

# Eurex Exchange and Eurex Clearing

IT Innovation – State-Of-The-Art Market Infrastructure

19 April 2013



Eurex Exchange / International Securities Exchange / European Energy Exchange / Eurex Clearing / Eurex Bonds / Eurex Repo



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# Agenda

- New platform overview
- New trading architecture – speed and reliability
- New clearing architecture – new technology for open markets
- Prisma – the next generation risk management Services
- Integration of all platforms



# New platform overview

## A brief history – the Eurex technology roadmap

<b>Eurex Clearing: New clearing architecture</b>	Introduction of <b>Eurex Clearing's new clearing architecture</b> – step 1 next steps to follow for more functionality	<b>2013</b>
<b>Prisma – new risk management</b>	Introduction of <b>Prisma, the new risk management system</b> considering a customer's entire portfolio composition for margin calculation	<b>2013</b>
<b>Eurex Exchange: New trading architecture</b>	Introduction of <b>Eurex Exchange's new trading architecture</b> , based upon the technology of ISE's new trading system	<b>2012</b>
<b>ISE: New trading system</b>	Introduction of <b>ISE's new trading system</b>	<b>2011</b>
<b>Eurex Release 14.0</b>	Introduction of <b>new interfaces</b> , such as the <b>Eurex FIXML interface</b> to support a smooth transition towards the new trading architecture	<b>2011</b>
<b>Eurex Release 13.0</b>	Introduction of <b>Enhanced Confirmation Solution</b> for global confirmation data without the MISS infrastructure*	<b>2010</b>
<b>Eurex Release 10.0</b>	- Introduction of <b>Enhanced Broadcast Solution</b> - Introduction of <b>Enhanced Transaction Solution</b>	<b>2007</b>
<b>Eurex Release 9.0</b>	Start with optional socket based interfaces: <b>Eurex New Socket-Data Feed</b> for market data	<b>2006</b>



# New platform overview

## New platforms for a new trading, clearing and risk management environment

### New trading architecture

- World-class performance: highest throughput and ultra-low latency
- Zero footprint strategy for external interface, high speed but standards
- High system flexibility = short time to market for new functionality and products
- Separation of trading units within customer organization

### New clearing architecture

- Modular system architecture to facilitate internal and external integration of extended / new services
- New toolkit to support new clearing initiatives, such as client asset protection, OTC offering, portfolio margining
- Market standard interfaces (e.g. FIXML) instead of proprietary interfaces

### Prisma risk management

- Prisma to replace current risk based margining in a stepwise approach
- New calculation considers customer's entire portfolio composition for margin requirements
- Greater accuracy due to cross-product scenarios
- Robust methodology
- High flexibility - covering broad range of instruments





