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大数据技术发展的两大方向和最新进展

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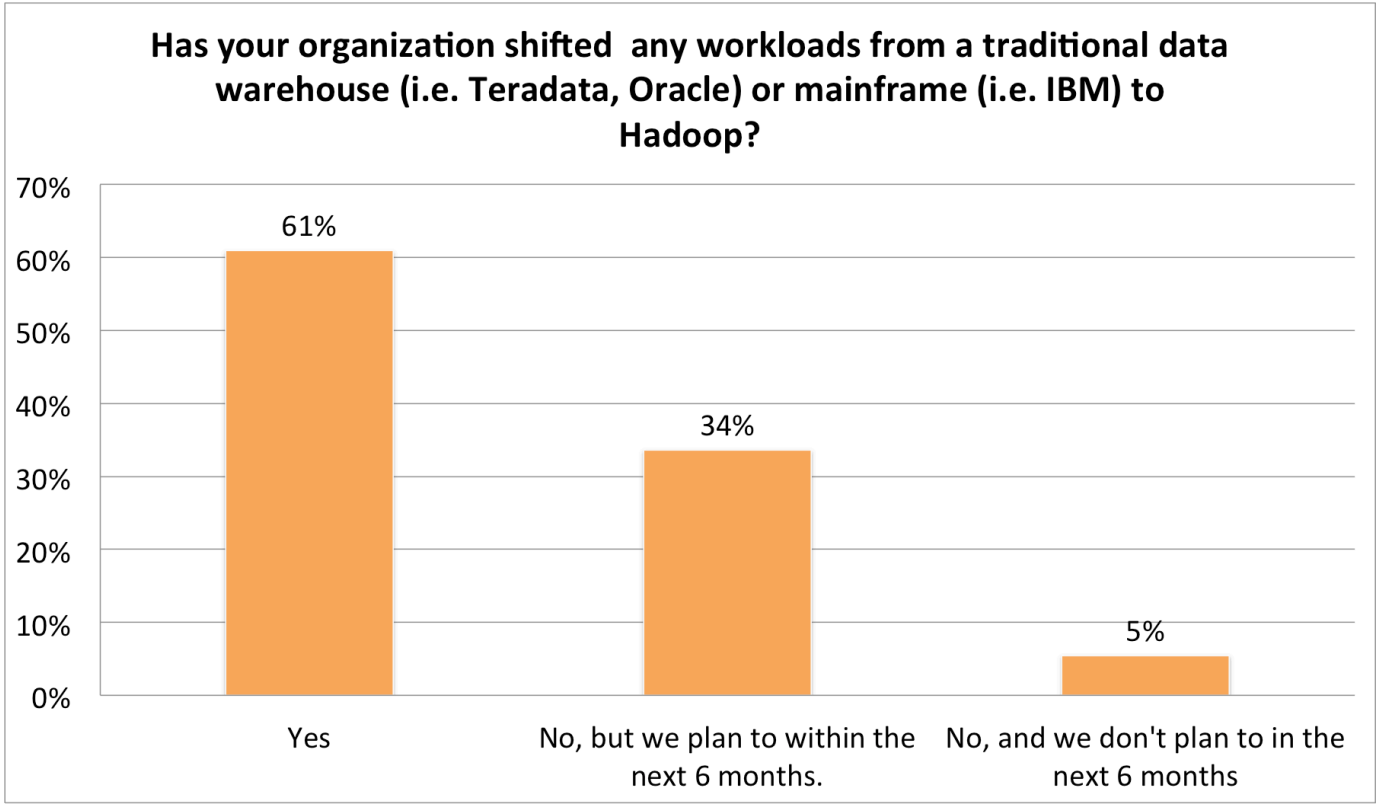
方向一：SQL on Hadoop是Killer App

