

(The art of not shooting yourself in the foot using Elasticsearch)

Using Elasticsearch as the Primary Data Store

ElasticNL Amsterdam
2019-10-08
@ElasticNL

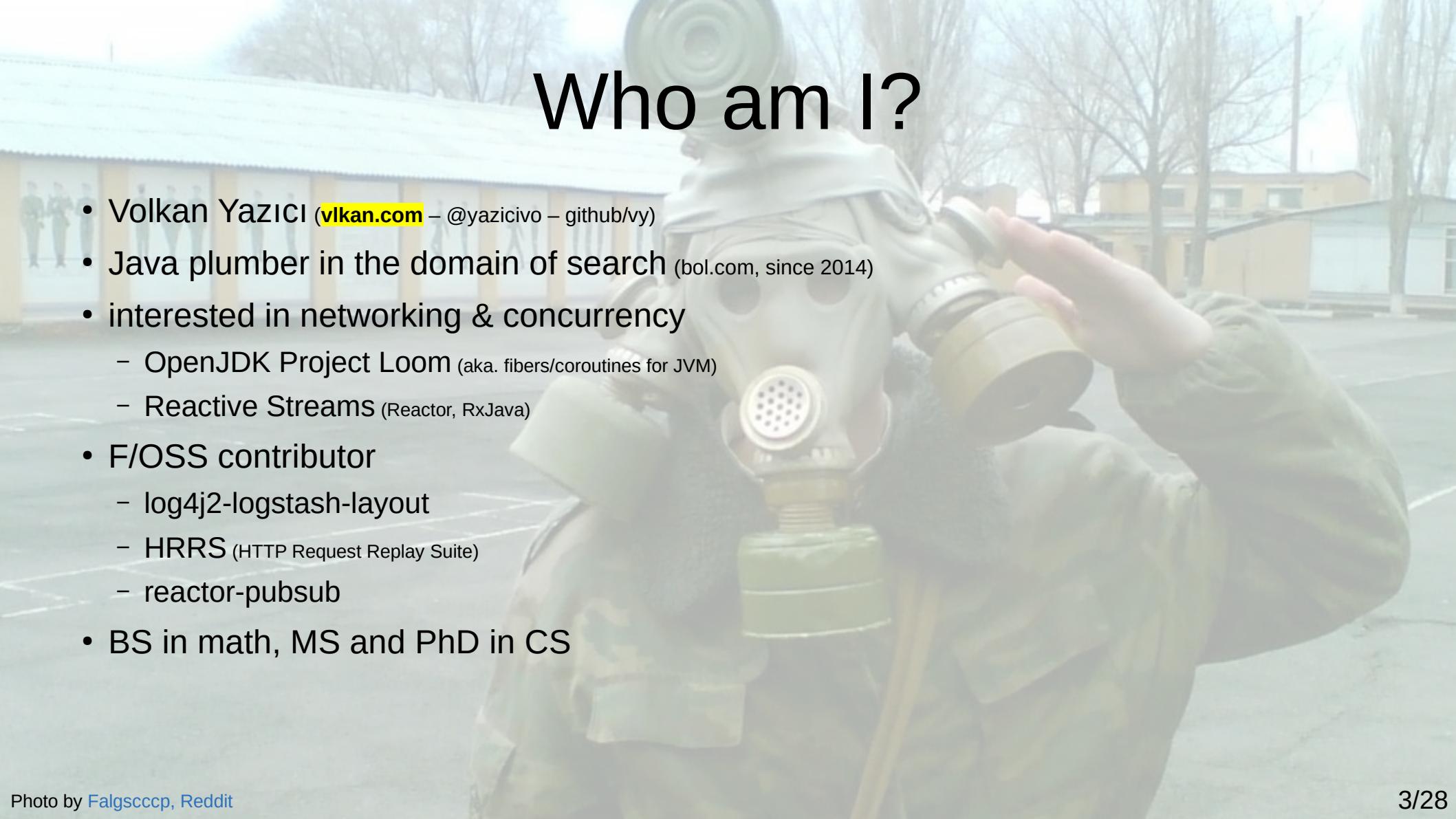
Volkan Yazıcı
<https://vlkan.com>
@yazicivo

Poll time!

