Automating Strategies for Advisors

April 16, 2015

Prior to joining KnowVera, Harry spent more than a decade at Thomson Reuters in a variety of Executive Vice President positions. Among his primary responsibilities were development of the firm's global sell-side equities strategy, design and marketing of next-generation premium trading desktops, and working with top buy-side accounts to build customized analytical solutions.

Harry also spent 10 years at Bridge Information Systems where, in his role as Executive Vice President, he was responsible for the design of Bridge's core products and the integration of multiple workstation applications.

A Director of the Kansas-based BATS Stock Exchange, Harry is also the Lead Director of the Exchange Board.

Harry graduated Cum Laude from Hobart College with a BA degree in Economics and Mathematics, and was elected to the Omicron Delta Epsilon Honor Society in Economics and Phi Beta Kappa.

Harry Temkin
Chief Executive Officer

Prior to joining KnowVera, Bill worked for Purdue Pharma L.P. as a Project Engineer, aiding in chemical process development, laboratory design, data center design, document archive design, construction management, and relocations.

Bill joined KnowVera in November 2006, prior to the actual founding of the company. Initially, Bill worked with the founding partners in improving the charting product, which eventually evolved into KnowVera Research, and the signaling engine, which eventually became KnowVera Designer and KnowVera Trader.

Bill currently works with the development team in writing requirements for new features, as well as testing new versions of KnowVera software. He was part of the team that developed the KnowVera Score and the various signals that are featured in the KnowVera Research platform. Bill also works with the trading team in developing and testing strategies and risk management models.

Bill Marino
Product Manager

Bill graduated from Columbia University with a Bachelor of Science degree in Chemical Engineering.

KnowVera Quant Designer and Trader

Moving Beyond Traditional Quantitative Technical Strategy Design and Implementation

The KnowVera team takes a consultative approach to Designing quantitative strategies for our clients trading needs.

Building a quantitative trading strategy can be a costly, laborious, and time consuming effort. It requires technology and developers to take an idea from white board to coding. If the results do not meet expectations the process must be repeated.

KnowVera Quant Designer is a patented predictive visual analytics software tool that helps Money Managers identify and respond to pricing trends faster and more efficiently. It eliminates the need for high cost technology and teams of developers. Going from conceptual ideas on the white board to full strategy design and testing can generally be achieved within 24 hours. The visual pallet within the Designer is your virtual white board. With a library of over 250 functions to choose from you can rapidly build strategies using mathematical functions, technical Indicators, Candle Stick patterns and filters by simply connecting panels. The system allows you to confirm visually what you are building and where the signals are before your first back test has been executed. Modifying a strategy and re-back testing is done in minutes not hours or days.

KnowVera Quant Trader is an execution management system that runs strategies created in Designer against live data, generating real time trading signals. Signals can be executed grey or black box, and orders are sent via FIX to <u>Interactive Brokers</u>. The resulting positions are monitored in a Performance window.

The Power of KnowVera

KnowVera Quant Designer differs from an operational order management system or execution management system in that it provides it's user with an automated method to create and use trading strategies based on technical indicators and formation functions in combination with real time pricing and charting data. The system generates trade alerts when the technical indicators underlying the technical trading strategy signal opportunistic trades. The application:

• Over 250 technical indicators, mathematical functions, formation functions, comparative functions and statistical functions

• The tools to visually and rapidly create technical trading strategies

• Trade signals based on alerts generated using visual integrated building block technology

• Integrates charts and graphs for detailed information about an alert condition

• Facilitates the use of automated user controlled exit strategies to help reduce risk

• A back testing engine to test the historical results of a technical trading strategy

You Have an Idea We can Implement it

Designer's innovative technology allows us to rapidly customize strategies to meet our client's trading needs.

