NSQ

a realtime distributed messaging platform

https://github.com/bitly/nsq

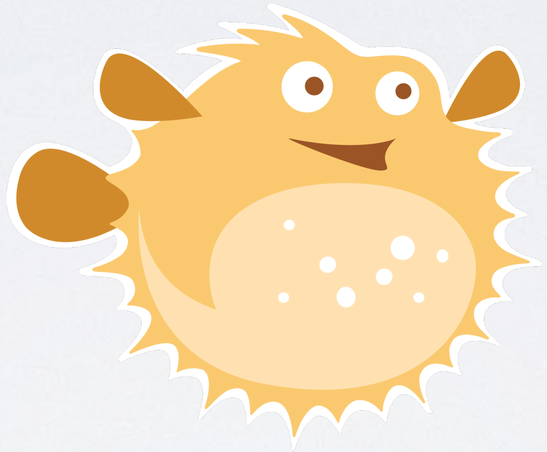
@imsnakes

April 24th 2014 - GopherCon

Matt Reiferson - CTO at Torando Labs

patterns

HI, I'M MATT



HI, I'M MATT

NAMING SUCKS QUEUE

WHAT EVEN IS **NSQ**?

NOT STABLE QUEUE

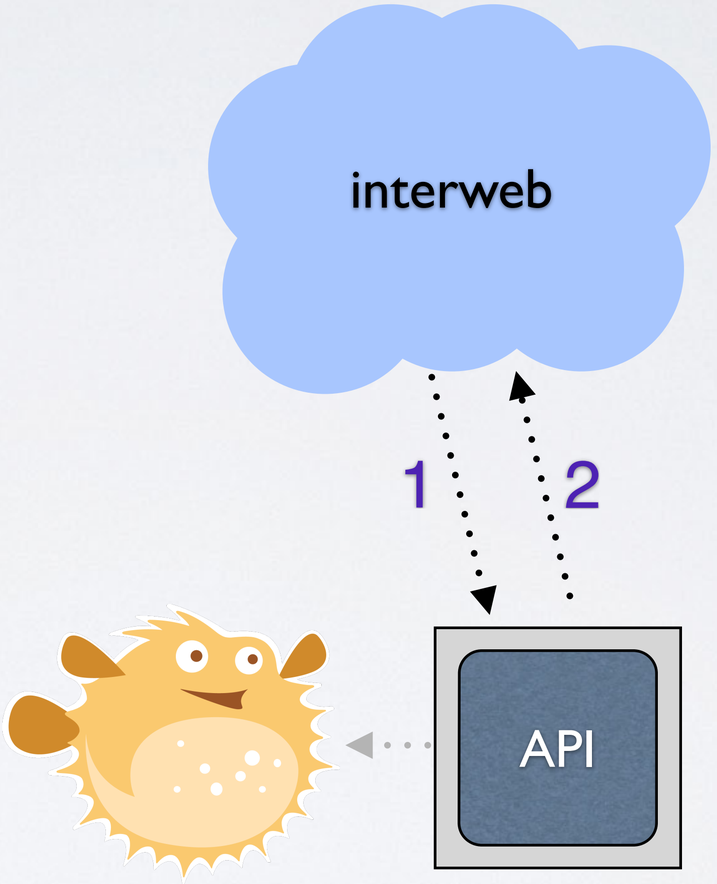
NEW SIMPLE QUEUE

Environmental
Friendly

SPRAY SOME **NSQ** ON IT

BIG THINGS HAVE SMALL BEGINNINGS

- boss says: "**I want metrics!**"
- **single** host
- **synchronous** writes



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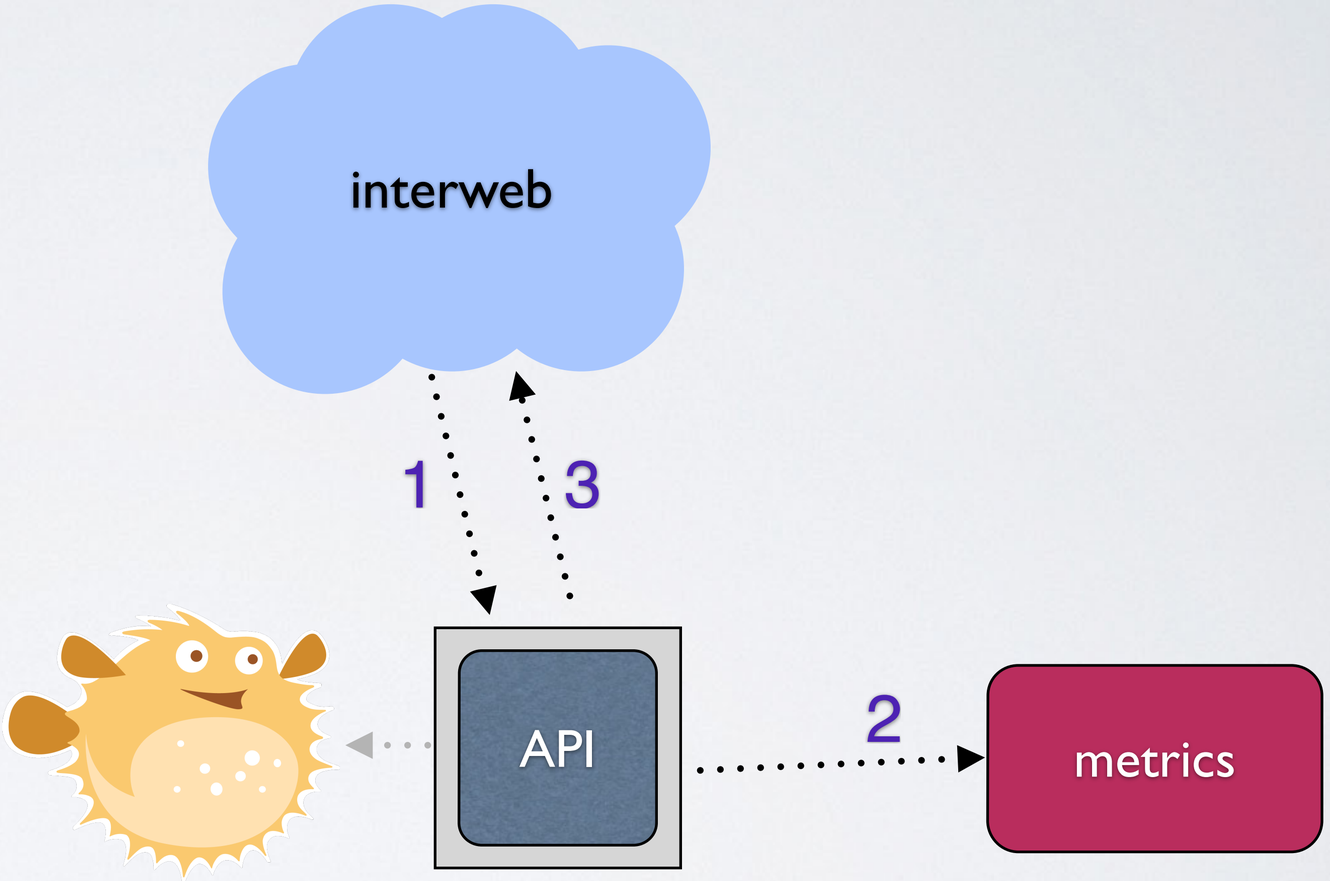
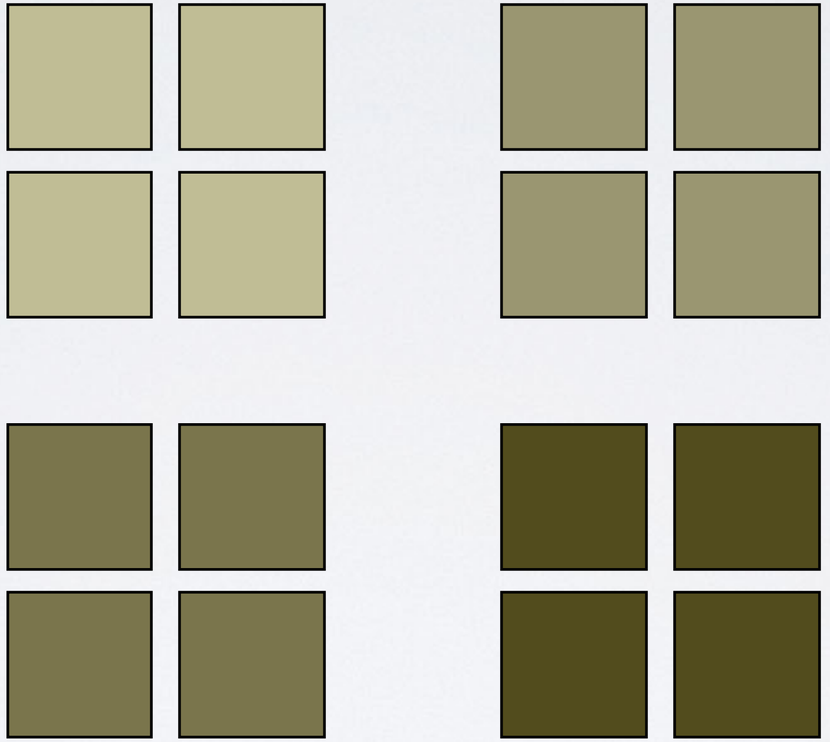


. . . AND THEN THEY EAT YOU



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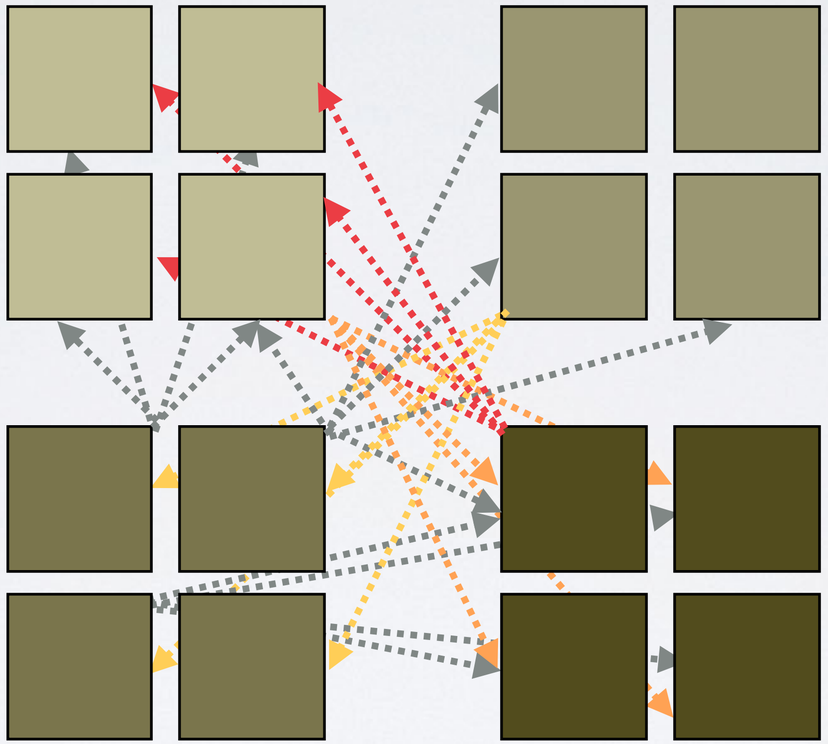
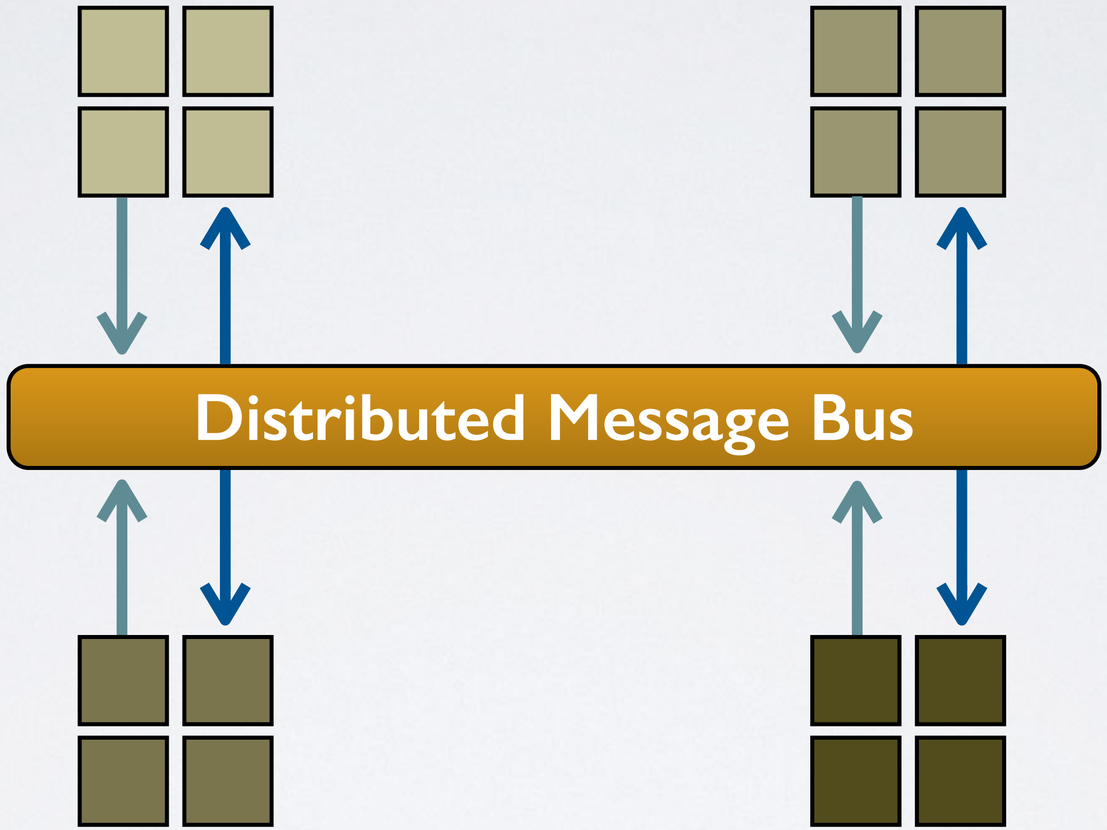


nightmare

BUT THERE'S HOPE

JUST USE

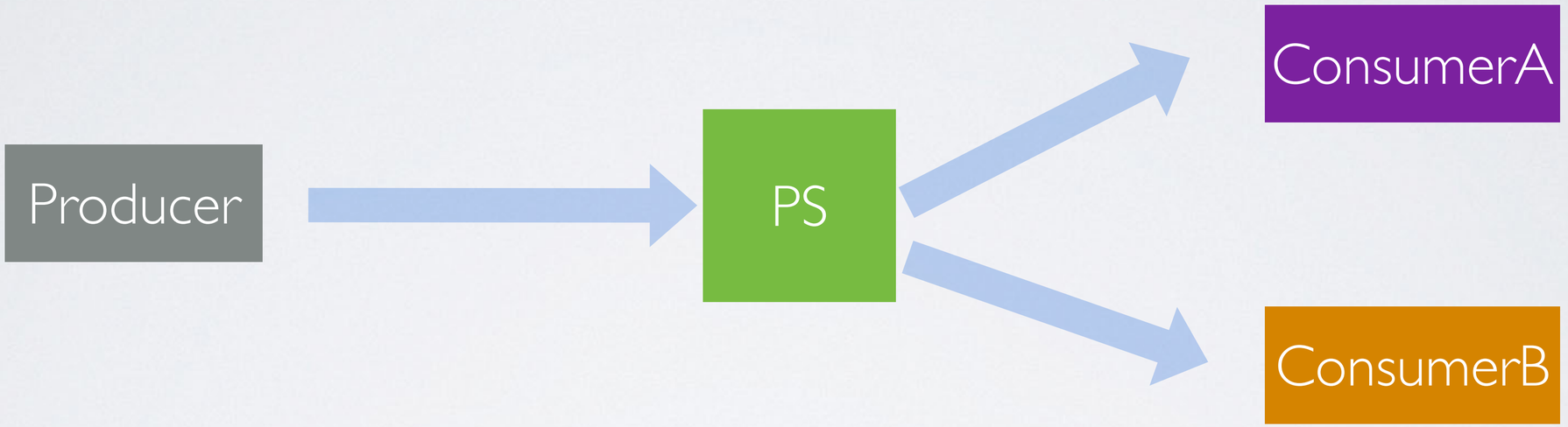
THE GOAL



provide a unifying distributed system to receive
and disseminate event data

MESSAGING PATTERNS

BROADCAST



de-couple

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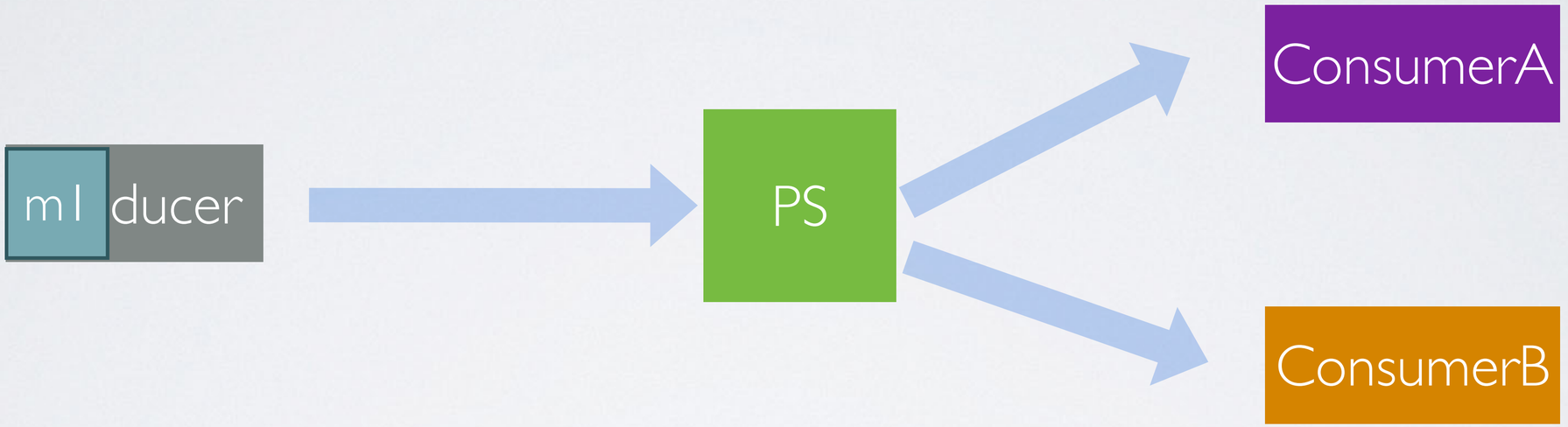

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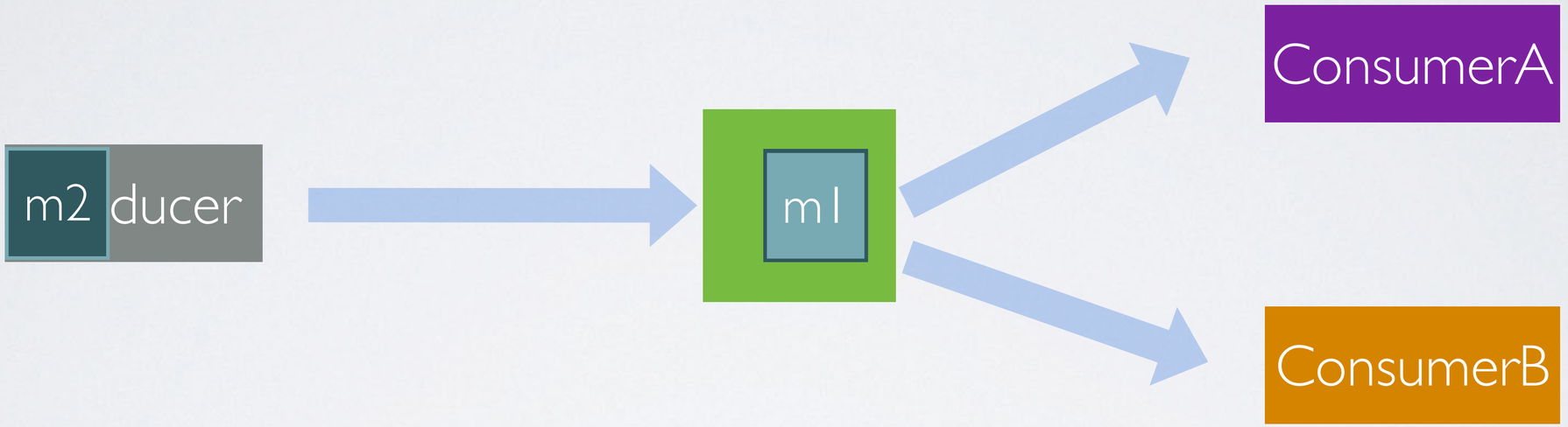

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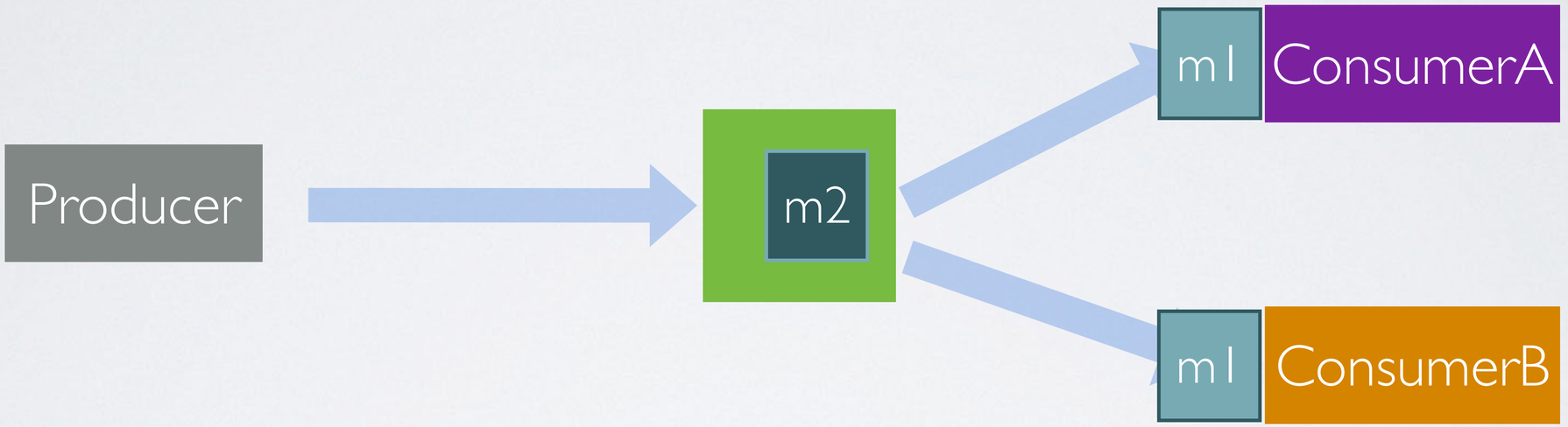

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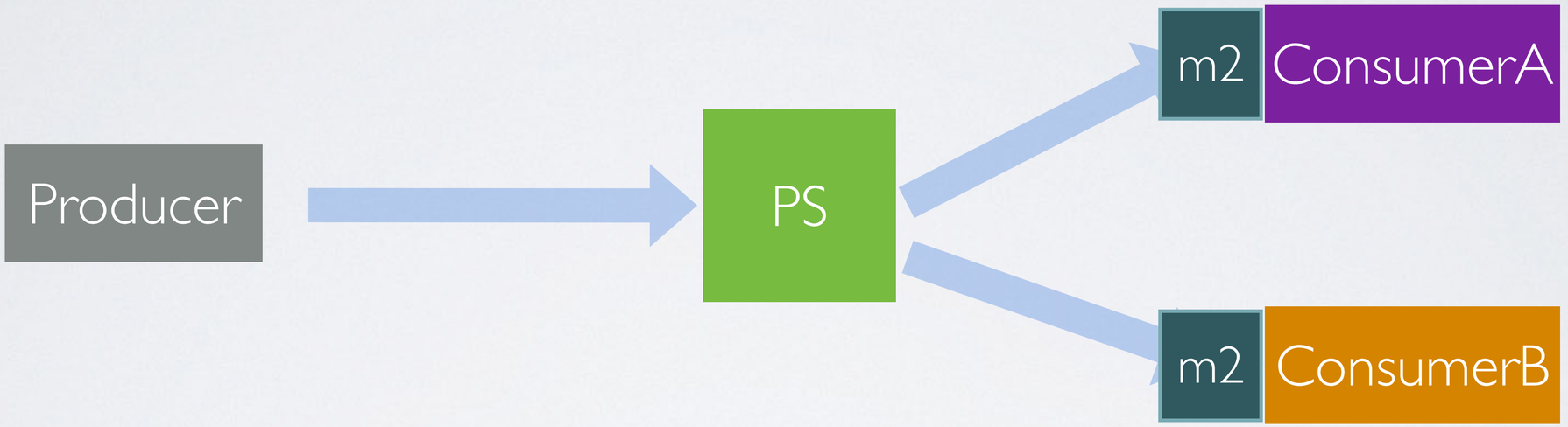

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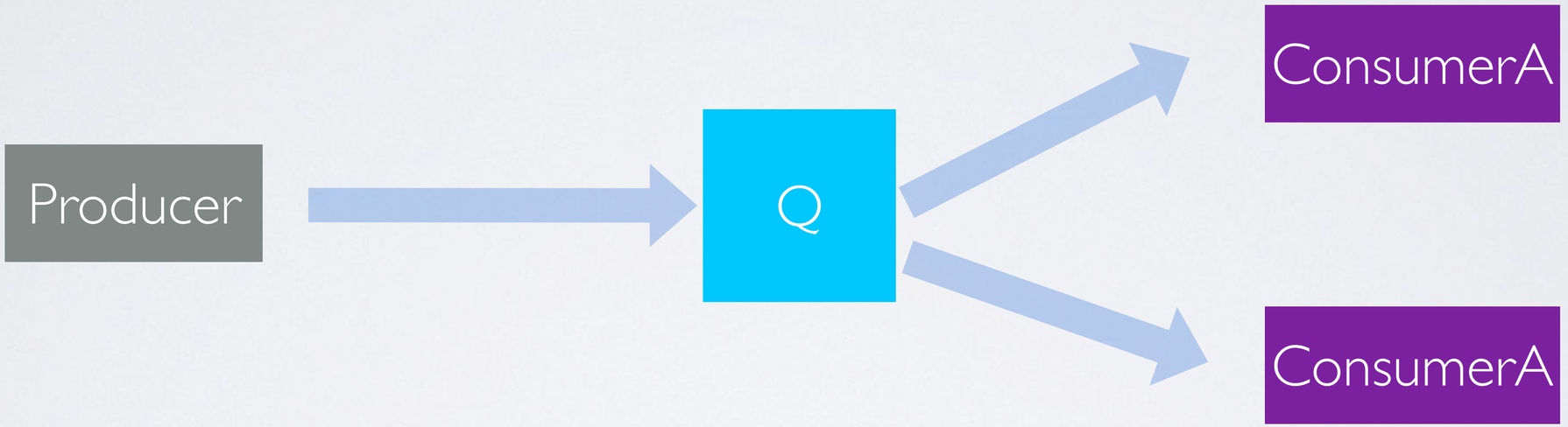

horizontal scalability

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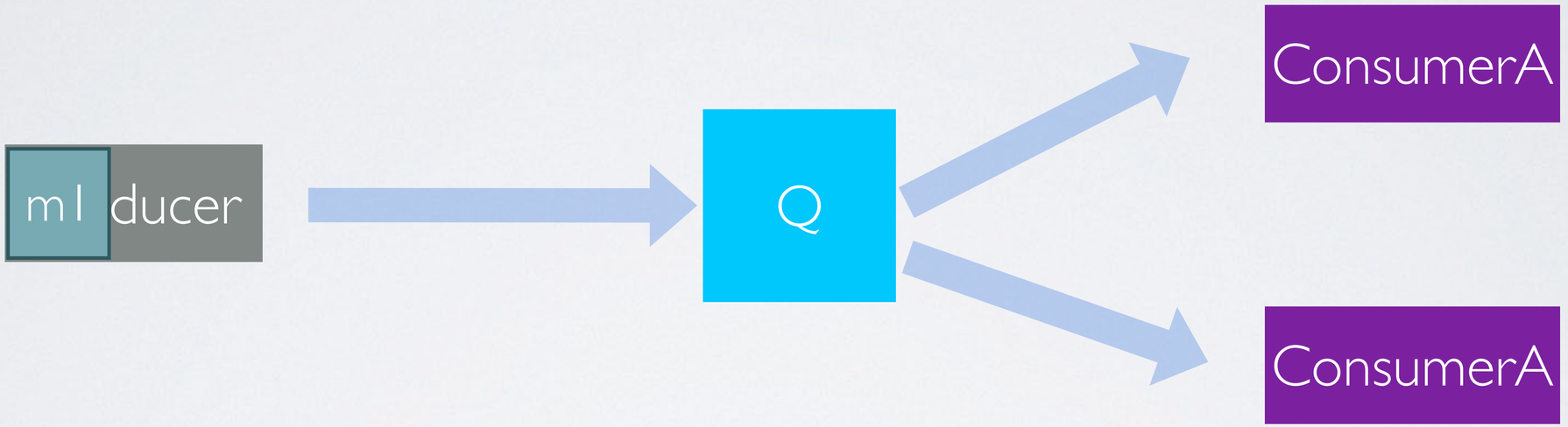

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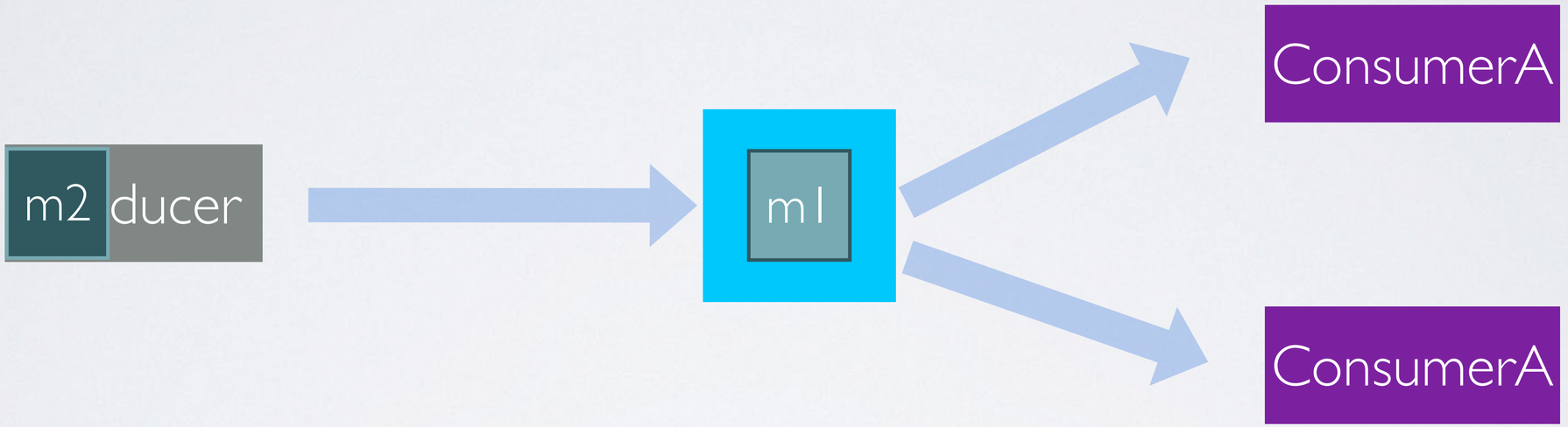