对SQL支持程度的制约阻碍了企业应用Hadoop技术

60%的Hadoop应用在SQL统计



Source: wikibon.org

SQL on Hadoop 技术

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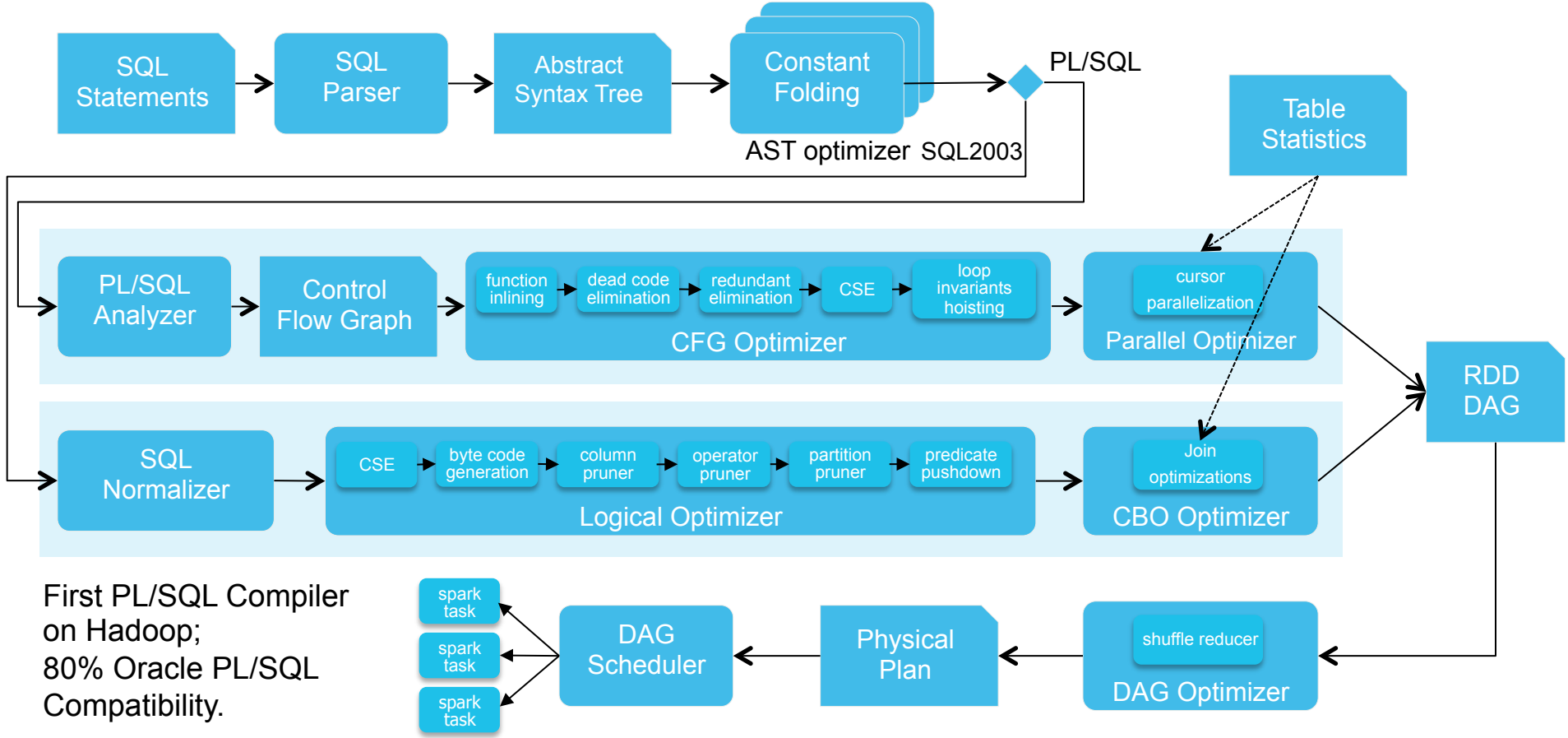
名称	计算引擎	ANSI SQL支持程度	存储过程	第一个版本发布时间
Cloudera Impala	类Dremel，类MPP引擎	SQL92子集+SQL2003扩展	不支持	2011/10
Hortonworks Tez/Stinger	Map/Reduce改进	SQL92子集+SQL2003扩展	不支持	2012/5
Transwarp Inceptor	Spark	SQL99 + SQL2003	Oracle Compatible PL/SQL	2013/11
Databricks SparkSQL	Spark	HiveQL（SQL92子集）	不支持	2014/6
MapR Drill	改进自OpenDremel	SQL92子集	不支持	2012/6立项，2014/11发布
IBM BigSQL v3	DB2/DPF like MPP Engine over HDFS	SQL 2003	不支持	2014/6
Pivotal HAWQ	Greenplum like MPP Engine over HDFS	SQL 2003	部分支持（Postgres like）	2013/2
Splice Machine	Apache Derby + HBase	SQL 1999	不支持	2015 GA
Actian Vortex	MPP Engine over HDFS	SQL 2003	不支持	2014

Inceptor PL/SQL Compiler



First PL/SQL Compiler on Hadoop;
80% Oracle PL/SQL Compatibility.