You Have an Idea We can Implement it
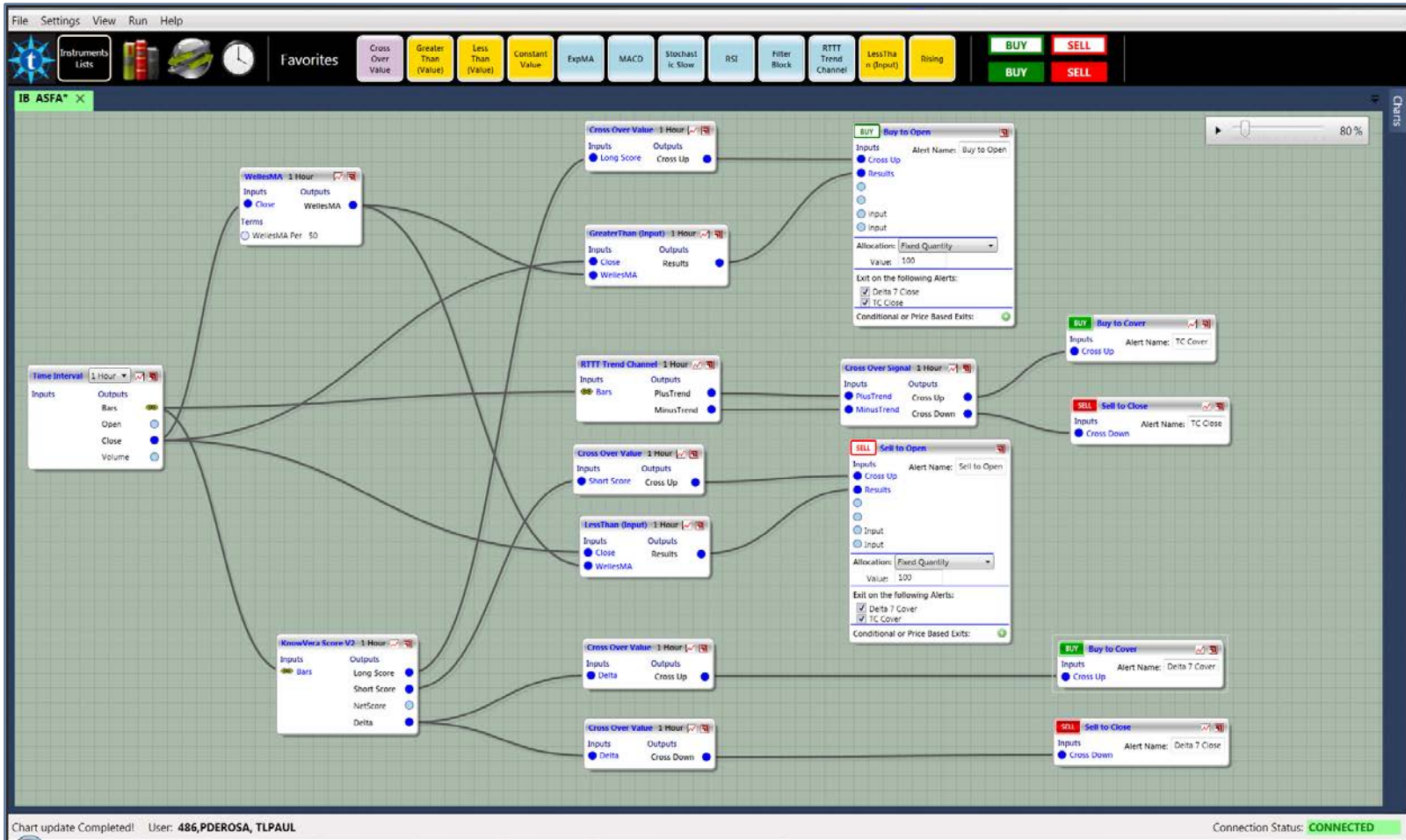
From the most basic to advanced strategies, our patented visual design software makes the development of strategies as simple as the click of a mouse. The time to design and implement a quantitative technical strategy is significantly reduced.

.

The ability to optimize the performance of your strategy by adjusting the exit rules with conditions or Priced Based exits further guide the trader in managing the risks implicit in trading.

