

StockPred: Stock Price Prediction Application

Selected Themes/Case:

Economics Empowerment: Navigating

Sustainable Economies for All

Presentation 2024

Presented By:

C242-PS012





! Disclaimer !

- All stocks discussed in this presentation are not intended as an invitation to buy or sell specific stocks.
- **Do Your Own Research (DYOR).**
- This statement complies with regulations from the **Financial Services Authority (Otoritas Jasa Keuangan - OJK)** and the **Indonesia Stock Exchange (Bursa Efek Indonesia - IDX)**, which emphasize the importance of independent analysis and informed decision-making in stock investments.

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Outline

- **Problem Statement & Solution**
- **Technology Overview**
- **Implementation Visualization**
- **Video Demo**
- **Impact Result**
- **Documentation**
- **Plan a local deployment on your project**

Problem Statement & Solution

Sub Outline :

- Number of Stock Investors and Stock Investment Risks
- Overview of IHSG
- Factors Influencing IHSG Fluctuations
- Why Is This Research Important?



Number of Stock Investors and Stock Investment Risks

Home > Berita > Siaran Pers > [Jumlah Investor Saham Di Indonesia Lampaui 6 Juta SID](#)

Detail Siaran Pers

Jumlah Investor Saham di Indonesia Lampaui 6 Juta SID

Bagikan:  

27 Sep 2024

PRESS RELEASE

PR No: 063/BEI.SPR/09-2024

- Stocks are considered a high-risk investment instrument due to stock price fluctuations.
- Without sufficient knowledge to analyze a stock, investors may face losses.
- **So, what are the factors that cause stock price fluctuations?**

- As of now, the number of stock investors in Indonesia has reached 6,001,573 Single Investor Identifications (SID).
- The Indonesia Stock Exchange (IDX) recorded an increase of over 744,000 new stock investors throughout 2024.

INVESTOR.ID

Masukkan kata kunci per



Minggu, 17 November 2024

 MARKET FINANCE BUSINESS MACROECONOMY NATIONAL INTERNATIONAL

 PREMIUM CONTENT

 NETWORK

Home > InveStory

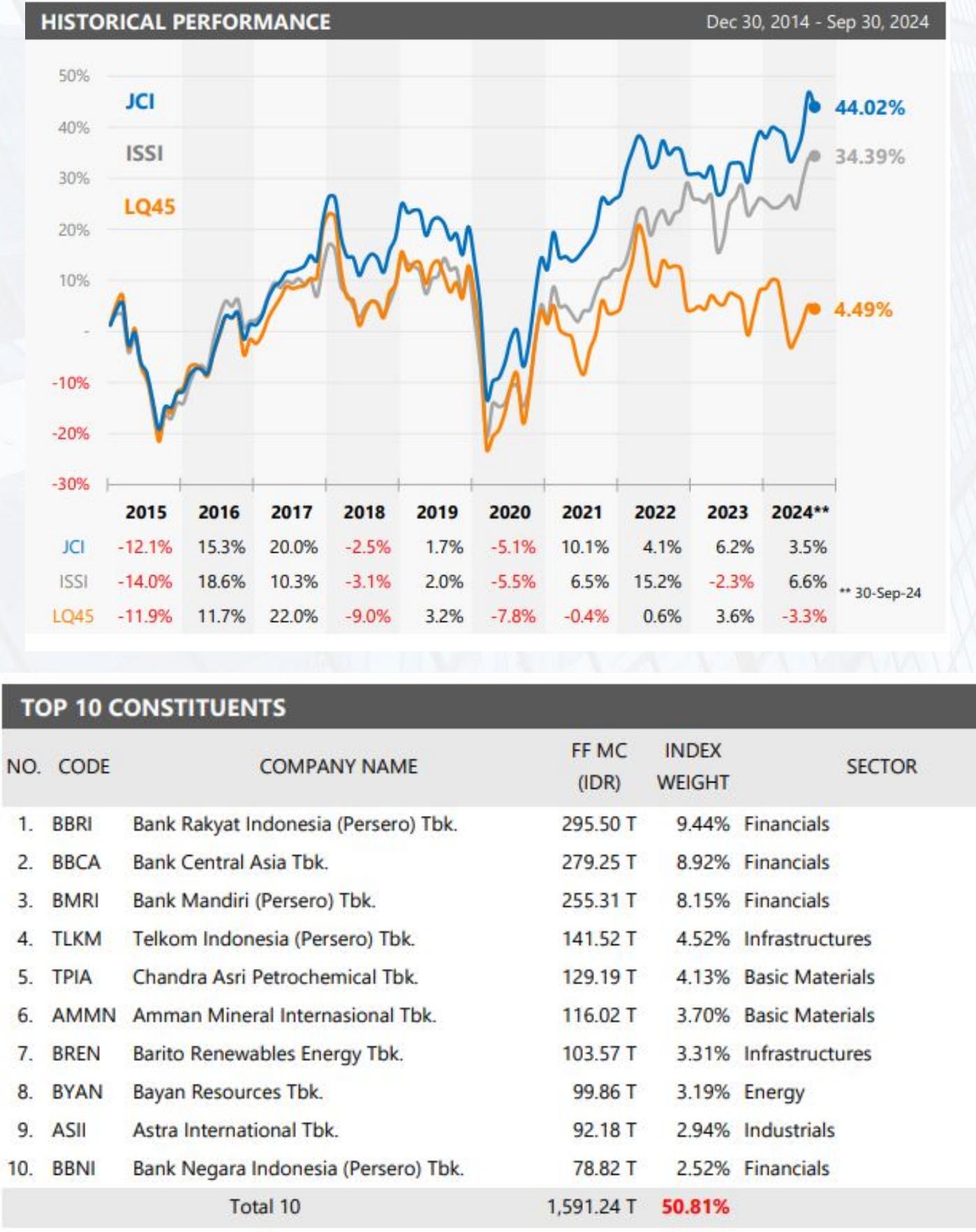
Banyak Investor Muda Ikut-ikutan Beli Saham, Akhirnya Rugi

Penulis : Thresa Sandra Desfika

16 Nov 2024 | 11:30 WIB

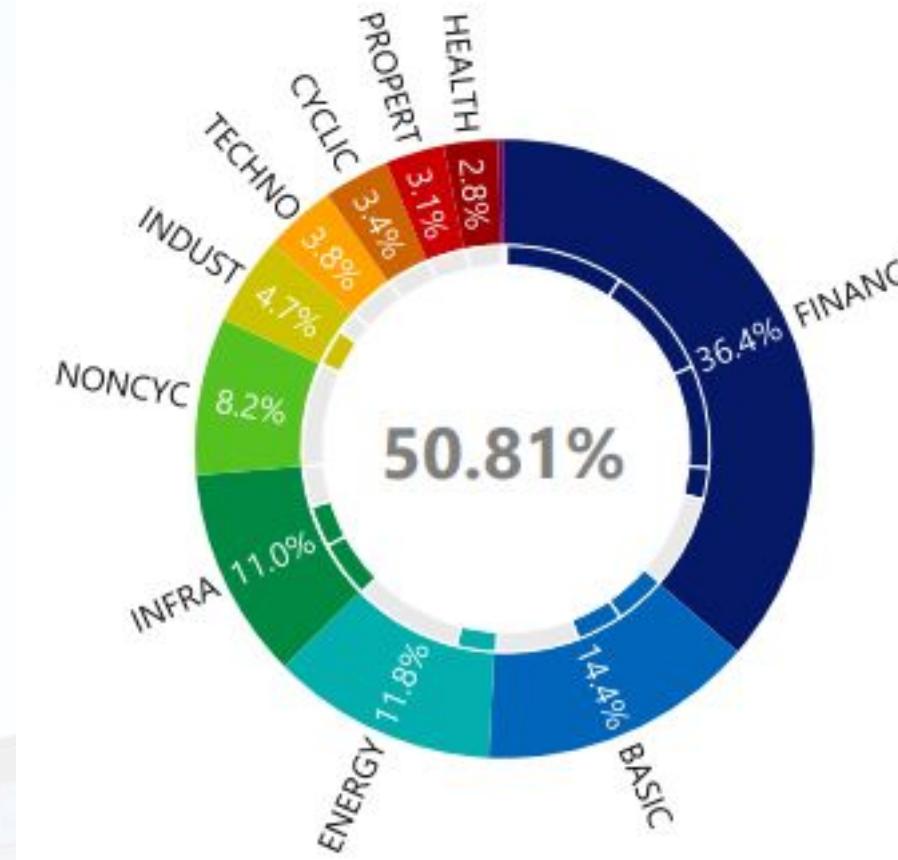
BAGIKAN





Overview of IHSG

SECTOR WEIGHTS AND POINT INDEX



| SECTOR | MTD (-1.86%) | | YTD (+3.51%) | |
|-----------|--------------|---------|--------------|---------|
| | RANK | POINT | RANK | POINT |
| A ENERGY | 7 | +4.75 | 2 | +127.05 |
| B BASIC | 2 | -71.70 | 1 | +163.96 |
| C INDUST | 5 | -2.26 | 9 | -15.45 |
| D NONCYC | 9 | +25.54 | 6 | +15.45 |
| E CYCLIC | 4 | -8.52 | 7 | +15.27 |
| F HEALTH | 8 | +15.13 | 5 | +24.01 |
| G FINANCE | 3 | -15.67 | 3 | +92.06 |
| H PROPERT | 10 | +26.38 | 4 | +39.76 |
| I TECHNO | 11 | +48.82 | 10 | -57.00 |
| J INFRA | 1 | -166.42 | 11 | -148.37 |
| K TRANS | 6 | +1.15 | 8 | -1.56 |

- IHSG : An index that measures the stock price performance of all listed companies in Main Board and Development Board of the Indonesia Stock Exchange

Factors Influencing IHSG Fluctuations

- Based on a study conducted by Rini Astuti et al.:
 - Macroeconomic factors (USD/IDR Exchange Rate, Bank Indonesia Interest Rate, and Inflation Rate)
 - Simultaneously have a significant impact on the IHSG.
- Thus, how can investors predict the price of individual stocks (not the IHSG value) to determine the optimal buy or sell price?

Jurnal Berkala Ilmiah Efisiensi

Volume 16 No. 02 Tahun 2016

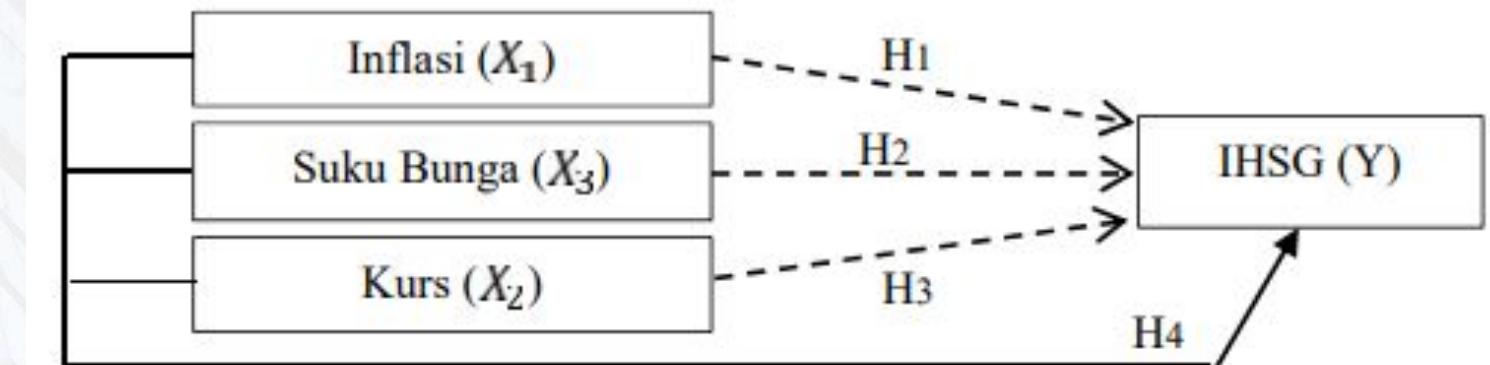
PENGARUH FAKTOR MAKRO EKONOMI TERHADAP INDEKS HARGA SAHAM GABUNGAN (IHSG) DI BURSA EFEK INDONESIA (BEI) PERIODE 2006-2015

INFLUENCES OF MACROECONOMIC FACTORS TO INDONESIA STOCK EXCHANGE (IDX) COMPOSITE ON IDX PERIOD 2006-2015

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Universitas Sam Ratulangi, Manado 95115, Indonesia
E-mail: riniastuti0510@gmail.com

Faktor Makro Ekonomi:



Gambar 1. Kerangka Pikir

Sumber: Literature review, 2016

Why Is This Research Important?

- **Financial Freedom**

- The ability to meet life's needs without financial concerns.
- Achievable through investment.

- **Stocks as an Investment Instrument**

- High potential returns but accompanied by high risks.
- Stock price fluctuations often lead to investor losses.

- **Main Problem**

- Investors often struggle to analyze the best timing for buying or selling stocks.
- The risk of loss increases without adequate analytical skills.



Why Is This Research Important?



- **Proposed Solution**

- A technology-based application to accurately predict stock prices.
- Assists investors in making informed decisions for buy and sell actions.

- **Research Benefits**

- Reduces the risk of losses in stock investments.
- Increases the potential for profits.
- Helps investors achieve financial freedom.

