Druid pour l'analyse de données en temps réel

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Abstract

Druid expliqué rapidement, pourquoi, comment.

Contents

1 Intro

1.1 Plan

- Introduction; why?
- How?

1.2 Experience

- Real Time Social Media Analytics

1.3 Real Time?

- Ingestion Latency: seconds
- Query Latency: seconds

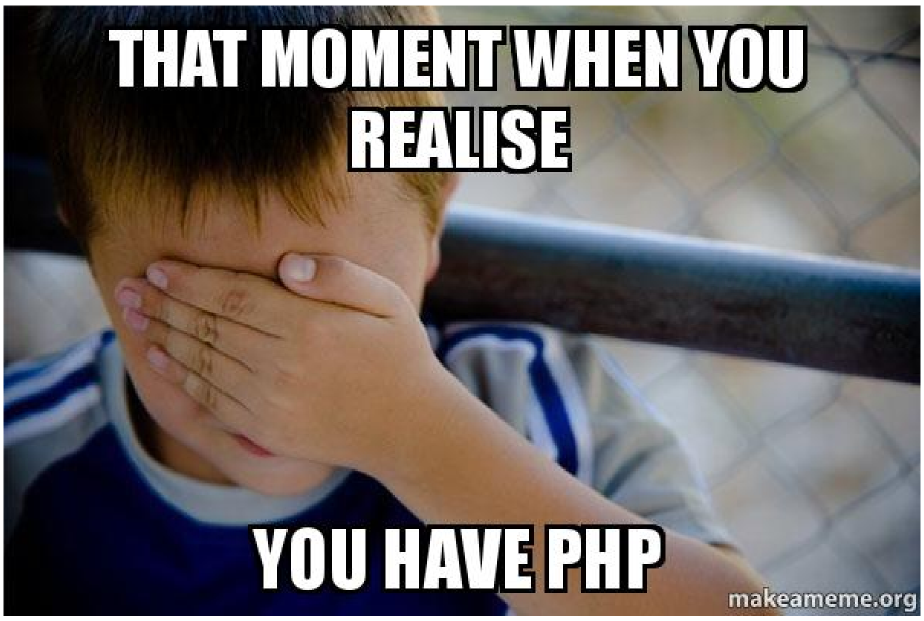
1.4 Demande

- Twitter: `20k msg/s`, `1msg = 10ko` pendant 24h
- Facebook public: 1000 à 2000 msg/s en continu

1.5 En pratique

- Twitter: 400 msg/s en continu, pics à 1500

1.6 Origine (PHP)



1.7 Introduction

- Traitement de donnée gros volume + faible latence
- Typiquement `pulse`

DEMO

1.8 Pre Considerations

Discovered vs Invented

1.9 Try to conceptualize (events)

Scalable + Real Time + Fail safe

- timeseries
- alerting system
- top N
- etc…

1.10 In the End

Druid concepts are always emerging naturally

2 Druid

2.1 Who

Metamarkets

2.2 Goal

> Druid is an open source store designed for real-time exploratory analytics on large data sets.
>
> hosted dashboard that would allow users to arbitrarily explore and visualize event streams.

2.3 Concepts

- Column-oriented storage layout
- distributed, shared-nothing architecture
- advanced indexing structure

2.4 Features

- fast aggregations
- flexible filters
- low latency data ingestion

arbitrary exploration of billion-row tables tables with sub-second latencies

2.5 Storage

- Columnar
- Inverted Index
- Immutable Segments

2.6 Columnar Storage

2.7 Index

- Values are dictionary encoded

```
{"USA" 1, "Canada" 2, "Mexico" 3, ...}
```

- Bitmap for every dimension value (used by filters)

```
"USA" -> [0 1 0 0 1 1 0 0 0]
```

- Column values (used by aggergation queries)

```
[2,1,3,15,1,1,2,8,7]
```

2.8 Data Segments

- Per time interval
- skip segments when querying
- Immutable
- Cache friendly
- No locking
- Versioned
- No locking
- Read-write concurrency

2.9 Real-time ingestion

- Via Real-Time Node and Firehose
- No redundancy or HA, thus not recommended
- Via Indexing Service and Tranquility API
- Core API
- Integration with Streaming Frameworks
- HTTP Server
- **Kafka Consumer**

2.10 Batch Ingestion

- File based (HDFS, S3, …)

