SQL on Big Data using Optiq

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Real-time Big Data Meetup
at RichRelevance

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What is “SQL on Big Data?”

- ☐ “Open-source Teradata”
- ☐ SQL generator for Map-Reduce
- ☐ ETL (Extract-Transform Load)
- ☐ Scalable transaction processing
- ☐ Querying nested data sets
- ☐ Querying documents & populating databases
- ☐ Continuous query/streaming

(Check one or more.)

Revolution & counter-revolution

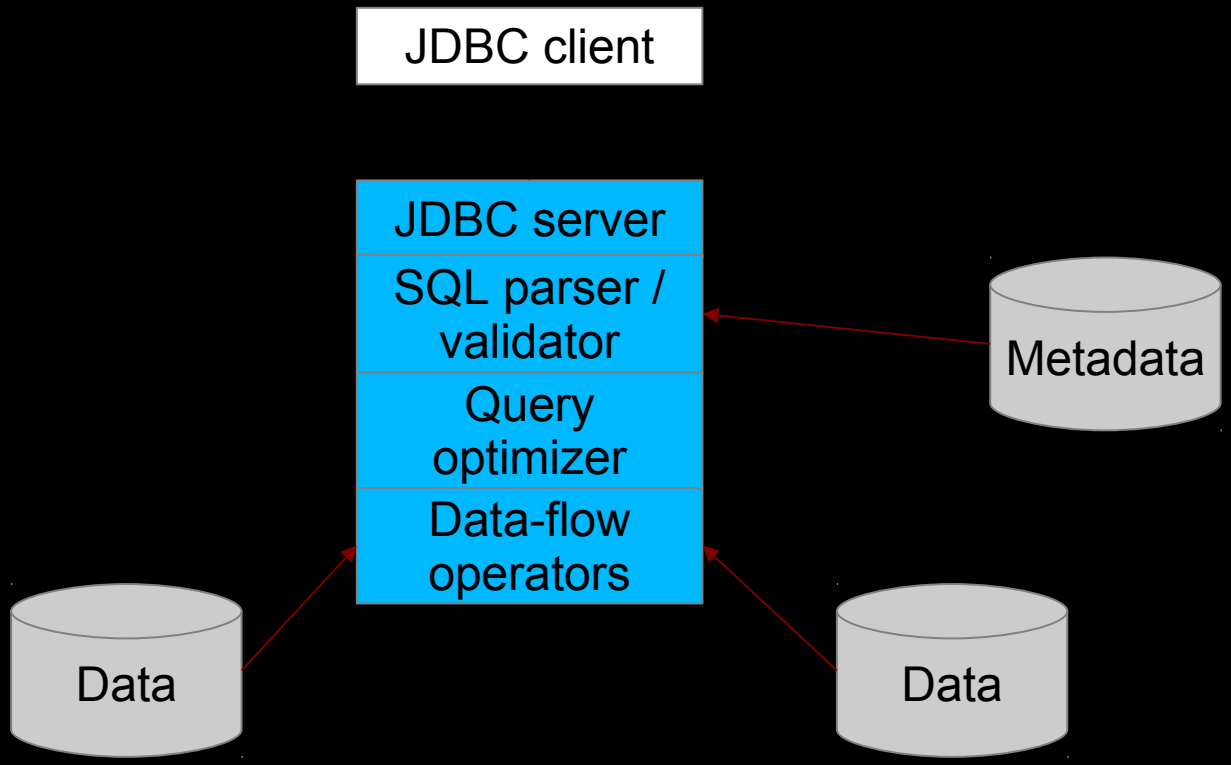
"Big Data" was a revolution in data management.

Lots of broken things got fixed (unlimited scale, data anywhere & any format, late schema, flexible queries).

