



Apache Kylin 架构与案例

HadoopCon 2016 Taipei

韩卿 | Luke Han

Apache Kylin co-creator & PMC chair

lukehan@apache.org

About me...

- 韩卿 | **Luke Han**
 - Kyligence Inc Co-founder & CEO
 - Apache Kylin Creator, PMC Chair
 - ASF Member, Microsoft MVP
 - lukehan@apache.org
 - @lukehq

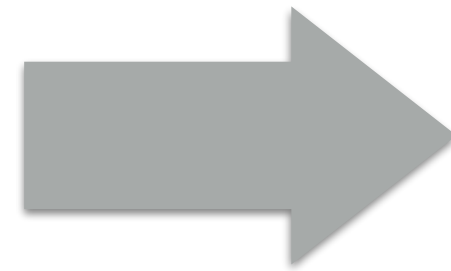


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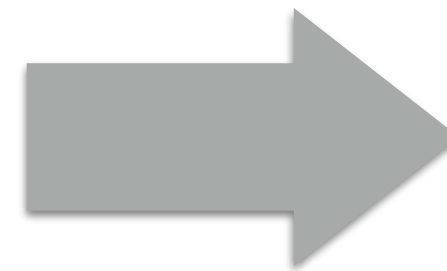
Kylin + Intelligence

A leading intelligent big data analytics company

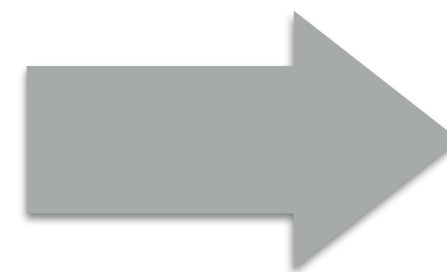
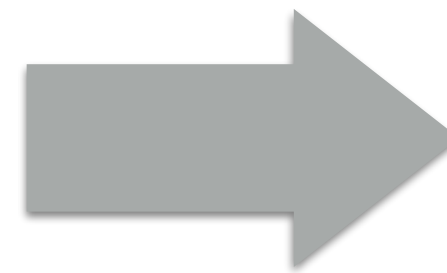
Startup



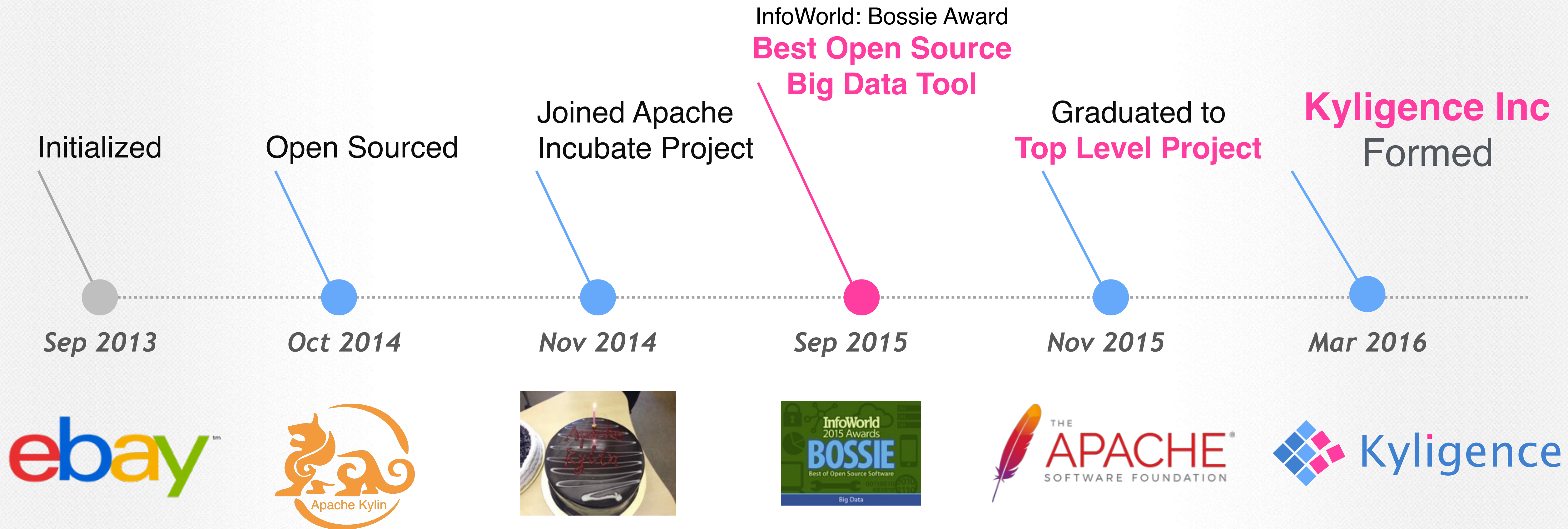
cloudera®



Apache Kafka



History



Apache Kylin

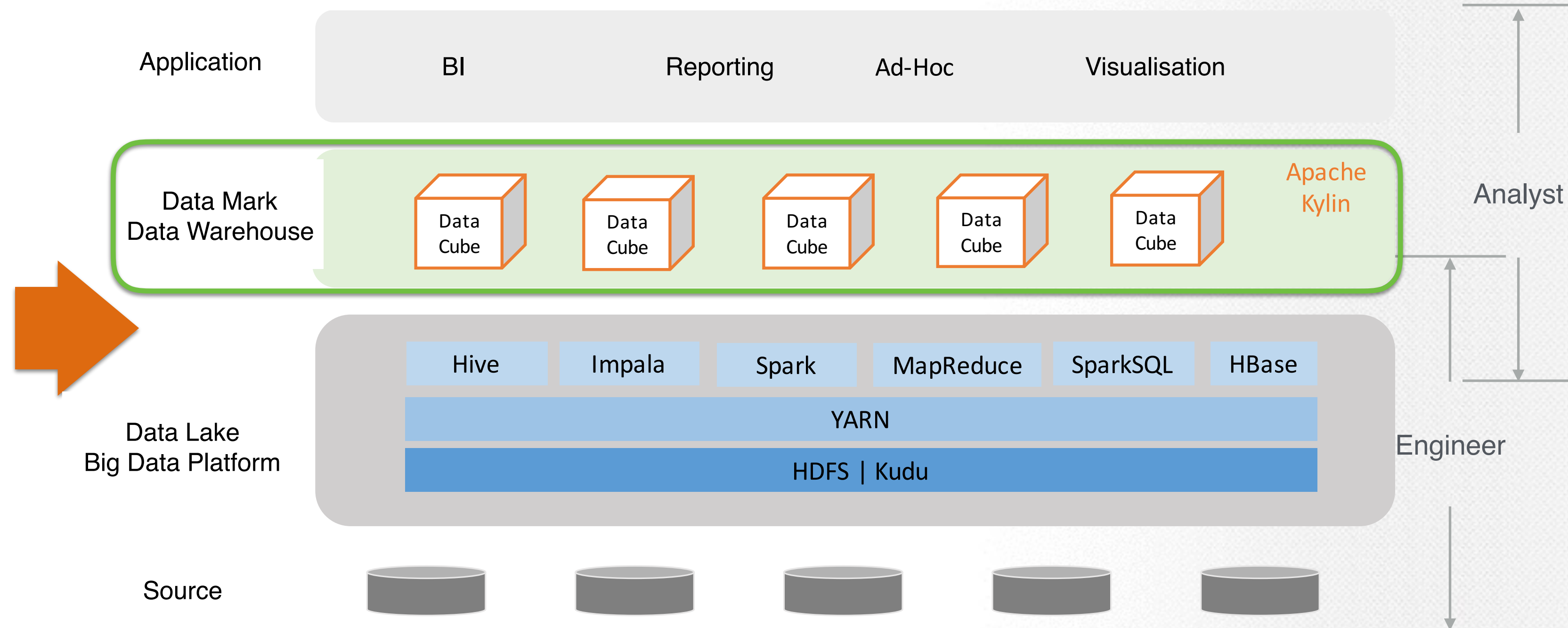
- ✓ Leading open source OLAP on Hadoop
- ✓ Fast growing open source community
- ✓ Adopted by 100+ global organizations
- ✓ Only born in China Apache Top Level Project
- ✓ Bossie Award: Best Open Source Big Data Tool

The technical aspects of Kylin are exciting, of course, but just as exciting is the way that Kylin represents a growing involvement of Asian countries like China in the Open Source community.

—Ted Dunning, VP of Apache IPMC



Industry Needs



Global Users



Why Kylin?

Volume

- **Data Volume**
 - eBay: 100+B per cube
 - Baidu Map: 10+B user behaviour data
 - Guandong Mobile: 10+B per day

Speed

- **Performance**
 - eBay: 90% < 1.18s
 - Meituan : 95%<1s, 99%<3s
 - Beijing Mobile: 36+ times fast than SparkSQL solution

Users

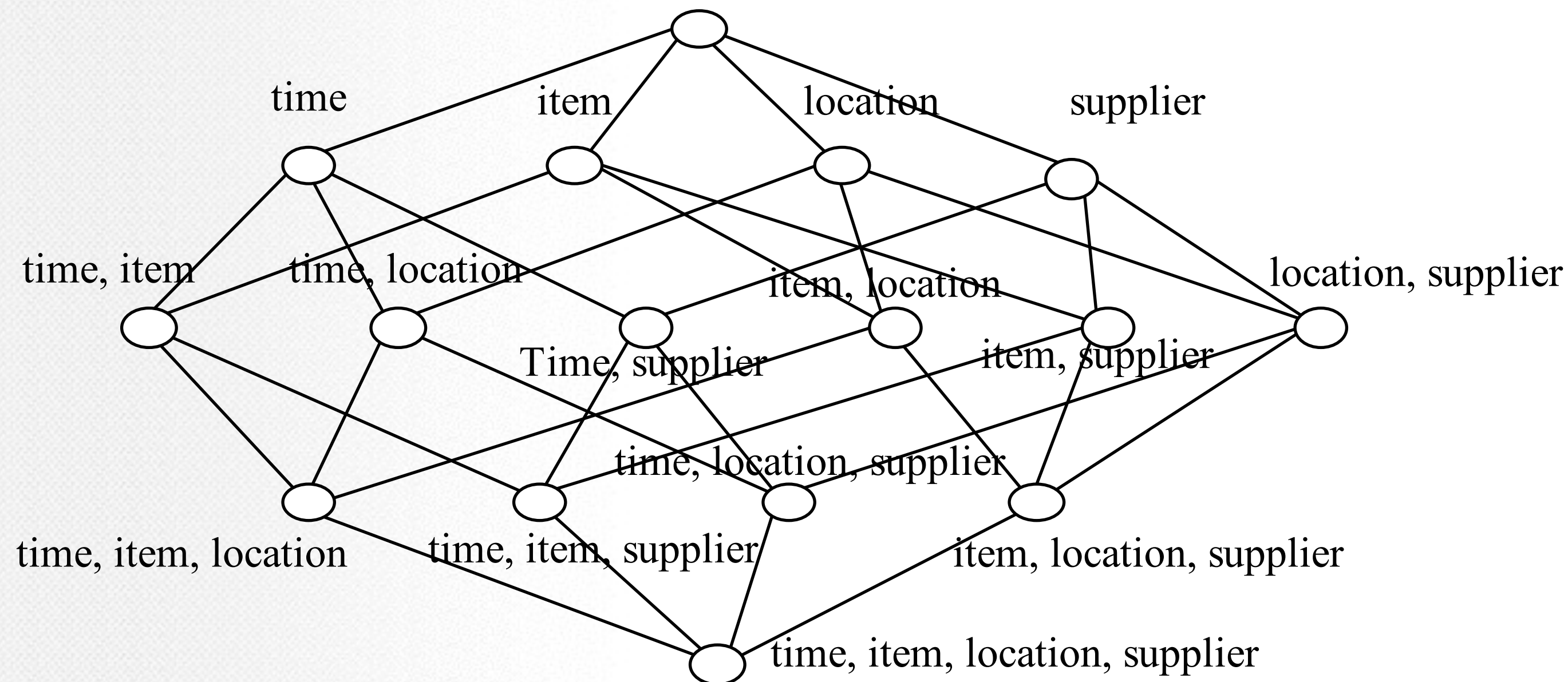
- **Users**
 - 100+ real use cases
 - Only one born in China Apache Top Level Project
 - “Best Open Source Big Data Tool”

Cost

- **Cost**
 - eBay: From Teradata to Kylin/Hadoop
 - VIP.com: Replaced Greanplum with Kylin/Hadoop
 - Guomei: 3x fast implementation