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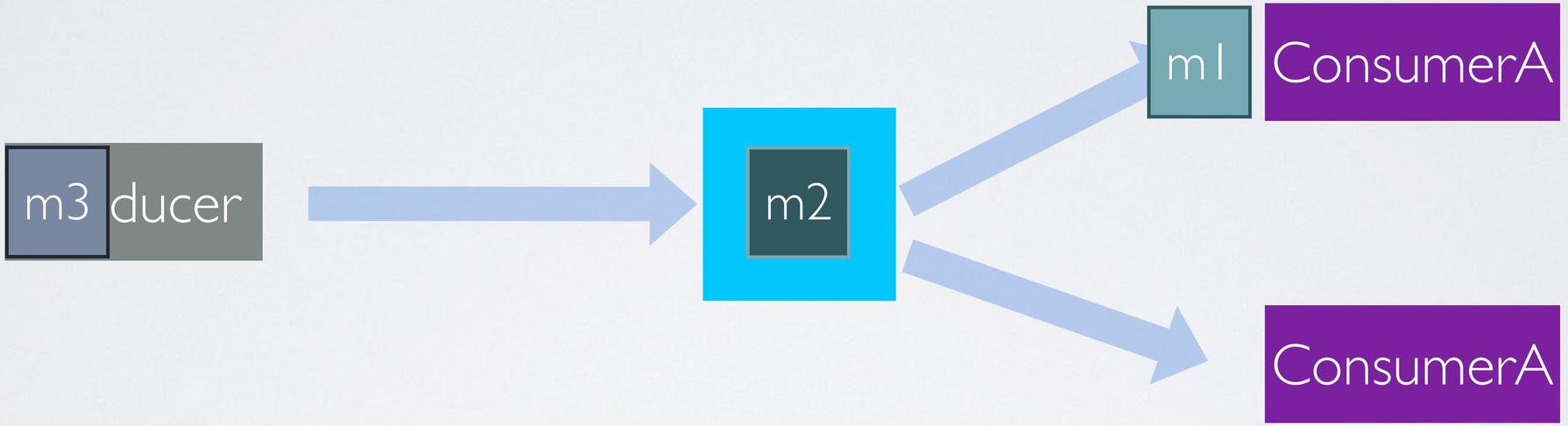

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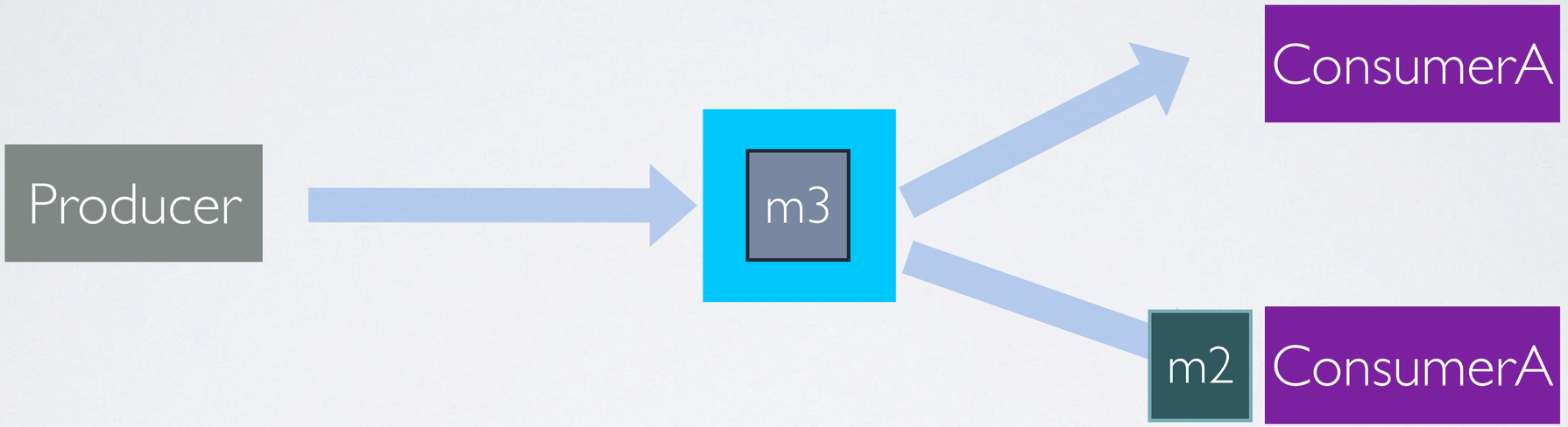

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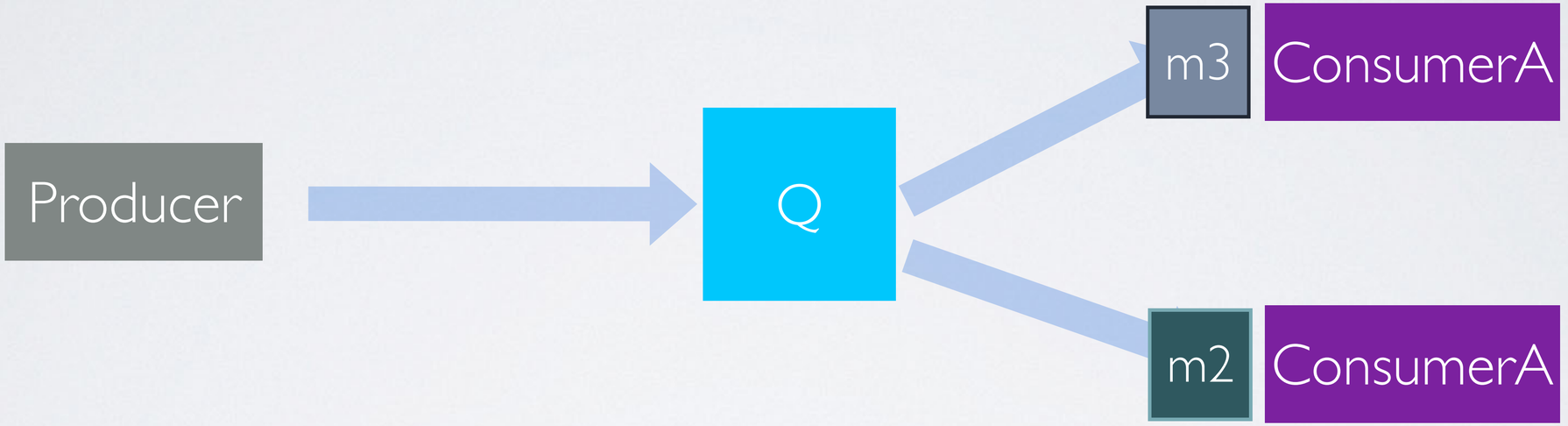

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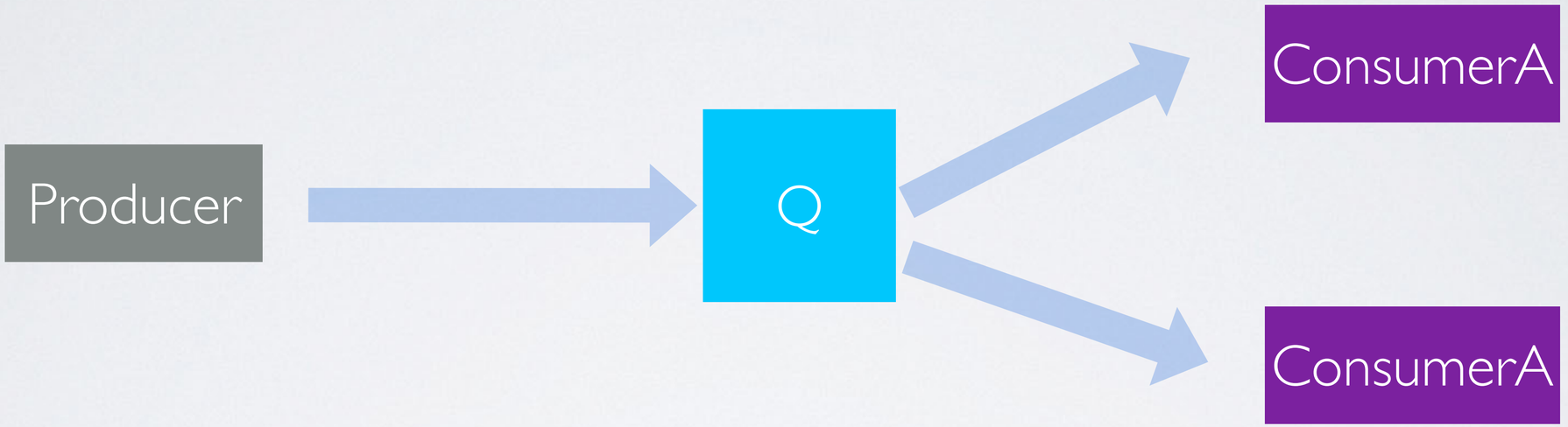

fault tolerance

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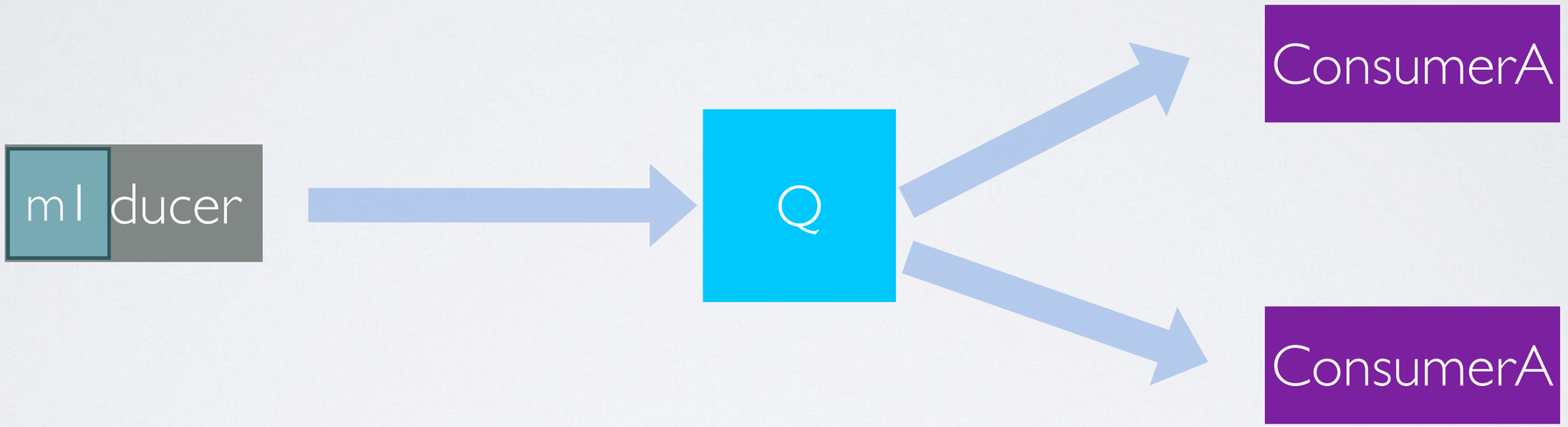

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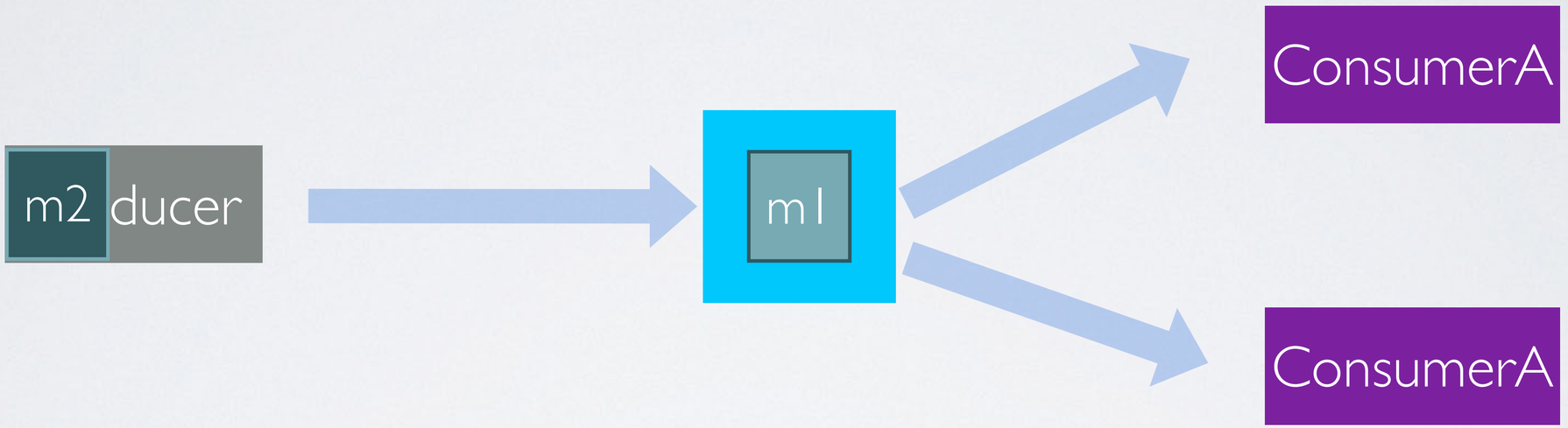

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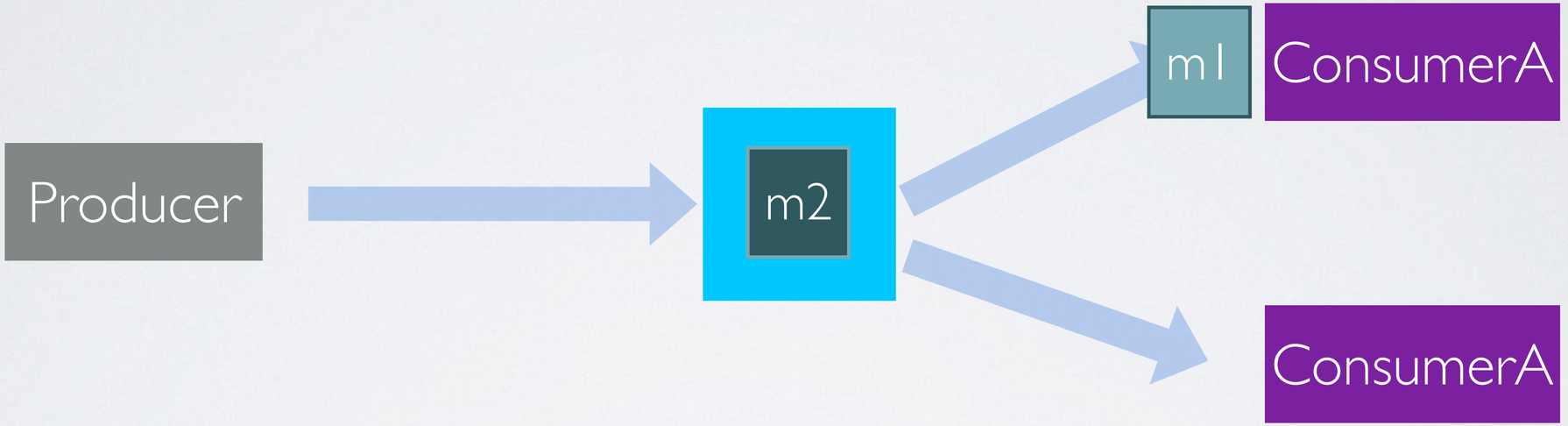

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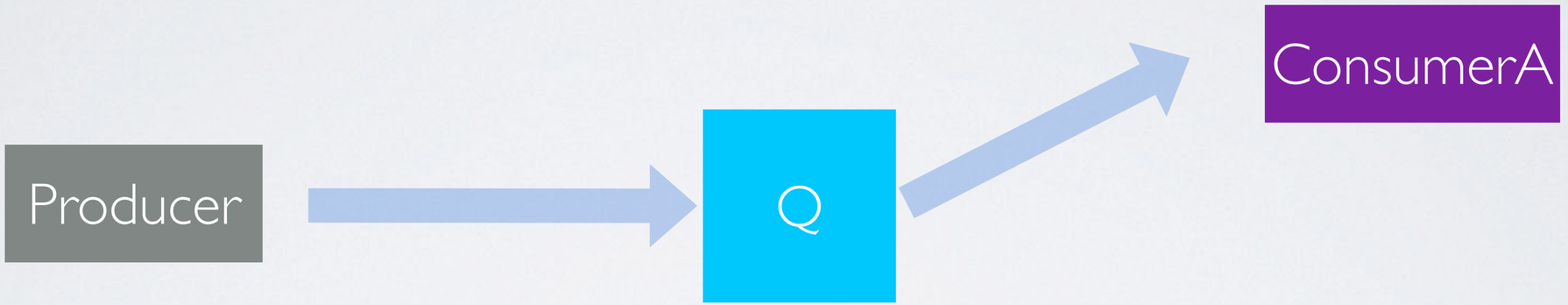

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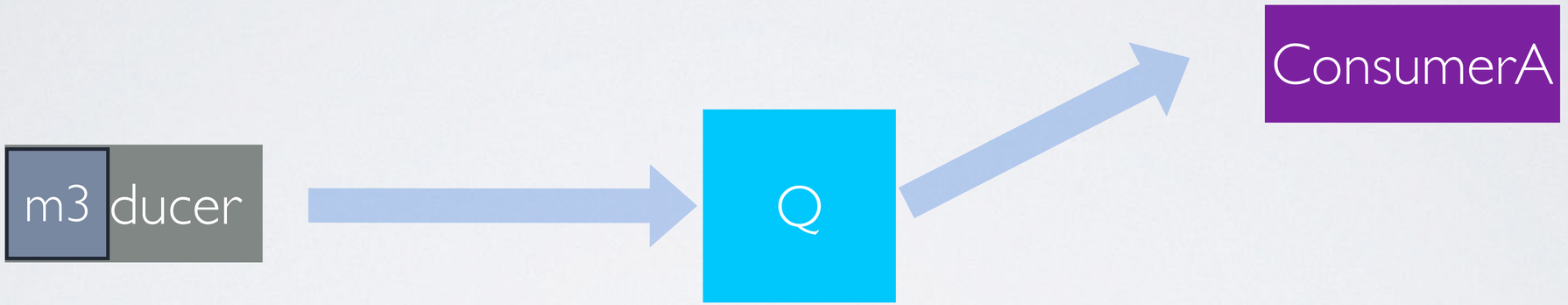

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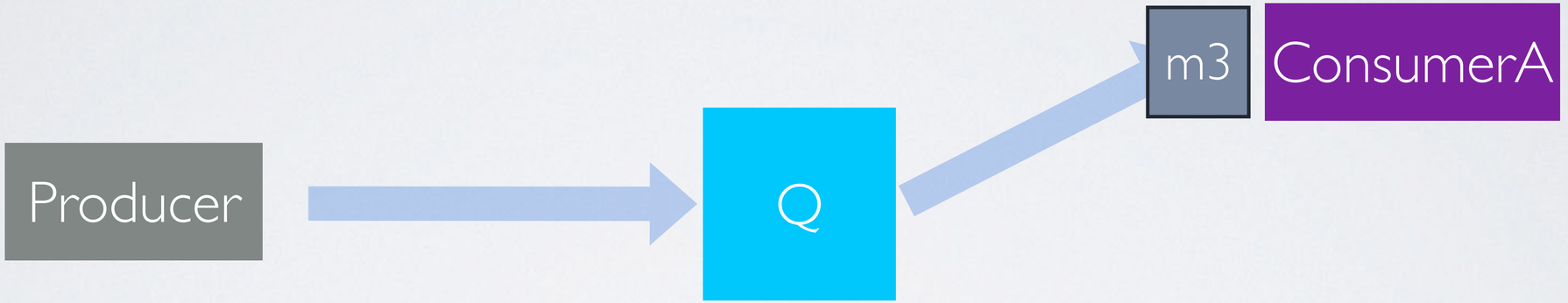

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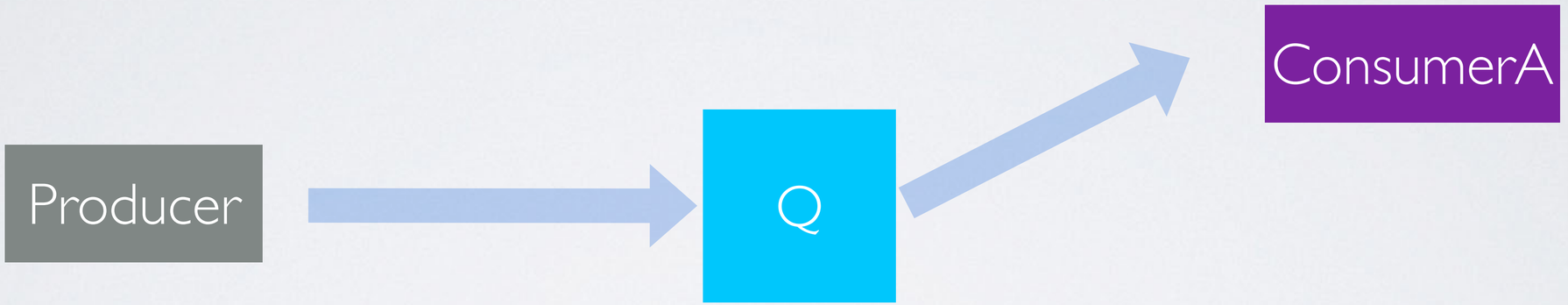

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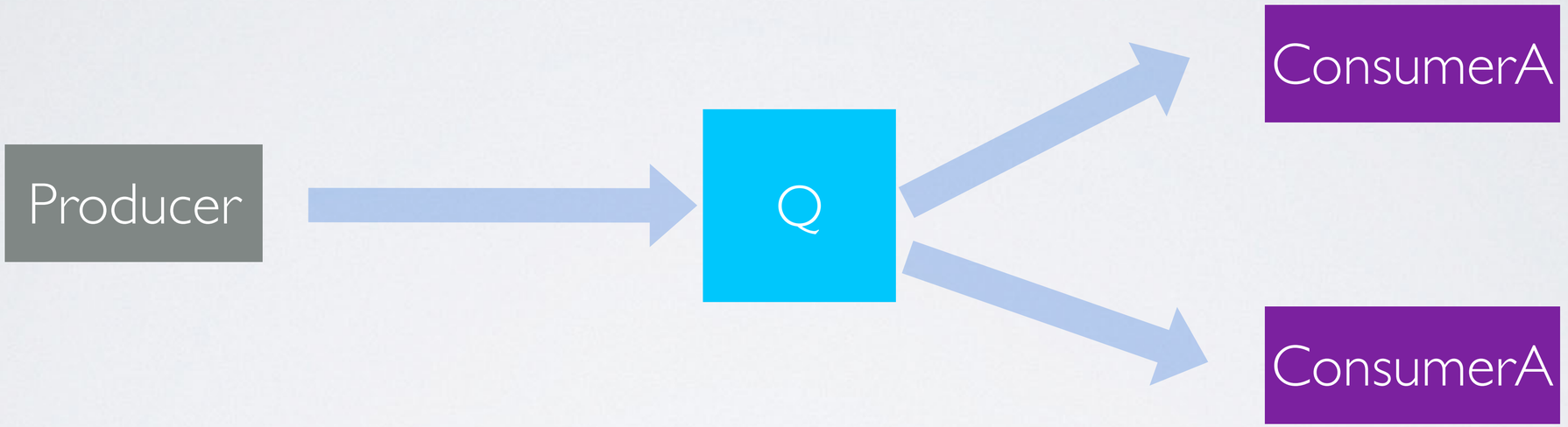

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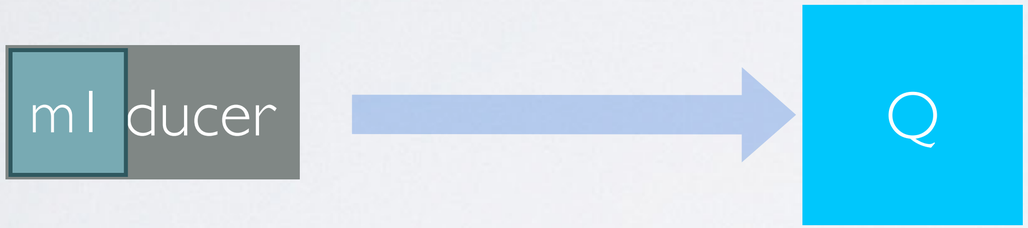

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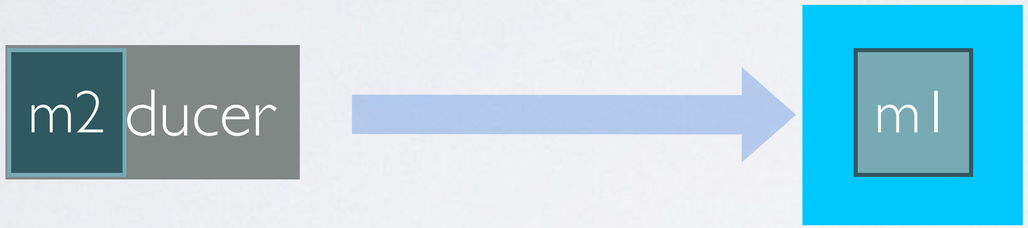

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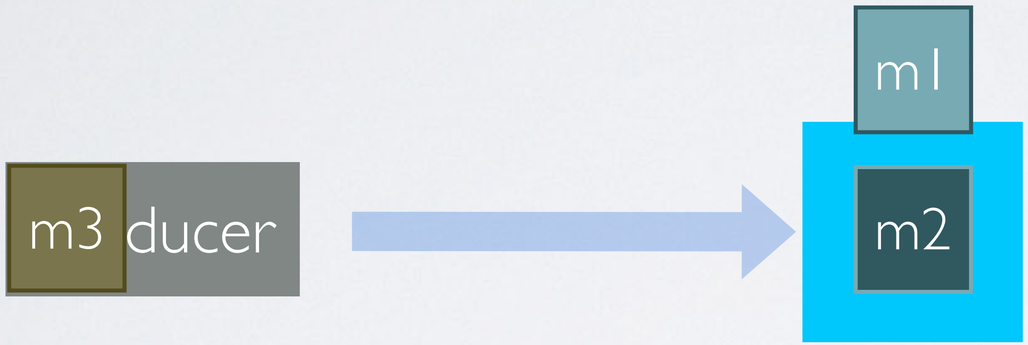

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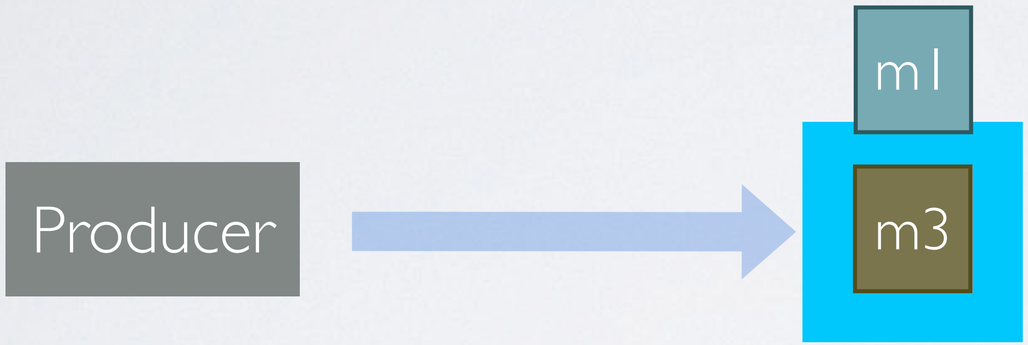

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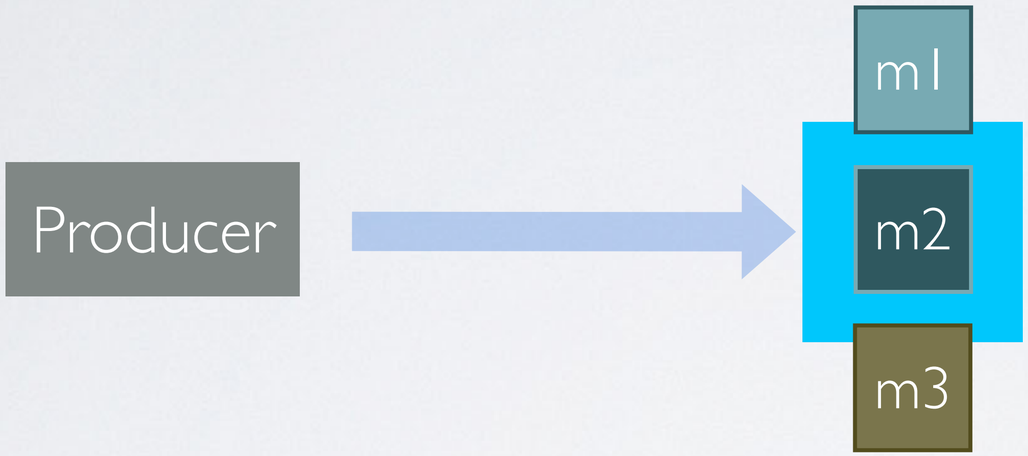

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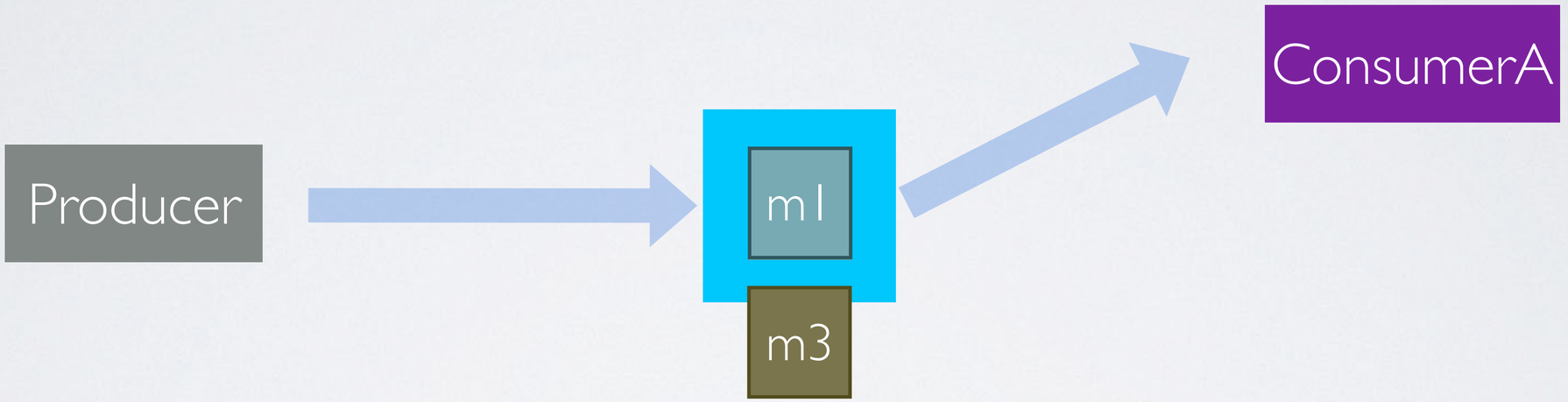

