Cryptocurrency Prediction using Social Media Sentiment & Volume

SPRING 2019 | DATA ENGINEERING & PLATFORMS FOR ANALYTICS

GROUP 5

Outline

- Executive Summary
- Business Use Case
- Tech Stack – Data and Tools
- Design Considerations
- Enhanced Entity Relationship Model
- Dimensional Model

Executive Summary

- Background:
  - The cryptocurrency market is very nascent and volatile. This makes the asset class very risky but also potentially lucrative.
  - Understanding the impact of social media on price direction can provide a cryptocurrency trader a better trading strategy.

Objective: To collect market information and social media engagement data for the major cryptocurrencies and tokens to create a platform for short-term trading strategy.

Business Use Case

A price prediction model based on metrics and sentiments from multiple online resources and incorporate it into larger system that automatically and intelligently manages a cryptocurrency portfolio.

Users:

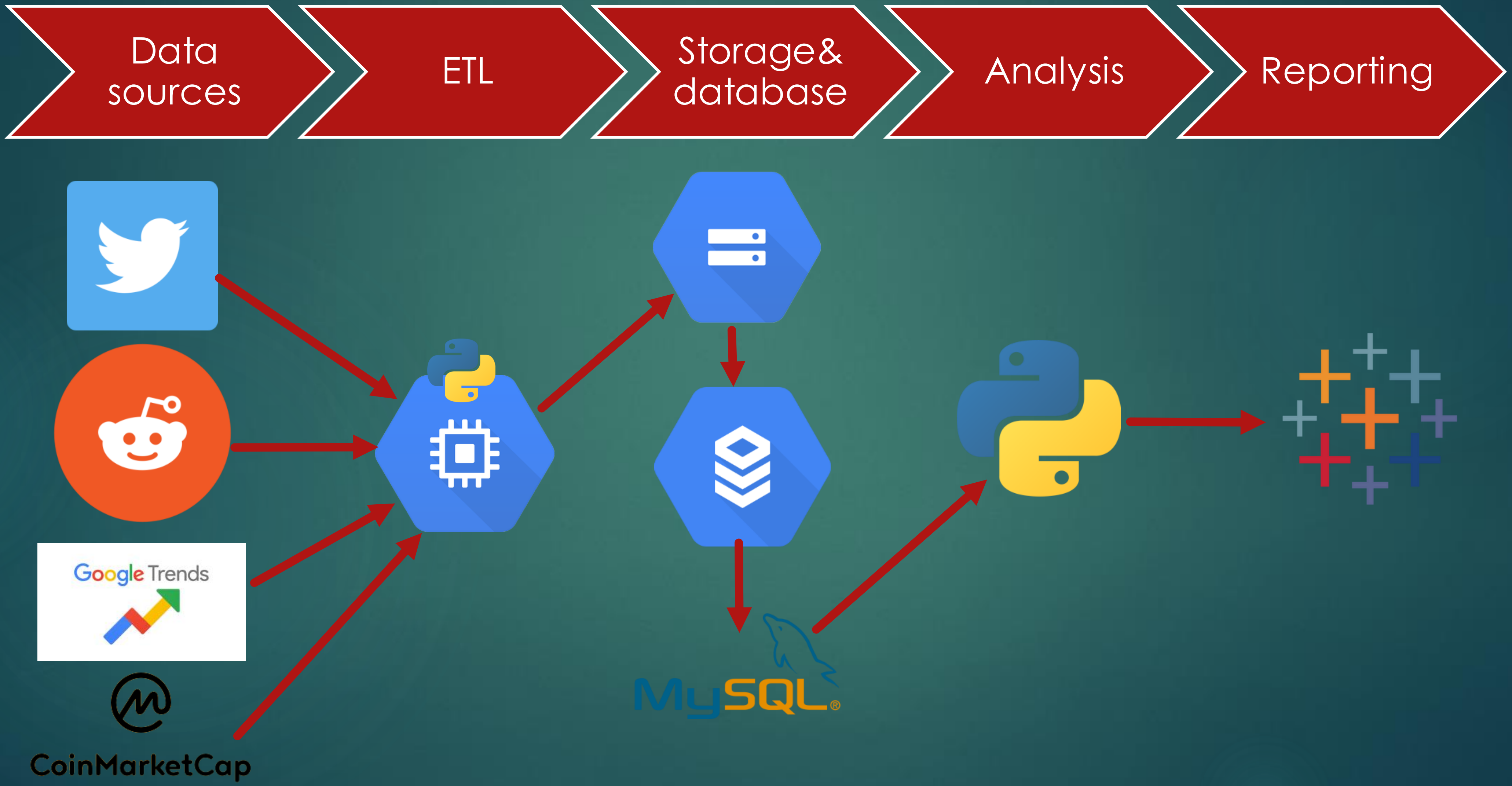
- Day-traders can use our database to build complex trading models based on social media sentiment and volume
- Long-term investors can find established/safer assets to diversify their portfolio
- Industry experts can use the dataset to analyze the publics knowledge and interest in their specific cryptocurrency/blockchain technology

