streambase

# StreamBase for Foreign Exchange

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BUSINESS ISSUE

Dispersed liquidity, increasing market sophistication, and growing price sensitivity make it challenging for FX participants on the buy and sell-side to make the best possible real-time trading decisions. To establish and grow successful trading operations, FX firms require a range of sophisticated capabilities, including:

CAPABILITIES NEEDED

- The ability to connect to and aggregate FX data from multiple liquidity sources
- Tools for rapidly developing, testing and deploying complex signaling and execution algorithms
- The ability to generate prices and distribute them to customers across single and multi dealer platforms
- Systems to automatically hedge positions and manage risk in real-time

SOLUTION

Using StreamBase, firms are able to quickly develop and deploy applications across the range of FX trading operations, from simple FX trading algorithms to entire FX dealing platforms.

**Venue Connectivity**

StreamBase provides connectivity to all the major FX liquidity providers, interbank networks, ECNs, and other venues. Available connectivity is constantly increasing, but includes:

- 360T
- CitiFX Pro
- Currenex
- DB
- Digitec D3
- ICAP/EBS
- ICAP/EBS Live XML
- FXAll/Accelor
- FXAll Relationship Trading
- FXCM Pro
- Gain GTX
- Goldman Sachs Electronic Trading FX
- Hotspot FXi
- Hotspot Itch
- HSBC FX
- Integral FX inside
- LavaFX
- Market Factory (FX Enhanced Market Data and Trading)
- Morgan Stanley FX
- Nomura
- UBS Fx2B

StreamBase adapters provide direct native connectivity to the various venues with ultra-low latency thanks to the multi-threaded, in-process StreamBase adapter architecture. Organizations requiring a normalized view of multiple execution venues can use StreamBase handlers to abstract venue-specific semantics and speed up application development. Where appropriate, adapters support the full range of venue semantics, including streaming prices, RFQ, quote submission, and order execution.

StreamBase can also process indicative FX data from consolidated feed vendors, including:

- ACTIV Financial
- Bloomberg
- Interactive Data
- Morningstar
- Thomson Reuters

**Liquidity Aggregation**

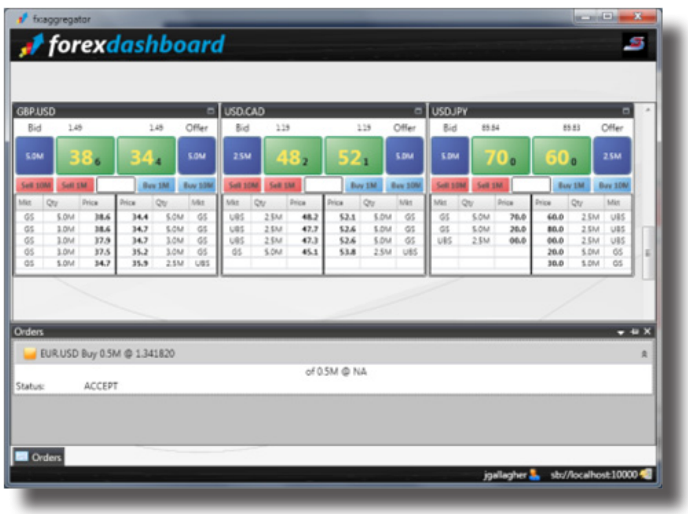
Trading organizations on both the buy- and sell-side of foreign exchange today need access to multiple liquidity providers. In order to make the best possible real-time trading decisions, liquidity across multiple venues can aggregated into a single picture of the whole market.

Using StreamBase, firms can develop custom algorithms for liquidity aggregation that can take into account not just price levels, but other transaction costs, counterparty relationships, latency characteristics, historical executions, and any other information available to the firm. The flexibility of StreamBase ensures that your trades are based on the most complete view of the most up to date information.

**Market Data Visualization**

StreamBase offers a variety of pre-built connectivity options for visualizing your FX trading results, including:

- Adobe Flex
- Eclipse RCP
- Java Swing
- Microsoft Excel and .NET
- Panopticon




**Market Data Distribution**

StreamBase offers a range of options for distributing market data to other applications. In addition to the native StreamBase transport, StreamBase supports publishing to popular market data systems and messaging middleware, including:

- JMS
- RMDS
- Solace Systems
- Tervela
- TIBCO EMS
- TIBCO RV
- Wombat
- 29West

Using the StreamBase Adapter API and Client API, StreamBase data can also be published into or integrated with a firm's existing proprietary infrastructure, using C++, Java, or .NET custom adapters.