Allocation Rules

- Fixed Capital
- Percentage of Available Funds
- Percentage of Initial Funds
- Fixed Quantity
- Fixed Ratio
- Percentage of Account Value

Condition or Priced Based Exit

- Price % Trailing Stop w/ Tightened Hard Stop
- Exit on Instrument Price % Change
- Exit on Instrument Price Change
- Exit on Position P&L % Change
- Exit on Position P&L $ Change
- Price % Trailing Stop w/ Tightened Trailing Stop
- Stop After number of bars
- Price $ value Trailing Stop w/ Tightened Trailing Stop
- Price Target w/Trailing Stop

Quantitative Report Details

Test Summary
- Test Parameters
- Strategy Definition

Strategy Performance Analysis
- Hypothetical Performance Summary
- Performance Ratios
- Comparative Benchmark Index Performance
- Equity Curve
- Equity Curve (Long Trades Only)
- Equity Curve (Short Trades Only)

Trading Analysis
- Trades
- Trading Statistics
- Outliers
- Winning Trades
- Losing Trades

Hypothetical Performance Summary

Hypothetical Performance Summary

	All Trades	Long Trades	Short Trades
Gross Profit	$861,250.00	$831,250.00	$30,000.00
Net Profit	$861,250.00	$831,250.00	$30,000.00
Highest Account Balance	$2,023,750.00	$1,910,000.00	$1,556,250.00
Lowest Account Balance	$805,000.00	$862,500.00	$870,000.00
Last Account Balance	$1,861,250.00	$1,831,250.00	$1,030,000.00
Lowest Available Cash	$733,750.00	$766,250.00	$798,750.00
Minimum Account Size Required	$266,250.00	$233,750.00	$201,250.00
Percent Return On Minimum Account Size	323.47%	355.61%	14.91%
Percent Return On Initial Capital	86.13%	83.13%	3.00%
Maximum Drawdown	$552,500.00	$248,750.00	$613,750.00
Maximum Percent Drawdown (On Minimum Account Size)	74.67%	66.38%	81.02%
Maximum Percent Drawdown (On Initial Capital)	27.30%	20.93%	39.44%
Peak To Valley Percent Drawdown	27.30%	4.12%	39.44%
Profit Factor	$1.25	$1.51	$1.02
Maximum Shares Held	100	100	100
Number Of Trades	158	80	78
Total Units traded	31,600	16,000	15,600

Hypothetical Performance Analysis

The Hypothetical Performance Analysis is a detailed performance report that is generated when a backtest is completed. This report displays profits or losses for a specific time period so traders can quickly assess how a strategy is performing and objectively analyze a strategy's strengths and weaknesses.

Quantitative Report Details
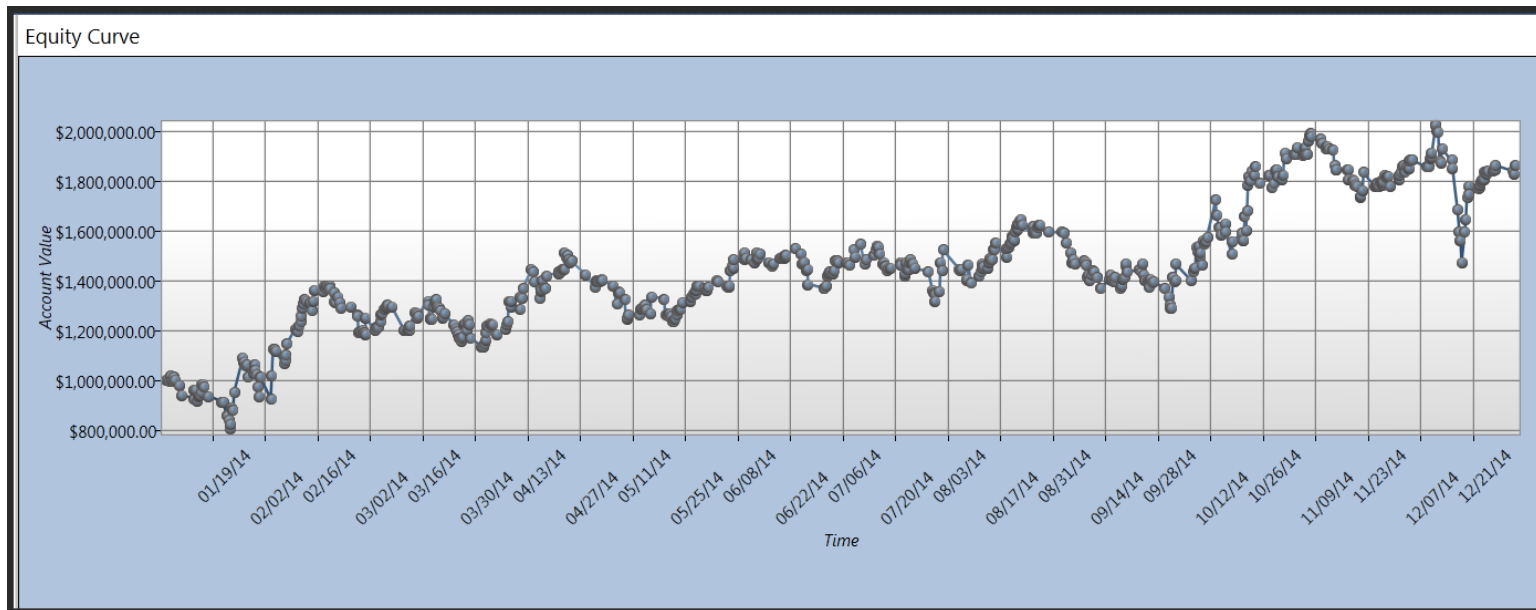
Quantitative Report Details
The Quantitative Report generates a more detailed strategy analysis when a backtest is run. You get an additional set of metrics including performance ratios and detailed equity curves, which are displayed in graphical form.