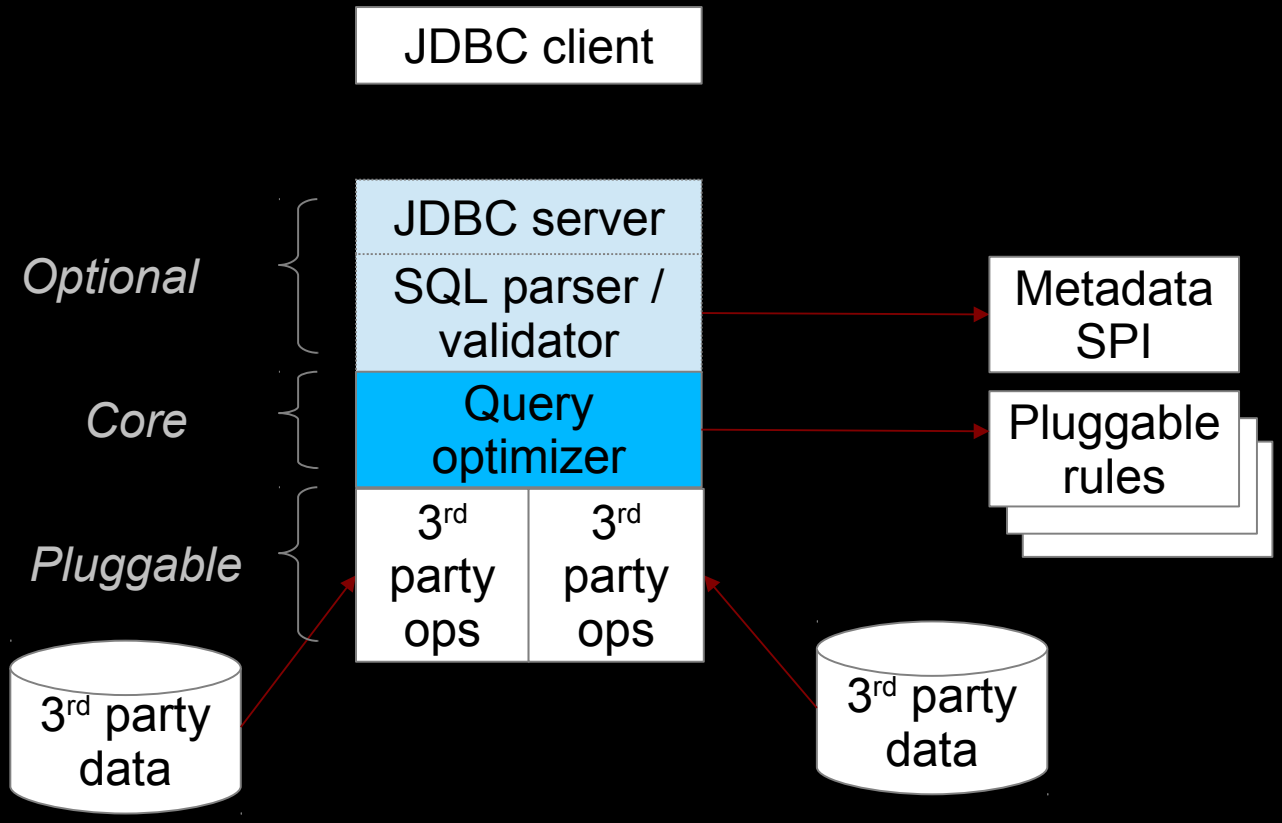
Some useful things got broken (standard interface, data independence, central control).

"In 5 years everyone will be using Hadoop and they won't even know it." – me, a few years ago

