

# Modeling

## RCs summary

- ☐ users should look up all information via tracking# from source to destination to tracking history
- ☐ payment information will be queried on a different UI page
- ☐ 3B deliveries every 4 mos
- ☐ 4-mos retention
- ☐ 99% 100ms for read latency for the last 10d deliveries
- ☐ 99% 100ms for writes
- ☐ 12K writes/sec, mostly updates on transit
- ☐ 29K reads/sec, mostly RFID query on transit

## Derived RCs wrt operations

delivery	inserts	289.3518519	3B deliveries every 4mos
	updates	11421.2963	subtract inserts(delivery & payment) from 12K w/s by WL RC
	reads	28421.2963	29K r/s(by WL RC) - payment r/s + TTL read
	deletes	289.3518519	TTL will delete as many docs as inserted
payment	inserts	289.3518519	3B deliveries every 4mos
	updates	0	payment has no update
	reads	868.0555556	2 reads defined by WL RC + TTL read
	deletes	289.3518519	TTL will delete as many docs as inserted

## Entity Relationship

- ☐ Delivery
- ☐ Tracking
- ☐ Payment

## Schema Design

Two collections

- ☐ Delivery with Tracking embedded in an array
- ☐ Payment

Why Delivery has Tracking embedded?

- ☐ Single Collection Pattern may be tempting because Delivery need not change once inserted and individual Tracking document inserting will be more efficient

- ☐ However, the average array length is not that long if embedded whilst separate Tracking inserts will bloat the total index size

## Tracking History

Timestamp		ISO Date
Location		string (warehouse name)
GPS Location		GeoJson (lat, lon)
Activity		string (origin scan departure scan export scan customs entry customs exit import scan destination scan out on delivery delivered held)
InternalActivity		Yes   No

## Delivery

Tracking# (unique)	ext. inquiry	14 digits (for customers and 3rd party to inquire about status)
_id (RFID)	int. tracking	12 octets (ASCII; internal tracking along delivery)
Status		Received AtOrigin InCustoms InTransit AtDestinationWarehouse OutOnDelivery Delivered Exception Returned
Scheduled Delivery		ISO Date
Shipped From		address*
Shipped by email	optional	
Shipment reference	optional	alphanumeric up to 35 chars set by a sender
Shipped To		address*
Shipped to email	optional	
Shipped on	TTL	ISO Date
Service Type		Express plus Express Express Saver Standard
Weight		double in kg
Dimensions		LWH in cm, Oversized: Yes No
Declared Value	optional	double in \$
Multiple Packages	optional	int (no of packages)
Additional Features	optional	Carbon-neutral, Saturday Delivery, No third party delivery, Additional insurance - Yes No
VAT number	optional	alphanumeric up to 15 chars

History		Tracking History[]
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index

1._id(RFID)
2. trackingno
3. Shipped From.Country + Shipped On(range) + Shipped To.Country + Shipment reference
4. Shipped On (TTL: 4mos)

## Payment

_id		trackingno
Payment method	string	Cash   PayPal   Payment Card
1. Paypal	octets	32B (Paypal operation hash)
2. Payment Card		Card Type
		Card number(16)
		Exp mo/yr
		CVV(3)
		Blling address*
3. Cash		ID (7 digits)
		address*
VAT ID		-> Delivery.VAT number
Customer broker ID	optional	
Promo code	optional	
Timestamp	TTL	ISO Date

index

1. _id (trackingno)
2. timestamp (TTL: 4mos)

# Sampling

- ☐ for sizing, populate 2 collections, delivery & payment, using nodejs application
- ☐ total 1/100 days worth of 250,000 docs for each collection (2 docs respectively are generated for every delivery)

## Test Result

from coll.stats()

db	shipdb				working set(10d)
collections	delivery	count	250,000 (worth of 1/100 days)		
		size	350,692,983		350,692,983,000
		storageSize	189,739,008		
		totalIndex	74,579,968		74,579,968,000
		totalSize	264,318,976		425,272,951,000
		avgObjSize	1,402		
		indexes	_id	RFID	
			trackno		
			fromOnToRef		
			on	TTL: 4mos	
		WT compRatio	0.54		
	payment	count	250,000 (worth of 1/100 days)		
		size	51,625,155		51,625,155,000
		storageSize	23,371,776		
		totalIndex	12,587,008		12,587,008,000
		totalSize	35,958,784		64,212,163,000
		avgObjSize	206		
		indexes	_id	trackno	
			timestamp	TTL: 4mos	
		WT compRatio	0.452720694		

## Sizing Proposal

Total Disk Capacity Required (GB)	3354.065361
Total Disk IOPS	3000
Total Memory Required	911.144495

Total CPU cores required	4
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☐ RS cluster (no sharded)