MCS Finance Club Report

Made by :–

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Course – B.Tech. C.S.E.(2nd year)

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Description

- **Asset Classes:** various asset classes (e.g., stocks, bonds, and alternative investments) are taken to maximize expected returns while managing risk. Total **16 assets** are taken.

1. **Stocks** : Amazon (AMZN), Microsoft (MSFT), Apple (AAPL), Adani Power (ADANIPOWER.NS), Tesla (TSLA)
2. **Cryptocurrency :** Bitcoin (BTC-USD), Ethereum (ETH-USD), XRP (XRP-USD)
3. **Gold** : iShares Gold Trust (IAU), SPDR Gold Shares (GLD)
4. **Mutual Funds :** Victory NASDAQ-100 Index Fund (USNQX), Schwab U.S. Large-Cap Growth Index Fund (SWLGX)
5. **Bonds :** Vanguard Short-Term Corporate Bond Index Fund (VSCSX), The Guggenheim Total Return Bond Fund (GIBIX)
6. **Real Estate :** Welltower Inc. (WELL), Public Storage (PSA)

- The data for each asset of different asset classes is taken for **925 days.**
- **API** used for historic data collection is **yfinance.**
- Monte Carlo simulations are run to project the potential portfolio performance over **1 years of time period(252 days).**
- Initial Portfolio amount - **$100000**
- Number of portfolios considered – **20000**
- Number of Monte Carlo simulations executed – **20000**

❖ **Note :- All data is shown for a particular execution that I witnessed on my device. It may be different on your device but explanation and analysis can be generalized and easily understood.**

Portfolios

- Types of portfolio profiles:

1. Aggressive : An aggressive portfolio is characterized with the target of achieving maximum returns and in the process taking higher risk resulting in higher allocation to high-risk, high-reward investments, such as equities or alternative assets. Investors with an aggressive profile seek maximum returns and are willing to tolerate significant market fluctuations.
2. Conservative : A moderate portfolio aims to strike a balance between risk and returns. It includes a diversified mix of assets, such as stocks, bonds, and possibly alternative investments. Investors adopting this profile are willing to accept some risk but also seek stability.
3. Moderate : A conservative portfolio prioritizes capital preservation and stability over high returns. It primarily consists of low-risk assets like bonds, money market instruments, and cash. Investors with a conservative profile have a low risk tolerance and aim to protect their capital.

- Specifying criteria for different profiles:-
- Aggressive – Portfolio with max returns
- Moderate – Portfolio with max Sharpe Ratio
- Conservative – Portfolio with min volatility/risk
- Low standard deviation in log returns of Conservative Investor suggest that investor is willing to take less risks and protect his/her capital and vice-versa with Aggressive Investor who is willing to take higher risks seeking maximum returns.

