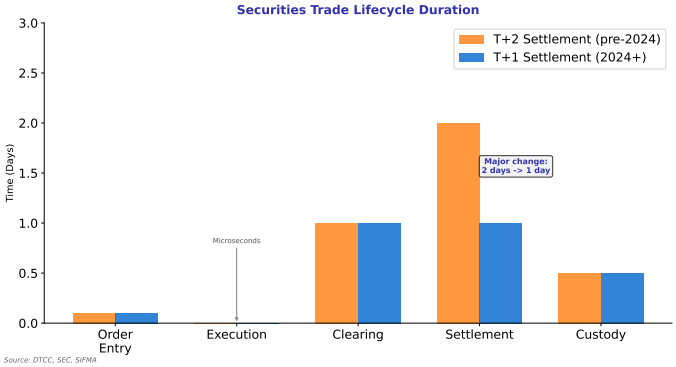
Lesson 44: Capital Markets Tech

Mini-Lecture Version (30 min)

Digital Finance

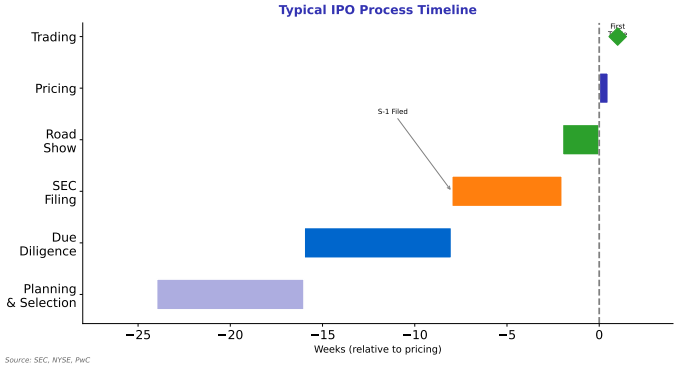
Learning Objectives: Understand the trade lifecycle from order to settlement — Analyze Order Management Systems (OMS), Execution Management Systems (EMS), and Portfolio Management Systems (PMS) — Examine clearing and settlement infrastructure — Evaluate post-trade processing and T+1 settlement

Capital Markets Workflow



This concept is fundamental to understanding Capital Markets Tech.

IPO Timeline and Process



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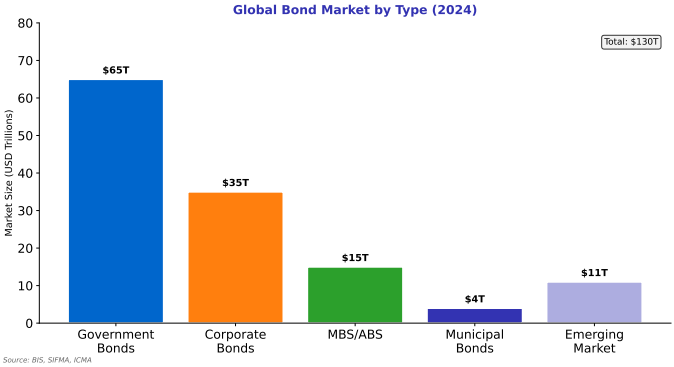
Bond Market Instruments



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End-to-End Trade Lifecycle

Pre-Trade Phase:

1. **Investment Decision:** Portfolio manager identifies opportunity
2. **Compliance Check:** Pre-trade compliance rules (limits, restrictions)
3. **Order Creation:** Order entered into OMS
4. **Order Routing:** EMS routes to broker/venue

Trade Execution Phase:

5. **Market Access:** Order reaches exchange/OTC market
6. **Execution:** Order matched and filled
7. **Trade Capture:** Execution details recorded
8. **Trade Enrichment:** Add settlement instructions, SSIs

Post-Trade Phase:

9. **Trade Confirmation:** Counterparty agreement (affirmation)
10. **Clearing:** Central counterparty (CCP) or bilateral
11. **Settlement:** Exchange of securities for cash
12. **Custody:** Asset safekeeping and servicing
13. **Reporting:** Regulatory and client reporting