Technology Overview

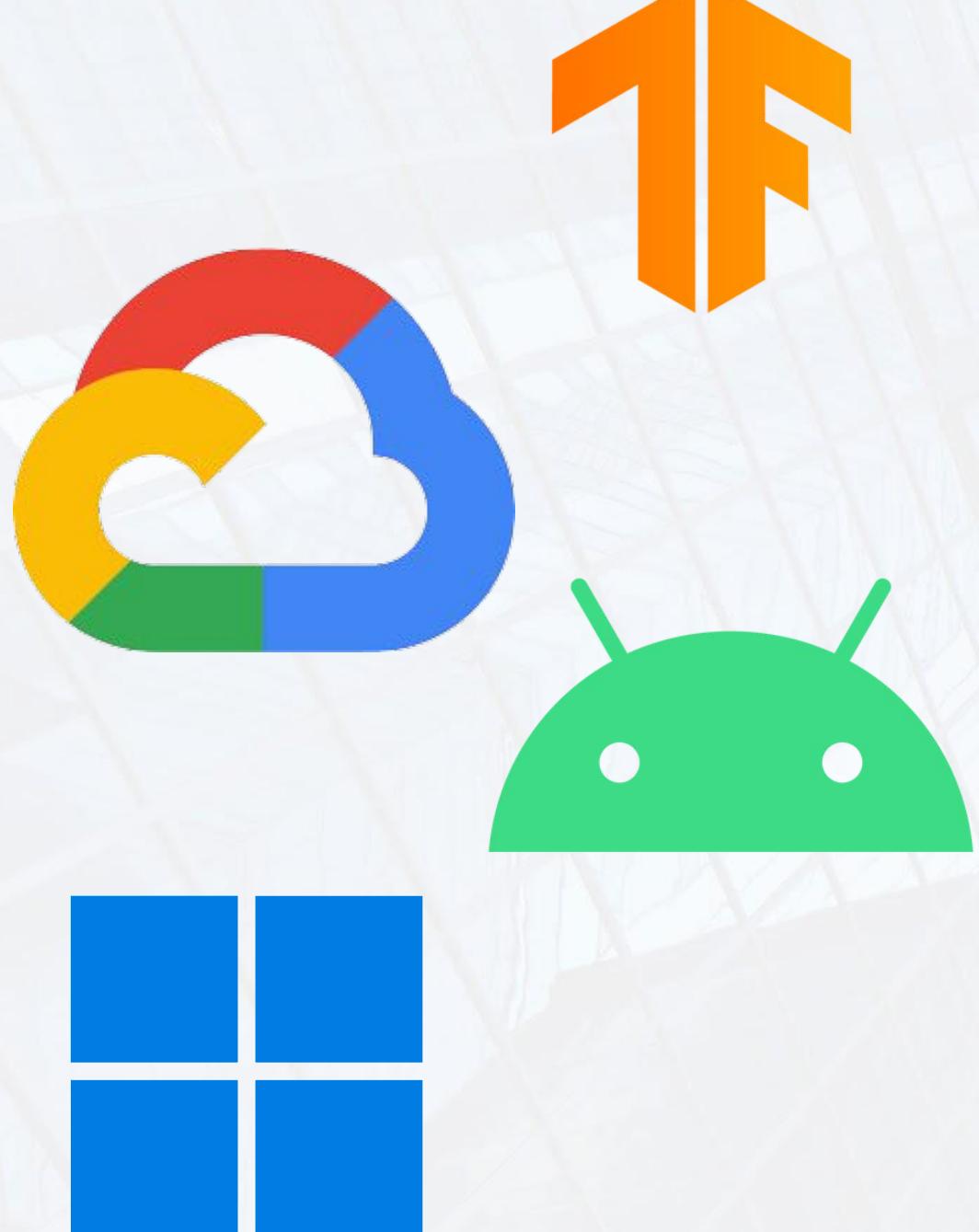
Sub Outline :

- About StockPred Application
- Machine Learning Implementation
- Cloud Computing Implementation
- Mobile Development Implementation
- Cross-Platform Development Implementation



About StockPred Application

- StockPred is an application for predicting the prices of 20 stocks listed on the Indonesia Stock Exchange, leveraging four technologies: Machine Learning, Cloud Computing, Mobile Development, and Cross-Platform Development.
- Implementation/Enhancement of previous research (Rini Astuti et al.):
 - Replacing the Dependent Variable (Y) from the IHSG (Jakarta Composite Index) to Individual Stocks.
 - Using a monthly dataset spanning from 2005 to 2023.
 - Employing machine learning technology with deep neural networks (DNN) to develop a linear regression model.
 - The research results are implemented into an Android and Windows based application, making it easier for investors to predict stock prices.
- The reason for this implementation/enhancement is to allow investors to directly use this application to determine when to buy or sell a stock.





