LiquidityHub

High Volume Low Latency Transaction Processing

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Jeremy Vickers, Technical Architect, Detica

Date: **12th March**

Reference: **QCon 2008**

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Contents

- Overview of LiquidityHub
- Key challenges
- Technology overview
- Outcome
- Lessons learned

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Overview

- Current Situation
  - Interest Rate Swaps
  - Manual process
  - Multiple sources
  - Trading mechanism risk on dealer

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Overview II

- Current Market Environment
  - Introducing change in a volatile environment
  - Change vs. execution confidence

'Market can find solution to sub prime debt crisis'

volatile markets...

Overview III

- LiquidityHub Vision
  - Build platform that enables access to multiple sources
  - Leverage existing distribution channels
  - Platform must scale to include future products
  - Offer Request for Stream with real time pricing
  - More transparency, better pricing
  - Enable STP, reduce costs

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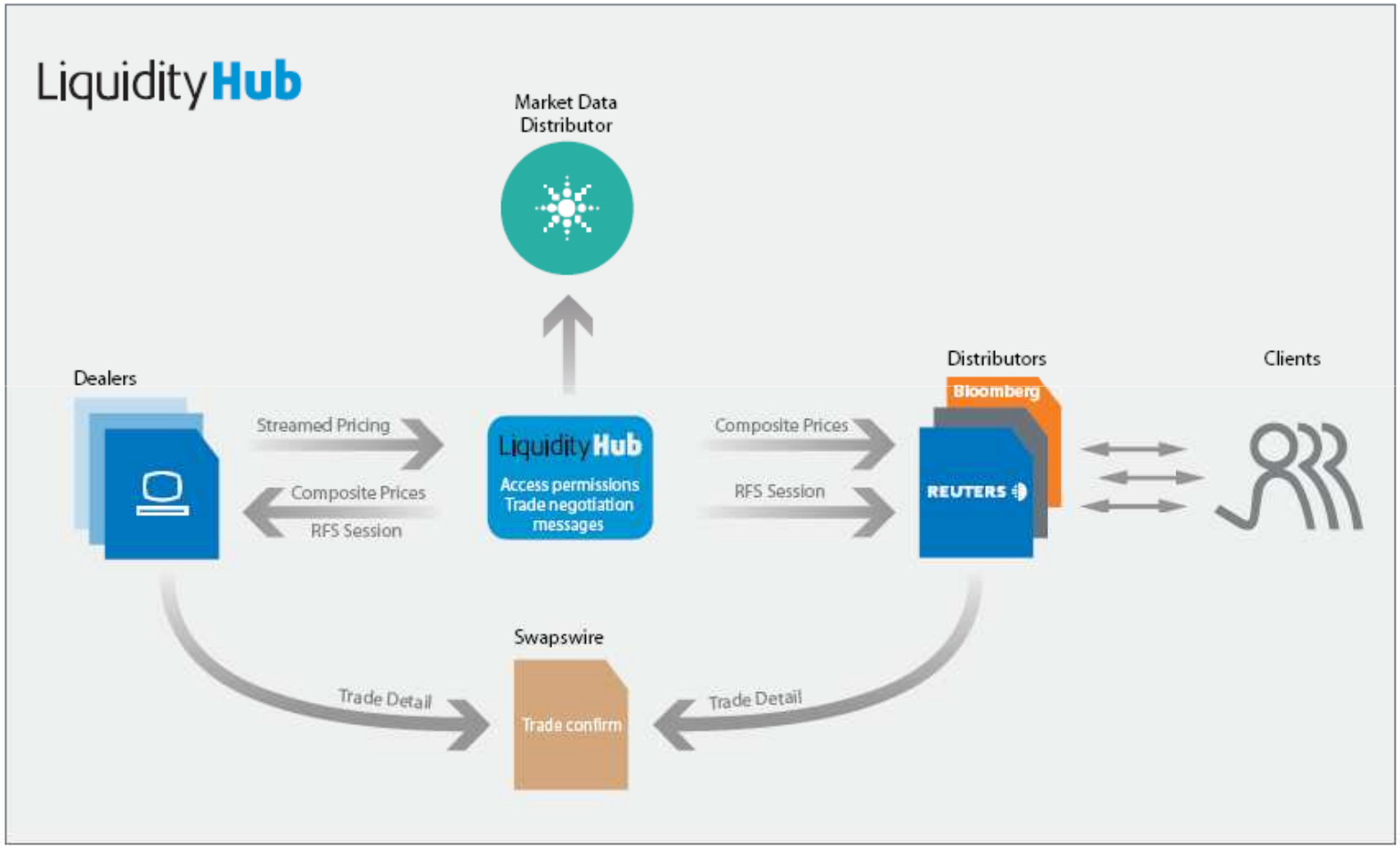
Overview IV


