

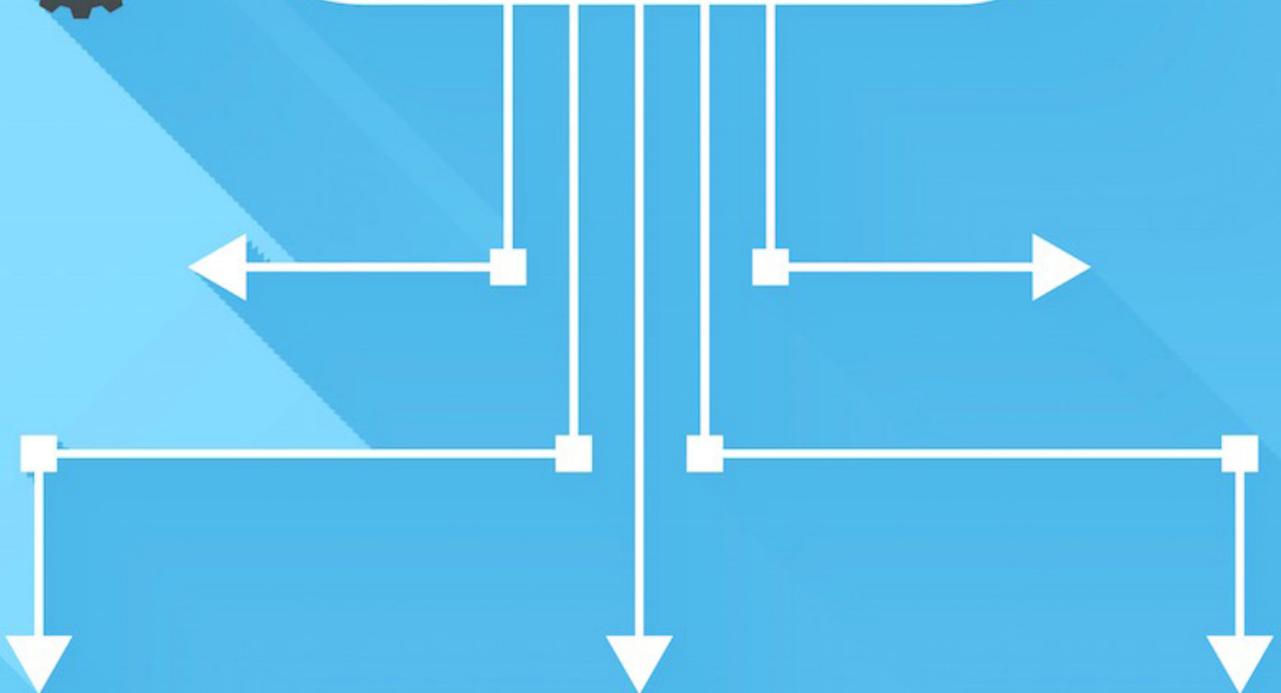


Zero Ops.
Complete Stack
Your Cloud.

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A decorative graphic featuring several gears of different colors (white, red, black) scattered across a blue background with diagonal stripes. A large white cloud shape is centered in the middle of the page.

Running AWS Workloads on ZeroStack Solution Brief



Amazon Web Services (AWS) is a popular cloud computing service that provides a set of infrastructure services to rapidly deploy and scale applications. ZeroStack Cloud is a powerful, scalable alternative that provides a similar experience to AWS, but without the infrastructure operations requirements, allowing developers and IT administrators to use the cloud with ease. This document provides a summary of how AWS customers can leverage the ZeroStack cloud platform.

ZeroStack Cloud Platform Basics

ZeroStack offers a scale-out, multi-site cloud platform using hyperconverged appliances that combine computing, storage, and software-defined networking (SDN) along with a self-healing management-control plane. ZeroStack's on-premises intelligent control plane is complemented by a SaaS based interface for administration, operations, and self service.

This combination offers the agility and simplicity of a public cloud with the control, performance, and locality of a private cloud.

Users can access the ZeroStack Cloud platform in three ways:

- **SaaS:** <https://console.zerostack.com> hosts the SaaS based user interface for ZeroStack. All admin and user operations can be performed from this portal.
- **API/SDK:** ZeroStack leverages OpenStack's cloud management software and ships with 100% pure OpenStack APIs. These APIs are RESTful and closely resemble the AWS APIs. The API documentation can be found at <http://developer.openstack.org/api-ref.html>. The API services offered by ZeroStack and their corresponding versions are described in the next section.
Language-specific SDKs are available in Java, Python, C++, and other languages.
- **Command line interface (CLI):** ZeroStack cloud services can be used by leveraging the OpenStack CLI. The CLI installation guide is available at <http://bit.ly/29WfvVg> and the CLI command guide is at <http://docs.openstack.org/cli-reference/openstack.html>.

ZeroStack Cloud Platform Services

ZeroStack ships a 100% pure OpenStack implementation of cloud services. These services closely map to various AWS services, as listed in the table below.