Machine Learning - Tools



TensorFlow

K Keras



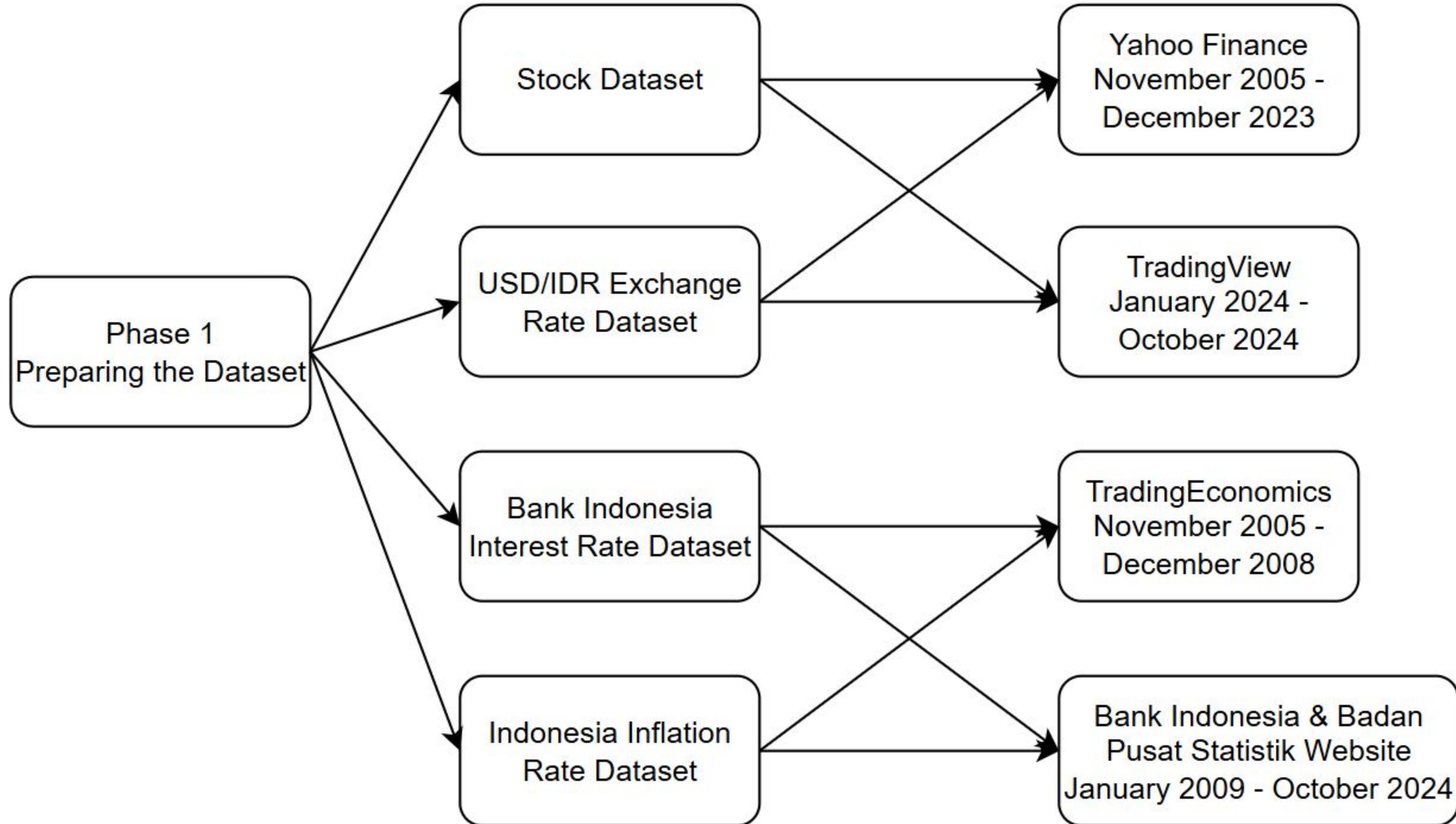
pandas



Matplotlib

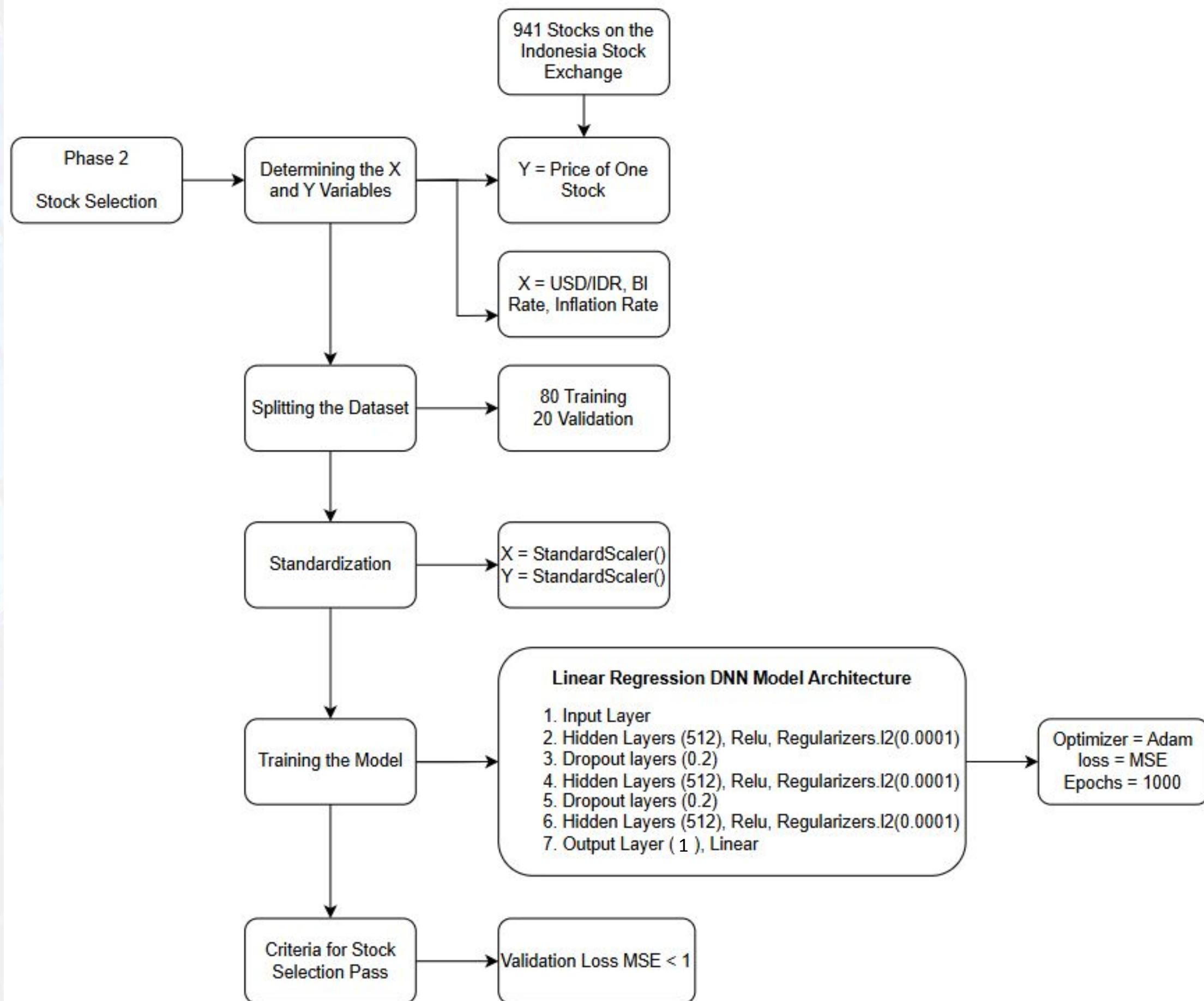
Machine Learning - Phase 1

Preparing the Dataset



Machine Learning - Phase 2

Stock Selection

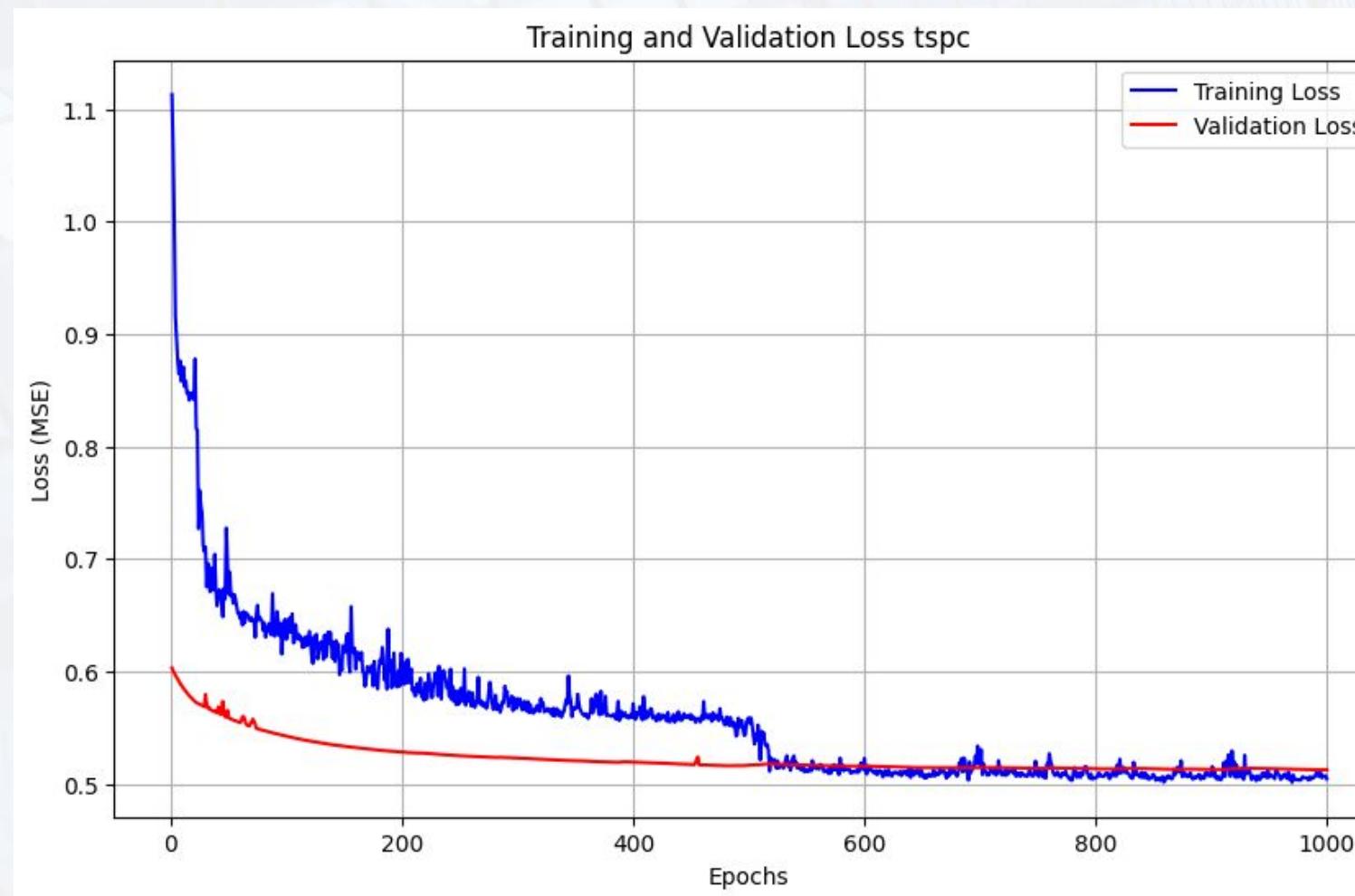


Machine Learning - Phase 2

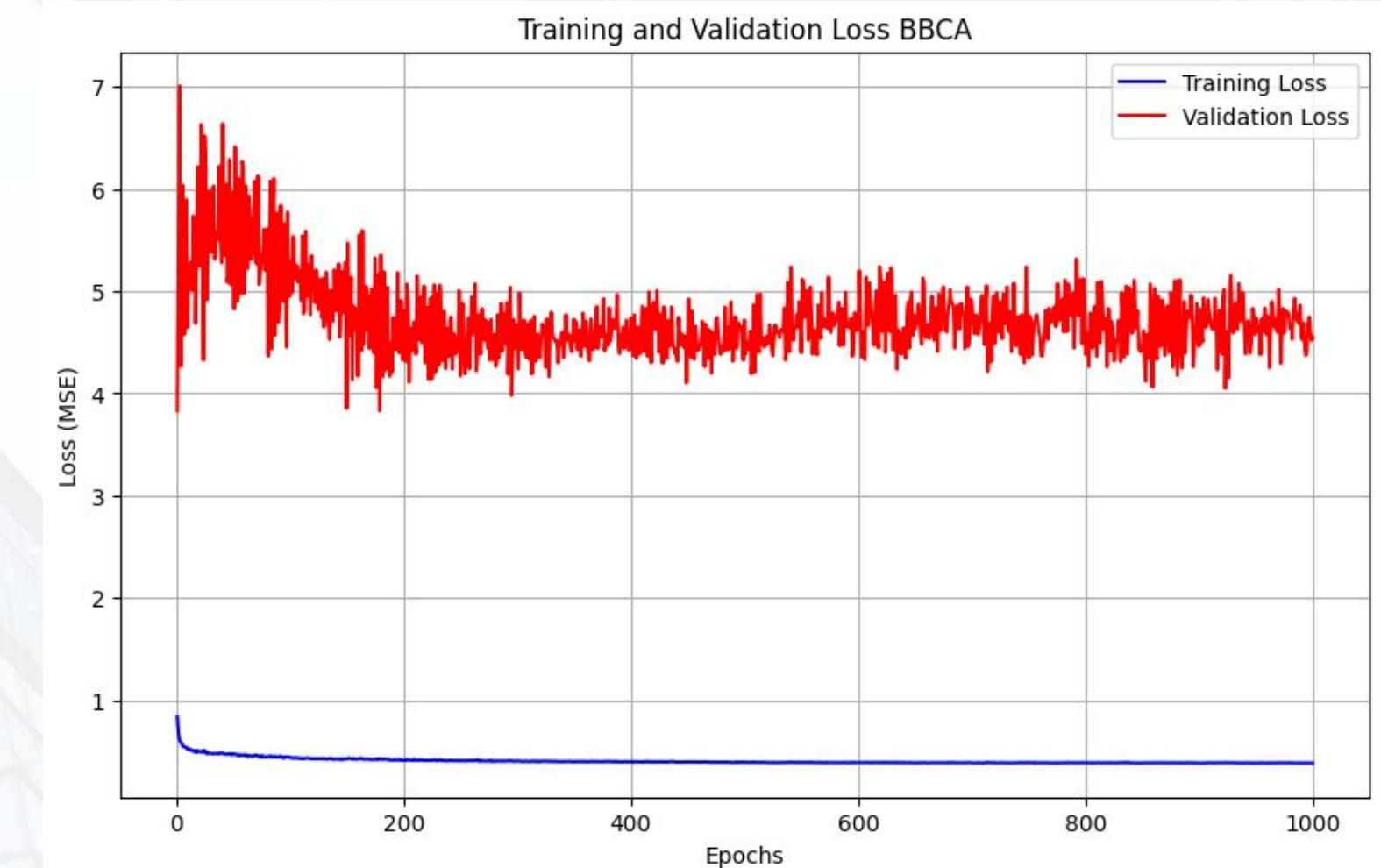
Stock Selection



**Example of Selected Stock:
Tempo Scan Pacific Tbk**



**Example of Unselected Stock:
PT Bank Central Asia Tbk**



Machine Learning - Phase 2

Stock Selection

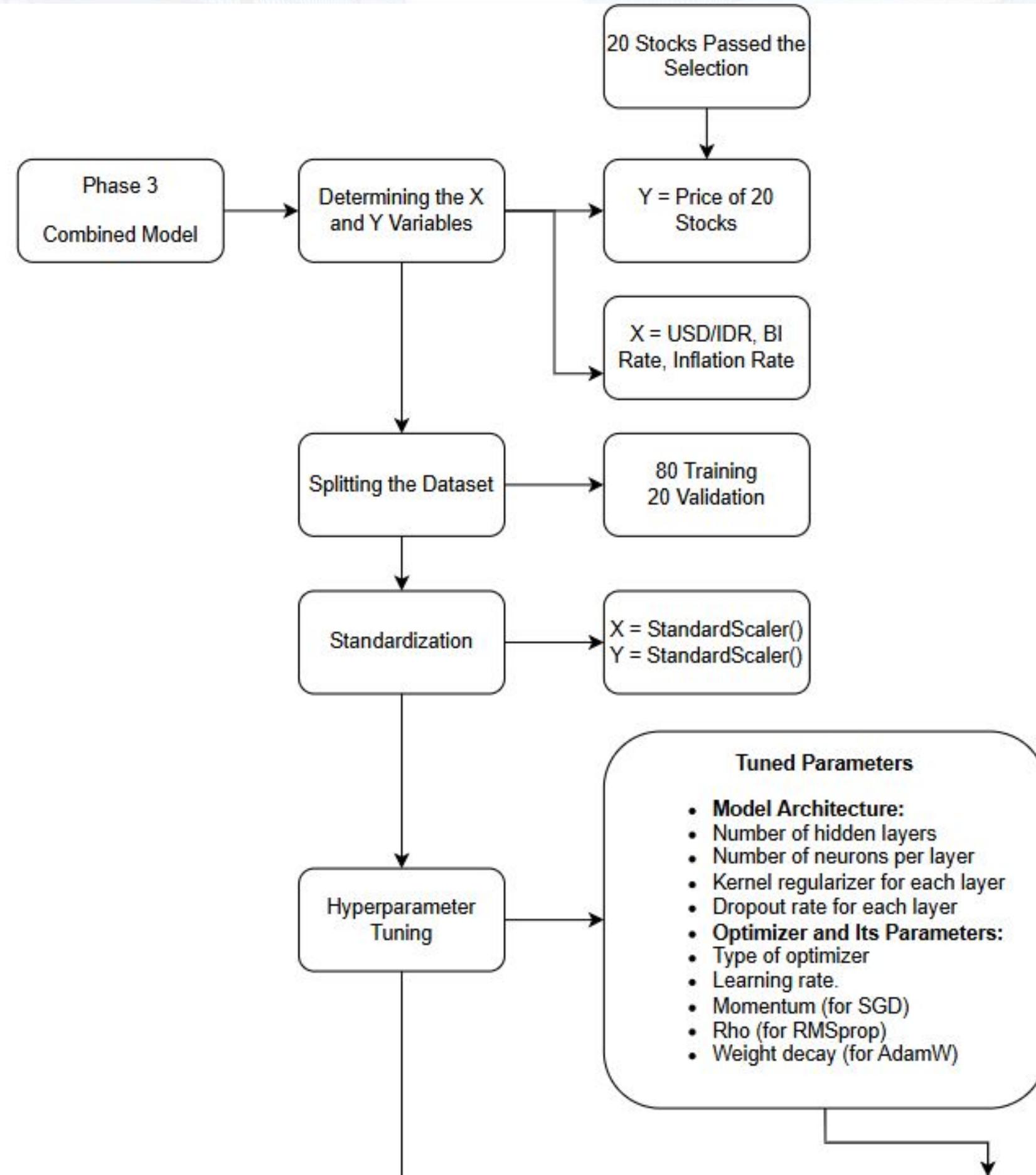


20 Selected Stocks Based on Validation Loss MSE ≤ 1



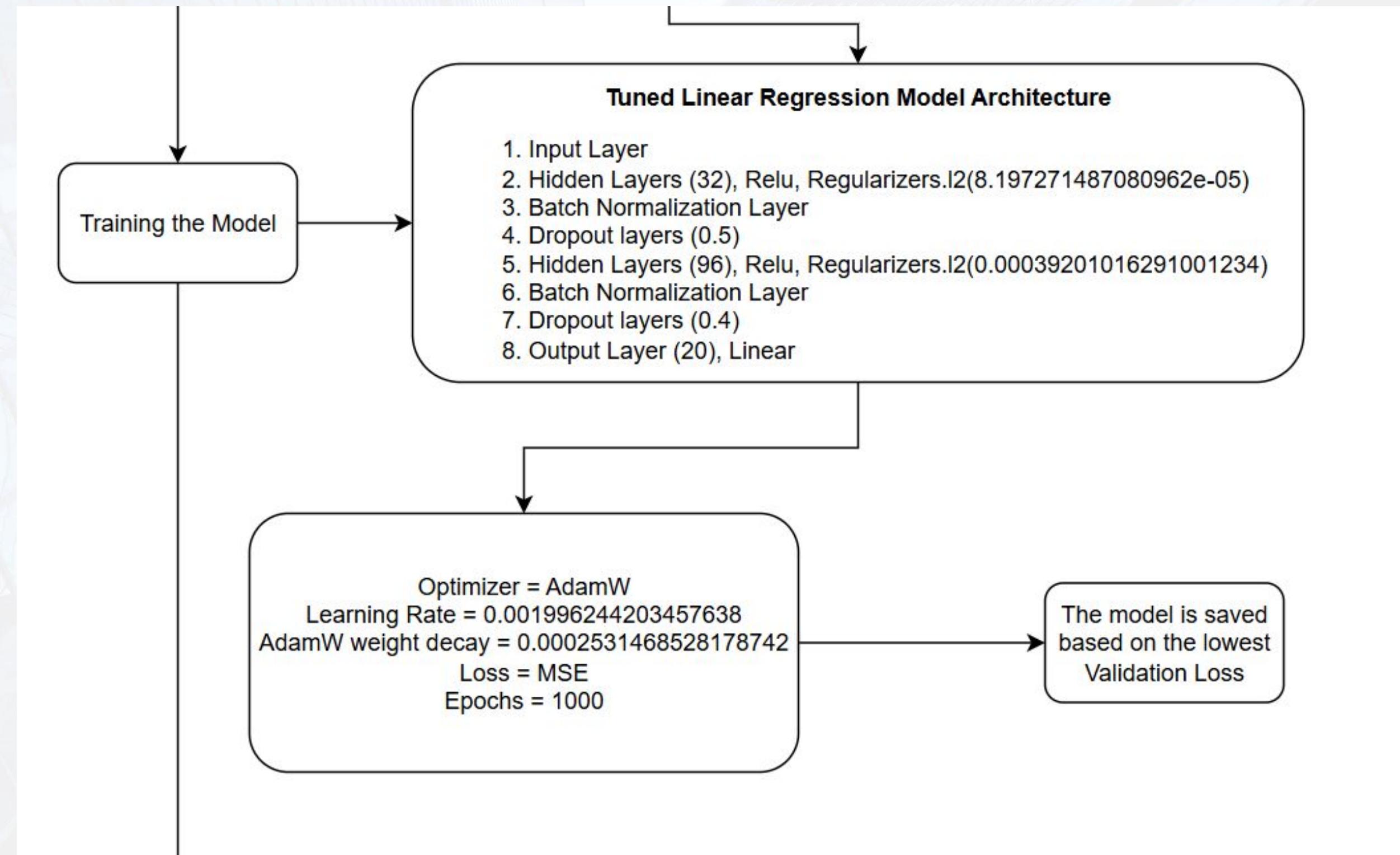
Machine Learning - Phase 3

Combined Model



Machine Learning - Phase 3

Combined Model



Machine Learning - Phase 3

Combined Model



```
[24] model.summary()
```

```
→ Model: "sequential_2"
```

| Layer (type) | Output Shape | Param # |
|--|--------------|---------|
| dense_6 (Dense) | (None, 32) | 128 |
| batch_normalization_4 (BatchNormalization) | (None, 32) | 128 |
| dropout_4 (Dropout) | (None, 32) | 0 |
| dense_7 (Dense) | (None, 96) | 3,168 |
| batch_normalization_5 (BatchNormalization) | (None, 96) | 384 |
| dropout_5 (Dropout) | (None, 96) | 0 |
| dense_8 (Dense) | (None, 20) | 1,940 |

Total params: 5,748 (22.45 KB)

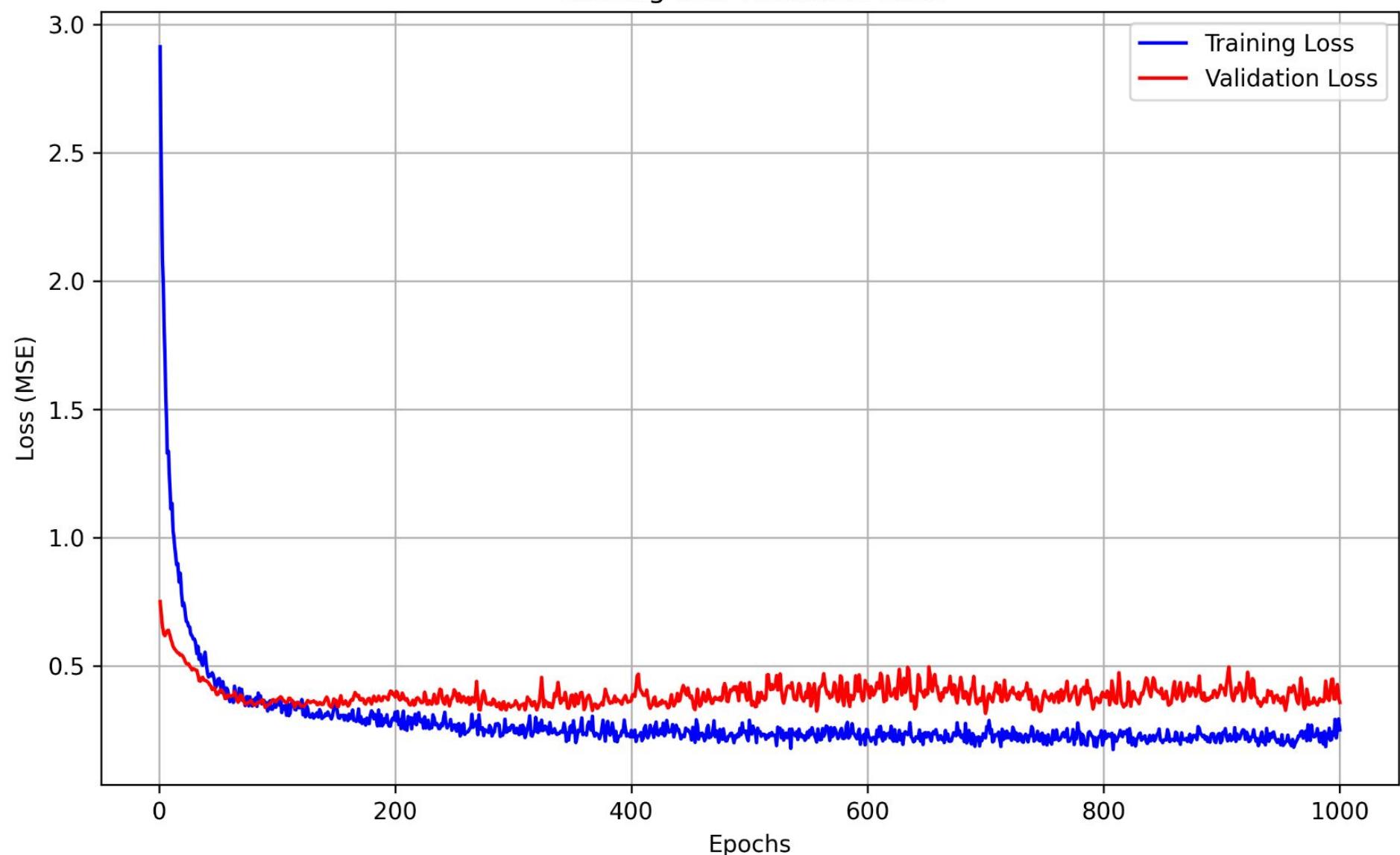
Trainable params: 5,492 (21.45 KB)

Non-trainable params: 256 (1.00 KB)