Business Use Case

- Question:
  - Is there a close relationship between social media and price fluctuations in cryptocurrency?
  - If so, can we predict short-term returns from activity and sentiments on various social media platforms such as Reddit, Twitter, Google Trends, etc. ?

Our goal is to build a price prediction model based on metrics and sentiments from multiple online resources and incorporate it into larger system that automatically and intelligently manages a cryptocurrency portfolio.

Data & Tools



Data sources

ETL

Storage& database

Analysis

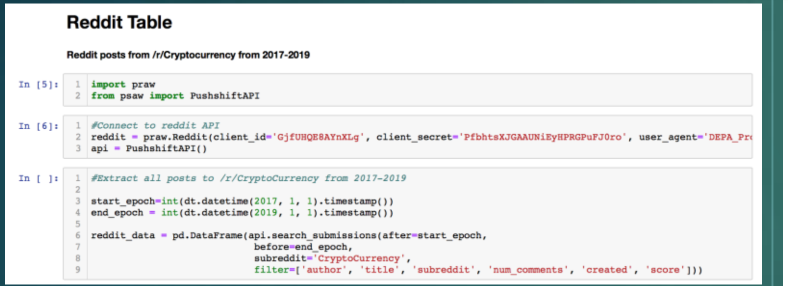
Reporting

Database Design Considerations

- Application Type: Online Analytical Processing for Business Intelligence and end users (OLAP)
- Data Format and Size: Cryptocurrency Financial Data
- Data Maintenance and Support: Open Source Project
- Hardware and Software: Google Cloud compute and virtual machines, and Google Cloud buckets for storage
- Number of Users:
- Location: Distributed System (as run through GCP's VM)
- Schedule and Budget:

Data Extraction

praw/psaw API



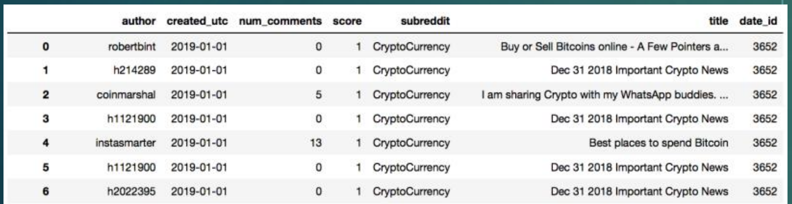
Reddit Table

Reddit posts from /r/Cryptocurrency from 2017-2019

```
In [5]:
import praw
from psaw import PushshiftAPI
```

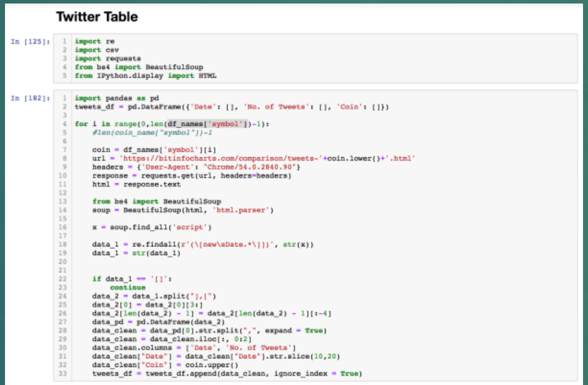
```
In [6]:
#Connect to reddit API
reddit = praw.Reddit(client_id='GjfUHQE8AYnXLg', client_secret='PfbhtsXJGAAUNiEyHPRGPuFJ0ro', user_agent='DEPA_Pr
api = PushshiftAPI()
```

```
In [ ]:
#Extract all posts to /r/CryptoCurrency from 2017-2019

start_epoch=int(dt.datetime(2017, 1, 1).timestamp())
end_epoch = int(dt.datetime(2019, 1, 1).timestamp())

reddit_data = pd.DataFrame(api.search_submissions(after=start_epoch,
                            before=end_epoch,
                            subreddit='CryptoCurrency',
                            filter=['author', 'title', 'subreddit', 'num_comments', 'created', 'score']))
```