Service Type	AWS Service	ZeroStack Service
Compute (VM as a service)	EC2	OpenStack Nova
Block storage	EBS	Openstack Cinder
Object storage	S3	Same S3 compatible API is supported
Image management	AMI services	OpenStack Glance
Load balancer	ELB	OpenStack LBaaS
Networking	AWS networking	OpenStack Neutron
Application templates	CloudFormation	OpenStack Heat
Identity and access control	IDM	OpenStack Keystone

AWS vs. ZeroStack Terminology

The table below maps some key concepts of AWS terminology with the ZeroStack world.

Concept	AWS Terminology	ZeroStack Terminology	Details
Machines	EC2 instances	Nova instances	API: http://developer.openstack.org/api-ref/compute/
Block storage	EBS volumes	Cinder volumes	API: http://developer.openstack.org/api-ref/blockstorage-v2.html
Object storage	Buckets	Containers	S3 API supported
Image management	AMIs	Glance images	API: http://developer.openstack.org/api-ref/image-v2.html
Tenant and network-level isolation	Virtual private cloud (VPC)	OpenStack project	APIs: http://developer.openstack.org/api-ref/networking-v2.html http://developer.openstack.org/api-ref/networking-v2-ext.html
VM-level firewalls	Security groups	Security groups	APIs: http://developer.openstack.org/api-ref/networking-v2-ext.html
Certificates for VM access	Access key, secret key	Access key, secret key	This works exactly the same on both AWS and ZeroStack.
Application templates	Cloud formation template	HOT template	API: http://developer.openstack.org/api-ref-orchestration-v1.html ZeroStack has an app store with popular application templates.
Availability zone	Availability zone	Availability zone	Same concept in both AWS and ZeroStack.
Region	Region	Region	Usually maps to a physical on premises datacenter.

AWS/ZeroStack Interoperability

Viewing Workloads Already Running on AWS

Users can add their AWS account as an “External Provider” to their ZeroStack project. They can add multiple AWS accounts to the same project in order to consolidate disparate workloads within a single project or tenant in ZeroStack.

Users can add the same AWS accounts to multiple projects. This allows users to migrate from a single AWS account to multiple projects within ZeroStack where they can take advantage of a tenancy model and enforce resource quota limits. Setting resource quotas helps limit the cost escalations in situations where VMs life cycles are not properly managed.

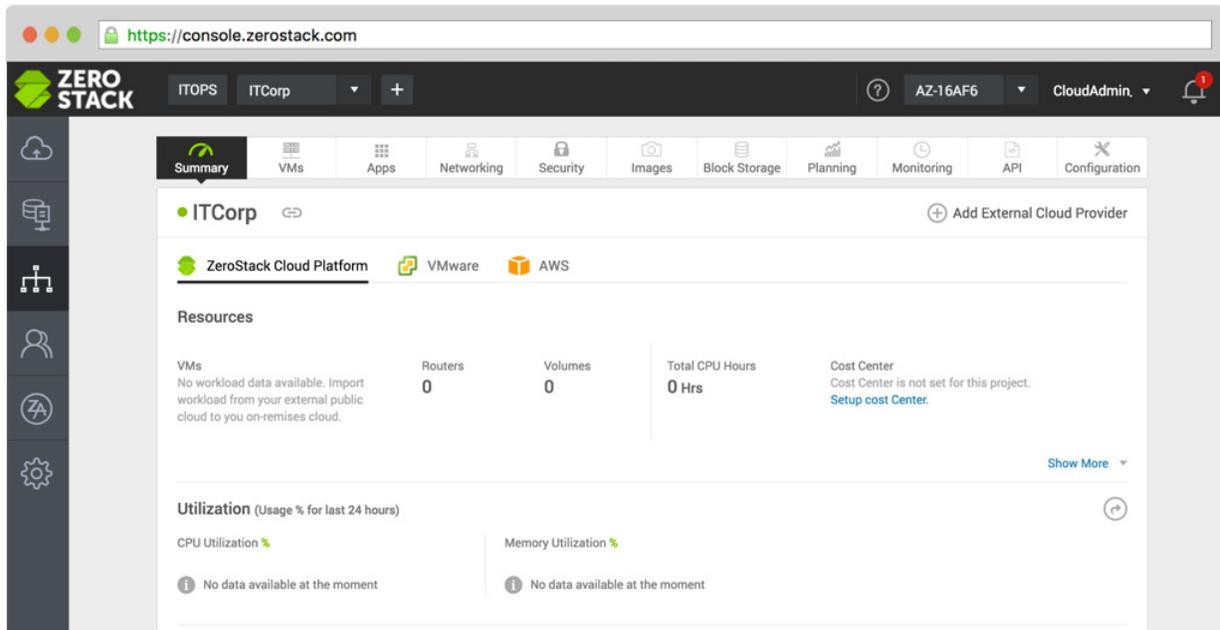


Figure 1. ZeroStack Console window

After an AWS account is added to a ZeroStack project, users can view their AWS VMs under the VM tab in their project workspace.

