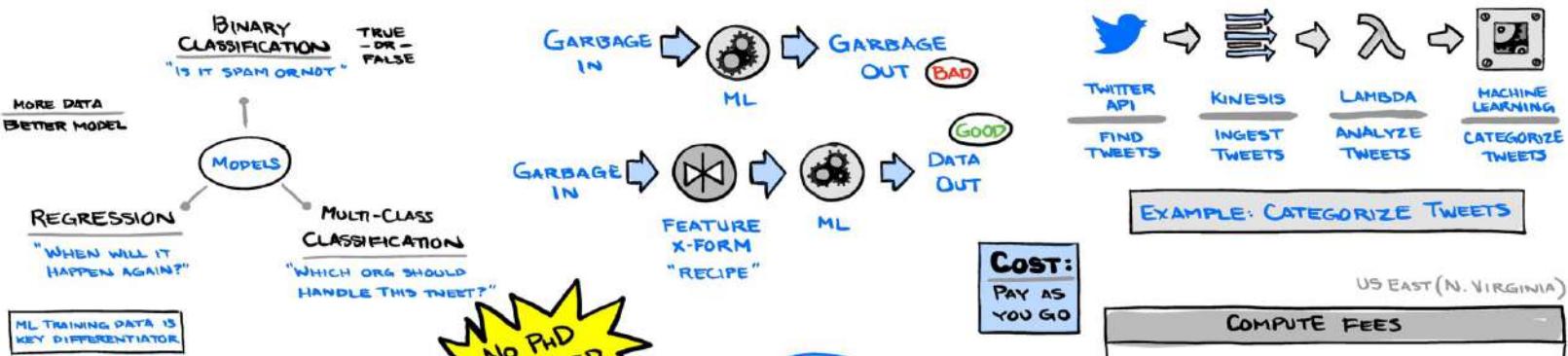


The image features a large, stylized orange cloud shape centered against a white background. Inside the cloud, the letters "AWS" are written in a bold, white, sans-serif font. The cloud has a soft, rounded edge and a slight shadow underneath, giving it a three-dimensional appearance. Below the cloud, there is a dense arrangement of various colored circles in shades of orange, yellow, red, blue, and cream, creating a layered, abstract base.

AWS



USE CASES

- FRAUD DETECTION
- DOC CLASSIFICATION
- SENTIMENT ANALYSIS
- DEMAND FORECASTING
- CLICK PREDICTION
- CUSTOMER CHURN
- MARKETING INTEL



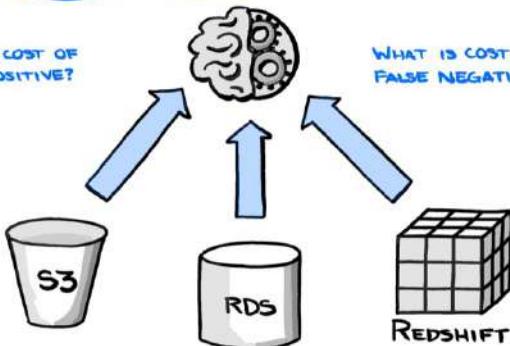
SUPERVISED LEARNING

- HISTORICAL DATA
- KNOWN INPUTS
- KNOWN OUTCOMES

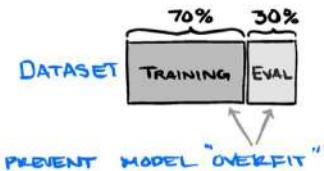


WHAT IS COST OF FALSE POSITIVE?

WHAT IS COST OF FALSE NEGATIVE?



COMPUTE FEES	
DATA ANALYSIS * MODEL BUILDING	42¢/HR
PREDICTION FEES	
BATCH OR REAL-TIME 10¢/1K $\frac{1}{100}$ ¢/EA + $\frac{1}{10}$ ¢/HR/10 MB MEMORY	MEMORY



THE ZEN OF CLOUD OPTIMIZATION

The Path to Total Enlightenment



jerry.hargrove@
awsgeek

① Know Your Objectives



What is your destination?

What are your goals?

- Cost savings
- Disaster recovery
- High Availability

You can have
your cake and
eat it too*



*As long as it's white
with vanilla frosting
and lemon filling



③ Know Your Constraints

Establish boundaries

Use guardrails



Budget

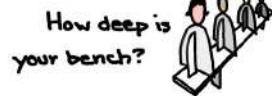


Staffing

⑤ Know Your Capabilities



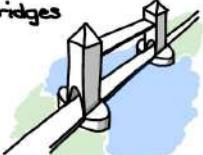
How full is
your tank?



⑥ Know Your Weaknesses

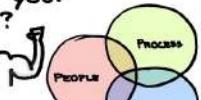
To Do:

1. Identify gaps
2. Build bridges



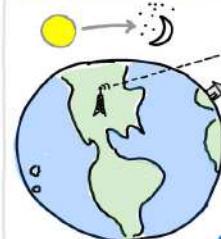
⑥ Know Your Workloads

What are your
strengths?



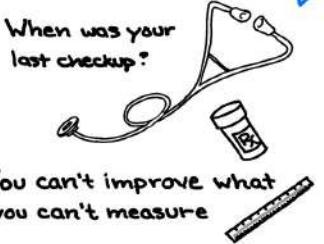
Where are
your weaknesses?

⑦ Know Your Customers



- Who?
- What?
- Where?
- When?
- Why?
- How?

⑧ Know Your Metrics



⑨ Know Your Options

Avoid:

- Do it yourself
- Not invented here



Embrace:

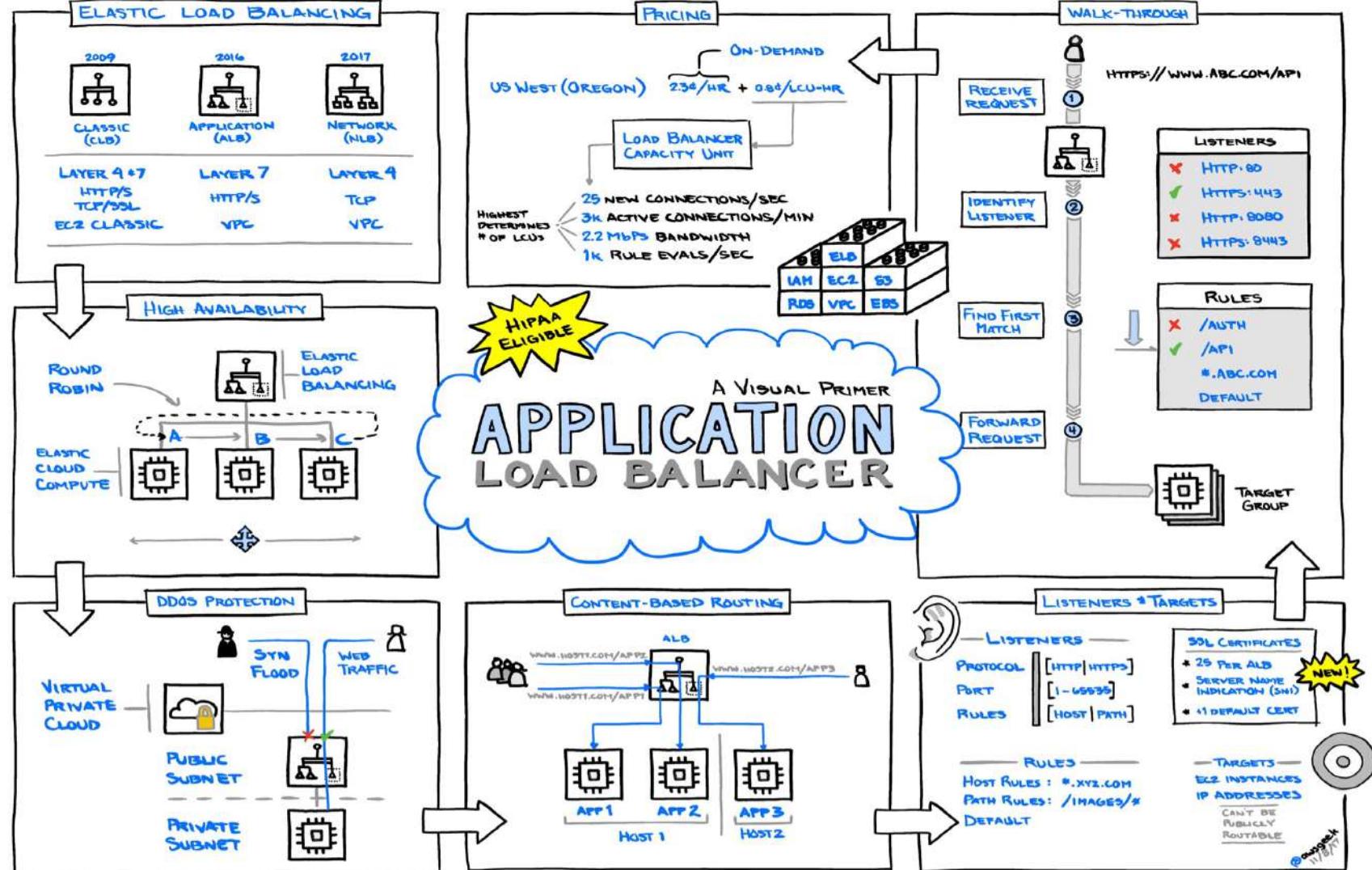
- Managed services
-

⑩ Know your past

Or be destined
to repeat it

over and
over and
over ...



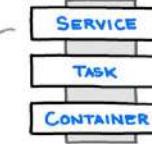


CONTAINER SERVICES PLATFORM



AMAZON EC2
CONTAINER
REGISTRY

- PRIVATE DOCKER REGISTRY
- STORE, MANAGE & DEPLOY IMAGES
- INTEGRATED WITH ECS
- SECURED WITH IAM



ECS TASK:

- DOCKER IMAGE
- CPU & MEMORY NEEDED
- NETWORKING & PORTS
- CONTAINER LINKAGE
- STORAGE VOLUMES
- IAM ROLES

TOOLING

- CLOUDFORMATION
- AWS CONSOLE
- COMMAND LINE
- AWS SDKS

COST

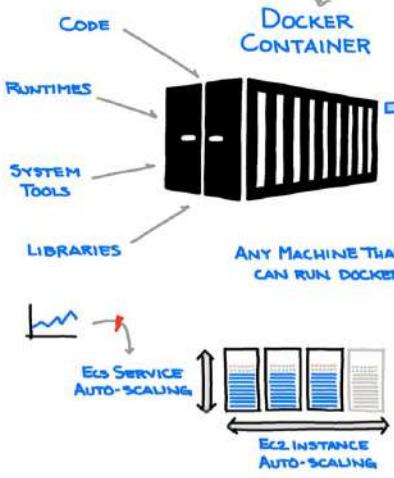
PAY FOR EC2, EBS, ETC
NO ADD'L COST FOR ECS

POINT IN TIME
CODE AND
DEPENDENCIES

ECS SERVICE:

- MANAGE LONG RUNNING TASKS
- RESTART FAILED TASKS
- MONITOR RUNNING TASKS
- AUTOMATE STARTING TASKS

POINT IN TIME
CONTAINER
CONFIGURATION

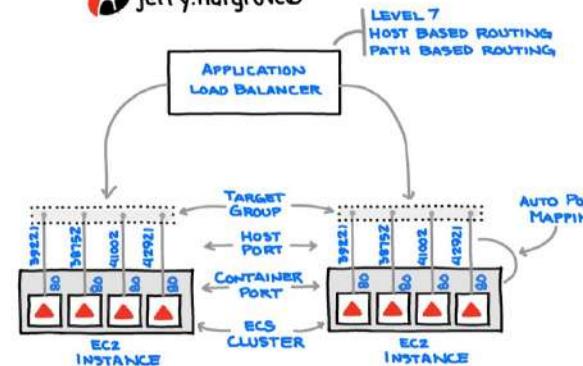


ANY MACHINE THAT
CAN RUN DOCKER

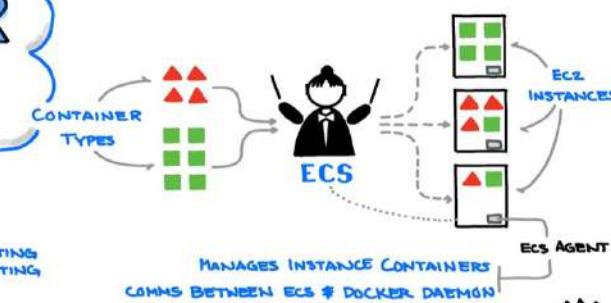
AMAZON ELASTIC CONTAINER SERVICE

@awsgeek
11/24/17

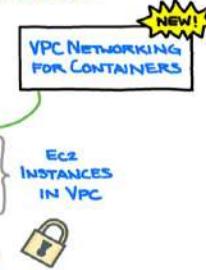
TASK PLACEMENT STRATEGIES



ECS AUTOMATES FLEET OF EC2 INSTANCES
TO DEPLOY & RUN DOCKER CONTAINERS ON



MANAGES INSTANCE CONTAINERS
COMMS BETWEEN ECS & DOCKER DAEMON



ON DEMAND
SPOT AND/OR
RESERVED

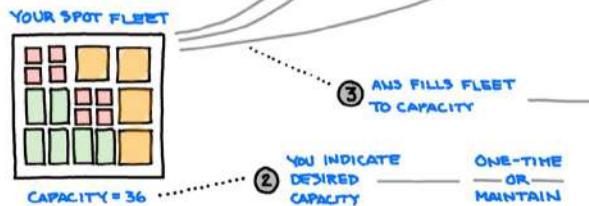
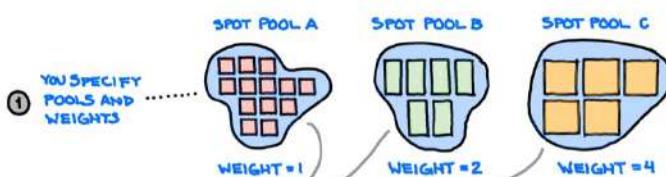
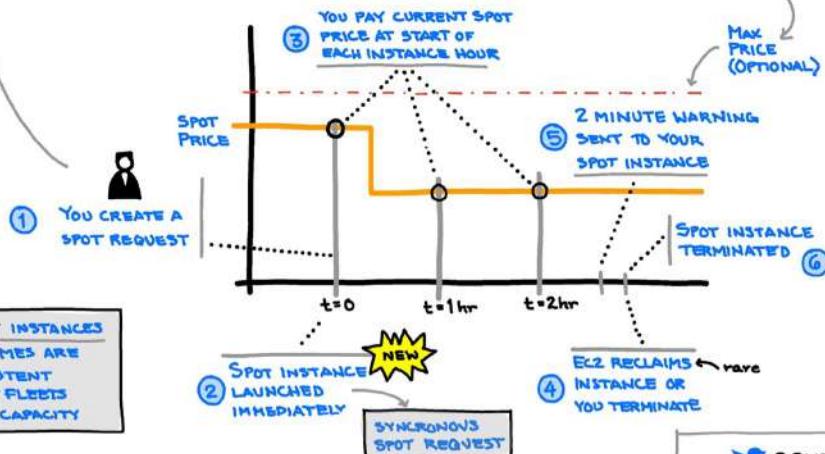
SPOT REQUEST

- INSTANCE TYPE
- INSTANCES COUNT
- MAXIMUM PRICE
- AVAILABILITY ZONE

SPOT POOL

SAME INSTANCE TYPE
SAME AVAILABILITY ZONE
SAME OPERATING SYSTEM

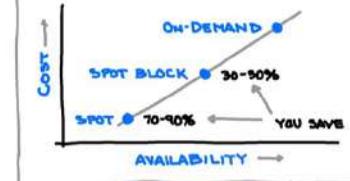
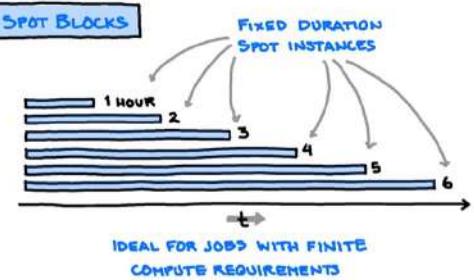
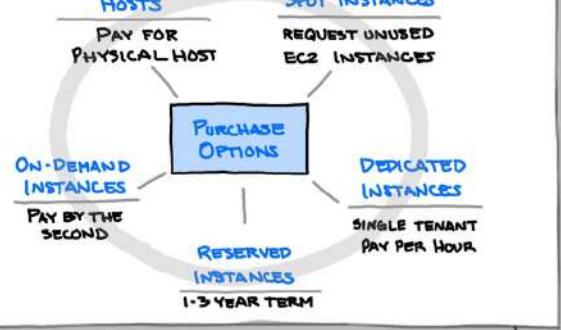
BEHAVES LIKE
OLD 'BID PRICE'



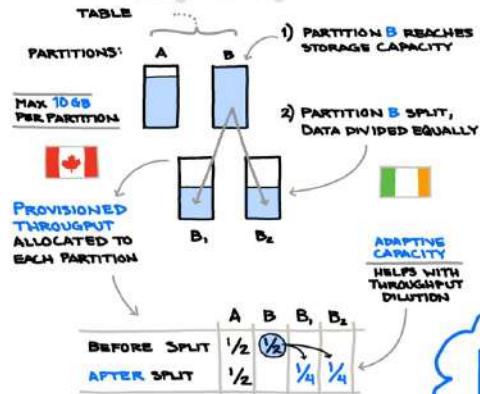
ALLOCATION STRATEGY
USE CHEAPEST POOL
OR
EQUALLY DISTRIBUTE

AMAZON EC2 SPOT INSTANCES

11/29/17



SCALABILITY



PRICING

STORAGE	\$ 0.25/GB/MO
READS	\$ 0.00015/RCU/HOUR
WRITES	\$ 0.00065/WCU/HOUR
BACKUPS	\$ 0.10/GB/MO
RESTORES	\$ 0.15/GB
PROVISIONED THROUGHPUT	

RESERVED CAPACITY PRICING AVAILABLE

1 WRITE CAPACITY UNIT

1 READ CAPACITY UNIT

1 WRITE PER SECOND, UP TO 1 KB

1 READ PER SECOND, UP TO 4 KB

(2X IF INCONSISTENT)

ESSENTIALS

KEY-VALUE OR DOCUMENT STORE

PARTITIONS HOLD UP TO 10 GB

UP TO 1000 WCU - OR - 3000 RCU

HASH (PK) = PARTITION

PARTITION KEY

+ LOCAL & GLOBAL SECONDARY INDICES

ITEMS

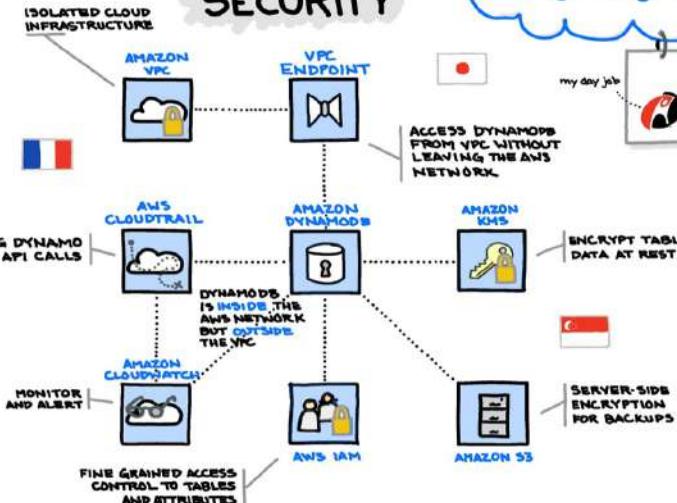
400 KB MAX PER ITEM

A TABLE

SORT KEY (OPTIONAL)

ATTRIBUTES

SECURITY



amazon DYNAMO DB

a fast, flexible no-sql database

1/10/18

AVAILABILITY

3 COPIES OF DATA

A PARTITION

copy copy

REGION 2

DYNAMIC DB

ASYNC REPLICATION

DYNAMO DB STREAMS

NEAR REAL-TIME CROSS-REGION REPLICATION

MASTER MASTER BEHAVIOR

KOREA

HIGH SPEED SSD DRIVES



FACILITY != AVAILABILITY ZONE

INDEPENDENT FAILURE DOMAINS

SSD

SSD

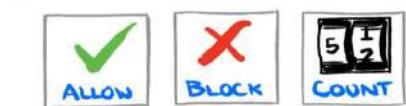
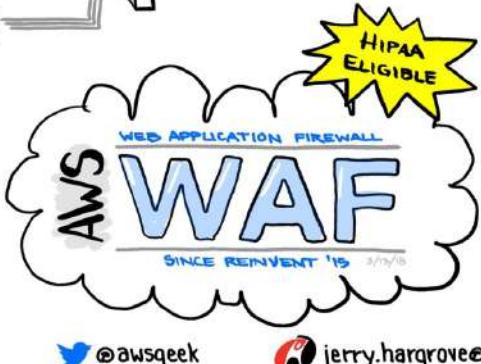
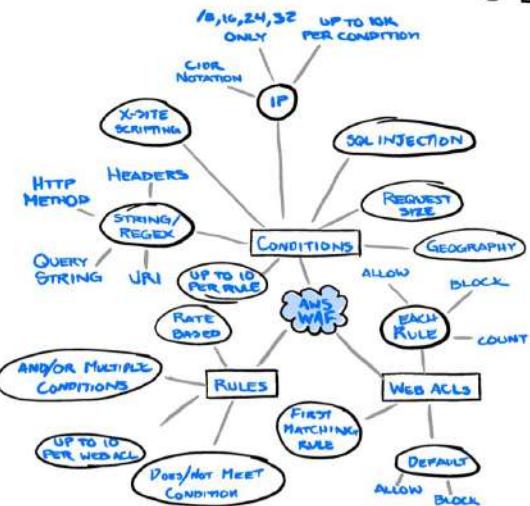
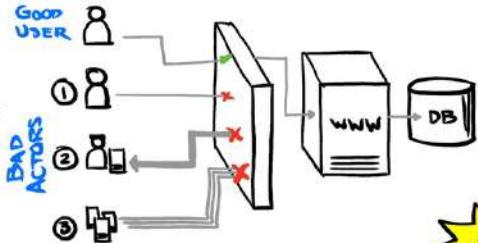
SSD

