

## Tools used/download

### (a) Web scraping

- Jupyter Notebook
- Python

### (b) Database (PostgreSQL)

- To download Postgres (Version: 6.15)
  1. Go to the postgresQL Website <https://www.postgresql.org/>
  2. Click on the 'Download' button located in the top menu
  3. Select the version of PostgreSQL you want to download
  4. Choose your operating system
  5. Follow the instructions to download and install PostgreSQL
- Extra reference: <https://youtu.be/0n41UTkOBb0>

### (c) Dashboard (Power BI)

- To download Power BI (Version: 2.112.1161.0 64-bit (December, 2022))
  1. Go to the Microsoft Power BI website <https://powerbi.microsoft.com/en-us/>
  2. Click on "Get started for free" button
  3. Create a Microsoft account , if you are new user
  4. After logging in to your Microsoft account , click on the 'Download Power BI Desktop'
  5. Follow the on-screen instructions to complete the installation
- Extra reference : <https://youtu.be/GT2NcTE6UEo>
- To download ODBC driver
  1. Go to Connecting Power BI to PostgreSQL via ODBC Driver Website <https://docs.devart.com/odbc/postgresql/?powerbi.htm>
  2. Click on the "Using ODBC Driver" then "Installation", then select the operating system that is compatible with your laptop.

## Source of data

### (a) Historical and daily update of stock price

- Yahoo finance api ( Python library)

### (b) Financial metric (Dividend, Dividend yield, ROE , DPR, EPS)

- KLSE screener
- Url: <https://www.klsescreener.com/v2/>

### (c) Financial metric (P/CF, P/B, P/E, Dividend 5 year growth rate)

- Bursa Malaysia website
- Url : <https://www.bursamarketplace.com/>

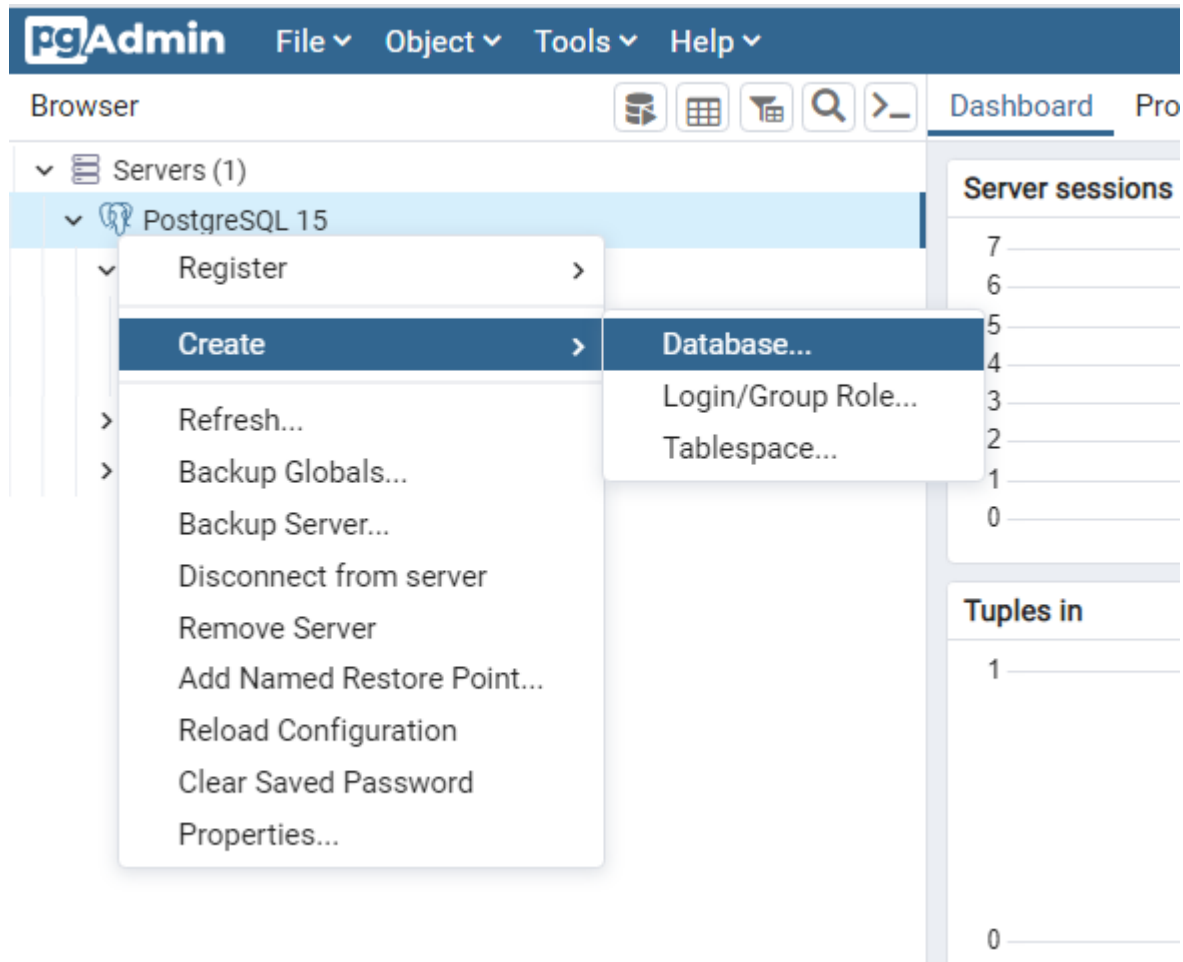
## Web scraping

1. Historical data
2. Latest data

### 3. Financial metrics

## Create database using PostgreSQL

1. Create a database: You can do it either by code (CREATE DATABASE database\_name;) or right click “PostgreSQL 15”, “Create”, then “Database”.



2. Create tables: Since we are developing this project using python, all our tables are imported from Jupyter Notebook into our database.

## Create dashboard using PowerBI

Connect to data: Before you can create a dashboard, you need to get the data you want to work with. To do this, you need to select "Get Data" from the Home tab of PowerBi Desktop, and then select the appropriate data source (such as Excel, SQL Server, SharePoint or other data source). In this project, you will need to connect to ODBC, which is a C programming language interface that allows applications to connect to various database management systems (DBMSs).

### From ODBC

Data source name (DSN)

dBASE Files

Advanced options

Connection string (non-credential properties) (optional) ⓘ

Driver={PostgreSQL ANSI(x64)}; Server=localhost; Port=5432; Database= dividendinvesting

SQL statement (optional)

Supported row reduction clauses (optional)

(None)

Detect

OK

Cancel

Expand the advanced options and put in the connection string, Driver={PostgreSQL ANSI(x64)}; Server=localhost; Port=5433; Database= my\_database. You will need to change to your own port number and the Database name.

