

## Technical Document (Team 10)

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### Introduction

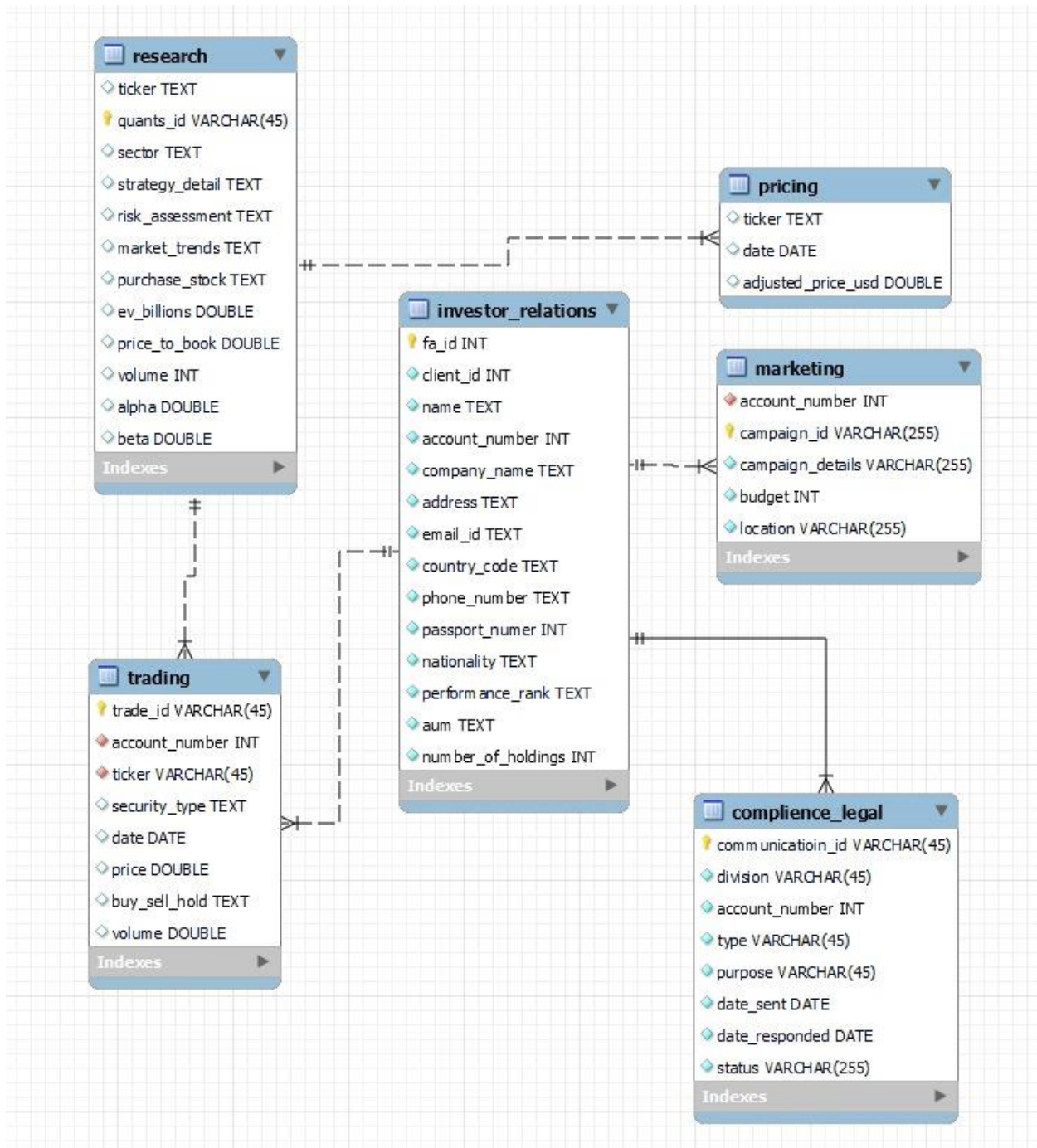
Raw data was collected through research and organized into an initial format. The table relationships, as shown in the early findings, included key entities such as Branch FAs, Relationship Managers, Legal Teams, Trading, and Research divisions. These connections were then connected in different ways such as one to many, many to one and many to many. Due to limit data that was accessible because of the company's quarterly filing, a few data sets had to be generated to ensure realistic and consistent graphs

From the raw data, the information was filtered and adjusted to the business requirements and the conditions of the projections. This resulted in a structured schema with six tables: investor\_relations, compliance\_legal, marketing, trading, pricing, and research. Each table was carefully structured to have a proper database requirement, including normalization, the allocation of primary keys (PKs), and foreign keys (FKs).

To implement the database, a local server was used to store the data, and the SQL schema was created to define the structure. MySQL server, along with python was used to formulate the analysis of the portfolio.

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## Schema Overview



**Figure 1:** ERD for Millennium Management. This diagram shows the relationships between the six main tables: investor\_relations, compliance\_legal, marketing, trading, pricing, and research.