A B C

HOUSED IN 3 "FACILITIES" WITHIN A REGION

COMMON WAF USE CASES

- PREPVENT
 - ① MALICIOUS USERS
 - ② CONTENT ABUSE
 - ③ DDOS ATTACKS



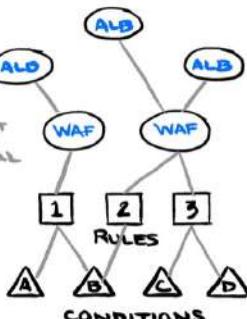
\$ #5/WEB ACL/Mo
\$1/RULE/WEBACL/Mo
604/MM REQUESTS



FOLLOW:
AWS SECURITY BLOG

* ACL, RULE, CONDITION ARE EITHER GLOBAL OR REGIONAL SPECIFIC

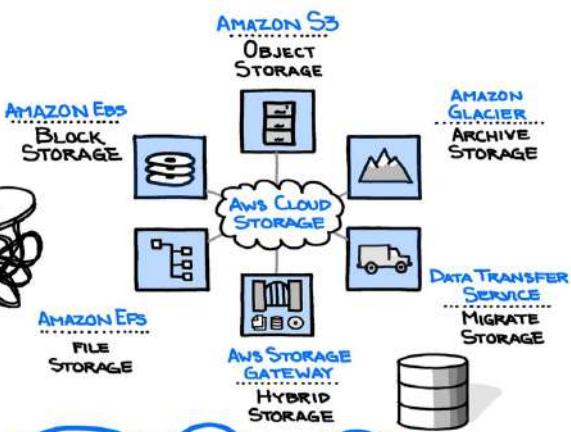
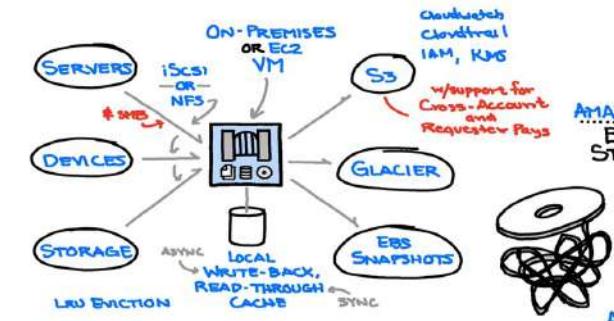
* REGIONAL MAY NOT BE USED BY GLOBAL AND VISA-VERSA



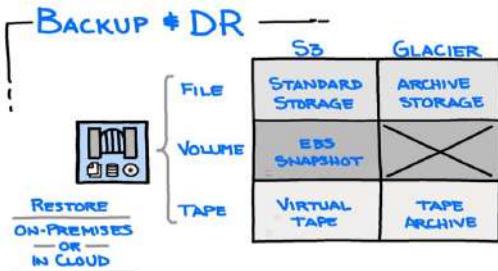
PRECONFIGURED PROTECTIONS

- ★ BAD BOT/SCRAPER
- ★ SQL INJECTION
- ★ CROSS-SITE SCRIPTING
- ★ HTTP FLOOD, SCANNER, PROBE
- ★ IP WHITE/BLACK LIST
- ★ KNOWN ATTACKER

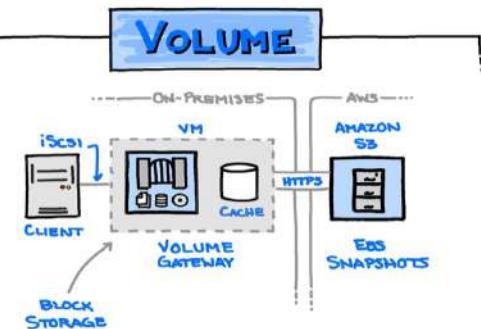
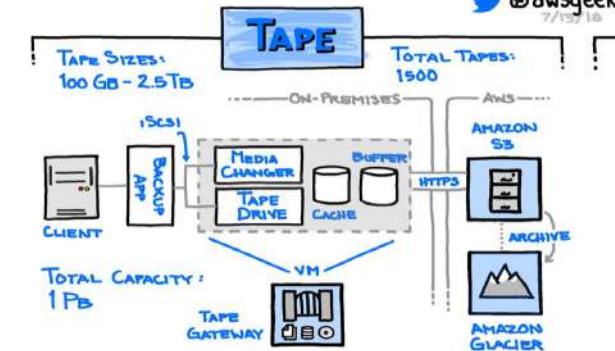
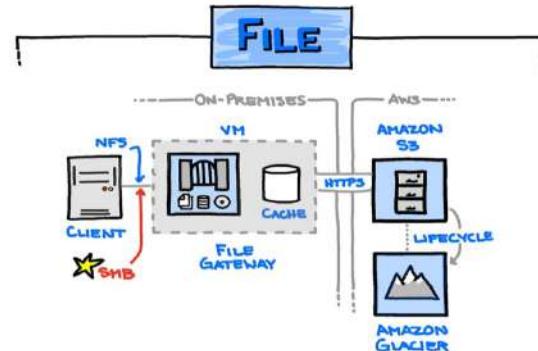
VIA CLOUDFORMATION
NEW OR EXISTING WAF



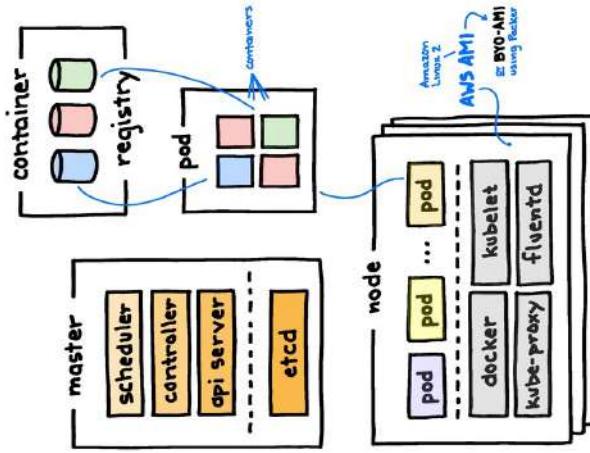
COST		
FILE	VOLUME	TAPE
1d /GB \Rightarrow \$125 MAX/Mo		
SS COSTS	2.34 GB/Mo	2.34 GB/Mo
	EBS COSTS SNAPSHOTS	0.44 GB/Mo ARCHIVE
STANDARD RATES		



- STANDARD STORAGE PROTOCOLS
- LOCAL CACHING OF HOT DATA
- DURABLE AWS STORAGE

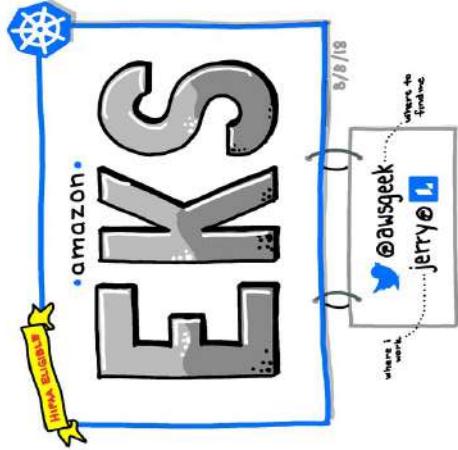


KUBERNETES

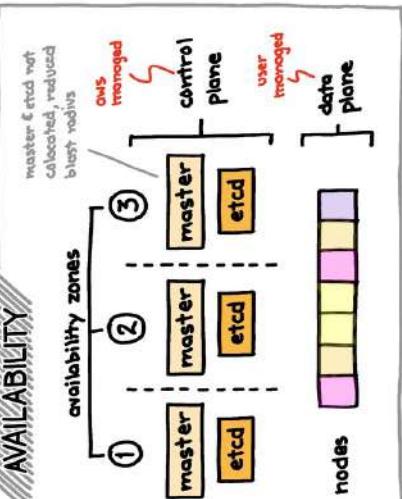


PRICING

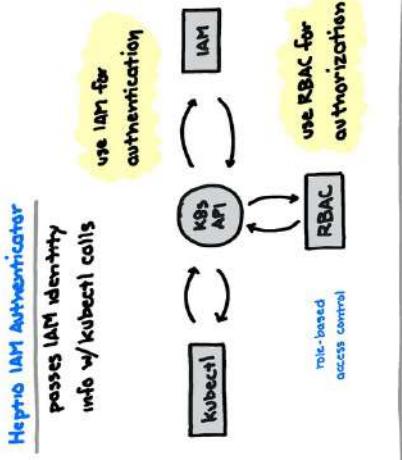
\$ 0.20/hr / cluster → \$199/mo / cluster
PLUS EC2 and EBS costs for worker nodes



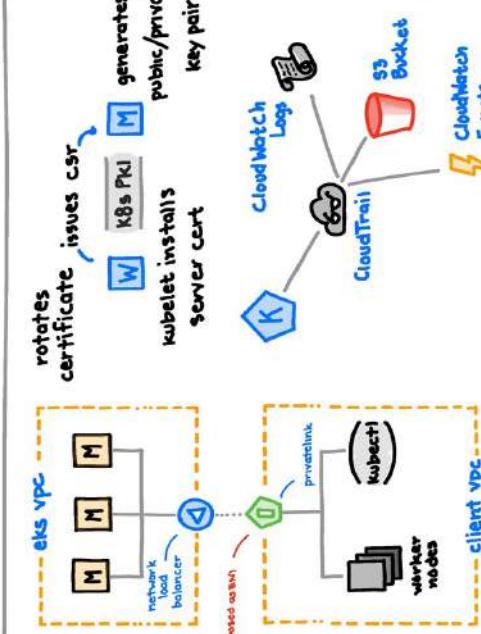
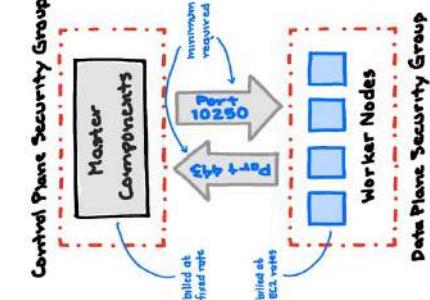
AVAILABILITY

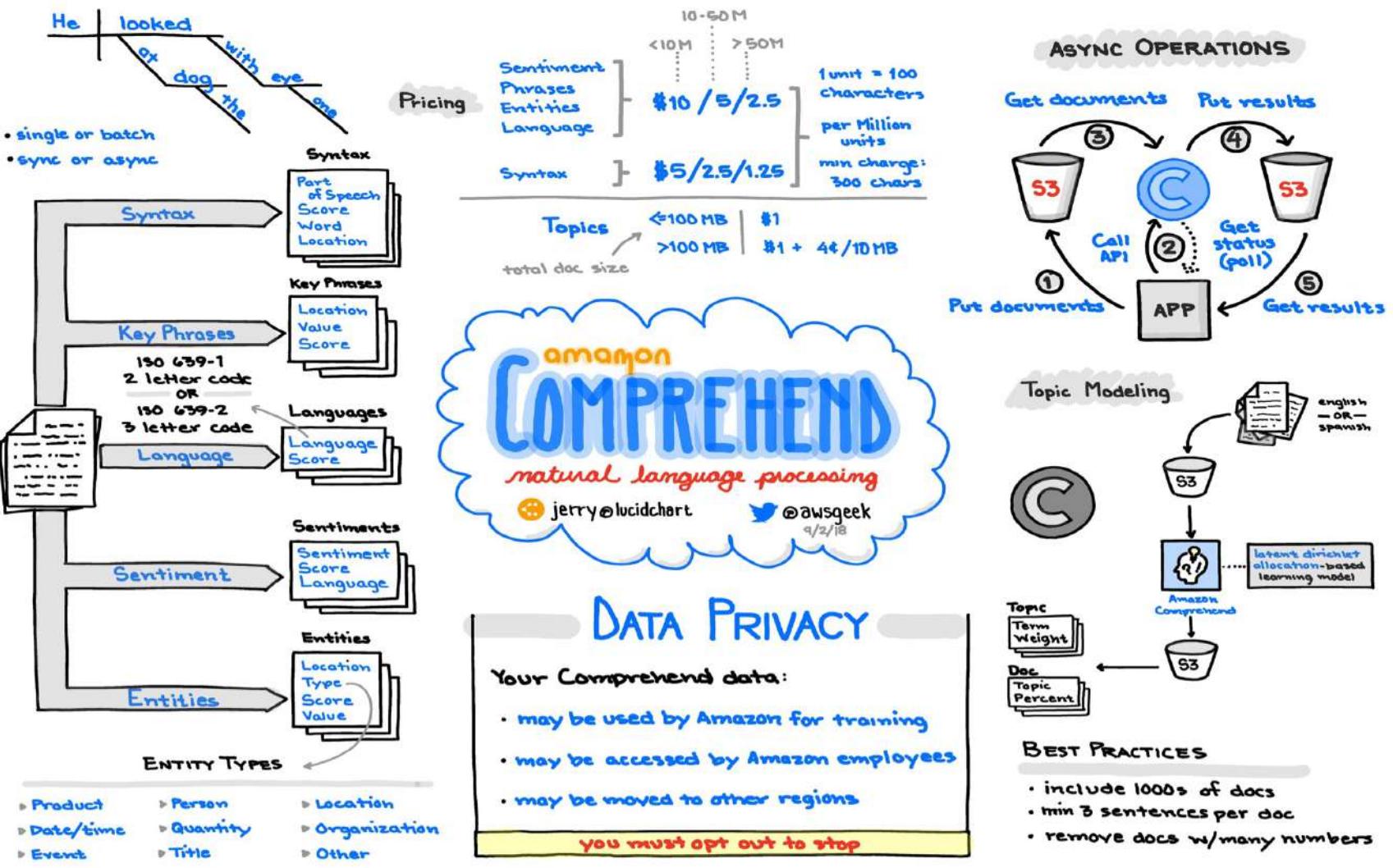


AUTH

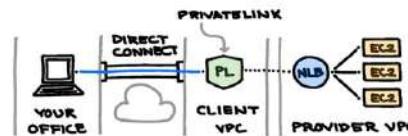


SECURITY





PRIVATELINK ADDRESSES ARE PRIVATE
NO PUBLIC IP ADDRESSES!!



EXPOSED AS ENI IN CLIENT VPC
CAN APPLY SECURITY GROUPS TO ENI

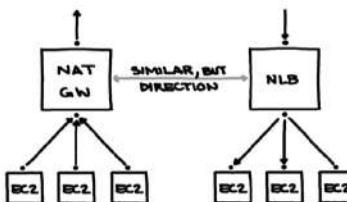
NO CROSS-REGION SUPPORT

BOTH REGIONAL & ZONAL DNS NAMES

USE FOR BETTER AVAILABILITY, LATENCY
(REMEMBER, ZONES DIFFER BY ACCOUNT)
MY 'A' MAY NOT BE YOUR 'A'

HYPERPLANE NODES

- BASED ON LB LOAD BALANCER ARCHITECTURE
- HYPERPLANE NODES ARE REALLY EC2 INSTANCES
- USED BY AWS TO MANAGE STATE & ROUTE PACKETS



PRICING: (OREGON)
16/ENDPOINT/AZ/HR
16/GB DATA

FOR CUSTOMERS & PARTNERS

EXPOSE YOUR SERVICE IN OTHER VPCS
LIFECYCLE EVENTS VIA SNS

FOR AWS SERVICES

BUILDS ON ENDPOINTS: S3, DYNAMODB

CLOUDWATCH, SNS, SAGEMAKER

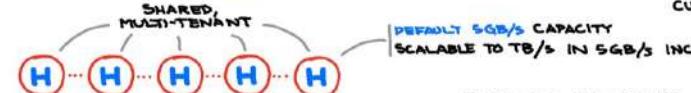
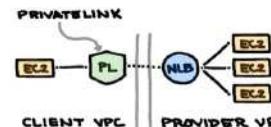
KINESIS, CODEBUILD, CONFIG

EC2, API GATEWAY, AWS SERVICE CATALOG

ELB, CLOUDFORMATION

EC2 SYSTEMS MANAGER

PRIVATELINK



NAT GW MUST ENSURE ALL CONNECTIONS TO DEST IP/PORT COME FROM UNIQUE SOURCE PORT

NLB MUST SELECT & ROUTE CONNECTIONS TO SAME TARGET

DEALING WITH NOISY NEIGHBORS? SHUFFLE SHARDING

- GIVE EACH CUSTOMER N RANDOM NODES AMONG MANY
- ONLY A SMALL PERCENTAGE WILL OVERLAP
- ISOLATE REALLY NOISY NEIGHBORS

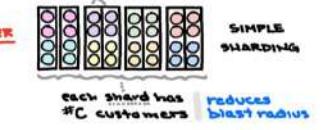
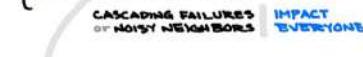
requires fault tolerant client

HOW TO DIFFERENTIATE TRAFFIC?

- ① USE ACCOUNTS/PASSWORDS/TOKENS
 - ② USE DIFF LISTENER PORTS ON TARGETS
 - ③ USE PROXY PROTOCOL V2 PREAMBLE
- PREFERRED, BUT REQ'S CODE PATCH

UNDER THE HOOD: AWS HYPERPLANE

NOT A PROXY!
DOESN'T TERM CONNECTIONS
SB LOAD BALANCER EVOLVED
USED BY EFS, NATGW, & NLB
RUNS ON EC2 IN EC2
DISTRIBUTED & TRANSACTIONAL



ENGINES

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

major versions supported for 3 years

minor versions supported for 1 year

PRICING

COSTS: (Oregon)

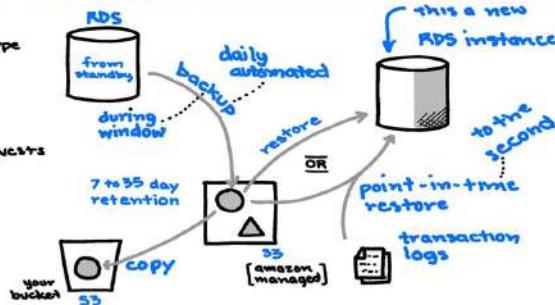
DB INSTANCE HOURS per engine/instance type billed hourly, round up

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

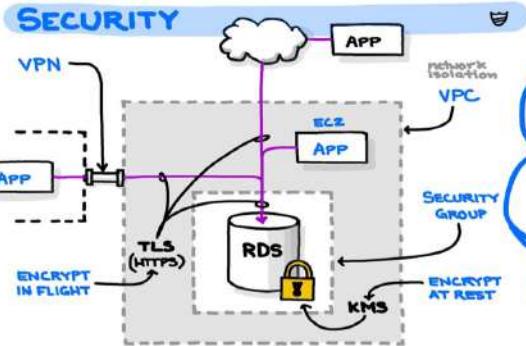
BACKUP STORAGE 100% of DB size free
9.5¢/GB/Mo after

DATA TRANSFER varies by destination

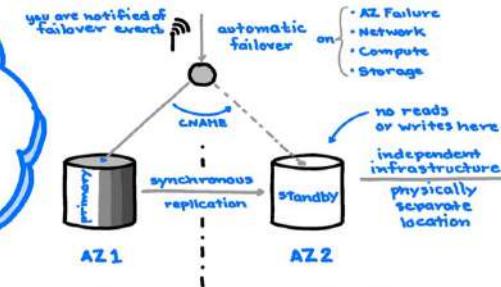
BACKUPS



SECURITY



MULTI-AZ



STORAGE

GP2 General Purpose
SSD 16TB Max

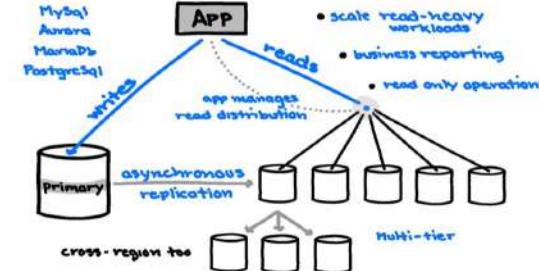


IOPs Provisioned IOPS
SSD 16TB Max
30K IOPS



Magnetic Legacy 1TB Max

READ REPLICAS



INSTANCES

SMALL WORKLOADS

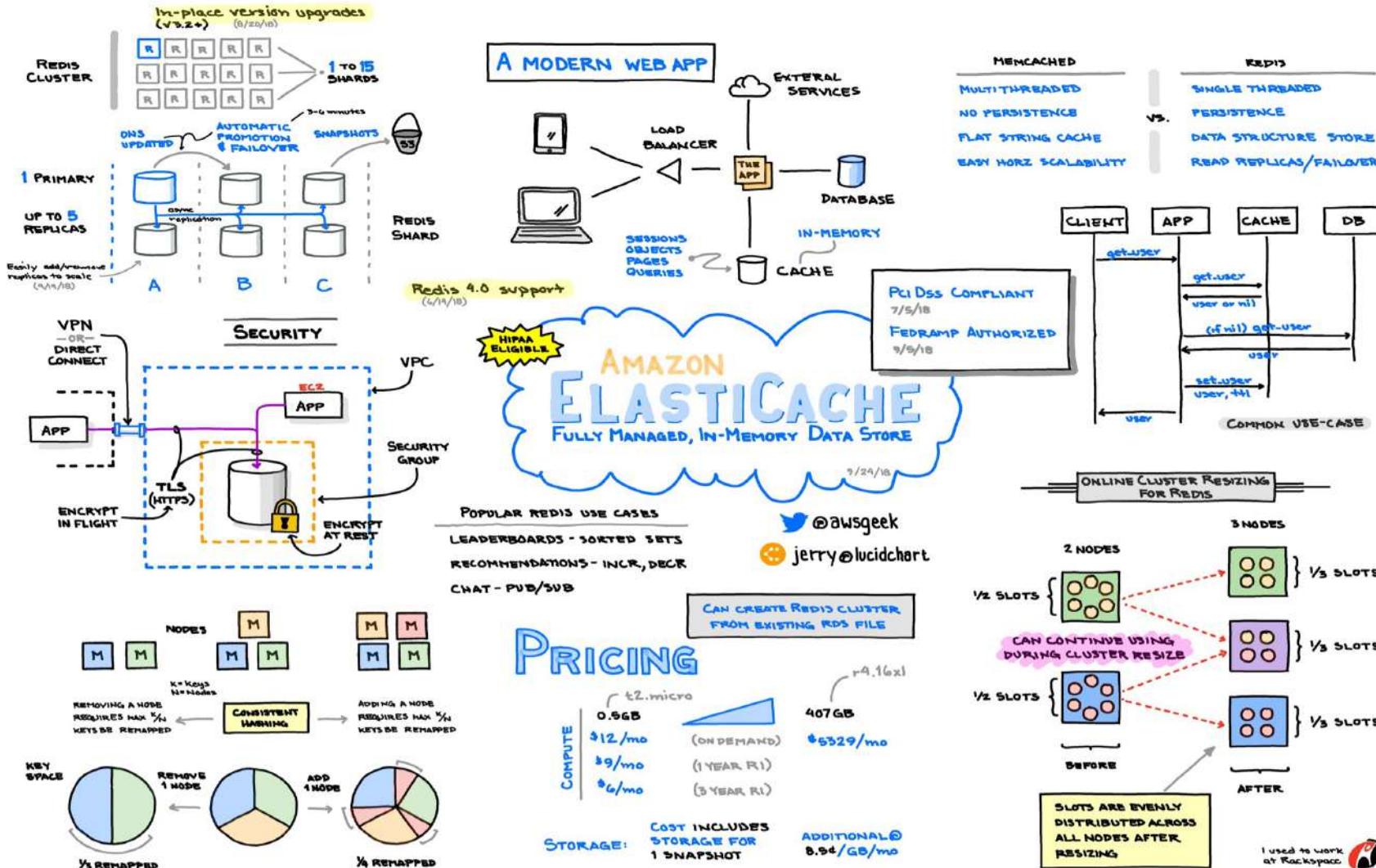
T2 burst 1 vCPU 8 vCPU
1 GB RAM 32 GB RAM