Conventional DBMS architecture

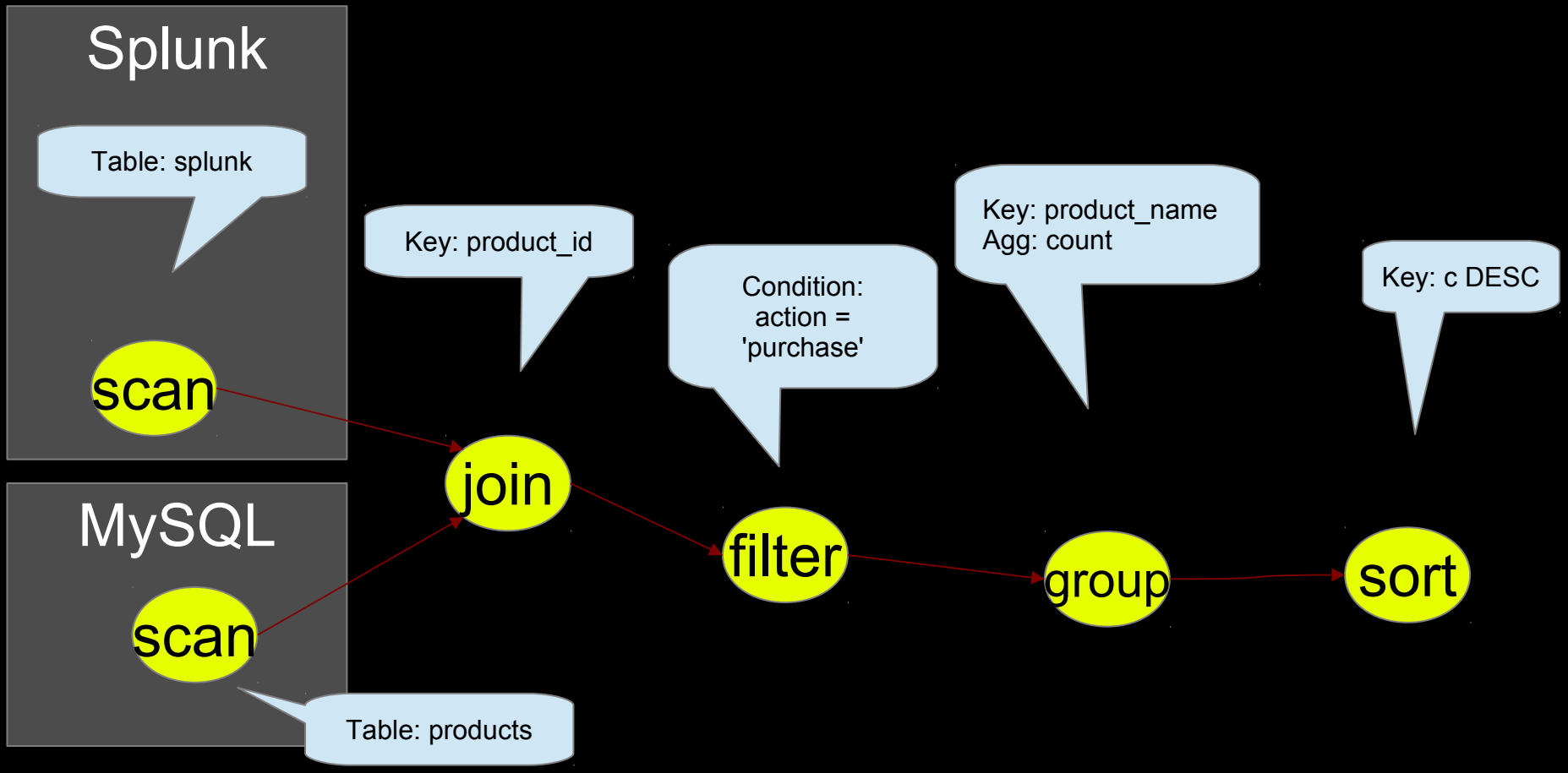


Optiq architecture



Expression tree

```
SELECT p.product_name, COUNT(*) AS c
FROM splunk.splunk AS s
    JOIN mysql.products AS p
    ON s.product_id = p.product_id
WHERE s.action = 'purchase'
GROUP BY p.product_name
ORDER BY c DESC
```