KnowVera Quant Trader

KnowVera is a fully integrated system, what you see in KQ Trader results from the strategies you create in KQ Designer.

Mathematical Operations

Absolute Value	Lookback Period
Add	Max
Between	Min
Constant Value	Mod
Divide	Multiply
Equal (Input)	Not
Equal To (Value)	Not Equal (Input)
Falling	Power
Greater Than (Value)	Rising
Greater Than (Input)	Root
Greater Than or Equal (Input)	Running Total
If – Then – Else	Math operation
Increment	Scale
Less Than (Value)	Slope
Less Than (Input)	Subtract
Less Than or Equal (Input)	Variable Lookback

Formation Functions

- Ascend / Descend
- Change Lookback
- Cross Formation (Signal)
- Cross Formation (Value)
- Dynamic Pivot High Count
- Dynamic Pivot Low Count
- Dynamic Register
- Highest Value
- Highest Value w/ Mark
- Lowest Value
- Lowest Value w/ Mark
- Pivot high
- Pivot high Lookback
- Pivot low
- Pivot Low Lookback
- Rising Falling
- Turn Formation
- Y Plot

Candlesticks Patterns

Abandoned Baby Bottom
Abandoned Bay Top
Advance Block
Belt Hold Line Bear
Belt Hold Line Bull
Breakaway Bear
Breakaway Bull
Counter Attack Bear
Counter Attack Bull
Dark Cloud Cover
Deliberation Bear
Deliberation Bull
Dragonfly Doji Bear
Dragonfly Doji Bull
Dragonfly Doji
Engulfing Line Bear
Engulfing Line Bull
Evening Dojo Star
Evening Star
Falling 3 Method
Gravestone Doji
Hammer
Hanging Man

Harami Black
Harami Cross Black
Harami Cross White
Harami White
High Wave
In Neck Line Bear
In Neck Line Bull
Inverted Hammer
Ladder Bottom
Long Legged Doji
Mat Hold Pattern
Meeting Lines Bear
Meeting Lines Bull
Morning Doji Star
Morning Star
On Neck
Piercing Line
Rising 3 Method
Separating Line Bear
Separating Line Bull
Shooting Star
Side By Side White Gap Down
Side By side White Gap Up

Stalled Bear Pattern
Stalled Bull Pattern
Tasuki Downside Gap
Tasuki Upside Gap
Three Black Crows
Three Gaps Down
Three Gaps Up
Three Line Strike Bear
Three Line Strike Bull
Three Outside Down
Three Outside Up
Three Stars In The South
Three White Soldiers
Thrusting Bear Line
Thrusting Bull Line
Tri Star Bear
Tri Star Bull
Tweezer Bottoms
Tweezer Tops
Upside Gap 2 Crows

