

Charles River Trader

Multi-Asset Order and Execution Management

Consolidate Systems in a Single Platform

Charles River Investment Management Solution (Charles River IMS) provides order and execution management in a single user interface that gives traders complete market visibility. Users can monitor real-time data and create, place and execute orders.

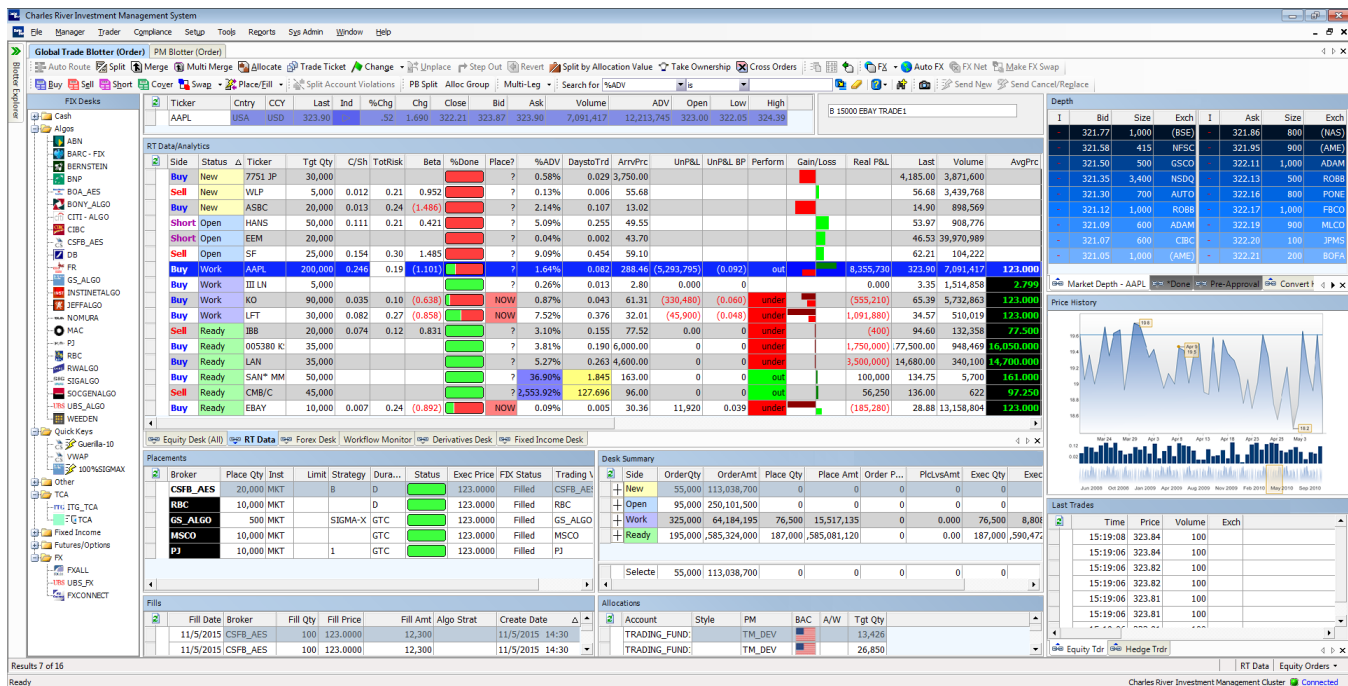
Charles River IMS is integrated with more than 150 trade and liquidity providers and 550 global Charles River FIX Network brokers. Interfaces with more than 60 algorithmic brokers offer direct access to over 600 global and regional trading strategies.

Key capabilities include:

- Manage single stock and list/portfolio execution strategies
- Monitor real-time market, order, and analytic data, including order P&L
- Quickly organize orders based on multiple criteria, with spreadsheet-like filtering, grouping and sorting
- Monitor compliance throughout the entire order lifecycle
- Easily add new brokers, strategies, and placement templates
- Synchronize all multi-monitor displays to active order

Multi-Asset Class Support

- Equities
- Fixed Income
- Rate and Credit Derivatives
- Foreign Exchange
- Options
- Commodities
- Futures



Traders can customize multiple blotter displays to show all necessary trade information on one or more monitors – real-time Level I and Level II pricing, pre-trade TCA, order benchmarking, time and sales, and watch lists – saving keystrokes and enabling faster order execution.

Screenshots are for informative purposes only; no live data being used.

