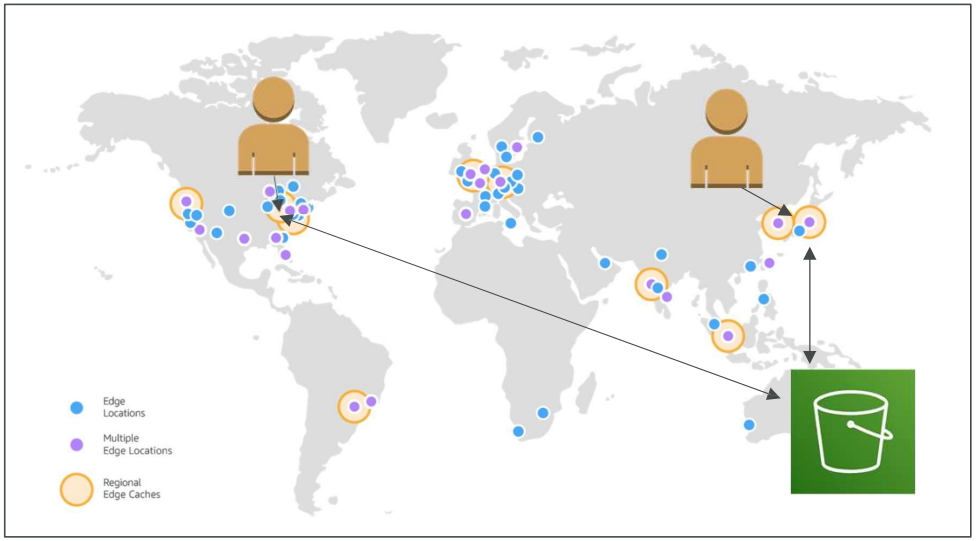
CloudFront & Global Accelerator

Amazon CloudFront

- Content Delivery Network (CDN)
- Improves read performance, content is cached at the edge
- Improves users experience
- 216 Point of Presence globally (edge locations)
- DDoS protection (because worldwide), integration with Shield, AWS Web Application Firewall