Technical Indicators

Accumulation / Distribution Line	Moving Average Convergence / Divergence	Relative Momentum Index
Accumulative Swing Index	Mass Index	Relative Strength Index
Accumulate or Running Total	MESA Sinewave	Relative Volatility Index
Average Directional Movement Index	Market Facilitation Index	Random Walk Index
Average Directional Movement Rating	Momentum	Stochastic Momentum Index
Ease of Movement	Money Flow Index	General Stochastic Calculation
Aroon	Moving Summation	Stochastic Oscillator, Fast
Aroon Oscillator	Net momentum Oscillator	Stochastic Oscillator, Slow
Average True Range	Negative Volume Index	Stochastic RSI
Average price	On balance Volume	Super Trend
Bollinger Band Width	On Balance Volume, Expanding system	Swing index
Commodity Channel Index	On Balance Volume, Moving	True Range
Chicago Floor Trading Pivotal Point	Oscillator	Trend Score
Chaikin Money Flow	Oscillator (Percent)	TRIX
Chaikin Oscillator	Performance Indicator	True Strength Index
Chaikin Volatility	Polarized Fractal Efficiency	Ultimate Oscillator
Chande Momentum Oscillator	Point and Line Dot	Up Average
Connor RSI	Price Oscillator	Vertical Horizontal Filter
Commodity Selection Index	Price Oscillator, Percent	Data Series Volume
Demand Index	Projection Bandwidth	Weak counter Trend Indicator
Directional Indicators	Projection Oscillator	Welles Directional Movement Syst.
Dynamic Momentum Index	Positive Volume Index	Welles wilder Summation
Down Average	Percentage Volume Oscillator	Welles Wilder Volatility
Directional Movement Index	Price Volume Rank	Williams Accumulation / Distribution
Forecast Oscillator	Price and Volume Trend	Williams percent R
Intraday momentum Index	Qstick	Zig Zag
Inertia	Range Indicator	
Klinger Oscillator	Ratio	

Technical Indicators - Overlays

Bollinger Bands	Simple Moving average
Bollinger Bands (Value)	3 Plot Simple Moving Average
DEMA	T3
Envelope	TEMA
Envelope Percent	Triangular Moving Average
Exponential Moving Average	Typical Price
Hull Moving Average	Variable Moving Average
Ichimoku Kinko Hyo	VIDYA
Keltner Channel	Volume Adjusted Moving Average
Least Squares Moving Average	Weighted Close
Moving Average Envelope	Weighted Moving Average
Moving Averages of the high and Low	Welles Wilder Moving Average
Median Price	3 Plot Welles Wilder Moving Average
Price Channels	Welles Directional Movement Trend
Projection Bands	Zero Lag Exponential Moving Average
Parabolic Stop and Reverse	

Statistical Functions

Moving Correlation Coefficient
Moving Covariance
Moving Dispersion
Rate of Change
R-squared
Moving Standard Deviation
Standard Error Bands
Moving Standard Error

Filters

Day of Week
Filter Series
Static Bar Filter
Static Value Filter
Sustain
Time of Day
Time Range

KR Proprietary

Prevailing Sentiment – JASPEN
Relative Value – JARVA
KV Score
KV Score 2
Price Trend Channel
Volatility Wave

Safeguarding of your Strategy

NON-DISCLOSURE AGREEMENT

This Agreement is made by and between "Subscriber", and KnowVera LLC,

1. Definition of Confidentiality. As used in this Agreement, "Confidential Information" refers to any information which has commercial value and is either (i) technical information, including patent, copyright, trade secret, and other proprietary information, techniques, sketches, drawings, models, inventions, know-how, processes, apparatus, equipment, algorithms, software programs, software source documents, and formulae related to the current, future and proposed products and services of Company, or (ii) non-technical information relating to Company's products, including without limitation pricing, margins, merchandising plans and strategies, finances, financial and accounting data and information, suppliers, customers, customer lists, purchasing data, sales and marketing plans, future business plans and any other information which is proprietary and confidential to Company.