# New trading architecture

## Characteristics of Eurex Exchange's new trading architecture

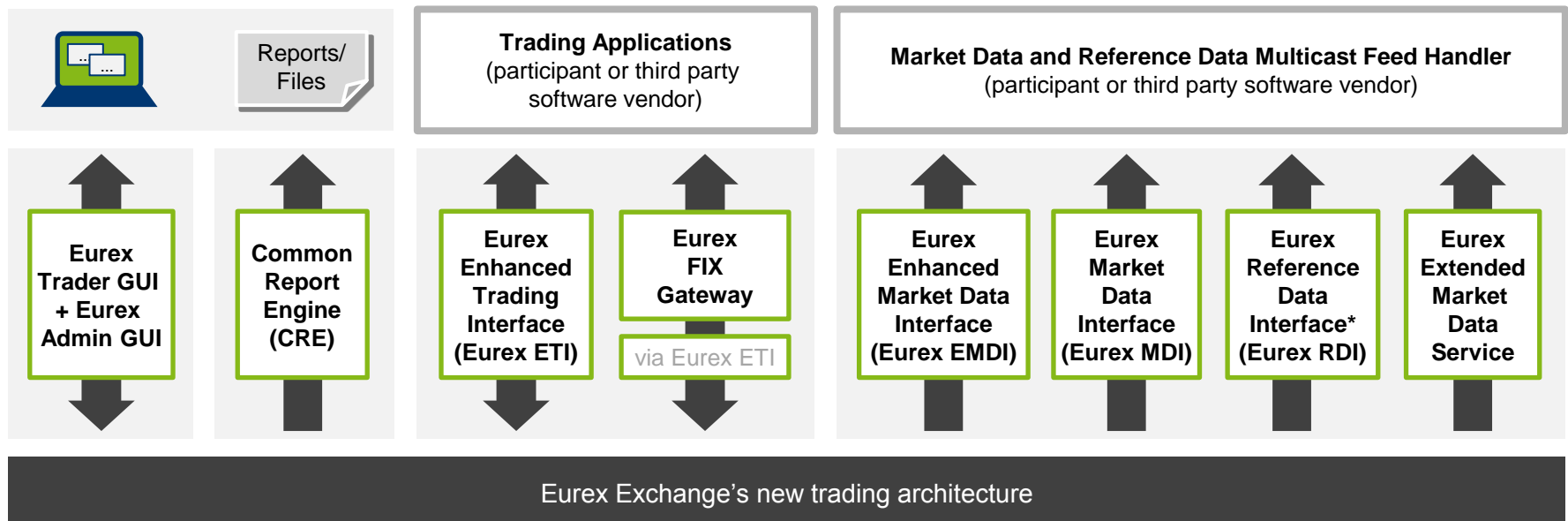
- New platform based on Linux operating system and high speed technology
  - Technical partitions concept for highest scalability, throughput and separation of failure domains
  - Multi-threading in the matching engine and post processing where parallel processing is possible
  - High speed messaging based on IBM's WLLM messaging middleware technology and system interconnection with Infiniband technology for low serialization time and superior throughput
  - Reliable by Design – fully redundant system layout with no single point of failure
- Zero footprint interfaces for exchange participants
  - Message based interfaces for trading and market/reference data
  - Web technology based GUI solutions for trading and administration
- New functionality
  - New hierarchy of participants and business units for logical separation of trading units within customer organizations
  - Synthetically linked full spread matrix for selected futures - all calendar spreads of a product
  - Non-standard options strategies enabling many combinations of options series without strategy templates
  - New order allocation scheme – time-pro-rata allocation combines aspects time and pro-rata allocation
  - New identical market order matching concept for futures and options – enables identical functions for futures and options products, such as market maker protection products and mass quotes for futures
- Designed from the ground up to support multiple markets - initially used for Eurex Exchange and the European Energy Exchange (EEX)



