

AWS Certified Cloud Practitioner

Exam Overview : 1. Cloud Concepts 3. Technology
 2. Security 4. Billing + Pricing

→ Make sure to go over the Domains !!

What is cloud computing?	Practice of using a network of remote servers hosted on the internet to 1. store 3. process data 2. manage rather than a local server on a personal computer	
On Premise Vs. Cloud Providers	<u>On Premise</u> <ul style="list-style-type: none">→ You own servers→ You hire IT labor→ You pay/rent real estate→ You take all the risk	<u>Cloud Providers</u> <ul style="list-style-type: none">→ Someone else<ul style="list-style-type: none">owns serverhires IT pplReal Estate→ You are responsible for configuring cloud services + code
Why chose cloud provider over On-premise?	<ul style="list-style-type: none">① Trade capital expense for variable expense<ul style="list-style-type: none">→ No upfront cost<ul style="list-style-type: none">→ Instead of paying for data centers & servers.→ Pay on demand<ul style="list-style-type: none">→ Pay only when you consume computing resources② Benefit from massive economies of scale<ul style="list-style-type: none">→ Usage is aggregated in cloud→ ∴, sharing the costs w/ customers③ Stop guessing capacity.<ul style="list-style-type: none">→ Not paying for idle or underutilized servers→ Can scale ↑ on ↓ to meet the current need④ Increase speed + agility<ul style="list-style-type: none">→ Launch resources within minutes	

	<p>⑤ Stop spending money on running & maintaining data centers → Focus on customers</p> <p>⑥ Go global in minutes → Quickly deploy app in multiple regions → Provide better experience & ↓ latency ⑥ minimal costs</p>
Types of Cloud Computing ?	<p>① SaaS ② PaaS ③ IaaS ↓ ↓ ↓ Customers Developers Administrators</p>
SaaS	<ul style="list-style-type: none"> → service that is run and managed by service provider → Don't care how the service is maintained, it just works
PaaS	<ul style="list-style-type: none"> → Focus on the deployment and management of your apps → Don't worry about provisioning, configuring, understanding the hardware or OS
IaaS	<ul style="list-style-type: none"> → Basic building of cloud IT. → Provides access to networking features, computers + data storage space → Don't worry about on premise disadvantages
Cloud Computing deployment models	<p>1. CLOUD 2. HYBRID 3. On-Premise</p>
Features of fully utilizing cloud computing ?	<ul style="list-style-type: none"> → Useful for startups and companies that don't require on-premise IT → Low cost and good for simple SaaS
Features of hybrid ?	<ul style="list-style-type: none"> → Deploying resources on-prem using virtualization and resource management tools → "Private cloud" → Used by government, hospitals, large enterprise due to super sensitive data and/or w/ heavy regulations.

Hybrid	<ul style="list-style-type: none"> → Can adopt cloud but they have legacy on premise environments and/or some customers are not comfortable going on cloud → Banks + Canada Investment Board → Accounting Companies 						
Where does all this Cloud Computing run?	<table border="0"> <tr> <td>Regions</td> <td>→ Physical locations w/ many AZs'</td> </tr> <tr> <td>Avaliability Zones</td> <td>→ One or more discrete data center</td> </tr> <tr> <td>Edge Locations</td> <td>→ datacenter owned by trusted partner of AWS.</td> </tr> </table>	Regions	→ Physical locations w/ many AZs'	Avaliability Zones	→ One or more discrete data center	Edge Locations	→ datacenter owned by trusted partner of AWS.
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REGIONS	<ul style="list-style-type: none"> → Geographically distinct location w/ multiple AZs <ul style="list-style-type: none"> ↳ At least two AZs. ↳ US-EAST is the largest ↳ To view billing Information ⇒ US-EAST 1 <ul style="list-style-type: none"> ↳ North Virginia ↳ Not all services are available 						
AZs	<ul style="list-style-type: none"> ↳ Distributing your instances across multiple AZs allows failover configuration for handling requests when one goes down. ↳ Latency between AZs are < 10 ms. → Directly owned & operated by AWS in which AWS services run. 						
Edge locations	<ul style="list-style-type: none"> → Owned by a trusted partner of AWS which has a direct connection to the AWS network. → Requests going to either Cloudfront or Route 53 will be routed to the nearest edge location automatically. → S3 Transfer acceleration traffic and API gateway endpoint traffic also use AWS Edge Network → Benefit: ↓ latency no matter where the end user is geographically located 						

GovCloud

- Region that allows customers to host sensitive controlled, unclassified information and other types of regulated workload
- Meant for customers who can architect secure cloud solutions that comply:
 - ↳ Department of defense cloud computing security requirements Guide
 - ↳ Export Administration regulations
 - ↳ U.S. international Traffic in Arms Regulations.

what is a cloud service provider?