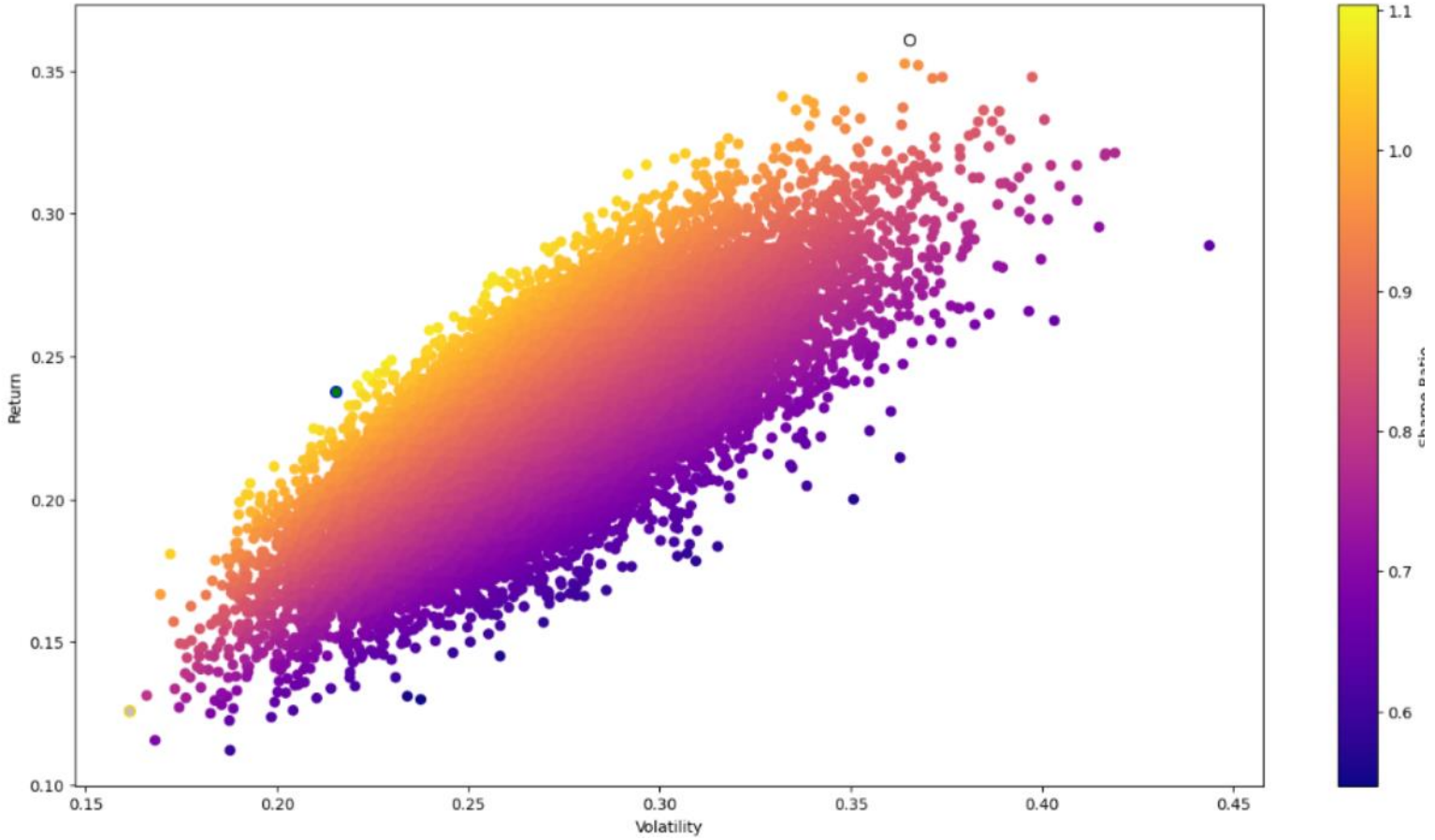
Important Metrics of each Portfolio

```
Metrics for aggressive profile:-
Returns                                                          0.360767
Volatility                                                       0.365244
Sharpe Ratio                                                     0.987742
Portfolio_Weights    [0.02688528364274029, 0.17340410763856884, 0.0...
Name: 12302, dtype: object


Metrics for moderate profile:-
Returns                                                          0.237843
Volatility                                                       0.215411
Sharpe Ratio                                                     1.104138
Portfolio_Weights    [0.046269356703418446, 0.15351958470705063, 0....
Name: 8962, dtype: object


Metrics for conservative profile:-
Returns                                                          0.125821
Volatility                                                       0.161348
Sharpe Ratio                                                      0.77981
Portfolio_Weights    [0.11194681004983506, 0.003987480797547807, 0....
Name: 1121, dtype: object
```

Weights of different Securities in each Portfolio

Security	Aggressive	Moderate	Conservative
AMZN	0.026885	0.046269	0.111947
MSFT	0.173404	0.153520	0.003987
AAPL	0.043135	0.059853	0.014279
ADANIPOWER.NS	0.010310	0.012162	0.057352
TSLA	0.175441	0.059057	0.020072
BTC-USD	0.031747	0.025938	0.128121
ETH-USD	0.030248	0.055639	0.130304
XRP-USD	0.012443	0.147035	0.137884
GLD	0.014479	0.060518	0.008146
IAU	0.053368	0.005179	0.080747
USNQX	0.064192	0.036011	0.009753
SWLGX	0.143772	0.097610	0.024322
VSCSX	0.022561	0.056679	0.039863
GIBIX	0.063628	0.149363	0.142851
WELL	0.046255	0.033096	0.076982
PSA	0.088131	0.002071	0.013389