Model Training Results

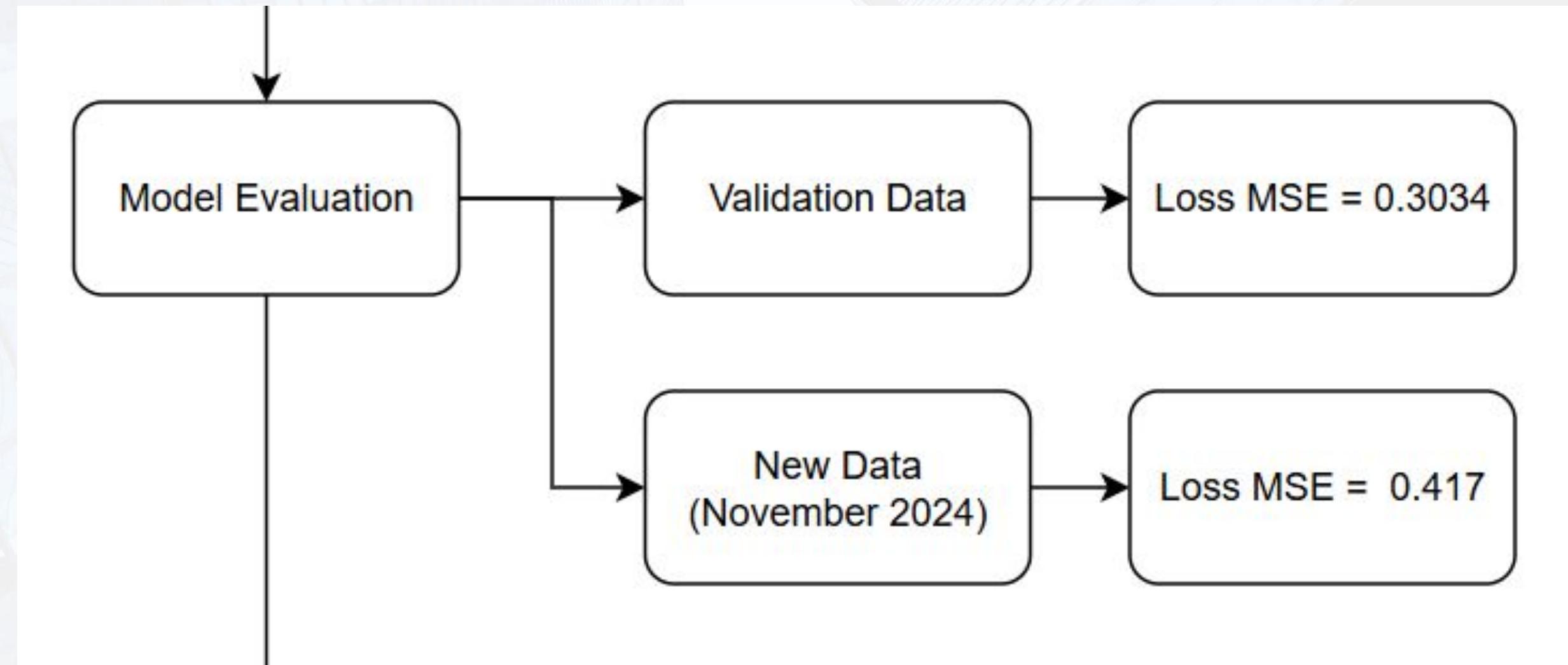
Model Summary

Training and Validation Loss



Machine Learning - Phase 3

Combined Model

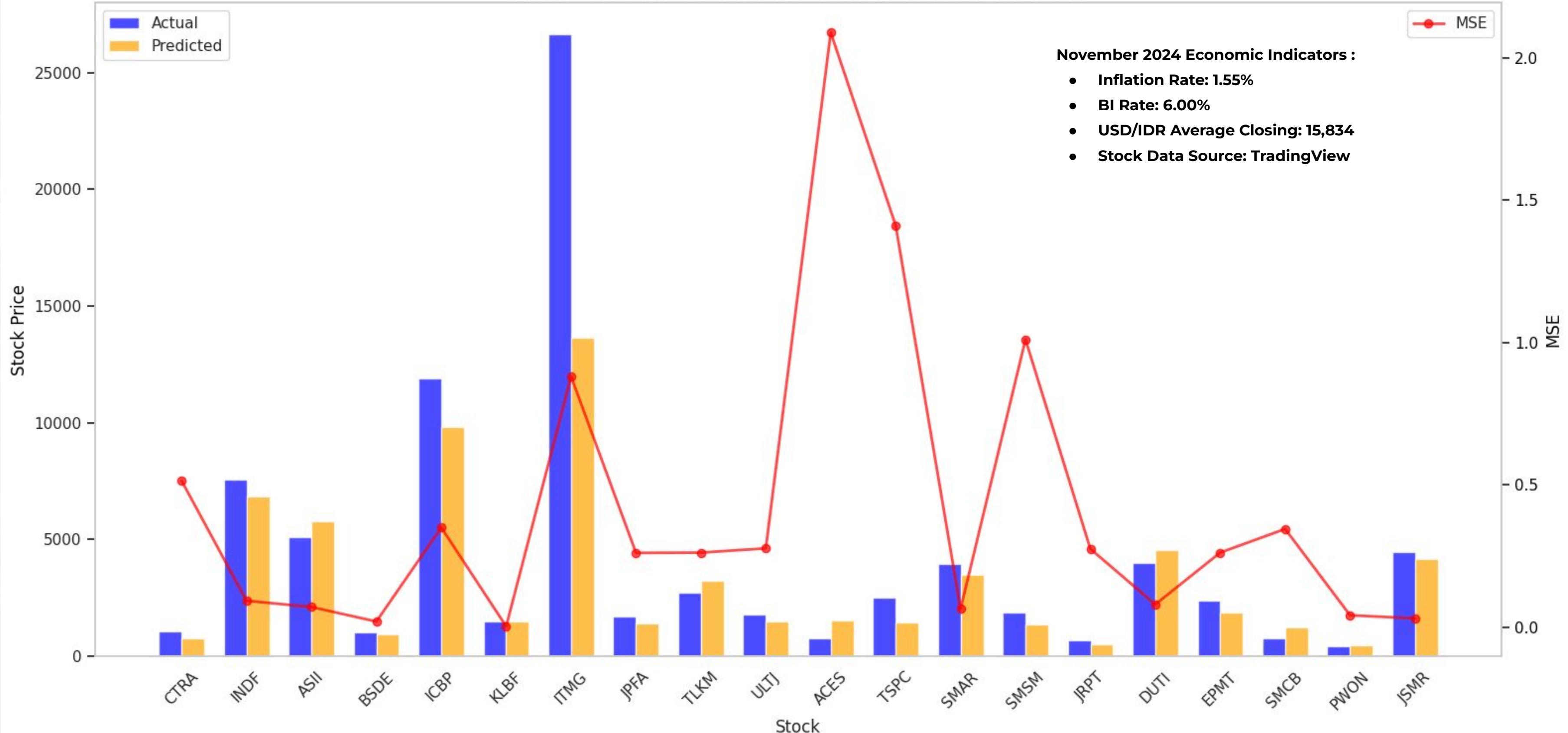


Machine Learning - Phase 3

Combined Model

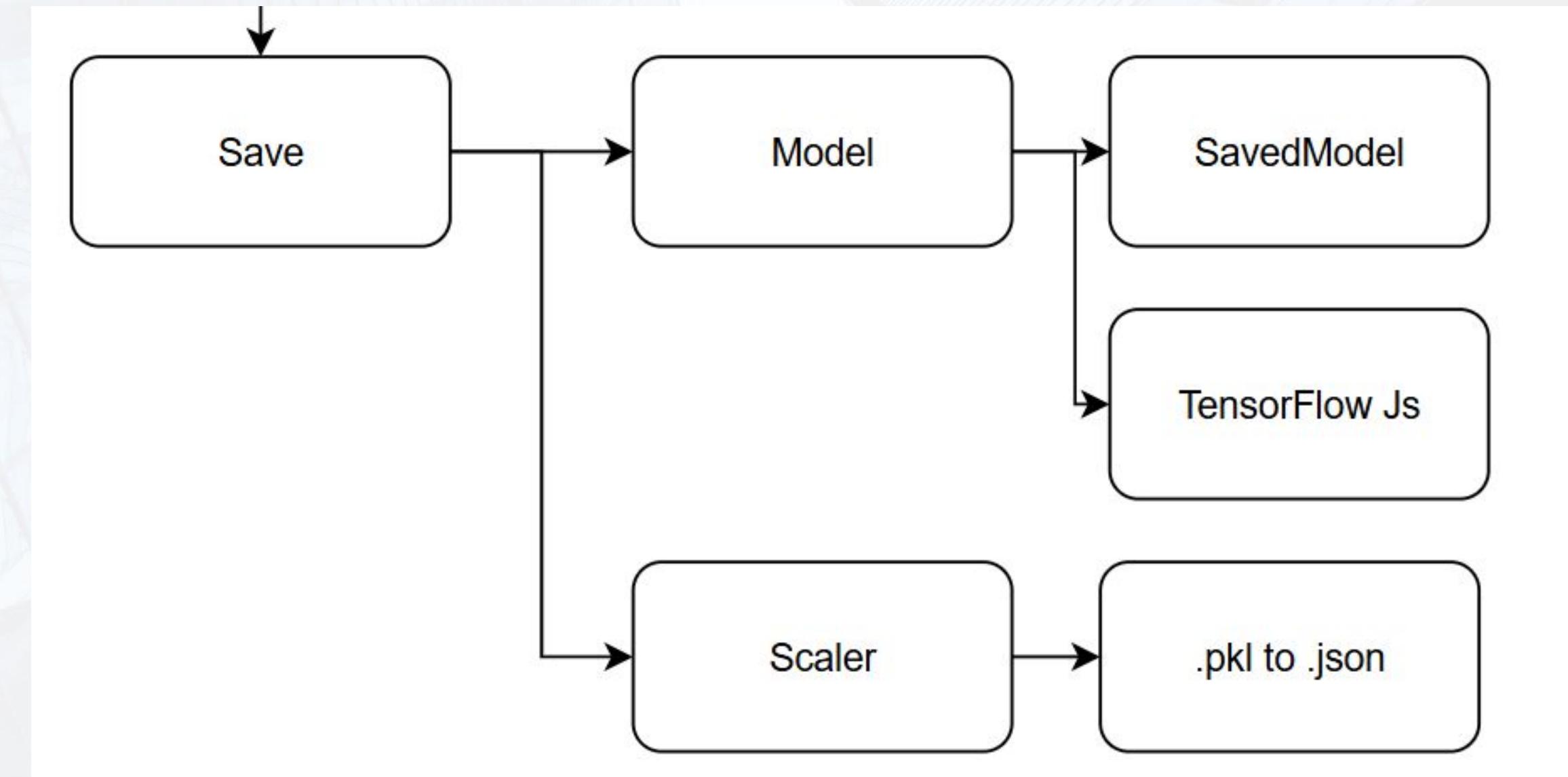


Model Evaluation Results with November 2024 Data



Machine Learning - Phase 3

Combined Model



Cloud Computing - Tools

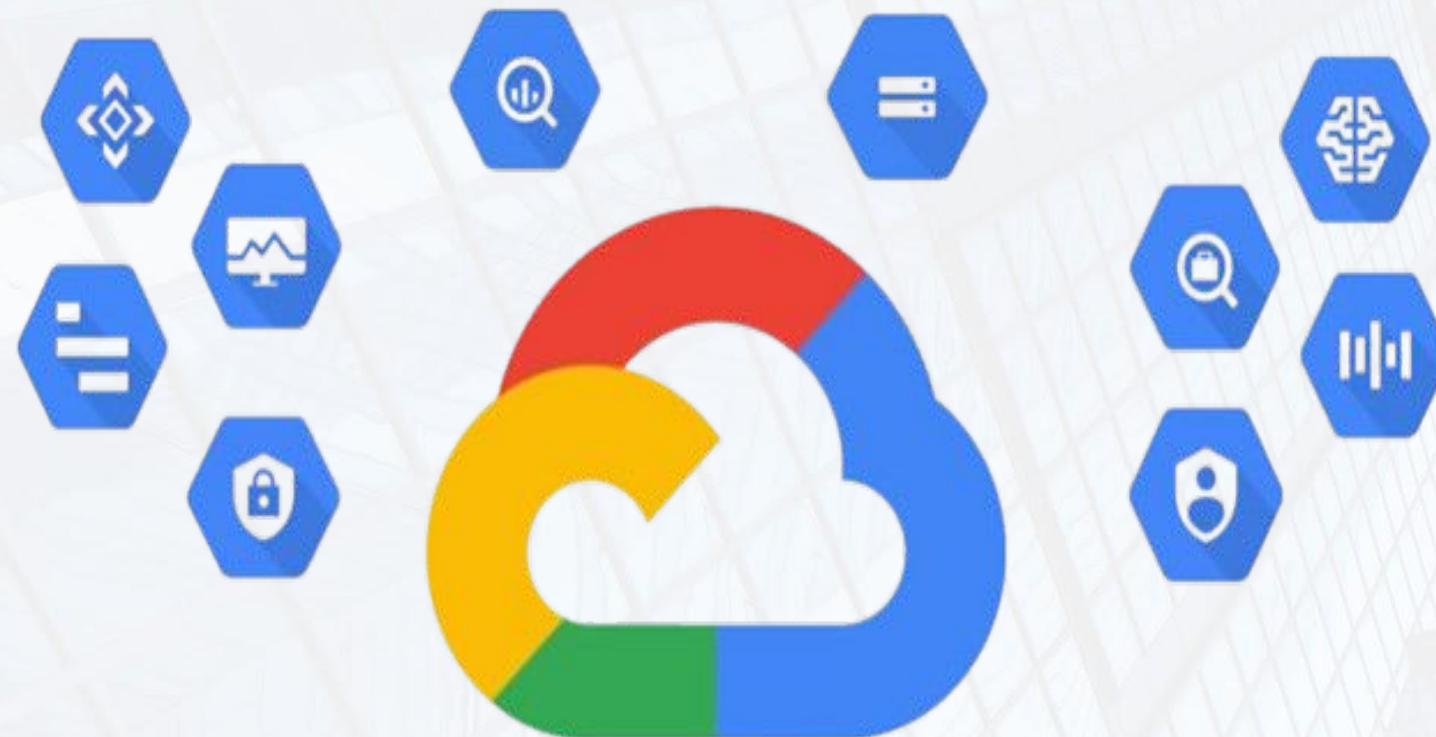


POSTMAN



Visual Studio Code

Cloud Computing - Architecture



Google Cloud

1. Cloud Run

A serverless platform for running containerized applications

2. Cloud IAM

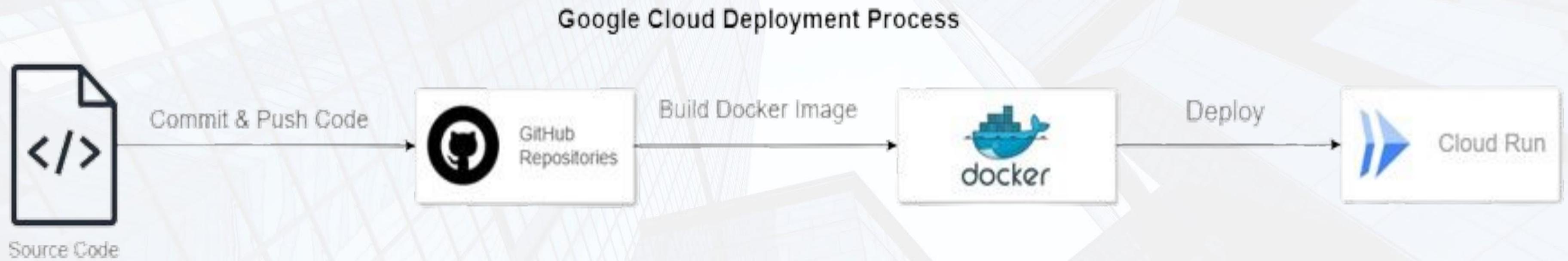
Manage authentication and authorization, ensuring that only users and systems with the appropriate credentials can access the API

