CQRS

PROCESSING EVENTS

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CODE.STAR

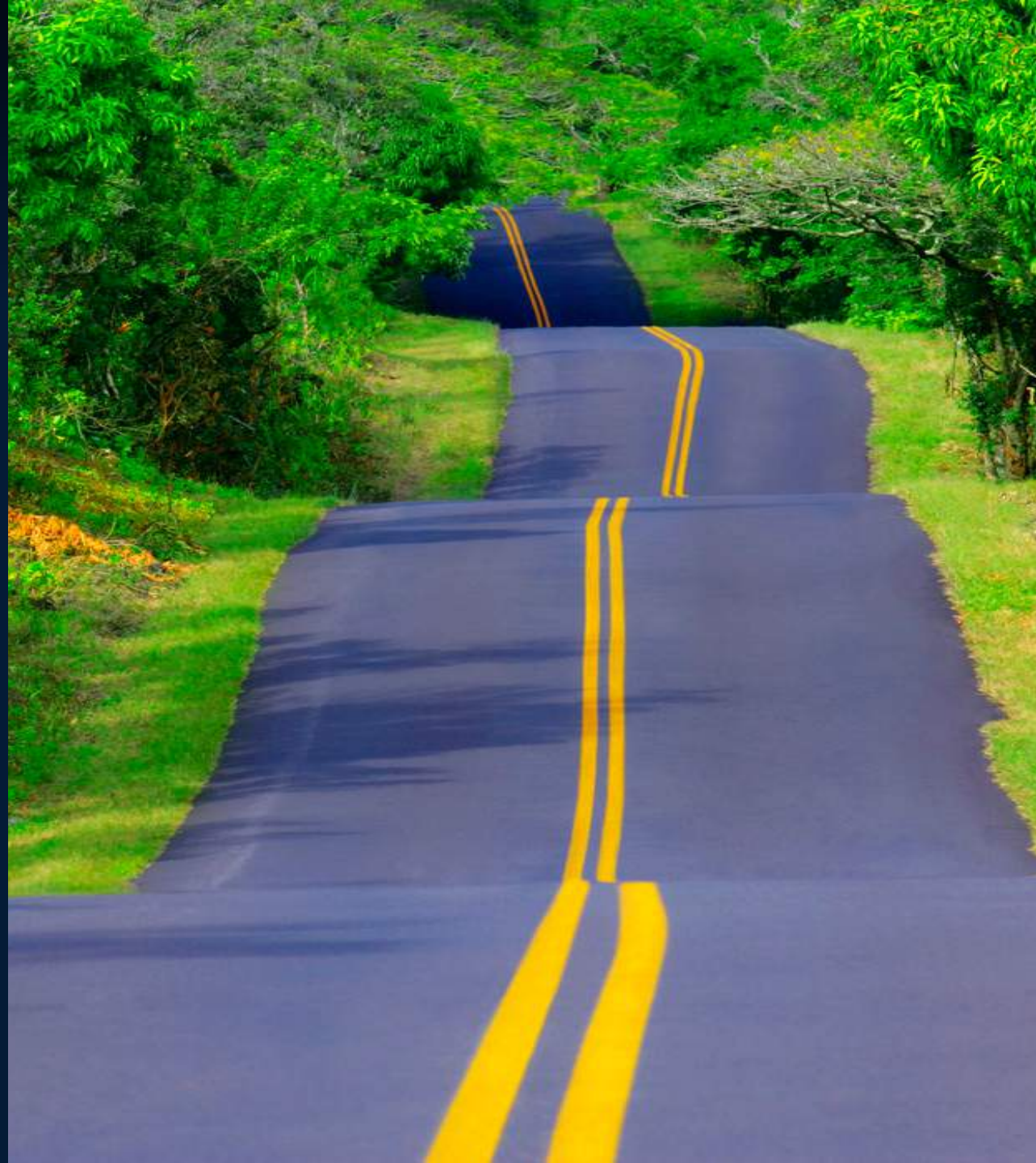
ING

Roadmap

Why this talk

Event Sourcing & CQRS

Query side processing



Why?

