

## STORAGE CLASSES

**STANDARD**  
— and —  
**INFREQUENT ACCESS**

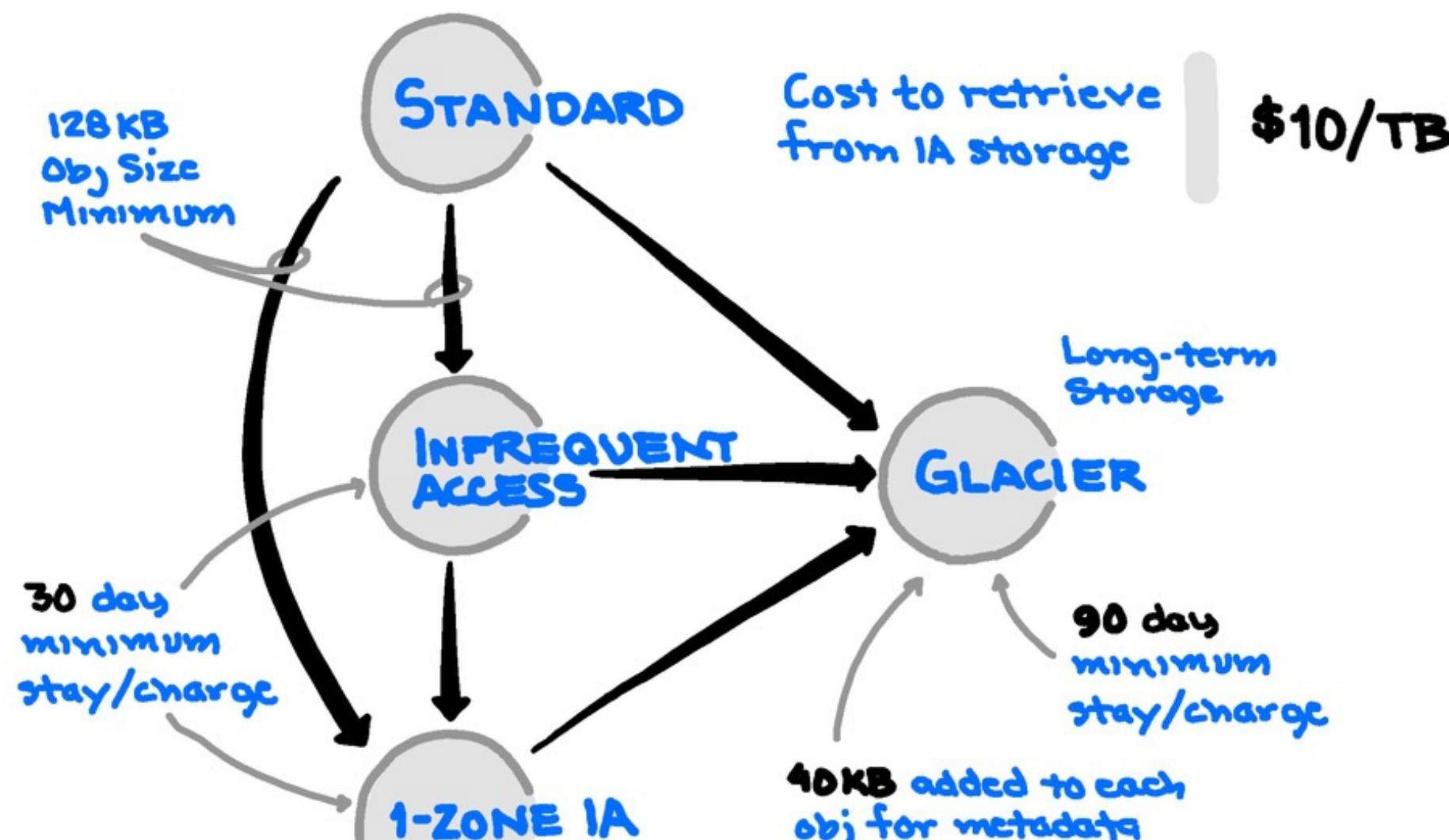
**11 NINES DURABILITY**

**1-ZONE INFREQUENT ACCESS**

**11 NINES DURABILITY**

**99.5% / YR AVAILABILITY**

## STORAGE CLASS TRANSITIONS



## SERVER SIDE ENCRYPTION

AES - 256  
master key rotation  
AWS managed KEYS

audit trail  
KMS managed KEYS  
more security controls

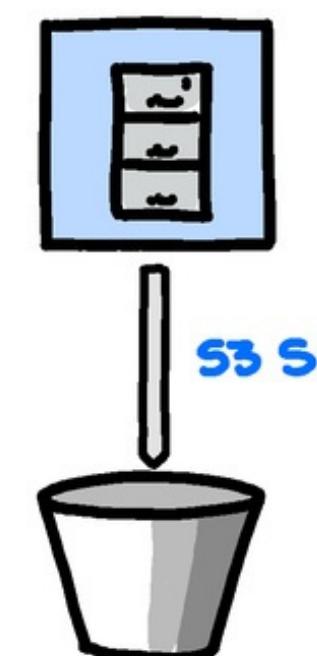
SELF managed KEYS  
you own it!



## QUERY IN PLACE

### AMAZON S3

#### OBJECT STORAGE



#### Cost:

\$2/TB scanned  
70¢/TB returned

Standard Storage

\$10/TB scanned  
or returned

IA Storage

Retrieve subset  
of data  
Use simple SQL

## OBJECT LOCKING

### PREVENT OBJECT DELETION

## GOVERNANCE

CAN'T DELETE  
TIL DATE

## COMPLIANCE

NEVER DELETE  
(EVER)

[all pricing from US West (Oregon)]

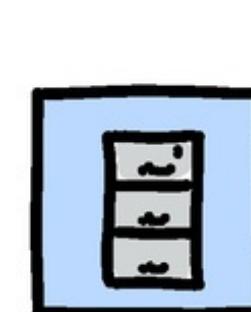
REQUESTS (\$USD per 1,000,000 requests)



	GET	POST	PUT	DELETE	SELECT	Other
Standard	0.4	5.0	5.0	5.0	5.0	0.4
Infrequent Access	1.0	10.0	10.0	10.0	1.0	1.0
1-Zone IA	1.0	10.0	10.0	10.0	1.0	1.0

Storage class transitions : 1¢ per 1,000 objects  
Transition to Glacier : 5¢ per 1,000 objects

## STORAGE



TB  
[0, 50]  
[51, 500]  
[501, ∞)

\$  
2.3¢  
2.2¢  
2.1¢

per GB/Mo

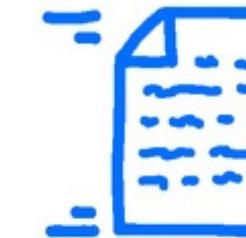
INFREQUENT ACCESS

STD  
1-ZONE

1.25¢  
1.0¢

GLACIER

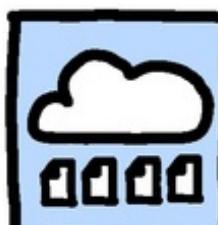
0.4¢



AMAZON CLOUDFRONT  
GLOBAL CDN

5.0¢  
to  
9.0¢  
GB

## DATA TRANSFER



internet

FREE

... 2.0¢ GB

OTHER AWS REGION

## ENGINES

- ▶ ORACLE
  - ▶ SQL SERVER
  - ▶ MYSQL
  - ▶ MARIADB
  - ▶ POSTGRESQL
  - ▶ AURORA
    - MySQL
    - PostgreSQL
- based on
- commercial
  - open source
  - cloud native by Amazon

## PRICING

COSTS: (Oregon)

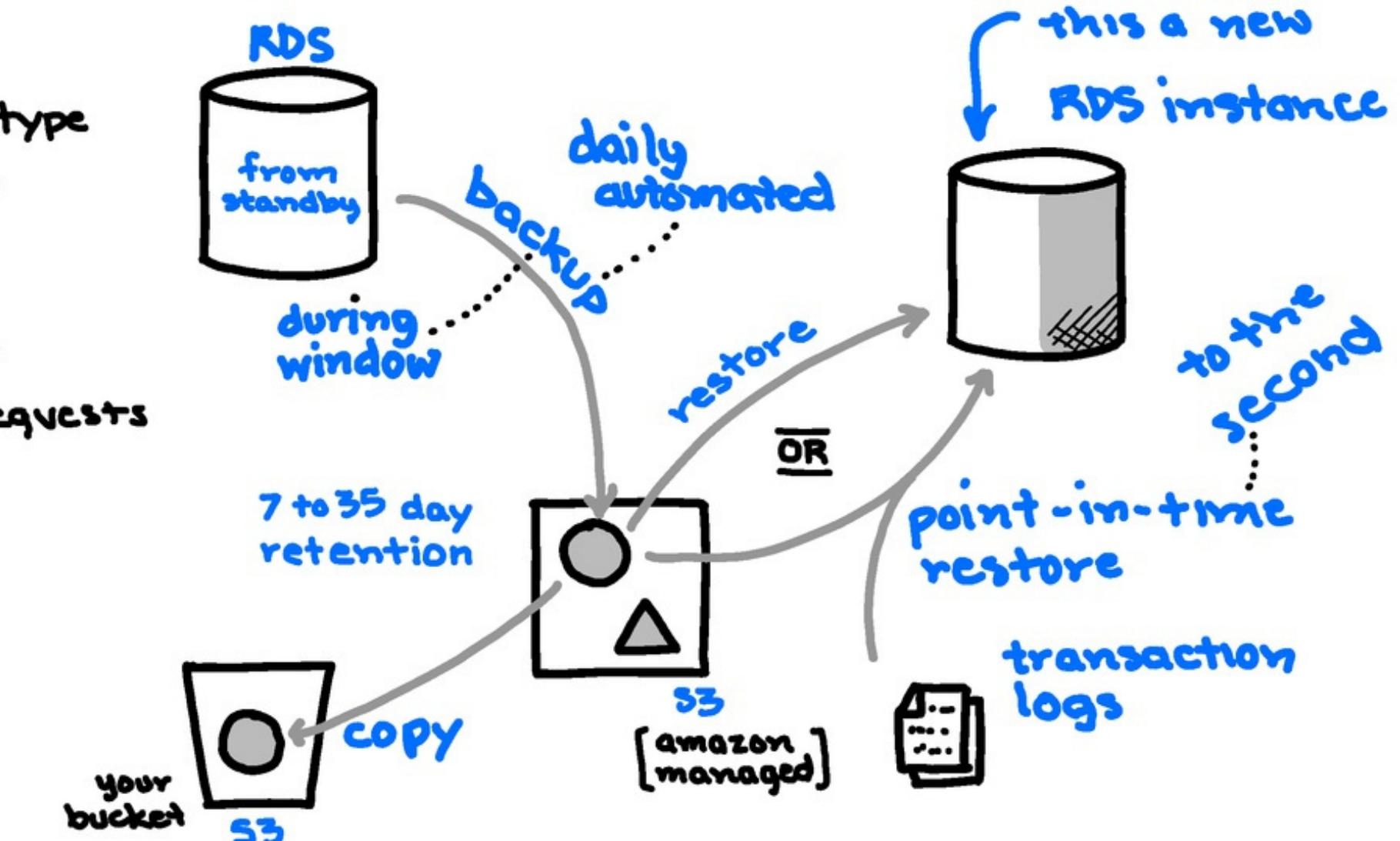
DB INSTANCE HOURS per engine/instance type  
billed hourly, round up

STORAGE GP2 ... 11.5¢/GB/Mo  
101 ... 12.5¢/GB/Mo + 10¢/10/Mo  
Mag ... 10¢/GB/Mo + 10¢/MM Requests

