

About me:

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Agenda:

- Cloud Infrastructure Overview
- Architecture Design
- Core Components
- Networking Overview
- Kubernetes Service Overview



What is Cloud Computing?

Cloud computing means accessing computing resources like



Over the internet instead of installing them locally on your computer.



Evolution of Infrastructure

The journey from bare-metal data centers to fully abstracted cloud environments has fundamentally redefined how telecom providers build and operate their infrastructure.



Traditional Infrastructure

Dedicated physical servers per workload. High CapEx, long provisioning times (weeks), rigid capacity planning, and low utilisation rates averaging 10–15%.



Virtualised Infrastructure

Hypervisor-based virtualisation enables multiple VMs per host. Improved utilisation (40–60%), faster provisioning, and workload consolidation — but still manually managed.



Cloud Infrastructure

Fully automated, software-defined, and self-service. On-demand provisioning in minutes, elastic scaling, multi-tenancy, and pay-as-you-go economics at telecom scale.



Limitations of Traditional Datacenter Infrastructure

1

Manual Provisioning

Slows down deployment, requiring extensive human intervention and delays.

2

Resource Fragmentation

Inefficient resource use arises from isolated silos and disparate management tools.

3

Slow Scaling

Scaling operations can take days, limiting rapid response to business needs.



4

Operational Complexity

Multiple tools and processes create overhead and complicate IT management.

5

High Capital Expenditure

Requires significant upfront investment, tying up funds in hardware purchases.

6

Limited Flexibility

Adaptability is constrained by legacy systems and integration challenges.

7

Inconsistent Performance

Performance varies across manual configurations, leading to unpredictable application behavior.

What is a Modern Cloud Infrastructure Platform

1

Enables seamless interaction with diverse cloud resources.

2

Automates repetitive tasks through intelligent orchestration.

3

Facilitates integration via standardized API interfaces.

4

Supports multi-tenancy with robust security measures.

Key Points

Advantages

1

Resource Efficiency

Maximizes utilization of physical infrastructure assets.

1

Rapid Scaling

Accommodates fluctuating workloads with minimal latency.

1

Cost Management

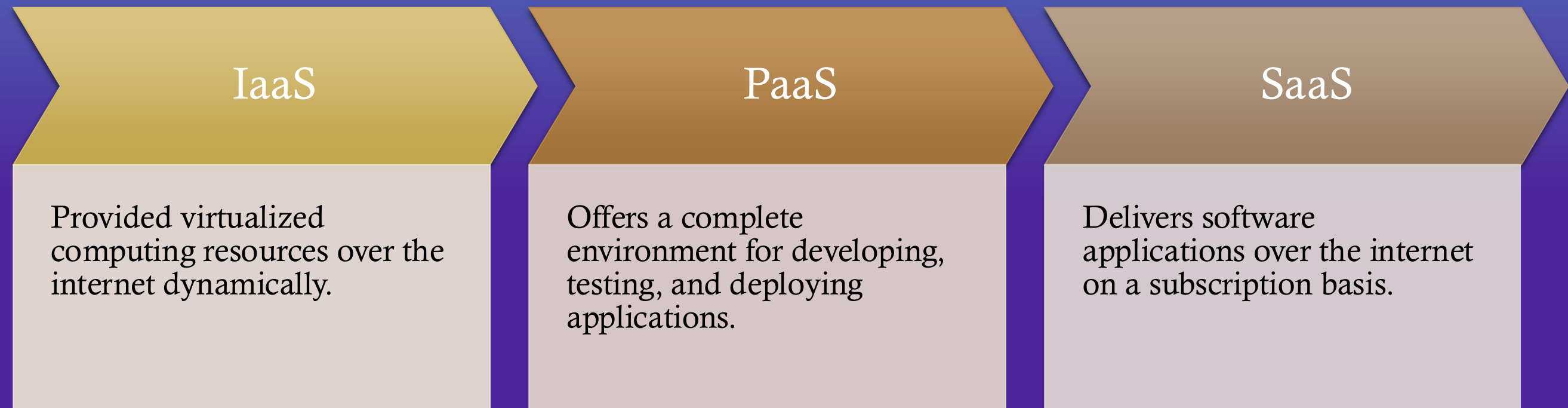
Optimizes operational costs through resource pooling.

1

User Empowerment

Empowers users with self-service access and controls.

Cloud Service Models



What is IaaS (Infrastructure as a Service) in Cloud?

Infrastructure as a Service (IaaS) delivers virtualized computing resources over the internet, giving you complete control over your infrastructure stack while we manage the physical hardware.

