

Ordo One

Introduction

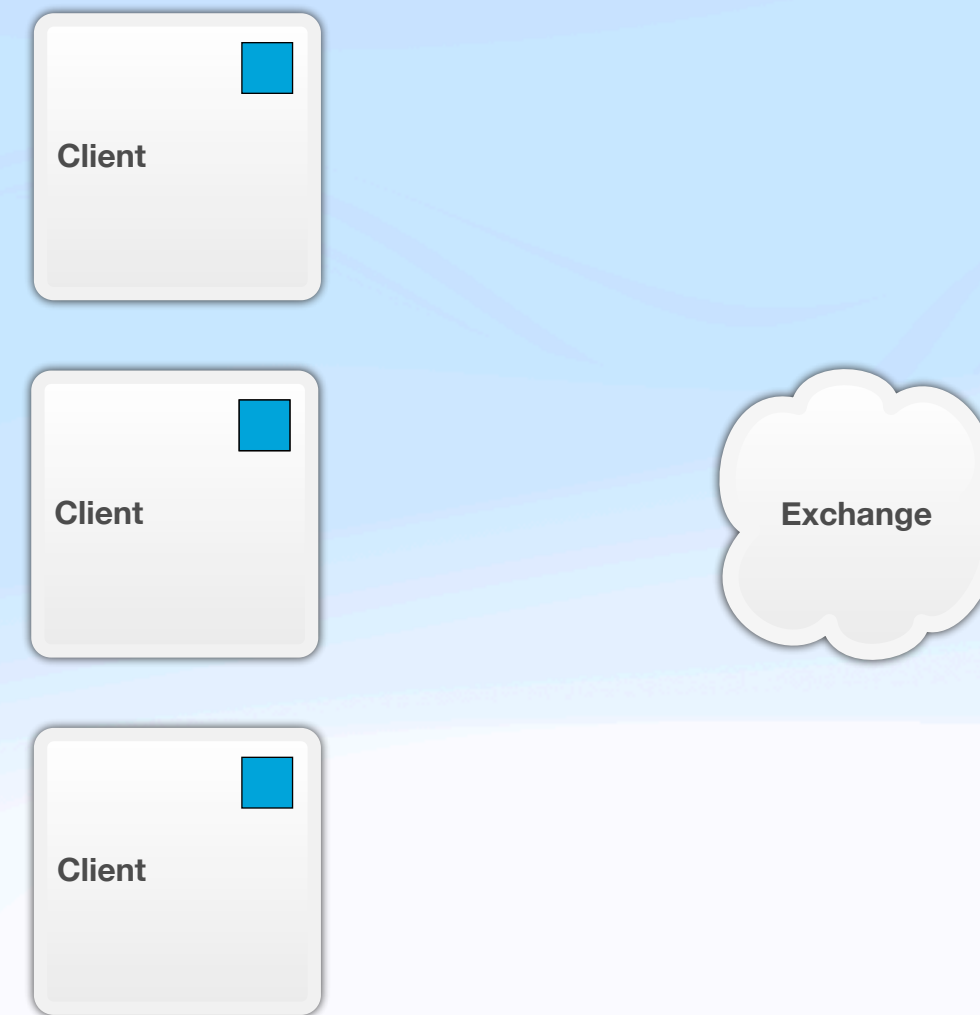
Jonas Hansbo, CEO, jonas@ordo.one

2024-11-14

Ordo One

- A **product software company** founded 2022
- A Next Generation Trading Platform (Ordo One) with a sustained focus on the needs of Market Makers and Proprietary Trading Firms
- Close “Co-op” between Proprietary Trading Firms and Product Development Entrepreneurs (us!)

