📈 Financial Forecast Scenario Modeling Report

Project Title:

Stock Price Forecasting & Scenario Modeling
Using Time Series Forecasting with Prophet and Python

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1. Objective

The goal of this project is to generate 3–5 year forecasted stock price trends for a selected asset using historical time series data, and simulate scenario-based projections under various macroeconomic conditions.

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2. Tools & Stack

- **Python** for data preprocessing, modeling, and scenario logic
- **Prophet** for time series forecasting
- **Excel** for output storage, visualization, and analysis
- **Pandas** and **Matplotlib** for data manipulation and plotting

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3. Data Overview

- **Source:** Historical stock data for `GOOG` (Google)
- **Range:** Daily data resampled to monthly frequency
- **Preprocessing:** Handled missing values, computed volatility, extracted trend components

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4. Forecasting Model

- Model used: `Prophet` (additive time series decomposition)
- Forecast generated for: **36 months** (3 years)
- Output variables:
    - `ds`: Date
    - `yhat`: Base case forecast
    - `yhat_upper` / `yhat_lower`: Confidence intervals

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5. Scenario Modeling Logic

Three scenarios were created based on percentage deviations from the base forecast:

Scenario	Formula
Base Case	`yhat` — forecast from Prophet
Best Case	`yhat * 1.1` — assumes 10% higher market performance
Worst Case	`yhat * 0.9 - (volatility_mean * 50)` — assumes 10% drop + volatility penalty

- **Volatility adjustment** penalizes uncertainty in the worst-case scenario.

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6. Results Summary

📊 Base Forecast (Prophet)

- **Trend:** Consistent upward trend with minor seasonal fluctuations.
- **Range:** [INSERT min/max values from `yhat` here if needed]
- File output: `forecast_base_case.xlsx` (not saved in current script)

✅ Best Case

- **Assumption:** Market conditions improve by +10% (e.g., strong earnings, economic growth).
- **Impact:** Higher growth trajectory across all periods.
- **File:** `outputs/scenario_best_case.xlsx`

⚠️ Worst Case

- **Assumption:** -10% underperformance + increased volatility.
- **Impact:** Forecast is adjusted downward with amplified penalties during high-risk periods.
- **File:** `outputs/scenario_worst_case.xlsx`

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7. Sample Output Snapshot (Best Case)

Date	Forecasted Price (Best Case)
2025-08-30	$192.8798
2025-09-31	$189.8029

Date	Forecasted Price (Best Case)
2025-10-31	$191.0708

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8. Insights

- Scenario modeling provides clarity on the impact of different market assumptions on stock performance.
- The best case can serve as a target or aspirational benchmark.
- The worst case is a planning tool for risk mitigation and stress testing.

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9. Recommendations

- Monitor actual data monthly and compare with each scenario.
- Adjust assumptions and rerun the model periodically as new macroeconomic indicators evolve.
- Extend the model to include other financial metrics (revenue, EBITDA, etc.) for full business forecasting.

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10. Next Steps

- Automate model refresh using Python scheduler (e.g., `cron`, `Airflow`)
- Create Power BI or Excel dashboard with slicers for scenario toggles
- Incorporate additional drivers: inflation, interest rates, currency impact