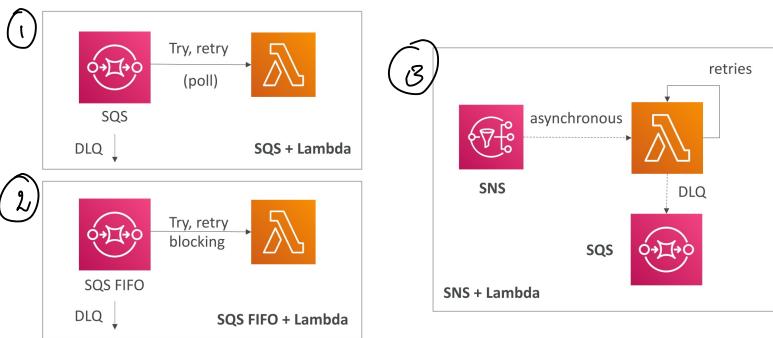


# # Event processing

## ① Lambda, SNS & SQS



① **SQS + λ**  
SQS has msgs & λ polls for msgs if the λ couldn't complete the message, then it might enter into an infinite loop.

to prevent this say after a certain no. of tries we put those requests to a dead letter queue (DLQ)

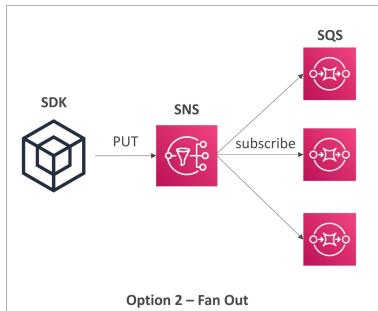
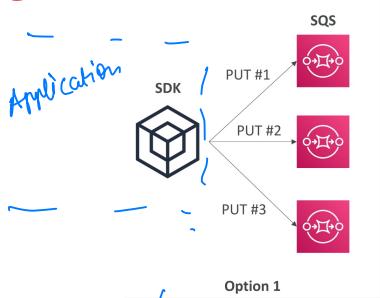
② **SQS FIFO + λ**

→ since all the msgs are in order & if one msg is unable to get through then this will block. so name remedy of DLQ

③ **SNS + λ**

→ retries 3 times when if still not processed then discard or put it into a DLQ but @ a service level (in ① & ② it was @ SQS side)

## 2] Fan Out Pattern:



if the application fails after sending #1 & #2 then #3 will never receive the last message  
Not reliable!

higher guarantee

## 3]

### S3 Event Notifications

- S3:ObjectCreated, S3:ObjectRemoved, S3:ObjectRestore, S3:Replication...
- Object name filtering possible (\*.jpg)
- Use case: generate thumbnails of images uploaded to S3
- Can create as many "S3 events" as desired
- S3 event notifications typically deliver events in seconds but can sometimes take a minute or longer



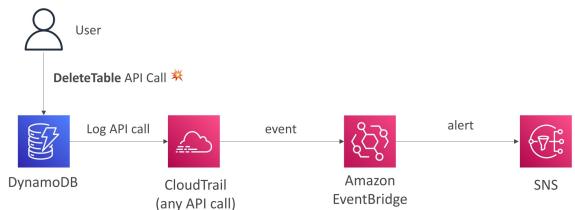
## 4]

### S3 Event Notifications with Amazon EventBridge



- Advanced filtering options with JSON rules (metadata, object size, name...)
- Multiple Destinations – ex Step Functions, Kinesis Streams / Firehose...
- EventBridge Capabilities – Archive, Replay Events, Reliable delivery

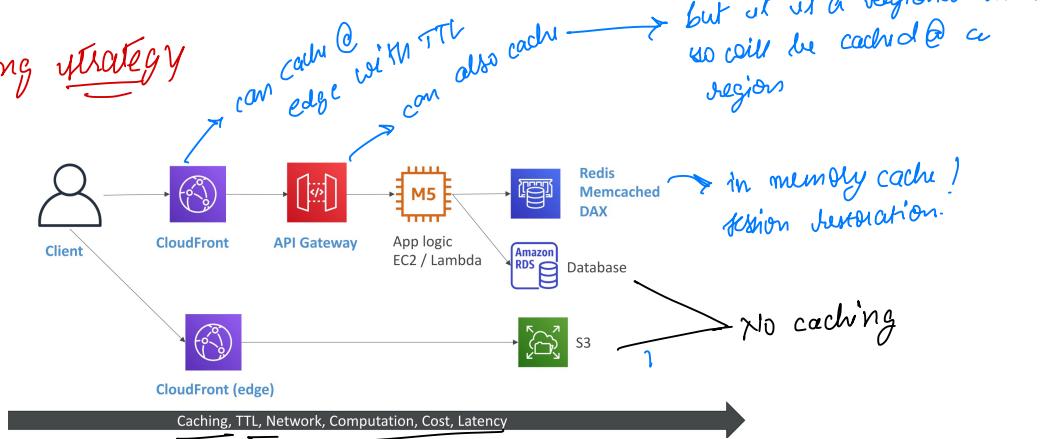
→ EventBridge can intercept any API calls by using the integration with CloudTrail