Key Characteristics

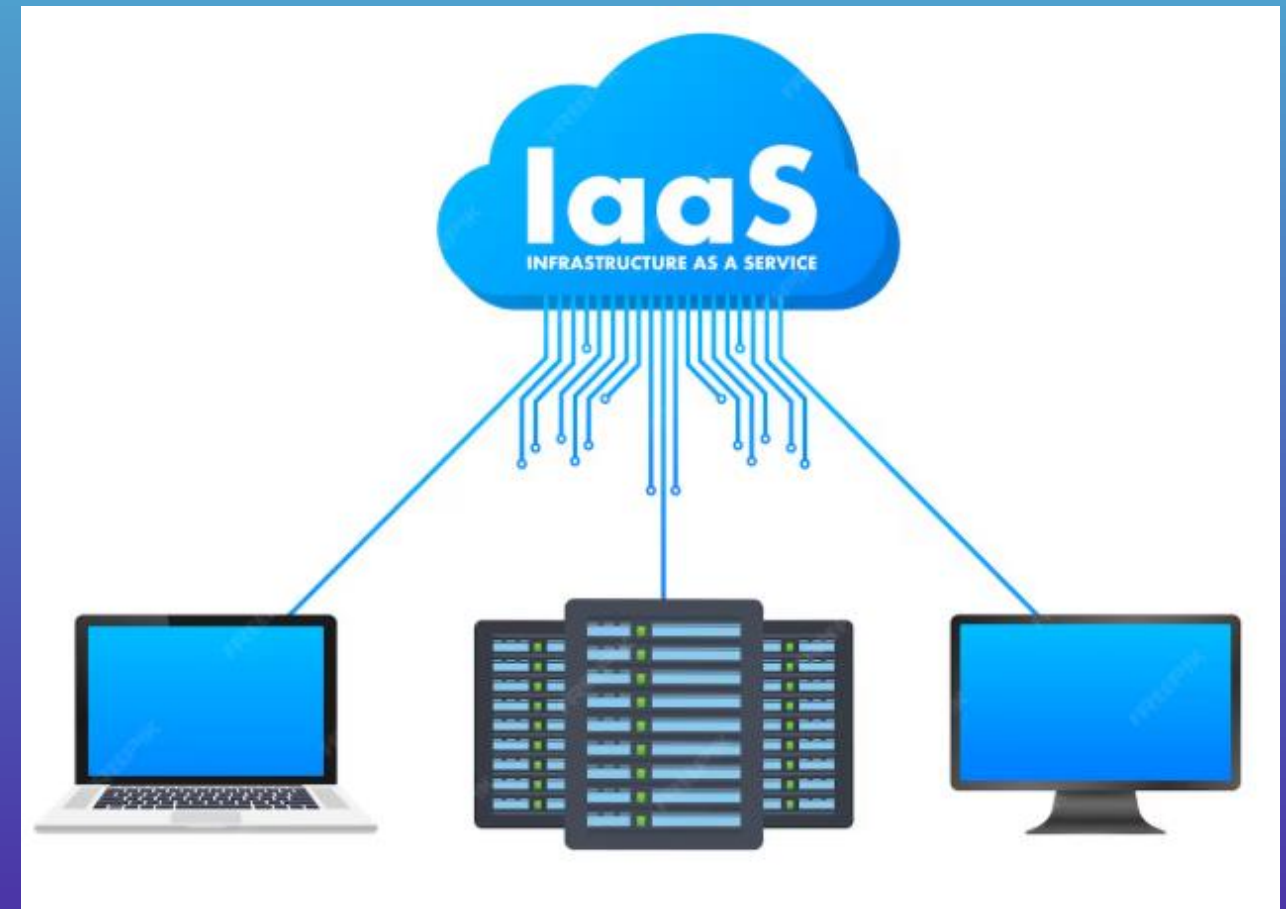
- ◆ Virtual machine instances on demand
- ◆ Elastic storage provisioning
- ◆ Software-defined networking
- ◆ Full OS and application control

Similar platforms include Amazon EC2, Microsoft Azure VMs, and Google Cloud Compute Engine.