Parallel Query Optimizer

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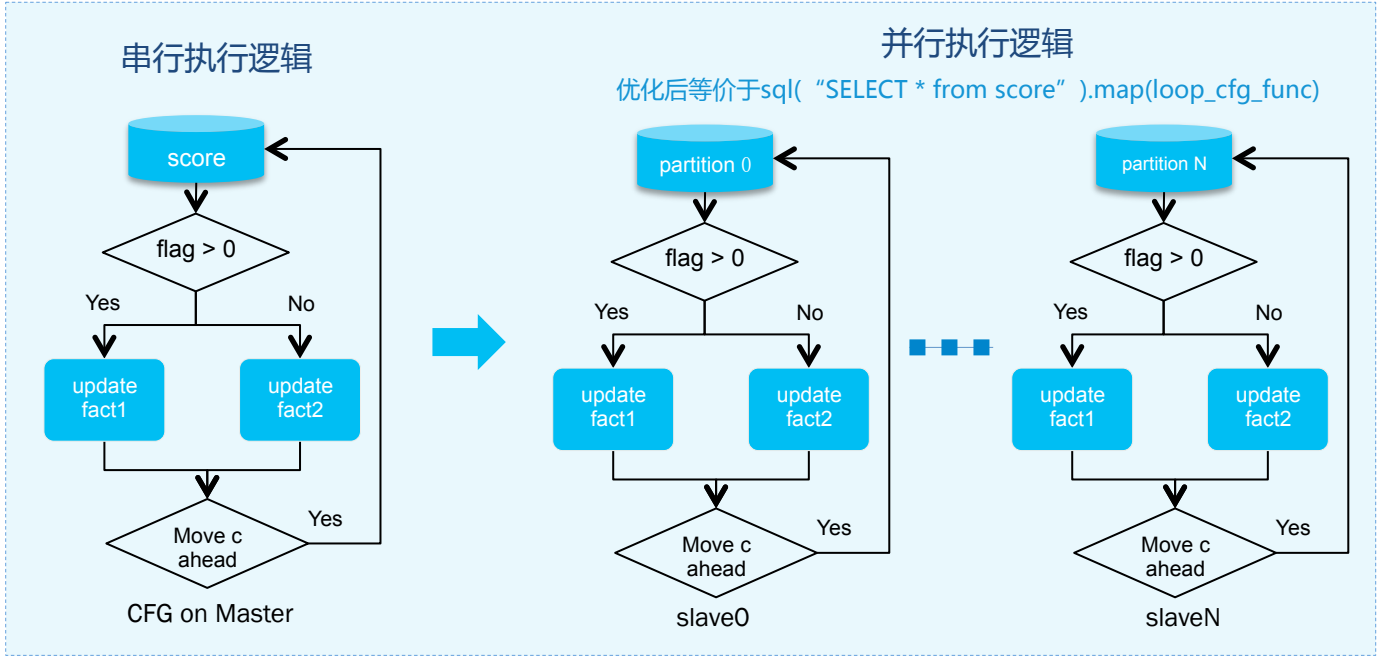
Parallel Query Optimizer

- partition parallelism
- control flow parallelism
- pipeline parallelism

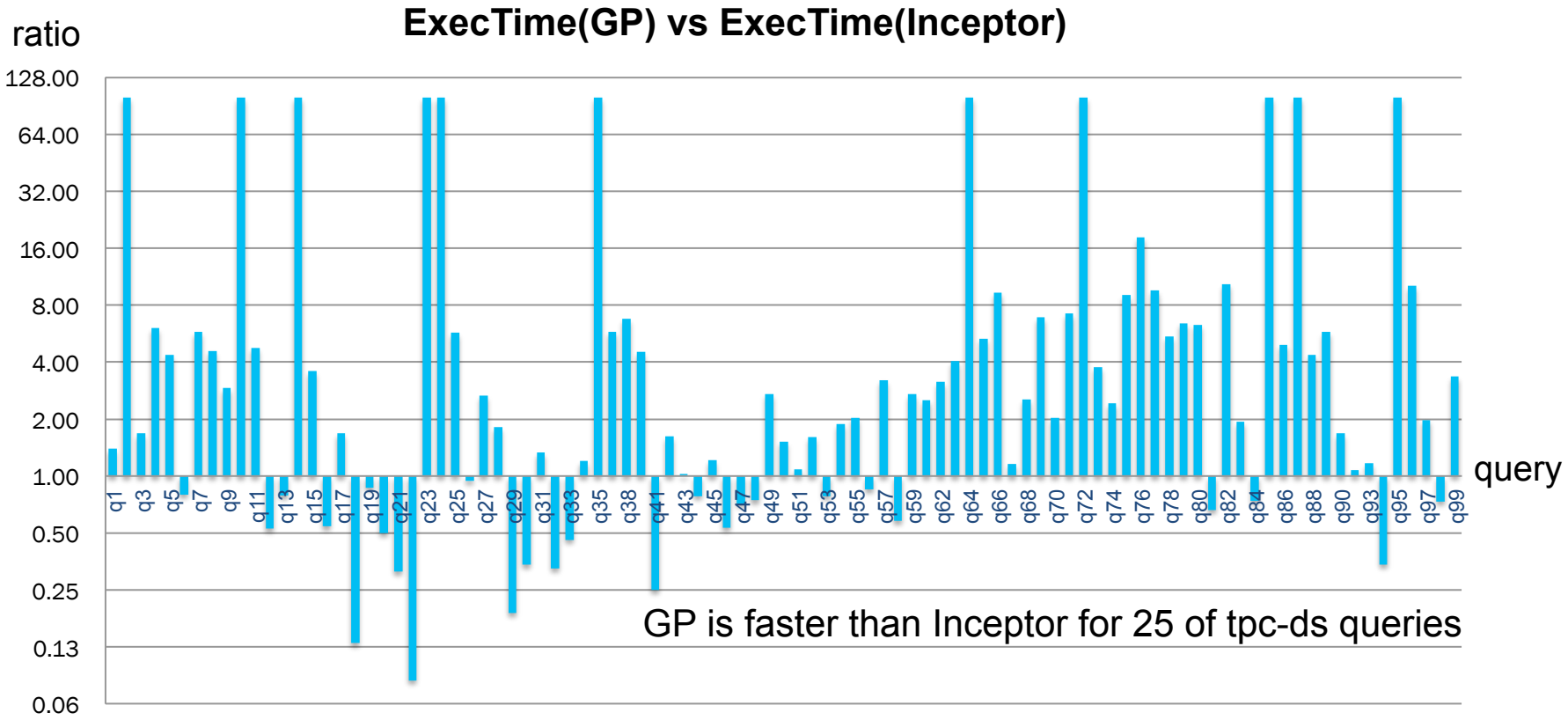
A cursor can be parallelized if there is no loop-carried dependence or the dependence is inductive.

