Foreign Exchange Management System (FXMS)

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Chapter 1

System Request (FXMS)

1.1 Project Sponsor

Dr. Noureddine Abbadeni

1.2 Business Need

The need for a project like the Foreign Exchange Management System (FXMS) is crucial for businesses operating internationally for several reasons:

- **Operating internationally:** Businesses engaged in importing and exporting goods and services will need a system like FXMS for currency conversion, enabling them to exchange their local currency for that of the country in which they wish to operate, thereby settling international transactions.
- **Managing cash flow:** Businesses operating overseas need to manage their cash across multiple currencies. FXMS will help them monitor and optimize their cash by converting currency at favorable rates and timings.
- **Softening the risk:** FXMS will provide businesses with tools to manage and mitigate the risks associated with fluctuations in currency prices. By using specific strategies, companies can lower the risk of exchange rate volatility and protect their profit margins.

1.3 Business Requirements

The functionality that the system should have includes:

- Ability to manage clients and accounts (insert, update, delete).
- Ability to manage trades (insert, update, and delete trades). Any trader can enter new trades while updating and deleting existing trades require specific privileges.
- Ability to manage traders and coverage groups by assigning a trader to a coverage group, moving a trader from one coverage group to another.

- Ability to manage currencies and rates including daily updates of rates available in the market. The system is assumed to be connected with another system (such as Tadawul) which provides daily updates for exchange rates between all currencies.
- The system will integrate with two systems: FX trading database and FX coverage group database. These two systems are the main data sources for the system.

1.4 Business Value

The Foreign Exchange Management System (FXMS) is expected to deliver significant gains:

- **Quicker and Better Decision Making:** Facilitated by the collection of multiple systems, enhancing competitive advantage in international markets.
- **Less Human Error:** The human factor is limited to tasks that require human interaction and not repetitive tasks that are error-prone.
- **More Money:** The efficient management of trades and currency conversions is expected to increase the organization's revenue.
- Headcount reduction by 10 traders per branch.
- 15% increase in market share.

1.5 Constraints

- The system should run on Windows 10.
- The system should be delivered by the end of the year 2028.
- Security and reliability must be considered during development.

Chapter 2

Feasibility Study

Overall, the risk in this project compared to the gains can be considered manageable.

2.1 Technical

The technical team is confident they can build it since they built a similar system before, the knowldege they gained during that experience lowers the risk.

- **Familiarity with application:** The team is familiar with building an FXMS.
- **Familiarity with technology:** Since the team members have a collective experience of over 50 years building complex software, we are confident they will be able to tackle the project.
- **Project Size:** Large project.
- **Compatibility:** The company wants a custom solution, so we will make sure it integrates well by analysing before we build anything and before we choose a platform.

The techincal team is confident they can build the system even though it is big. They have built a similar system before and they are familiar with the requirements and the technology.

2.2 Financial

2.2.1 Cost-Benefit Analysis

The cashflow analysis below in Figure 2.1 is a condensed versin of the 4 years (monthly based) version of the cashflow analysis. It gives an idea on the way the project will behave financially.

	Cash Flow Analysis					
		Y1	Y2	Y3	Y4	total
	0	1	2	3	4	
cash out						
office furniture	(150,000.00)					(150,000.00)
laptops	(50,000.00)					(50,000.00)
office rent		(300,000.00)	(300,000.00)	(300,000.00)	(300,000.00)	(1,200,000.00)
moci		(5,000.00)	(5,000.00)	(5,000.00)	(5,000.00)	(20,000.00)
utility		(11,000.00)	(11,000.00)	(11,000.00)	(11,000.00)	(44,000.00)
marketing		(500,000.00)	(500,000.00)	(500,000.00)	(500,000.00)	(2,000,000.00)
maintenance		(50,000.00)	(50,000.00)	(50,000.00)	(50,000.00)	(200,000.00)
t&a		(50,000.00)	(50,000.00)	(50,000.00)	(50,000.00)	(200,000.00)
salary		(1,463,370.00)	(1,463,370.00)	(1,463,370.00)	(1,463,370.00)	(5,853,480.00)
total	(200,000.00)	(2,379,370.00)	(2,379,370.00)	(2,379,370.00)	(2,379,370.00)	(9,717,480.00)
cash in						
captial	2,000,000.00					2,000,000.00
increased sales			1,450,083.37	7,758,308.70	41,508,891.91	50,717,283.98
decreased salaries			3,207,642.57	-	-	3,207,642.57
total	2,000,000.00	-	4,657,725.93	7,758,308.70	41,508,891.91	55,924,926.54
net cashflow	1,800,000.00	(2,379,370.00)	2,278,355.93	5,378,938.70	39,129,521.91	46,207,446.54
cummulative net cashflow	1,800,000.00	(579,370.00)	1,698,985.93	7,077,924.63	46,207,446.54	