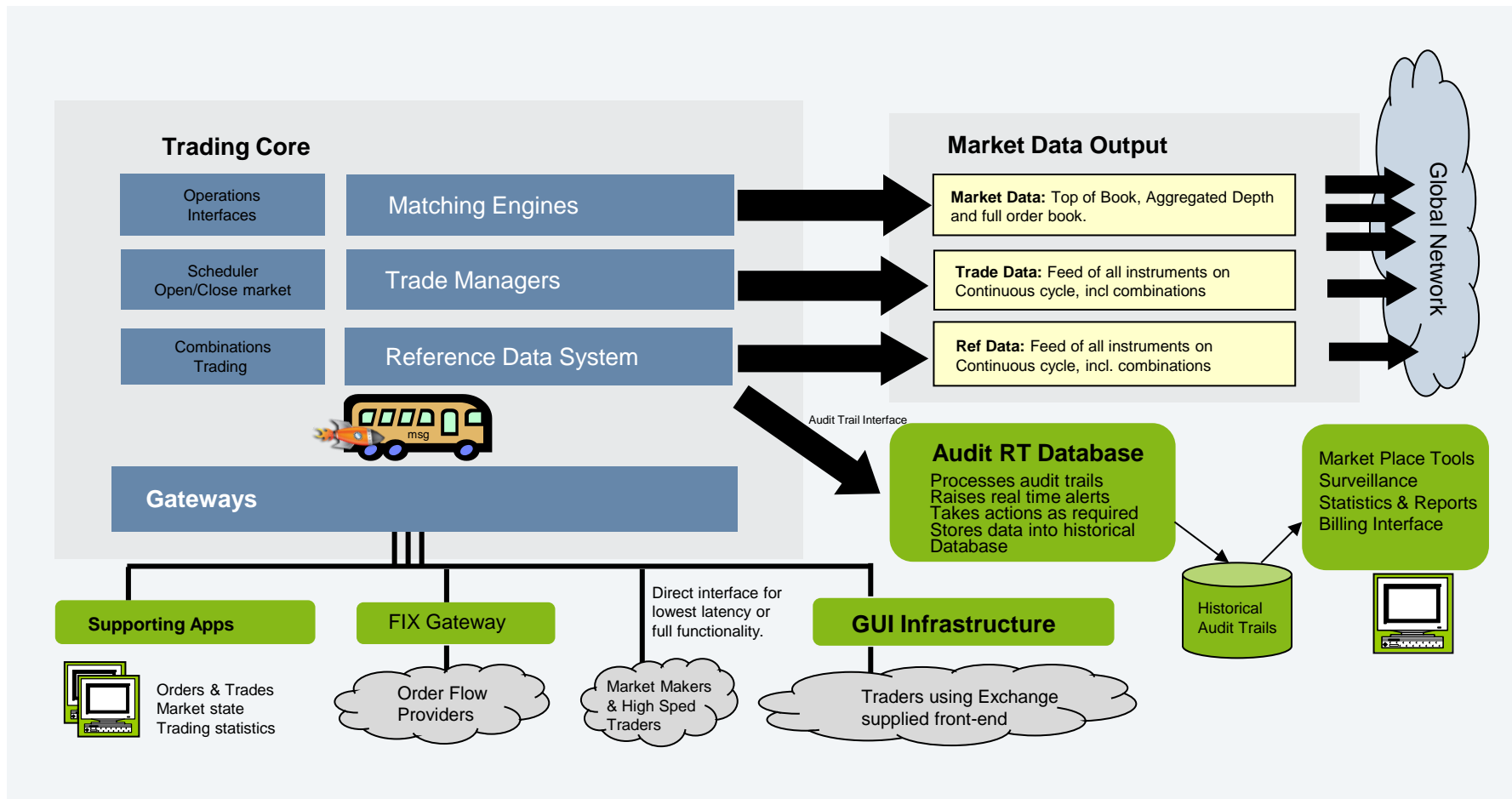
# New trading architecture

## Interface landscape of Eurex Exchange's new trading architecture

- Different interfaces for different purposes allowing for optimal functional coverage
- Deployment of industry standards, such as FIX protocol, FAST compression and web standards (GUI) allowing for fast deployment by participants
- Due to zero footprint strategy no installation of exchange software necessary for participants



# New trading architecture





# New clearing architecture

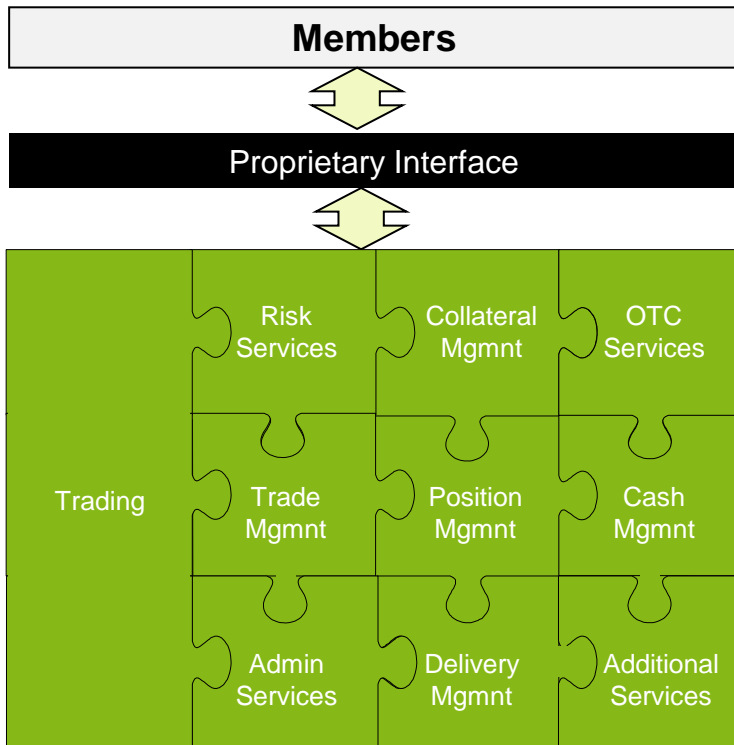
## Goals of the Eurex Clearing's new clearing architecture