游标示例程序

```
CURSOR c IS SELECT * from
score
OPEN c
FOR v_rec IN c LOOP
  IF v_rec.flag > 0 THEN
    UPDATE fact1 SET …
  ELSE
    UPDATE fact2 SET …
  END IF
END LOOP
```

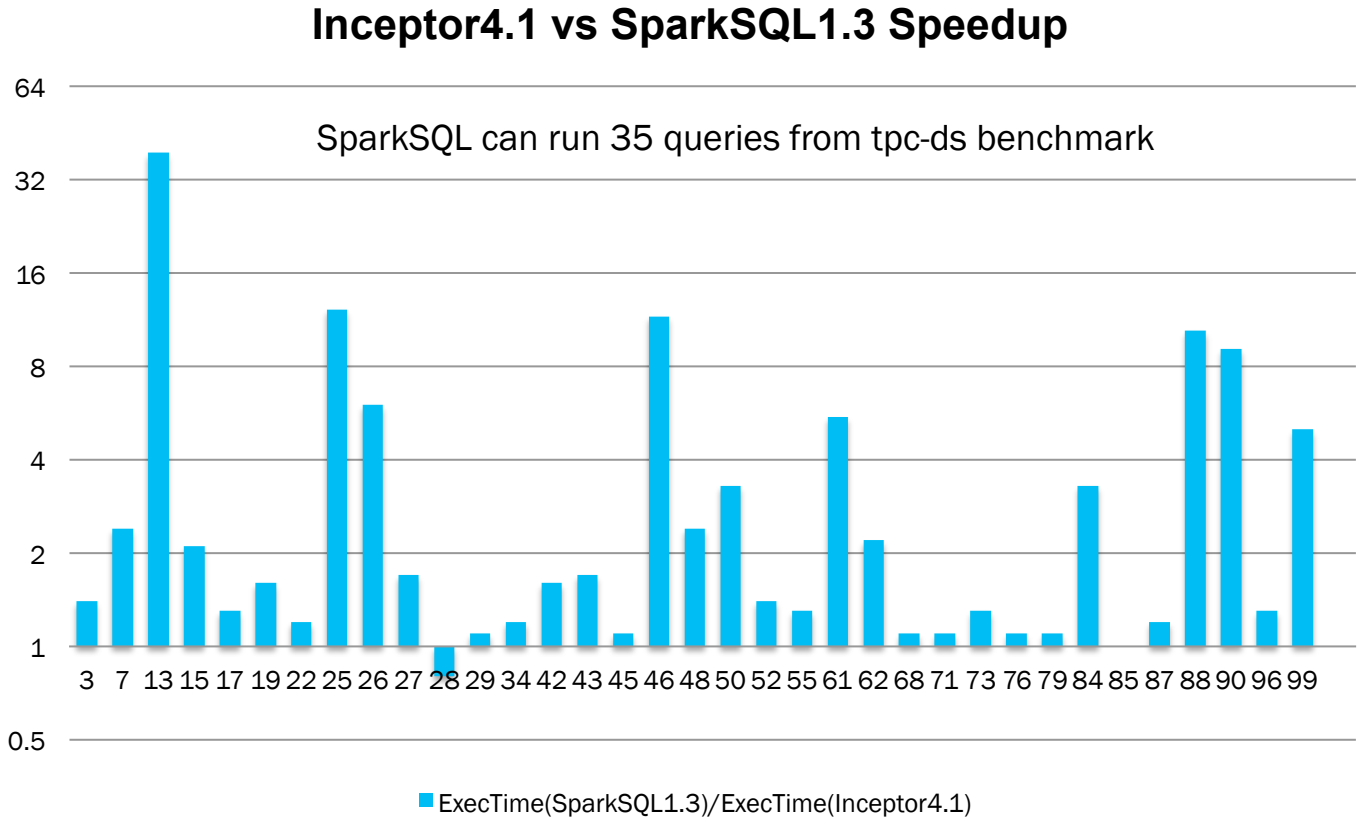


Transwarp Inceptor vs Greenplum DB



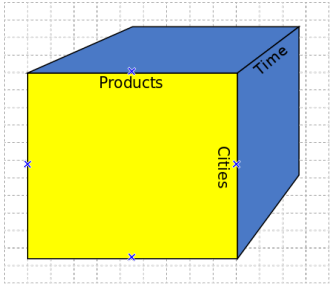
Transwarp Inceptor 4.1 vs Spark SQL 1.3