Monte Carlo Simulations for various portfolio profiles:



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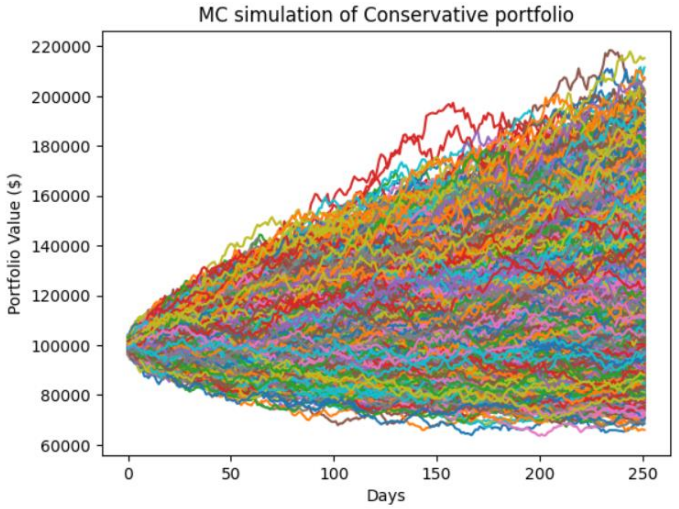
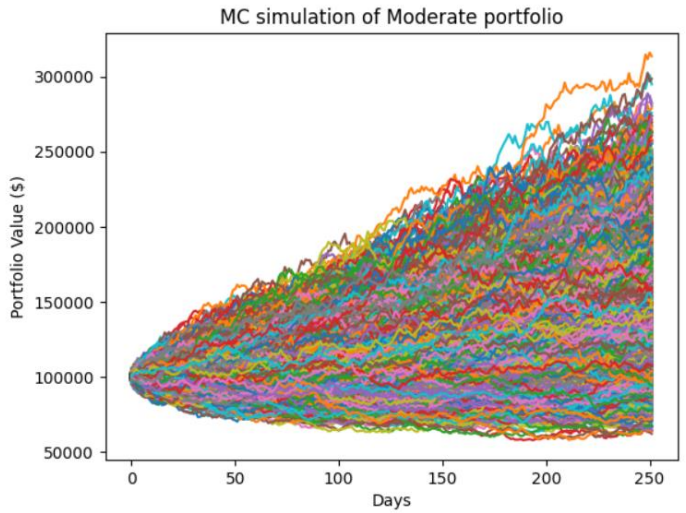
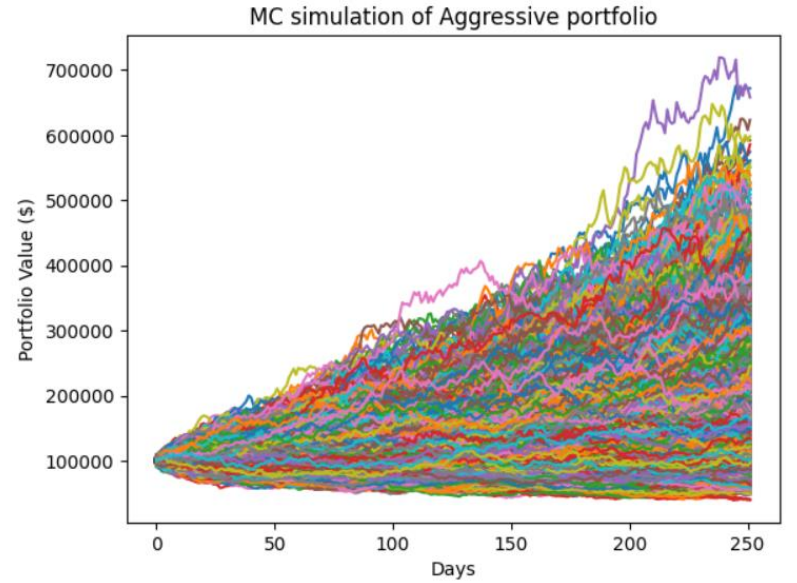
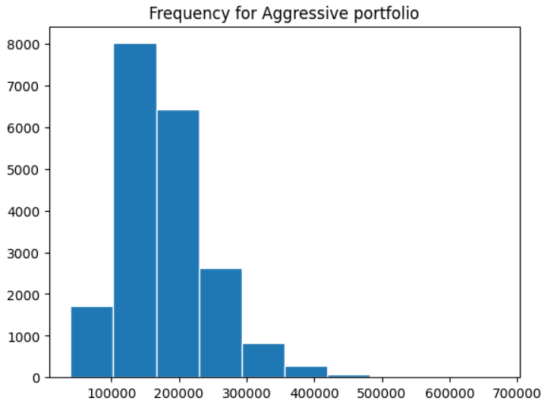
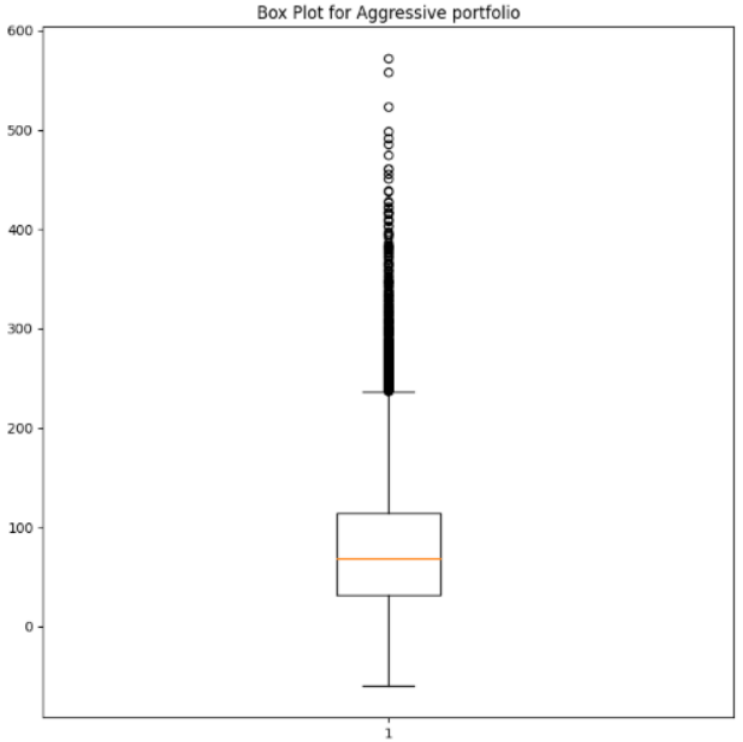