## Navigator

Display Options ▾

ODBC (driver={PostgreSQL ANSI(x64)};server=l...

dividendinvesting [1]

public [11]

- ☒ daily\_stock
- ☒ div\_perf
- ☒ dividend\_info
- ☐ final\_ratings
- ☒ final\_summary
- ☒ latest\_sum
- ☐ model\_table
- ☒ stock\_info
- ☒ stock\_perf
- ☐ sum\_final
- ☐ summary\_stocks

daily\_stock

stockDate	stockOpen	stockHigh	stockLow	stockClose	stockCode
23/9/2020	0.61	0.61	0.595	0.6	5275
24/9/2020	0.6	0.61	0.595	0.605	5275
25/9/2020	0.605	0.63	0.6	0.62	5275
28/9/2020	0.605	0.625	0.605	0.62	5275
29/9/2020	0.62	0.62	0.615	0.62	5275
30/9/2020	0.61	0.62	0.605	0.61	5275
1/10/2020	0.61	0.615	0.595	0.605	5275
2/10/2020	0.6	0.605	0.59	0.605	5275
5/10/2020	0.61	0.61	0.59	0.605	5275
6/10/2020	0.605	0.605	0.58	0.59	5275
7/10/2020	0.59	0.6	0.59	0.595	5275
8/10/2020	0.595	0.605	0.595	0.605	5275
9/10/2020	0.615	0.72	0.615	0.67	5275
12/10/2020	0.67	0.67	0.585	0.595	5275
13/10/2020	0.61	0.63	0.595	0.605	5275
14/10/2020	0.615	0.615	0.6	0.61	5275
15/10/2020	0.61	0.615	0.595	0.6	5275
16/10/2020	0.6	0.64	0.6	0.61	5275
19/10/2020	0.615	0.615	0.6	0.615	5275
20/10/2020	0.61	0.61	0.595	0.605	5275
21/10/2020	0.61	0.61	0.59	0.595	5275
22/10/2020	0.595	0.6	0.585	0.585	5275
23/10/2020	0.59	0.595	0.575	0.575	5275

Select Related Tables

Load

Transform Data

Cancel

In the Navigator window, you need to load all the relevant datasets to Power BI. With all datasets loaded, you can now create reports using the visualisations provided by Power BI.

## **Project Information**

**Name:** Dividend Investing

**Purpose:**

1. Build a dashboard to present and analyse the financial metrics to identify stocks that would be good investments for dividends
2. Create models to forecast the future dividend performance of a stock

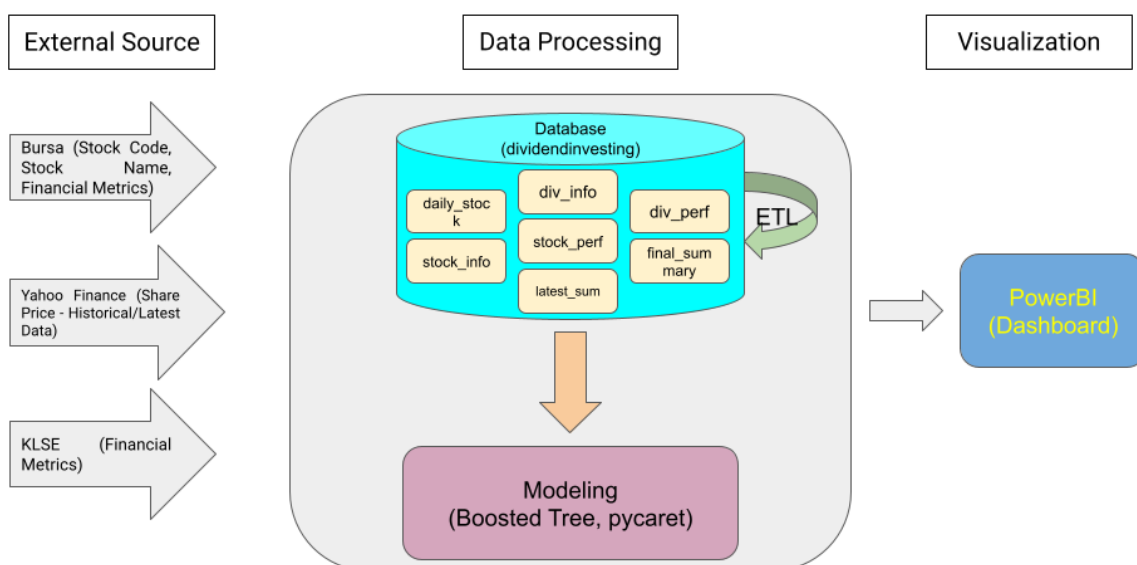
**Schedule:**

### **Project Schedule**

Step 1	Get stock code and stock name - (2 days)
Step 2	Get historical stock price - (5 days)
Step 3	Obtain latest stock price - (3 days)
Step 4	Get financial metrics (KLSE and Bursa Malaysia) - (6 days)
Step 5	Perform data cleaning/formatting and joining (ETL) - (10 days)
Step 6	Stored it into database - (3 days)
Step 7	Build a dashboard in Power BI - (3 days)
Step 8	Build predictive model - (4 days)

