Excel to Compute XIRR

1. **Enter Cash Flows:** In one column, list all the cash flows (positive and negative).
2. **Enter Dates:** In another column, list the corresponding dates of the cash flows.
3. **Use the XIRR Formula:**

```
excel
Copy code
=XIRR(cash_flows, dates)
```

4. **Interpret the Result:** The result will be the annualized return that accounts for the exact timing of each cash flow.

Key Considerations

- **Positive and Negative Cash Flows:** For XIRR to work, the cash flows must contain at least one negative value (an investment) and one positive value (a return).
- **Accurate Dates:** The exact date of each cash flow must be used for correct computation.
- **Iterative Solution:** XIRR is solved iteratively, meaning the accuracy of the result depends on how well the software or method converges.

Summary

- **XIRR** computes the annualized rate of return for a series of irregular cash flows.
- It accounts for the specific timing of each cash flow, making it more accurate than standard IRR for non-periodic investments.
- It is widely used in financial modeling, portfolio performance evaluation, and personal financial planning.

2. Unrealized Gains/Losses:

- Formula: $(\text{Current Price} - \text{Purchase Price}) * \text{Quantity}$.
- Display in red (loss) or green (gain).

4. Investment Holdings by Product Type

- **Screen Description:**
 - Groups the holdings by product type (e.g., equities, bonds, mutual funds).
- **Elements:**
 1. **Holdings Breakdown by Product Type:**
 - Pie chart showing the proportion of each type of product in the portfolio.

- Include data table showing values and percentages by product type.

5. Investment Holdings by Currency

- **Screen Description:**
 - Shows the currency distribution of investment holdings.
- **Elements:**
 1. **Currency Holdings Distribution:**
 - Display a pie chart or bar graph.
 - Include a table with details on holdings per currency and their equivalent in the base currency.
 2. **Currency Conversion:**
 - Use the bank's real-time FX rates for conversion.
 - **Formula:** Value in Foreign Currency * FX Rate = Value in Base Currency.

6. Investment Transaction History

- **Screen Description:**
 - Lists all buy/sell transactions of investments.
- **Elements:**
 1. **Transaction List:**
 - Date, asset name, product type, buy/sell indicator, quantity, price, transaction fees, and total amount.
 2. **Filter Options:**
 - By date, product type, currency, or transaction type (buy/sell).

7. Insurance Summary

- **Screen Description:**
 - Summary of all insurance policies.
- **Elements:**
 1. **Total Insurance Coverage:**
 - Sum of all policy coverage amounts.
 2. **Insurance Policy Overview:**
 - Table showing policy type (e.g., life, health), coverage amount, premium, and expiration date.

8. Insurance Policies

- **Screen Description:**
 - Detailed view of each insurance policy.
- **Elements:**
 1. **Policy Details:**
 - Policy number, coverage type, start date, end date, premium, and payment frequency.
 2. **Coverage Amount:**
 - Breakdown of coverage for different scenarios (e.g., critical illness, accidental death).

9. Insurance Transactions

- **Screen Description:**
 - History of all insurance-related transactions.
- **Elements:**
 1. **Transaction List:**
 - Columns include date, policy number, transaction type (premium payment, claim), amount, and status.

10. Deposit Summary

- **Screen Description:**
 - Overview of all deposit accounts.
- **Elements:**
 1. **Total Deposit Amount:**
 - Formula: Sum of all account balances.
 - Display in the customer's base currency and foreign currencies.
 2. **Account Breakdown:**
 - Table listing account number, type (savings, fixed deposit), balance, and currency.

11. Deposit Holdings by Currency

- **Screen Description:**
 - View of deposits categorized by currency.
- **Elements:**
 1. **Currency Breakdown:**
 - Pie chart showing deposits per currency.
 - Include total deposit value per currency converted to base currency.

12. Glossary

- **Screen Description:**
 - Definitions of key financial and banking terms used in the report.
- **Elements:**
 1. **List of Terms:**
 - Provide definitions for terms like "ROI," "Unrealized Gains," "FX Rates," etc.

13. Disclaimers

- **Screen Description:**
 - Legal disclaimers and notices relevant to the portfolio and investments.
- **Elements:**
 1. **Standard Disclaimers:**
 - Text covering investment risks, market volatility, and legal conditions.