Druid pour l'analyse de données en temps réel

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Intro

Plan

- Introduction; why?
- How?

Experience

- Real Time Social Media Analytics

Real Time?

- Ingestion Latency: seconds
- Query Latency: seconds

Demande

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

En pratique

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

Origine (PHP)

Introduction

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

DEMO

Pre Considerations

Discovered vs Invented

Try to conceptualize (events)

Scalable + Real Time + Fail safe

- timeseries
- alerting system
- top N
- etc...

In the End

Druid concepts are always emerging naturally

Druid

Who

Metamarkets

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.

Concepts

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

Features

- fast aggregations
- flexible filters
- low latency data ingestion

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

Storage

- Columnar
- Inverted Index
- Immutable Segments

Columnar Storage

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]
```

Data Segments

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

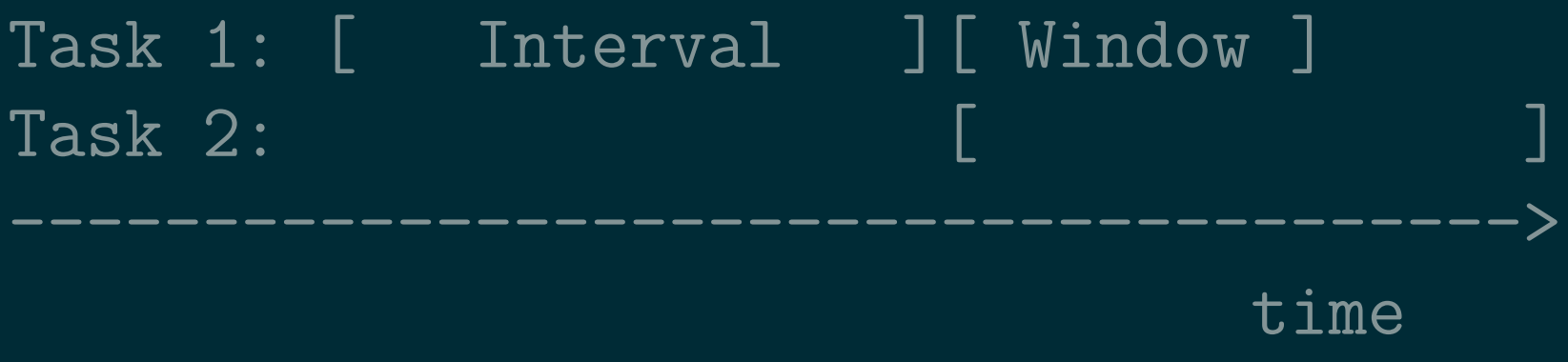
Real-time ingestion

- 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**

Batch Ingestion

- File based (HDFS, S3, ...)

Real-time Ingestion



Minimum indexing slots =
Data Sources $\times$ Partitions $\times$ Replicas $\times$ 2

Querying

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

Tip

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

Query Spec

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

Example(s)

TODO

Caching

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

Load Rules

- Can be defined
- What can be set

Components

Druid Components

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

Coordinator

Manage Segments

Real-time Nodes

- Pulling data in real-time
- Indexing it

Historical Nodes

- Keep historical segments

Overlord

- Accepts tasks and distributes them to middle manager

Middle Manager

- Execute submitted tasks via Peons

Broker Nodes

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

Deep Storage

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

Considerations & Tools

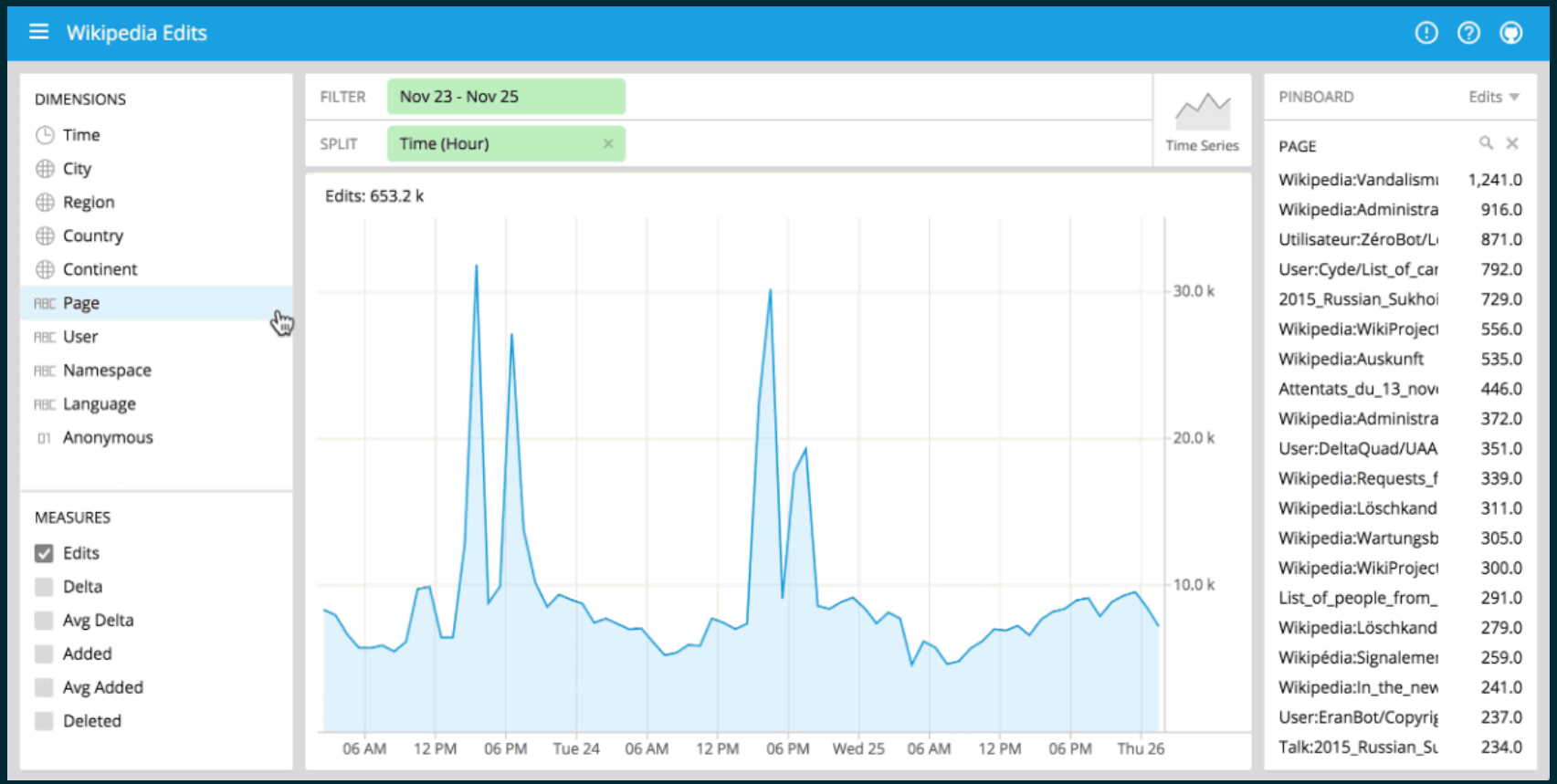
When *not* to choose Druid

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

Graphite (metrics)

Graphite

Pivot (exploring data)



Pivot

Caravel (exploring data)