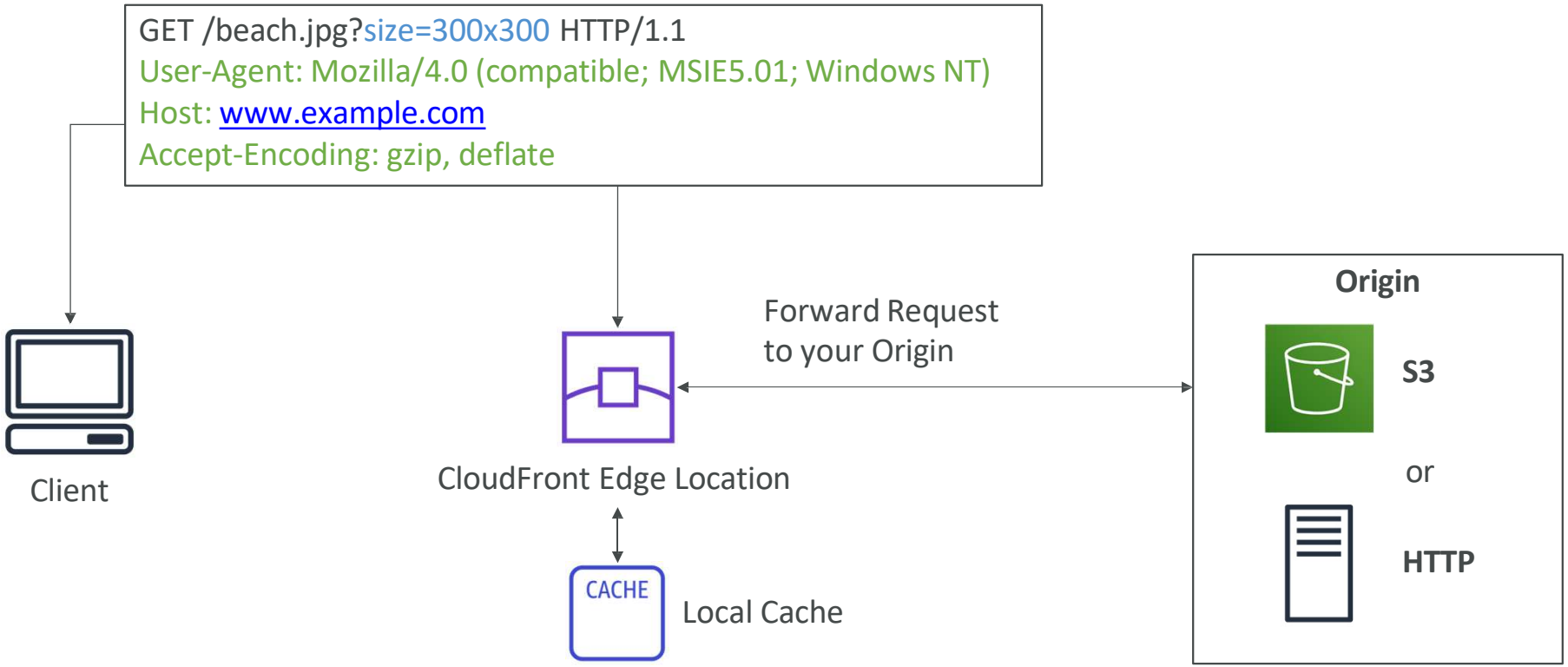


Source: https://aws.amazon.com/cloudfront/features/?nc=sn&loc=2

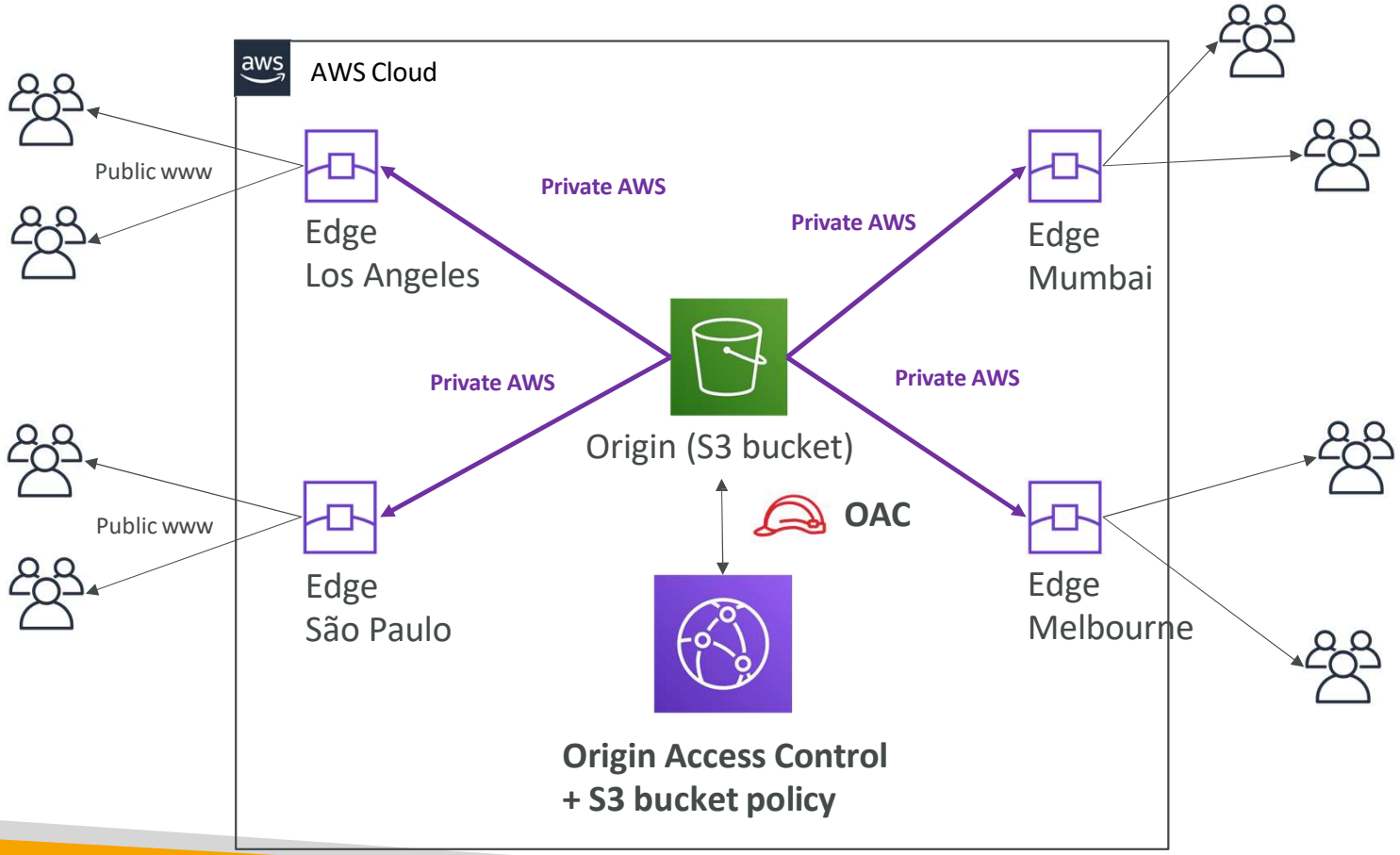
CloudFront – Origins

- S3 bucket
  - For distributing files and caching them at the edge
  - Enhanced security with CloudFront Origin Access Control (OAC)
  - OAC is replacing Origin Access Identity (OAI)
  - CloudFront can be used as an ingress (to upload files to S3)
- Custom Origin (HTTP)
  - Application Load Balancer
  - EC2 instance
  - S3 website (must first enable the bucket as a static S3 website)
  - Any HTTP backend you want

