IST 659

Database Implementation Report - Stock Trading System

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# Problem Summary

The Stock Trading System is an automated system for trading stocks of publicly traded companies and it has the following data requirements:

A company is uniquely determined by its name, while also having a headquarters address and an established date. Address is a composite attribute, with components street number, apartment number, city, street and zip Code. Some companies have publicly traded common stocks, and are named public companies. Each public company has only one such stock. Each stock has a unique stock code and specified number of shares. Every stock trades on one or more exchanges, but the number of trading exchanges cannot exceed 9. An exchange is uniquely determined by its name. There is a stock symbol associated with a stock, which is used to track trades on an exchange. The same stock may have different symbols on different exchanges. The last trading price and current daily volume for every symbol should be recorded.

Stocks are owned and traded by traders. A trader has a name and a trader id. The trader id uniquely determines the trader. Traders do not trade directly, but via brokers. A broker is uniquely determined by its name and state. Each broker deals with one or more exchanges and pays a fixed yearly fee to every exchange it deals with. The fee could be different for every broker/exchange pair. A trader owns at least one account with at least one broker. She/he may hold more than one account with the same broker and deal with more than one broker. An account is uniquely determined by the broker and account number. A broker may have no accounts. Each account has exactly one owner. Accounts hold securities and cash. Note that a stock bought on one exchange could be sold on another, so it is stocks, not symbols, which are held.

Traders place trading orders via their brokerages. Every transaction contains the following information: number of shares, price, commissions paid by the buyer and the seller to their brokerages and the timestamp. Exchange and transaction number uniquely determine the transaction. Note that an order could be filled by several transactions. The stocks are traded if their orders are fulfilled by some transactions.