Appointments

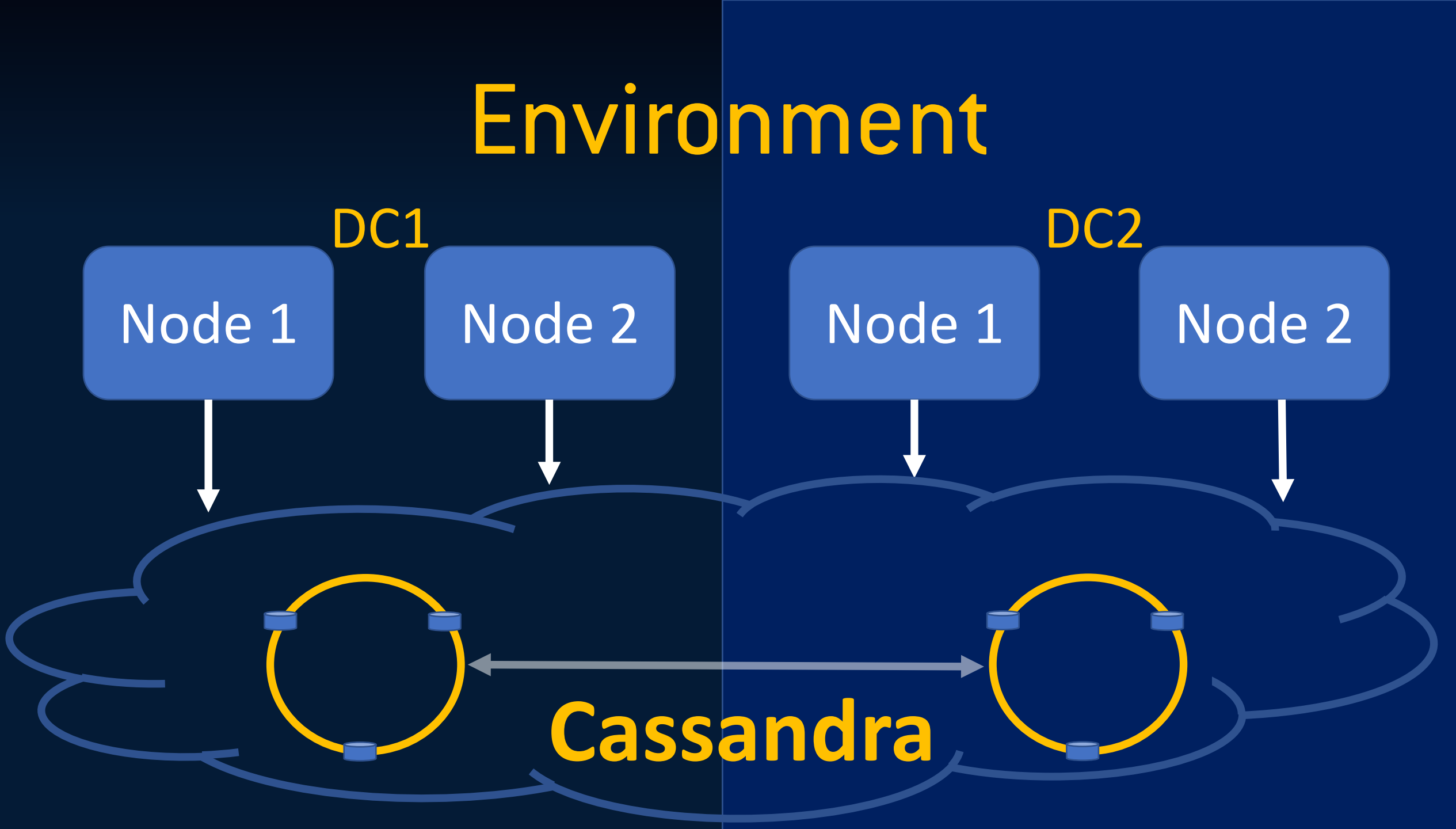
Make

Move

Reassign

Conclude

Cancel


Environment
DC1
DC2
Node 1
Node 2
Node 1
Node 2
Cassandra

Cassandra

Model around your queries

- determine what queries to support
- create a table for that query … 1 partition

Geo. W. Shuster

Dr		Cr	
[illegible]	$32.00	June 30 [illegible]	$17.00
[illegible]	10.00	" " [illegible]	32.10
" 28 " [illegible]	22.10	" " [illegible]	20.00
To Balance	$69.10		69.10
		[illegible] By Balance	23.10
		July 5 By Cash	65.00
	10.00	" " [illegible]	5.90
July 1 To Cash	25.00	" 7 Cash	180.00
" 3 [illegible]	67.50	" [illegible]	15.42
" 3 [illegible]	200.00	" [illegible] Downieville	2.00
" 7 [illegible]	175.00	" 9 By Cash	160.00
" 7 [illegible] Bigelow	175.00	" 12 " Cash	80.00
" 12 " [illegible]	140.00	[illegible] 43	45.15
17 [illegible]	85.00	" 17 " Cash	321.00
17 [illegible] Fairfield	135.00	" 23 [illegible]	63.60
17 [illegible]	20.00	" Other [illegible]	2.17
23 To Cash	2.50	" 24 By Cash	15.00
" [illegible]	1035.00	21 By [illegible]	4.90
	29.67	21 By [illegible] L. Shuster	37.43
23 To Balance		23 By [illegible] 2.00	44.00
	1064.67		1064.67
		July 23 By Balance	$29.67
		Aug 17 Amt. Due	31.80
		Oct 2 " "	48.20
			109.67
			66.00
Oct 2 To [illegible]	60.00		$43.67
" [illegible]	6.00		3.50
	66.00	[illegible] 26 Amt Due	47.17
		" 27 By Cash	30.00
			17.17

Clinton P. Hillibec

Bill Lawrence Co

Dr			Cr	
1897			1897	
May 31	To Miles #12 170	43.50	Aug 10 By Cash	15.00
July 12	" " #27 170	37.50	" 23 " "	45.00
"	" " #32 "	40.00	Oct 1 " "	20.00
"	" " #8 "	17.50	" 20 " "	54.00
Sept 22	" " 21 170	54.00	" 25 " "	40
		$211.50	Balance	20.45
	10% Disc.	21.15		
		$190.35		
	Extra frght to [illegible]	4.10		
		$194.45		$194.45
1898 July	1 To Bal	$20.45	1898 Aug 25 By Cash	50.00
"	7 Scroll #32 181	40.00	" " "	60.00
"	" #7½ Nicholson	14.50	" 26 " "	20.00
	#27 Olinger (2nd Base)	51.50	Allowance for frght on Dorris & Olinger Wx.	3.00
Aug	#166 2nd Size	100.00		
		226.45	Sept 12 By Cash	30.00
	10% Disc on $206.00	20.60	May 4 " "	15.00
		$205.85	Sept 14 " "	30.00
	#2 Baker (Special Price 181)		Oct 21 By Cash	110.00
	#2 Mrs Moss	25.00		
	#1416½ Dorris	51.00	Oct 30 " A. Morse	90.00
		281.85		[illegible]
May	#1 C. 16.00 Dis 1.60	14.40	1899 Apl By Pasturage Mare	7.50
		296.25	1900 Feb 16 By Cash	10.00
			Feb 21 Bal	32.00
Sept 23	#1409¼ Neh	85.00		
" 30	#27 J.R. Co 182	50.75		
"	#4031	45.50		
		477.50		$477.50
1900 Feb 21	To Bal.	32.00		

Event Sourcing

'ensures that all changes

to application state

are stored as a

sequence of events.'

