elasticsearch

(R)Evolution

Philipp Krenn @xeraa

elastic


Revolution

342 systems in ranking, May 2018

Rank May 2018	Rank Apr 2018	Rank May 2017	DBMS	Database Model	Score May 2018	Score Apr 2018	Score May 2017
1.	1.	1.	Oracle	Relational DBMS	1290.42	+0.63	-63.90
2.	2.	2.	MySQL	Relational DBMS	1223.34	-3.06	-116.69
3.	3.	3.	Microsoft SQL Server	Relational DBMS	1085.84	-9.67	-127.96
4.	4.	4.	PostgreSQL	Relational DBMS	400.90	+5.43	+34.99
5.	5.	5.	MongoDB	Document store	342.11	+0.70	+10.53
6.	6.	6.	DB2	Relational DBMS	181.[illegible]	[illegible]	-3.23
7.	↑ 9.	↑ 9.	Redis	Key-value store	135.35	+5.24	+17.90
8.	↓ 7.	↓ 7.	Microsoft Access	Relational DBMS	133.11	+0.89	+3.24
9.	↓ 8.	↑ 11.	Elasticsearch	Search engine	130.44	-0.92	+21.62
10.	10.	↓ 8.	Cassandra	Wide column store	117.83	-1.26	-5.28
11.	11.	↓ 10.	SQLite	Relational DBMS	115.45	-0.53	-0.61
12.	12.	12.	Teradata	Relational DBMS	74.41	+0.74	-1.91
13.	13.	↑ 16.	Splunk	Search engine	65.09	+0.04	+8.40
14.	14.	↑ 18.	MariaDB	Relational DBMS	64.99	+0.44	+14.01
15.	15.	↓ 14.	Solr	Search engine	61.51	-1.70	-2.26

https://db-engines.com/en/ranking

342 systems in ranking, May 2018

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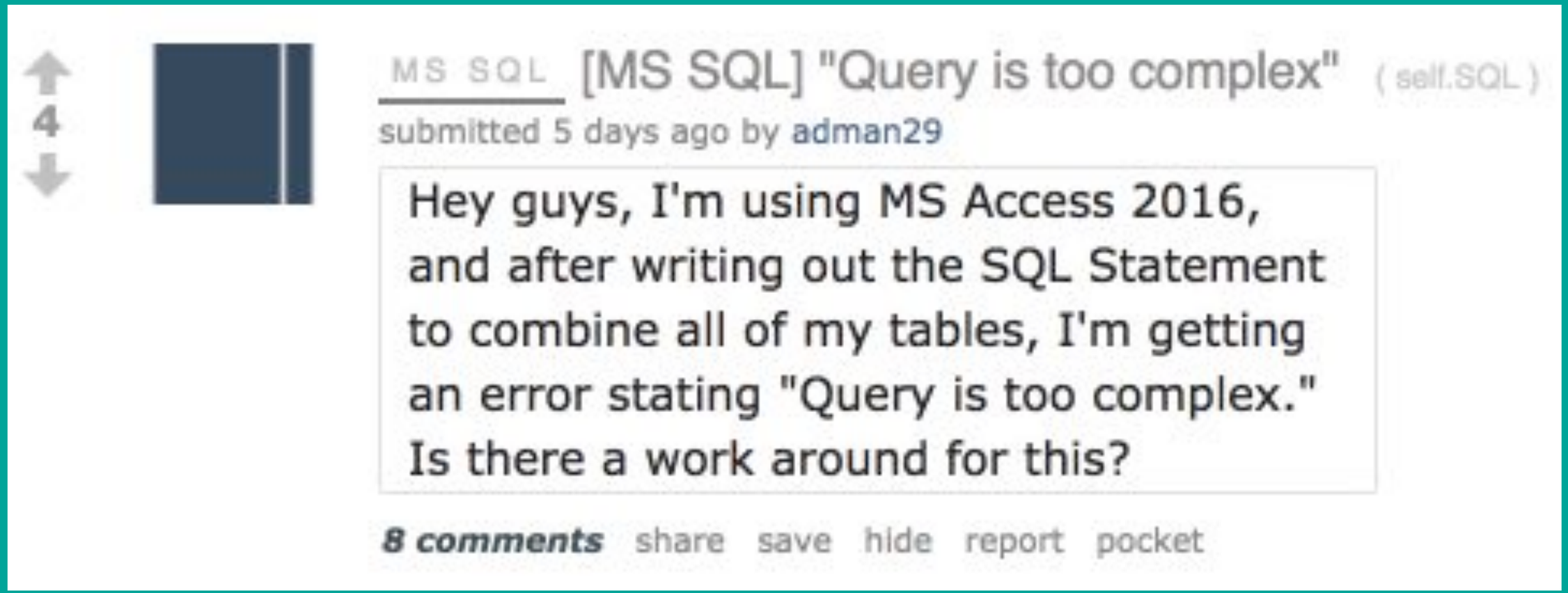

https://www.reddit.com/r/SQL/comments/7i828i/ms_sql_query_is_too_complex/

Who uses Elasticsearch?

