

"Watching the Stock Market" Independent Data Science Project by Racquel Bazos

made with SQLite, DB Browser, and using data from Google Finance

The problem:

The data:

The methods:

Questions and Answers Explored:

Basic Queries
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Advanced Challenges

The problem:

Per the Codecademy prompt for this project: "You are asked by a company to help them make more informed decisions on investments. To start, you will be watching the stock market, collecting data, and identifying trends!"

The data:

Using Google Finance, I tracked the stock prices of 5 stocks in different sectors at three different times per day during the five days of the business week starting on 2/10/2023 and ending on 2/16/2023. No data was collected for the intervening weekend between 2/10 and 2/13 because American exchanges aren't open on the weekend. There were 15 records collected per stock and 75 records collected total.

The times of day were supposed to represent the opening (9:30/10:00AM), midday (12:00PM), and closing (4:00PM) prices of each stock. Although many stocks had data

beginning at 9:30AM, not all did, which is why some of opening prices were taken at 10:00AM.

The stocks we're looking at are Tesla, Meta, Disney, Target, and Yum! Brands.

The methods:

I built the database and inserted data into it directly using SQLite and DB Browser. It was good practice, but I will most likely be importing .csv files for building future databases in order to have a more streamlined workflow.

My database schema is as follows:

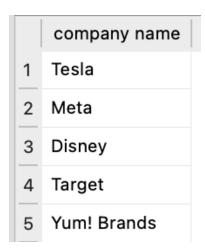
The id number will identify each record, <code>stock_name</code> will correspond to the name of the business in question, <code>stock_symbol</code> is the name of the stock, <code>stock_exchange</code> refers to the Nasdaq or New York Stock Exchange, <code>time_checked</code> is a datetime in <code>%Y-%m-%d %H:%M</code> format, but simplified using <code>strftime()</code>. And lastly, <code>price</code> is the price of the stock input using the <code>REAL</code> datatype because they are decimal values representing dollars and cents.

Questions and Answers Explored:

Basic Queries

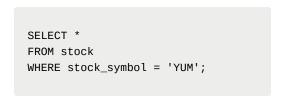
What are the distinct stocks in the table?

SELECT DISTINCT stock_name AS 'company name' FROM stock;



The result.

Query all data for a single stock. Do you notice any overall trends?



						1
	id	stock_name	stock_symbol	stock_exchange	time checked	price
1	53	Yum! Brands	YUM	NYSE	2023-02-10 09:30	131.04
2	54	Yum! Brands	YUM	NYSE	2023-02-10 12:00	131.11
3	55	Yum! Brands	YUM	NYSE	2023-02-10 16:00	131.32
4	56	Yum! Brands	YUM	NYSE	2023-02-13 09:30	131.85
5	57	Yum! Brands	YUM	NYSE	2023-02-13 12:00	133.43
6	58	Yum! Brands	YUM	NYSE	2023-02-13 16:00	132.57
7	59	Yum! Brands	YUM	NYSE	2023-02-14 09:30	132.85
8	60	Yum! Brands	YUM	NYSE	2023-02-14 12:00	131.5
9	61	Yum! Brands	YUM	NYSE	2023-02-14 16:00	130.83
10	62	Yum! Brands	YUM	NYSE	2023-02-15 09:30	130.41
11	63	Yum! Brands	YUM	NYSE	2023-02-15 12:00	130.31
12	64	Yum! Brands	YUM	NYSE	2023-02-15 16:00	131.7
13	65	Yum! Brands	YUM	NYSE	2023-02-16 09:30	130.73
14	74	Yum! Brands	YUM	NYSE	2023-02-16 12:00	130.93
15	75	Yum! Brands	YUM	NYSE	2023-02-16 16:00	131.72

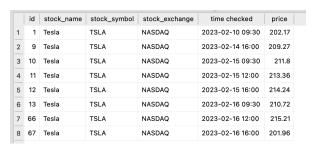
The result.

Despite slightly higher prices on Monday and Tuesday (2/13, 2/14), the stock price mostly stayed within the \$130-\$131 range.

Which rows have a price above 100? between 40 to 50, etc?