Inceptor性能比SparkSQL的加速比例



交互式OLAP分析：Distributed Cube

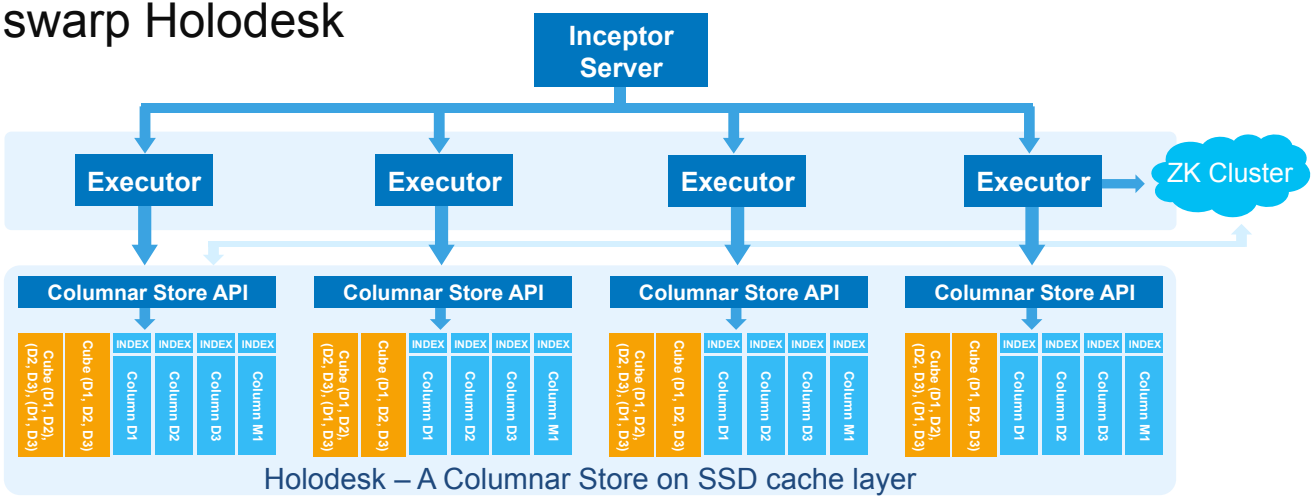
- Cube是OLAP分析的常用技术
  - Slicing
  - Dicing
  - Rollup
  - Drill Up/Down
  - Pivot



如何定义一个Cube？

```
create table store_sales tblproperties(
    'cache'='ram',
   'holodesk.dimensions'='product, cities, time'
) as select * from store_sales;00000
```

