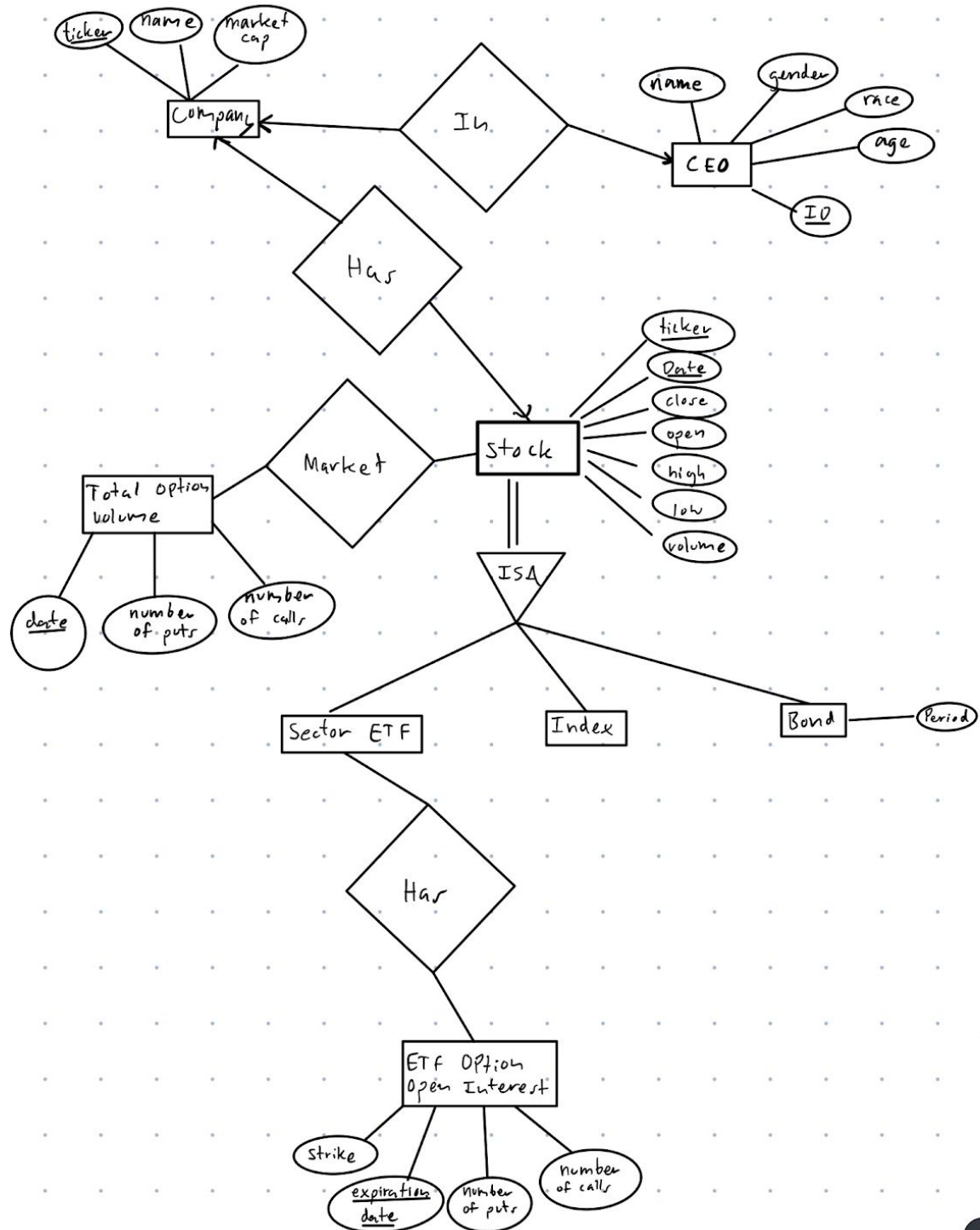Miles Lee - mlee276
Jeremy Zhou - jzhou83

Part 1

Part 2

Index(<u>Ticker</u>, <u>Date</u>, Open, Close, High, Low, Volume)
Bond(<u>Ticker</u>, <u>Date</u>, Open, Close, High, Low, Volume, Period)
SectorETF(<u>Ticker</u>, <u>Date</u>, Open, Close, High, Low, Volume, Sector)
OptionOI(<u>Ticker</u>, <u>Strike</u>, <u>Expiration</u>, CallOI, PutVol)
OptionVolume(<u>Date</u>, CallVol, PutVol)
Company(<u>Ticker</u>, CompanyName, MarketCap, ID)
CEO(<u>ID</u>, Name, Gender, Race, Age)

Some decisions we made include:
- Using an ID for the company CEO since there can be multiple CEOs with the same name. Creating the CEO relation wasn't necessary, but we thought it would be helpful to isolate personal information.
- Creating three separate databases for the three types of "stocks" (this was an IS-A relationship in the ER diagram). Note that we use the term "stock" (also used in the ER diagram) to refer to any price-changing entity that behaves like a stock, including various securities such as bonds.

Part 3
$F = F_c = \{$

   Ticker, Date $\rightarrow$ Open, Close, High, Low, Volume, Period, Sector;
   Ticker $\rightarrow$ CompanyName, MarketCap, ID;
   Ticker, Strike, Expiration $\rightarrow$ callOI, putOI;
   Date $\rightarrow$ callVol, putVol;
   ID $\rightarrow$ Name, Gender, Race, Age;

$\}$

Although F^+ is not written here, we checked that for all FD's in F^+ of each relation in part 2, at least one of the 3NF conditions holds. The relations were already normalized, so we didn't make any changes in this part. See the relationship schema in part 2. The constraints are:
1. $0 < ID < 2^{31}-1$, and an integer (foreign key constraint)
2. Open, Close, High, Low are floats
3. Volume, CallOI, PutOI, CallVol, PutVol, Age must be an integer between 0 and $2^{31}-1$
4. Period must be in {"1 Mo", "2 Mo", "3 Mo", "6 Mo", "1 Yr", "2 Yr", "3 Yr", "5 yr", "7 yr", "10 yr", "20 yr", "30 yr"}
5. Sector, CompanyName, Name, Gender, Race are varchar(255)
6. MarketCap must be an integer between 0 and $2^{63}-1$