CloudFront at a high level



CloudFront – S3 as an Origin

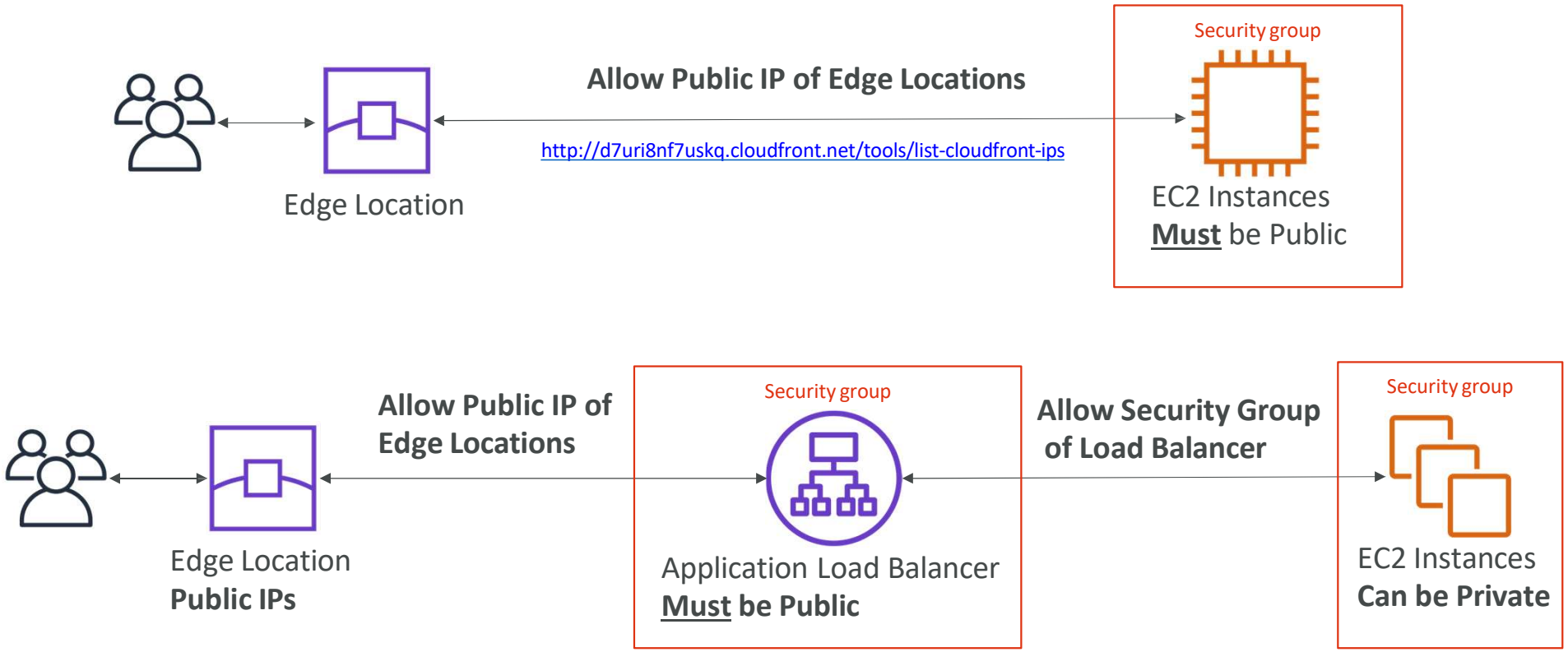


CloudFront vs S3 Cross Region Replication

- CloudFront:
  - Global Edge network
  - Files are cached for a TTL (maybe a day)
  - Great for static content that must be available everywhere

- S3 Cross Region Replication:
  - Must be setup for each region you want replication to happen
  - Files are updated in near real-time
  - Read only
  - Great for dynamic content that needs to be available at low-latency in few regions

CloudFront – ALB or EC2 as an origin



CloudFront Geo Restriction

- You can restrict who can access your distribution
  - Allowlist: Allow your users to access your content only if they're in one of the countries on a list of approved countries.
  - Blocklist: Prevent your users from accessing your content if they're in one of the countries on a list of banned countries.
