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Information Management

Automating the confirmation of derivative trades

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Executive summary

Trading in derivatives continues to grow at a rapid pace. Indeed, the outstanding notional value (or face value) of over-the-counter (OTC) derivatives exceeded $415 trillion by the end of 2006, an increase of nearly 375% when compared with 2001 levels.[1] Unfortunately, the underlying trade processing and risk management infrastructure at institutions active in derivatives trading has struggled to keep pace with the growth of these complex instruments. Lengthy confirmation cycles are one consequence of this situation.

Failure to confirm derivative trading transactions in a timely manner creates considerable risks, particularly for sell-side firms. For example, unconfirmed transactions can be difficult to enforce and allow errors in a firm's records to remain undetected, introducing substantial exposures. One recent situation involved an Allied Irish Bank foreign exchange (FX) dealer who attempted to cover his $700 million loss through the use of fictitious OTC options that were never confirmed. [2]

Not surprisingly, firms are seeking ways to improve their derivatives confirmation processing and thereby minimize their risk and exposure. Increased automation is critical to such efforts.

This paper outlines a derivatives confirmation solution architecture designed to help financial markets firms minimize or eliminate many manual steps that often occur during the post-trade phase of OTC derivatives. Workflow management, database management, document templates, and message queuing software combine to form a cohesive architecture for managing the derivatives confirmation and trade maintenance processes. Potential benefits of this architecture include

- Reduced operational risk.
- Improved operational efficiency.
- Increased volume of processed confirmations to keep pace with growing industry demand.
- Improved client service.

Such benefits can be achieved without causing undue strain on existing technical resources or disrupting a firm's existing technology infrastructure. Subsequent sections of this paper explain how that's possible.

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[1] OTC derivatives market activity reports issued twice yearly by the Bank for International Settlements.

[2] Hull, J. *The Magazine of the Rotman School of Management / Spring 2007, Hull's Laws: What We Can Learn from Derivatives Mishaps, pgs 32-36*

Introduction

OTC derivatives are financial products sold by wholesale banks to their clients, typically to help these clients manage the risk on some aspect of their financial position, be it their exposure to interest rates, currencies or the credit worthiness of their customers. The Bank of International Settlements (BIS) provides the following definitions:

> *OTC: a method of trading that does not involve an exchange. In over the-counter markets, participants trade directly with each other, typically through telephone links.*
>
> *Derivative: a financial contract the value of which depends on the value of one or more underlying reference assets, rates or indices. For analytical purposes, all derivatives contracts can be divided into basic building blocks of forward contracts, options or combinations thereof.*

The key characteristics are the direct trading between participants and the non-standard nature of the instruments. These two features mean that each and every deal needs to be specified in a contract between the two parties that details the economic and legal terms and conditions of the trade. In other words, the contract represents a confirmation of the terms and conditions negotiated as part of the trade.

The importance of derivatives trading is well-recognized, as this quote from Allan Greenspan (former chairman of the Board of Governors of the Federal Reserve Board of the United States) indicates:

> "Over-the-counter (OTC) derivatives have come to play an exceptionally important role in our financial system and in our economy. These instruments allow users to unbundle risks and allocate them to the investors most willing and able to assume them. A growing number of financial and non-financial institutions have embraced derivatives as an integral part of their risk capital allocation and profit maximization. In particular, the profitability of derivative products has been a major factor in the significant gain in the finance industry's share of American corporate output during the past decade--a reflection of their value to non-financial industry. Indeed, this value added from derivatives itself derives from their ability to enhance the process of wealth creation throughout our economy."[3]

Risk

Failing to confirm derivative trades in an accurate and timely manner can result in increased risk, cost and sanctions from industry regulators. The failure to confirm a transaction may jeopardize its enforceability or the ability to net it against other transactions. Furthermore, to the extent that it allows errors in recording transactions to go undetected, an unconfirmed transaction may cause market or counterparty credit risks to be misrepresented and, most seriously, to be underestimated.

[3] The Federal Reserve Board, Testimony of Chairman Alan Greenspan, *Over-the-counter derivatives*, February 10, 2000

The significance of this problem depends upon the nature of the error and the type of transaction involved. This risk is perhaps greatest for transactions with errors in the quantitative terms of deals, particularly transactions for which errors could go undetected the longest, for example long-dated forwards that do not provide for a payment to be made or received for several years.

> There are real risks here –take the Allied Irish Bank FX dealer, who lost $700 million, covered his losses with fictitious OTC options as hedges – these were never confirmed and it was only when the confirmations clerk eventually questioned senior management about the lack of a matched confirmation that he was caught and the losses discovered.[4]

The capture of data on OTC transactions and preparation of confirmations remains a manual process at many firms. Dealers typically embrace the goal of "straight-through processing" (STP). This involves the capture of trade details directly from front-end trading systems and complete automated processing of confirmations and settlements without the need for re-keying or reformatting data. However, while some dealers have achieved this goal for plain vanilla transactions (Forward Rate Agreements[5], interest rate swaps), few, if any, have achieved it for highly structured transactions. Progress towards this would reduce outstanding confirmations, both by speeding their preparation and by avoiding the inevitable errors associated with manual processing.

