

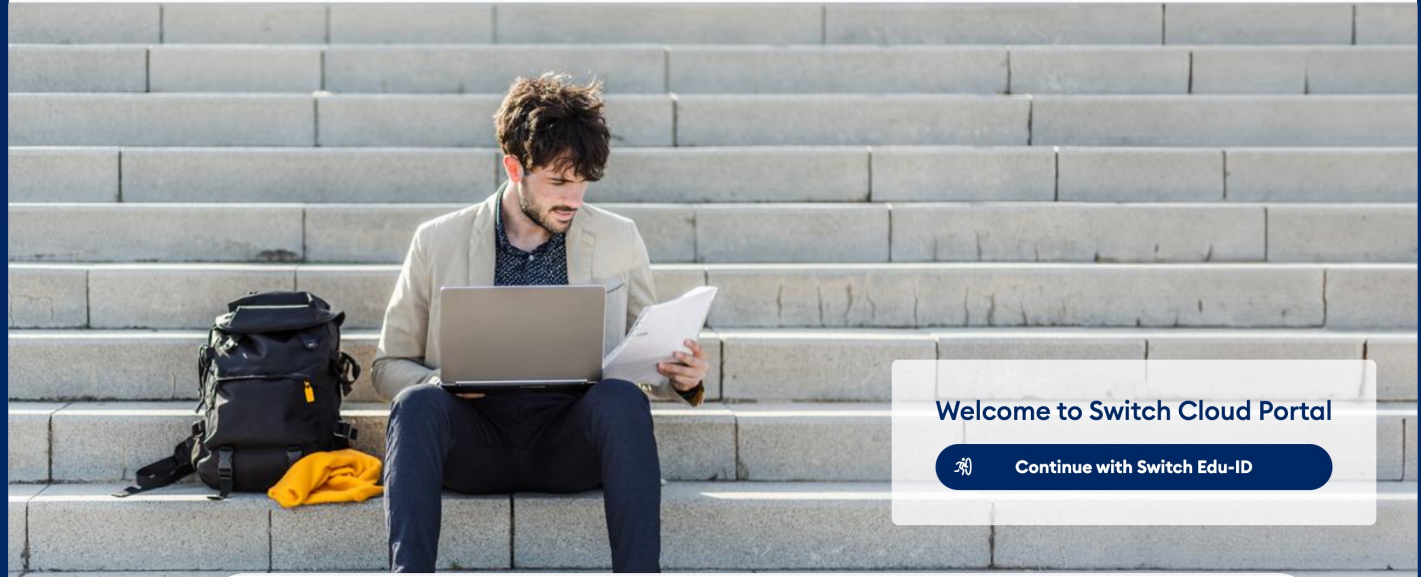
# Switch

# Switch Cloud

Empowering Education, Research, and Innovation

Visho Jesudasan, hpc-ch Forum, 23.05.2024

Switch Cloud



Welcome to Switch Cloud Portal



Continue with Switch Edu-ID

Switch Cloud

PRTL

PRTL > E2E Tests > Swich Cloud Compute

- Service groups
- Audit Logs
- Manage organisation

## Swich Cloud Compute

Edit Delete

Instance type	OpenStack Project
Status	Active
Updated at	Less than a minute ago
Created at	About 2 months ago
Description	-

### Members

Name	Joined at
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*“Provide a secure and cost-efficient cloud platform fully controlled by Switch to the Swiss academic institutions that fuels innovation and research excellence.”* switch foundation council

