MoVE
Model Validation Engine

March 2018

CC&G – Risk Policy Team

MoVE in a Nutshell

A web-based platform to identify and manage risk exposures across different asset classes

Smart risk management environment

Risk managers can integrate a wide set of developed models into an easily configurable tool, which enables autonomous access to DB (no IT support needed)

Robust collateral analytics

The tool is complemented with in-built reliable risk models for CC&G's clearing services, developed according to best practices and including both margin simulations and a suite of VaR models

Flexible architecture

All functionalities can be run via a flexible and customizable user interface

Tailored solutions

The platform can be tailored to client's needs to effectively implement and utilize at best all functionalities, thanks to our analytical and industry expertise

Risk Modelling Functionalities

Portfolio VaR

Includes a vast suite of certified VaR models for multiple asset classes

- Historical VaR / Expected Shortfall
- Parametric VaR
- Monte Carlo VaR

CC&G margin simulator

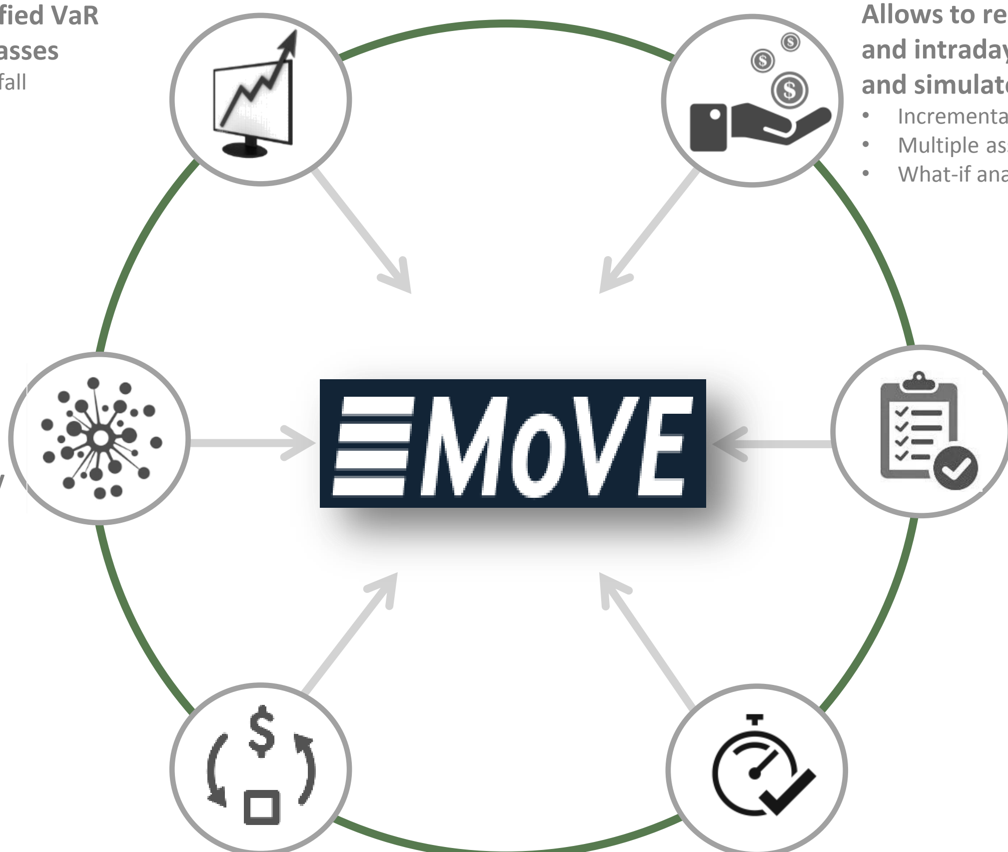
Allows to replicate initial, variation and intraday margin calls for actual and simulated portfolios

- Incremental margin
- Multiple asset classes
- What-if analysis

Network analysis

Models wide data sets using network representation theory

- Network construction
- Network effects valuation



Model validation

Enables a quantitative validation through automated checks

- Stress test, back test, sensitivity test
- Performance analysis
- Input data quality (freshness, gap, swing analysis)
- Regulatory compliance check

Portfolio attribution analysis

Identifies sources of return to serve as strategic risk tool

- Return attribution
- Performance attribution

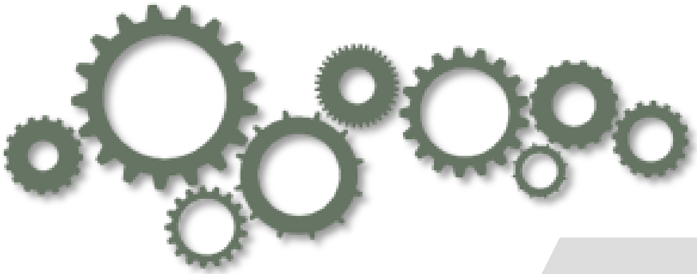
Time series comparison

Automated data storage allows performance analysis between different models over extended time horizons

- KRIs and KPIs
- Anomaly detection

Technical Overview

London Stock Exchange Group



Calculation engine

Non-developer users can easily run models from interface with no need to access/edit source code

- A Java component interacts with Matlab Runtime to run compiled code
- Other programming languages are also supported

Web interface

User friendly application, easily navigated with a web browser

- Runs on top of Drupal 7 CMS (WAMP stack) with custom modules and functionalities
- Provides data dashboarding and visualization

Centralized data storage

Results and data are stored in a dedicated DB and can be queried via web interface or downloaded as files

- MySQL database

Batch execution

Allows periodical scheduled runs of models, e.g. to create time series

- Allows automatic chained execution of model runs for a range of past dates

Development kit

New models created and compiled in Matlab can be easily integrated in the web interface