Seamlessly Migrating Workloads from AWS to ZeroStack

Users can choose one or more VMs and migrate them by answering some simple questions to map the VM's AWS configuration to ZeroStack. The system automatically detects the characteristics of the EC2 instance, and the best configuration of that instance in ZeroStack. Most of the time the system-generated defaults can be used as is. Users may want to change the configuration of the VM as part of the migration, such as changing the storage pool type from HDD to SSD.

The migration process is asynchronous and users can track progress on the ZeroStack UI. The process allows seamless migration of Ubuntu, CentOS, RHEL, and Windows instances.

Recreating AWS VPCs on ZeroStack

Most AWS customers spin up workloads by creating virtual private clouds (VPCs). A ZeroStack project is the equivalent construct in your private cloud. For every existing VPC in AWS, users can create an equivalent within a ZeroStack project.

Networking and Security

Similar to VPCs, users can launch VMs in a virtual network that they define. Users have complete control over their virtual networking environment, including the selection of IP address ranges, creation of subnets, and configuration of route tables and network gateways.

Users can easily customize the network configuration. For example, a user can create an intranet or public-facing subnet for their web servers that has access to the Internet, and place their backend systems such as databases or application servers in private subnets with no Internet access.

Users can leverage multiple layers of security, including security groups and network access-control lists, to help control access to instances in each subnet. Users can also upload or generate key pairs for securely connecting to VMs.

Load Balancer

ZeroStack offers Load Balancer as a Service (LBaaS), which is equivalent to the ELB functionality in AWS. Users can create web or other scale-out applications and connect them to load balancer instances. The load balancers can be assigned fixed-private, intranet-facing, or external-facing IP addresses depending on the nature of the application.

Disaster Recovery

Users can periodically back up an entire project or mission-critical VMs within a project to external NFS-mounted storage.

Workload Placement

ZeroStack's placement policies allow for the placement of workloads on certain hardware or with certain storage profiles. For instance, users could create a "gold" placement policy that places VMs in a subset of hosts and with all SSD volume types.

Role-Based Access Control in ZeroStack

Customers who want to deploy workloads on ZeroStack can connect their on-premises active directory or LDAP, allowing users to log in using their corporate credentials. They can also create users and groups within ZeroStack's Identity Service. Access to resources can be controlled by assigning granular privileges to users/groups at a project level.

Use Cases

AWS customers can use ZeroStack for a number of use cases. A sample of these is listed below.

Self Service

IT admins can offer developers and lines of businesses a self-service IT platform without the hassles of an IT ticketing system. The system has a built-in approval workflow that simplifies the process of requesting and approving resources. ZeroStack allows the cloud to be divided into business units that map to organizations within any size enterprise. These business units can be tied to AD/LDAP organization units and domains. This allows existing corporate authentication and authorization mechanisms to work seamlessly with ZeroStack.

ZeroStack also offers a fully featured app store where admins can offer a controlled set of image and application templates that developers can deploy with ease. Developers can also upload their own templates to be used for testing, staging, and production.

CI/CD Workflows

The ZeroStack app store comes with templates for deploying Git Server and Jenkins Server, and for creating developer boxes with ease. Enterprises with an existing CI/CD workflow can easily spin up workloads on ZeroStack by referencing the OpenStack APIs for workload creation. All popular CI/CD tools (both containers and VMs) have OpenStack plugins, so the OpenStack APIs are very helpful.

Hosting Internal or Public-Facing Website

Users can host a basic web application, such as a blog or simple website in a ZeroStack project, and gain the additional layers of privacy and security afforded by the platform. They can secure the website by creating security group rules that allow the webserver to respond to inbound HTTP and SSL requests from the Internet while simultaneously prohibiting the webserver from initiating outbound connections to the Internet.

Hosting Multi-Tier Web Applications

Users can host multi-tier web applications and strictly enforce access and security restrictions between web servers, application servers, and databases. Users launch web servers in a publicly accessible subnet and application servers and databases in non-publicly accessible subnets. These application servers and databases can't be directly accessed from the Internet, but they are still available via something like a NAT gateway to download patches. Users control access between the servers and subnets using inbound and outbound packet filtering provided by network access-control lists and security groups.

Deploying Big Data Applications

Applications such as Apache Spark and Hadoop tend to be resource intensive and need VM flavors with high CPU and memory count. Running these VMs for prolonged periods of time on a public cloud can be cost prohibitive. ZeroStack is an ideal on platform for importing these workloads on-premises and saving on monthly AWS fees.

Enterprises that adopt AWS often need to move large amounts of data to the public cloud in order for big data analytics processing. For compliance and security reasons, some enterprises are unable to move this data. Also, the amount of data can be a limitation. In the zApp Store, ZeroStack offers big data application templates making it easy for customers to run big data workloads.