Figure 2.1: Cashflow Analysis of FXMS

2.2.2 ROI and BEP

We will move to the big numbers, the ROI and the BEP.

ROI	488%
BEP	36

Figure 2.2: ROI and BEP of FXMS

2.2.3 Conclusion

The project overall risk is medium. Although the team familiarity is high, the system's dependencies and huge footprint makes us consider the project as medium risk.

Chapter 3

Methodology

Now we will evaluate the methodologies we can use to build the system. We will follow a three step approach to help us choose the right methodology. The three steps are:

1. **Criteria:** We will list the criteria we will use to evaluate the methodologies and answer them according to our familiarity.
2. **Evaluation:** We will evaluate the methodologies based on the criteria answers above. This will help us in choosing the right methodology.
3. **Selection:** We will choose the methodology that fits the use case. It might not be a 100% fit, it would be the most suitable one.

3.1 Criteria

The criteria we will use to evaluate the methodologies are shown and answered in Table 3.1.

Table 3.1: Criteria Answers for System Development Methodologies

Criteria	Answer
Are the requiremnts unclear?	Yes
Are we unfamiliar with the technology?	No
Are the requirements complex?	Yes
Should the system be reliable?	Yes
Is time allocated for building the system short?	No
Do we have schedule visibility?	No

3.2 Evaluation

We will evaluate the methodologies based on the criteria answers above. The following table, 3.2, shows each criteria and the methodology that fits it based on our answer from the previous section in Table 3.1.

Table 3.2: Criteria Evaluation for System Development Methodologies

Criteria	Fit Methodology
Requirements are clear	All
Team is familiar with techonology	All
Requirments are complex	Throwaway Prototyping
System should be relable	V-Model & Throwaway Prototyping
Time allocated for building is not short	All
We don't have schedule visibility	All

3.3 Selection

Based on the evaluation above, we will choose the methodology that fits the use case. The methodology that fits the use case is the "Throwaway Prototyping" methodology. This methodology fits the use case because the requirements are complex and the system should be reliable. And since other criterions are not a problem, we can choose this methodology.

Chapter 4

Project Workplan

The project workplan is shown in Figure 4.1. The project is divided into 7 main phases after the "Kick off meeting". The phases are:

- **Requirements Gathering:** This phase will be done by Nawaf.
- **Business Case:** This phase will be done by Mohammed.
- **System Design:** This phase will be done by Yazeed.
- **Analysis:** This phase will be done by Nawaf.
- **Design:** This phase will be done by Mohammed.
- **Development:** This phase will be done by Yazeed.
- **Quality Assurance:** This phase will be done by Nawaf.
- **Testing:** This phase will be done by Yazeed.