Regulation

The financial industry regulators are taking an increasing interest in ensuring that sound risk management processes are applied throughout the industry. Chief among the measures is the Basel Capital Accord which requires firms to make capital provision to cover the risks which they incur through a detailed review of their own specific activities. The Basel Accord also includes provision against "Operational Risk." Operational Risk is defined as "the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events".[6]

The importance of automation

The firms that participate in derivatives trading include all of the major global, international, US investment and domestic banks. As trading in derivatives continues to grow at a rapid pace, lengthy trade confirmation cycles impose unhealthy levels of operational risk on sell-side firms. Although the financial markets industry has managed to reduce the average number of business days required to confirm certain types of derivatives contracts, outstanding confirmations continue to plague many firms. (Fig. 1

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[4] Hull, J. *The Magazine of the Rotman School of Management / Spring 2007*, *Hull's Laws: What We Can Learn from Derivatives Mishaps, pgs 32-36*

[5] An over-the-counter contract between parties that determines the rate of interest, or the currency exchange rate, to be paid or received on an obligation beginning at a future start date. The contract will determine the rates to be used along with the termination date and notional value. On this type of agreement, it is only the differential that is paid on the notional amount of the contract.

[6] Basel Committee on Banking Supervision, Working Paper on the Regulatory Treatment of Operational Risk, September 2001

depicts a sample of the various types of financial institutions that can be impacted by lengthy confirmation cycles.)

Derivatives Trading Participant Categories

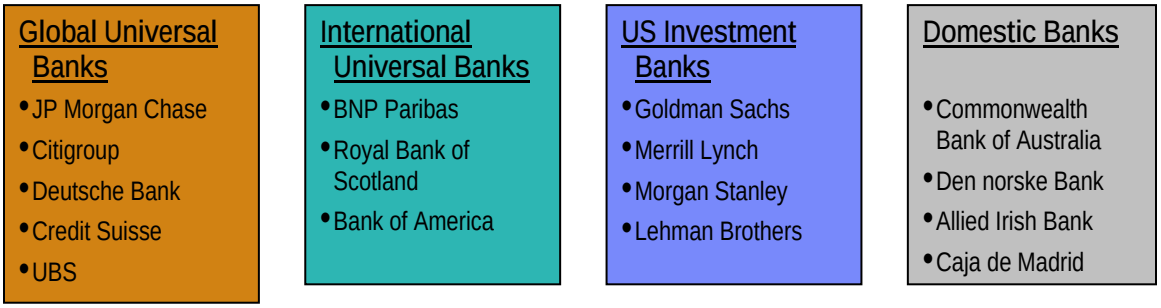

Fig.1: Sample of firms active in derivatives trading

According to a recent benchmarking survey conducted by the International Swaps and Derivatives Association (ISDA),[7] interest rate derivatives and equity derivatives were subjected to longer confirmation backlogs than other derivative classes. In particular, outstanding confirmations of interest rate derivatives averaged 10.7 business days in late 2006, while outstanding confirmations of equity derivatives averaged 13.7 business days. However, large firms that traded more than 1500 OTC derivatives per week suffered from considerably higher backlogs for all derivatives classes. For example, large firms averaged 13.9 business days for confirmations of interest rate derivatives and 22.6 business days for equity derivatives.

The derivatives confirmation process

The derivatives trading confirmation process is perhaps one of the last areas in the wholesale banking industry to be automated. There are several reasons for this, including the highly complex and customized nature of these products, the perception that only lawyers can draft confirmations, and difficulties in automating the matching of the seller's confirmation to the buyer's. The matching challenge reflects the fact that the electronic chain is broken at the first stage with the manual generation of the documents.

Consider the typical flow of the confirmation process of an OTC derivatives trade, as shown in Fig. 2. The process involves multiple areas within each financial institution participating in the trade. As such, it can be quite labor-intensive.

[7] *ISDA 2007 Operations Benchmarking Survey*, ISDA, 2007. Available at www.isda.org.