3. Cloud Storage

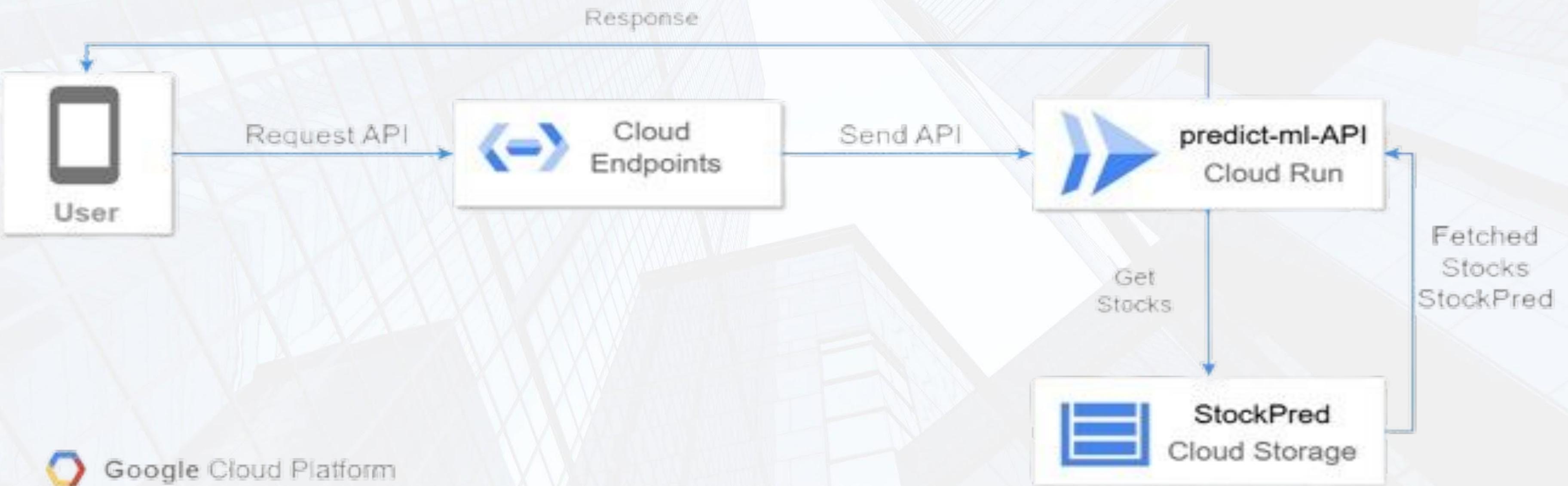
Storing machine learning models in SavedModel and TensorFlow.js formats



Google Cloud Platform



Cloud Computing - Infrastructure



Mobile Development Tools



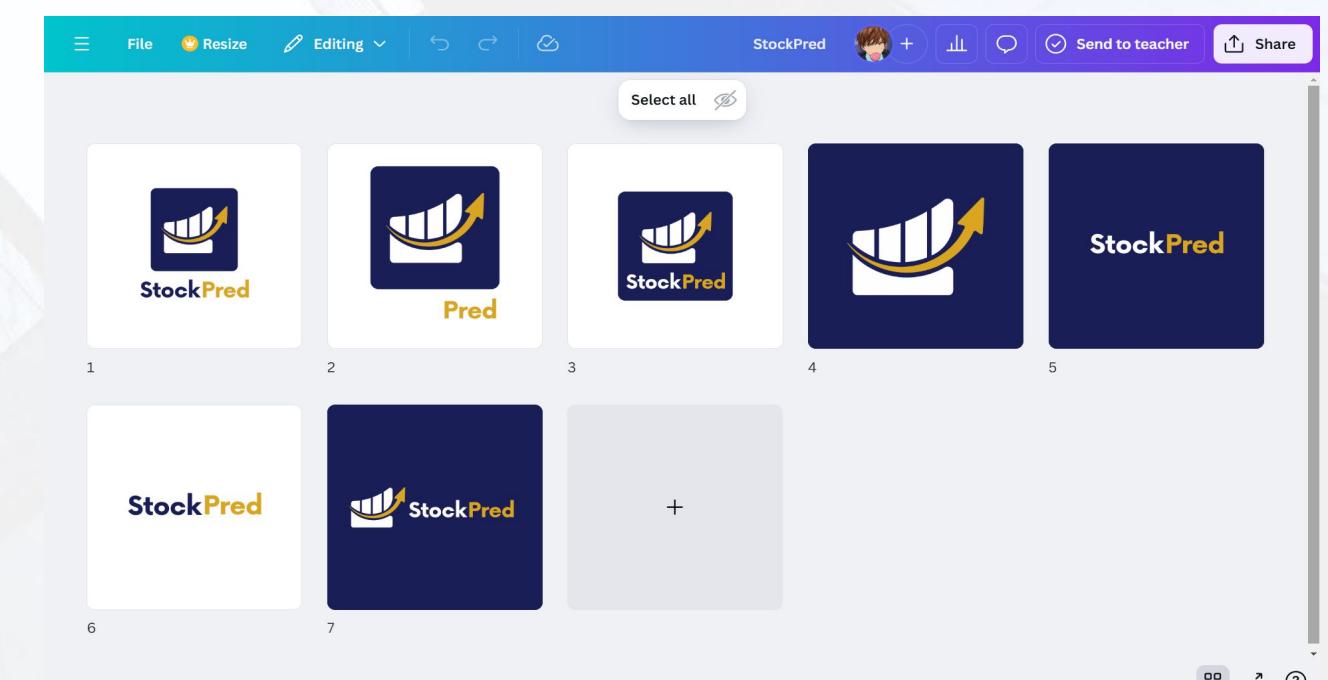
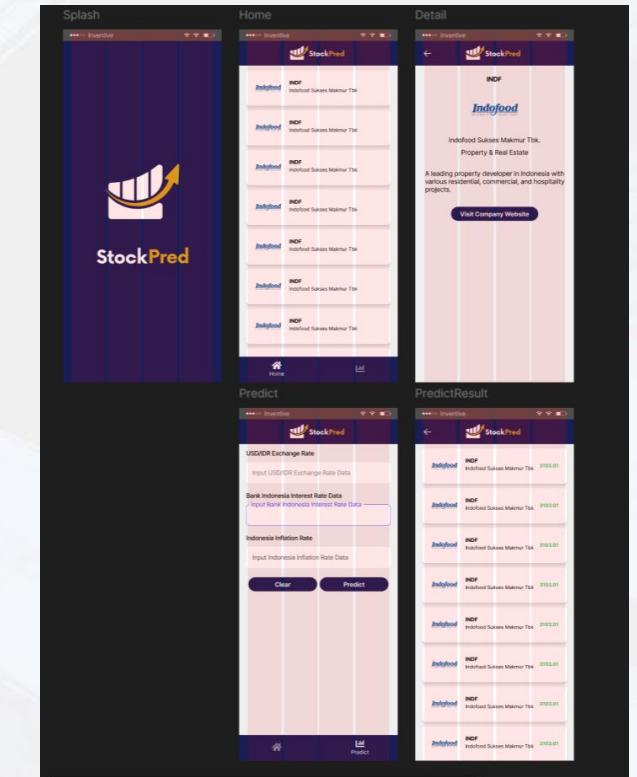
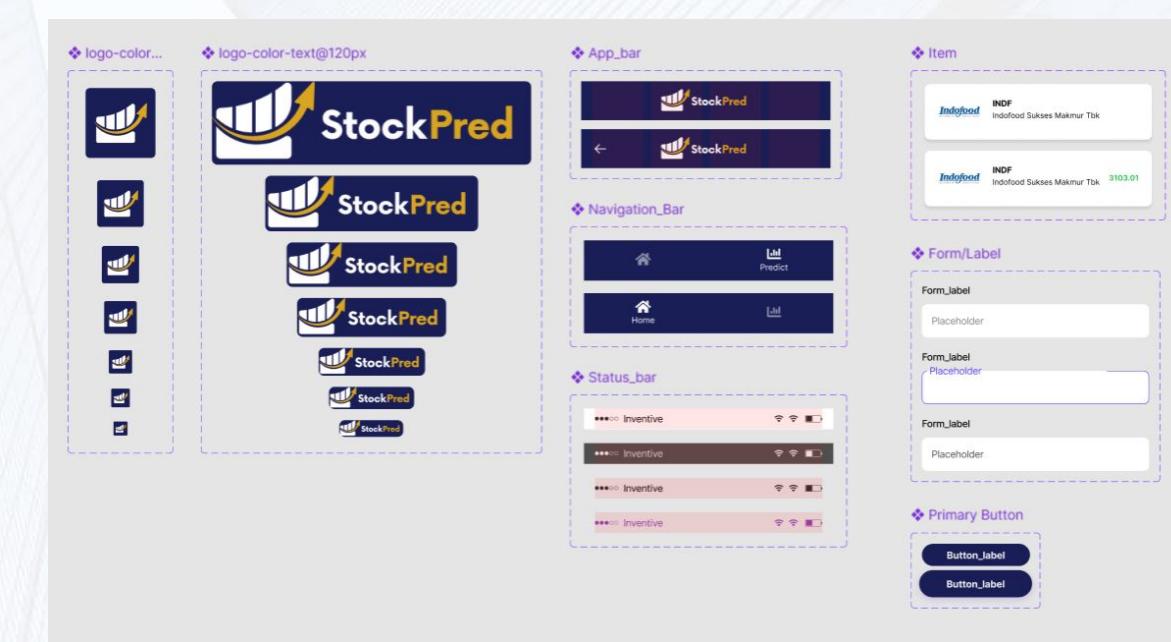
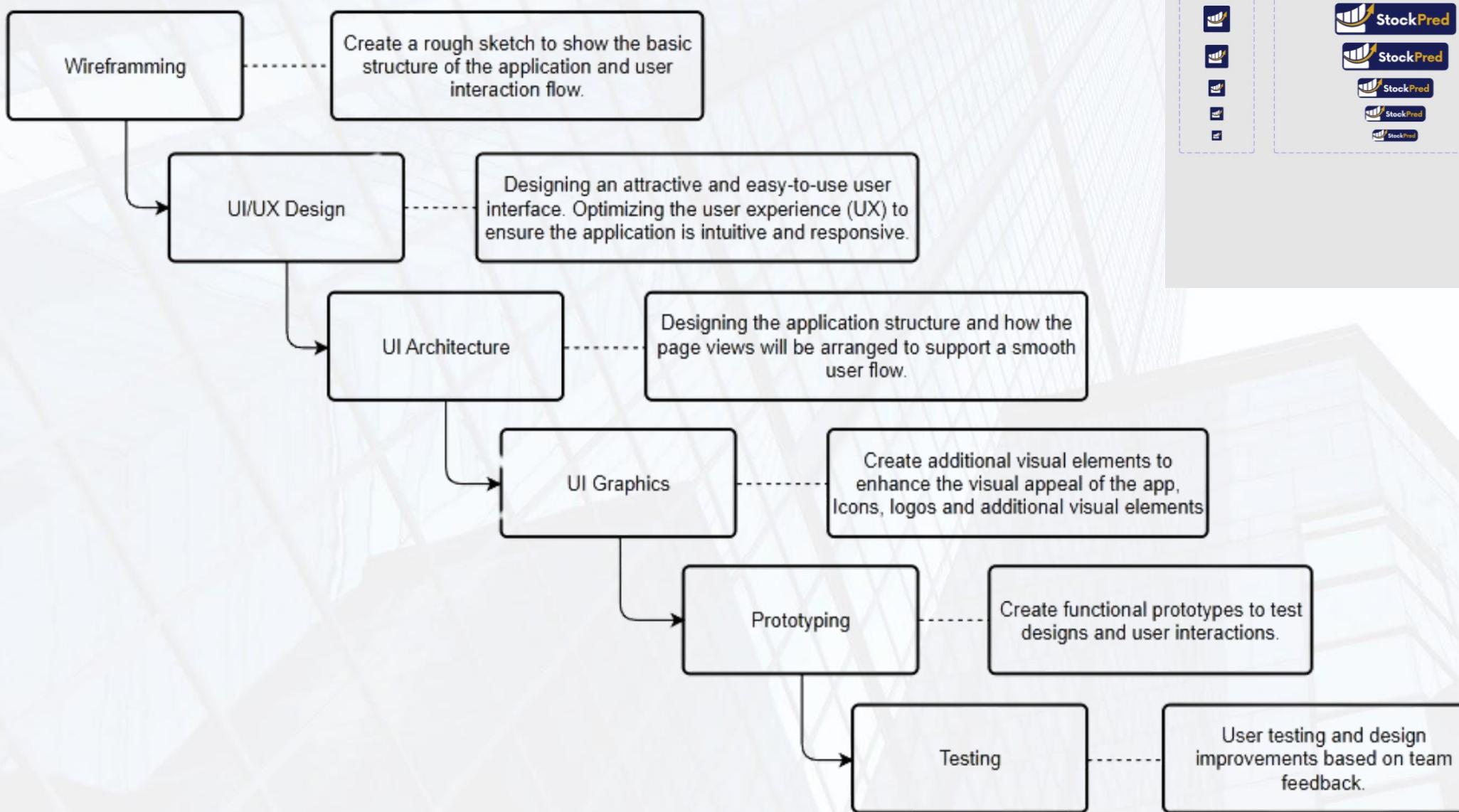
Figma



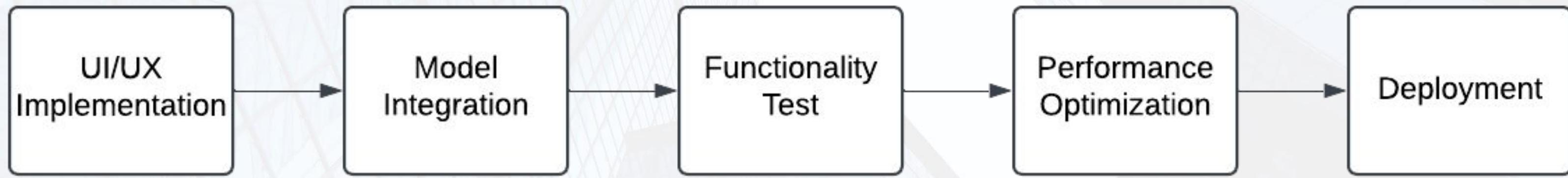
Canva

Mobile Development

Designing with Figma & Canva



Mobile Development Workflow



Cross-Platform Development

Cross-Platform Support

Besides being available on **Android developed with Kotlin**,
StockPred is also **available** on the **Windows platform**,
built using the **Flutter** framework.