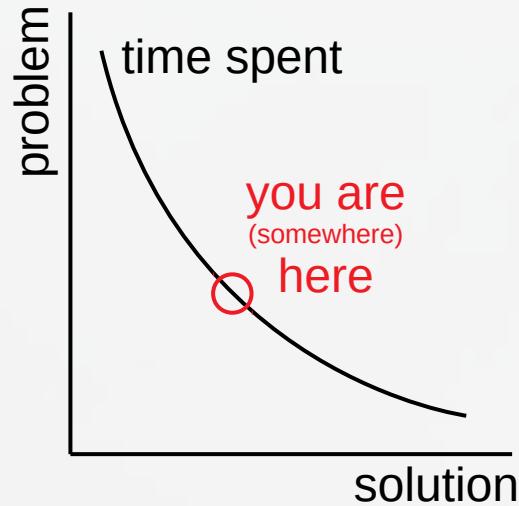
- Recently purchased an item online?
- Elasticsearch users?
- Elasticsearch users with 10+ node clusters?
- Updating Elasticsearch indices real-time?
- Has ever lost data in Elasticsearch?

Who am I?

- Volkan YAZICI (vlkan.com – @yazicivo – github/vy)
- Java plumber in the domain of search (bol.com, since 2014)
- interested in networking & concurrency
 - OpenJDK Project Loom (aka. fibers/coroutines for JVM)
 - Reactive Streams (Reactor, RxJava)
- F/OSS contributor
 - log4j2-logstash-layout
 - HRRS (HTTP Request Replay Suite)
 - reactor-pubsub
- BS in math, MS and PhD in CS



Disclaimer





9+ million active¹ clients²
17+ million articles²
200k+ sellers²
1500+ employees²
62+ million visits/month²

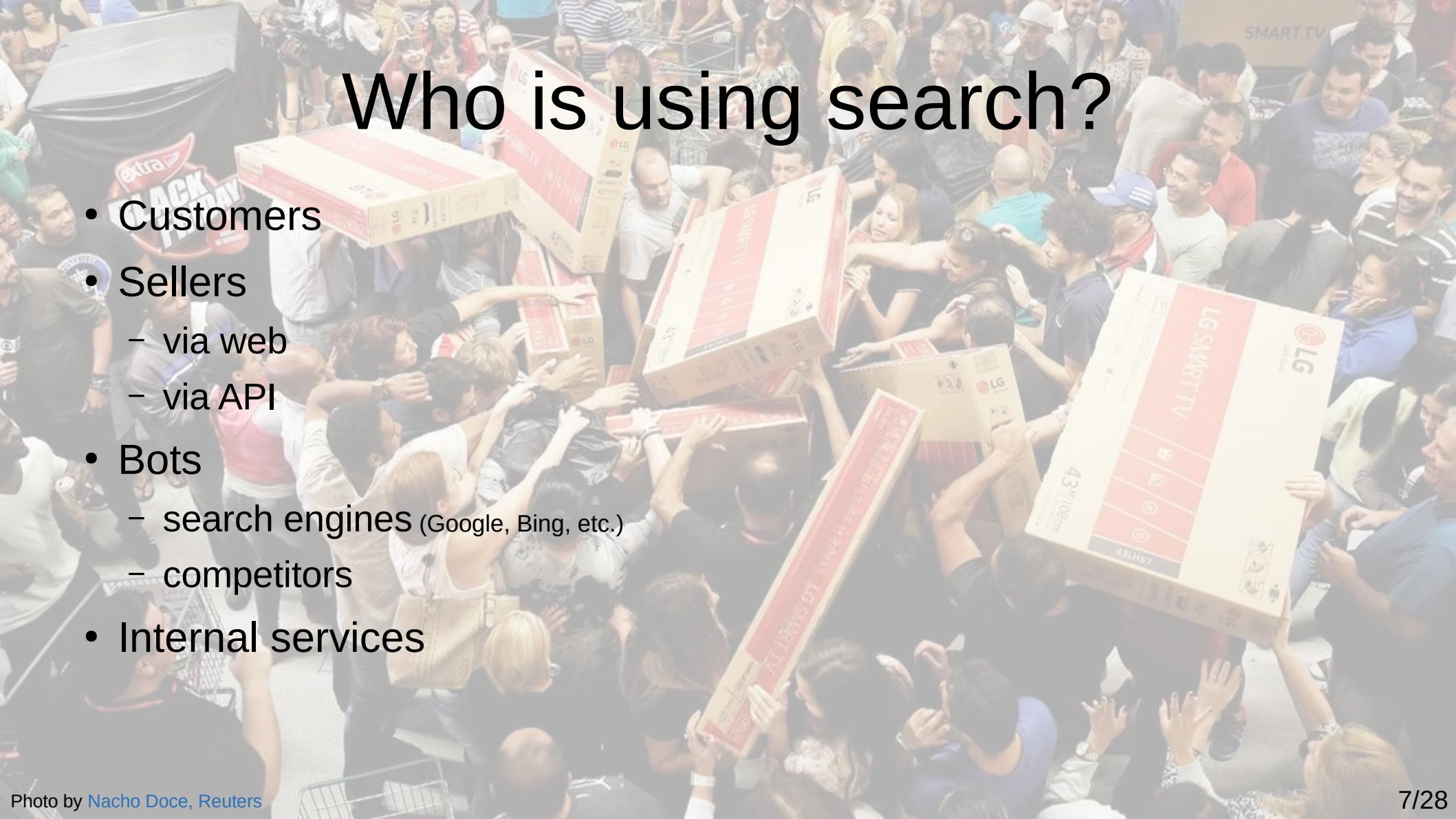
¹ Customers who ordered an item in the last 365 days.