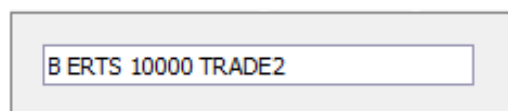
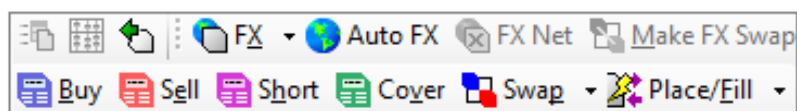
Seamless Interoperability

Charles River IMS provides a real-time dashboard for managing daily trading operations, workflows and execution. Dynamic blotter columns visually show real-time data changes – execution status, order status and gain/loss – via color and magnitude displays. Within the blotter, traders can manually or automatically import orders using spreadsheets or files. The system can be integrated easily with external applications using Extensible Markup Language (XML) files, application programming interfaces (APIs), or Web services.

Advanced FIX auto-routing evaluates order characteristics, real-time market data, and pre-trade TCA calculations, enabling routing of orders to preferred destinations.

Tight integration with Charles River Compliance allows traders to monitor compliance throughout the trade lifecycle, including pre-trade. Users can reduce errors and risk by identifying potential issues before a trade is executed.

Charles River IMS supports multi-monitor set-ups for custom desktop layouts and blotter profiles, based on individual needs and preferences. This allows a variety of custom views to be configured, such as single stock vs. portfolio trade, domestic vs. international, and groupings by asset type, with integrated and linked market data. Traders can easily create and manage programs, and drag and drop to move orders between programs. Orders can be easily split, cancelled, replaced, or cloned directly in the blotter.



Customizable toolbars and quick entry capability speed order creation.

Global Connectivity

The Charles River Network delivers fast and reliable direct access between buy-side clients and sell-side brokers. It supports global electronic trading via FIX, provides access to over 600 global liquidity venues and enables broker-neutral, low-latency connectivity to all major trading destinations worldwide.

Traders can quickly send orders directly from the blotter to multi-broker trading venues, crossing networks, broker algorithms, program desks, alternative trading systems, dark pools, and smart routers. Connections are fully tested and monitored by dedicated Charles River Network operations teams.

Charles River offers clients complete FIX software administration, connectivity management and support for each sell-side broker and trading destination. These services eliminate the need for client FIX network administration and increase network reliability through continuous monitoring and ongoing testing and certification.

OEMS Capabilities

- Direct Brokerage
- Trader Routing
- Auto FX
- Commission Rules
- Fee Defaults
- Reporting

FIX Network Highlights

- Reliable, redundant point-to-point connectivity
- Access brokers, ECNs, ATs, fixed income and FX venues
- Monitor Indications of Interest (IOIs), fills, real-time pricing, trade and end-to-end connectivity status
- Connect via dedicated telecommunications infrastructure or Virtual Private Network (VPN)
- Minimize setup and firewall maintenance with network option combining simplicity of a hub with flexibility of point-to-point

OEMS Capabilities

Real-Time Market Data

- Interface seamlessly with all major data providers
- Capture/snap real-time prices across order lifecycle
- Create or import watch lists for any set of securities
- Monitor interactive Level I and Level II (depth of market) data directly within the blotter
- View time and sales data for recent volume by venue and price level
- Create custom charts; access charts via navigations to third-party terminals or embedded components
- Receive news for securities/portfolios to identify market events/trends

Pre- and Post-Trade Transaction Cost Analysis (TCA)

- Access data and value-added tools from over a dozen 3rd-party pre- and post-trade TCA providers
- Retrieve pre-trade TCA data for analysis and routing directly in the blotter
- Access third-party applications and web pages for context-sensitive drilldown and analysis
- Leverage web-based TCA screens for current orders
- Assess potential trade risk and impact in real-time
- Eliminate need to manage multiple systems or re-key critical data

Program Trading

- Create, trade, monitor and update programs directly in the blotter
- Customize program reporting and monitoring of execution progress for quick adjustments
- Act on an entire program as easily as a single order
- Perform one-click execution via placement templates

Algorithmic Trading

Charles River Broker Packs allow users to access new liquidity destinations or deploy customized sell-side algorithms. A Broker Pack can be imported in one step – without any system upgrades or software changes – for quick trading using the latest strategies.

