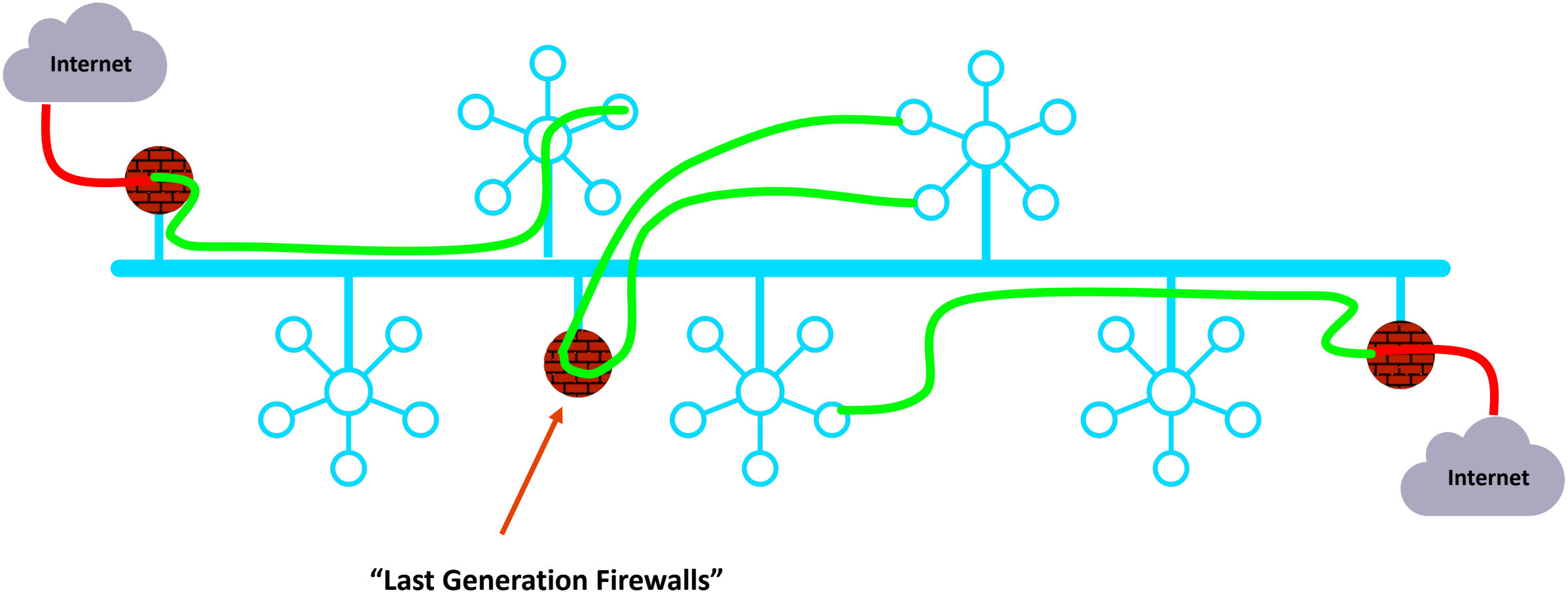
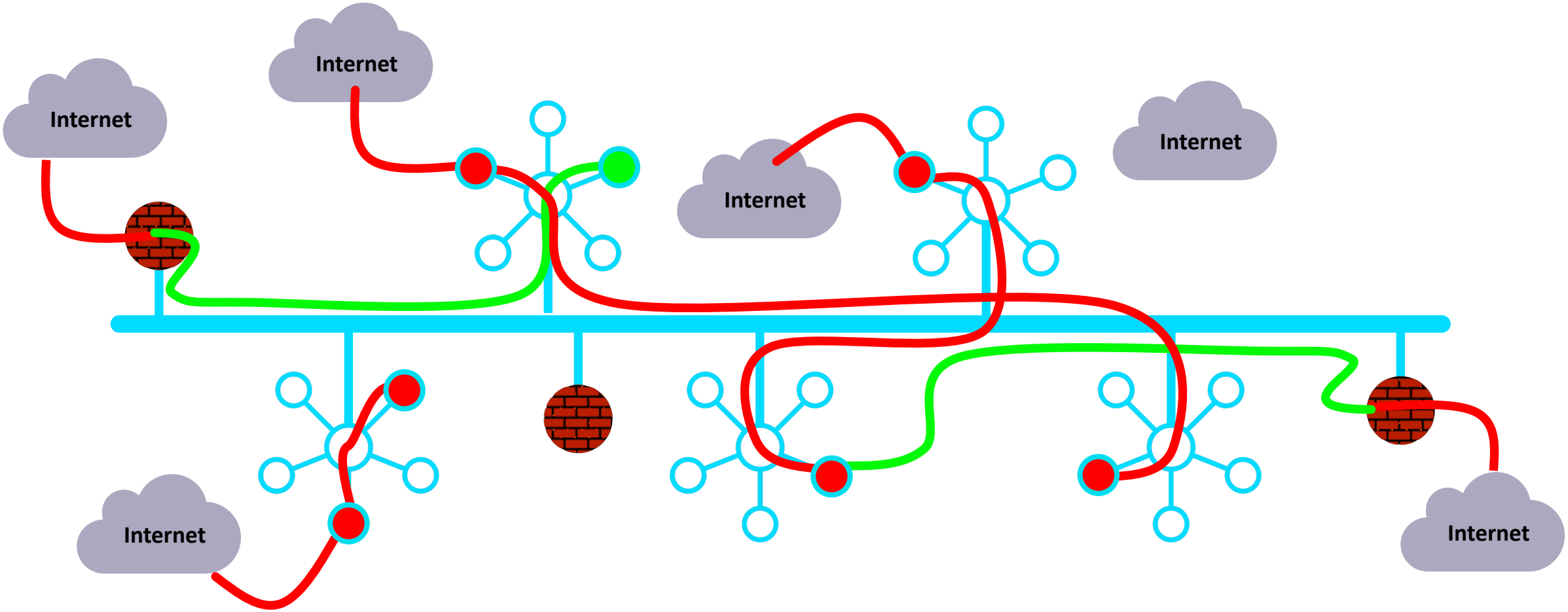
Distributed Cloud Firewall

ACE Solutions Architecture Team

As Architected with Lift-and-Shift, Bolt-on, Data Center Era Products…



In Reality…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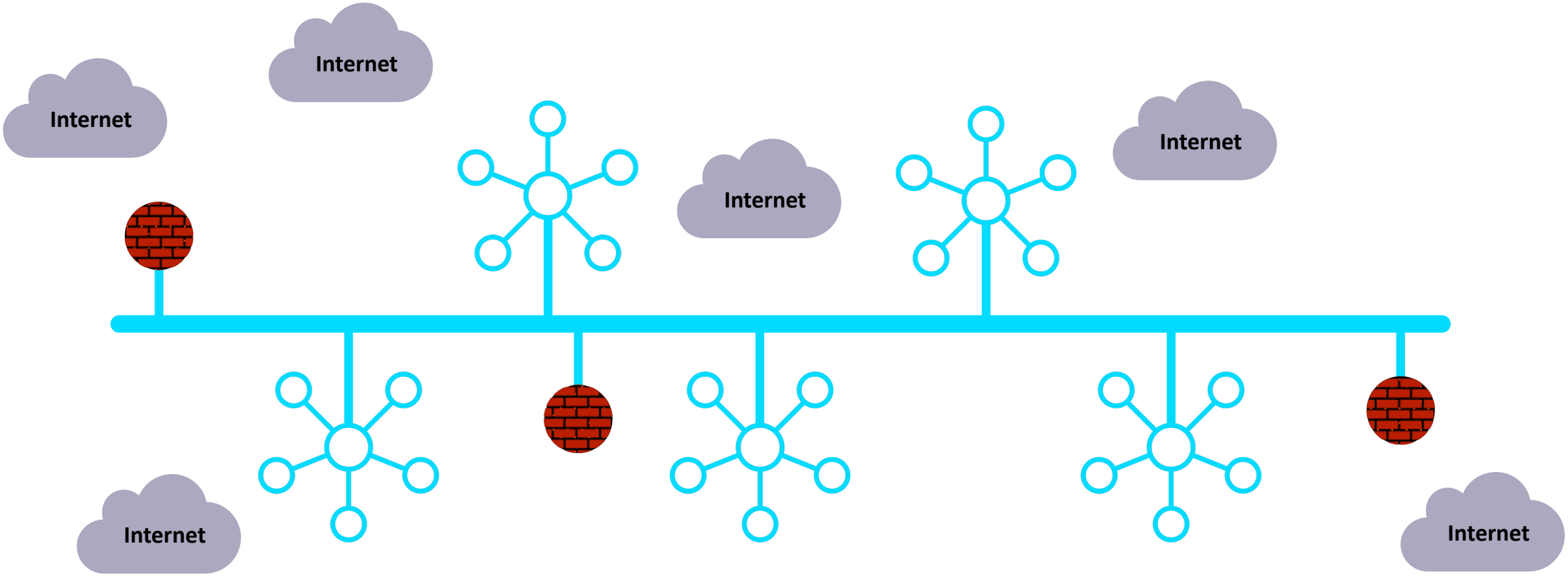
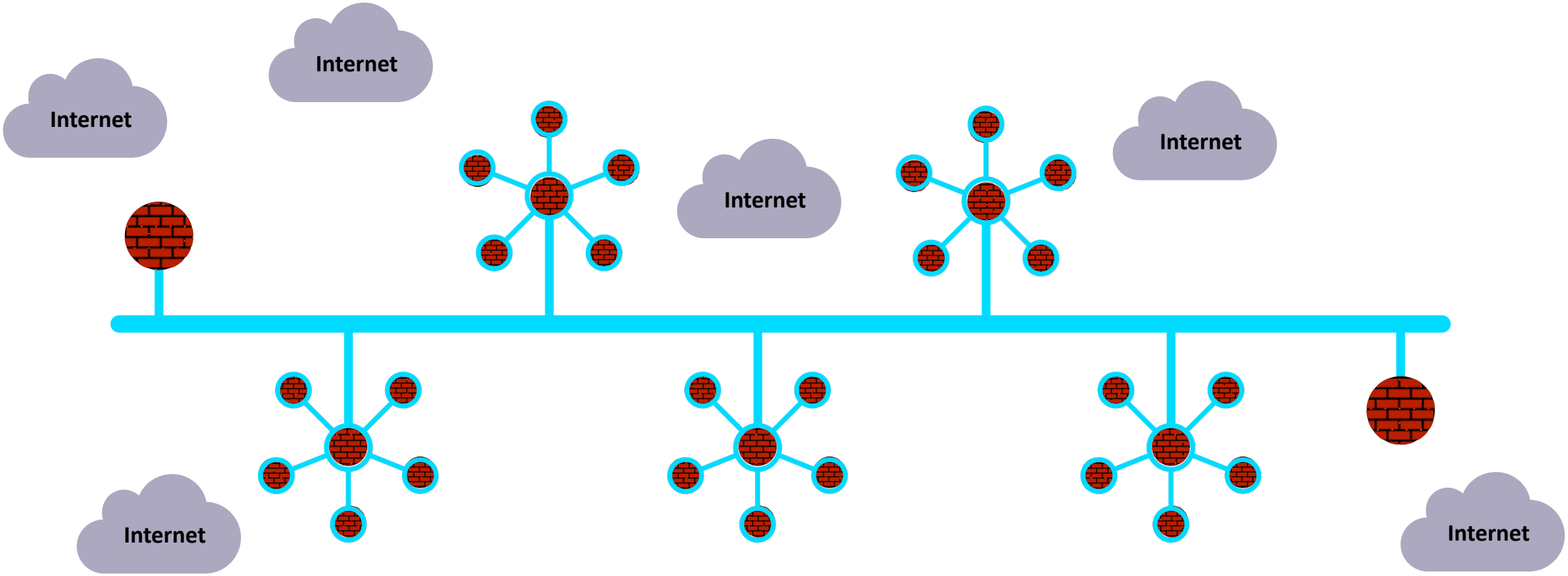
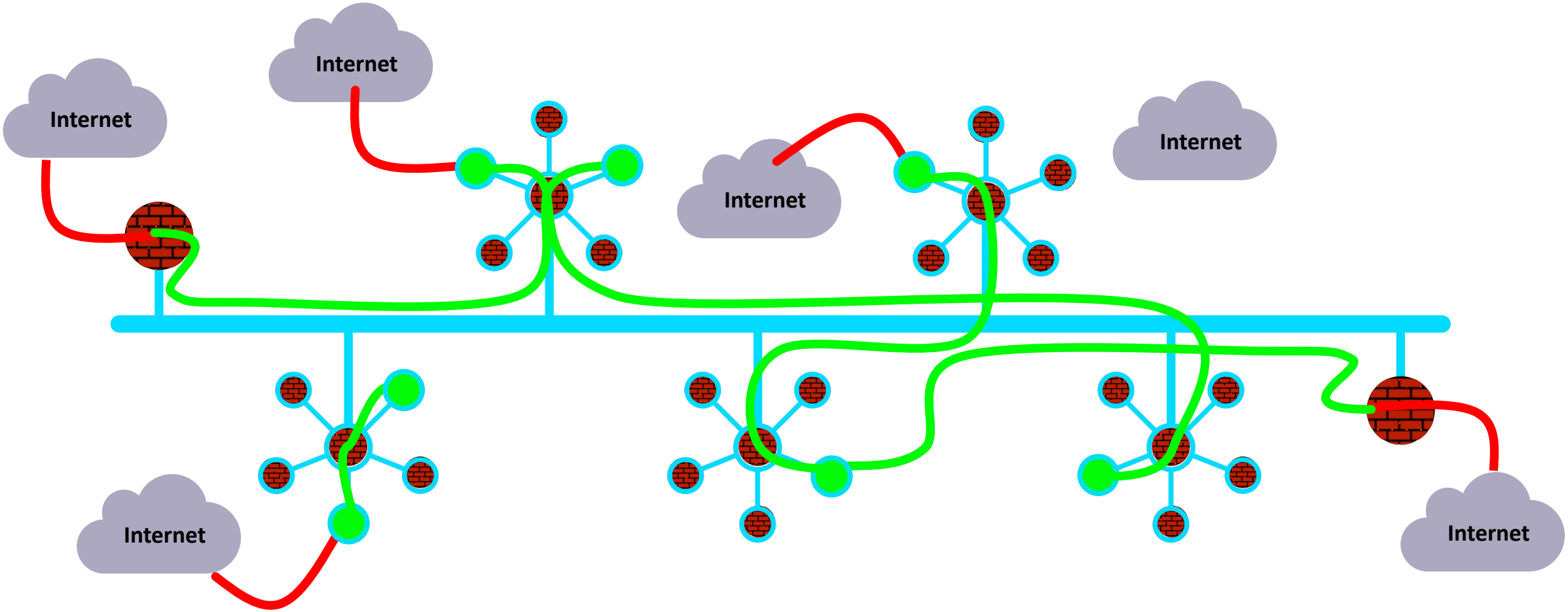
What If… the architecture was built for cloud