1990s – Research & Trade



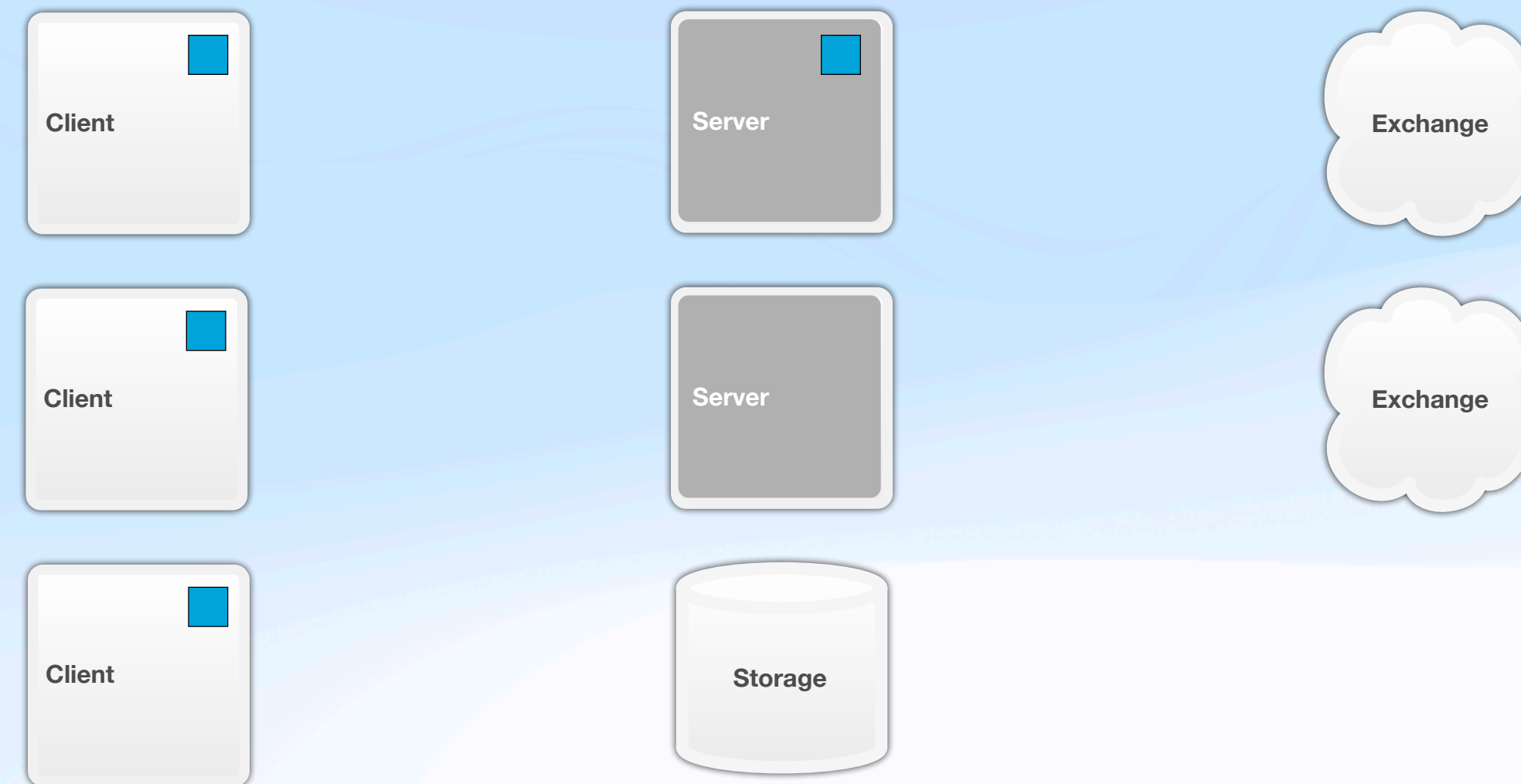
■ Business logic

1990s – Orc Trader



■ Business logic

2000s – Orc Liquidator



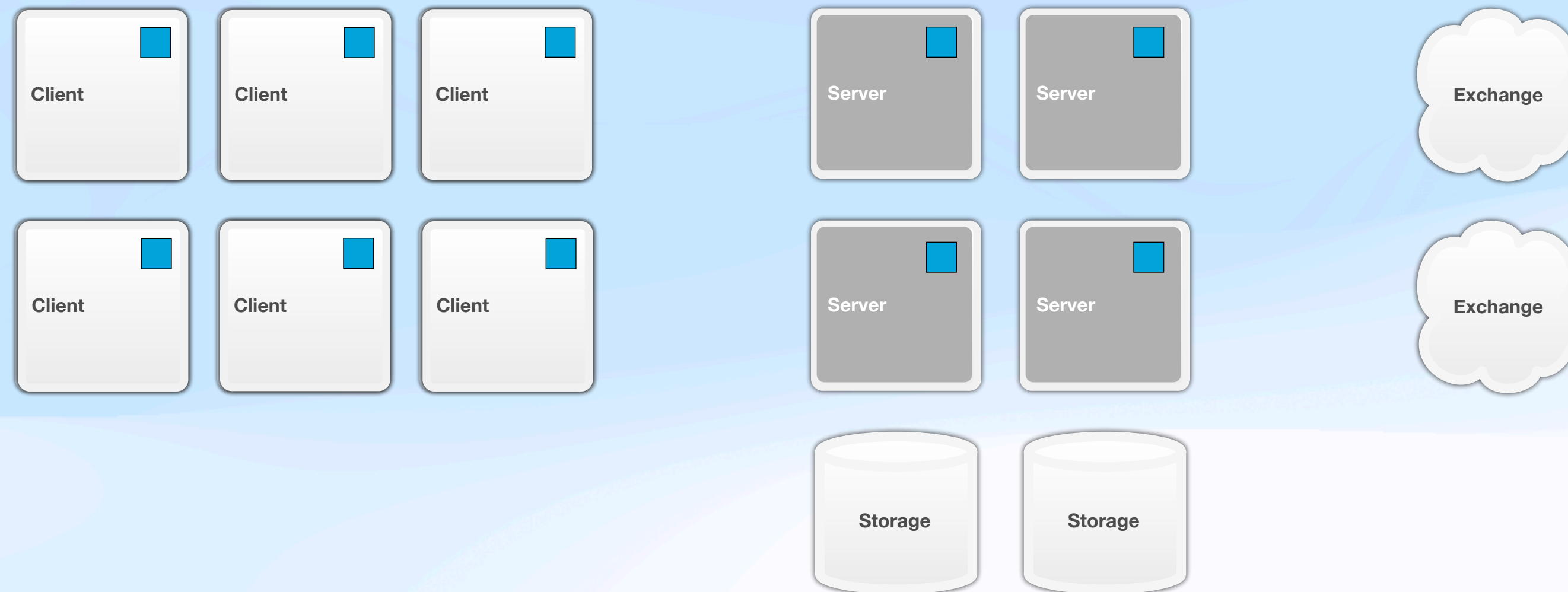
■ Business logic

2010— Tbricks



■ Business logic

2020 — Ordo One



Speed, speed, speed

$O(1)$

One technology stack

www.swift.org

- Frontend built with Swift UI on the desktop running on macOS
- Backend modules run on Ubuntu, also 100% Swift.