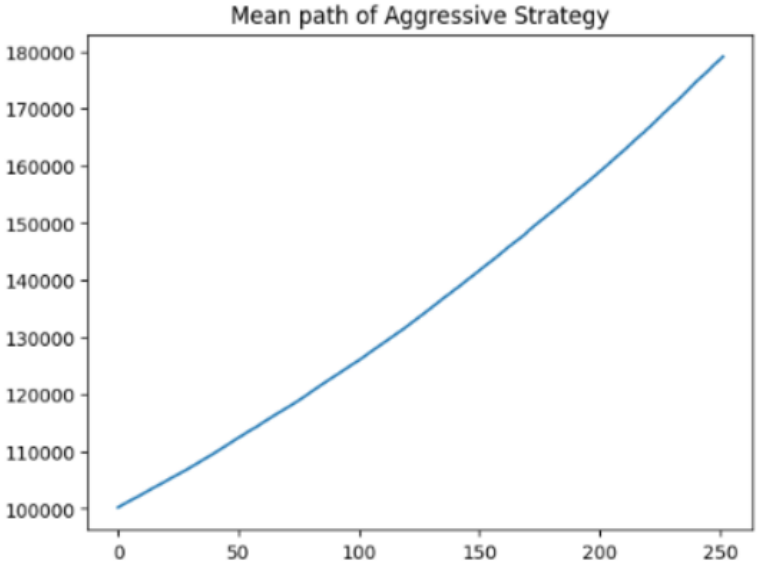


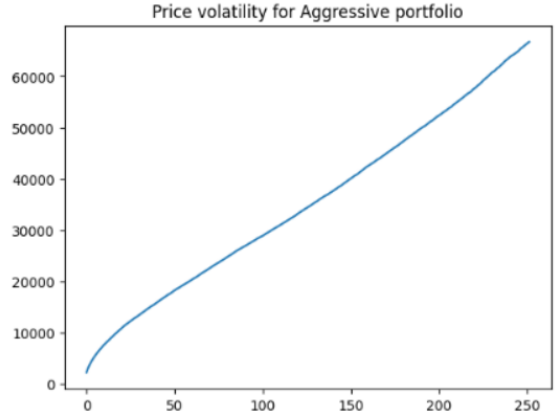


```
VaR $93068.62
The maximum returns of Aggressive:-
571.981669913586
The average returns of Aggressive:-
79.09139220070247
The minimum returns of Aggressive:-
-60.239463586679655
Chances of Aggressive portfolio giving +ve returns
92.56
```