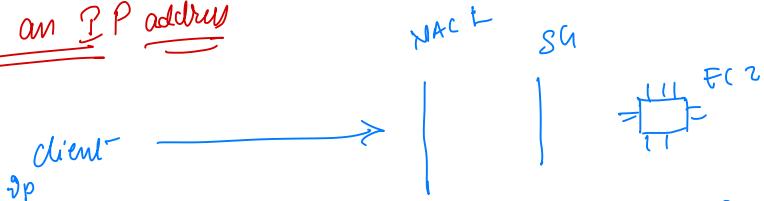
→ external events using API gateway.



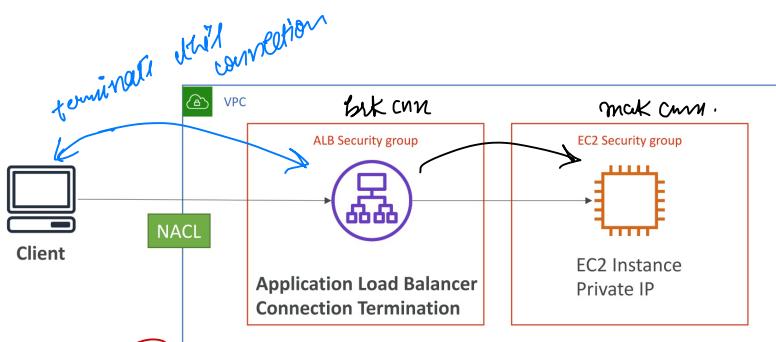
# Caching strategy



## # Blocking an IP address



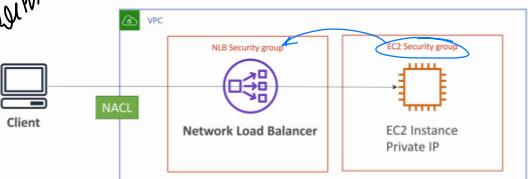
- first line of defense can be @ NACL level (deny rule for the IP)
- SG won't be very helpful because if it's a local network then we can define a CIDR but if not if with a global app then not a good option!
- or run a firewall software on EC2 instance.



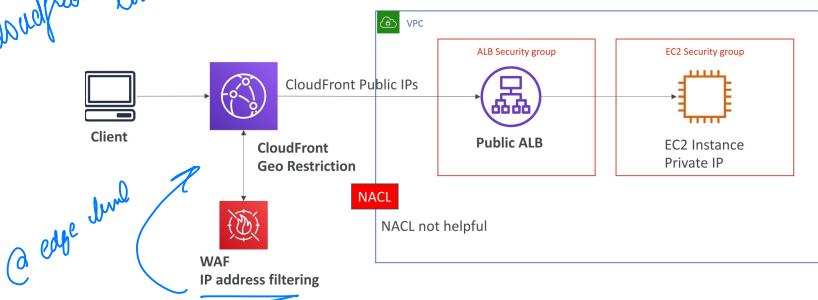
(no user client IPs  
then look for  
x-forwarded-for  
header)

In addition to layer 4 WAF for complex filtering of IP addresses.

Now with an NLB



filter @ the CloudFront level!



Since CloudFront is in b/w on ALB & client hence the ALB will see only CloudFront's ip & not the client so NACL not used.

## # High Performance Computing

- The cloud is the perfect place to perform HPC
  - You can create a very high number of resources in no time { on demand to release the resources }
  - You can speed up time to results by adding more resources
  - You can pay only for the systems you have used
- 
- Perform genomics, computational chemistry, financial risk modeling, weather prediction, machine learning, deep learning, autonomous driving

- Which services help perform HPC?

Step 1

Move data into AWS

*direct connect*

*snowball / snow mobile*  
*Data sync.*

Step 2

Compute & networking

*EC2 instance* →  
*spot instances or spot fees for cost saving + ASG*  
*placement group (cluster)*

*more --*

## \* EC2 Enhanced Networking (SR-IoV)

(↑ BW, ↑ PPS, ↓ latency).