LiquidityHub
Market Data Distributor
Dealers
Streamed Pricing
Composite Prices
RFS Session
LiquidityHub
Access permissions
Trade negotiation messages
Composite Prices
RFS Session
Distributors
Bloomberg
REUTERS
Clients
Swapswire
Trade Detail
Trade confirm
Trade Detail

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Key Challenges

- Performance
  - Trade negotiation is time-sensitive, < 100 ms latency required
  - Year one volume 20,000 msg/s scaling to 100,000 msg/s by year five.
- Reliability
  - No loss of trade messages / transactions
- Ease Of Integration
  - Dealers and Distributors
- Availability
  - 99.99%
- Time To Market
  - Go Live Sept 2007 (9 months!)

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Key Challenges - Implementation

- Technology partner needed to define and implement the solution:
  - Detica had a global team with a track record implementing high volume low latency systems
  - Event Driven & Real Time Architecture expertise
  - Dedicated Market Services business area
  - Combined business and technology capability

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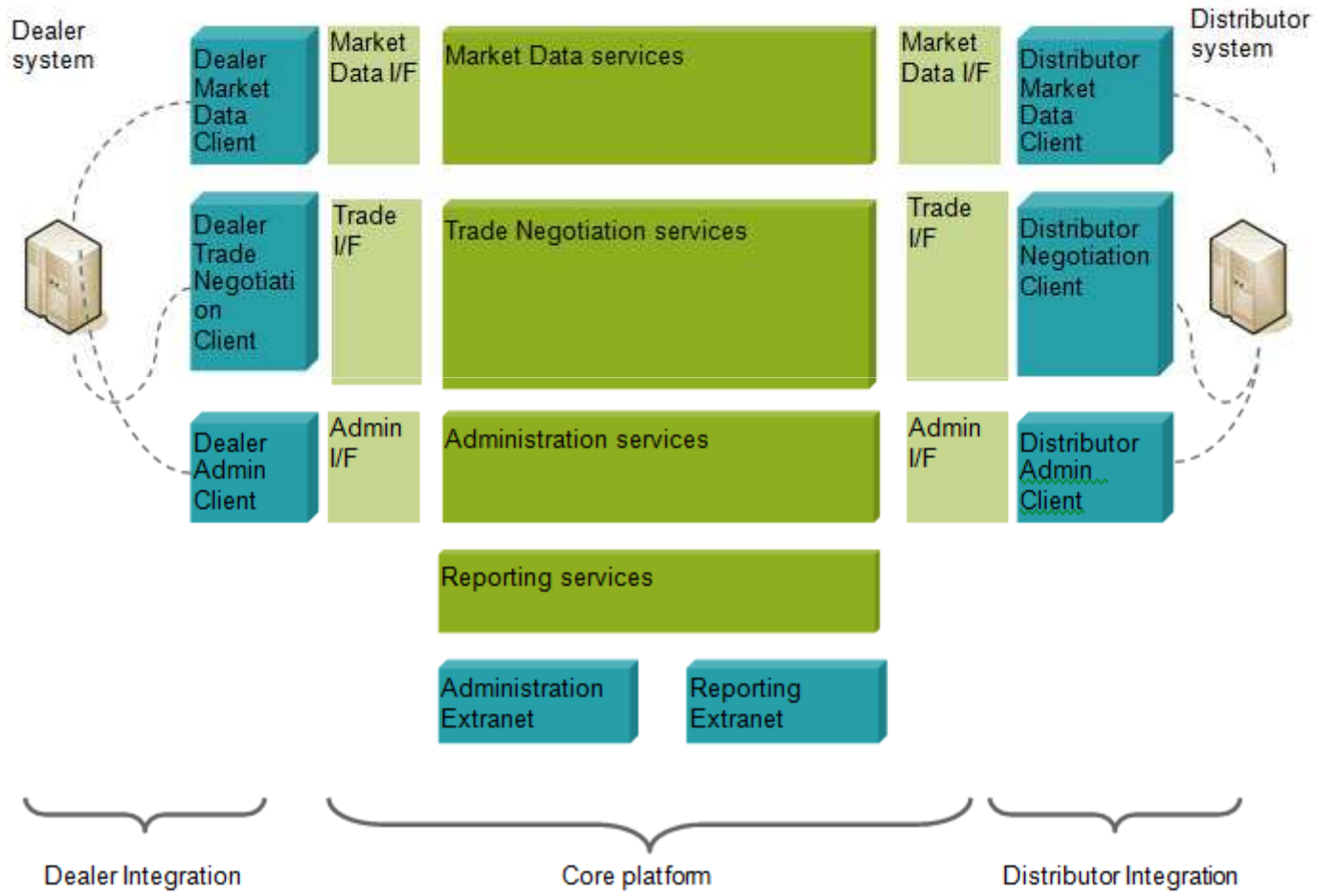
Technology – Functional Overview