² As of October 2018.

E-commerce search

- Search
 - Matching
 - Ranking
 - Faceting
- Guidance
 - Suggestions
 - Auto-corrections
 - Recommendations

The screenshot shows the bol.com search results for 'wijnglazen'. The search bar at the top contains the query 'wijnglazen'. Below the search bar, there are filters for Categorieën (Koken & Tafelen, Glazen, Wijnglazen), Merk (Riedel, Schott Zwiesel, Royal Leerdam), Kleur (Transparent, Zwart, Multi), Aantal glazen (6, 1, 2), and Opties (Vaatwasserbestendig, Y, Met voet). The main search results are displayed in two columns. The first column shows a product from Leonardo: 'Leonardo Puccini Witte Wijnglas - 6 Stuks' for 24, with a price of 30,56. The second column shows another product from Leonardo: 'Leonardo Puccini Rode wijnglas - 0,75 l - 6 stuks' for 30,56. Both products have a rating of ★★★★☆ (39) and are described as Vaatwasserbestendig (6 stuks | 560 ml | Glas) and Vaatwasserbestendig (6 stuks | 750 ml | Glas) respectively. The interface includes a sidebar with categories like 'Koken & Tafelen' and 'Glazen', and a 'Cadeautip' section.

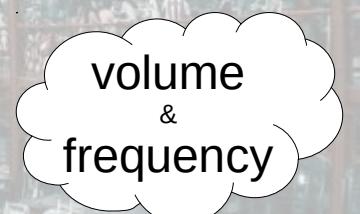
A photograph showing a large, dense crowd of people in what appears to be a supermarket or store aisle. Many individuals are holding up large boxes, specifically for LG Smart TVs, which are prominently displayed in the foreground and background. The scene conveys a sense of a busy sale or event.

Who is using search?

- Customers
- Sellers
 - via web
 - via API
- Bots
 - search engines (Google, Bing, etc.)
 - competitors
- Internal services

Search input

- Product attributes (title, EAN, ISBN, color, etc.)
- Seller offers (price, availability, deliverability)
- Derived content (for ranking)
 - Sale popularity
 - Price quality
 - Customer feedback (reviews, etc.)
- Configuration (faceting, value translations, etc.)