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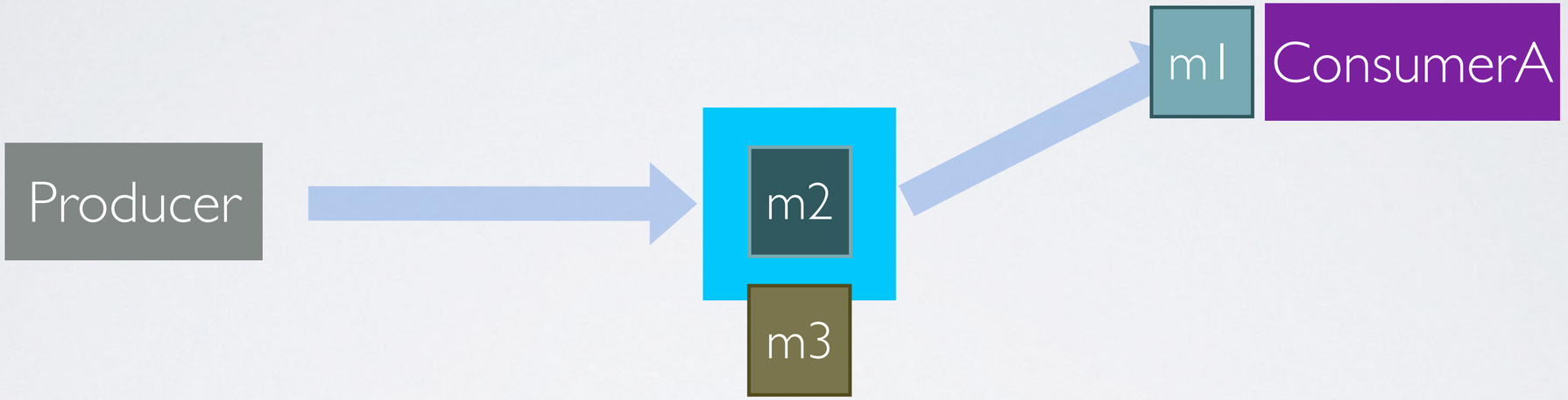

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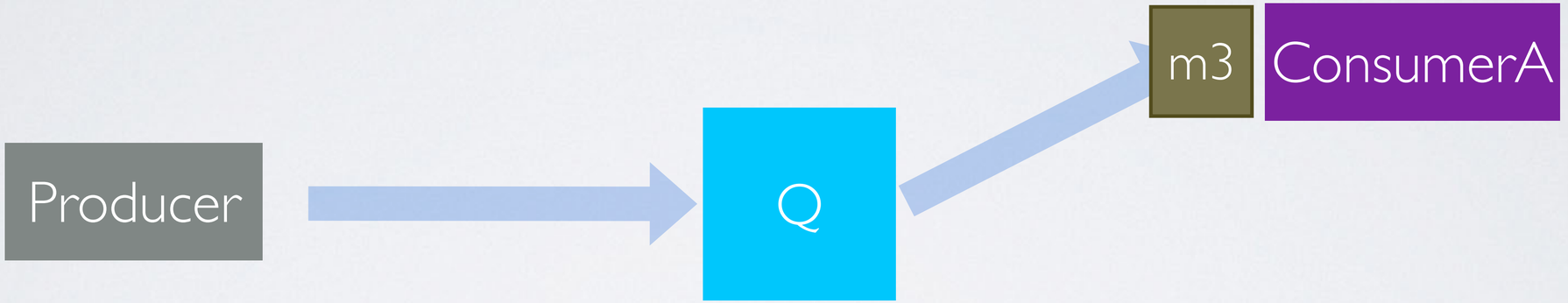

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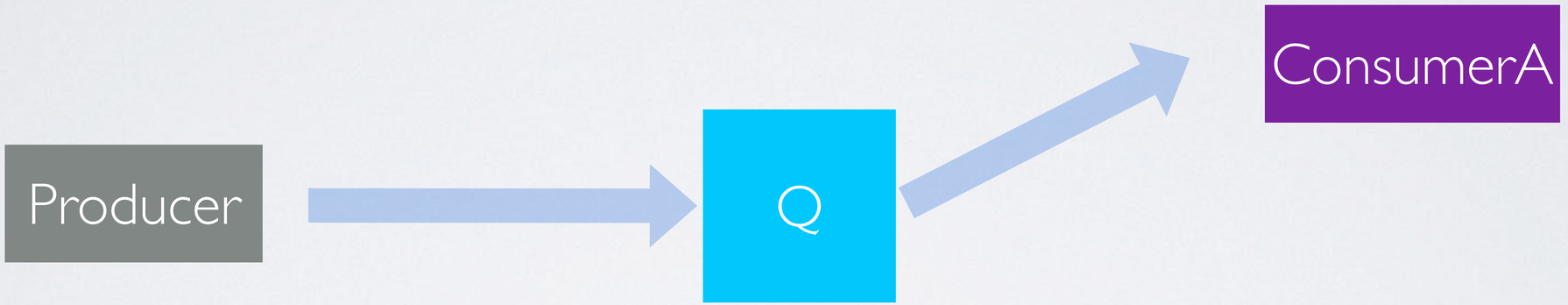


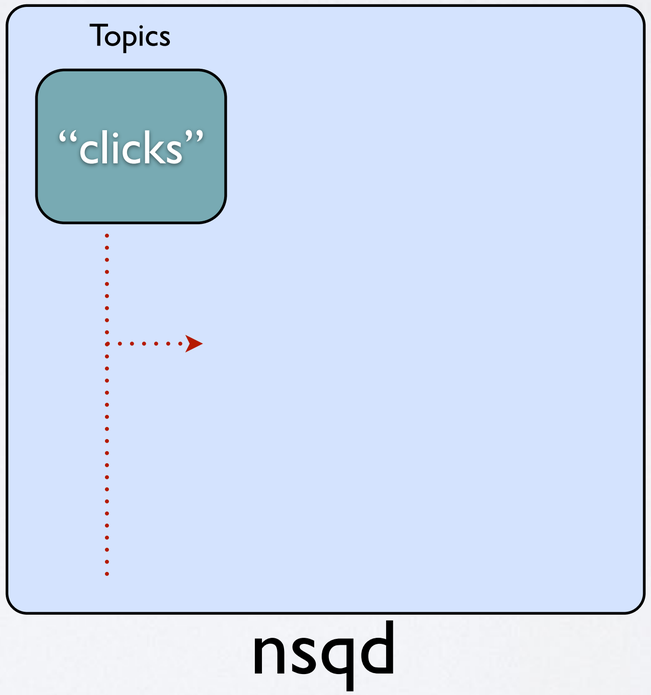
welp

NSQD

TOPICS AND CHANNELS

combine pubsub, distribution, and queueing

- a **topic** is a distinct stream of messages
- a **topic** has one or more **channels**
- topics and channels are created at **runtime**
- messages are **pushed** to consumers



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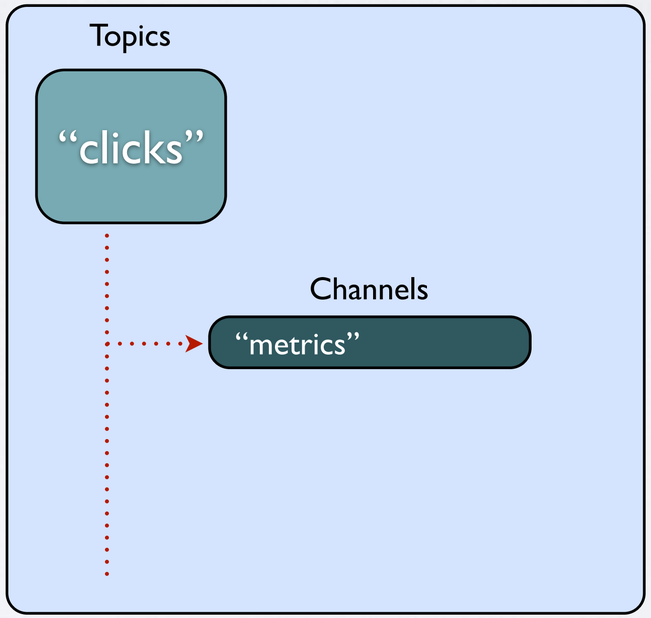

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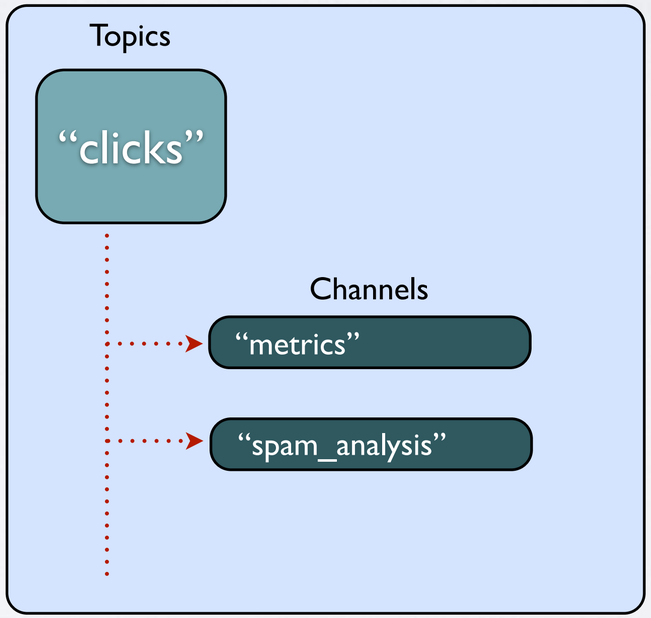

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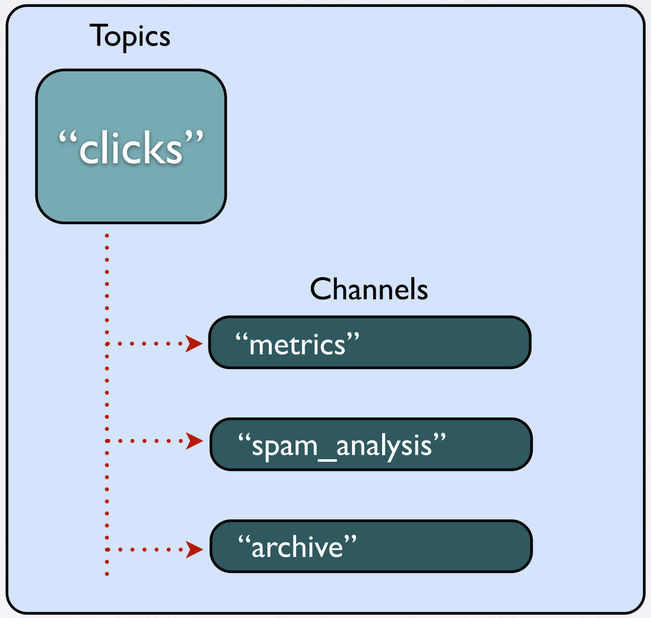

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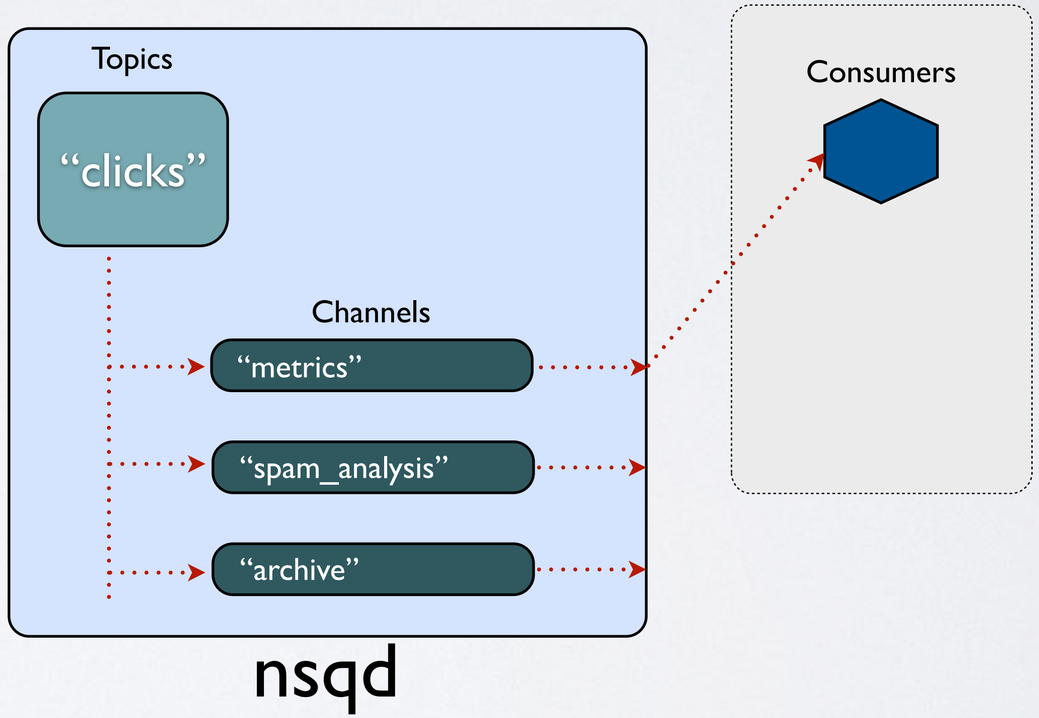

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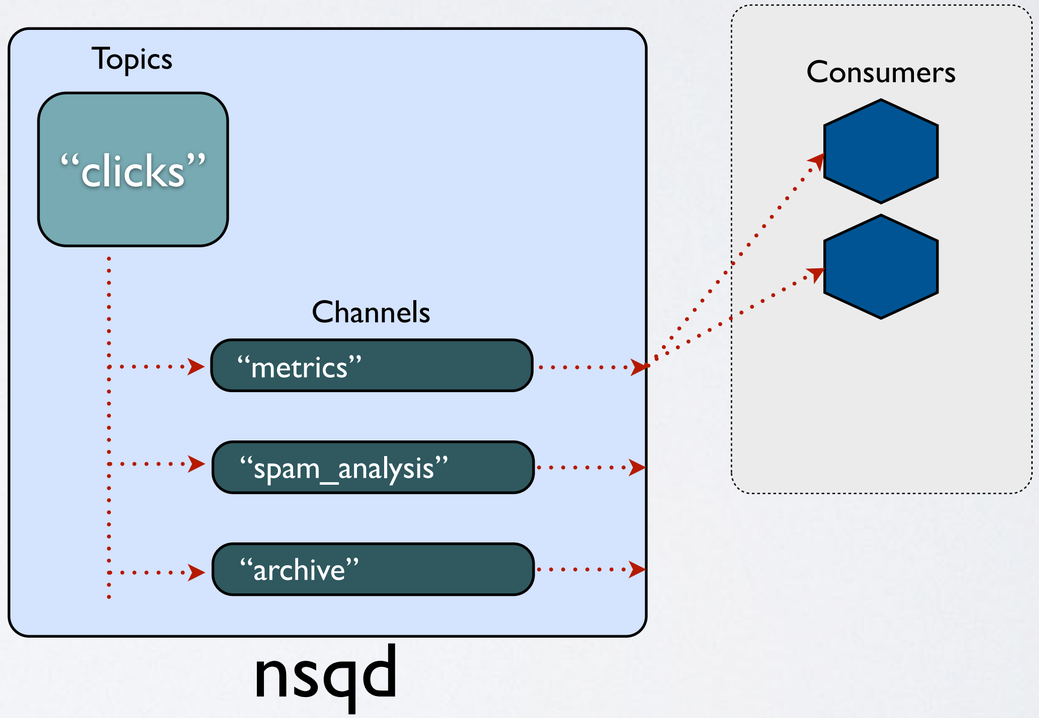

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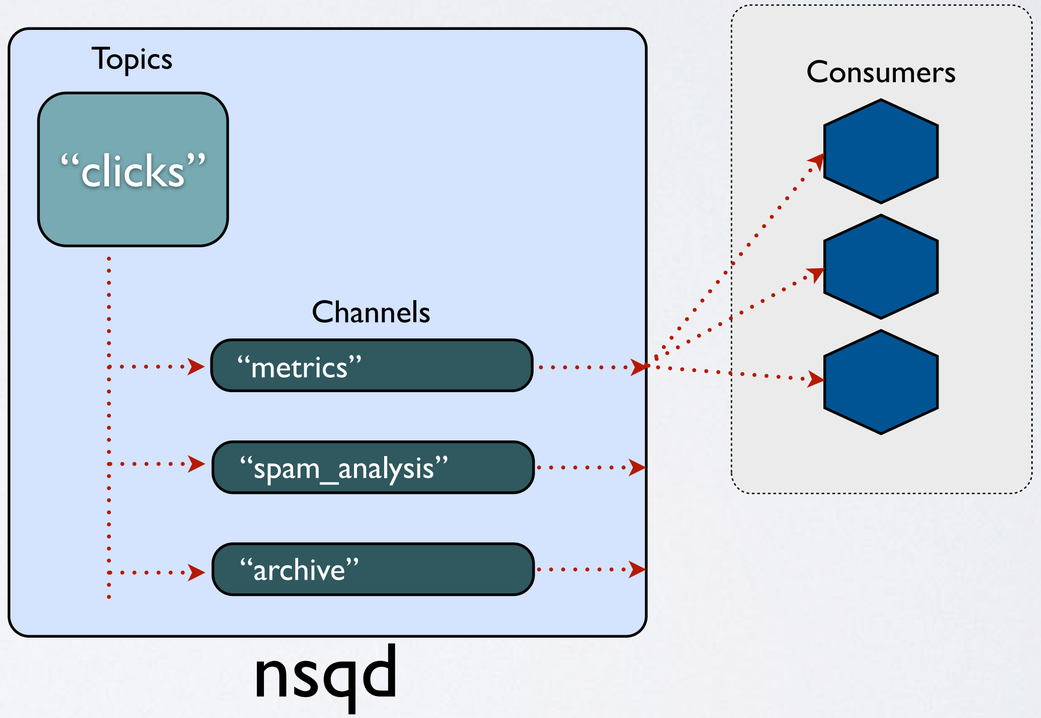

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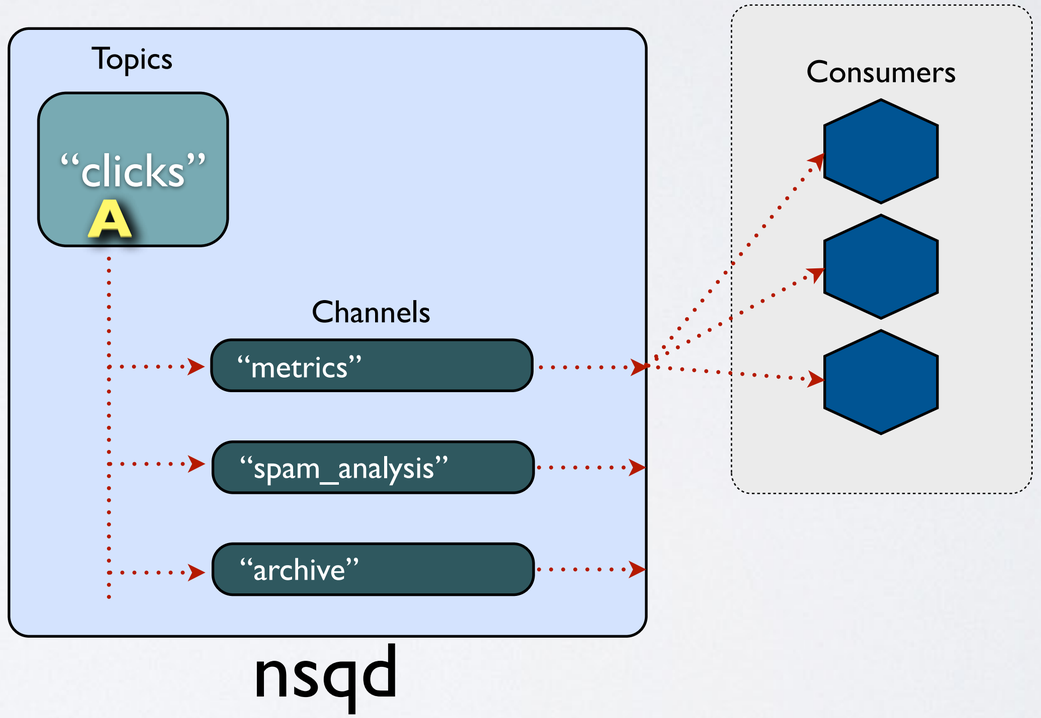

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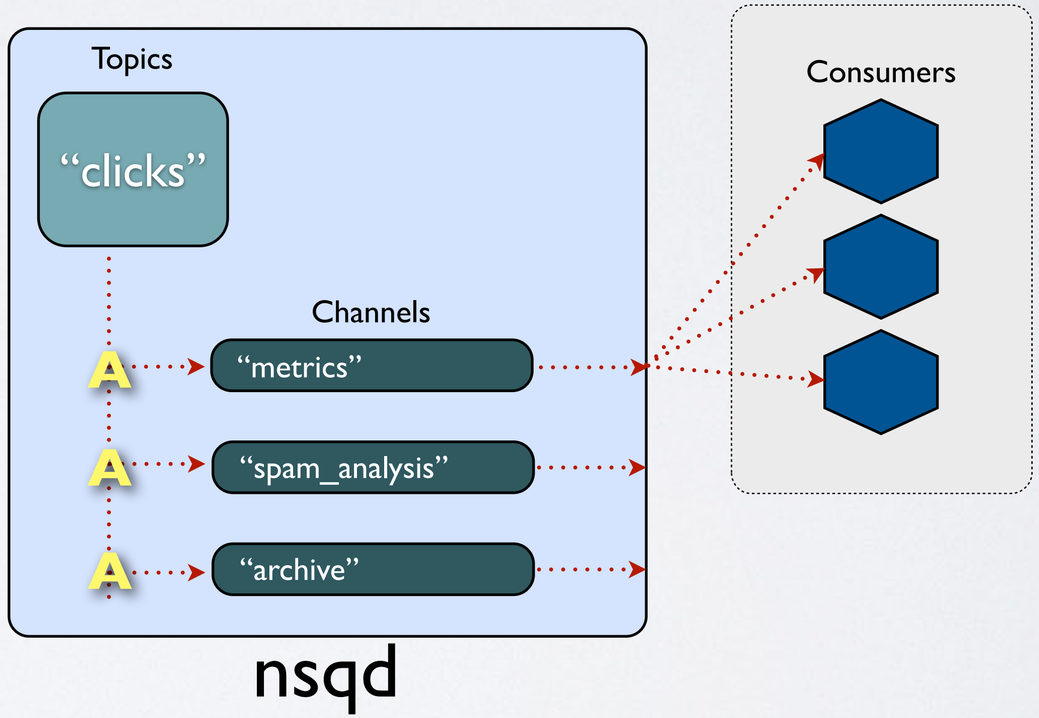

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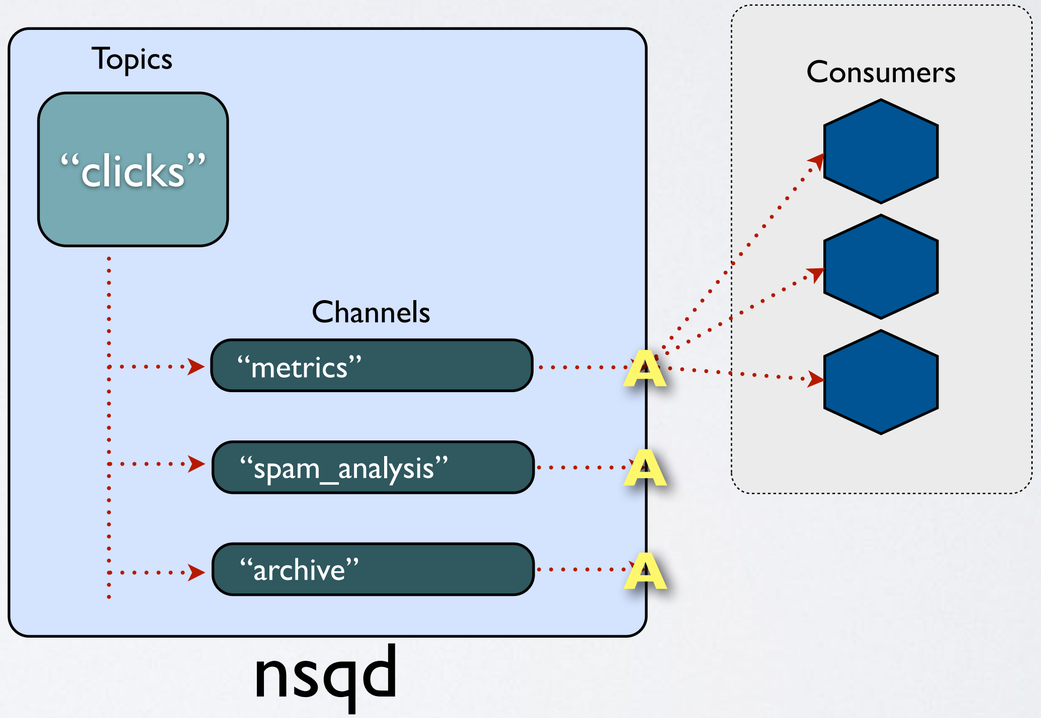

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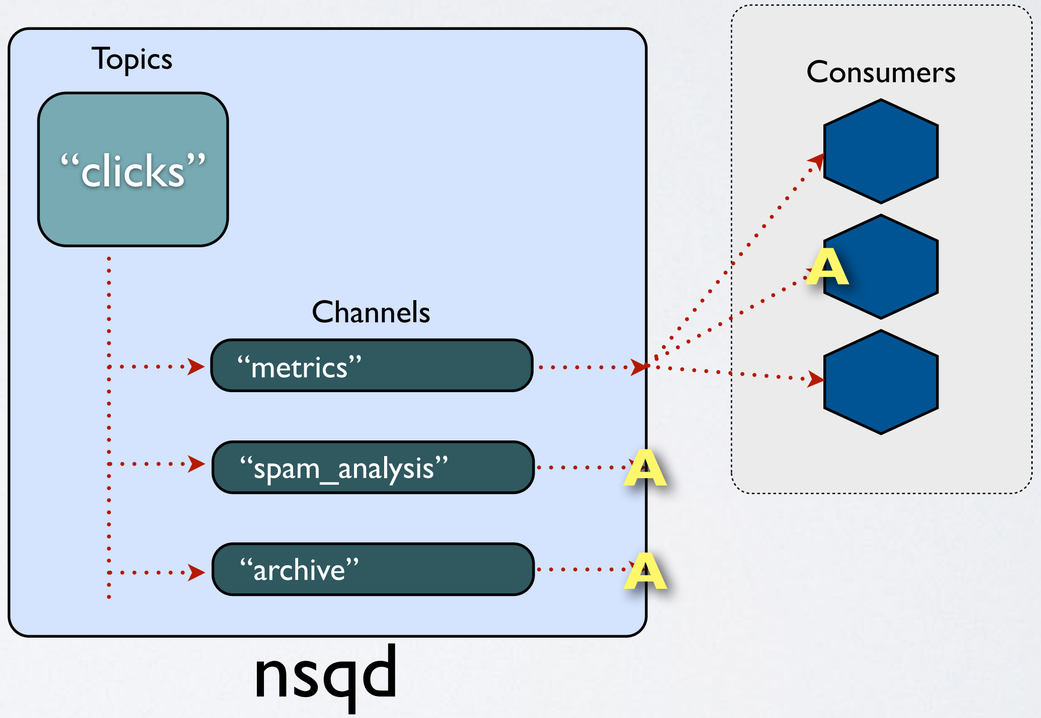

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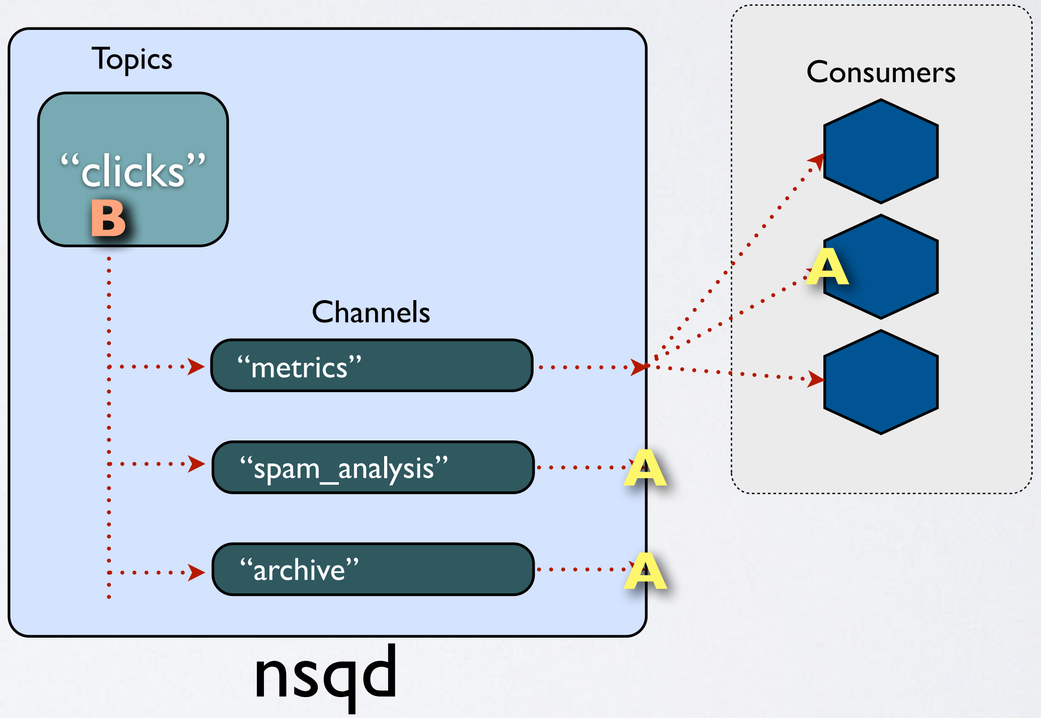

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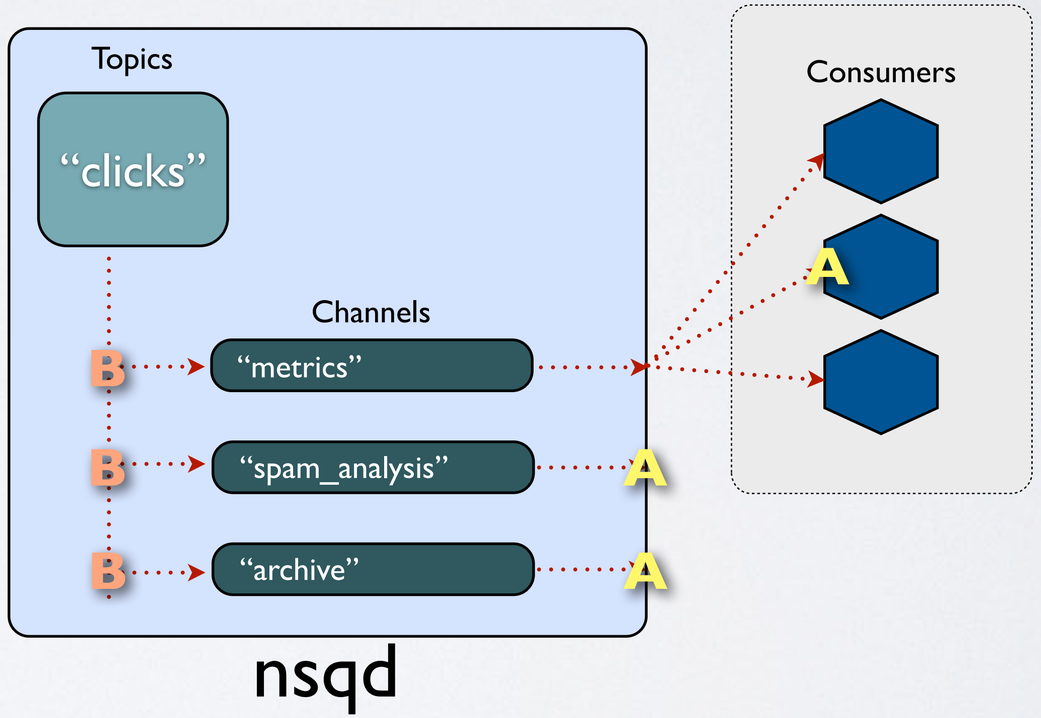