CPU INTENSIVE WORKLOADS

M3/M4 general purpose 2 vCPU 64 vCPU
8 GB RAM 256 GB RAM

QUERY INTENSIVE WORKLOADS

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



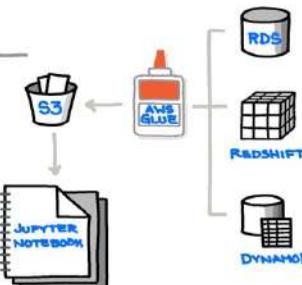
BUILD

COMMON TEMPLATES

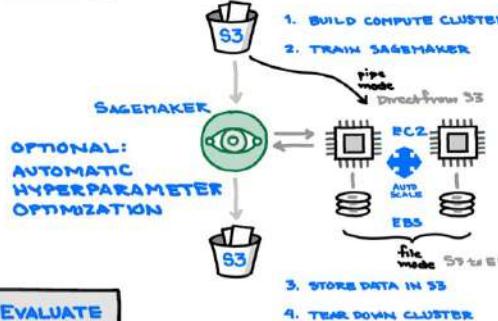
- TIME SERIES FORECAST
- DIRECT MARKETING TARGETS
- PREDICT CUSTOMER CHURN

ADV. TEMPLATES

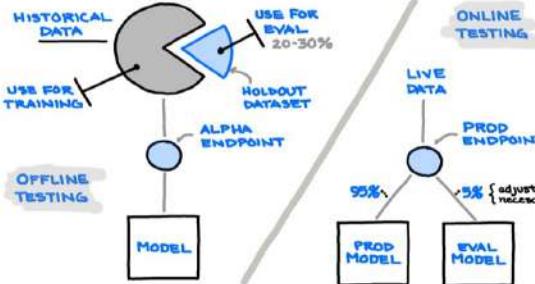
- BYO TENSORFLOW & PYTORCH CONTAINERS
- BYO SCIKIT OR R-ALGO



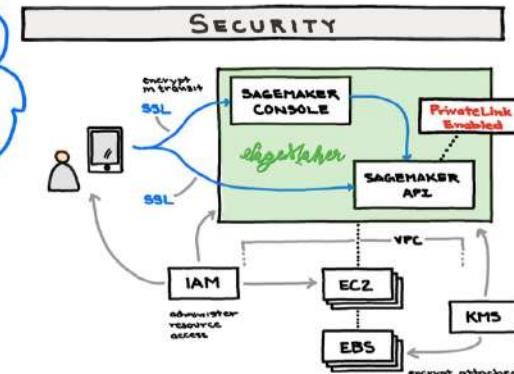
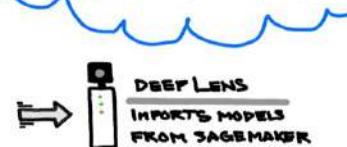
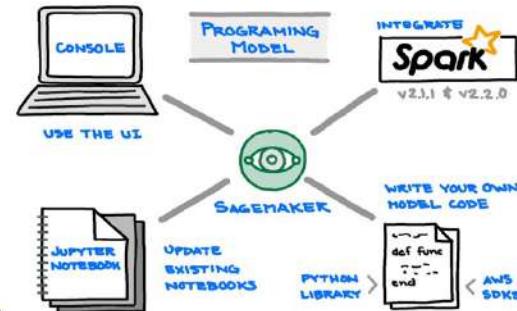
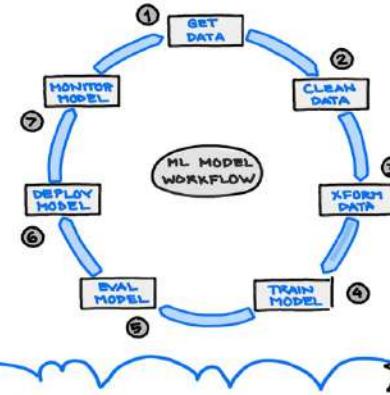
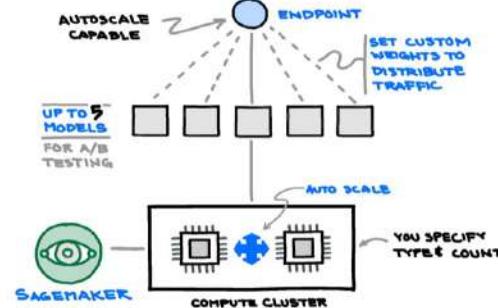
TRAIN



EVALUATE



DEPLOY



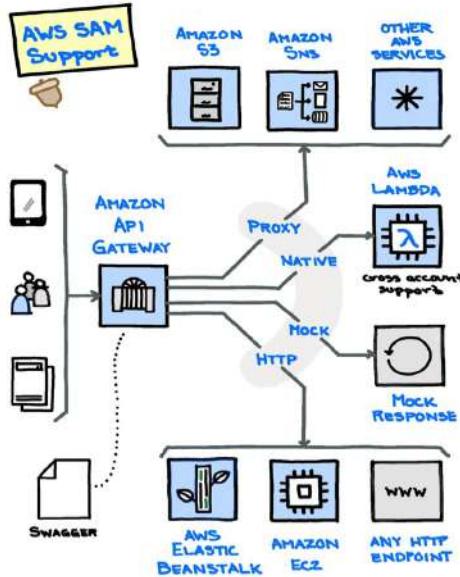
PRICING

INSTANCE FEES: ON DEMAND, HOURLY RATE, 1 MINUTE MINIMUM, PER SECOND

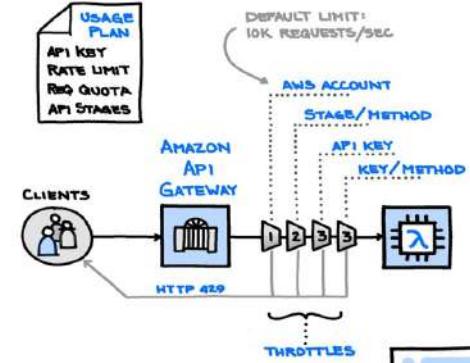
STORAGE FEES: 14¢/GB/Mo (UP TO 6TB FOR TRAINING)

PROCESSING FEES: 1.6¢/GB (IN/OUT)

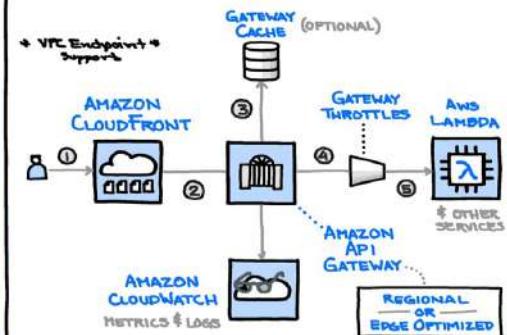
THE INTEGRATIONS



THROTTLING



UNDER THE HOOD



EVOLUTION OF AN API



PRICING

DATA TRANSFER (PER GB)	
FIRST 10TB	9¢
NEXT 40TB	8.5¢
NEXT 100TB	7¢
NEXT 300TB	5¢

API calls tiered from: \$3.50/MM to: \$1.51/MM

CACHING FROM: 2¢/0.5GB/HR TO: \$3.80/237GB/HR

STORAGE CLASSES

STANDARD
and
INFREQUENT ACCESS

11 NINES DURABILITY

1-ZONE INFREQUENT ACCESS

11 NINES DURABILITY

99.5% /YR AVAILABILITY

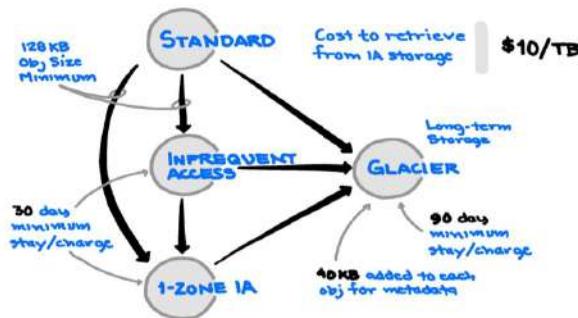
AVAILABILITY ZONES



AVAILABILITY ZONES



STORAGE CLASS TRANSITIONS



SERVER SIDE ENCRYPTION

AES-256
master key rotation

audit trail
AWS managed KETS

KMS managed KEYS
more security controls

SELF managed KEYS
you own it!



[all pricing from US West (Oregon)]

REQUESTS (\$USD per 1000,000 requests)

API CALLS

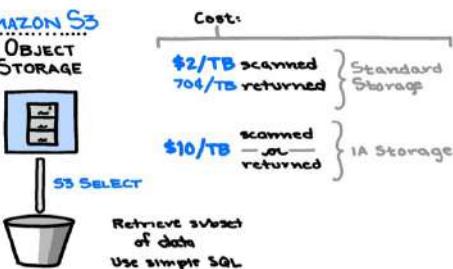
	GET	POST	PUT	DELETE	LIST	SELECT	OTHER
Standard	0.4	5.0	5.0	5.0	5.0	0.4	0.4
Infrequent Access	1.0	10.0	10.0	10.0	1.0	1.0	1.0
1-Zone IA	1.0	10.0	10.0	10.0	1.0	1.0	1.0

Storage class transitions : 1¢ per 1,000 objects

Transition to Glacier : 5¢ per 1,000 objects

QUERY IN PLACE

AMAZON S3 OBJECT STORAGE



OBJECT LOCKING NEW

PREPARE OBJECT DELETION

GOVERNANCE

CAN'T DELETE TIL DATE

COMPLIANCE

NEVER DELETE (EVER)

STORAGE

	TB	\$
INFREQUENT ACCESS	[0, 50]	2.34
	(51, 500)	2.26
	(501, ∞)	2.14
STD 1-ZONE	1.25¢	
	1.0¢	
GLACIER	0.4¢	

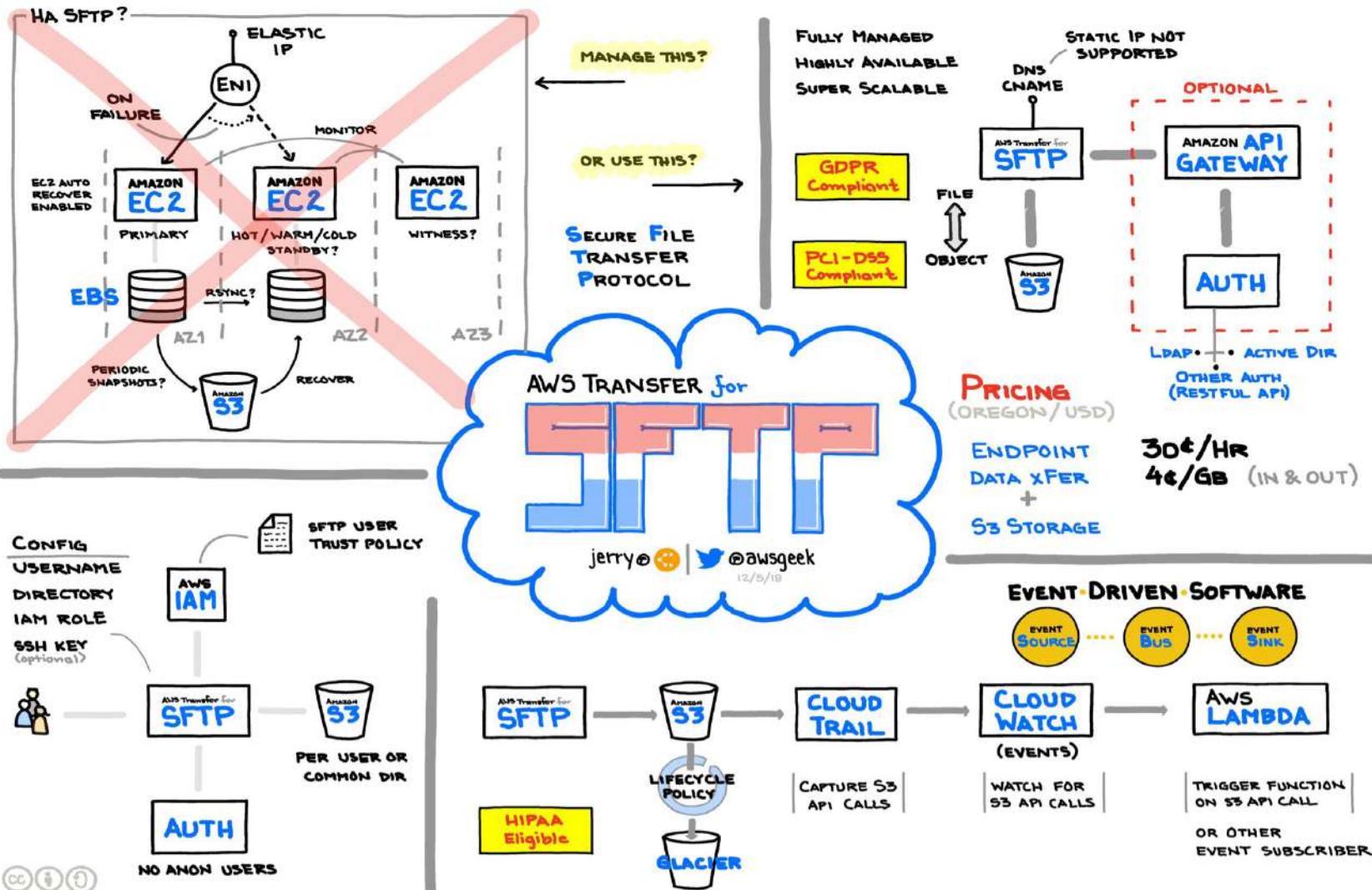
per GB/mo

DATA TRANSFER



jerry@lucidchart

@awsgeek



SOCIAL NETWORKING

GROUP FRIENDS WHO LIKE OR DISLIKE SIMILAR THINGS

RECOMMENDATION ENGINE

MAKE PURCHASE SUGGESTIONS BASED ON OTHER USERS WITH SIMILAR INTERESTS

FRAUD DETECTION

DETECT CONNECTIONS TO KNOWN FRAUD SCENARIOS

KNOWLEDGE GRAPHS

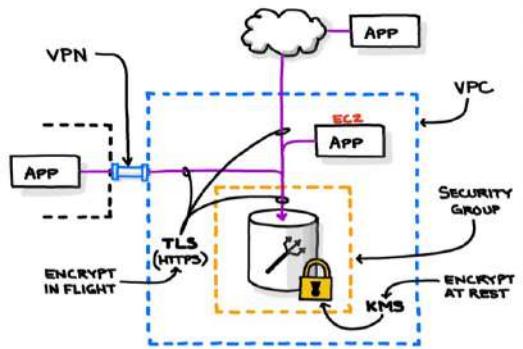
STORE AND QUERY INTO & RELATIONSHIPS BETWEEN USERS

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

STORAGE

10¢/GB/MO

I/O

20¢/MILLION REQUESTS

BACKUPS

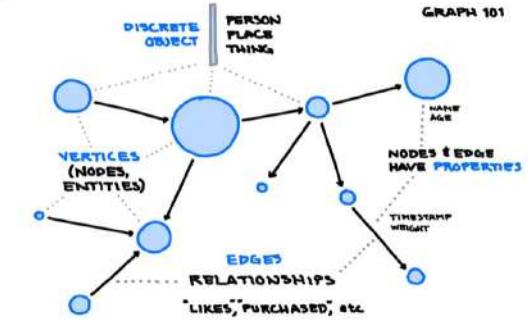
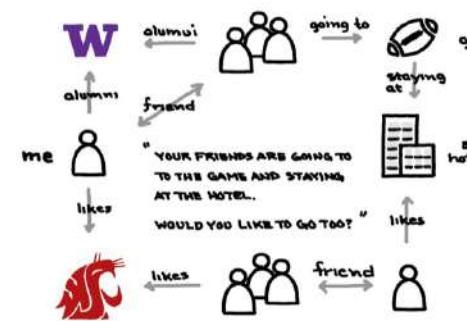
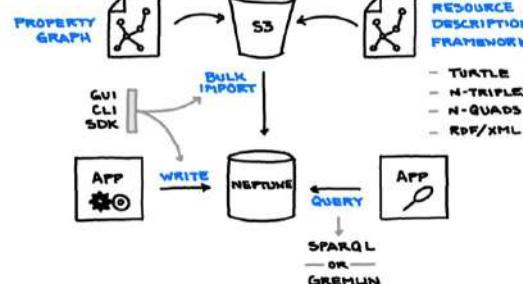
UP TO DB SIZE, FREE