https://martinfowler.com/eaaDev/EventSourcing.html

Time

Events

Created

10:00 – 12:00 9th Nov
with Smith
in Zaandam

Current State

10:00 – 12:00 9th Nov
with Smith
in Zaandam

Time

Events

Created
10:00 – 12:00 9th Nov
with Smith
in Zaandam

Moved
14:00 – 16:00 2th Nov
with Jones
in Amsterdam
'Bid has been made'

Current State

14:00 – 16:00 2th Nov
with Jones
in Amsterdam
'Bid has been made'

Time

Events

Created
10:00 – 12:00 9th Nov
with Smith
in Zaandam

Moved
14:00 – 16:00 2th Nov
with Jones
in Amsterdam
'Bid has been made'

Concluded
5-star
'product sold'

Current State

14:00 – 16:00 2th Nov
with Jones
in Amsterdam
'Bid has been made'
Concluded(5-star, product-sold)

Event Sourcing

Built-in audit log

Troubleshooting

Space requirements

Querying entities

Command-Query Responsibility Segregation

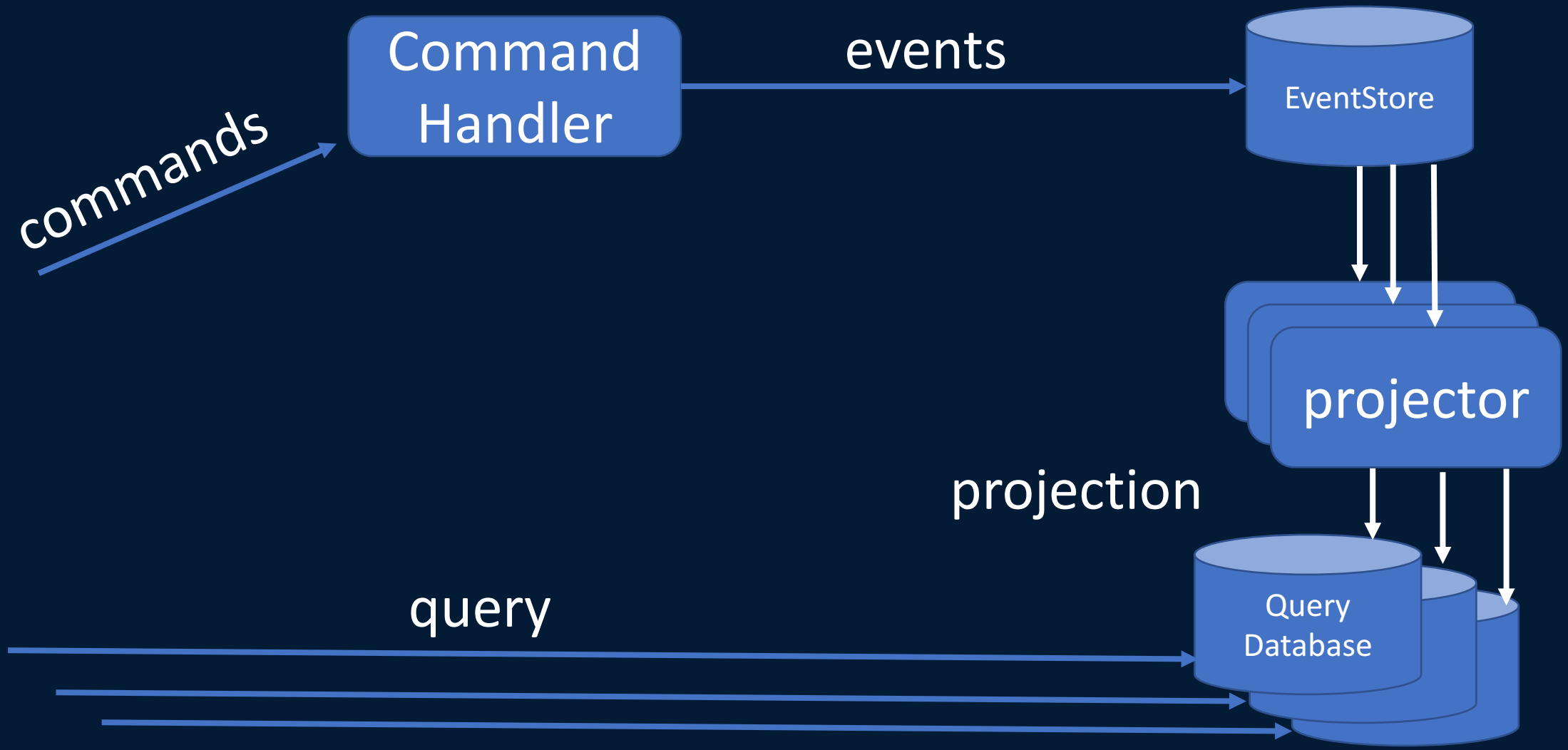
CQRS

Architectural pattern

with driving forces

- Collaboration
- Staleness

The CQRS universe



Advantages CQRS with ES

Scale read/write independently

Scale Query side per use-case