Your Control vs. Provider Control

You manage: Operating systems, applications, databases, and runtime environments

We manage: Physical servers, network infrastructure, and virtualization layer



Cloud Platform Architecture Overview

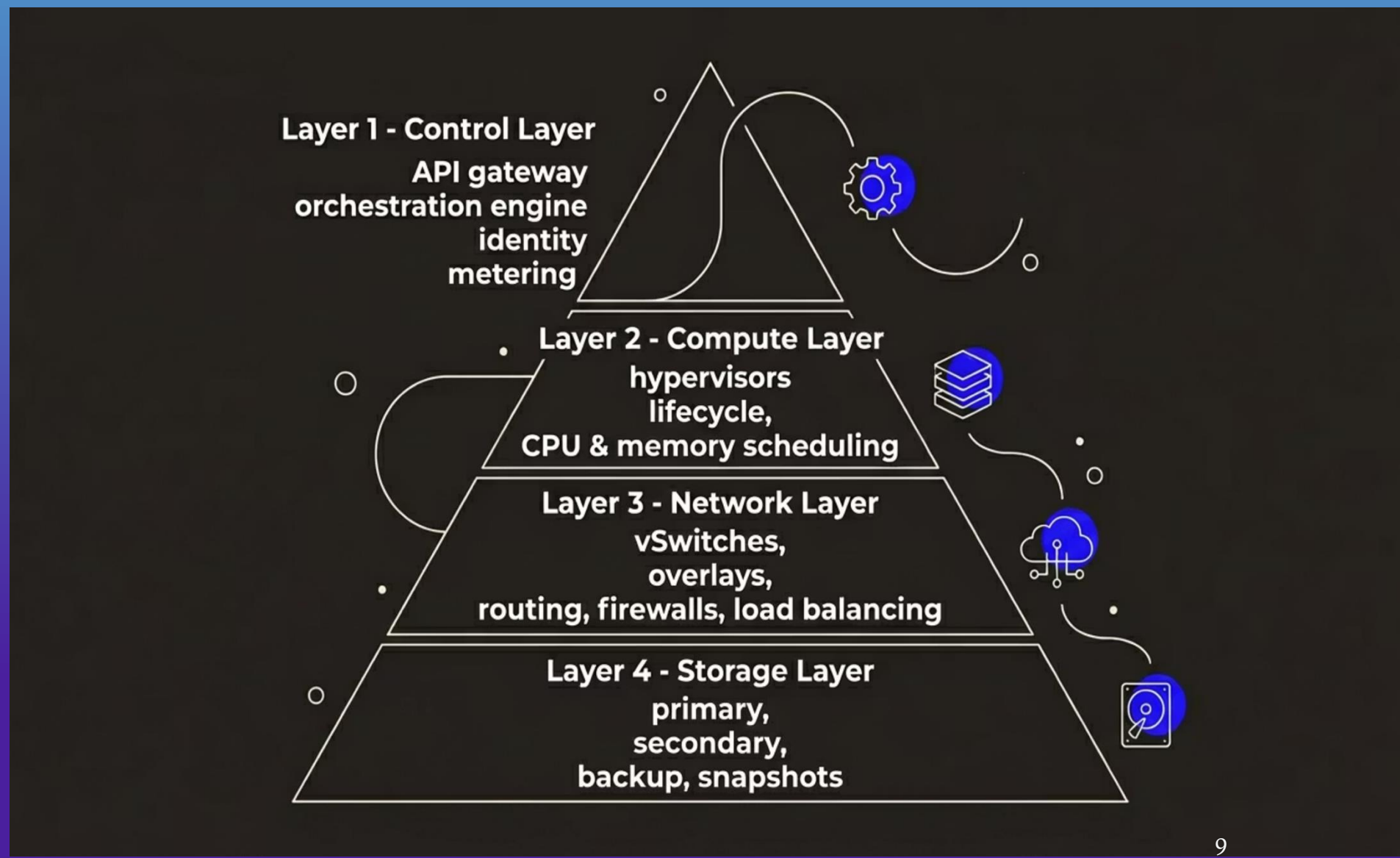
The platform is structured as a layered architecture. Each layer has clear responsibilities and well-defined interfaces, enabling independent scaling and component substitution without cascading changes.

Control Layer

The intelligence of the platform. Handles all API requests, orchestrates resources, enforces policies, and exposes the management portal and programmatic interfaces to operators and tenants.

Compute & Storage Layers

Physical and virtual compute nodes managed by hypervisors. Storage spans primary (block) and secondary (image/object) tiers. Both layers are abstracted and presented as pooled resources.



Core Cloud Management System

The cloud management system is the operational brain of the platform. It coordinates every resource lifecycle event — from initial provisioning to decommissioning — through a unified, policy-driven control plane.



Orchestration Engine

Coordinates multi-resource deployments, enforces placement policies, manages VM scheduling across hypervisor hosts, and handles failover logic with configurable high-availability rules.



Automation & API

Exposes a rich RESTful API for full programmatic control. Integrates with Terraform, Ansible, and CI/CD pipelines. Supports webhook-based event notifications for operational automation.



Resource Provisioning

Automates the full VM lifecycle — create, start, stop, migrate, snapshot, and destroy. Supports compute offerings (CPU/RAM templates) and storage volume attachment workflows.



Monitoring & Alerting

Collects real-time metrics for CPU, memory, disk I/O, and network throughput. Configurable alert thresholds trigger automated remediation or operator notifications via email or webhook.

Physical Infrastructure Layer

The physical layer forms the foundation upon which all virtualized services are built. Careful hardware selection and configuration directly determine the platform's performance envelope and reliability characteristics.



Hypervisors & Compute Nodes

KVM-based hypervisors run on bare-metal compute nodes. Each node exposes physical CPU cores, RAM, and local disk to the scheduler. NUMA-aware placement optimises latency-sensitive workloads.



Storage Systems

Primary storage leverages high-performance SAN arrays or distributed block storage (e.g. Ceph). Secondary storage holds VM templates, ISO images, and snapshots on NFS or object-compatible backends.



Networking Equipment

Top-of-rack (ToR) switches provide 10/25/100 GbE connectivity. Dedicated out-of-band management networks separate tenant data traffic from platform control and IPMI/BMC management planes.

