Portfolio Back-Testing with Portfolio Maestro: An Introduction to Portfolio Back-Testing

Frederic Palmliden, CMT
Senior Quantitative Analyst
TSLabs@TradeStation.com

Summary

Portfolio Maestro is a powerful way to test trading strategies at a portfolio level and generate advanced performance reports. Strategies that could only be tested in TradeStation on one security at a time are now applicable to an entire portfolio simultaneously. Money management and ranking rules, as well as commissions and slippage, can also be included.

This new series of papers will highlight the new state-of-the-art back-testing and reporting features of Portfolio Maestro, including real-world portfolio back-testing examples. In this introductory paper, a single strategy with a group of symbols will be utilized to demonstrate the basic functionality that powers Portfolio Maestro. Future papers will examine the program's more advanced features, such as money-management techniques and walk-forward optimization.

Figure 1: Portfolio Maestro Equity Curve
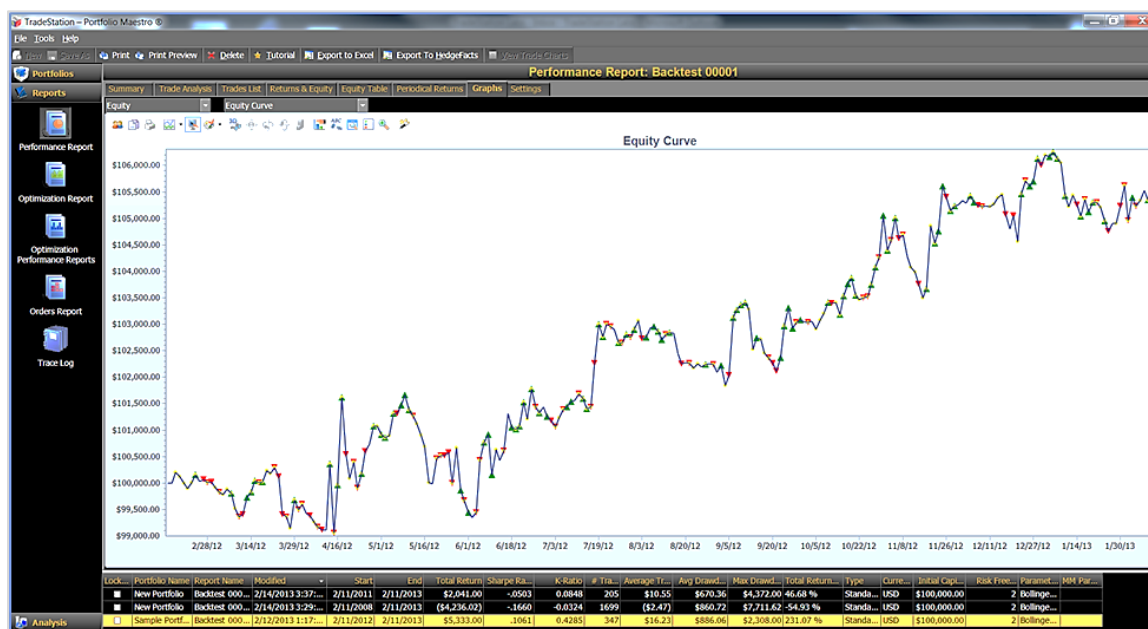
Geography and Terminology

Before diving into Portfolio Maestro, it is important to understand the program's general layout and terminology. As far as the geography is concerned, the design is similar to the TradeStation desktop, with a Shortcut Bar on the left side of the screen, a Contents Panel in the center and a top Menu Bar (see figure 2). What is a little different is the Selections Panel in the bottom portion of the screen.