- A Cloud Service Provider is a company which:
 - ↳ Provides multiple Cloud Services
 - ↳ Cloud services can be chained to create cloud architectures
 - ↳ C.S are accessible via Single Unified API
 - ↳ C.S utilized metre billing based on usage
 - ↳ C.S have rich monitoring built in
 - ↳ C.S have IaaS offering
 - ↳ C.S offers automation via infrastructure as Code

What is a Cloud Platform? Examples?

- If a company provides multiple cloud services under a single UI but do not meet all of the requirements that a CSP does, it would be referred as a Cloud Platform.

Example: Databricks, Twilio , HashiCorp.

what are the 4 core cloud service offerings

1. Compute
 2. Storage
 3. Database
 4. Networking + Content Delivery
- 
EC2 VMs

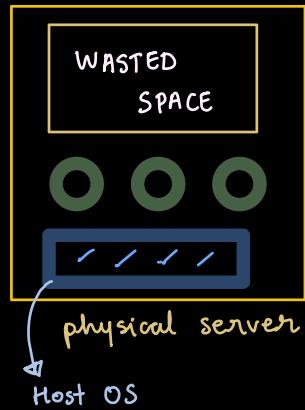

EBS Virtual Drives


RDS SQL Databases

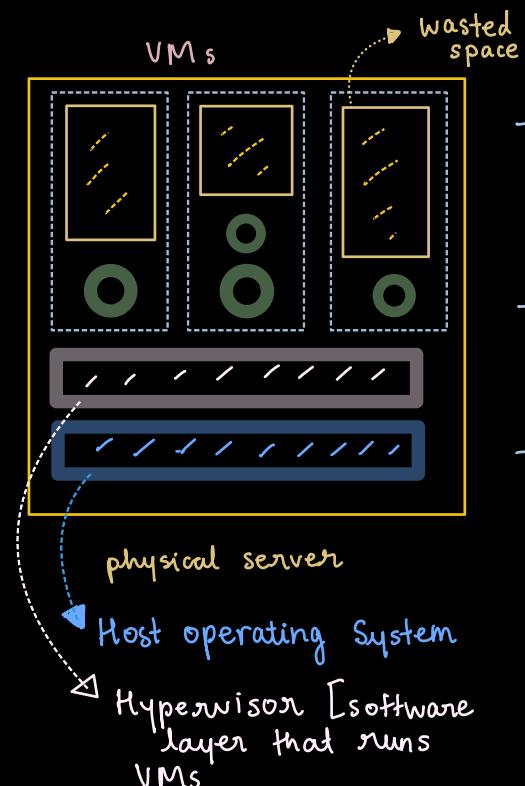

VPC Private Cloud Networks

Evolution of computing

DEDICATED

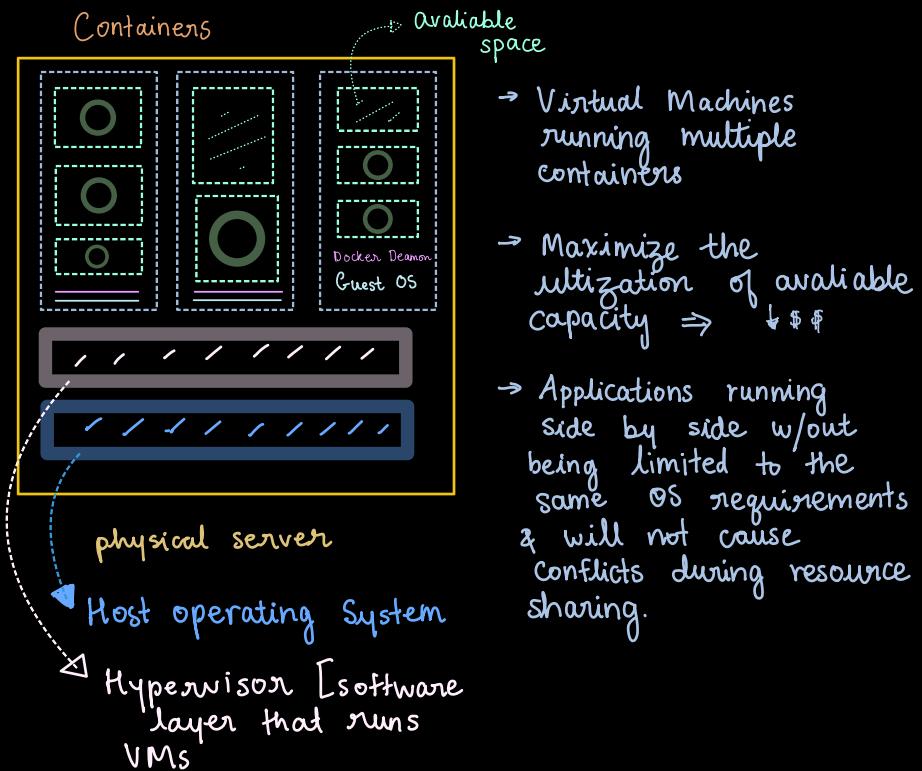


- Physical server wholly utilized by a single customer
- Guess capacity
- Overpay for an underutilized server
- Cannot vertically scale, need manual migration
- Multiple apps [] can result in conflicts in resource sharing.



- Multiple VMs on 1 physical server shared by multiple customers
- Cheap but still overpaying for underutilizing VM
- Easy to vertical/ Horizontally scale

Evolution of Computing



SEVEN ADVANTAGES OF CLOUD?

