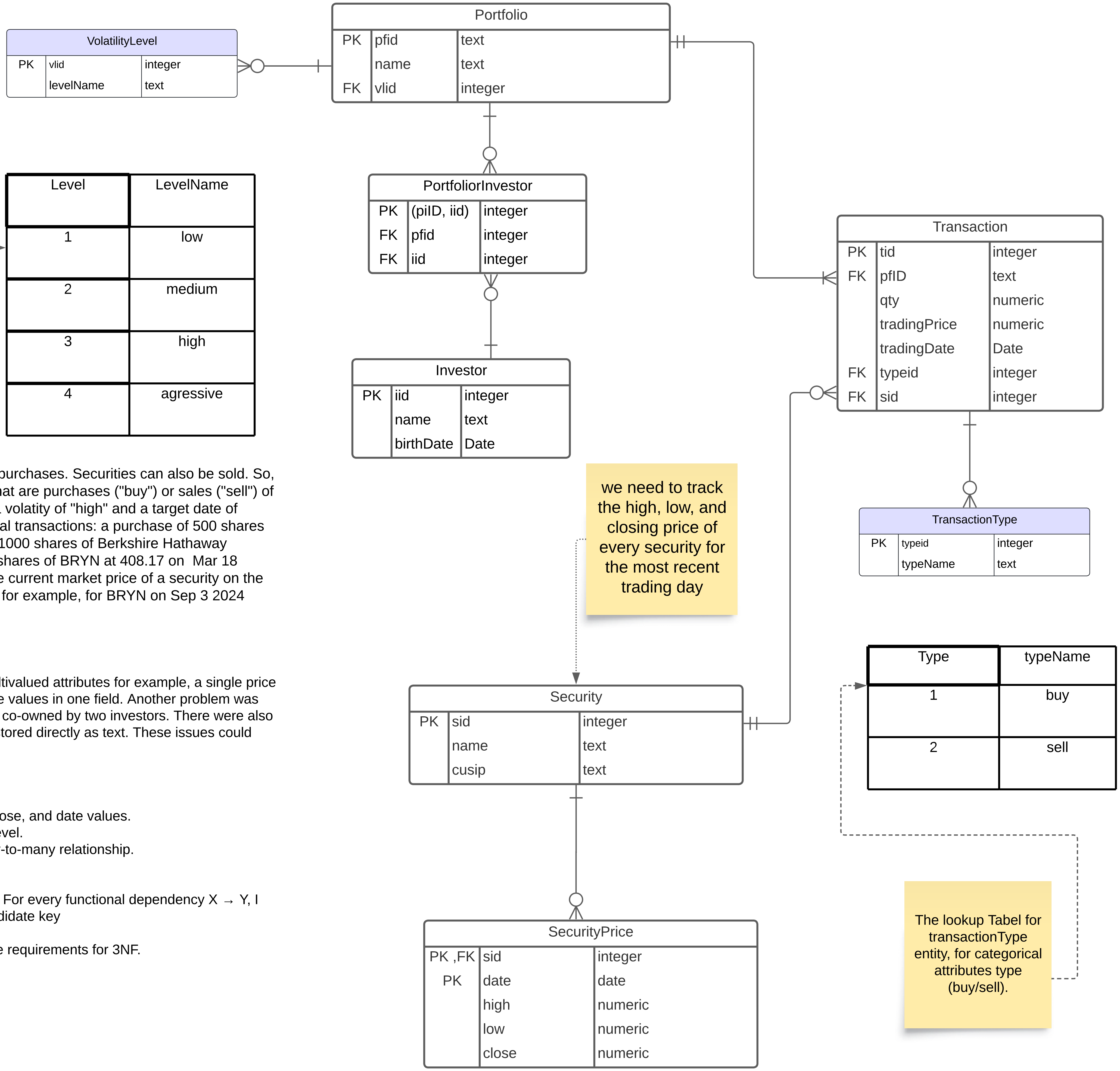
CS5200 - ASSIGNMENT 04.1 -
Normaliza a Schema
Shorena K. Anzhilov
Summer 2025



VolatilityLevel		
PK	vlid	integer
	levelName	text

Portfolio		
PK	pfid	text
	name	text
FK	vlid	integer

PortfoliorInvestor		
PK	(piID, iid)	integer
FK	pfid	integer
FK	iid	integer

Investor		
PK	iid	integer
	name	text
	birthDate	Date

Transaction		
PK	tid	integer
FK	pfID	text
	qty	numeric
	tradingPrice	numeric
	tradingDate	Date
FK	typeid	integer
FK	sid	integer

TransactionType		
PK	typeid	integer
	typeName	text

Security		
PK	sid	integer
	name	text
	cusip	text

SecurityPrice		
PK ,FK	sid	integer
PK	date	date
	high	numeric
	low	numeric
	close	numeric

The lookup Tabel for VolatiliLevel entity for cotegorical attributes.

Level	LevelName
1	low
2	medium
3	high
4	agressive

we need to track the high, low, and closing price of every security for the most recent trading day

Type	typeName
1	buy
2	sell

The lookup Tabel for transactionType entity, for categorical attributes type (buy/sell).

A portfolio is a collection of securities acquired through purchases. Securities can also be sold. So, a portfolio is associated with numerous "transactions" that are purchases ("buy") or sales ("sell") of some security. For example, portfolio "Education" with a volaty of "high" and a target date of "2038" is owned by "Jeff Lupis". The portfolio had several transactions: a purchase of 500 shares of Microsoft ("MSFT") at $134.58 on Sept 14 2022 and 1000 shares of Berkshire Hathaway ("BRYN") at 332.95 on Oct 11 2023, plus a sale of 100 shares of BRYN at 408.17 on Mar 18 2024. A portfolio can be co-owned by two investors. The current market price of a security on the most recent date traded is a triple of high/low/close, so, for example, for BRYN on Sep 3 2024 might have been 431.5/430.25/431.15

My notes:

The original schema was not in 3NF. It had issues like multivalued attributes for example, a single price attribute in the Security entity included high, low, and close values in one field. Another problem was the many-to-many relationship, where a portfolio could be co-owned by two investors. There were also categorical values such as volatility and transaction type stored directly as text. These issues could lead to redundancy, anomalies, or data inconsistency.

To fix this, I decomposed the schema:

1. Created a SecurityPrice table to store daily high, low, close, and date values.
2. Used lookup tables for TransactionType and VolatilityLevel.
3. Added a join table PortfolioInvestor to resolve the many-to-many relationship.

▮▮

The table was then checked to make sure it satisfies 3NF. For every functional dependency X → Y, I confirmed that either X is a superkey, or Y is part of a candidate key

The final ERD diagram is fully normalized and satisfies the requirements for 3NF.