Figure 2: Portfolio Maestro Layout
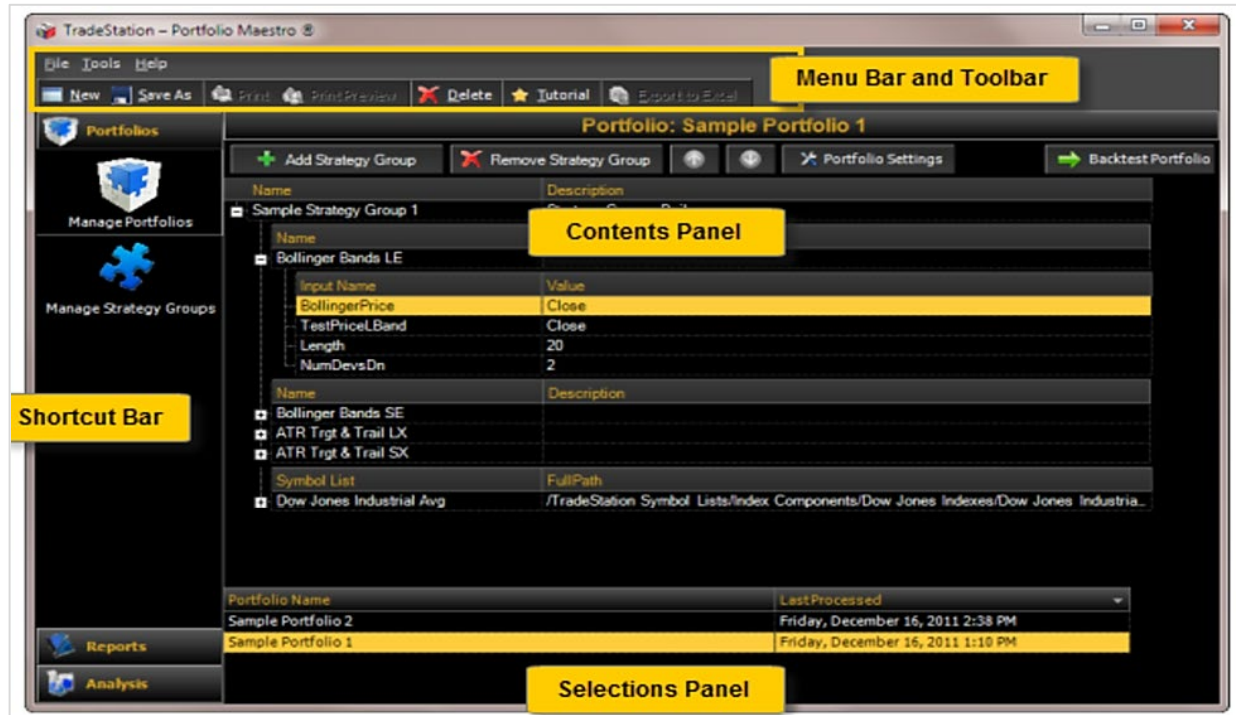
The top Menu Bar offers basic controls that allow you to create new content, print and save. The Shortcut Bar helps to quickly access Portfolio Maestro tools, from managing portfolios to viewing performance reports. Notice that the Shortcut Bar has a "Manage Portfolios" icon as well as a "Manage Strategy Groups" icon. These two terms are very important in understanding how Portfolio Maestro works. A Strategy Group contains a least one strategy component with at least one symbol, whereas a Portfolio contains at least one Strategy Group. Therefore, in order to build a portfolio, at least one Strategy Group would have to be already created.

The Contents Panel displays the contents of a selected Portfolio or Strategy Group, and also helps to display different settings. The Selections Panel contains a list of Portfolios, Strategy Groups and reports that can be displayed in the Contents Panel.

Strategy Testing Example

To fully understand the basic functionality of Portfolio Maestro, we will analyze a simple example step by step. In this example, the familiar supplied Bollinger Bands strategy components are selected and applied to the Dow Jones Transportation index, which includes 20 stocks.

To back-test the portfolio, we employ the following five steps.