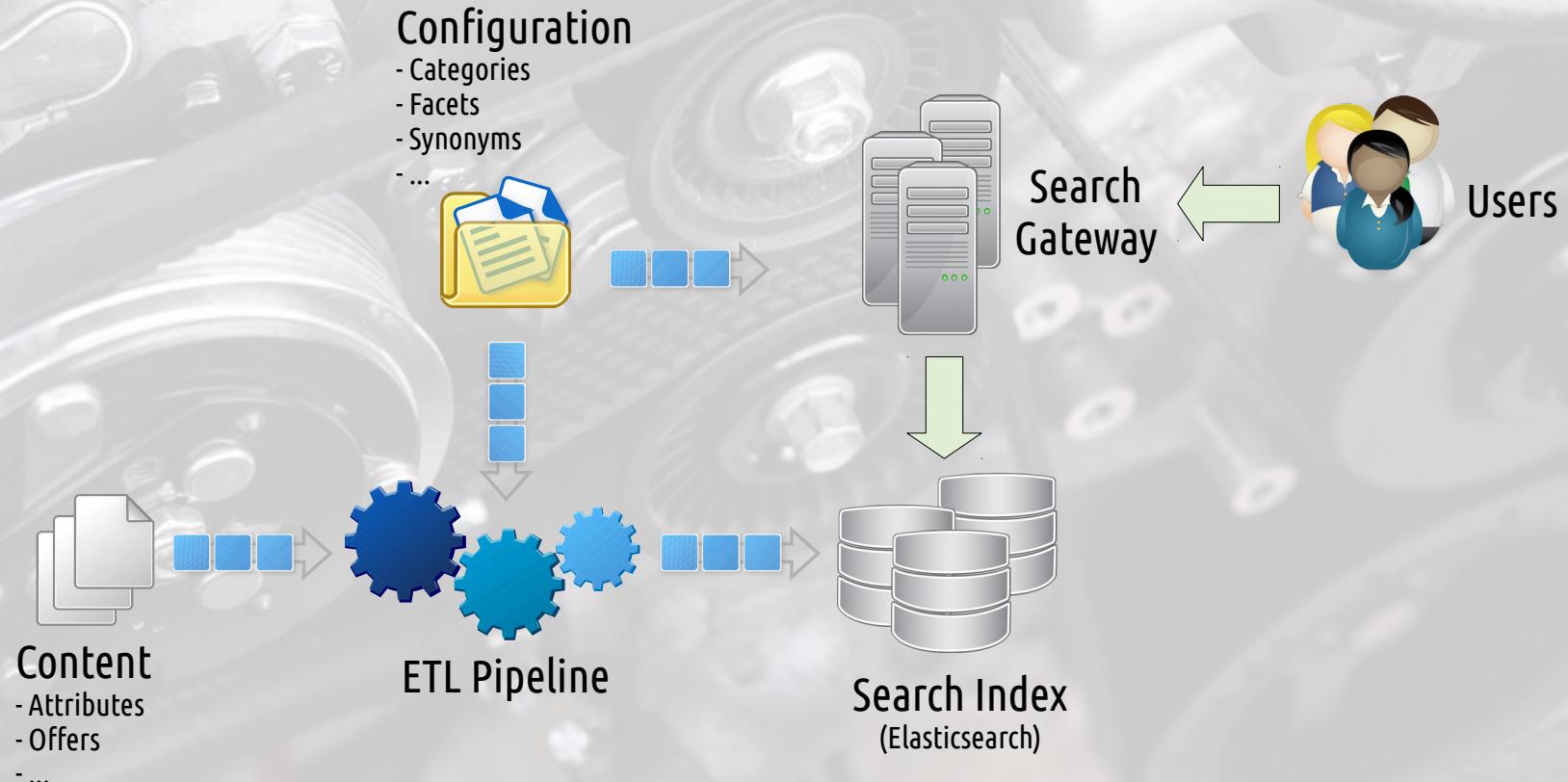
volume
&
frequency



Search output

- Hits (products and offers)
- Facets
- Auto-corrections
- Redirects (huge SEO impact)

Architecture overview



Data arrival latency

Source	Past	Present	Future
Attributes	1/24h	streaming	streaming
Offers	streaming	streaming	streaming
Facets	1/24h	1/24h	streaming
Indexing	1/24h	1/5h	streaming

Performance

- Search
- ETL
- Caching

(see [Varnishing Search Performance](#))



Photo by [Vidar Nordli-Mathisen](#)