- The “country” is determined using a 3rd party Geo-IP database
- Use case: Copyright Laws to control access to content

CloudFront - Pricing

- CloudFront Edge locations are all around the world
- The cost of data out per edge location varies

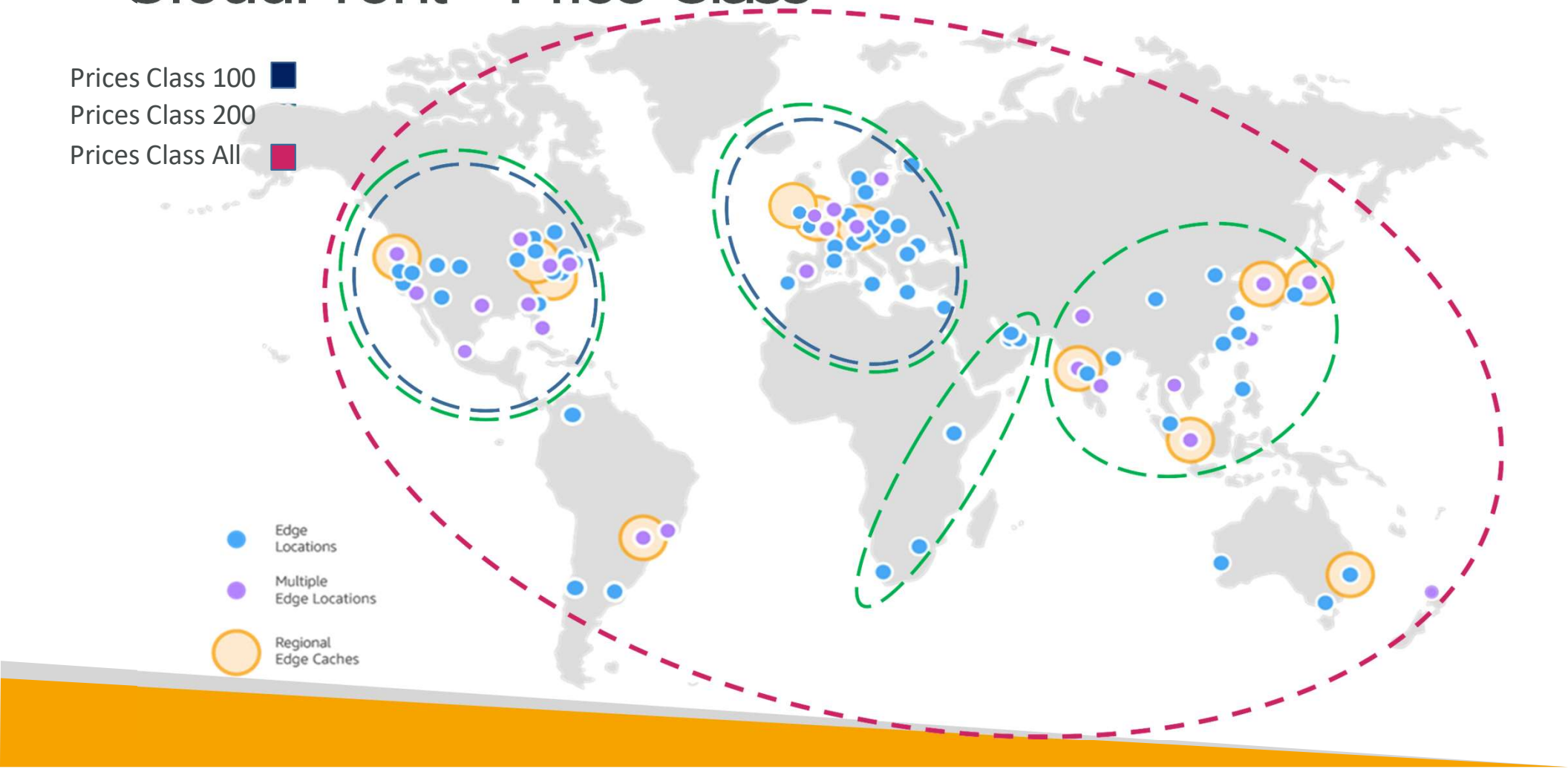
Per Month	United States, Mexico, & Canada	Europe & Israel	South Africa, Kenya, & Middle East	South America	Japan	Australia & New Zealand	Hong Kong, Philippines, Singapore, South Korea, Taiwan, & Thailand	India
First 10TB	$0.085	$0.085	$0.110	$0.110	$0.114	$0.114	$0.140	$0.170
Next 40TB	$0.080	$0.080	$0.105	$0.105	$0.089	$0.098	$0.135	$0.130
Next 100TB	$0.060	$0.060	$0.090	$0.090	$0.086	$0.094	$0.120	$0.110
Next 350TB	$0.040	$0.040	$0.080	$0.080	$0.084	$0.092	$0.100	$0.100
Next 524TB	$0.030	$0.030	$0.060	$0.060	$0.080	$0.090	$0.080	$0.100
Next 4PB	$0.025	$0.025	$0.050	$0.050	$0.070	$0.085	$0.070	$0.100
Over 5PB	$0.020	$0.020	$0.040	$0.040	$0.060	$0.080	$0.060	$0.100