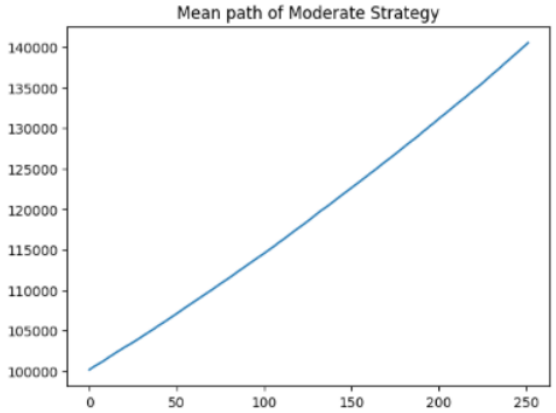


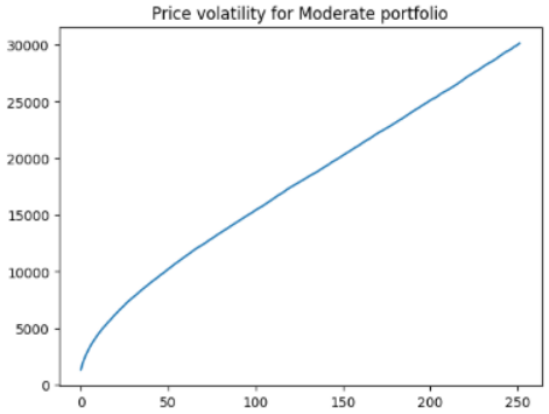


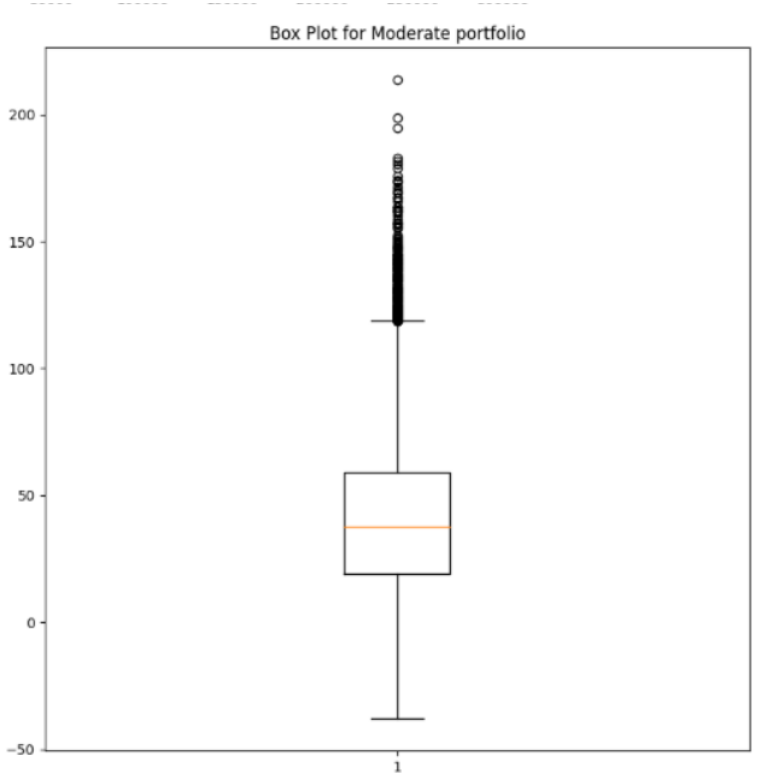


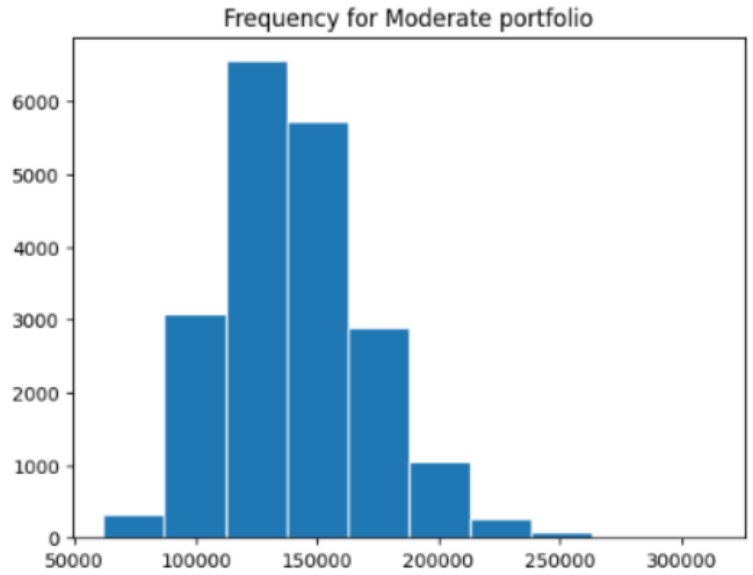
Analysis of Aggressive Portfolio

```
VaR $96807.17
The maximum returns of Moderate:-
213.60533081728965
The average returns of Moderate:-
40.57307015478066
The minimum returns of Moderate:-
-38.02671706948064
Chances of Moderate portfolio giving +ve returns
93.11500000000001
```