elastic

Infrastructure | Developer Advocate

http://thedudeabides.com/articles/the_birth_of_compass

elastic

elasticsearch.

Terms

Cluster, Node, Index, Shard, Document, ID

```
$ curl http://localhost:9200
{
  "name": "elasticsearch1",
  "cluster_name": "docker-cluster",
  "cluster_uuid": "l6wfwv8XSniiI_Fx6qqrcw",
  "version": {
    "number": "5.6.9",
    "build_hash": "877a590",
    "build_date": "2018-04-12T16:25:14.838Z",
    "build_snapshot": false,
    "lucene_version": "6.6.1"
  },
  "tagline": "You Know, for Search"
}
```

```
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```
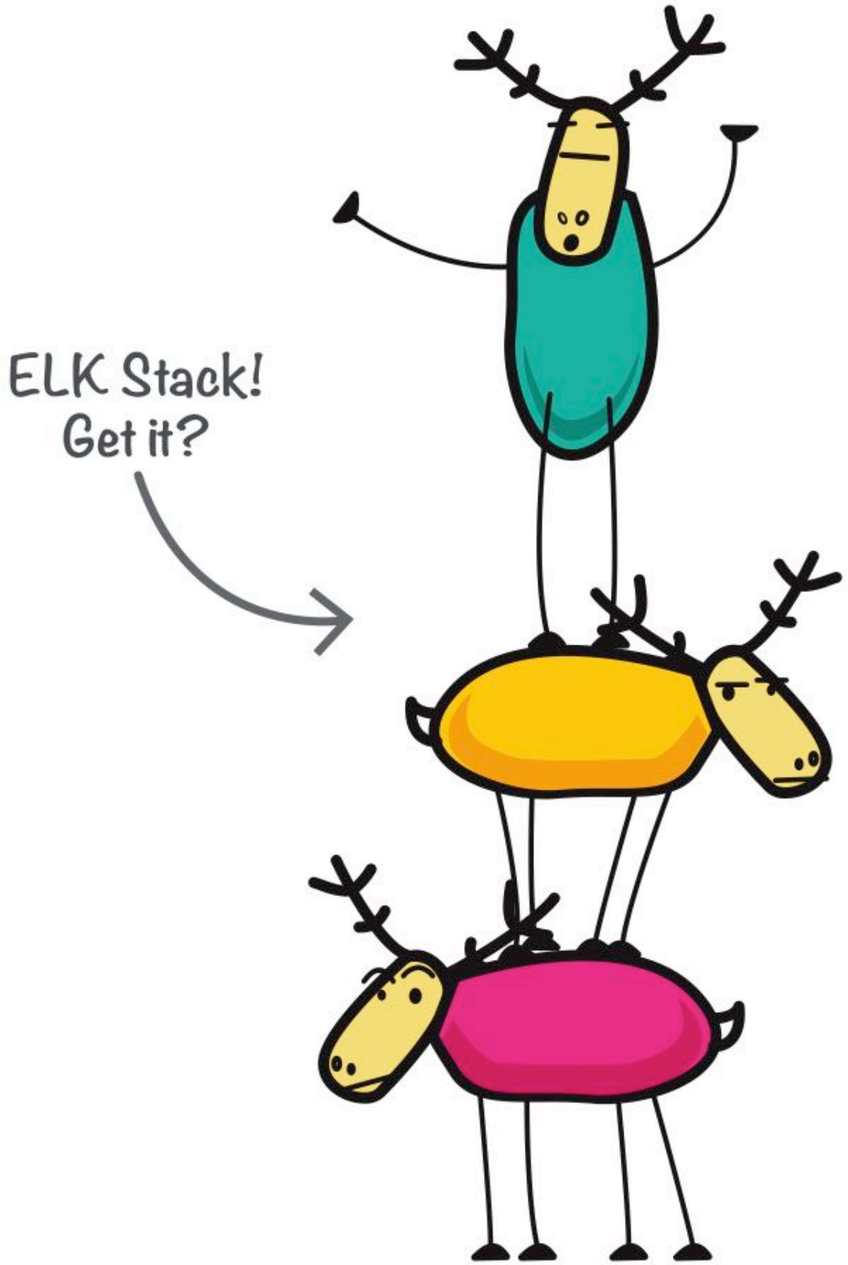

logstash



E Elasticsearch

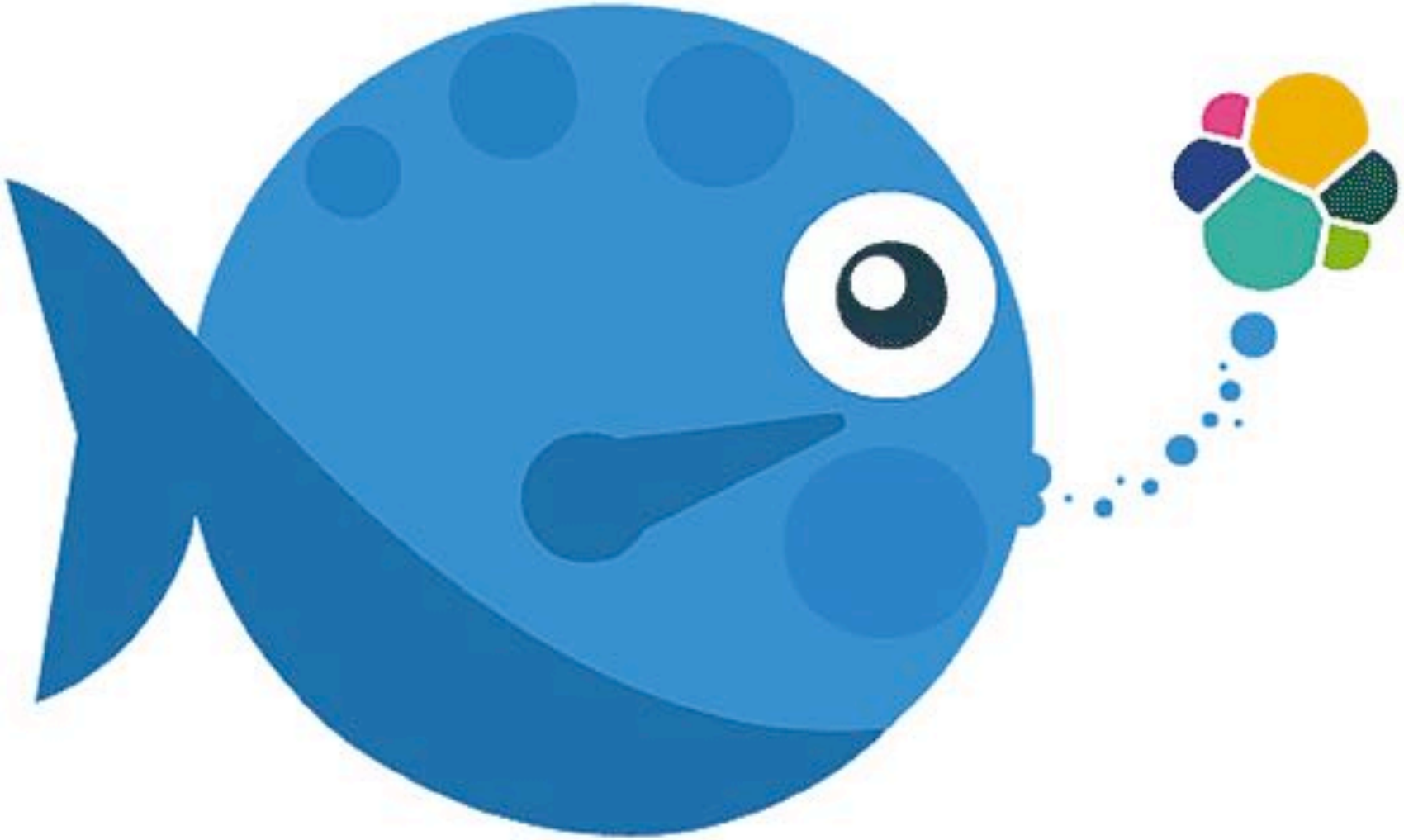
L Logstash

K Kibana

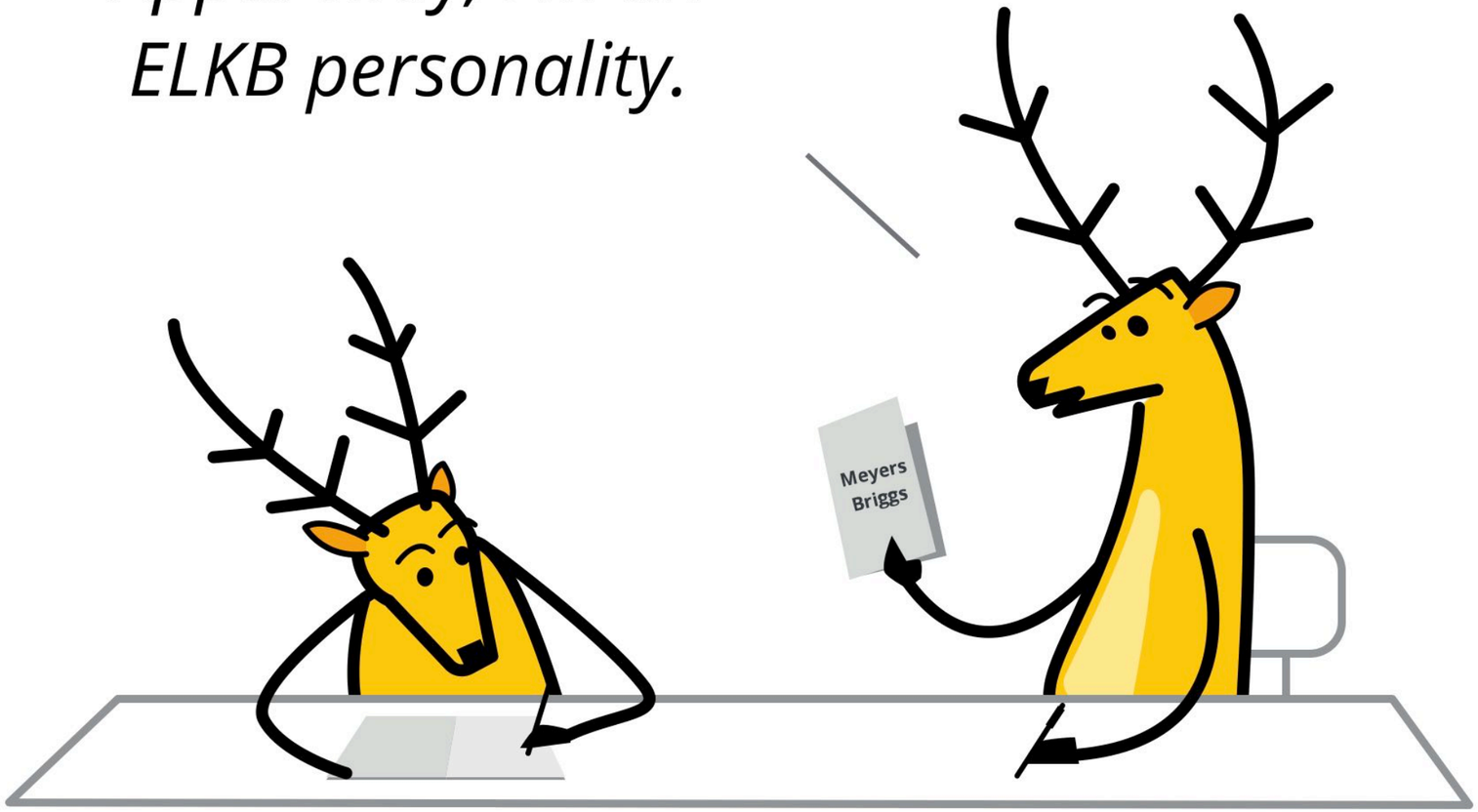

