



Open Source on the Trading Desk

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Introduction

The Financial Services industry has always been early adopters of the latest technology trends. This is not surprising in an environment where a fraction of a second or a penny can mean the difference between profit and loss. Firms are constantly looking for any advantage that can set them apart from their competitors.

Most, if not all, of the major firms in the industry adopted Open Source software for things like operating systems (Linux), Web Servers (Apache, JBoss) and middleware (JMS) over the last couple of years. The high quality of the available software coupled with an obvious cost advantage have had a dramatic impact on IT budgets in an industry that is famous for spending lavishly on technology.

In the current economic climate the case for Open Source has become even more compelling. CEOs and CIOs are preparing for a serious negative impact on their business. The resounding questions for businesses today are: how to utilize technology to establish or maintain a competitive advantage while maintaining or cutting investments in IT?

The answer in many cases is Open Source Software. Financial Services firms are looking at deploying open source in areas such as business intelligence, document management, customer relationship management, database management and even order and risk management. This White Paper will explore some of the possibilities that Open Source Software can bring to financial services industry and the trading desk.

Business Intelligence and Data Warehousing

Today, more than ever, Financial Services Firms need complete and accurate information about their risk, exposure, and P&L. A comprehensive business intelligence implementation is critical in providing senior management with an accurate view of all key business metrics. Having this type of information readily available can literally be the difference between success and failure.

Unfortunately, commercial business intelligence systems sold by Oracle, IBM and SAP are incredibly expensive and take a long time to implement. This can create a huge barrier for firms struggling with tightened IT budgets and limited resources.

Pentaho is the leading provider of Open Source business intelligence solutions. It provides the full spectrum of business intelligence tools, from reporting to analysis, dashboards, data mining, and data integration. Features include:

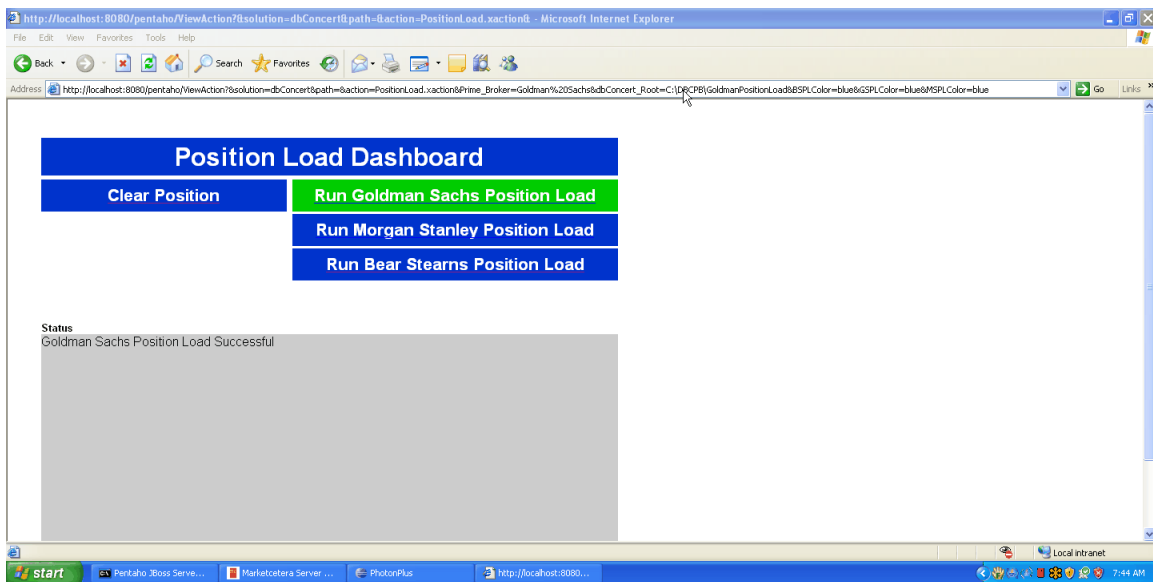
- Pentaho Reporting – Allows users to easily create reports from multiple disparate data sources. Easy to use report designers support the creation of a wide variety of report and graph formats. Output can be HTML, PDF and a wide variety of other standard formats.
- Pentaho Analysis – Supports creating OLAP cubes that allow users view data dimensionally and to browse data interactively and drill down into the details quickly and easily.