Architecture

Balance between Space & Time



0-D(apex) cuboid

1-D cuboids

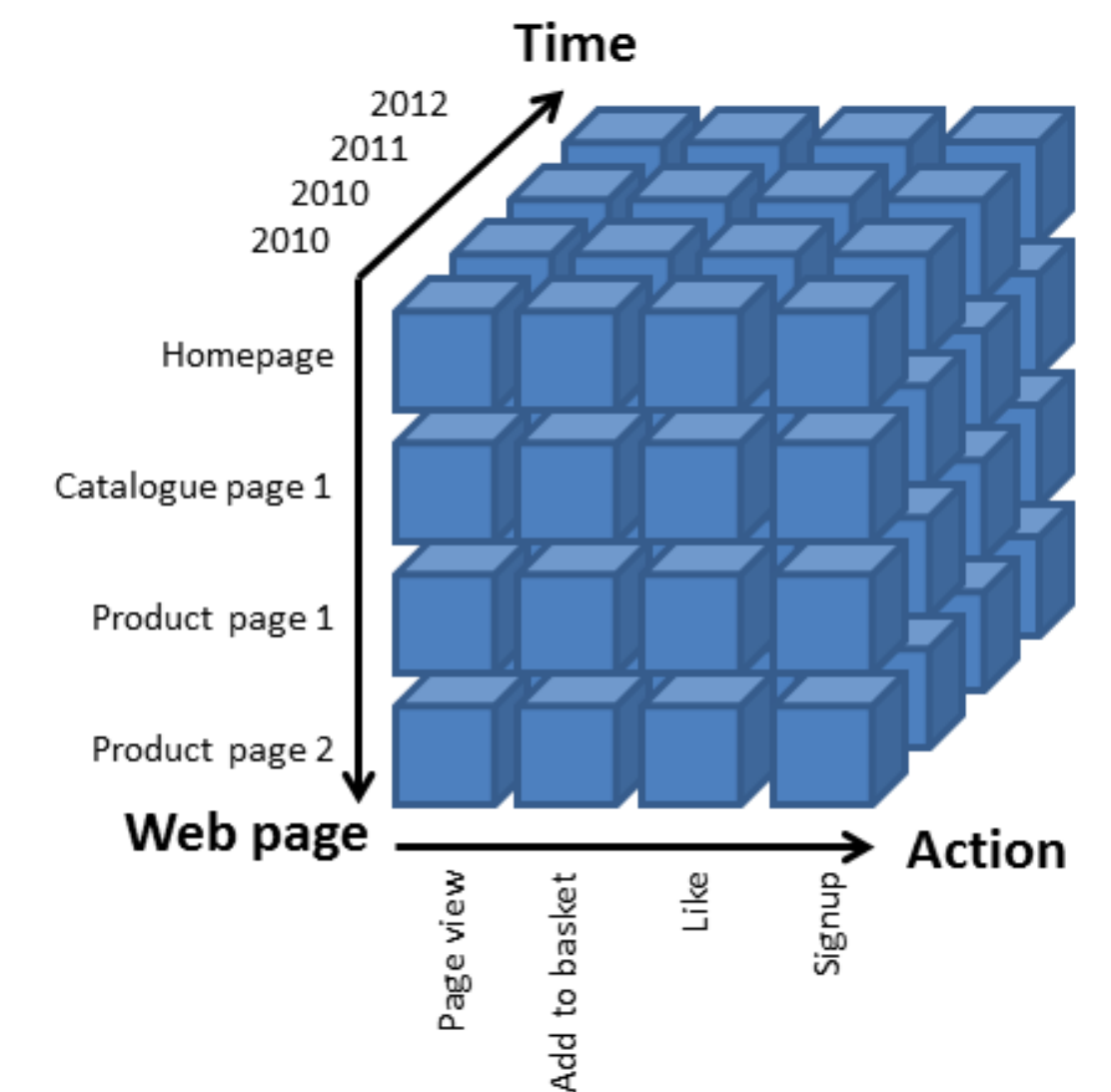
2-D cuboids

3-D cuboids

4-D(base) cuboid

OLAP Cube

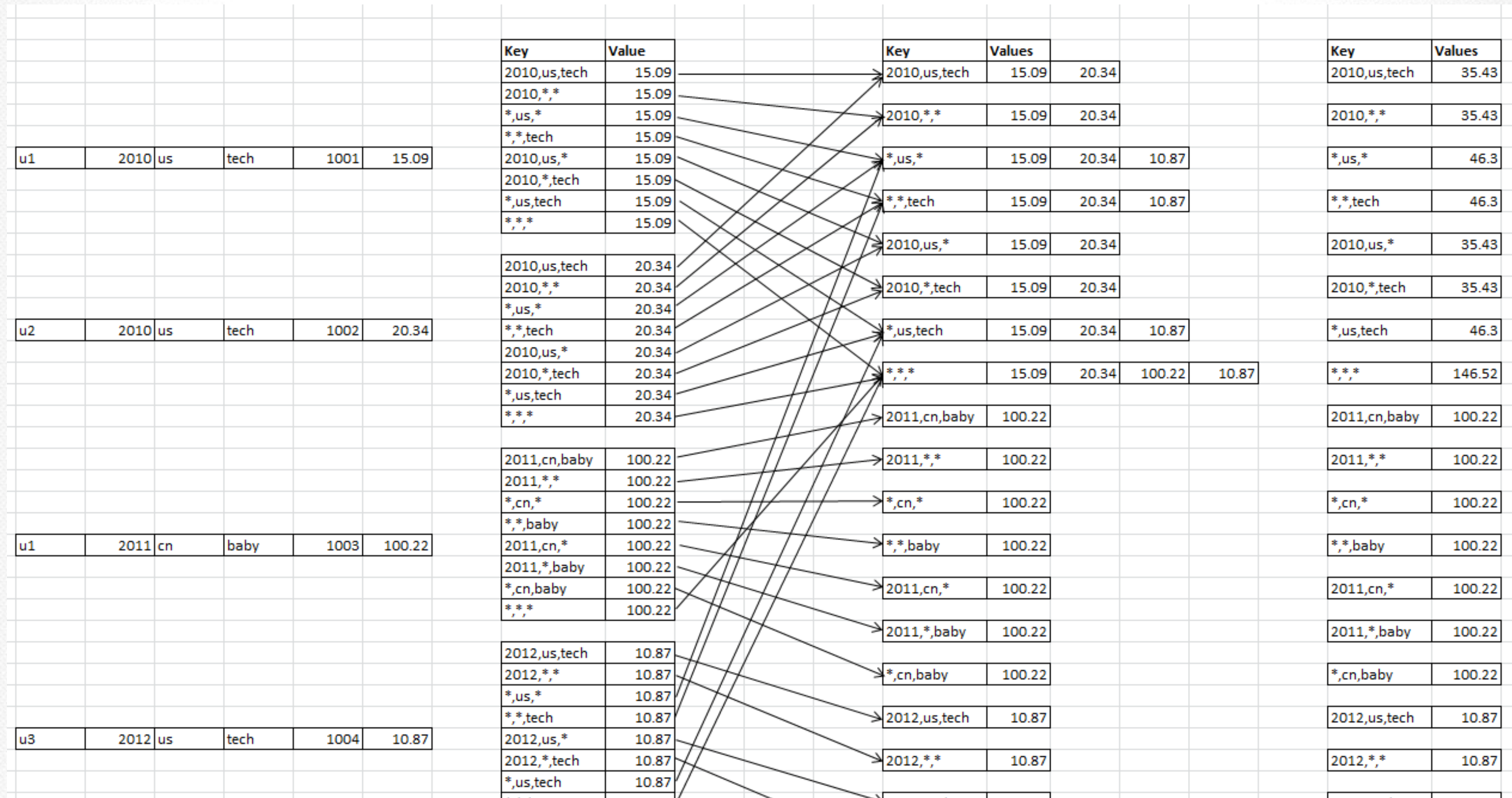
- Cuboid = one combination of dimensions
- Cube = all combination of dimensions (all cuboids)



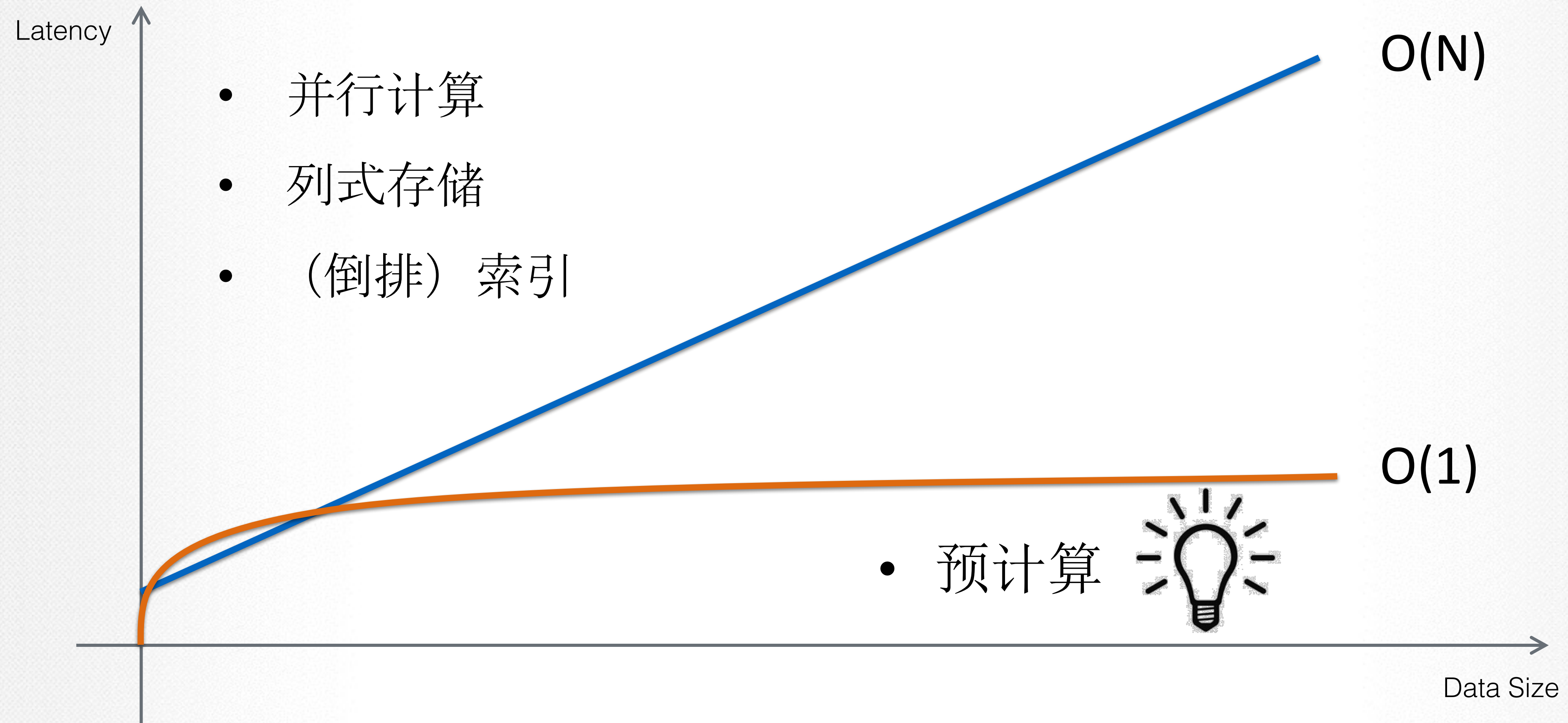
Base vs. aggregate cells; ancestor vs. descendant cells; parent vs. child cells

1. (9/15, milk, Urbana, Dairy_land) - <time, item, location, supplier>
2. (9/15, milk, Urbana, *) - <time, item, location>
3. (*, milk, Urbana, *) - <item, location>
4. (*, milk, Chicago, *) - <item, location>
5. (*, milk, *, *) - <item>