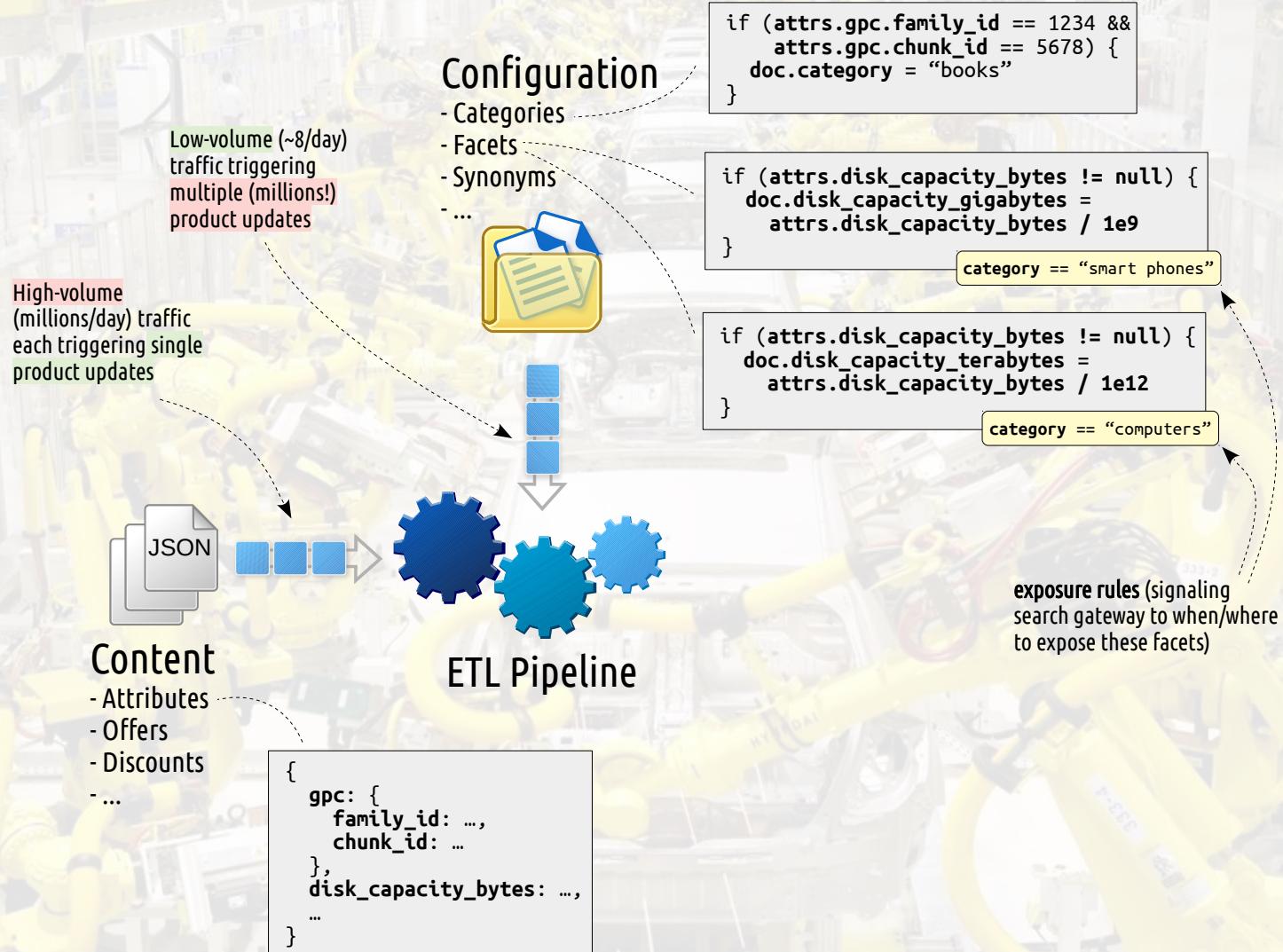


Photo by [Adrian Schulte, MSC Public Affairs, U.S. Navy](#)

A photograph of a factory assembly line, likely for vehicle production. Numerous yellow industrial robots with black grippers are positioned around a white car chassis, performing various assembly tasks. The robots are connected by a complex network of yellow and red hoses. The background shows a large, modern factory structure with metal railings and overhead cranes.

ETL

(Extract, Transform, Load)



Why ETL at all?

Strategy	Advantages	Disadvantages
Without ETL	Changes take immediate effect	Latency and throughput hurts Aggregations become impractical
With ETL	Optimal query-time performance	Need to bake affected products

Content stream

- Sources
 - Content
 - Offer
 - Ranking
 - ...
- High-volume traffic
- ETL'ing is expensive
(due to tens of thousands of configurations)

```
if (attrs.gpc.family_id == 1234 &&
    attrs.gpc.chunk_id == 5678) {
    doc.category = "books"
}
```

Configuration stream

- Business screens
 - Configuration snapshots
 - Query on any field
- Low-volume traffic
- Retrospective changes



```
if (attrs.gpc.family_id == 1234 &&
    attrs.gpc.chunk_id == 5678) {
    doc.category = "books"
}
```