- New modular platform concept
  - Based upon Linux with increased usage of standard / open source components in architecture
  - Establishes technical synergies with new trading architecture and Prisma
  - Encapsulation of individual service modules with clearly defined interfaces
  - Independent release cycles per clearing service possible
  - Will allow for extended service hours (23x6)
- Clearing member interfaces - no need to use Eurex defined hardware and software delivered by Eurex Clearing
  - New standardized FIXML interface to shield members from mandatory back-end changes; low member footprint solution without software installation effort and due to intrinsic backward compatibility in interface layer
  - New web GUI with zero footprint based on new Eurex clearing GUI strategy



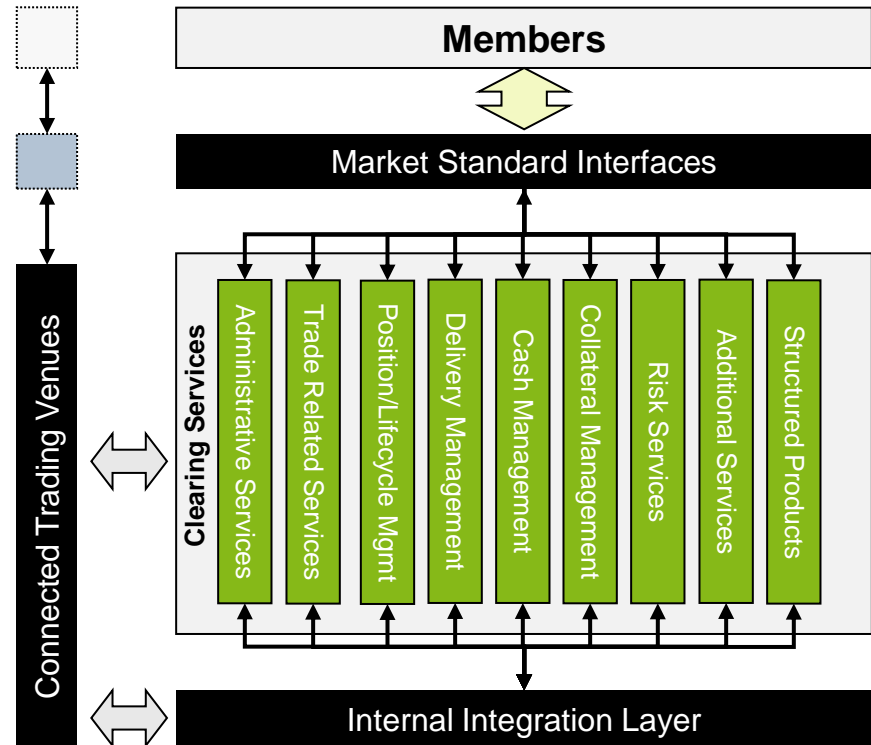
# New clearing architecture

## Former trading / clearing System



Monolithic highly integrated system with big footprint at member site

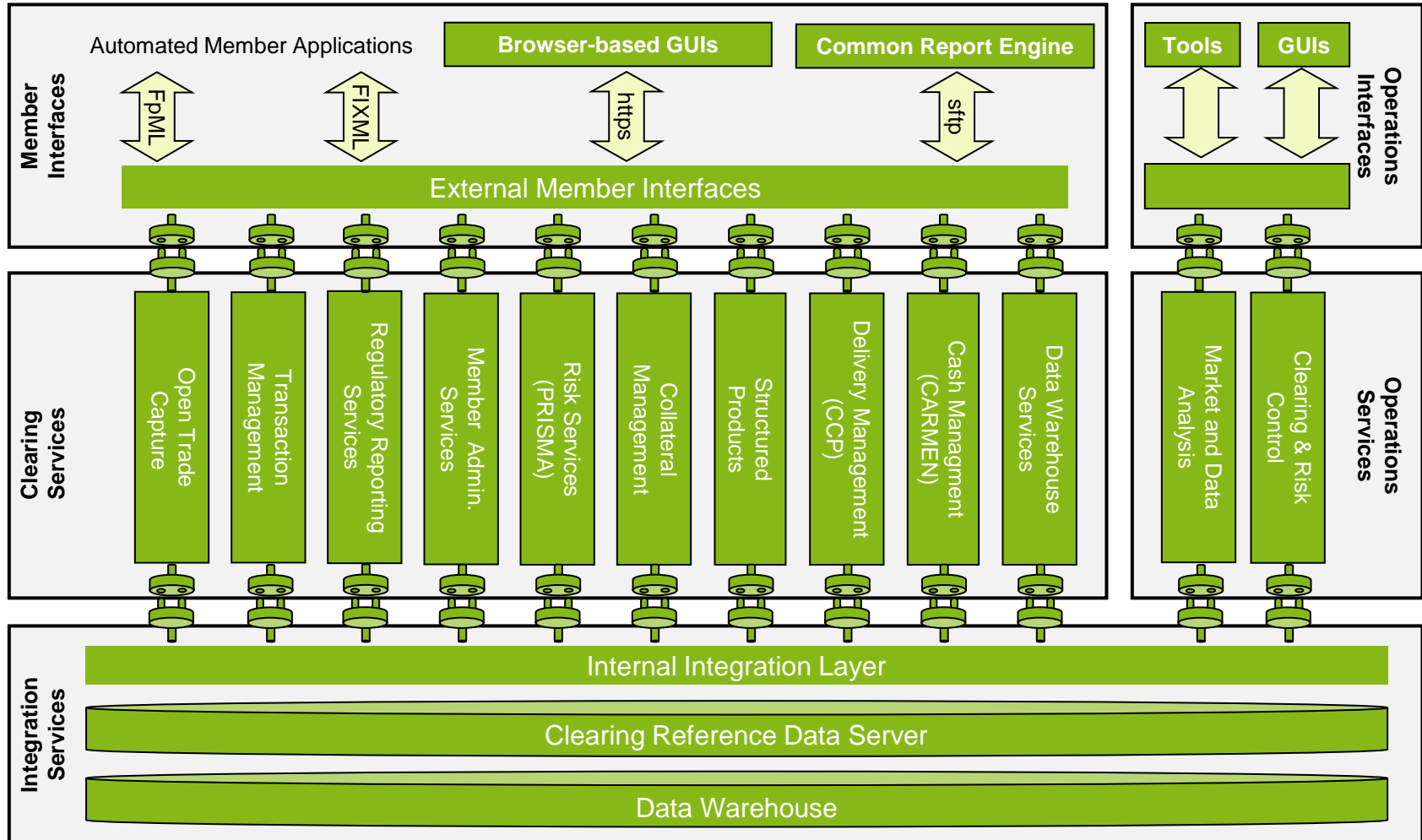
## New clearing architecture



Modular clearing services maintainable on a separate basis in a rapid development approach