mozilla


slack

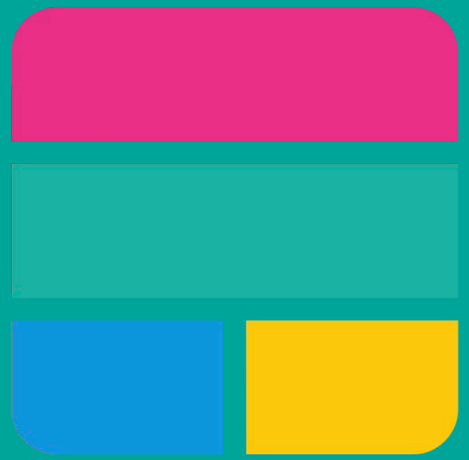

BLIZZARD
ENTERTAINMENT



Apparently, I'm an ELKB personality.

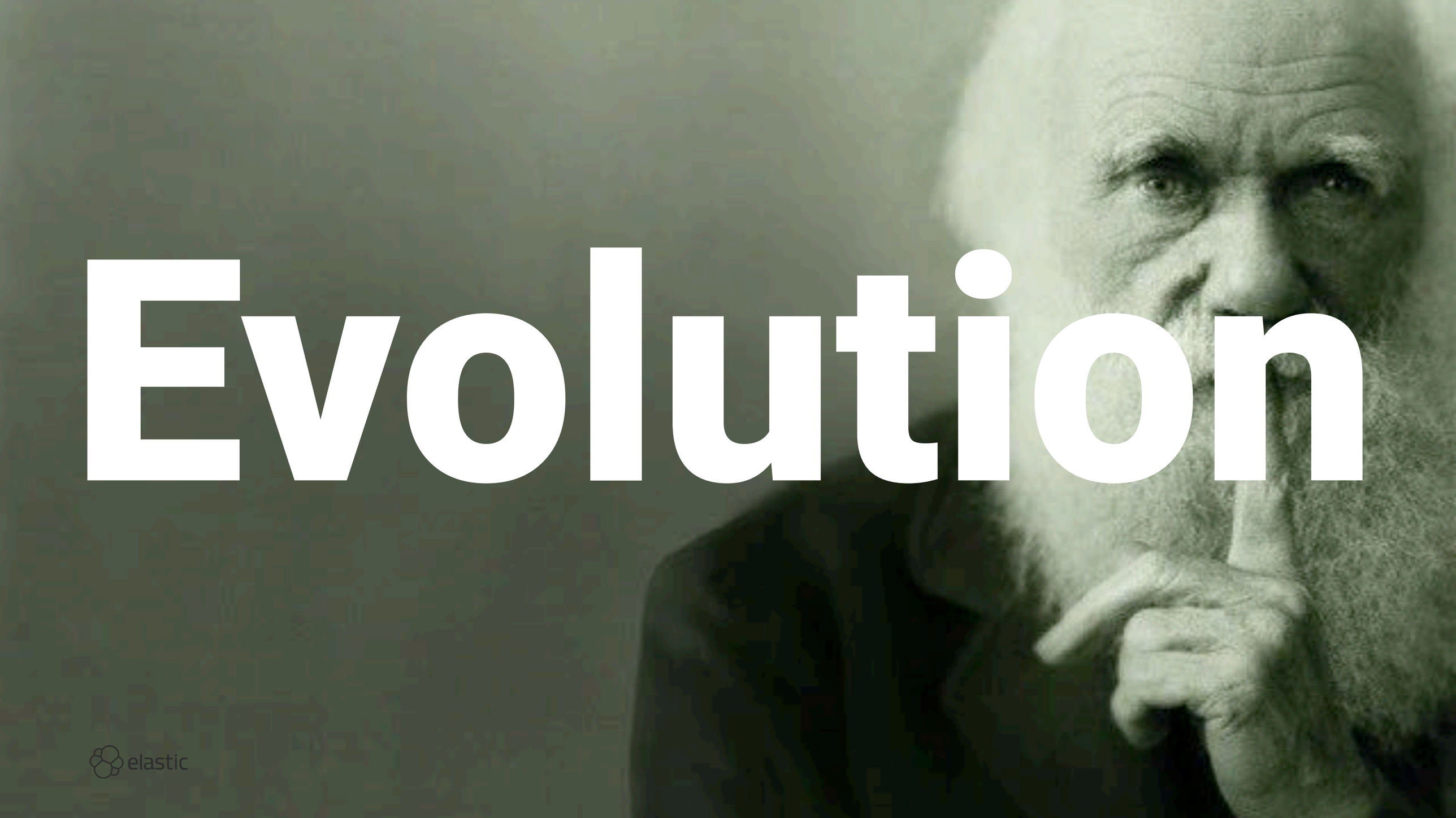


elastic



elastic stack

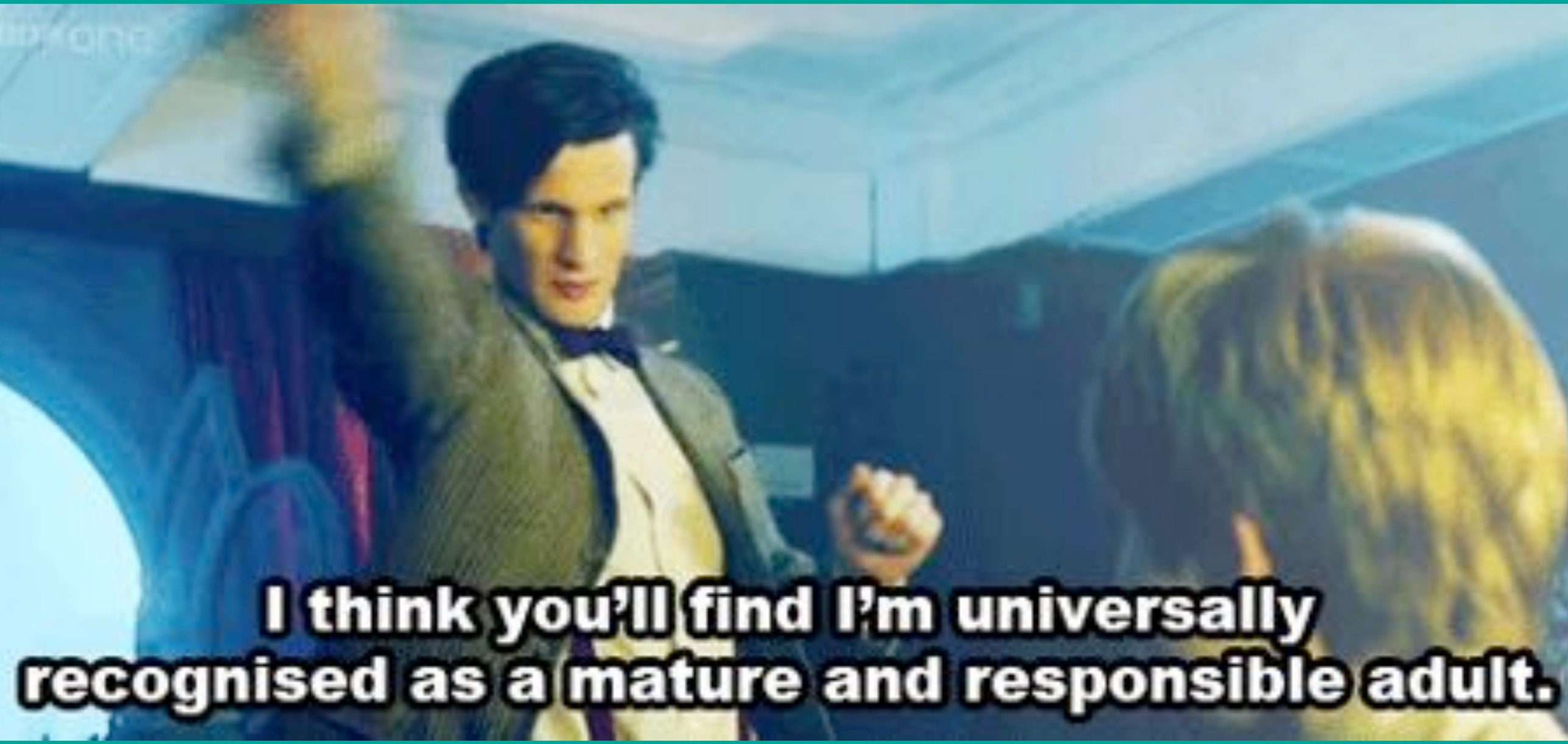
Evolution



elastic

Questions: **https://sli.do/xeraa**

Answers: **https://twitter.com/xeraa**


I think you'll find I'm universally