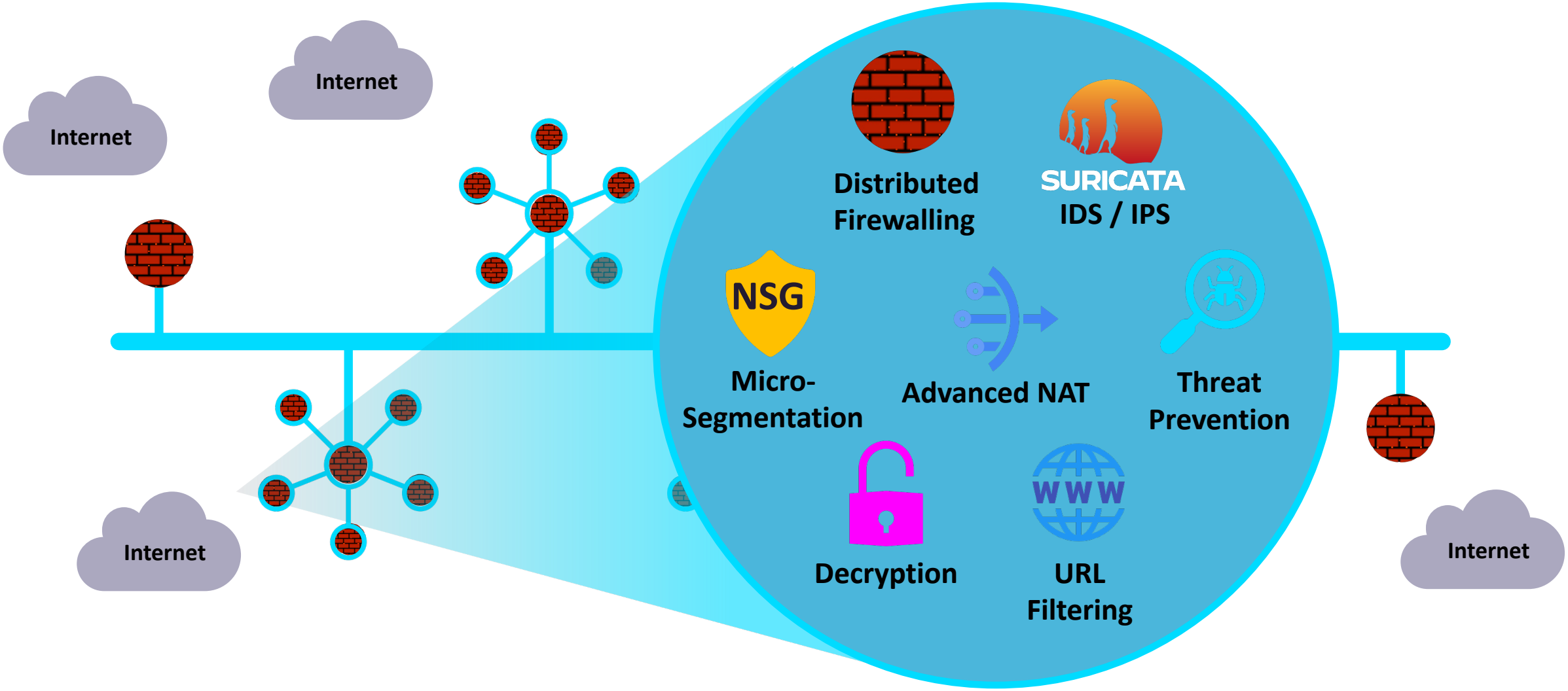
Firewalling Functions were Embedded in the Cloud Network Everywhere…



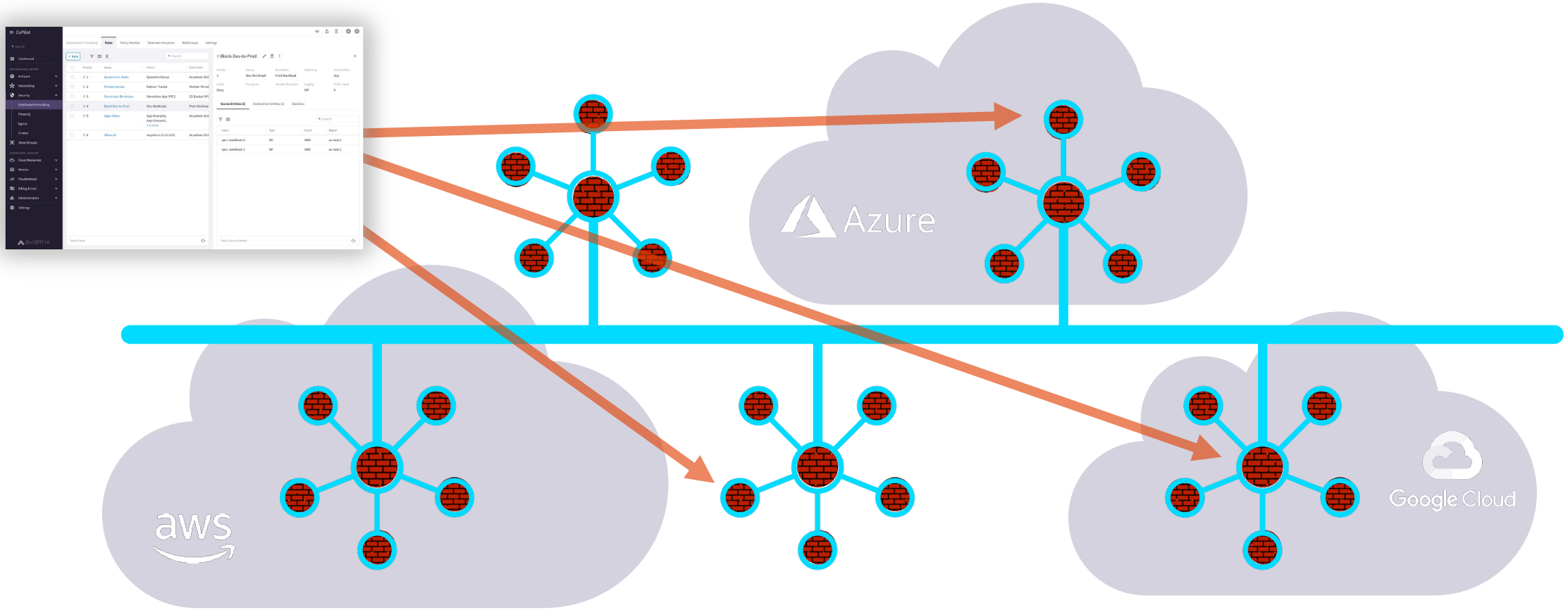
Centrally Managed, with Distributed Inspection & Enforcement…



And, What If it was more than just firewalling…



Policy Creation Looked Like One Big Firewall … A Distributed Cloud Firewall…



Where and How Policies Are Enforced Is Abstracted…

Smart Group

- **What is a Smart Group?**

A Smart Group identifies a group of resources that have similar policy requirements, that are confined in the same logical container.