- ① COST EFFECTIVE
- ② GLOBAL → JUST CHOOSE A REGION
- ③ SECURE
- ④ RELIABLE → FAULT TOLERANCE, DISASTER RECOVERY
- ⑤ SCALABLE
- ⑥ ELASTIC → AUTOMATE SCALING DURING ↑ OR ↓ IN DEMAND
- ⑦ CURRENT → UNDERLING H/S WARE IS PATCHED, UPGRADED + REPLACED BY C.P W/OUT INTERRUPTION

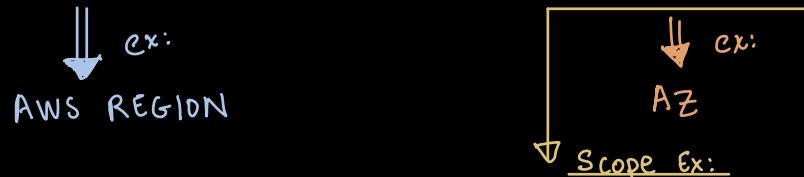
WHAT IS FAULT DOMAIN

A FAULT DOMAIN IS A SECTION OF A NETWORK THAT IS VULNERABLE TO DAMAGE IF A CRITICAL DEVICE / SYSTEM FAILS.

END GOAL OF FAULT DOMAIN IS FOR THE FAILURE TO NOT CASCADE OUTSIDE THAT DOMAIN, ∴ LIMITING THE DAMAGE POSSIBLE.

YOU CAN HAVE NESTED FAULT DOMAINS.

FAULT LEVEL \Rightarrow COLLECTION OF FAULT DOMAINS



- Specific servers in a rack
 - Entire rack in a datacenter
 - Entire data centre in building
- \Rightarrow Up to CSP to define boundaries of domain.

FAULT TOLERANCE

\rightarrow AZ = FAULT DOMAIN = INDEPENDENT FAILURE ZONE

\hookrightarrow CONNECTED THROUGH LOW-LATENCY LINKS

Failure Zone

- \rightarrow AZ's are physically separated within a typical metropolitan region and are located in lower risk flood plain.
- \rightarrow Discrete uninterruptible power supply (UPS) and on-site backup generation facilities
- \rightarrow Data centre located in AZ's are designed to be supplied by independent substations to reduce risk of an event on the power grid impacting more than 1 AZ.
- \rightarrow AZs are all redundantly connected to multiple tier 1 transit providers.