recognised as a mature and responsible adult.

Strictness*

5.0

* Demo

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IT'S BAD

Bootstrap Checks

https://www.elastic.co/guide/en/elasticsearch/reference/current/bootstrap-checks.html

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Bootstrap Checks

- Heap size check
- File descriptor check
- Memory lock check
- Maximum number of threads check
- Maximum size virtual memory check
- Max file size check
- Maximum map count check
- Client JVM check
- Use serial collector check
- System call filter check
- OnError and OnOutOfMemoryError checks
- Early-access check
- G1GC check
- All permission check

Parameters & Configs

Rolling Upgrades*

6.0

* Demo

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Floodstage Watermark*

6.0

* Demo

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Sawyer Rd
NEXT SIGNAL

Low 85%

High 90%

Floodstage 95%

Sequence Numbers*

6.0

* Demo

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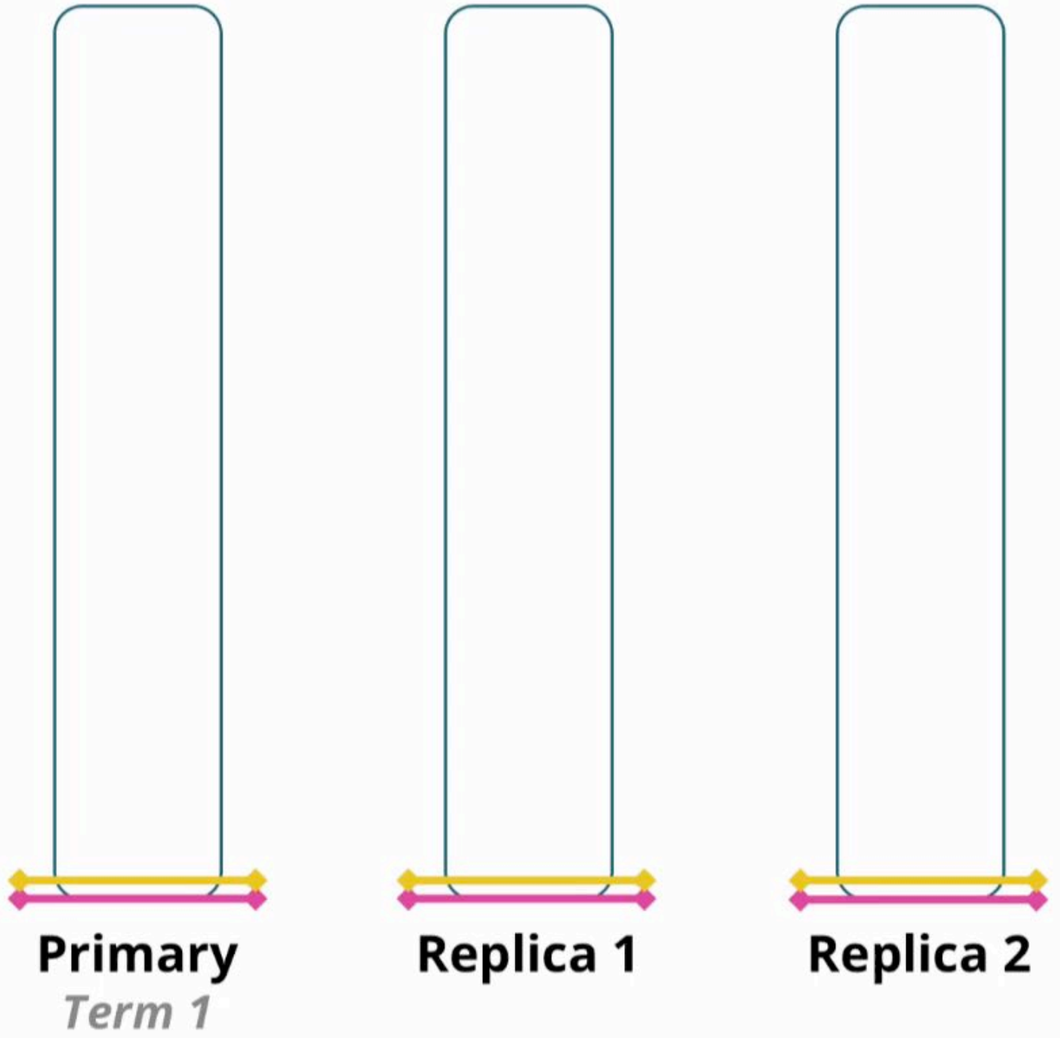
Primary
Term 1
Replica 1
Replica 2
Global checkpoint
Local checkpoint

63 bits ought to be
enough for anyone.

Tradeoff