1.   Create a Strategy Group

The first step in the portfolio back-testing process is to create a Strategy Group by clicking on the Manage Strategy Groups icon in the Shortcut Bar. Then click on "New" at the top left corner of the screen. A dialog opens to name the new Strategy Group (see figure 3 below). Once named, the new Strategy Group is listed in the Selections Panel.
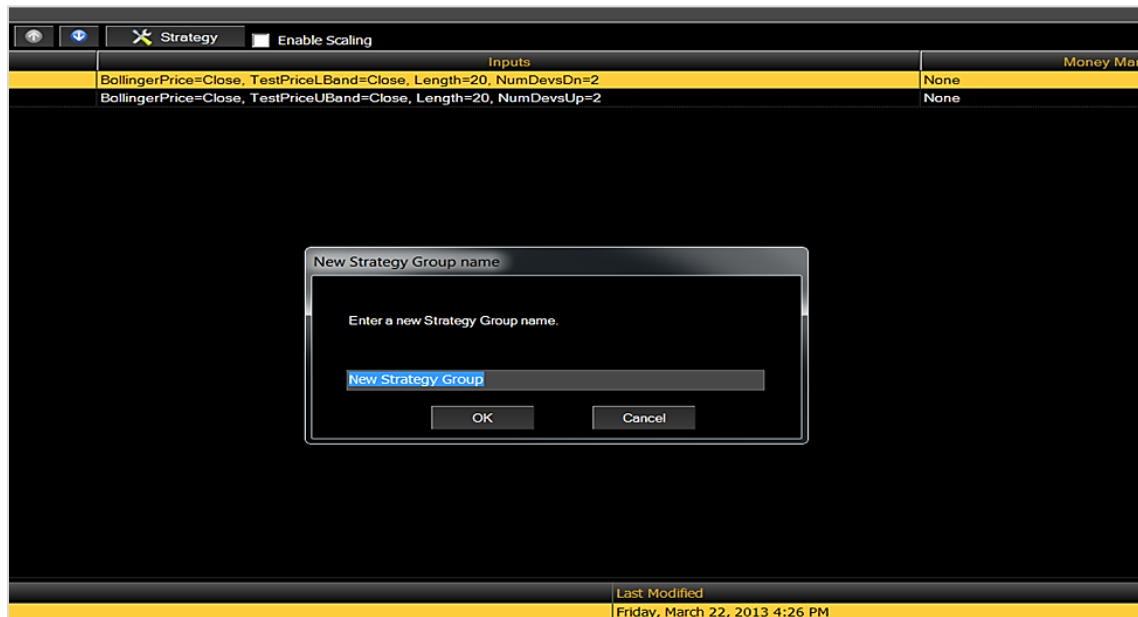
Next, click on "Add Strategy," and select Bollinger Bands LE and Bollinger Bands SE in order to take long entries as well as short entries. For the purposes of this example, the default settings will be used (i.e., Length = 20 and NumDevsUp/NumDevsDn = 2). The different settings are viewable by clicking on the "+" sign next to the strategy component name and may be adjusted if needed (see figure 4).

Notice that there are three separate tabs within the Strategy Group. The Strategies tab was used to insert the strategy components. The Symbol Lists tab will be used next to specify which symbols to use. After clicking on the tab name, click on "Add Symbol List" and select Dow Jones Transportation within the Dow Jones Indexes, inside the Index Components, under TradeStation Symbol Lists. The members of the index are then listed in the Symbol Lists tab (see figure 5).

The last tab is the Ranking tab, which can be used to limit the number of long and short entries. For instance, a Percent Change (%) criterion may be selected in order to limit the number of positions. The functionality becomes especially helpful when large number of signals are generated and when only a certain number of positions can actually be taken (due to capital requirements, for example). No ranking techniques will be used for this example.

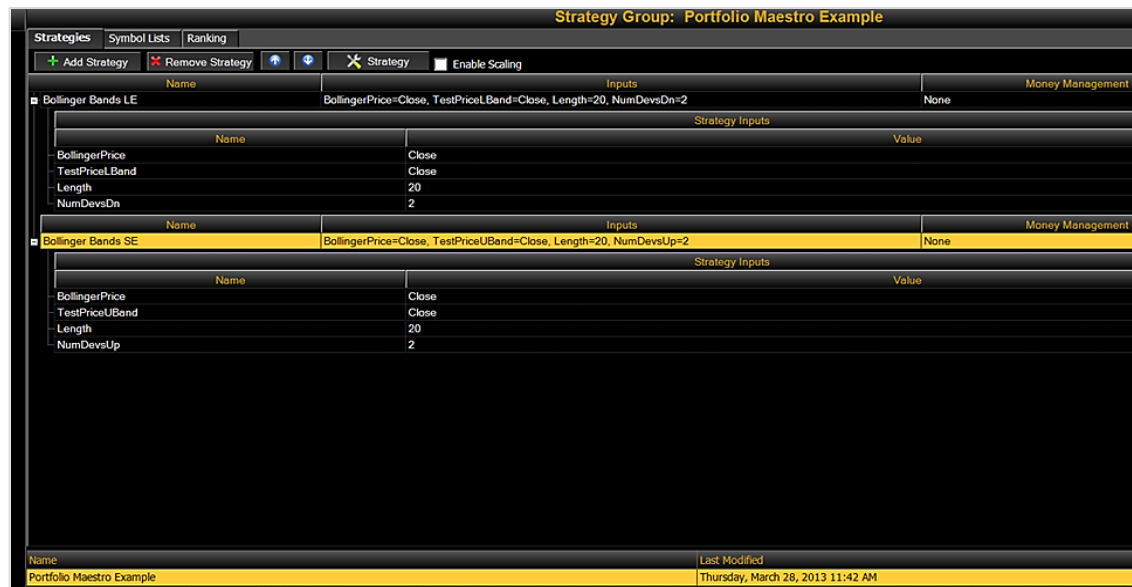Figure 4: Strategies Tab Settings within the Strategy Group