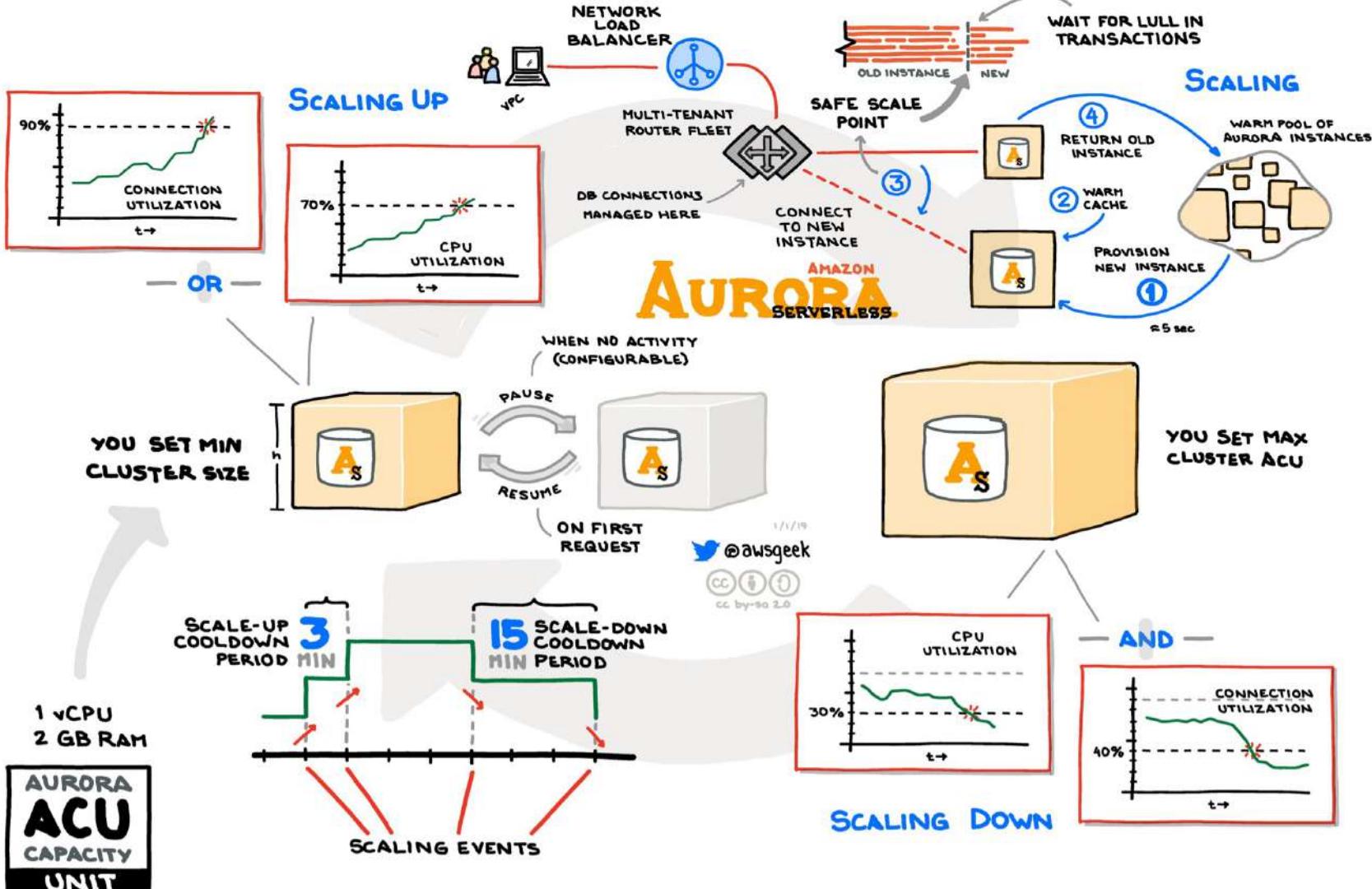
DATA TRANSFER

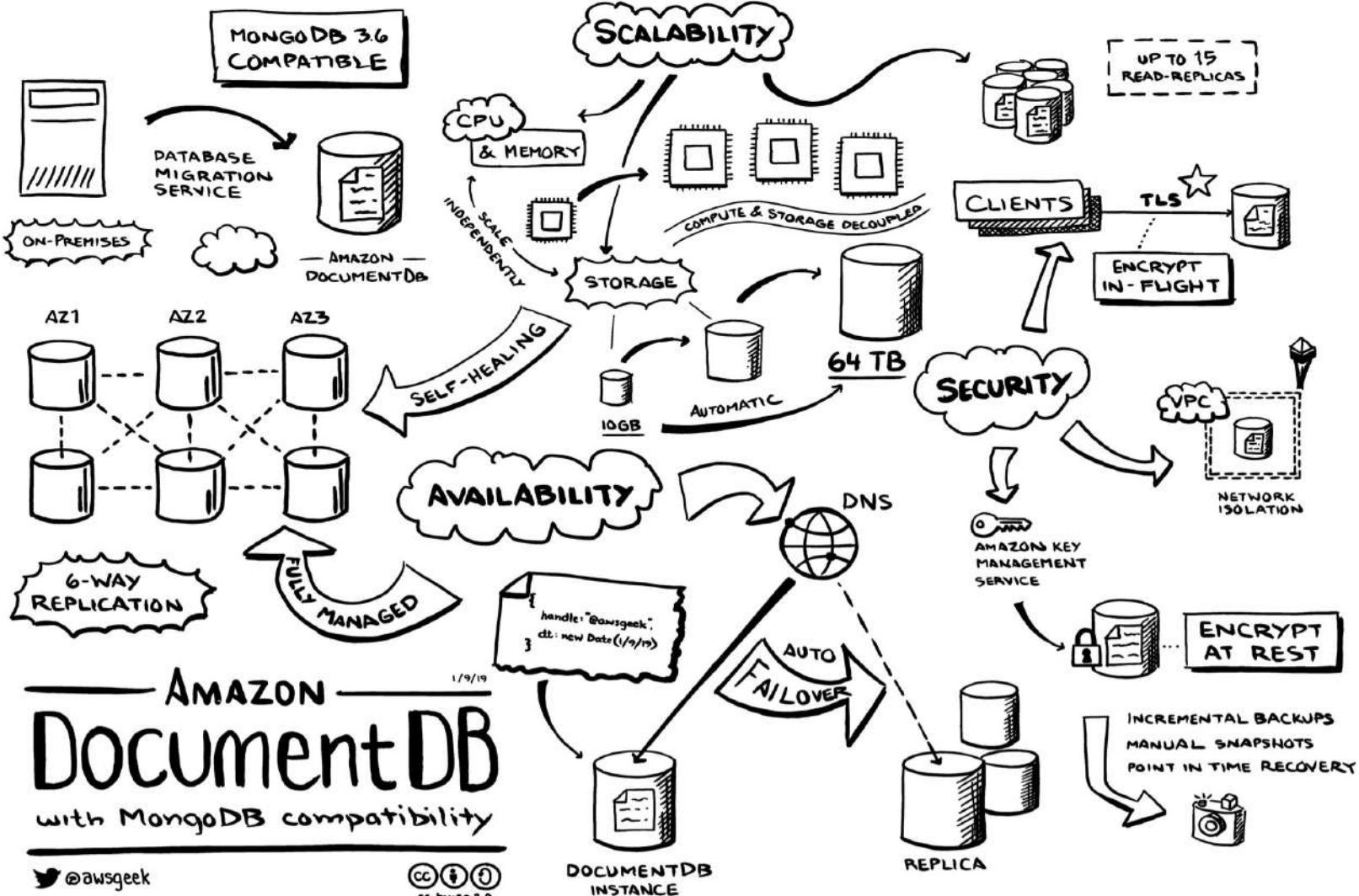
IN ... FREE

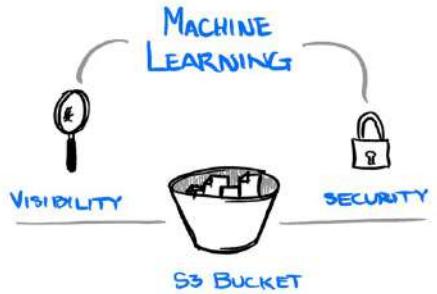
OUT ... 2¢/GB TO OTHER REGION
... 9¢/GB TO INTERNET

STARTING
AT 35¢/HR
FOR R4.LG



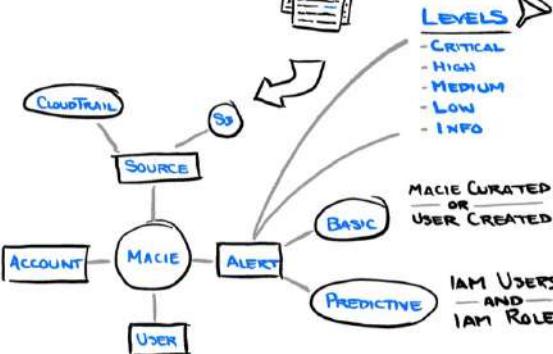




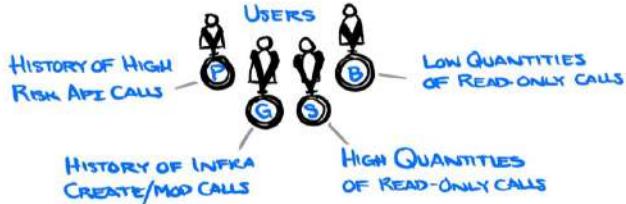


AS EASY AS:

- ① ENABLE MACIE
- ② SELECT S3 BUCKETS
- ③ REVIEW ALERTS



	CONTENT CLASSIFICATION	\$5/GB
	EVENT PROCESSING	\$4/MM
	EXTENDED DATA RETENTION	5¢/GB/Mo
+ TRAIL EVENT COSTS + S3 GET/LIST COSTS		

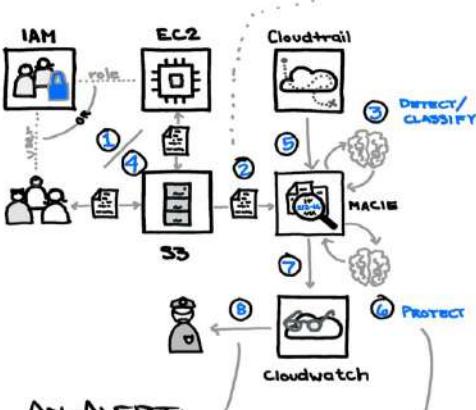


AN ALERT:

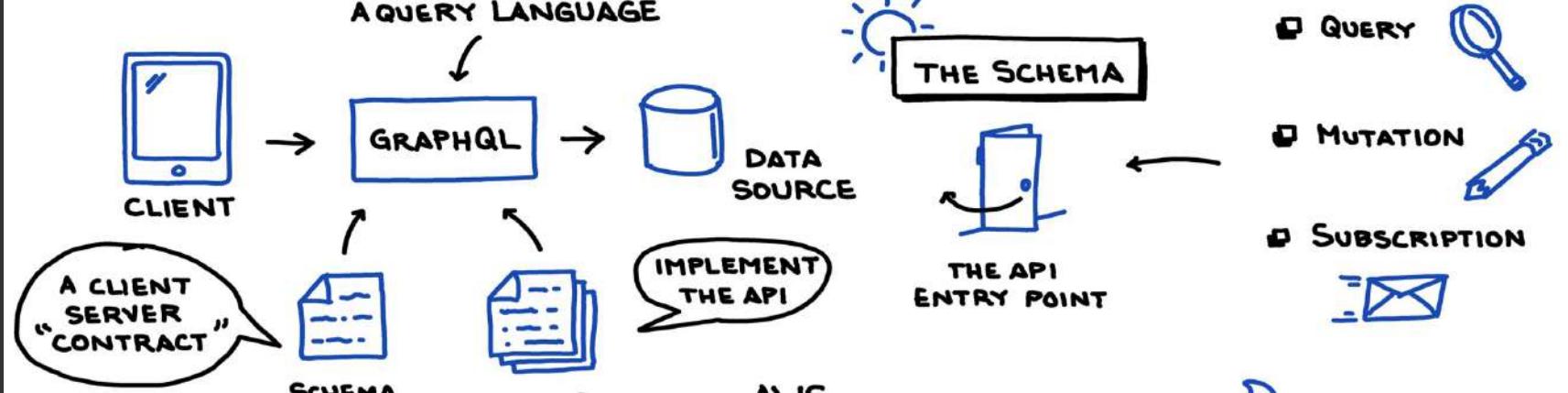
- SEVERITY
- TIMESTAMP
- CATEGORY
- S3 BUCKET/ OBJECT
- COMMENTS
- # VIEWS
- AWS REGION
- # RESULTS

ENCRYPTED S3 OBJECTS

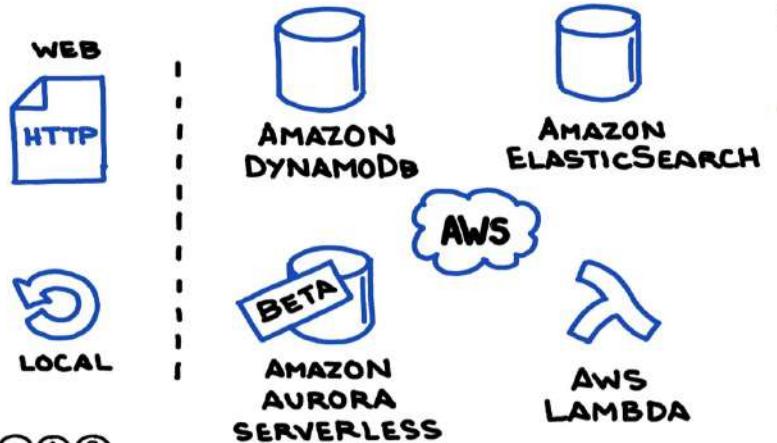
SERVER SIDE ENCRYPTION	✓
KMS KEYS	✓ WITH IAM PERMISSION
CLIENT ENCRYPTED	✗



- DATA ACCESS
- PATTERN
 - RECOGNITION



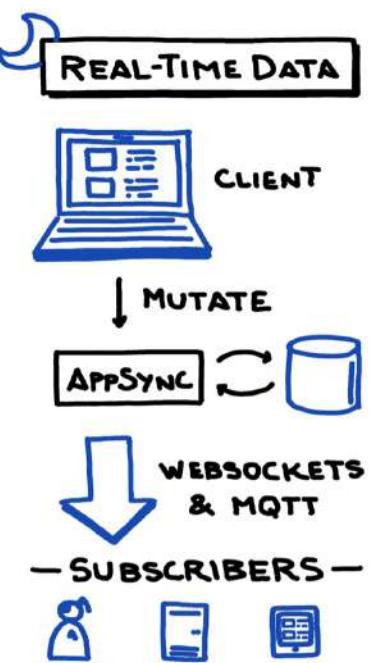
RESOLVERS

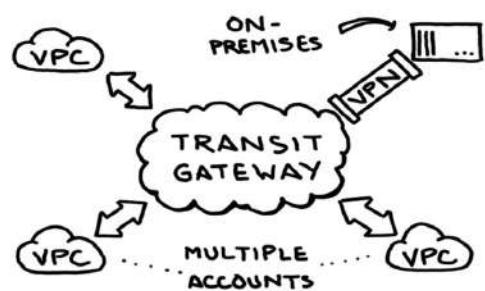


AWS
APPSYNC
MANAGED • GRAPHQL
1/23/19 @awsgeek

OFFLINE DATA ACCESS

- ① MUTATE OFFLINE
 - ② UPLOAD CHANGES
 - ③ RESOLVE CONFLICTS
-

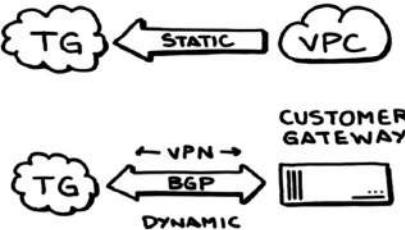




HUB and SPOKE



ROUTE PROPAGATION



COMMAND LINE INTERFACE



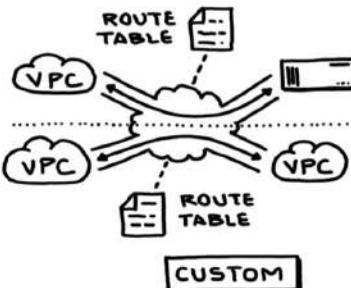
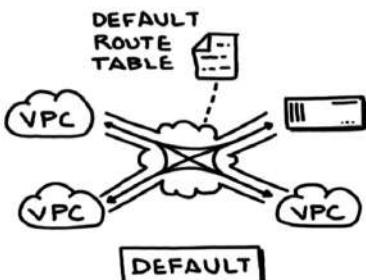
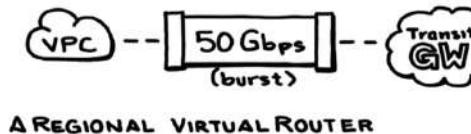
CLOUDFORMATION



AWS SDKs



BANDWIDTH



MONITORING



VPC FLOW LOGS



CLOUDWATCH METRICS



CLOUDWATCH LOGS

— CUSTOM ROUTING —

Periodic Table of Amazon Web Services

by  AWS

amazon A athena	amazon Gs ground station	aws Wa well-architected tool	aws Lm license manager	amazon Et elastic transcoder	aws Mh migration hub	aws Am amplify	amazon V virtual private cloud	amazon S3 simple storage service
amazon Cs cloudsearch	aws G glue	aws Cw cloudwatch	aws Mc management console	amazon Kv kinesis media streams	aws Ad application discovery service	amazon Ag api gateway	amazon Cr cloudfront	aws Sg step gateway
amazon Mr elastic map reduce	aws Glue business applications	aws Ds relational database service	aws I iot core	aws Dd iot device defender	aws Ac auto scaling	aws Ms managed services	aws Dm database migration service	amazon 53 route 53
amazon Es elasticsearch	aws Lf lake formation	amazon Ce cost explorer	amazon Cs elastic container service	aws L lambda	amazon Co connect	aws Cb codebuild	amazon Au aurora	aws Fx fsx for lustre
amazon K hinesis	aws SF step functions	amazon Bu budgets	amazon Ch chime	aws O outposts	amazon Pi pinpoint	aws Cc codecommit	amazon Ds dynamodb	aws 53 route 53
amazon Ka managed streaming for kafka	amazon Mq activemq	aws Cu cost & usage report	amazon Wm workmail	amazon Ls lightsail	aws Sa serverless application repository	amazon E simple email service	aws Cd codedeploy	amazon Ti timestream
amazon R redshift	amazon N simple notification service	aws Ri reserved instance reporting	amazon C elastic cloud compute	aws Ba batch	aws Lb elastic load balancing	aws Cs codestar	aws Cd codepipeline	amazon Gg iot greengrass
amazon Qs quicksight	amazon Q simple queue service	amazon Au lambda@edge	amazon Eb elastic beanstalk	aws Vm vmware cloud on aws	amazon Co correto	aws Cli command line interface	amazon Ec elasticache	aws Ev iot events
aws Dp data pipeline	aws Ap appsync	amazon Su sumerian	amazon Cr elastic container registry	aws F fargate	aws Rm robomaker	aws C9 cloud9	aws Sd tools & skills	amazon Gl gamelift
amazon Sm sagemaker	amazon Co comprehend	amazon Ei elastic inference	amazon Fc forecast	amazon Lx lex	amazon Pe personalize	amazon Po pollo	amazon Rk rekognition	amazon Gt sagemaker ground truth
aws Im identity & access management	amazon Cd cloud directory	amazon Co cognito	amazon Gd guardduty	amazon I inspector	amazon M macie	aws Ar artifact	aws Cm certificate manager	aws Hs cloudhsm
aws Tf tensorflow on aws	amazon Cd cloud directory	amazon Co cognito	amazon Gd guardduty	amazon I inspector	amazon M macie	aws Ar artifact	aws Cm certificate manager	aws Ds directory service
aws Im identity & access management	amazon Cd cloud directory	amazon Co cognito	amazon Gd guardduty	amazon I inspector	amazon M macie	aws Ar artifact	aws Cm certificate manager	aws Fm firewall manager
aws Tf tensorflow on aws	amazon Cd cloud directory	amazon Co cognito	amazon Gd guardduty	amazon I inspector	amazon M macie	aws Ar artifact	aws Cm certificate manager	aws Fm firewall manager
aws Sm secret manager	aws Sh security hub	aws Sm single sign-on	aws Tf tensorflow on aws	aws Sm single sign-on	aws Sm single sign-on	aws Tf tensorflow on aws	aws Sm single sign-on	aws Tf tensorflow on aws
aws Sm secret manager	aws Sh security hub	aws Sm single sign-on	aws Tf tensorflow on aws	aws Sm single sign-on	aws Sm single sign-on	aws Tf tensorflow on aws	aws Sm single sign-on	aws Tf tensorflow on aws

AMAZON WORKLINK

@awsgeek



AMAZON WORKSPACES



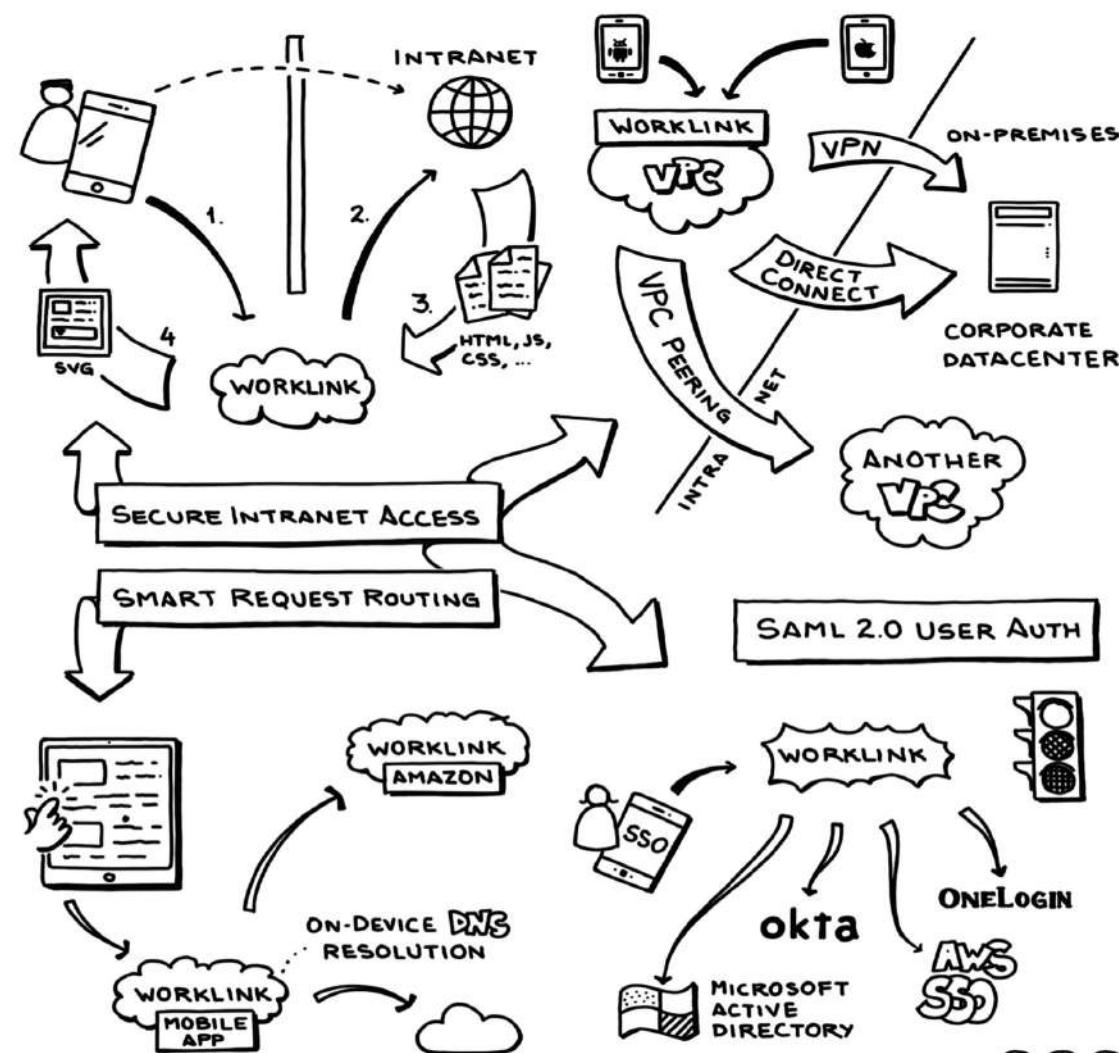
AMAZON WORKDOCS



AMAZON APPSTREAM 2.0



AMAZON WORKLINK



CREATE

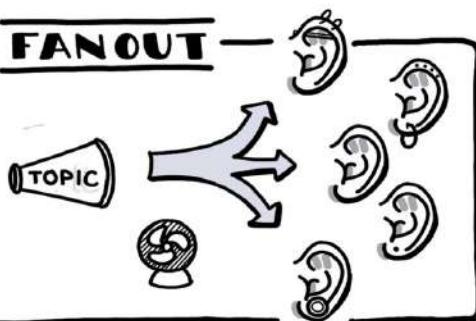
SUBSCRIBE

PUBLISH



A TOPIC

FANOUT



PCI
COMPLIANT



Command Line
Interface

Language
SDKs



Web
Console

Service
(https)



Mobile
Device

HIPAA
ELIGIBLE

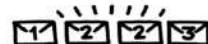


and
MORE

Lambda

AMAZON — @awsgeek
SNS
— PUB/SUB —
NOTIFICATIONS

AT LEAST ONCE
DELIVERY



Phone
(sms)

CC-BY-SA



A
Message



Filter

Queue
(sqS)

Subscriber



PUBLISHERS

SUBSCRIBERS

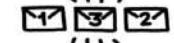
Storage
Compute
Networking
Databases
Dev Tools