Direct Market Access (DMA)

- Route orders directly to the market via DMA brokers
- View real-time time and sales data

Equity Trade Analytics

- Manage orders based on country, level of liquidity and estimated cost impact
- View and evaluate orders before placement
- Execute/manage complex orders while automatically routing simpler orders
- Monitor intra-day implementation shortfall in real-time via gain/loss indicators and program slippage screens

Derivatives

- Supports listed and OTC derivatives
- Integrates with MarkitSERV, DTCC and Bloomberg VCON
- Drag-and-drop order submission to Tradeweb and Bloomberg SEFs
- Leverage embedded swap valuation and analytics

EMS Capabilities

- Algorithmic Trading
- Real-Time Data
- Integrated Watch Lists
- Interactive Level I, Level II Display
- Price Snapping
- Integrated News
- Integrated Pre- and Post-Trade TCA
- Program Trading
- Real-Time Implementation Shortfall
- Trade Analytics
- Direct Market Access (DMA)
- Automated Order Routing
- Short Locate

OEMS Capabilities cont.

FX

- Leverage currency pair-based internal crossing/netting
- Access pre-configured trading calendar
- Integrates with FX execution venues (FXall, FX Connect, 360T)
- Cover cross-border trading with Auto FX facility
- Easily manage FX forward rolls
- Supports FX algo trading

Automated Order Routing

- Evaluate order characteristics, market conditions and/or pre-trade TCA information to help automate workflows
- Leverage a multi-broker DMA console to route/modify orders and view positions within the order book via a single click
- Manually work the order or directly route it to the market via a specific broker venue and/or broker algorithm
- Ensure consistent order routing and automatically route low-alpha opportunities via FIX-based electronic trading

Integrated Post-Trade Matching and Settlement

- Provides consistent view of the trade, from execution to settlement
- Allows fully automated post-trade processing with ability to route exceptions for review
- Helps ensure central or local matching via rules-based functionality

Extensive Configurability

- Configure preferred execution paths, automated smart routing logic and criteria
- Enable IOIs, dark pools and integration with block trading and crossing systems
- Integrate user-defined business logic directly into the blotter and final allocation process
- Automatically track directed brokerage, commissions and fees

Streamlined Execution

- Access markets quickly and eliminate keystrokes with drag-and-drop shortcuts and bump buttons
- Enable one-click execution via configurable broker bar
- Leverage auto-routing rules



A State Street Company

CHARLES RIVER DEVELOPMENT, A STATE STREET COMPANY

Charles River enables sound and efficient investing across all asset classes. Investment firms in more than 40 countries use Charles River IMS to manage more than US\$25 Trillion in assets in the institutional investment, wealth management and hedge fund industries. Our Software as a Service-based solution (SaaS) is designed to automate and simplify investment management on a single platform - from portfolio management and risk analytics through trading and post-trade settlement, with integrated compliance and managed data throughout. Headquartered in Burlington, Massachusetts, we support clients globally with more than 750 employees in 11 regional offices. CRD.COM

Charles River Development - A State Street Company is wholly owned business of State Street Corporation (incorporated in Massachusetts).

This document and information herein (together, the "Content") is subject to change without notice based on market and other conditions and may not reflect the views of State Street Corporation and its subsidiaries and affiliates ("State Street"). The Content is provided only for general informational, illustrative, and/or marketing purposes, or in connection with exploratory conversations; it does not take into account any client or prospect's particular investment or other financial objectives or strategies, nor any client's legal, regulatory, tax or accounting status, nor does it purport to be comprehensive or intended to replace the exercise of a client or prospect's own careful independent review regarding any corresponding investment or other financial decision. The Content does not constitute investment research or legal, regulatory, investment, tax or accounting advice and is not an offer or solicitation to buy or sell securities or any other product, nor is it intended to constitute any binding contractual arrangement or commitment by State Street of any kind. The Content provided was prepared and obtained from sources believed to be reliable at the time of preparation, however it is provided "as-is" and State Street makes no guarantee, representation, or warranty of any kind including, without limitation, as to its accuracy, suitability, timeliness, merchantability, fitness for a particular purpose, non-infringement of third-party rights, or otherwise. State Street disclaims all liability, whether arising in contract, tort or otherwise, for any claims, losses, liabilities, damages (including direct, indirect, special or consequential), expenses or costs arising from or connected with the Content. The Content is not intended for retail clients or for distribution to, and may not be relied upon by, any person or entity in any jurisdiction or country where such distribution or use would be contrary to applicable law or regulation. The Content provided may contain certain statements that could be deemed forward-looking statements; any such statements or forecasted information are not guarantees or reliable indicators for future performance and actual results or developments may differ materially from those depicted or projected. Past performance is no guarantee of future results. No permission is granted to reprint, sell, copy, distribute, or modify the Content in any form or by any means without the prior written consent of State Street.

The offer or sale of any of these products and services in your jurisdiction is subject to the receipt by State Street of such internal and external approvals as it deems necessary in its sole discretion. Please contact your sales representative for further information.

©2018 STATE STREET CORPORATION

2274912.1.1.GBL