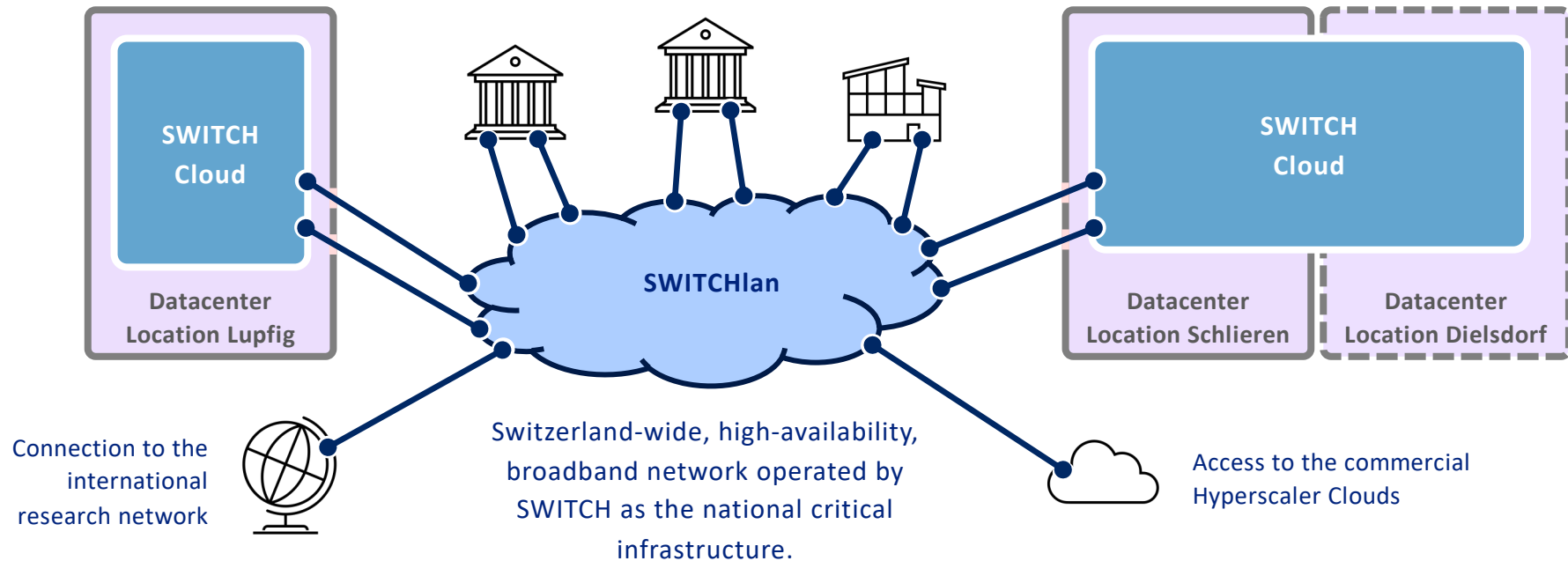
## “What do we need?”

- High availability
- Minimum two locations
- BCM and ISO 27001 certification
- Physical protection
- Power
- Capacity
- Cooling
- Trusted partner



## We are happy to work with Green

The SWITCH Cloud has two individual regions and is located in two of Green Datacenter AG's centers in Lupfig and Schlieren. At both locations, the SWITCH Cloud is redundantly connected to the National Education and Research Network operated by SWITCH. This means that all universities and research institutes in Switzerland have direct end-to-end access to the SWITCH Cloud, controlled by SWITCH, at no additional cost.





## Role model in terms of sustainability

Reduction of energy demand by outsourcing to energy-efficient infrastructure

The outsourcing of data centres and server rooms of universities and research institutes to the SWITCH Cloud, leads to an overall decrease in electricity consumption and thus an improvement in energy efficiency.

*See Study: "Rechenzentren in der Schweiz – Stromverbrauch und Effizienzpotenzial, Bundesamt für Energie, EnergieSchweiz, 2021"*

Green Datacenter AG's energy efficiency programs are managed under ISO 50001 and are certified according to internationally valid standards.

Green was awarded the federal Watt d'Or for his efforts.

## Main Challenges:

**Challenge:** With increasing cyber threats and stringent data protection laws, ensuring the security and privacy of sensitive data remains a top concern.

**Challenge:** Cloud costs can escalate quickly without proper management tools and clear pricing models, leading to budget overruns.

**Challenge:** Institutions often struggle with predicting their needs for computing resources, leading to either resource shortages or wasteful over-provisioning.

## Governance & Security

The concept of sovereignty in the context of Cloud implies that the data and computing resources hosted on the sovereign cloud are subject to the laws, regulations, and policies of the governing authority – in this case Switch as your foundation has the full governance of Switch Cloud

- **Data Sovereignty and Compliance:** Switch Cloud's adherence to Swiss data protection laws offers a significant advantage for local universities and research centers concerned about data privacy and sovereignty.
- **The governance structure of SWITCH ensures that the foundation always acts in the interest of its beneficiaries, namely the universities and research institutions of Switzerland.**
- **Operated in an ISO-certified environment and with ISO-certified partner**
- **Planned ISO-27001 certification for whole cloud offering**

# Governance & Security

**Security in every level – from physical security in the DC to service Mesh**

## **Switch SOC and Switch CERT**

- Switch Cloud is monitored by Switch SOC and in case of security Incident Switch CERT will be involved

## **Data in transport**

- Network access controls (security groups, VPC) that you control
- Encryption on the wire – TLS, Ipsec, MACsec, SCION

## **Data at rest**

- Use HashiCorp Vault to manage your Keys
- Encryption Block storage and S3 Storage

## **Data in use – confidential computing**

- Prevent unauthorized remote memory reads
- Prevent unauthorized access to CPU in use



## Transparency and plannability as the basis for the pricing model

### Cost transparency

The calculation of the costs for the individual services is transparent and does not contain any hidden margins.