CHOOSE

‘CQRS with Event Sourcing’ Frameworks

Kafka as event store

Axon Framework

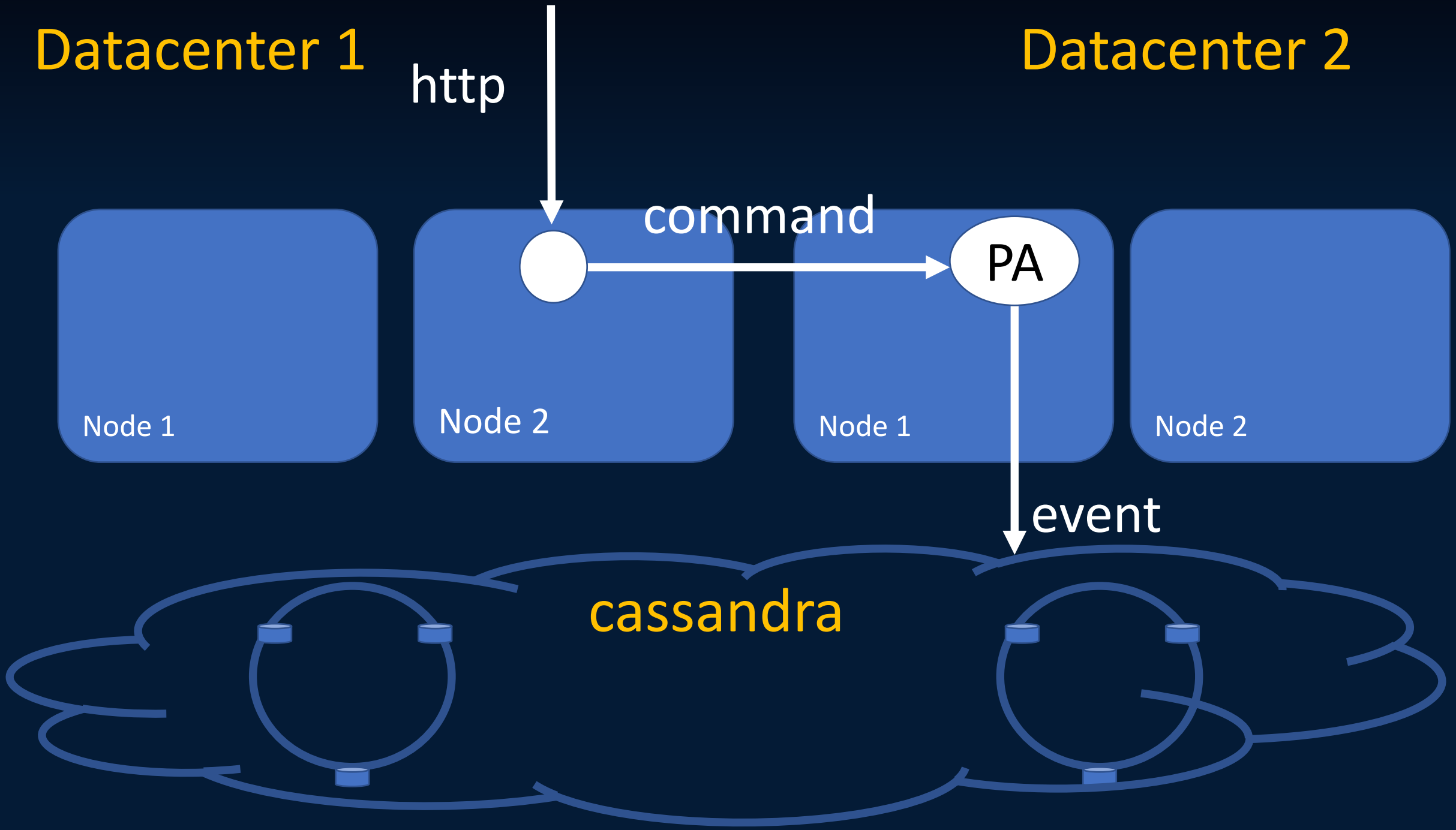
Eventuate

Akka Persistence

Persistence

Persistent Actor

Journal

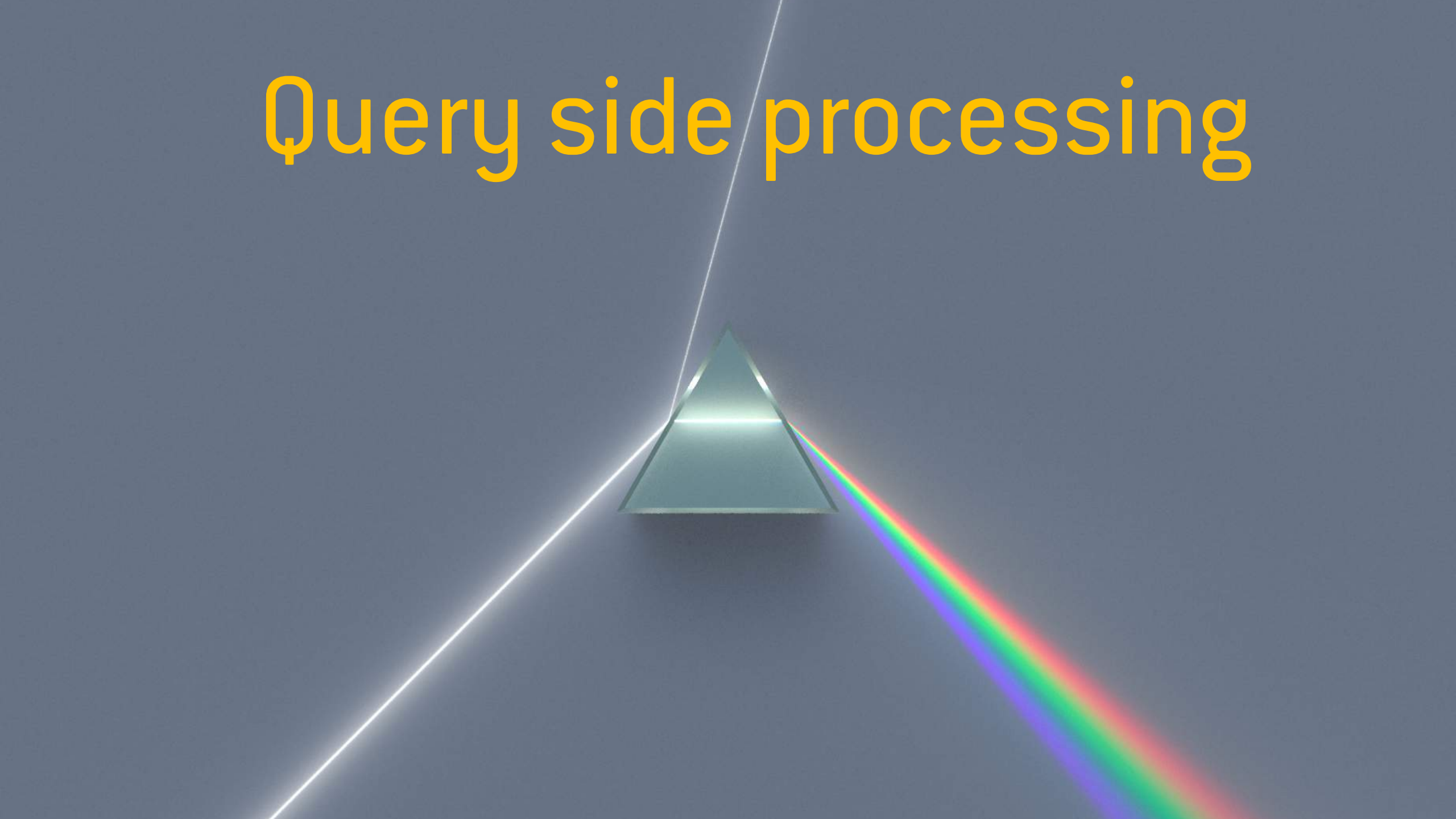

Datacenter 1
http
Datacenter 2
command
PA
Node 1
Node 2
Node 1
Node 2
event
cassandra

Cassandra Events table

persistence_id	partition_nr	sequence_nr	timestamp	timebucket
7c7ec816-efc6...	0	1	8ef7f9...	20171018
7c7ec816-efc6...	0	2	99e314...	20171018
7c7ec816-efc6...	0	3	a41f2b...	20171018

tag1	writer_uuid	ser_id	ser_manifest	event
appointment	f0088eec...	2	nl...Created	[payload]
appointment	f0088eec...	2	nl...Reassigned	[payload]
appointment	f0088eec...	2	nl...Moved	[payload]

Query side processing



Using Persistence Query

Using Persistence Query

```
PersistenceQuery(system)
  .readJournalFor[LeveldbReadJournal](
                                  Identifier)
  .eventsByTag("appointment")
  .map(println)
  .runWith(Sink.ignore)
```

Considerations read side

Resumability

Event order