**Architecture of project:**

### **Architecture of the project**



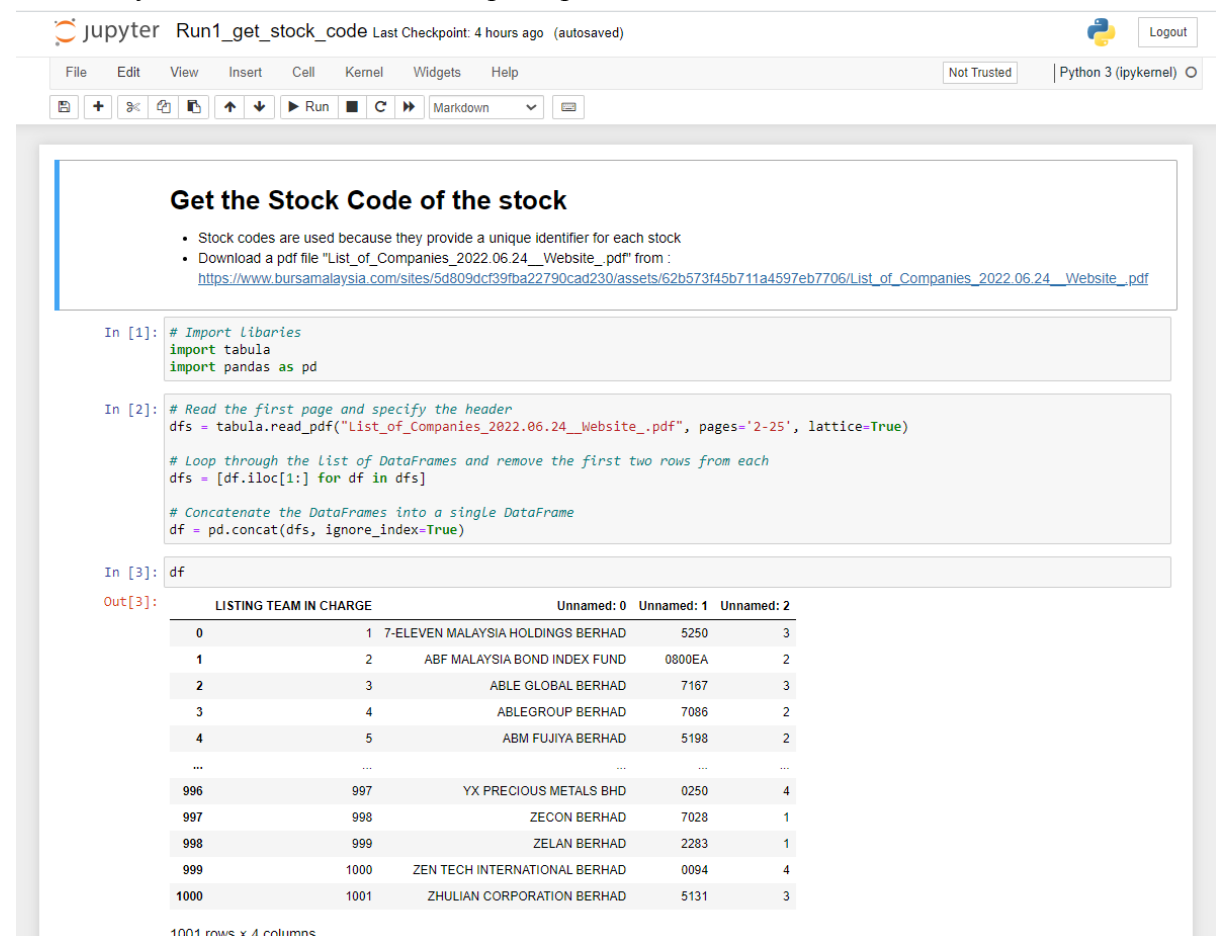
# Complete steps of developing the project (Dividend Investing)

## Step 1: Get stock code and stock name

First, download "List\_of\_Companies\_2022.06.24\_\_Website\_.pdf" from Bursa Malaysia, where the PDF contains a complete list of stock codes and stock names. Next, read the PDF and grab the tables using a python library called "tabula". After grabbing all the information, combine the stock code and stock name into one dataframe.

Problem: Some stock codes are duplicated or delisted.

Solution: Use the unique function to detect duplicates and manually remove duplicates. For delisted stocks, you may encounter delisted stock errors when running historical stock price data, and you need to run another loop to update the latest stock code.



The screenshot shows a Jupyter Notebook interface with the title "Run1\_get\_stock\_code" and a last checkpoint of 4 hours ago. The notebook contains three code cells and one output cell. The first code cell imports the necessary libraries: `import tabula` and `import pandas as pd`. The second code cell reads the PDF file "List\_of\_Companies\_2022.06.24\_\_Website\_.pdf" using the `tabula.read_pdf` function, specifying the pages to read (2-25) and the lattice option. It then loops through the list of DataFrames and removes the first two rows from each. The third code cell concatenates the DataFrames into a single DataFrame. The output cell displays the resulting DataFrame, which contains 1001 rows and 4 columns. The table shows the following data:

	LISTING TEAM IN CHARGE	Unnamed: 0	Unnamed: 1	Unnamed: 2
0	1 7-ELEVEN MALAYSIA HOLDINGS BERHAD	5250	3	
1	2 ABF MALAYSIA BOND INDEX FUND	0800EA	2	
2	3 ABLE GLOBAL BERHAD	7167	3	
3	4 ABLEGROUP BERHAD	7086	2	
4	5 ABM FUJIYA BERHAD	5198	2	
...	...	...	...	...
996	997 YX PRECIOUS METALS BHD	0250	4	
997	998 ZECON BERHAD	7028	1	
998	999 ZELAN BERHAD	2283	1	
999	1000 ZEN TECH INTERNATIONAL BERHAD	0094	4	
1000	1001 ZHULIAN CORPORATION BERHAD	5131	3	

1001 rows x 4 columns

Run1\_get\_stock\_code.ipynb

## Step 2: Get historical stock price

The purpose of collecting historical stock prices is to understand the trend of a company's stock price over the years. For this project, we will use the "yfinance" API to scrape each company's share price from 2017 to 2023. Scrapping historical stock prices is a one-time event.

Problem: Not all historical stock price data can be scraped at one time

Solution: Save the missing stock price data in a list and run a second loop

jupyter Run2\_historical\_data Last Checkpoint: 4 hours ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3 (ipykernel)

Run

## Scrape stock historical data from 2/1/2017 to 26/1/2023

- Scraping historical stock data using Yahoo Finance API to extract the stock prices
- Analyze the trend of the stock performance in dashboard using Power BI

\*\*\* install libraries using code: `pip install [library]`

```
In [1]: # import Libraries
from datetime import datetime
from pandas_datareader import data as pdr
import yfinance as yf
import pandas as pd
```

### Load stock code and stock company

- Read 'stock\_code.csv' file using read\_csv() function
- Convert the dataframe 'df' to dictionary format