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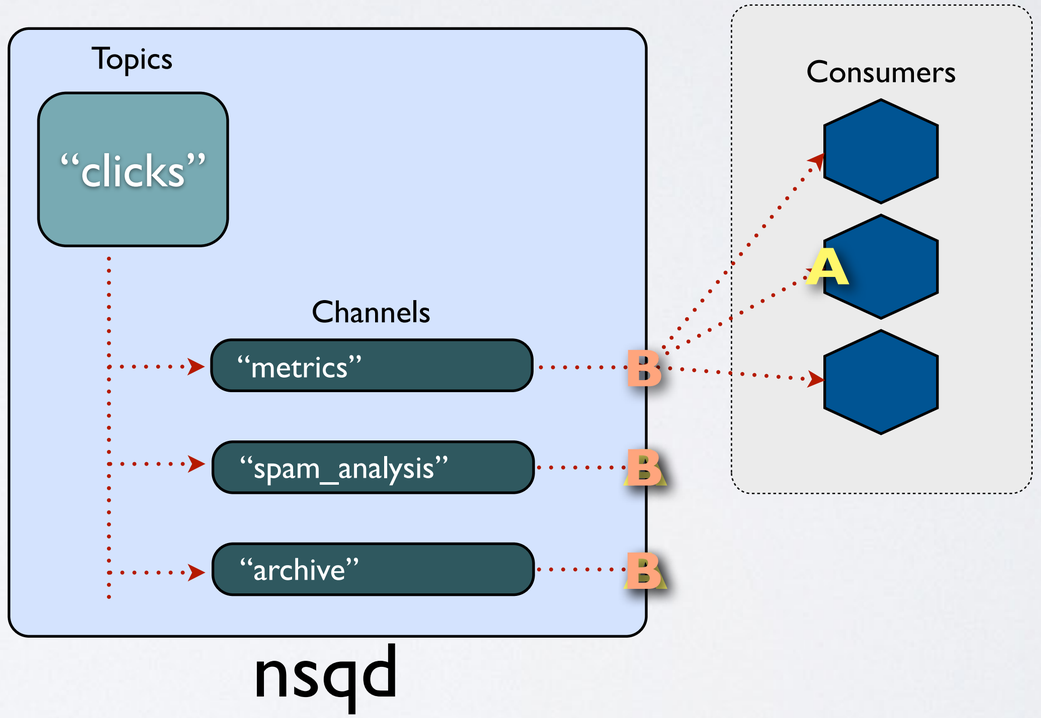

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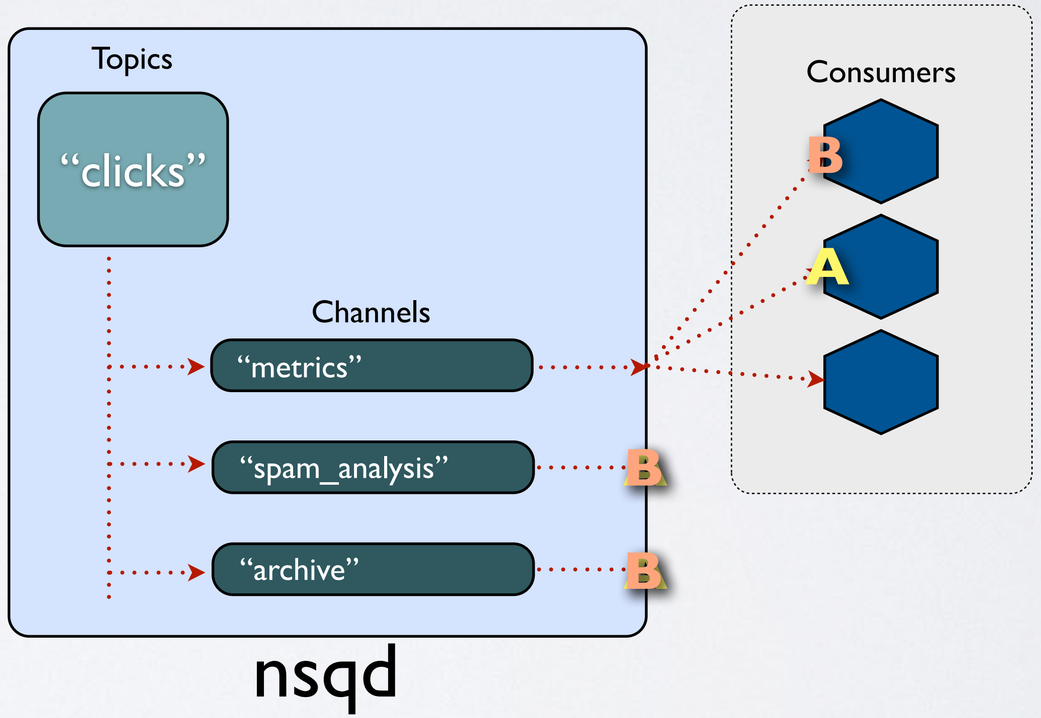
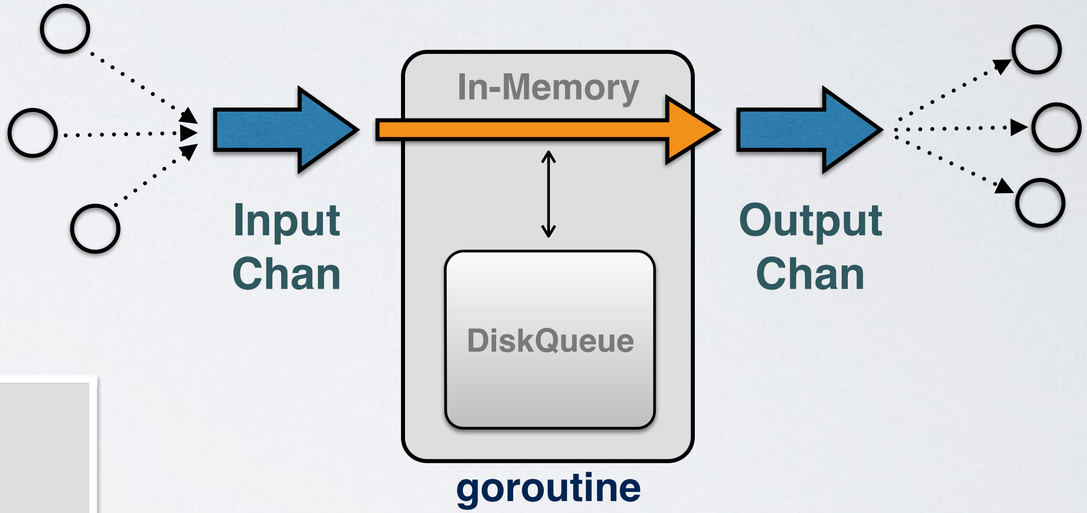


UNDER THE HOOD

- **topics** and **channels** are *independent*
- configurable high water mark (disk persistence)
- "bounded" memory footprint

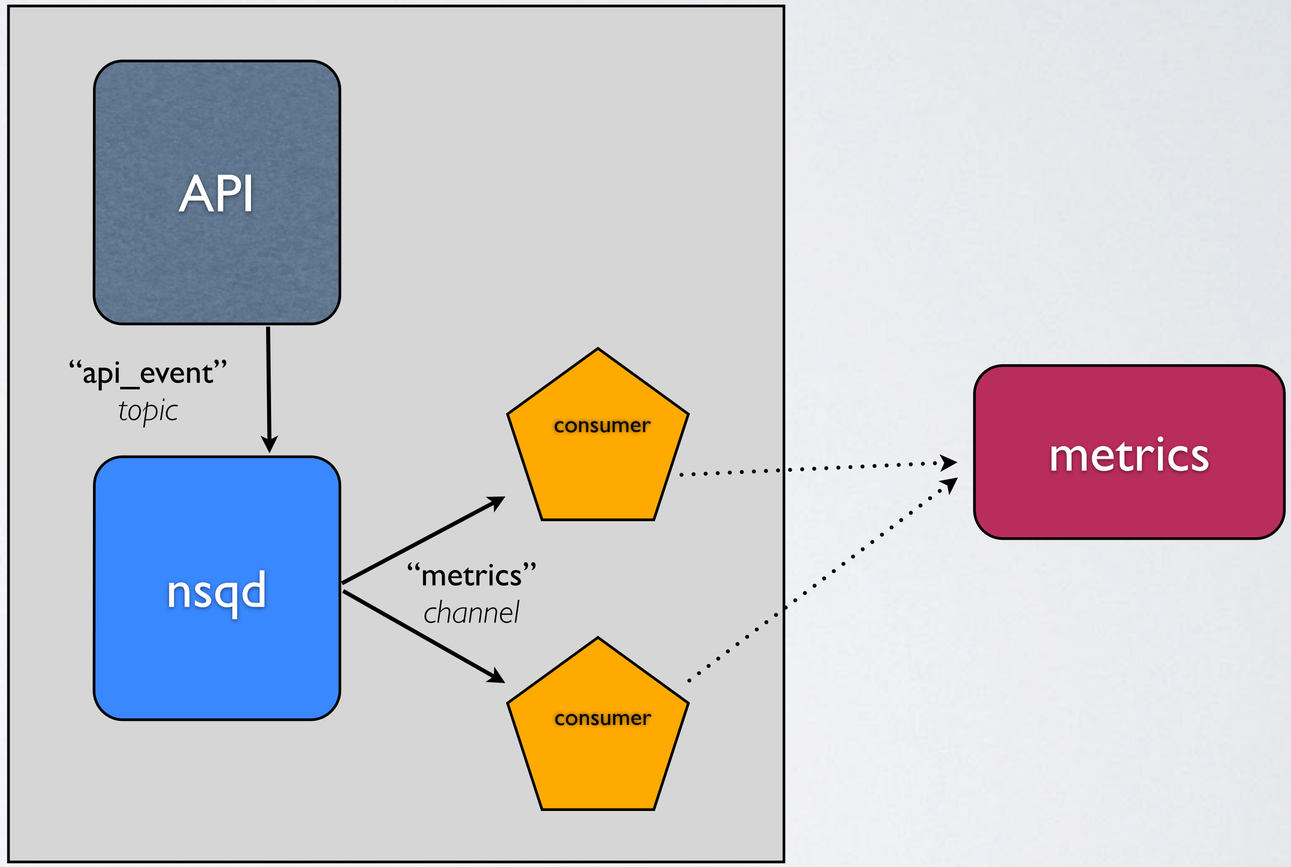



```
for msg := range c.incomingMsgChan {
    select {
    case c.memoryMsgChan <- msg:
    default:
        err := WriteMessageToBackend(&msgBuf, msg, c)
        if err != nil {
            // log whatever
        }
    }
}
```

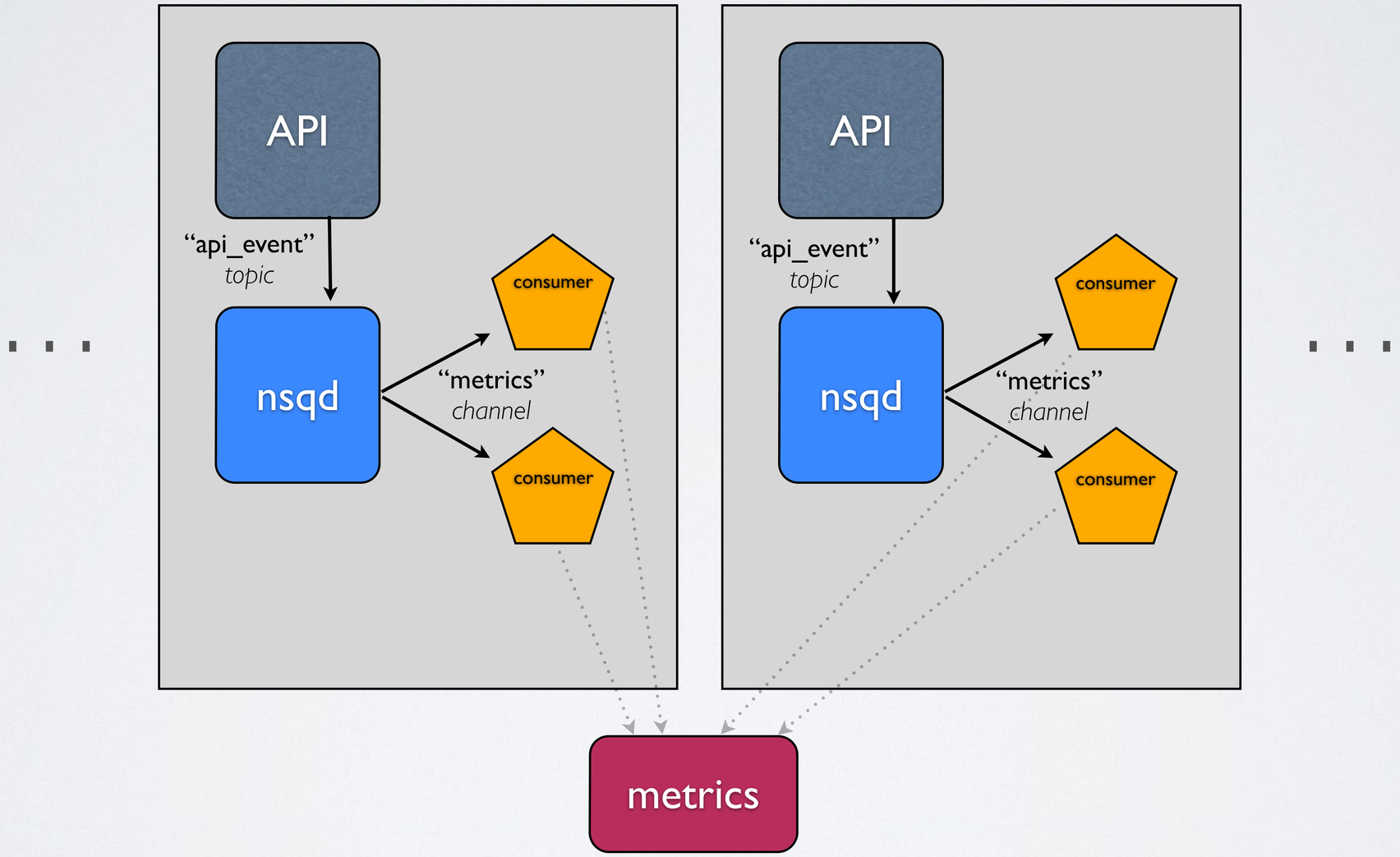
THERE AND BACK AGAIN

DE-COUPLE

- PUB locally to **nsqd** via HTTP
- perform work **async**
- co-locate everything (**silo**)



SCALE HORIZONTALLY



A MESSAGE QUEUE

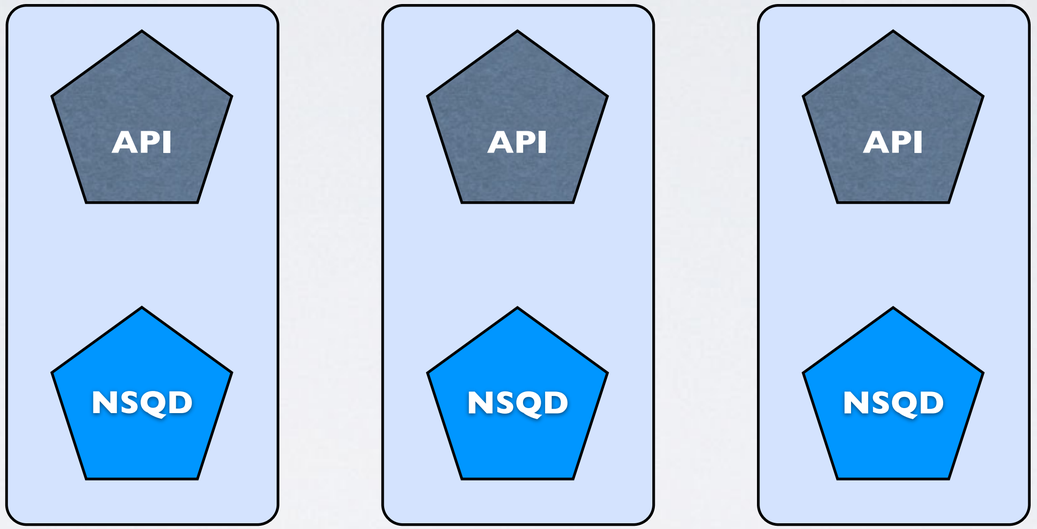
IS **BORING**

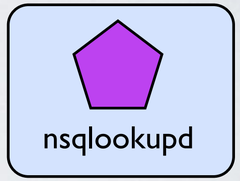
(IN ISOLATION)

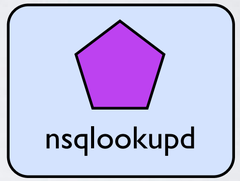
NSQLOOKUPD

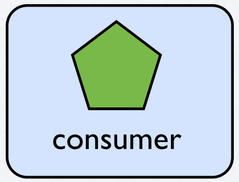
TYPICAL NSQ CLUSTER

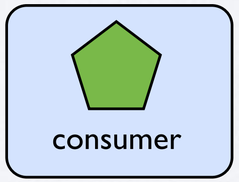
- enable *distributed* and *decentralized* topologies
- no centralized broker
- **nsqlookupd** instances are *independent* (**no coordinatation**)











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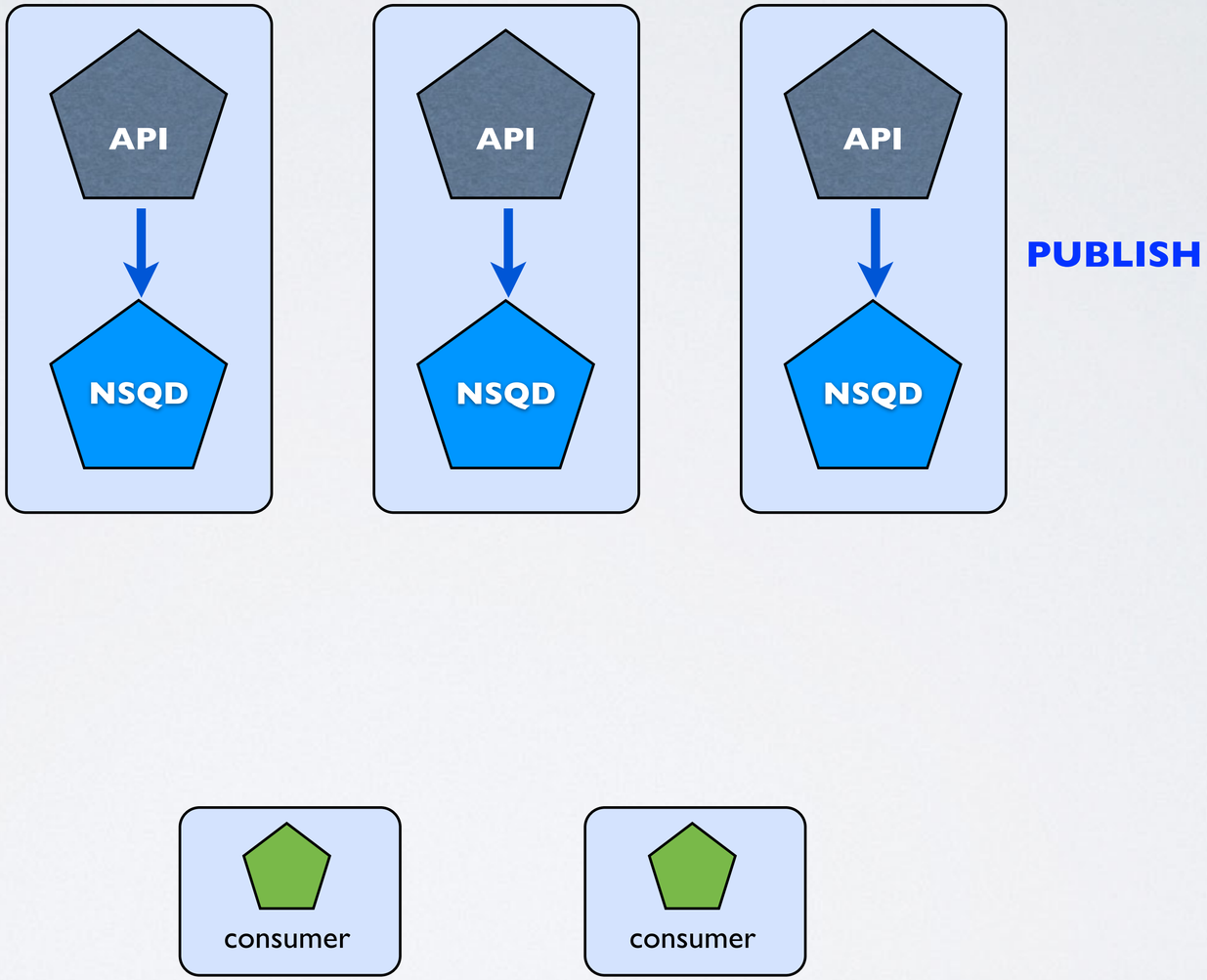

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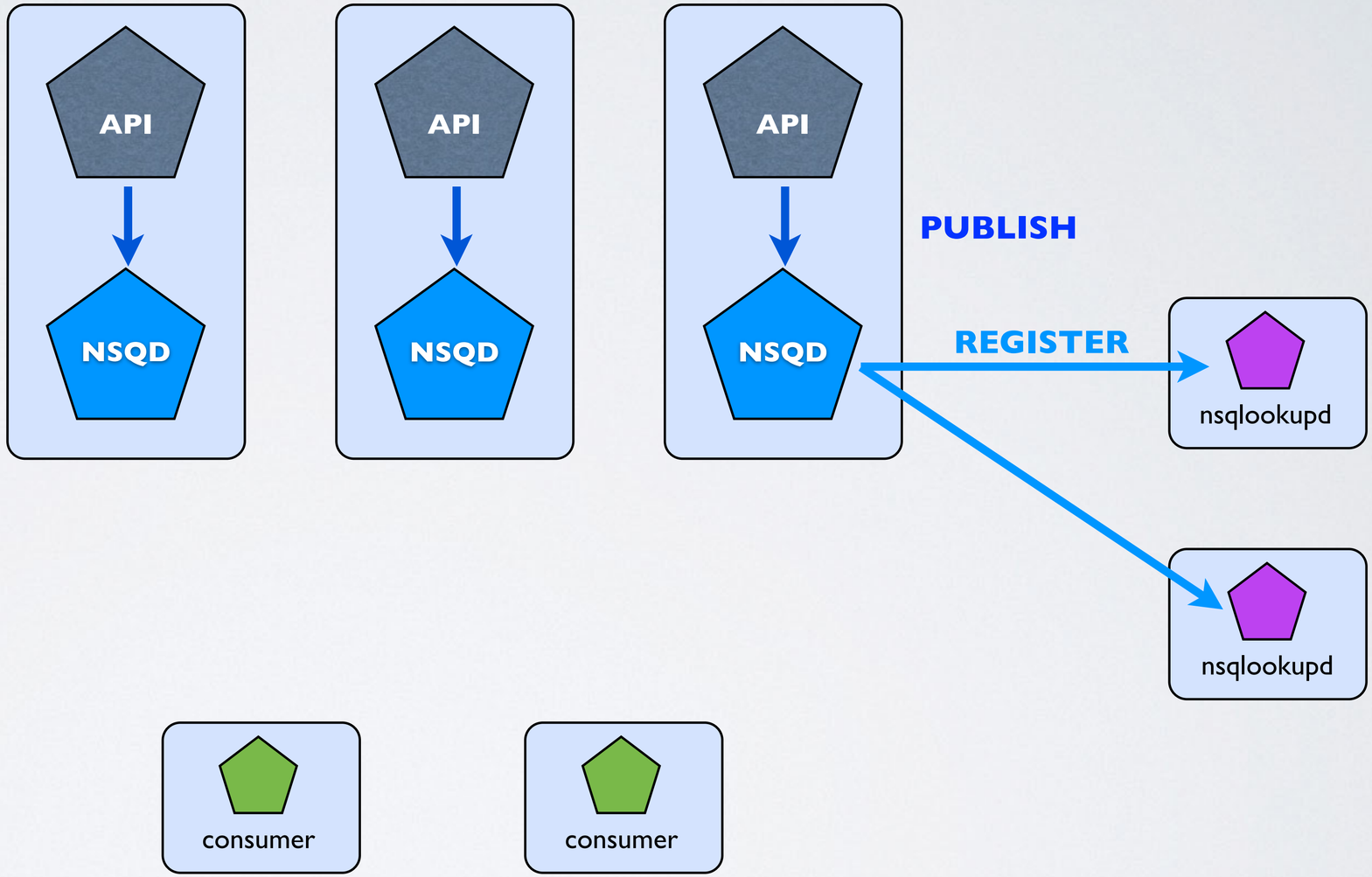

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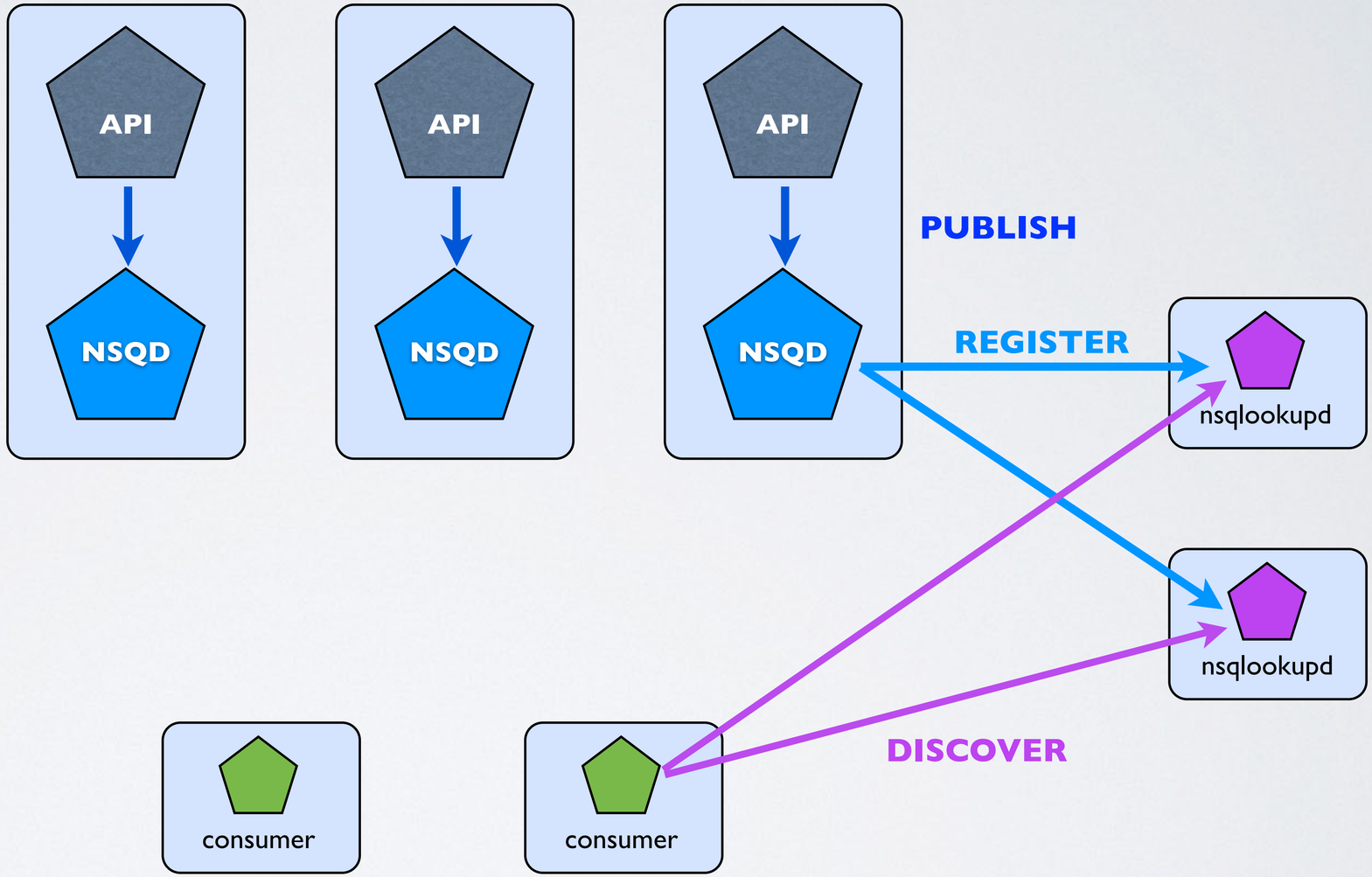

