Case: Transforming data into insights

- ETL process of Financial data

Introducing me

- Martin Birk Andreasen (M28)
- Data Scientist at STAR
- Interests:
  - NLP, ML and Econometrics
  - Data Science and Engineering
  - Running and CrossFit
- Economist (Cand.polit)
- Courses after graduation:
  - Deep Learning (DTU)
  - Data Engineering (udacity)
  - Machine learning (stanford)
  - Power BI (SuperUsers)

Project: Finance ETL

Outline

- Data is downloaded from yahoo finance and uploaded to a data lake on AWS S3
- - Create: IAM Role and Redshift cluster
- - Create PostgreSQL tables
- - *E*xtract data from S3 to staging tables on Redshift
- - *T*ransform data from staging tables to Fact and Dimension tables
- - Test tables are correct
- - *L*oad data for analysis

Objective

- use the DWH for analytics e.g. focasting model of price volatility
- Potentially combine with reddit sentiment analysis

Data Warehouse Design

Dimension tabel: DimCorp

Ticker	CorpName	CEO	Founded
TSLA	Tesla	Elon Musk	2003-07-01
AAPL	Apple	Tim Cook	1976-04-01

Fact tabel: FactHist (sample)

ticker	date	adjclose
TSLA	2022-05-25	658.0
AAPL	2022-04-29	157.0

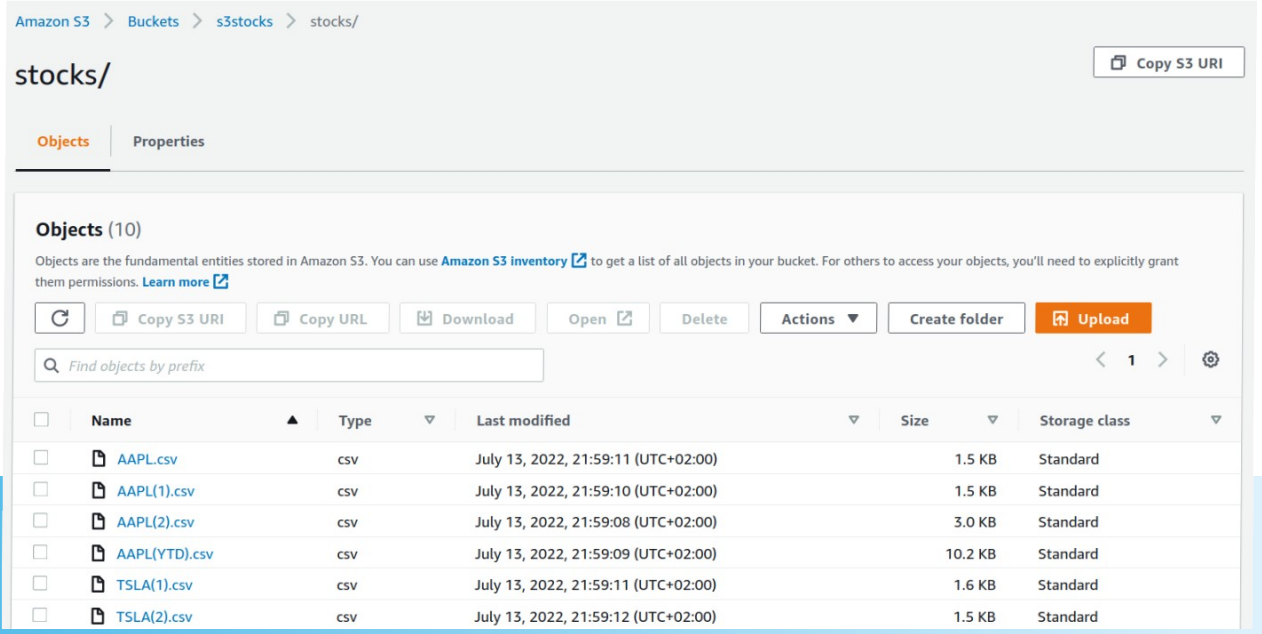
AWS

Data Lake: AWS Amazon Simple Storage Service (S3)

- Pros:
  - Cost-effective
  - Scalable
  - Automatic backup
  - Sharing/Access
- Cons:
  - Lack of total control

Data Warehouse: AWS Redshift

- Pros:
  - Performance: Massively Parallel Processing (MPP)
  - Scalable
- Cons:
  - +/- price



Data Lake: Approach

Setting up AWS (General)

1) Create AWS user
2) Download and set up Command Line Interface (CLI)
3) Create IAM Role (permissions)
4) Create IAM user
   - programmatic actions
   - attach existing policies
   - AdministratorAccess
5) Create Security Group

Setting up AWS S3

A) Create S3 Bucket

B) Set billing alarm!

