Qumulo

Terraform - Cloud Q on AWS

Deploying a Distributed Multi-AZ Cluster

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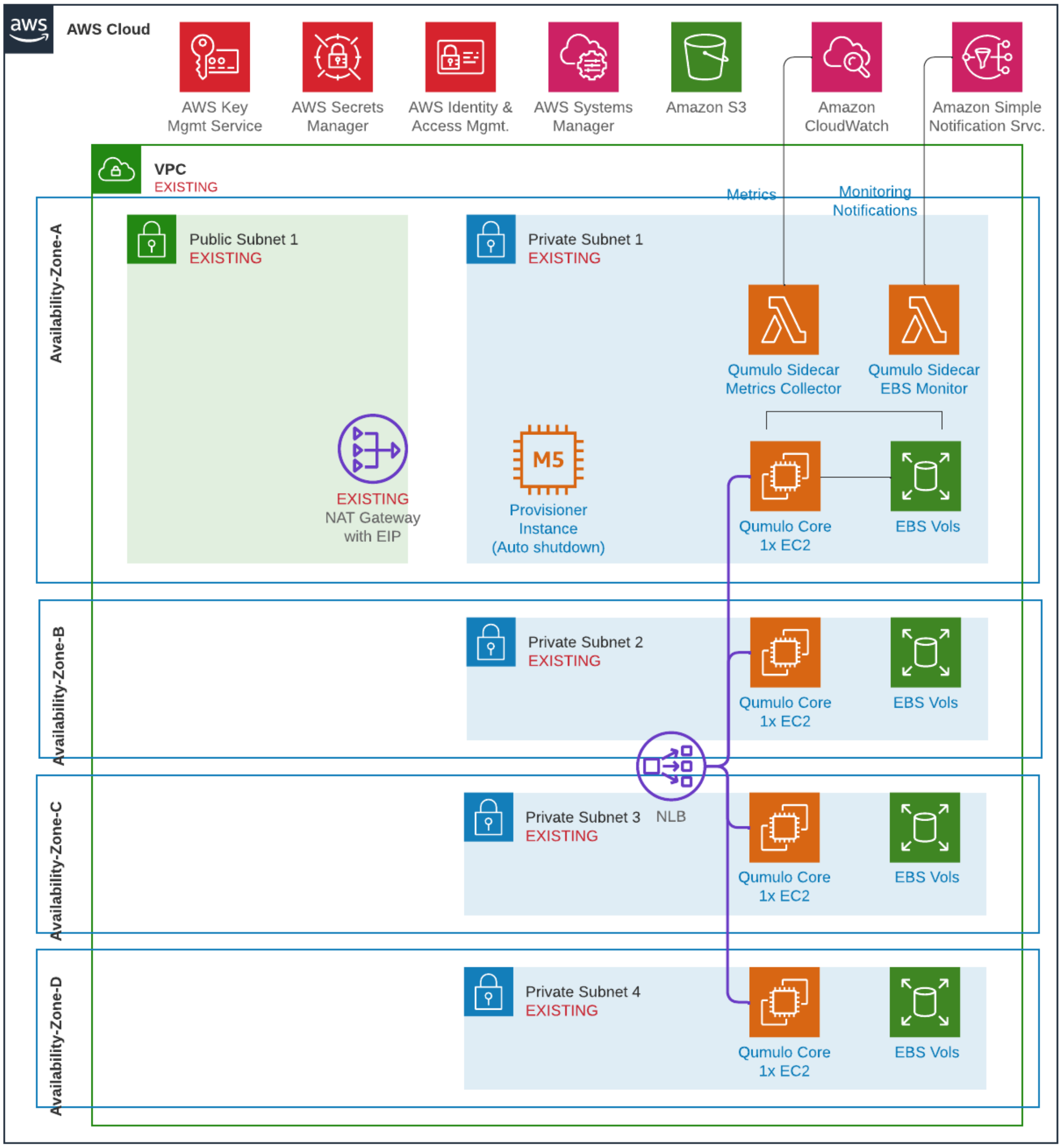
Overview

A Qumulo cluster may be deployed in a distributed multi-AZ fashion. The reference architecture for this deployment is shown below.



Provided by Qumulo

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Benefits of Distributed Multi-AZ

The primary benefit is the enhanced availability of the cluster during AZ outages. Since all Qumulo clusters are instantly consistent, there is no durability benefit, short of a tornado taking out a physical AZ.

- Enhanced availability with single AZ outages
- Simple client failover and restore with an AWS NLB
- Deploy a single cluster - no need to replicate to a second cluster for availability

Detriments of Distributed Multi-AZ

The primary drawback of a distributed multi-AZ deployment is an impact to performance. The inter-AZ traffic has additional latency. This is most noticeable on small file workloads with up to a 40% impact at the extremes. Large file workloads are minimally impacted by the additional latency.

- Limited Regional Support
- Additional latency - very small file workload impacts
- NFSv3 locking is not reliable with an AWS NLB

Costs of Distributed Multi-AZ

Generally speaking a distributed multi-AZ cluster is more cost effective than a pair of clusters with replication as long as the average sustained throughput is <500MB/s 24x7. Most workloads fall far below this bar even though they may have peaks that are much higher.

Supported Regions

A Qumulo cluster requires a minimum of 4 nodes. Thus, 4 AZs are required. This limits the regional support for this architecture on AWS to three regions.

Americas

- us-east-1, US East (N. Virginia) (5 AZs, note: AZ use1-az3 is not supported)
- us-west-2, US West (Oregon) (4 AZs)

Asia Pacific

- ap-northeast-2, Asia Pacific (Seoul) (4 AZs)

Requirements

- Number of AZs: 4
- Number of Nodes in Cluster: 4, 8, or 12
- Load Distribution: AWS NLB

Deploying a Distributed Multi-AZ Cluster

Terraform Variables

All the Terraform variables are used in the same manner except:

- Enter four subnets for **private_subnet_id**, comma delimited, one for each AZ
- Rather than specifying the q_node_count, specify **q_nodes_per_az**, 1, 2, or 3

Terraform Deployment

Simply **terraform apply** with your tfvars. The URL for the NLB will be provided as a Terraform output. Nothing else is required. You may set additional optional variables for the **nlb-qumulo** module which are documented in-line. For example, you may choose to deploy the NLB in separate subnets from the cluster itself. To do this use the **q_nlb_override_subnet_id** variable.

Adding Nodes to a Distributed Multi-AZ Cluster

Nodes must be added in increments of 4 nodes at a time. Further, a cluster may only be grown from 4 nodes to 8 nodes (q_nodes_per_az=1 to 2). For 3 nodes per AZ a new cluster must be deployed. Here are the steps to add 4 nodes to an existing 4 node cluster, for a total of 8 nodes, 2 per AZ.

1. Set q_nodes_per_az=2 in your tfvars file
2. Terraform apply
3. From an EC2 instance with connectivity to the cluster perform the following commands:
    a. ssh -i <your keypair.pem> admin@<ip address of any node>
    b. sudo -i
    c. cd /opt/qumulo
    d. ./qq_internal login -u admin
    e. Enter the admin password
    f. ./qq_internal increase_node_fault_tolerance

Summary of Multi-AZ Configurations

q_nodes_per_az	AZs	# Nodes	Node Protection	AZ Protection	Notes
1	4	4	1	1	Cluster can grow to an 8 node
2	4	8	2	1	
3	4	12	3	1	