SNS
EVENTHUB

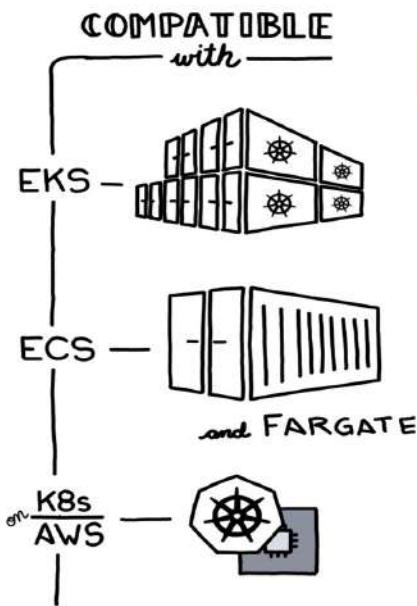
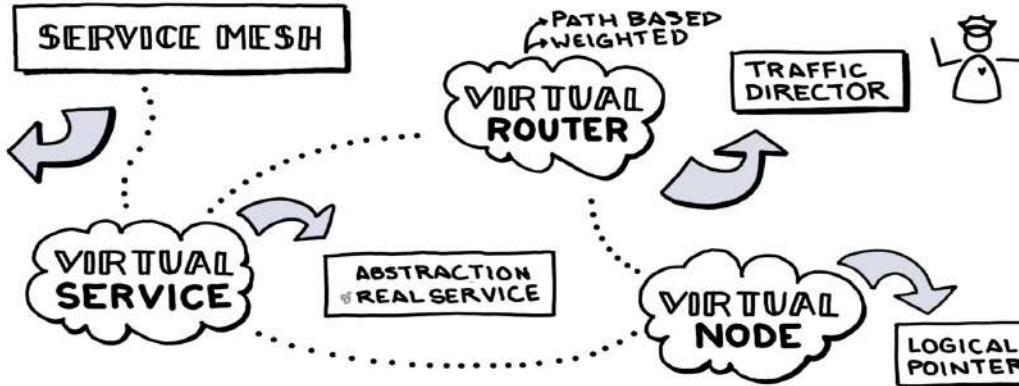
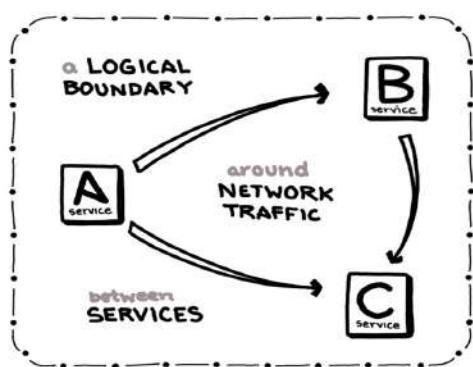
SQS
Lambda
Http/s

PUBLISHED

BEST EFFORT
ORDERING



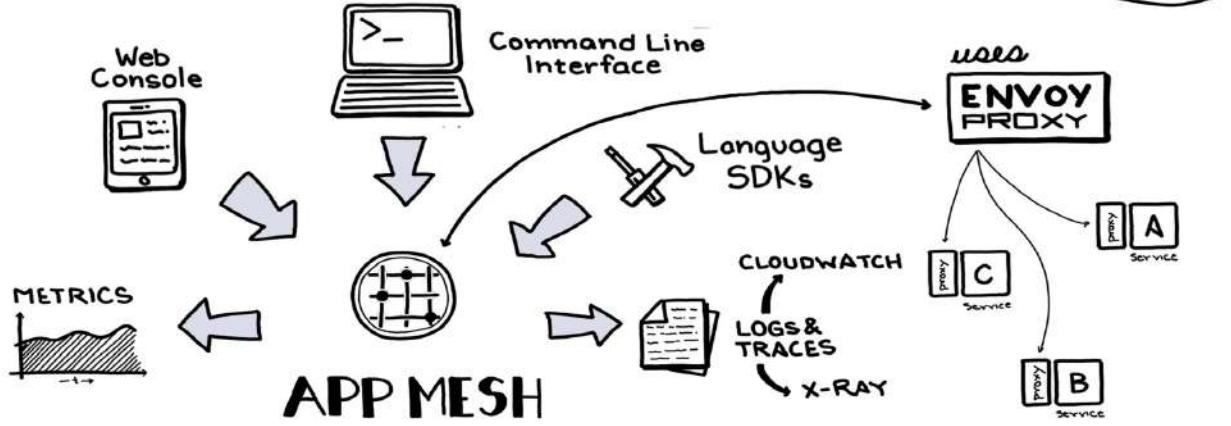
CC-BY-SA

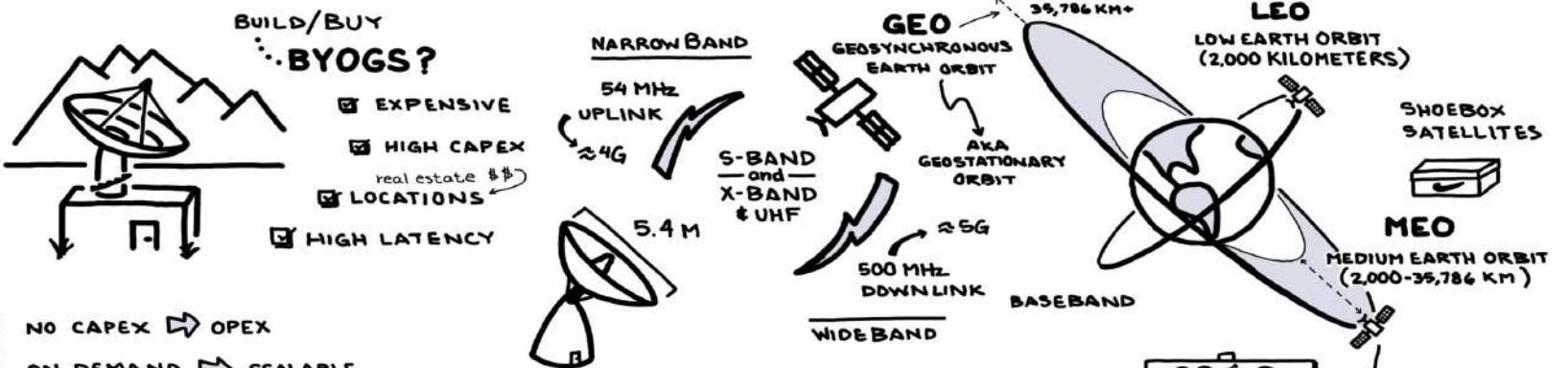


AWS APP MESH

@awsgeek

SERVICE MONITORING & CONTROL





NO CAPEX → OPEX
ON DEMAND → SCALABLE
LOW LATENCY
4 → 8 → 80
EASY ACCESS
SIMPLE PRICING ↗

PRICING

- \$ ON DEMAND
- \$ USAGE BASED
- \$ PER MINUTE
- \$ RESERVED CAPACITY DISCOUNTS

↗ SAVE UP TO 80% OVER DIY GS COST

DEALING WITH CONTENTION
for GS time

efficient SCHEDULING
sufficient CAPACITY

GROUND STATION

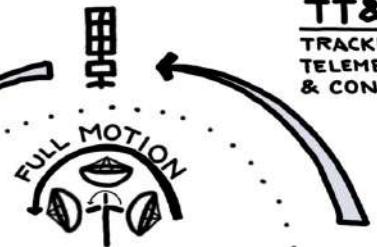
SATELLITE COMMAND & CONTROL



DEMOCRATIZE SPACE

TT&C

TRACKING,
TELEMETRY
& CONTROL



ANTENNA GATEWAY

VITA-49
RF OVER IP

AZ EL DATA

MINIMUM
2 ANTENNAS
PER GROUND
STATION

GSaaS
GROUND
STATION
AS A SERVICE

DEMODULATION
RECEIVING
FRONT-END
PROCESSING

YOUR VPC
Obj Files
VPC
VITA-49
RF OVER IP

WEATHER
NATURAL DISASTERS



TIMELINE

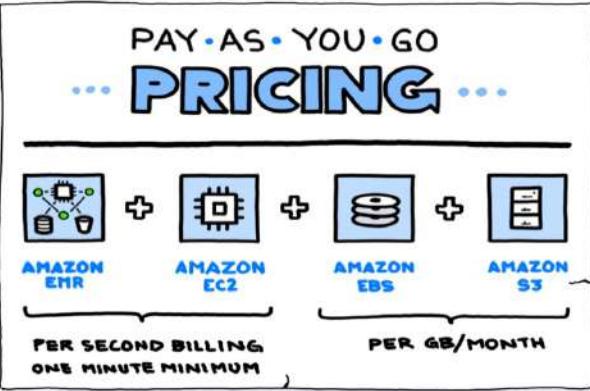
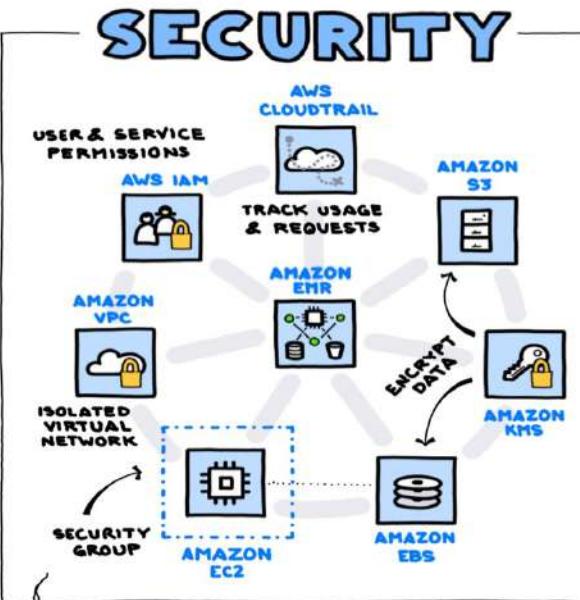
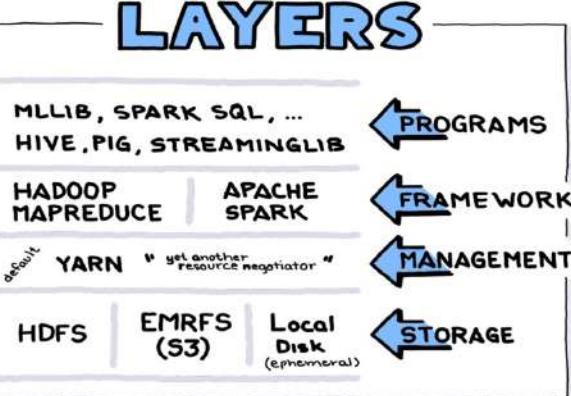
2009	BETA LAUNCH PIG & HIVE
10	CC1/GPU INSTANCES
11	BOOTSTRAP ACTIONS SPOT INSTANCES
12	CC2 INSTANCES HBASE
13	DATA PIPELINE S3 SSE
14	IMPALA IAM ROLES
15	HUNK APACHE SPARK
16	PRIVATE SUBNETS CLOUDFORMATION
17	FLINK AUTO-SCALING
18	MXNET NOTEBOOKS
2019	TENSORFLOW 99.9% SLA

(a subset of enhancements since launch)



- MACHINE LEARNING
- REALTIME STREAMING
- CLICKSTREAM ANALYSIS
- GENOMICS
- ETL

- HOSTED HADOOP PLATFORM
- ELASTIC CLUSTERS
- CONSOLE, CLI & SDK ACCESS
- STORAGE OPTIONS
 - S3, EBS, RDS
 - DYNAMODB
 - REDSHIFT
 - GLACIER



EC2 SPOT for HADOOP TASK NODES up to **90%** SAVINGS



INGEST 1

CloudTrail S3 = Kinesis
 CloudFront DynamoDB

MySQL

Postgres

SQL Server

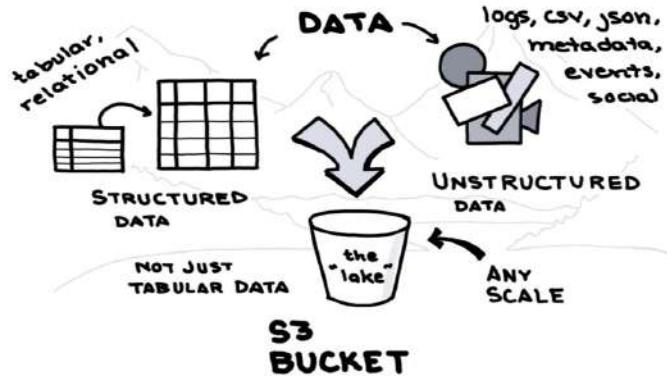
MariaDB

Oracle

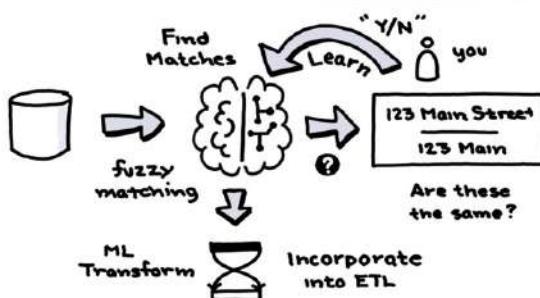


AWS GLUE
ETL Jobs

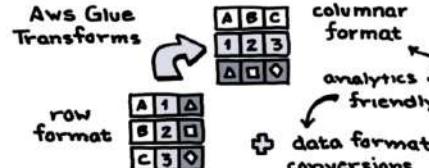
AWS DATA LAKE SERVICE LAKE FORMATION



CLEAN 2



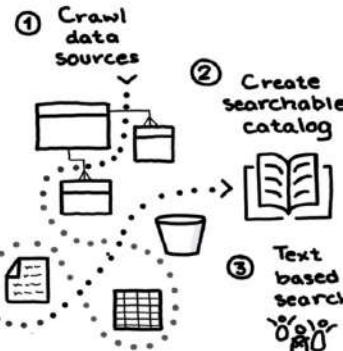
3 TRANSFORM



5 SECURE



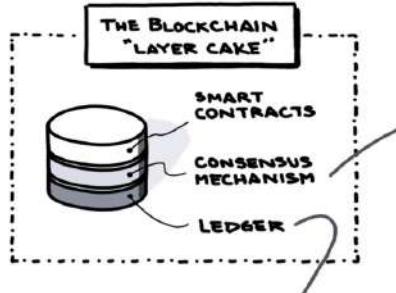
4 CATALOG



AMAZON MANAGED BLOCKCHAIN

@awsgeek 23 AUG 2019

SCALABLE BLOCKCHAIN NETWORKS



CONSENSUS mechanism



V.3
B-E-D



V.3
B-E-D



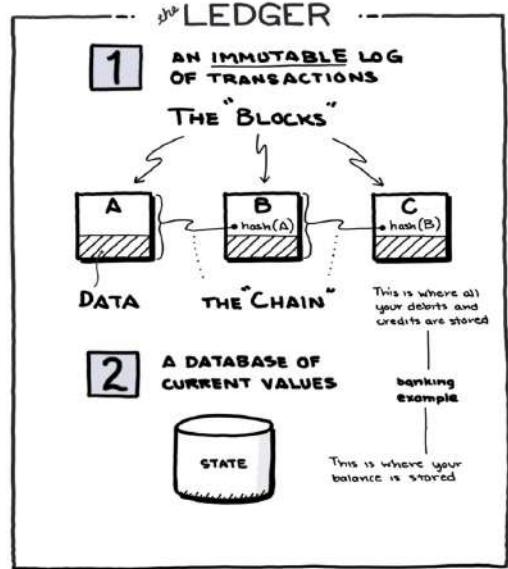
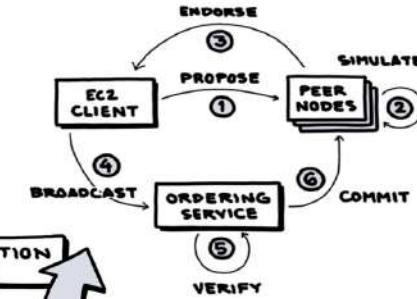
V.2
B-E-D

- Do the right members endorse the transaction?
- Does everyone have the right ledger?
- etc...

TRANSACTION FLOW

HYPERLEDGER FABRIC

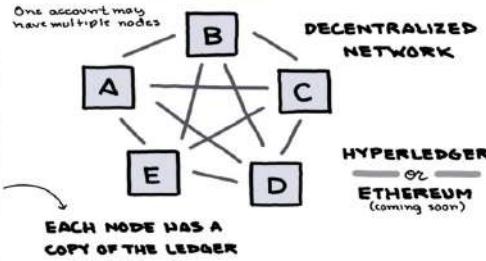
NETWORK



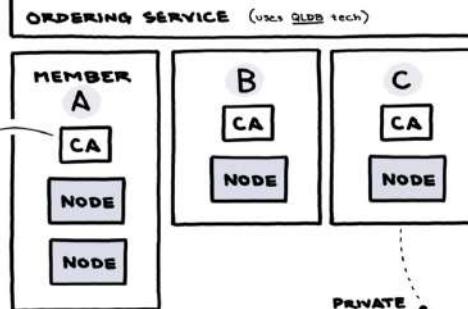
SMART CONTRACT

CODE EXECUTABLE LOGIC USED BY APPS TO INTERACT WITH LEDGER

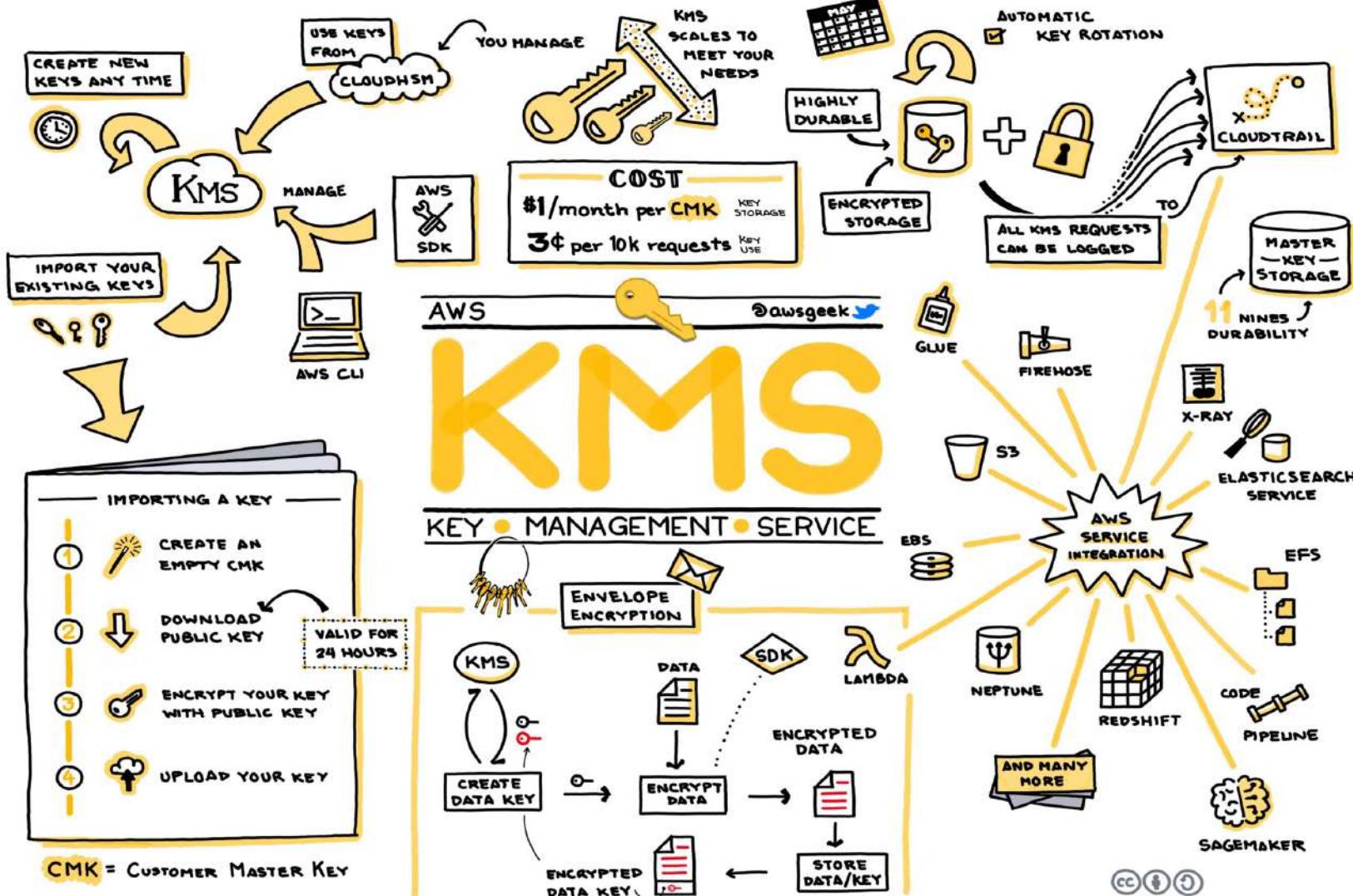
AMAZON MANAGED BLOCKCHAIN

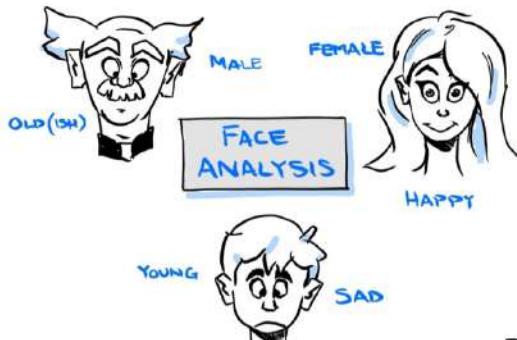
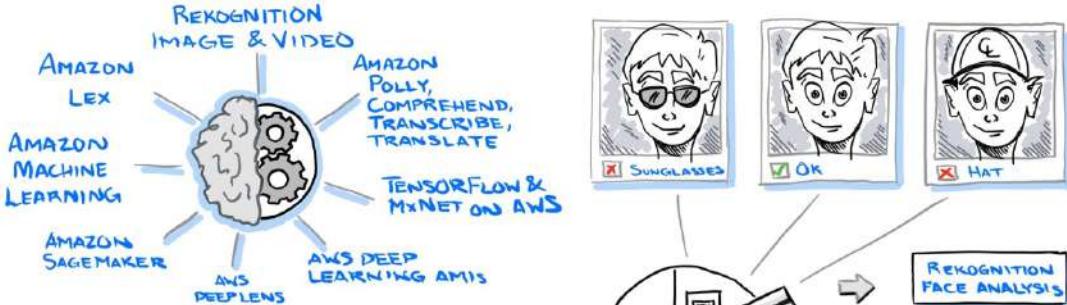
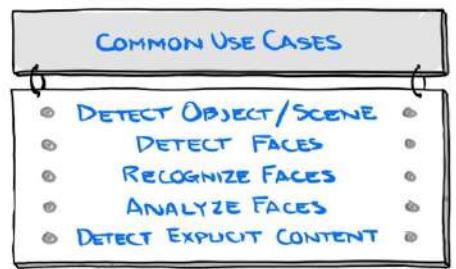