Some of the reasons why CLOUD stands out

Compute orchestration: Create and manage virtual machine instances and Kubernetes clusters.

Networking: Set up firewalls, load balancers, isolated networks, and VPNs.

Storage: Manage virtual machine volumes, backups.

Account management: Organize users, accounts, and access controls across projects or teams.

User Interface: A clean, responsive, and functional web-based dashboard.

Compute Features

Full Lifecycle Management for Virtual Machines

Virtual Machine Lifecycle

Create, start, stop, migrate, and destroy instances on demand with complete control over compute resources and configurations

Instance Snapshots

Capture point-in-time backups of running or stopped instances for quick recovery and rollback capabilities

SSH Key Pairs

Secure, password-less access for Linux-based instances using public-key cryptography authentication



Guest Network

VM Deployment Zone

Private network segment where virtual machine instances are deployed and isolated from other tenants

Connectivity Services

Provides connectivity between VMs and optionally to external networks and the internet

Network Services

Built-in support for DHCP, DNS, Source NAT, Port Forwarding, and Load Balancing capabilities

Tenant Isolation

Complete isolation between tenants using virtual networking and security controls



Virtual Private Cloud

Advanced Network Architecture for Enterprise Workloads

Multiple Isolated Networks

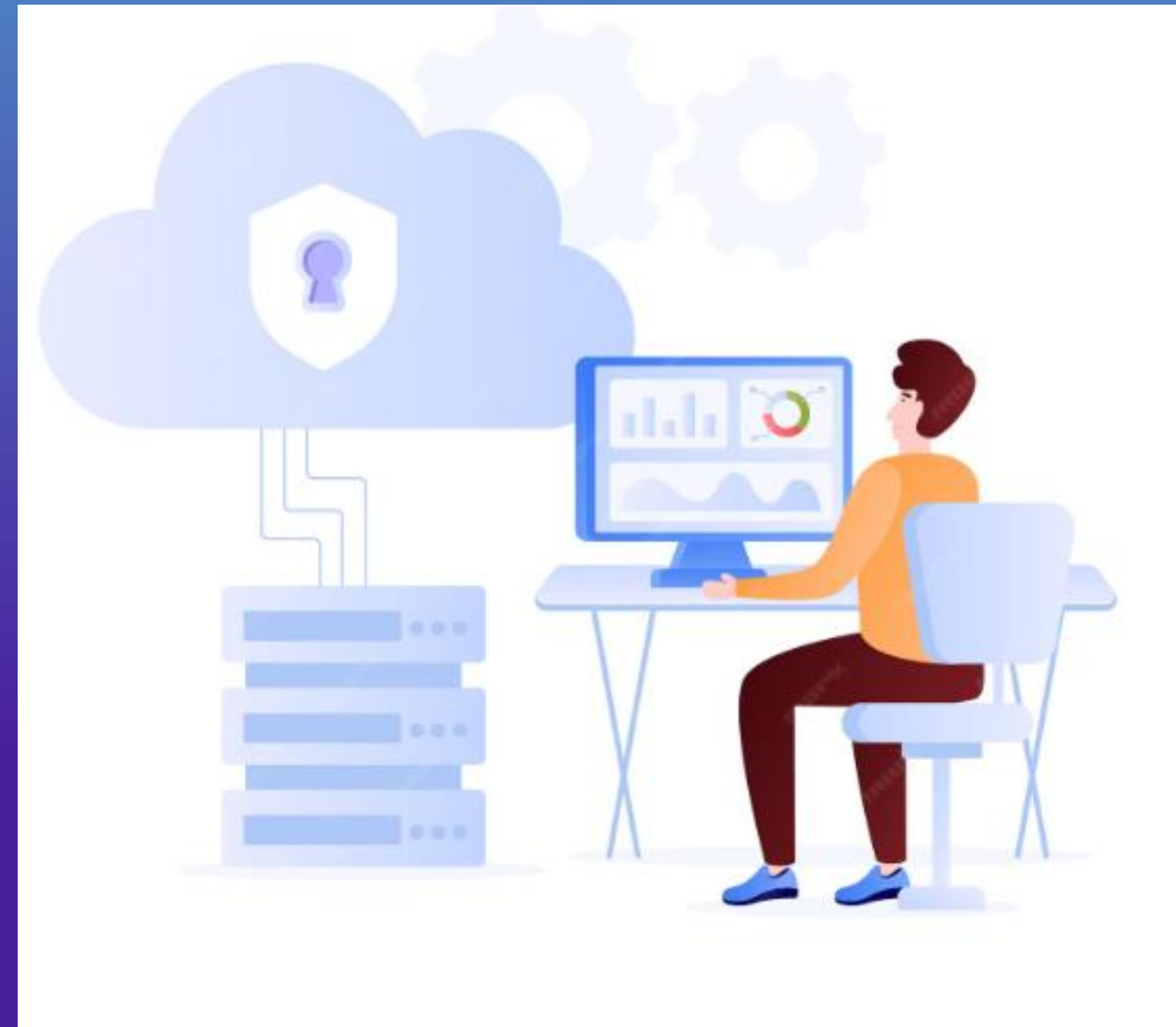
Create multiple isolated subnets within a single VPC using Layer-3 routing with a virtual router

Advanced Security Features

- Access Control Lists (ACLs)
- Static NAT configurations
- Site-to-Site VPN connections
- Network tier segmentation

Enterprise-Ready

Designed for complex workloads requiring multi-tier architectures, hybrid connectivity, and strict security compliance



Major Components of a VPC

Network Tiers?