I adjusted the first query to look for values over \$200 because every data point I collected was over \$100. The results showed that all prices over \$200 were Tesla datapoints, but not all Tesla values were above \$200 (8 out of 15).

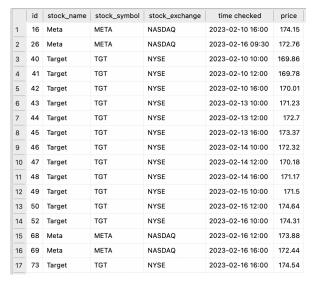




The results.

For the **BETWEEN** query, I adjusted the range to \$150-175 to better fit my data.

SELECT *
FROM stock
WHERE price BETWEEN 150 AND 175;



...which yielded results from only Target and Meta.

Sort the table by price. What are the minimum and maximum prices?

```
SELECT *
FROM stock
ORDER BY price;
```

When ordered by price (in default ascending order), we can see that Disney has the lowest price in our dataset with \$105.83, taken at 4:00PM on Thursday. Meanwhile, the highest price we have is Tesla at midday on Thursday at \$215.21.

	id	stock_name	stock_symbol	stock_exchange	time checked	price
1	71	Disney	DIS	NYSE	2023-02-16 16:00	105.83
2	34	Disney	DIS	NYSE	2023-02-14 12:00	106.77
3	30	Disney	DIS	NYSE	2023-02-13 10:00	107.09
4	36	Disney	DIS	NYSE	2023-02-15 10:00	107.28
5	33	Disney	DIS	NYSE	2023-02-14 10:00	107.55
6	39	Disney	DIS	NYSE	2023-02-16 09:30	107.55
7	31	Disney	DIS	NYSE	2023-02-13 12:00	107.61
8	35	Disney	DIS	NYSE	2023-02-14 16:00	107.67
9	32	Disney	DIS	NYSE	2023-02-13 16:00	107.69
10	70	Disney	DIS	NYSE	2023-02-16 12:00	107.98
11	29	Disney	DIS	NYSE	2023-02-10 16:00	108.05
12	37	Disney	DIS	NYSE	2023-02-15 12:00	108.09
13	28	Disney	DIS	NYSE	2023-02-10 12:00	108.34
14	27	Disney	DIS	NYSE	2023-02-10 09:30	108.79
15	38	Disney	DIS	NYSE	2023-02-15 16:00	109.24
16	63	Yum! Brands	YUM	NYSE	2023-02-15 12:00	130.31
17	62	Yum! Brands	YUM	NYSE	2023-02-15 09:30	130.41
18	65	Yum! Brands	YUM	NYSE	2023-02-16 09:30	130.73
19	61	Yum! Brands	YUM	NYSE	2023-02-14 16:00	130.83
20	74	Yum! Brands	YUM	NYSE	2023-02-16 12:00	130.93
21	53	Yum! Brands	YUM	NYSE	2023-02-10 09:30	131.04

	id	stock_name	stock_symbol	stock_exchange	time checked	price
22	54	Yum! Brands	YUM	NYSE	2023-02-10 12:00	131.11
23	55	Yum! Brands	YUM	NYSE	2023-02-10 16:00	131.32
24	60	Yum! Brands	YUM	NYSE	2023-02-14 12:00	131.5
25	64	Yum! Brands	YUM	NYSE	2023-02-15 16:00	131.7
26	75	Yum! Brands	YUM	NYSE	2023-02-16 16:00	131.72
27	56	Yum! Brands	YUM	NYSE	2023-02-13 09:30	131.85
28	58	Yum! Brands	YUM	NYSE	2023-02-13 16:00	132.57
29	59	Yum! Brands	YUM	NYSE	2023-02-14 09:30	132.85
30	57	Yum! Brands	YUM	NYSE	2023-02-13 12:00	133.43
31	41	Target	TGT	NYSE	2023-02-10 12:00	169.78
32	40	Target	TGT	NYSE	2023-02-10 10:00	169.86
33	42	Target	TGT	NYSE	2023-02-10 16:00	170.01
34	47	Target	TGT	NYSE	2023-02-14 12:00	170.18
35	48	Target	TGT	NYSE	2023-02-14 16:00	171.17
36	43	Target	TGT	NYSE	2023-02-13 10:00	171.23
37	49	Target	TGT	NYSE	2023-02-15 10:00	171.5
38	46	Target	TGT	NYSE	2023-02-14 10:00	172.32
39	69	Meta	META	NASDAQ	2023-02-16 16:00	172.44
40	44	Target	TGT	NYSE	2023-02-13 12:00	172.7
41	26	Meta	META	NASDAQ	2023-02-16 09:30	172.76
42	45	Target	TGT	NYSE	2023-02-13 16:00	173.37
43	68	Meta	МЕТА	NASDAQ	2023-02-16 12:00	173.88