ETL Operational Overview

H1-H6
Design

1. n
2. n
3. n

H1-Headline

Text

Text

Text

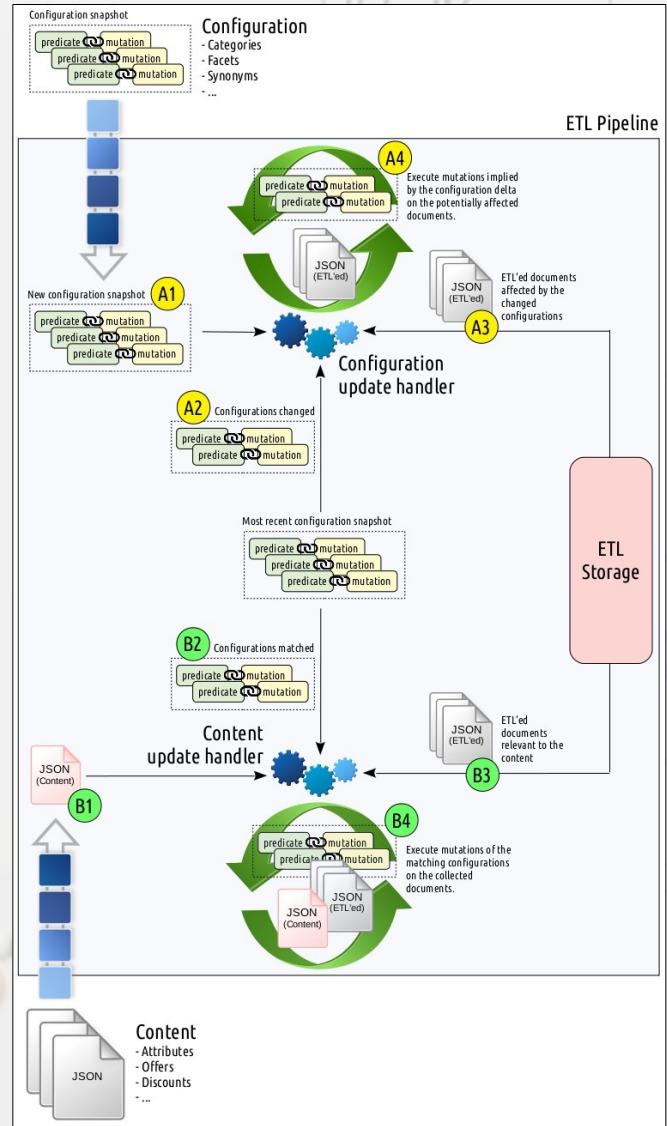
Text

Text

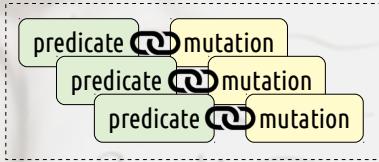
Text

Video
module





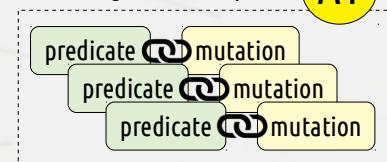
Configuration snapshot



Configuration

- Categories
- Facets
- Synonyms
- ...

New configuration snapshot

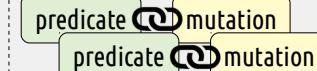


A1

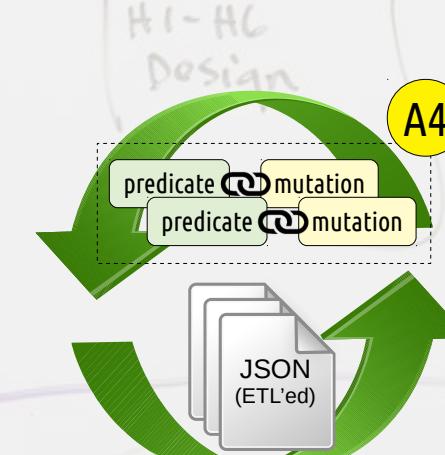
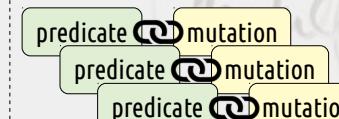
```
if (attrs.gpc.family_id == 1234 &&  
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}
```