## Table Descriptions

**Table 1.1: Investor Relations Table**

Field Name	Data Type	Description
fa_id	INT	Unique ID for the financial advisor
client_id	INT	Unique ID for clients
name	TEXT	Name of the client
account_number	INT (PK)	Unique account number
company_name	TEXT	Name of the company
address	TEXT	Address of the client
email_id	TEXT	Email of the client
country_code	TEXT	Country code of the client
phone_number	TEXT	Phone number/contact info of the client
passport_number	TEXT	Passport number of the client
nationality	TEXT	Nationality of the client
performance_rank	INT	Performance rank
aum	TEXT	Assets under the management
number_of_holdings	INT	Number of holdings under the account

### Purpose:

This table combines Relationship Managers (RMs) and Branch FAs from the initial data. It supports client portfolio tracking and connects with trading, compliance\_legal, and marketing tables.

**Table 1.2: Compliance Legal Table**

Field Name	Data Type	Description
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communication_id	VARCHAR(45)	Unique ID for legal communications
division	VARCHAR(45)	Division responsible for compliance
account_number	INT (FK)	Links to investor relations
type	VARCHAR(45)	Type of compliance action
purpose	VARCHAR(45)	Purpose of compliance communication
date_sent	DATE	Date the communication was sent
date_responded	DATE	Date the response was received
status	VARCHAR(225)	Status for the request

**Purpose:**

This combines the legal and compliance data. This table links compliance activities with client data.

**Table 1.3: Marketing Table**

Field Name	Data Type	Description
account_number	INT	Unique account number linked to marketing
campaign_id	VARCHAR(45)	Unique ID for the campaign
campaign_details	VARCHAR(225)	Description of the campaign
budget	INT	Allocated budget for marketing
location	VARCHAR(225)	Marketing campaign location

**Purpose:**

The marketing table connects with investor\_relations via account\_number.

**Table 1.4: Trading Table**

Field Name	Data Type	Description
trade_id	VARCHAR(45)	Unique trade identifier
account_number	INT (FK)	Links to investor relations
ticker	VARCHAR(45)	Stock ticker symbol
security_type	TEXT	Type of security being traded
date	DATE	Date of the trade
price	DOUBLE	Trade price per unit
buy_sell_hold	TEXT	Indicates if the trade is a buy, sell or hold
volume	DOUBLE	Volume of the security traded

Purpose:

The trading table connects to pricing and research tables for price validation and stock analysis.

**Table 1.5: Pricing Table**

Field Name	Data Type	Description
ticker	VARCHAR(45) (PK)	Stock ticker symbol
date	DATE	Date of the price record
adjusted_price_usd	DATE	Adjusted price of the stock in USD

Purpose:

The pricing table connects to the trading and research tables and keeps track of pricing data.

**Table 1.6: Research Table**

Field Name	Data Type	Description
ticker	TEXT (PK)	Stock ticker symbol
quants_id	VARCHAR (45)	Unique ID linking quantitative models

sector	TEXT	Sector classification
strategy_detail	TEXT	Strategy association in detail
risk_assessment	TEXT	Risk assessment data
market_trends	TEXT	Analysis of market trends
purchase_stock	TEXT	Indicate stock purchase recommendations
ev_billions	DOUBLE	Enterprise value in billions
price_to_book	DOUBLE	Price to book ratio
volume	INT	Volume of trades for the stock
alpha	DOUBLE	Performance metric (alpha)
beta	DOUBLE	Risk metric (beta)

#### Purpose:

The research table combines quants, fixed income, and equity research insights to support portfolio strategies.

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## Relationships and Business Processes

### Key Relationships

- Investor Relations ↔ Trading: The account\_number field in the trading table links to the investor\_relations table, enabling the tracking of all trades executed by the client accounts. This relationship provides a direct connection between client portfolio management and their trading activity, ensuring overall client insight.
- Investor Relations ↔ Compliance Legal: The account\_number field in the compliance\_legal table links back to the investor\_relations table. This ensures compliance actions, such as audits or legal communication, are associated with the correct client accounts. This relationship supports regular tracking and helps maintain compliance records effectively.

- **Trading ↔ Pricing:** The ticker field in the trading table connects to the pricing table, allowing the system to access stock prices. This ensures that all trades are executed with the pricing data, for performance evaluations and financial reporting.
- **Research ↔ Pricing:** The ticker field in the research table links to the pricing table, enabling the analysis of key performance metrics like alpha and beta alongside stock price trends. This relationship supports the validation of investment strategies based on comprehensive financial insights.
- **Investor Relations ↔ Marketing:** The account\_number field in the marketing table connects to the investor\_relations table, ensuring that marketing campaigns are targeted based on client profiles and preferences.

### **Business Processes Supported**

- **Client Portfolio Tracking:** By integrating the investor\_relations table with the trading and compliance\_legal tables, the system provides an overall view of client activities, including trades and compliance records. This ensures easy portfolio management.
  - **Marketing Campaign Targeting:** The connection between the marketing table and investor\_relations enables targeted campaigns based on client data, improving effectiveness.
  - **Compliance and Audit Management:** The integration of compliance\_legal with investor\_relations ensures that compliance actions are directly linked to client accounts.
  - **Trading and Pricing Validation:** The link between trading and pricing ensures that all transactions use verified stock prices, providing accurate financial records and trade performance analysis.
  - **Research-Driven Strategy Validation:** The connection between research, pricing, and trading supports the validation of trading strategies, ensuring the most accurate investment decisions based on financial and market trends.
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## **Conclusion**

The Millennium Management database was created to assist important business activities with effective data integration and decision-making. The database fulfills the best standards for scalability and accuracy by using MySQL and relational database concepts. By supporting client tracking, trading analysis, compliance, marketing, and research initiatives, the schema offers a strong basis for both operational and strategic goals.