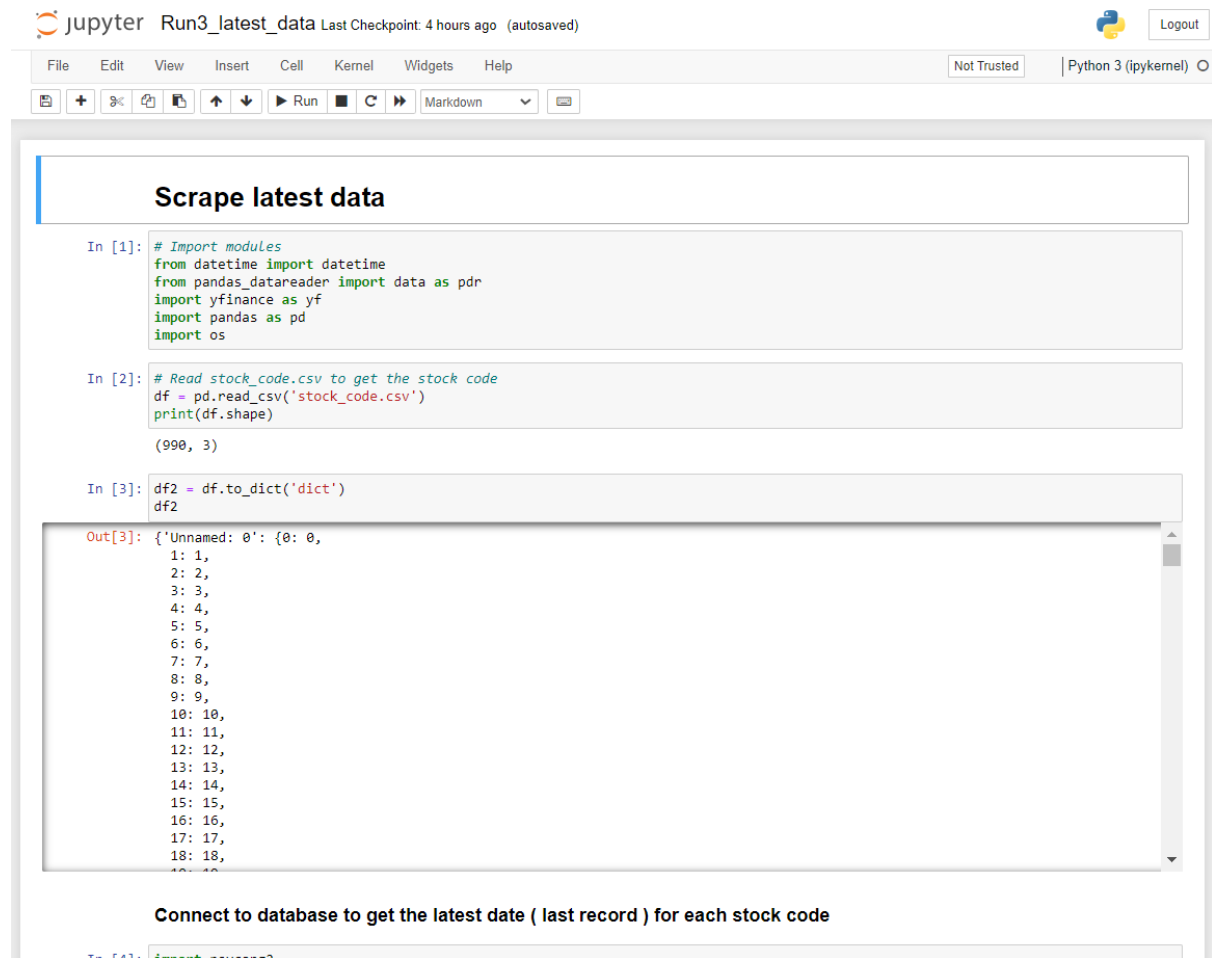
```
In [2]: df = pd.read_csv('stock_code.csv')
df2 = df.to_dict('dict')
df2
```

```
Out[2]: {'Unnamed: 0': {0: 0,
1: 1,
2: 2,
3: 3,
4: 4,
5: 5,
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10: 10,
11: 11,
12: 12,
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14: 14,
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```

Run2\_historical\_data.ipynb

### Step 3: Get latest stock price

The stock price for each stock must be scraped daily so that the data is up to date. With the latest stock price, we can know the performance of the stock for the day.



Jupyter Run3\_latest\_data Last Checkpoint: 4 hours ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3 (ipykernel)

### Scrape latest data

```
In [1]: # Import modules
from datetime import datetime
from pandas_datareader import data as pdr
import yfinance as yf
import pandas as pd
import os

In [2]: # Read stock_code.csv to get the stock code
df = pd.read_csv('stock_code.csv')
print(df.shape)

(990, 3)

In [3]: df2 = df.to_dict('dict')
df2

Out[3]: {'Unnamed: 0': {0: 0,
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Jupyter Run4\_WebScraping(div\_info and div\_yield) Last Checkpoint: 4 hours ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3 (ipykernel)

Scrape dividend info from KLSE and calculate dividend yield

- Scrape dividend information (Financial Year, Ex.Date, Announced Date, Amount) from KLSE website
- <https://www.klscreeener.com/v2/stocks/view/7152/jaycorp-bhd>

```
In [2]: # Import Libraries
from selenium import webdriver
from bs4 import BeautifulSoup as bs
from datetime import datetime
import pandas as pd
import time
import random
import warnings
warnings.filterwarnings("ignore")
```

Get stock code

```
In [2]: # Get the stock code
df = pd.read_csv('stock_code.csv')
df
```

```
Out[2]:
```

	Unnamed: 0	stock_name	stock_code
0	0	7-ELEVEN MALAYSIA HOLDINGS BERHAD	5250.KL
1	1	ABF MALAYSIA BOND INDEX FUND	0800EA.KL
2	2	ABLE GLOBAL BERHAD	7167.KL
3	3	ABLEGROUP BERHAD	7086.KL
4	4	ABM FUJIYA BERHAD	5198.KL
...	...	...	...
985	985	YX PRECIOUS METALS BHD	0250.KL
986	986	ZECON BERHAD	7028.KL
987	987	ZELAN BERHAD	2283.KL
988	988	ZEN TECH INTERNATIONAL BERHAD	0094.KL
989	989	ZHULIAN CORPORATION BERHAD	5131.KL

990 rows x 3 columns

Run4\_WebScraping(div\_info and div\_yield).ipynb

## Step 5: Scrape quarter report from KLSE

On the KLSE website, there is a quarterly table that reports the financial year, EPS, DPS, and ROE for each quarter of the stock. The information will be used to determine the financial performance of each company for each quarter throughout the years. We performed a loop for all the stock codes and used the “beautiful soup” library to get the tables. The ROE metric can only be found in the quarterly table, hence we will use that as our guide to find the quarterly table and extract the information we need. If quarterly tables cannot be found, the list of stock code will be appended into the no\_quarter\_list, so that we can perform a second loop to obtain all the information.