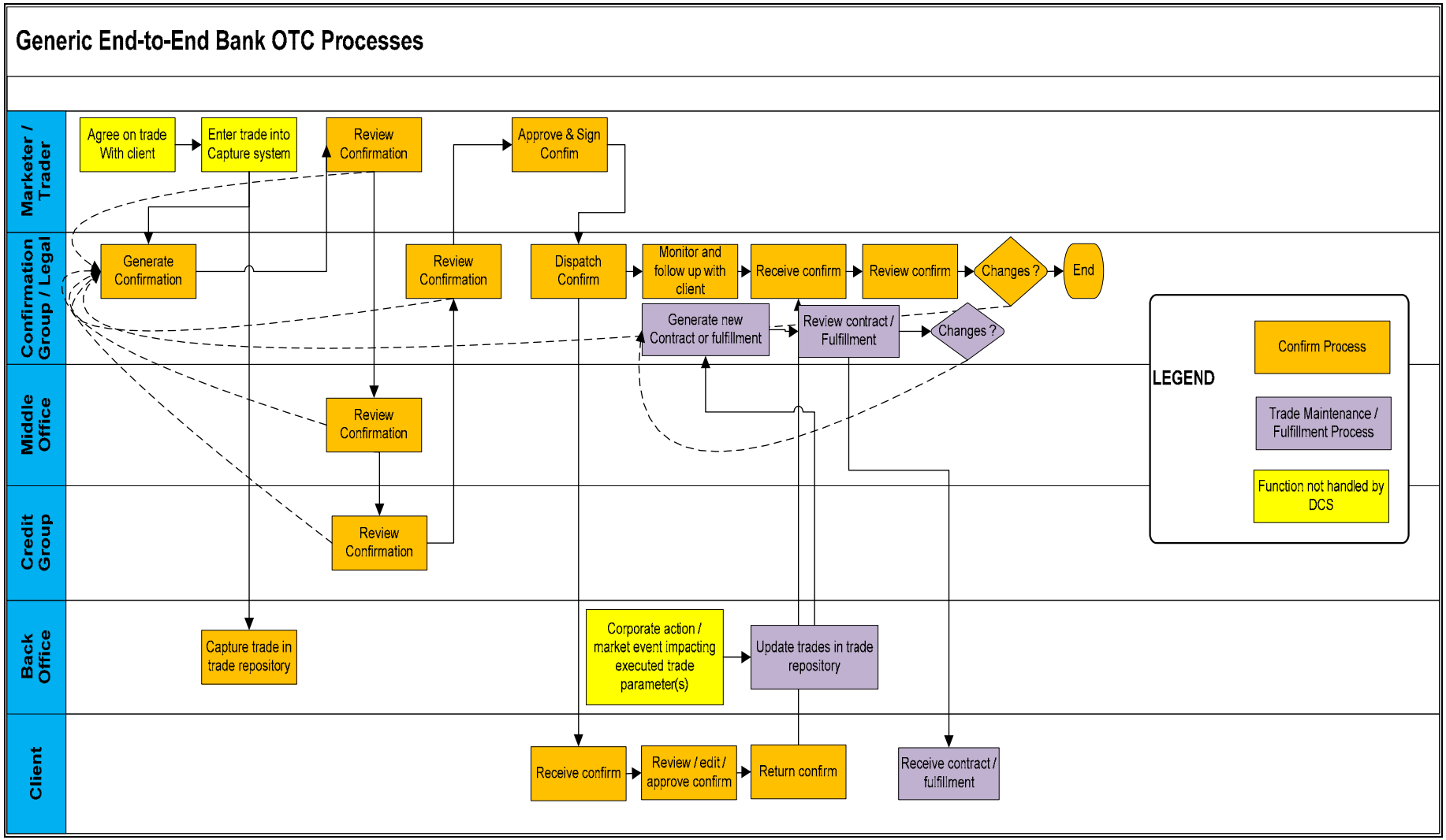

Fig. 2: Business process flow for OTC derivatives.

About this paper

This paper describes a derivatives confirmation solution architecture to help financial automate many of the manual steps that often occur during the post-trade phase of OTC derivatives. Potential benefits of this architecture include

- Reduced operational risk.
- Improved operational efficiency, which may include removal of bottlenecks and improved forecasts of future business resource needs, costs, and throughputs
- Increased volume of confirms processed while reducing costly exceptions.
- Ability to leverage XML for multi-channel communications.
- The ability for firms to leverage external data matching services such as DTCC and SWIFT.
- Improved client service.
- Minimized strain on technical resources by giving non-technical business users control over process design and document template generation.
- Continuous process improvement with real-time operational and historical analysis and offline optimization testing.
- Improved time to market for new financial instruments.

Business requirements and technical implications

A well-architected confirmation solution is critical to providing firms with the technical agility needed in a demanding, competitive, quickly changing marketplace. The architecture needs to integrate within the existing IT frameworks as well as offer high levels of availability, scalability, and reliability. Additional requirements include support for both document-based and system-to-system workflows, XML support in database and enterprise content management (ECM) software, and support for creating and managing document templates.

IBM clients undertaking derivatives confirmation projects often do so to reduce operational exposure, comply with regulatory pressures, improve the productivity of their compliance departments, and improve time to market. Additional drivers have included a desire to reduce the maintenance and support costs of “home-grown” derivatives processing systems and to leverage new XML standards to help automate the categorization of information.

IBM has defined a technical solution consisting of leading IBM software and non-IBM software. Fig. 3 illustrates the required functional components within the derivatives confirmation solution.