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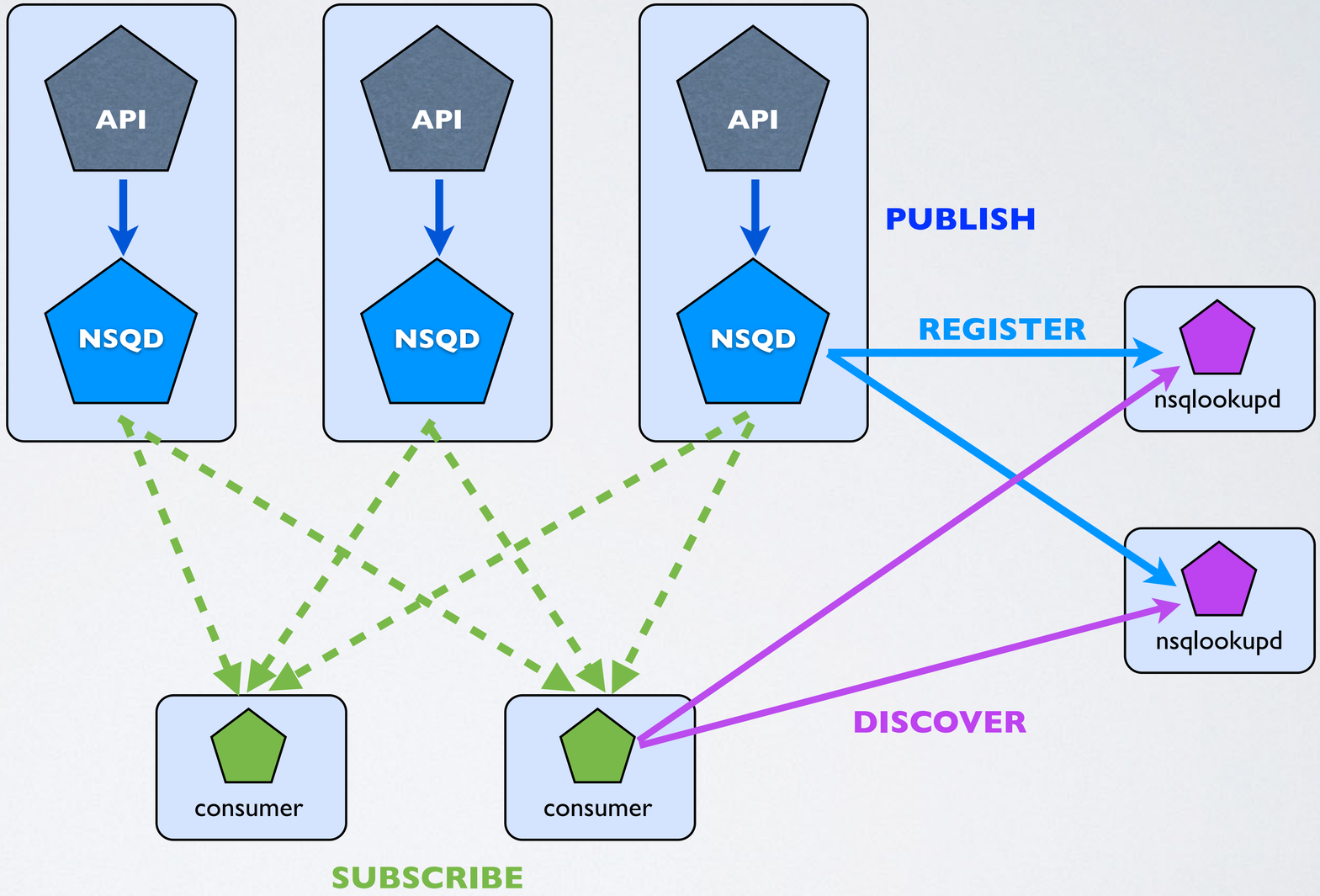
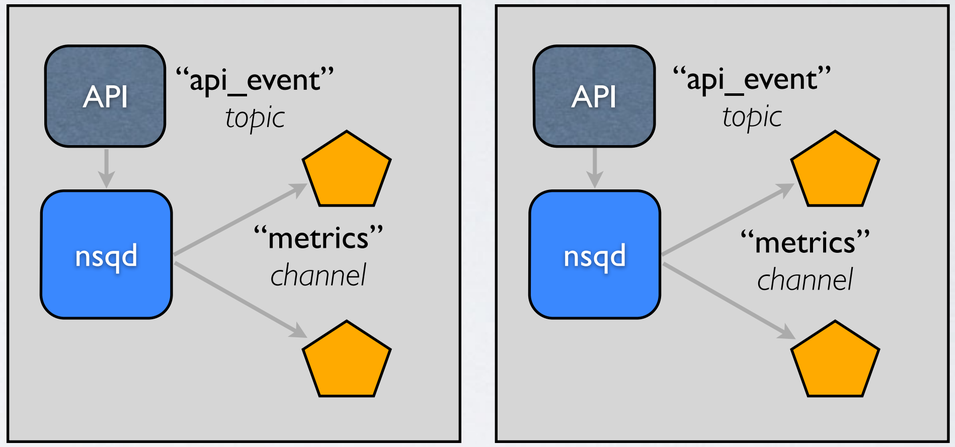


… AND AGAIN

DISCOVERABILITY

- introduce **nsqlookupd**
- producers and consumers come and go
- other services can discover and subscribe to this topic



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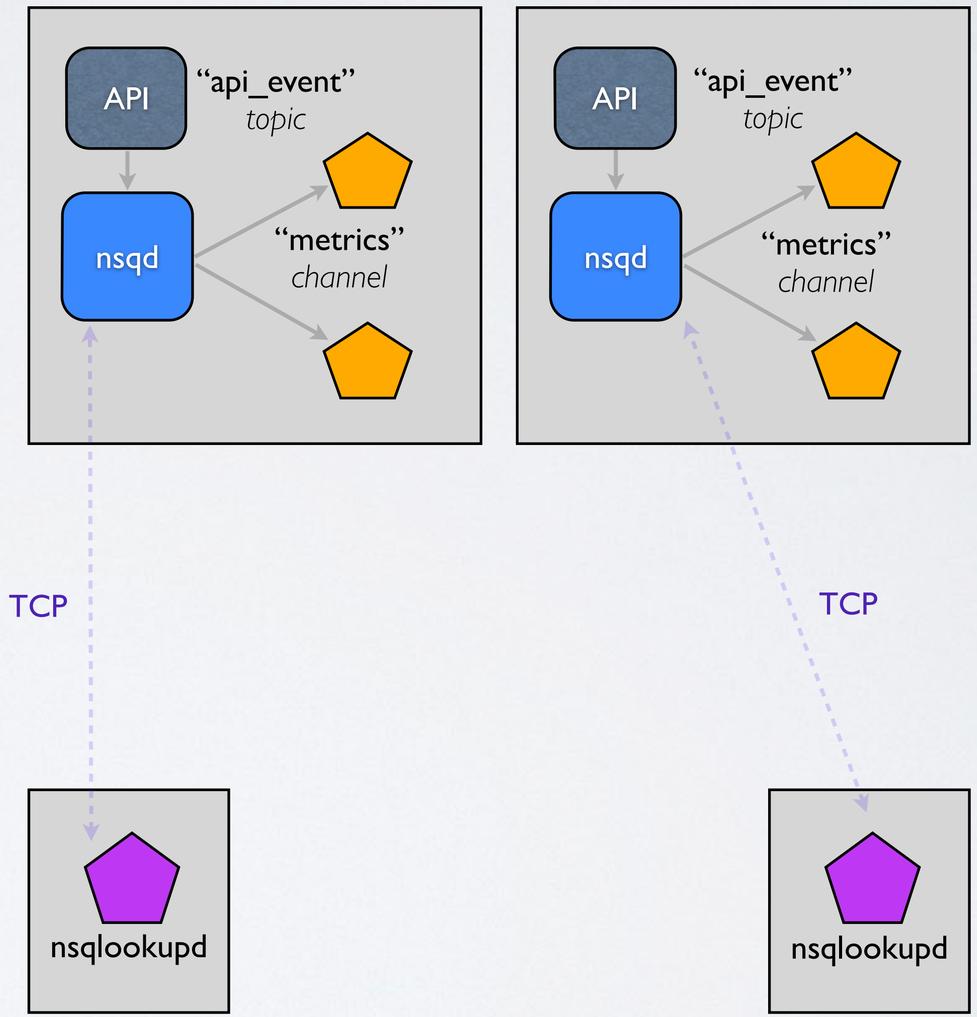

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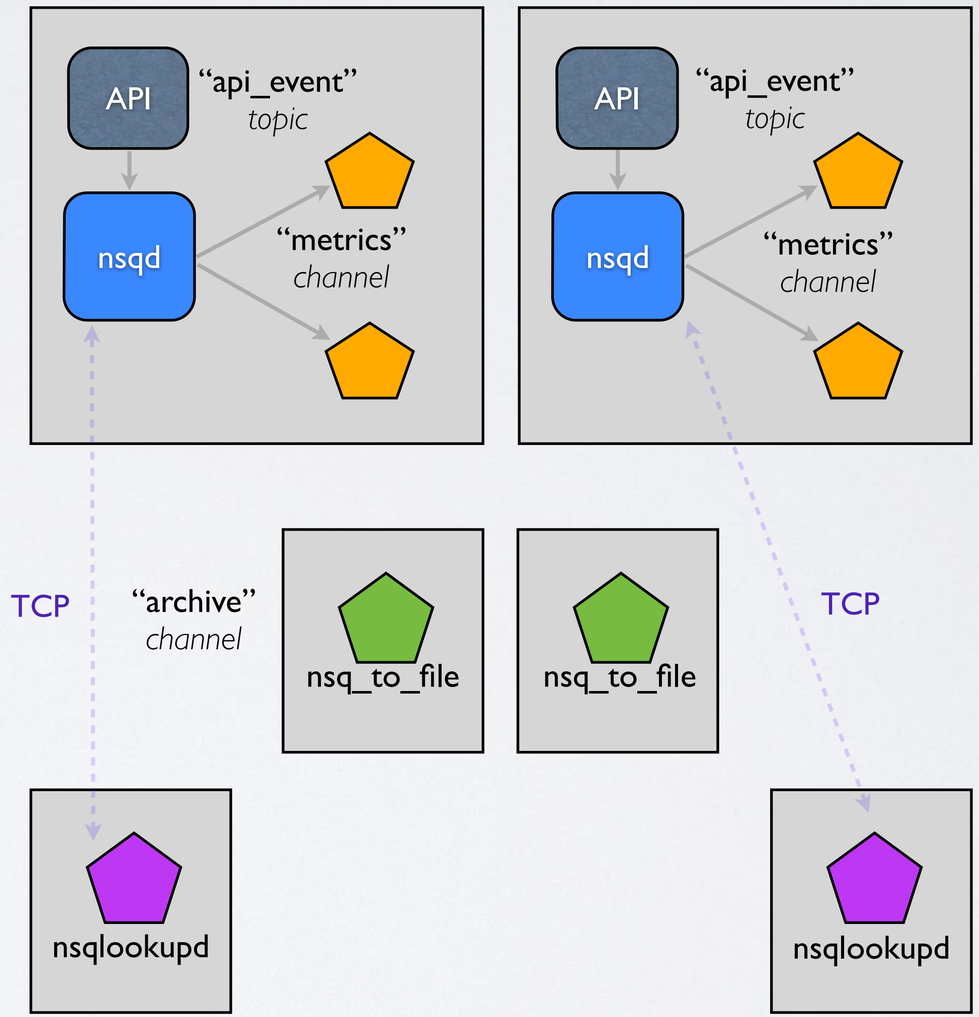

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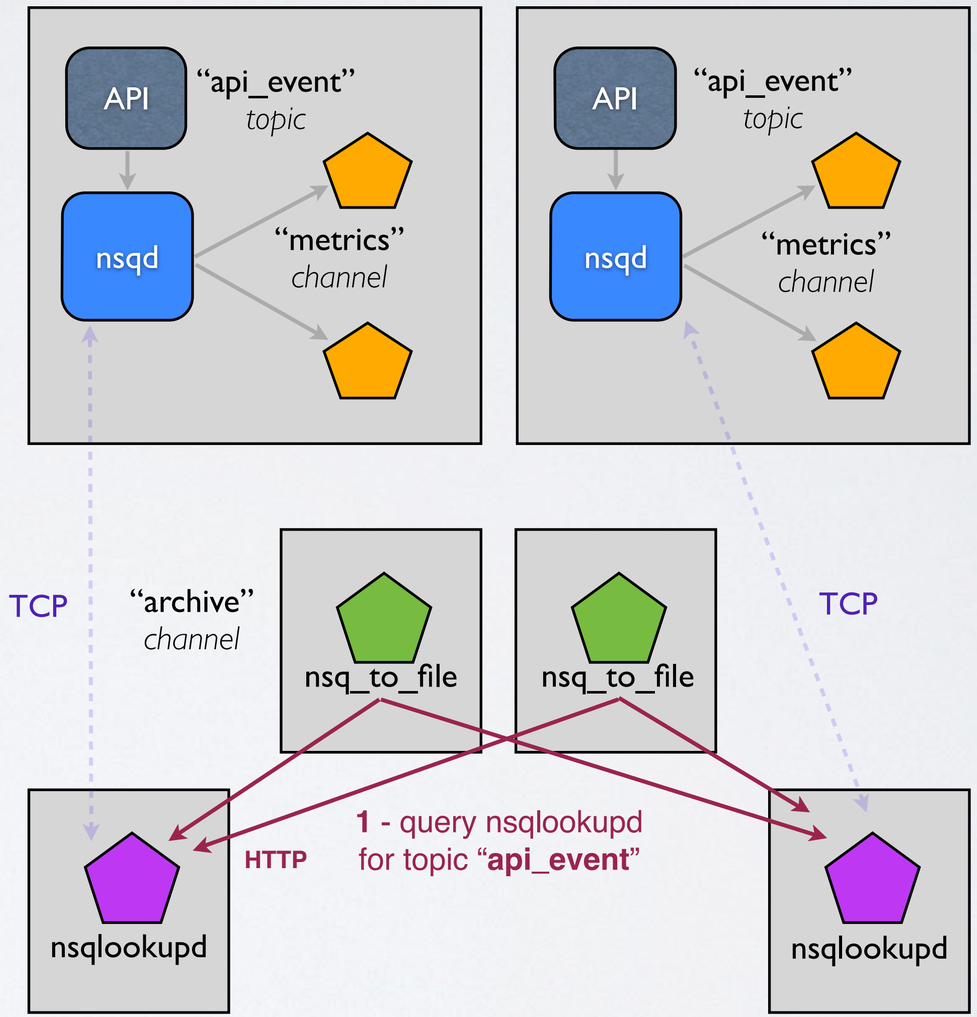

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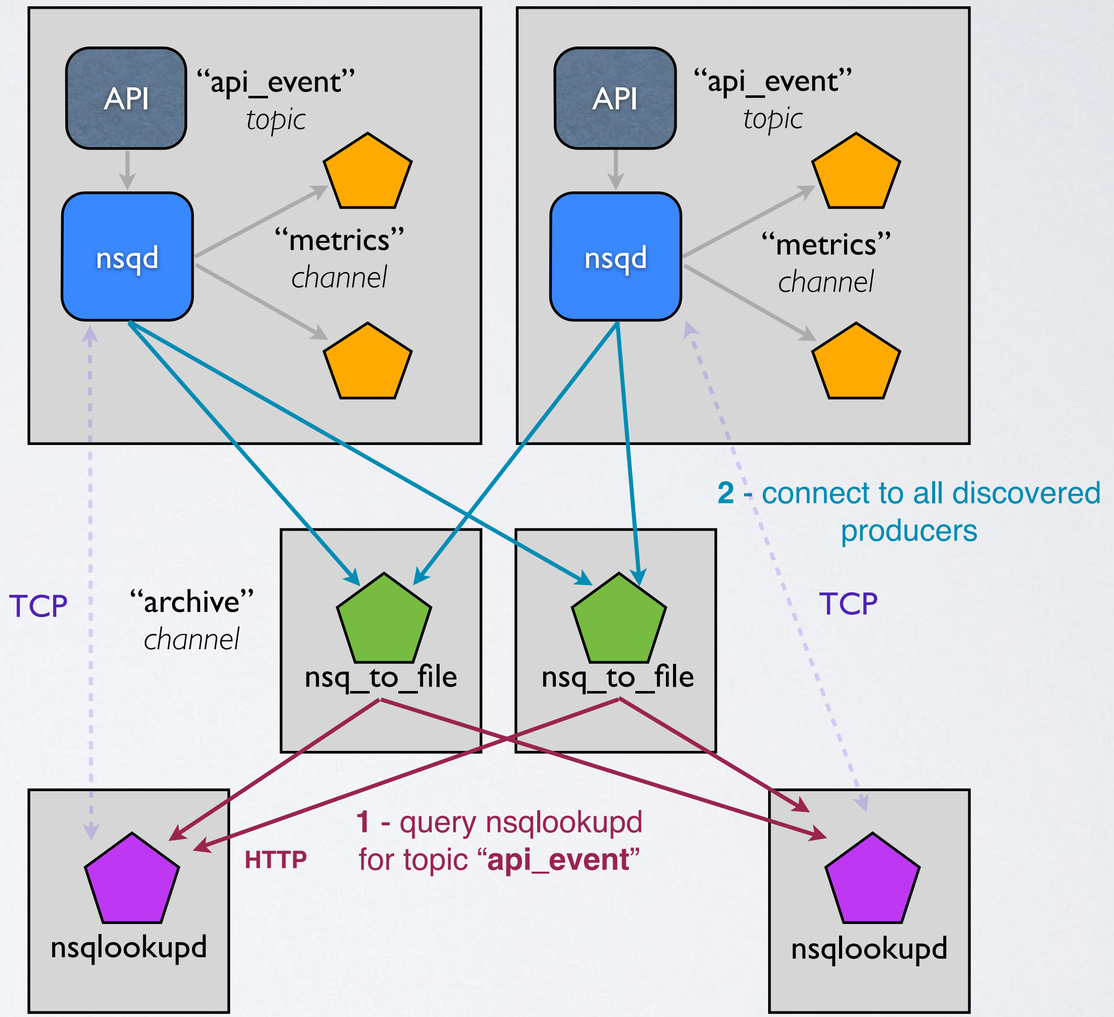
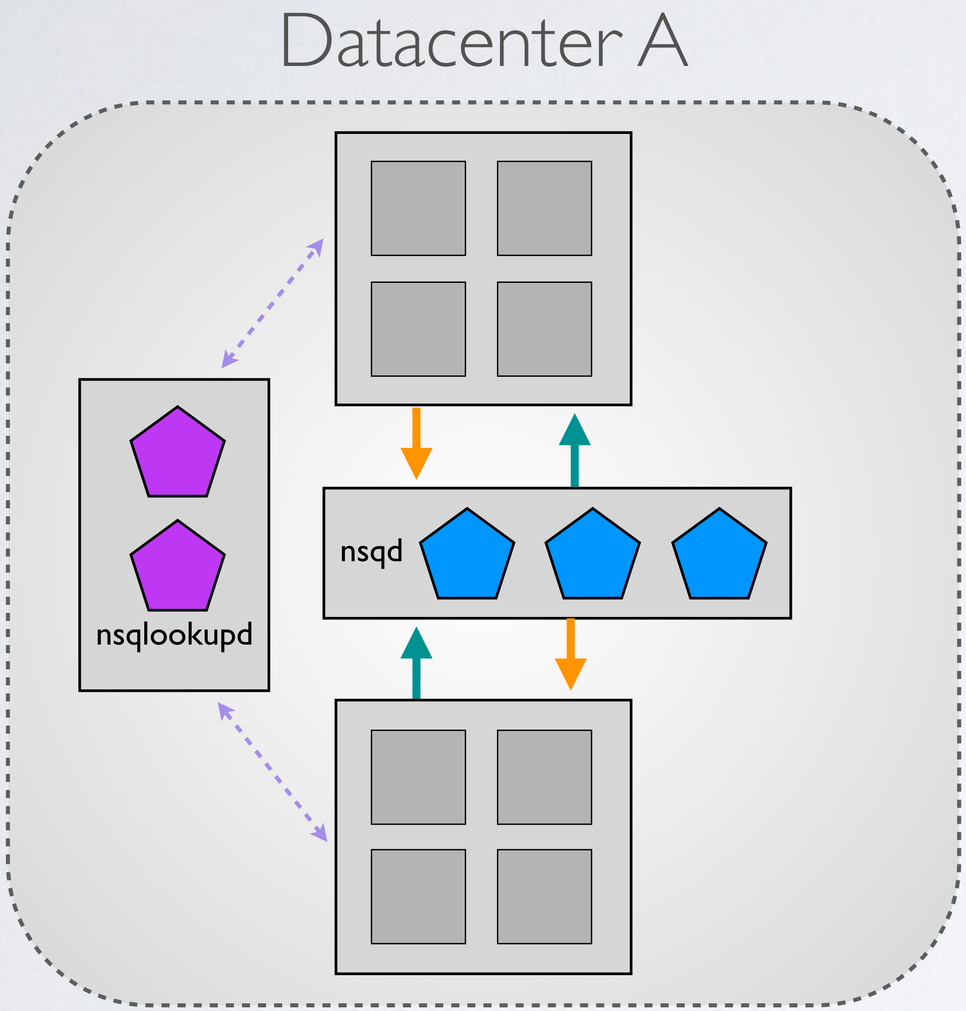


TO INFINITY AND BEYOND



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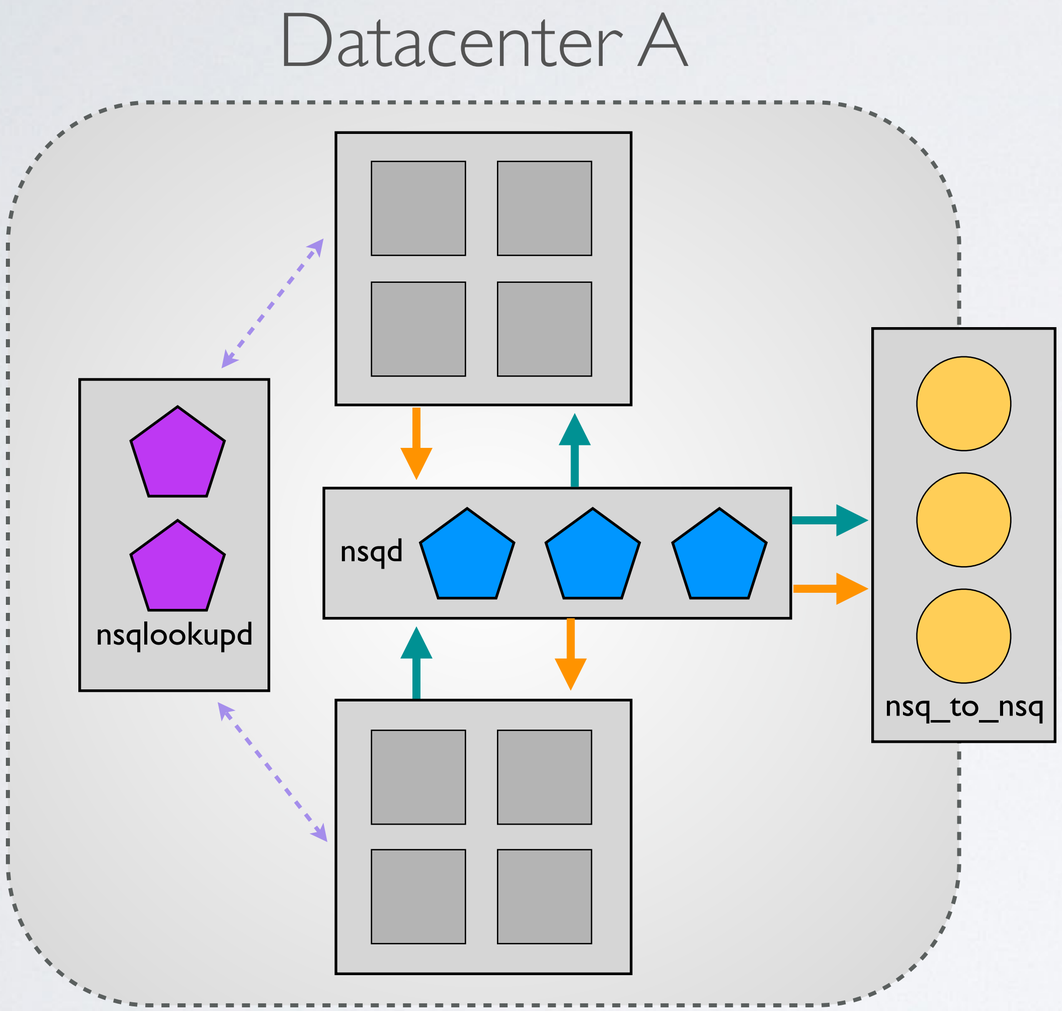

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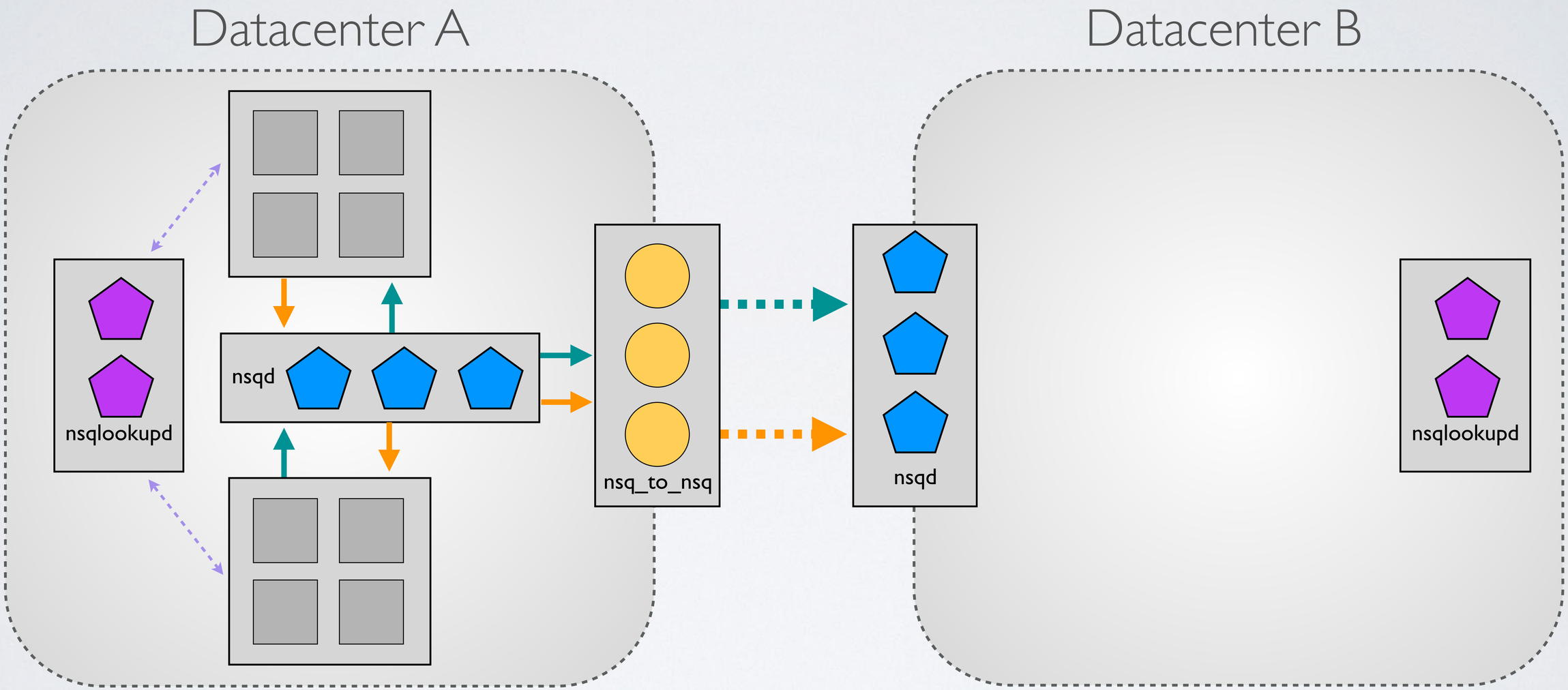

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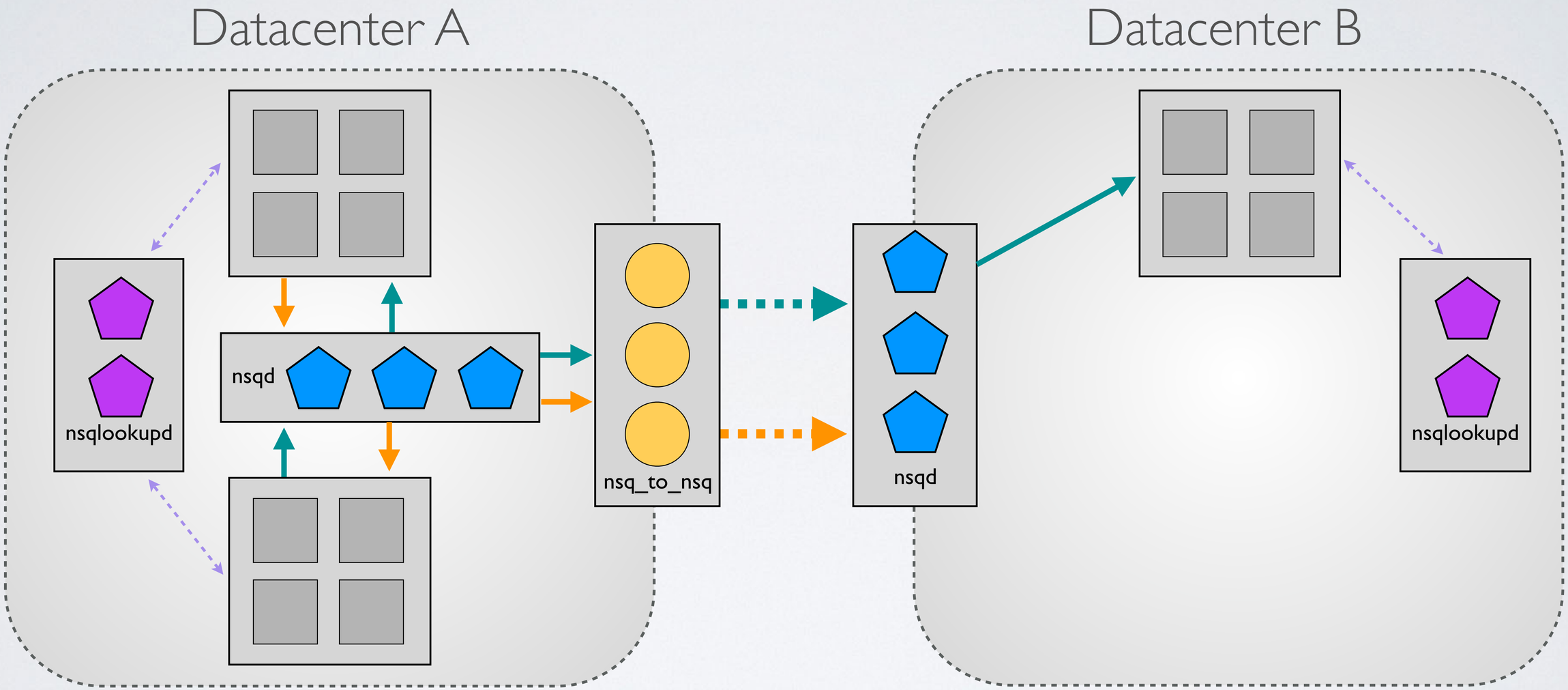