CERTIFICATE AUTHORITY
USES KMS



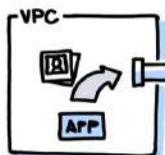
A CREATES BUT
DON'T OWN NETWORK





PRICING

① \$ PER IMAGE



PRIVATELINK

REKOGNITION



\$ ②



FACE META STORE

IMAGE

③ \$ PER MINUTE



VIDEO

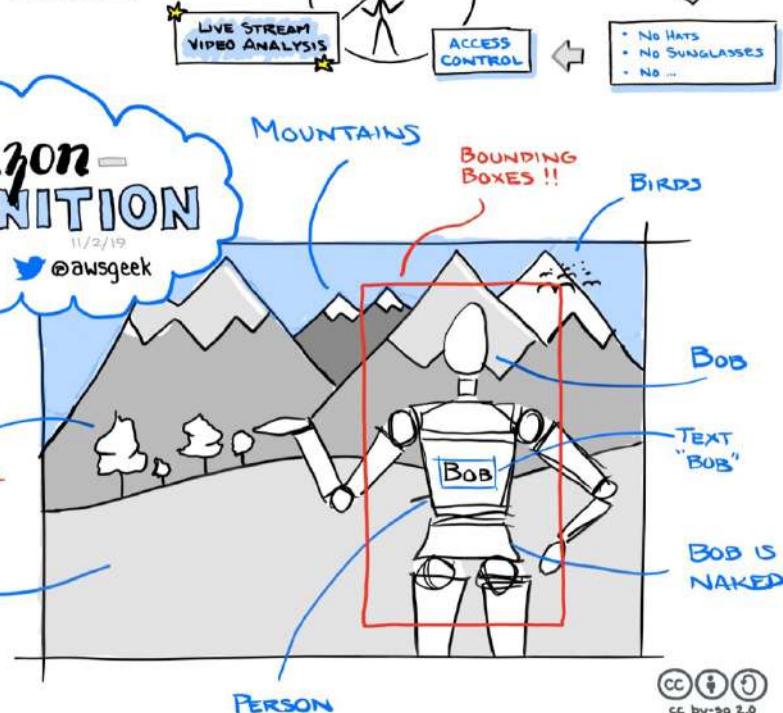
TREES /
HIERARCHICAL
METADATA /
OUTDOORS

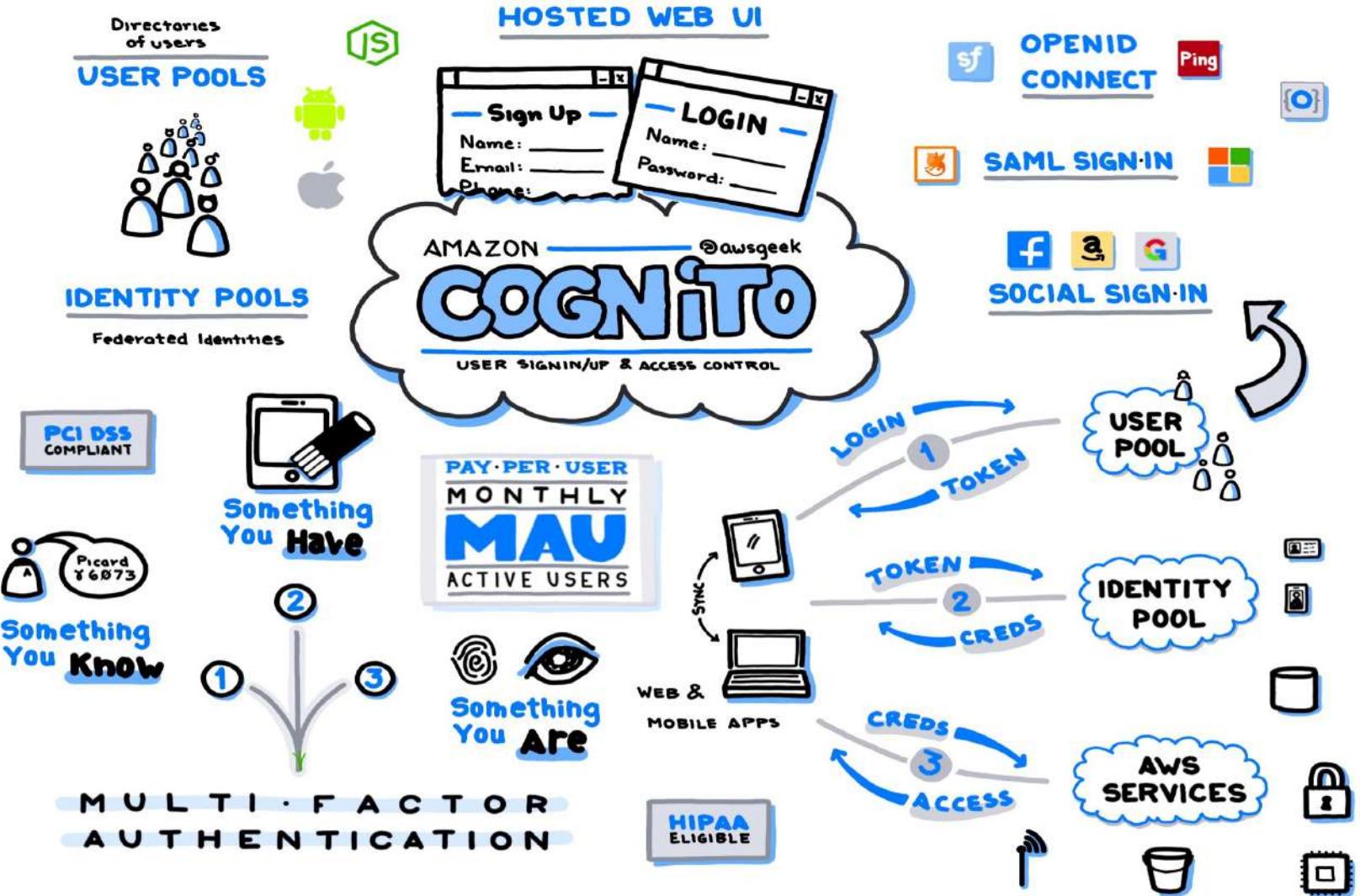
AMAZON AI FAMILY

HIPAA
ELIGIBLE

-amazon-
REKOGNITION

11/2/19
@awsgeek

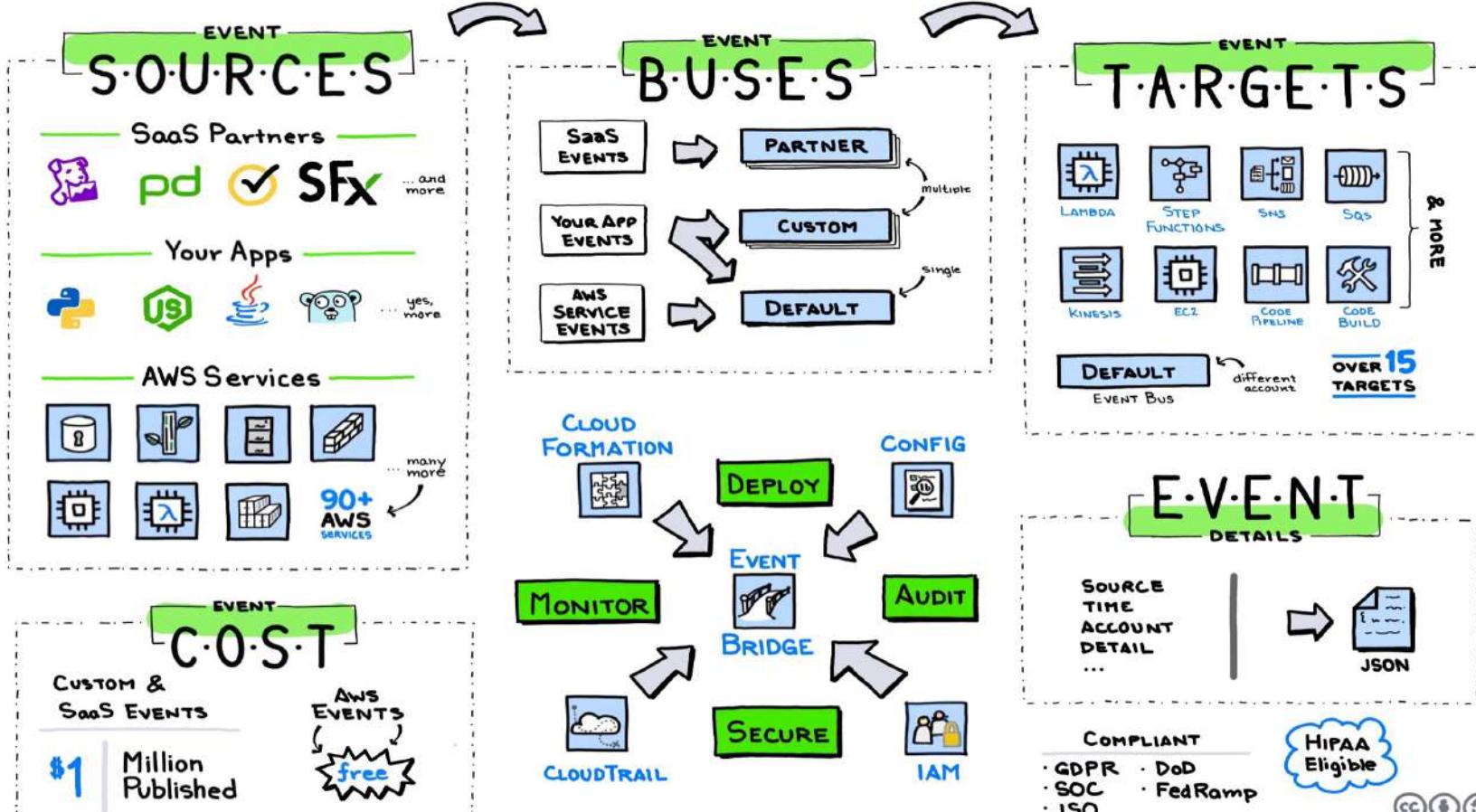






EVENTBRIDGE

SERVERLESS EVENT BUS



compute database storage

ON-DEMAND
delivery



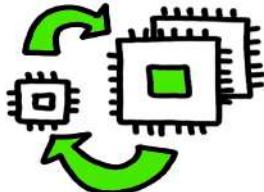
of IT RESOURCES



over the INTERNET



ELASTIC
& scalable



What is CLOUD COMPUTING?



SPEED
& agility

GLOBAL
footprint



COST
savings



with PAY-AS-YOU-GO
pricing



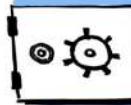
@awsgeek



SCHEDULE



BACKUP
PLAN



BACKUP
VAULT

RESOURCE-BASED
ACCESS POLICY



LIFECYCLE
POLICY

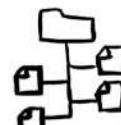


WARM
STORAGE

PCI-DSS
COMPLIANT



COLD
STORAGE



AMAZON
EFS



AMAZON RDS

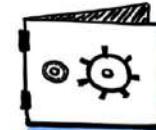


MONITOR
& ALERT



EBS
VOLUMES

BACKUP



BACKUP



SNAPSHOT



HIPAA
ELIGIBLE

AUTOMATED



ON-PREMISES

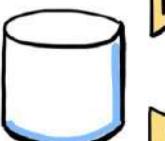
AMAZON
DYNAMO DB



SECURE



AWS
KEY
MANAGEMENT
SERVICE



FIRST
BACKUP
→
FULL
INCREMENTAL
THE REST →



BACKUPS



LOCKED



UNLOCKED



LOCKED



UNLOCKED



Lustre 101

MDS



METADATA SERVER

Record namespace, inodes
Maintain index



OSS



OBJECT STORAGE SERVER

Record file content
Primary scalable service



metadata, directory ops
file open, close

MDS

file creation status

IO & OPS

file IO locking

file creation status

OSS

file creation status

OSS

file creation status

EXASCALE STORAGE
for COMPUTING AT SCALE



MDS

HIPAA
ELIGIBLE

OSS

OSS

OSS

OSS

AMAZON
F5X for
LUSTRE

3/2/20

PRIMARY
MEANS OF
SCALING

① READ/
WRITE FILE

② GET
STRIPE
INFO

③ READ/
WRITE STRIPES

APP

the file

CHUNK
IT UP

PARALLEL IO
HI THROUGHPUT

CC BY-SA 2.0

YOUR LOGICALLY
ISOLATED VPC

1000's of
AMAZON EC2
INSTANCES

ENCRYPTED
IN TRANSIT

USE
SECURITY GROUPS
TO CONTROL ACCESS

DEFINE INGRESS
& EGRESS PORTS

AMAZON
FSx4L

DATA AUTOMATICALLY
ENCRYPTED AT REST

CHOOSE

high speed
short term

SCRATCH
File System

replicated
long term

PERSISTENT
File System

NEW!

HIERARCHICAL STORAGE MANAGEMENT
on-demand OR batch loading

LUSTRE
CLIENTS

AMAZON
EC2

AMAZON FSx
for LUSTRE

ALL IN THE
FAMILY

AMAZON S3

AMAZON S3

PERSISTENT
STORAGE

OSS

fast SSD storage

(lazy load)

durable storage

ACTIVITY
TRACKING

AWS
CLOUDTRAIL

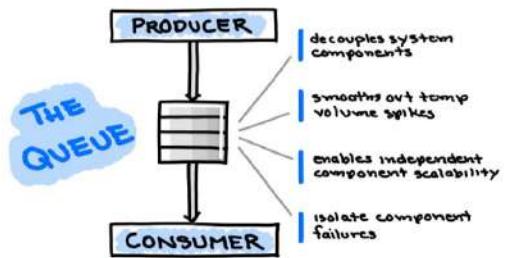
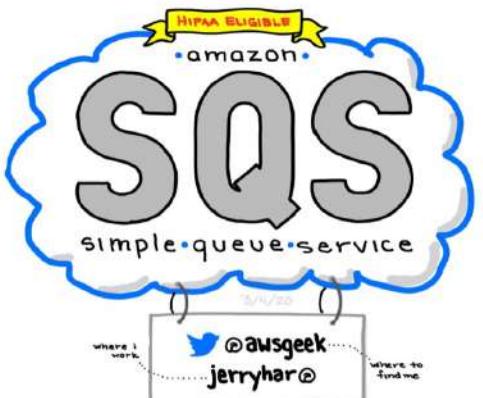
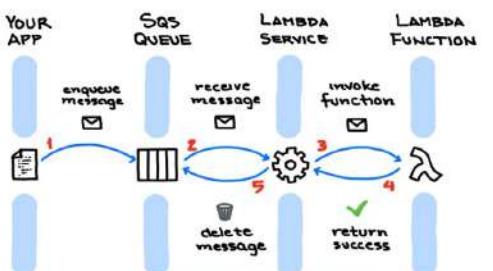
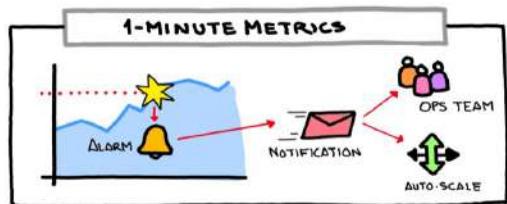
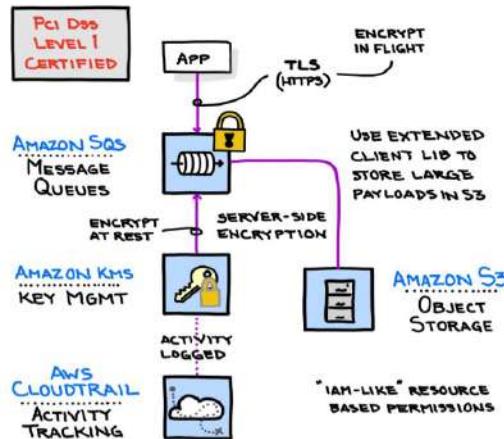
CLOUDWATCH

MONITORING
ALERTING

S3

CC
BY
SA
2.0

Security



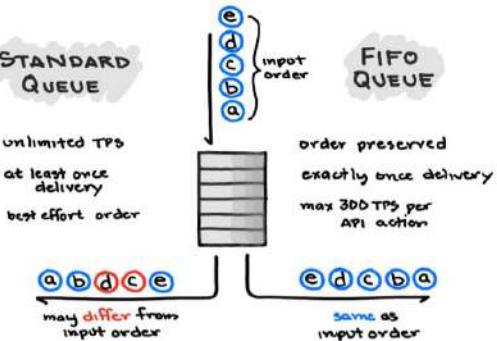
Pricing

each 64K chunk of payload counts as 1 request

Standard	40¢	per MM requests
FIFO	50¢	additional costs for S3 + KMS

Send, receive, delete, visibility APIs at FIFO rates, others at standard rate

data transfer starts at 90¢/GB



Limits

MESSAGE RETENTION PERIOD
MIN: 1 MIN MAX: 14 DAYS

MAXIMUM MESSAGE SIZE
MIN: 1 KB MAX: 256 KB

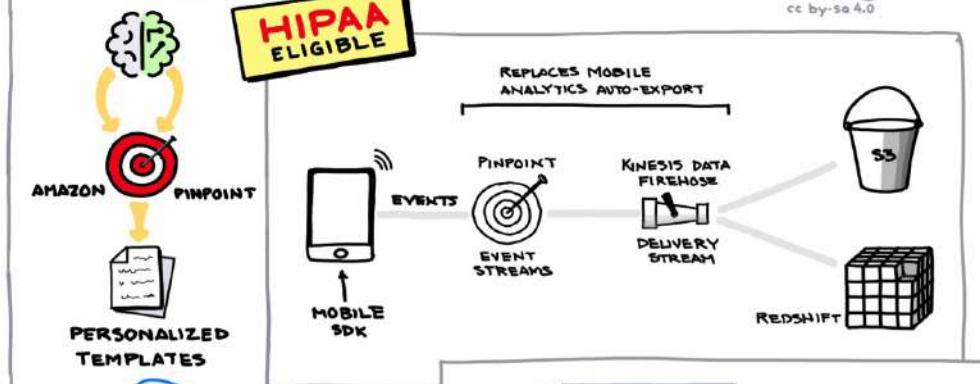
MAXIMUM INFLIGHT MESSAGES
STD: 120K FIFO: 20K

PAY AS YOU GO

PRICING

	OPTIONAL:
EMAIL	\$1 per 10K
MOBILE PUSH	\$1 per 1M over 1M
SMS	per message varies by destination
EVENTS:	\$1 per 1M collected via mobile SDK

+ \$1.20 per 1K endpoints (over 5k)



PINPOINT

CUSTOMER ENGAGEMENT

1. CUSTOMER ANALYTICS
2. CUSTOMER SEGMENTATION
3. MULTI-CHANNEL MESSAGING

amazon PINPOINT

@awsgeek

9/9/20

Amazon Pinpoint

CAMPAIGN MANAGEMENT

CUSTOM ENGAGEMENT FAMILY of SERVICES

Amazon Connect

CUSTOMER CONTACT CENTER

1 CUSTOMER ANALYTICS

- DEMOGRAPHIC DATA
- INTEREST DATA
- ENGAGEMENT DATA

METRICS
ACTIVATION
RETENTION
CONVERSION

DAILY USERS
CHURN RATE
RETENTION RATE
ANG REVENUE
LIFETIME VALUE
...

2 CUSTOMER SEGMENTATION

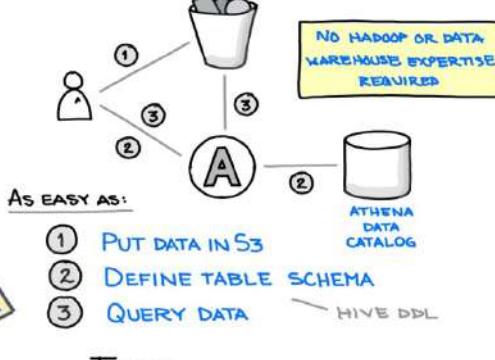
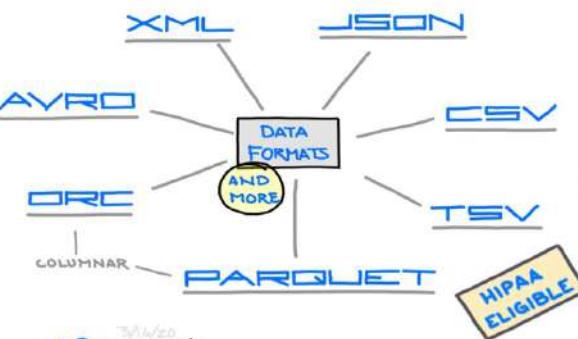
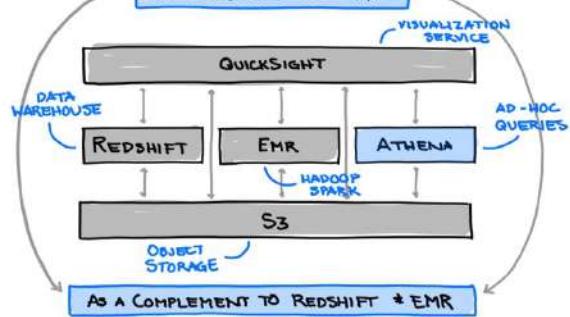
- DEMOGRAPHICS.... age, gender, location...
- INTERESTS..... sports, hobbies, likes...
- ENGAGEMENT..... sessions, purchases...



3 Multi-Channel Messaging

- ▷ MOBILE PUSH
 - APPLE PUSH NOTIFICATION
 - FIREBASE CLOUD MESSAGING
 - GOOGLE CLOUD MESSAGING
- ▷ EMAIL
 - HTML or PLAIN TEXT
- ▷ SMS

WHERE DOES ATHENA FIT?