- The web interface provides a backend for integrating new models and their parameters

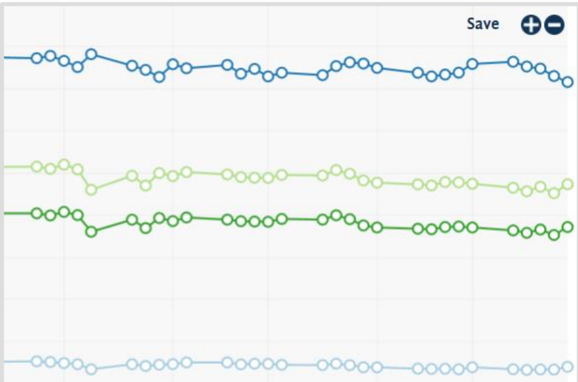
Message queue system

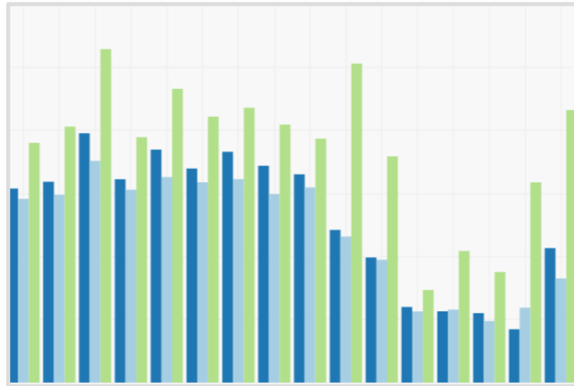
Models run asinchronously without blocking frontend functionalities

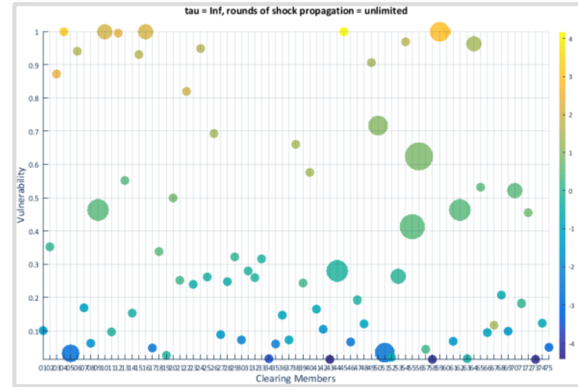
- Model runs are queued and handled as soon as a calculation engine component is free
- RabbitMQ server

Reporting

Graphics examples



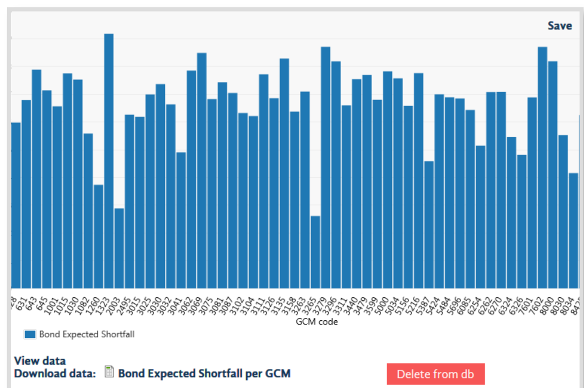




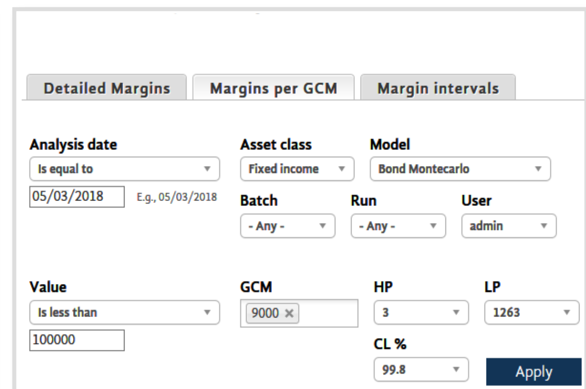
Online table view

GCM	NCM	ACCT	SUBACCT	STLGID	VALUE
GCM1	NCM1	C	*OMN	NET	3,574,398.95 €
GCM1	NCM1	F	*OMN	NET	17,299,054.08 €
GCM2	NCM2	C	*OMN	MTA	4,846,849.88 €
GCM2	NCM2	C	*OMN	NET	823,922.87 €
GCM2	NCM3	F	*OMN	MTA	83,829.50 €
GCM2	NCM4	F	*OMN	NET	682,968.10 €
GCM3	NCM5	F	*OMN	MTA	25,019,913.04 €
GCM3	NCM6	C	*OMN	MTA	11,167,705.29 €
GCM4	NCM7	F	*OMN	MTA	509.04 €
GCM4	NCM8	C	*OMN	MTA	14,025.18 €
GCM4	NCM9	F	*OMN	MTA	5,017,000.94 €

Export to Excel



Database access view



Contact Details

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About CC&G

CC&G is the LSEG Italian-based provider of risk management, open access clearing and CCP services to 12 markets, including Borsa Italiana's markets, NEX Group's BrokerTec and Hi-MTF.

CC&G eliminates counterparty risk by sitting in the middle of a trade as the buyer to every seller and the seller to every buyer, becoming the guarantor for final settlement of the contracts.

CC&G provides services across a diverse range of asset classes including equities, ETFs, derivatives, close-end funds, fixed income and commodity derivatives. CC&G has an interoperability agreement with LCH S.A. for European Bond and Repo markets.

CC&G promotes and offers the post-trading services in an equitable, transparent and non-discriminatory manner and on the basis of criteria and procedure aimed at assuring interoperability, security and equal treatment among market infrastructures, to all subjects who so request and are qualified in accordance with national and community legislation, applicable rules and decisions of the competent Authorities.