- Pentaho Data Mining – Allows sophisticated users to uncover hidden patterns in data. Future outcomes can be predicted based on past patterns and trends.
- Pentaho Data Integration – A toolkit that can be deployed to gather information from multiple disparate systems to create a central Data Warehouse that can form the cornerstone for a complete Business Intelligence solution.

The following sections contain just a few examples of the types of analysis that can be accomplished by using the Pentaho BI suite.

Accurately assessing risk and exposure have become key drivers in most financial services firms these days. A key component of managing firm wide risk is tying all of the various systems used within the organization into a single, centrally accessible data warehouse. The Pentaho Data Integration toolkit can be used to consolidate data from multiple disparate systems.

The following Position Load dashboard is an example of how a hedge fund might bring in start of day positions from multiple Prime Brokers:

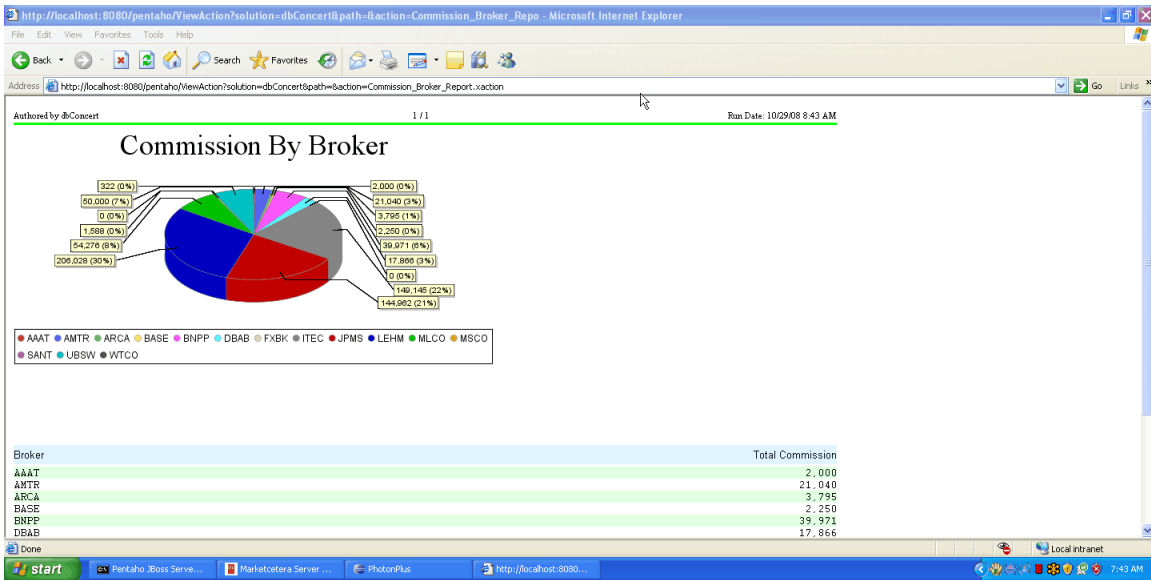


The same toolkit could also be used to pull data together from the multiple order management, accounting and risk systems used by a firm.

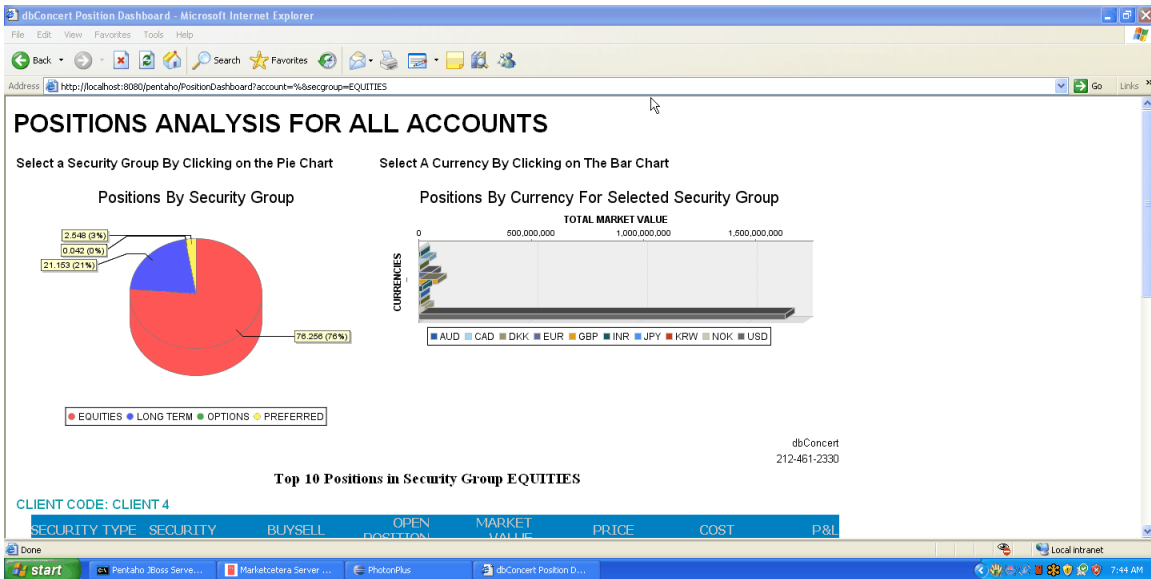
Once data has been loaded, the rest of the Pentaho toolkit can be used to provide a wide variety of analytics.