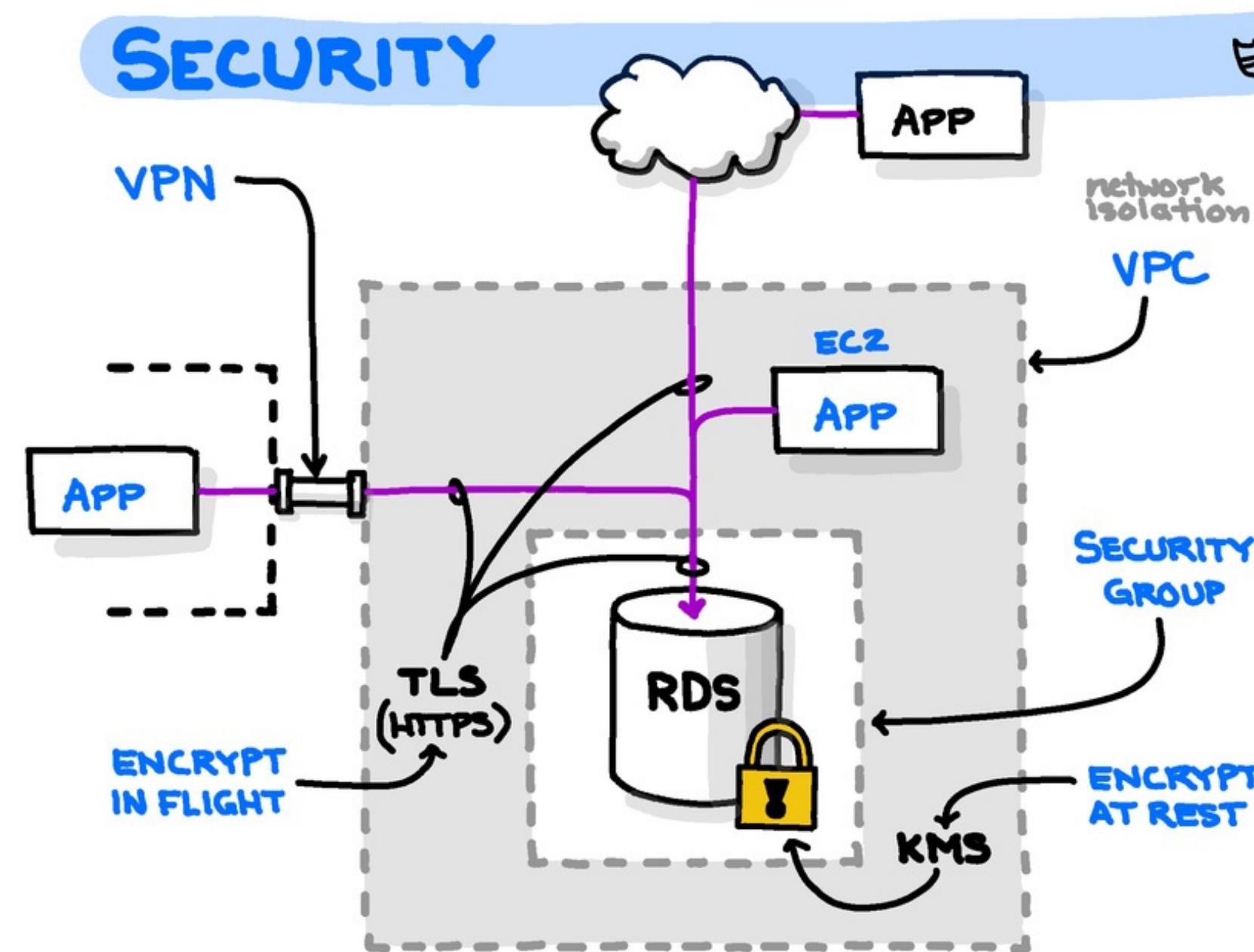
BACKUP STORAGE 100% of DB size free  
9.5¢/GB/Mo after