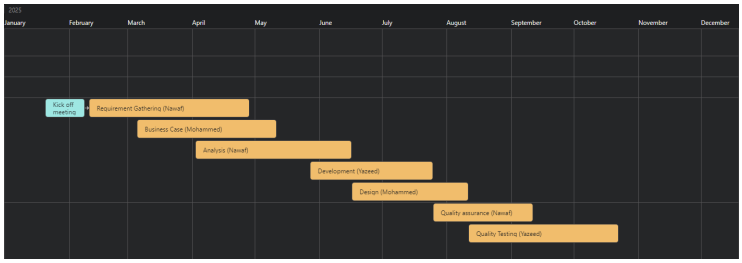

Figure 4.1: Workplan Breadown Structure (WBS) of FXMS

Chapter 5

Gathering/Elicitation Techniques

- **Type of information:** A mix between as-is (existing data sources) and to-be (our new system). The techniques that appeal are:
  - Interviews
  - Joint Application Design (JAD)
- **Depth of information:** High depth of information is required since the system is complex and deals with financial information, we can't affoed losses because of aasumptions. Hence, the techniques that appeal are:
  - Interviews
  - Joint Application Design (JAD)
- **Breadth of information:** Medium breadth of information is required. The techniques that appeal are:
  - Joint Application Design (JAD)
- **Integration of information:** We need to integrate data from different stakeholders, so high integration is required. The techniques that appeal are:
  - Joint Application Design (JAD)
- **User Involvement:** High involvement is required. The techniques that appeal are:
  - Joint Application Design (JAD)
- **Cost:** Since the time required to do the project is short, money shouldn't be a problem. All techniques are low to medium so all of the apply here.

Based on the facts stated below for each criterion, we have concluded that the most suitable techniques:

- Interviews
- Joint Application Design (JAD)

Chapter 6

Requirements Analysis

After carefully analysing the requirements there are some things concerning them and there are some contradictions as well as missing parts. Examples of this are in the Functional requirements (FR):

- It was stated that the system will have the ability to manage clients and accounts which incudes inserting updating and deleting, but who has the privileges to this action?
  - **Solution:** Assign the privileges to the admin.
- It was stated that the system will have the ability to manage trades as well as inserting updating and deleting trades as well as entering new trades while updating and deleting existing trades which require specific privileges what are the privileges who has these privileges.
  - **Solution:** Assign the privileges to the admin.
- It was also stated that the system will have the ability to manage traders and coverage groups by assigning a trader to a coverage groups but the question is who will have the privileges to execute this actions?
  - **Solution:** Assign the privileges to the admin.

Chapter 7

List of Stakeholders

Based on the information provided, the following stakeholders can be identified:

- Traders
- Clients (Organizations and Companies)
- Coverage Groups
- Investment Bank (Business User/Sponsor)

Chapter 8

System Boundary

We have identified the system boundary as shown in the figure below in Figure 8.1. The system boundary includes both our new system and the two data courses we will be integrating with.