**Algorithmic Trading, Signal Generation, and Execution Management**

Trading algorithms need a combination of good data, low latency venue access, and sophisticated analysis. StreamBase as a platform provides all three.

Algorithms are developed in StreamBase Studio, a rapid development environment based on the Eclipse platform, where visual programming and an extensible library of analytics empower quantitative analysts to build complex algorithms. Within Studio, quants can back-test, optimize, test, debug, and deploy into production all kinds of algorithms.

Signal generation algorithms benefit from low latency access to a range of data sources in StreamBase. In addition to FX market data, algorithms can generate signals based on data from other asset classes, digitized news, public sentiment data, key economic indicators, and any other information available within the firm. The most clever signaling strategies combine not only speed and intelligence, but access to novel data sources.

Execution management algorithms can manage a large order across multiple venues or over time. Using the parent-child order tracking that is part of the StreamBase Demo Packages, algo authors only have to think about when to trade and how to respond to their fills. The details of order state management and integration with order management systems are handled by the components provided by StreamBase as source code.

**Pricing and Rates Engines**

Dealers and other market makers in foreign exchange need to create prices based on customer relationships, current positions, and market conditions. A good rates engine is the key to a profitable dealing business. Using StreamBase, firms can create custom-tailored rates based not only on traditional customer banding and spreading, but also based on individualized customer profiles and behavior. Combined with auto hedging logic, the rates can be skewed to capture latent customer demand and hedge away unwanted positions.

Using StreamBase Complex Event Processing, firms can develop the sophisticated rates engines required to maintain profitable customer relationships in the current market.

**Quoting and Price Distribution**

Prices need to be distributed to customers once they are created. StreamBase's connectivity provides many avenues for

price distribution within the firm. Outside the firm, prices are often distributed on specialized networks. Connectivity for price distribution includes:

- 360T
- Currenex
- FXall Relationship Trading

Prices can also be distributed via single dealer platforms. Single dealer platforms are often based on messaging middleware, or on internet messaging infrastructure. Popular integrations include:

- Caplin
- MyChannels

StreamBase dealing platforms also support automated responses to requests for quote (RFQ) over a variety of messaging infrastructures, including direct FIX messaging.

**FX Dealing**

FX dealing refers to providing pricing and execution services to institutional clients. FX dealing has become more challenging in recent years as customers and markets have become more sophisticated, price sensitive, and high frequency.

Combining many of the aforementioned StreamBase FX capabilities enables an organization to develop an entire FX dealing infrastructure based on StreamBase. Three large sell-side banks which are available for select reference calls use StreamBase for their FX dealing needs in large part because of StreamBase's:

- Pre-built venue connectivity and extensibility
- Platform customizability and flexibility
- High performance and scalability
- Developer and quantitative analyst empowerment

**Auto Hedging and Risk Management**

Using algorithms developed in StreamBase, firms can track their positions, realized and unrealized profit and loss, and exposure to market volatility. This enables an automation of traditional FX hedging. Using proper hedging, a firm can lock in profits related to dealing with minimal cost. And by coupling risk management to pricing, risk can be managed efficiently based on existing customer flow.

## STREAMBASE SPECIFICATIONS

| | |
|---|---|
| **Application Programming Interfaces (APIs) for C++ Java, .NET** | ■ Client API: used for building adapters that connect input and output streams to StreamBase<br>■ Custom Function API: extends StreamBase functionality by supporting custom-built math and aggregate functions |
| **FX Connectivity Examples** | ■ Currenex<br>■ Goldman Sachs Electronic Trading FX<br>■ UBS Fx2B<br>■ Hotspot FXi<br>■ And other major FX venues |
| **Enterprise Functionality** | ■ Clustering<br>■ High availability<br>■ SMP-enabled |
| **Server Platforms** | ■ Red Hat Enterprise Linux AS 4.0, 5.0<br>■ Novell SUSE<br>■ Linux Enterprise Server 10<br>■ Sun Solaris 10<br>■ Windows XP, Windows Server 2003, 2008 |
| **Development Platform** | ■ Red Hat Enterprise Edition AS 4.0, or 5.0<br>■ Sun Solaris 10<br>■ Windows XP, Windows Vista Business, Windows Server 2003, 2008 |

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