2.11 Real-time Ingestion

```
Task 1: [   Interval   ][ Window ]
Task 2:                 [             ]
-------------------------------------->
                                time
```

Minimum indexing slots =
Data Sources × Partitions × Replicas × 2

3 Querying

3.1 Query types

- Group by: group by multiple dimensions
- Top N: like grouping by a single dimension
- Timeseries: without grouping over dimensions
- Search: Dimensions lookup
- Time Boundary: Find available data timeframe
- Metadata queries

3.2 Tip

- Prefer `topN` over `groupBy`
- Prefer `timeseries` over `topN`
- Use limits (and priorities)

3.3 Query Spec

- Data source
- Dimensions
- Interval
- Filters
- Aggergations
- Post Aggregations
- Granularity
- Context (query configuration)
- Limit

3.4 Example(s)

TODO

3.5 Caching

- Historical node level
- By segment
- Broker Level
- By segment and query
- `groupBy` is disabled on purpose!
- By default - local caching

3.6 Load Rules

- Can be defined
- What can be set

4 Components

4.1 Druid Components

- Real-time Nodes
- Historical Nodes
- Broker Nodes
- Coordinator
- For indexing:
- Overlord
- Middle Manager
- Deep Storage
- Metadata Storage
- Load Balancer
- Cache

4.2 Coordinator

Manage Segments

4.3 Real-time Nodes

- Pulling data in real-time
- Indexing it

4.4 Historical Nodes

- Keep historical segments

4.5 Overlord

- Accepts tasks and distributes them to middle manager

4.6 Middle Manager

- Execute submitted tasks via Peons

4.7 Broker Nodes

- Route query to Real-time and Historical nodes
- Merge results

4.8 Deep Storage

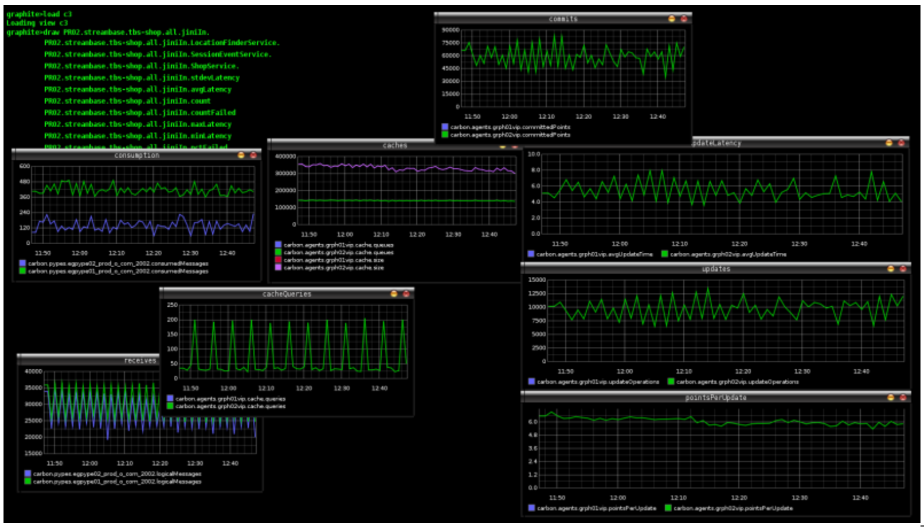
- Segments backup (HDFS, S3, ...)

5 Considerations & Tools

5.1 When *not* to choose Druid

- Data is not time-series
- Cardinality is *very* high
- Number of dimensions is high
- Setup cost must be avoided