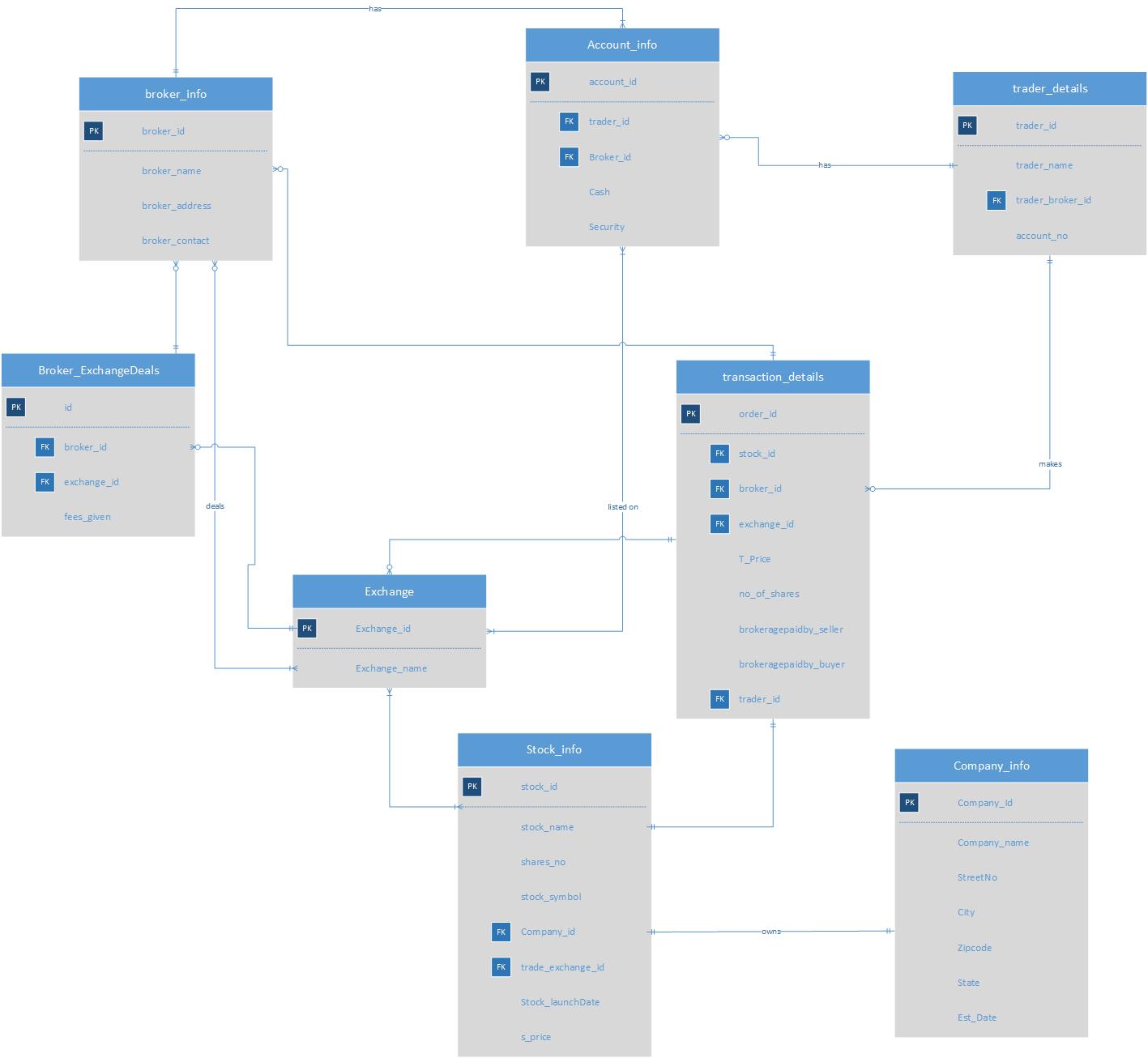
# Business Rules

* Each public company has only one such stock, each stock has a unique stock code and specified number of shares.
* Every stock trades on one or more exchanges, but the number of trading exchanges cannot exceed 9.
* A trader owns at least one account with at least one brokerage.
* Each account has exactly one owner.
* The stocks are traded if their orders are fulfilled by some transactions.

# Entities and Attributes

|  |  |
| --- | --- |
| 1. **Account\_info** |  |
| 1. account\_no | Unique id of each account |
| 1. trader\_id | Contains Trader id |
| 1. broker\_id | Contains Broker id |
| 1. cash | Contains cash |
| 1. Security | Contains security |
|  |  |
| 1. **Exchange** |  |
| 1. Exchange\_id | Unique id of each Exchange |
| 1. Exchange\_name | Name of exchange |
|  |  |
| 1. **Company\_info** |  |
| 1. Company\_id | Unique id of each company |
| 1. Company\_name | Name of Company |
| 1. Street\_no | Street number of the company |
| 1. City | City in which company resides |
| 1. Zipcode | Zipcode of the company’s location |
| 1. State | State in which company lies |
| 1. Est\_date | Date of establishment |
|  |  |
| 1. **Broker\_Info** |  |
| 1. Broker\_id | Unique id of each broker |
| 1. Broker\_name | Name of broker |
| 1. Broker\_address | Broker’s address |
| 1. Contact\_no | Broker’s contact number |
|  |  |
| 1. **BrokerExchangeDeals** |  |
| 1. ID | Unique id of each deal completed |
| 1. Broker\_id | Unique id of each broker |
| 1. Exchange\_id | Unique id of each exchange |
| 1. Fees\_given | Value of brokerage |
|  |  |
| 1. **Stock\_info** |  |
| 1. Stock\_id | Unique id of each stock |
| 1. Stock\_name | Name of each stock |
| 1. Shares\_no | Number of shares |
| 1. S\_price | Price of a unit stock |
| 1. Stock\_symbol | Tracks trades on an Exchange |
| 1. Company\_id | Unique id of each company |
| 1. Trader\_exchange\_id | Same as exchange\_id in |
| 1. Stock\_launch\_date | Date the stock was launched in the IPO |
|  |  |
| 1. **Trader\_details** |  |
| 1. Trader\_id | Unique id of each trader |
| 1. Trader\_broker\_id |  |
| 1. Account\_no | Unique id of each account |
|  |  |
| 1. **Transaction\_details** |  |
| 1. Order\_id | Unique id of each order |
| 1. Stock\_id | Unique id of each stock |
| 1. Broker\_id | Unique id of each broker |
| 1. Trader\_id | Unique id of each trader |
| 1. Exchange\_id | Unique id of each exchange |
| 1. No\_of\_shares | Number of Shares |
| 1. T\_Price | Total amount of stocks purchased/sold |
| 1. Brokeragepaidby\_seller | Brokerage paid by seller |
| 1. Brokeragepaidby\_buyer | Brokerage paid by buyer |