Scalability

Changing requirements

Push or Pull (*)

Resumability

Resumability


```
val offset = readOffset().getOrElse(noOffset)

PersistenceQuery(system)
  .readJournalFor(Identifier)
  .eventsByTag(tag, offset)
  .map(processEvent)
  .map(saveOffset)
  ...
```

Eventual Consistency

The same stream elements

(in same order) are returned

for multiple executions of the query

on a best effort basis.

https://static.javadoc.io/com.typesafe.akka/akka-persistence-cassandra_2.12/0.58/akka/persistence/cassandra/query/scaladsl/CassandraReadJournal$.html

id	seq	timestamp
A	1	04.709
B	1	04.731
C	1	04.801

eventual-consistency-delay=100ms

id	seq	timestamp
A	*1*	*04.709*
B	*1*	*04.731*
C	1	04.801
A	3	04.824
C	2	04.957

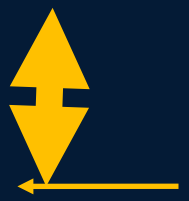
delayed-event-timeout = 1000ms

STOP

NOW (920)

eventual-consistency-delay=100ms

id	seq	timestamp
A	*1*	*04.709*
B	*1*	*04.731*
A	2	04.768
C	*1*	*04.801*
A	3	04.824
C	2	04.957
A	4	04.973



NOW (05.063)

NO ONE WANTS

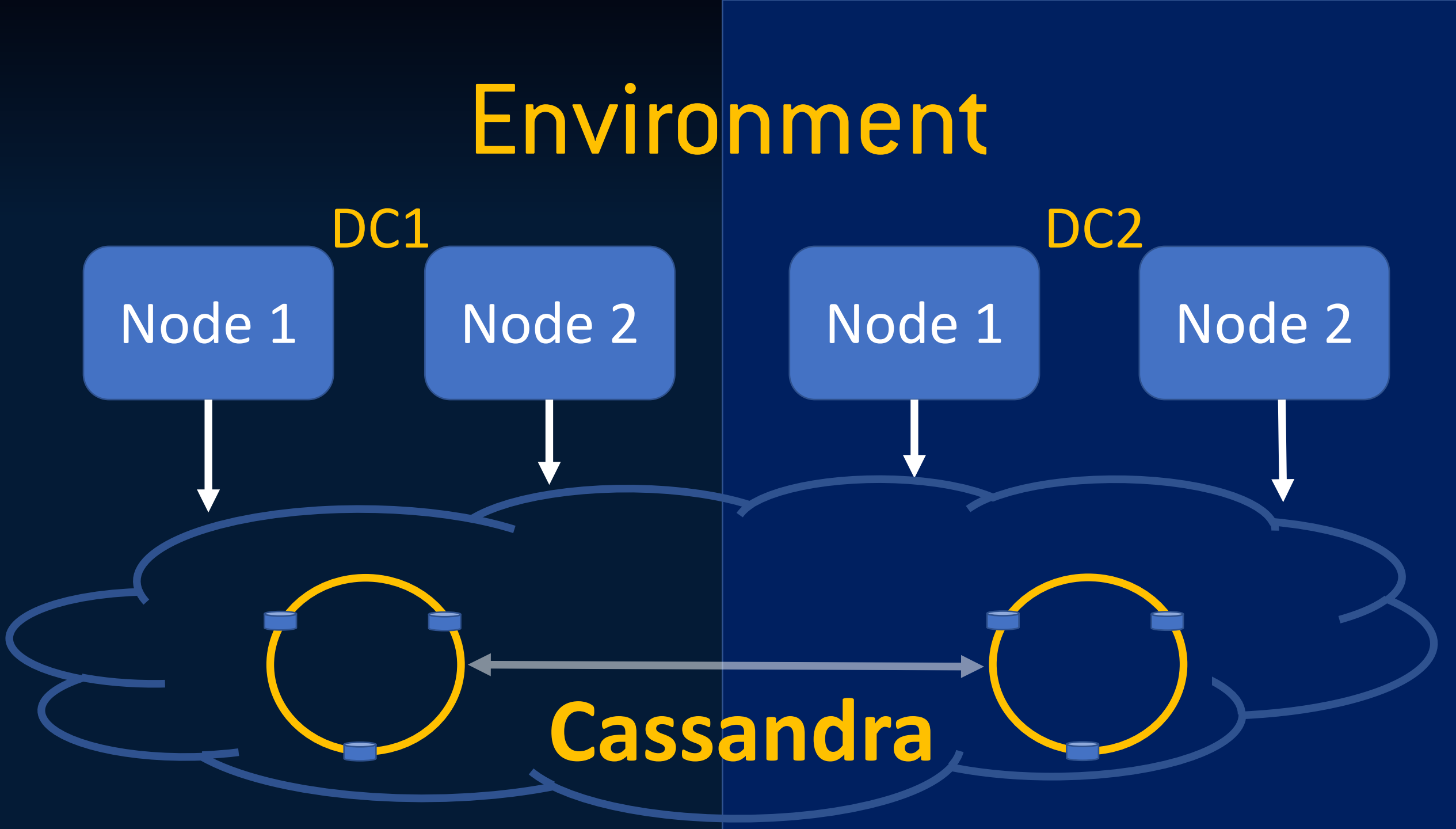
EVENTUAL CONSISTENCY.

