Z-Brain – ZeroStack’s “Learning-Engine”

ZeroStack Delivers
ZeroStack’s Intelligent Cloud Platform is a fully integrated cloud solution that delivers a private cloud with the ease of use of a public cloud at a fraction of the cost. This solution is fully integrated with public clouds to offer seamless migration between clouds.

Three Key Innovations

Z-COS: ZeroStack’s cloud operating system converts servers into a hyper-converged cloud faster than any other vendor, and with integrated intelligence works in tandem with Z-Brain to build the world’s first self-driving cloud. Z-COS is a fully integrated stack and includes software-defined storage (SDS), software-defined networking (SDN), a full-functioned hypervisor and a distributed, self-healing control plane.

Z-Brain: ZeroStack’s intelligent software dramatically reduces operational tasks, and learns by leveraging a big-data layer that stores and analyzes rich telemetry using AI and machine learning which take the guesswork out of capacity planning, upgrades, ongoing management and troubleshooting. The on-premises infrastructure is consumed via a SaaS-based user interface, running in the cloud.

Z-AppStore: The integrated App Store enables 1-click deployment of many applications for rapid application development and deployment.

Key Functionality

- Security & compliance
- Self-service portal with built-in approval system for resource allocation
- Seamless integration with AWS, multi-cloud support
- Application migration across clouds
- Big-data analytics driven monitoring & troubleshooting
- Instant provisioning, automated workflows for common tasks as-a-service
- Granular analytics-based capacity planning & expansion, chargebacks & showbacks
- Proactive software-driven project-level capacity planning
- Multisite cloud administration
## Security & Compliance

ZeroStack ensures compliance by giving customers the ability to attribute every cloud action to a user. The unique timeline view collects data about all operations performed on the cloud, including all user creations and logins, object creation, removal and cloning amongst others. User actions are automatically added to the timeline of events and inventory, thus making data readily available for auditing and compliance purposes.

The data resides on premises including VMs, data stores, users, and credentials. ZeroStack provides security from within the enterprise to the ZeroStack Cloud by using a unidirectional communication port (443) and encrypted SSL-based communication. IP addresses for the corporate firewall (including those assigned to the Cloud Building Block hosts) are not accessible from the cloud. ZeroStack uses role-based access control (RBAC) and enables multiple roles, each with a set of capabilities.

## Self-service portal with built-in approval system for resource allocation

The self-service portal allows developers and IT to test, build or deploy applications within minutes, without going through a ticketing system. Admins can create projects with certain quotas in terms of CPU, memory, storage space and network resources. Users can then consume these projects in a self-service manner. They can create VMs, volumes, private networks, routers and assign security rules on a per VM level. For some of the resources like project creation, the portal allows customers to have approval workflow for better control.

## Seamless integration with AWS, multi-cloud support

Customer AWS accounts can be added as a cloud resource provider into the ZeroStack's SaaS portal. Once an account is added, ZeroStack can discover and show all the workloads running in AWS. Z-Brain enables migration of workloads from AWS to ZeroStack and vice versa and makes it ultra-simple with a few simple clicks. ZeroStack implements granular project level management and control paradigm project with well-defined quotas and networking. A ZeroStack project maps to AWS Virtual Private Cloud (VPC) notion. As part of migration, ZeroStack handles all resources such as CPU, memory, virtual disks and network topology that is needed by the application. This allows seamless migration of multi-tier applications from AWS to ZeroStack or the other way.

## Application migration across clouds

ZeroStack also provide seamless integration with VMware. Customers can add vSphere as a provider into the ZeroStack's SaaS portal. Again, once an account is added, ZeroStack can discover and show all workloads running in vSphere. Z-Brain enables migration of workloads from VMware to ZeroStack and makes it ultra-simple with a few simple clicks. This allows customers to move from VMware to AWS also in a risk-free manner. In future, more cloud services (Azure, Google Cloud) will be added to the supported list.
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<td>Big data analytics driven monitoring &amp; troubleshooting</td>
<td>ZeroStack's monitoring system proactively detects problems before they happen. With robust performance-utilization dashboards for all infrastructure levels, events, statistical metrics, and notifications, IT teams can continuously monitor the on-premise cloud infrastructure. Cloud operators can troubleshoot from historical data by using the timeline view of events, statistics, and inventory.</td>
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**Infrastructure dashboard to monitor overall health of cloud across sites and geographies**

| Instant provisioning, automated workflows for common tasks as-a-service | Enterprise IT teams like to offer their consumers a self-service platform that facilitates on-demand resource creation with guaranteed high performance and complete control. A traditional virtualized environment is not a private cloud because it has limited self-service and sparse automation support. In this highly structured and siloed infrastructure, for instance when developers need to kick start an analytics project and need a dynamic infrastructure for multiple iterations of building, testing, and deploying applications on demand. The IT team rapidly becomes a bottleneck and eventually fails to serve the needs of end users in an agile fashion. |