The first example is a simple pie chart and report showing commission payments across a firm's various brokerage relationships. Similar charts could be built showing the market value of all transactions executed with each broker. This would be particularly useful in managing a firm's counterparty risk, which has become particularly important in the current financial climate.

The power of the Pentaho Reporting platform allows these types of graphs and reports to be built in hours, not days or weeks.



The example shown below is a more complex interactive dashboard that would allow a portfolio manager to analyze exposure and P&L across both asset class and currency. The pie chart to the left shows the portfolio asset mix. By clicking on a particular slice of the pie, the bar chart to the right changes to reflect the breakdown of that asset class by currency. The top ten positions in each category are highlighted in the report at the bottom to provide an immediate indication of the largest exposures in the portfolio.



A key component of Pentaho BI platform is the Mondrian Data Analysis tool. This provides developers with a tool to create sophisticated OLAP cubes that allow users to interactively browse data at different levels of aggregation. In the example below a cube has been created with the four dimensions of Strategy, Sub-Strategy, Deal and Security. This is the way a large number of hedge funds and proprietary trading desks have typically view their positions.

The cube allows the various dimensions to be expanded or compressed by simply clicking on the +/- signs to the left of the data values. The cube can be sorted by clicking on the various column headings, rotated on its axes and even exported to Excel for further analysis. This provides managers with a highly interactive way to view and manage their data.

				Measures						
STRATEGY	SUB-STRATEGY	DEAL	SECURITY DESCRIPTION	OPEN POSITION	PRICE	CURRENCY	MARKET VALUE	LOCAL MARKET VALUE	P&L RATE	FV
-All Strategies	+All Sub-Strategies	+All Deals	+All Securities	130,750,676			1,862,527,178			6,324
ASIA	+All Sub-Strategies	+All Deals	+All Securities	1,922,747			16,370,802			233
EUROPE	+All Sub-Strategies	+All Deals	+All Securities	56,859,162			168,665,490			837
HIGH YIELD	+All Sub-Strategies	+All Deals	+All Securities	1,062,362			8,782,373			279
INDIA	+All Sub-Strategies	+All Deals	+All Securities	3,802,000			38,366,277			233
LONG/SHORT	+All Sub-Strategies	+All Deals	-All Securities	8,032,110			142,530,777			1,442
			AAMES INVESTMENT COR	420,800	4.87	USD	2,049,296	2,049,296	2	47
			AC MOORE ARTS &	298,900	16.95	USD	5,066,355	5,066,355	2	47
			ALLTEL CORP	459,000	54.5	USD	25,015,500	25,015,500	2	47
			AMERICAN AXLE &	200,000	16.64	USD	3,328,000	3,328,000	2	47
			ANWORTH MORTGAGE ASS	235,000	8.16	USD	1,917,600	1,917,600	2	47
			CHARTER COMMUNICATIO	800,000	1.3	USD	1,040,000	1,040,000	2	47
			COMCAST CORP-CL A	75,000	34.84	USD	2,613,000	2,613,000	2	47
			DIRECTV GROUP INC/TH	150,000	17.43	USD	2,614,500	2,614,500	2	47
			ECHOSTAR COMMUNICATI	400,000	35.4	USD	14,160,001	14,160,001	2	47
			ESTEE LAUDER COMPANI	75,000	37.6	USD	2,820,000	2,820,000	2	47

The examples here are just a small sampling of the types of tools that can be developed using a robust Business Intelligence platform. By using an open source solution such as Pentaho, complete BI solutions can be developed with a significantly reduced Total Cost of Ownership (TCO).