Figure 5: Symbol Lists Tab Settings within the Strategy Group

2. Create a Portfolio

Once a Strategy Group has been created, the next step is to create a Portfolio. First, click on the Manage Portfolio icon in the Shortcut Bar. Then click on "New" at the top left of the screen, which will open a dialog to name the new Portfolio. Once the new Portfolio is named, it will appear in the Selections Panel. The next step is to link the Strategy Group to the new Portfolio. Click on "Add Strategy Group" at the left side of the screen and select the Strategy Group that was created earlier. The Strategy Group that was created earlier is now part of the new Portfolio and the Portfolio is ready to be back-tested.

3. Back-Test the Portfolio

To back-test the Portfolio, click on the "Backtest" button at the top right corner of the screen. A dialog opens with four separate tabs with multiple options (see figure 6 below). The look-back period for the back-test, as well as the type of back-test, can be specified in the Settings tab. For this example, two years of history will be used and a standard back-test will be employed (default settings). The other default settings will be used in the other tabs as well, such as a fixed shares amount of 100 per trade in the Cost and Quantity tab. In the same tab, commissions and slippage can be specified per share or per trade. Notice also that the back-test will be saved by default, but a specific name can be indicated for future reference. To start the back-test, click on "Perform Backtest" on the lower side of the window.

4. View the Performance Report

Once the back-test is complete, there is an automatic option to either view the analysis immediately or later. Selecting view the report immediately opens the Performance Report, which contains multiple tabs. The performance report in Portfolio Maestro offers a wealth of information – not only on a portfolio level, but also per symbol. The Summary tab provides a snapshot of the overall performance of the Portfolio for the time period covered (see figure 7). The Trades List tab shows the trades for all symbols within the Portfolio, including entry and exit dates, and profit or loss per trade (see figure 8). Advanced performance information is available by security as well, including drawdown and run-up data in currency or in percentage terms. Keep in mind that a Strategy Performance Report in TradeStation only lists trades for one security.