### Cost stability

The costs charged for the services of Switch Cloud are stable in the long term, as they are controlled as tariffs by the Board of Trustees. This means that multi-year contracts can also be offered if required.

### Free data connection

A relevant cost aspect of cloud computing is the data transfer between the cloud and the users. These costs do not apply at all with Switch Cloud, because the connection is ensured exclusively via the research and education network operated by Switch

# Pricing Models



Pay as You Go



Reserved  
Instances



Switch Cloud  
Credits\*

# Scalability & Flexibility

## Elastic and On-Demand Cloud Resource Management

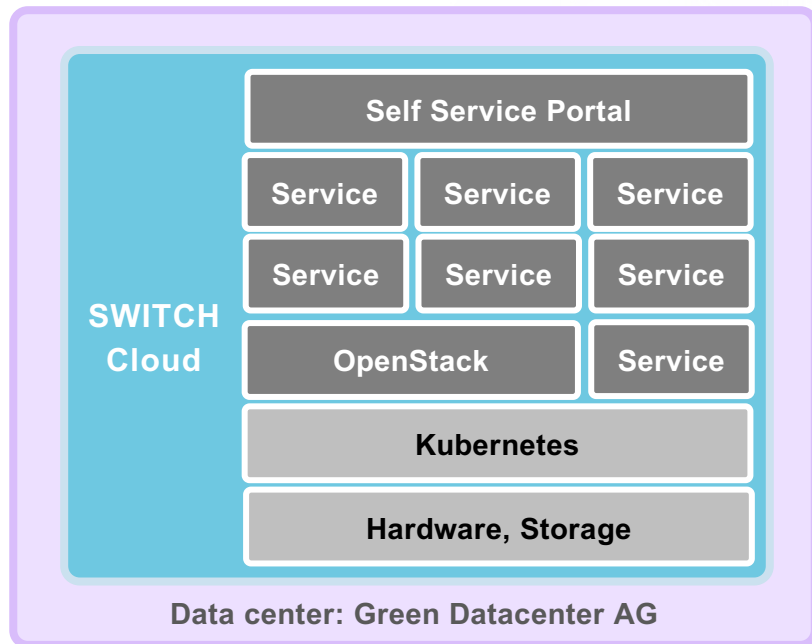
### Scalability

Resources can be elastically provisioned and released to scale rapidly with demand. For users, the resources available for provisioning often appear to be unlimited and can be purchased in any quantity at any time. This elasticity ensures that applications can handle varying loads and traffic spikes efficiently without manual intervention.

