



## Case Study

# CME Group pioneers real-time risk architecture





# Introduction

CME Group, the world's leading and most diverse derivatives marketplace, operates in a highly-regulated market – and one that has undergone significant change. New and pending mandates, particularly around clearing, have had a significant impact on its business as well as that of its clients.

CME Group's expanded role in the reformed derivatives landscape means it has an even bigger responsibility for managing risk. In July 2012, CME Group was designated as a systemically important Financial Market Utility under Title VIII of the Dodd-Frank Act by the Financial Stability Oversight Council ("FSOC").

CME Group continuously assesses and enhances the technology it uses to manage risk. In conjunction with these changes, CME Group's technology team sought to identify how technology could help CME Clearing react to widespread market evolution and equip risk analysts with more robust risk management tools.



## The challenges

### A wave of regulatory change

Firms across the financial markets have had to cope with new regulatory pressures. In particular, the Dodd-Frank Act and the move to a centrally-cleared model for OTC derivatives have had a huge impact. As a central counterparty (“CCP”), CME Clearing positioned itself to rise to the challenge of helping market participants continue to manage their risk while meeting new regulatory requirements in a seamless manner by offering Swaps clearing services. To support this effort, CME Group’s Technology team committed to enhancing its robust risk management infrastructure with the integration of tools needed to manage the risk of cleared Swaps products and continuing to ensure the safety and soundness of the markets it serves.

One important technological requirement was in response to Dodd-Frank where the CFTC required new cleared swaps customer protection standards. Often referred to as “Legal Segregation with Operational Commingling,” or LSOC; this regulation fundamentally changed how firms treat cleared swaps customer positions and related margin. This, along with the CFTC customer protection enhancements for futures and options called Customer Gross Margining (“CGM”), meant that CME Group needed to view risk in an entirely different way.

CME Clearing risk management analysts were able to start managing clearing member risk at a far more granular level by monitoring individual client portfolios. They were also able to look at risk collectively across all of the asset classes cleared by CME Group – Futures/Options, Interest Rate Swaps, and Credit Default Swaps – on a real-time basis and conduct trend analysis. All of this was made possible by CME Group’s technology team and their drive to expand, update, and modernise its risk infrastructure.

## Bridging technology and the business

In any large organisation, technology underpins critical business processes and multiple teams rely on technology to do their jobs well. However, technology staff are sometimes removed from the core issue they’re trying to solve. If they are to address real business requirements, they need to first embed themselves at the heart of the challenge in hand.

Heather Munoz, Managing Director, Enterprise Architecture at CME Group, said: “We recognised that there was an opportunity for technology to make a significant impact across the business. But before we could start thinking about architecture, we needed to see the problems from the analysts’ point of view. We had to understand how regulations were affecting them, what insight they needed and how often they needed it. Only then could we make informed decisions about infrastructure.”



## The need for visibility

A key issue was the timeliness of the risk management information the analysts were receiving. Because the risk systems were batch-orientated, they delivered snapshots of P&Ls, margins, collateral and overall market risk information at 20- to 30-minute intervals throughout the day. Typically, this involved extracting and storing sets of data each time to perform the queries. The time-consuming nature of batch processing resulted in more time intensive risk analysis.

All of this involved looking at multiple pre-aggregated sets of information. If analysts wanted to view information in a new way, the technology team would need to carry out significant development work to provide that view. And because the tools were not integrated, they didn't naturally deliver a consolidated view of risk across all asset classes and portfolios.

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**Heather Munoz** - Managing Director, Enterprise Architecture at CME Group Banking

## Tacking performance

High performance is business-critical at CME Group. Each day millions of trades and prices are processed by the technology team, so leveraging CME Group's high systems performance in the risk management space was intuitive. However, because the risk management systems were not integrated, the business was unable to achieve the performance and response times it needed.

With new regulations, increasingly complex portfolios and growing data volumes, doing nothing was simply not an option. This static setup needed to change – and CME Clearing required a near real-time view with more detailed analytics.

Solving the puzzle with its existing technology would have required the risk department to more than triple the size of its analyst team. The cost implications of doing so made this option unrealistic.



## **The solution:** a different approach to real-time risk management

### **Speed and performance**

The technology team in collaboration with the business selected ActivePivot, the in-memory technology from ActiveViam, as the mission-critical backbone to its new risk management infrastructure.

Heather Munoz commented: “A major factor in our decision was ActivePivot’s ability to keep pace with multiple feeds of data. We needed to centralise data across all venues, asset classes and countries, be able to host and add multiple calculations, and provide support for ad hoc queries. It was really the combination of real time capability, high availability, and a straightforward integration of our bespoke business logic that set the platform apart.”