CloudFront – Price Classes

- You can reduce the number of edge locations for cost reduction
- Three price classes:
  1. Price Class All: all regions – best performance
  2. Price Class 200: most regions, but excludes the most expensive regions
  3. Price Class 100: only the least expensive regions

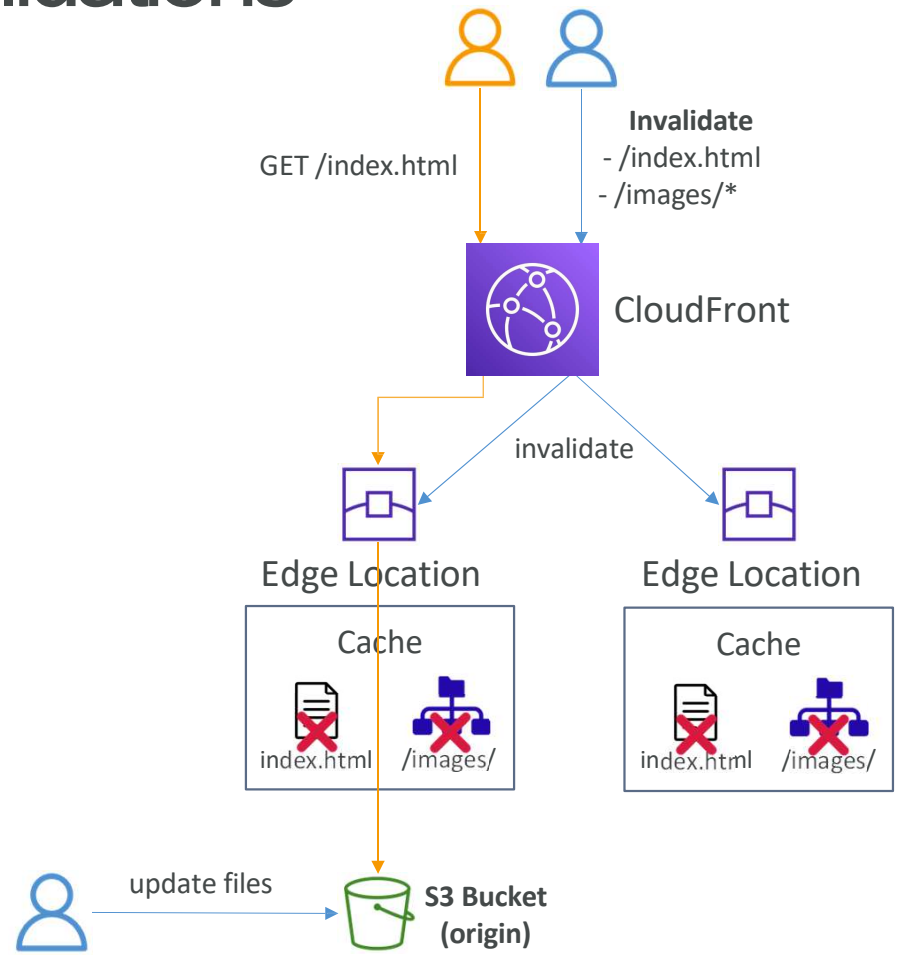
Edge Locations Included Within	United States, Mexico, & Canada	Europe & Israel	South Africa, Kenya, & Middle East	South America	Japan	Australia & New Zealand	Hong Kong, Philippines, Singapore, South Korea, Taiwan, & Thailand	India
Price Class All	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Price Class 200	Yes	Yes	Yes	x	Yes	x	Yes	Yes
Price Class 100	Yes	Yes	x	x	x	x	x	x