**Diagram showing Instant provisioning, automated workflows for common tasks as-a-service**
Using business units and projects in ZeroStack, the IT team can map an entire organization’s structure and enforce quotas at a project-level for a true, metered private cloud model. With the built-in approval workflow, the IT team can (a) eliminate repetitive IT tickets, (b) enforce compliance, and (c) stay aware of infrastructure demands. The developers can use the SaaS portal to provision resources on demand, just as they would on a public cloud. ZeroStack’s built-in ZApp Store provides a rich and centralized catalog of popular VM images and application templates, thus eliminating bottlenecks for workload deployments.

Even in an elastic private cloud environment, infrastructure resources like computing, memory, storage, network bandwidth, and IP addresses are finite and must be managed. Enterprise IT teams face three time-intensive challenges for managing a typical, elastic private cloud infrastructure:

• Determining the optimal use of existing resources,
• Monitoring the resource consumption rate to accurately estimate future needs, and
• Precisely associating resource use with individuals or groups.

Without the ability to automatically bill to the exact line-of-business accounts accurately, IT teams rapidly get tangled in endless spreadsheets and ad-hoc estimations.

ZeroStack’s analytics-driven, web-based platform learns from your historical data to accurately predict the type of infrastructure your cloud needs. Empowered with these key insights in resource consumption, IT teams can continuously measure infrastructure and scale their environments to multiple distributed locations while maintaining an end-to-end DevOps workflow. Developers can use the increased deployment frequency to ship builds at a faster rate. Developers can now monitor, measure, and improve the code instead of using the traditional ad-hoc estimation techniques.
Enterprise IT team can dump the traditional spreadsheets and estimates and instead get clear visibility into buying decisions. This is done via the SaaS platform, thus saving IT from additional software investments.

Each project can be associated with a cost center. The resource consumption is reported against a specific cost center and can be used as a cost measure of IT for that project. ZeroStack Cloud Platform prevents redundant resource usage, provides insight into consumption trends, and can be used for showback and chargeback processes.

At the self-service layer, business units can see a comparison of their resource use to a given quota, as well as the rate at which resources are being consumed, highlighting VM sprawl and under-performing resources. The system enables users to resize their workloads if resources are under- or over-utilized.

On the infrastructure side, ZeroStack’s model is organized into regions and availability zones and at the logical level, it is organized into business units (BUs) and projects. Each BU has multiple projects. Each project can be assigned a resource quota that the project’s users cannot exceed. ZeroStack’s capacity planner operates at the infrastructure level and the logical level.

At the infrastructure-level, a cloud administrator can view the total capacity on a per-region basis. For each region, the total physical computing, memory, and storage is made available. The cloud administrator can also view all of the enabled storage pools, the capacity of each pool, and usage date for each pool. For CPU and memory, the system also provides overall CPU and memory utilization of various granularities (daily, weekly, monthly).

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<td>ZeroStack’s “Learning engine” provides visibility into buying decisions.</td>
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<td>Monitor workload health</td>
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| **Proactive software driven project-level capacity planning** | At the logical level, the capacity planner operates on project-level quotas. Cloud administrators as well as project administrators can not only view the total quota allocated to them, but can also get insight into the ratio of resources utilized within that quota (actual CPU, memory, and storage utilization).

Consider a project team where extra-large VMs are created and the quota often gets exhausted faster than the estimated rate. The project administrator must immediately submit a request for additional resources. The cloud administrator, meanwhile, will have to analyze each application’s actual utilization trend. The cloud administrator might find that most of these applications are utilizing very little CPU or memory. In such cases, the cloud administrator will need to manually resize these applications to an appropriate size, thus freeing up room in the current quota. In the true spirit of self service, this can be done by the project administrators, too. As resources are consumed by projects, the usage is recorded as follows:

- Total CPU hours consumed
- Total storage consumed
- Total bandwidth used (TX and RX)
### Multisite cloud administration

The infrastructure is organized into availability zones (AZs) and regions. Multiple Cloud Building Blocks form one AZ and multiple AZs form a region. Each physical data center is represented by one region. As more capacity is added to the cloud, users can choose to (a) add these to an existing AZ, (b) create a new AZ in an existing region, or (c) create a completely new region. IT team can now have simplified deployment and centralized management across multiple data centers or ROBO sites.