SwiftUI



Swift

ubuntu



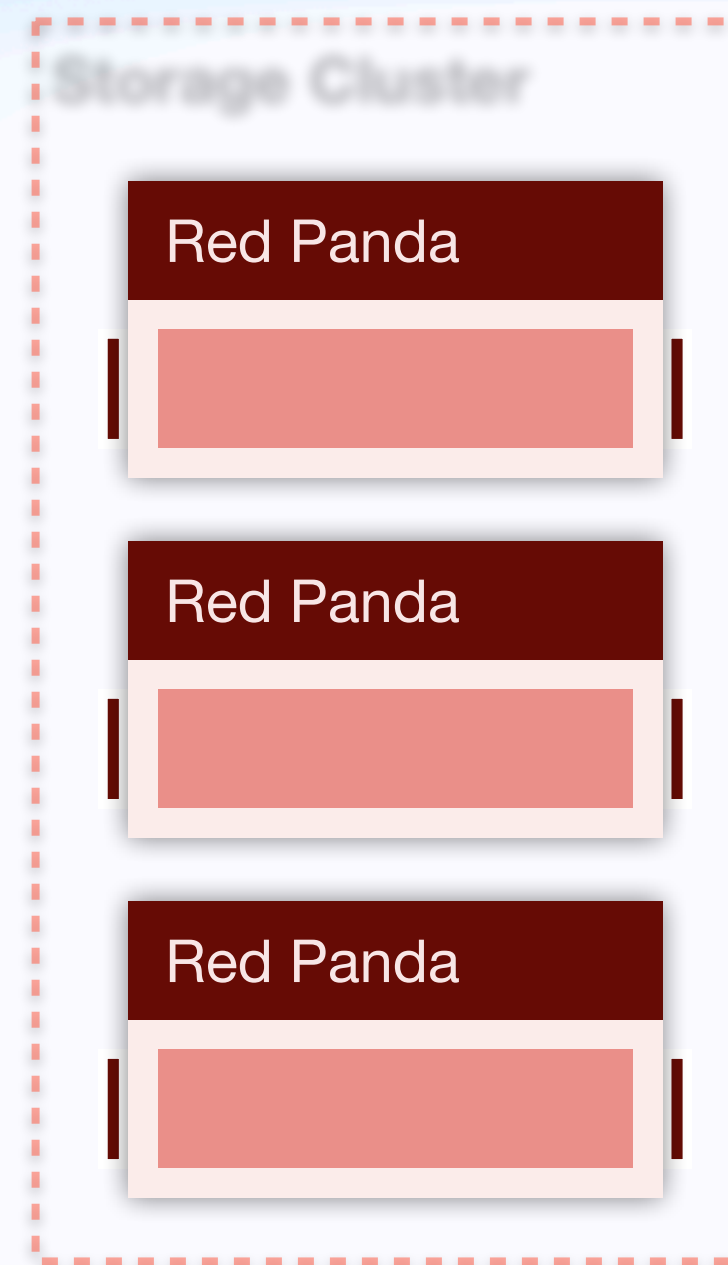