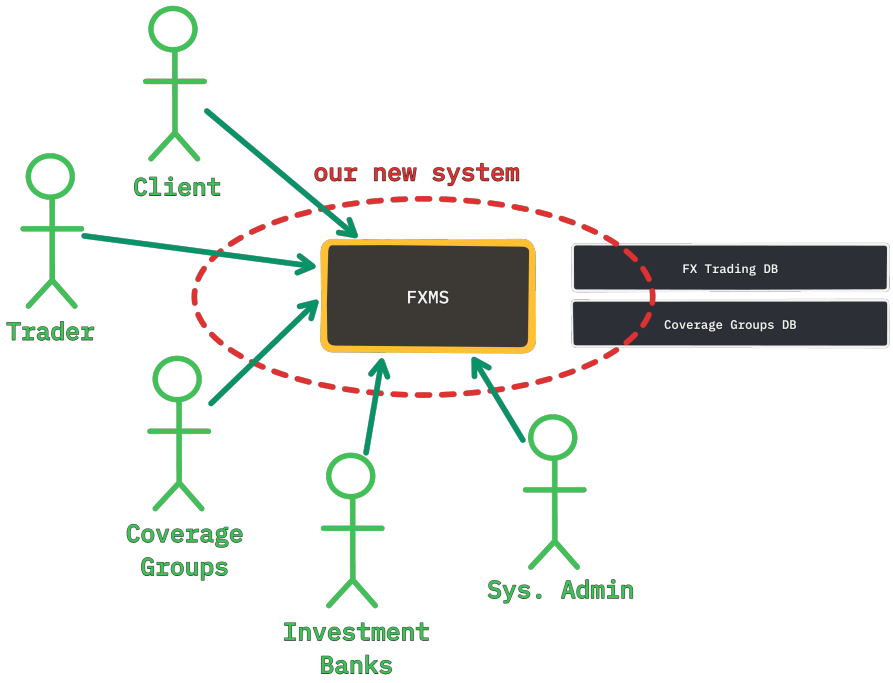

Figure 8.1: System Boundary of FXMS

Chapter 9

Functional Requirements

Based on the information provided, the following functional requirements can be identified:

1. The system shall allow managing accounts (insert, update, delete)
2. The system shall allow managing trades (insert, update, delete)
3. The system shall allow managing traders and coverage groups (assign traders to groups, move traders between groups)
4. The system shall support different types of FX trades (spot, forward, swap, options)
5. The system shall allow managing currencies and rates with a daily update of rates.
6. The system shall calculate profit and loss for each trade
7. The FXMS shall be able to search and retrieve specific trades using customizable filters (currencies, exchange rates, regions, dates).
8. The FXMS shall be able to generate different types of reports (PnL, trade history, ...).

Chapter 10

Non-Functional Requirements

1. Deployment: The system shall be deployed on Windows 10.
2. Delivery Time: The system shall be delivered by the end of the current year.
3. Performance: The system shall be able to execute a trade in a short time (50 trades per second).
4. Availability: The system shall be available between 6am to 6pm. Bugs shall be resolved within 30 minutes maxmimum in those hours.
5. Security: The system shall have role-based access control to manage users access to data (such as identity of customers, PnL, ...) and there should be strict access control to the system.
6. Reliability: The system shall be reliable and available 99.9% of the time.
7. Usability: The system shall be easy to use and user friendly.

Chapter 11

UC Model

11.1 Use Case Diagram

The use case diagram of the FXMS is shown in Figure 11.1. The diagrams shows the functional requirements of the sytem layed out at use cases so that it is easier to comprehed.

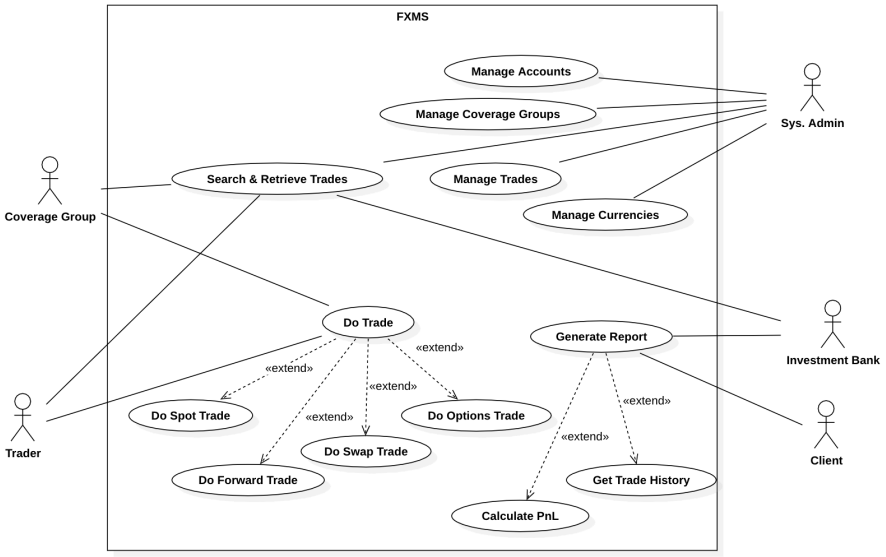

Figure 11.1: Use Case Diagram of FXMS

11.2 Use Cases Descriptions

Use Case Template

Use Case Name: Do Spot Trade	**Priority/Importance:** HIGH	**ID Number:** #1

Short Description: This UC allows traders and coverage groups to do spot trades.

