Since 1984
Charles River has distilled the best practices from a diverse, global client base and incorporated them into the Charles River Investment Management Solution (Charles River IMS). With a long term view and singular focus on the front and middle office, Charles River has helped large and small firms achieve:

- Better Investment decisions
- One organization-wide view of investments
- Accurate, actionable data throughout the investment process
- Reduced costs

Today
More than 350 investment firms in over 44 countries rely on Charles River to:

- Improve trade execution
- Monitor & reduce risk
- Simplify & streamline operations

Tomorrow
In an environment of ever-changing market, competitive and regulatory pressures, Charles River continues to invest heavily in R&D to help clients:

- Grow and retain assets through continuous innovation
- Diversify and expand products and geographic coverage
- Keep up with regulatory requirements
Charles River Investment Management Solution

Charles River IMS automates front and middle office investment management functions for buy-side firms in the institutional asset and fund management, private wealth, alternative investments, insurance, banking and pension markets. Charles River helps clients optimize operations, reduce risk, and improve reliability and consistency with:

**End-to-End Investment Lifecycle Support**
Charles River IMS supports the entire investment lifecycle on one platform, from decision support activities through trading and post-trade settlement, with the broadest available asset class support and integrated compliance and risk management throughout. Built-in Investment Book of Record (IBOR) capabilities further improve efficiency and accuracy by removing dependence on back-office data feeds. Charles River’s Enterprise Data Management (EDM) facilities help firms improve the accuracy, consistency and completeness of their reference, analytics, pricing, and benchmark data.

**Delivered as a Service**
Charles River IMS is delivered as a hosted service, with integrated data and end user support, which enables clients to access the latest functionality faster, improve data quality, and streamline operations. This simplified Software as a Service (SaaS) operating model helps clients make better investment management decisions and respond more quickly/effectively to business, investor and regulatory demands. This increases end user satisfaction, ensures more predictable costs, and helps mitigate operational risk. The SaaS-based offering includes seamless upgrades and 24/7, follow-the-sun support provided by Charles River’s in-house support staff. Most importantly, Charles River provides the proper foundation for the investment process by providing, validating and managing all necessary data.

**One Platform for Multiple Business Lines**
Charles River IMS combines best of breed components in a platform that meets the diverse and demanding requirements of institutional asset and fund managers, banks, wealth managers, alternative investment managers and hedge funds, pensions and insurers. Best practice workflows help improve investment productivity, and a high degree of scalability, configurability and openness enables clients to consolidate the management of multiple business lines. Only Charles River IMS supports the full spectrum of financial product offerings, from basic asset class specific products to solution oriented and complex multi-asset products.

**Anytime, Anywhere Access**
Charles River provides several end user deployment options, and easily scales to support thousands of users. In addition to desktop deployment, a fully-configurable, browser-based dashboard allows financial advisors to quickly personalize information for managing complex accounts and client relationships. Charles River’s mobile app meets the growing demand for remote access by giving users a “big picture” view into Charles River IMS when away from the office via iPad and Android devices. Financial advisors and other client-facing users can make in-person meetings more interactive by using tablets as graphical reporting and presentation tools.

**Key Advantages**
- Reduce risk, cost and complexity
- Increase end user productivity & satisfaction
- Streamline front- and middle-office workflows
- Simplify infrastructure & management
- Launch new products faster

Charles River offers easy remote access via web browsers and mobile devices, with desktop deployment for sophisticated workflows and actions.
Market Segments

Institutional Asset & Fund Management
By consolidating separate products in an enterprise solution, firms are able to automate processes, streamline workflows and reduce the points of integration that contribute to inefficiencies and errors:

- **Improve decision support** by centralizing all portfolio analysis and construction activity
- **Ensure efficient risk management** with automated compliance checking throughout the investment lifecycle
- **Increase trader productivity** with a single order and execution management system
- **Reduce technology costs** and simplify management by leveraging Charles River’s infrastructure and application management expertise
- **Speed introduction of new products** with built-in support for all asset classes, including mutual funds, ETFs, futures, options, fixed income
- **Ensure tax-efficient portfolios** and tax optimization across households
- **Support region-specific frameworks** and products, such as SMA, UMA, UMH, Rep as Manager, and Mutual Fund Wraps
- **Maintain a holistic view** of family assets, including household-, and multi-generation-oriented views
- **Improve throughput** by rebalancing high volumes of separately managed, unified and household accounts
- **Effectively implement investment strategies** using characteristic-based allocation models and custom benchmark portfolios
- **Enrich client presentations** with graphical reports on mobile devices

Wealth Management
Charles River IMS brings institutional capabilities that support discretionary and non-discretionary private wealth product lines, enhance client interactions, and efficiently manage large volumes of accounts and trades:

- **Speed introduction of new products** with built-in support for all asset classes, including mutual funds, ETFs, futures, options, fixed income
- **Ensure tax-efficient portfolios** and tax optimization across households
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Alternative Investment Management & Hedge Funds
Charles River’s enterprise solution meets the requirements of both large and small organizations, enabling alternative investment managers to:

- **Create and manage multiple strategies and sub-strategies** with institutional capabilities across all asset classes, including derivatives & FX
- **Minimize ramp-up time** with out-of-the-box templates for quick set-up and flexible configuration of user interfaces and workflows
- **Support active management styles that add alpha**, with strong decision support and execution capabilities, including a global view of investment performance and risk, and the ability to monitor P&L in real time
- **Alleviate staffing and infrastructure pressures** with a turnkey solution that simplifies day-to-day operations and scales with business needs
- **Streamline regulatory obligations** such as global shareholder disclosure (GSD) reporting with automated compliance checking and built-in libraries

Grow & retain assets
Diversify products
Expand geographies
Keep up with regulatory requirements
Simplify systems & operations
Reduce risk & cost
A Simplified Operating Model

SaaS-based deployment provides clients with significantly faster access to new capabilities and ensures the necessary data for Charles River IMS. Clients can leverage the economy of scale in Charles River’s global support teams and the expertise that comes from supporting a diverse client base. Having a single point of contact for software, hardware, data and connectivity saves time and improves accountability.

Key Advantages
- Improve data accuracy
- Access the latest software
- Improve day-to-day operations
- Minimize staff requirements and training
- Lower technology costs
- Reduce operational risk
- Increase user satisfaction

Data Services & Support
Investment management systems consume enormous quantities of data, and ensuring consistent data quality is one of the biggest challenges for most firms. Properly mapping, feeding and managing ever-growing data volumes across instrument types is an industry-wide problem that is compounded by frequent changes and quality issues with data providers. Charles River alleviates data problems by providing an all-inclusive data solution incorporating:

- A managed Charles River Data Service using best of breed providers, that maps and enriches reference and real-time data, and supports new security setup
- Certified Bloomberg interfaces that work out-of-the-box and are continuously maintained and managed by Charles River
- Built-in Investment Book of Record (IBOR) to ensure an accurate view of positions and cash throughout the trading day
- Additional providers based on asset class with standardized integration and support (e.g., FinCAD analytics, The Yield Book real-time mortgage analytics)
- Enterprise Data Management (EDM) facilities to manage, monitor and promote golden copy data within Charles River IMS and to other systems

Charles River helps reduce data costs, technical issues and administrative headaches by managing the entire data process for clients, aggregating all necessary data and incorporating it directly into the Charles River IMS across nearly a thousand data fields. Charles River coordinates with data vendors to manage interfaces, handle changes in data feeds, adapt to new data requirements, and ensure smooth software upgrades.

Private Cloud-Based Delivery
Charles River keeps software current by managing regular upgrades and ensuring optimal application performance and reliability. Application specialists manage Charles River IMS according to best practices, and provide application and integration expertise that is difficult for firms to build and maintain in-house.