```
index.translog.retention.size: 512MB

index.translog.retention.age: 12h
```

Cross Datacenter Replication

6.x or 7.x

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~~Types~~*

5.6 to 8.0

* Demo

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Why

Data types

Sparsity

Scoring

How

5.6 opt-in single type

6.x single type

7.x type optional in API

8.x no more types

https://www.elastic.co/guide/en/elasticsearch/reference/current/removal-of-types.html#_schedule_for_removal_of_mapping_types

Automatic Queue Resizing

6.0

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Reject and Retry Instead of Long Queues

`thread_pool.search.target_response_rate: 2s`

Serving 50 requests/s

Queue size: $2 * 50 = 100$

Adaptive Replica Selection

6.1 (enabled by default in 7.0)

C3: Cutting Tail Latency in Cloud Data Stores via Adaptive Replica Selection

Lalith Suresh, ***Technische Universität Berlin;*** **Marco Canini,** ***Université catholique de Louvain;***
Stefan Schmid, ***Technische Universität Berlin and Telekom Innovation Labs;***
Anja Feldmann, ***Technische Universität Berlin***

https://www.usenix.org/conference/nsdi15/technical-sessions/presentation/suresh

Pick Best Shard

Exponentially Weighted Moving Average (EWMA)

Piggyback on requests

Test case	Throughput improvement %	50th % change	90th % change	99th % change
1 replica, no load	1.9%	-1.7%	0.5%	1.3%
1 replica, with load	115.8%	129.0%	-62.3%	-57.1%
4 replicas, no load	11.6%	-27.2%	-28.6%	-25.9%
4 replicas, with load	65.8%	-63.5%	-39.8%	-16.9%
1 replica, round robin, no load	6.8%	-7.2%	-16.6%	-28.0%

Shrink & Split*

5.0 6.1

* Demo

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Shrink

Combine shards by a factor

Split

Split into a factor of `number_of_routing_shards`

Not required in 7.0+

Shards

7.0

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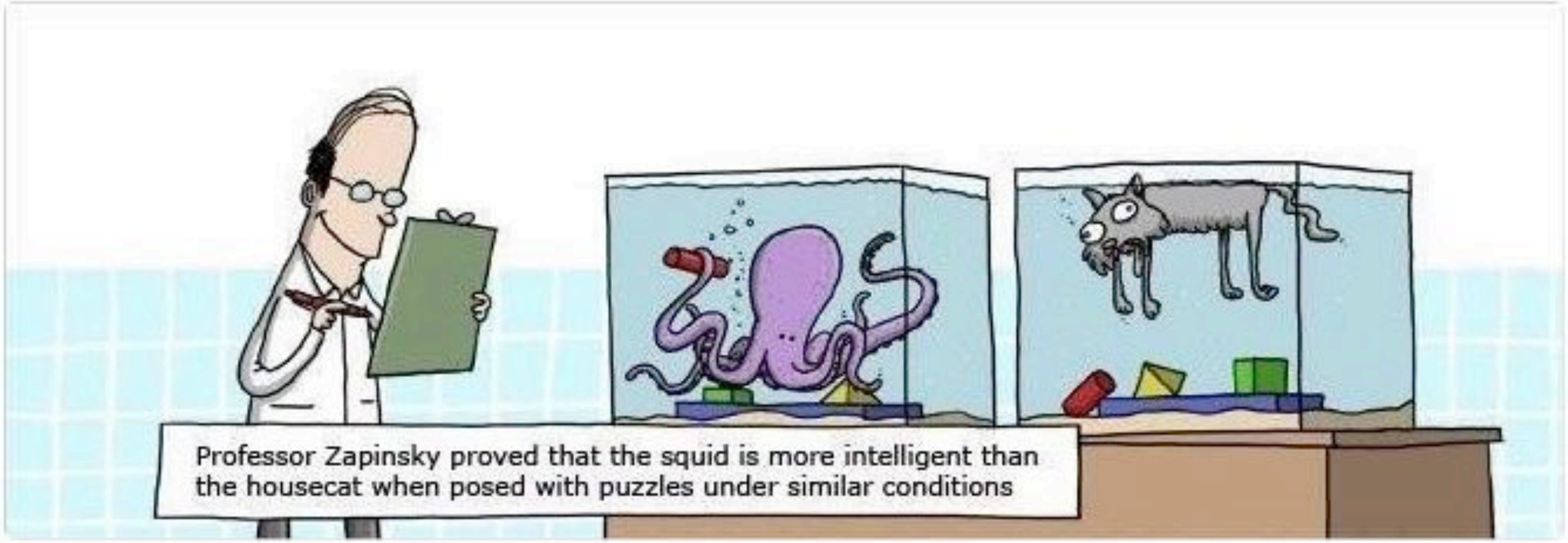
Default: 1 shard per index

Oversharding

Benchmarks


Professor Zapinsky proved that the squid is more intelligent than
the housecat when posed with puzzles under similar conditions

Rally

https://elasticsearch-benchmarks.elastic.co

Conclusion

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Rolling Upgrades

Floodstage Watermark

Sequence Numbers

~~Types~~

Automatic Queue Resizing

Adaptive Replica Selection

Shrink & Split

Shard Number

Questions?

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