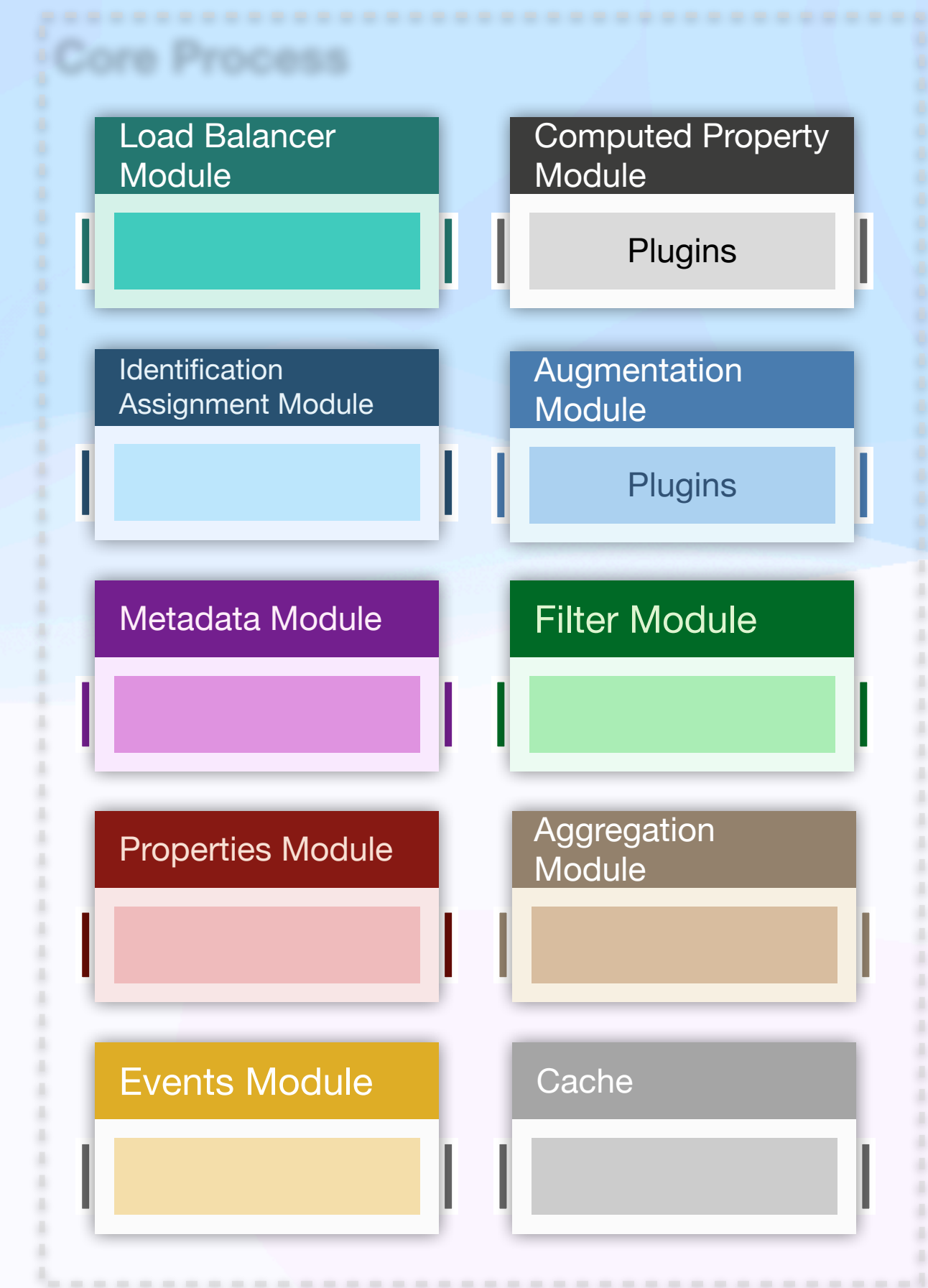
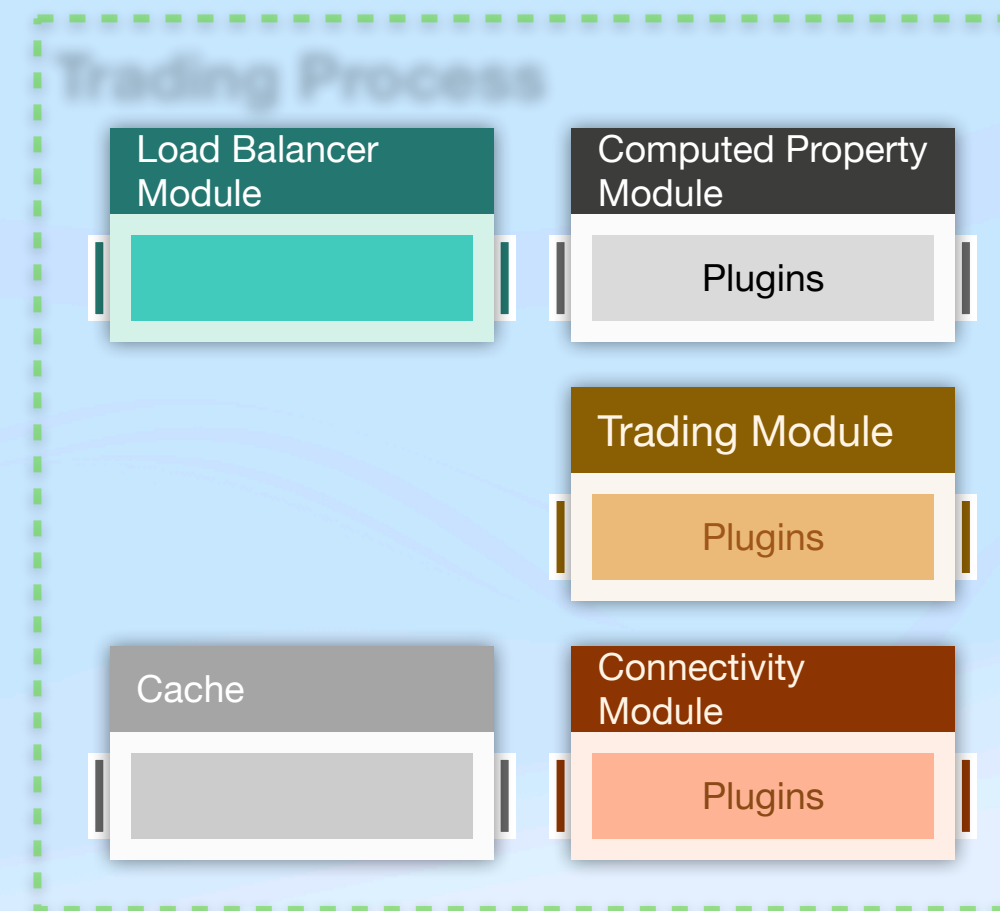