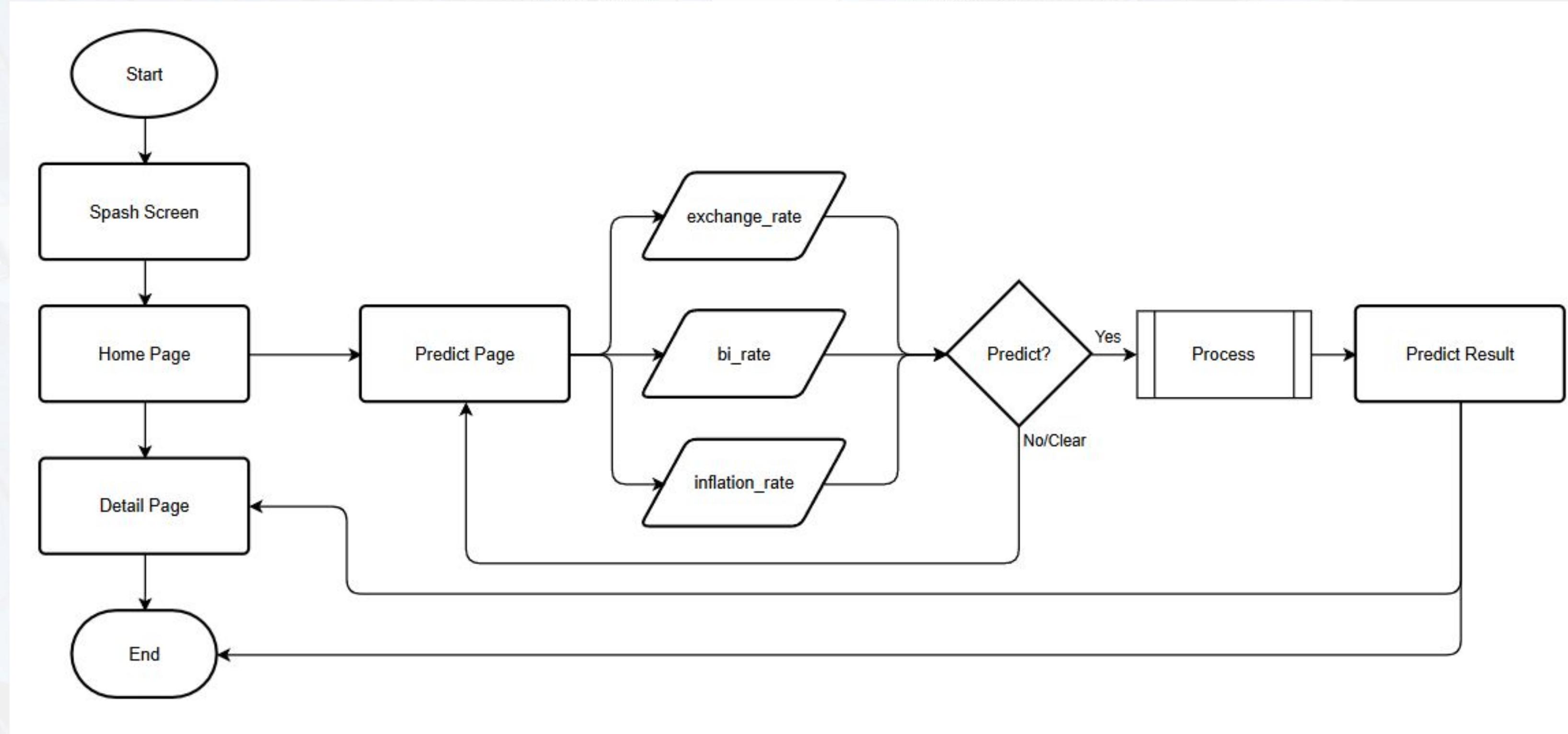
Implementation Visualization

Sub Outline :

- User Flow
- Screenshots Android Application with Kotlin
- Screenshots Windows Application with Flutter



User Flow



Android Application with Kotlin



Home Menu



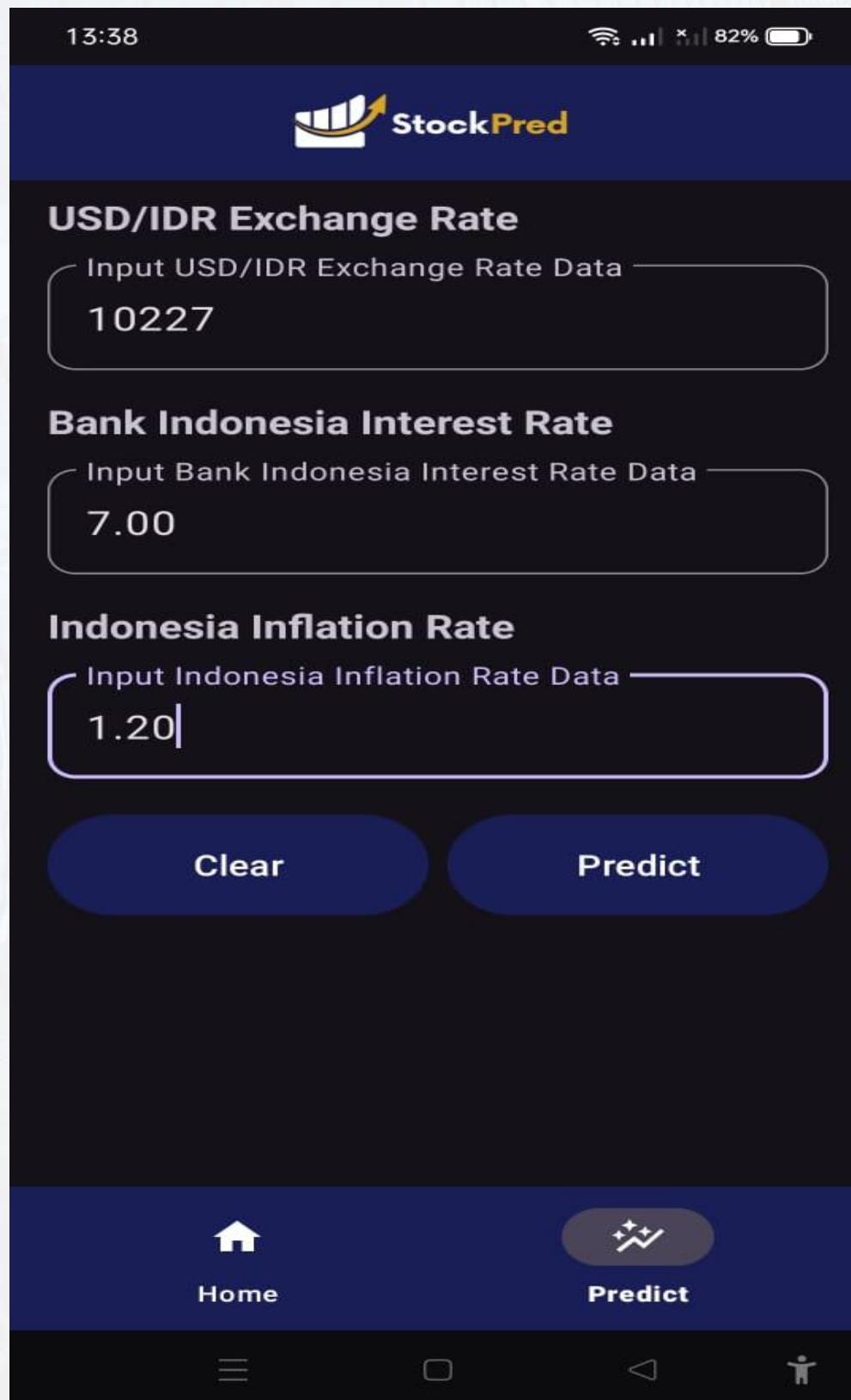
Stock Details



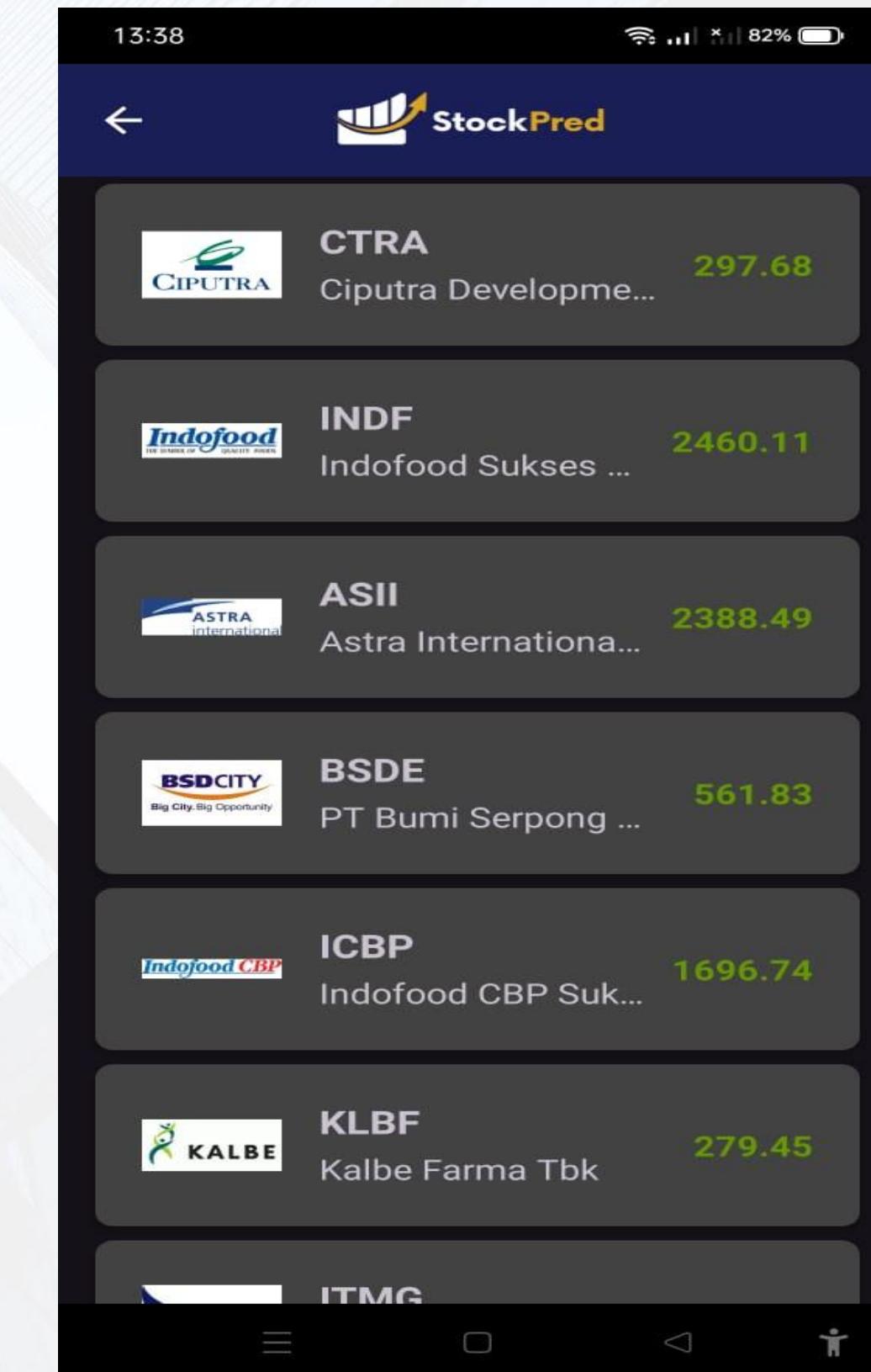
Android Application with Kotlin



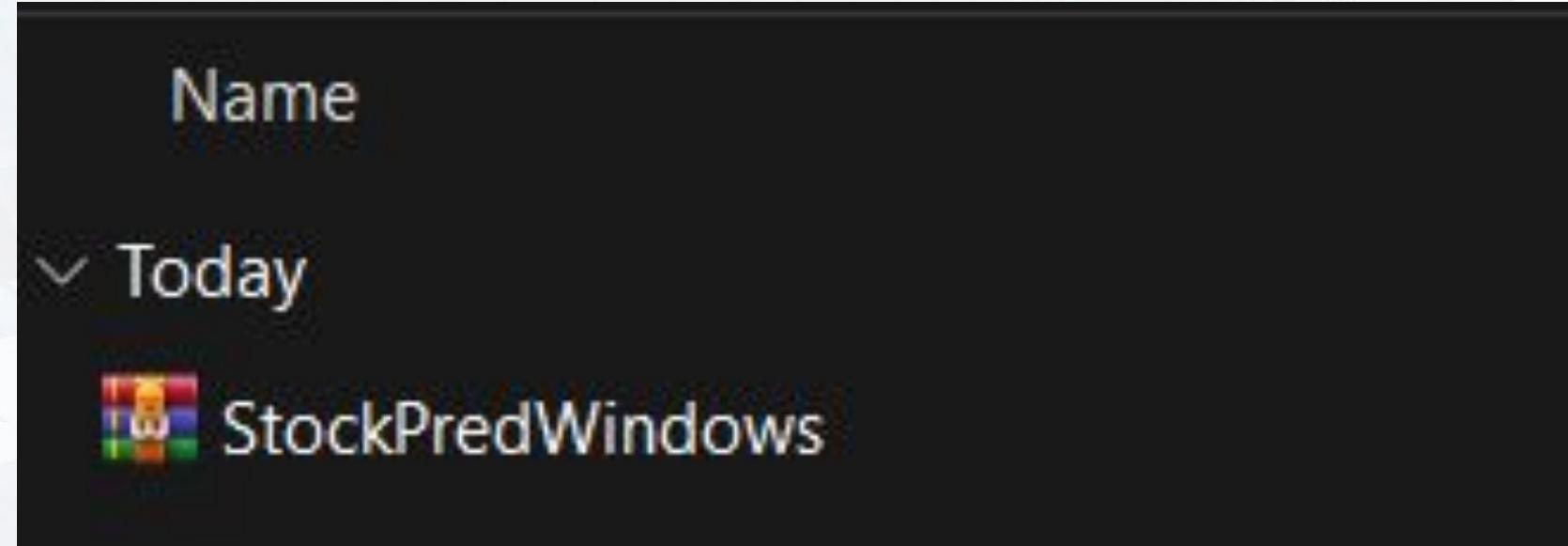
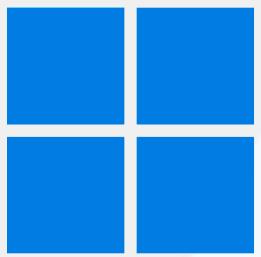
Predict Menu



Predict Result



Windows Application with Flutter

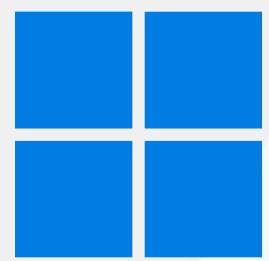


How to use the Windows version of the application?

| Name | Date modified | Type | Size |
|---------------------------------|------------------|-----------------------|-----------|
| data | 30/11/2024 10.12 | File folder | |
| flutter_windows.dll | 07/08/2024 13.13 | Application extens... | 17.754 KB |
| stock_pred | 30/11/2024 10.12 | Application | 58 KB |
| url_launcher_windows_plugin.dll | 30/11/2024 10.12 | Application extens... | 87 KB |

- 1. Extract the RAR file **StockPredWindows.rar****
- 2. Click on **stock_pred.exe****

Windows Application with Flutter



Home Menu



The screenshot shows the StockPred application running on a Windows operating system. The window title is "stock_pred". The main content area displays a list of companies:

- CIPUTRA** CTRA Ciputra Development Tbk
- Indofood** INDF Indofood Sukses Makmur Tbk
- ASTRA international** ASII Astra International Tbk
- BSD CITY** BSDE PT Bumi Serpong Damai Tbk
- Indofood CBP** ICBP Indofood CBP Sukses Makmur Tbk
- KALBE** KLBF Kalbe Farma Tbk
- ITMG** ITMG Indo Tambangraya Megah Tbk