Multi-AZ for High Availability

IF AN APPLICATION IS PARTITIONED ACROSS AZs, COMPANIES ARE BETTER ISOLATED + PROTECTED FROM ISSUES SUCH AS POWER OUTAGES, EARTHQUAKES + MORE.

AWS Global Network ?

AWS GLOBAL NETWORK REPRESENT THE INTERCONNECTIONS BETWEEN THE AWS GLOBAL INFRASTRUCTURE

What is Point of Presence ?

INTERMEDIATE LOCATION BETWEEN AWS REGION + END USER.

- ↳ COULD BE A DATA CENTER OR COLLECTION OF HARDWARE
 - ↳ OWNED BY AWS / TRUSTED PARTNER
 - ↳ UTILIZED BY AWS SERVICES RELATED FOR CONTENT DELIVERY / EXPEDITED UPLOADS .

→ POP resources are :

→ Edge locations

Data Centers that hold cached on the most popular files so that the delivery of distance to the end users are reduced.

→ Regional Edge Locations

Data centers that hold much larger caches of ↓ popular files to ↓ a full round trip + ↓ cost of transfer fees .

Amazon Cloudfront



Content Delivery Network

- Point website to cloudfront so that it will route requests to nearest Edge location cache
- Caches the contents of what origin would return to various edge locations around the world.

AWS Global Accelerator



→ Finds the optimal path from the end user to your web servers.

→ Deployed within edge location

Benefit: Send traffic to an edge location instead of directly to your web app

S3 Transfer Acceleration

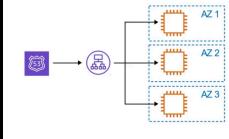


On ramp edge location

Step ①: Special URL generated for end users to upload files to a nearby edge location

Benefit: Once a file is uploaded to an edge location, it can move much faster within AWS network to reach S3

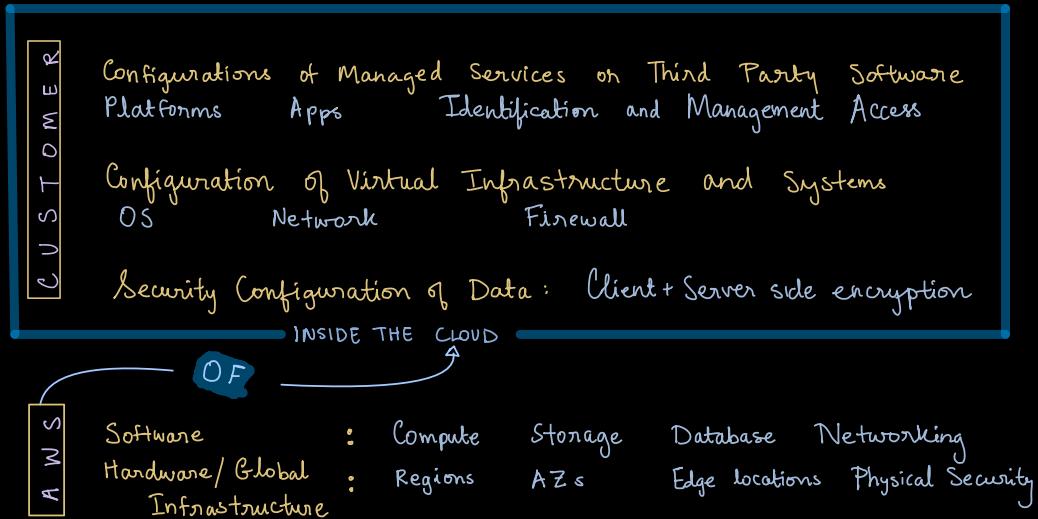
What is Solution Architect ?	ROLE IN A TECHNICAL ORGANIZATION THAT ARCHITECTS A TECHNICAL SOLUTION USING MULTIPLE SYSTEMS VIA RESEARCHING, DOCUMENTATION, EXPERIMENTATION
What is Cloud Architect ?	SOLUTION ARCHITECT THAT IS FOCUSED SOLELY ON ARCHITECTING TECHNICAL SOLUTIONS USING CLOUD SERVICES
Aws Direct Connect	<ul style="list-style-type: none"> → Useful if you own a data center → AWS Direct Connect is a private/dedicated Connection between Your datacenter and AWS <p><u>Benefits</u> :</p> <ol style="list-style-type: none"> ① Helps reduce network costs and increase bandwidth throughput ② Provides a more consistent network experience than a typical internet based Connection
What is a co-location ?	Data centre where equipment, space, bandwidth are available for rent to retail customers.
LOCAL ZONES	<p>Data centres located very close to densely populated area to provide single digit millisecond low latency performance for that area.</p> <p><u>PURPOSE</u> :</p> <ul style="list-style-type: none"> → Support highly-demanding apps sensitive to latencies → Media + Entertainment → Electronic Design Automation → Ad-Tech → Machine learning
Data Residency	Physical / Geographical locations of where an organization or cloud resources reside.
Compliance Boundaries	Regulatory compliance [legal requirement] by a govt on organization that describes where data + cloud resources are allowed to reside.
Data Sovereignty	Jurisdictional control / legal authority that can be asserted over data b/c it's physical location is within jurisdictional boundaries