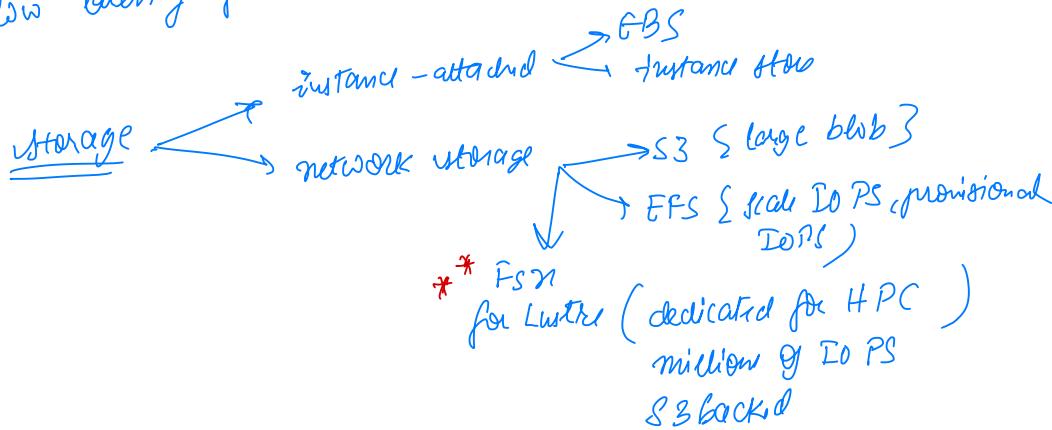
① Elastic Network Adapter (ENA)  $\Rightarrow$  100 Gbps

② Intel Q2599 VF upto 10 Gbps { legacy }

## ② Elastic Fabric Adapters { Improved ENA }

→ dedicated for HPC & only work for Linux,  
→ great for inter-node communication, (tightly coupled workload)  
distributed computation.

→ leverages MPI (Message Passing Interface) standard  
which helps bypass the underlying Linux OS to provide  
low latency for reliable transport



## Step III

### Automation & Orchestration

① AWS Batch  $\rightarrow$  multiple jobs,  
single job across  
many EC2 instances  
 $\rightarrow$  schedule & launch EC2  
instances accordingly.

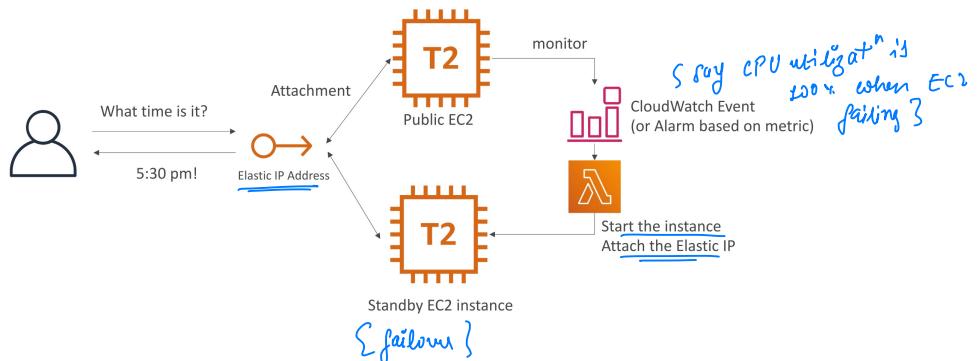
## ② AWS parallel cluster

- open aws cluster management tool to deploy HPC on AWS
- config. with txt file
- it will automate creation of VPC, Subnets, clusters, etc.
- \* → use parallel cluster along EFA (bc there is parameter in txt file to enable elastic fabric adapters on the cluster and its impact is to improve network performance.)

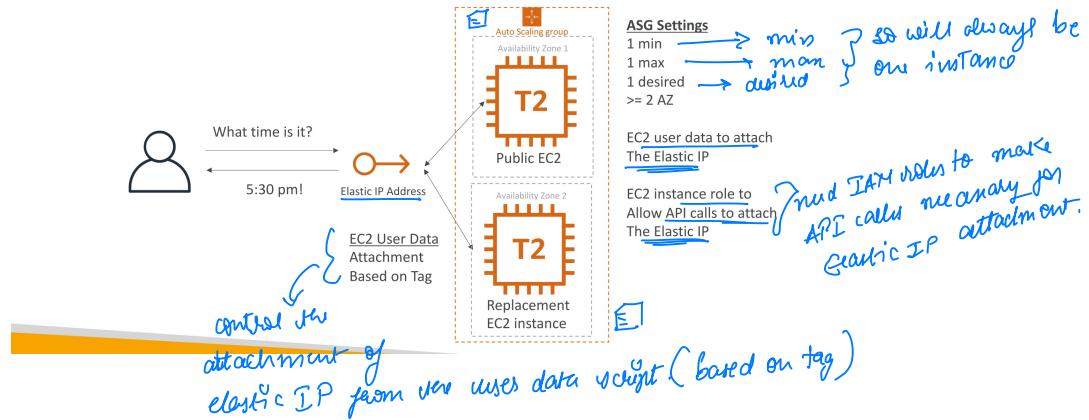
## # Making EC2 instance highly available

- EC2 instance hosting a webserver running in one AZ how do we improve the availability.

### ① Cloudwatch alarm + ↗



② Inside an ASG



③ Suppose we also have some storage by EBS volume