Document Management

As financial services firms of all shapes and sizes adapt to what will certainly become a more highly regulated environment, tracking and organizing key documents will become extremely important. Compliance officers will need to quickly access legal documents when requested.

On the other side of the spectrum, portfolio managers and traders will want to catalog and organize the research that they collect to assist in the investment decision making process. With across the board cuts in staff at most firms, there simply aren't resources to manage these documents manually.

Alfresco is the leading Open Source Alternative for Enterprise Content Management (ECM). It couples the innovation of open source with the stability of a true enterprise-class platform. The open source model allows Alfresco to use best-of-breed open source technologies and contributions from the open source community to get higher quality

software produced more quickly at much lower cost. Alfresco provides:

- Enterprise Content Management (ECM)
- Document Management
- Web Content Management
- Collaboration
- Knowledge Management
- Records Management
- Image Management

Firms can use Alfresco to track client legal documents and agreements, broker and analyst research along with a wide variety of other critical documents.

In this example Alfresco has been integrated with the Pentaho BI Platform. Portfolio managers are presented with a list of their active positions. By clicking on the security name, all research documents associated with the position are displayed.

The screenshot displays two overlapping web browser windows. The left window, titled 'dbConcert Position Dashboard - Microsoft Internet Explorer', shows a 'POSITIONS ANALYSIS FOR AC' dashboard. It features a 'Select One For Analysis' section with a 'Sort By: AccountCode' dropdown. Below this is a table with three columns: 'AccountCode', 'SECURITY', and 'BUYSELL'. The table contains two rows of data and a 'Grand Total' row. The right window, titled 'Alfresco Web Client - Microsoft Internet Explorer', shows the Alfresco interface. It includes a 'Navigator' on the left with links for 'My Alfresco', 'Company Home', 'My Home', and 'Guest Home'. The main content area shows 'My Alfresco > ACM' with a 'Browse Spaces' section and a 'Content Items' section. The 'Content Items' section displays a document titled 'Proposed AMP Verification Process.vsd' with a size of 74 KB and a date of 3 November 2008 12:40.

AccountCode	SECURITY	BUYSELL
12345678	U S DOLLAR	SL
12345678	ACNOM.CORP.CMN	BY
Grand Total		

Order Management

The current market conditions are creating significant challenges for all investors from the smallest hedge funds to the largest institutional investors. To compete, your trading systems must be agile, easy to implement, fast to adapt, and secure. Unfortunately most commercial Order Management Systems have become increasingly complex and difficult to deploy. It is not uncommon for an OMS implementation take six months, a year or even longer.

The majority of the commercial OMS offerings are geared towards a synthetic view of what the vendor thinks the typical trader or portfolio manager is looking for in terms of features and functions. This creates feature rich systems where most users are utilizing

only a small portion of what is available. At the same time, important features are missing and complicated workarounds need to be developed.

As a result of the mismatch between features and requirements, many firms are forced to implement multiple trading platforms for different asset classes and/or business lines. The only alternative is for firms to custom build an in-house, proprietary platform specifically designed for their needs. Either way, there are significant costs to both implement and support the existing order management alternatives.