- The members of a Smart Group can be classified using *three* methods:
  - CSP Tags
  - Resource Attributes
  - CIDR

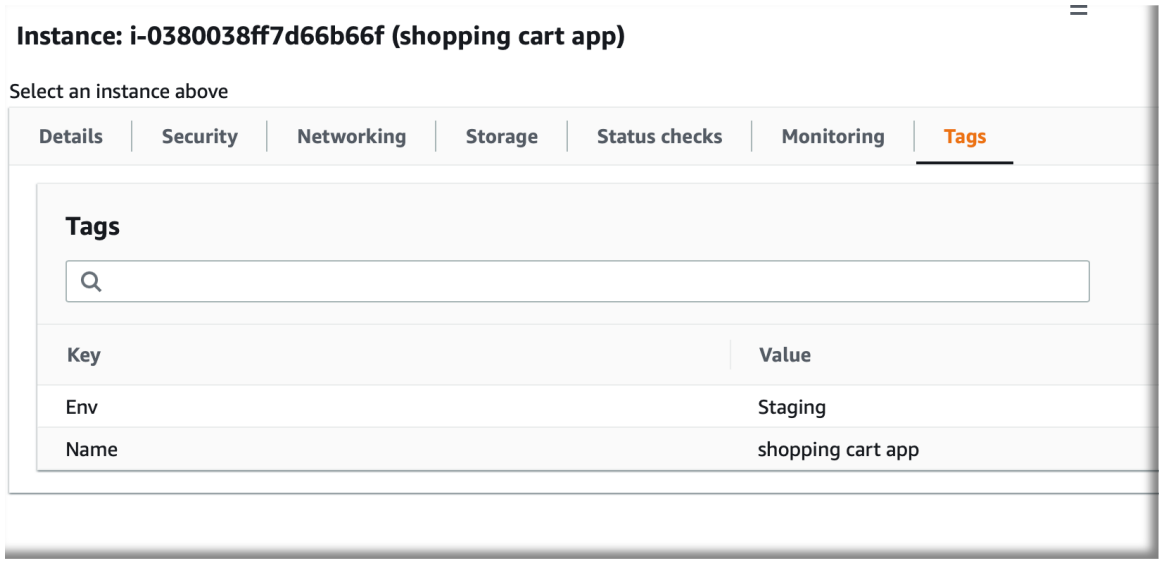
Classification Methods

CSP Tags (recommended)

- Tags are assigned to:
  - Instance
  - VPC/VNET
  - Subnet
- Tags are {Key, Value} pairs
- Eg: A VM hosting shopping cart application can be tagged with:

  {Key: Type, Value: Shopping cart app}

  {Key: Env, Value: Staging}



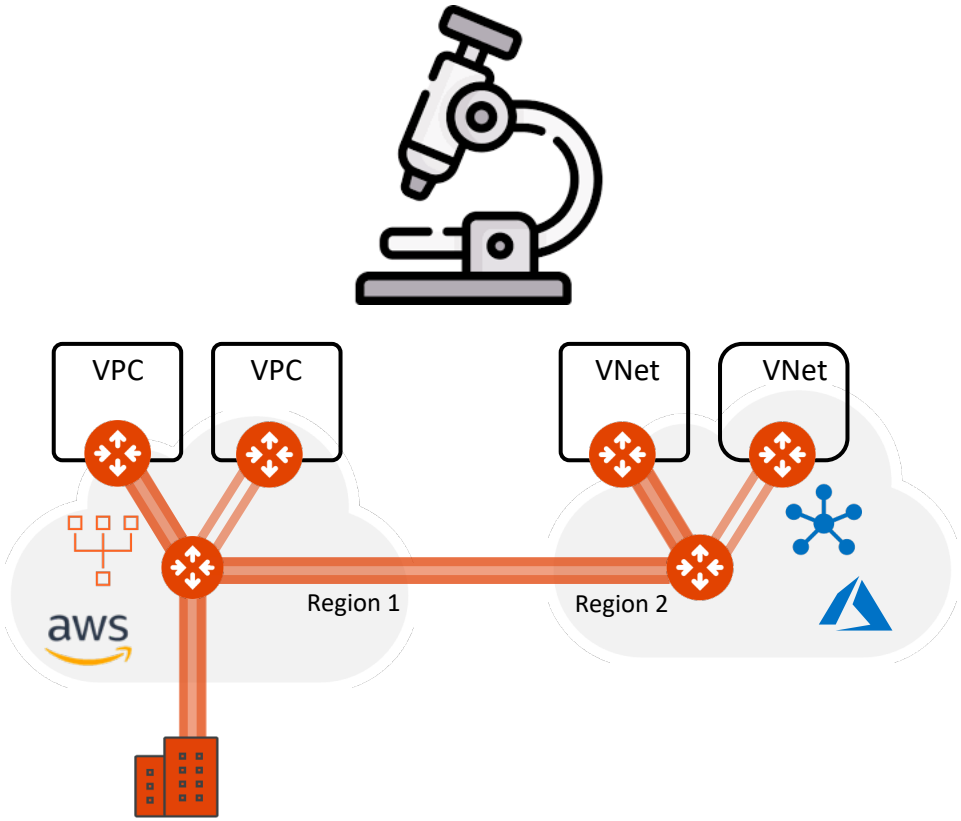
Resource attribute

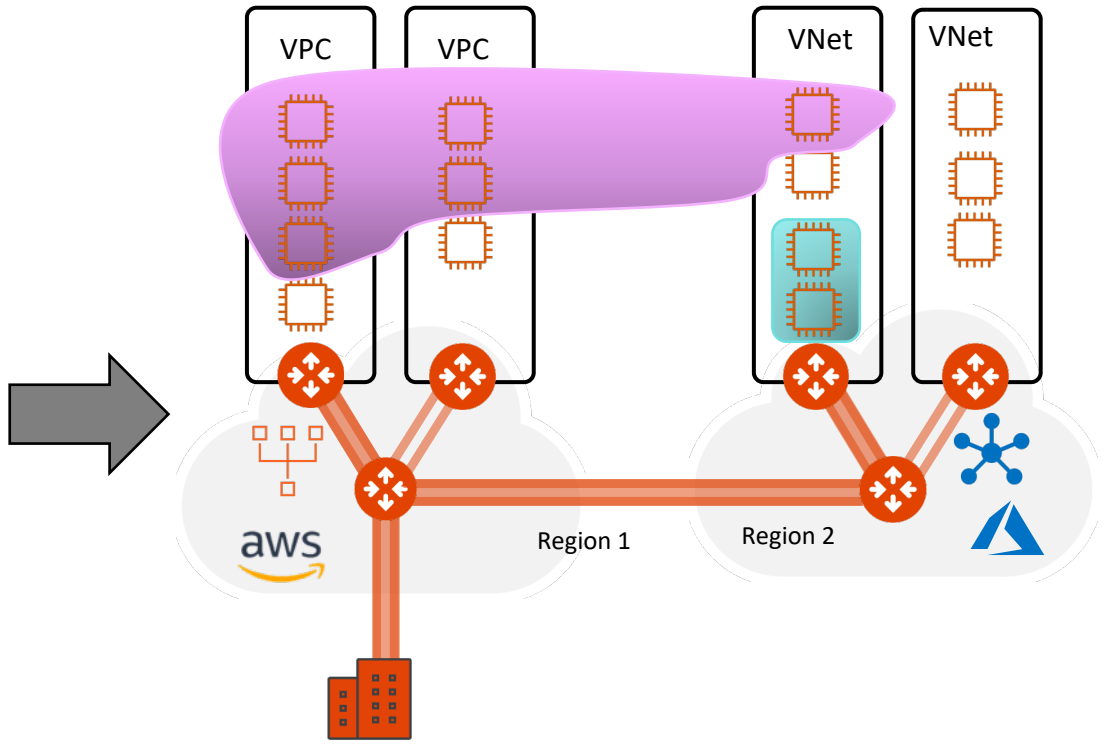
- Region Name, Account Name

IP Prefixes

- CIDR

Distributed Firewalling: Intra-rule vs. Inter-rule





Smart Groups

Apache

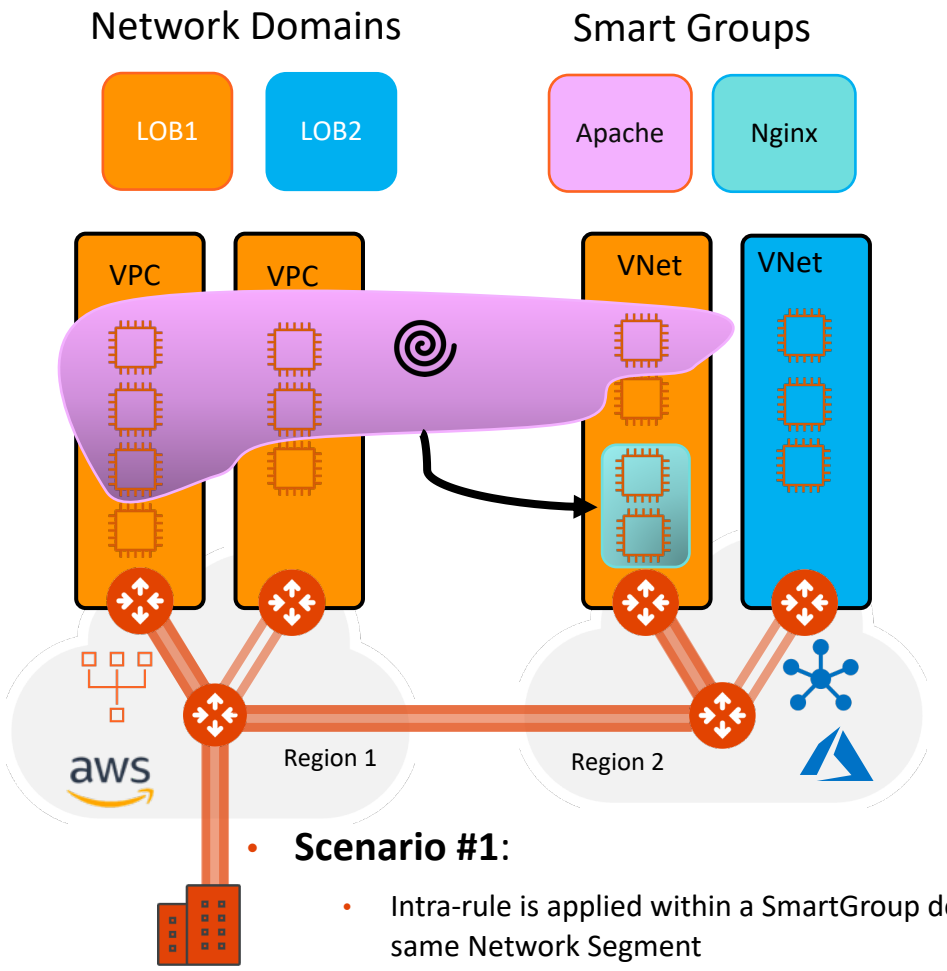
Nginx

A rule between SGs can be defined for achieving the *INTER-SMARTGROUP* communication