- Each Network Tier acts as an isolated Network with its own VLANs and CIDR list
- The Network Tiers are segmented by means of VLANs.
- The NIC of each Network Tier acts as its gateway.

Public IP?

- allow your resources (such as virtual machines) to be accessible from the internet.
- allocate Public IPs, assign them to instances
- port forwarding, create firewall rules, and release them when no longer needed.



Major Components of a VPC

Public Gateway?

- ◆ The traffic to and from the Internet routed to the VPC through the public gateway.

Private Gateway?

- ◆ All the traffic to and from a private Network routed to the VPC through the private gateway.

VPN Gateway?

- ◆ The VPC side of a VPN connection.

Site-to-Site VPN Connections

- ◆ A hardware-based VPN connection between your VPC and your datacenter, home Network, or co-location facility.



Major Components of a VPC

Customer Gateway?

- The customer side of a VPN Connection.

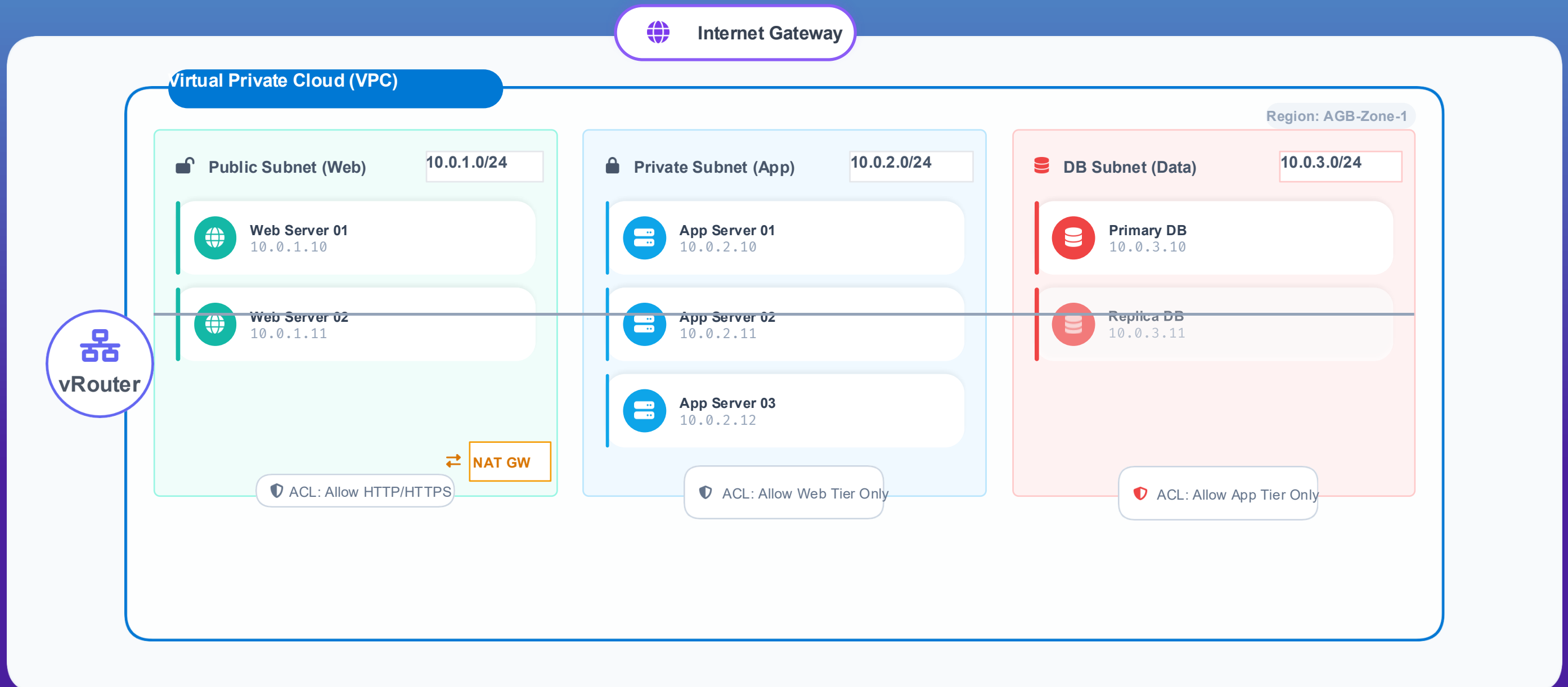
Network ACL?