Jupyter Run5\_WebScraping(quarter\_report) Last Checkpoint: 3 minutes ago (autosaved) Python 3 (ipykernel)

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Run

### Scrape quarter report from KLSE

- Scrape quarter report information (EPS,DPS,Financial Year,ROE) from KLSE website
- <https://www.klsecreeper.com/v2/stocks/view/7152/jaycorp-bhd>

```
In [1]: # Import libraries
from selenium import webdriver
from bs4 import BeautifulSoup as bs
from datetime import datetime
import pandas as pd
import time
import random
import warnings
warnings.filterwarnings("ignore")
```

#### Get stock code

```
In [2]: df = pd.read_csv('stock_code.csv')
df
```

```
Out[2]:
```

	Unnamed: 0	stock_name	stock_code
0	0	7-ELEVEN MALAYSIA HOLDINGS BERHAD	5250.KL
1	1	ABF MALAYSIA BOND INDEX FUND	0800EA.KL
2	2	ABLE GLOBAL BERHAD	7167.KL
3	3	ABLEGROUP BERHAD	7086.KL
4	4	ABM FUJIYA BERHAD	5198.KL
...	...	...	...
985	985	YX PRECIOUS METALS BHD	0250.KL
986	986	ZECON BERHAD	7028.KL
987	987	ZELAN BERHAD	2283.KL
988	988	ZEN TECH INTERNATIONAL BERHAD	0094.KL
989	989	ZHULIAN CORPORATION BERHAD	5131.KL

990 rows x 3 columns

Run5\_WebScraping(quarter\_report).ipynb

## Step 6: Scrape the annual report from KLSE

In this step, we will perform a similar process to the previous step to extract information from the annual table on the KLSE website. The financial metrics we will extract from the annual table are the financial year, EPS, and DP%. Similar to step 5 of finding quarterly statements, where DP% is used as a guide to find the annual table. If no annual table is found, the list of stock code will be appended into the no\_annual\_list and a second loop will be performed to extract all the information for each stock code.

Run6\_WebScraping(annual\_report)

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Run

Markdown

## Scrape annual report from KLSE

-scrape quarter report information (EPS,Financial Year,DP%) from KLSE website

- <https://www.klscreeener.com/v2/stocks/view/7152/jaycorp-bhd>

### Import libraries

```
In [1]: from selenium import webdriver
from bs4 import BeautifulSoup as bs
from datetime import datetime
import pandas as pd
import time
import random
import warnings
warnings.filterwarnings("ignore")
```

### Get stock code

```
In [2]: df = pd.read_csv('stock_code.csv')
df
```

```
Out[2]:
```

	Unnamed: 0	stock_name	stock_code
0	0	7-ELEVEN MALAYSIA HOLDINGS BERHAD	5250.KL
1	1	ABF MALAYSIA BOND INDEX FUND	0800EA.KL
2	2	ABLE GLOBAL BERHAD	7167.KL
3	3	ABLEGROUP BERHAD	7086.KL
4	4	ABM FUJIYA BERHAD	5198.KL
...	...	...	...
985	985	YX PRECIOUS METALS BHD	0250.KL
986	986	ZECON BERHAD	7028.KL
987	987	ZELAN BERHAD	2283.KL
988	988	ZEN TECH INTERNATIONAL BERHAD	0094.KL
989	989	ZHULIAN CORPORATION BERHAD	5131.KL

Run6 WebScraping(annual report).ipynb

### Step 7&8: Scrape financial metrics from Bursa

Both of these steps scraped the financial metrics such as PE, PB, PCF and 5-year dividend growth rate from the Bursa website. The reason we are grabbing the two financial metrics separately in two notebooks is because we want to reduce errors in extracting information, which can be time consuming. If the financial metrics/urls of the stock code cannot be scraped/found, it will print an error message with which financial metrics/urls of the stock code could not be scraped. The missing urls of the stock code will be appended into the list url.

## Scrape financial metrics from Bursa

-scrape Price per earnings(pe) and Price to book value(pb) from Bursa Malaysia

- <https://www.bursamarketplace.com/mkt/themarket/stock/JAYC>

### Import libraries

```
In [1]: from selenium import webdriver
from bs4 import BeautifulSoup as bs
from datetime import datetime
import pandas as pd
import time
import random
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.by import By
from selenium.common.exceptions import NoSuchElementException
```

```
In [2]: df = pd.read_csv('stock_code.csv')
```

```
In [3]: # Remove the last three character
df['stock_code'] = df['stock_code'].str.slice(0, -3)
```

```
In [4]: # Put it into a list called stock_code
stock_code = list(df['stock_code'])
stock_code
```

```
Out[4]: ['5250',
'0800EA',
'7167',
'7086',
'5198',
'03028',
'7131',
'0218',
'0122',
'1481',
'5281',
'9148',
'7191',
'7146',
'0121']
```

Run7\_WebScraping(pepb).ipynb

jupyter Run8\_WebScraping(pcf\_div\_growth) Last Checkpoint: Last Monday at 10:44 AM (autosaved) Logout

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Scrape financial metrics from Bursa

-scrape Price to cash flow(div\_pcf) and 5 Year dividend growth rate(div\_5year\_growth) from Bursa Malaysia

- <https://www.bursamarketplace.com/mkt/themarket/stock/JAYC/financials>

Import libraries

```
In [2]: from selenium import webdriver
from bs4 import BeautifulSoup as bs
from datetime import datetime
import pandas as pd
import time
import random
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.by import By
from selenium.common.exceptions import NoSuchElementException
```

```
In [2]: df = pd.read_csv('stock_code.csv')
```

```
In [3]: df['stock_code'] = df['stock_code'].str.slice(0,-3)
```

```
In [4]: df
```

```
Out[4]:
```

	stock_company	stock_code
0	7-ELEVEN MALAYSIA HOLDINGS BERHAD	5250
1	ABF MALAYSIA BOND INDEX FUND	0800EA
2	ABLE GLOBAL BERHAD	7167
3	ABLEGROUP BERHAD	7086
4	ABM FUJIYA BERHAD	5198
...	...	...
985	YX PRECIOUS METALS BHD	0250
986	ZECON BERHAD	7028
987	ZELAN BERHAD	2283
988	ZEN TECH INTERNATIONAL BERHAD	0094
989	ZHUI JIAN CORPORATION BERHAD	5131

Run8\_WebScraping(pcf\_div\_growth).ipynb

## Step 9: Define the definitions and scoring all the financial metrics

We define definitions and scores for each financial metric we use. This is to give the reader an understanding of the purpose of each financial metric and how each stock is performing according to the score.