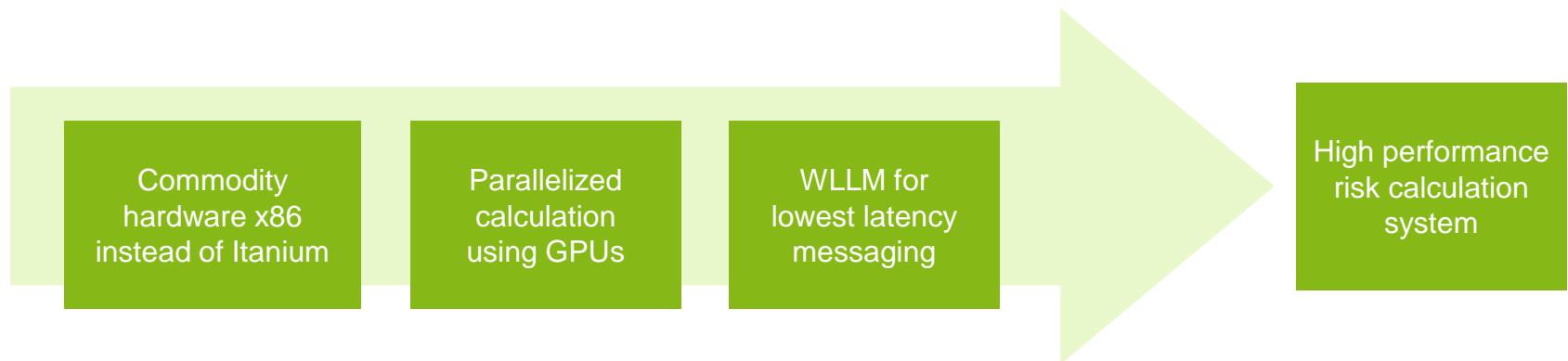
# New clearing architecture – Target system view



# Prisma – new risk management

## Eurex Clearing Prisma replaces risk based margining in a stepwise approach

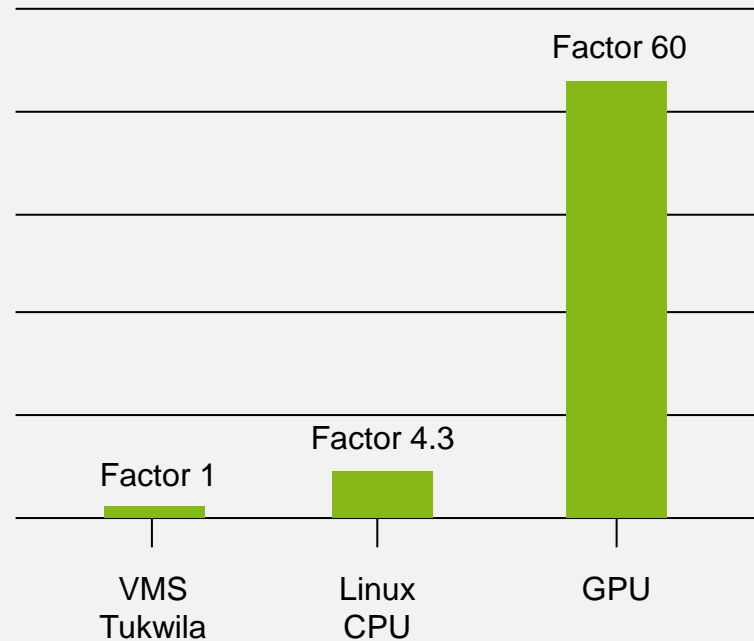
- The existing risk-based margining used by Eurex Clearing for the calculation of margin requirements for clearing member is effective, but does not consider a customer's entire portfolio composition when calculating margin requirements
- With Prisma Eurex Clearing introduces a new portfolio based risk management model calculating combined risks among customer positions, according to liquidation groups
- Technical concepts from the other new platforms are also used for the Prisma platform
  - Cluster internal high speed messaging based on WLLM
  - Reference data system and data access
  - Commodity x86 hardware instead of Itanium providing best price-performance ratio