CloudFront - Price Class



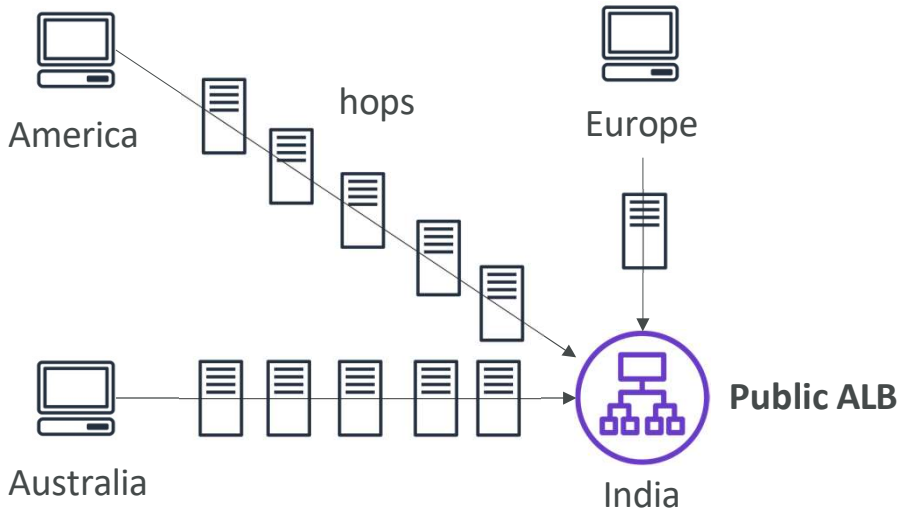
CloudFront - Cache Invalidations

- In case you update the back-end origin, CloudFront doesn't know about it and will only get the refreshed content after the TTL has expired
- However, you can force an entire or partial cache refresh (thus bypassing the TTL) by performing a CloudFront Invalidation
- You can invalidate all files (*) or a special path (/images/*)



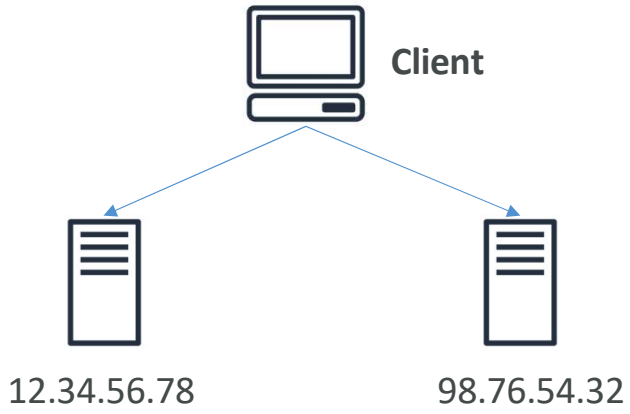
Global users for our application

- You have deployed an application and have global users who want to access it directly.
- They go over the public internet, which can add a lot of latency due to many hops
- We wish to go as fast as possible through AWS network to minimize latency

