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Architecture Spotlight:
Vertical Markets | The Consumer Web

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Preliminary – Not for Publication

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Static Model

- Batch updates

- Standardized reports

- Real-time analytics

Dynamic Model

- Huge transaction volumes

- Data science and complex analytics produced in real time

- User-driven, on-demand reporting

- Network effects

Pioneers

- Google

- Facebook

- Netflix

- Amazon

New Technologies

- NoSQL and graph databases

- Cloud computing

- Small, scalable servers

- Fault tolerance

Data Flow – Consumer Site

User Actions

- Page Views
- Searches
- Purchases
- Uploads

Analytics

- Trends
- Clustering
- Profiles
- Histories

User Content

- Stories
- Suggestions
- Ads

External Events

- News Reports
- Market Movements
- Product Offerings

Reports

- Content Refinement
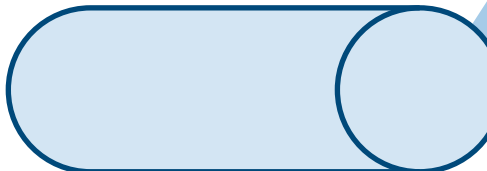- Usage Statistics
- Revenue

Data Flow – Finance

Live and Static Trade Data

ID	Book	Security	NbShares
	18579	ORCL	220
1	2142039	COST	8423
2	12145	ALTR	3520
3	21121	AKAM	10020
4	2036915	AAPL	3383
5	2055103	VMED	4954
6	15316	CMCSA	8461

Streaming Market Data

ID	Security	Bid	Ask
	ATVI	63.90	64.05
1	ADBE	14.55	16.52
2	AKAM	340.20	341.49
3	ALXN	5.37	6.86
4	ALTR	443.04	444.54
5	AMZN	59.82	60.94
6	AMGN	60.29	60.82