C) Assign IAM Role permissions

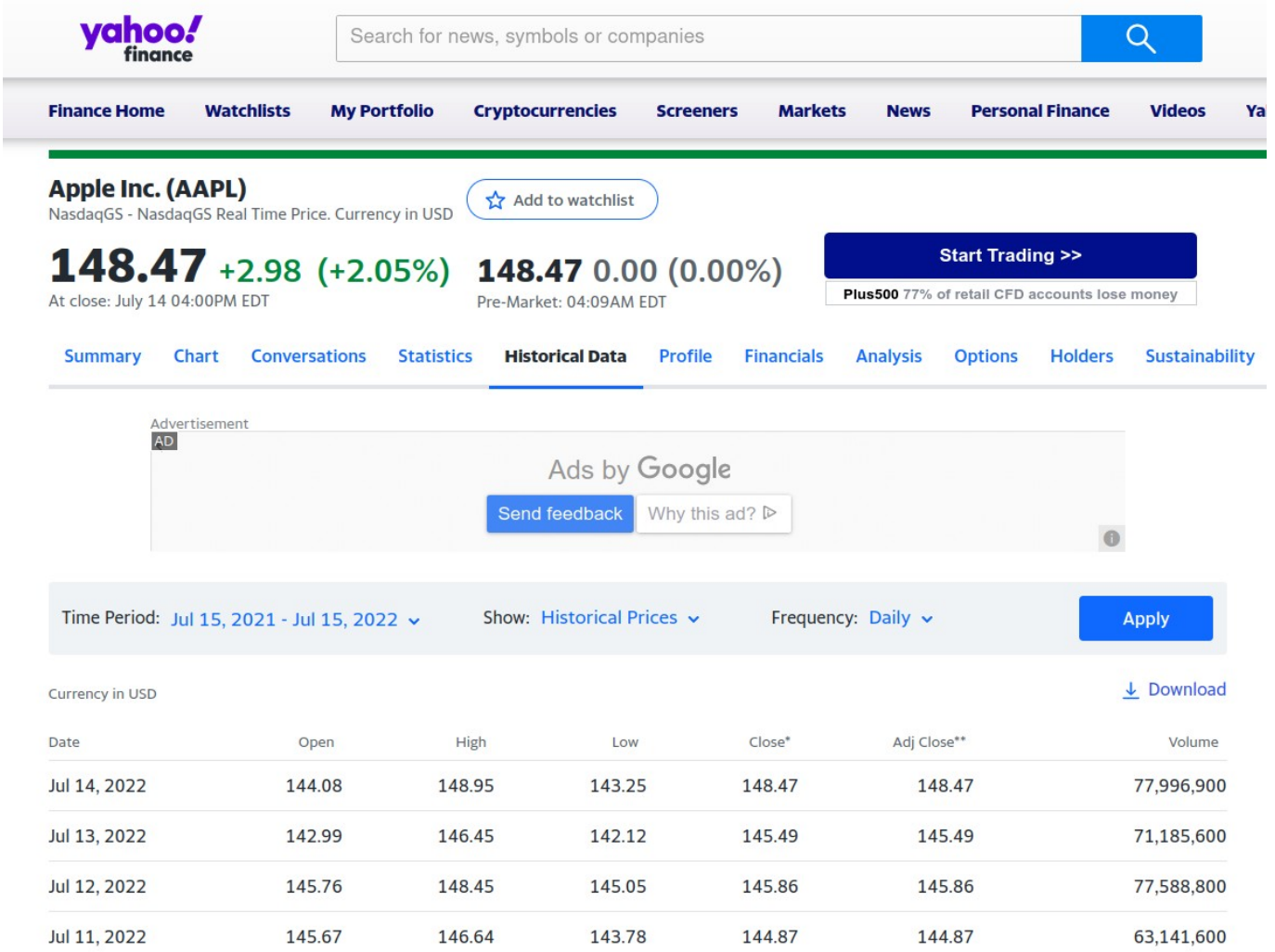
D) Upload (CSV/json) files

E) Assign IAM users (clients)

```
(base) martin@martin-HP-ENVY-x360-Convertible-13-ag0xxx:~$ aws configure list --profile AdminMabiUser
      Name                    Value             Type    Location
      ----                    -----             ----    --------
   profile           AdminMabiUser           manual    --profile
access_key     ****************KHYC shared-credentials-file
secret_key     ****************QX/P shared-credentials-file
    region                us-east-1      config-file    ~/.aws/config
```

Let’s explore

- Github
- AWS
- VS code
- Terminal



Objective: Analysis

- Portfolio Overview

ticker	date	adjclose	corpname	ceo	founded
AAPL	2022-01-03	181.0	Apple	Tim Cook	1976-04-01
AAPL	2022-01-04	179.0	Apple	Tim Cook	1976-04-01
AAPL	2022-01-05	174.0	Apple	Tim Cook	1976-04-01
AAPL	2022-01-06	171.0	Apple	Tim Cook	1976-04-01
AAPL	2022-01-07	171.0	Apple	Tim Cook	1976-04-01

- Stock price volatility forecast
  - Predict e.g. daily
  - Retrain model monthly

ticker	date	adjclose	daily_return
AAPL	2022-01-03	181.0	NaN
AAPL	2022-01-04	179.0	-1.104972
AAPL	2022-01-05	174.0	-2.793296
AAPL	2022-01-06	171.0	-1.724138
AAPL	2022-01-07	171.0	0.000000

Further development

For Production

- Apache Airflow (ETL part)
- API for live update
- Add reddit sentiment
  - Requires EC2 w. GPU

For speed (e.g. for trading)

- PySpark
- Distributed systems Hadoop
- AWS: EMR or EC2 Cluster Computing