A2

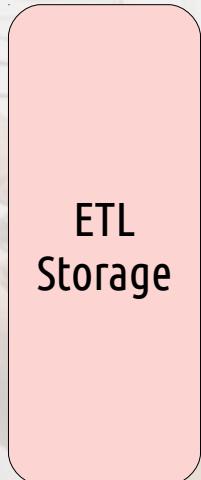
Configurations changed

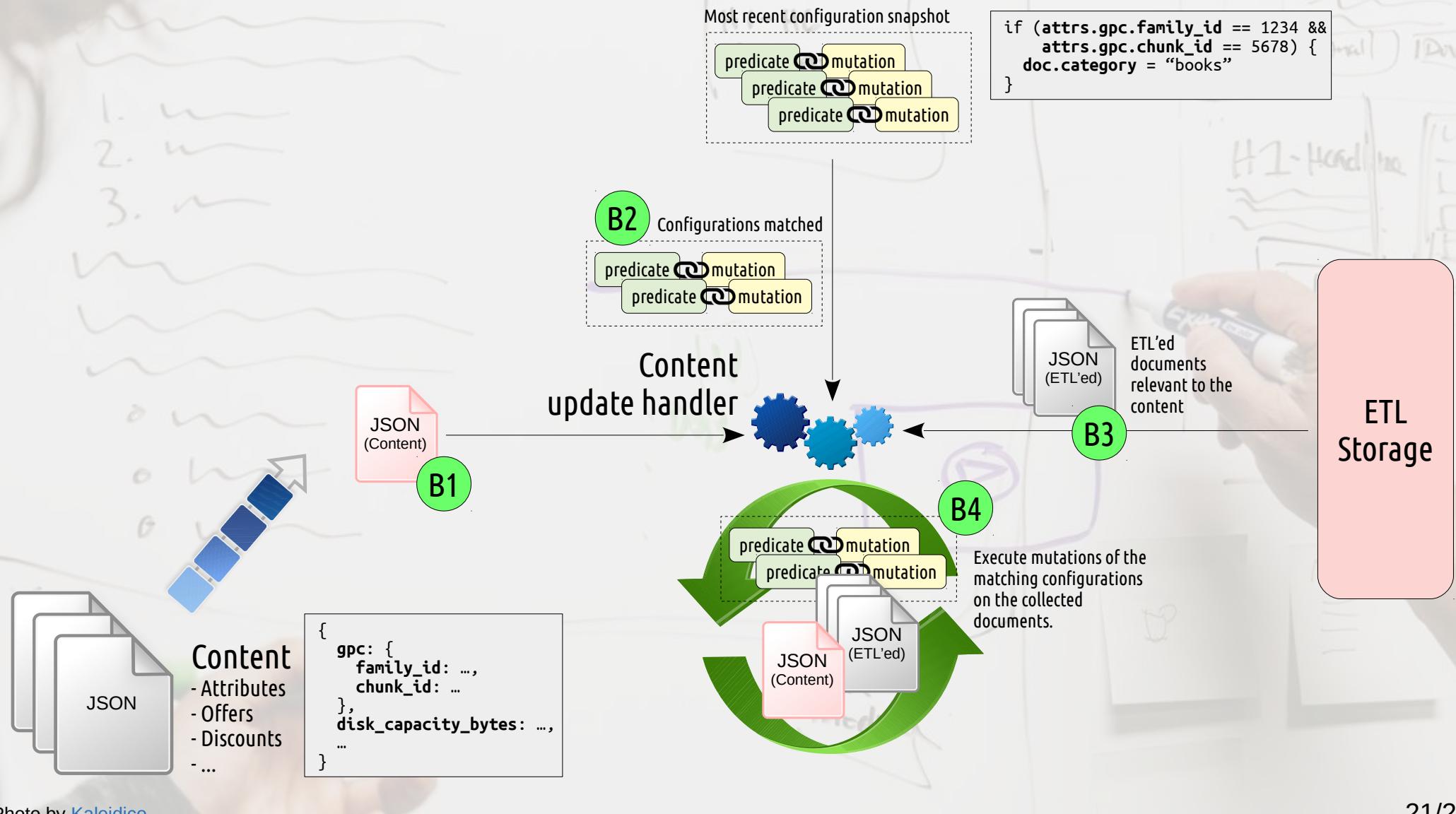


Most recent configuration snapshot



Configuration update handler





Old ETL

- One giant PL/SQL troop marching 1/24h
- “Baseline” taking ~12h
- Failures hurt a lot
- Difficult to
 - innovate
 - debug
 - observe
- At the edge of software limits
 - e.g. max column count
 - multiple threads in PL/SQL
 - optimizer hints getting broken as
 - upgrades take place
 - data size change



Battle of ETL Storage Solutions

Storage Solution	Distributed?	Sharded?	Required Indices	Integrity Measure
PostgreSQL	No	No	One ¹	Transactions
PostgreSQL (partitioned)	No	Yes ²	One ¹	Transactions
MongoDB	Yes	Yes ³	Some ⁴	Transactions/CAS ⁵
Elasticsearch	Yes	Yes	None	CAS ⁶

1) PostgreSQL jsonb index covers all fields.

2) PostgreSQL partitioning is not sharding in distributed sense, but still serves a similar purpose.

3) MongoDB sharding requires manual configuration.

4) MongoDB requires an explicit index for each whitelisted field allowed in ETL configuration predicates.

5) MongoDB updateMany() or findAndModify() can be leveraged for the desired integrity.