Expression tree (optimized)

```
SELECT p.product_name, COUNT(*) AS c
FROM splunk.splunk AS s
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   ON s.product_id = p.product_id
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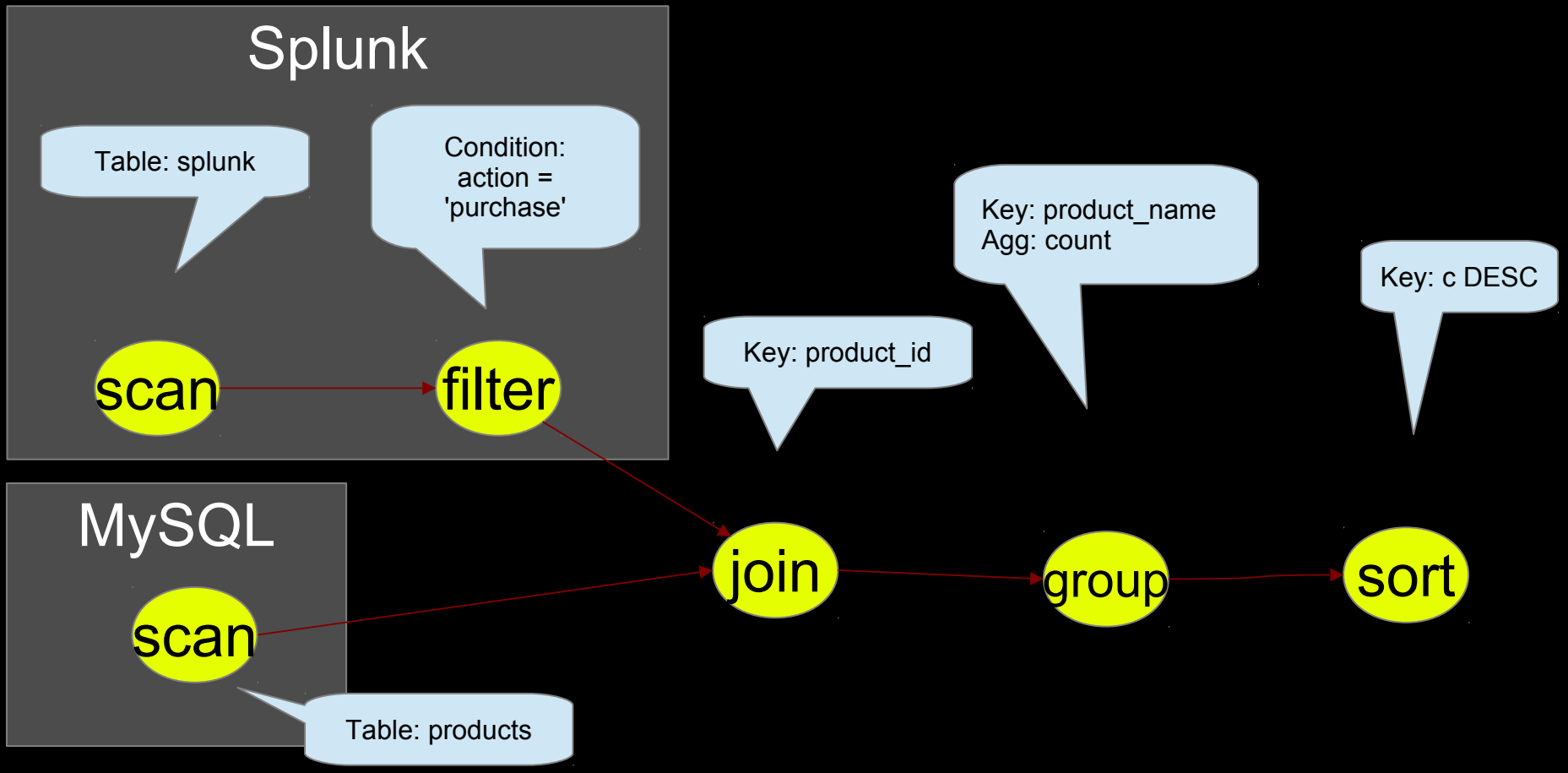


Apache Drill

"Apache Drill (incubating) is a distributed system for interactive analysis of large-scale datasets, based on Google's Dremel. Its goal is to efficiently process nested data. It is a design goal to scale to 10,000 servers or more and to be able to process petabyes of data and trillions of records in seconds."

Data model: JSON, late-binding

Optiq:

- SQL → logical plan (current)
- Logical → physical plan (proposed)

Cascading Lingual

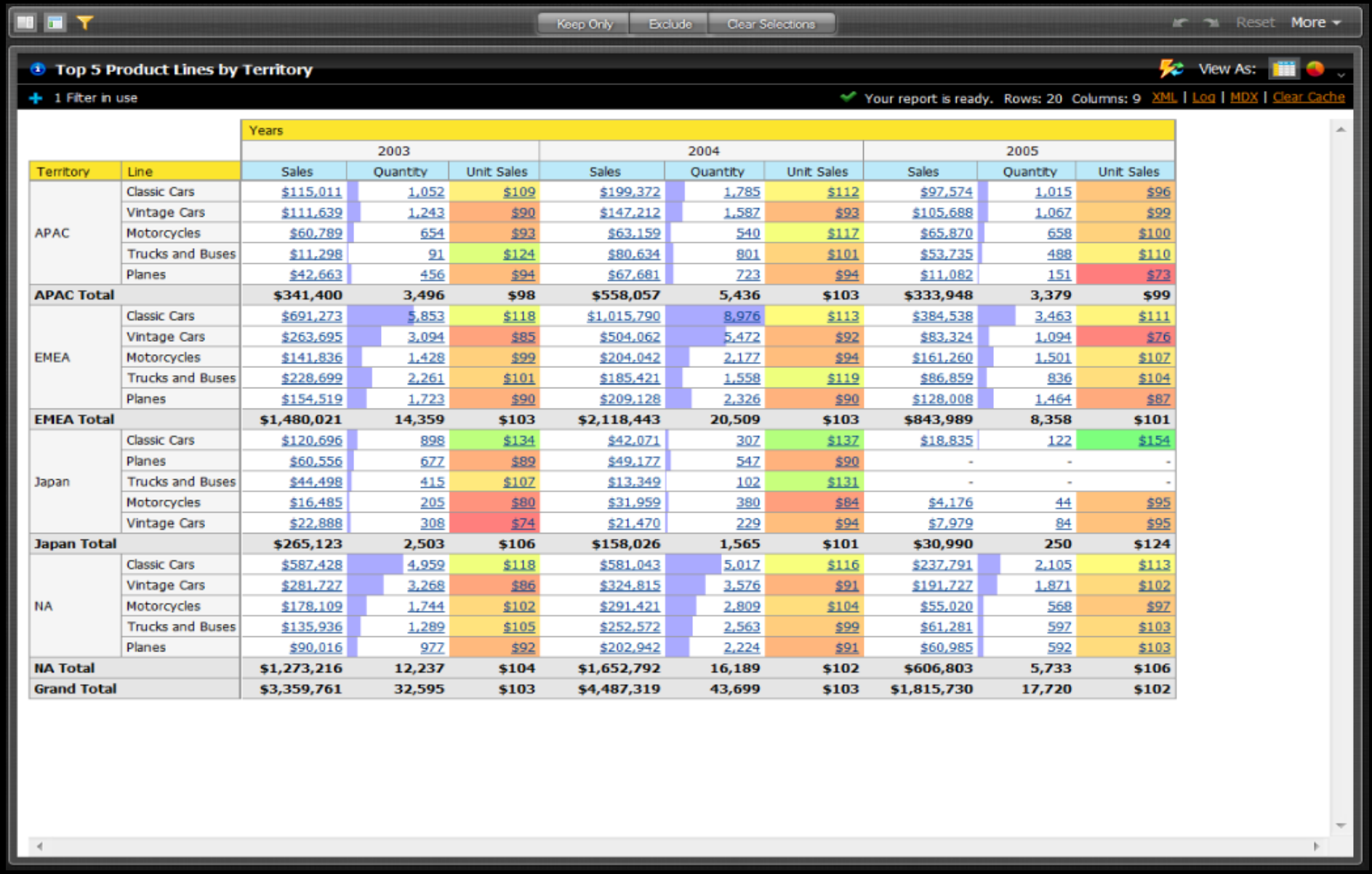
"Cascading is the de facto Java API for creating complex data processing workloads and the engine underneath Scalding, Cascalog, and others."

Lingual uses Optiq to translate SQL onto Cascading flows