	id	stock_name	stock_symbol	stock_exchange	time checked	price
44	16	Meta	META	NASDAQ	2023-02-10 16:00	174.15
45	52	Target	TGT	NYSE	2023-02-16 10:00	174.31
46	73	Target	TGT	NYSE	2023-02-16 16:00	174.54
47	50	Target	TGT	NYSE	2023-02-15 12:00	174.64
48	15	Meta	META	NASDAQ	2023-02-10 12:00	175.27
49	14	Meta	META	NASDAQ	2023-02-10 09:30	176.01
50	51	Target	TGT	NYSE	2023-02-15 16:00	176.1
51	23	Meta	META	NASDAQ	2023-02-15 09:30	176.34
52	24	Meta	META	NASDAQ	2023-02-15 12:00	176.39
53	72	Target	TGT	NYSE	2023-02-16 12:00	176.43
54	20	Meta	META	NASDAQ	2023-02-14 09:30	177.06
55	25	Meta	META	NASDAQ	2023-02-15 16:00	177.16
56	17	Meta	META	NASDAQ	2023-02-13 09:30	178.14
57	21	Meta	META	NASDAQ	2023-02-14 12:00	178.74
58	19	Meta	META	NASDAQ	2023-02-13 16:00	179.43
59	22	Meta	META	NASDAQ	2023-02-14 16:00	179.48
60	18	Meta	META	NASDAQ	2023-02-13 12:00	179.77
61	7	Tesla	TSLA	NASDAQ	2023-02-14 09:30	191.6
62	5	Tesla	TSLA	NASDAQ	2023-02-13 12:00	193.26
63	4	Tesla	TSLA	NASDAQ	2023-02-13 09:30	194.37
64	6	Tesla	TSLA	NASDAQ	2023-02-13 16:00	194.61
65	2	Tesla	TSLA	NASDAQ	2023-02-10 12:00	196.25

65	2	Tesla	TSLA	NASDAQ	2023-02-10 12:00	196.25
66	3	Tesla	TSLA	NASDAQ	2023-02-10 16:00	196.89
67	8	Tesla	TSLA	NASDAQ	2023-02-14 12:00	199.85
68	67	Tesla	TSLA	NASDAQ	2023-02-16 16:00	201.96
69	1	Tesla	TSLA	NASDAQ	2023-02-10 09:30	202.17
70	9	Tesla	TSLA	NASDAQ	2023-02-14 16:00	209.27
71	13	Tesla	TSLA	NASDAQ	2023-02-16 09:30	210.72
72	10	Tesla	TSLA	NASDAQ	2023-02-15 09:30	211.8
73	11	Tesla	TSLA	NASDAQ	2023-02-15 12:00	213.36
74	12	Tesla	TSLA	NASDAQ	2023-02-15 16:00	214.24
75	66	Tesla	TSLA	NASDAQ	2023-02-16 12:00	215.21

Intermediate Challenges

Explore using aggregate functions to look at key statistics about the data (e.g., min, max, average).

Of course, instead of manually looking through the table to find the min and max values, we could've used aggregates.

SELECT stock_symbol, MIN(price)
FROM stock;

SELECT stock_symbol, MAX(price)
FROM stock;

	stock_symbol	MIN(price)
1	DIS	105.83

	stock_symbol	MAX(price)
1	TSLA	215.21

The average price for all the stocks was:

SELECT ROUND(AVG(price), 2) AS 'Average Price'

FROM stock;

Average Price
1 158.25

Group the data by stock and repeat. How do the stocks compare to each other?

```
SELECT stock_symbol, MIN(price), MAX(price), ROUND(AVG(price), 2) AS 'Average Price',
ROUND(MAX(price) - MIN(price), 2) AS 'Range'
FROM stock
GROUP BY stock_symbol;
```

	stock_symbol	MIN(price)	MAX(price)	Average Price	Range
1	DIS	105.83	109.24	107.7	3.41
2	META	172.44	179.77	176.47	7.33
3	TGT	169.78	176.43	172.54	6.65
4	TSLA	191.6	215.21	203.04	23.61
5	YUM	130.31	133.43	131.49	3.12

Comparing the stocks against each other, we can see that Tesla has both the highest average price, but also the highest range in prices, indicating there were large swings in price during the week.