DATA TRANSFER varies by destination

## BACKUPS

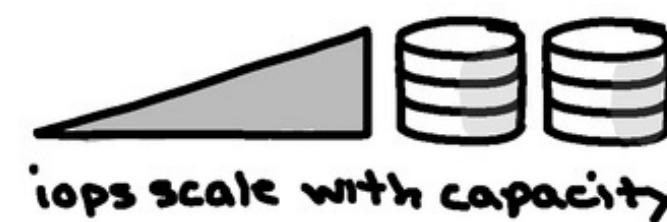


## SECURITY

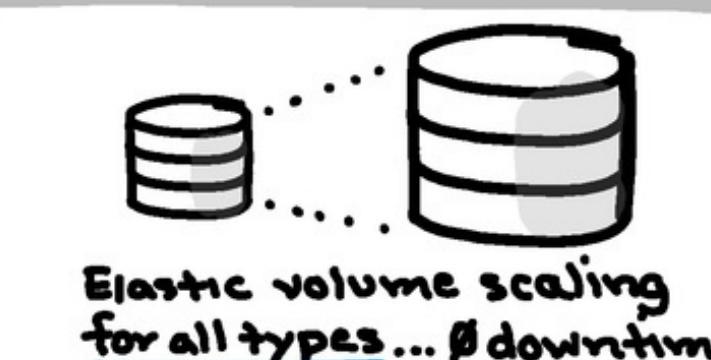


## STORAGE

**GP2** General Purpose  
SSD 16TB Max

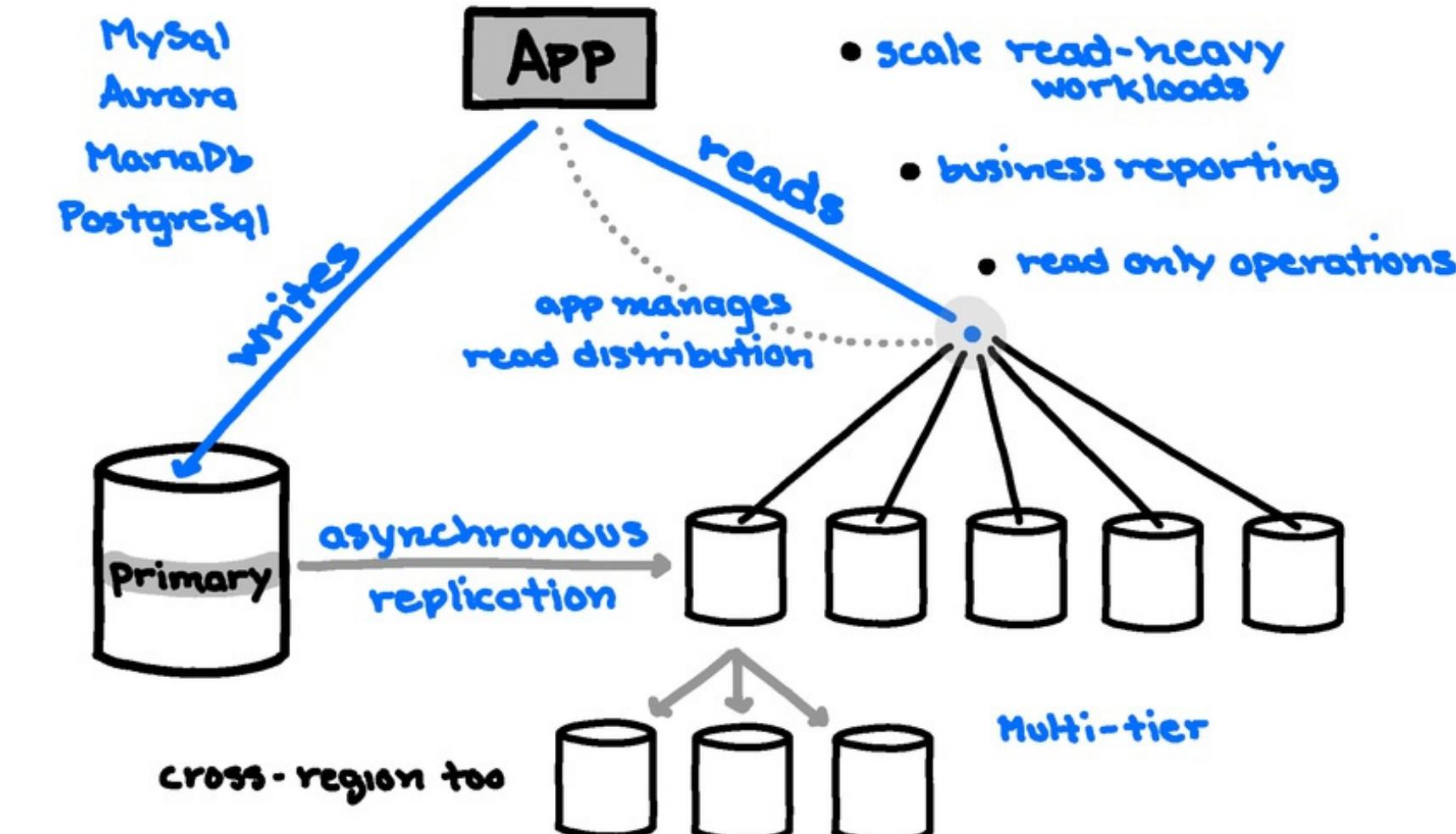


**IOP1** Provisioned IOPS  
SSD 16TB Max  
30K IOPS



**Magnetic** Legacy 1TB Max

## READ REPLICAS



## INSTANCES

### SMALL WORKLOADS

**T2**  
burst

1 vCPU  
1 GB RAM  
8 vCPU  
32 GB RAM

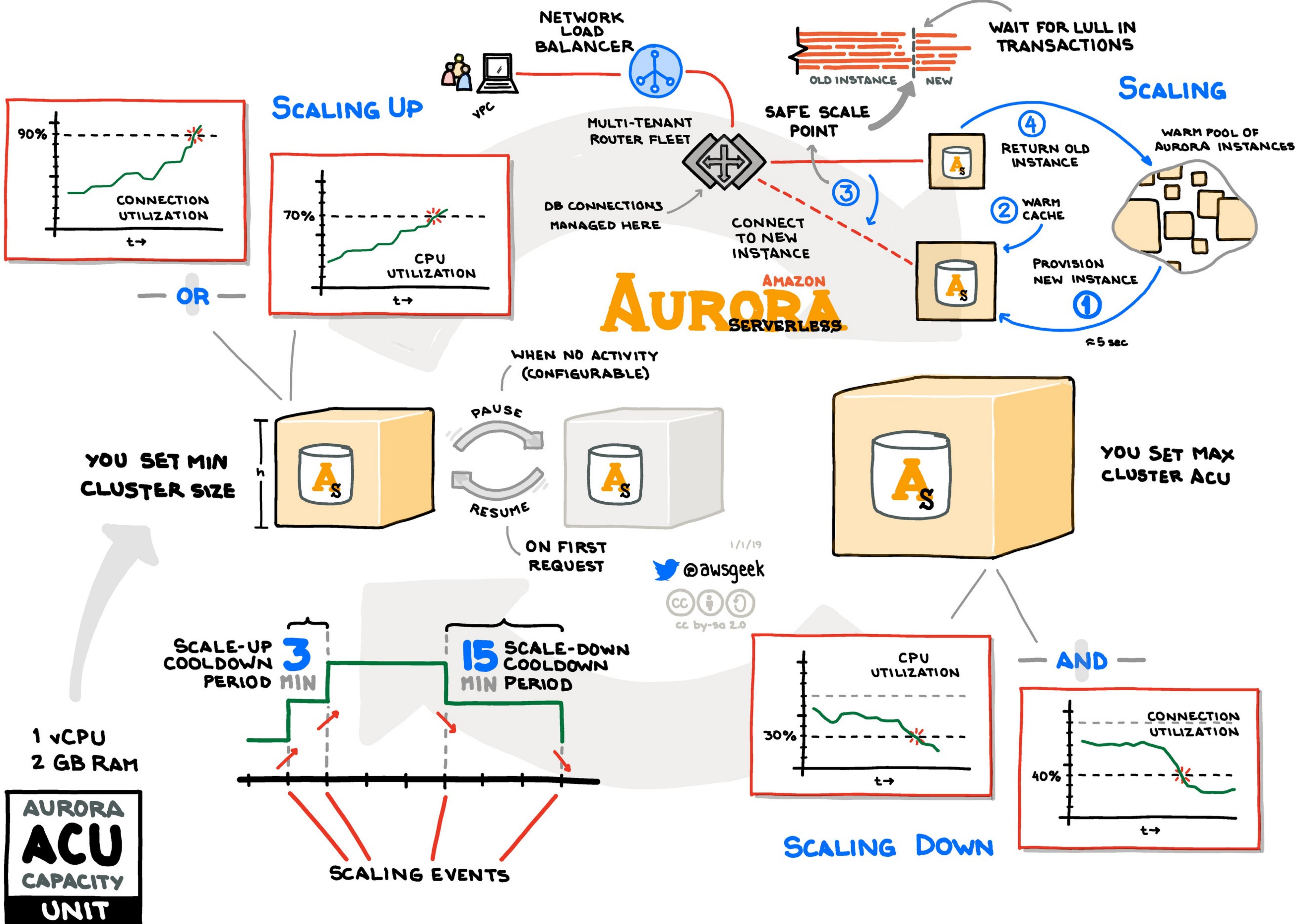
### CPU INTENSIVE WORKLOADS

**M3/M4**  
general purpose

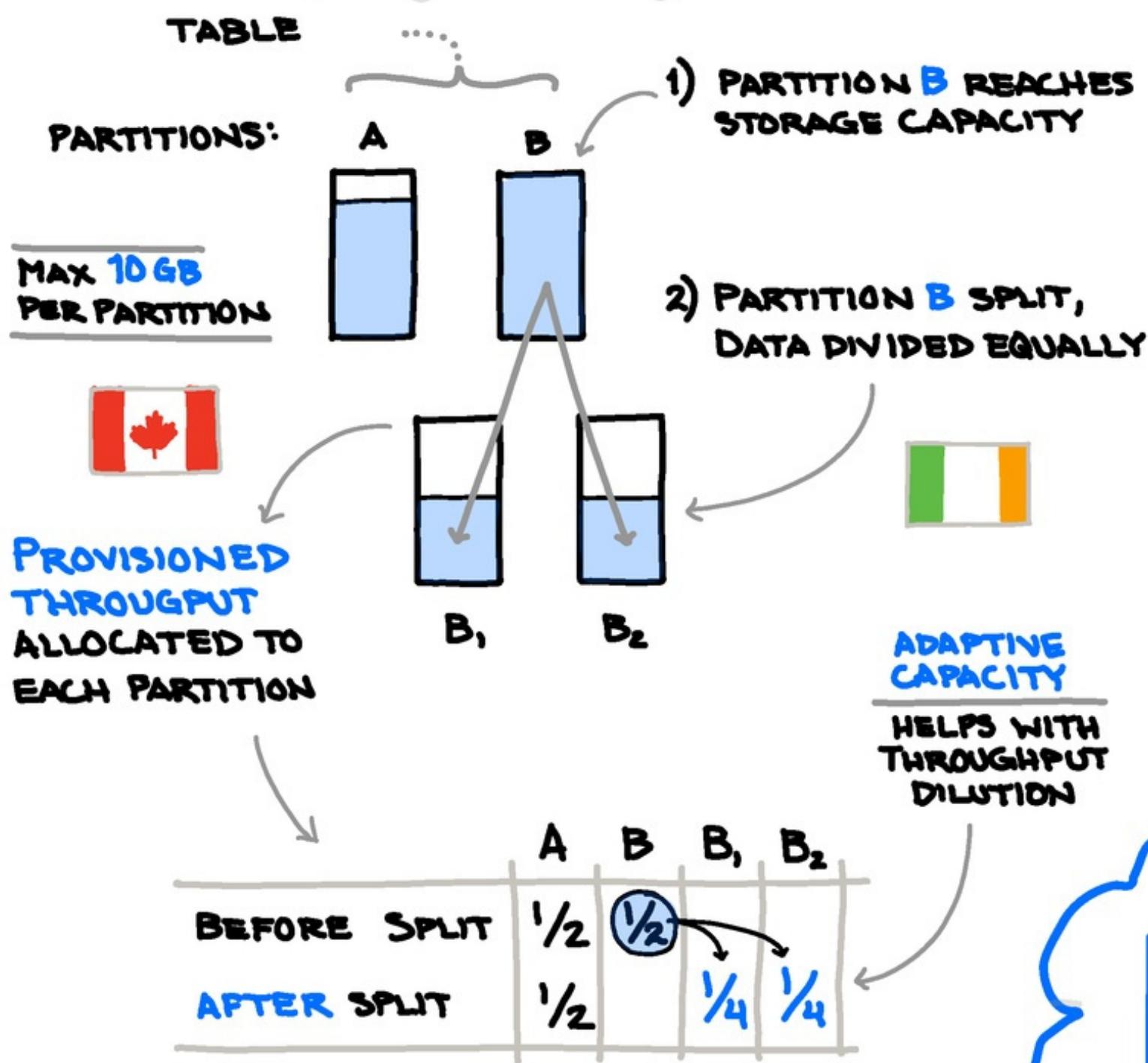
2 vCPU  
8 GB RAM  
64 vCPU  
256 GB RAM

### QUERY INTENSIVE WORKLOADS

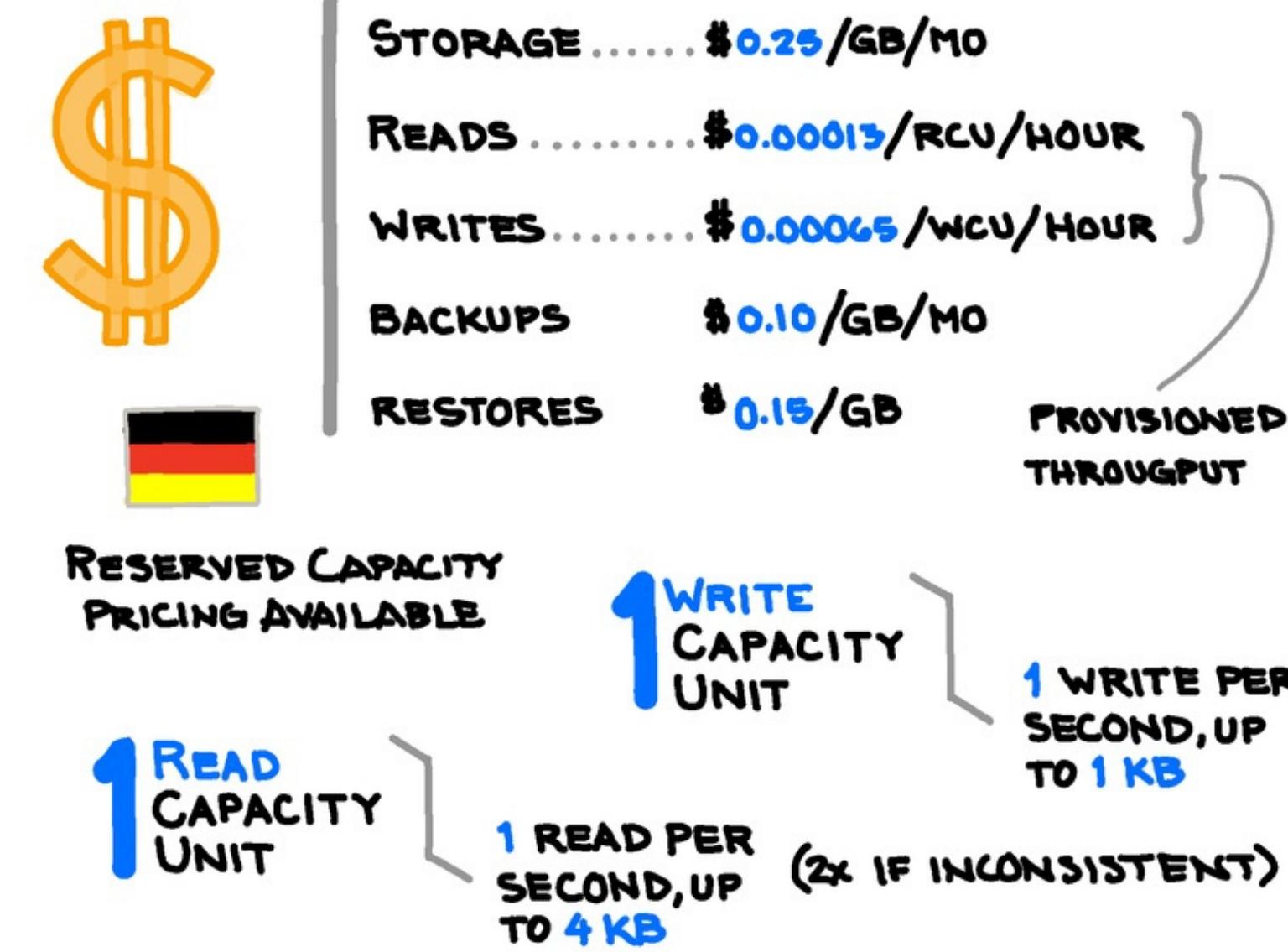
**R3/R4/X1(e)**  
mem optimized  
2 vCPU  
16 GB RAM  
128 vCPU  
3904 GB RAM