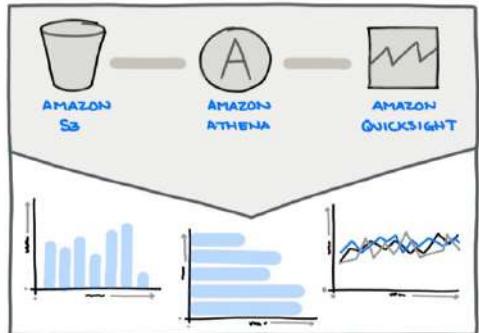
SERVERLESS	HIGHLY AVAILABLE
NO INFRA OR ADMIN	WARM COMPUTE POOLS
NO SPIN UP TIME	DATA IN S3
NO MAINTENANCE	MULTIPLE AZ
CONVENIENT	PERFORMANT
NO DATA LOADING	AUTO PARALLELIZATION
NATIVE DATA FORMATS	STREAMING RESULTS
NO ETL INVOLVED	COMPRESS/COLUMNAR

3/16/20
@awsgeek

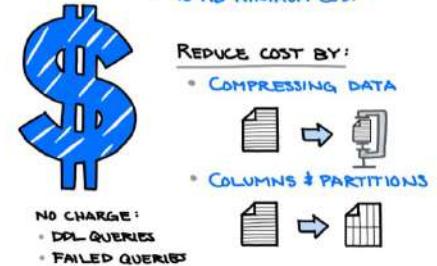
AMAZON athena

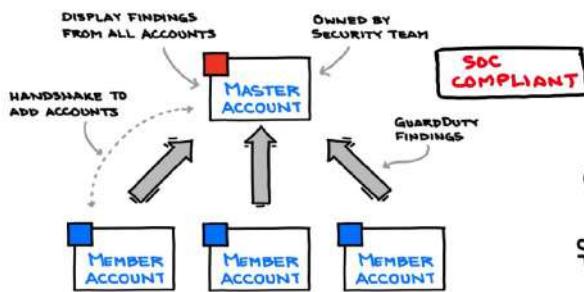
GOAL: MAKE IT EASY TO ANALYZE DATA IN S3

DDL IN HIVE	SCHEMA IS METADATA
SCHEMA ON READ	PROJECTED ON DATA DURING QUERY
EXTERNAL TABLES ONLY	DIFFERENT SCHEMAS FOR SAME DATA
SERDES - SUPPORT FOR MANY DATA FORMATS	
SERIALIZE DESERIALIZER	

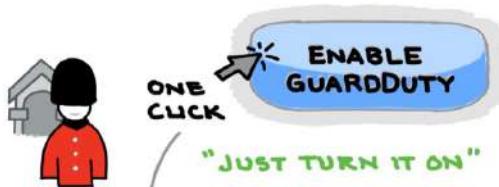


- \$5/TB SCANNED PER QUERY**
- ROUNDED UP TO NEAREST MB
 - 10 MB MINIMUM COST





CENTRALIZED THREAT DETECTION



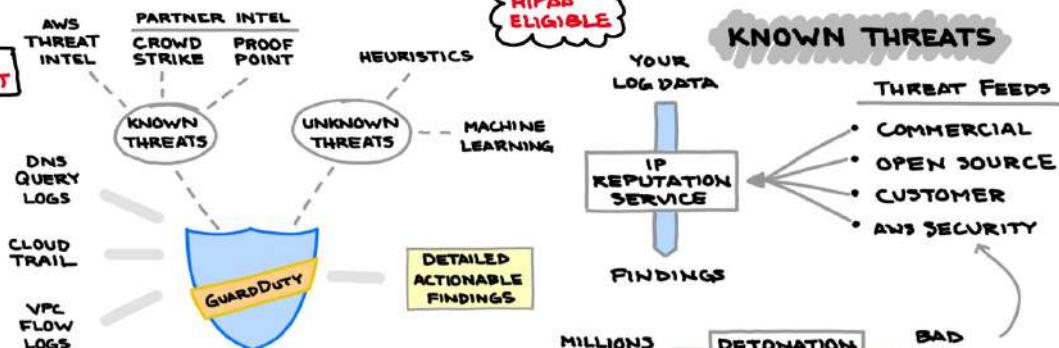
GIVES AWS ACCESS TO
YOUR CLOUDTRAIL, VPC
FLOW, & DNS QUERY LOGS

PRICING (US WEST - OREGON)

CLOUDTRAIL LOGS \$4/MO/MM

VPC FLOW LOGS & DNS QUERY LOGS

\$1/GB/MO	FIRST 500 GB
50¢/GB/MO	NEXT 2000 GB
25¢/GB/MO	NEXT 7500 GB
15¢/GB/MO	OVER 10K GB



KNOWN THREATS

THREAT FEEDS

- COMMERCIAL
- OPEN SOURCE
- CUSTOMER
- AWS SECURITY

UNKNOWN THREATS

SIGNAL PATTERNS
DETECT DEVIATIONS
MUCH RED
MACHINE LEARNING



GUARDDUTY IS A REGIONAL SERVICE
YOU MUST ENABLE IN ALL REGIONS



AUTOMATION FRAMEWORK

DETECTION TIMES

EC2 - 65 FAST, 30 SEC - 2 MIN
T2 SLOW, 5 - 10 MIN

CLOUDTRAIL - 5-15 MIN

DNS - BEHIND CLOUDTRAIL

DETECTION CATEGORIES

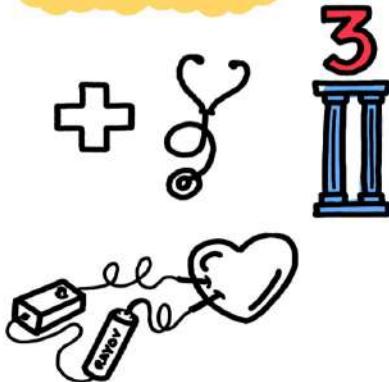
- | | |
|-----------------|------------------|
| • RECON | • STEALTH |
| • BACKDOOR | • CRYPTOCURRENCY |
| • TROJAN | • PEN TESTING * |
| • UNAUTH ACCESS | |



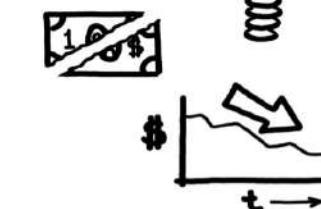
THE 5 PILLARS of the AWS WELL-ARCHITECTED FRAMEWORK

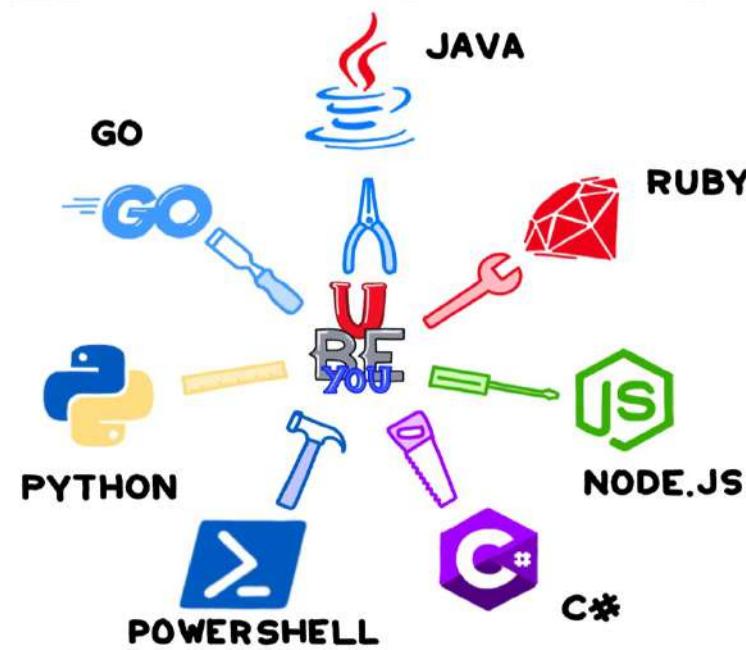
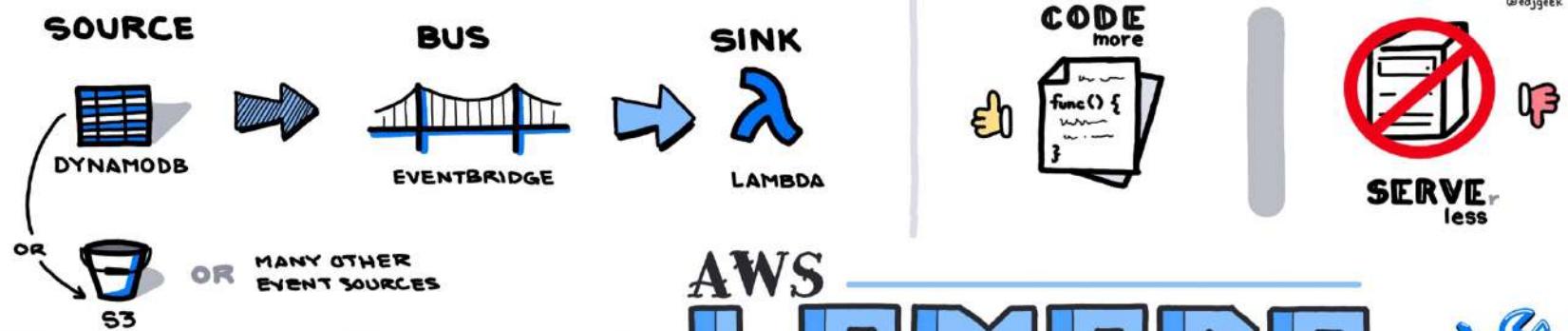
4/2/20 @awsgeek

RELIABILITY



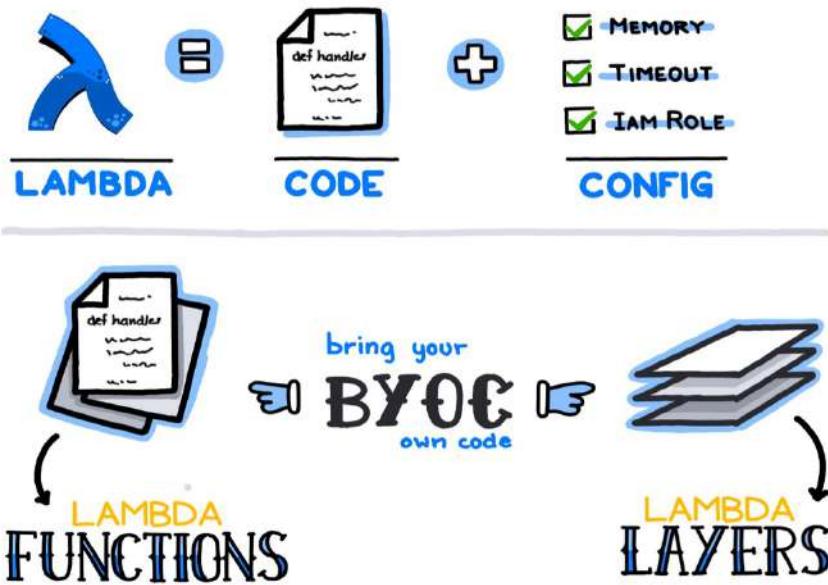
PERFORMANCE
EFFICIENCY





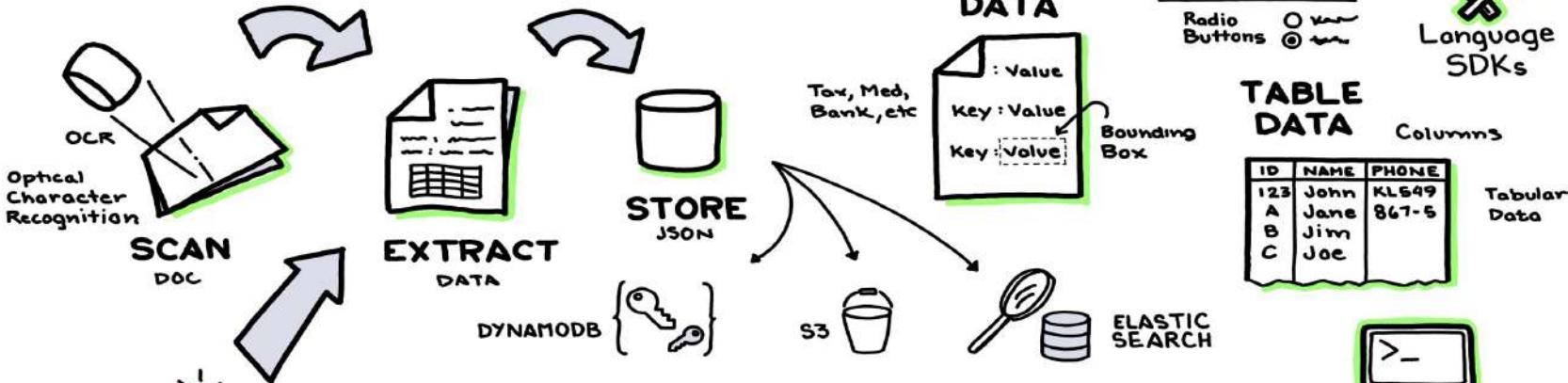
AWS LAMBDA

4/6/2020 @awsgeek



NO CODE REQUIRED

NO TEMPLATES REQUIRED



AMAZON

@awsgeek

TEXTRACT

4/9/20

EXTRACT TEXT & DATA

MACHINE
LEARNING

PRICING
PRICING
PRICING

PAY
PER
USE

PER
PAGE

- TEXT DETECTION
- DOCUMENT ANALYSIS
- FORMS & TABLES

JPG
-or-
PNG

SINGLE PAGE
SYNCHRONOUS
DETECT & ANALYZE
NEAR REAL-TIME

PDF
only

MULTI-PAGE
ASYNC



Web
Console

③ send
status

ASYNC
PROCESSING

②



TEXTRACT

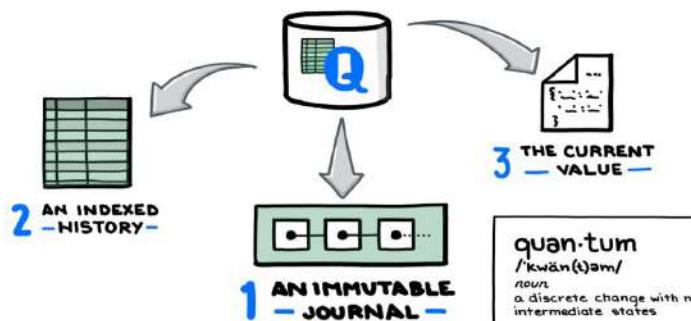
①
make
request



④ get results

CC BY-SA 2.0

WHAT IS A QUANTUM LEDGER DB?



DATABASE

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

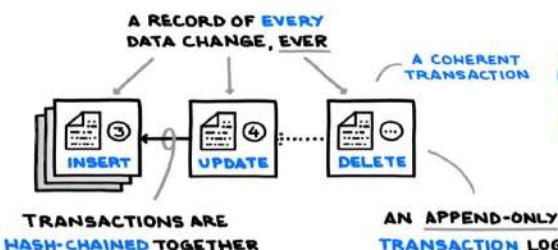
STREAMING

- NEAR REAL TIME
- KINESIS DATA STREAMS

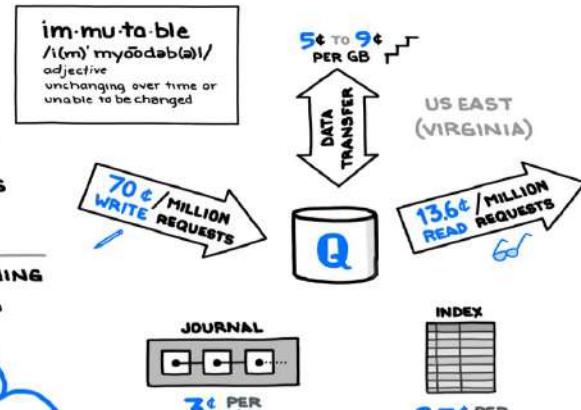
SERVERLESS

- NO NODE PROVISIONING
- NO IO PROVISIONING

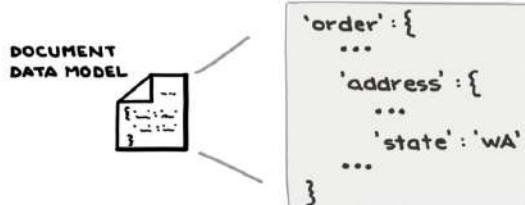
WHAT IS AN IMMUTABLE JOURNAL?



How Much Does QLDB Cost?



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

Compliance

PCI

HIPAA



ISO



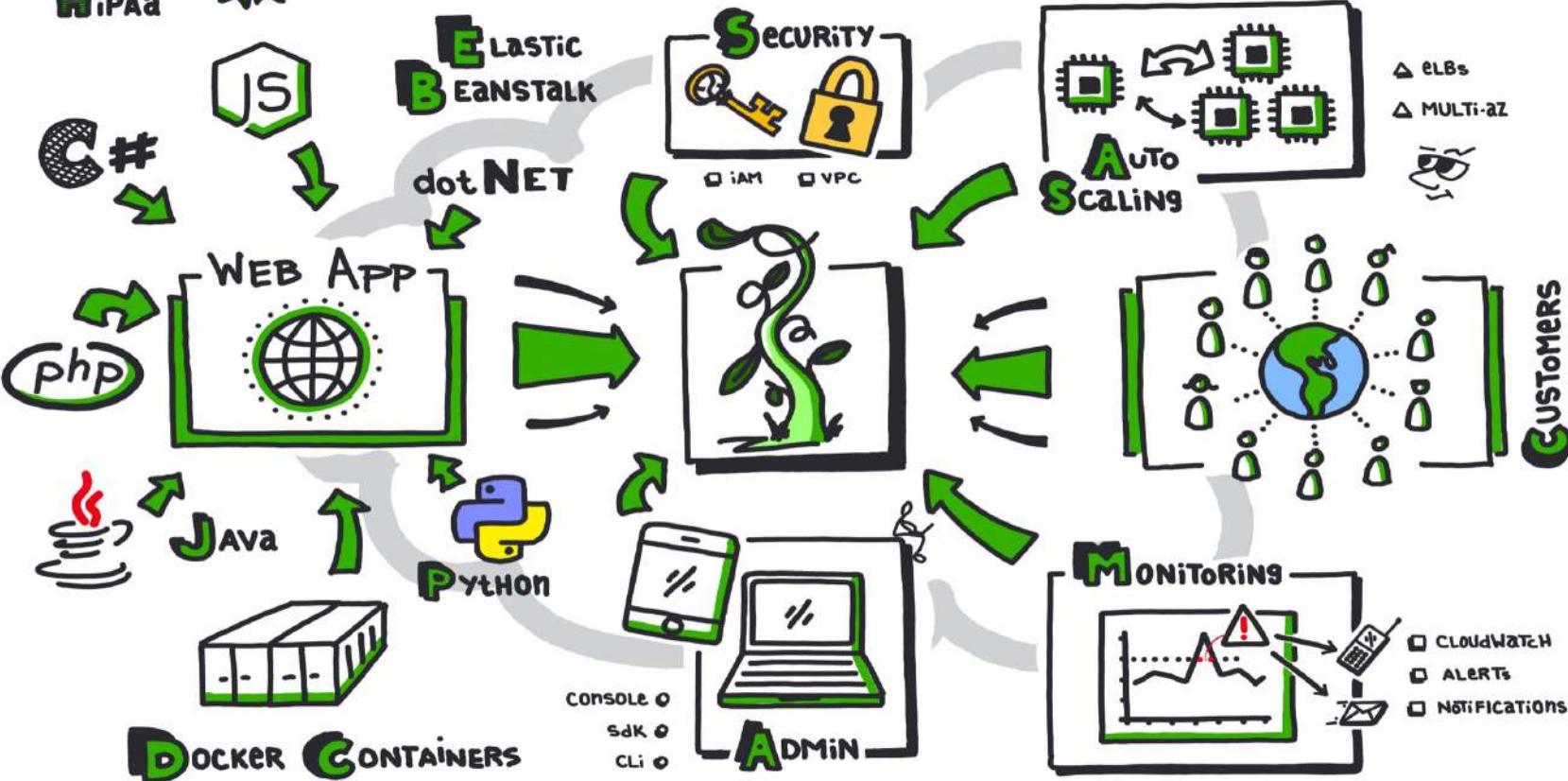
SOC
1,2,3

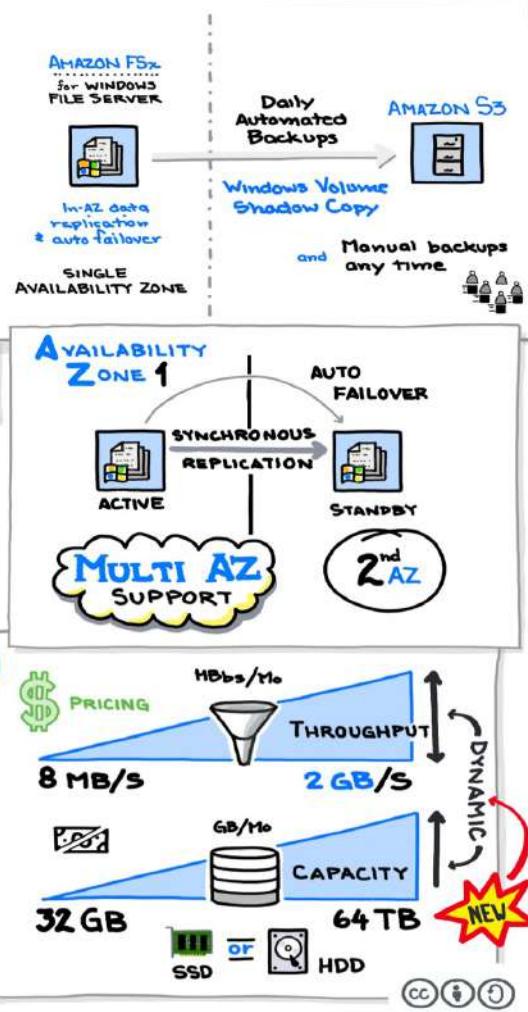
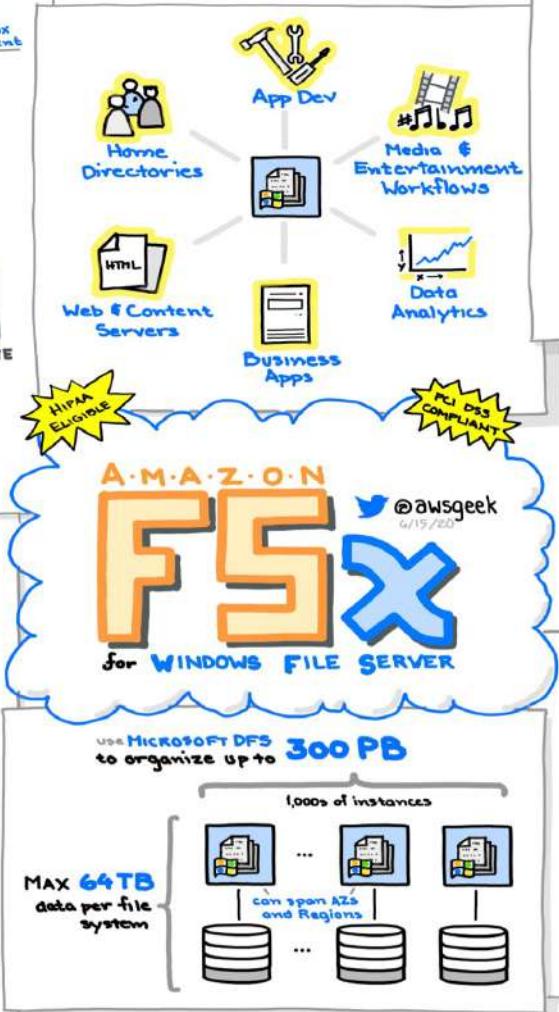
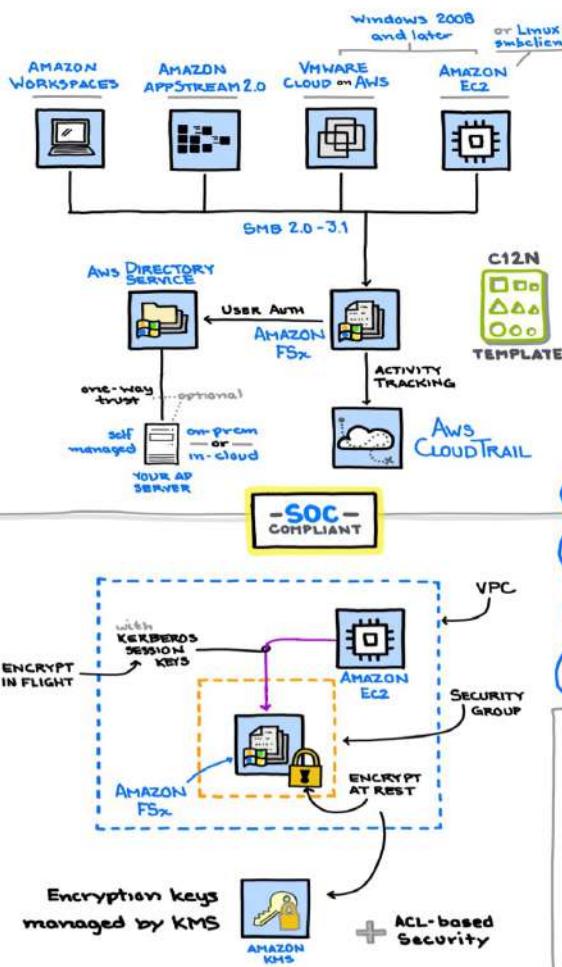
AWS · ELASTIC