	author	created_utc	num_comments	score	subreddit	title	date_id
0	robertbint	2019-01-01	0	1	CryptoCurrency	Buy or Sell Bitcoins online - A Few Pointers a...	3652
1	h214289	2019-01-01	0	1	CryptoCurrency	Dec 31 2018 Important Crypto News	3652
2	coinmarshal	2019-01-01	5	1	CryptoCurrency	I am sharing Crypto with my WhatsApp buddies. ...	3652
3	h1121900	2019-01-01	0	1	CryptoCurrency	Dec 31 2018 Important Crypto News	3652
4	instasmarter	2019-01-01	13	1	CryptoCurrency	Best places to spend Bitcoin	3652
5	h1121900	2019-01-01	0	1	CryptoCurrency	Dec 31 2018 Important Crypto News	3652
6	h2022395	2019-01-01	0	1	CryptoCurrency	Dec 31 2018 Important Crypto News	3652

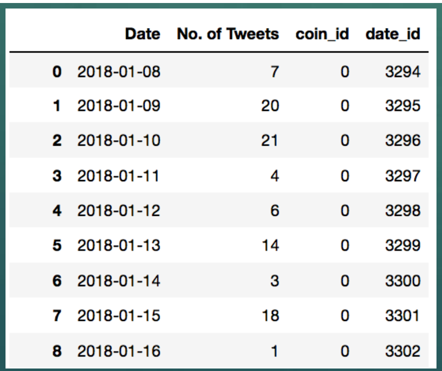
beautifulsoup



Twitter Table

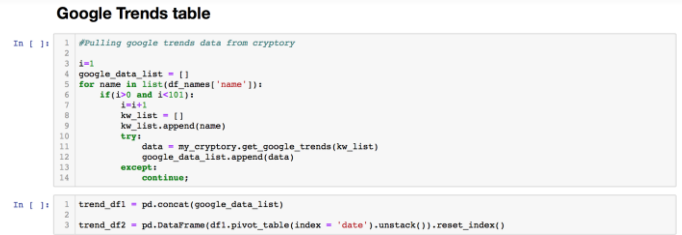
```
In [125]:
import re
import csv
import requests
from bs4 import BeautifulSoup
from IPython.display import HTML
```

```
In [182]:
import pandas as pd
tweets_df = pd.DataFrame({'Date': [], 'No. of Tweets': [], 'Coin': []})

for i in range(0,len(df_names['symbol'])-1):
    #len(coin_name["symbol"])-1

    coin = df_names['symbol'][i]
    url = 'https://bitinfocharts.com/comparison/tweets-'+coin.lower()+'.html'
    headers = {'User-Agent': "Chrome/54.0.2840.90"}
    response = requests.get(url, headers=headers)
    html = response.text

    from bs4 import BeautifulSoup
    soup = BeautifulSoup(html, 'html.parser')

    x = soup.find_all('script')

    data_1 = re.findall(r'(\[new\sDate.*\]])', str(x))
    data_1 = str(data_1)


    if data_1 == '[]':
        continue
    data_2 = data_1.split("],[")
    data_2[0] = data_2[0][3:]
    data_2[len(data_2) - 1] = data_2[len(data_2) - 1][:-4]
    data_pd = pd.DataFrame(data_2)
    data_clean = data_pd[0].str.split(",", expand = True)
    data_clean = data_clean.iloc[:, 0:2]
    data_clean.columns = ['Date', 'No. of Tweets']
    data_clean["Date"] = data_clean["Date"].str.slice(10,20)
    data_clean["Coin"] = coin.upper()
    tweets_df = tweets_df.append(data_clean, ignore_index = True)
```



	Date	No. of Tweets	coin_id	date_id
0	2018-01-08	7	0	3294
1	2018-01-09	20	0	3295
2	2018-01-10	21	0	3296
3	2018-01-11	4	0	3297
4	2018-01-12	6	0	3298
5	2018-01-13	14	0	3299
6	2018-01-14	3	0	3300
7	2018-01-15	18	0	3301
8	2018-01-16	1	0	3302