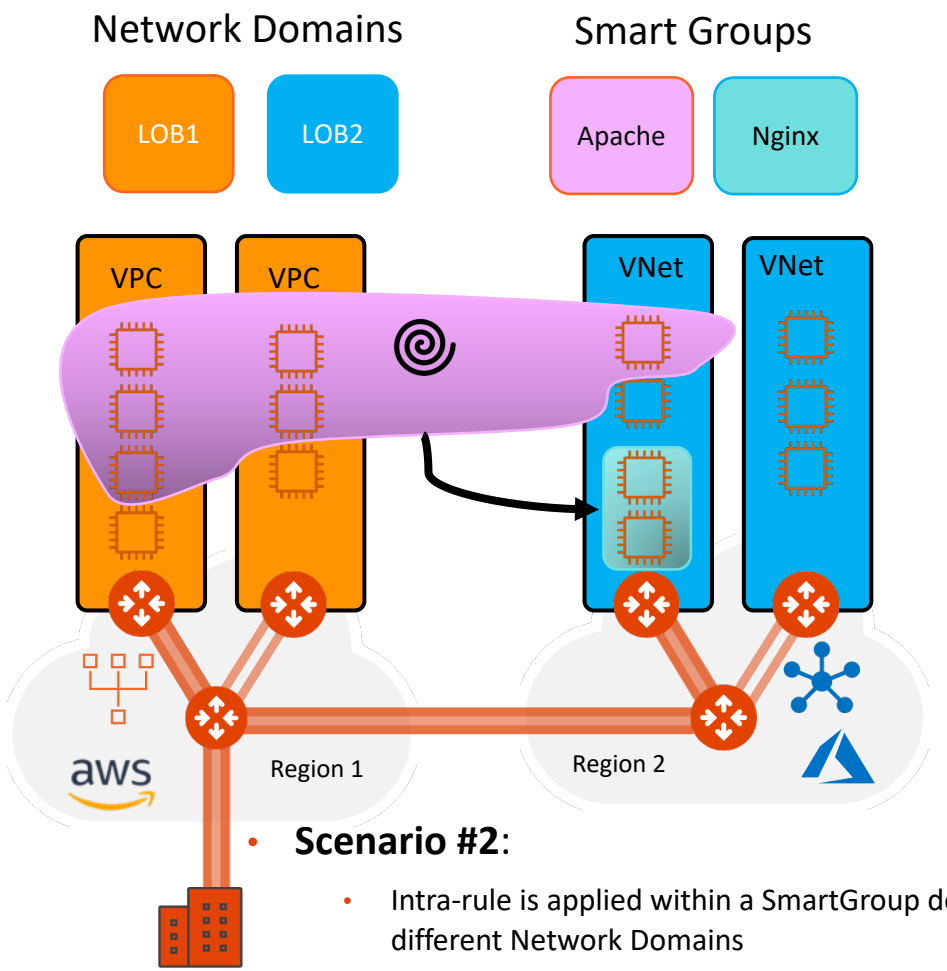
- **INTRA-RULE**: is defined <u>within</u> a Smart Group, for dictating what kind of traffic is allowed/prohibited among all the instances that belong to that Smart Group

- **INTER-RULE:** is defined among Smart Groups, for dictating what kind of traffic is allowed/prohibited among two or more Smart Groups.

Network Segmentation & Distributed Cloud Firewall Rule



- **Scenario #1**:
  - Intra-rule is applied within a SmartGroup defined in the same Network Segment
  - Inter-rule is applied between SmartGroups within the same network Domain

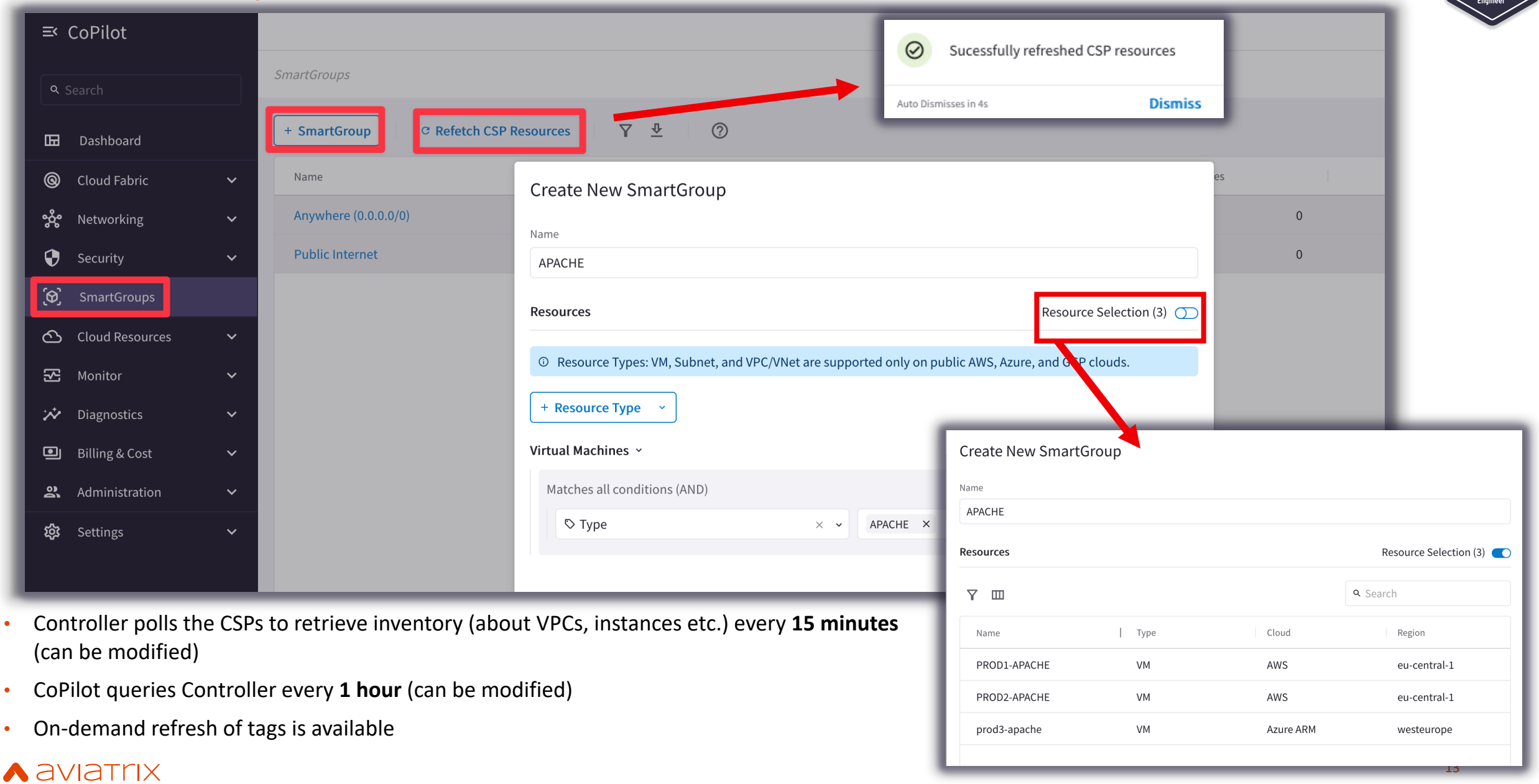


- **Scenario #2**:
  - Intra-rule is applied within a SmartGroup defined across two different Network Domains
  - Inter-rule is applied between SmartGroups defined across two different network Domains

Caveat:

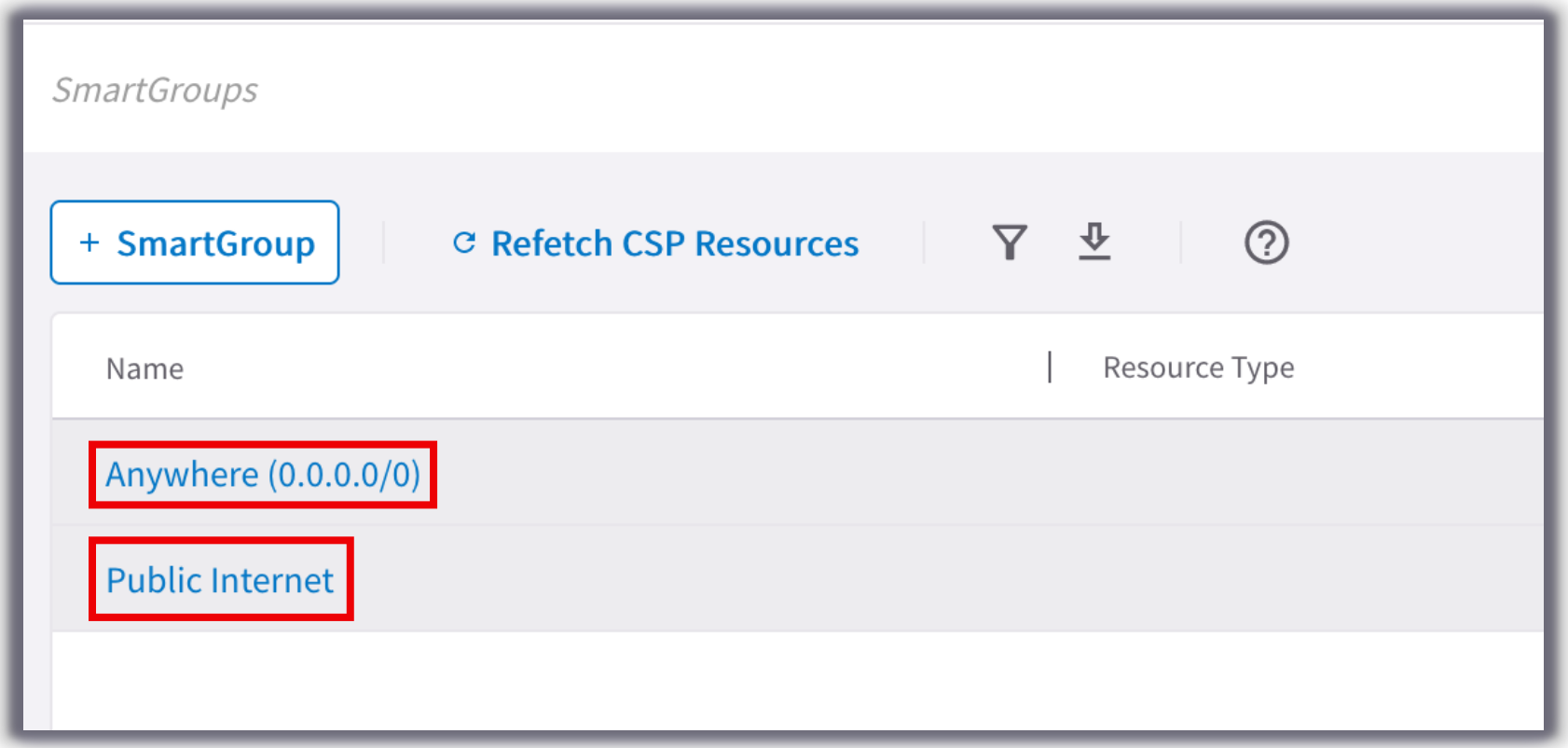
- Network Segmentation and Distributed Firewalling are **NOT** mutually exclusive!
- Network Segmentation takes **precedence** over the extent of a SmartGroup