More traditional OLAP cubes might have been able to deliver on speed but failed when it came to performance and coping with volumes. ActivePivot’s ability to provide real time data streams to support alert mechanisms across huge data sets in real-time, along with on-the-fly calculations and ad hoc analysis was key.

Another factor in the decision was ActivePivot's ability to fit with CME Group's technology stack. Because the platform works with Java, the technology team knew it would be easy to integrate with existing systems without having to introduce new proprietary hardware.

CME Group also needed a platform it could easily customise to its own setup and requirements. Many competing solutions were very specific to a particular risk analyst profile or use case, with predominantly out-of-the-box features. The technology team, however, had bigger ambitions. They wanted to build out the infrastructure with a custom calculation engine along with other applications to help risk analysts better support the business. ActivePivot's flexibility was the perfect fit.

## Partnering for a smooth

Following an initial proof of concept, ActiveViam helped CME Group to implement ActivePivot as the backbone of the exchange's risk calculations, real-time position keeping and P&L, followed by Value at Risk calculation and analysis capabilities.

Key to the success of the project was the close partnership between ActiveViam and CME Group's technology team throughout the entire implementation and beyond.

ActiveViam provided on-site consulting services to help CME Group get the most from the new platform. This included training for its analysts and technology users and advice on how to configure the setup to deliver maximum performance and usability. By the time the system went live, the CME Group team had a deep understanding of how ActivePivot worked and how to harness its full power.

It was because of this strong relationship and consultancy that CME Group's technology team was able to conduct further feature development, configuration, and source data integration of its own.

This includes continuing integration with multiple sources of data, designing a customised user interface, and a robust web services API – all of which relied on the underlying data platform.

The technology team could also link several critical applications, including customer-facing systems, to the newly developed data platform with ActivePivot serving as the central component. These systems included CME Core, an online margining service that pulls portfolio and margin data in real-time, as well as an online trade blotter application that relies on real-time trade information flowing through the platform.



## The results

### Real-time and usable insight

Perhaps the most significant benefit for CME Clearing is the ability to equip risk analysts with real-time insights, moving away from the previous 30-minute batch cycles. This includes full visibility over the effect of new trades added to a portfolio as well as the effect of changes to market data on existing portfolios on a real-time basis. This means they can see the current P&L, react to events as they happen, deliver real-time mark-to-market, and gain quicker insight into market changes.

Analysts can also compare this real-time data to historical scenarios. With ActivePivot, they can recreate a snapshot of any time over the previous five days. This involves reconstructing the different levels of aggregation and calculations to get the full picture of a particular point in time. This allows for deeper analysis of exceptions or recent events and a faster, more accurate resolution.



# Greater protection and reduced risk for the clearing members

The ability to spot abnormal trends in the market and alert clearing members has always been critical to CME Group's risk management and increasing the speed at which this occurs is hugely valuable. The new and improved risk management system at CME Group is highly sensitive to these abnormalities, which include periods of increased volatility and overall trading volume due to significant global economic circumstances. This allows the exchange to instantly notify its clearing members so that they can take corrective action before the next banking cycle occurs. The automated system can even detect an incorrectly entered price on a trade before the client is even aware of the effect on their P&L, and help CME Group's analysts escalate and remedy the situation before it becomes real money.

Heather Munoz added: "If a clearing member exhibits abnormal trading patterns, or is exposed to sudden unexpected adverse market conditions, or even makes a mistake on the price of a trade, we can capture that as soon as it happens. The risk team can then call up a member and have them back out of a trade or otherwise adjust their portfolios if need be – so it's good for us and it's good for the members."

## Reduced time to market

For CME Group's technology team to build its own OLAP cube, it would have taken an enormous amount of resources and time. By partnering with ActiveViam, CME Group leverages the results of years of research and development to deploy a highly customisable and robust real-time risk infrastructure, tailored to its specific requirements, quickly.

This foundation also speeds up the time it takes to introduce new applications. Because of the agility of ActivePivot, new features that might have taken months to introduce can now take just days or even hours.

# Greater automation and efficiency

With ActivePivot, CME Group has replaced six different risk management tools with a single platform. Having an integrated technology setup that delivers real-time insights greatly simplifies and more quickly automates many of the risk management processes – particularly the more routine functions.

ActivePivot provides up-to-date comprehensive risk management views that enable analysts to automatically be alerted to exceptions and immediately begin an investigation, removing the need for analysts to do the time-consuming task of proactive searching and manual filtering.