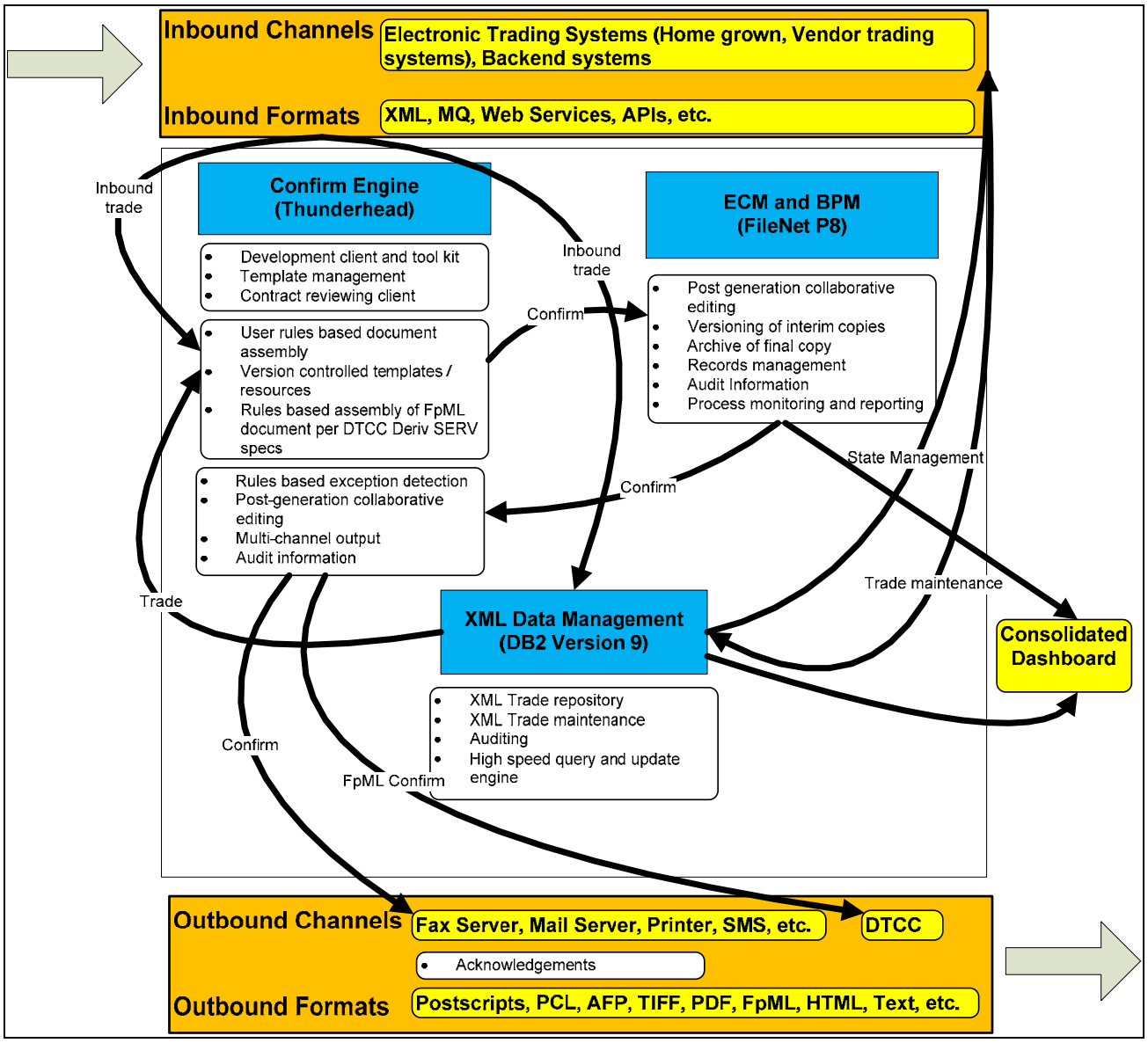

Fig. 3: Derivatives confirmation solution and process flow. The three core components are shown in the central box.

Derivatives confirmation engine architecture

The fundamental architecture consists of several core and optional components. Core components, as illustrated in Fig. 3, are:

- Confirmation Engine - Document generation and management component to create, manage and publish contracts.
- Enterprise Content Management (ECM) and Business Process Management (BPM) – Software to store the various contract states and to orchestrate the various tasks required to complete the confirmation.

- XML data management - Software to store and maintain trade data represented in an XML format, provide high-speed data access services, and maintain an audit trail for enterprise-wide workflows. This system must also be able to easily integrate existing data stored in a traditional relational format, such as master reference data.

Two optional components help firms integrate this derivatives confirmation solution into their broader IT environment:

- Message Broker and Messaging Transport – If needed, software to route and transport incoming trade data and dispatch the information to other system components. WebSphere Message Broker and WebSphere MQ are examples of these.
- Enterprise Business Process Management (EBPM) – If needed, software to help integrate the solution into an existing application and IT infrastructure. WebSphere Process Server is one example.

It's worthwhile to examine the role of each of these components in greater detail, as well as to explore some of the important technical characteristics associated with each component.

Confirm Engine (Thunderhead) with Enterprise Content Management and Business Process Management software (IBM FileNet P8)

Efficient and controlled trade confirmation processing requires several inter-related document generation capabilities, including:

- Generation and delivery of trade confirmations to all interested parties in an agreed upon format in a timely fashion (e.g., same-day or "T+0" confirmations).
- Flexible trade confirmation template environment.
- Management of exceptions and confirmation requests that aren't suitable for straight through processing (STP).
- Collection of meaningful audit data for trade confirmation edits and processes.