2. Nondisclosure and Nonuse Obligations. Recipient will maintain in confidence and will not disclose, disseminate or use any Confidential Information belonging to Company, whether or not in written form. Recipient agrees that Recipient shall treat all Confidential Information of Company with at least the same degree of care as Recipient accords its own confidential information. Recipient further represents that Recipient exercises at least reasonable care to protect its own confidential information. If Recipient is not an individual, Recipient agrees that Recipient shall disclose Confidential Information only to those of its employees who need to know such information, and certifies that such employees have previously signed a copy of this Agreement.

3. Survival. This Agreement shall govern all communications between the parties. Recipient understands that its obligation sunder Paragraph 2 ("Nondisclosure and Nonuse Obligations") shall survive the termination of any other relationship between the parties. Upon termination of any relationship between the parties, Recipient will promptly deliver to Company, without retaining any copies, all documents and other materials furnished to Recipient by Company.

4. Governing Law. This Agreement shall be governed in all respects by the laws of the United States of America and by the laws of the State of New York.

5. Injunctive Relief. A breach of any of the promises or agreements contained herein will result in irreparable and continuing damage to Company for which there will be no adequate remedy at law, and Company shall be entitled to injunctive relief and/or a decree for specific performance, and such other relief as may be proper (including monetary damages if appropriate).

6. Entire Agreement. This Agreement constitutes the entire agreement with respect to the Confidential Information disclosed herein and supersedes all prior or contemporaneous oral or written agreements concerning such Confidential Information. This Agreement may only be changed by mutual agreement of authorized representatives of the parties in writing.

Rackspace Client Network
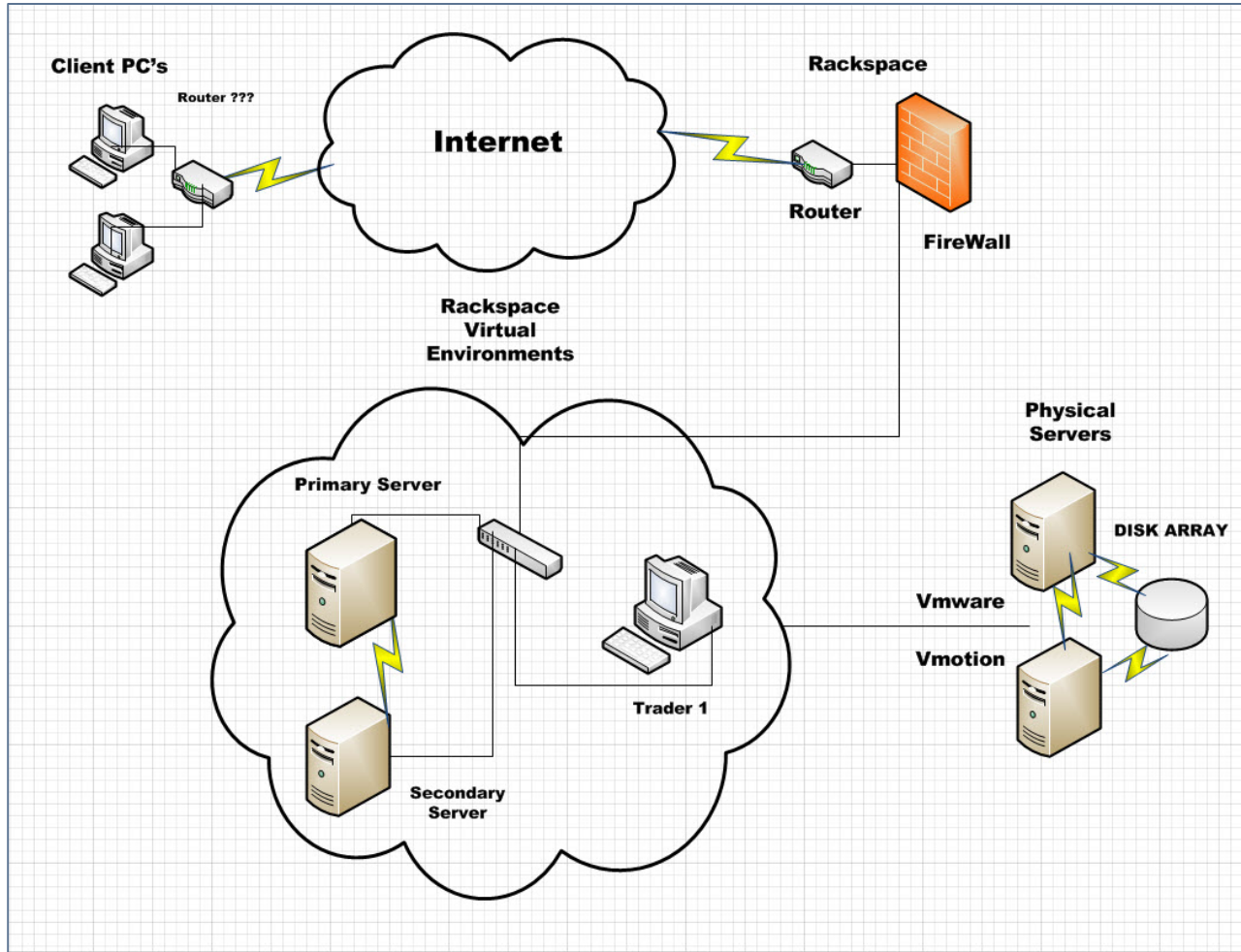
Paul De Rosa
Senior Client Relationship Manager
Paul.DeRosa@KnowVera.com
203.617.4048