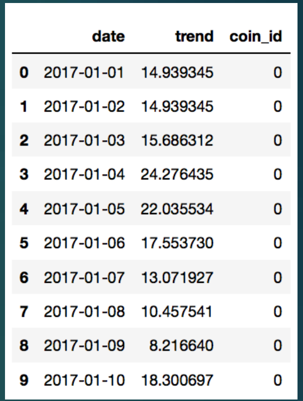
cryptory API



Google Trends table

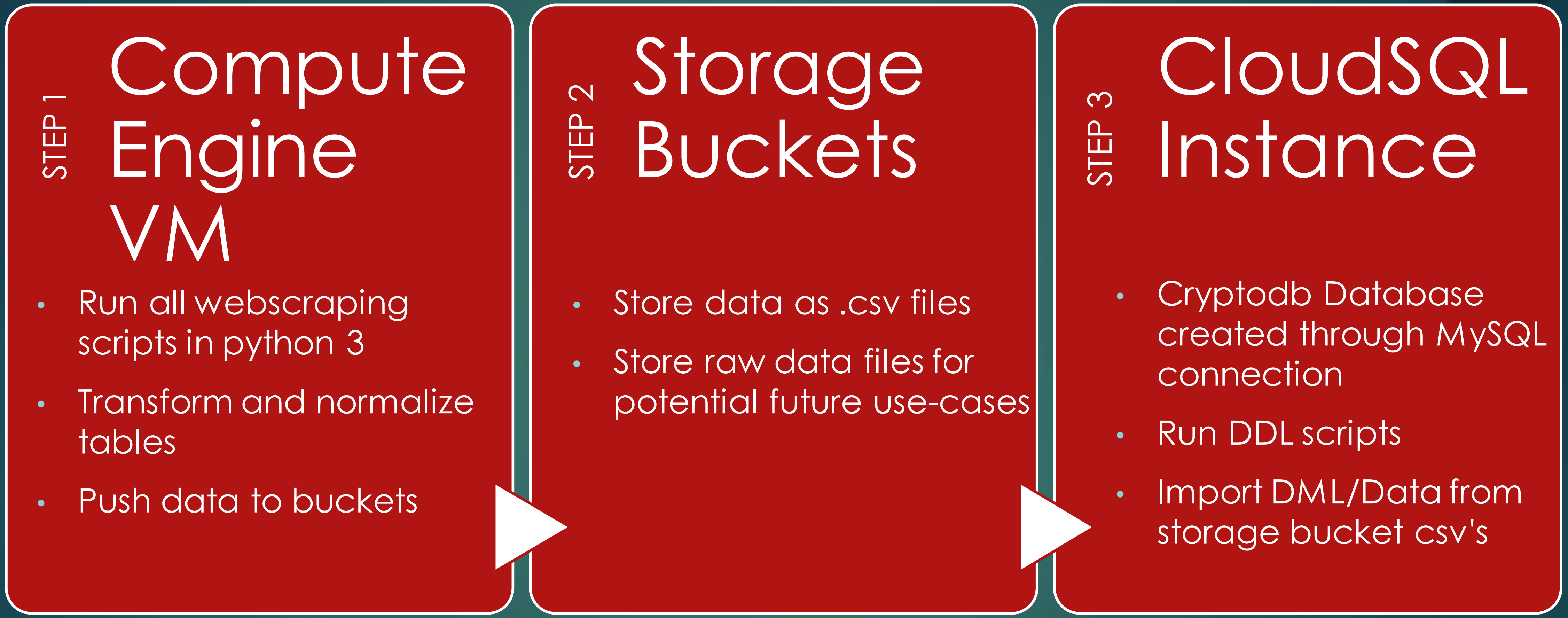
```
In [ ]:
#Pulling google trends data from cryptory

i=1
google_data_list = []
for name in list(df_names['name']):
    if(i>0 and i<101):
        i=i+1
        kw_list = []
        kw_list.append(name)
        try:
            data = my_cryptory.get_google_trends(kw_list)
            google_data_list.append(data)
        except:
            continue;
```

```
In [ ]:
trend_df1 = pd.concat(google_data_list)

trend_df2 = pd.DataFrame(df1.pivot_table(index = 'date').unstack()).reset_index()
```



	date	trend	coin_id
0	2017-01-01	14.939345	0
1	2017-01-02	14.939345	0
2	2017-01-03	15.686312	0
3	2017-01-04	24.276435	0
4	2017-01-05	22.035534	0
5	2017-01-06	17.553730	0
6	2017-01-07	13.071927	0
7	2017-01-08	10.457541	0
8	2017-01-09	8.216640	0
9	2017-01-10	18.300697	0