# Prisma – new risk management

## High performance by parallel processing with GPUs instead of conventional CPUs

Theoretical option price calculations per second



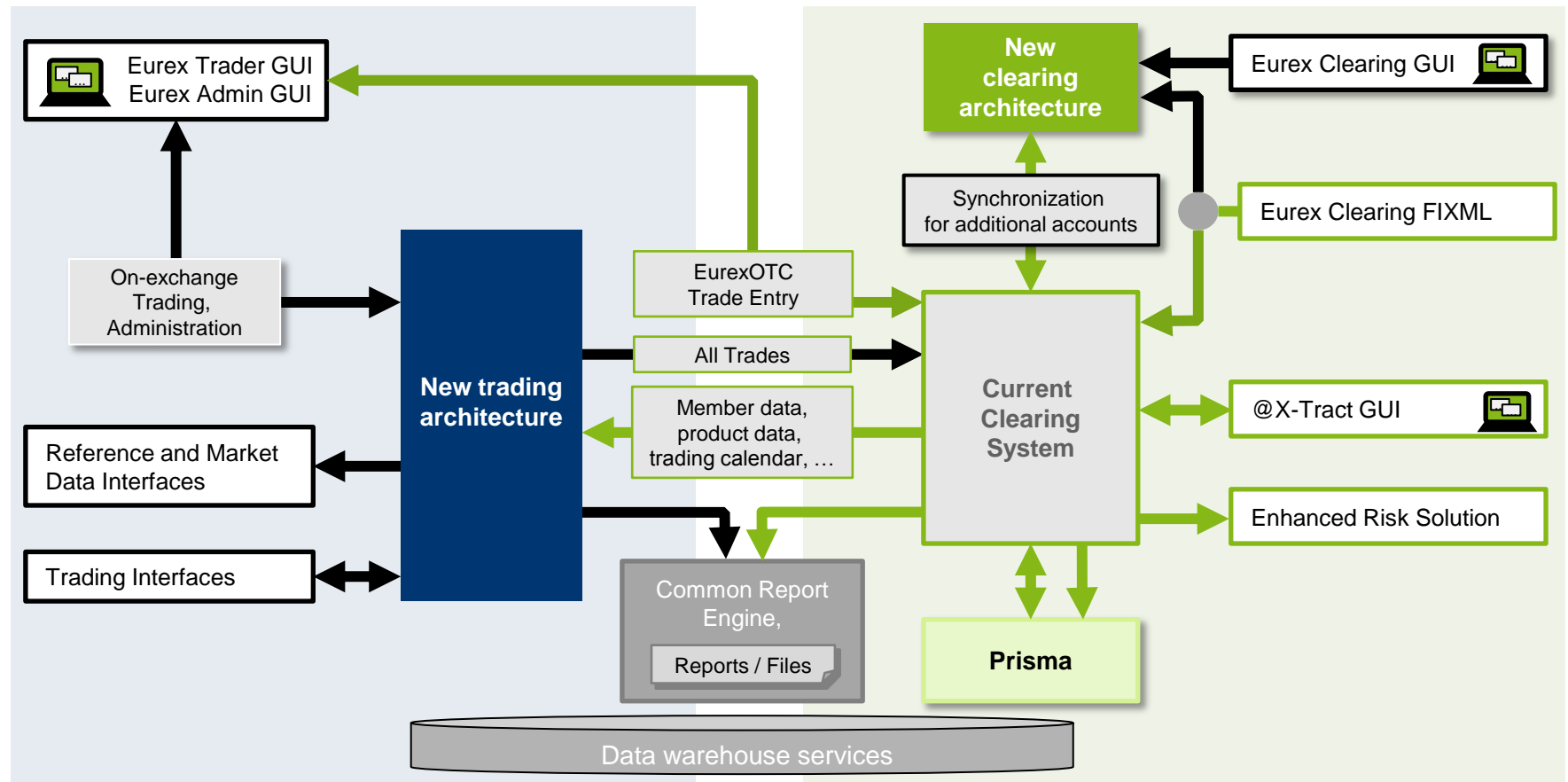
- GPU based parallel calculation provides significantly better calculation performance than conventional CPU based calculation
- Target: Duration as today with expected volume increase by factor 3 and number of scenarios by factor 30 approx.

#### Legend

- VMS Tukwila: BL860C i2, 2 x Itanium 9300 Quad Core @ 1.76GHz
- Linux CPU: Intel Xeon E5470, 2 x Xeon Quad Core @ 3.33GHz
- GPU: NVidia Tesla S1070, 4 x Tesla GPU with 240 Cores @ 1.44GHz

# Integration of platforms

## Integration of trading, clearing and risk management – step 1





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