### Switch Cloud Portal & Self-service first

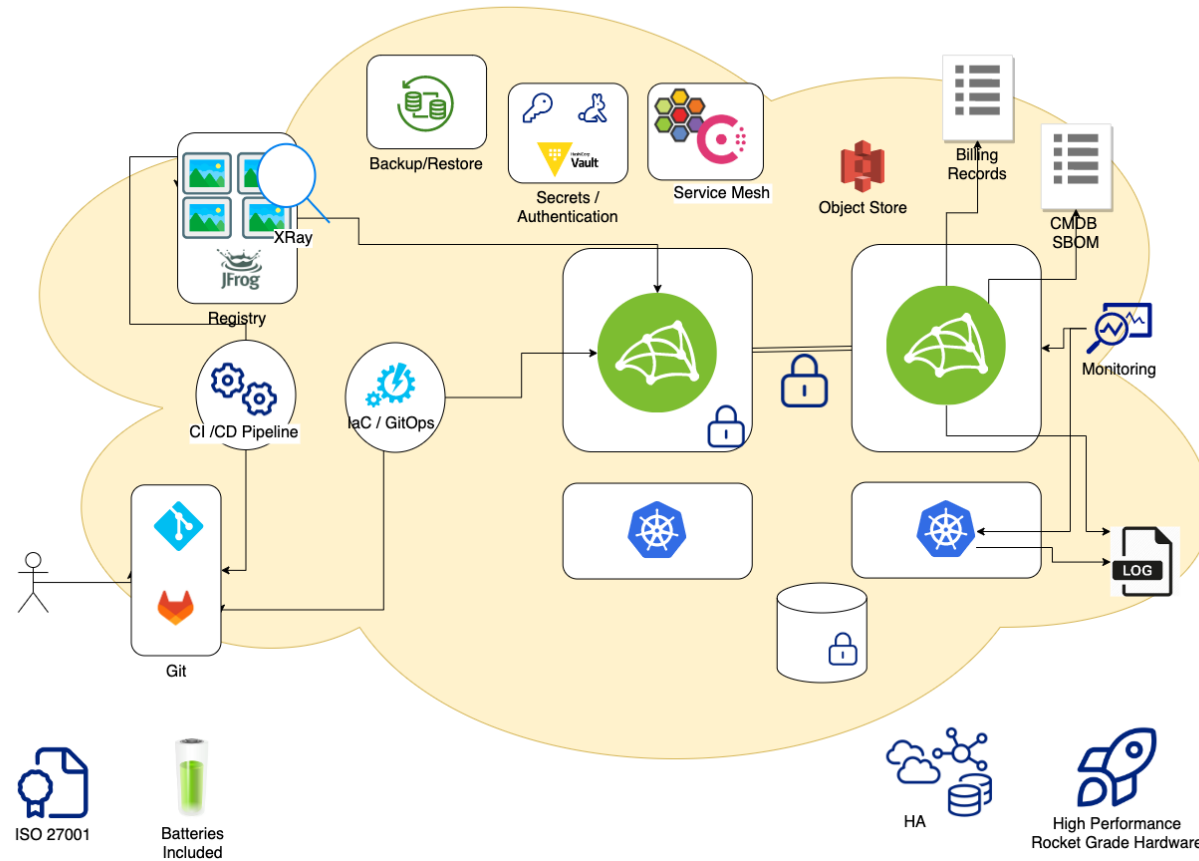
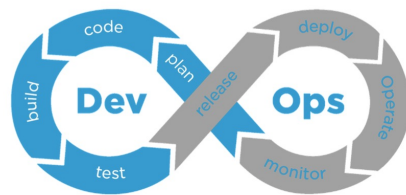
This allows users to access and manage computing resources directly through the Switch Cloud portal or API. It empowers users to quickly obtain the necessary resources without waiting for Cloud provider approval or manual setup, enhancing speed and convenience.

# Switch Cloud



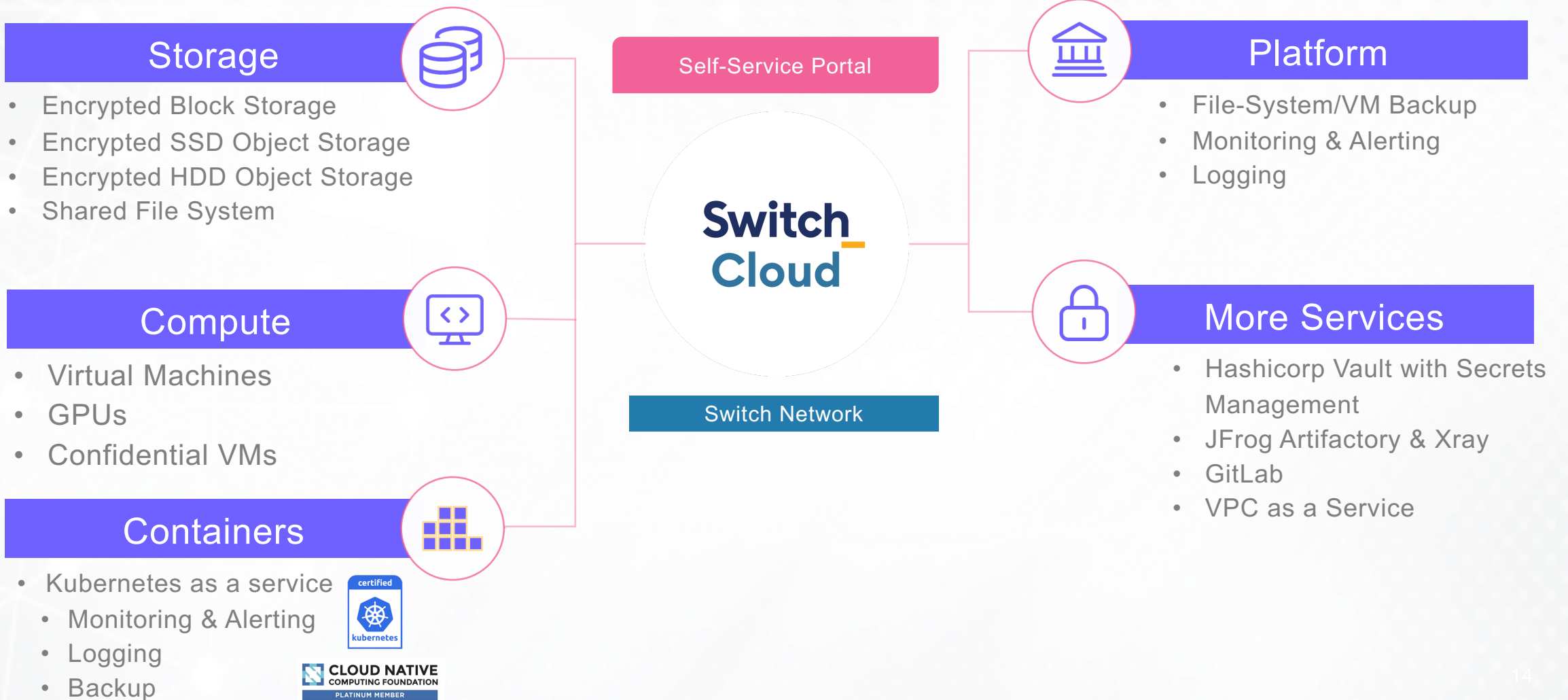
The SWITCH Cloud consists of various software and hardware components. The architecture follows the latest best practices for cloud infrastructure. The entire infrastructure is self-contained and operated autonomously.