Trigger: This UC starts when the trader initiates a spot trade from the system.

Type: Regular

Primary actor(s): Trader, Coverage Group	**Secondary actor(s):** None

Pre-condition: Market must be open

Relationships:

Extends: Do Trade **Includes:** **Generalization/Specialization:**

Major Inputs:

Input	Source
Selected Account	Trader, Coverage Group
Trade Amount	Trader, Coverage Group
.....	.....
.....	.....

Major Outputs:

Output	Destination
Amount Prompt	Trader, Coverage Group
Trade Success Prompt	Trader, Coverage Group
Failure Prompt	Trader, Coverage Group
Base Account Selected	Trader, Coverage Group

Major Steps Performed:

1. The trader or coverage group chooses the product he wants to trade.
2. The trader or coverage group enters the amount of the trade.
3. The system registers the trade in the database.

Alternate Steps:

- Alt-1: If the trader or coverage group didn't select an account, the selected account will be the base account.

Exceptions:

- Exp-1: If the account has low balance, the spot trade will fail. (BR#1)

Information for Steps

Amount Prompt

Trade Success Prompt

Base Account Selected

Failure Prompt

Conclusion: This UC ends when the trader or coverage group receives a confirmation message.

Post-condition(s): A spot trade will be added to the system and executed and linked to the trader or coverage group.

Business Rules:

- BR#1: A trader or coverage group cannot execute the trade if the balance is low.

Special Requirements: None

Figure 11.2: Do Spot Trade

Use Case Template

Use Case Name: Do Forward Trade	**Priority/Importance:** HIGH	**ID Number:** #2
Short Description: This UC allows traders and coverage groups to do forward trades.		
Trigger: This UC starts when the trader initiates a forward trade from the system. **Type:** Regular		
Primary actor(s): Trader, Coverage Group	**Secondary actor(s):** None	
Pre-condition: Market must be open		
Relationships: **Extends:** Do Trade **Includes:** **Generalization/Specialization:**		

Major Inputs:

Input	Source
Selected Account	Trader, Coverage Group
Trade Amount	Trader, Coverage Group
Forward Contract Details - Trader, Coverage Group	

Major Outputs:

Output	Destination
Amount Prompt	Trader, Coverage Group
Trade Success Prompt	Trader, Coverage Group
Failure Prompt	Trader, Coverage Group
Base Account Selected	Trader, Coverage Group

Major Steps Performed:

1. The trader or coverage group selects the forward contract they want to trade.
2. The trader or coverage group enters the amount of the forward trade.
3. The trader or coverage group specifies the details of the forward contract (e.g., delivery date, underlying asset, etc.).
4. The system registers the trade in the database.

Information for Steps

Amount Prompt

Trade Success Prompt

Alternate Steps:

- Alt-1: If the trader or coverage group didn't select an account, the selected account will be the base account.

Base Account Selected

Exceptions:

- Exp-1: If the account has low balance, the forward trade will fail. (BR#1)
- Exp-2: If the forward contract details are invalid or incomplete, the forward trade will fail. (BR#2)

Failure Prompt

Conclusion: This UC ends when the trader or coverage group receives a confirmation message.
Post-condition(s): A forward trade will be added to the system and executed, and linked to the trader or coverage group.
Business Rules: - BR#1: A trader or coverage group cannot execute the trade if the balance is low. - BR#2: The forward contract details must be valid and complete for the trade to be executed.
Special Requirements: None

Figure 11.3: Do Forward Trade

Use Case Template

Use Case Name: Do Swap Trade	**Priority/Importance:** HIGH	**ID Number:** #3

Short Description: This UC allows traders and coverage groups to do swap trades.

Trigger: This UC starts when the trader initiates a swap trade from the system.