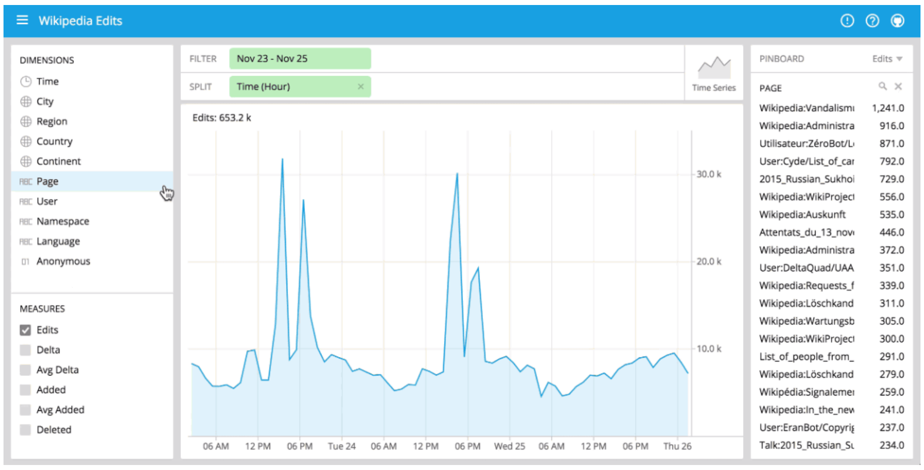
5.2 Graphite (metrics)



```
graphite>load c3
Loading view c3
graphite>draw PR02.streambase.tbs-shop.all.jiniIn.
        PR02.streambase.tbs-shop.all.jiniIn.LocationFinderService.
        PR02.streambase.tbs-shop.all.jiniIn.SessionEventService.
        PR02.streambase.tbs-shop.all.jiniIn.ShopService.
        PR02.streambase.tbs-shop.all.jiniIn.stdevLatency
        PR02.streambase.tbs-shop.all.jiniIn.avgLatency
        PR02.streambase.tbs-shop.all.jiniIn.count
        PR02.streambase.tbs-shop.all.jiniIn.countFailed
        PR02.streambase.tbs-shop.all.jiniIn.maxLatency
        PR02.streambase.tbs-shop.all.jiniIn.minLatency
        PR02.streambase.tbs-shop.all.jiniIn.pctFailed
```

Graphite

5.3 Pivot (exploring data)



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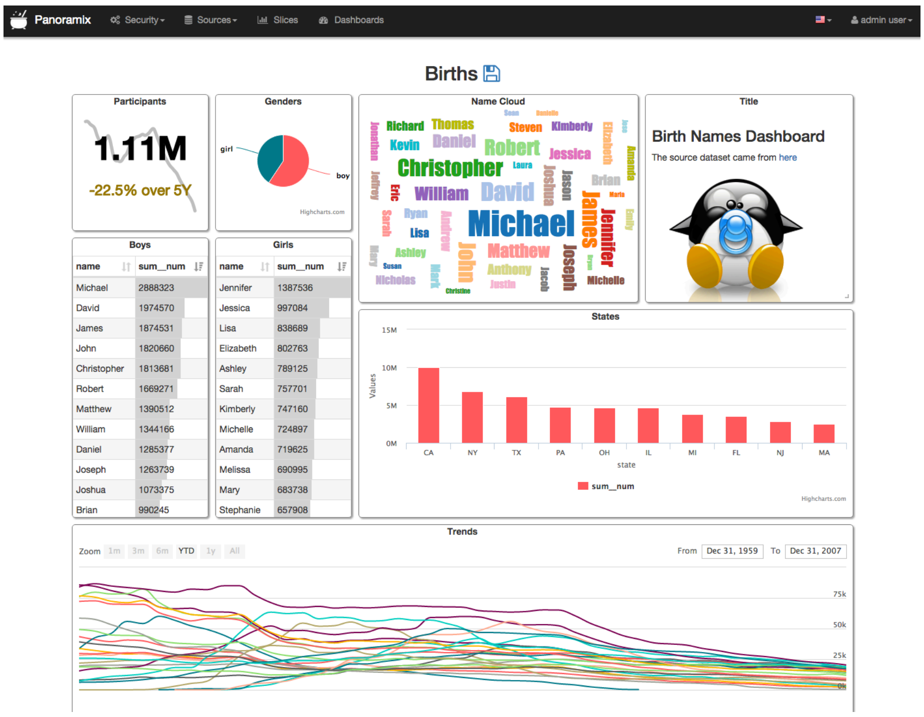
Pivot

5.4 Caravel (exploring data)



Births

Birth Names Dashboard

The source dataset came from here

Boys

name	sum__num
Michael	2888323
David	1974570
James	1874531
John	1820660
Christopher	1813681
Robert	1669271
Matthew	1390512
William	1344166
Daniel	1285377
Joseph	1263739
Joshua	1073375
Brian	990245

Girls

name	sum__num
Jennifer	1387536
Jessica	997084
Lisa	838689
Elizabeth	802763
Ashley	789125
Sarah	757701
Kimberly	747160
Michelle	724897
Amanda	719625
Melissa	690995
Mary	683738
Stephanie	657908

Caravel