# Automation & GitOps Architecture



# Portfolio Vision

A portfolio of complementary services is being developed on the Switch Cloud infrastructure.



# Switch Cloud Compute

Switch Cloud Compute is a secure and customizable compute service that lets you create and run virtual machines using OpenStack infrastructure. It offers a wide range of features, including Self-Service Capabilities, Physical GPU Provisioning, VM Resizing, Disk encryption, and more.

- AMD EPYC™ 9004 Series, DDR5
- SSD NVMe high-performance storage with encryption made for the modern enterprise
- In-Region Load Balancer
- Disk encryption at rest
- Infrastructure as Code (IaaS) support
- Self-service Capabilities
- Software-Defined Networking (SDN)
- Dual-Stack IPv4, IPv6
- Disk snapshots
- Affinity/Anti-Affinity Rules
- VM Shelving
- VM resizing (scale up/down)
- Network policies (security groups)
- VM Cloning

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- Physical GPU Provisioning (GA 2)
- Global Load Balancing (GA 2)
- Support Windows Operating Systems (GA 2)
- Per Volume Disk Encryption at Rest (GA 3)
- Support Windows with Secure Boot (GA 3)

Next

# Switch Cloud S3 Object Storage

Switch Cloud S3 Object Storage, based on the Ceph storage system, provides a scalable, secure, and reliable object storage solution that supports the S3 API. It is designed to store and manage large volumes of unstructured data, such as VM images, backups, and archival data. This service will be accessible via the Switch Cloud Portal, offering a user-friendly interface for managing storage resources.

- S3 API Compatibility
- Scalable SSD Storage
- Data Encryption at Rest
- Data Encryption in Transit
- User-Friendly Management Interface
- Access Management and Security
- Data Lifecycle Management
- Storage Analytics and Insights
- Object Lock

June 2024

- Batch Operations
- Event Notifications
- Bring-Your-Own-Key (BYOK) Data Encryption
- Cross-Zone Replication

Next



# Switch Cloud Kubernetes

Quickly achieve cloud native transformation without the burden of infrastructure management. Switch Cloud Kubernetes provides advanced features to help you operationalize your cloud resources at scale in the most cost-efficient way possible

- A self service portal to operate and monitor clusters with an intuitive user interface
- Keep data safe & secure with secure and reliable architecture
- Integrated Backup, Logging and Monitoring Features
- Create clusters in just a few clicks
- Upgrade your control plane and nodes without disruption and roll back as you need
- Automatically scale up or down with the Kubernetes cluster Auto-scaler
- 100% Vanilla Kubernetes compliant
- Automatic roll out and roll back of upgrades
- Open Policy Agent (OPA) with Gatekeeper
- Use Cilium CNI or bring your own
- Dual Stack Support – IPv4 and IPv6

Summer 2024



# Switch Cloud GPU Offering

## High demand for VMs with GPU

- First Priority on GPU PCI Passthrough
- Switch Cloud GPU Service ready by Q4 this year
- Expanding to new DC in Dübendorf
- Preparation for PoC ongoing

Next steps in planning with run:ai and nvidia



# Switch

