# FIX and High Performance Trading Technology

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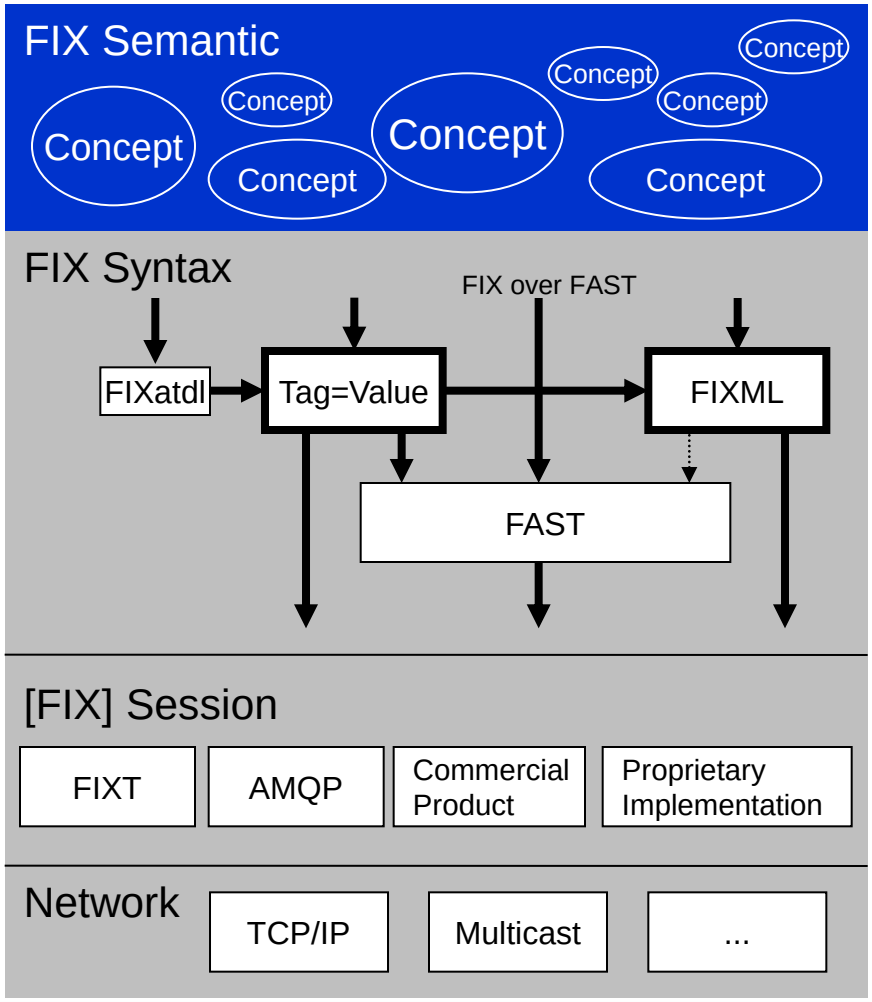
# Setting the scene…

- Why talk about FIX and High Performance?
- Is FIX more than just an interface?
- How has FIX been deployed in the past?
- What is needed to take FIX to the next level?