Static Reference Data

Big data sets, Live data, Complex logic

Huge user base, diverse needs

Live, rich, big interactive reports

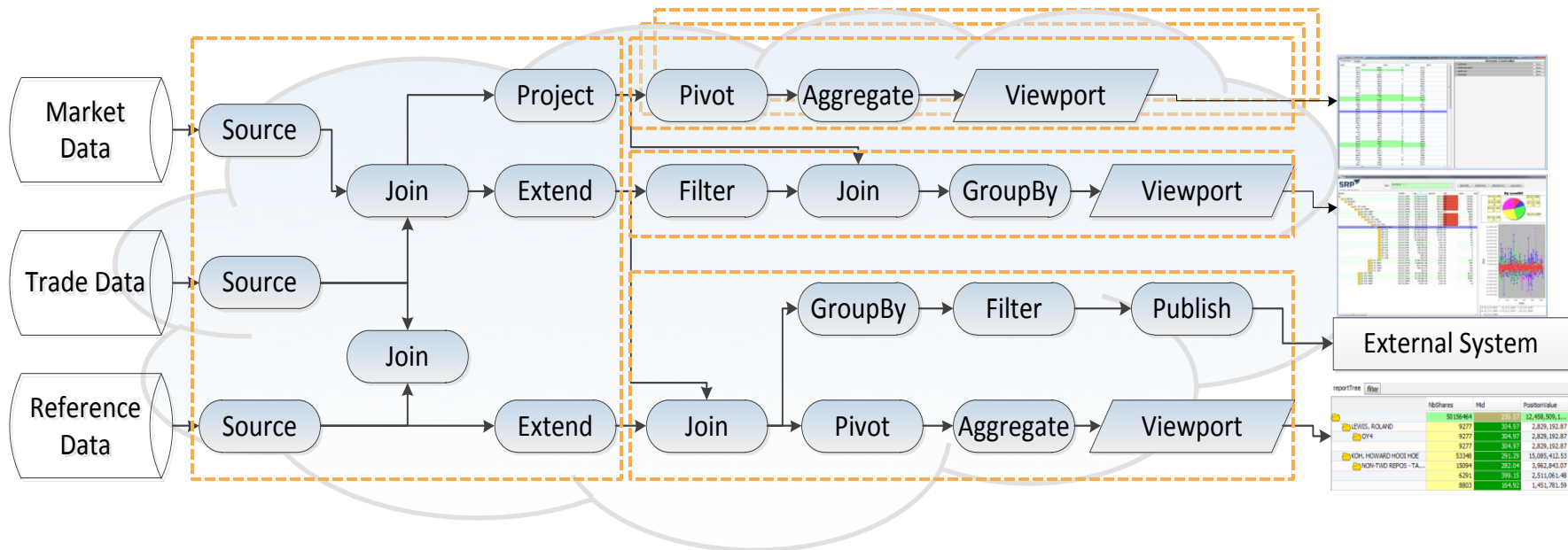# Platform Elements

- Data capture and audit

- Grid calculation

- Real-time data flow

- Visualization

Real-Time Data Algebra
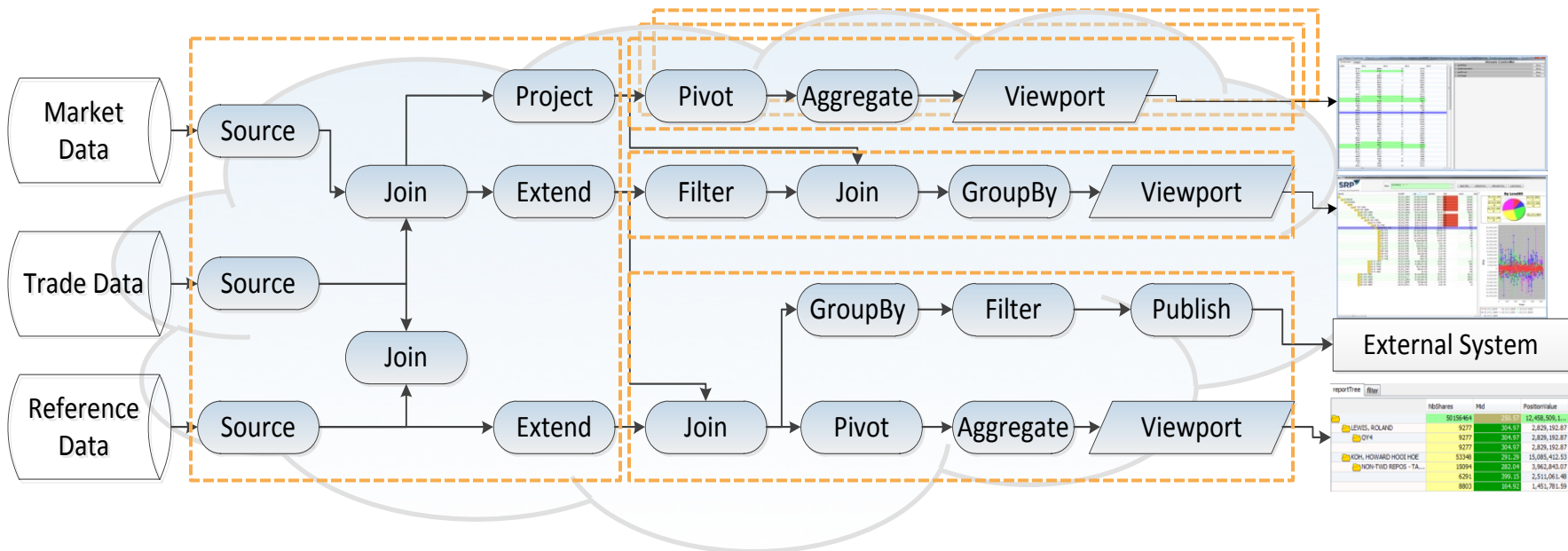
Distributed Runtime

	Typed tuples		**Highly optimized building blocks**		**Java language support**		**Compact delta messaging**		**System-level deployment**
Records	Stored as a Java class of primitive types (no boxing!) by synthesizing JVM byte code on-the-fly	**Operators**	Build complex live systems by functional composition of algebraic operators	**Expressions**	Predicates, expressions, aggregations can all be dynamically changed at runtime	**Messaging**	Only changes are propagated thru the system using a very compact message format	**Processes**	Global namespace, load-balancing, failover, and elasticity provided by design

Benefits of Common Platform

- Rapid development

- Handles infrastructure complexities

- Ensures consistency

Commonalities with massively scaled Web sites

- Volume & Velocity

- Real-time decision-making

- Dynamic, flexible views

- Graph-like data model

- Use of open-source tools

- Synthesis of real-time data from many sources

- Failover, load balancing, fault tolerance

Advantages over consumer sites

- Well-defined problem space

- Steady feedback leads to tailored refinement

- Demanding, insightful users

- Techniques translate directly to large set of applications across industries

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Q&A