Data Storage



STEP 1

Compute Engine VM

- Run all webscraping scripts in python 3
- Transform and normalize tables
- Push data to buckets

STEP 2

Storage Buckets

- Store data as .csv files
- Store raw data files for potential future use-cases

STEP 3

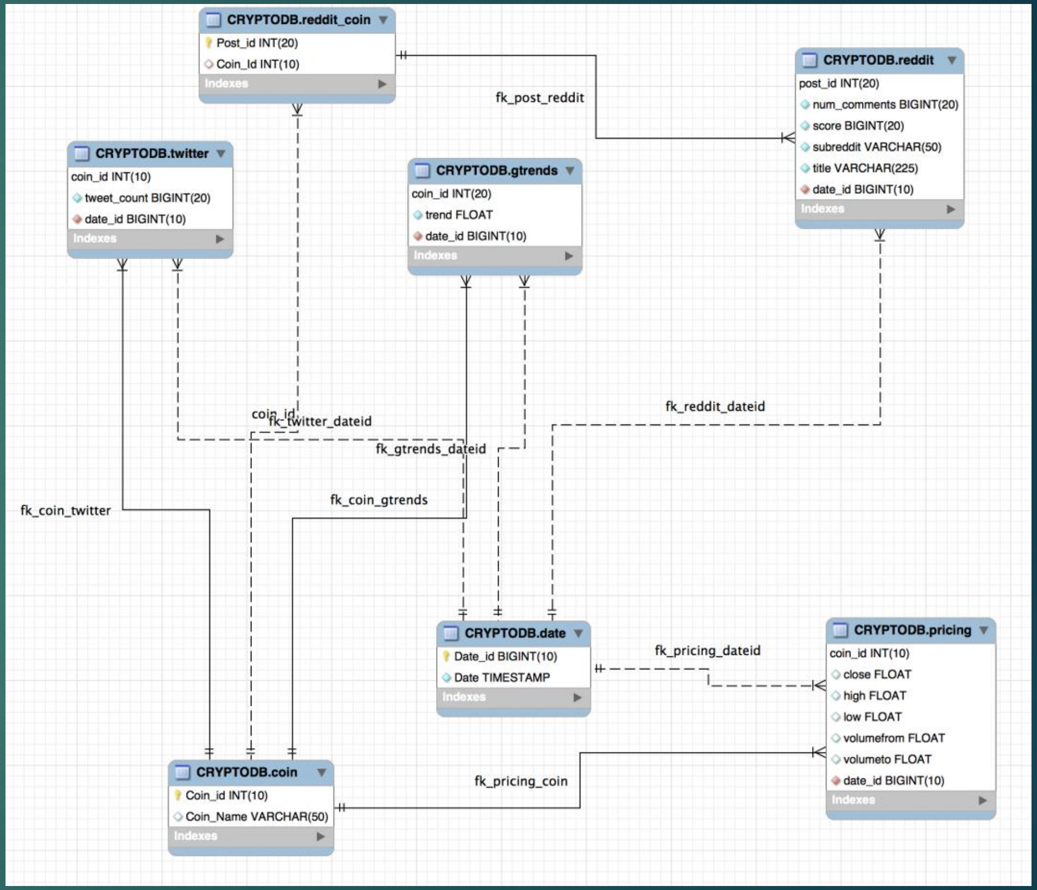
CloudSQL Instance

- Cryptodb Database created through MySQL connection
- Run DDL scripts
- Import DML/Data from storage bucket csv's

Enhanced Entity Relationship Diagram

Entities:

- reddit: /r/cryptocurrency sub post data
- reddit_subs: subscriber count for >150 coin subreddits
- Pricing: cryptocurrency market OHLCV data
- Twitter: tweet count by coin mentioned
- gtrends: Google trend data by coin
- reddit_Coin: join-table linking reddit post data to coin ID
- date : date information



Relationship & Cardinality: <-- not sure if we need this since the arrows already show it

Datatypes: <-- also already shown in the table ?