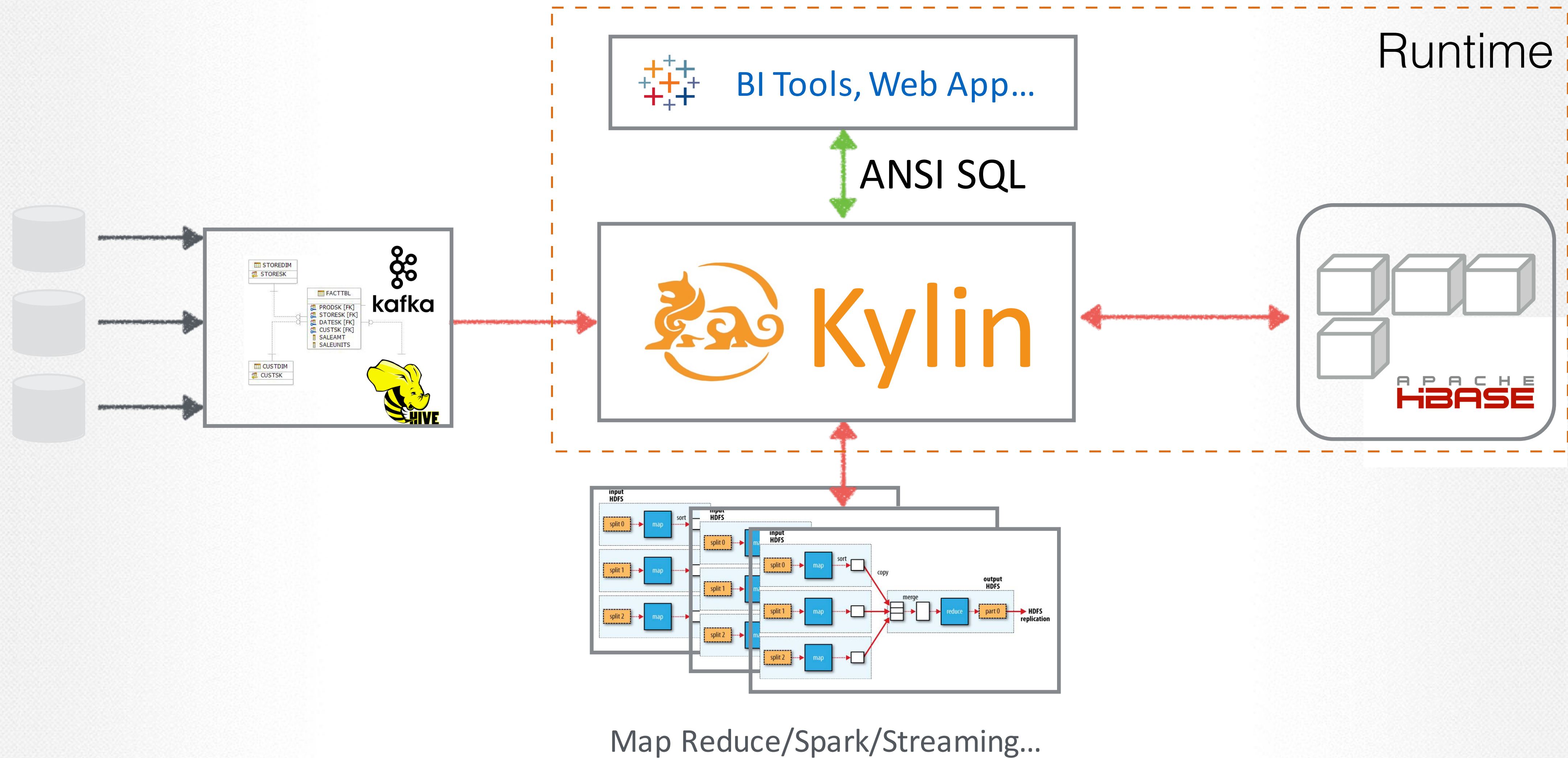
From Relational to KV



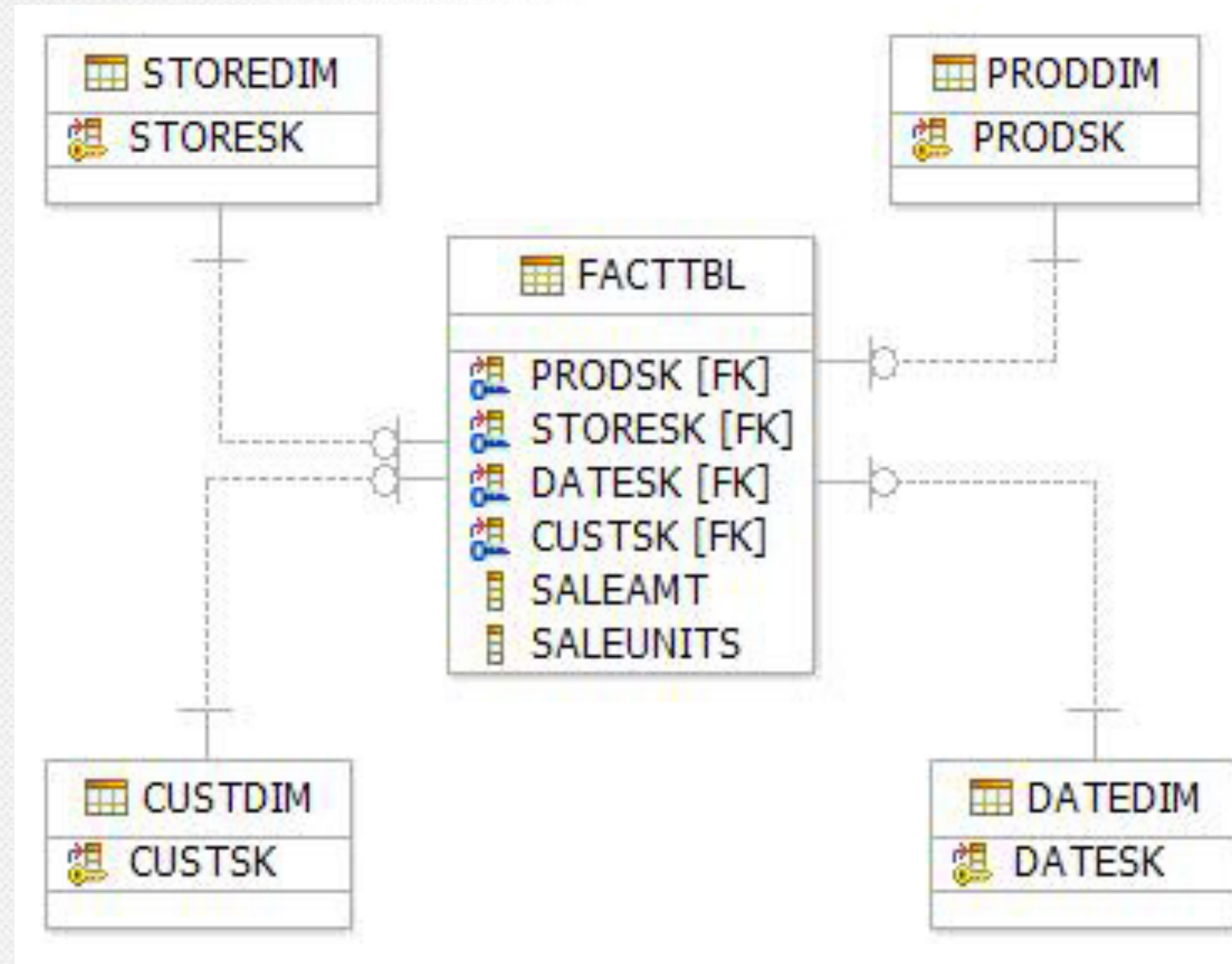
$O(n)$ vs $O(1)$



Architecture



Storage



Pre-Joined Flat Table	
Dimensions	D1
	D2
	...
	DX
Measures	M1
	M2
	...
	MY

Pre-Aggregated Table	
Dimensions	D3
	D6
	D8
Measures	M1
	M2
	...
	MY

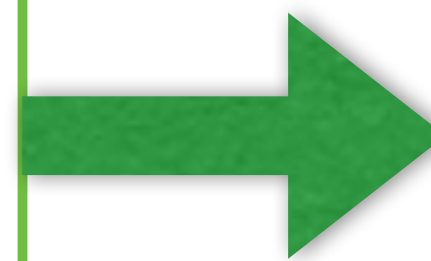
Cuboid ID	D1	D2	...	DX	M1	M2	...	MY
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Row Key = Cuboid ID+Dimensions

Row Value = Measures

SQL

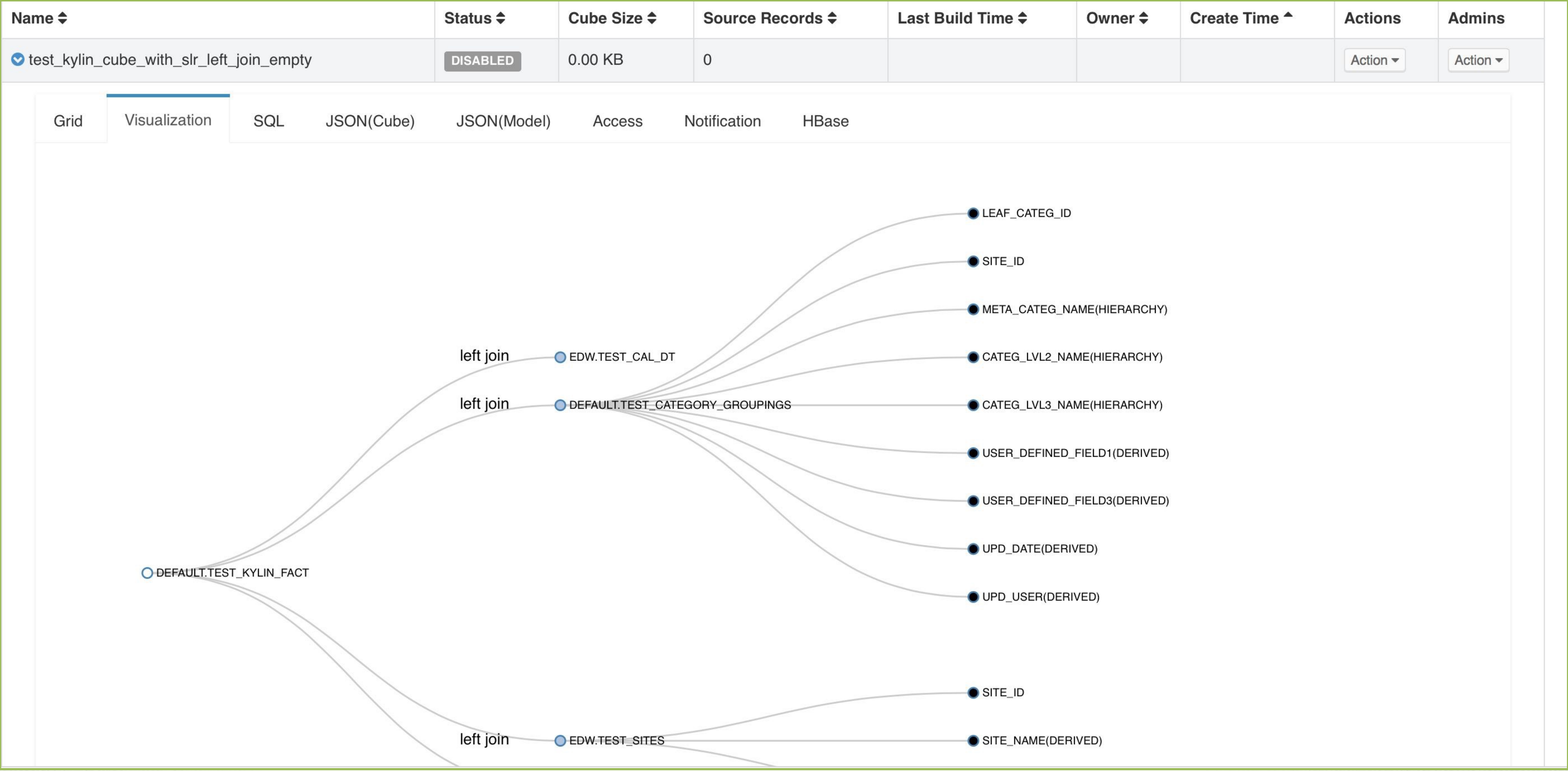
```
SELECT test_cal_dt.week_beg_dt,
test_category.category_name, test_category.lvl2_name,
test_category.lvl3_name,
test_kylin_fact.lstg_format_name, test_sites.site_name,
SUM(test_kylin_fact.price) AS GMV, COUNT(*) AS
TRANS_CNT
FROM test_kylin_fact
LEFT JOIN test_cal_dt ON test_kylin_fact.cal_dt =
test_cal_dt.cal_dt
LEFT JOIN test_category ON test_kylin_fact.leaf_categ_id
= test_category.leaf_categ_id AND
test_kylin_fact.lstg_site_id = test_category.site_id
LEFT JOIN test_sites ON test_kylin_fact.lstg_site_id =
test_sites.site_id
WHERE test_kylin_fact.seller_id = 123456 OR
test_kylin_fact.lstg_format_name = 'New'
GROUP BY test_cal_dt.week_beg_dt,
test_category.category_name, test_category.lvl2_name,
test_category.lvl3_name,
test_kylin_fact.lstg_format_name, test_sites.site_name
```



OLAPToEnumerableConverter

```
OLAPProjectRel(WEEK_BEG_DT=[ $\$0$ ], category_name=[ $\$1$ ],
CATEG_LVL2_NAME=[ $\$2$ ], CATEG_LVL3_NAME=[ $\$3$ ], LSTG_FORMAT_NAME=[ $\$4$ ],
SITE_NAME=[ $\$5$ ], GMV=[CASE(=( $\$7$ , 0), null,  $\$6$ )], TRANS_CNT=[ $\$8$ ])
OLAPAggregateRel(group=[{0, 1, 2, 3, 4, 5}], agg#0=[ $\$SUM0(\$6)$ ],
agg#1=[COUNT( $\$6$ )], TRANS_CNT=[COUNT()])
OLAPProjectRel(WEEK_BEG_DT=[ $\$13$ ], category_name=[ $\$21$ ],
CATEG_LVL2_NAME=[ $\$15$ ], CATEG_LVL3_NAME=[ $\$14$ ],
LSTG_FORMAT_NAME=[ $\$5$ ], SITE_NAME=[ $\$23$ ], PRICE=[ $\$0$ ])
OLAPFilterRel(condition=[OR(=( $\$3$ , 123456), =( $\$5$ , 'New'))])
OLAPJoinRel(condition=[=( $\$2$ ,  $\$25$ )], joinType=[left])
OLAPJoinRel(condition=[AND(=( $\$6$ ,  $\$22$ ), =( $\$2$ ,  $\$17$ ))], joinType=[left])
OLAPJoinRel(condition=[=( $\$4$ ,  $\$12$ )], joinType=[left])
OLAPTableScan(table=[[DEFAULT, TEST_KYLIN_FACT]], fields=[[0, 1, 2, 3,
4, 5, 6, 7, 8, 9, 10, 11]])
OLAPTableScan(table=[[DEFAULT, TEST_CAL_DT]], fields=[[0, 1]])
OLAPTableScan(table=[[DEFAULT, test_category]], fields=[[0, 1, 2, 3, 4, 5,
6, 7, 8]])
OLAPTableScan(table=[[DEFAULT, TEST_SITES]], fields=[[0, 1, 2]])
```