TGT and META are strange points of comparison in terms of sector and dominance, but they have pretty close average stock prices for this week.

DIS and YUM (the parent company of Taco Bell, KFC, and Pizza Hut) both moved very little throughout the week, with similarly low ranges in price. Depending on the stock

analyst looking at these numbers, they could say these companies are strong and stable or stagnating at a certain level of price support.

Group the data by day or hour of day.

```
SELECT *
FROM stock
WHERE time_checked LIKE '%16:00'
ORDER BY stock_symbol;
```

By checking for times ending with 4:00PM, we can see how each stock ended each day throughout the week, and by extension if the week represents a win or loss for the stock price.

	id	stock_name	stock_symbol	stock_exchange	time_checked	price
1	29	Disney	DIS	NYSE	2023-02-10 16:00	108.05
2	32	Disney	DIS	NYSE	2023-02-13 16:00	107.69
3	35	Disney	DIS	NYSE	2023-02-14 16:00	107.67
4	38	Disney	DIS	NYSE	2023-02-15 16:00	109.24
5	71	Disney	DIS	NYSE	2023-02-16 16:00	105.83
6	16	Meta	META	NASDAQ	2023-02-10 16:00	174.15
7	19	Meta	META	NASDAQ	2023-02-13 16:00	179.43
8	22	Meta	META	NASDAQ	2023-02-14 16:00	179.48
9	25	Meta	META	NASDAQ	2023-02-15 16:00	177.16
10	69	Meta	META	NASDAQ	2023-02-16 16:00	172.44
11	42	Target	TGT	NYSE	2023-02-10 16:00	170.01
12	45	Target	TGT	NYSE	2023-02-13 16:00	173.37
13	48	Target	TGT	NYSE	2023-02-14 16:00	171.17
14	51	Target	TGT	NYSE	2023-02-15 16:00	176.1
15	73	Target	TGT	NYSE	2023-02-16 16:00	174.54
16	3	Tesla	TSLA	NASDAQ	2023-02-10 16:00	196.89
17	6	Tesla	TSLA	NASDAQ	2023-02-13 16:00	194.61
18	9	Tesla	TSLA	NASDAQ	2023-02-14 16:00	209.27
19	12	Tesla	TSLA	NASDAQ	2023-02-15 16:00	214.24
20	67	Tesla	TSLA	NASDAQ	2023-02-16 16:00	201.96
21	55	Yum! Brands	YUM	NYSE	2023-02-10 16:00	131.32
22	58	Yum! Brands	YUM	NYSE	2023-02-13 16:00	132.57
23	61	Yum! Brands	YUM	NYSE	2023-02-14 16:00	130.83
24	64	Yum! Brands	YUM	NYSE	2023-02-15 16:00	131.7
25	75	Yum! Brands	YUM	NYSE	2023-02-16 16:00	131.72

DIS ended the first day of the week with \$108.05 and ended with a closing price of \$105.83 — a loss.

META started with a closing price of \$174.15 and ended with a closing price of \$172.44 — a loss.

TGT started with a closing price of \$170.01 and ended with a closing price of \$174.54 — a \$4 per share gain.

TSLA started with a closing price of \$196.89 and ended with a closing price of \$201.96 — a \$5 per share gain, but down \$10 from its intraweek high, and maximum for this dataset, of \$215.

And finally, Yum started with a closing price of \$131.32 and ended with a closing price of \$131.72 — a \$0.40 per share gain.