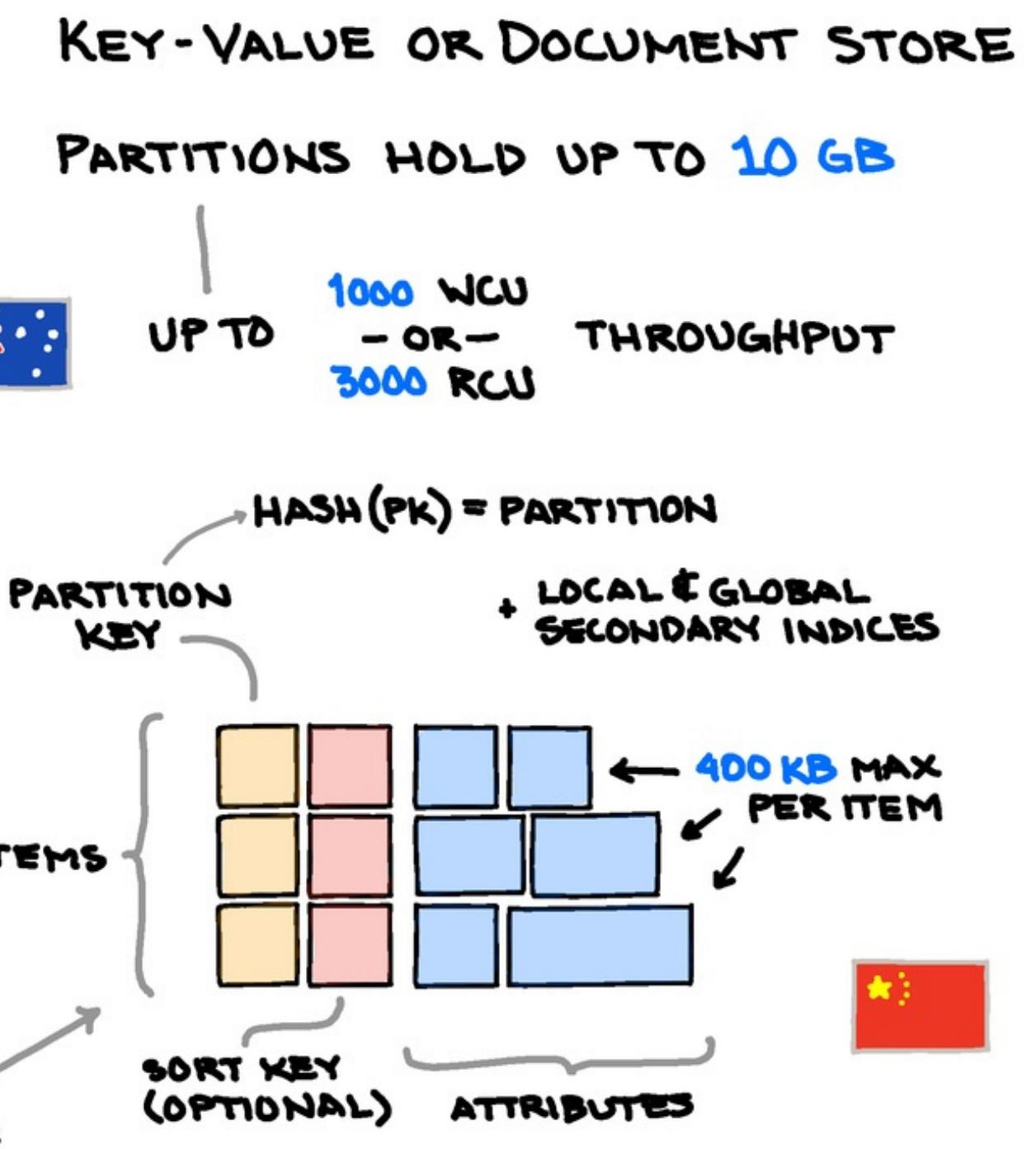
# SCALABILITY



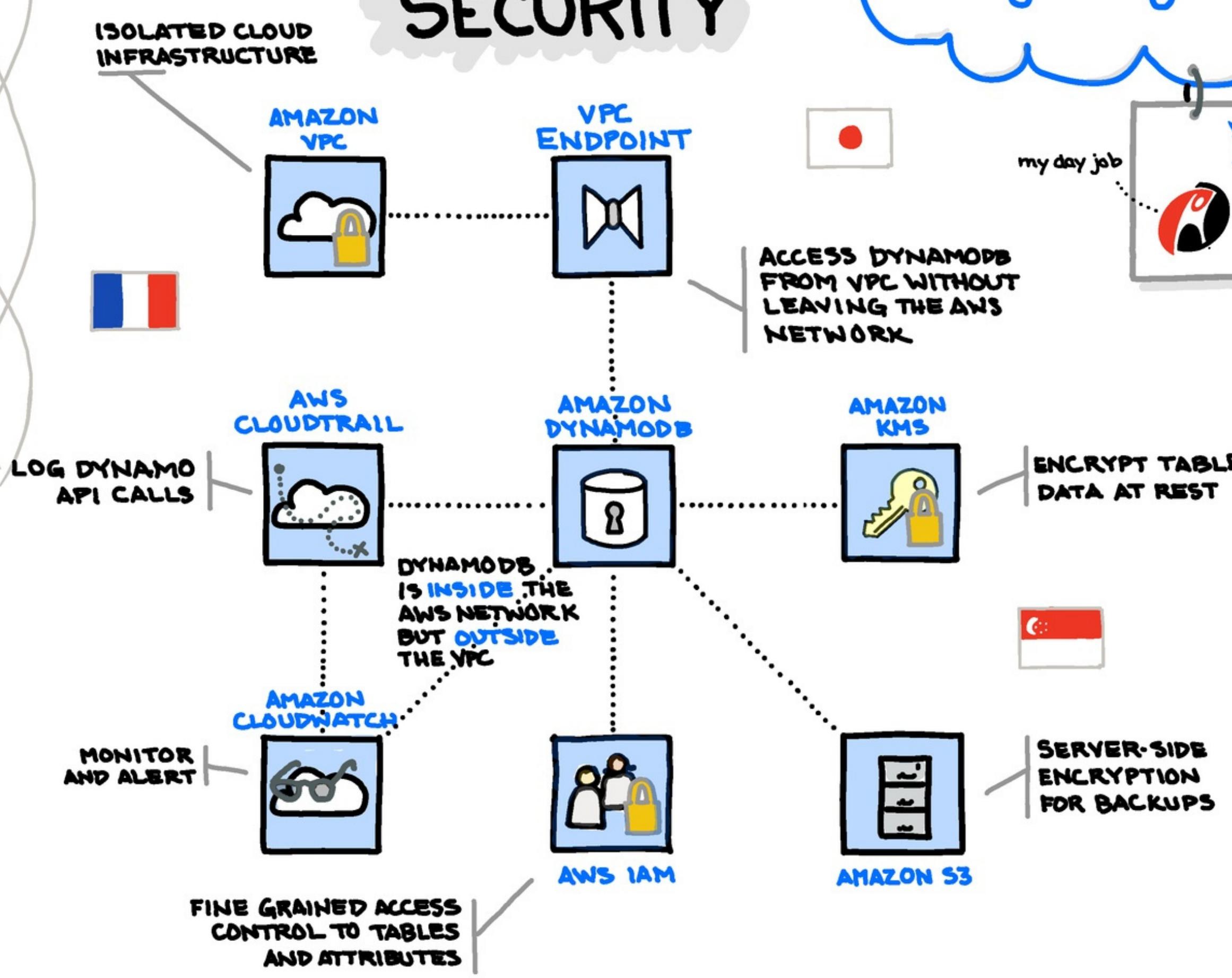
# PRICING



# ESSENTIALS



# SECURITY

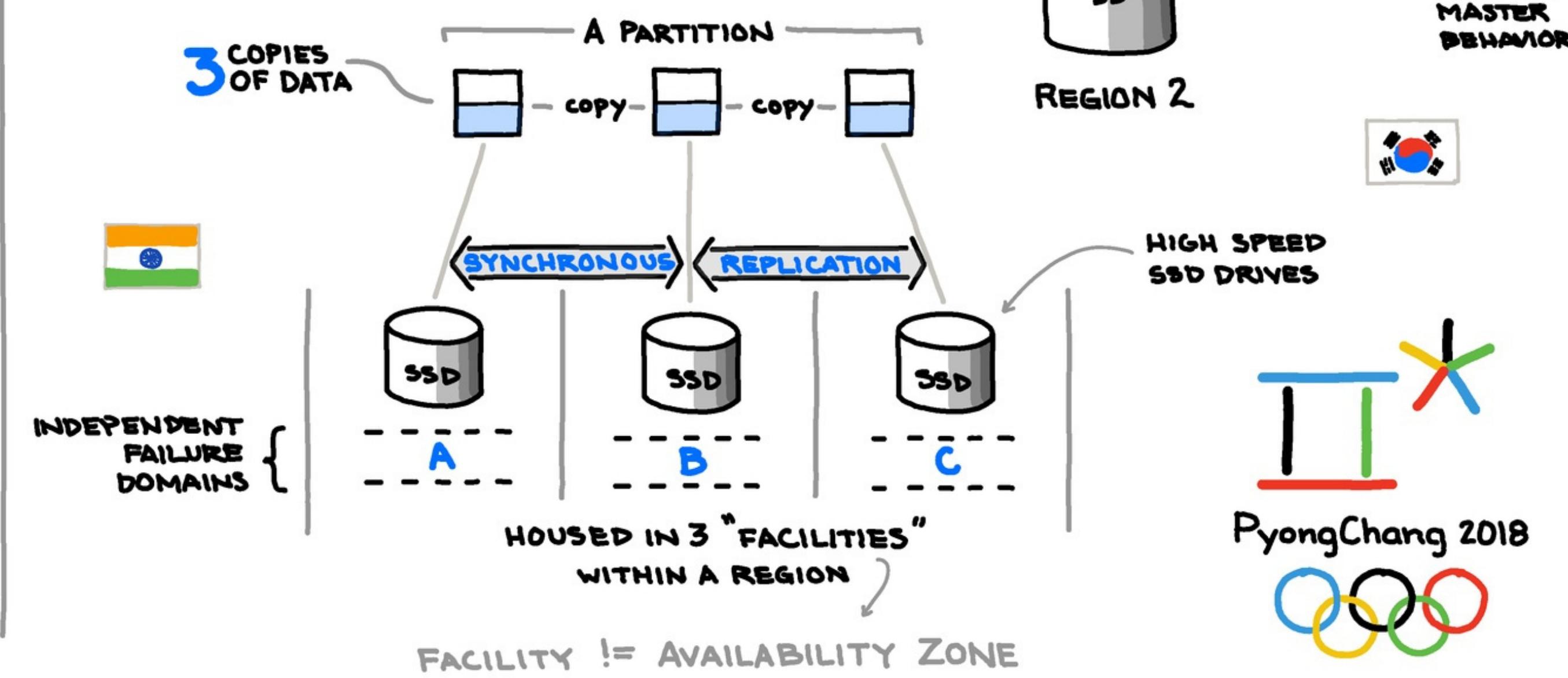


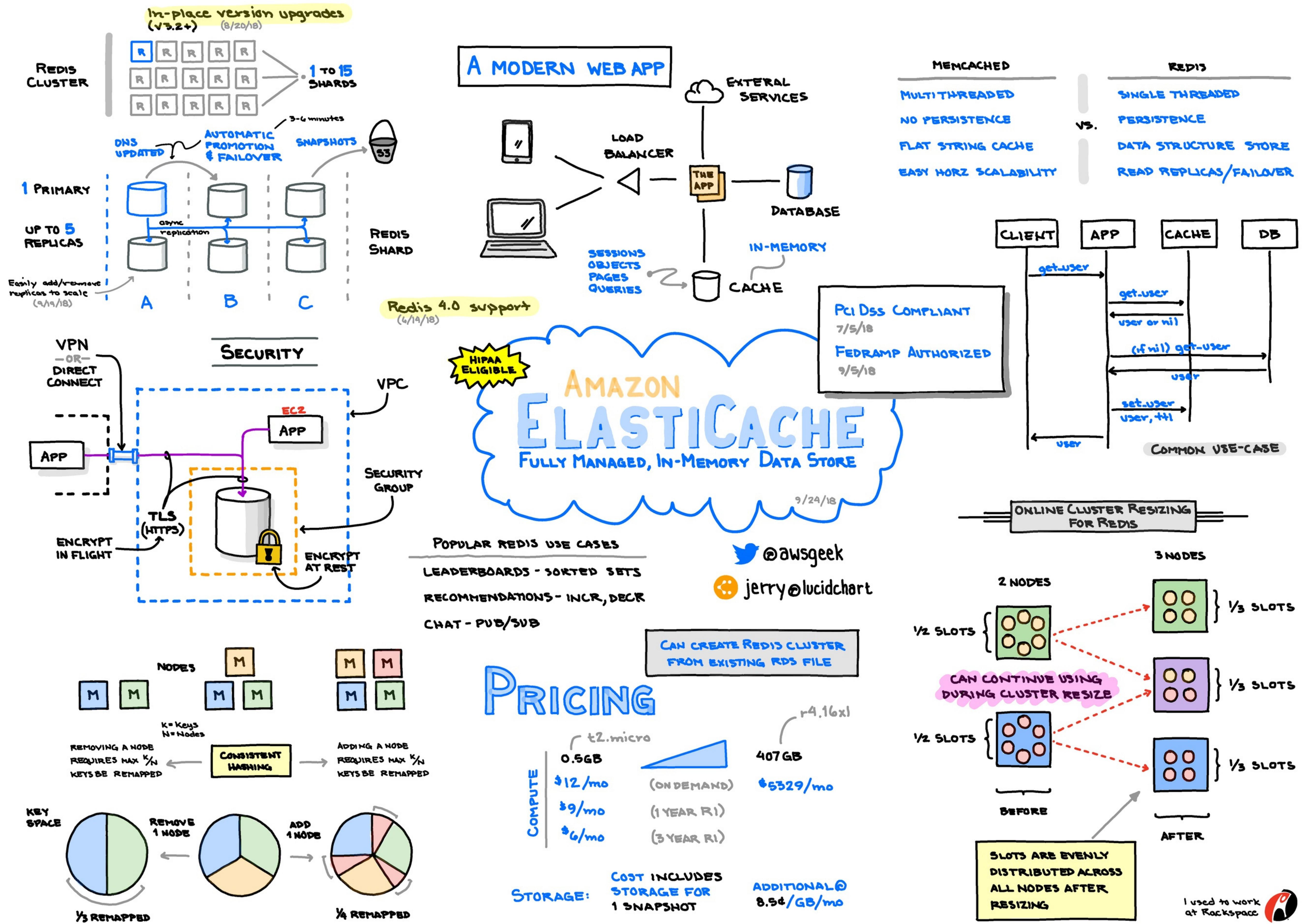
# amazon DYNAMO DB

a fast, flexible no-sql database

2/10/18

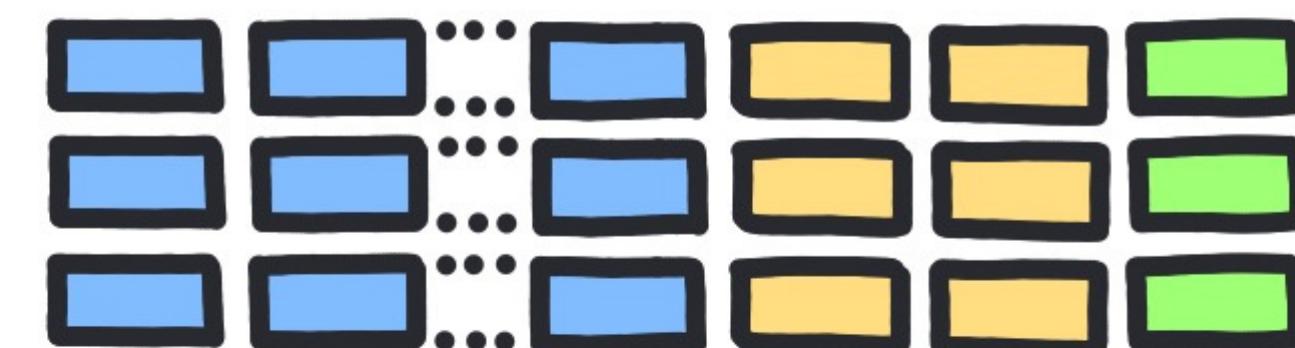
# AVAILABILITY





# TABLE

DIMENSIONS  
up to 128/table

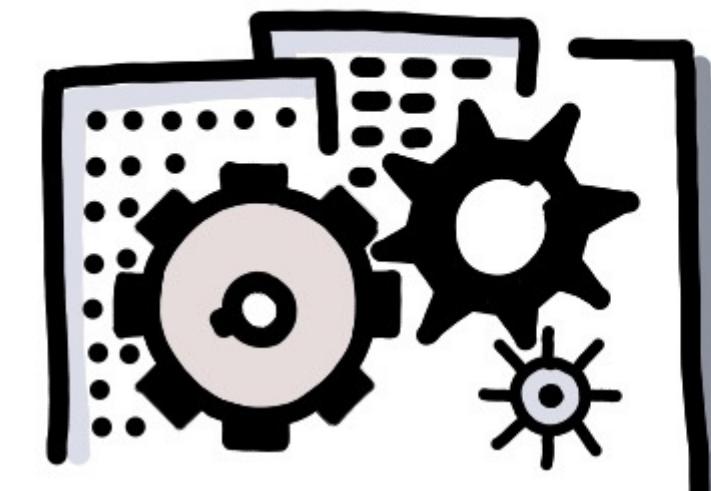


TIMESTAMP

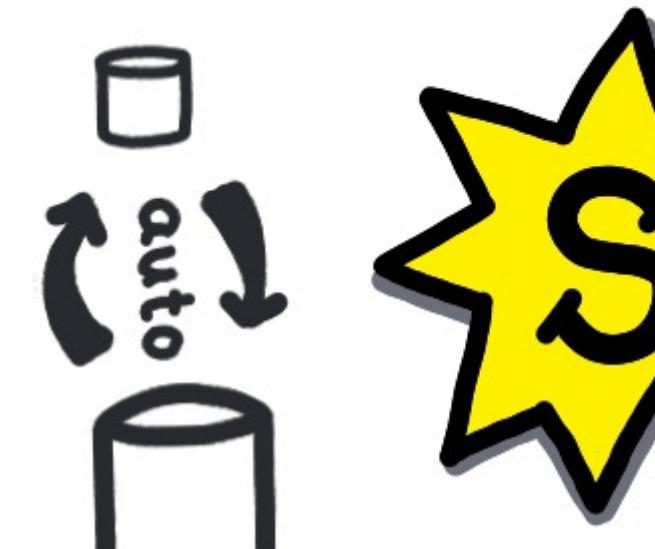
str, bool,  
big int, double

MEASURE NAME & VALUE:TYPE

TIME SERIES  
DATA

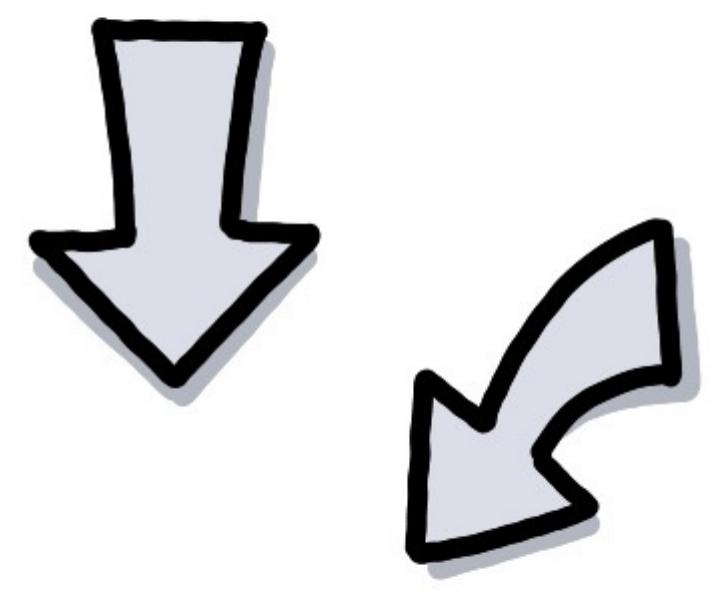


INDUSTRIAL  
TELEMETRY



SCALABLE

SENSOR  
DATA

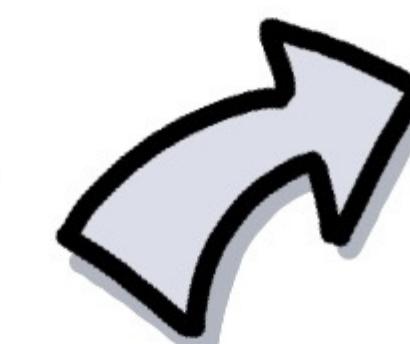


WEATHER

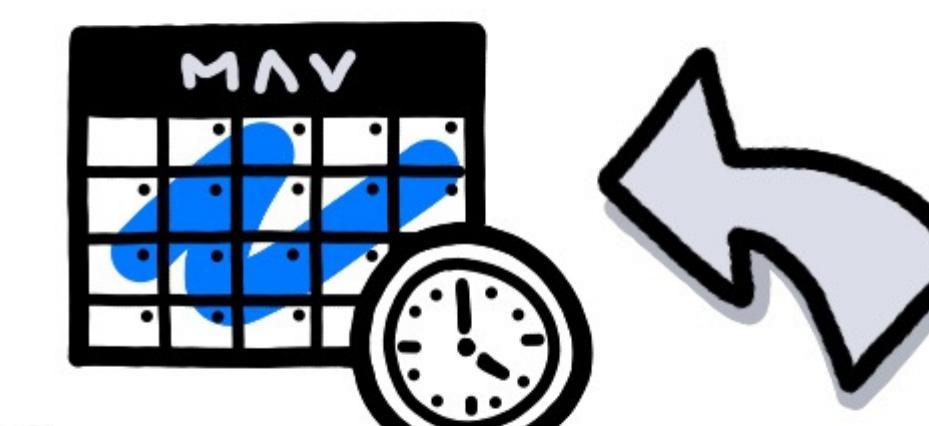


WWW

CLICKSTREAM



CLICK!



→ timestamped  
→ deduplicated

SERVER  
STATS



SECURE

DATA IS  
ALWAYS  
ENCRYPTED

SERVERLESS