Thunderhead, an IBM business partner, provides a platform for generating documents and other communications that facilitates the efficient and audited processing of trading applications in the key areas listed above. Its design and methodology for document generation that includes:

- Powerful business user authored processing rules and document templates. Thunderhead enables people who understand the business process to quickly and easily create rules that determine the behavior of trade confirmations including document channel, look and feel and exception handling. This empowerment of business analysts helps reduce IT support needs.
- Full support for open standards, including XML. All trade confirmation components and content exist entirely as XML in Thunderhead. The rendered format and "look and feel" of the confirmation is completely separate from this

content. This enables the Thunderhead platform to generate personalized communication of trade data to various financial institutions, trading parties and counterparties in a variety of channels and formats, such as print, fax, Web, email, SMS and FpML.

- Superior Exception Handling. Thunderhead enables clients to quickly adopt a processing model that automatically generates trade confirmations via FpML messages to appropriate institutions, including the DTCC. It also proves a robust framework for handling the inevitable exceptions that arise and require human interaction.
- Fine Audit Control. Thunderhead can collect audit information from both STP operations as well as human-based trading interaction. All human edits made to trade confirmations are secured and tracked.

In the derivatives confirmation process, enabling content owners to create and manage document templates is a key concern. Thunderhead provides an easy-to-use interface so business users can create content, define document assembly rules, manage versioning, and maintain audit tracking for all confirmation templates. With Business Content Studio, business users can employ intelligent drag-and-drop capabilities as well as wizard entry screens to create document assembly rules. In addition, users can select shared content from IBM's FileNet P8 as well as create on-the-fly content where necessary. The Business Content Editor Screen presents a channel-independent view of the content and logic rules, providing a clear layout of the document assembly process. Fig. 4 shows a document template displayed in the Business Content Studio client.

Business Content Studio uniquely separates out development roles based upon the specific skills typically present within groups that collaborate in the document generation process. Templates ("blueprints" for trade confirms that include rules, paragraphs, etc.) can be authored by business users or analysts. Subsequently, trade data capture and manipulation can be managed by IT. The styling and "look and feel" of confirmations can be handled by a completely different group, like marketing, if desired.

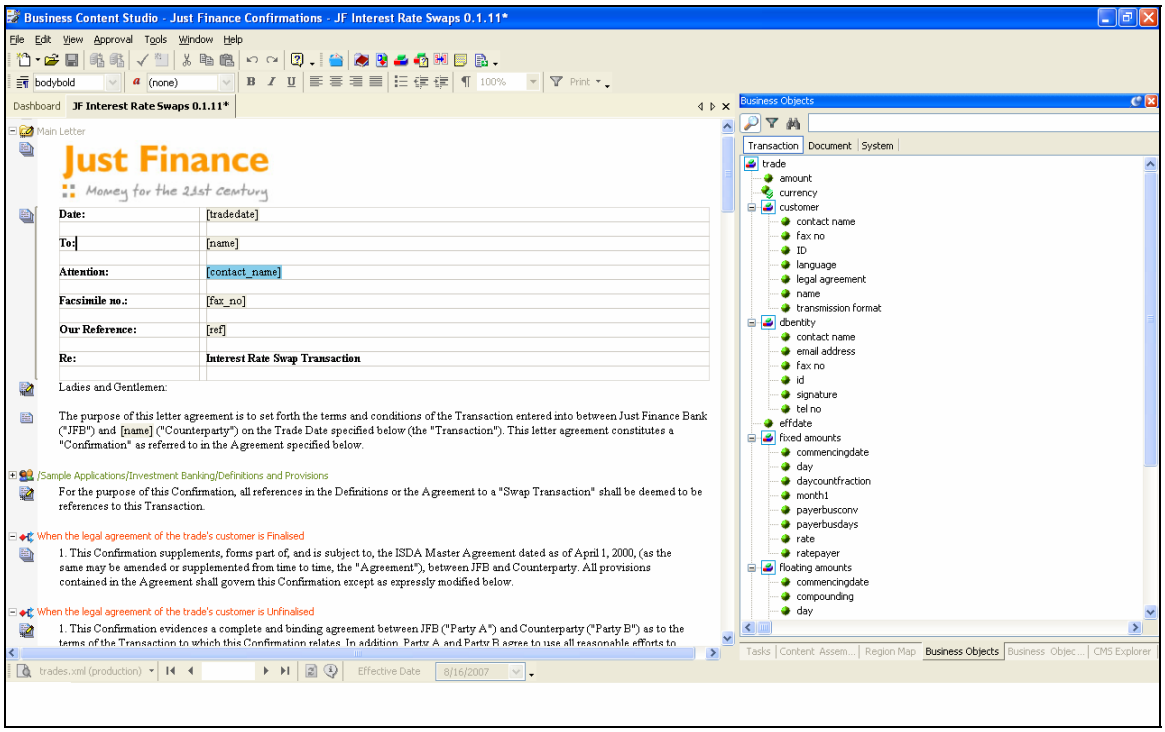

Fig. 4: Document Template in Business Content Studio

In addition to streamlining the template creation and management process, streamlining the review and modification of non-standard confirmations poses a unique challenge in the confirmation process. For more exotic structured products, back office personnel often must review and edit a confirmation before release to the buyer. Thunderhead's Review Framework is a key regulatory module that allows documents created by the Thunderhead engine to be distributed to an IBM FileNet workflow for manual review and editing within a controlled environment prior to delivery. In addition, the Review Case Editor client displays any data errors that have been detected. These exception rules are created by the template designer in the document template.