Performance data is also available in other tabs, such as the Equity Curve for the Portfolio as a whole in the Graphs tab (see figure 9) and weekly return data in the Periodical Returns tab. Keep in mind that the equity curve represents the performance of the Portfolio as a whole for the time period covered in the back-test. Profit and loss data is also viewable by symbol by selecting "Total P/L by Symbol" and by selecting individual symbols from the portfolio (see figure 10).
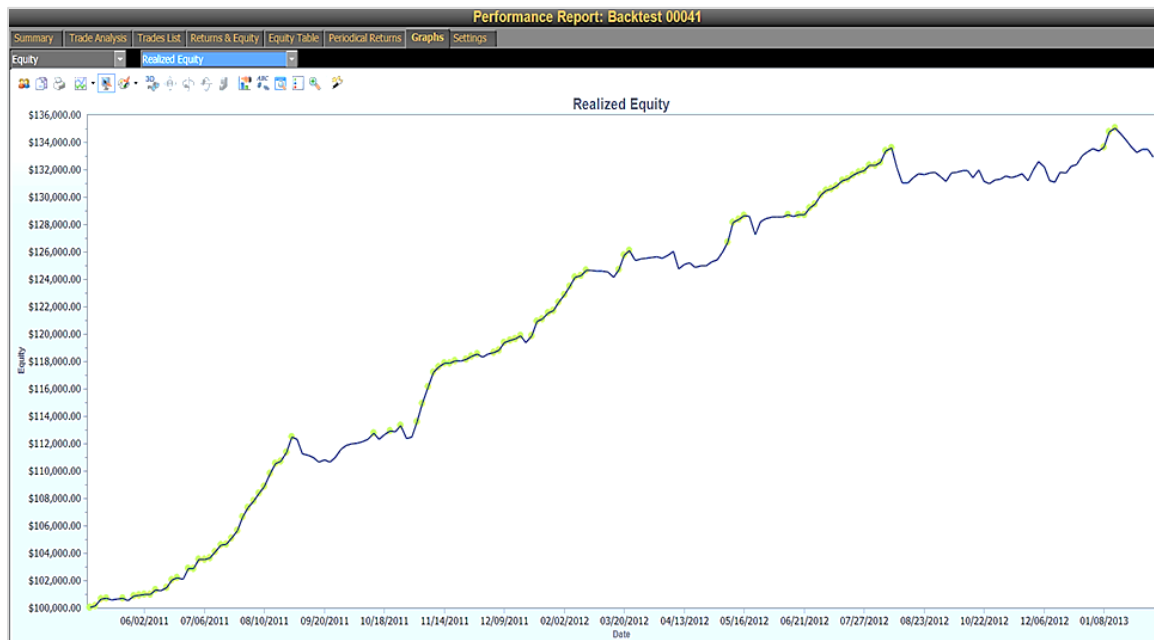
Figure 7: Performance Report

Figure 8: Performance Report Trades List

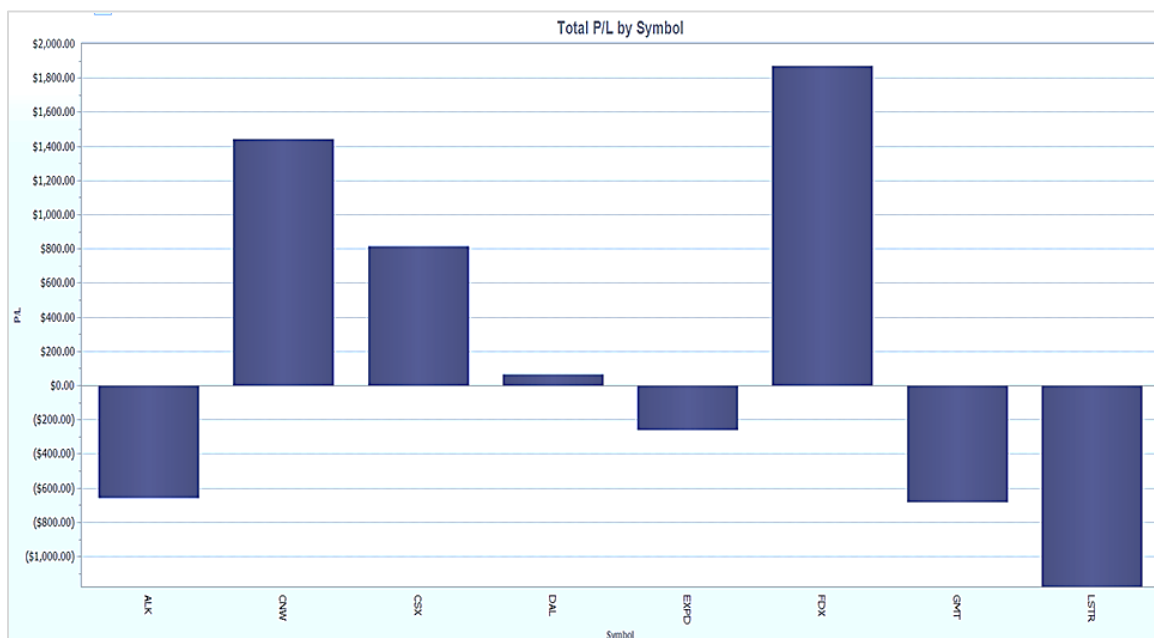**Figure 9: Performance Report Equity Curve**

Figure 10: Performance Report Total P/L by Symbol

5. View Current Positions

Finally, in order to bridge the theoretical back-test and live trading, an Orders Report is available, which lists current positions as well as open orders as of the time the back-test was performed (see figure 11). The Positions tab shows if a long or short position is held in each symbol within the Portfolio as well as the current profit or loss per symbol, as of the time the back-test was performed. Notice also that there are Filled Orders and Cancelled Orders tabs, which can be used to view filled or cancelled orders, again as of the time the back-test is performed.