# Performance is impacted by…

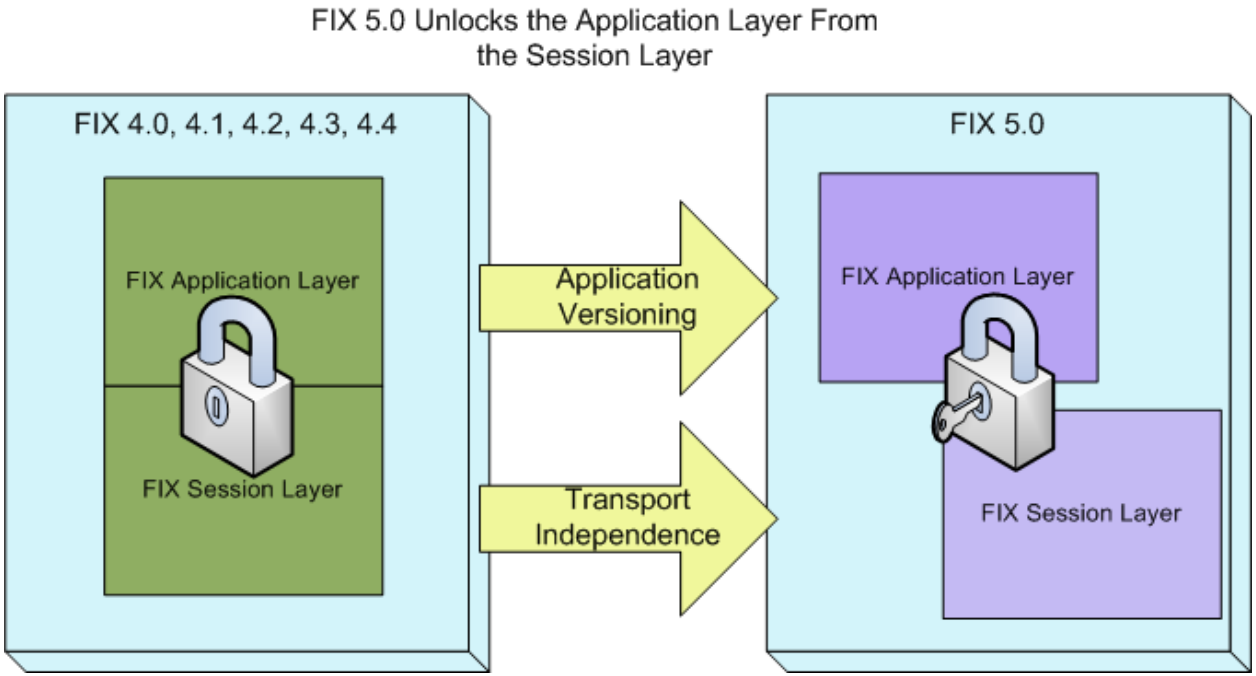
- Network Infrastructure
- Hardware
- Software
- Databases
- Interfaces
  - Encoding / Syntax
  - Alignment of interfaces and applications
  - Semantic verbosity of interfaces

# FIX Application and Transport Layer




- FIX semantics layer (application) consists of one or more concepts for each business functionality
- FIX syntax layer offers ASCII, XML and binary representations of the FIX semantics
- FAST is currently the only binary representation offered by FIX
- FIX session layer allows FIX and non-FIX transports as of FIX 5.0
- TCP/IP is used for transactions, multicast only for market data

# Structural Changes with FIX 5.0



# Encoding / Syntax

- FIXatdl
  - <Strategy name="Tazer1" uiRep="Tazer" wireValue="Tazer" version="1" fixMsgType= "D" providerID="ABC">…
- FIX tag=value
  - 8=FIX.4.2^9=92^35=A^49=BOFASEC0^…
- FIXML
  - <IOI IOIID="4711" TransTyp="N" Side="2" Qty="200"…
- FAST
  - FAST Templates describe message layouts
  - 81 84 41 4C CC 01 EA 91 82 E0 B1 FF 99 E0 B0

Increase of wire level legibility decreases performance!