Thunderhead's Review Framework provides a complete environment for exception handling and selective STP. Organizations can manually inspect pre-defined documents prior to dispatch to highlight communications with high-value clients or for quality assurance purposes.

The Thunderhead production platform automates the assembly, production and distribution of trade confirmations to internal and external reviewers. Traditional document generation platforms focus on printing standard documents but are limited when producing non-print formats such as FpML. Furthermore, they often lack robust support for managing interactive reviews and editing non-standard, exotic confirmations. Thunderhead provides a highly scalable production platform to produce all manner of confirmations including high-volume, standard confirmations and exotic confirmations requiring manual review and editing. The Thunderhead system is based upon J2EE and therefore, leverages IBM WebSphere's Application Server.

Finally, Thunderhead provides a powerful exception handling framework that integrates seamlessly with IBM FileNet Process Manager via the FileNet P8 Java API for both process and content management. Document exceptions in Thunderhead can "subscribe" to appropriate workflow processes in FileNet. Alternatively, a FileNet workflow process can invoke a Web service to have Thunderhead system return a document of interest.

If a trade confirmation cannot be handled in a STP manner, users can define conditions that cause the trade to be automatically forwarded to a FileNet exception process for controlled human interaction. Thunderhead accepts XML trade data from, for example, IBM's DB2 9 as the basis to both start a document generation process as well as "fill in" trade data and characteristics onto a rendered trade confirmation. The trade data is merged with the trade template to create what is called a "Review Case" under an exception condition. That Review Case, which is an XML document, can be submitted to IBM FileNet BPM for an approval process. Thunderhead supplies a document editor plug-in that can leverage various Web- or dashboard-based technologies (including FileNet Workplace) to enable the participants of the exception process to edit the confirmation. Specific sections or even words on the document can be locked in read-only mode for specific users and/or groups, providing highly granular security control. Areas, sections, etc. that are made available to workflow users are audited in an XML file that details what change was made, when it was made and by whom.

To further automate the derivatives confirmation process, Thunderhead can generate content to support a variety of popular output channels, including print, fax, web, email, SMS and industry-specific XML schemas such as FpML for DTCC's Deriv/SERV clearinghouse. Once generated, a FileNet workflow can automatically route the output as needed to further streamline operations. And content can be automatically archived in the FileNet ECM system for record-keeping.

From a compliance perspective, the derivatives confirmation solution described in this paper automates the application of client-defined business rules to ensure compliance across all jurisdictions. With the solution's content and compliance management capabilities, banks can reduce costs while enabling automated real-time communications to be undertaken with confidence. Role-based dashboards provide management with considerable visibility across operations for improved oversight.

As of this writing, Thunderhead is installed in the derivatives operations of 12 of the world's 20 largest investment banks. One firm has used Thunderhead to release back office capacity, increase the ability to handle trade volumes (in some cases by 50%), scale their workloads to meet trading volume spikes, and reduce risk exposure. At another, Thunderhead has helped reduce the time to produce confirmations from more than 90 days to 2 (or fewer) days and reduce the time to create trade documentation from 13 hours to 7 seconds. Furthermore, Thunderhead has helped this firm improve integration and updates between its front, middle, and back offices, virtually eliminating the unconfirmed trade backlog.

In summary, the Thunderhead platform for Enterprise Communications works with the IBM FileNet suite of Enterprise Content Management (ECM) and Business Process Management (BPM) products as well as IBM DB2 9 to automate the trade confirmation process and manage critical trade information and confirmation documentation. By helping investment banks transition from a linear, fragmented process to a more intelligent, collaborative process, these technologies can improve operational efficiency and bottom-line performance.

XML data management with DB2 9

Database management software provides two overall functions in this architecture:

- Storage and management of derivative trade data, which is typically represented in an XML format such as the Financial Products Markup Language (FpML), an ISDA standard. XML formats that model derivatives contain highly nested, complex hierarchical structures that vary considerably based on the particulars of the given derivative. The XML capabilities of DB2 9 are essential for this function since the storage and maintenance of derivatives data is not efficient with a relational database engine.
- Storage of an audit trail that logs information about messages flowing between different workflow components in the system. Such messages are often exchanged in XML, and firms can find it useful to track some or all of this data for compliance and future analytic purposes.

With certain database management systems, such as IBM's DB2, firms can rely on a single database management system (DBMS) to fulfill these needs.

Indeed, efficient storage and management of XML trade data, as well as an XML-based audit trail, is crucial for this derivatives confirmation engine architecture. This is because the hierarchical and varying nature of XML formats that model derivatives presents challenges for many traditional DBMSs. Often, only two rudimentary modeling options are available: decomposing (or "shredding") the data across numerous table columns or storing the data intact within a character or binary large object (CLOB or BLOB) column of a table. Each technique has disadvantages.