Figure 11: Orders Report

Symbol	Entry Date	Profit	Symbol ▲	Type	Price	Quantity	Strategy Group	Strategy
ALK	9/28/2012	($2,798.00)	ALK	Short Entry	$35.31	100	Portfolio Maestro Example	Bollinger Bands SE
CHRW	3/19/2013	$5.00	CHRW	Short Entry	$59.20	100	Portfolio Maestro Example	Bollinger Bands SE
CNW	1/7/2013	($577.00)	CNW	Short Entry	$29.30	100	Portfolio Maestro Example	Bollinger Bands SE
CSX	1/8/2013	($388.00)	CSX	Short Entry	$20.47	100	Portfolio Maestro Example	Bollinger Bands SE
DAL	10/9/2012	($648.00)	DAL	Short Entry	$10.11	100	Portfolio Maestro Example	Bollinger Bands SE
EXPD	2/20/2013	($687.00)	EXPD	Long Entry	$42.60	100	Portfolio Maestro Example	Bollinger Bands LE
FDX	3/25/2013	($86.00)	FDX	Long Entry	$98.51	100	Portfolio Maestro Example	Bollinger Bands LE
GMT	7/24/2012	($1,021.00)	GMT	Short Entry	$40.93	100	Portfolio Maestro Example	Bollinger Bands SE
JBHT	3/1/2013	($412.00)	JBHT	Short Entry	$69.74	100	Portfolio Maestro Example	Bollinger Bands SE
JBLU	12/24/2012	($110.00)	JBLU	Short Entry	$5.80	100	Portfolio Maestro Example	Bollinger Bands SE
KEX	12/24/2012	($1,446.00)	KEX	Short Entry	$61.33	100	Portfolio Maestro Example	Bollinger Bands SE
KSU	1/8/2013	($2,179.00)	KSU	Short Entry	$85.95	100	Portfolio Maestro Example	Bollinger Bands SE
LSTR	2/15/2013	$139.00	LSTR	Long Entry	$55.31	100	Portfolio Maestro Example	Bollinger Bands LE
LUV	11/8/2012	($418.00)	LUV	Short Entry	$9.01	100	Portfolio Maestro Example	Bollinger Bands SE
MATX	2/28/2013	($153.00)	MATX	Long Entry	$25.78	100	Portfolio Maestro Example	Bollinger Bands LE
NSC	12/7/2012	($1,479.00)	NSC	Short Entry	$61.49	100	Portfolio Maestro Example	Bollinger Bands SE
R	8/1/2012	($1,989.00)	R	Short Entry	$39.51	100	Portfolio Maestro Example	Bollinger Bands SE
UAL	11/12/2012	($1,120.00)	UAL	Short Entry	$21.13	100	Portfolio Maestro Example	Bollinger Bands SE
UNP	12/20/2012	($1,508.00)	UNP	Short Entry	$125.75	100	Portfolio Maestro Example	Bollinger Bands SE
UPS	12/21/2012	($1,083.00)	UPS	Short Entry	$74.60	100	Portfolio Maestro Example	Bollinger Bands SE

Conclusion

Portfolio Maestro's powerful back-testing capabilities generate a wealth of information for portfolio analysis and evaluation. A simple strategy was utilized in this paper with a fairly short list of symbols for educational and demonstration purposes. However, keep in mind that a Portfolio can be very complex, with multiple Strategy Groups containing multiple strategy components with large lists of individual securities. Moreover, ranking, money management, portfolio constraints, portfolio targets and stops, portfolio optimization and walk-forward analysis can all be exploited. These different advanced topics will be explored in upcoming papers.