Smart Groups Creation



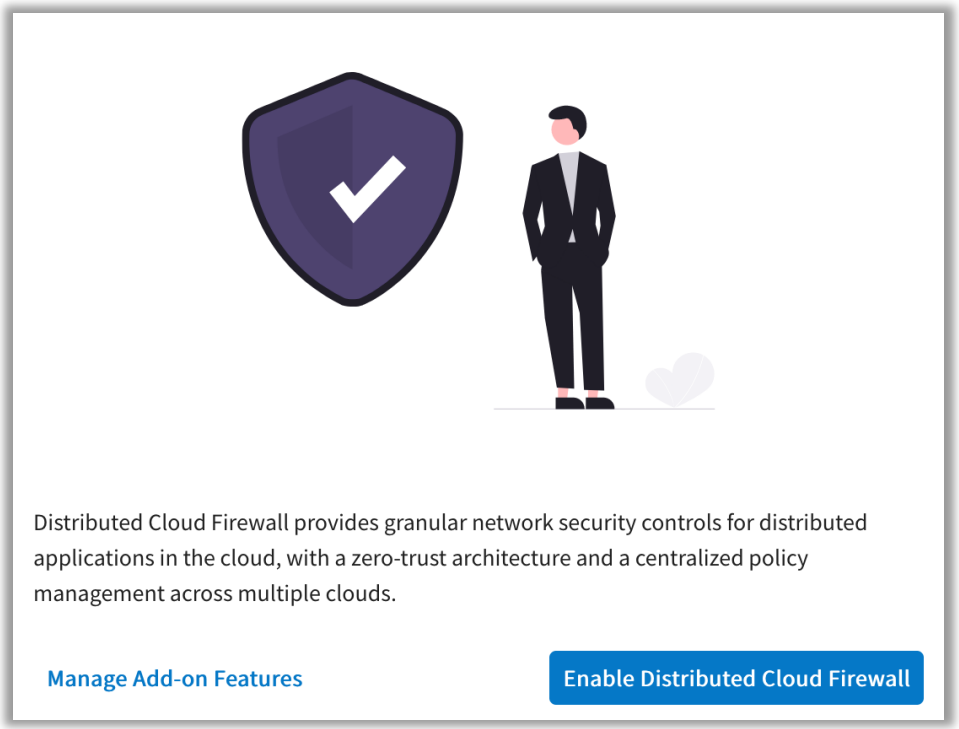
- Controller polls the CSPs to retrieve inventory (about VPCs, instances etc.) every **15 minutes** (can be modified)
- CoPilot queries Controller every **1 hour** (can be modified)
- On-demand refresh of tags is available

Pre-defined Smart Groups



- **Anywhere (0.0.0.0/0)** → RFC1918 routes + Default Route (IGW)
- **Public Internet** → Default Route (IGW)

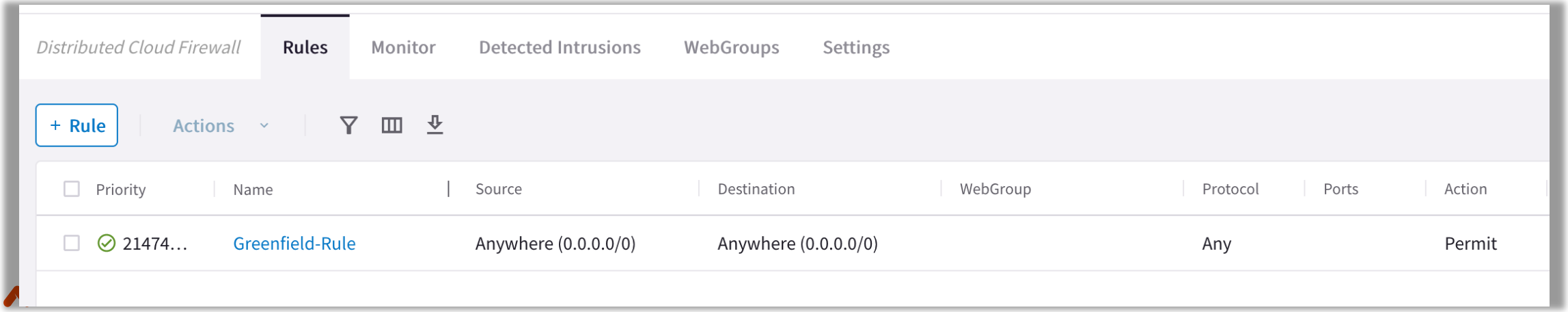
Enabling Distributed Cloud Firewall



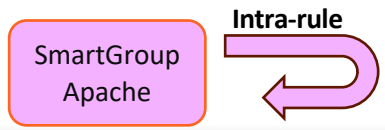
- Enabling the Distributed Cloud Firewall without configured rules will deny all previously permitted traffic due to its implicit Deny All rule.
- To maintain consistency, a **Greenfield Rule** will be created to allow traffic that maintains the current state, facilitating the creation of custom rules for specific security needs.

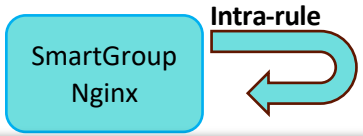
DENY LIST MODEL (THREAT-CENTRIC MODEL):

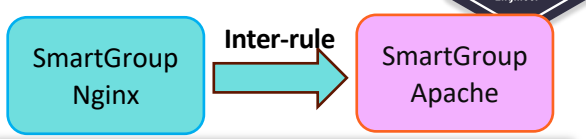
❑allow all data to flow, except for exactly what you say should be stopped.

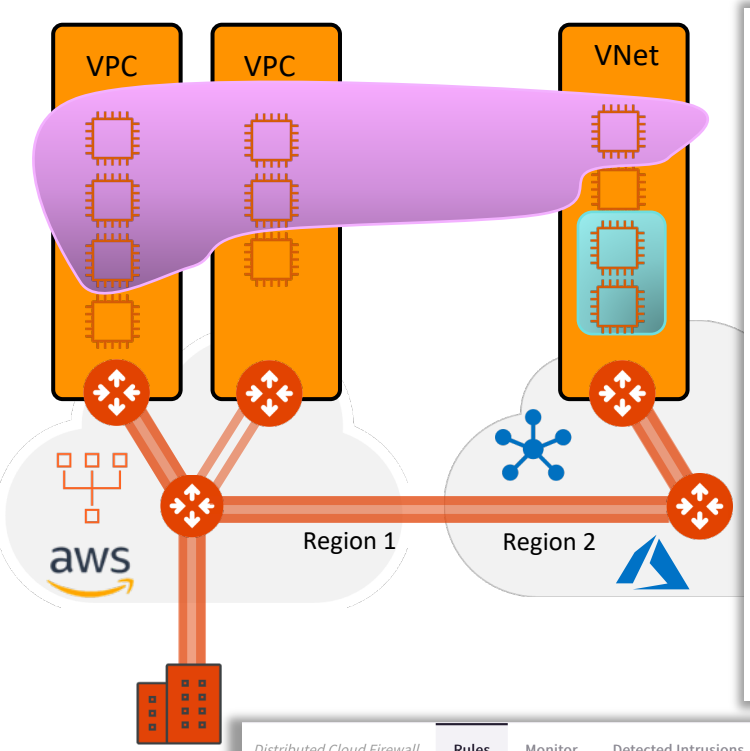


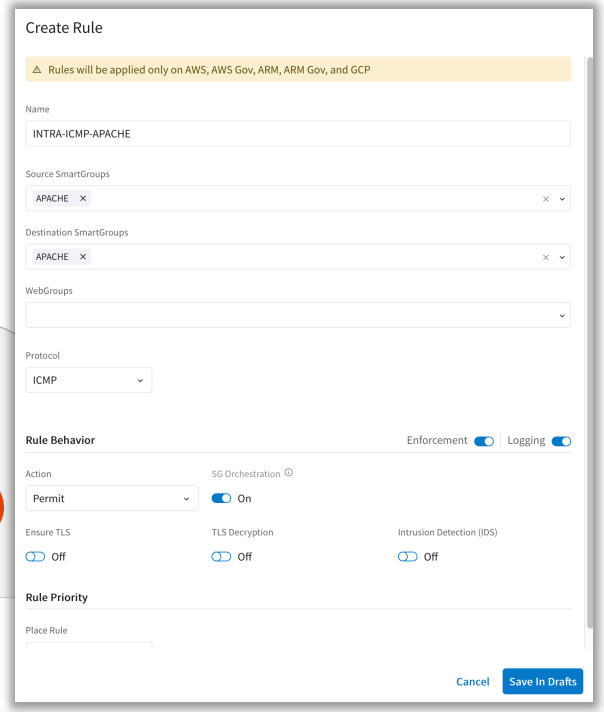
Micro-Segmention: SmartGroups, Intra-Rules and Inter-Rules