Storing the derivatives data as large objects makes searching, updating, and retrieving portions of contracts expensive because the database system doesn't understand the internal structures of these objects. Decomposing the contracts and transforming the data into non-XML data types can involve complex, labor-intensive mappings. Furthermore, writing the code necessary to retrieve (or query) information stored in numerous tables can be labor-intensive and error-prone. Finally hard-coded XML-to-table mappings are costly to change, inhibiting the flexibility required by derivatives trading applications.

Larger trade volumes and increased automation require an infrastructure that offers superior runtime performance and scalability. IBM benchmarks have shown that DB2 pureXML™ technology can provide 2- to 5-times faster performance for concurrent insert operations and up to 40 times faster performance for certain types of queries when

compared with relational alternatives.[8] Furthermore, separate studies conducted by Intel[9] and IBM[10] on different hardware platforms also demonstrate high levels of scalability for read-only as well as read/write workloads.

Various technical features in DB2 support strong runtime performance and scalability. These include new XML-based indexing techniques, new cost-based query optimization techniques, direct support for the XQuery language (which avoids the overhead of transforming XQueries into SQL), and pre-parsing of the XML data prior to storage (which avoids expensive XML parsing operations at query runtime). To integrate easily within existing IT infrastructures, DB2 supports popular application programming interfaces (APIs) and industry-standard query languages. Thus, firms can employ a common interface and database management platform for traditional corporate data (modeled in tables) as well as complex derivatives trading data (modeled in XML). Indeed, IBM even offers free software to help firms quickly deploy a sample derivatives trading database complete with FpML data, associated database objects, pre-built queries, and stored procedures.

IBM studies and early client experiences have shown that DB2's hybrid architecture can reduce labor requirements, shorten development cycles, and provide strong runtime performance. For example, Storebrand, a Norwegian financial services firm, compared DB2's pureXML support with relational technology for various situations.[11] It found that pureXML enabled them to

- Generate a report in less than 10 minutes instead of more than 1 day.
- Implement a schema change in a few minutes instead of requiring a full day to prototype and test the change.
- Reduce the I/O portions of select Web services by 65%.

[8] Nicola, M. and V. Rodrigues. "A performance comparison of DB2 9 pureXML and CLOB or shredded XML storage," *IBM developerWorks*, Dec. 2006.

[9] *DB2 pureXML scalability on Intel Xeon MP Platforms using IBM N Series Storage*, Intel paper, 2006.
[10] Kogan, I. and M. Nicola, B. Schiefer. "DB2 9 XML performance characteristics," *IBM developerWorks*, Jan. 2006.

[11] Saracco, C. and D. Chamberlin, R. Ahuja. DB2 pureXML Overview and Fast Start, IBM Redbook Chapter 1, July 2006.

Conclusions

There are industry wide deficiencies in the OTC confirmation process. The deficiencies are seen in inefficient and manual production processes, high rework levels, extended and variable trade confirmation cycle times and high error rates.

What if ….

- Derivatives trades could be tracked according to an automated graphical model to determine each trade's progress, identify bottlenecks, and benchmark internal processes to industry standards?
- Standard business and legal rules could be applied to the derivatives trade confirmation process so that trade contracts could be custom-developed in real-time, reviewed and electronically forwarded to interested parties?
- The derivatives trade confirmation process was subjected to automated process management to ensure that various tasks take place in the allotted time and according to guidelines?
- An automated derivatives exception management solution could analyze, benchmark and report on the message traffic it sees?
- The maintenance (queries and updates) of executed derivatives trades could be processed quickly and efficiently?
- Business Analysts could analyze and improve trade flows through a business-centric client tool?

The derivatives confirmation solution outlined in this paper addresses these and more "*what ifs*." It integrates best-of-breed software components into a robust, post trade OTC derivatives solution.

Getting Started

To learn more about how the integrated Derivatives Confirmation Solution (DCS) can help with your derivatives trading application, consult the materials cited in the "References" section or contact your IBM account representative.

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Appendix A: About derivatives

A derivative is a financial instrument based upon (or derived from) some asset, such as a stock or stock index (in the case of an *equity derivative*). Two parties agree to exchange cash or something of value based upon conditions affecting the underlying asset. Typically, one party uses the trade as a way to mitigate (or *hedge* against) risk; the other party uses the trade as a way to gain immediate income (through fees or premiums) and/or to *speculate* that future market conditions will provide profits.

Two short examples may help clarify these concepts. An *equity option derivative* might give Party A the option to sell 1000 shares of IBM stock to Party B at $90 per share in one year's time. Party A might seek such a contract if he believes IBM's share price, currently trading at $93, will drop below $90. To hedge against this, he's willing to pay a fee for the right to sell the stock the following year for $90 per share. Party B might speculate that IBM stock will exceed $90 per share by the contract settlement date and seek to profit from the up-front fees.

A *credit default swap derivative* could involve two financial institutions agreeing that one institution will assume the credit risk for a loan. Perhaps Bank A loaned $10 million to an airline company. Although the loan provides Bank A with a favorable income stream, it also carries risk. Officials at Bank A may fear that rising fuel prices, labor unrest, and competitive pressures could prompt the airline to default on its loan payments. To hedge against this, Bank A negotiates with Bank B to purchase protection against this type of credit event. In essence, Bank A agrees to pay Bank B periodic fees (premiums) to insure itself against the airline's failure to pay. If a default occurs, Bank B will pay a specified sum to Bank A.