MEMORY  
STORE

Monitoring  
Analytics



FAST  
QUERIES

1 hr → 1 yr  
RETENTION

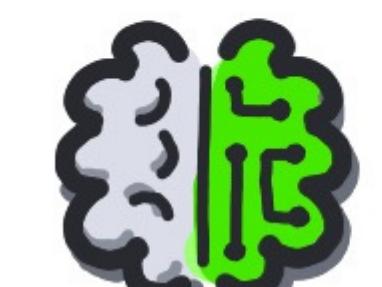


SSD  
STORE

AI/ML  
Biz Intel



USES  
a subset  
of SQL



MAGNETIC  
STORE



HISTORICAL  
QUERIES

1 day → 20 yr  
RETENTION



TIME-BASED  
RETENTION  
POLICY

# TIMESTREAM

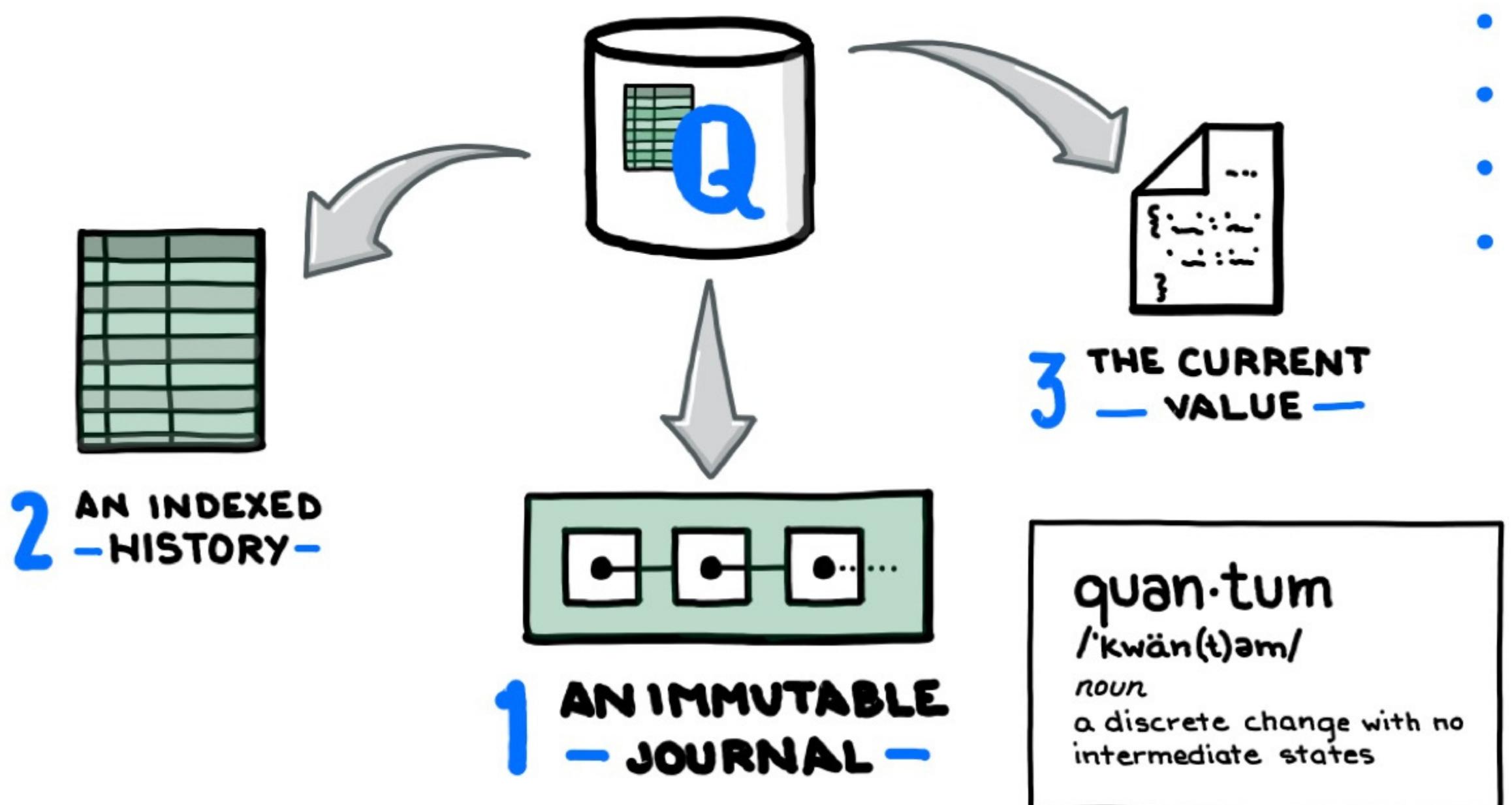
9/30/2020

TIME • SERIES • DATABASE

@awsgeek

CC BY SA 4.0

# WHAT IS A QUANTUM LEDGER DB?



## DATABASE

- FULLY TRANSACTIONAL
- ACID FUNCTIONALITY
- DOCUMENT DATA MODEL
- UN/STRUCTURED DATA

## STREAMING

- NEAR REAL TIME
- KINESIS DATA STREAMS

## SERVERLESS

- NO NODE PROVISIONING
- NO IO PROVISIONING

# How Much Does QLDB Cost?

**im·mu·ta·ble**  
*/i(m)'myooðab(ə)b/*  
 adjective  
 unchanging over time or unable to be changed

5¢ TO 9¢  
 PER GB

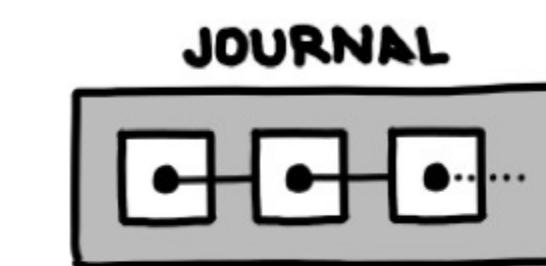
US EAST  
 (VIRGINIA)