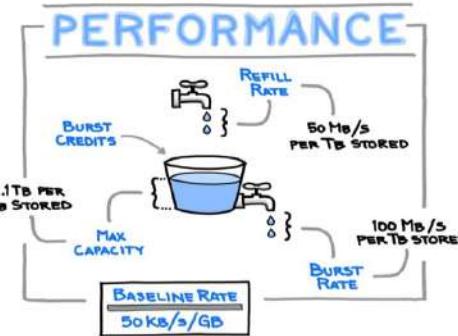
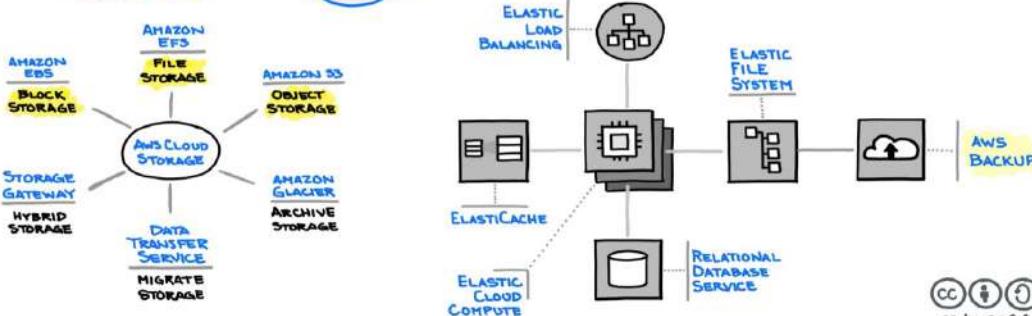
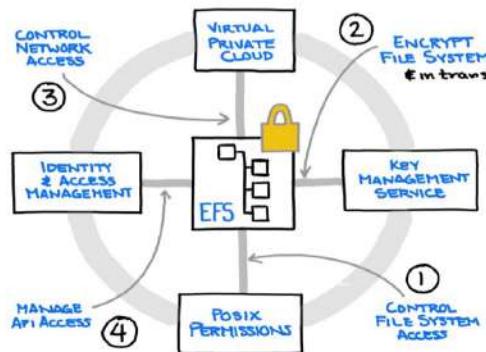
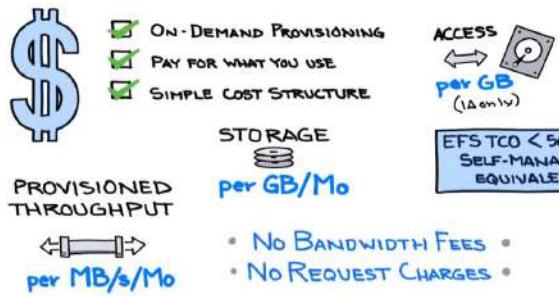
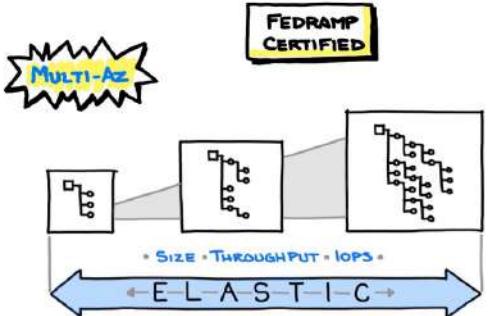
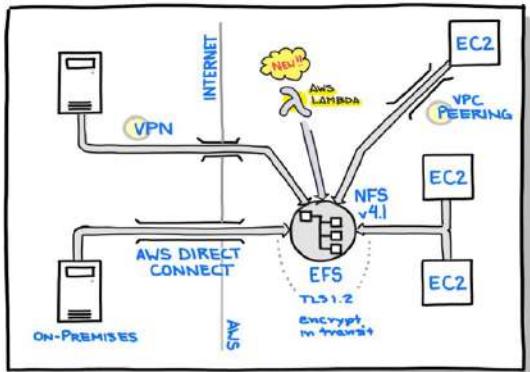
@awsgeek

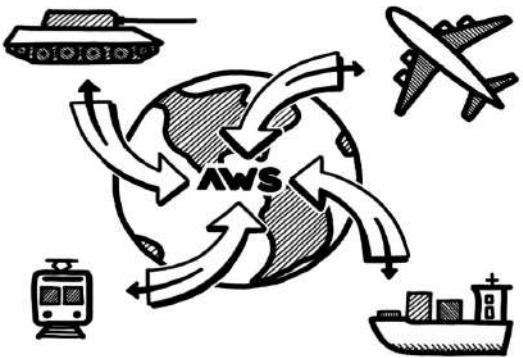
BEANSTALK

5/30/20



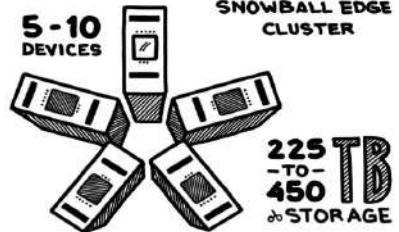






AWS @awsgeek

SNOW FAMILY



2 CPUs 2.2 GHz

WIFI 4 GB RAM

EC2 λ · LAMBDA
8 TB Battery

SNOWCONE

STORAGE OPTIMIZED ← SNOWBALL EDGE → COMPUTE OPTIMIZED

80 GB RAM

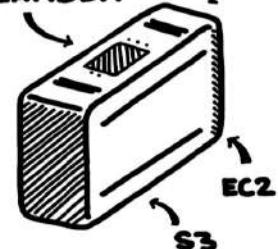
52 vCPUs

40 vCPUs

LAMBDA EBS

208 RAM GB

80 TB

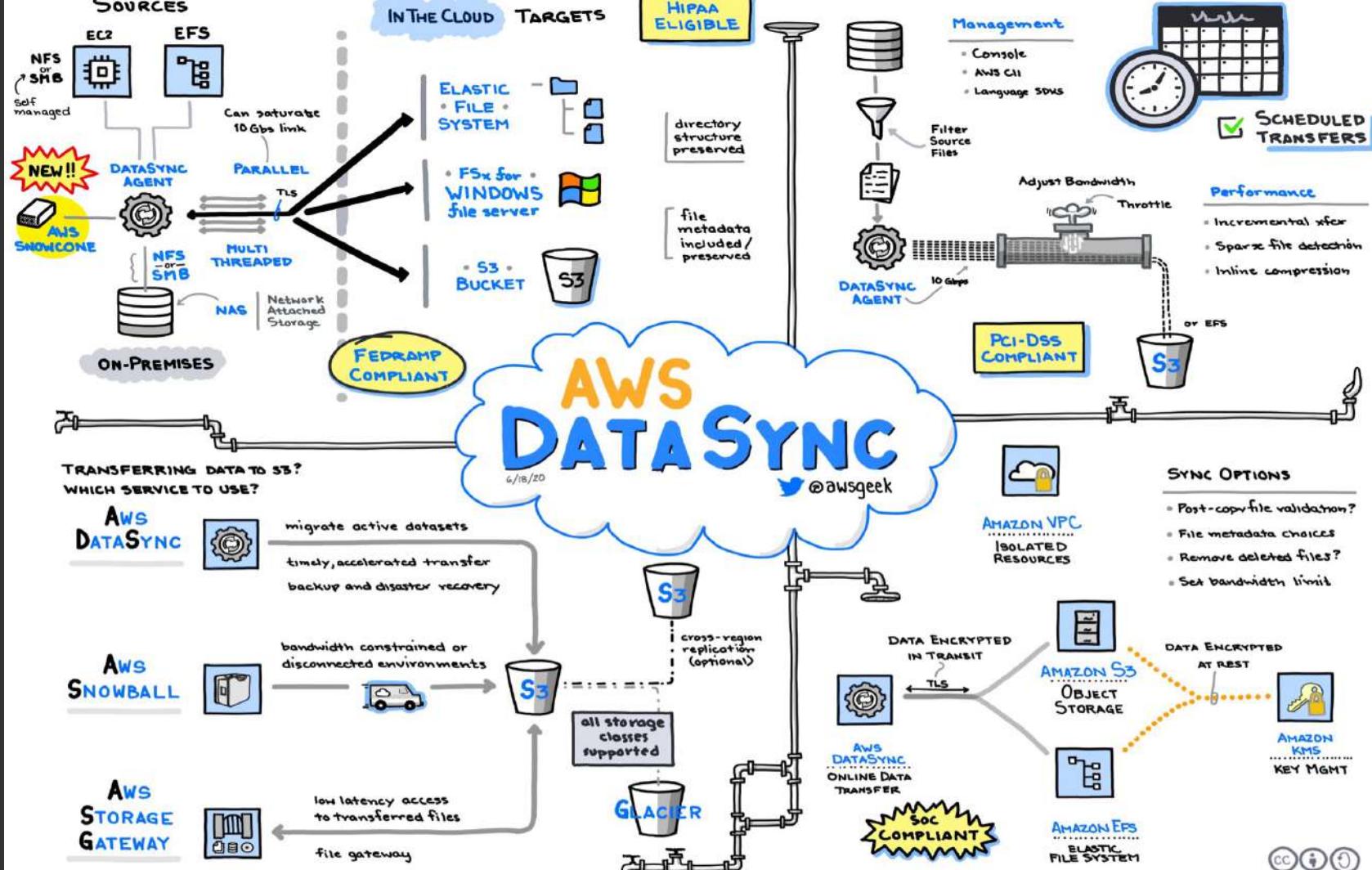


SNOWBALL

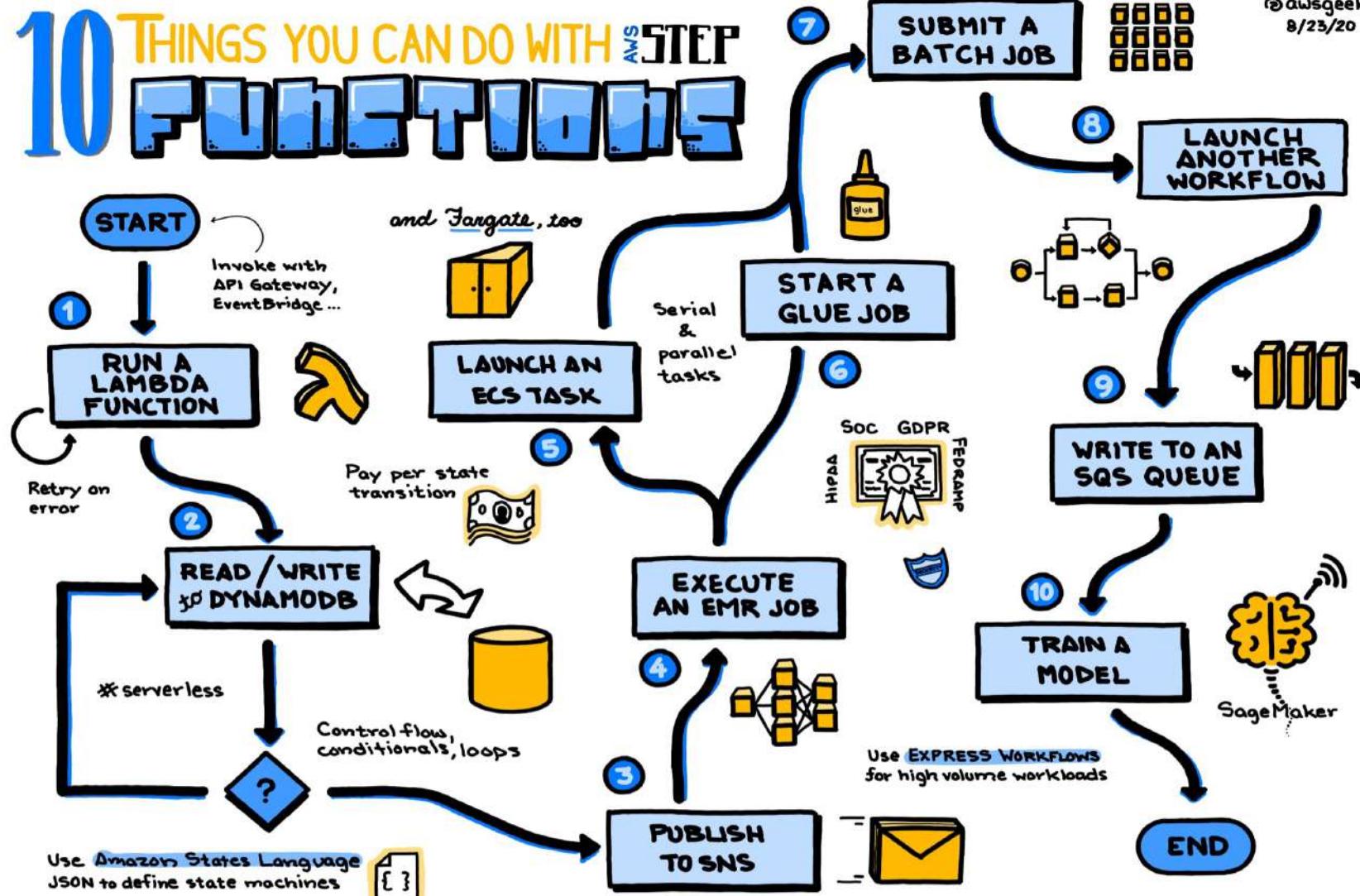
100 PB

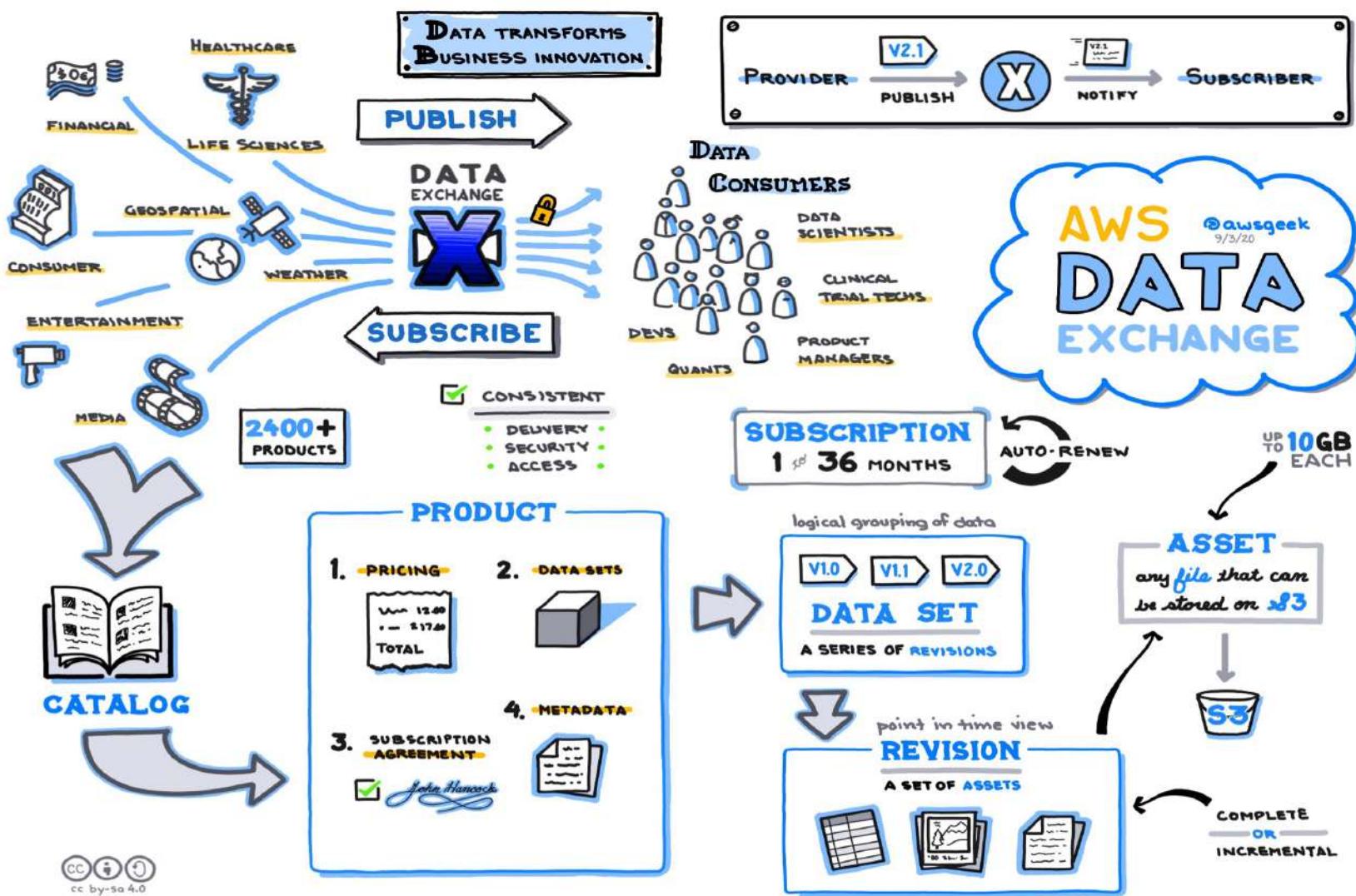


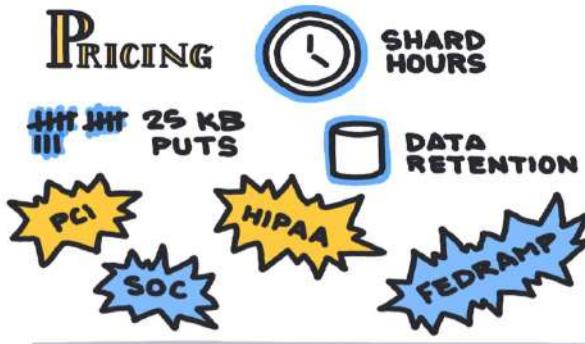
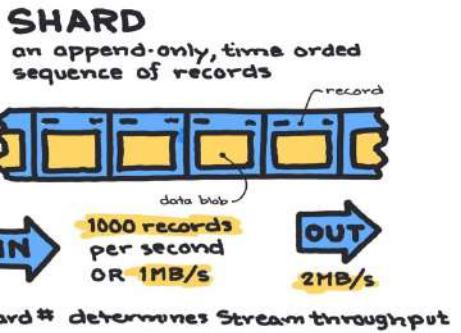
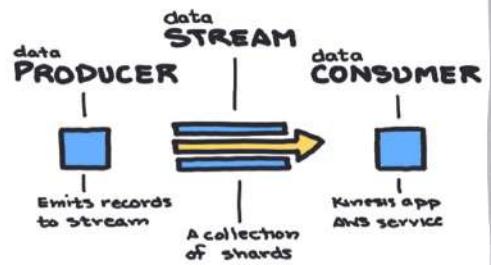
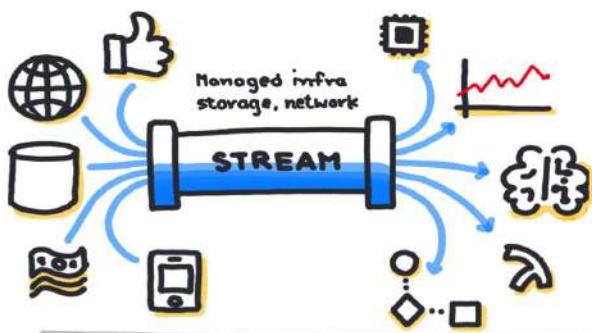
SNOWBALL EDGE CLUSTER



10 THINGS YOU CAN DO WITH AWS STEP FUNCTIONS







DATA KINESIS STREAMS

STREAM • DATA • AT • SCALE