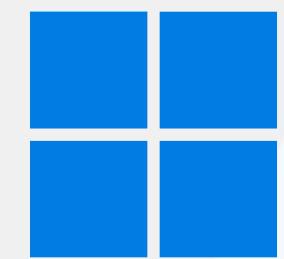
Stock Information Details



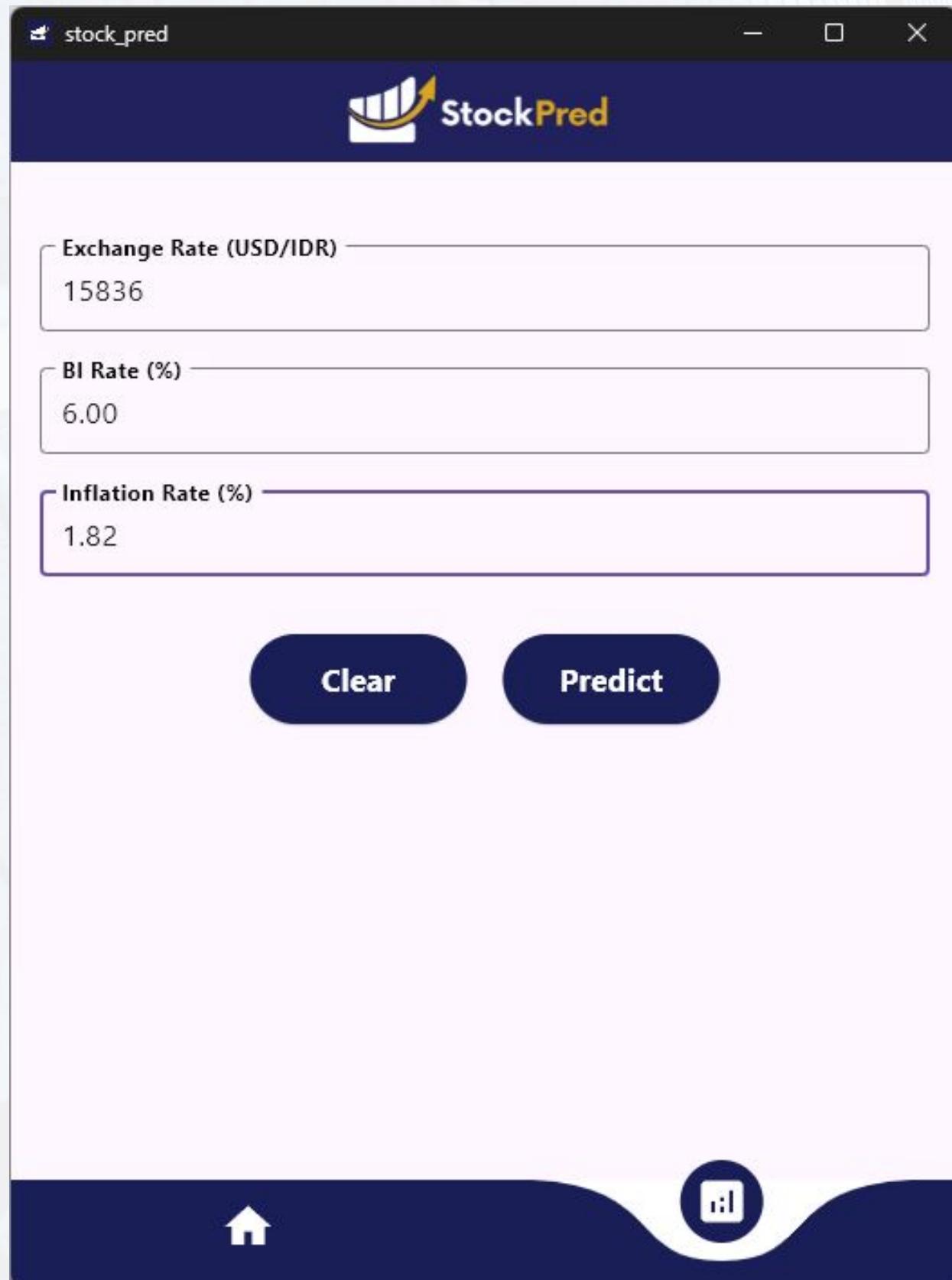
The screenshot shows the StockPred application displaying detailed information for PT Ultrajaya Milk Industry & Trading Company Tbk (Code: ULTJ). The window title is "stock_pred". The details shown are:

- PT Ultrajaya Milk Industry & Trading Company Tbk**
- Sector :** Consumer Staples
- Description :** A leading milk and beverage producer in Indonesia with various dairy products.
- Code :** ULTJ
- Sector :** Consumer Staples
- Visit Company Website**

Windows Application with Flutter



Predict Menu

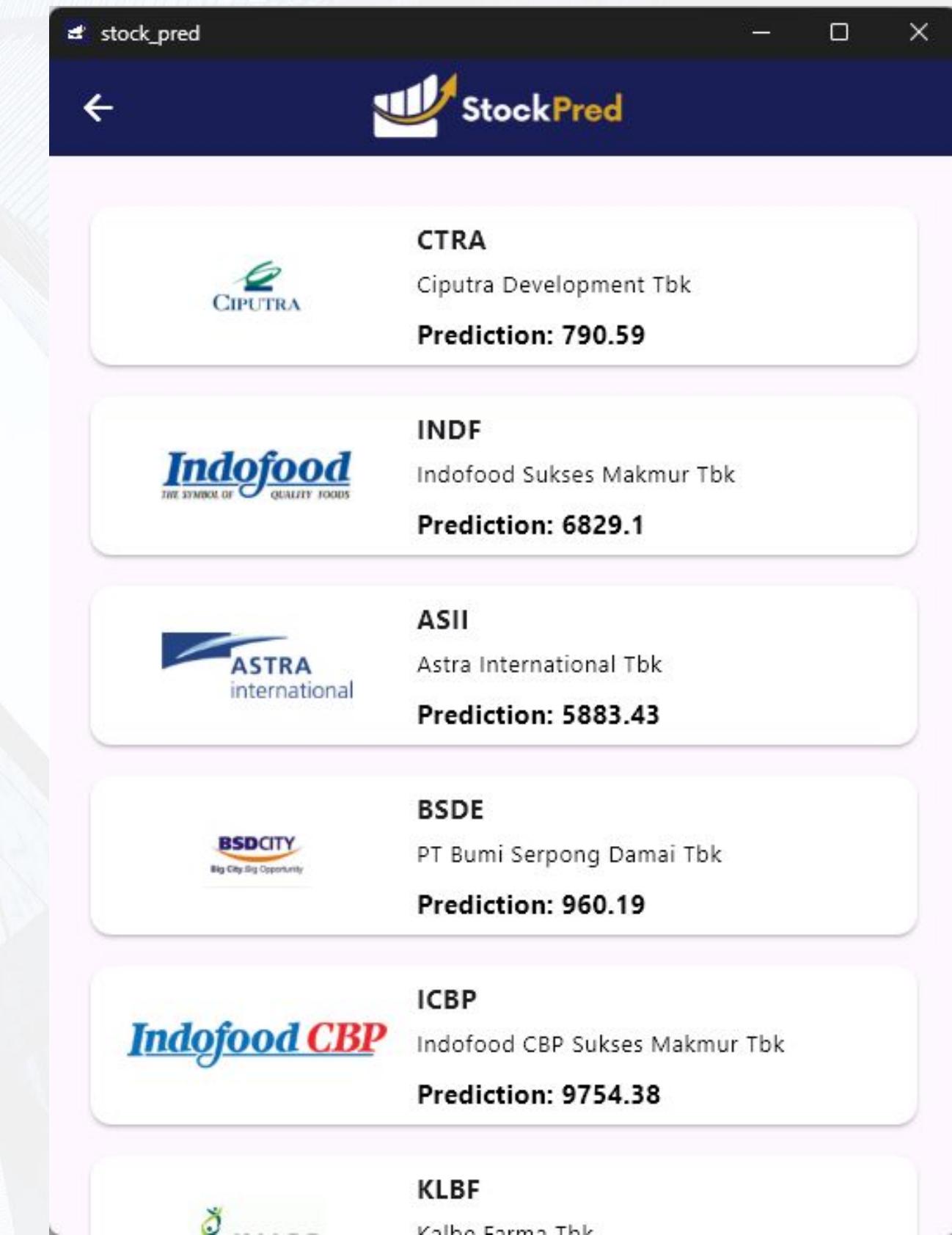


A screenshot of a Windows application window titled "stock_pred". The title bar features the StockPred logo. The main interface consists of three input fields for financial data:

- Exchange Rate (USD/IDR): 15836
- BI Rate (%): 6.00
- Inflation Rate (%): 1.82

Below the inputs are two buttons: "Clear" and "Predict". At the bottom of the window is a decorative footer bar with icons for a house and a square.

Prediction Results



A screenshot of a Windows application window titled "stock_pred". The title bar features the StockPred logo. The main interface displays a list of stock predictions:

| | | |
|---|---------------------|--------------------------------|
|  CIPUTRA | CTRA | Ciputra Development Tbk |
|  Indofood <small>THE SYMBOL OF QUALITY FOODS</small> | INDF | Indofood Sukses Makmur Tbk |
|  ASTRA international | ASII | Astra International Tbk |
|  BSDCITY <small>Big City.Big Opportunity</small> | BSDE | PT Bumi Serpong Damai Tbk |
|  Indofood CBP | ICBP | Indofood CBP Sukses Makmur Tbk |
| | Prediction: 9754.38 | |
|  KLBF | | Kalbe Farma Tbk |

Video Demo

Sub Outline :

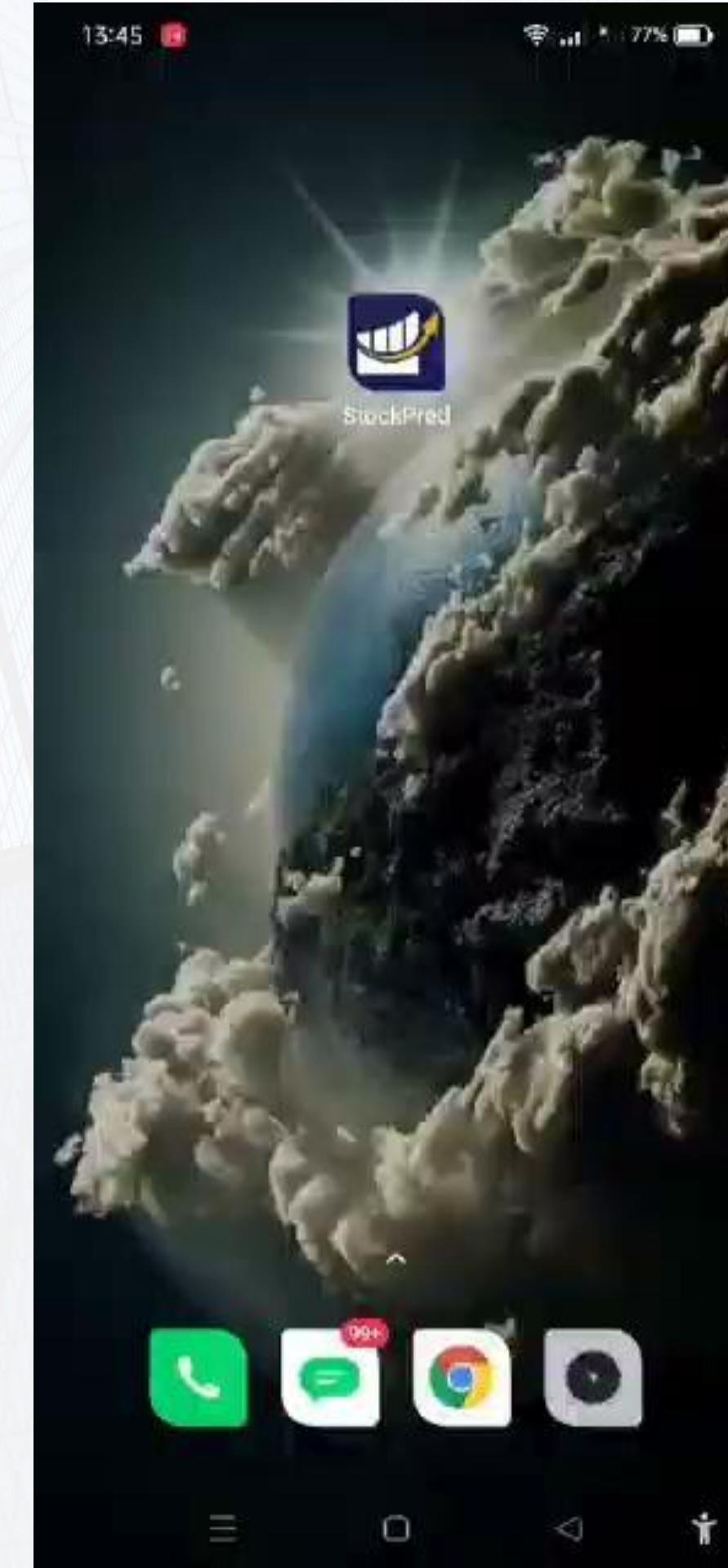
- **Android Application with Kotlin - Demo App**
- **Windows Application with Flutter - Demo App**
- **Download App**