Design Data Model



Start 2015-0

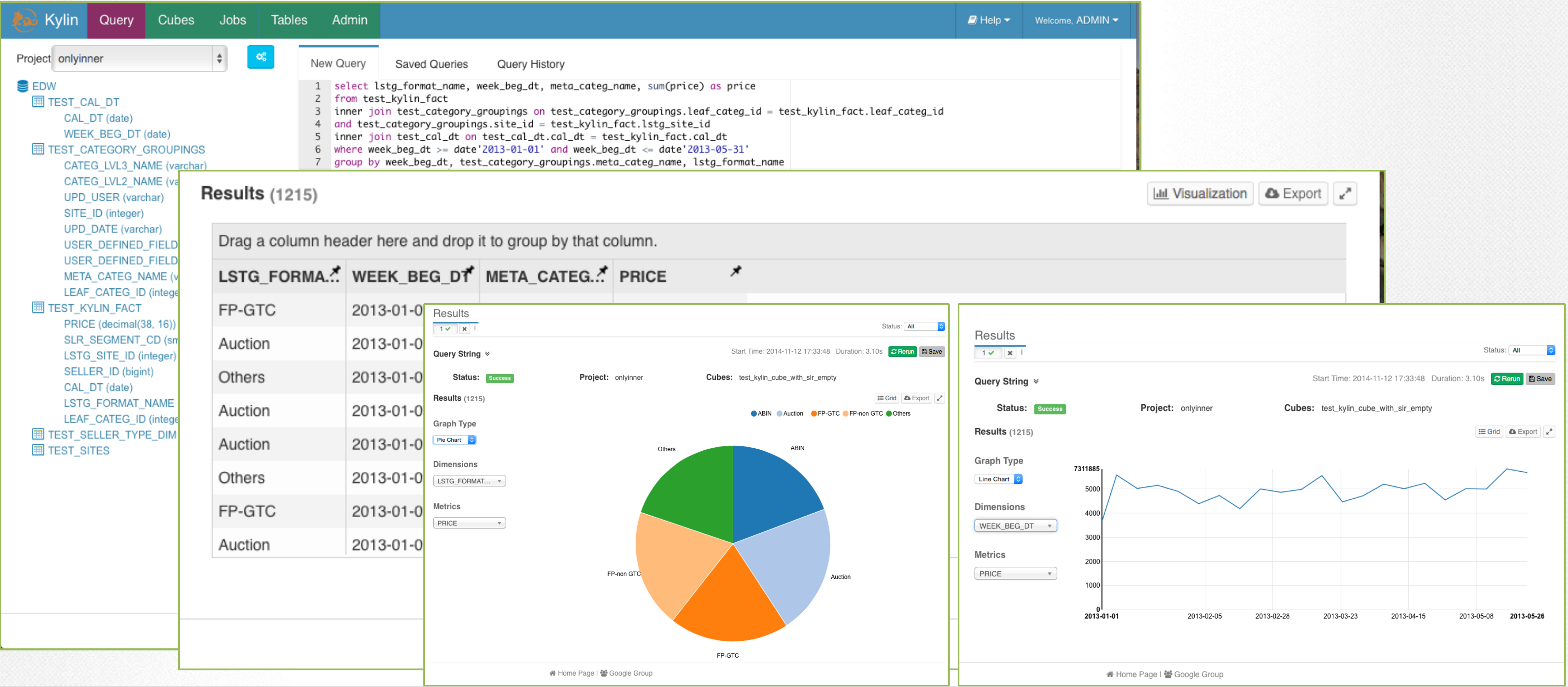
Output

Close

About Apache Hadoop

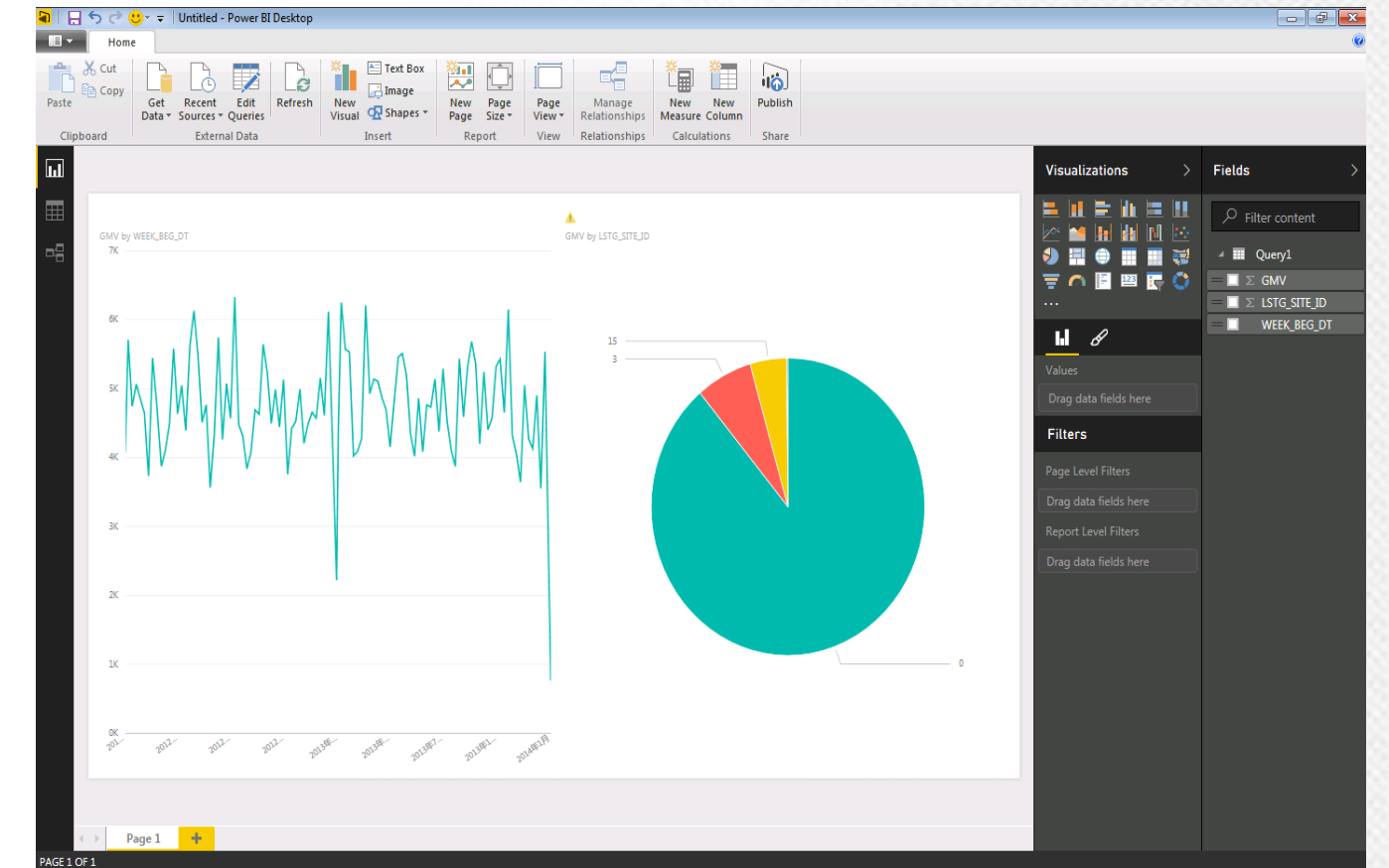
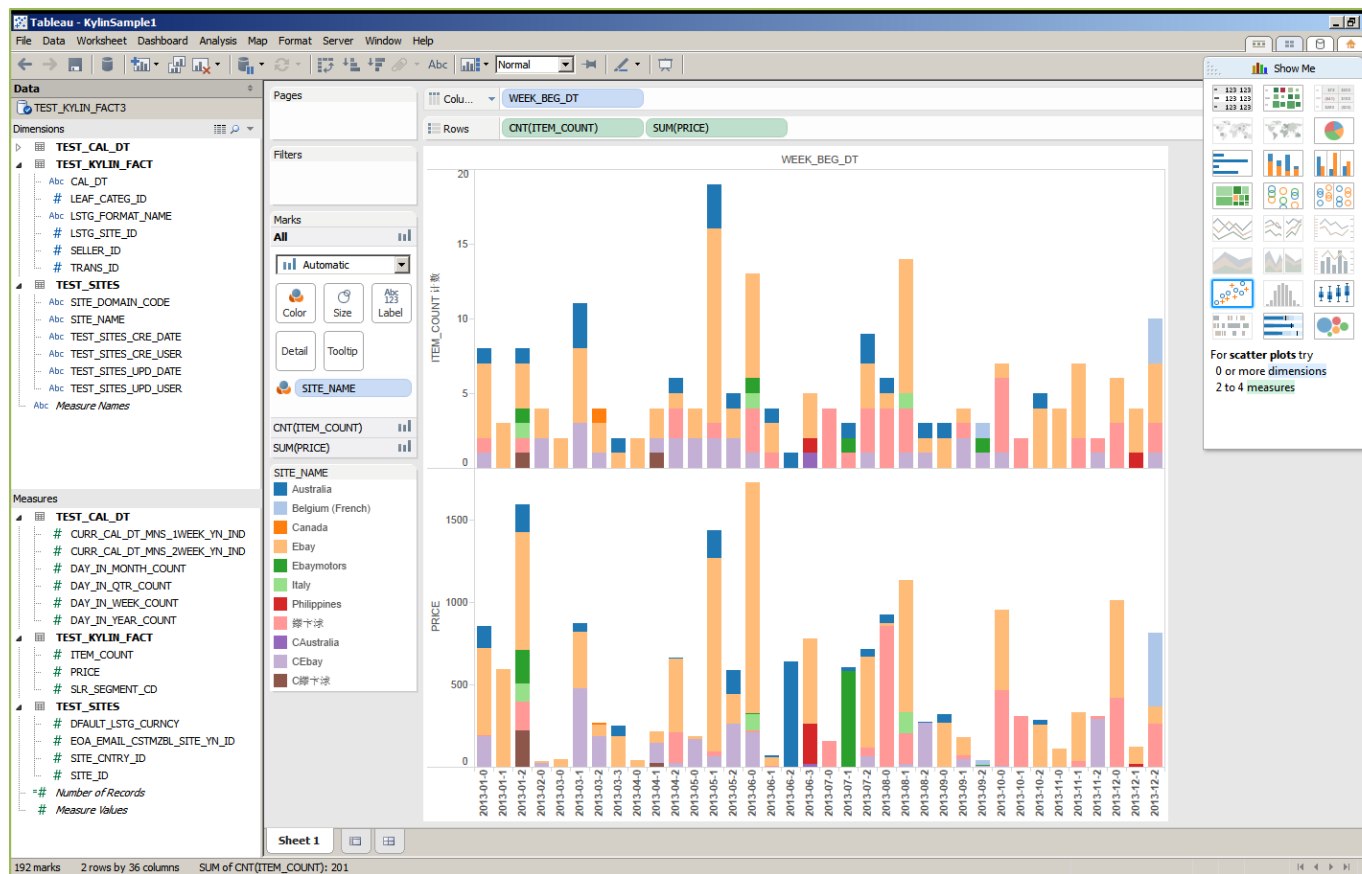
End 2015-04-12 18:20:40 PST

Explore Data

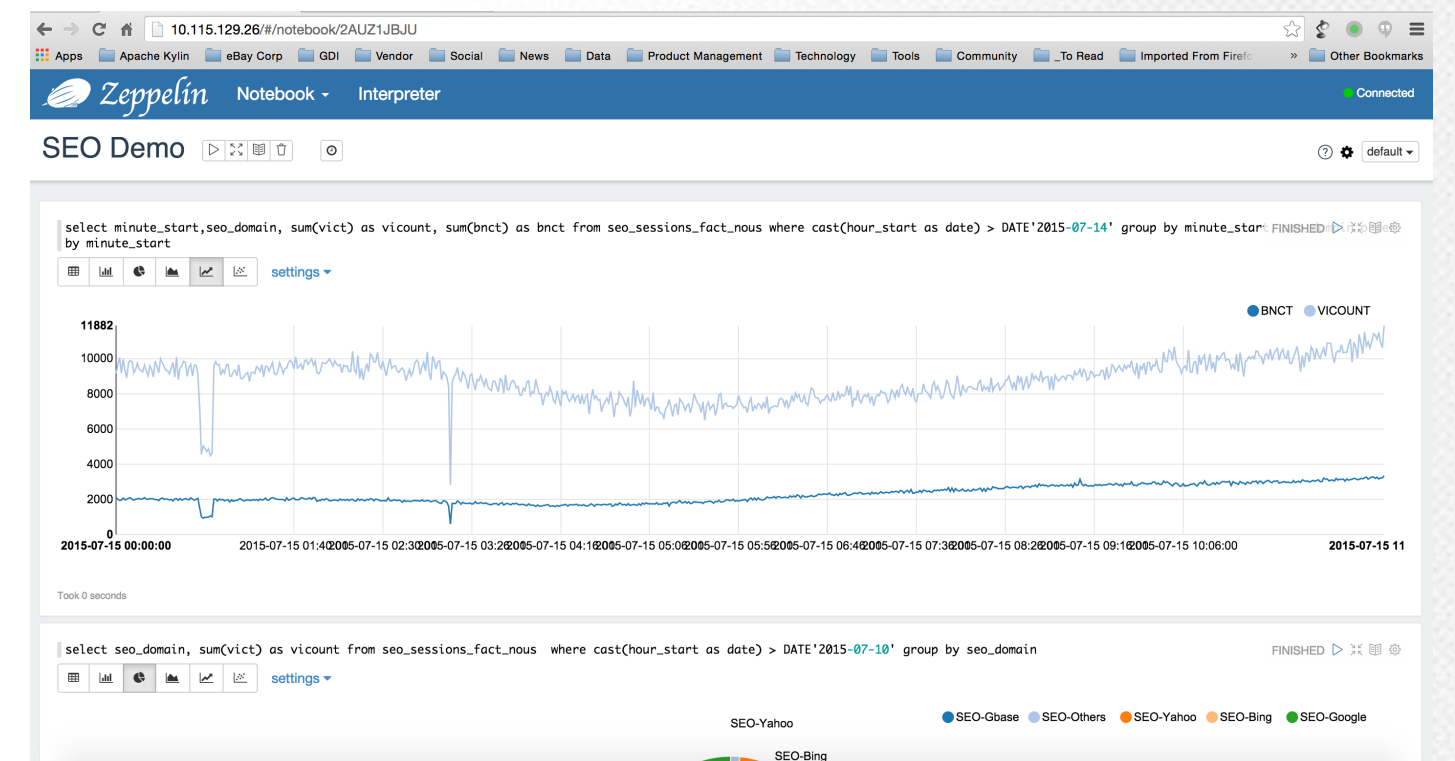


BI Tools

- Tableau
- Excel/PowerBI
- Zeppelin
- Caravel
- ...



CAL_DT	LEAF_CATEG_ID	LSTG_SITE_ID	LSTG_FORMAT_NAME	SLR_SEGMENT_CD	PRICE	ITEM_COUNT	SELLER_ID	TRANS
2012/1/1	216	0	Auction		12	38,5632	1322623	0
2012/1/1	314	0	FP-GTC		99	93,9928	896307	0
2012/1/1	15868	0	Auction		-99	80,233	1924796	0
2012/1/1	20865	0	Auction		5	95,4734	1907573	0
2012/1/1	26249	0	FP-GTC		11	99,8952	924465	0
2012/1/1	30059	3	FP-non GTC		14	99,8031	1221795	0
2012/1/1	31519	0	ABIN		12	82,6399	1603461	0
2012/1/1	32876	0	ABIN		12	52,4727	434383	0
2012/1/1	37851	0	ABIN		16	14,2143	604092	0
2012/1/1	45479	0	FP-non GTC		5	5,4557	1780379	0
2012/1/1	57990	0	FP-non GTC		15	74,5636	1502383	0
2012/1/1	87118	0	FP-GTC		5	8,3619	180846	0
2012/1/1	108782	10	ABIN		14	26,2638	1029458	0
2012/1/2	1161	3	FP-GTC		11	22,9973	1159330	0
2012/1/2	1357	0	ABIN		12	89,2786	92507	0
2012/1/2	2023	0	FP-GTC		5	73,9308	1926572	0
2012/1/2	20485	0	FP-non GTC		12	13,1577	151683	0
2012/1/2	20886	0	FP-non GTC		11	31,5019	1680207	0
2012/1/2	26262	0	FP-GTC		5	34,5762	606890	0
2012/1/2	31519	0	Auction		12	6,5088	718023	0
2012/1/2	31673	0	Auction		15	65,8814	1577640	0
2012/1/2	48027	0	FP-GTC		16	9,4746	1568558	0
2012/1/2	57990	3	Others		16	75,4612	1148795	0
2012/1/2	61323	0	Auction		16	10,5206	1103969	0
2012/1/2	63861	0	Auction		12	99,9549	2321014	0
2012/1/2	95672	0	ABIN		14	16,6339	1374506	0
2012/1/2	106246	0	FP-non GTC		15	94,8797	527478	0
2012/1/2	121153	0	ABIN		11	99,3149	1803467	0
2012/1/2	121153	0	FP-GTC		16	1,9409	1670028	0
2012/1/2	132939	0	FP-GTC		16	85,5012	672963	0
2012/1/2	164261	0	FP-GTC		-99	95,7825	678071	0
2012/1/2	164261	0	FP-non GTC		5	99,4868	150473	0
2012/1/2	165889	0	FP-non GTC		13	66,1294	931818	0
2012/1/3	314	0	FP-non GTC		14	71,8099	1535216	0
2012/1/3	1940	0	Others		-99	-98,0246	417920	0