IT'S A NECESSARY EVIL.

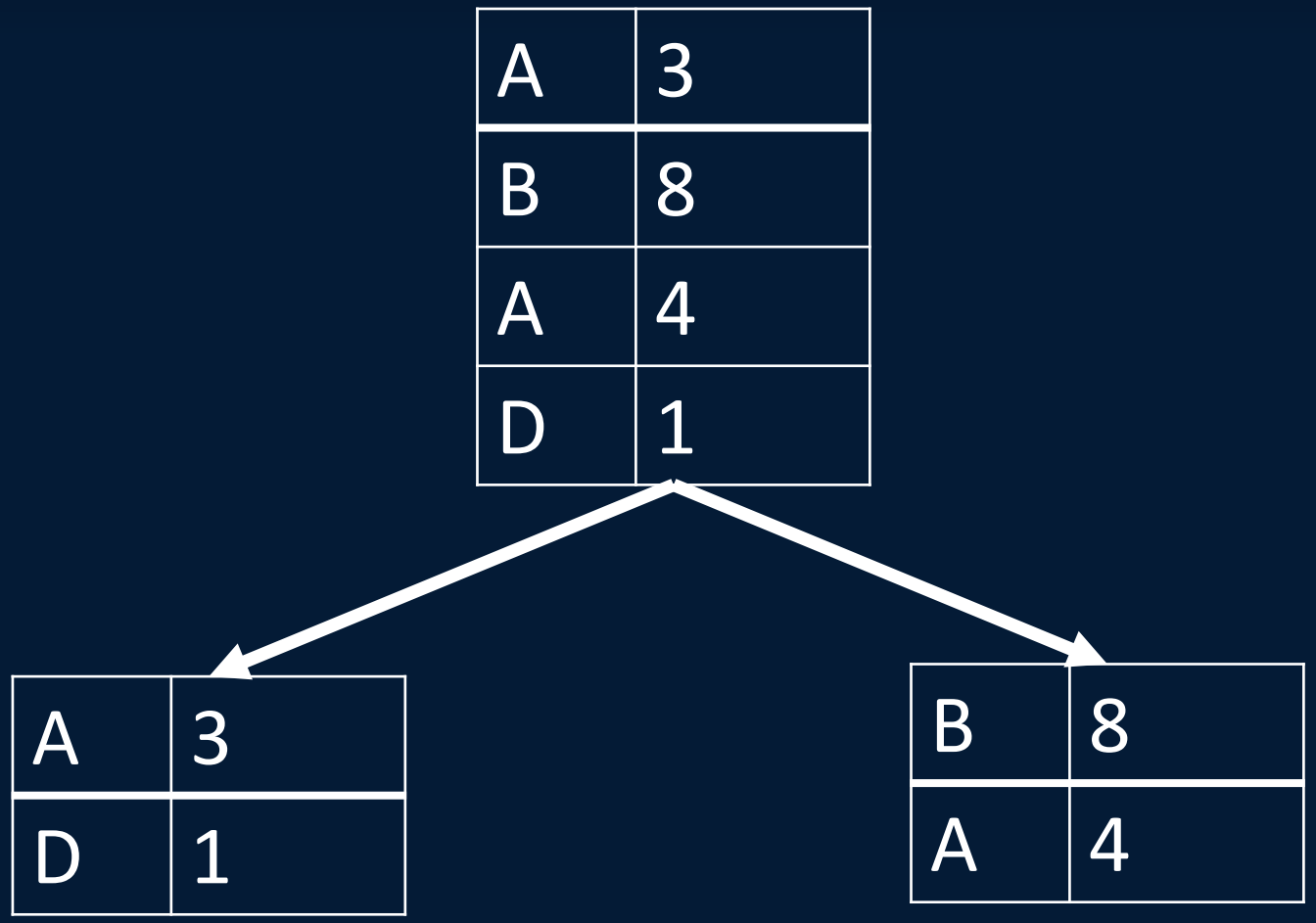
IT'S NOT COOL. IT'S USEFUL.

Jonas Bonér

How much latency can you accept ?