- Cube on Transwarp Holodesk



Cube Size
256KB固定大小

Holodesk Cube带来的性能加速

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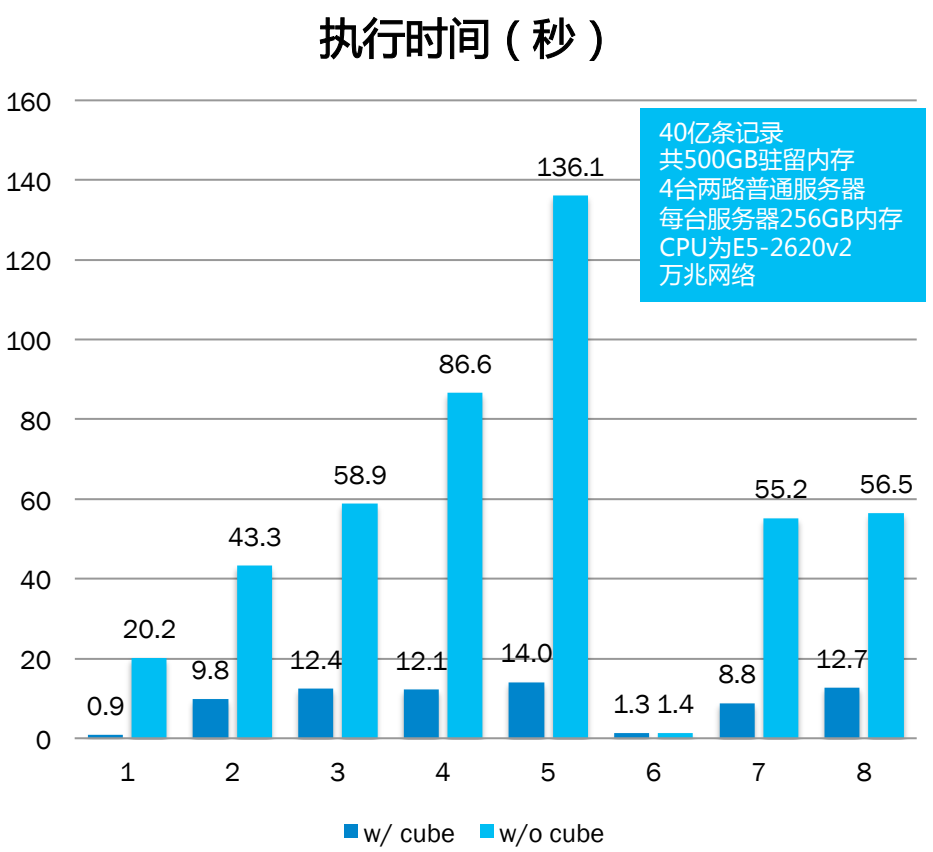
Operation		SQL query
q1	count	select count(*) from store_sales
q2	measure	select sum(ss_sales_price) from store_sales
q3	aggregation	select sum(ss_sales_price) from store_sales group by ss_customer_sk
q4	drill down	select sum(ss_sales_price) from store_sales group by ss_sold_date_sk
q5	drill down	select sum(ss_sales_price) from store_sales group by ss_customer_sk, ss_sold_date_sk
q6	slice	select sum(ss_sales_price) from store_sales_r where ss_customer_sk=5000 group by ss_customer_sk,ss_sold_date_sk
q7	dice	select sum(ss_sales_price) from store_sales where ss_sold_date_sk between 2450629 and 2451816 group by ss_customer_sk
q8	pivot	select sum(ss_sales_price) from store_sales where ss_customer_sk > 5000 and ss_sold_date_sk between 2450629 and 2451816 group by ss_customer_sk,ss_sold_date_sk



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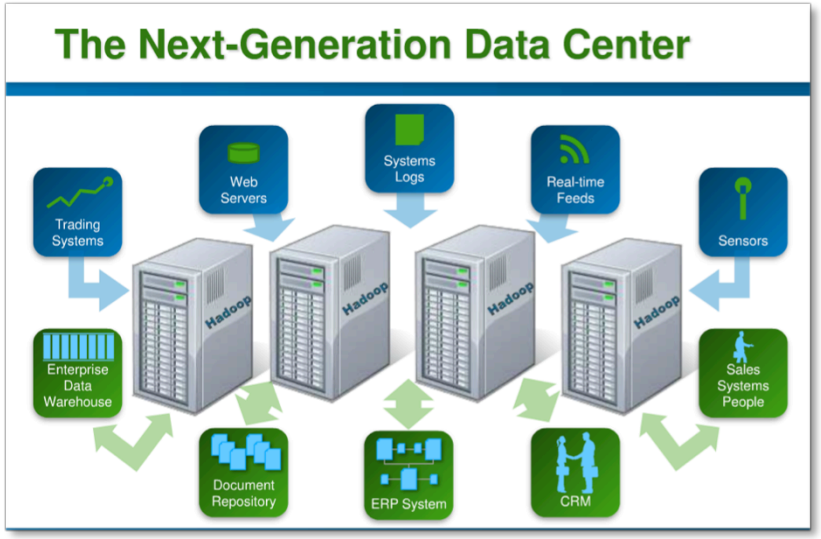
方向二：Hadoop加速Docker化