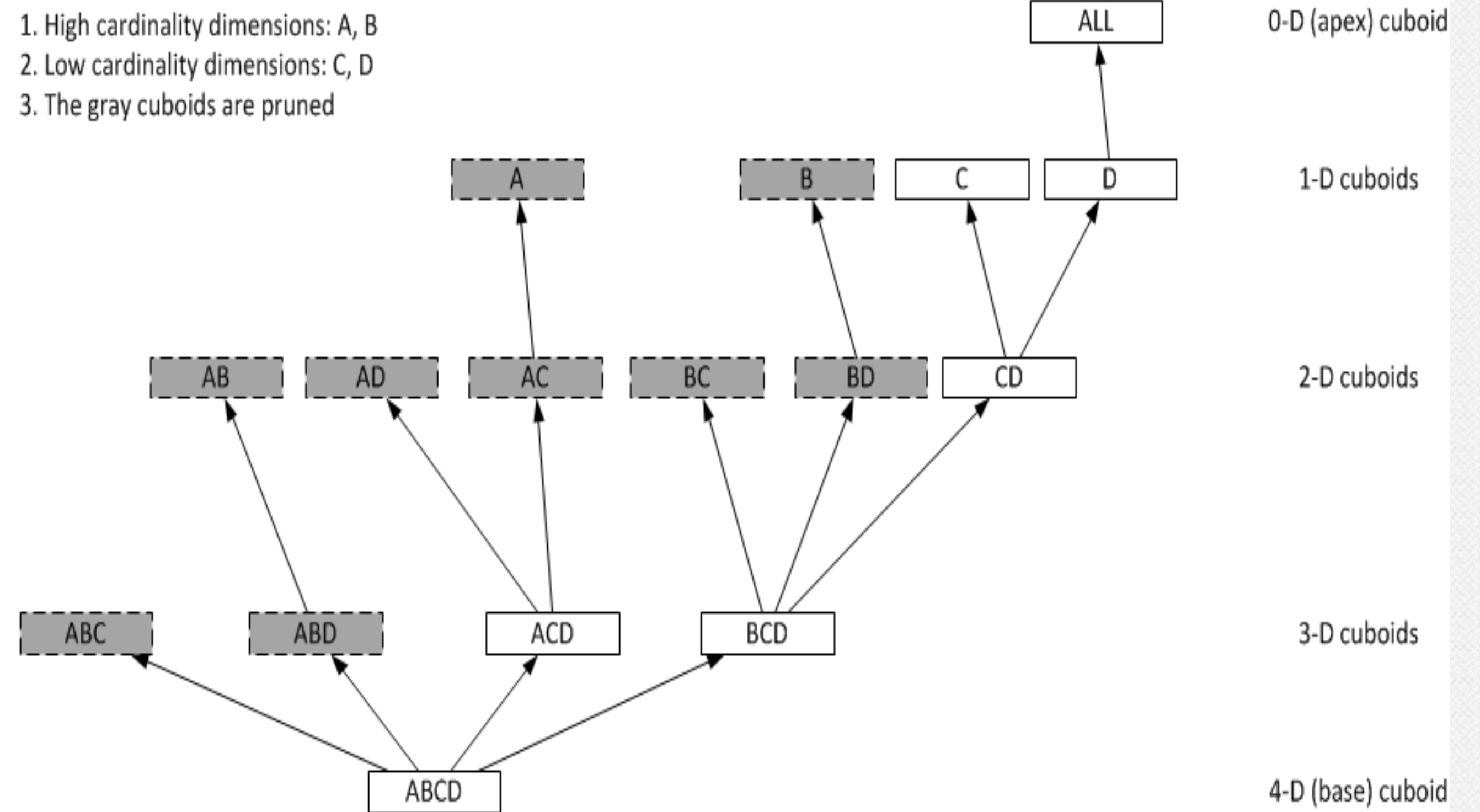


How to deal with data expansion

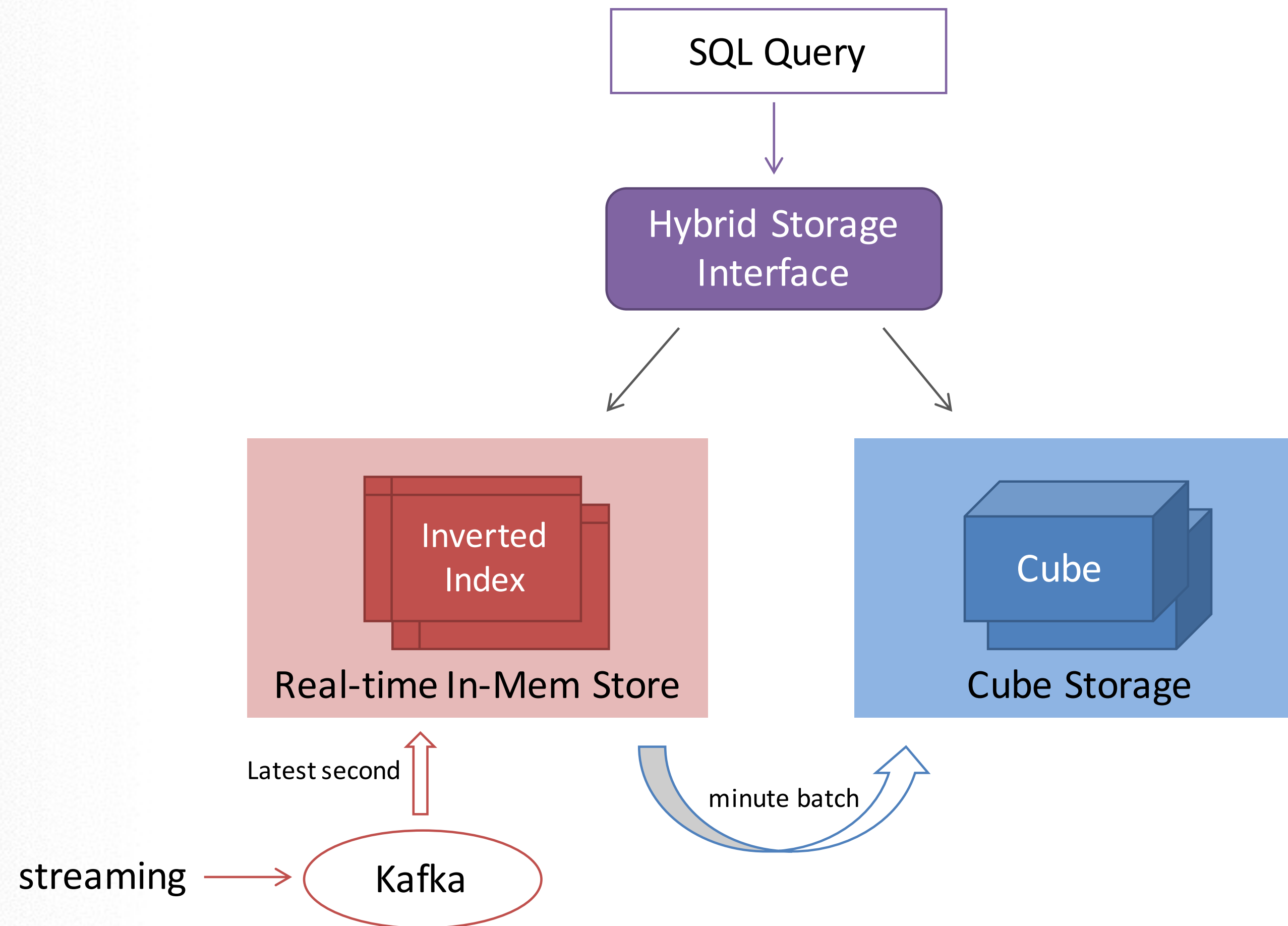
- Reduce Dimensions
 - Hierarchy
 - Derived
 - Extended
- Aggregation Group