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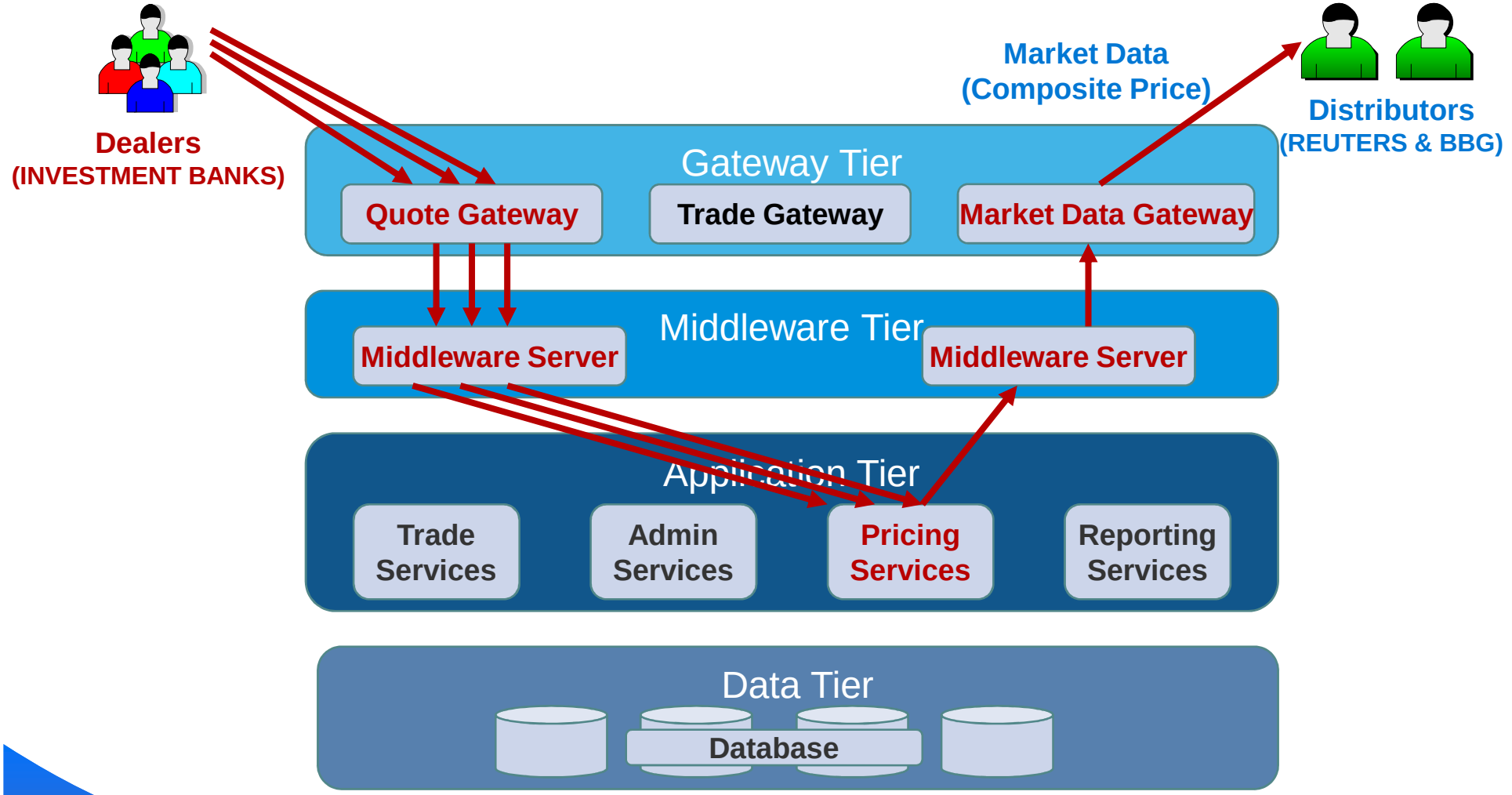
Technology – Pricing Example