Which of the rows have a price greater than the average of all prices in the dataset?

```
SELECT *
FROM stock
WHERE price > (SELECT AVG(price) FROM stock);
```

	id	stock_name	stock_symbol	stock_exchange	time_checked	price
1	1	Tesla	TSLA	NASDAQ	2023-02-10 09:30	202.17
2	2	Tesla	TSLA	NASDAQ	2023-02-10 12:00	196.25
3	3	Tesla	TSLA	NASDAQ	2023-02-10 16:00	196.89
4	4	Tesla	TSLA	NASDAQ	2023-02-13 09:30	194.37
5	5	Tesla	TSLA	NASDAQ	2023-02-13 12:00	193.26
6	6	Tesla	TSLA	NASDAQ	2023-02-13 16:00	194.61
7	7	Tesla	TSLA	NASDAQ	2023-02-14 09:30	191.6
8	8	Tesla	TSLA	NASDAQ	2023-02-14 12:00	199.85
9	9	Tesla	TSLA	NASDAQ	2023-02-14 16:00	209.27
10	10	Tesla	TSLA	NASDAQ	2023-02-15 09:30	211.8
11	11	Tesla	TSLA	NASDAQ	2023-02-15 12:00	213.36
12	12	Tesla	TSLA	NASDAQ	2023-02-15 16:00	214.24
13	13	Tesla	TSLA	NASDAQ	2023-02-16 09:30	210.72
14	14	Meta	META	NASDAQ	2023-02-10 09:30	176.01
15	15	Meta	META	NASDAQ	2023-02-10 12:00	175.27
16	16	Meta	META	NASDAQ	2023-02-10 16:00	174.15
17	17	Meta	META	NASDAQ	2023-02-13 09:30	178.14
18	18	Meta	META	NASDAQ	2023-02-13 12:00	179.77
19	19	Meta	META	NASDAQ	2023-02-13 16:00	179.43

	id	stock_name	stock_symbol	stock_exchange	time_checked	price
20	20	Meta	META	NASDAQ	2023-02-14 09:30	177.06
21	21	Meta	META	NASDAQ	2023-02-14 12:00	178.74
22	22	Meta	META	NASDAQ	2023-02-14 16:00	179.48
23	23	Meta	META	NASDAQ	2023-02-15 09:30	176.34
24	24	Meta	META	NASDAQ	2023-02-15 12:00	176.39
25	25	Meta	META	NASDAQ	2023-02-15 16:00	177.16
26	26	Meta	META	NASDAQ	2023-02-16 09:30	172.76
27	40	Target	TGT	NYSE	2023-02-10 10:00	169.86
28	41	Target	TGT	NYSE	2023-02-10 12:00	169.78
29	42	Target	TGT	NYSE	2023-02-10 16:00	170.01
30	43	Target	TGT	NYSE	2023-02-13 10:00	171.23
31	44	Target	TGT	NYSE	2023-02-13 12:00	172.7
32	45	Target	TGT	NYSE	2023-02-13 16:00	173.37
33	46	Target	TGT	NYSE	2023-02-14 10:00	172.32
34	47	Target	TGT	NYSE	2023-02-14 12:00	170.18
35	48	Target	TGT	NYSE	2023-02-14 16:00	171.17
36	49	Target	TGT	NYSE	2023-02-15 10:00	171.5
37	50	Target	TGT	NYSE	2023-02-15 12:00	174.64
38	51	Target	TGT	NYSE	2023-02-15 16:00	176.1

39	52	Target	TGT	NYSE	2023-02-16 10:00	174.31
40	66	Tesla	TSLA	NASDAQ	2023-02-16 12:00	215.21
41	67	Tesla	TSLA	NASDAQ	2023-02-16 16:00	201.96
42	68	Meta	META	NASDAQ	2023-02-16 12:00	173.88
43	69	Meta	META	NASDAQ	2023-02-16 16:00	172.44
44	72	Target	TGT	NYSE	2023-02-16 12:00	176.43
45	73	Target	TGT	NYSE	2023-02-16 16:00	174.54

45 out of 75 records have prices higher than the average.

Advanced Challenges

In addition to the built-in aggregate functions, explore ways to calculate other key statistics about the data, such as median or variance.