- Network ACL is a group of Network ACL items. Network ACL items are nothing but numbered rules that are evaluated in order, starting with the lowest numbered rule.



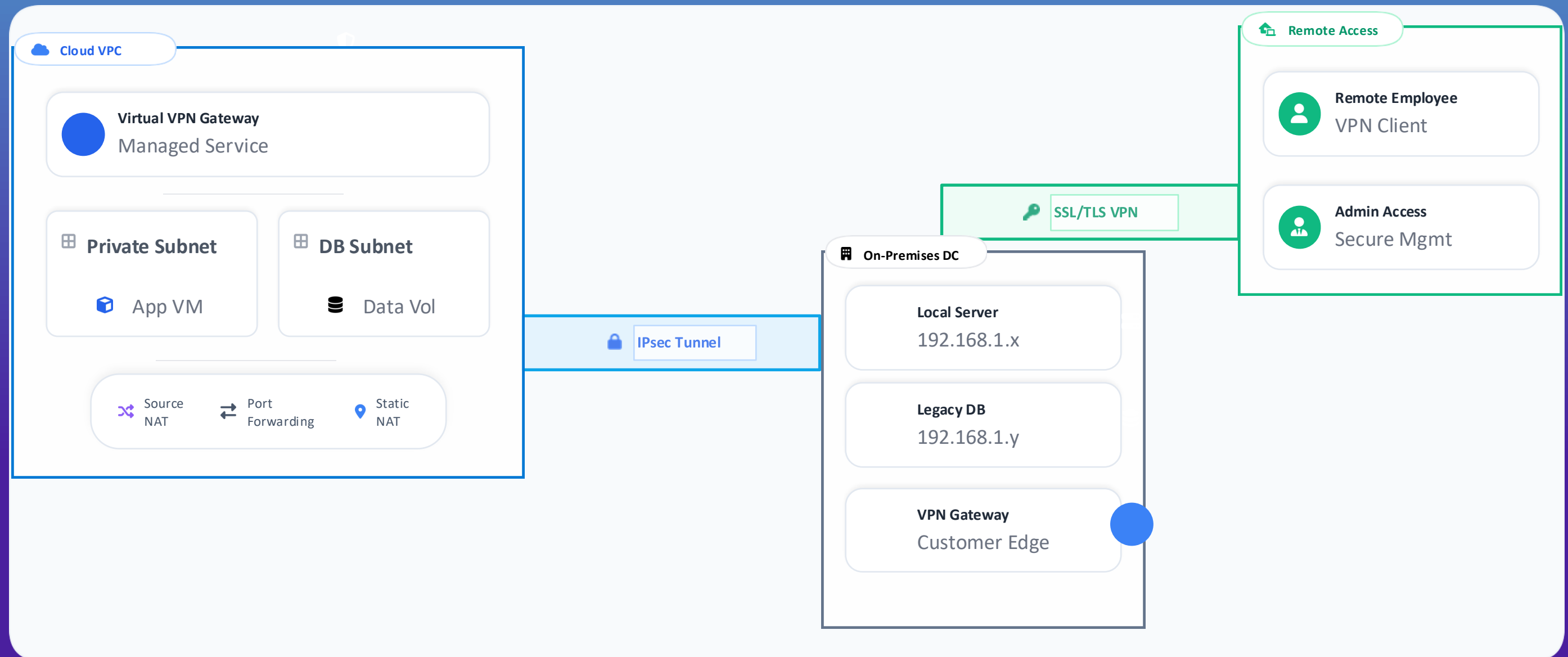
VPC Architecture (Multi-Tier)

Design isolated, secure network environments with granular control over subnets, routing, and access policies.