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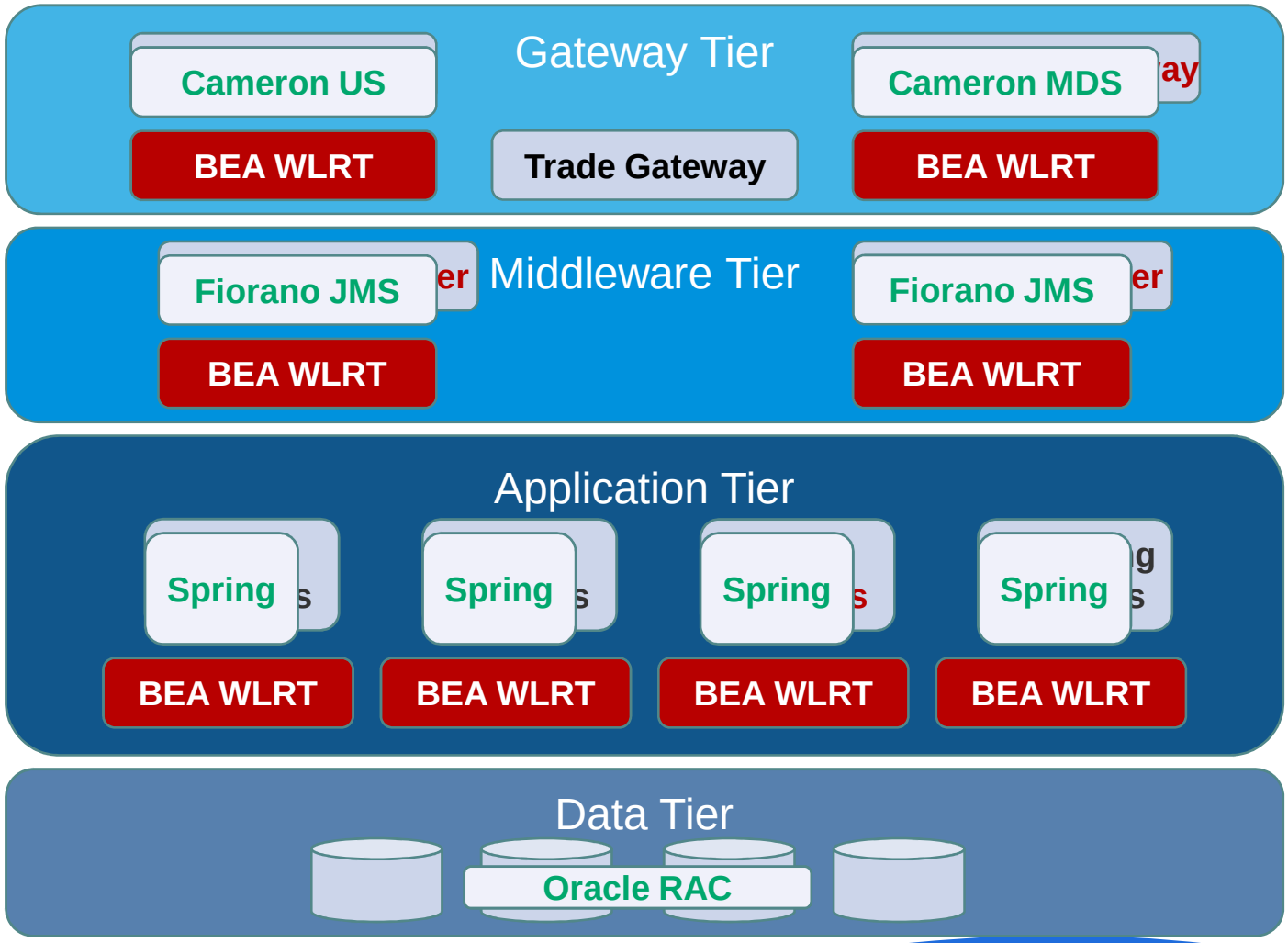
Technology - Products