Interactive Brokers has a complete turnkey solution for *Advisors* that provides trading, clearing, and reporting
capability for advisors of all sizes

IB Advisor accounts let Professional Registered Investment Advisors (RIAs) and Commodity Trading Advisors (CTAs) execute and allocate trades among multiple clients from a single order management interface.

Advisors Enjoy these Benefits

➢ Manage all your client accounts and trading from our comprehensive suite of tools.

➢ Automate multi-client trade allocations and portfolio rebalancing.

➢ Create professional, client-ready performance presentations with PortfolioAnalyst.

➢ White Brand statements, customer registration and other informational materials with your own organization's identity.

➢ Advisors can provide clients with the ability to directly fund, view statements and trade.

Key Features

➢ **Model Portfolios** – offer Advisors an efficient, organized approach to investing client assets. Simplify the tasks of managing and investing multiple client accounts by creating groupings of instruments based on specific investment themes

➢ **Allocation Features** – Professional Advisors can use Pre-Trade Allocations to allocate block trades with a single mouse click to multiple client accounts.

➢ **Stock Yield Enhancement** – extra yield on fully-paid stocks by allowing IB to borrow shares in exchange for cash collateral. IB will lend the shares to traders who want to sell short and are willing to pay a fee to borrow them. Each day that your stock is on loan, you will be paid a loan fee based on market rates.

➢ **Financing Tiers** – low cost and best execution - Rated Low Cost Broker for 9 years in a row by Barron's.

Risk Management

Our sophisticated [risk-assessment technology](#) helps you manage your risk in dynamic markets.

Risk Navigator℠
A real-time market-risk management platform provides a measure of risk exposure across multiple asset classes.

Credit Manager
Advanced risk management technology working behind the scenes to manage risk and enforce credit-related regulations.

Real Time Activity Monitor
lets you monitor every aspect of your account activity, including the values used in IB's margin calculations.

IB Money Manager Marketplace

IB's Money Manager Marketplace is the first electronic forum designed to connect Wealth Manager & Money Manager Advisors:

Where Advisors can focus on marketing and gathering customer assets while taking advantage of specific trading expertise of registered Money Managers

Strength and Security Facts about Interactive Brokers Group

- On a consolidated basis, Interactive Brokers Group (IBG) exceeds $4.8 billion in equity capital.

- IBG has reported solidly positive earnings for the past 18 consecutive years.

- IBG holds no material positions in over-the-counter securities or derivatives.

- IBG holds no CDOs, MBS or CDS.

- The gross amount of IBG's portfolio of debt securities, with the exception of U.S. government securities, is less than 10% of our equity capital.

- Interactive Brokers LLC is rated 'A-/A-2'; Outlook Stable by Standard & Poor's.

- Interactive Brokers LLC's Real-Time Margin system continuously enforces trading limits

Contact Information

William L. Katts

(203) 554-6709

wkatts@interactivebrokers.com

Interactive Brokers Corp.

8 Greenwich Office Park

Greenwich, CT 06831