$$2^{30} \rightarrow 2^{10} + 2^{10} + 2^{10}$$

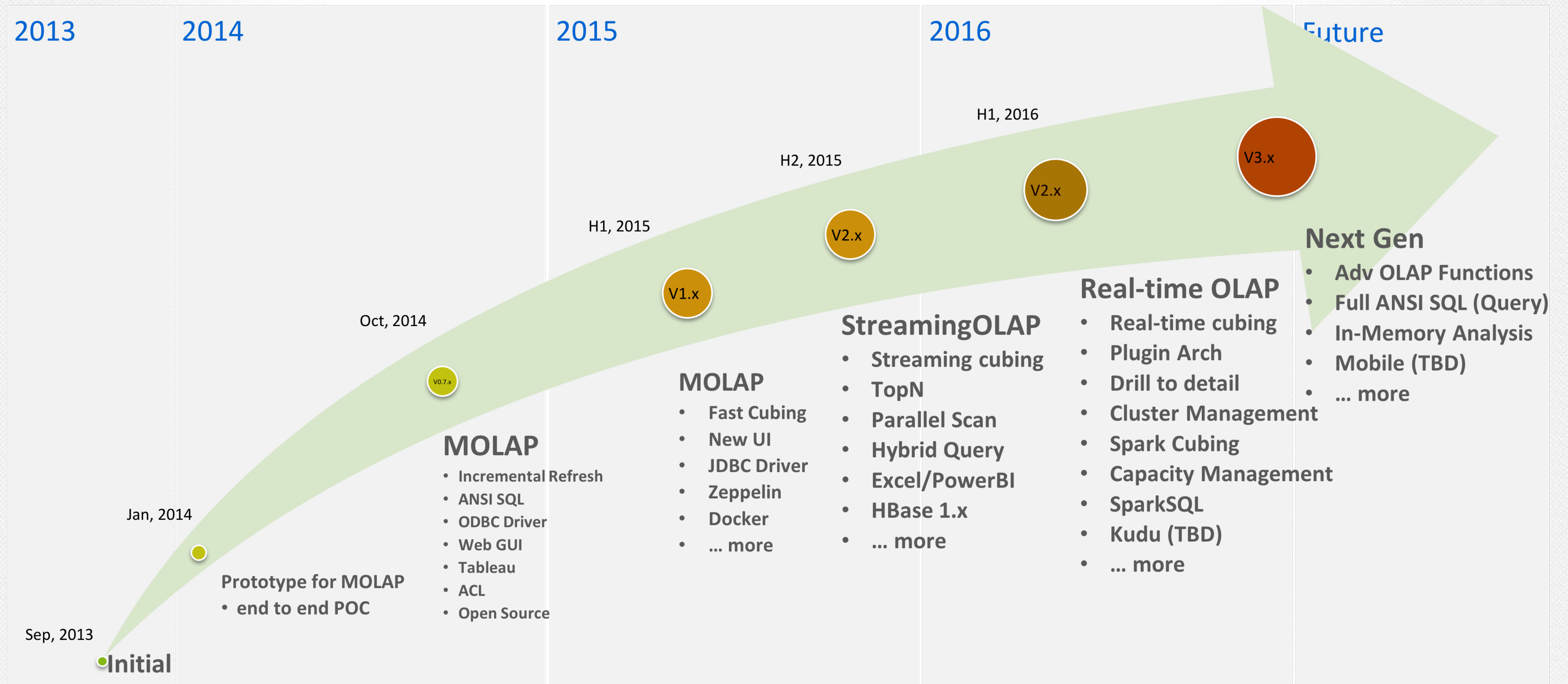
- Partial Cube



Lambda Architecture



Roadmap

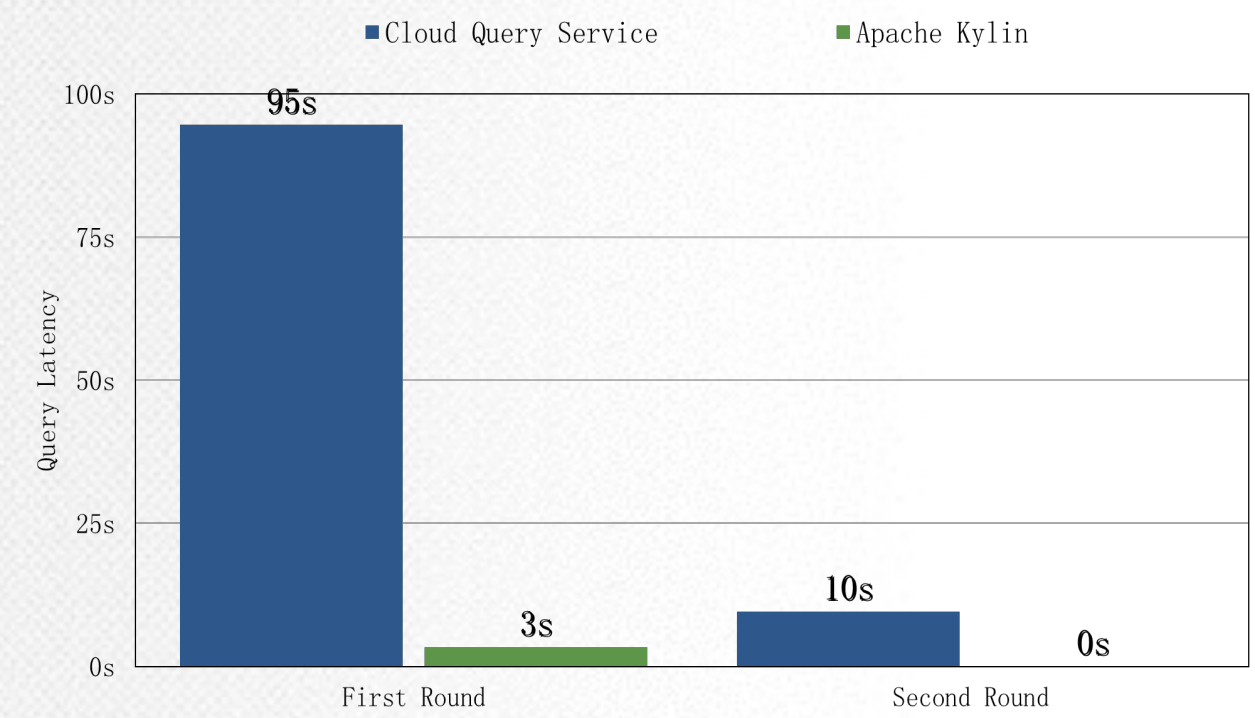


Use Cases

eBay

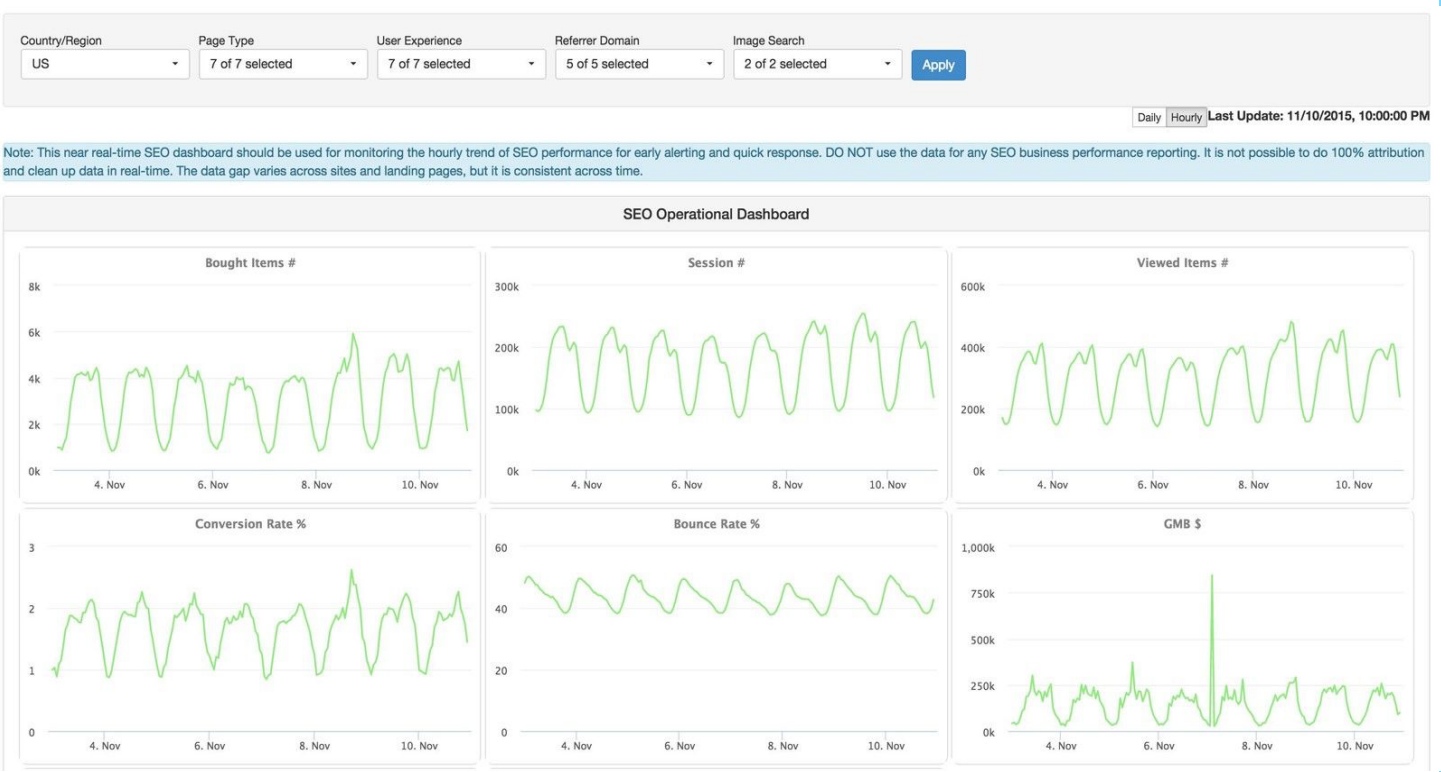
- eCG

- GA Deep Dive
- Pilot Case
- Extreme challenge for storage and building time
- Enabled Tableau



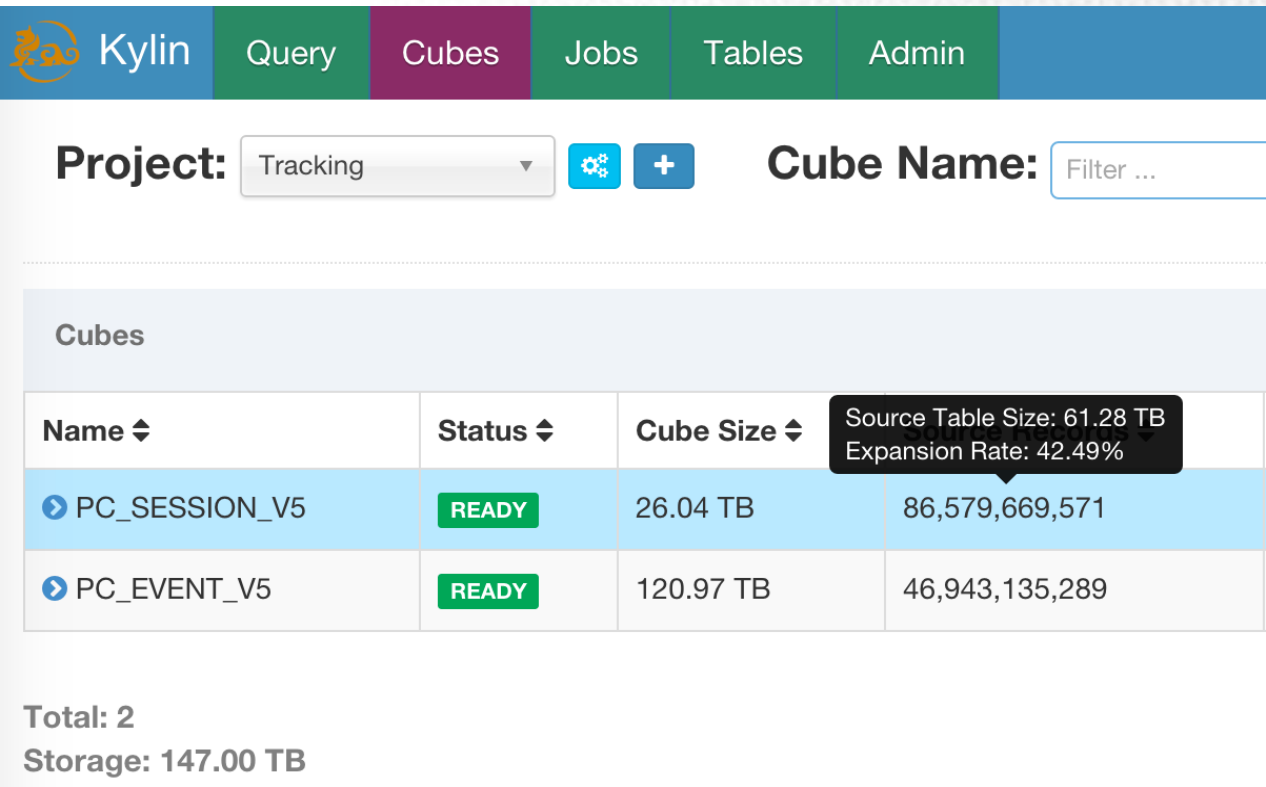
- DSS Nous

- NRT SEO Dashboard
- Near Real-time and Historical together

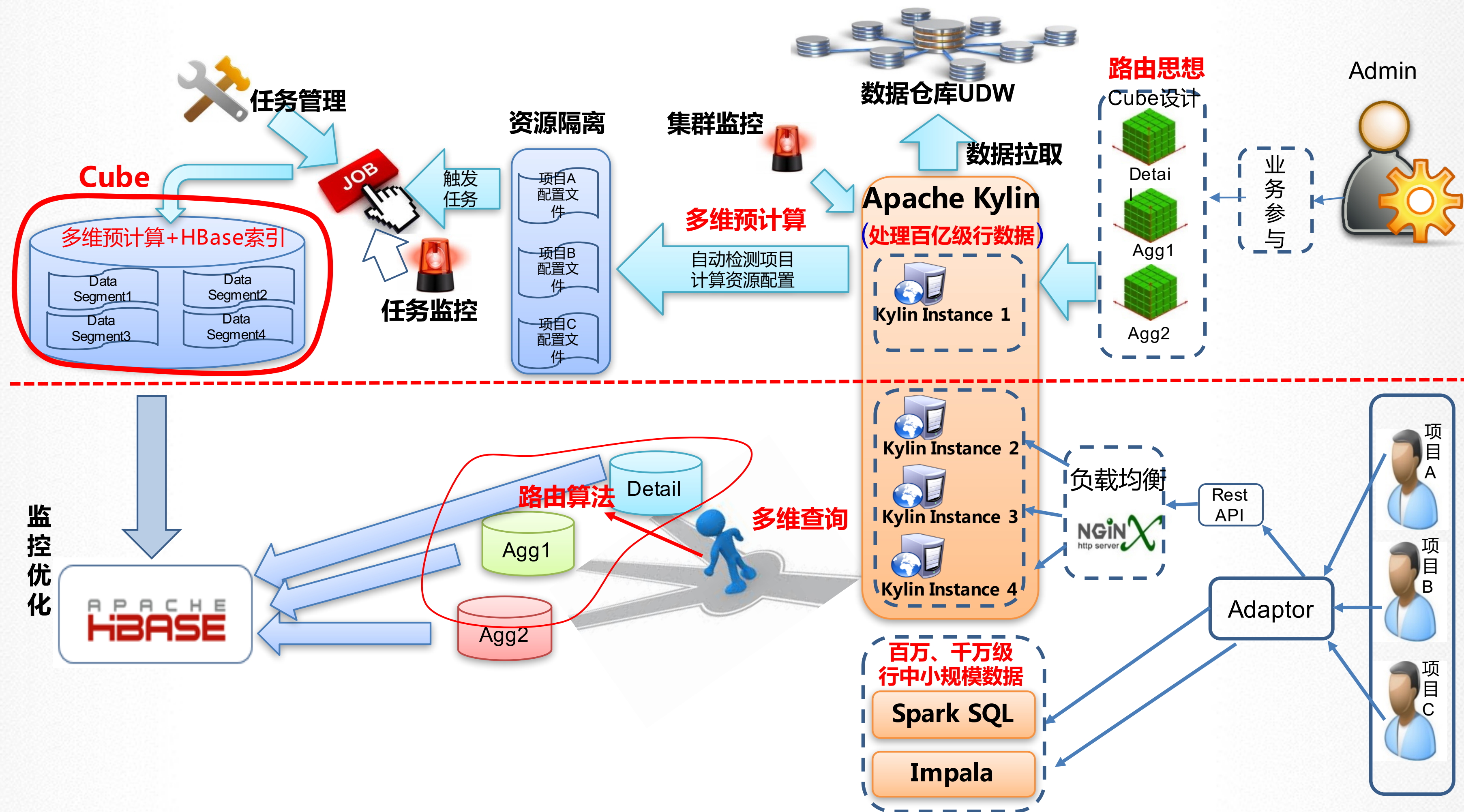


- eCS

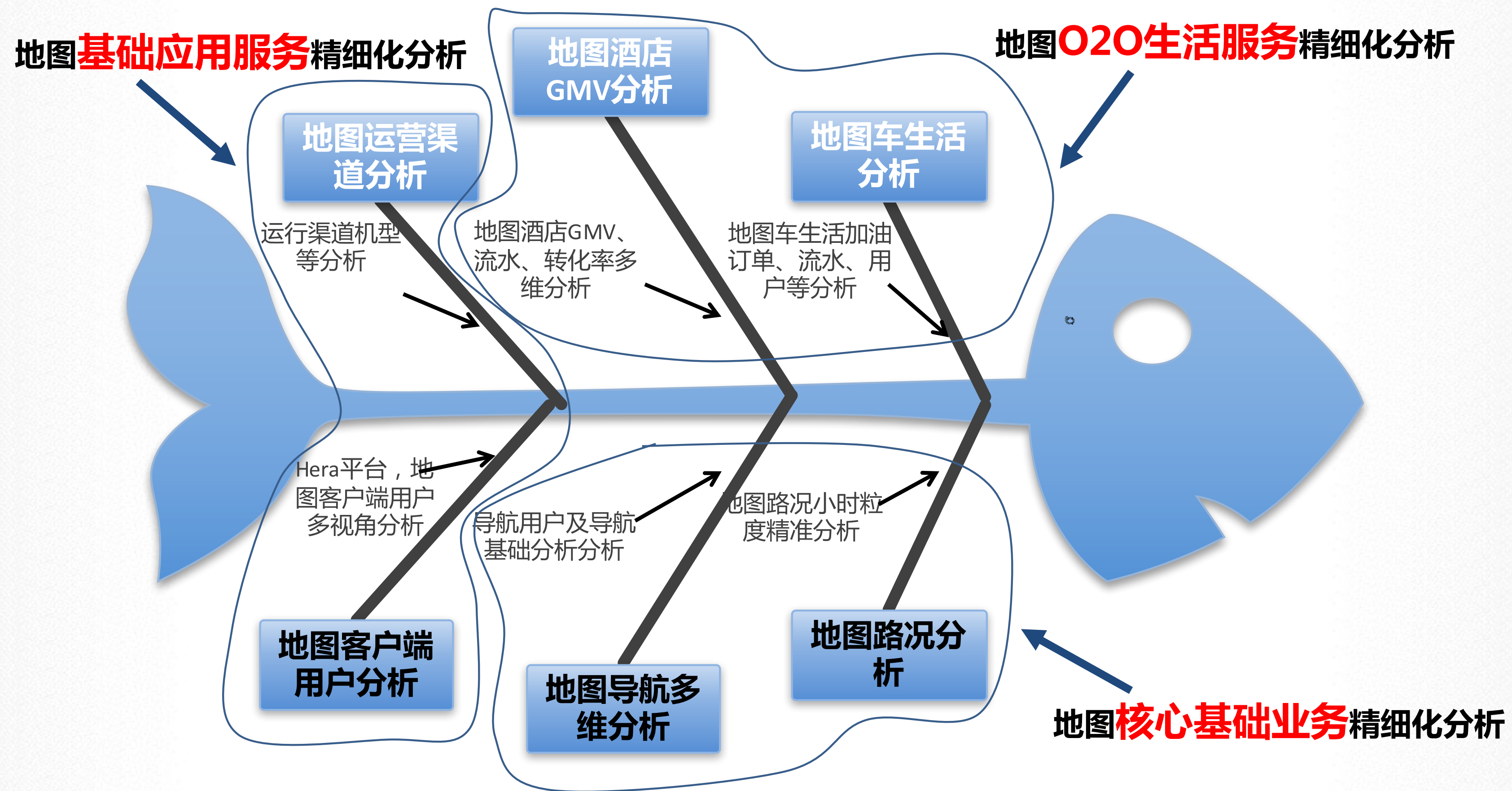
- Tracking Report
- Hugest Cube: 100+B raw records in one cube