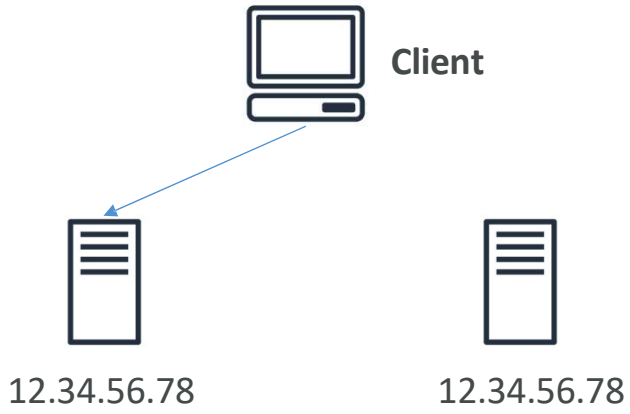


Unicast IP vs Anycast IP

- Unicast IP: one server holds one IP address

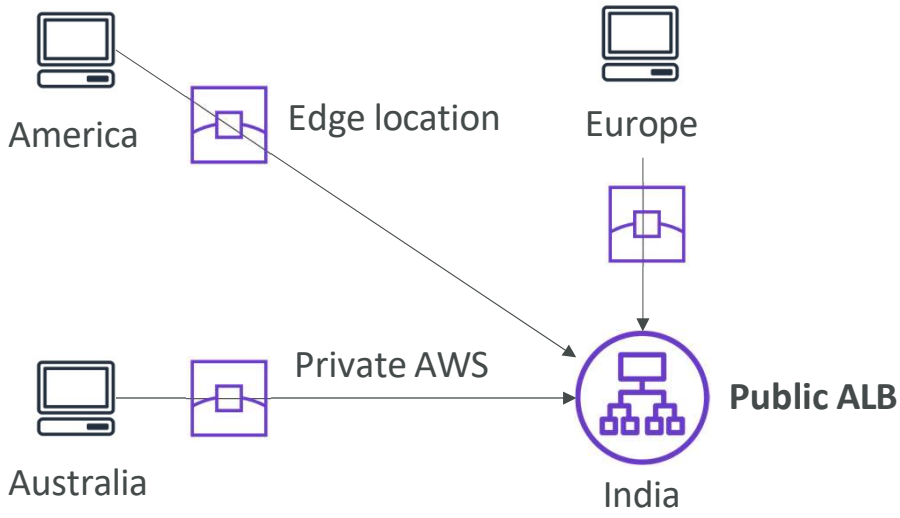


- Anycast IP: all servers hold the same IP address and the client is routed to the nearest one



AWS Global Accelerator

- Leverage the AWS internal network to route to your application
- 2 Anycast IP are created for your application
- The Anycast IP send traffic directly to Edge Locations
- The Edge locations send the traffic to your application



AWS Global Accelerator

- Works with Elastic IP, EC2 instances, ALB, NLB, public or private
- Consistent Performance
  - Intelligent routing to lowest latency and fast regional failover
  - No issue with client cache (because the IP doesn't change)
  - Internal AWS network
- Health Checks
  - Global Accelerator performs a health check of your applications
  - Helps make your application global (failover less than 1 minute for unhealthy)
  - Great for disaster recovery (thanks to the health checks)
- Security
  - only 2 external IP need to be whitelisted
  - DDoS protection thanks to AWS Shield

AWS Global Accelerator vs CloudFront

- They both use the AWS global network and its edge locations around the world
- Both services integrate with AWS Shield for DDoS protection.

- CloudFront
  - Improves performance for both cacheable content (such as images and videos)
  - Dynamic content (such as API acceleration and dynamic site delivery)
  - Content is served at the edge

- Global Accelerator
  - Improves performance for a wide range of applications over TCP or UDP
  - Proxying packets at the edge to applications running in one or more AWS Regions.
  - Good fit for non-HTTP use cases, such as gaming (UDP), IoT (MQTT), or Voice over IP
  - Good for HTTP use cases that require static IP addresses
  - Good for HTTP use cases that required deterministic, fast regional failover