Typical Timeline (Equities):

- Execution: Milliseconds to seconds
- Confirmation: T+0 (same day)
- Settlement: T+1 (US, May 2024) or T+2 (Europe)

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Key Systems in Trade Lifecycle

Front Office Systems:

- **PMS (Portfolio Management):** Holdings, analytics, compliance
- **OMS (Order Management):** Order creation, routing, allocation
- **EMS (Execution Management):** Smart order routing, algos, broker connectivity
- **RMS (Risk Management):** Pre/post-trade risk checks

Middle Office Systems:

- **Trade Matching:** Confirm execution details with counterparty
- **P&L and Attribution:** Explain portfolio performance
- **Collateral Management:** Margin calls, OTC derivatives
- **Corporate Actions:** Dividends, stock splits, tenders

Back Office Systems:

- **Clearing:** CCP novation, netting
- **Settlement:** DVP (Delivery vs Payment) processing
- **Custody:** Safekeeping, asset servicing
- **Reconciliation:** Cash, positions, NAV
- **Reporting:** Regulatory (MiFID II, EMIR), client statements

Data Management:

- **Reference Data:** Securities master, counterparty data
- **Market Data:** Prices, corporate actions
- **Master Data:** Accounts, legal entities (LEI)

Leading platforms: Charles River (PMS/OMS/EMS), Bloomberg AIM, SimCorp Dimension, Aladdin (BlackRock)

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Order Management Systems (OMS)

Core OMS Functions:

- **Order Entry:** Support all order types (market, limit, algo)
- **Pre-Trade Compliance:** Rule-based checks (concentration limits, restricted lists)
- **Order Routing:** Send to EMS or broker for execution
- **Execution Management:** Track fill status and average price
- **Allocation:** Distribute fills across accounts (pro-rata, FIFO)
- **Audit Trail:** Immutable log of all order events (MiFID II requirement)

Order Lifecycle in OMS:

1. Created (PM enters order)
2. Validated (compliance check)
3. Routed (sent to broker/EMS)
4. Partially Filled / Filled
5. (See full lecture for details)

OMS Vendors:

- **Charles River IMS:** Multi-asset, buy-side focused
- **Bloomberg AIM:** Integrated with market data and analytics
- **Eze OMS (SS&C):** Hedge funds and asset managers
- **SimCorp Dimension:** Front-to-back platform
- **Aladdin (BlackRock):** Enterprise investment management

Integration Points:

- **Upstream:** PMS portfolio models, compliance system
- **Downstream:** EMS, brokers (FIX protocol)
- **Lateral:** Market data, reference data, risk analytics
- **Back Office:** Trade booking, settlement systems

Industry trend: Cloud-native OMS (Enfusion, Talos) gaining traction vs legacy on-premise

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Execution Management Systems (EMS)

EMS Core Capabilities:

- **Smart Order Routing (SOR):** Best execution across venues
- **Algorithmic Trading:** VWAP, TWAP, implementation shortfall
- **Direct Market Access (DMA):** Low-latency connectivity
- **Broker Aggregation:** Consolidate execution across brokers
- **TCA (Transaction Cost Analysis):** Post-trade performance measurement
- **FIX Connectivity:** Industry-standard protocol for order routing

Buy-Side vs Sell-Side EMS:

- **Buy-Side:** Broker-neutral, multi-broker connectivity, TCA focus
- **Sell-Side:** Broker-specific, liquidity sourcing, client order handling

Leading EMS Providers:

- **FlexTrade:** Multi-asset, broker-neutral
- **Bloomberg EMSX:** Integrated with Terminal
- **Fidessa (ION):** Equities and derivatives
- **Portware (FactSet):** Algorithmic trading focus
- **TradingScreen:** FX and multi-asset

Best Execution Framework:

- **Pre-Trade:** Venue analysis, liquidity assessment
- **Execution:** SOR optimizes routing decisions
- **Post-Trade:** TCA benchmarks (VWAP, arrival price, implementation shortfall)
- **Reporting:** RTS 27/28 (MiFID II), Rule 606 (US)