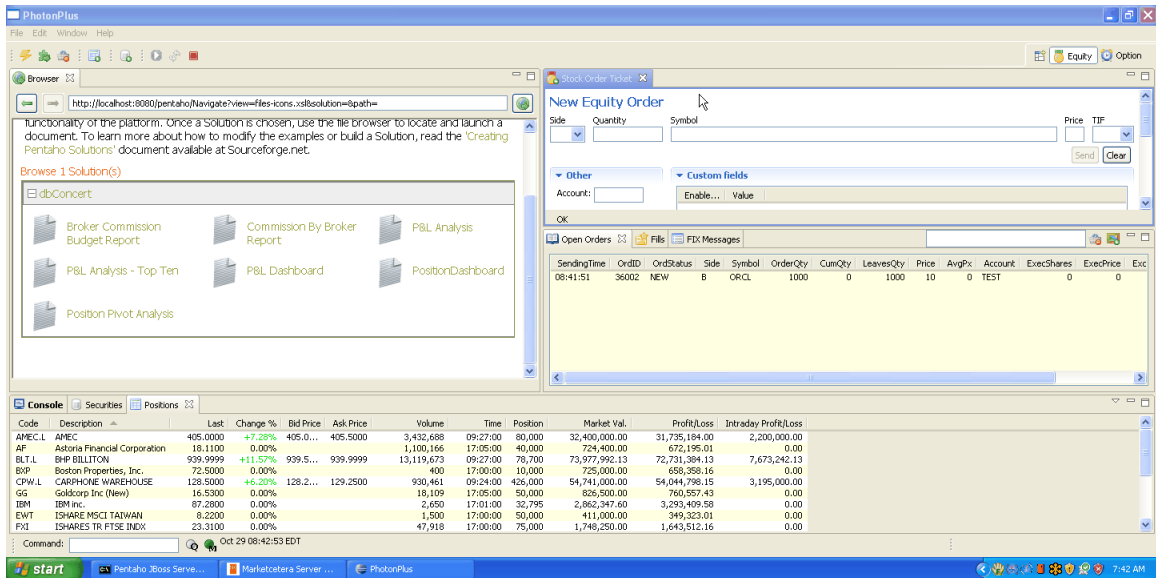
The current focus on improved operational efficiencies as well as a need to drastically reduce overall technology costs is causing many firms to rethink their current strategy. The Marketcetera Open Source Order Management System presents an extremely attractive alternative to both proprietary and commercially developed order management systems.

The platform supports both Equity and Options trading and consists of a server component (the Order Routing Server) and a feature rich GUI (Photon). A batch order loader and reporting framework (Tradebase) are also included in the base implementation. A built in scripting capability allows you to build automated trading systems that maximize the effectiveness of both your traders and developers.

The ORS provides support for all current versions of the FIX protocol through the implementation of the highly popular QuickFIX engine. Communication between the various Marketcetera components is achieved by utilizing the ActiveMQ JMS implementation.

Built on top of the Eclipse Platform, the Photon GUI is extremely easy to customize insuring that your traders get a system geared specifically to their workflow. New views and perspectives can be built and integrated into the platform without changing the underlying source code.

The extremely open nature of the platform also supports integrating the Photon trading capabilities with Open Source data integration, business intelligence, and document management, all functions on the trading desk can be automated in a single integrated environment. As workflows change and new opportunities arise, the platform can be modified and extended to support any business requirement.



Database Management

In order to power all of this technology financial services firms need to deploy an enterprise class relational database. Ingres is the only Open Source database that provides the strength and features expected from an enterprise class database while significantly reducing total cost of ownership. Ingres Database is a leader in supporting mission-critical applications and helping manage the most demanding enterprise applications of Fortune 500 companies. Focused on reliability, security, scalability, and ease of use, Ingres contains features demanded by the enterprise while providing the flexibility of Open Source.

Specific enterprise class features include:

- Security
- Scalability
- High Performance
- High Availability
- Flexible Backup and Recovery
- Extensive development platform support
- Industry Leading Support
- Easy to use development tools

In addition to all of its other enterprise class features, Ingres has been tested and certified to work with a wide variety of other open source software including Pentaho, Alfresco and Marketcetera. The Ingres IceBreaker database appliance provides complete integration between the database server and operating system (Linux) with one easy to install and maintain package.

Summary

By utilizing and integrating various Open Source software components, complete, custom designed solutions can be created that automate a wide variety of tasks done in today's financial services firms. Users will no longer be forced to make do with software that does not meet their specific functional requirements.

In addition, substantial cost savings are possible do to the significantly lower cost of ownership that is made possible by utilizing Open Source Software. As a result, new initiatives can be started without large upfront investments and pilots can be implemented rapidly to test markets or customer reactions.

Over the last several years a new trend has developed that makes the use of open source software even more attractive. Commercial open source firms such as Ingres, Pentaho and Alfresco provide all of benefits of the open source plus the availability of high quality professional support and training. Although there is obviously a charge for these services, it is still considerably lower than the cost of purchasing non-open alternatives.

If you haven't thought about Open Source solutions yet, it may be a good time to reconsider. In these days, agility, cost efficiency and time-to-market pay off.