Environment
DC1
DC2
Node 1
Node 2
Node 1
Node 2
Cassandra

In parallel



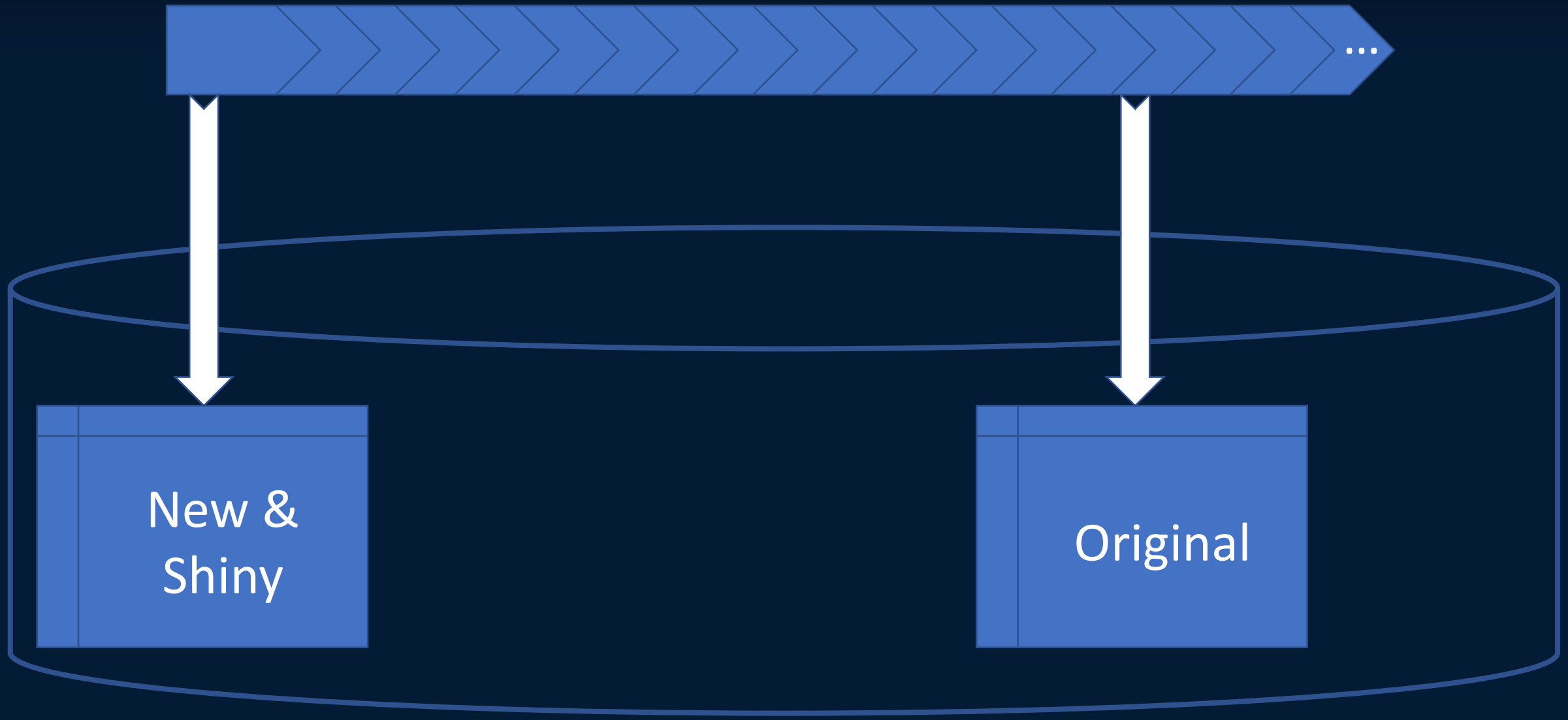

Read-side Sharding

Read side Sharding

- shard upon event data
- shard on the entity id

Changing requirements

Projection upgrade



The Dark Side of Event Sourcing:

Managing Data Conversion

http://files.movereem.nl/2017saner-eventsourcing.pdf

Event store upgrade techniques

Multiple versions

Upcasting

Lazy transformation

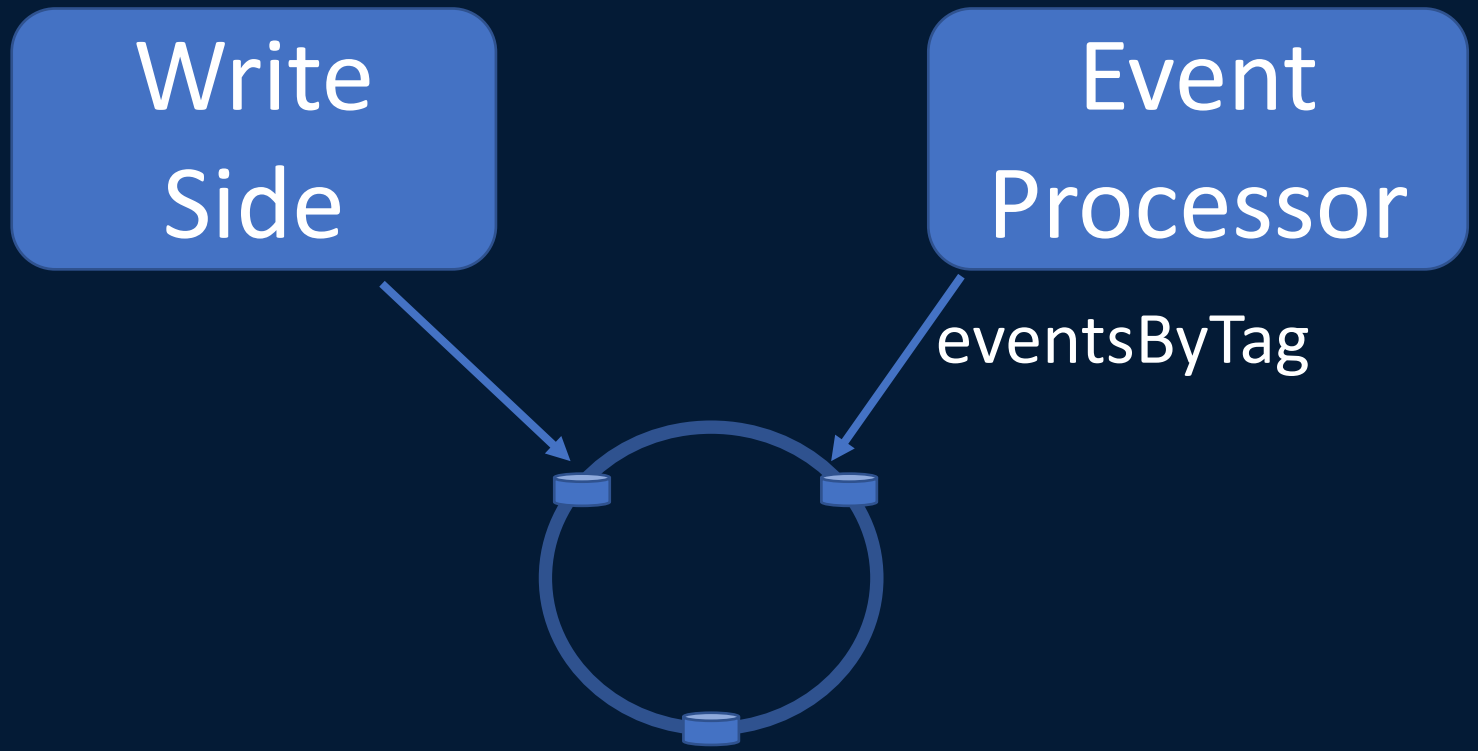
In place transformation

Copy and transformation

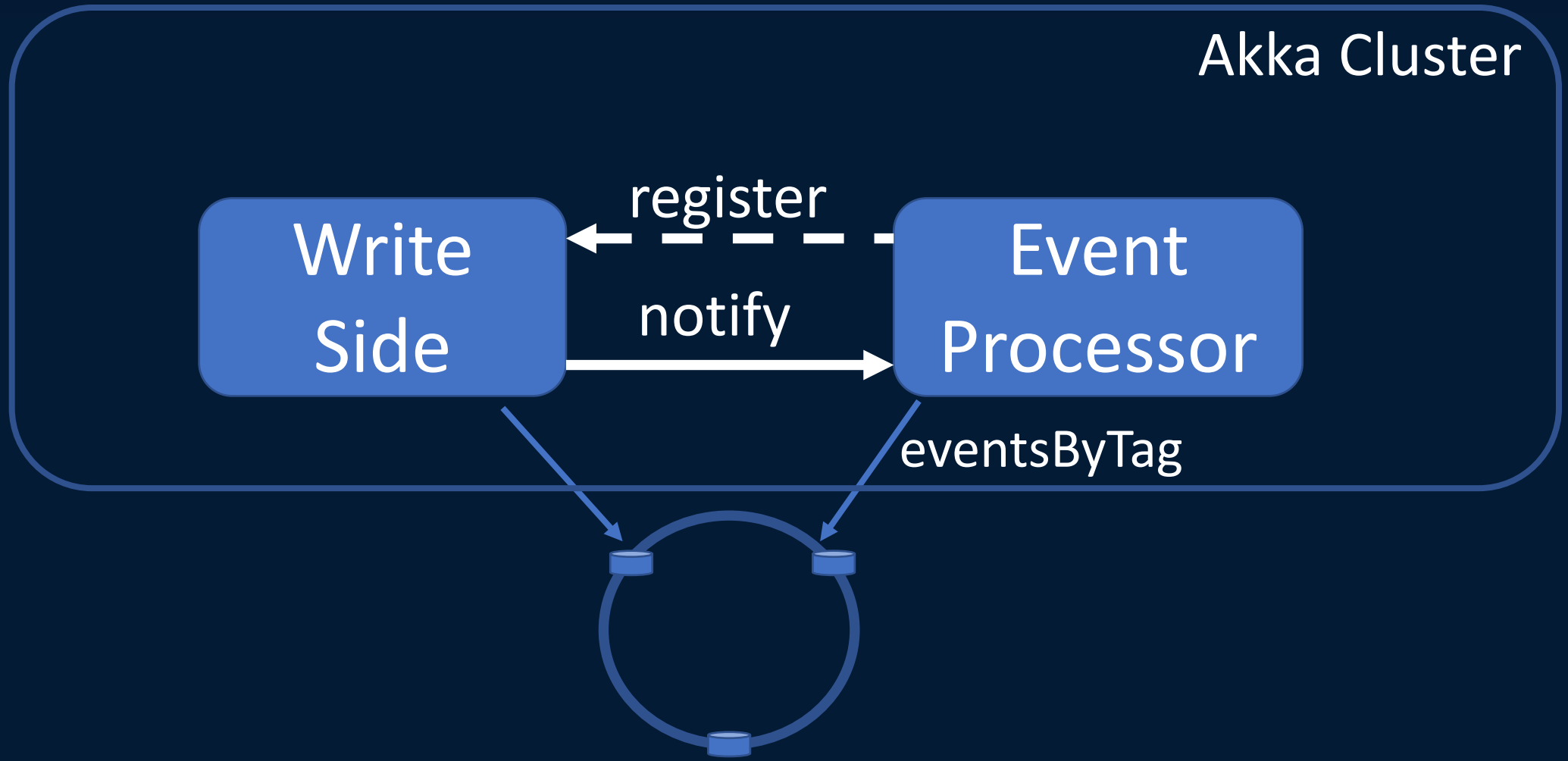
Event store upgrade techniques

	Read-side impact
Multiple versions	-
Upcasting	+
Lazy transformation	+
In place transformation	++
Copy and transformation	++

Pull



Push


Akka Cluster
register
Write Side
notify
Event Processor
eventsByTag

In conclusion

CQRS and Event Sourcing

Query side processing

- resumability
- event order
- scale
- requirement changes
- push vs pull