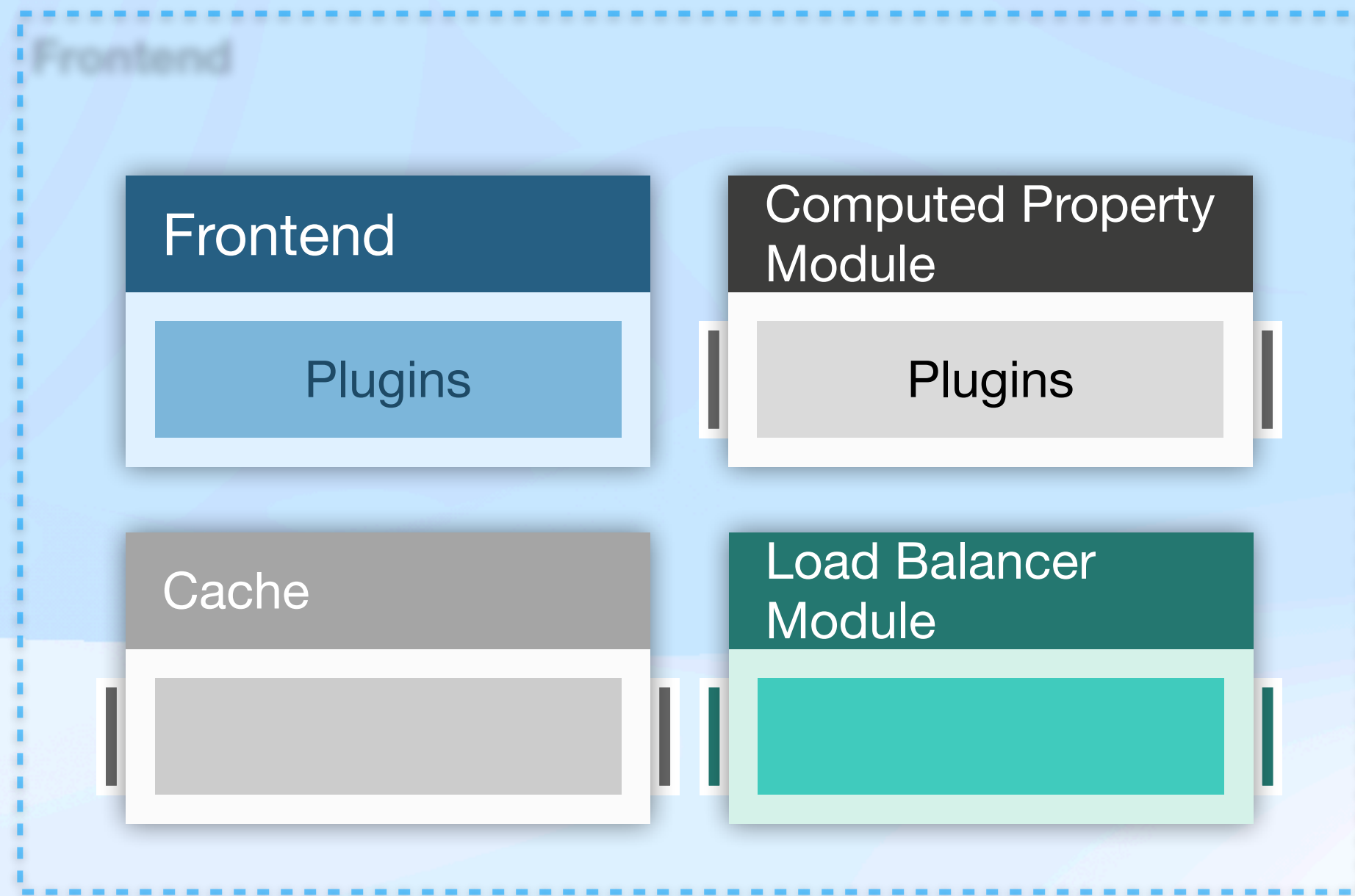
**Database
technology**