企业对多租户资源管控和弹性计算的需求促使Hadoop发生变革

企业大数据平台的切实需求



统一的企业大数据平台 (Data Hub)

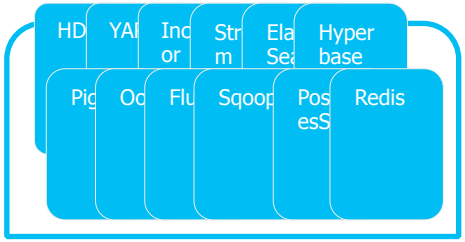
需求一：资源弹性共享 - 提高资源利用率

- 灵活部署：Big Data + Application
- 资源调度：Auto-scaling + Self-healing
- 服务发现：Central Repository

需求二：隔离性 - 保障服务质量和安全性

- 数据隔离：Data Sources，Access Pattern, Confidential Levels
- 计算隔离：CPU、Memory、I/O
- 应用隔离

Announcing Transwarp Operating System



Service Repository

Transwarp Operating System

Ring 0：Docker/Container
Ring 1：Resource scheduler
Ring 2：Built-in system services
Ring 3：Central service repository (docker images)

可运行在裸机组成的集群中，或者是公有云上

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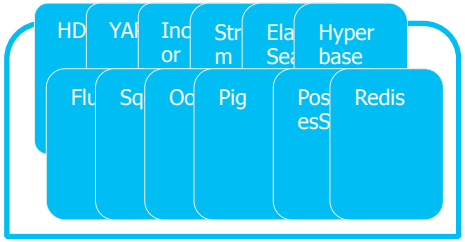
Transwarp Operating System

Containers	Scheduler			System Service			
Container Plugins	CPU/MEM	Disk	Network	coordination	orchestration	auto-scaling	discovery
docker	priority-based scheduler	storage manager	VLAN manager	etcd	load balancer	replicator	name service

TOS – automated deployment



Service Repository

通过Web、REST API or CLI 一键瞬间安装和部署集群
自动根据服务的依赖性安装所需的其他服务组件

HDFS | YARN+ Map/ Reduce | Inceptor | Stream | Elastic Search | Hyperbase | Flume | Sqoop | Oozie | Pig

TRANSWARP OPERATING SYSTEM

Transwarp Operating System

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TOS – Better Scheduler for Isolation

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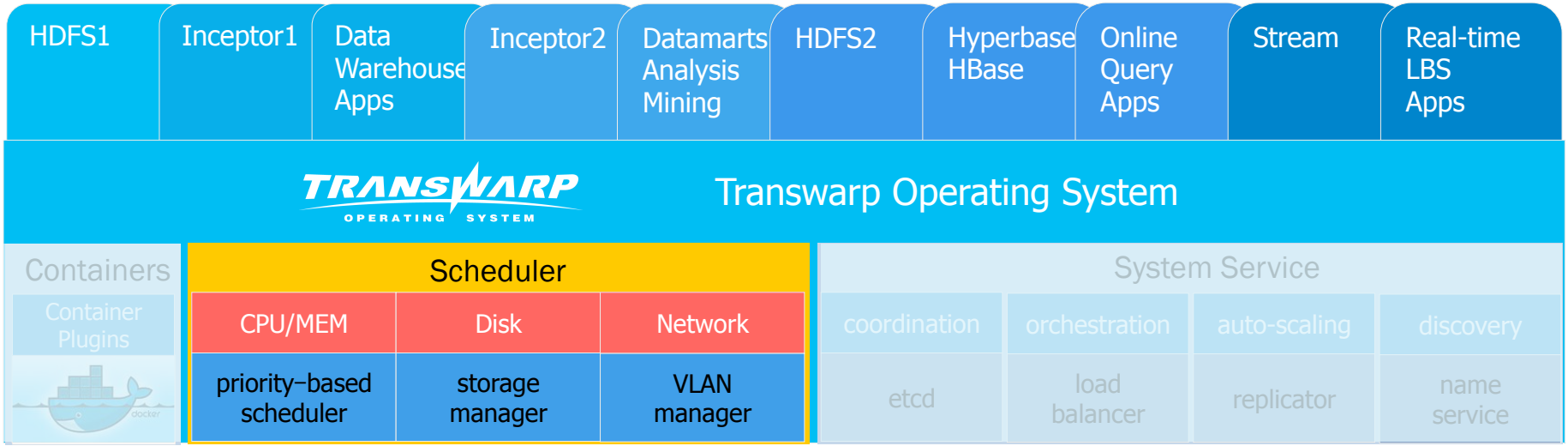
为什么要重写资源管理框架来代替YARN？