Compliance Advisory Services
Charles River’s compliance services team provides a level of knowledge and depth of skills difficult to maintain with in-house staff alone. Compliance Advisory Services acts as an extension of the client’s compliance organization to ensure that their compliance rules and workflows are efficient, follow accepted best practices and align with client mandates and regulatory requirements.

FIX Connectivity
Charles River’s broker-neutral financial network supports global electronic trading via FIX with access to over 600 global liquidity venues. Full integration facilitates direct access between buy-side clients, sell-side brokers and trading venues to simplify operations and improve trading reliability. Charles River provides complete FIX administration, connectivity management and support for each sell-side broker and trading destination, eliminating the need for customer involvement and increasing service levels through continuous testing, certification and monitoring of sell-side end points.
Portfolio Management

Charles River IMS provides extensive decision support for fixed income, equity, FX and derivatives on one platform with integrated data. Excel-like data visualization and aggregation capabilities and best practice workflows provide portfolio managers with a readily familiar tool that is easy to use and frees them from dependency on individual spreadsheets. Integrated performance measurement and risk management provide real time visibility into performance and risk exposure. Scenario analysis and advanced analytical capabilities help portfolio managers understand investment risks.

Fixed Income

Charles River IMS provides portfolio analysis tools and analytics for standard and emerging corporate bond markets, a comprehensive set of government bond types from more than 50 countries, plus fixed income derivatives, including interest rate and credit default swaps, forwards, futures and options. Fixed income views can group portfolios by multiple classifications, including sectors, ratings, issuers and duration bands, with flexible drill-down, enabling portfolio managers to:

- Evaluate portfolio strategies by conducting benchmark comparisons and dispersion analysis
- Understand and manage risk leveraging Charles River’s powerful built-in analytics tools and third-party sources for exposure management, sensitivities, risk analytics, stress testing, ex-post risk, Value-at-Risk (VaR) and ex-ante risk
- Ascertain portfolio-level impact before generating orders by proposing on either a “what if” or “generic” basis

Key Capabilities
- Portfolio Construction
- Asset Allocation & Rebalancing
- Performance Measurement & Attribution
- Scenario Analysis
- Ex-Ante Risk
- Ex-Post Risk
- Value-at-Risk (VaR)

With Charles River’s single workspace, portfolio managers can easily view their accounts, drill down to holdings, and display multiple concurrent views of the same accounts.
**Equity**

Charles River’s portfolio analysis tools support equities and equity derivatives, including futures, options, and total return swaps. Portfolio managers can create and implement both active and passive investment strategies using asset allocation and security selection tools, to help optimize workflows for one or many portfolios using customizable views to:

- **Efficiently manage holdings** by targeting on country, region, currency, industry/sector, and market capitalization roll-ups
- **Fulfill organizational and fund mandates** by rebalancing portfolios or utilizing cash invest/divest capabilities to align positions with their respective model or index
- **Determine risk impact** of potential orders by conducting hypothetical “what-if” analysis
- **Optimize operations** by automatically factoring client-specific restrictions into all order generation activities

**Foreign Exchange**

Full multi-currency support allows portfolio managers to view any portfolio in any currency, using real-time FX rates, enabling them to:

- **Effectively manage and hedge currency risk** with currency overlay
- **Quickly assess FX/hedging needs** with currency-based settlement day forecasting and flexible viewing options (by asset currency, currency clusters, across portfolios, etc.)
- **Fine-tune currency exposure** by consolidating/rolling forward positions

**Advanced Capabilities**

- Strategy/Model Management
- Currency Overlay Management & Hedging
- Instrument Exposure Look-Through
- Investment Book of Record

Flexible tools enable portfolio managers to classify their holdings and implement investment decisions for one or many portfolios, align positions with benchmarks or models, and monitor the status of orders across the trading desk.