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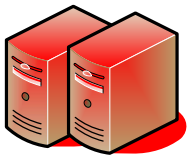
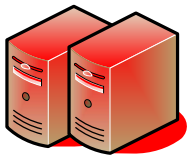
Technology – Hardware

Cameron US/MDS FIX WLRT

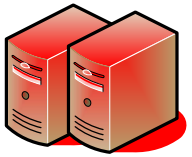


Trade & Quote Gateway



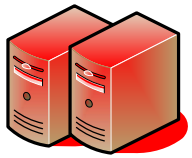
Market Data Gateway

FioranoMQ WLRT

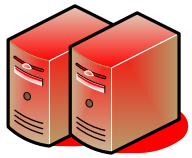


Middleware

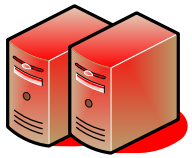
Spring WLRT



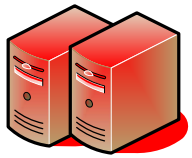
Trade Services



Pricing Services

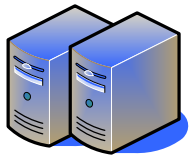


Admin Services

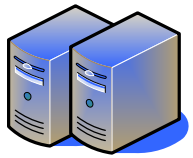


Reporting Services

Oracle RAC



Op/Trade Databases



Tick/Reporting Databases

Key

HP DL360
Dual Core 2xCPU 3GHz
4GB RAM

HP DL580
Dual Core 4xCPU 3.4GHz
8GB RAM

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Technology – Product Performance

- Cameron Universal Server & Market Data Server
  - FIX Servers
    - FIX is a standard communications protocol within the Investment Banking domain but is flexible enough to be customised
  - Cameron US/MDS can handle > 25,000 msg/s

- Fiorano MQ
  - Pure JMS Server
  - Can handle > 80,000 non-persistent msg/s

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Technology – Product Performance

- WebLogic Real Time provided a huge performance improvement compared to standard Sun JVM
  - **With -**15ms latency
  - **Without -** significantly > 100ms latency
- Underpinned key components in each tier
  - FIX Gateway Servers
  - JMS Servers
  - Spring
- Made Java solution a feasible and good choice for this system.
- System handling ~ 25,000 msg/s with 95th percentile latency ~15ms