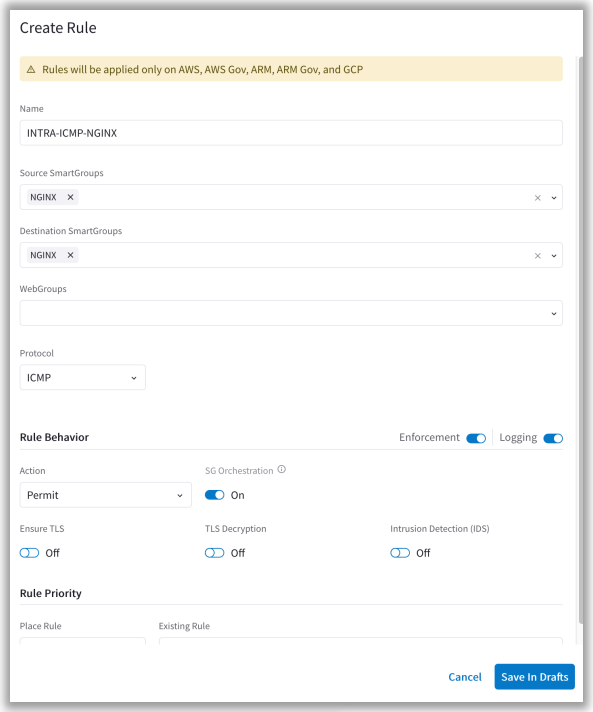


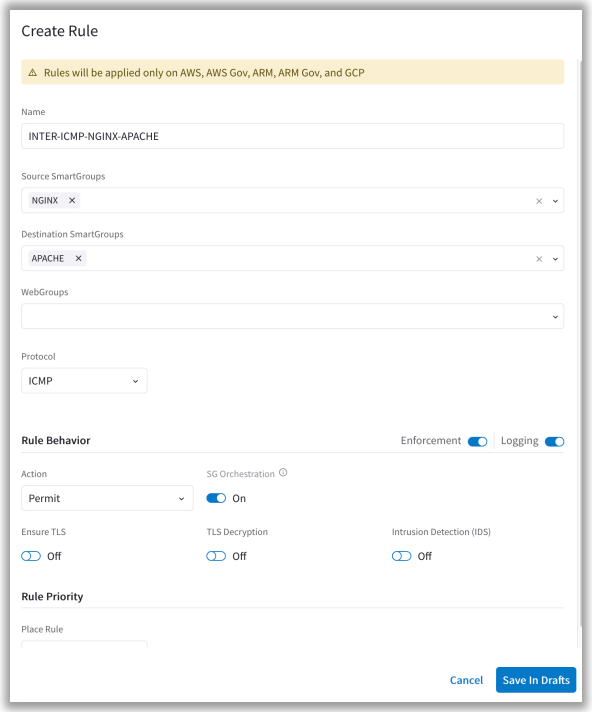


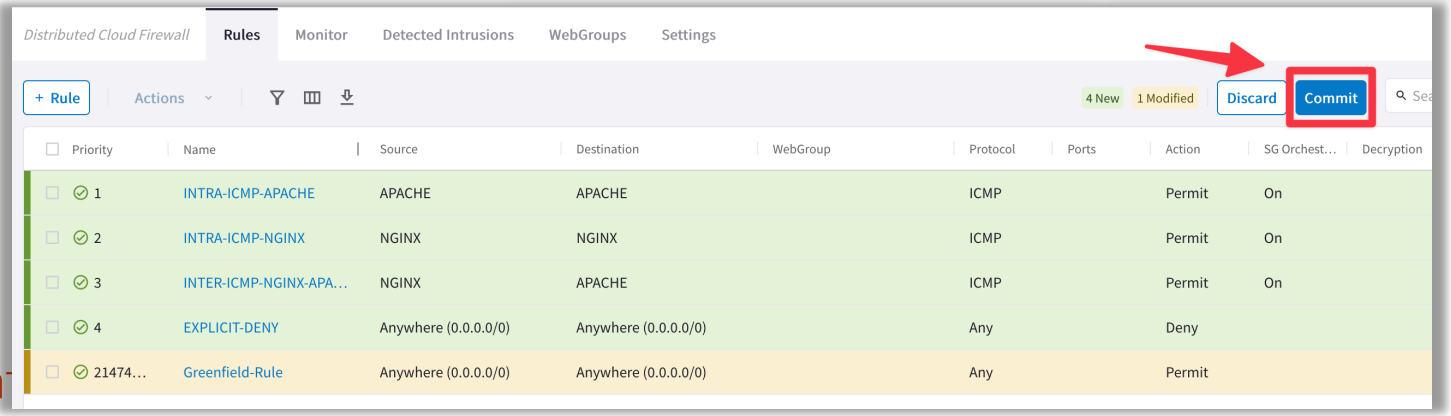








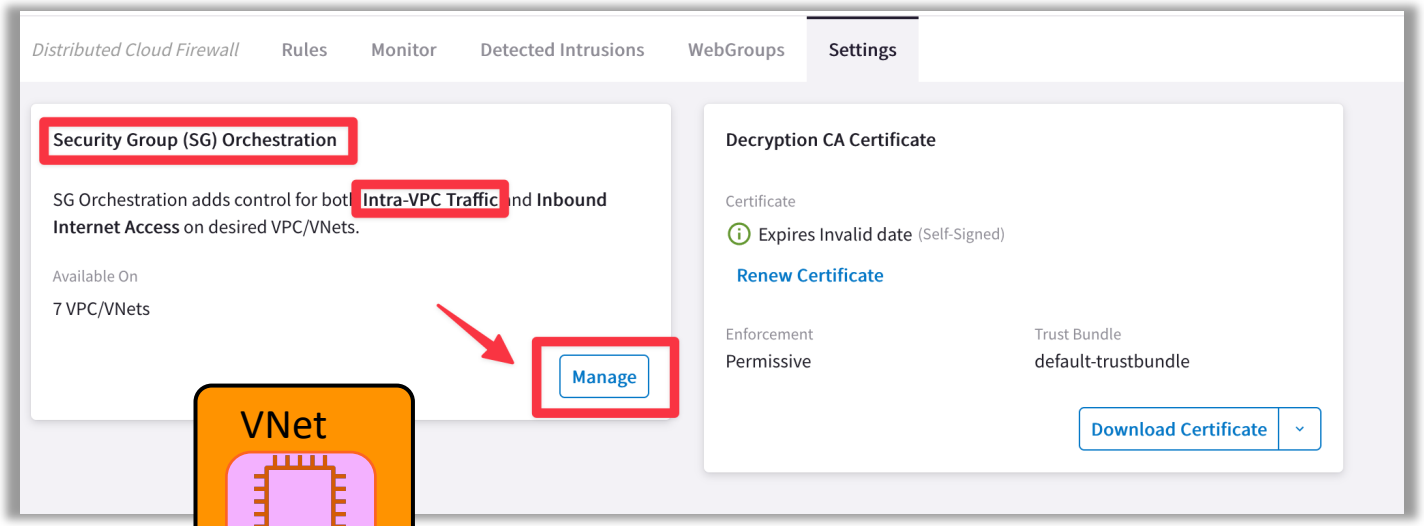


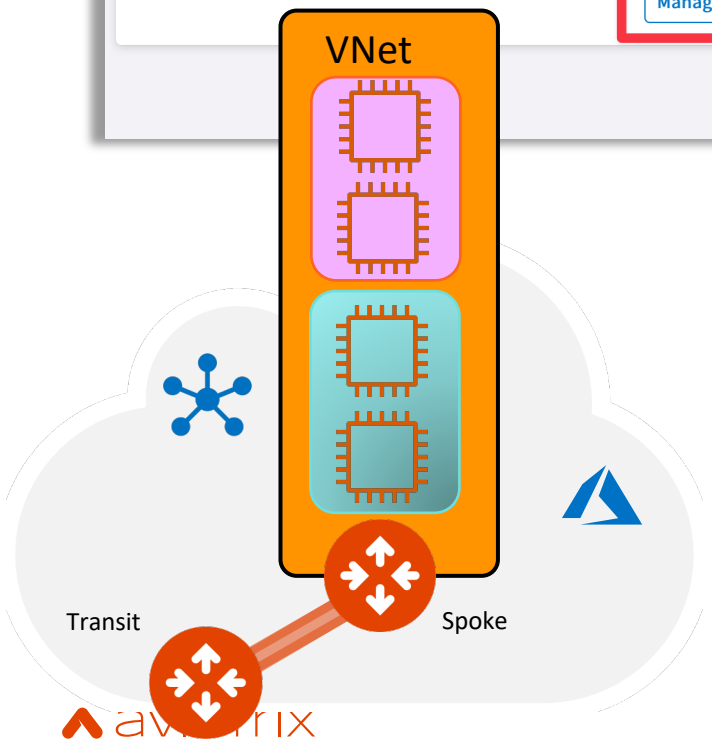


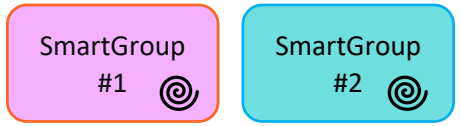
- **Micro-Segmentation**: Combination of SmartGroups and DCF Rules
- Rule changes are saved in **Draft** state.
- When you apply a rule to a SmartGroup, please keep in mind that there is an **Invisible Hidden Deny** at the very bottom.
- To save the changes click on "**Commit**"
- **Discard** will trash the changes
- Rule is **stateful**, this means that the return traffic is allowed automatically

Intra VPC/VNET Distributed Firewalling (available on AWS/Azure)