What is server rack?	A frame design to hold and organize IT equipment										
AWS Outposts	<p>AWS Outposts service offers the same AWS infrastructure, AWS services, APIs, and tools to virtually any datacenter, co-location or on-premise facility for a truly consistent hybrid experience.</p> <p>↳ Literally a rack of servers.</p>										
What are the two factors that solution architect need to consider?	<ol style="list-style-type: none"> 1. [Security] How secure is this solution? 2. [Cost] How much is this solution going to cost? 										
What are the factors that cloud solution architect need to consider when designing architecture based on business requirements?	<table border="0"> <tr> <td>Availability</td><td>- ability to ensure a service remains available</td></tr> <tr> <td>Scalability</td><td>- ability to grow rapidly or unimpeded</td></tr> <tr> <td>Elasticity</td><td>- ability to shrink and grow to meet demand</td></tr> <tr> <td>Fault Tolerance</td><td>- ability to prevent a failure</td></tr> <tr> <td>Disaster Recovery</td><td>- ability to recover from a failure</td></tr> </table>	Availability	- ability to ensure a service remains available	Scalability	- ability to grow rapidly or unimpeded	Elasticity	- ability to shrink and grow to meet demand	Fault Tolerance	- ability to prevent a failure	Disaster Recovery	- ability to recover from a failure
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Example of implementing High availability .	 <p>Running workload across multiple AZs ensures that if 1 or 2 AZs become unavailable, your service/apps remains available.</p>										
Elastic Load Balancer	<p>A load balancer allows you to evenly distribute traffic to multiple servers in one or more datacenter. If a datacenter or server becomes unavailable, the load balancer will route the traffic to only available datacenters with servers.</p>										
Example of High Scalability	<p>Think about vertically / horizontally scaling</p> <p style="text-align: center;">↓ ↓</p> <table border="0"> <tr> <td>Upgrade to a larger server</td> <td>Add more servers of the same size</td> <td>* This is a manual process.</td> </tr> </table>	Upgrade to a larger server	Add more servers of the same size	* This is a manual process.							
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Example of High Elasticity	<ul style="list-style-type: none"> → Similar to elasticity, However This is done automatically → Only applies to Horizontal Scaling. <p style="text-align: center;">↓</p> <p>Scaling In vs. Scaling Out</p>										

Example of Fault Tolerance?	Fall-over is when you have a plan to shift traffic to a redundant system in case primary system fails. Example: → Having a secondary database synced to a primary database → Secondary database becomes the primary DB when a fail-over occurs. Service: RDS multi AZ
Example of High Durability?	 Cloud endure disaster Recovery service ↳ Continuously replicates your machines into a low-cost staging area in your target AWS account and preferred region enabling fast and reliable recovery in case of IT data center failures.
What is a business continuity plan?	Document that outlines how a business will continue operating during an unplanned disruption in services.
What is recovery point objective?	Maximum acceptable amount of data loss after an unplanned data loss incident. It is express as an amount of time.
What is recovery time objective?	Maximum amount of downtime your business can tolerate w/o incurring a significant financial loss.
What does ARN stand for? What is it?	Amazon resource names [ARNs] uniquely identify AWS resources → Required to specify a resource unambiguously across all AWS Example: <partition>:<service>:<region>:<account-id>:<resource-type>:<resource-id> Purpose: → Use for support → Use to create a policy for certain resources
What is a SDK?	Software Development kit is a collection of software development tools in one installation package AWS SDK is used to programmatically do CRUD operations w/ AWS resources
Two methods to writing IaC? What two AWS offerings for writing IaC?	<p><u>Declarative</u></p> <ul style="list-style-type: none"> → What you  is what you get → More verbose i.e. 0 chance of mis-configuration → Uses scripted language like YAML, XML <p>↓</p> <p>AWS Cloudformation [CFN]</p>  <p><u>Imperative</u></p> <ul style="list-style-type: none"> → You say what you want, rest is filled → More chances of mis-configuration → More extensive than Declarative → Uses programming languages, e.g: Java, Ruby <p>↓</p> <p>AWS CDK → generates CFN</p> 