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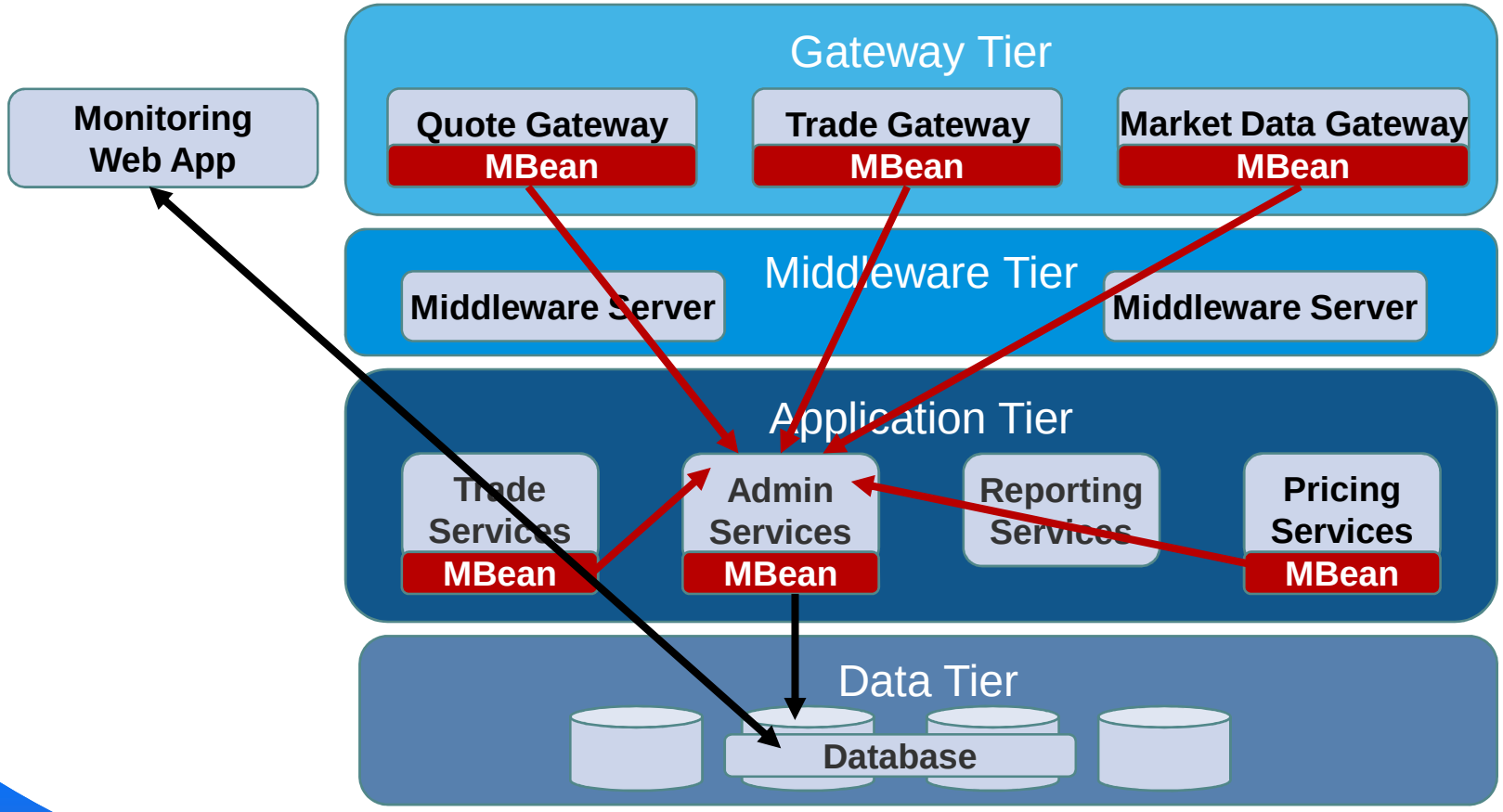
Performance Monitoring

- JMX Monitoring Framework



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Performance Monitoring

- Administration Application provides detailed statistics on:
  - Latency
    - Per message type
    - Per component if required
  - Throughput
  - Server/Service Status
- Provides an easily understandable dashboard for LiquidityHub staff.

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Outcome

- Designed, built and delivered the system in 9 months.
- System meets year 1 peak performance targets
  - Current latency figures 4 – 8ms
- System can scale to much higher message volumes
- Phase 4 currently in progress

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Lessons Learned

- Create more testing tools
  - Distributor GUI test harness
  - Log search & view
- Early prototyping helped de-risk the architecture
- Consider virtualization
- Managing 17 organisations is not easy!
  - Weekly tech forums worked well

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Questions?

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