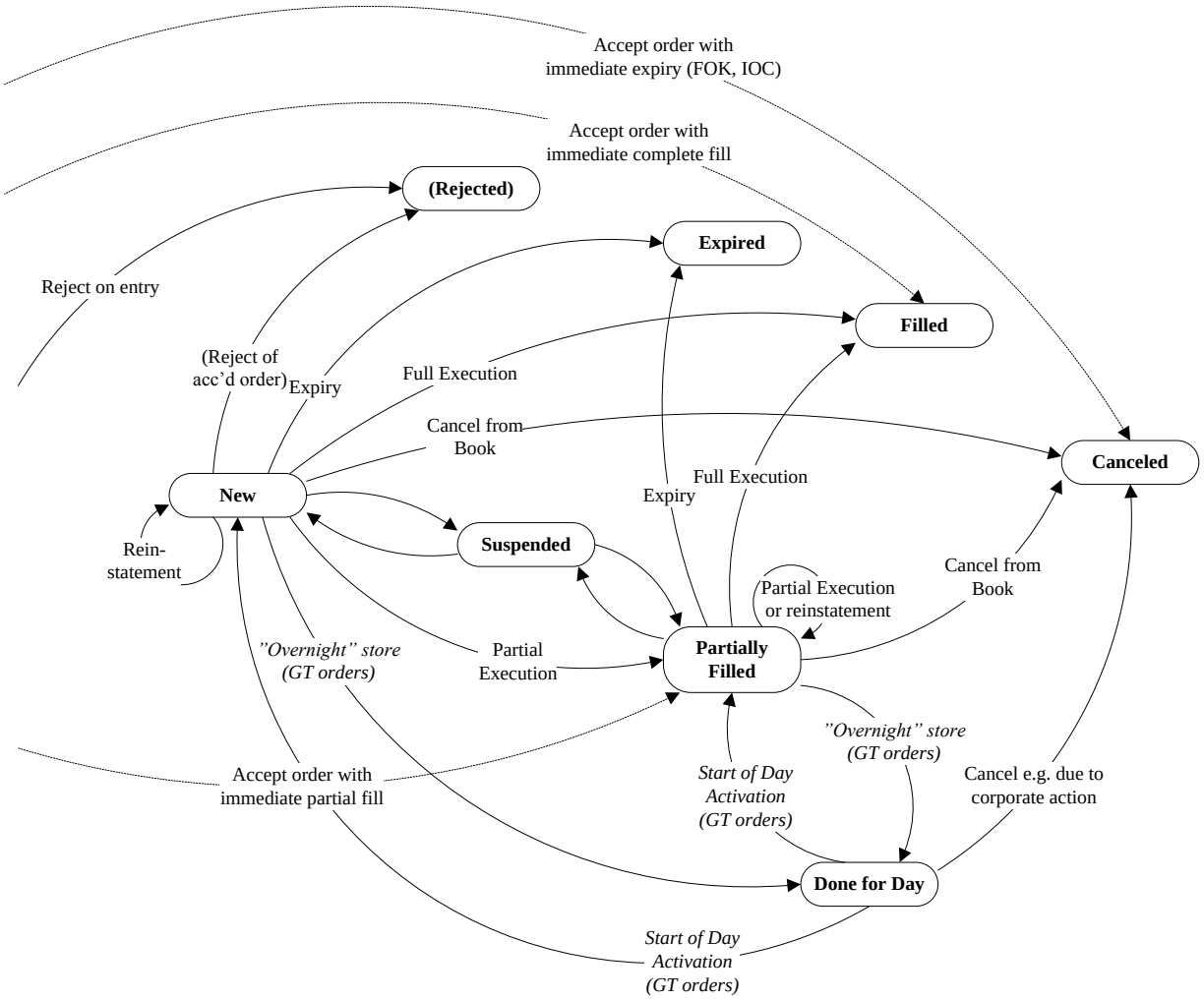
# Alignment of Interfaces and Applications

- Data Types
  - ASCII versus binary
  - MultipleCharValue, MultipleStringValue
- Entity Identification
  - IDs for Order, quotes, trades may be assigned by sender or receiver
- Transaction Models
  - 1:n translation (replication)
  - n:1 translation (bundling)
- Recovery Models
  - FIX Session Layer
  - FIX Application Sequencing