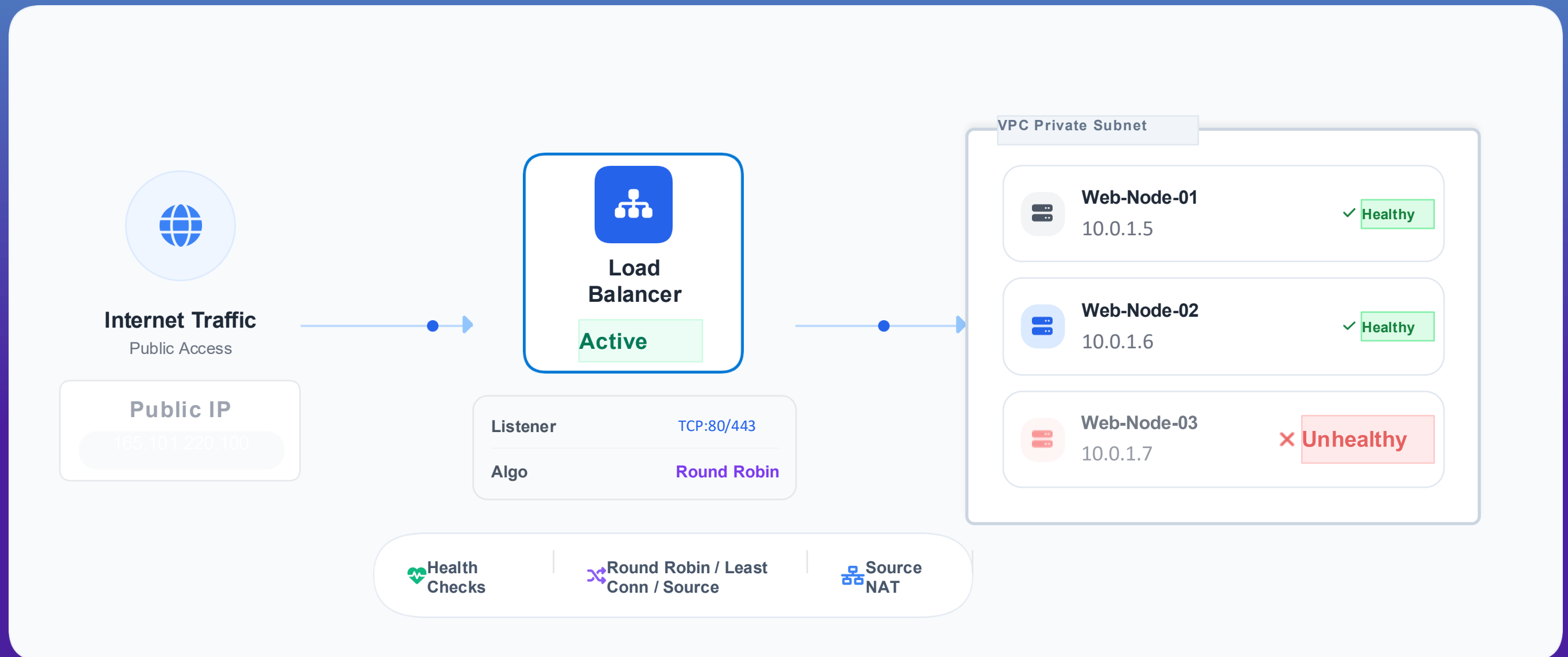
VPN & Hybrid Cloud Connectivity

Extend your on-premises network securely to Cloud with Site-to-Site VPN and enable remote workforce access.



Advanced Networking & Load Balancing

Distribute traffic efficiently across healthy instances with integrated Layer Load Balancing and robust network management.



Storage Features



CLOUD Storage provides persistent block-level storage resources that work just like AWS EBS, Azure Managed Disks, and Google Cloud Persistent Disks.

- Block-Level Storage**
Persistent storage volumes attached to compute instances like physical drives
- Hot-Plug & Detach**
Attach and detach storage volumes to instances without downtime
- Online Resizing**
Expand storage capacity without stopping instances or disrupting operations
- Instant Snapshots**
Point-in-time copies for backup, recovery, and volume cloning