# Cost savings

Change can be a costly exercise. However, CME has avoided the need for large and costly development cycles to satisfy a growing demand for ad-hoc specific views at increasingly granular levels of detail and across multiple lines of business. Ultimately, the firm has been able to better scale with increased business and increased regulatory obligations– and that has a huge cost benefit.



# A platform for the future

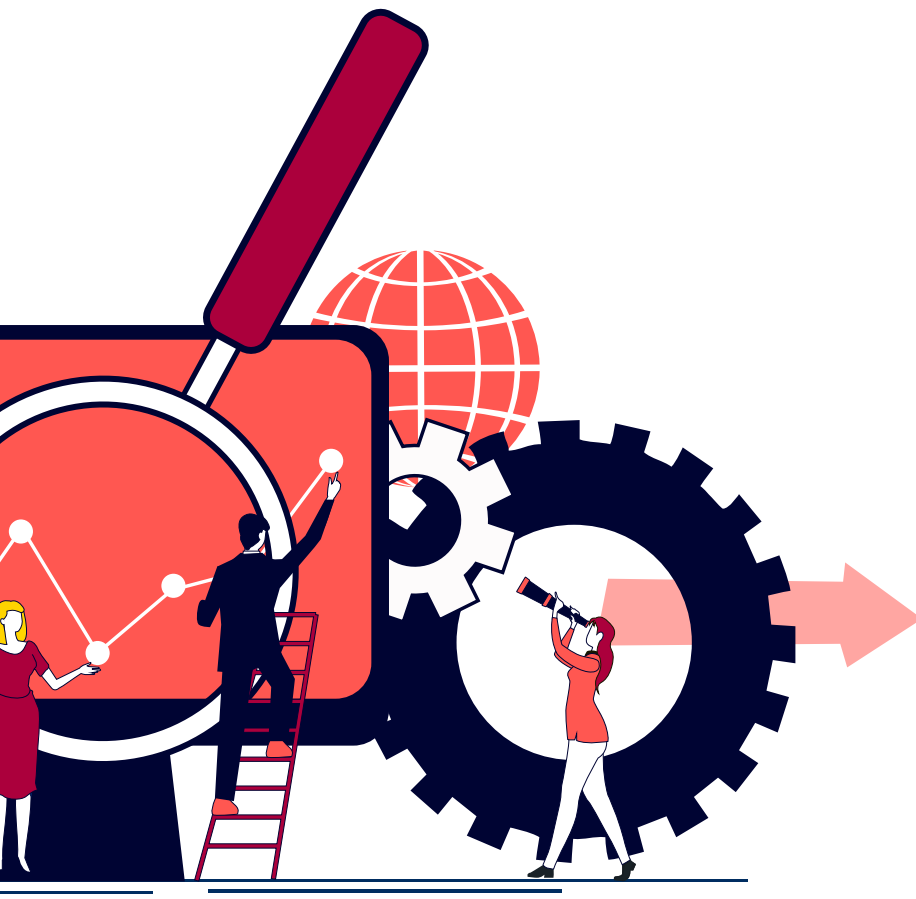
Regulations have transformed the financial markets and, in the OTC space, placed CCPs firmly under the spotlight. In response, CME Group's technology team took a bold architectural decision that enabled the organisation to redefine how it manages risk.

Heather Munoz concluded: "Competition has increased in the new clearing landscape, with clearing members able to choose from more options and a growing array of offerings. By delivering effective, real-time risk management, CME Group can attract and service greater volumes. What's more, because the technology reduces the total cost per trade, we can also remain cost-effective. As such, our new technology approach has had a significant impact on the business and will continue to do so in the future."

In terms of the wider capital markets, CCPs now find themselves tasked with a crucial and systemic role. It will be their ability to truly mitigate risk between counterparties that will ultimately dictate just how far the industry has come since the crisis.

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**Heather Munoz** - Managing Director, Enterprise Architecture at CME Group



# About ActiveViam

ActiveViam provide precision data analytics tools to help organisations make better decisions faster.

ActiveViam started in 2005 with the vision of leveraging in-memory technology to create an analytics platform where businesses could leverage the largest data sets without restrictions, keep them up-to-date in real time and use them to empower their decision makers. Our goal at ActiveViam, is to let organisations not only make decisions faster, but better; to not only reach their data, but their potential; to not only see their data, but find their way into the future.

ActiveViam is a privately owned company with offices in Paris, London, New York and Singapore.

For more information please visit: [www.activeviam.com](http://www.activeviam.com)

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