# ERD



# Creation of Tables

create table company\_info

(

company\_id char(10) primary key,

company\_name VARCHAR(30) NOT NULL,

streetNo VARCHAR(30) NOT NULL,

city VARCHAR (50) NOT NULL,

c\_state VARCHAR (50) NOT NULL,

zipcode NUMERIC (10) NOT NULL,

established\_date DATETIME NOT NULL

);

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create table exchange

(

exchange\_id char(10) primary key,

exchange\_name varchar(10) NOT NULL

);

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CREATE TABLE broker\_info(

broker\_id char(10) primary key,

broker\_fname varchar(30) NOT NULL,

broker\_lname varchar(30) NOT NULL,

broker\_contact varchar(12) NOT NULL,

broker\_streetno numeric(10) NOT NULL,

broker\_streetname varchar(50) NOT NULL,

broker\_city varchar(30) NOT NULL,

broker\_state varchar(30) NOT NULL,

broker\_zip numeric(10) NOT NULL

);

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CREATE TABLE trader\_info(

trader\_id char(10) primary key NOT NULL,

trader\_fname varchar(30) NOT NULL,

trader\_lname varchar(30) NOT NULL,

account\_no numeric(9) NOT NULL,

trader\_contact varchar(12) NOT NULL,

trader\_streetno numeric(10) NOT NULL,

trader\_streetname varchar(50) NOT NULL,

trader\_city varchar(30) NOT NULL,

trader\_state varchar(30) NOT NULL,

trader\_zip numeric(10) NOT NULL

);

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CREATE TABLE Account\_info(

account\_id char(10) primary key NOT NULL,

cash numeric(10) NOT NULL,

security numeric(10) NOT NULL,

trader\_id char(10) FOREIGN KEY (trader\_id) REFERENCES trader\_info(trader\_id),

broker\_id char(10) FOREIGN KEY (broker\_id) REFERENCES broker\_info(broker\_id)

);

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CREATE TABLE broker\_exchange\_deals(

id char(10) primary key,

fees\_given char(5),

broker\_id char(10) FOREIGN KEY (broker\_id) REFERENCES broker\_info(broker\_id),

exchange\_id char(10) FOREIGN KEY (exchange\_id) REFERENCES exchange(exchange\_id)

);

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create table stock\_info

(

stock\_id char(10) primary key,

stock\_name VARCHAR(20) NOT NULL,

shares\_no NUMERIC(10) NOT NULL,

stock\_symbol varchar(30) NOT NULL,

stock\_launchDate DATETIME NOT NULL,

s\_price NUMERIC(10) NOT NULL,

company\_id char(10) FOREIGN KEY (company\_id) REFERENCES company\_info(company\_id),

trade\_exchange\_id char(10) FOREIGN KEY (trade\_exchange\_id) REFERENCES exchange(exchange\_id)

);

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create table transaction\_info

(

order\_id char(10) primary key,

T\_Price NUMERIC(10) NOT NULL,

No\_Of\_Shares NUMERIC(10) NOT NULL,

brokeragepaidby\_seller NUMERIC(10) NOT NULL,

brokeragepaidby\_buyer NUMERIC(10) NOT NULL,

id char(10) FOREIGN KEY (id) REFERENCES broker\_exchange\_deals(id),

stock\_id char(10) FOREIGN KEY (stock\_id) REFERENCES Stock\_info(stock\_id),

broker\_id char(10) FOREIGN KEY (broker\_id) REFERENCES broker\_info(broker\_id),

exchange\_id char(10) FOREIGN KEY (exchange\_id) REFERENCES exchange(exchange\_id),

trader\_id char(10) FOREIGN KEY (trader\_id) REFERENCES trader\_info(trader\_id)