## Definition of financial metrics

Financial Metrics	Definitions
Dividend Yield (DY)	Annual dividend per share/Current Share price
Dividend Payout Ratio (DPR)	Annual dividend/Net income attributed to common shareholders
Earning per share (EPS)	Net income of the company/Average outstanding share of the company
Return on equity (ROE)	Annual net income/Shareholders equity
Price to book value (PB)	Market price per share/Book value per share
Price to earning ratio (PE)	Stock's current price/Latest EPS
Price to cash flow (P/CF)	Market capitalization/Cash flow from operations
Growth rate (GR)	$(\text{Latest Dividend}/\text{Initial Dividend})^{1/n} - 1$ , where n is the period

## Scoring for all the financial metrics


Financial Metrics	Scoring				
	1	2	3	4	5
DY	< 1	$1 \leq x \leq 3$	$3 \leq x \leq 6$	$6 \leq x \leq 10$	> 10
DPR	< 10 or > 90	$70 < x \leq 90$	$10 \leq x < 20$	$50 < x \leq 70$	$20 \leq x \leq 50$
EPS	< 20	$20 \leq x < 40$	$40 \leq x < 60$	$60 \leq x < 90$	$\geq 80$
ROE	< 20	$20 \leq x < 50$	$50 \leq x < 70$	$70 \leq x < 100$	$\geq 100$
PB	> 2.5	$1.5 < x \leq 2.5$	$1 < x \leq 1.5$	$0.5 < x \leq 1$	$0 \leq x \leq 0.5$
PE	> 70	$50 < x \leq 70$	$25 < x \leq 50$	$20 \leq x \leq 25$	< 20
P/CF	>100	$20 < x \leq 100$	$10 < x \leq 20$ or > 0	$0.75 < x \leq 10$	$0 \leq X \leq 0.75$
GR	$\leq -25$	$-25 < x \leq 0$	$0 < x \leq 25$	$25 < x \leq 50$	> 50

## Step 10: Create models to predict the top 10 stock code for dividend investing

In this step, we will create a model such as boosted tree regression and use pycaret, a python library that automates the machine learning workflow and helps detect the best model for the data. First, we will use the data from 2018 to 2021 as training data and test data, while the data from 2022 to the latest will be used to predict the top 10 stock codes that are most suitable for dividend investing. DY, DPR, EPS, and ROE will be used as predictor variables, and from here they will predict the overall score for each stock.

For the Boosted Tree regression model, we split the data into 70% as training data and 30% as testing data. Next, we fit the training data to the GradientBoostingRegressor function with a random state of 42. Finally, we tested the model accuracy using the test data and got a pretty good result with MSE = 0.07 and an R-squared score close to 1, 0.99. We use the model to predict the top 10 stock codes due to its good accuracy.

For another model, we split the data into 90% as training data and 10% as testing data. After setting up the environment using the setup function by defining all the parameters, it will compare which models will produce the lowest error score and the highest R2 score. It can be seen that the catboost model produced the best results, so it was used to predict the top 10 stocks.

Jupyter Run9\_Modeling(boosted\_tree\_regression) Last Checkpoint: a day ago (autosaved)  Logout

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Run

### Create a model that predicts the top 10 stock code for dividend investing

- Using boosted tree regression to test the accuracy and compare it with another model identified by pycaret

```
In [1]: # Import Libraries
import numpy as np
import pandas as pd
import psycopg2
from sqlalchemy import create_engine
from urllib.parse import quote
from datetime import timedelta
```

```
In [2]: # Connect to database
conn_string = 'postgresql://postgres:Jiawei1105@localhost/dividendinvesting'

#connect
db = create_engine(conn_string)
conn = db.connect()
conn = psycopg2.connect(conn_string)
conn.autocommit = True
cursor = conn.cursor()
```

Create a table, 'train\_test\_tab' in database where it will contains data starting from Year 2018 to 2021 for each stock code and it will be used to split it into training and test data

```
In [3]: # Using sql query to get recent date
sql2 = '''SELECT "sum_stockCode", sum_year, sum_status, "sum_dividend(RM)", "sum_averageDividend_y_%", "sum_averageAnnual_dp(%)",
FROM train_test_tab;'''
cursor.execute(sql2)
train_test_table = cursor.fetchall()
df = pd.DataFrame(train_test_table, columns=["sum_stockCode", 'sum_year', 'sum_status', "sum_dividend(RM)", "sum_averageDividend
conn.commit()
conn.close()
```

```
In [4]: df
```

```
Out[4]:
```

	sum_stockCode	sum_year	sum_status	sum_dividend(RM)	sum_averageDividend_y_%	sum_averageAnnual_dp(%)	sum_averageQuar_eps	sum_averageQt
0	0001	2018	Y	0.0150	1.650	0.0	0.021	

Run9\_Modeling(boosted\_tree\_regression).ipynb

jupyter Run10\_Modeling(pycaret\_catboost) Last Checkpoint: Last Monday at 14:57 (autosaved) Python 3 (ipykernel)

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### Create a model that predicts the top 10 stock code for dividend investing

- Use pycaret to identify which algorithm has the lowest errors and also the highest R2 score
- pycaret is a python library that helps to identify which algorithms will create a model that best fits the data

```
In [1]: # Import Libraries
import pycaret as pc
import psycopg2
import pandas as pd
from sqlalchemy import create_engine
import numpy as np
from pycaret.regression import *
from sklearn.metrics import mean_squared_error, r2_score, mean_absolute_error
```

```
In [2]: # Connect to database
conn_string = 'postgresql://postgres:Jiawei1105@localhost/dividendinvesting'

# Connect
db = create_engine(conn_string)
conn = db.connect()
conn = psycopg2.connect(conn_string)
conn.autocommit = True
cursor = conn.cursor()
```

### Using the data in the 'train\_test\_tab' table to split the data into training and test data

```
In [3]: # Using sql query
sql = '''SELECT "sum_stockCode", sum_year, sum_status, "sum_dividend(RM)", "sum_averageDividend_y_%", "sum_averageAnnual_dp(%)",
FROM train_test_tab;'''
cursor.execute(sql)
train_test_tab = cursor.fetchall()
data = pd.DataFrame(train_test_tab, columns=["sum_stockCode", 'sum_year', 'sum_status', "sum_dividend(RM)", "sum_averageDividend_y_%", "sum_averageAnnual_dp(%)", "sum_averageAnnual_dp(%)", "sum_averageAnnual_dp(%)", "sum_averageAnnual_dp(%)"])
conn.commit()
conn.close()
```