Comprehensive multi-currency and FX support help portfolio managers manage currency exposure across multinational portfolios.
Performance Measurement & Attribution

Charles River IMS enriches the portfolio management process with up-to-date performance measurement and attribution analysis (PMA) and facilitates GIPS compliance, without the need to integrate a standalone PMA system. Users can directly access all return, contribution, attribution and risk data for each portfolio, for a variety of timeframes and user-defined classification levels. Charles River reference and pricing data reduces operational complexity and helps ensure a consistent view of performance and attribution across the firm. Users can also perform backward-looking performance analyses for any historical time period or account using multiple search criteria.

- **Eliminate standalone systems** with fixed income and equity performance and attribution on a consolidated platform
- **Provide context for decision making** by bringing results directly into portfolio management workspace or reports
- **Streamline workflows** with “look-through” calculation down to the individual security level and dynamic recalculation of results when methodologies and classifications are changed on the fly
- **Reflect investment objectives and/or strategies** using custom blended benchmarks
- **Automatically reconcile performance contribution, attribution and ex-post risk data** by eliminating multiple data feeds from disparate systems
- **Reduce “noise” and inaccuracies** by easily restating performance data (price changes, corporate actions, etc.)
- **Automate GIPS support** with rules to maintain GIPS composite memberships; standard reports include firm and composite disclosures

Performance reports provide detailed breakdowns of performance figures and summarize results in bar or trend charts that can be viewed from Charles River IMS or a web browser.
Integrated risk management and scenario analysis functions enable firms to meet client and regulatory demands for greater transparency and stricter guidelines throughout the investment management lifecycle. Charles River IMS provides portfolio managers, risk managers and compliance officers with curve-based analytic measures, ex-post and ex-ante risk metrics, accessible directly from portfolio management workflows and reports.

More informed decision making - view key rate durations and sensitivities to other analytical factors for the entire portfolio and benchmark, calculated natively

Framework for stress-testing portfolios - specify interest rate and credit scenarios; then view effects on the portfolio and benchmark for portfolio fair value, yield, duration and other analytics

Increased visibility and availability of ex-post and ex-ante risk metrics - report risk contribution and attribution for tracking error, volatility, variance, information ratio, beta; summary risk measures include Jensen’s alpha, Sharpe ratio, Treynor ratio, Sortino ratio, downside risk and others; calculate Value-at-Risk (VaR) using historical simulation, as well as ex-ante volatility and tracking error (TE) using Charles River’s statistical factor model or a third party factor model

Centralized risk management - seamless integration with Charles River’s compliance functions automates risk monitoring across the enterprise

With Charles River IMS, risk measurement and management become an integral part of daily portfolio management activities, using the same data and metrics as compliance managers and risk analysts.

Flexible scenario definitions help investment managers analyze the full spectrum of conditions and stress events as defined by regulators or anticipated by portfolio managers.
Trading & Execution

With Charles River’s combined order and execution management system (OEMS), traders can work more productively by creating, placing and executing orders in one trading blotter. From one screen, traders can manage trade execution strategies, streamline complex workflows into “one-click” execution, act on an entire program as if acting on a single order, and monitor market data and active orders. Full integration with portfolio management functions enables better communication between traders and managers. Interfaces with sell-side and execution venues support cross-asset class coverage.

Charles River’s trading blotter offers numerous advantages over discrete order and execution systems. Traders can work more efficiently by eliminating multiple interfaces, fragmented workflows and order staging problems inherent in utilizing separate order and execution platforms. Traders no longer have to switch between systems or re-key critical information, which saves time and reduces errors. Benefits beyond the trading desk include improved compliance and auditing, reduced operational risk, and simpler infrastructure.