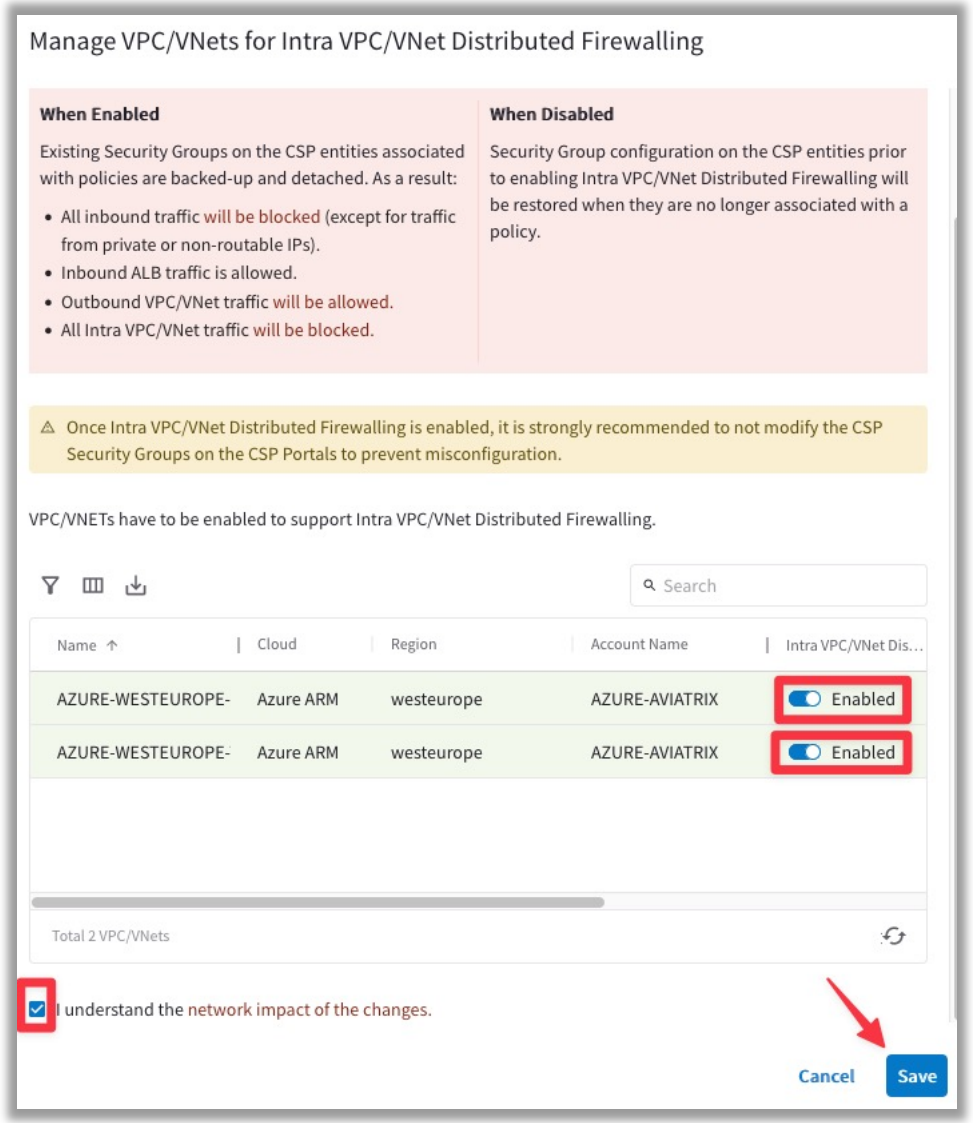
❑ Enable the feature on the relevant VNets



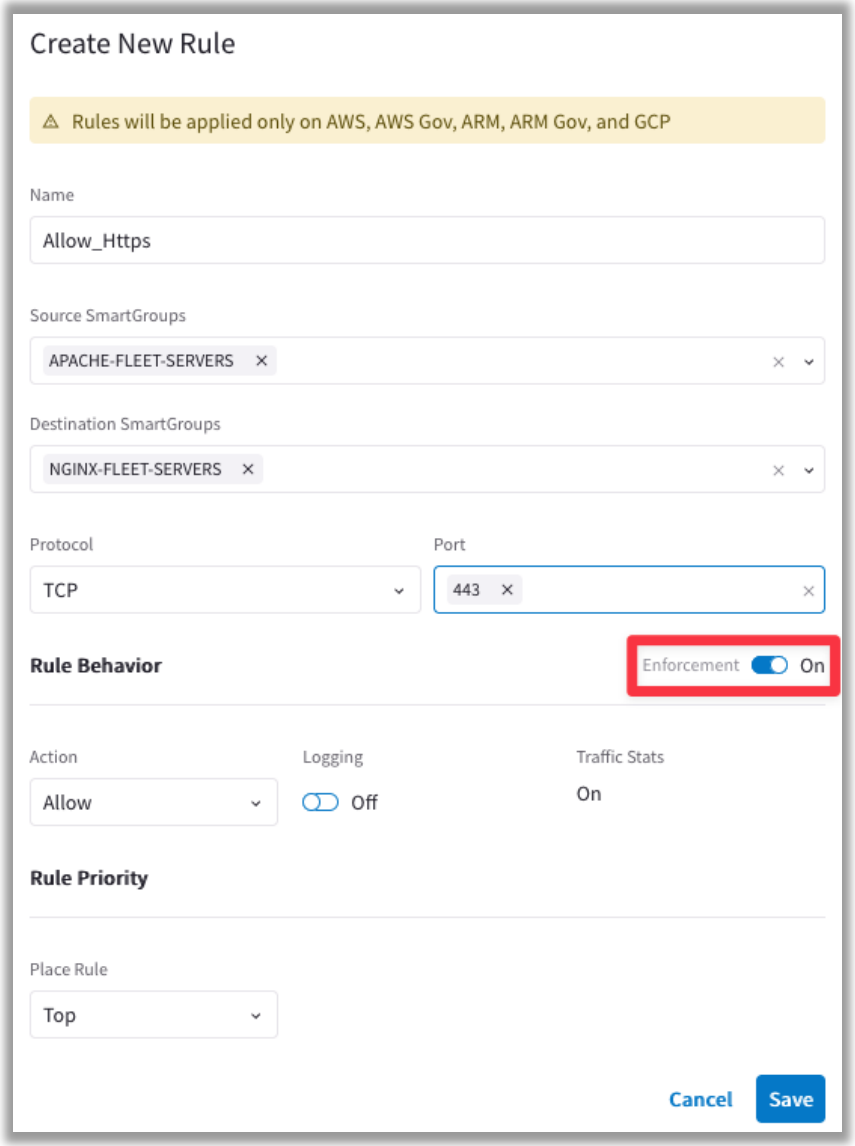




- If you enable the Security Group orchestration (*aka Intra-VPC Traffic Control*), the SmartGroups will not be able to communicate with each other unless an inter rule is applied between them.
- This is pure L4 separation using the Native Cloud Constructs (such as SG, NSG and ASG). This is not L7 inspection.
- **Future Implementation**: traffic will be diverted to the nearby Spoke GW for the L7 inspection



Rule Enforcement



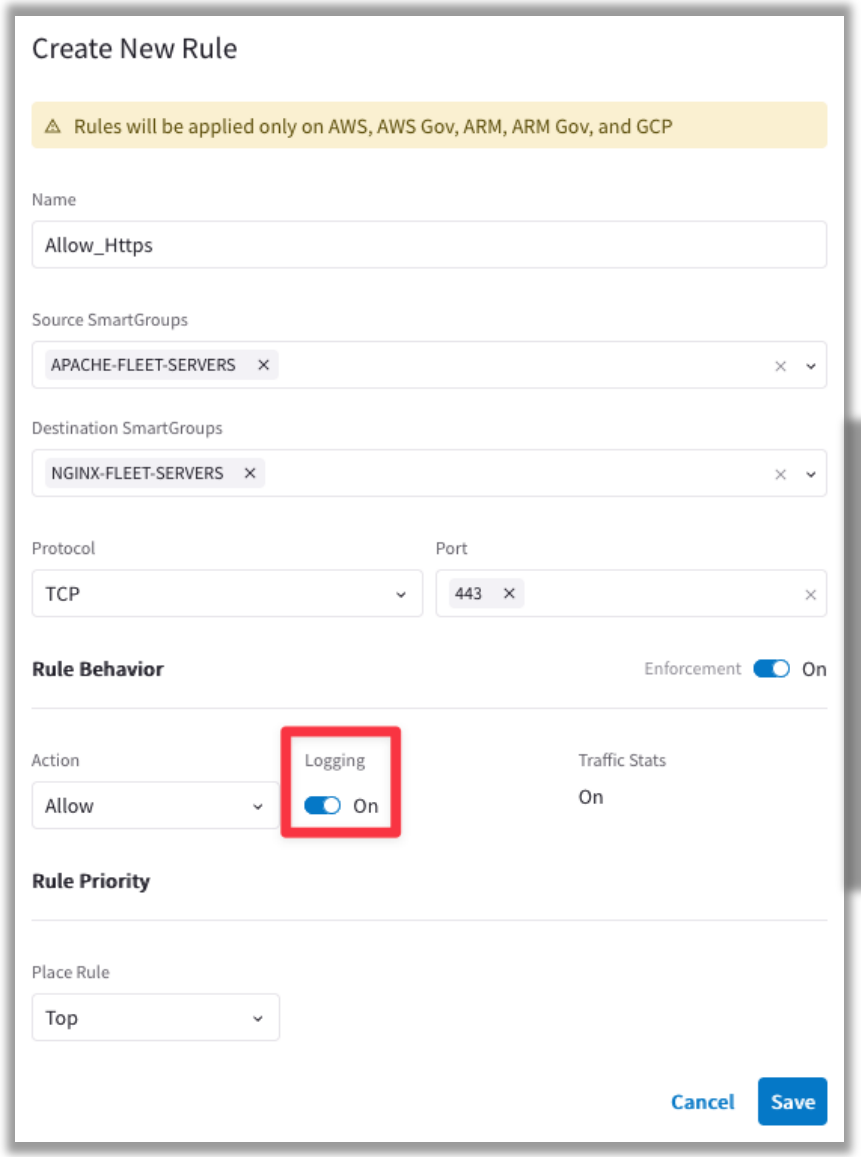
Enforcement ON

- Policy is enforced in the Data Plane

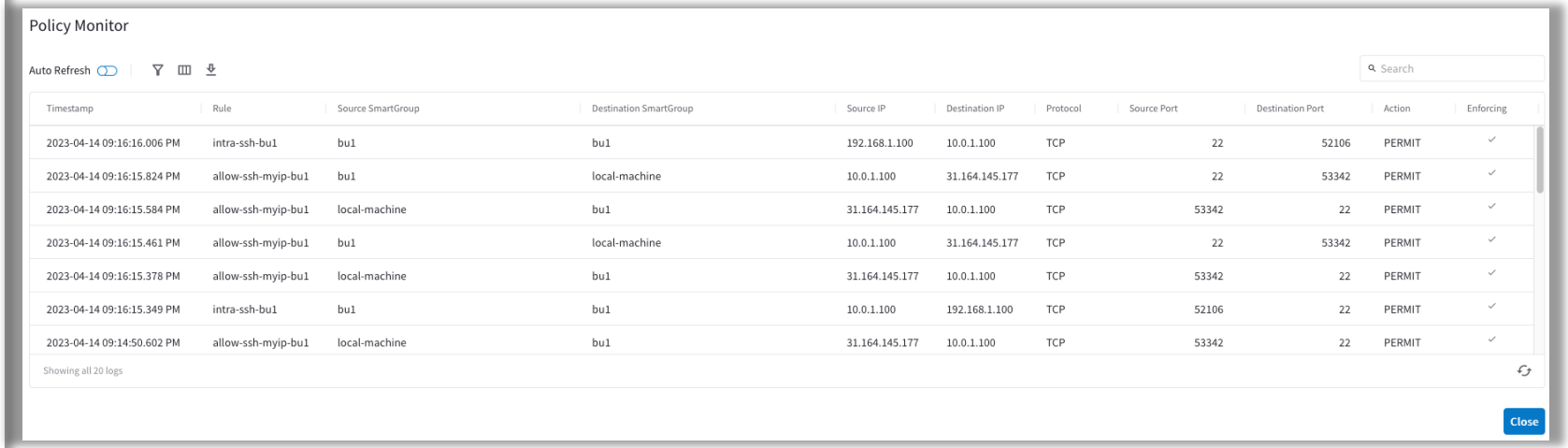
Enforcement OFF

- Policy is NOT enforced in the Data Plane
- The option provides a *Watch/Test* mode
- Common use case is with deny rule
- Watch what traffic hits the deny rule before enforcing the rule in the Data Plane.