What is the shared responsibility model?

Shared responsibility model is a cloud security framework that define the security obligations of the customer versus the CSP.



PaaS and SaaS and FaaS that AWS provides



AWS Elastic Beanstalk
PaaS
Similar to Heroku



AWS Lambda
FaaS i.e. serverless
Similar to Firebase



Amazon Workdocs
SaaS
Similar to Microsoft Sharepoint

What is a virtual machine?

Emulation of a physical computer using software. Server virtualization allows you to easily create, copy, resize or migrate your server.

What is EC2?

EC2 is a highly configurable server where you can choose AMI (Amazon machine image) that affects options such as:-
 → amount of CPUs, RAM, network bandwidth, type of OS, attach virtual hard drives.

What are containers?

Virtualizing an OS to run multiple workloads on a single OS instance.
 Containers are usually used in micro-service architecture i.e. dividing up applications into smaller ones that can talk to each other.

What is ECS?

Elastic Container Services is a container orchestration server that supports docker containers. Launches a cluster of server(s) on EC2 instances with docker installed.

What is Edge Computing	When you push your computing workloads outside of your networks to run close to the destination location Ex: Pushing computing to run on phones, IoT, external servers not within the cloud network
What is hybrid computing?	When you're able to run workloads on both on-prem datacenter and AWS VPC (Virtual Private Cloud)
What is bottlerocket	Linux based operating system built by AWS for running containers on VMs or bare metal hosts.
What is high-performance computing?	Clusters of hundreds of thousands of servers with fast connections between each of them with the purpose of boosting computing capacity.
What is AWS Parallel Cluster?	AWS-supported open source cluster management tool that makes it easy for you to deploy and manage High Performance Computing Clusters on AWS.
Elastic Block Store	Data is split into evenly sized blocks → Directly accessed by OS → Supports only a single write volume Ex:- Use this when you need a virtual hard drive attached to a VM.
AWS Elastic File Storage	File is stored with data and metadata → Multiple connections via a network share → Supports multiple reads, writing locks the file. Use this when you need a file-share where multiple users or VMs need to access the same drive. *File protocols.
What is AWS S3?	→ Object stored w/ data, metadata, object ID → Scales with limited no file limit or storage limit → Supports multiple reads and writes (no locks) No need to worry about underlying infrastructure
List two storage architectures?	File systems: Manages data as files and file hierarchy Block storage: Manages data as blocks within sectors and tracks.

What is a data warehouse?	A relational database designed for analytic workloads, which is generally column oriented data-store. <ul style="list-style-type: none"> → Usually perform aggregation and optimized around columns → Generally designed to be hot i.e. returning queries very fast even though they have vast amounts of data → Not meant for real time reporting, therefore infrequently accessed.
What is VPC?	Virtual Private Cloud (VPC) is a logically isolated section of the AWS network where you launch AWS resources. <ul style="list-style-type: none"> → You choose a range of IPs using CIDR range. ($10.0.0.0/16 = 65,536$)
What is a subnet?	Subnet is a logical partition of an IP network into multiple smaller network segments. You are breaking down your IP range for VPC into smaller networks
What is NACL?	Network Access Control Lists (NACLs) acts as a virtual firewall at the subnet level. Example: Block a specific IP address known for abuse <ul style="list-style-type: none"> "Allow or Deny rules"
What is a security group?	Acts a firewall at the instance level. Implicitly denies all traffic Example: Allow EC2 instance access on port 22 for SSH <ul style="list-style-type: none"> "Create only allow rules and cannot block a single IP address"