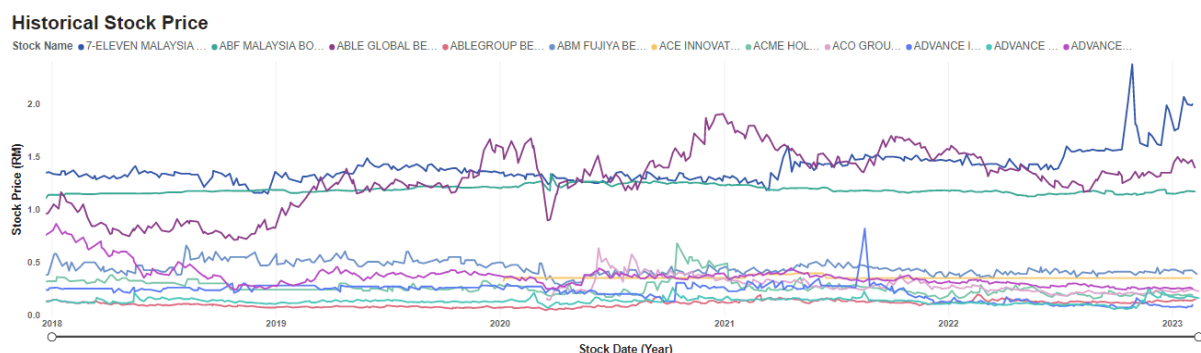
```
In [4]: data
```

```
Out[4]:
```

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## Step 11: Create a dashboard to show the result

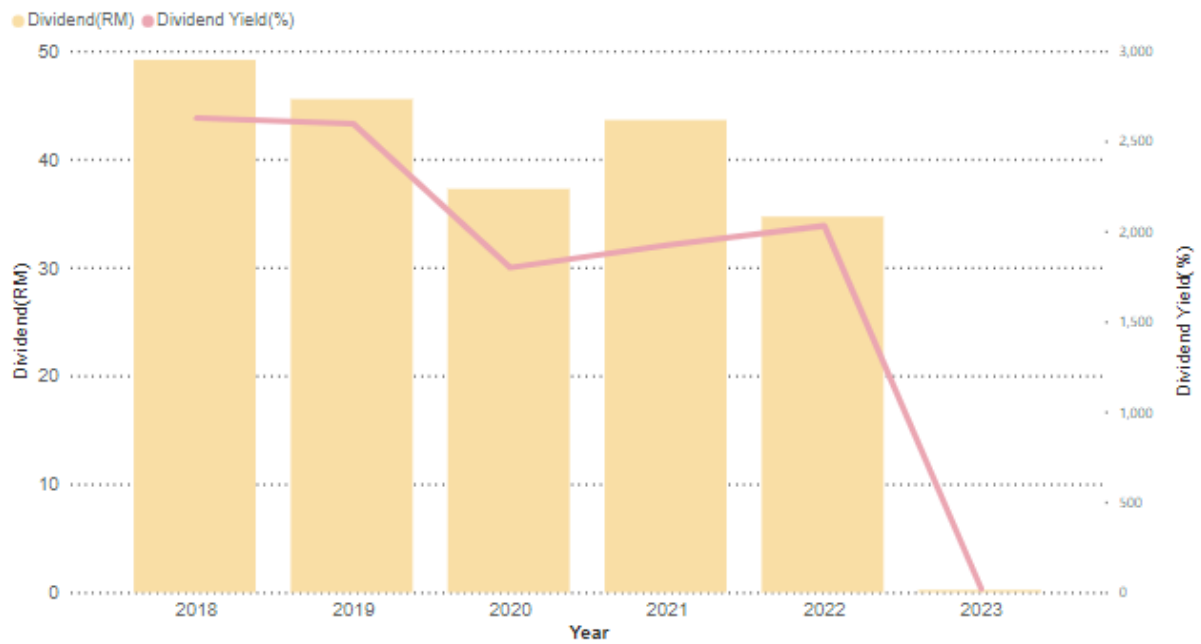
With everything done, we will now create a dashboard with the data we got. The first is to create a line chart to show the stock price trend from 2018 to the latest data we have available.



Next, create a line column chart where the bars represent the dividends paid by the company and the line represents the dividend yield in percentage.



**Dividend(RM) and Dividend Yield(%) by Year**



Create a line chart where the first y-axis is the dividend yield and the second y-axis is the dividend payout ratio. The chart shows how much dividends a company pays each year compared to its share price, and how much a company is willing to pay investors after reporting its net income.

**Dividend Yield(%) and Annual DP(%) by Year**



A stock summary table was created to show financial metrics for each stock, including whether the company paid dividends to its investors in that particular year.

#### Summary of Stocks

Stock Code	Dividend Status	Dividend(RM)	Dividend Yield(%)	DPR(%)	Earning per Share(EPS)	ROE(%)
0001						
2018	Y	0.02	1.65	0.00	0.02	10.90
2019	Y	0.02	1.16	51.00	0.03	9.50
2020	Y	0.02	0.97	44.00	0.03	10.10
2021	Y	0.02	1.34	44.00	0.03	8.70
2022	Y	0.01	0.28	57.00	0.04	8.30
0002						
2018	Y	0.05	3.40	0.00	0.12	10.50
2019	Y	0.07	4.31	0.00	0.16	13.70
2020	Y	0.09	3.85	0.00	0.21	16.50
2021	Y	0.09	3.17	0.00	0.17	12.20
2022	Y	0.26	5.42	23.00	0.42	27.00
0005	N	0.00	0.00	0.00		
0006	N	0.00	0.00	0.00		
0007	N	0.00	0.00	0.00		
0008						
2018	Y	0.01	2.45	37.00	0.03	7.40
2019	Y	0.02	3.24	49.00	0.03	9.30
2020	Y	0.02	3.02	41.00	0.04	10.50
2021	Y	0.02	3.85	48.00	0.03	8.50
0010	N	0.00	0.00	0.00		
0011						
2018	Y	0.02	7.45	97.00	0.02	7.40
2019	Y	0.02	6.61	69.00	0.02	9.70
2020	Y	0.02	3.53	86.00	0.02	7.40
2021	Y	0.01	2.62	24.00	0.03	11.50
0012						
2018	Y	0.02	2.74	34.00	0.06	9.00
2019	Y	0.02	2.79	33.00	0.06	8.50
2020	Y	0.02	2.73	36.00	0.06	8.30
2021	Y	0.03	3.02	32.00	0.10	11.90

From the summary of the stocks table, we convert the values into the scores we defined earlier and insert an overall score column to see the scores for each stock code for each year.