Typical EMS connects to 20-50 brokers and 100+ execution venues globally

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Portfolio Management Systems (PMS)

PMS Core Functions:

- **Portfolio Modeling:** Target allocations, rebalancing
- **Performance Measurement:** Time-weighted, money-weighted returns
- **Attribution Analysis:** Decompose returns (allocation vs selection)
- **Risk Analytics:** VaR, tracking error, factor exposures
- **Compliance Monitoring:** Investment guidelines, restrictions
- **Client Reporting:** Customizable statements and factsheets

Performance Attribution (Brinson Model):

$$R_p - R_b = \underbrace{\sum w_i(R_i - R_b)}_{\text{Allocation}} + \underbrace{\sum W_b(r_i - R_i)}_{\text{Selection}} + \underbrace{\sum (w_i - W_b)(r_i - R_i)}_{\text{Interaction}}$$

where w_i = portfolio weight, W_b = benchmark weight, r_i = sector return, R_i = benchmark sector return

Leading PMS Platforms:

- **Aladdin (BlackRock):** Enterprise, institutional scale
- **SimCorp Dimension:** Front-to-back, asset managers
- **Charles River IMS:** Integrated OMS/PMS
- **FactSet:** Analytics and reporting focus
- **Refinitiv (LSEG) Eikon:** Multi-asset portfolio tools

Data Sources:

- **Positions:** From custodians, prime brokers
- **Prices:** Market data vendors (Bloomberg, Refinitiv)
- **Transactions:** OMS, trade confirmations
- **Benchmarks:** Index providers (MSCI, FTSE Russell)
- **Corporate Actions:** Data vendors, custodians

Aladdin serves $21+ trillion AUM across 13,000+ institutions (2024)

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Key Takeaways

1. Understand the trade lifecycle from order to settlement
2. Analyze Order Management Systems (OMS), Execution Management Systems (EMS), and Portfolio Management Systems (PMS)
3. Examine clearing and settlement infrastructure
4. Evaluate post-trade processing and T+1 settlement

Bottom Line: Capital Markets Tech is transforming how financial services operate and compete.

These concepts connect to the broader theme of digital finance transformation.

Capital Markets Tech in Visual Perspective

Technology view

Application view

Future view

Visual representations help reinforce key concepts of capital markets tech.

Concrete Examples: Making It Real

Technical Examples

- Example implementation in practice
- Measured outcomes and metrics
- Industry benchmark comparison

Case Study

- Real-world deployment scenario
- Quantifiable results achieved

Industry Leaders

- Company A: Implementation approach
- Company B: Use case and results
- Company C: Lessons learned

Market Data

- Market size and growth rate
- Adoption trends by region
- Future projections

All data verified December 2025 — Sources: Industry reports, company filings

Quiz Questions (1–5)

Q1. What is the primary purpose of capital markets tech?
A) Increase efficiency B) Reduce costs C) Improve access D) All of the above

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Answer: D – All these factors contribute to the value proposition.

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A) APIs B) Blockchain C) Machine Learning D) Cloud Computing

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Answer: A – APIs enable integration and interoperability.

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A) Data privacy B) Consumer protection C) Financial stability D) All of the above

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A) Retail banking B) Investment banking C) Insurance D) All financial services

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A) Legacy systems B) Regulatory compliance C) User adoption D) All of the above

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A) North America B) Europe C) Asia-Pacific D) Varies by segment

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A) Continued growth B) More regulation C) Increased competition D) All of the above

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Answer: D – Multiple trends will shape the future.

Q10. What is a key takeaway about capital markets tech?
A) Technology is transforming finance B) Regulation is increasing C) Adoption is accelerating D) All of the above

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Q10. What is a key takeaway about capital markets tech?
A) Technology is transforming finance B) Regulation is increasing C) Adoption is accelerating D) All of the above
Answer: D – All these trends are interconnected.