Kafka compatible

<https://www.redpanda.com/>

Redpanda

Modules & Processes



Plugins

Single integration & customisation interface

- All integration & customisation is done via **plugins**
 - Trading logic
 - Calculations
 - User interface
- Plugins are 100% **Swift** based (no script languages, proprietary syntaxes etc)
 - Tools: IDE (Xcode / VSCode), debugger (LLDB), profiling (Instruments) etc

Math tasks at Ordo One

Calculating fair prices of financial derivatives

- Generally based on Black & Scholes framework from 1973

$$dS = \sigma S dX + \mu S dt$$

$$\frac{\partial V}{\partial t} + \frac{1}{2} \sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS \frac{\partial V}{\partial S} - rV = 0$$

Ordo one focuses on listed options

Equity options but also options based on futures contracts

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Last Updated 14 Nov 2024 02:32:10 AM CT. Market data is delayed by at least 10 minutes

OVERVIEW QUOTES SETTLEMENTS VOLUME & OI TIME & SALES SPECS MARGINS CALENDAR FUTURES **OPTIONS**

E-MINI S&P 500 OPTIONS - QUOTES

VENUE: GLOBEX

AUTO-REFRESH IS OFF Last Updated 14 Nov 2024 02:32:18 AM CT. Market data is delayed by at least 10 minutes.