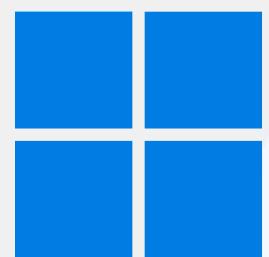
Android Application with Kotlin



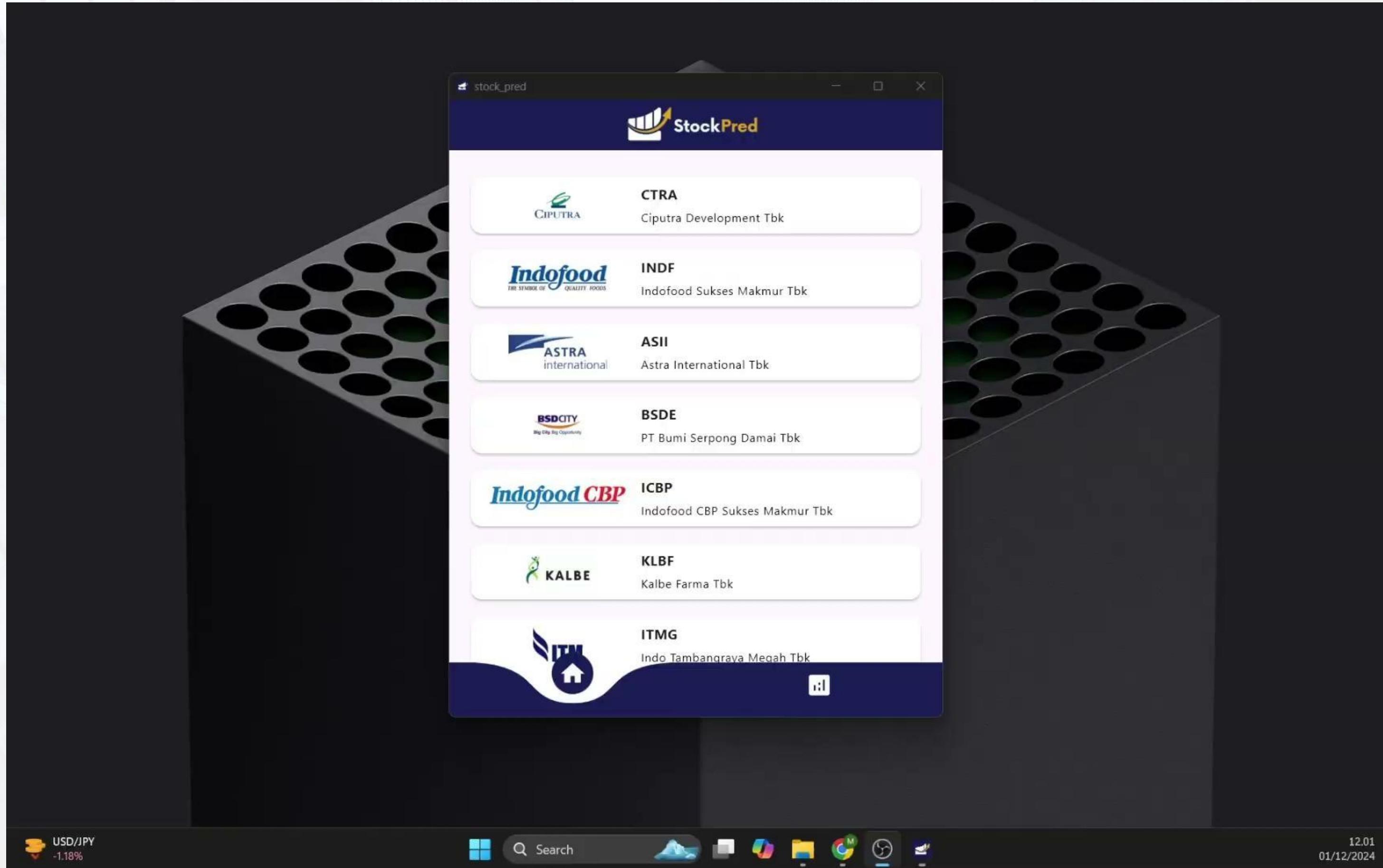
Demo App



Windows Application with Flutter

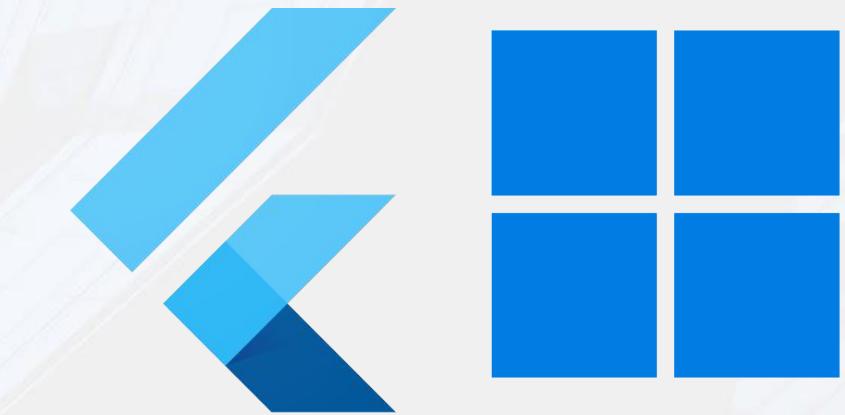


Demo App



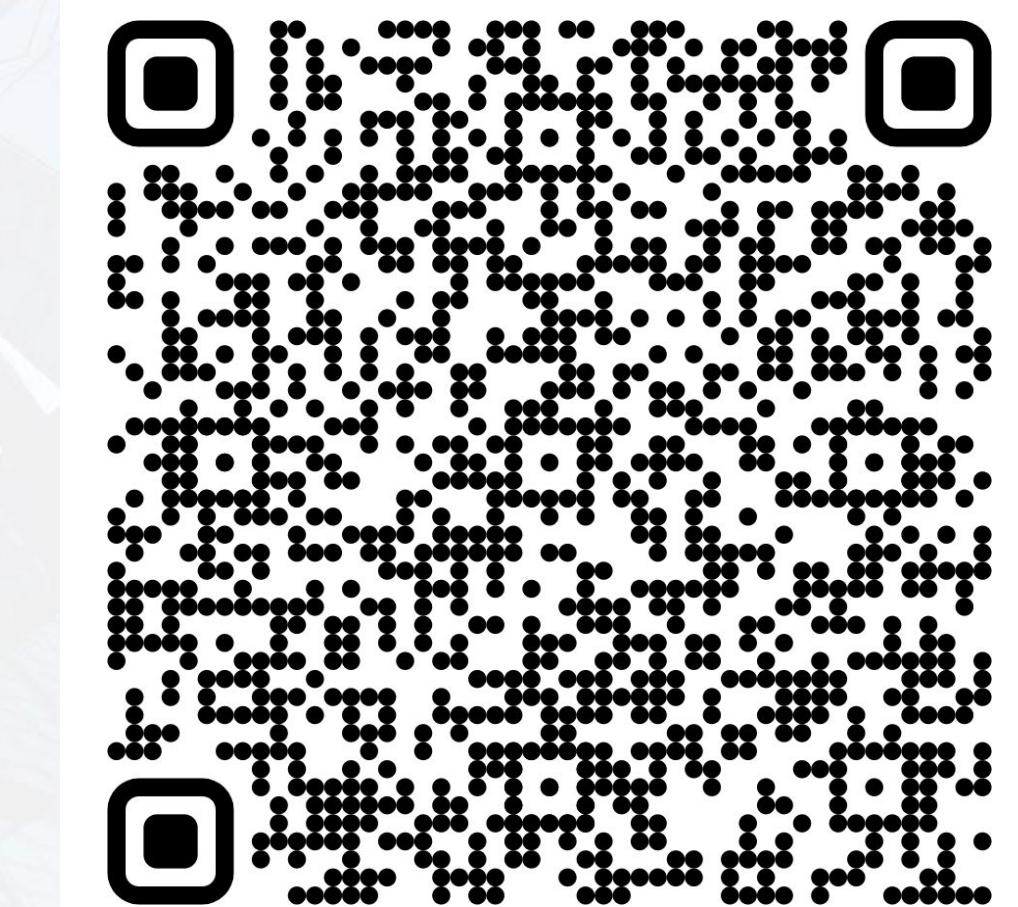


Download Application



Scan Here

<https://storage.googleapis.com/stockpredbangkit22024/StockPredAndroid.apk>

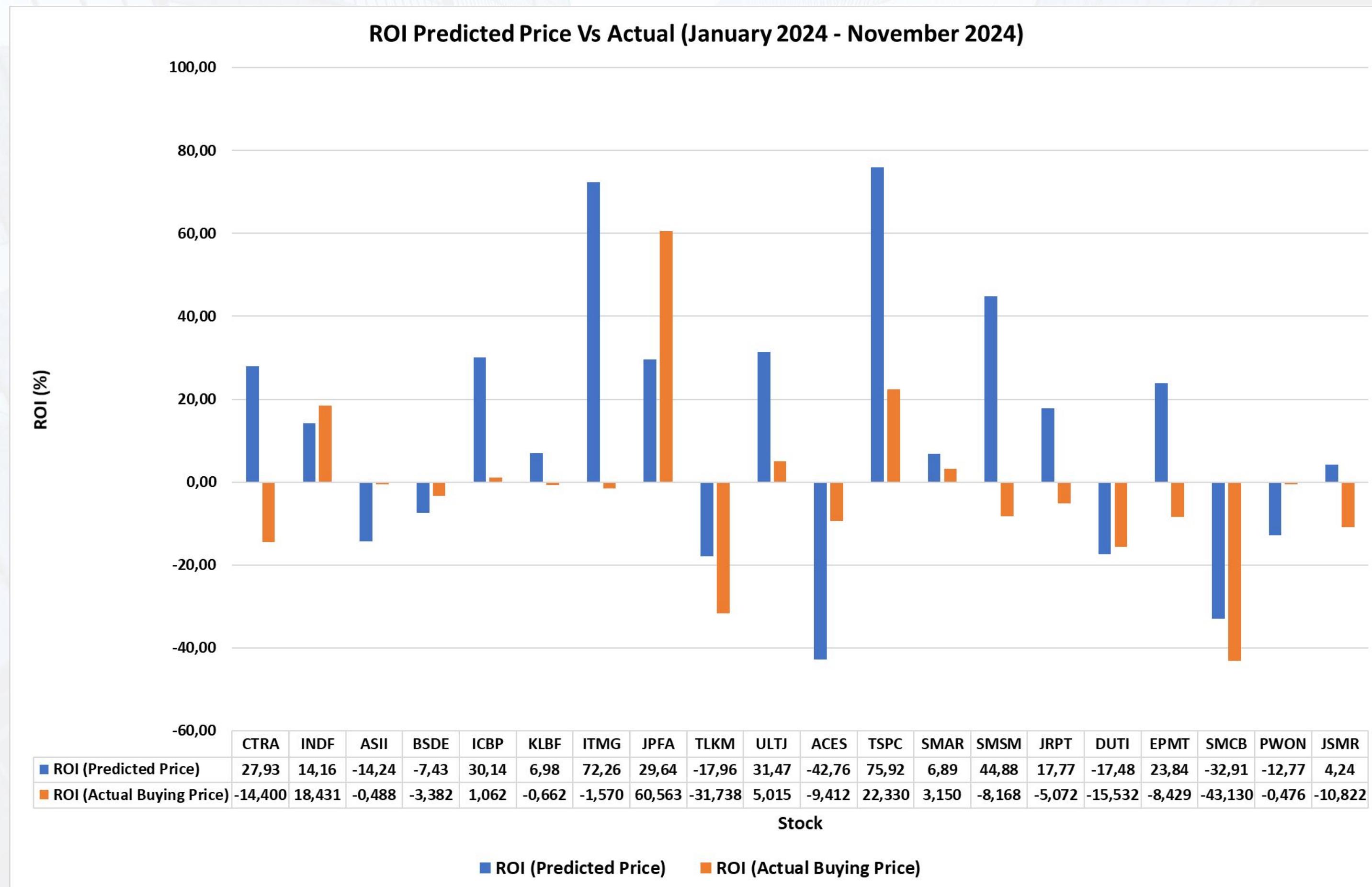


<https://storage.googleapis.com/stockpredbangkit22024/StockPredWindows.rar>

Impact Result



Impact Result - Return On Investment (ROI)



Documentation



Documentation

Scan Here



<https://github.com/StockPredBangkit22024>

**Plan a local deployment
on your project**



Plan a local deployment on your project

| Month | Activity | Details | Overhead Costs | Resources/Tools | Personnel Costs (Rp25,000/hour) | | | | | | | | |
|--|---|---|----------------|---|---------------------------------|----------|--------|----------------|-------------|-----------------|--------------|--------------|---------------------|
| 1 | Administration & Data Preparation | | | | | | | | | | | | |
| | Data Subscription | GoAPI subscription (Rp530,000/month). | Rp2.120.000 | GoAPI access, payment platform, internet connection. | Rp0 | | | | | | | | |
| | Advanced Data Sources | Investing.com Pro+ (Rp303,899/month, annual upfront cost). | Rp1.215.596 | GoAPI access, payment platform, internet connection. | Rp0 | | | | | | | | |
| | Dataset Access | PE, PBV datasets from open/public sources. | Rp0 | Pandas, Excel. | Rp0 | | | | | | | | |
| | Dataset and Model Review | Preprocessing existing dataset (PE, PBV integration). | Rp0 | Google Colab, Pandas, Numpy, Scikit-Learn, internet connection. | Rp11.250.000 | | | | | | | | |
| | Total | | Rp3.335.596 | | 3 Staff x 6 hours x 25 days | | | | | | | | |
| 2 | Model Development & Training | | | | | | | | | | | | |
| | Model Update | Add PE, PBV features and fine-tune DNN with hyperparameter optimization (HPO). | Rp1.000.000 | TensorFlow, Keras Tuner, Google Colab Pro. | Rp15.000.000 | | | | | | | | |
| | Total | | Rp1.000.000 | | 3 Staff x 8 hours x 25 days | | | | | | | | |
| 3 | API & Authentication Development | | | | | | | | | | | | |
| | Cloud Run | Top up GCP for Cloud Run. | Rp1.500.000 | Google Cloud Run. | Rp0 | | | | | | | | |
| | API Development | Build stock prediction API with DNN model using Node.js, Express.js, and deploy to Cloud Run. | Rp0 | Node.js, Docker, Cloud Run. | Rp10.000.000 | | | | | | | | |
| | CI/CD Setup | Automate testing and deployment pipeline for the API. | Rp200.000 | GitHub Actions, Docker. | Rp2.000.000 | | | | | | | | |
| | Authentication Development | Implement Firebase login, secure API with user tokens. | Rp500.000 | Firebase Authentication, Postman for testing. | Rp10.000.000 | | | | | | | | |
| | Total | | Rp2.200.000 | | 2 Staff x 10 hours x 20 days | | | | | | | | |
| 4 | Integration & Testing | | | | | | | | | | | | |
| | API Integration | Connect DNN API with GoAPI and ensure seamless data exchange. | Rp0 | Postman, Android Studio for testing connections. | Rp10.000.000 | | | | | | | | |
| | Full System Testing | Comprehensive testing: functional, performance, and security. | Rp0 | Test devices, internet connection, bug tracking tools. | Rp2.500.000 | | | | | | | | |
| | Total | | Rp0 | | 2 Staff x 10 hours x 5 days | | | | | | | | |
| 5 | Mobile App Development | | | | | | | | | | | | |
| | App Feature Development | Build "login", "Home", and "Prediction" features, link to APIs. | Rp0 | Android Studio, Kotlin. | Rp12.500.000 | | | | | | | | |
| | Real-Device Testing | Test app on Android devices and validate predictions from APIs. | Rp0 | Test devices, user feedback tools. | Rp2.500.000 | | | | | | | | |
| | Total | | Rp0 | | 2 Staff x 10 hours x 25 days | | | | | | | | |
| 6 | Bug Fixing & Launch & Monitoring | | | | | | | | | | | | |
| | Bug Fixing | Address issues identified during testing. | Rp0 | Debugging tools, internet connection. | Rp7.500.000 | | | | | | | | |
| | Play Store Registration | Register Play Store account. | Rp387.500 | Google Developer account. | Rp0 | | | | | | | | |
| | Local App Launch | Release the app to local users and gather feedback. | Rp0 | Play Store registration (if applicable), Android devices. | Rp2.500.000 | | | | | | | | |
| | Monitoring & Maintenance | Monitor API performance, user authentication, and app stability. | Rp0 | Logging tools, Firebase monitoring. | Rp2.500.000 | | | | | | | | |
| | Total | | Rp387.500 | | 2 Staff x 10 hours x 5 days | | | | | | | | |
| Total Costs: <table border="1"> <thead> <tr> <th>Category</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td>Overhead Costs</td> <td>Rp6.923.096</td> </tr> <tr> <td>Personnel Costs</td> <td>Rp75.750.000</td> </tr> <tr> <td>Total</td> <td>Rp82.673.096</td> </tr> </tbody> </table> | | | | | | Category | Amount | Overhead Costs | Rp6.923.096 | Personnel Costs | Rp75.750.000 | Total | Rp82.673.096 |
| Category | Amount | | | | | | | | | | | | |
| Overhead Costs | Rp6.923.096 | | | | | | | | | | | | |
| Personnel Costs | Rp75.750.000 | | | | | | | | | | | | |
| Total | Rp82.673.096 | | | | | | | | | | | | |

 C242-PS012

Thank You For your Attention