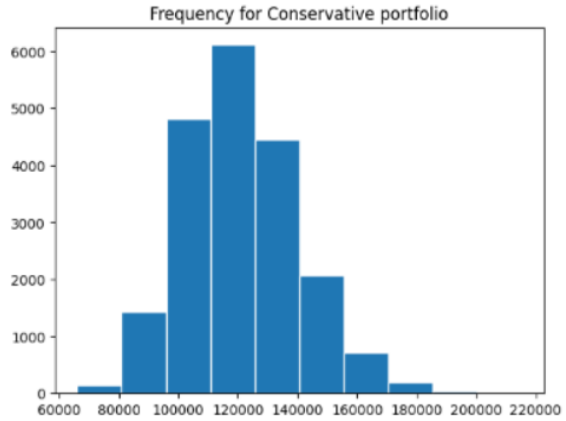


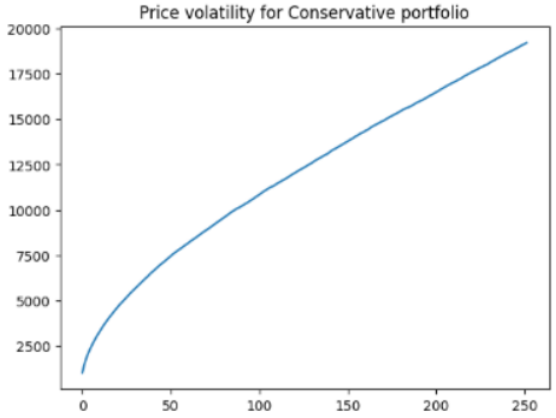


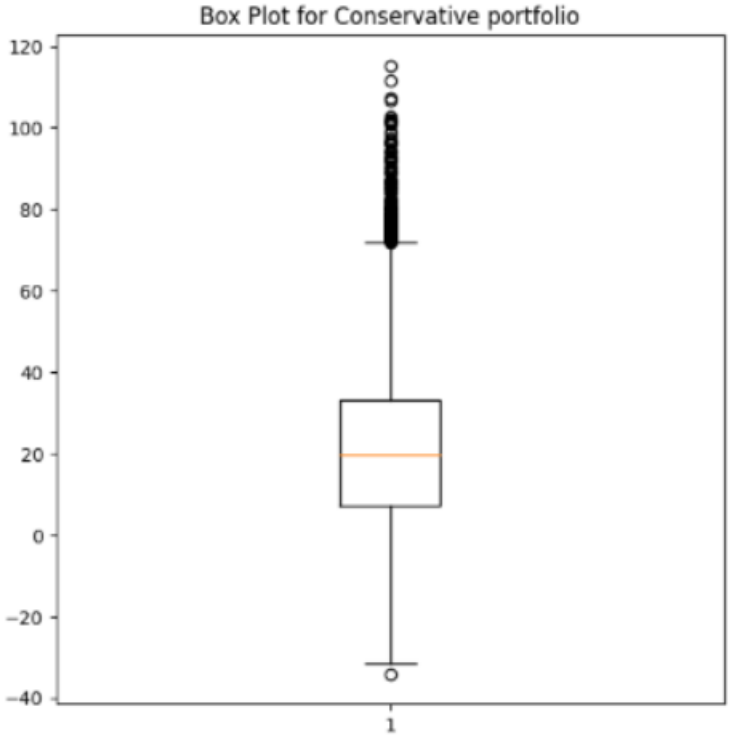


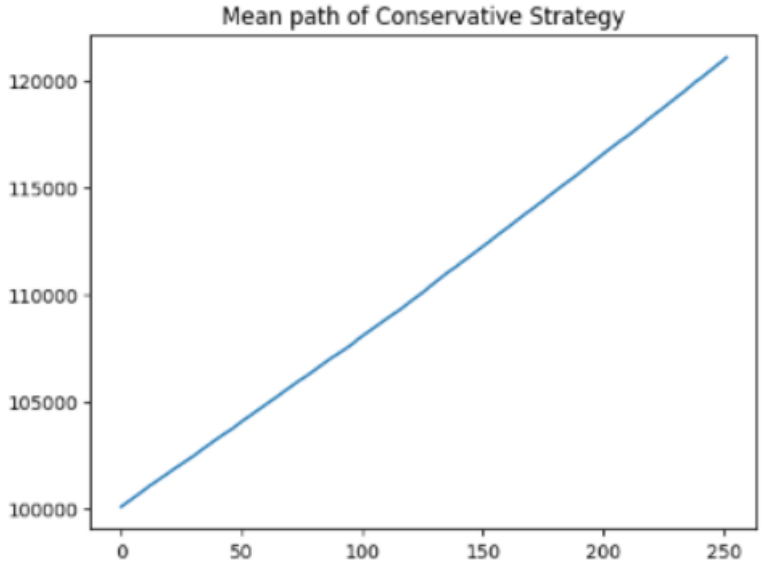
Analysis of Moderate Portfolio

```
VaR $92434.29
The maximum returns of Conservative:-
115.25467608824722
The average returns of Conservative:-
21.079060779017524
The minimum returns of Conservative:-
-33.97159473132601
Chances of Conservative portfolio giving +ve returns
87.095
```









Analysis of Conservative Portfolio

Recommendations

1. The multivariate normal distribution makes certain assumptions that could lead to inaccurate outcomes. Utilizing more versatile distribution methods can yield improved results.
2. Increasing the quantity of Monte Carlo simulations can enhance the quality of results.
3. To achieve better outcomes, consider using a larger dataset for analysis.
4. An alternative method for computing optimal portfolio weights, as presented, can be employed for an alternate analysis.
5. For improved portfolio parameters, such as mean returns and portfolio standard deviation, it is advisable to disregard extreme data points.
6. For a more comprehensive analysis, calculate both Value at Risk (VaR) and Conditional Value at Risk (CVaR) for the portfolio.