#### Final Ratings for all the stocks

Stock Code	Dividend Status	DY Score	DPR Score	EPS Score	ROE Score	Overall Score
0001						
2018	Y	2.00	1.00	1.00	1.00	5.00
2019	Y	2.00	4.00	1.00	1.00	8.00
2020	Y	1.00	5.00	1.00	1.00	8.00
2021	Y	2.00	5.00	1.00	1.00	9.00
2022	Y	1.00	4.00	1.00	1.00	7.00
0002						
2018	Y	3.00	1.00	1.00	1.00	6.00
2019	Y	3.00	1.00	1.00	1.00	6.00
2020	Y	3.00	1.00	2.00	1.00	7.00
2021	Y	3.00	1.00	1.00	1.00	6.00
2022	Y	3.00	5.00	3.00	2.00	13.00
0005	N	1.00	1.00	0.00	0.00	2.00
0006	N	1.00	1.00	0.00	0.00	2.00
0007	N	1.00	1.00	0.00	0.00	2.00
0008						
2018	Y	2.00	5.00	1.00	1.00	9.00
2019	Y	3.00	5.00	1.00	1.00	10.00
2020	Y	3.00	5.00	1.00	1.00	10.00
2021	Y	3.00	5.00	1.00	1.00	10.00
0010	N	1.00	1.00	0.00	0.00	2.00
0011	Y	3.25	3.00	1.00	1.00	8.25
0012	Y	2.20	5.00	1.00	1.00	9.20
0017						
2018	N	1.00	1.00	0.00	0.00	2.00
2019	N	1.00	1.00	0.00	0.00	2.00
2020	N	1.00	1.00	0.00	0.00	2.00
2021	N	1.00	1.00	0.00	0.00	2.00
2022	N	1.00	1.00	0.00	0.00	2.00
0018	N	1.00	1.00	0.00	0.00	2.00
0020	N	1.00	1.00	0.00	0.00	2.00
0021	Y	2.00	1.00	1.00	1.00	5.00

Since we scraped financial metrics from Bursa Malaysia separately in steps 7 and 8, we will now concatenate them together to create subsequent tables so that users can see the latest financial metrics immediately.

jupyter Run11\_(Latest\_Summary) Last Checkpoint: 18 hours ago (autosaved) Logout

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### Create latest summary table which contain all the financial metrics for stock from 2022 to current

```
In [1]: import pandas as pd
```

```
In [2]: df= pd.read_csv('Share.csv')
df
```

```
Out[2]:
```

	Unnamed: 0	stock_code	pcf	div_5year_growth
0	0	5250	9.620	3.211
1	1	0800EA	36.661	0.000
2	2	7167	8.926	27.226
3	3	7086	122.935	0.000
4	4	5198	7.515	0.000
...	...	...	...	...
983	983	2283	13.774	0.000
984	984	0094	3.792	0.000
985	985	5131	18.297	14.870
986	986	7016	5.352	-0.448
987	987	7139	36.661	0.000

988 rows x 4 columns

```
In [3]: del df['Unnamed: 0']
```

```
In [4]: df[df['stock_code']=='03006']
```

```
Out[4]:
```

	stock_code	pcf	div_5year_growth
600	03006	50.013	0.000

```
In [5]: df2 = pd.read_csv('pepb.csv')
```

```
In [6]: df2
```

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Finally, a table with the latest annual metrics (including add-on metrics, DPS, P/B, P/CF, P/E, Dividend 5-year growth rate) are converted to a score to show their total score.

## Latest Year Metrics

Stock Code	Year	Dividend Status	Dividend Yield(%)	DPR (%)	DPS(RM)	EPS	P/B	P/CF	P/E	Dividend 5 Year Growth Rate	ROE (%)
7247	2022	Y	463.70	40.00	1.91	0.16	0.63	2.87	0.41	1.36	15.40
5255	2022	Y	78.82	0.00	0.07	0.01	0.83	3.60	13.69	0.00	4.60
6645	2022	Y	74.77	82.00	0.25	0.31	0.23	1.08	1.23	-4.37	13.20
5673	2022	Y	56.60	1.00	0.30	0.47	3.71	10.56	2.97	0.00	34.40
7229	2022	Y	40.67	9.00	0.85	0.10	0.57	4.84	11.91	-11.81	3.70
5077	2022	Y	27.78	79.00	0.10	0.08	0.78	1.51	3.14	0.00	14.70
8044	2022	Y	25.97	45.00	0.20	0.44	11.14	11.73	0.00	0.00	139.10
3336	2022	Y	13.85	95.00	0.21	0.22	0.53	12.43	34.76	-4.37	7.60
5254	2022	Y	13.52	49.00	0.11	0.23	0.56	4.03	2.57	-10.45	16.70
5168	2022	Y	13.08	77.00	0.57	0.95	1.04	1.54	0.00	68.07	48.70
3514	2022	Y	12.12	142.00	0.02	0.01	0.84	9.73	9.80	0.00	6.30
5121	2022	Y	11.89	38.00	0.08	0.07	0.61	24.78	0.00	-24.44	6.10
2542	2022	Y	11.72	88.00	0.40	0.23	0.60	8.67	9.85	-7.79	3.90
9288	2022	Y	10.90	85.00	0.19	0.22	1.40	6.84	8.69	11.56	11.70
7106	2022	Y	10.66	39.00	0.11	0.28	0.45	2.64	25.10	53.26	14.90
6262	2022	Y	10.61	102.00	0.16	0.16	2.35	7.02	7.06	55.19	23.50
5185	2022	Y	10.52	0.00	0.23	0.54	0.48	6.93	3.24	-15.22	11.10

## Latest Year Ratings

Stock Code	Year	Dividend Status	DY Score	DPR Score	EPS Score	P/B Score	P/CF Score	P/E Score	GR Score	ROE Score	Overall Score
5168	2022	Y	5	2	5	3	4	5	5	2	31
1163	2022	Y	4	3	5	4	4	5	4	1	30
5012	2022	Y	4	4	4	4	4	5	4	1	30
7106	2022	Y	5	5	2	5	4	3	5	1	30
1082	2022	Y	2	5	5	4	4	5	3	1	29
1929	2022	Y	3	5	5	4	4	5	2	1	29
4006	2022	Y	2	5	5	4	4	5	3	1	29
5139	2022	Y	3	5	5	3	4	5	3	1	29
6009	2022	Y	5	5	2	4	4	5	3	1	29
8044	2022	Y	5	5	3	1	3	5	2	5	29
9059	2022	Y	4	5	2	4	4	5	3	2	29
1066	2022	Y	2	5	3	4	4	5	4	1	28
2127	2022	Y	3	3	3	5	5	5	2	2	28
2488	2022	Y	4	5	2	4	4	5	3	1	28
4383	2022	Y	3	5	1	5	4	5	4	1	28
5007	2022	Y	4	5	2	4	4	5	3	1	28
5135	2022	Y	4	5	2	4	4	5	3	1	28
5197	2022	Y	4	5	2	4	4	5	3	1	28