	资源粒度	隔离程度	依赖性	通用性
YARN	CPU/MEM	进程级别、不精确	依赖某个HDFS	支持少量计算引擎
Kubernetes	CPU/MEM	Container	不依赖Hadoop	支持通用Linux负载
TOS	CPU,MEM, DISK,NETWORK	Container + Quota + VLAN	不依赖Hadoop	支持大数据及通用应用



TOS- auto-scaling & self-healing

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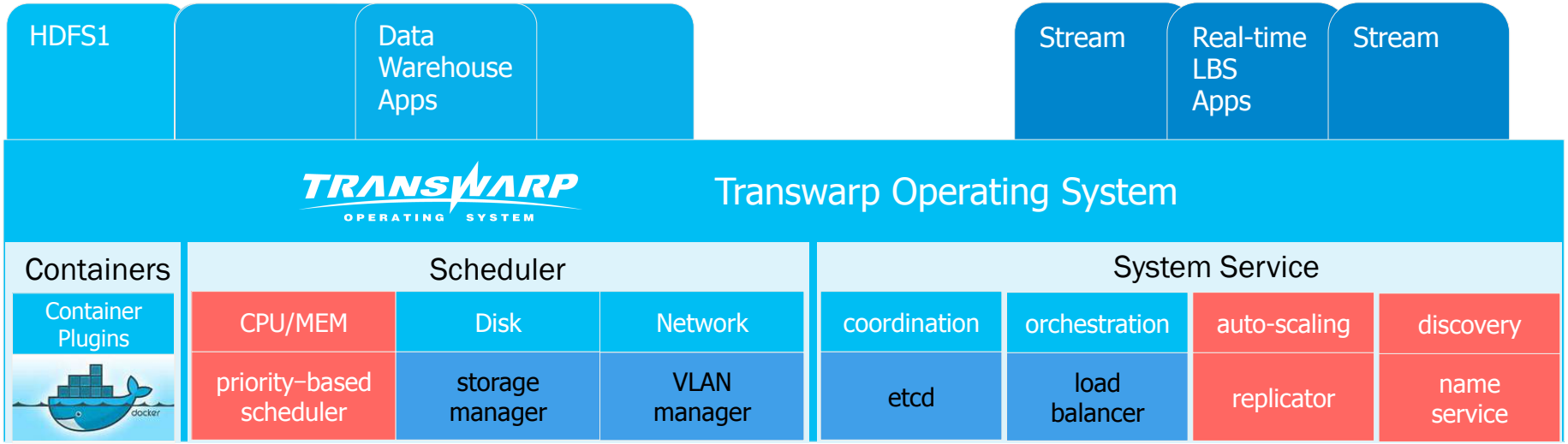
动态扩容/收缩集群：Capacity Scheduler + Priority/Price-based Bidding (支持抢占)

自动修复集群：Replicator监测集群规模并保持该规模



Big Data将成为Docker的主要应用之一

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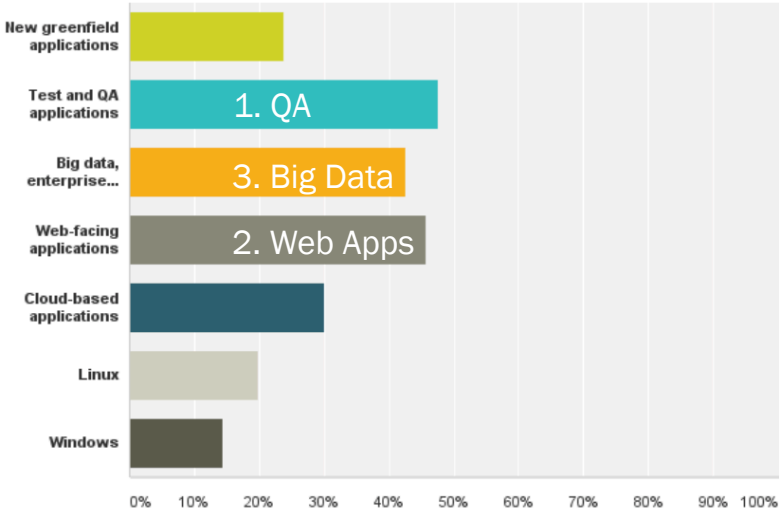
Q7: Where are you using or planning to use Docker over the next year? (Check all that apply)

Answered: 745 Skipped: 0



vmblog.com source: stackengine.com StackEngine

Transwarp Operating System

- ✓ automated hadoop deployment
- ✓ run any docker images
- ✓ better isolation
- ✓ auto-scaling & self-healing

Transwarp Operating System 将在2015Q2二季度末发布！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