Fixed Income

Charles River IMS improves trader decision making with quick and efficient workflows and built-in quote management. Traders can find liquidity and negotiate with counterparties, monitor the market, and execute both cash and derivative trades, with:

- **Comprehensive asset support** including government, investment grade, high yield, municipal, structured, inflation-linked, emerging market debt, TBA, and listed and OTC derivatives
- **Accurate and up-to-date security information**, including benchmarks and curves, with tight integration to fixed income market data providers
- **Integration with leading fixed income ECNs**, allowing traders to stage orders to TradeWeb, MarketAxess, BondVision and Bloomberg, and receive completed trade details after execution
- **Advanced trading capabilities** including generic order handling, multiple-quote support, streamlined booking of complex swaps, trading on price, yield, spread, swap rate and deal spread

Charles River’s configurable trading blotter automates manual processes with integrated quoting and built-in access to trading platforms.

Key Capabilities

- Order & Execution Management (OEMS)
- Data Charting & Visualization
- Trading Analytics & Transaction Cost Analysis (TCA)
- Broker & Commission Management
**Equity**

Today’s equity trader requires quick access to all relevant data and liquidity. Charles River’s intuitive trading blotter encompasses all the key workflows for equity cash and equity derivative orders, including:

- **Easy access to fundamental trading analytics** at all stages of the trade lifecycle, with integrated transaction cost analysis (TCA) from order generation through execution
- **Support for multiple trading methods and strategies** including program trading, single name trading, algorithmic trading, DMA trading and spread trading
- **Freedom to focus attention on more complex, less liquid orders** by utilizing automated smart order routing for low touch orders

**Integrated critical market data and charting**, including real-time level I and level II exchange data, price history, news, watch lists, time and sales, and venue analysis

**Built-in access to liquidity** with a broker-neutral FIX network, providing connectivity to more than 600 trading destinations and ability to quickly add new destinations

Charles River brings together the tools and data traders need to effectively implement trading strategies.

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**Foreign Exchange**

Charles River’s automated FX capabilities help investment managers hedge out currency exposure and risk, and reduce the cost of settlement for cross-border trading. Charles River enables firms to manage their own FX trades with a highly efficient workflow that easily links FX trades back to the original equity, fixed income or derivative trade, and ultimately reduces costs with:

- **Fully automated settlement and hedging trades** based on pre-defined settlement and hedging rules
- **Complete transparency into portfolio cash** through full integration to cash flow forecast
- **Direct access to multiple liquidity destinations** including bank direct, ECNs and bank algorithms

**Streamlined access to the best rate** through streaming quotes (RFQ/RFS)

**Best execution analysis and reporting**, including the ability to store historical quotes

Charles River helps traders achieve best execution by gathering multiple quotes and automatically identifying the best rate.
Compliance

Charles River helps clients meet demands for more stringent risk management with centralized compliance monitoring and management capabilities, and advisory services that utilize a comprehensive library of built-in rules for worldwide regulatory requirements and mandates, including US SEC 1940 Act and Rule 2a-7, UCITS and CESR, Dodd-Frank, KAGB, global shareholder disclosure (GSD) regulations and others. Charles River IMS automates the compliance workflow and provides advanced compliance rule building, testing and maintenance, customizable reporting and a complete audit history, including the ability to:

- **Reduce intra-day risk** by validating compliance at any stage of the trade lifecycle: pre-trade, in-trade, post-execution, end-of-day/post-trade
- **Supply regulators and auditors** with end-to-end audit trail and extensive trade compliance reporting
- **Streamline portfolio management workflows** by incorporating compliance rules into “what-if” analysis
- **Optimize compliance monitoring** by prioritizing and filtering alerts
- **Easily trace violations** and perform historical trend analysis through “As of” compliance reporting

**Key Capabilities**
- Compliance Lifecycle Monitoring
- Comprehensive Rule Libraries
- Rule Building & Testing
- Model Compliance
- Advisory & Global Shareholder Disclosure Services
- “As of” Compliance
- Derivative Exposure Calculations
- Calculation Builder
- Integrated VaR Monitoring
- “Four Eyes” Test Authorization

Charles River automates compliance validation and reduces risk with monitoring integrated throughout the trade lifecycle.