6) Elasticsearch _version field can be leveraged to implement a CAS (compare-and-swap) loop.

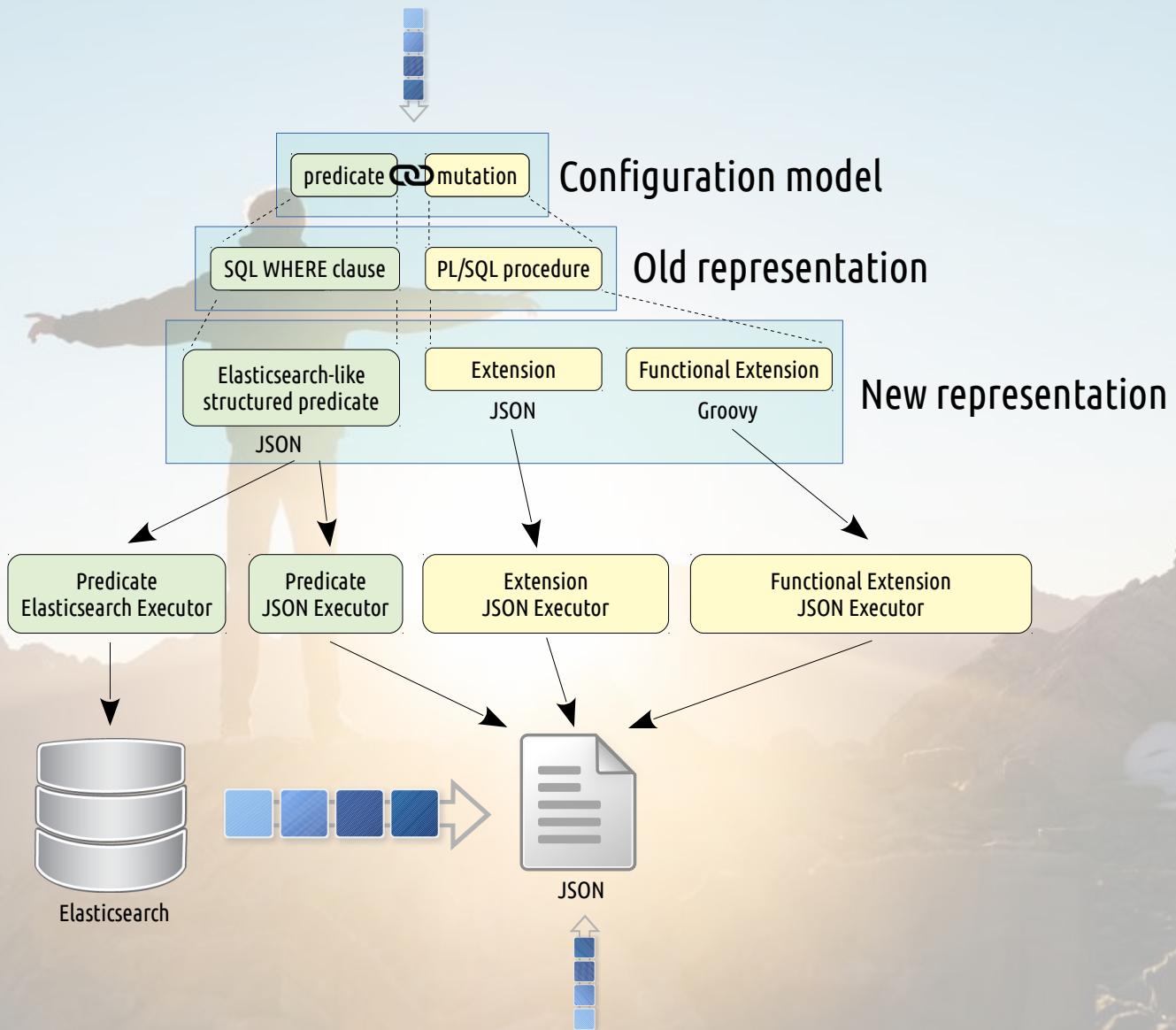
A silhouette of a person standing on a mountain peak with arms outstretched, set against a bright, hazy sky.

New ETL

Storage solution winner: Elasticsearch



- Versatile query support
- Implicit indexing
- Scales good for reads, ok'ish for writes
- Easy to maintain
- Extensive experience



TL;DR

Google-like search != e-commerce search
(though both employ full-text search)

ETL = the art of cooking content (for search)

ETL rules necessitate search as well
(due to excessive faceting)

Elasticsearch is a good candidate for storage in ETL



Thank you!

(Questions?)

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