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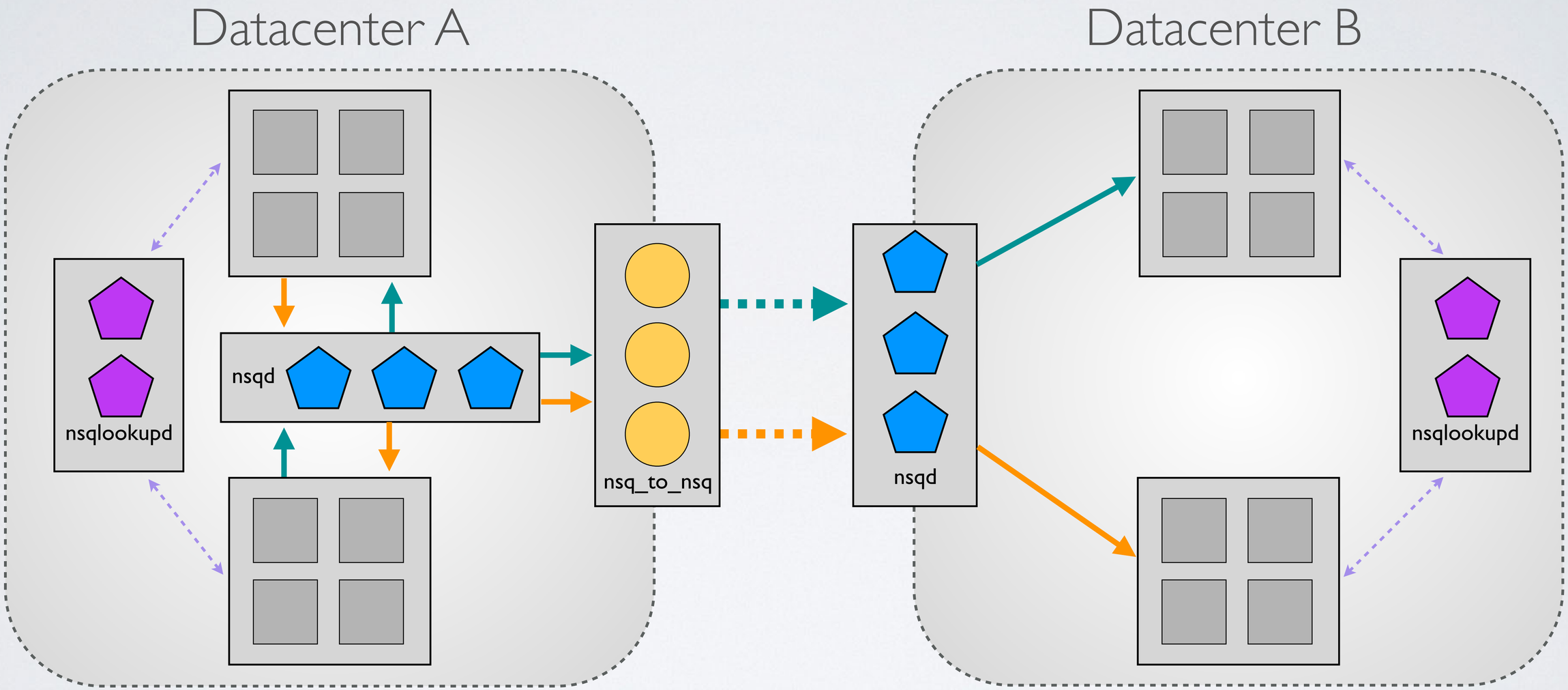


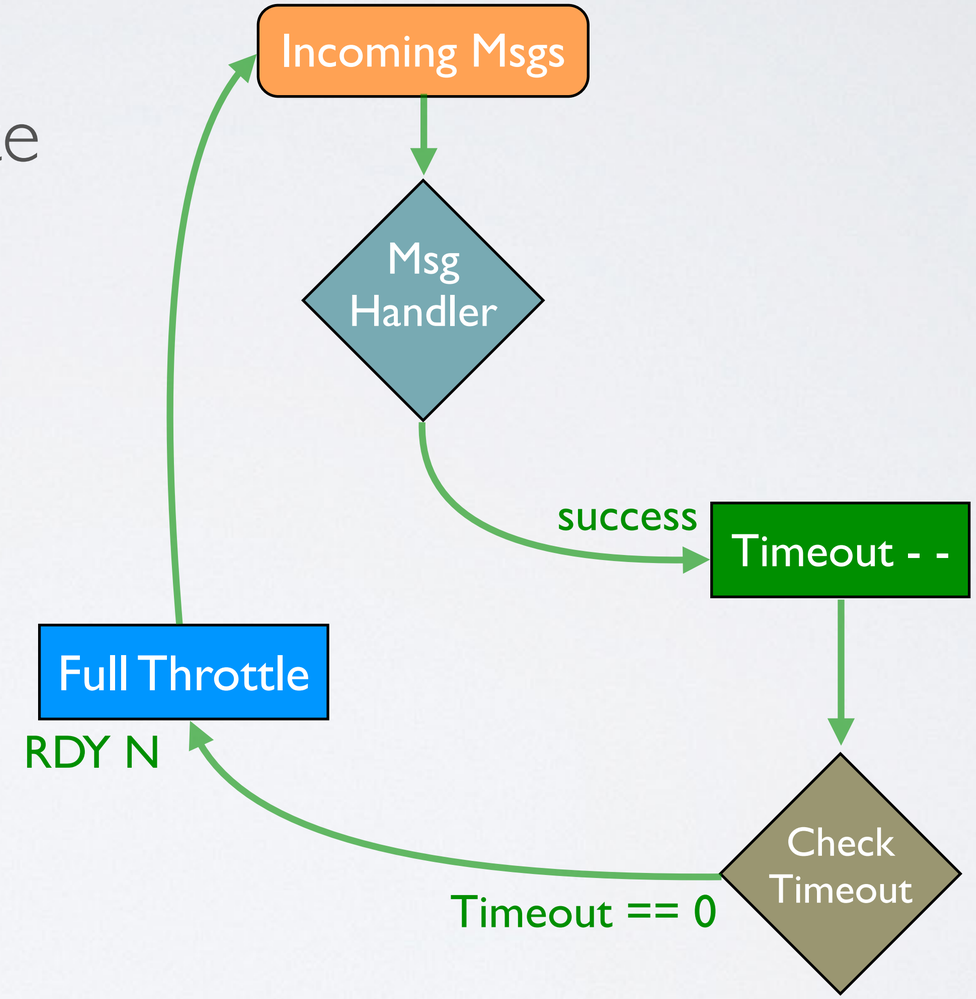
OPS

GUARANTEES

- messages are delivered *at least* once
- messages are *not* durable (by default)
- messages received are *un-ordered*
- consumers *eventually* find all topic producers

BACK PRESSSSSSSSSSSURE

- clients control flow - **RDY** state
  - concurrency knob
- processing fails?
  - slow down rate
- bad message?
  - limit attempts
  - delay re-processing



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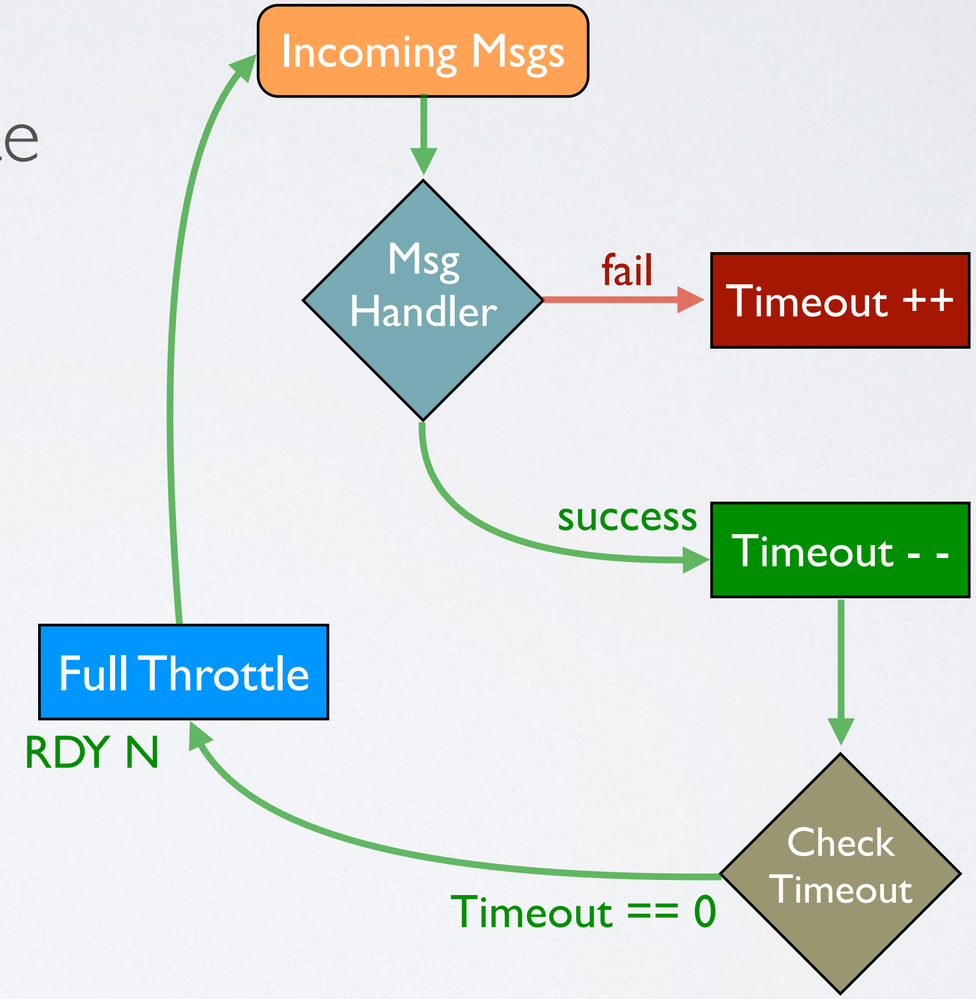

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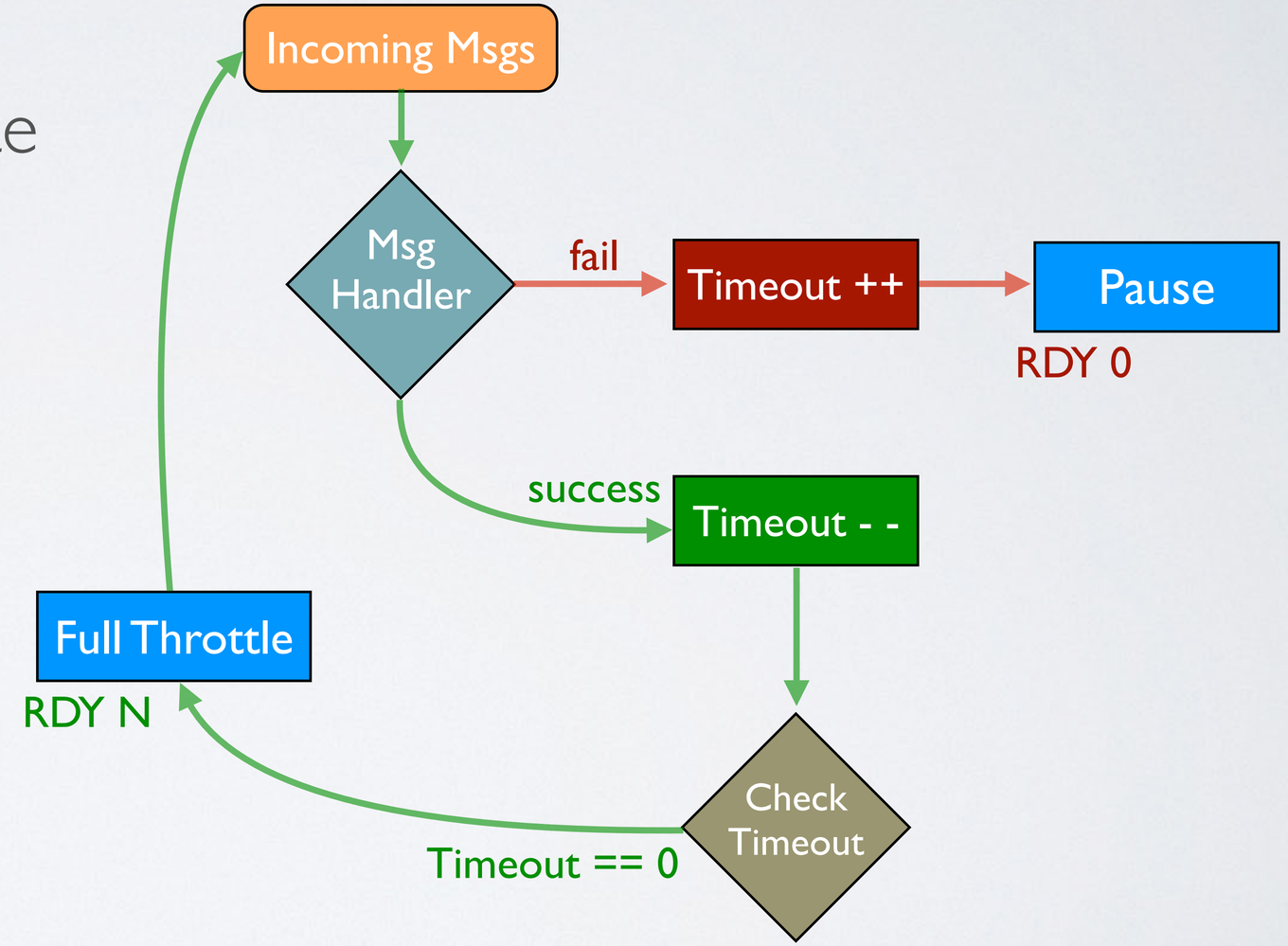

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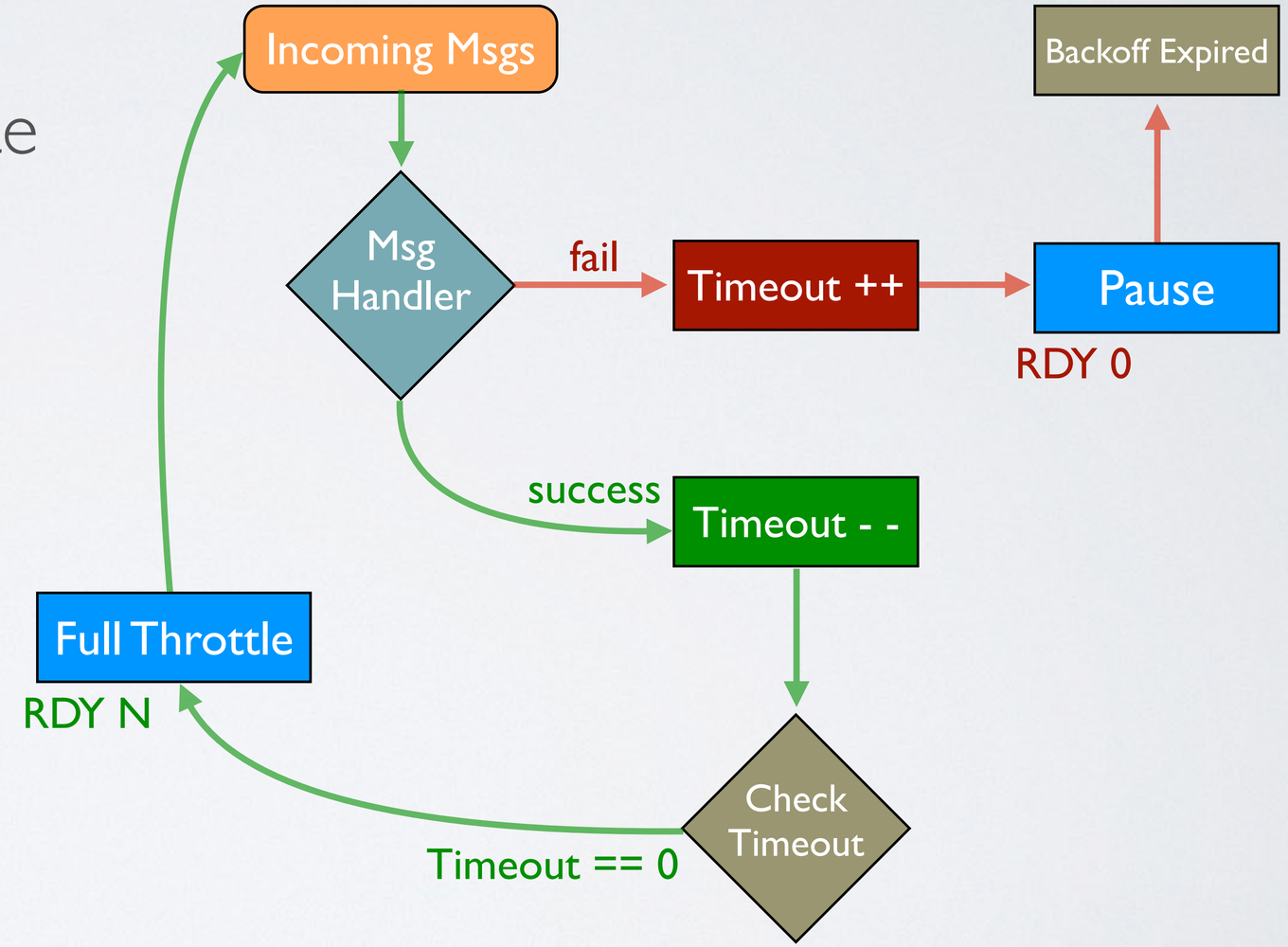

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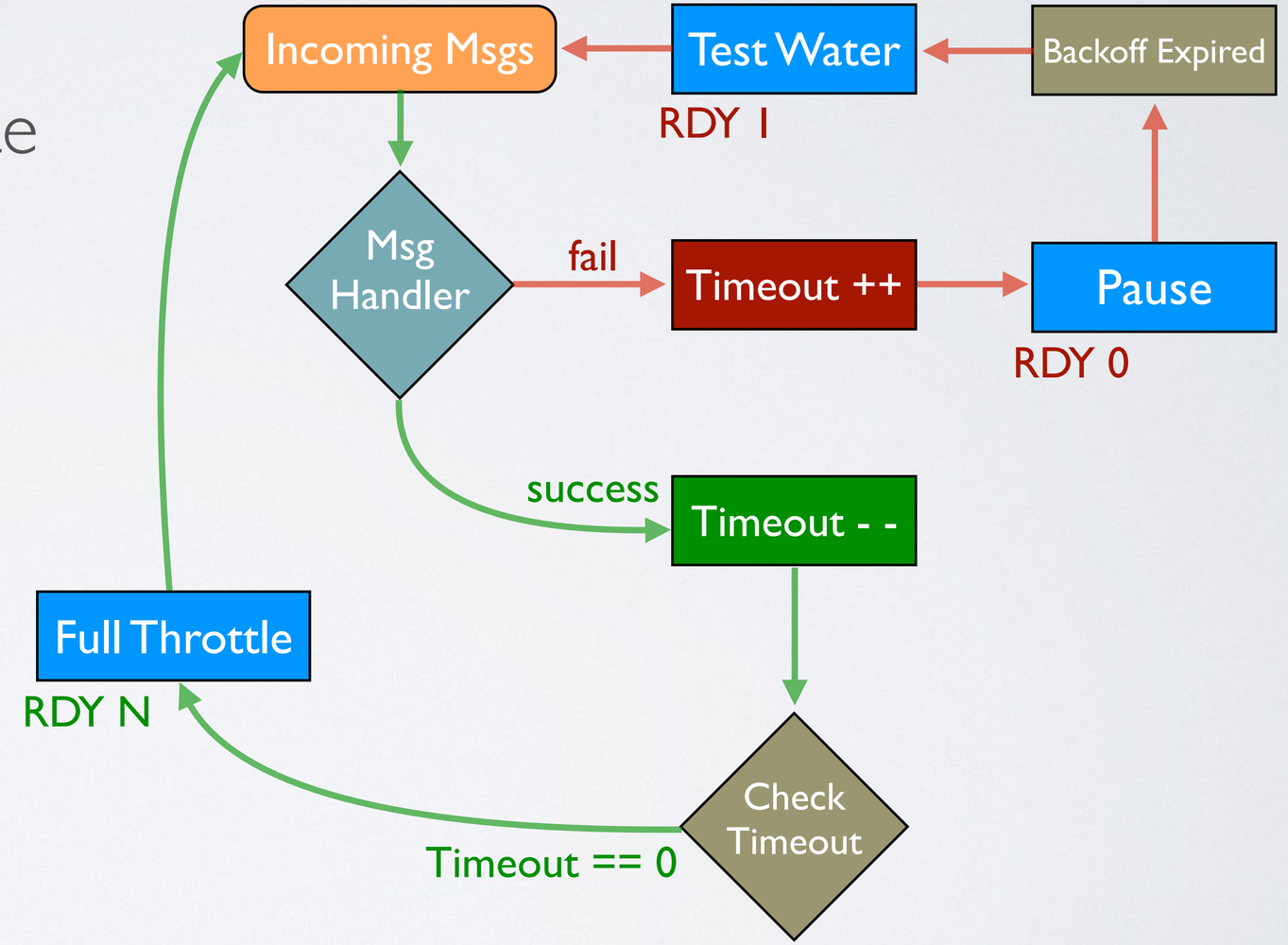

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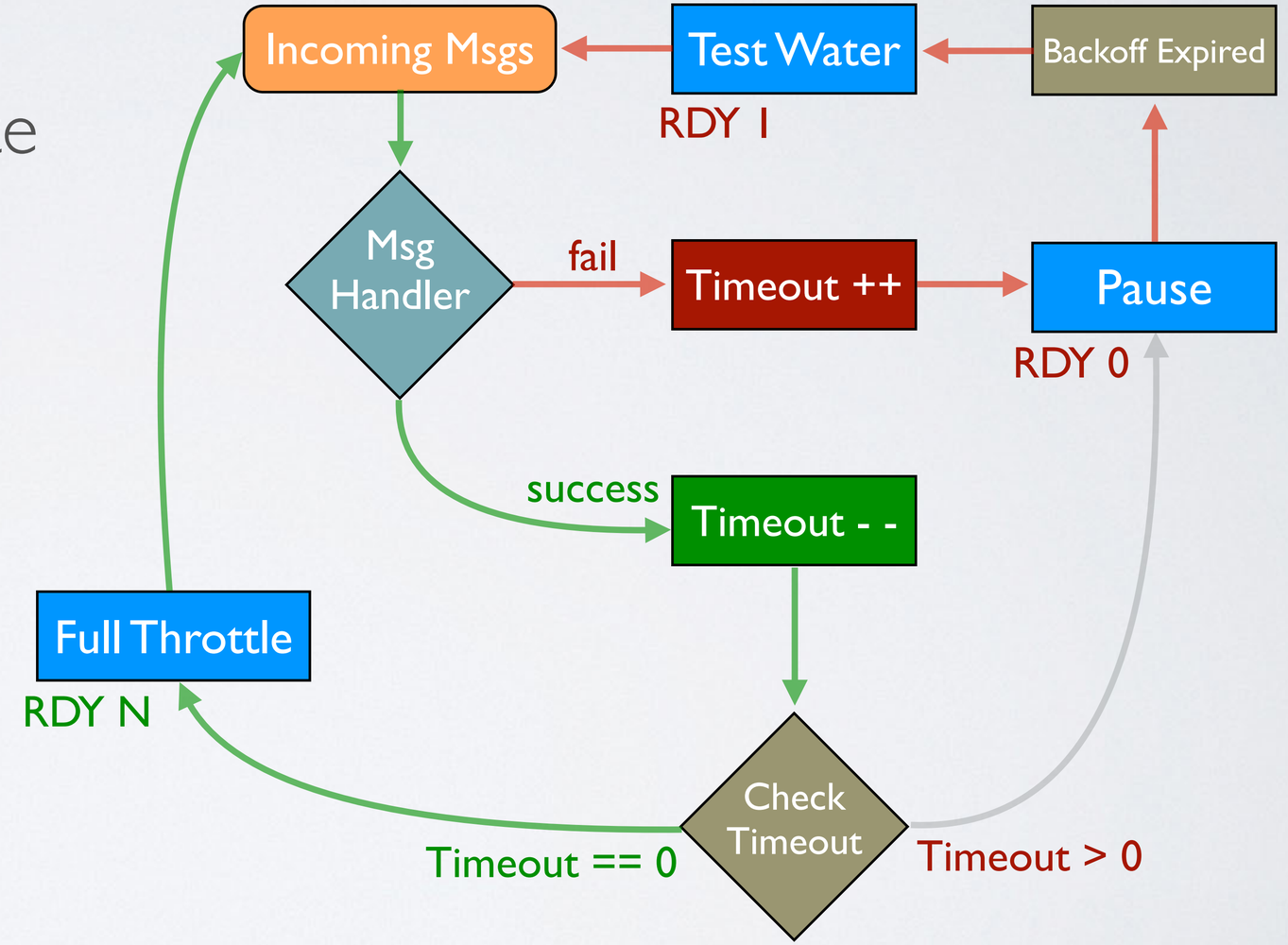
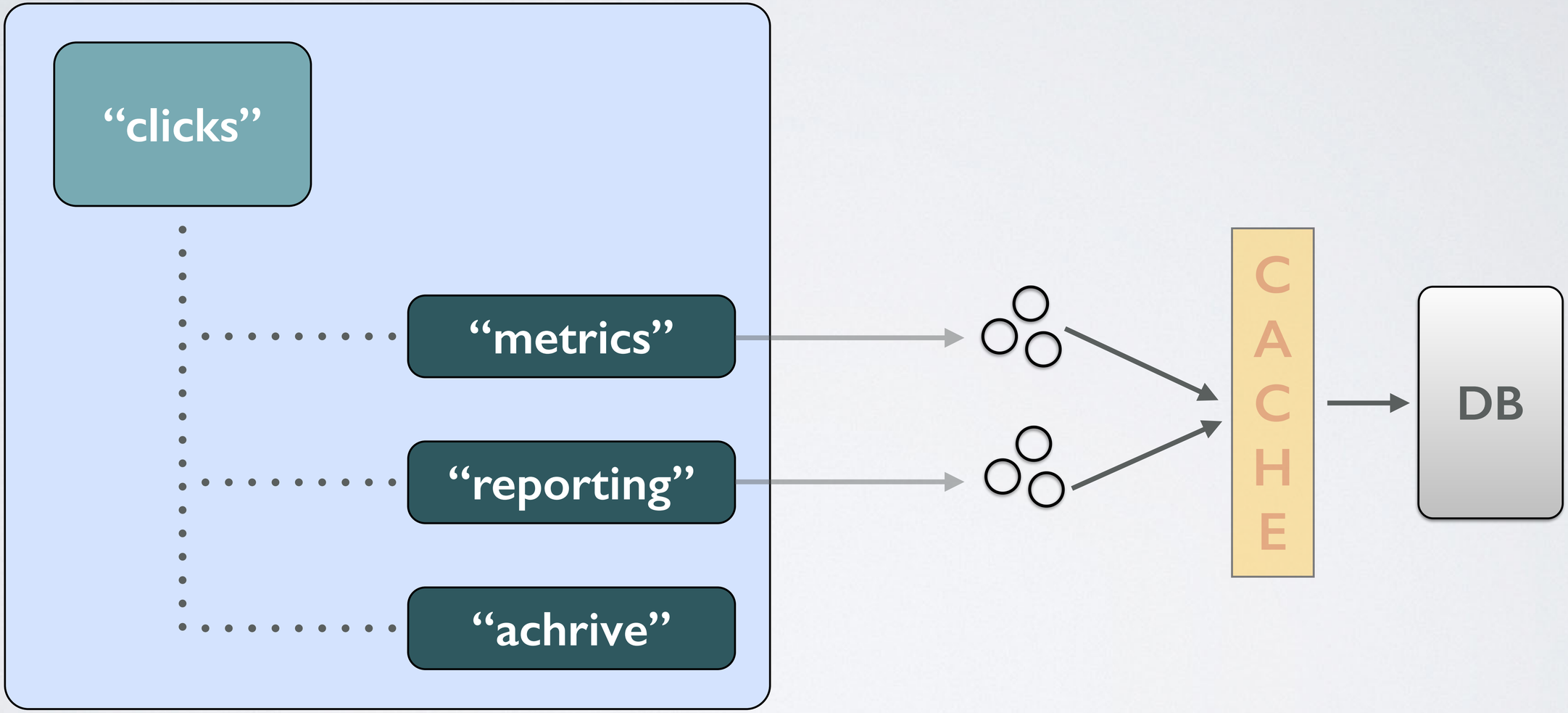


TOPIC & CHANNEL PAUSING



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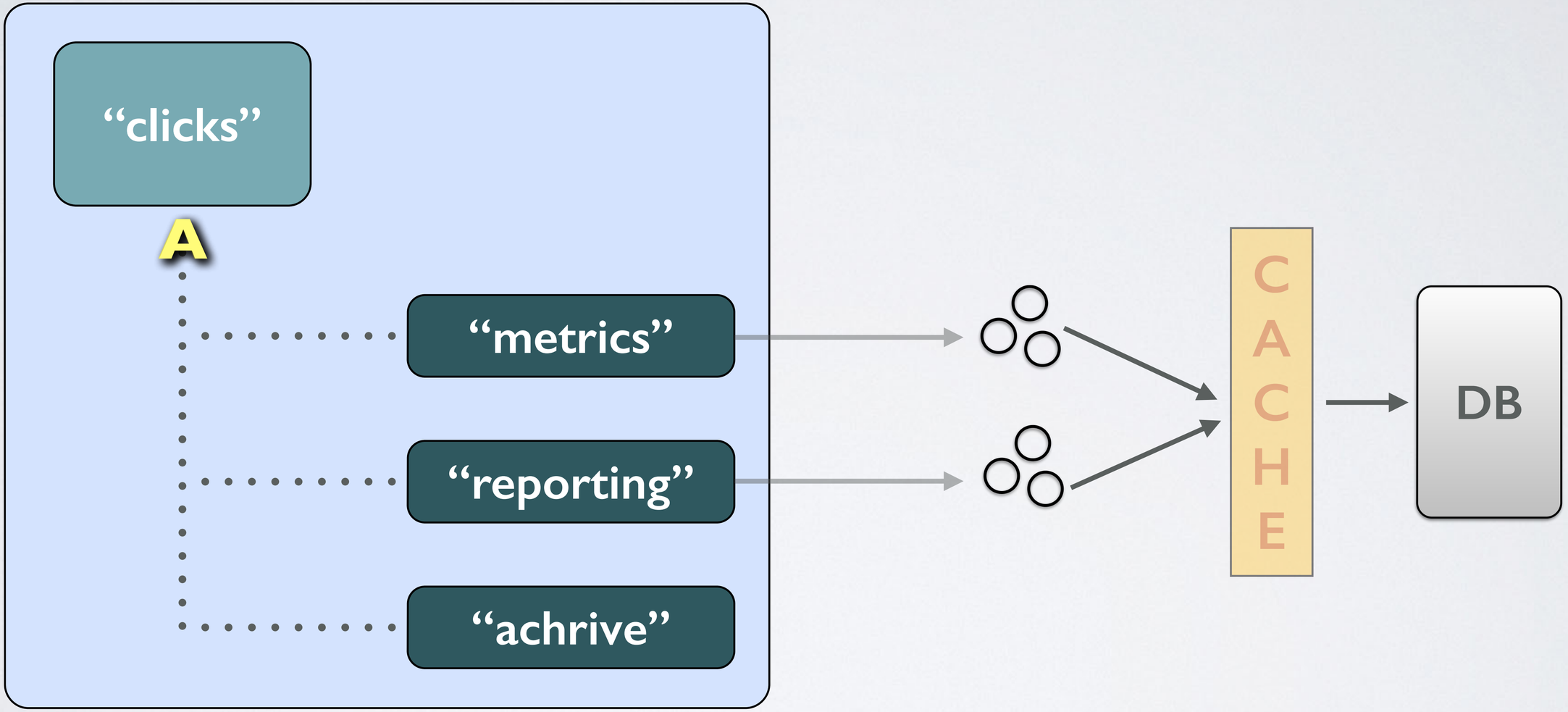