Rule Logging



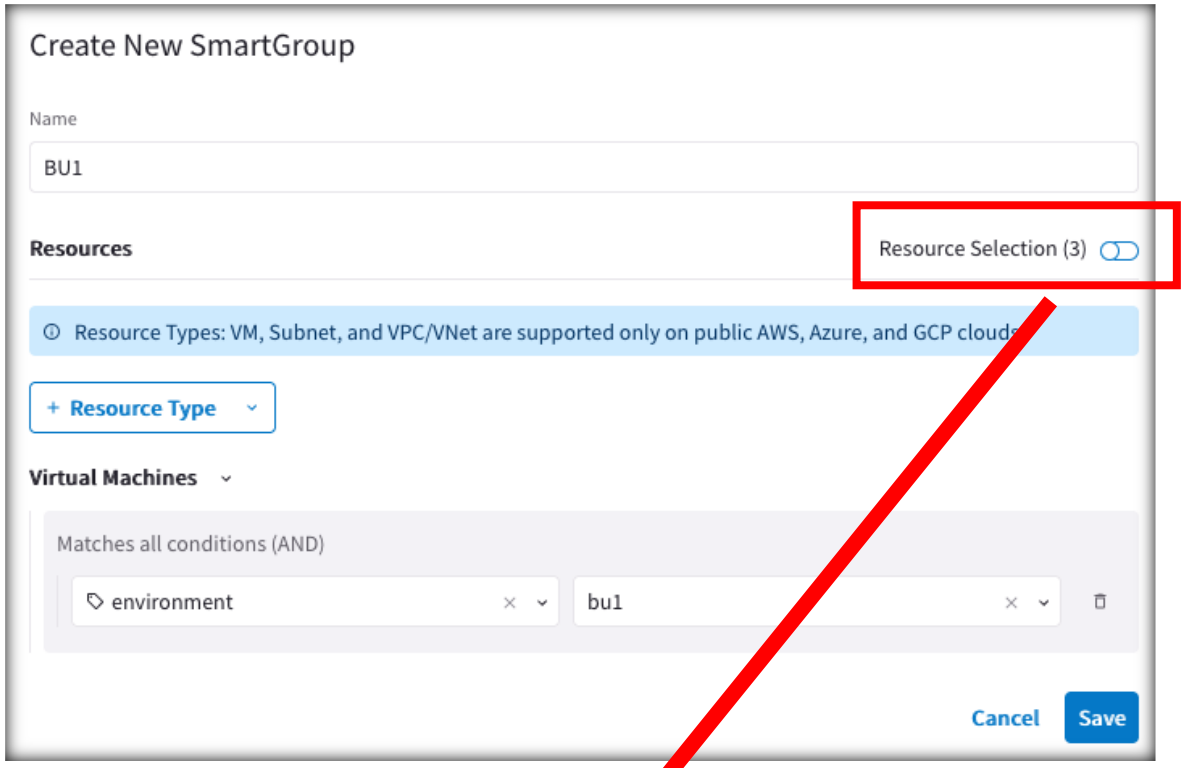
- **Logging can be turned ON/OFF per rule**
- **Configure Syslog to view the logs**

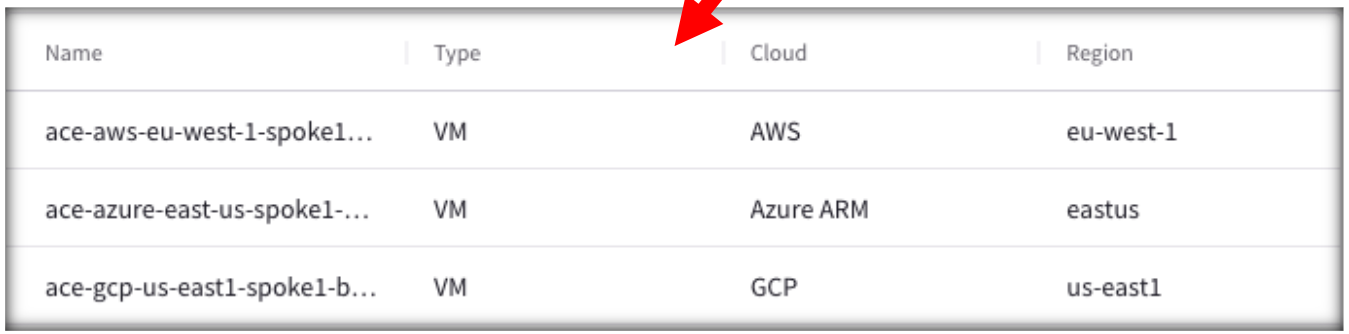


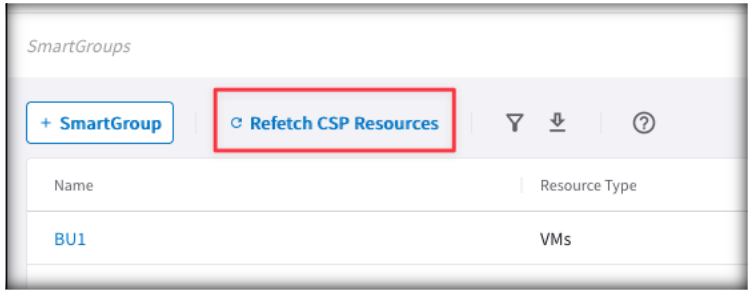
Tools for troubleshooting Distributed Cloud Firewall

Creation of the SmartGroup: the right matching criteria dilemma

1) Choose the right matching criteria for resources that you want to see assigned to a specific SmartGroup:
   - Classification based on the **CSP Tags**
   - Classification based on the **Resource Properties** (i.e. Name, Region or Account Name)
   - Classification based on the **IPs/CIDRs**
2) Use the **Preview Resources** toggle switch to verify the selected resources that have been mapped to the Smart Group
3) Use the On-Demand **Refetch CSP Resources** button to retrieve the most recent inventory



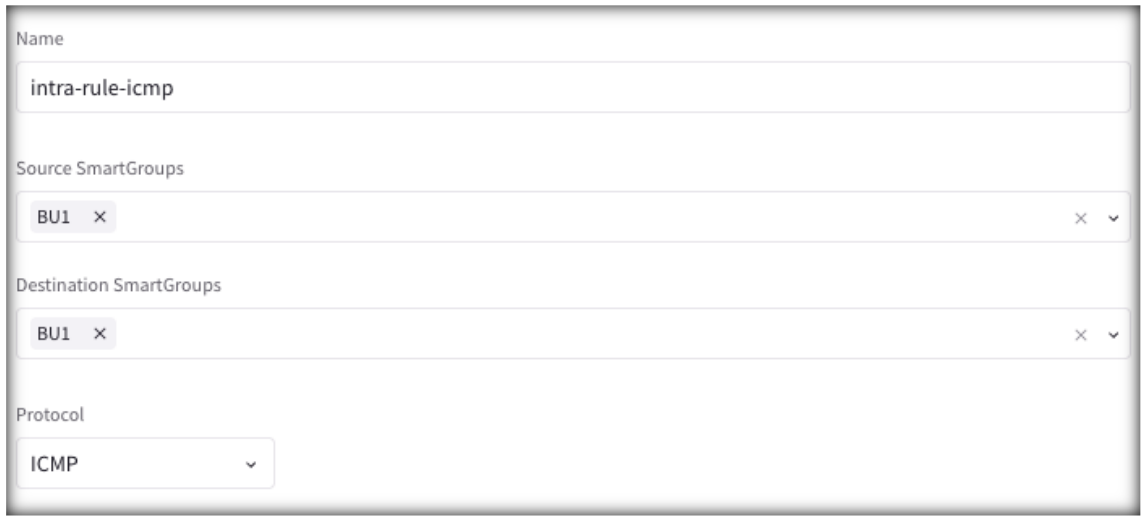


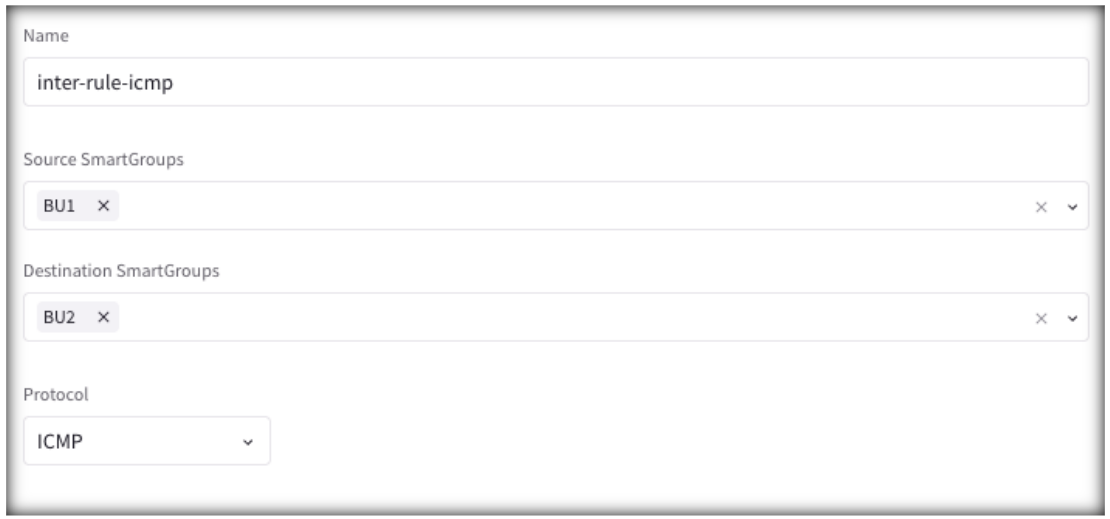


Creation of the Rules: intra-rule vs. inter-rule

1) **Intra-rule** will affect the traffic WITHIN a Smart Group
   - Source Smart Group and Destination Smart Group must be the same

2) **Inter-rule** will affect the traffic BETWEEN SmartGroups
   - Source Smart Group and Destination Smart Group must differ





CAVEAT – The Invisible Implicit Deny: as soon as a Rule is committed (either intra-rule or inter-rule) a hidden deny is applied at the bottom of your Rules list. The implicit deny is really an "invisible deny"; you won't see a "deny any" line automagically added! Since you don't see it, it's easy to forget about. Forgetting about the implicit deny is the #1 reason for Distributed Firewalling Rule not giving you the desired results.

Next:

Lab 8 Distributed Cloud Firewall