70¢  
 WRITE / MILLION  
 REQUESTS

13.6¢  
 READ / MILLION  
 REQUESTS

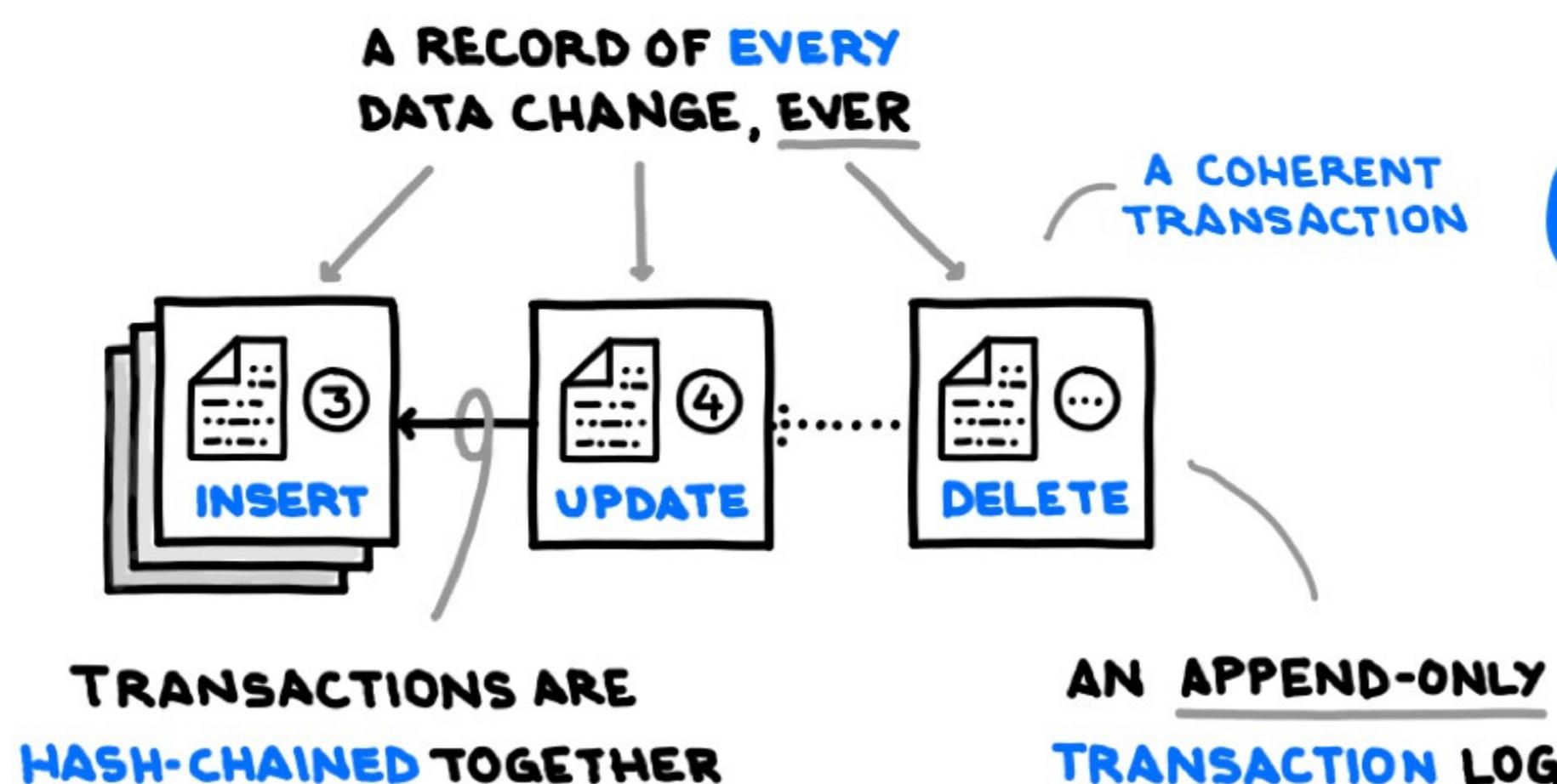


25¢ PER  
 GB/MO

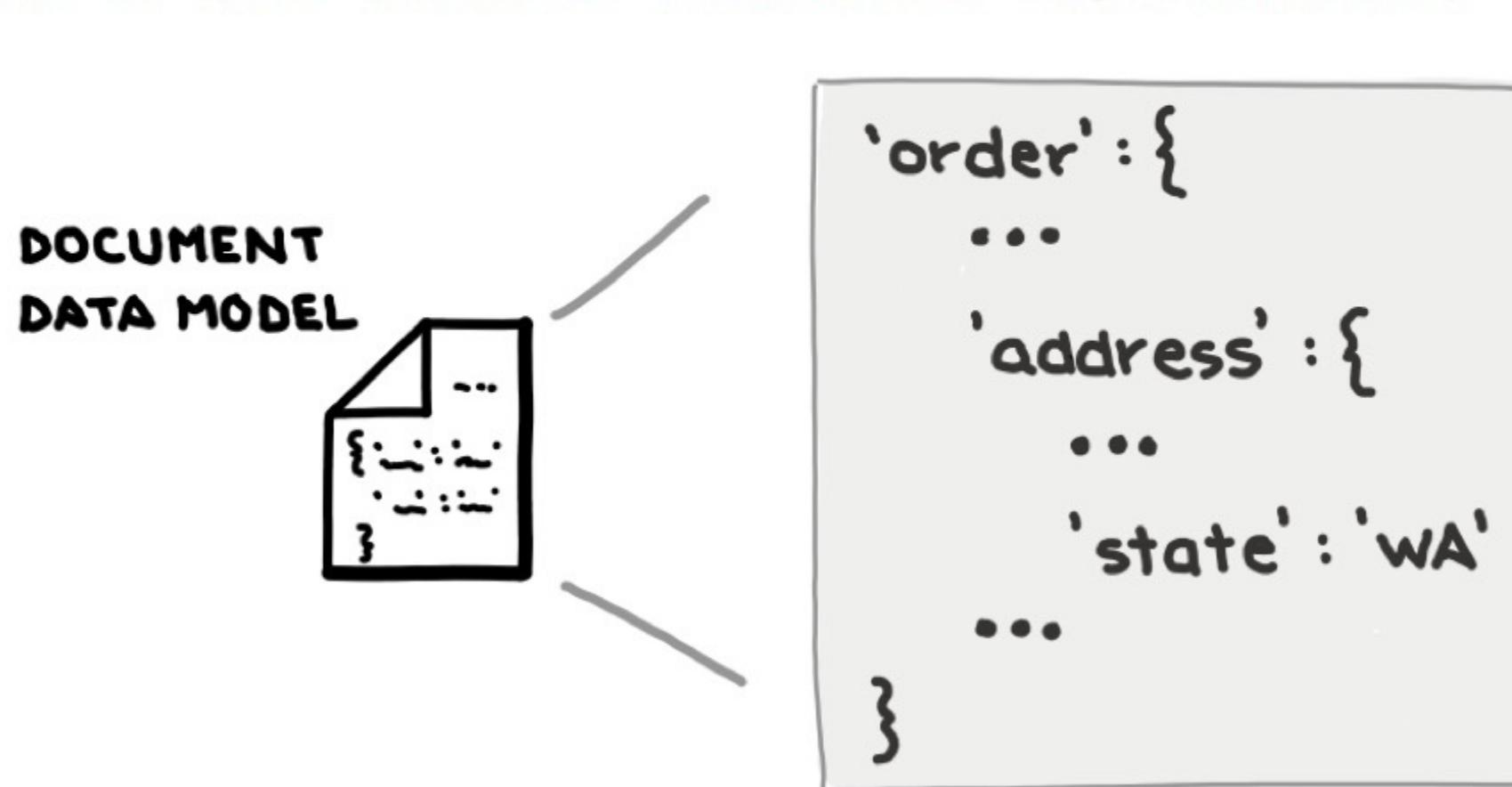


3¢ PER  
 GB/MO

# WHAT IS AN IMMUTABLE JOURNAL?



# How is Data Stored/Queried?



NESTED DOCS  
 LIKE JOINED  
 TABLES

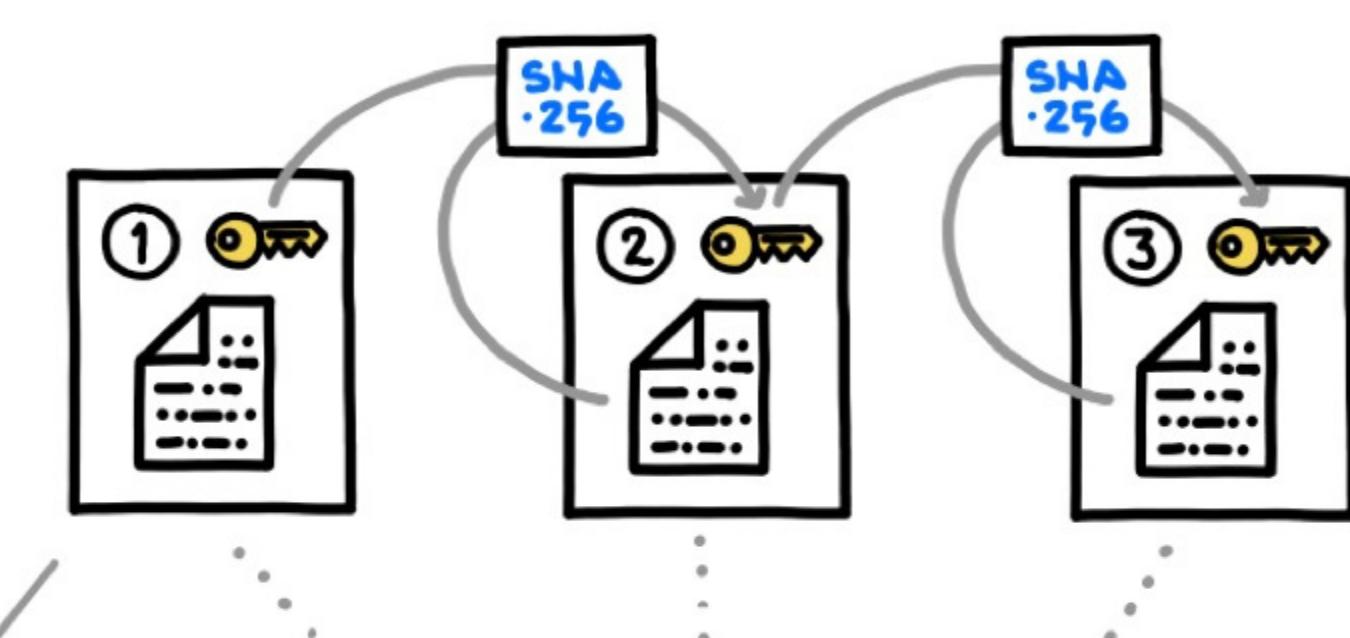
QUERY

SELECT \*  
 FROM orders AS o  
 WHERE o.address.state = 'WA'