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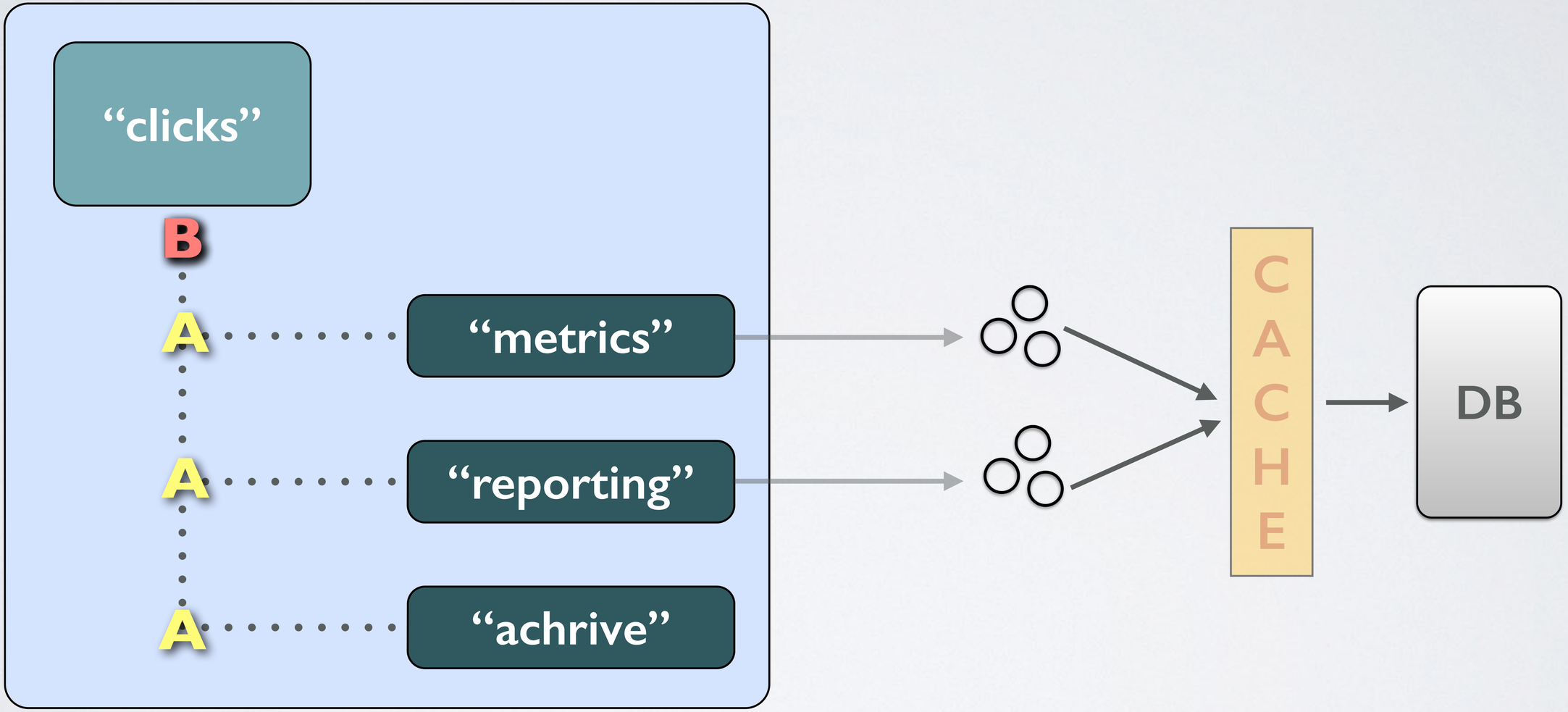

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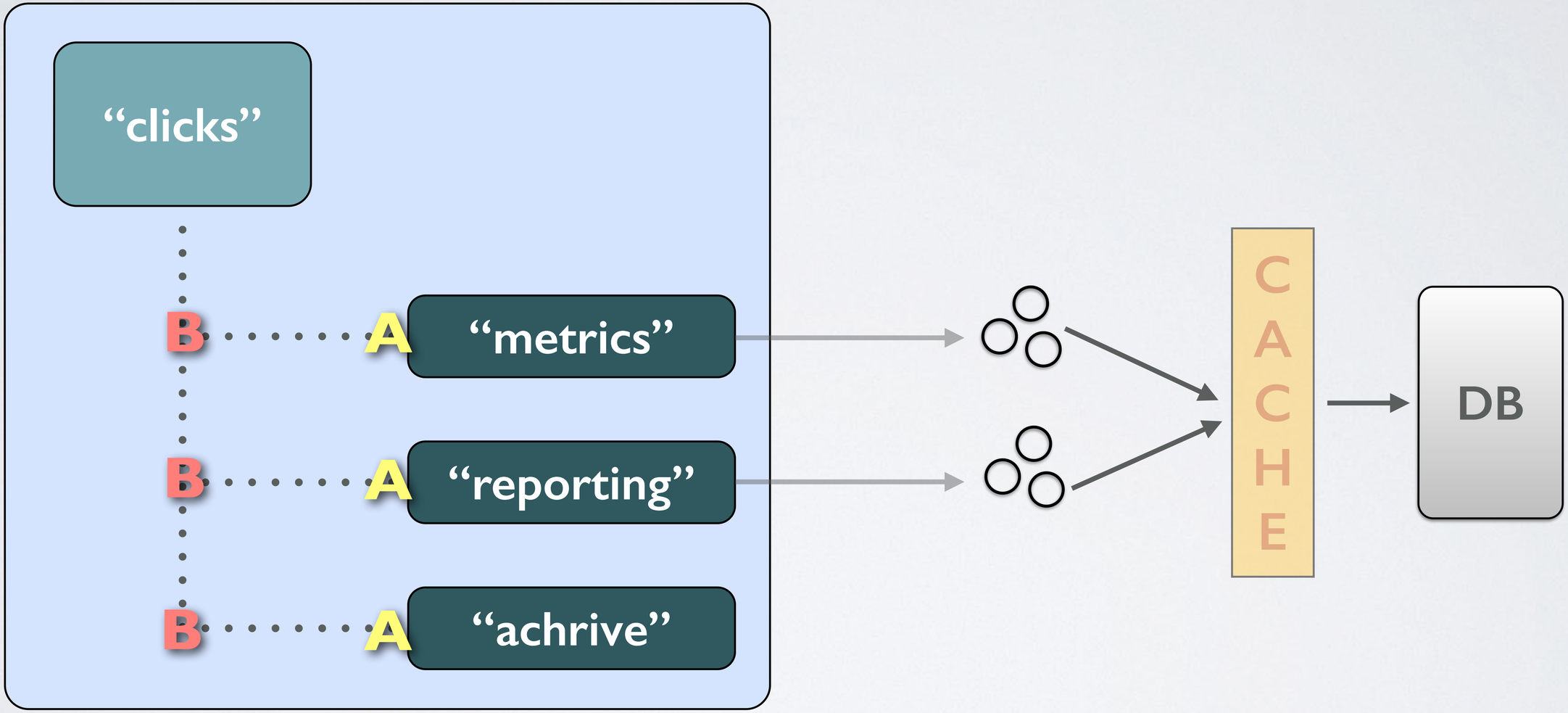

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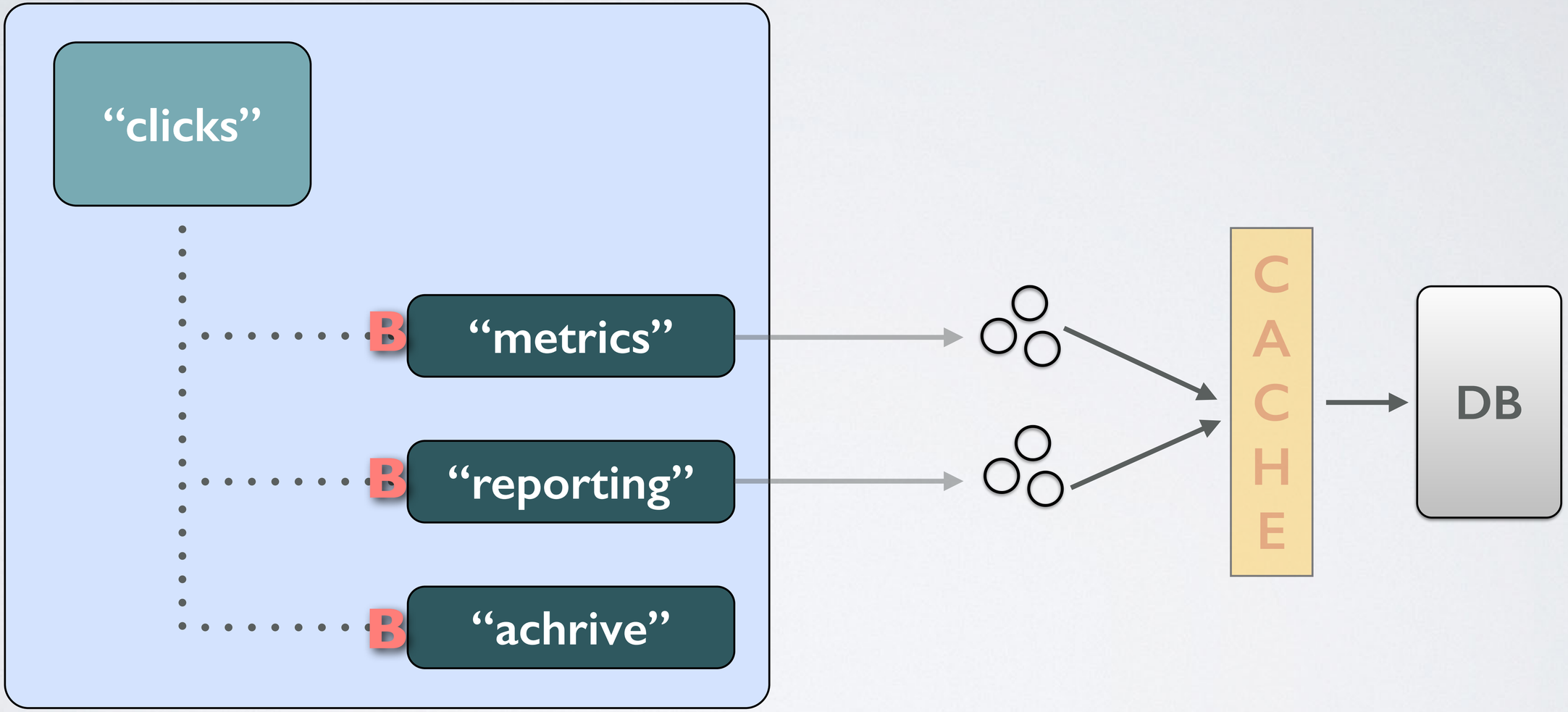

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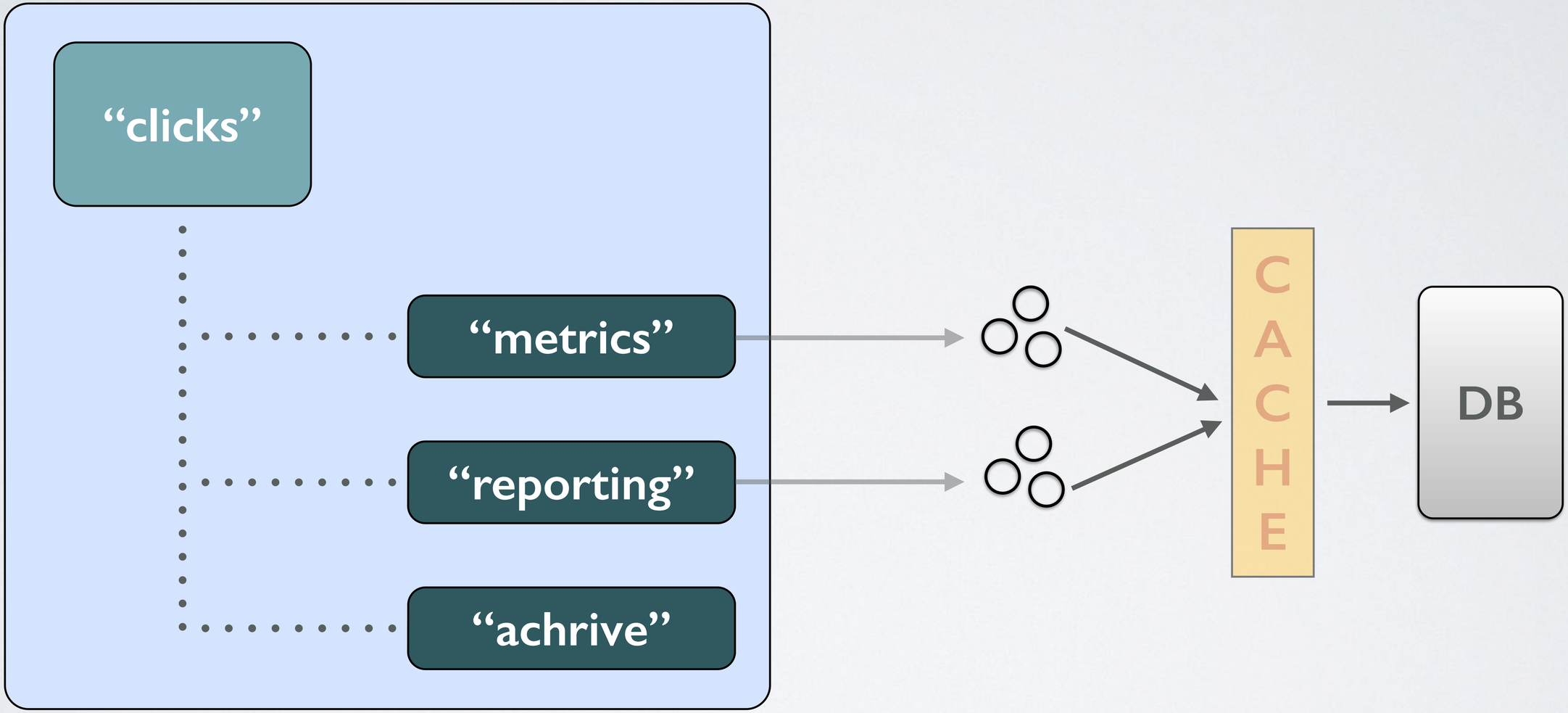

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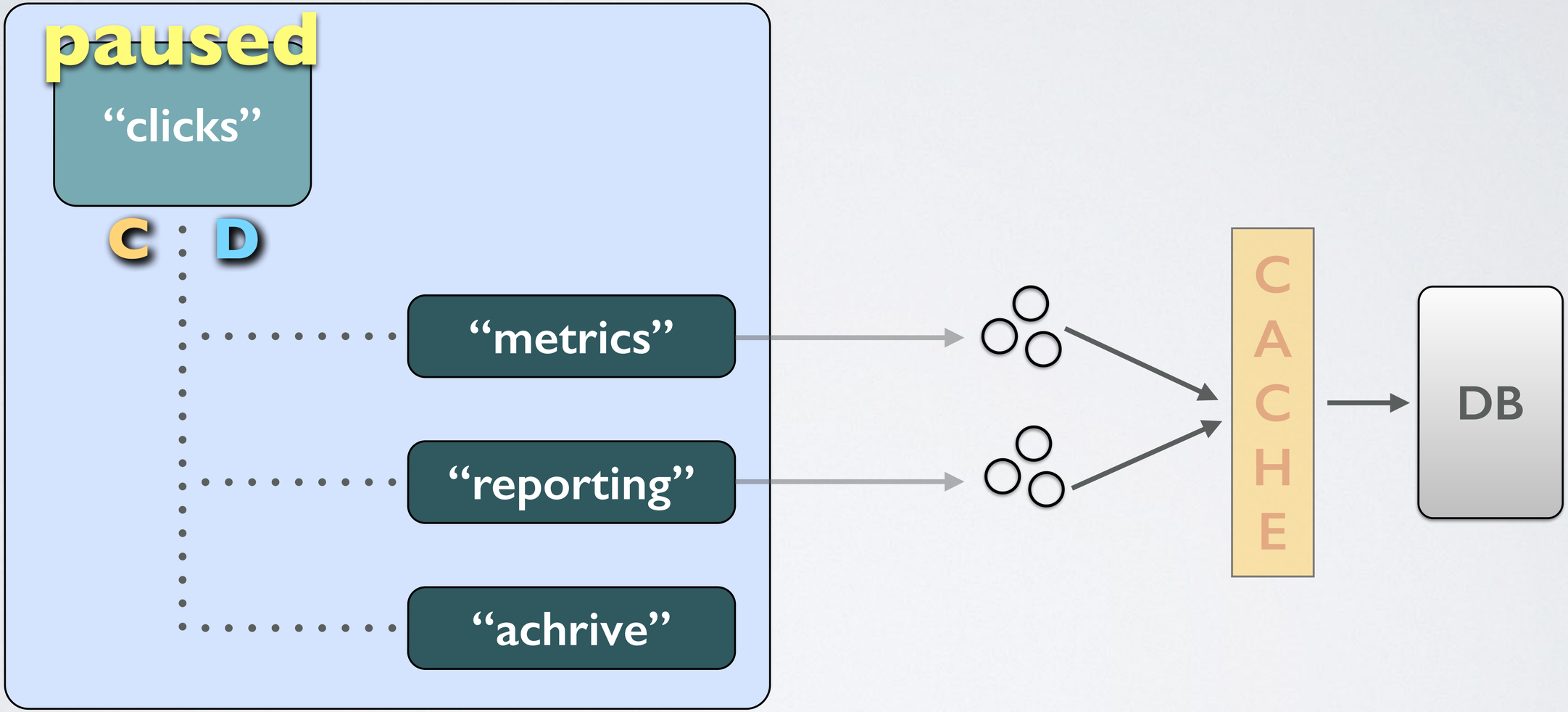

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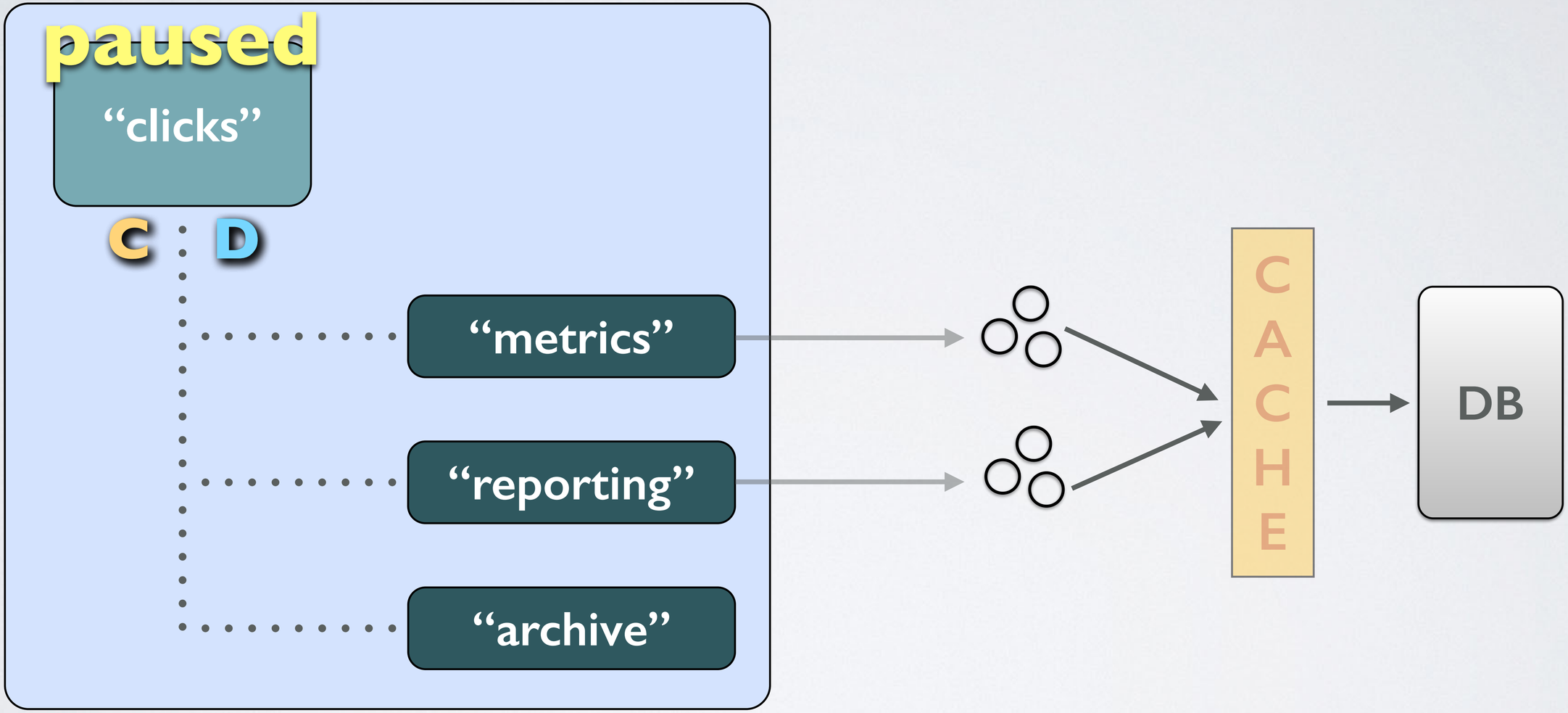

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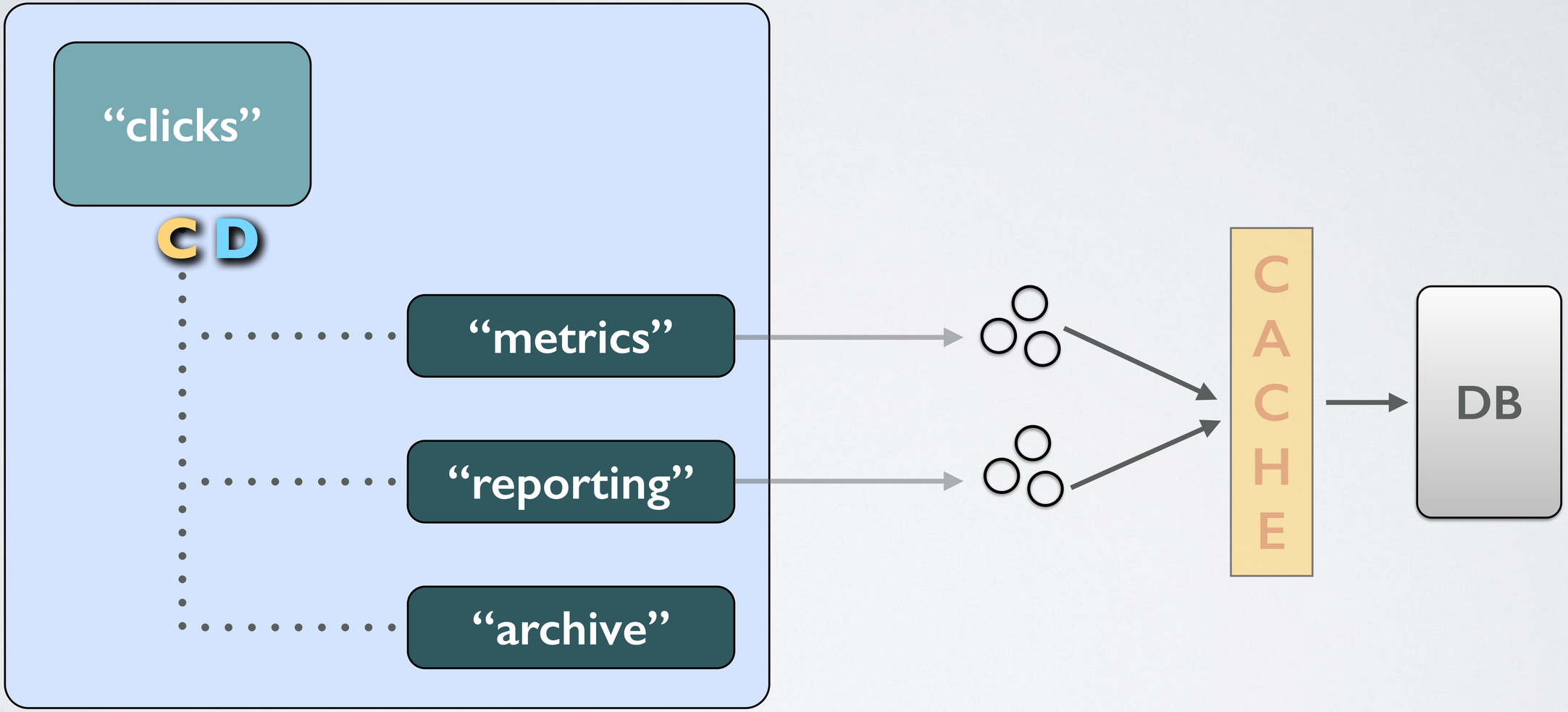

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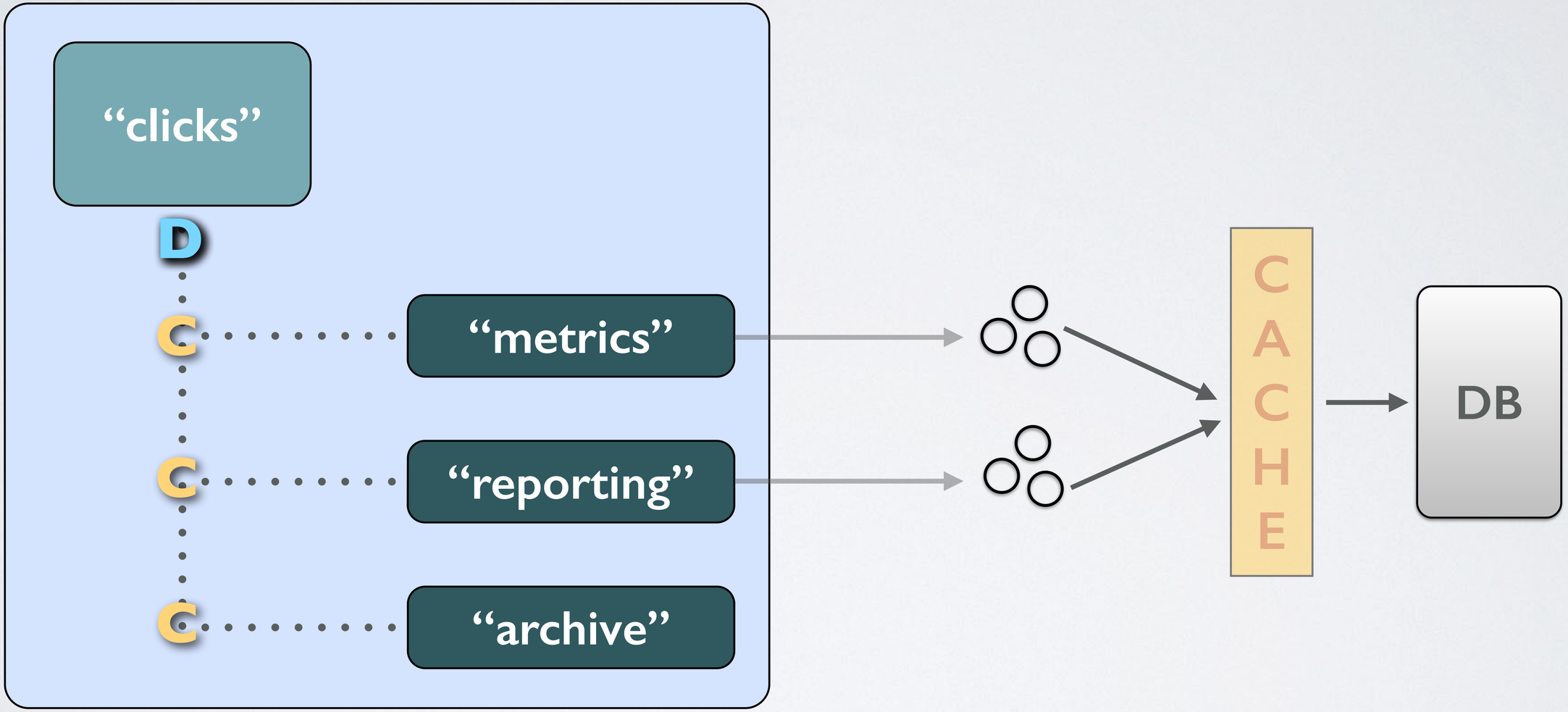

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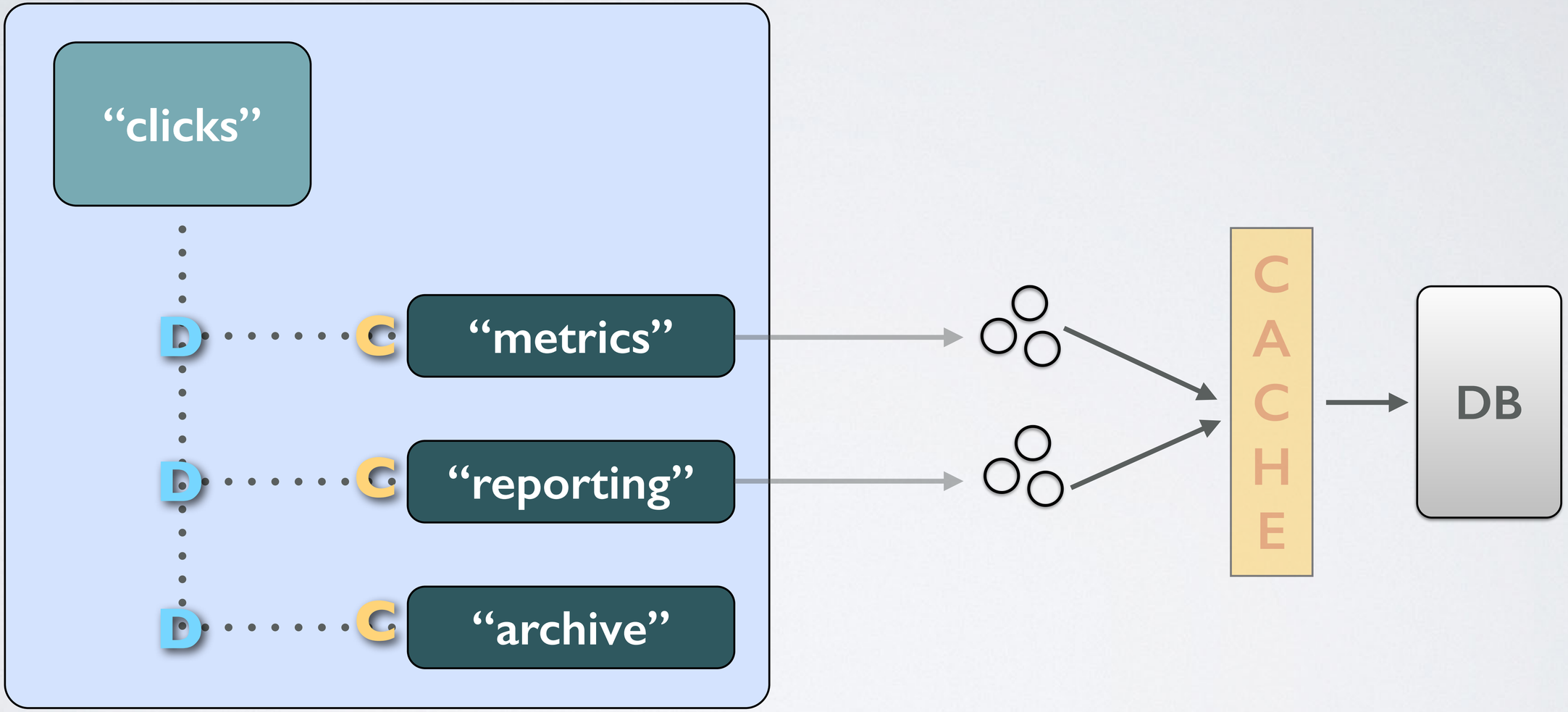