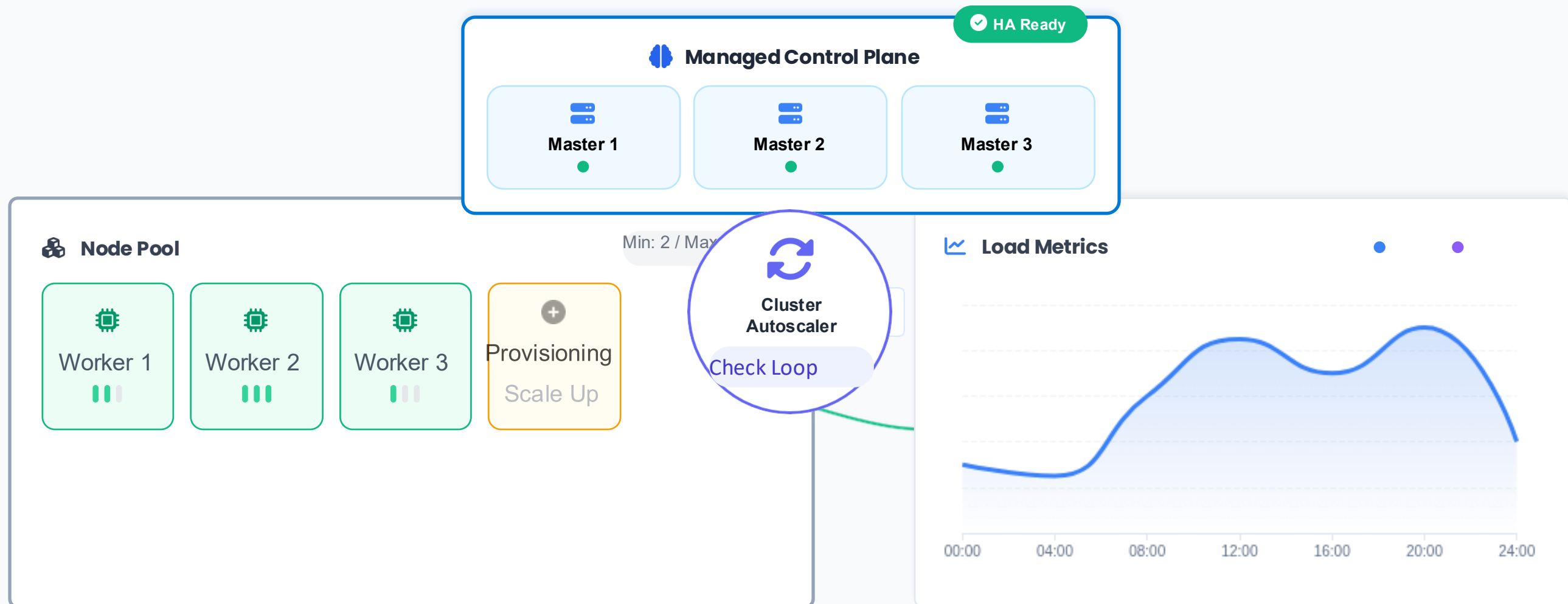
Kubernetes Features

- ◆ Deploy and manage containerized workloads through the integrated Kubernetes Service (KS)
- ◆ Zero-management master nodes
- ◆ Dynamically adjust cluster size based on real-time resource demand to optimize performance
- ◆ Multi-Master control planes and automated node recovery ensure your applications remain online during failures.



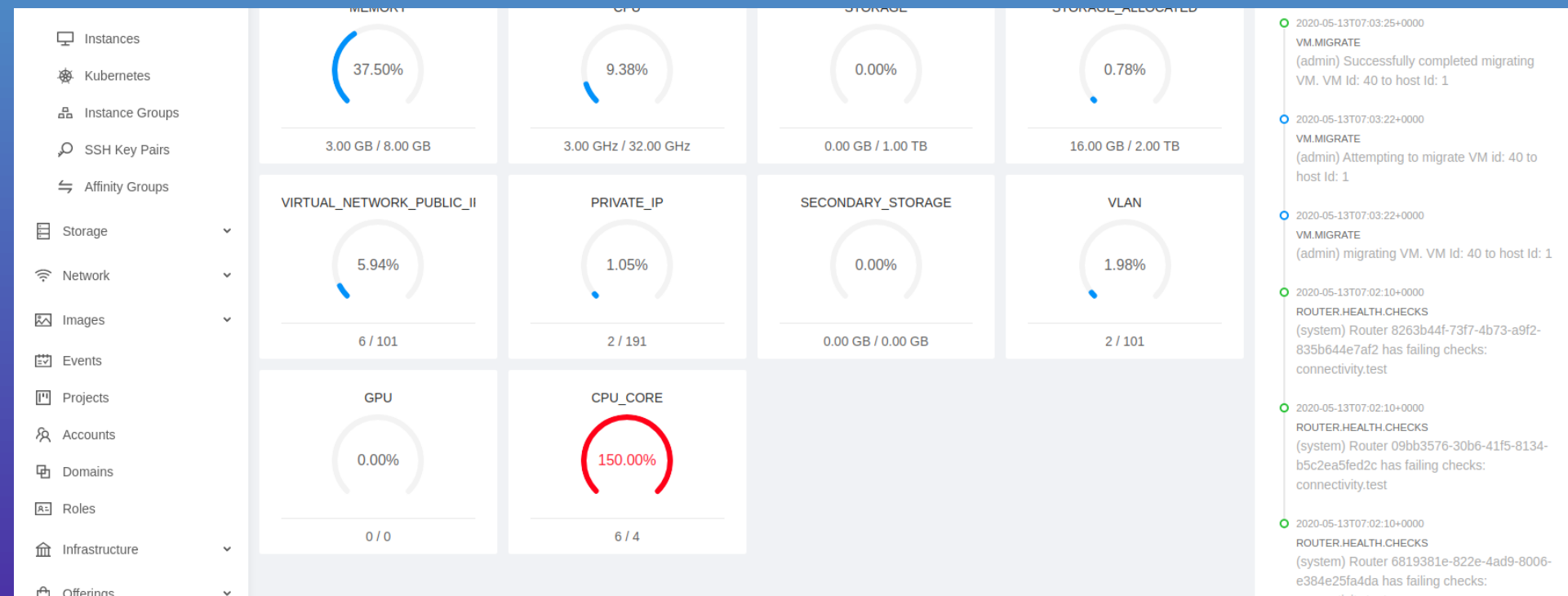
Auto-Scaling & High Availability

Ensure application uptime with redundant control planes and dynamic worker node scaling based on real-time demand.



Graphical User Interface (GUI) & API

- ◆ Web-based admin UI for provisioning & cloud management
- ◆ Self-service UI for end users
- ◆ Manage VMs, templates, and resources easily
- ◆ Customizable UI for enterprise or service provider branding
- ◆ Provides a REST-like API for the operation, management and use of the cloud





Any Question

Thank You



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