百度地图



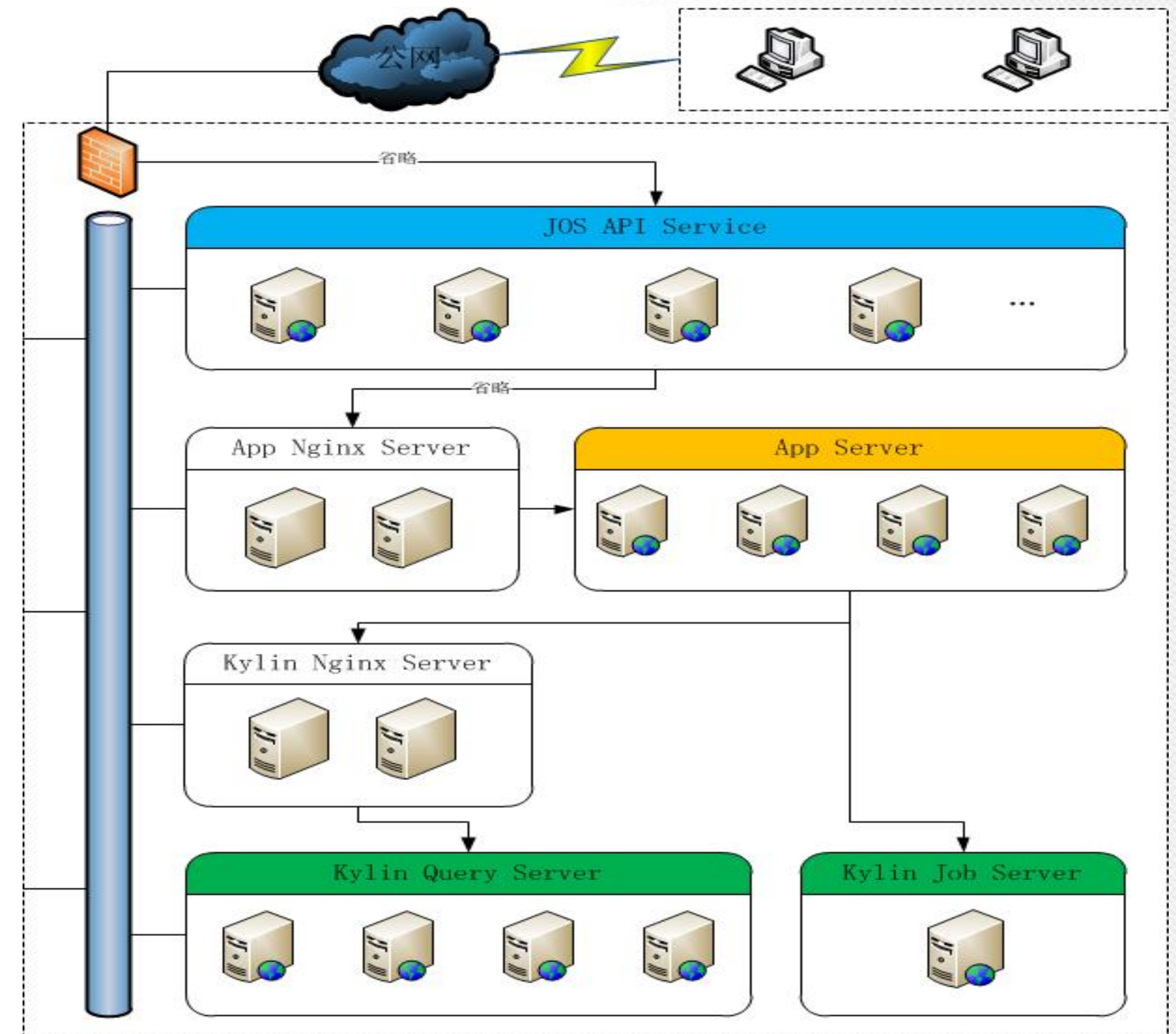
百度地图



共计**50+亿**行源数据，最大**单表20+亿**行记录

京东

- Powered by Apache Kylin
 - JCloud JOS - API Statistics
 - JCloud 云海 – Low latency query engine
 - JCloud Data Cloud – OLAP platform for online analytics tool



北京移动

I. Fast and Easy deployment



II. Low query latency

	Reousrces	Latency	comments
hive	86vcores+380GBMEM	1522s	orc+zlib
spark sql	131vcores+912GBMEM	125s	orc+zlib
kylin	Hbase5 nodes	3.43s	

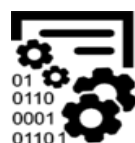
*Test SQL : select rat,count(distinct msisdn) from phone_usertmp where reportdate='20160225' group by rat;