## FOR SYSTEM OF RECORD APPS

- MANUFACTURING • HR
- INSURANCE • FINANCE
- SUPPLY CHAIN • PAYROLL

CHANGES  
 IMMEDIATELY  
 DETECTABLE



TRANSACTIONS RECORDS ARE CRYPTOGRAPHICALLY VERIFIABLE

# SOCIAL NETWORKING

GROUP FRIENDS WHO LIKE OR DISLIKE SIMILAR THINGS

**RECOMENDATION ENGINE**  
MAKE PURCHASE SUGGESTIONS BASED ON OTHER USERS  
WITH SIMILAR INTERESTS

**FRAUD DETECTION**  
DETECT CONNECTIONS TO KNOWN FRAUD SCENARIOS

# KNOWLEDGE GRAPHS

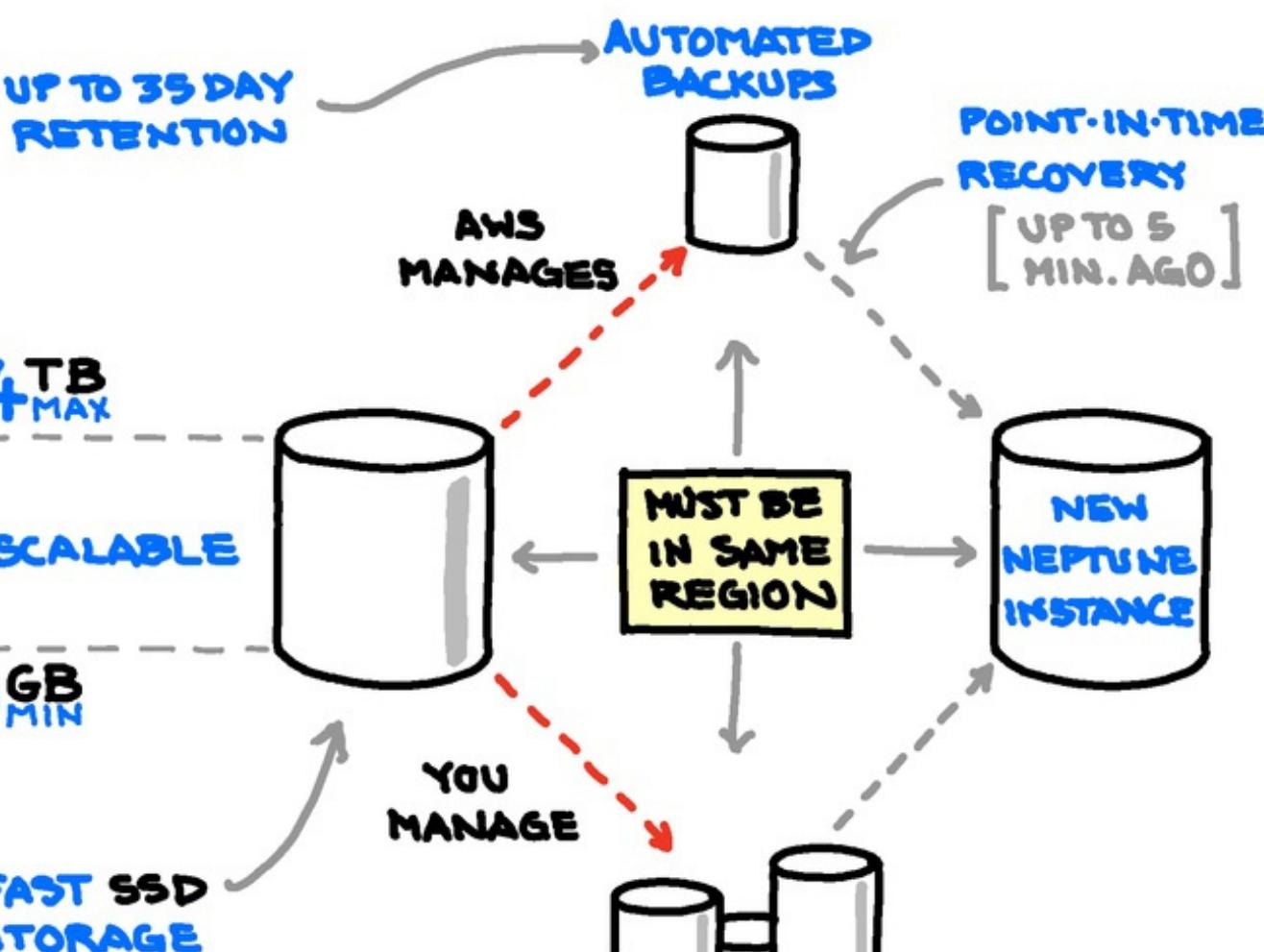
STORE AND QUERY INFO & RELATIONSHIPS BETWEEN USERS

# LIFE SCIENCES

## SECURELY STORE AND PROCESS PATIENT & HEALTHCARE DATA

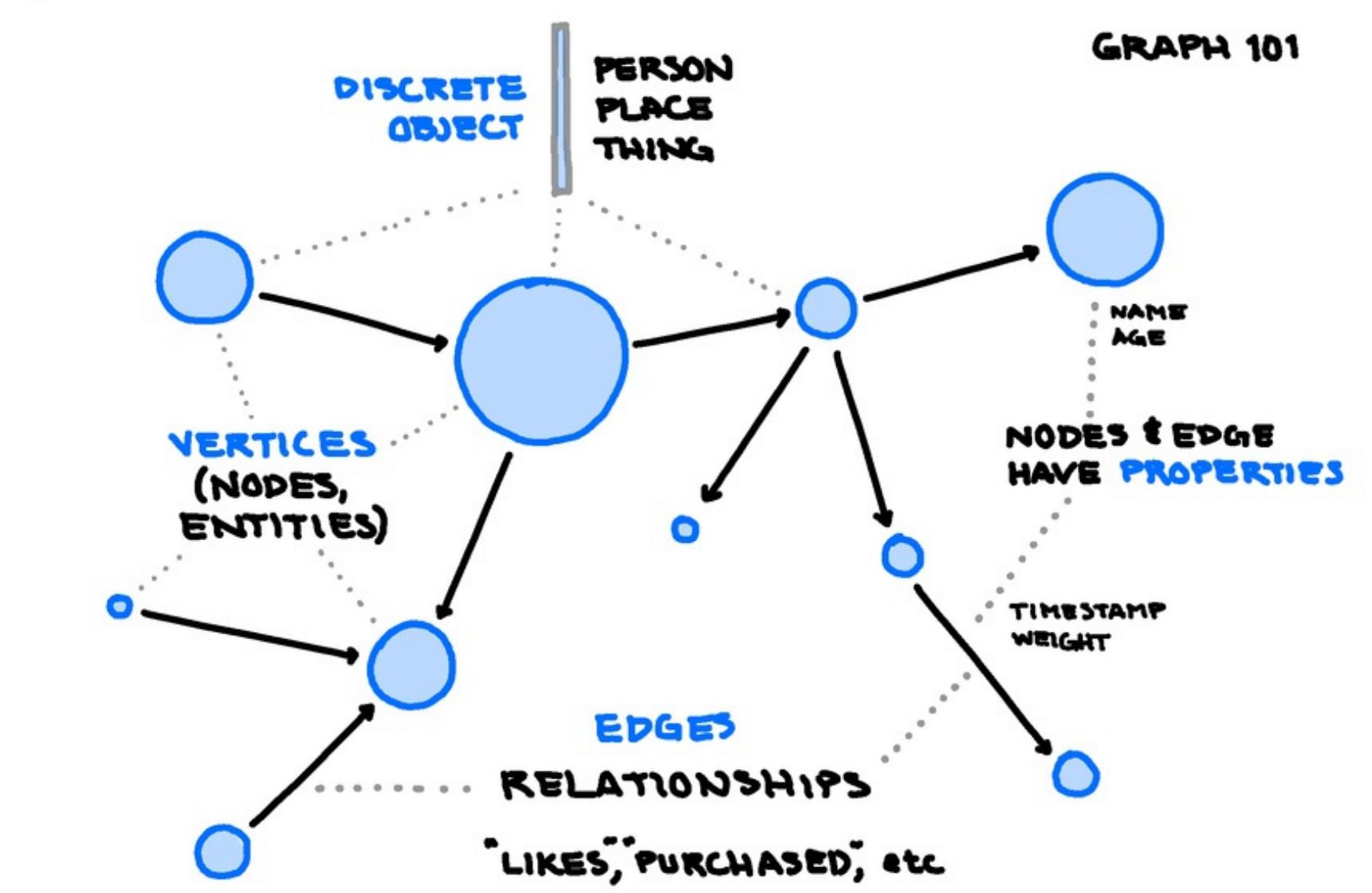