);

ALTER TABLE transaction\_info

ADD account\_id char(10) FOREIGN KEY (ACCOUNT\_ID) REFERENCES Account\_info(account\_id);

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# Insertion of Tables

insert into company\_info values(1, 'Apple', '1', 'Cupertino', 'California', '95014', '1976-04-01');

insert into company\_info values(2, 'Google', '1600', 'Menlo Park', 'California', '94043', '1998-09-04');

insert into company\_info values(3, 'Amazon', '410', 'Seattle', 'Washington', '98109', '1994-07-05');

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insert into broker\_info values(1, 'Johnny', 'Walker', '315-555-5555', '45', 'Tiemann Place', 'Manhattan', 'New York', '10027');

insert into broker\_info values(2, 'Paul', 'Smith', '315-545-6655', '7906', '5th Avenue', 'Brooklyn', 'New York', '11209');

insert into broker\_info values(3, 'Marc', 'New York', '315-343-5566', '4322', 'Queens Street', 'Long Island City', 'New York', '11101');

insert into broker\_info values(4, 'John', 'Hopkins', '315-343-7666', '4322', 'Queens Street', 'Long Island City', 'New York', '11101');

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insert into  exchange values(1, 'NYSE');

insert into  exchange values(2, 'NASDAQ');

insert into  exchange values(3, 'CSE');

insert into  exchange values(4, 'ASE');

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insert into trader\_info values(1, 'Yash', 'Pasar', '987651819', '315-450-1430', '212', 'Westcott Street', 'Syracuse', 'New York', '13210');

insert into trader\_info values(2, 'Amit', 'Jadhav', '984321819', '315-395-7948', '141', 'Avondale Place', 'Syracuse', 'New York', '13210');

insert into trader\_info values(3, 'Devansh', 'Khakkar', '787673219', '315-378-9014', '716', 'South Beech Street', 'Syracuse', 'New York', '13210');

insert into trader\_info values(4, 'Manan', 'Dedhia', '654651819', '315-395-7788', '400', 'Westcott Street', 'Syracuse', 'New York', '13210');

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insert into account\_info values(1, '1800', '1500', '1', '3');

insert into account\_info values(2, '2800', '1000', '1', '2');

insert into account\_info values(3, '800', '3500', '2', '1');

insert into account\_info values(4, '400', '2500', '2', '2');

insert into account\_info values(5, '900', '1500', '2', '3');

insert into account\_info values(6, '800', '1500', '3', '1');

insert into account\_info values(7, '800', '500', '4', '2');

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insert into broker\_exchange\_deals values(1, '0.15', '1', '1');

insert into broker\_exchange\_deals values(2, '0.25', '1', '2');

insert into broker\_exchange\_deals values(3, '0.10', '1', '3');

insert into broker\_exchange\_deals values(4, '0.15', '2', '1');

insert into broker\_exchange\_deals values(5, '0.25', '2', '2');

insert into broker\_exchange\_deals values(6, '0.10', '3', '3');

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insert into stock\_info values(1,'Apple Inc.', '1300', 'AAPL', '1980-12-12', '203.86', '1', '1' );

insert into stock\_info values(2,'Apple Inc.', '1300', 'AAPL', '1980-12-12', '203.86', '1', '2' );

insert into stock\_info values(3,'Apple Inc.', '1300', 'AAPL', '1980-12-12', '203.86', '1', '3' );

insert into stock\_info values(4,'Alphabet Inc.', '1267', 'GOOGL', '1998-09-04', '1241.47', '2', '1' );

insert into stock\_info values(5,'Alphabet Inc.', '1267', 'GOOGL', '1998-09-04', '1241.47', '2', '2' );