*Data size: 103GB , records: 1.1+B

Data Overview



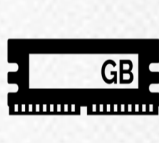
20+M
Users



Data Volume
30+ B/day



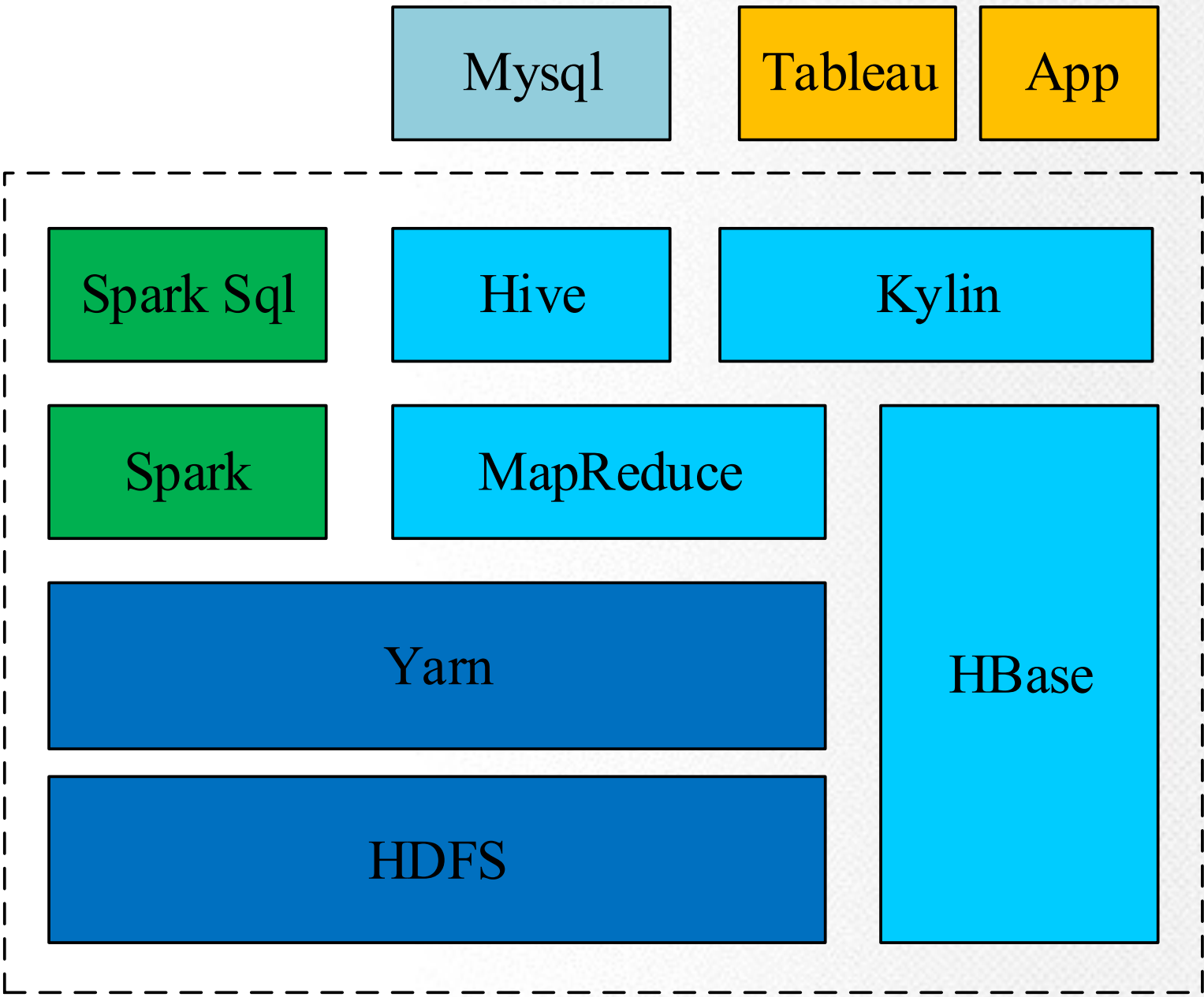
ETL
3TB/day



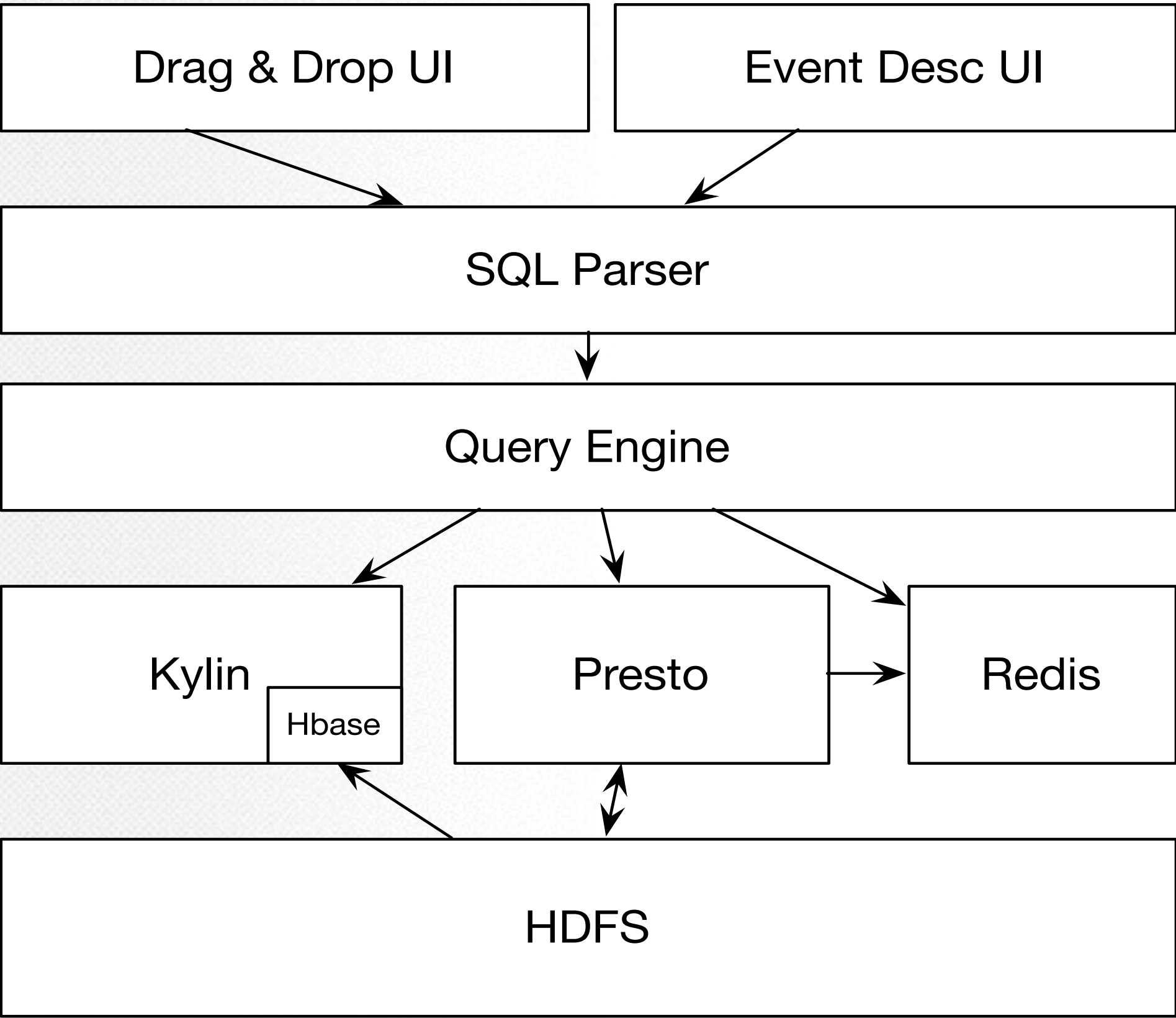
Cluster
400TB



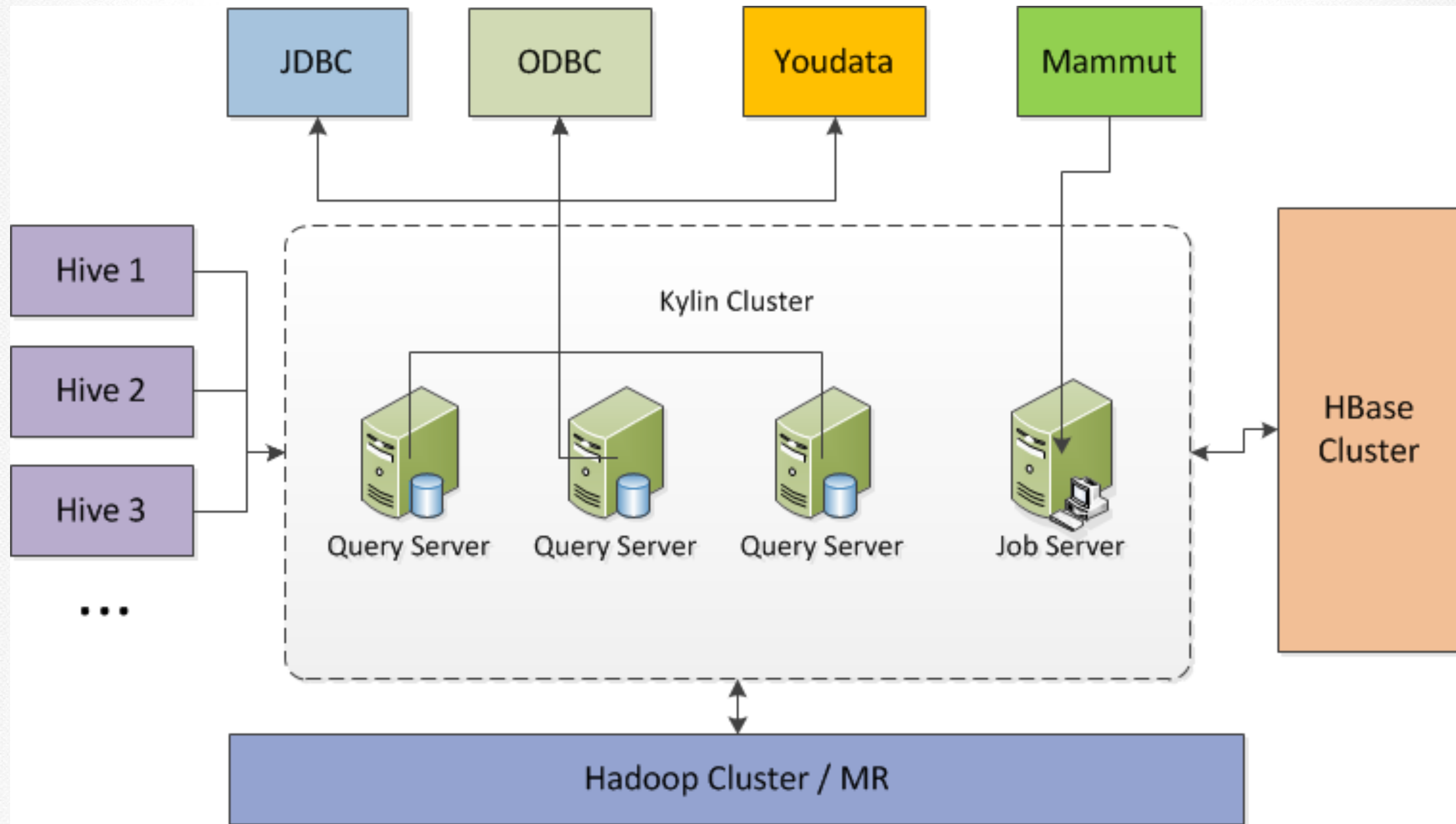
Jobs
800+/day



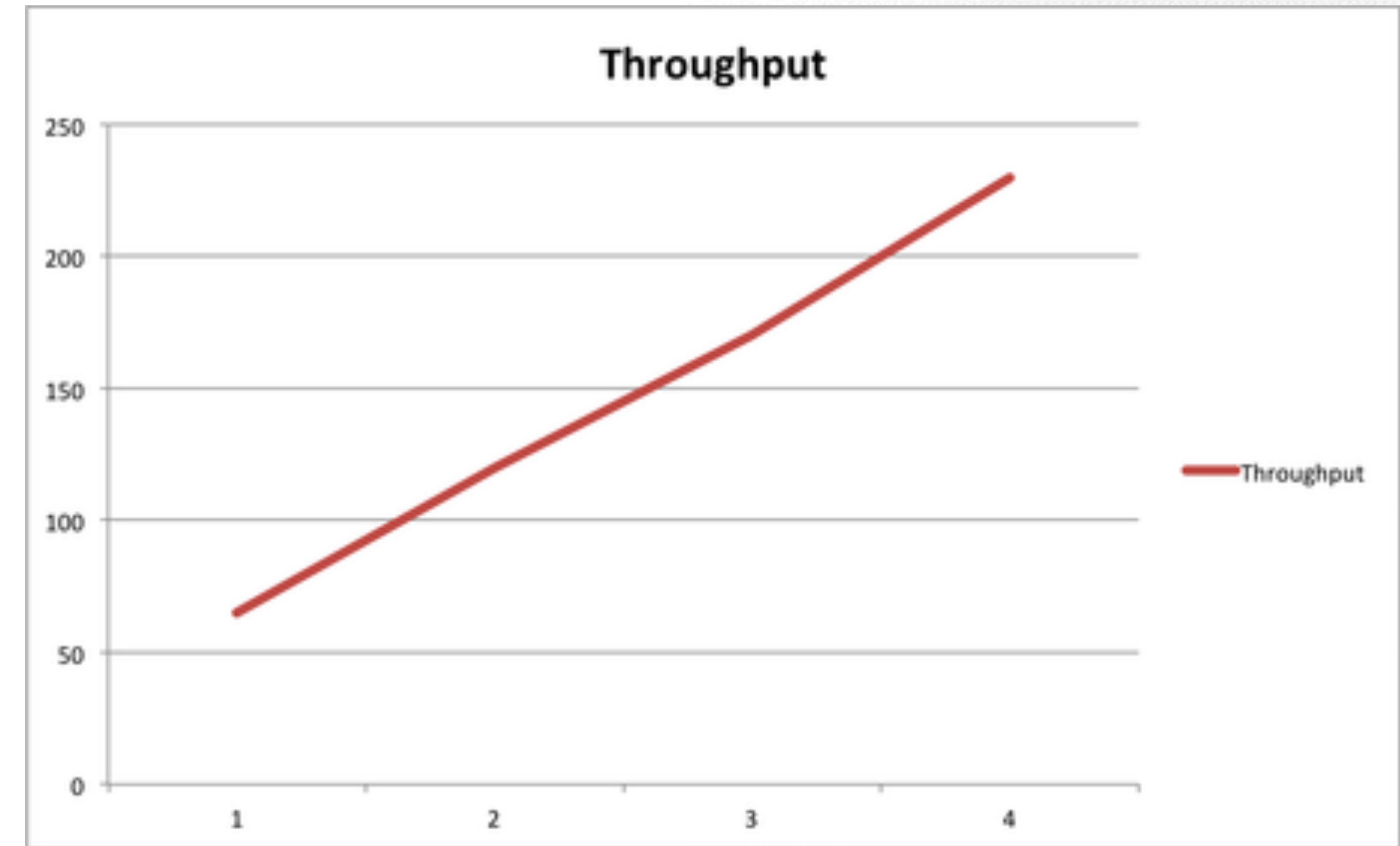
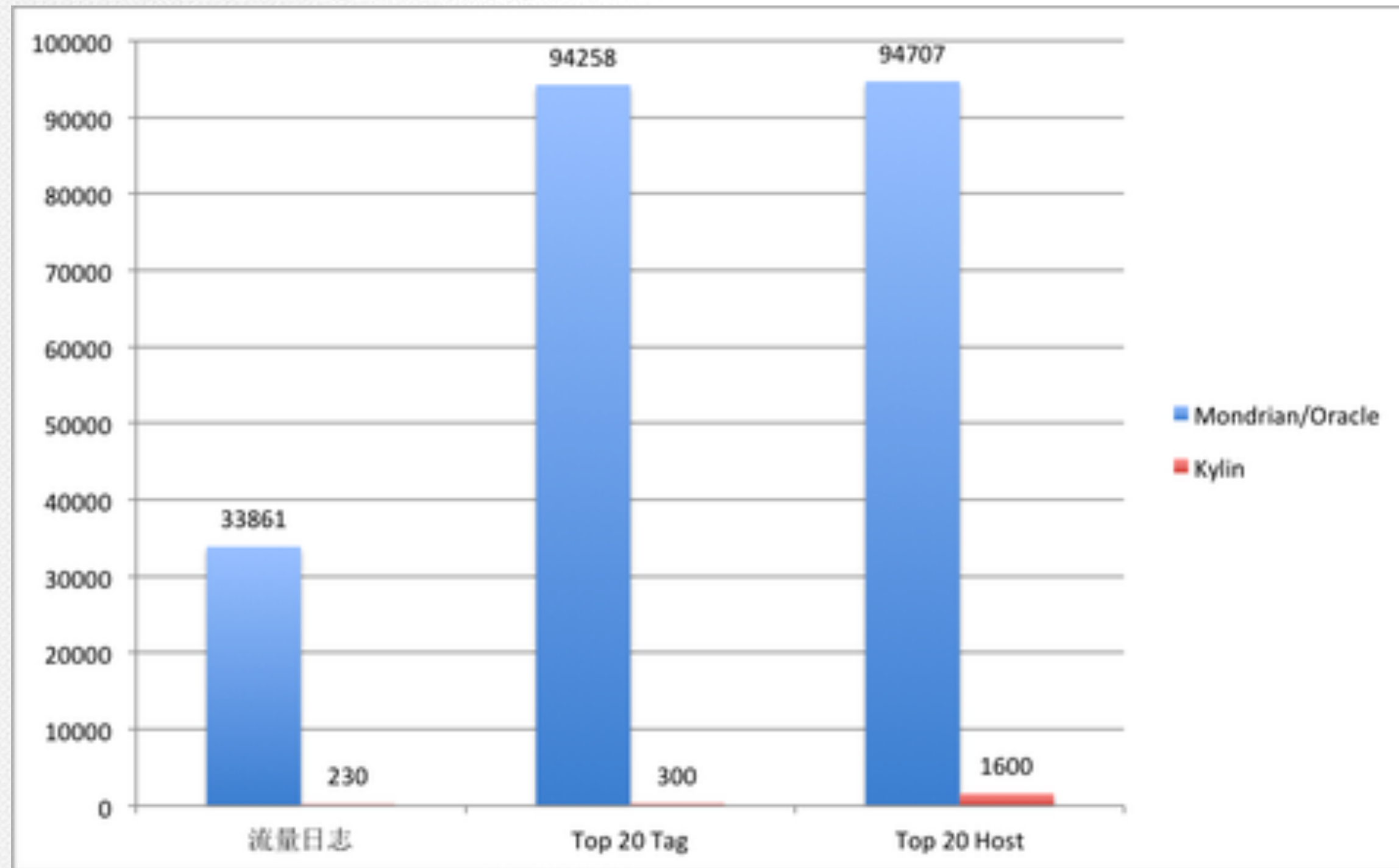
唯品会



网易



Performance Benchmark



By NetEase:

<http://www.bitstech.net/2016/01/04/kylin-olap/>

Apache Kylin

- 千亿数据，亚秒级查询延迟
- 标准SQL，交互式分析
- 无缝集成，整合主流BI工具
- 非侵入式部署，可扩展架构
- 水平扩展，从容应对高并发
- 快速实施，无需编码

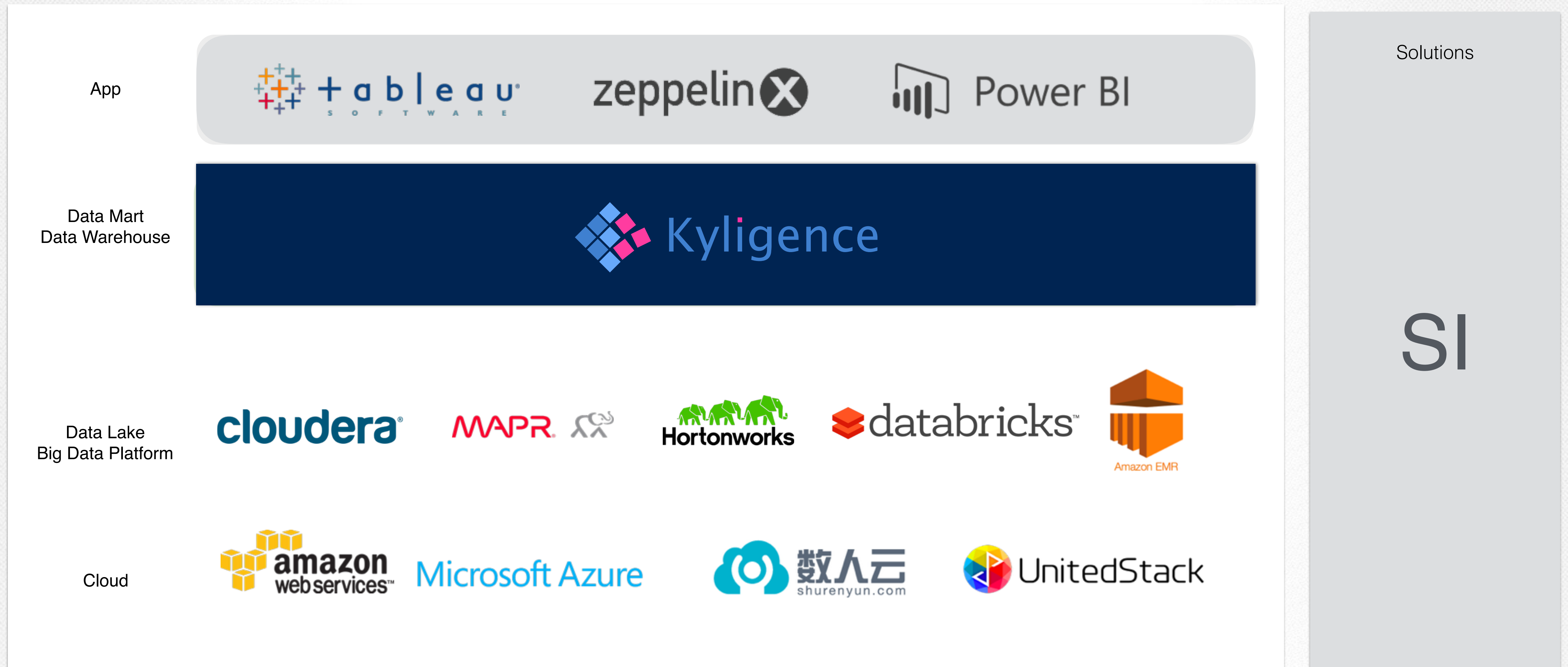


Kyligence Inc

- ✓ Formed by creator of Apache Kylin
- ✓ Kylin PMC members: 6
- ✓ Contributed over 90% Kylin code
- ✓ Success stories from variety industries
- ✓ Global partnership
- ✓ Certified training
- ✓ 5x8 or 7x24 expert support



Ecosystem



Q & A

- **For open source Kylin**

- dev@kylin.apache.org
- Twitter: @ApacheKylin
- <http://kylin.apache.org>

- **For Kyligence Inc**

- info@kyligence.io
- Twitter: @Kyligence
- <http://kyligence.io>



WeChat: Kyligence



WeChat: ApacheKylin