SQL is "yet another DSL" for Cascading

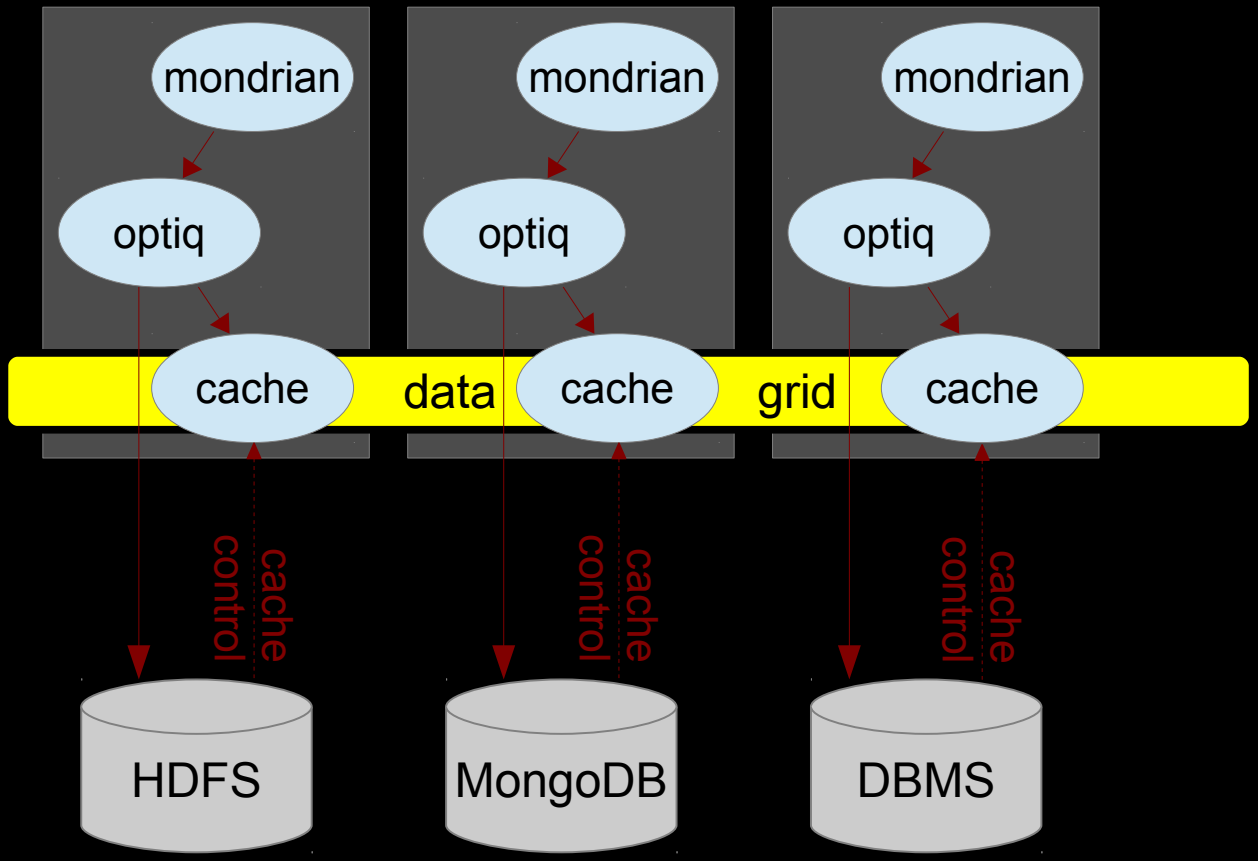
Just released!

Mondrian (Pentaho Analysis)



		Years								
		2003			2004			2005		
Territory	Line	Sales	Quantity	Unit Sales	Sales	Quantity	Unit Sales	Sales	Quantity	Unit Sales
APAC	Classic Cars	$115,011	1,052	$109	$199,372	1,785	$112	$97,574	1,015	$96
	Vintage Cars	$111,639	1,243	$90	$147,212	1,587	$93	$105,688	1,067	$99
	Motorcycles	$60,789	654	$93	$63,159	540	$117	$65,870	658	$100
	Trucks and Buses	$11,298	91	$124	$80,634	801	$101	$53,735	488	$110
	Planes	$42,663	456	$94	$67,681	723	$94	$11,082	151	$73
APAC Total		**$341,400**	**3,496**	**$98**	**$558,057**	**5,436**	**$103**	**$333,948**	**3,379**	**$99**
EMEA	Classic Cars	$691,273	5,853	$118	$1,015,790	8,976	$113	$384,538	3,463	$111
	Vintage Cars	$263,695	3,094	$85	$504,062	5,472	$92	$83,324	1,094	$76
	Motorcycles	$141,836	1,428	$99	$204,042	2,177	$94	$161,260	1,501	$107
	Trucks and Buses	$228,699	2,261	$101	$185,421	1,558	$119	$86,859	836	$104