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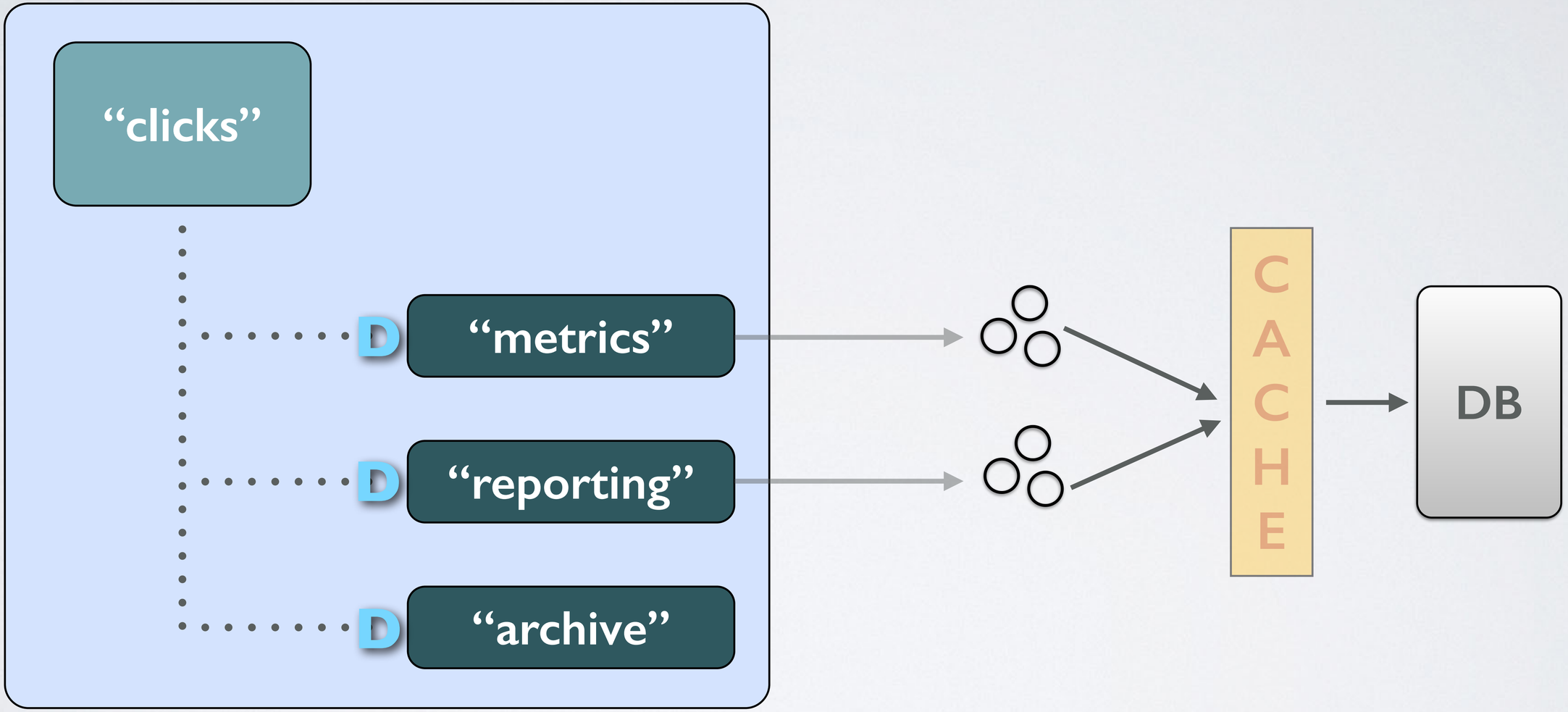

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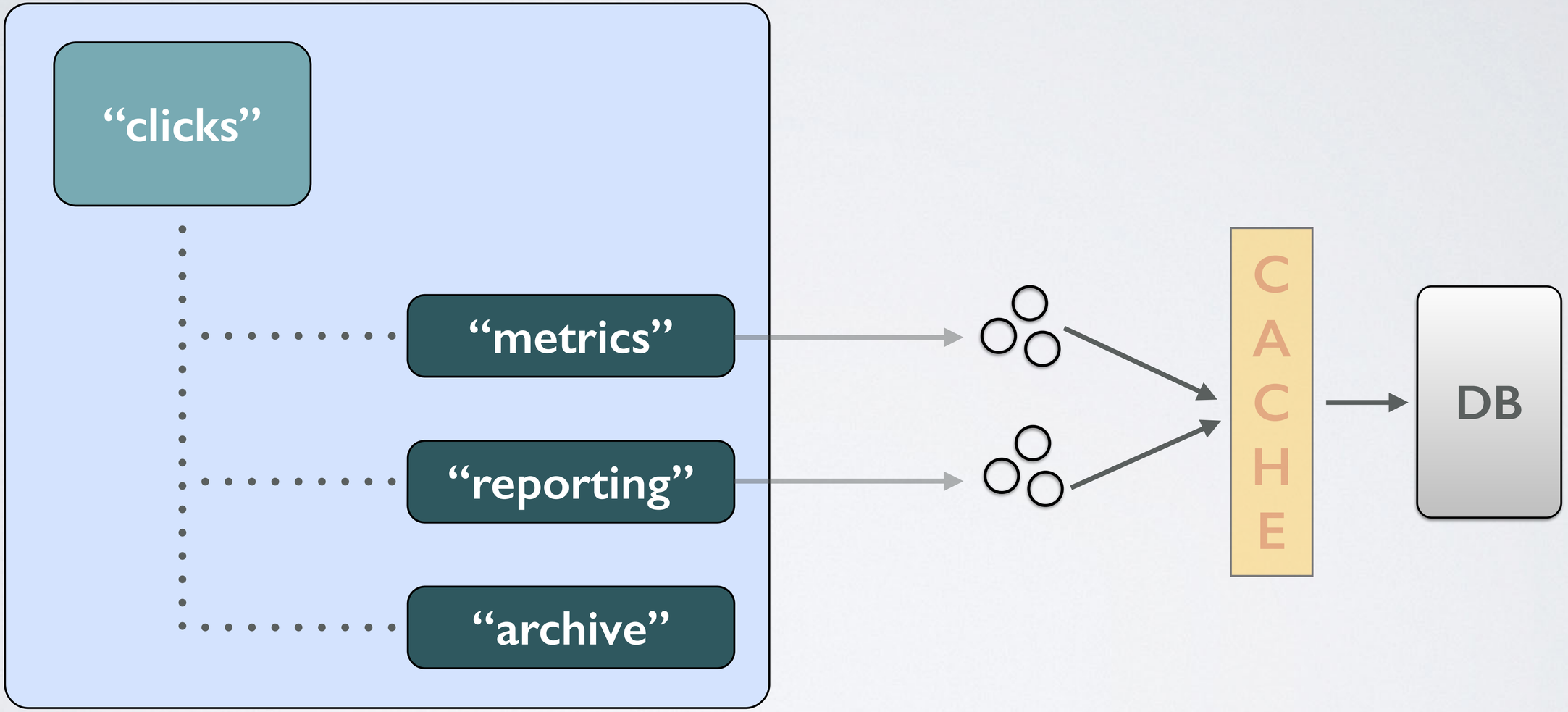

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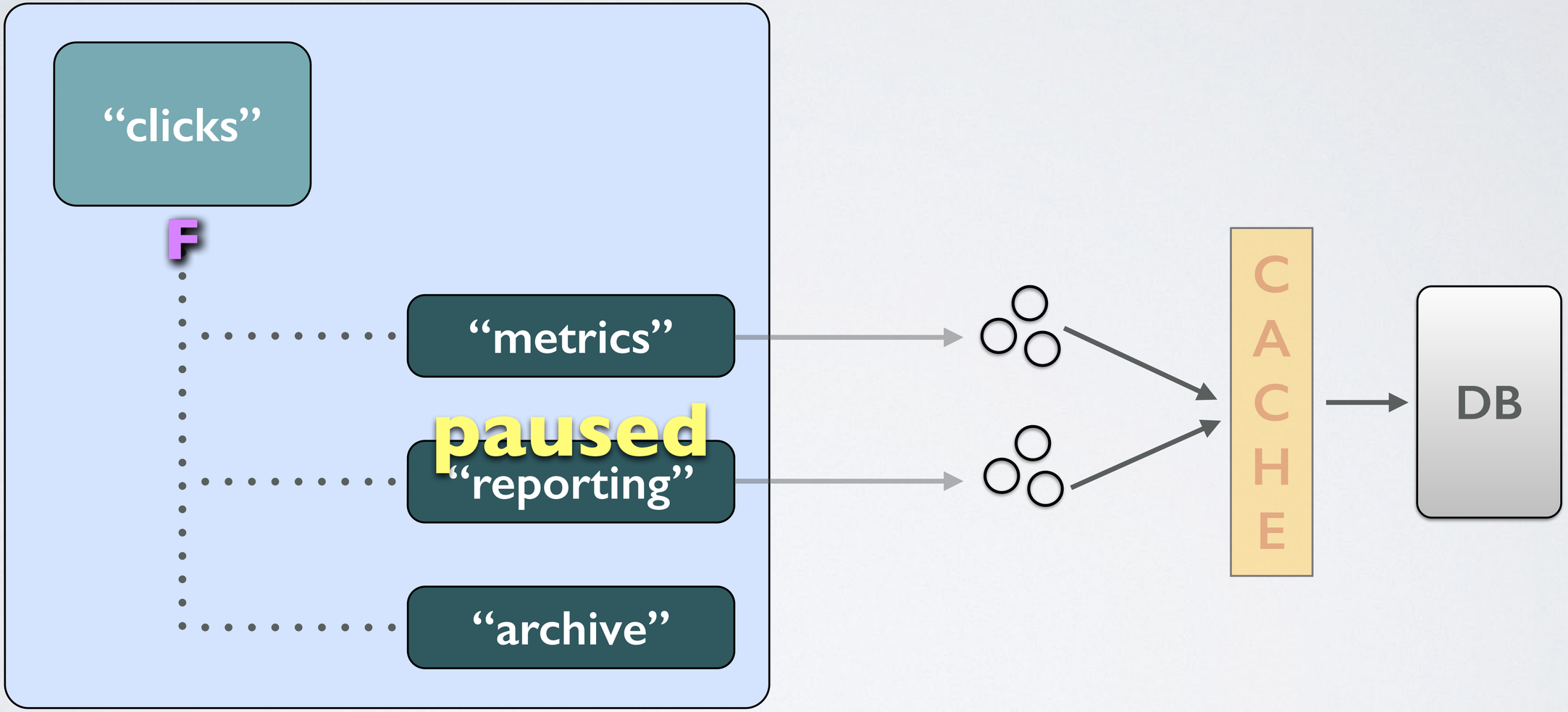

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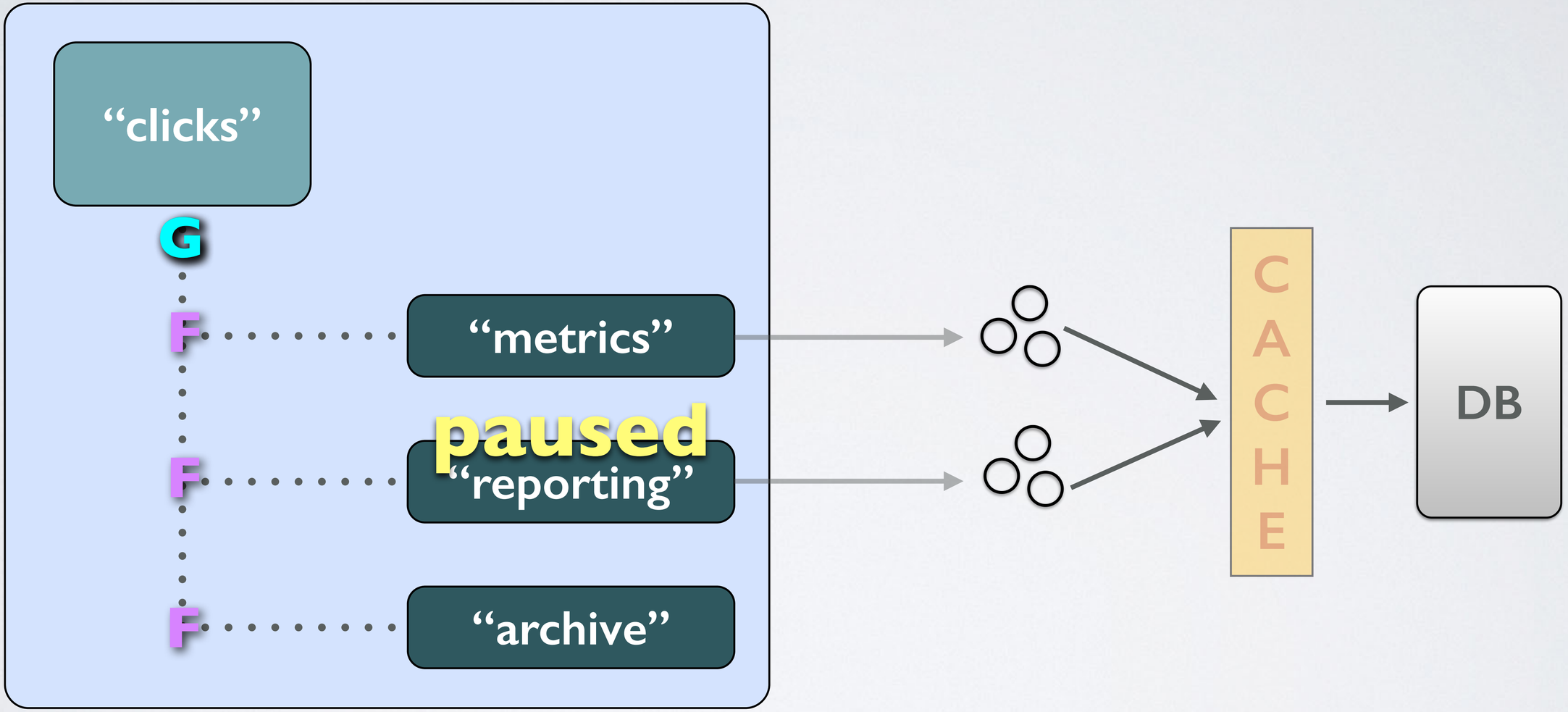

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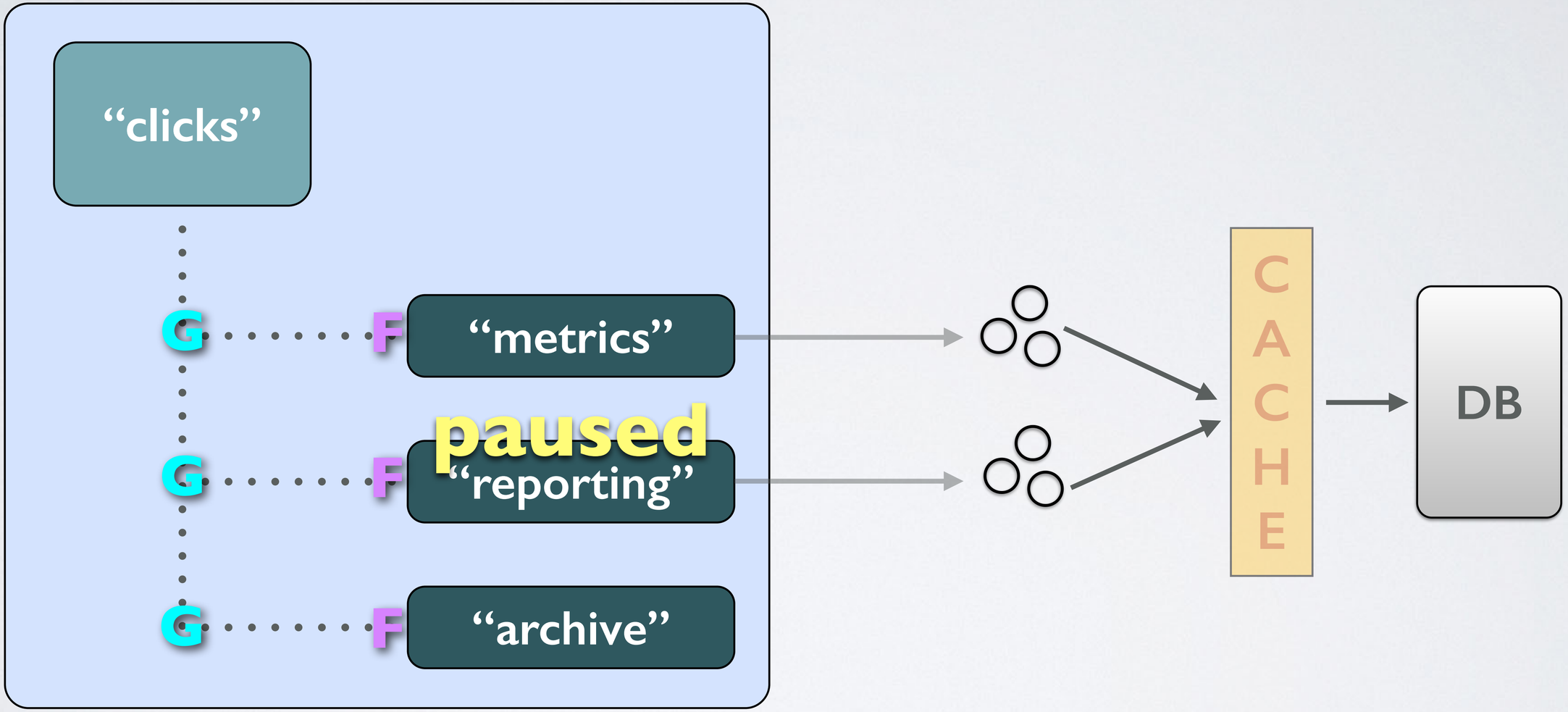

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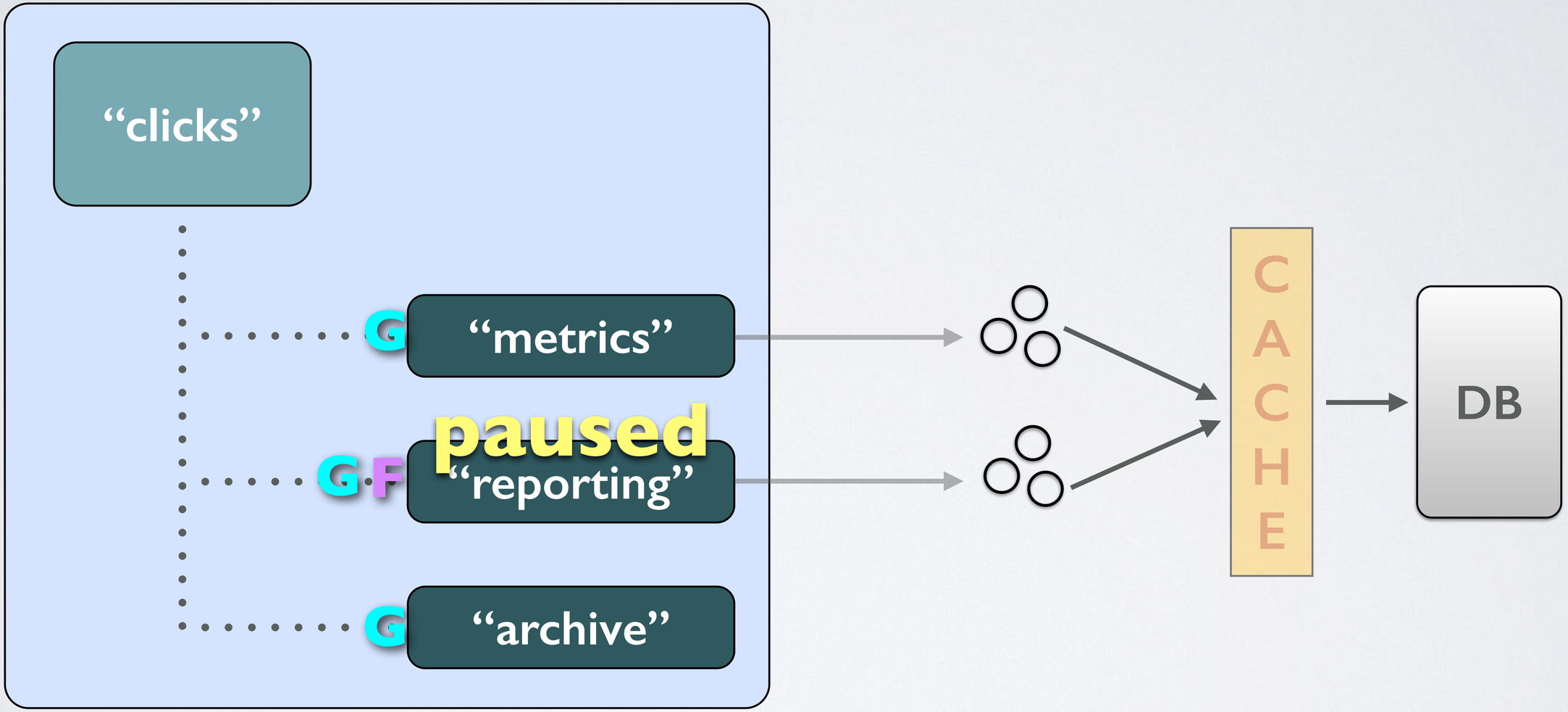

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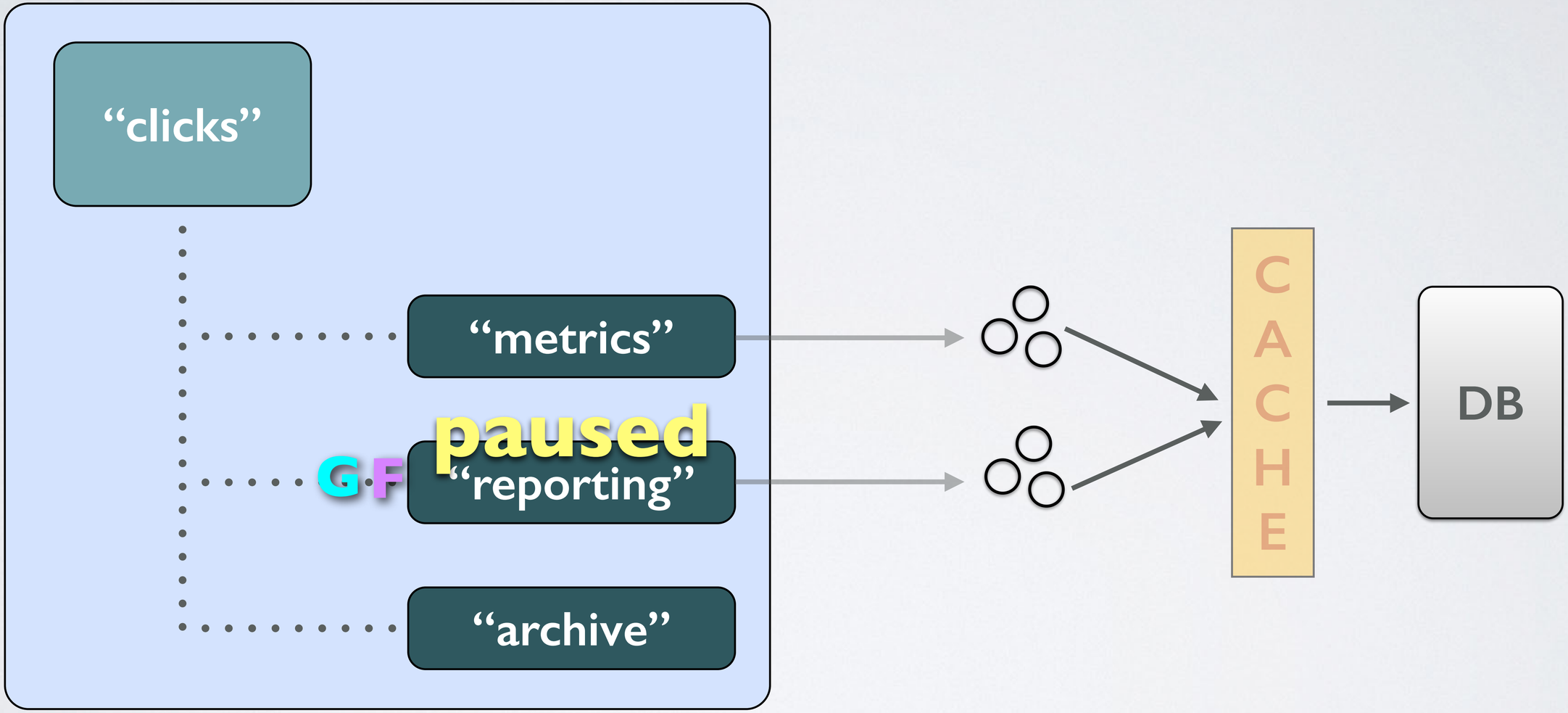

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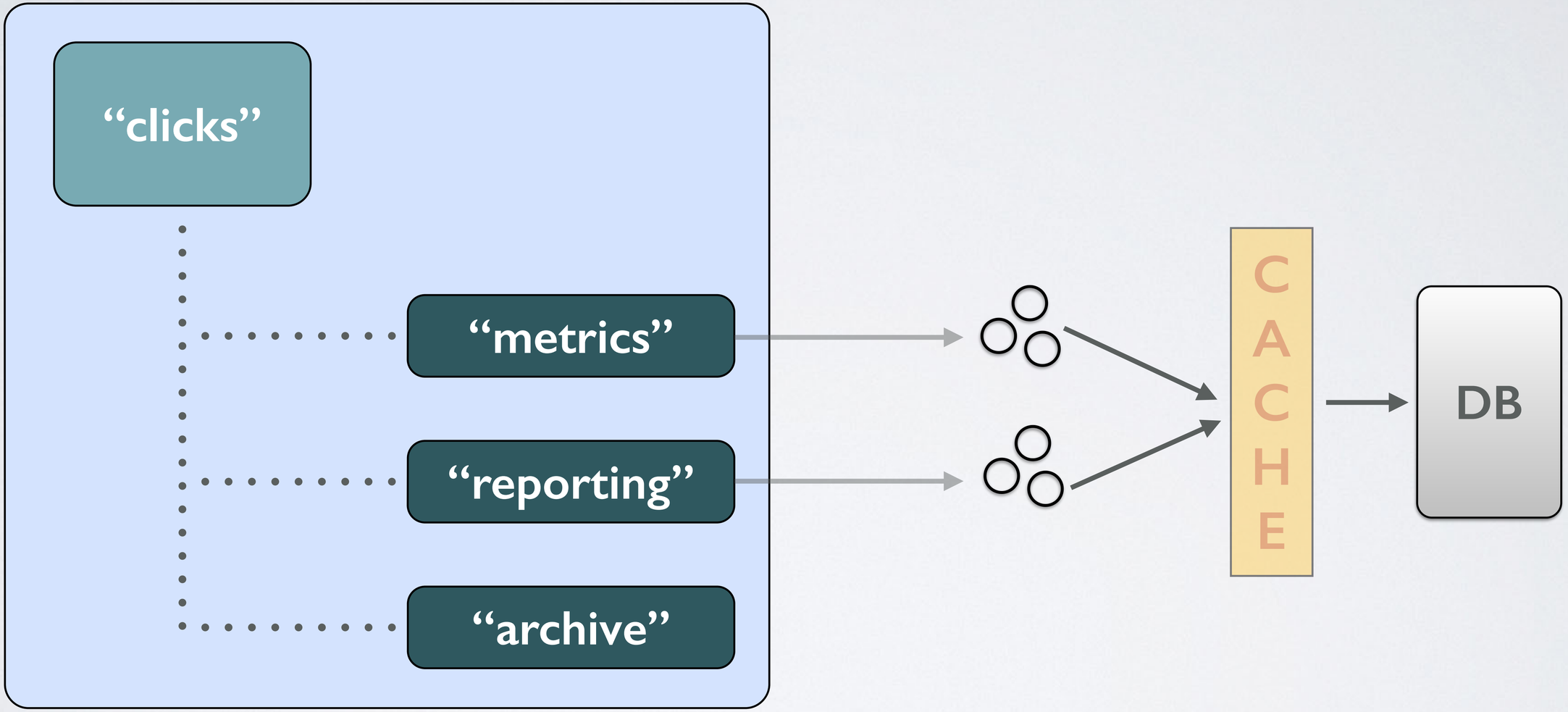
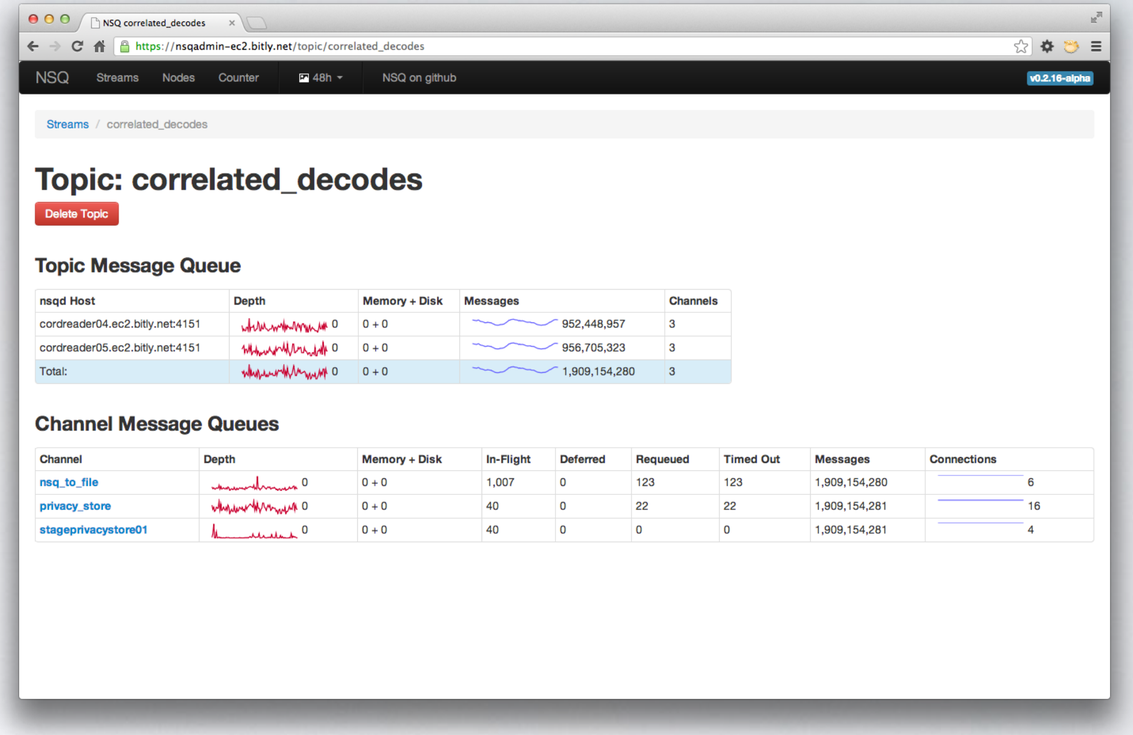


ONE MORE THING

- **#ephemeral** channels
- channel **sampling**
- TLS / Snappy
- telemetry over statsd / HTTP



SUMMARY

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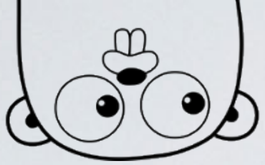
- 19 client libraries, 11 languages
- over 2 years in production



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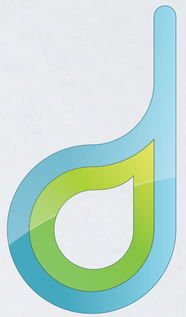
IN PRODUCTION



heavy water

Thanks!

@imsnakes

https://github.com/bitly/nsq

shoutout to ***@jehiah*** *(co-author of NSQ)*