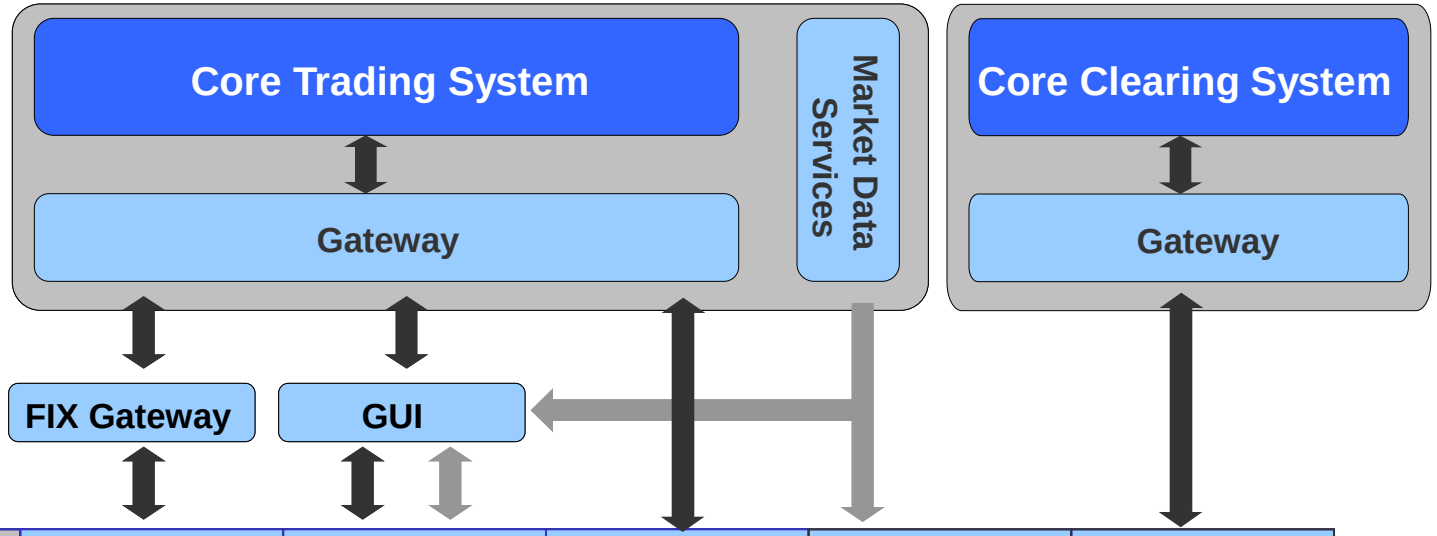
# Semantic Verbosity of Interfaces

- Mandatory versus optional fields
  - AvgPx is optional as of FIX 5.0
  - Order Cancel Request requires not only an order identifier and an instrument but also the side and order quantity
- Explicit versus implicit information
  - Single Execution Report for IOC/FOK orders
  - FIX 5.0 SP1 Specification Volume 7: Exchanges and Markets
- Message bundling
  - Multiple fills of the same order in a single Execution Report (SP1)
  - Mass action messages that can be optimized by receiver
- Echo of input from requests
  - Order submitter does not need attributes that do not change

# FIX Order State Changes



# Interface Architecture Framework




| Protocol | FIX over FIX | Interactive | FIX over Binary | FIX over FAST | FIXML over AMQP |
|---|---|---|---|---|---|
| Typical User | Order Routers | Standard User | Market Maker<br>Algo Trader<br>3rd Party GUI | Market Maker<br>Algo Trader<br>3rd Party GUI | Clearing Firm<br>3rd Party GUI |
| Transport Layer | FIX 4.x, FIXT 1.x<br>TCP/IP | N/A | **Binary**<br>TCP/IP | FAST 1.x<br>UDP Multicast | AMQP |
| Application Layer | FIX 4.x, FIX 5 | N/A | FIX 5.0 SPx | FIX 5.0 SPx | FIXML 5.0 SPx |

# Deutsche Börse Interfaces using FIX

- International Securities Exchange (ISE)
  - FIX 5.0 SP2 over Binary for Trading and Market Making
  - FIX 5.0 SP2 over FAST 1.2 for Reference and Market Data
  - FIX 4.2, 4.3, 4.4 over FIX Engine for Order Routing
- Eurex
  - FIXML 5.0 SP2 over AMQP for real-time Risk Management
  - FIXML 5.0 SP2 over AMQP for Clearing & OTC Trade Entry
- Eurex and Xetra
  - FIX 4.2, FIX 4.4 over FIX Engine for Order Routing
  - FIX 5.0 SP2 over FAST 1.2 for netted Market Data

# Conclusion

- FIX is a universal language for the financial industry, not just a technology.
- FIX can be used for many different interface types in combination with the appropriate transport.
- High performance can be achieved with FIX by integrating FIX semantics into the core system and using a binary transport.
- Gateways conveying FIX messages between internal and external applications can then be designed to be stateless.

# Questions?