	Planes	$154,519	1,723	$90	$209,128	2,326	$90	$128,008	1,464	$87
EMEA Total		**$1,480,021**	**14,359**	**$103**	**$2,118,443**	**20,509**	**$103**	**$843,989**	**8,358**	**$101**
Japan	Classic Cars	$120,696	898	$134	$42,071	307	$137	$18,835	122	$154
	Planes	$60,556	677	$89	$49,177	547	$90	-	-	-
	Trucks and Buses	$44,498	415	$107	$13,349	102	$131	-	-	-
	Motorcycles	$16,485	205	$80	$31,959	380	$84	$4,176	44	$95
	Vintage Cars	$22,888	308	$74	$21,470	229	$94	$7,979	84	$95
Japan Total		**$265,123**	**2,503**	**$106**	**$158,026**	**1,565**	**$101**	**$30,990**	**250**	**$124**
NA	Classic Cars	$587,428	4,959	$118	$581,043	5,017	$116	$237,791	2,105	$113
	Vintage Cars	$281,727	3,268	$86	$324,815	3,576	$91	$191,727	1,871	$102
	Motorcycles	$178,109	1,744	$102	$291,421	2,809	$104	$55,020	568	$97
	Trucks and Buses	$135,936	1,289	$105	$252,572	2,563	$99	$61,281	597	$103
	Planes	$90,016	977	$92	$202,942	2,224	$91	$60,985	592	$103
NA Total		**$1,273,216**	**12,237**	**$104**	**$1,652,792**	**16,189**	**$102**	**$606,803**	**5,733**	**$106**
Grand Total		**$3,359,761**	**32,595**	**$103**	**$4,487,319**	**43,699**	**$103**	**$1,815,730**	**17,720**	**$102**

Mondrian next-gen architecture



Optiq provides SQL view onto hybrid SQL + NoSQL + in-memory store

In-memory tables (query results, planned & on-the-fly materializations)

Raw data + summarized / projected / sorted / re-organized data. Partitions.

Summary: Data independence

Logical & physical data models

Requires & allows query optimization

Allows you (or the system) to re-organize data

Query federation, data movement, caching

SQL interface for humans & machines

Optiq lets you add rules to optimize better

Thank you!

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optiq https://github.com/julianhyde/optiq

drill http://incubator.apache.org/drill/

lingual http://www.cascading.org/lingual/

mondrian http://mondrian.pentaho.com

slides https://github.com/julianhyde/share/tree/master/slides