insert into stock\_info values(6,'Alphabet Inc.', '1267', 'GOOGL', '1998-09-04', '1241.47', '2', '3' );

insert into stock\_info values(7,'Amazon.com Inc.', '900', 'AMZN', '1997-11-11', '1861.69', '3', '1' );

insert into stock\_info values(8,'Amazon.com Inc.', '900', 'AMZN', '1997-11-11', '1861.69', '3', '2' );

insert into stock\_info values(9,'Amazon.com Inc.', '900', 'AMZN', '1997-11-11', '1861.69', '3', '3' );

insert into stock\_info values(10,'Amazon.com Inc.', '900', 'AMZN', '1997-11-11', '1861.69', '3', '4' );

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insert into transaction\_info values(1,20400,100,12,30,1,1,1,1,1,1 );

insert into transaction\_info values(2,10200,50,6,15,2,2,2,2,2,4 );

insert into transaction\_info values(3,16728,82,42,30,1,3,2,1,3,6 );

insert into transaction\_info values(4,16728,82,42,30,1,3,2,1,3,6 );

insert into transaction\_info values(5,11120,55,42,30,1,3,2,1,3,6 );

insert into transaction\_info values(17,1320,5,42,30,1,3,2,1,3,6 );

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SELECT \* FROM company\_info;

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SELECT \* FROM broker\_info;

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SELECT \* FROM exchange;

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SELECT \* FROM trader\_info;

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SELECT \* FROM account\_info;

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Description automatically generated

SELECT \* FROM broker\_exchange\_deals;

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Description automatically generated

SELECT \* FROM stock\_info;

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Description automatically generated

SELECT \* FROM transaction\_info;

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# Trigger

drop trigger S\_Quantity

create trigger S\_Quantity

ON transaction\_info

AFTER INSERT

AS

DECLARE @No\_Of\_Shares AS INT

DECLARE @T\_Price AS INT

SET @No\_Of\_Shares = (SELECT TOP 1 inserted.No\_Of\_Shares FROM inserted)

SET @T\_Price = (SELECT TOP 1 inserted.T\_Price FROM inserted)

IF @No\_Of\_Shares<50

BEGIN

 RAISERROR  ('Number of shares should be greater than or equal to 50',15,1);

  ROLLBACK

END

if @T\_Price < 10000

BEGIN

 RAISERROR  ('Total transaction value has to be greater than or equal to 10000',15,1);

  ROLLBACK

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# Major Data Questions

/\* 1. For each public company list the number of exchanges which its stock trades on \*/

select s.stock\_name, count(s.trade\_exchange\_id) as No\_of\_exchanges

from stock\_info s

group by s.stock\_name

ORDER BY No\_of\_exchanges;

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/\* 2. List all Exchanges who have stock from the public company established before “Jan01,1982” \*/

select e.exchange\_name

from exchange e

inner join stock\_info s on s.trade\_exchange\_id = e.exchange\_id

inner join company\_info c on c.company\_id = s.company\_id

where c.established\_date < '1982-01-01';

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/\* 3. Find each Trader who has exactly one account \*/

select a.trader\_id

from account\_info a

group by a.trader\_id

having count(a.account\_id) = 1;

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/\* 4. Find all Brokerages who do not have any accounts \*/

select b.broker\_fname,b.broker\_lname, b.broker\_id

from broker\_info b

left join account\_info as a

on b.broker\_id = a.broker\_id

where b.broker\_id

not in (select distinct(broker\_id) from account\_info);

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/\* 5. List all stocks belonging to each Exchange \*/

Select stock\_name, exchange\_name

from stock\_info as s

join exchange as e on s.trade\_exchange\_id = e.exchange\_id

order by s.stock\_name

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# login Page

1. Admin Login

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1. Trader Login

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1. Interface once logged in

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# Forms

1. Broker Form

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1. Company Form

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1. Stock Form

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1. Trader

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1. Purchases

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# Report

1. Admin Report

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1. Individual Trader Report

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