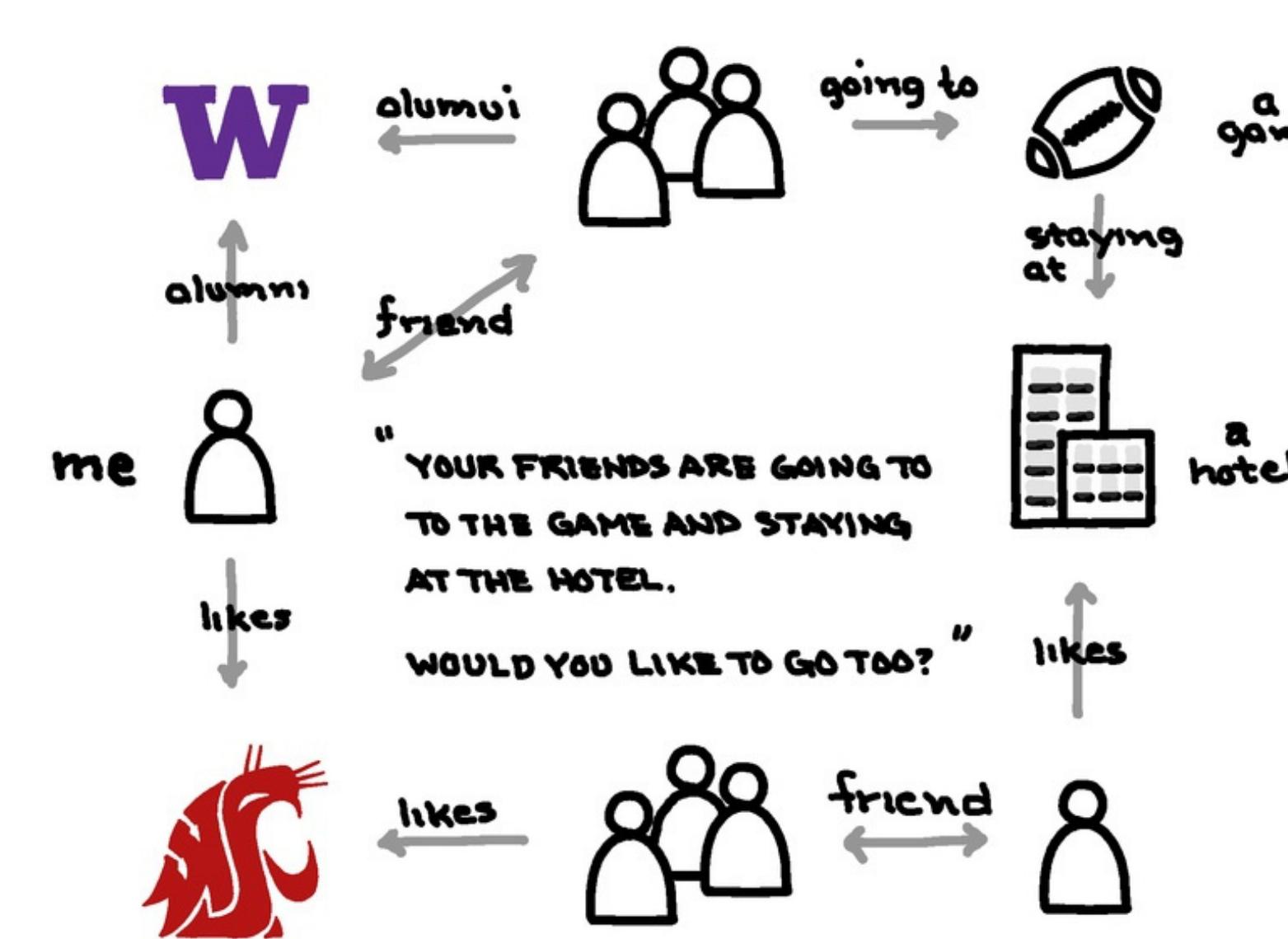
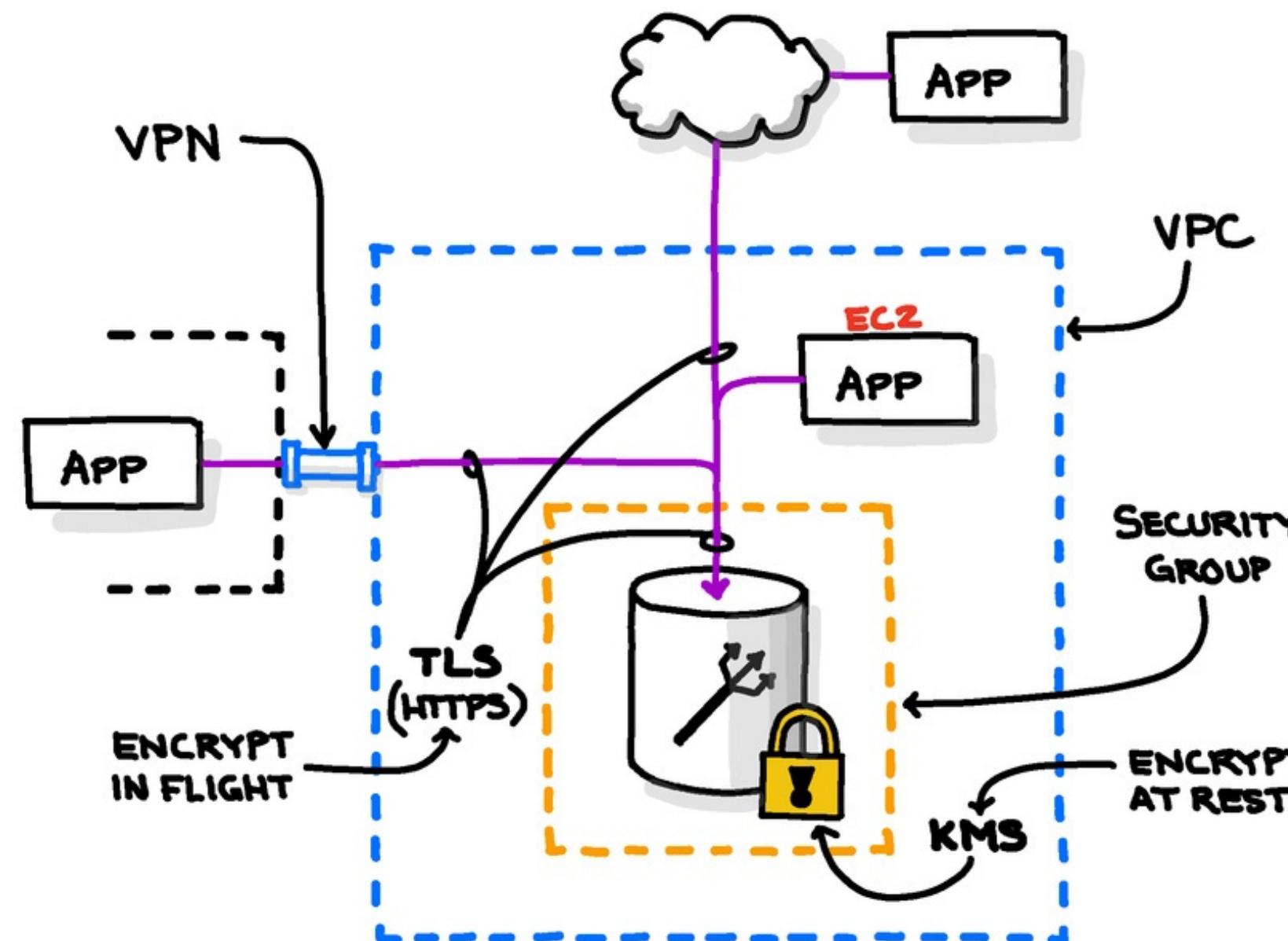
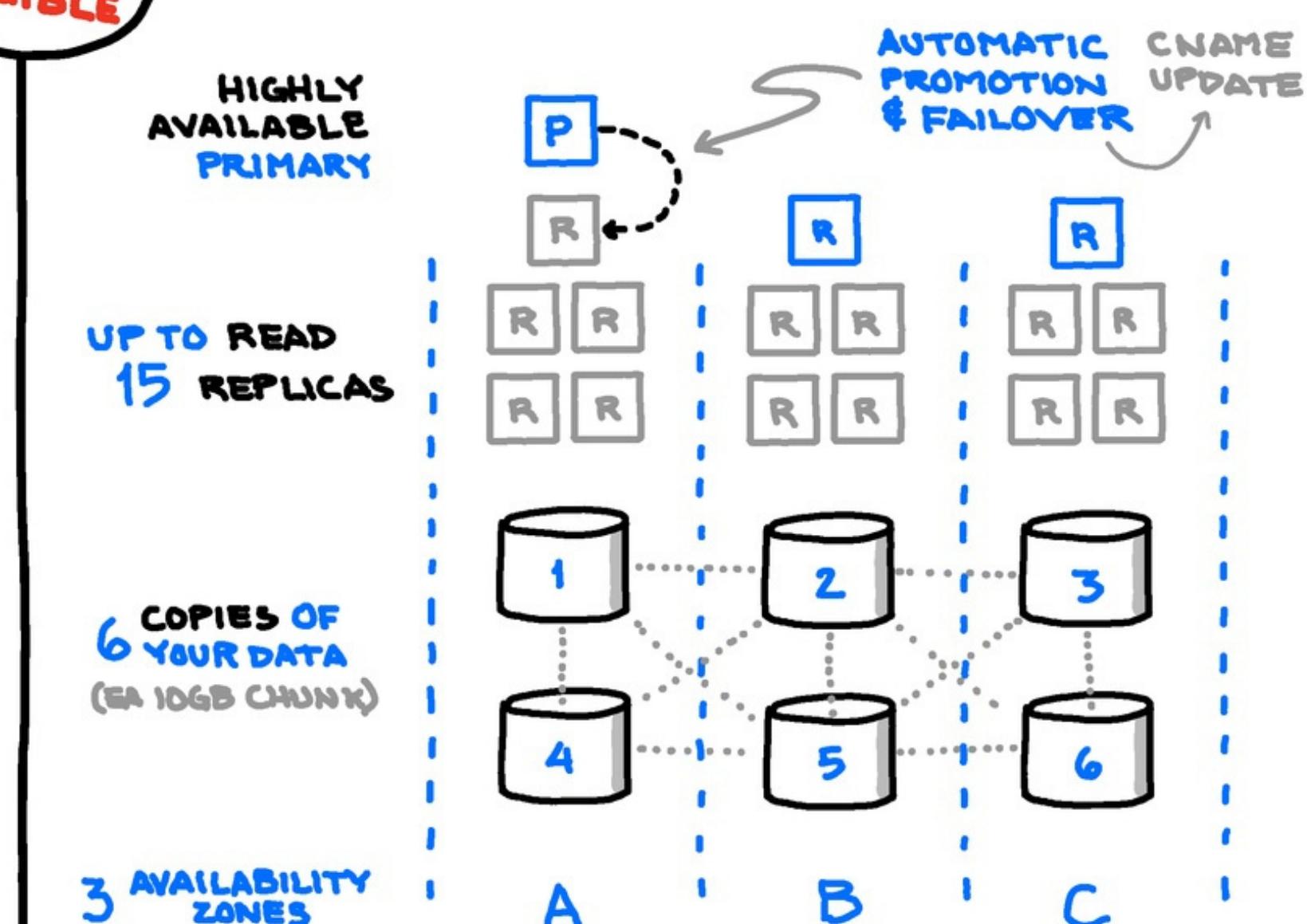
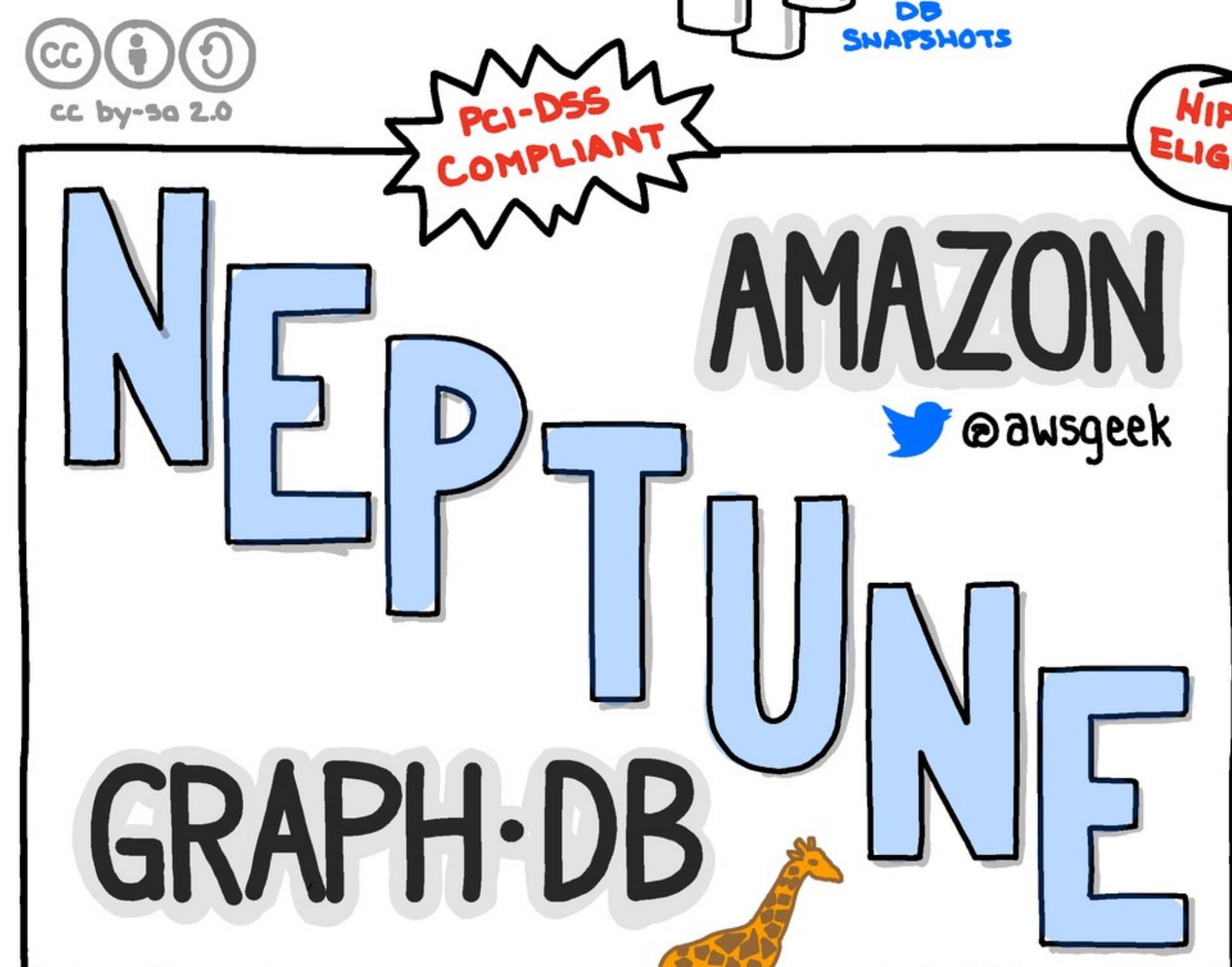
# NETWORK/IT OPS

STORE NETWORK TOPOLOGY & DISCOVER RELATIONSHIPS  
BETWEEN HOSTS



# PRICING

ON-DEMAND	PRIMARY - PER HOUR REPLICAS - SAME	STARTING AT 35¢/HR FOR R4.LG
STORAGE	10¢/GB/MO	
IO	20¢/MILLION REQUESTS	per 16 KB read 4 KB write
BACKUPS	UP TO DB SIZE, FREE \$3 RATES AFTER	
DATA TRANSFER	IN .. FREE OUT .. 2¢/GB TO OTHER REGION .. 9¢/GB TO INTERNET	



# — AMAZON —

# DocumentDB

with MongoDB compatibility