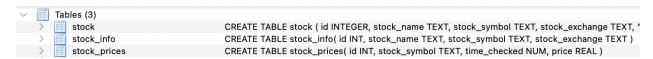
```
SELECT stock_symbol, price
FROM stock
ORDER BY price
LIMIT 1
OFFSET (SELECT COUNT(*) FROM stock) / 2;
```

	stock_symbol	price	
1	TGT	172.32	

Let's refactor the data into 2 tables: stock_info to store general info about the stock itself (ie. symbol, name) and stock_prices to store the collected data on price (ie. symbol, datetime, price).

```
CREATE TABLE stock_info AS
SELECT id, stock_name, stock_symbol, stock_exchange FROM stock;
```

```
CREATE TABLE stock_prices AS
SELECT id, stock_symbol, time_checked, price FROM stock;
```



Now, we do not need to repeat both <code>symbol</code> and <code>name</code> for each row of price data.

Instead, join the 2 tables in order to view more information on the stock with each row of price.

```
SELECT *
FROM stock_info
JOIN stock_prices
  ON stock_info.id = stock_prices.id
LIMIT 19;
```

	id	stock_name	stock_symbol	stock_exchange	id	stock_symbol	time_checked	price
1	1	Tesla	TSLA	NASDAQ	1	TSLA	2023-02-10 09:30	202.17
2	2	Tesla	TSLA	NASDAQ	2	TSLA	2023-02-10 12:00	196.25
3	3	Tesla	TSLA	NASDAQ	3	TSLA	2023-02-10 16:00	196.89
4	4	Tesla	TSLA	NASDAQ	4	TSLA	2023-02-13 09:30	194.37
5	5	Tesla	TSLA	NASDAQ	5	TSLA	2023-02-13 12:00	193.26
6	6	Tesla	TSLA	NASDAQ	6	TSLA	2023-02-13 16:00	194.61
7	7	Tesla	TSLA	NASDAQ	7	TSLA	2023-02-14 09:30	191.6
8	8	Tesla	TSLA	NASDAQ	8	TSLA	2023-02-14 12:00	199.85
9	9	Tesla	TSLA	NASDAQ	9	TSLA	2023-02-14 16:00	209.27
10	10	Tesla	TSLA	NASDAQ	10	TSLA	2023-02-15 09:30	211.8
11	11	Tesla	TSLA	NASDAQ	11	TSLA	2023-02-15 12:00	213.36
12	12	Tesla	TSLA	NASDAQ	12	TSLA	2023-02-15 16:00	214.24
13	13	Tesla	TSLA	NASDAQ	13	TSLA	2023-02-16 09:30	210.72
14	14	Meta	META	NASDAQ	14	META	2023-02-10 09:30	176.01
15	15	Meta	META	NASDAQ	15	META	2023-02-10 12:00	175.27
16	16	Meta	META	NASDAQ	16	META	2023-02-10 16:00	174.15
17	17	Meta	META	NASDAQ	17	META	2023-02-13 09:30	178.14
18	18	Meta	META	NASDAQ	18	META	2023-02-13 12:00	179.77
19	19	Meta	META	NASDAQ	19	META	2023-02-13 16:00	179.43

Add more variables to the stock_info table and update the data (e.g., sector, industry, etc).

```
SELECT *,
CASE
WHEN stock_name = 'Tesla' THEN 'Automotive'
WHEN stock_name = 'Meta' THEN 'Social Media'
WHEN stock_name = 'Target' THEN 'Consumer Retail'
WHEN stock_name = 'Disney' THEN 'Entertainment'
WHEN stock_name = 'Yum! Brands' THEN 'Fast Food'
ELSE 'Other'
END AS 'Sector'
FROM stock_info;
```

66	66	Tesla	TSLA	NASDAQ	Automotive
67	67	Tesla	TSLA	NASDAQ	Automotive
68	68	Meta	META	NASDAQ	Social Media
69	69	Meta	META	NASDAQ	Social Media
70	70	Disney	DIS	NYSE	Entertainment
71	71	Disney	DIS	NYSE	Entertainment
72	72	Target	TGT	NYSE	Consumer Retail
73	73	Target	TGT	NYSE	Consumer Retail
74	74	Yum! Brands	YUM	NYSE	Fast Food
75	75	Yum! Brands	YUM	NYSE	Fast Food

Thanks for reading through my findings! Onward + upward!