UNDERLYING FUTURE	CHART	LAST	CHANGE	PRIOR SETTLE	HIGH	LOW	VOLUME	UPDATED
DEC 2024 ESZ4		6016.25	+0.25 (UNCH)	6016.00	6022.00	6004.00	61,078	02:22:56 CT 14 Nov 2024

EXPIRATION DEC 2024 STRIKE RANGE AT THE MONEY VIEW: LIST | STRADDLE

CALLS							STRIKE PRICE	PUTS						
UPDATED	VOLUME	HIGH	LOW	PRIOR SETTLE	CHANGE	LAST		LAST	CHANGE	PRIOR SETTLE	LOW	HIGH	VOLUME	UPDATED
20:55:27 CT 13 Nov 2024	0	-	-	111.75	-	-	5975.0	-	-	71.00	-	-	0	20:55:27 CT 13 Nov 2024
20:55:27 CT 13 Nov 2024	0	-	-	108.50	-	-	5980.0	72.00	-0.75	72.75	72.00	77.50	5	02:16:18 CT 14 Nov 2024
01:53:07 CT 14 Nov 2024	3	102.00	101.75	102.25	-0.25	102.00	5990.0	78.00	+1.50	76.50	78.00	78.00	1	01:46:46 CT 14 Nov 2024
01:52:04 CT 14 Nov 2024	490	96.00	93.00	96.50	-0.75	95.75	6000.0	82.00	+1.50	80.50	81.50	83.25	269	01:55:50 CT 14 Nov 2024
01:46:55 CT 14 Nov 2024	2	89.75	88.25	90.75	-1.00	89.75	6010.0	87.75	+3.00	84.75	85.25	87.75	3	20:55:27 CT 13 Nov 2024
01:53:07 CT 14 Nov 2024	1	84.50	84.50	85.50	-1.00	84.50	6020.0	88.25	-1.25	89.50	88.25	90.25	20	02:12:21 CT 14 Nov 2024
01:53:07 CT	6	81.75	81.75	82.75	-1.00	81.75	6025.0	-	-	91.75	-	-	22	20:55:27 CT

Challenges

Option pricing

- Calculate $V = V(S, \sigma)$, as well as $\partial V / \partial S$, $\partial^2 V / \partial S^2$, $\partial V / \partial \sigma$, accurately and very fast
- Accurate implied function evaluation ("implied volatility") $\sigma(S, V) = V^{-1}(S, V)$
- Modelling $\sigma(S, X, t)$ – avoiding arbitrage (negative $\partial^2 V / \partial S^2$ at any strike X)
- Massive number of vanilla derivatives on a single underlying (calls, puts, strikes, expirations)
- Massive number of updates S , $\sigma(S, X, t)$ on a big set of underlyings S_i etc
- Real-time requirements for both trading and risk

Project ideas

- Vanilla options on underlying stock which is paying out discrete dividends
 - Numerical methods (binomial, FDM, monte carlo)
 - Analytical methods (Taylor expansions)
 - Analysis of put-call parity
- Analysis of Taylor expansion for both fair value and implied volatility calculations
- Other commonly used financial derivatives such as Asian options

Literature pertaining to proposed subject

- "Back to Basics: a new approach to the discrete dividend problem", Haug, E. G. et al., Wilmott Magazine, pp. 37-47, 2003.
- "Efficient Pricing of Derivatives on Assets with Discrete Dividends", Vellekoop & Niewenhuis, Applied Mathematical Finance, Vol. 13, No. 3, 265-284, 2006.
- "Closed Formula for Options with Discrete Dividends and Its Derivatives", Veiga & Wystup, Applied Mathematical Finance, November 2009.
- "Pricing of American Options by Adaptive Tree Methods on GPUs." Jacob Lundgren, Degree project in Mathematics, Stockholm 2015.