Type: Regular

Primary actor(s): Trader, Coverage Group	**Secondary actor(s):** None

Pre-condition: Market must be open

Relationships:

Extends: Do Trade **Includes:** **Generalization/Specialization:**

Major Inputs:

Input	Source
Selected Account	Trader, Coverage Group
Trade Amount	Trader, Coverage Group
Swap Contract Details - Trader, Coverage Group	

Major Outputs:

Output	Destination
Amount Prompt	Trader, Coverage Group
Trade Success Prompt	Trader, Coverage Group
Failure Prompt	Trader, Coverage Group
Base Account Selected	Trader, Coverage Group

Major Steps Performed:

1. The trader or coverage group selects the swap contract they want to trade.
2. The trader or coverage group enters the amount of the swap trade.
3. The trader or coverage group specifies the details of the swap contract (e.g., delivery date, underlying asset, etc.).
4. The system registers the trade in the database.

Information for Steps

Amount Prompt

Trade Success Prompt

Alternate Steps:

- Alt-1: If the trader or coverage group didn't select an account, the selected account will be the base account.

Base Account Selected

Exceptions:

- Exp-1: If the account has low balance, the forward trade will fail. (BR#1)
- Exp-2: If the swap contract details are invalid or incomplete, the swap trade will fail. (BR#2)

Failure Prompt

Conclusion: This UC ends when the trader or coverage group receives a confirmation message.

Post-condition(s): A swap trade will be added to the system and executed and linked to the trader or coverage group.

Business Rules:

- BR#1: A trader or coverage group cannot execute the trade if the balance is low.
- BR#2: The swap contract details must be valid and complete for the trade to be executed.

Special Requirements: None

Figure 11.4: Do Swap Trade

Use Case Template

Use Case Name: Do Options Trade	**Priority/Importance:** HIGH	**ID Number:** #3

Short Description: This UC allows traders and coverage groups to do options trades.

Trigger: This UC starts when the trader initiates a options trade from the system.

Type: Regular

Primary actor(s): Trader, Coverage Group

Secondary actor(s): None

Pre-condition: Market must be open

Relationships:

Extends: Do Trade **Includes:** **Generalization/Specialization:**

Major Inputs:

Input	Source
Selected Account	Trader, Coverage Group
Trade Amount	Trader, Coverage Group
Options Contract Details	Trader, Coverage Group

Major Outputs:

Output	Destination
Amount Prompt	Trader, Coverage Group
Trade Success Prompt	Trader, Coverage Group
Failure Prompt	Trader, Coverage Group
Base Account Selected	Trader, Coverage Group

Major Steps Performed:

1. The trader or coverage group selects the options contract they want to trade.
2. The trader or coverage group enters the amount of the options trade.
3. The trader or coverage group specifies the details of the options contract (e.g., delivery date, underlying asset, etc.).
4. The system registers the trade in the database.

Information for Steps

Amount Prompt

Trade Success Prompt

Alternate Steps:

- Alt-1: If the trader or coverage group didn't select an account, the selected account will be the base account.

Base Account Selected

Exceptions:

- Exp-1: If the account has low balance, the options trade will fail. (BR#1)
- Exp-2: If the options contract details are invalid or incomplete, the options trade will fail. (BR#2)

Failure Prompt

Conclusion: This UC ends when the trader or coverage group receives a confirmation message.

Post-condition(s): A options trade will be added to the system and executed and linked to the trader or coverage group.

Business Rules:

- BR#1: A trader or coverage group cannot execute the trade if the balance is low.
- BR#2: The options contract details must be valid and complete for the trade to be executed.

Special Requirements: None

Figure 11.5: Do Options Trade

Chapter 12

NFRs Specification

1. **Usability:** The system shall allow any action for the trader in three or less clicks.
2. **Reliability:** The system shall be up 99.99% of the time.
3. **Accuracy:** The system shall save the amounts in integer format using the smallest unit of the currency.
4. **Throughput:** The system shall execute 50 trades per second.
5. **Security:** The system shall have a role-based access control (RBAC) system.
6. **Security:** The system shall have multi-factor mechanism in place.