Different types of derivatives are traded privately *(over-the-counter or OTC)* or through a public exchange *(exchange-traded).* Growth in derivatives trading is typically measured in the outstanding *notional* amount of such contracts, i.e., the nominal or face value used to calculate payments.

Derivatives can be divided into three general classes: *futures/forwards*, which involve buying or selling an asset at a future date; *options,* which give one party the option to sell an asset at a future date; and *swaps,* which enable two parties to exchange cash or other assets. The assets underlying different classes of derivatives can vary but often involve equities, interest rates, credit events, commodities, or foreign exchange rates.

For the purposes of this paper, the important characteristics of derivatives are: they're complex financial instruments that vary considerably, their life span typically ranges from months to years, and their terms and conditions may change over time. Indeed, even the parties involved may change over the life of a derivatives contract, as one party may assign its position to another (*novate).*

Appendix B: Derivatives Processing Overview

The OTC derivatives confirmation process has 5 key stages. A diagram of the process is shown in Fig. 2.

The stages are:

1. Confirmation generation
2. Review/edit/approve
3. Dispatch
4. Follow up
5. Matching

Confirmation generation
The confirmation generation stage is typically carried out by a specialist in the confirmations or documentation group. Specialists in this area are generally lawyers who have moved into the banking world. The generation process begins with the receipt of a new set of trade details, either electronically or via a ticket, which the specialist will incorporate into a template for that trade type, perhaps by re-keying, or by cutting and pasting.

The template could be purchased from a source such as ISDA (International Swaps and Derivatives Association), and maintained in a database, or it could simply be a copy of the last confirmation of this type of trade that the specialist drafted.

Once the trade details have been captured the specialist will then manually enrich the document with the following:

- Details of any ISDA Master Agreements in place.
- Client or counterparty information
- Contact names
- Legal and correspondence addresses
- Custom content requested by the client, for example some clients may choose to net settlement proceeds with those of other transactions under a netting agreement, while others may not.
- Custom formatting requested by the client
- Settlement information
- Bank and securities account details for both the bank and the client
- Credit information
- Details of credit ratings and clues relating to credit rating
- Information on any collateral that may be required

Review/edit/approve

The review/edit/approve stage is a multi-phase process that takes the draft confirmation and sends it to each of the internal parties with an interest in the terms and conditions of the trade. These will include but not be limited to the following:

- Documentation group supervisor
- Front office
    - Marketer/salesperson
    - Risk manager/trader
- Credit department
- Legal department
- Middle office

At each stage the draft confirmation is checked for content against the appropriate trade, client, credit, etc. records. There are three possible outcomes at each stage:

- Approval – everything is correct and the document can be moved on to the next check
- Amend Document – there is an error in the document that needs to be corrected. Depending on the process this may cause the document to be returned to the drafter straight away, or, more likely, it will continue through the checking process to collect all amendments before being returned to the drafter. The amended document will then go through this process again.
- Amend Trade or Reference Data – there is an error in the representation of the trade or its supporting data that needs to be corrected. Once corrected the confirmation will need to be re-drafted and then go through this process again.

Dispatch
Once the document has been through all the required iterations of review and amends it will finally be signed by a suitably qualified representative or officer of the bank and dispatched to the counterparty, by whichever method the counterparty prefers, currently the prevalent method is by fax.

Follow up
Following dispatch there is a process of monitoring all outstanding confirmations for response from the client. There are two basic sub-processes here:

- Aging – monitoring the age profile of the outstanding confirmations, against time thresholds that then trigger the follow up activity.
- Client follow up – chasing counterparties for responses when nothing has been received. Typically the first threshold for chasing is 30 days after dispatch.

Matching
Once a counterparty has responded, either with their own confirmation or with an annotated copy of the one which was sent out, their response needs to be matched with the details of the trade and the outgoing confirmation to which it pertains. Once the two records have been brought together they need to be reconciled for differences. Any

differences that are discovered need to be investigated and rectified either on the bank's side or the client's. Once this is complete the trade can have its status changed to affirmed and the process is complete.

References and free software downloads

About derivatives

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About IBM DB2 pureXML

DB2 pureXML software bundles for FpML, FIXML, and other formats. Available for free download at http://www.alphaworks.ibm.com/tech/purexml

Nicola, M. and V. Rodrigues. "A performance comparison of DB2 9 pureXML and CLOB or shredded XML storage," *IBM developerWorks*, Dec. 2006.

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About Thunderhead

Thunderhead Straight-Through Processing for Trade Confirmations, IBM Partner Solution for Financial Services profile, IBM Corp., June 2007.

Thunderhead XML Adapter for Deriv/SERV Trade Matching, http://www.thunderhead.com/resources/Thunderhead_DTCC_US.pdf

About IBM FileNet P8

Please visit http://www.filenet.com/.

Software Downloads

DB2 pureXML software bundles for FpML, FIXML, and other formats. Available for free download at http://www.alphaworks.ibm.com/tech/purexml

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