Comprehensive reporting tools, including historical trend analysis and “As of” reporting, supply documentation needed for regulatory or audit inquiries.
Post-Trade & IBOR

Post-Trade Matching, Confirmation & Settlement

Charles River boosts operational efficiency and reduces risk by automating the post-trade process and providing centralized confirmation, trade matching and settlement instruction workflows. For each transaction, dealers and traders, portfolio managers, compliance, and operations personnel have the same real-time view of all post-trade processing activity and data. The resulting low-touch settlement process minimizes manual steps and enables investment managers to:

**Expedite settlement** by routing individual trades and allocations in real time to facilitate same-day matching and confirmation

**Manage “by exception”** with personalized views and alerts that save time and speed up corrective intervention

**Reduce failed trades and settlement issues** with consistent views of post-trade activity and data

**Consolidate post-execution operations** by centralizing all reference data and settlement instructions

Charles River IMS automatically routes transaction details and ensures central or local matching with centralized exception management and configurable, rule-based local tolerance matching. Built-in interfaces include:

- Omgeo OASYS, CTM & TradeSuite
- MarkitSERV swap clearing
- FIX 4.2 or 4.4 allocation workflow
- Local match/affirm with any destination
- ISO 15022/SWIFT for custodian notification

Investment Book of Record (IBOR)

Charles River’s integrated Investment Book of Record provides traders and portfolio managers with an accurate, real-time, and consolidated view of positions and cash. Purpose-built for the front office, Charles River IMS provides an investment-centric view of positions that reduces trade errors and time spent manually reconciling position data.

Charles River increases confidence in investment decisions by providing consistent position data and actionable analytics throughout the investment process. Unlike closed systems, Charles River IMS makes position data easily available to downstream systems including reporting, performance attribution and risk management, enabling them to access the same accurate view of positions in real time.

Incorporating IBOR in the investment management platform enables organizations to decouple the front office from the back office, and helps firms that do not have an accounting system and rely solely on feeds from custodians and prime brokers. It also benefits wealth managers who need to consolidate positions from multiple accounting systems, or control tax lot tagging for newer multi-sleeve or multi-strategy products, such as Unified Managed Accounts (UMA). Charles River’s IBOR solution allows users to:

**Improve accuracy and reduce end-of-day processing time** by eliminating dependency on back-office data

**Help portfolio managers remain fully invested** by providing accurate intraday cash balance information

**Reduce the possibility of trading errors and compliance violations** by ensuring that investment managers are trading on timely, accurate, complete information

**Increase transparency and improve recordkeeping** by incorporating external transactions that affect positions

- **Key Capabilities**
  - Block & Allocation Matching
  - Accounting Import/Exports
  - OTC Clearing
  - Reconciliation
About Charles River

Charles River provides an end-to-end solution to automate front and middle office investment management functions across asset classes on a single platform. Delivered as a hosted service, the solution offers a simplified operating model that improves data quality and investment professional productivity, controls risk and lowers technology costs. Charles River serves more than 350 investment firms in over 44 countries in the institutional asset and fund management, private wealth, alternative investments, insurance, banking, and pension markets.

Clients by Primary Business
- Institutional Asset and Fund Management - 39%
- Wealth Management - 20%
- Banking - 12%
- Hedge Funds - 15%
- Insurance - 10%
- Pension Funds - 4%

Charles River Staff by Function
- Research and Development - 37%
- Client Services - 45%
- Sales / Marketing - 9%
- Management / Administration - 9%

Locations
- Boston (Headquarters)
- Beijing
- Dublin
- Hong Kong
- Indianapolis
- London
- Melbourne
- New York
- Singapore
- Tokyo
- Toronto

For any of the information in this document that is presented as planned or projected, Charles River Development reserves the right to change plans, priorities and future enhancements at any time without notice. (Updated January 2015)
Enterprise Solution
Delivered as a Hosted Service

Integrated Data

FIX Connectivity

Front and Middle Office

Institutional • Wealth Management • Hedge Funds
Banks • Pensions • Insurance