HyperSDK

AWS, Azure & GCP Migration

Export and migrate virtual machines from the three major public clouds using HyperSDK's unified provider interface — with native SDK integration, format conversion, and cost optimization.

AWS EC2 — Azure VMs — GCP Compute Engine — Unified VMInfo

AWS EC2 Export

Export EC2 instances as VMDK or VHD using AWS VM Import/Export with S3 staging.

AMI to VMDK/VHD

HyperSDK creates an export task via the EC2 VM Import/Export API. The instance is captured as an AMI, then exported to your S3 bucket in VMDK, VHD, or RAW format.

S3 Staging

Exported disk images land in a configurable S3 bucket and prefix. HyperSDK handles bucket policy validation, multipart downloads, and automatic cleanup of staging artifacts.

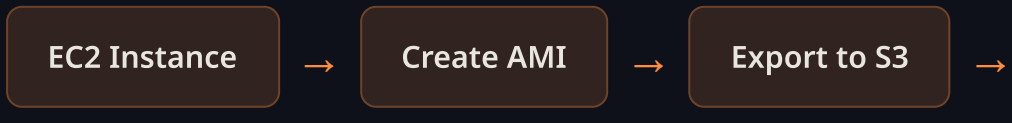
IAM Roles & Permissions

Supports IAM user credentials, assumed roles, and instance profiles. Requires ec2:CreateInstanceExportTask, s3:PutObject, and s3:GetObject permissions — HyperSDK validates before starting.

Export Monitoring

Polls export task status with configurable intervals. Real-time progress percentage, status messages, and estimated completion time surfaced via the job system.

AWS Export Flow




Download VMDK
→
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Azure VM Export

Export Azure VMs by generating SAS URLs for managed disk downloads from Blob Storage.

Managed Disk to VHD

Azure managed disks are exported as VHD files via temporary SAS (Shared Access Signature) URLs. HyperSDK deallocates the VM, generates the SAS URL, and streams the download.

Blob Storage

For unmanaged disks, HyperSDK reads directly from the page blob in Azure Blob Storage. Supports both classic and ARM deployment models.

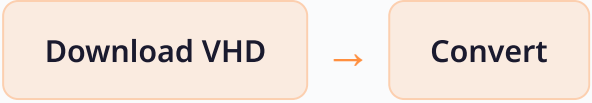
Service Principal Auth

Authenticates via Azure Service Principal (client ID + secret + tenant), managed identity, or Azure CLI credentials. Supports sovereign clouds (Gov, China, Germany).

Resource Metadata

Captures VM size, OS type, data disks, NICs, NSGs, tags, and availability zone. Maps Azure VM sizes to equivalent CPU/memory for target hypervisor configuration.

Azure Export Flow


Download VHD
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GCP Compute Export

Export Google Compute Engine instances via GCS-based image export with service account authentication.

Instance to VMDK

HyperSDK creates a GCE image from the instance's persistent disk, then exports to a GCS bucket in VMDK or RAW format using the Cloud Build-based image export workflow.

GCS Staging

Exported images land in a configurable GCS bucket. HyperSDK handles signed URL generation for download, with automatic lifecycle policies for staging cleanup.

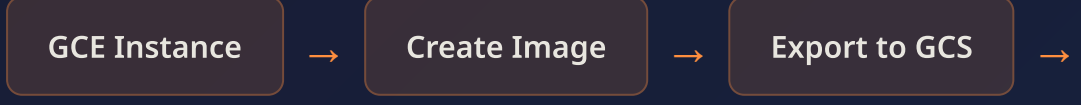
Service Account Auth

Supports service account JSON key files, workload identity, and application default credentials. Requires compute.images.export and storage.objects.create permissions.

Image Export Tracking

Monitors the Cloud Build export job with real-time log streaming. Progress, status, and error details are surfaced through HyperSDK's unified job system.

GCP Export Flow




Download VMDK
→
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Multi-Cloud Discovery

Unified VMInfo interface across all providers with consistent metadata mapping.

Unified VMInfo Interface

Every provider maps its native VM representation to HyperSDK's canonical VMInfo struct. Name, ID, state, CPU, memory, disks, and network — normalized regardless of source cloud.

toVMInfo Helpers

Each provider implements a toVMInfo() function that translates cloud-specific metadata (AWS tags, Azure resource IDs, GCP labels) into the common domain type.

Consistent Metadata

Tags, labels, and custom attributes are normalized into a unified map[string]string. OS family detection works across all providers for migration planning.

Cross-Cloud Inventory

Discover VMs across AWS, Azure, and GCP in a single API call. Results include provider type, region, and account/subscription/project for complete multi-cloud visibility.

Field	AWS	Azure	GCP
VM ID	Instance ID	Resource ID	Instance Name
State	running/stopped	PowerState/running	RUNNING/TERMINATED
CPU/Memory	Instance Type lookup	VM Size lookup	Machine Type lookup

Disks	EBS Volumes	Managed Disks	Persistent Disks
Tags	EC2 Tags	Azure Tags	GCP Labels

Format Conversion

Native Go disk format converters with zero external dependency on qemu-img.

🔄

Native Go Converters

Pure Go implementations for VMDK, QCOW2, VHD, VHDX, and RAW format reading and writing. No need to install qemu-img or any external binary on the migration host.

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VMDK to QCOW2

Direct VMDK-to-QCOW2 conversion optimized for sparse images. Preserves thin provisioning, supports compression, and handles all VMDK descriptor types (monolithic, split, stream-optimized).

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VHD/VHDX Support

Convert to/from Microsoft VHD (fixed and dynamic) and VHDX (with log replay). Essential for Hyper-V interop and Azure managed disk compatibility.

⚡

RAW Format

Flat RAW image support for maximum compatibility. Useful for direct dd-style writes to block devices or for providers that require unstructured disk images.

Source	Target	Method	Compression
VMDK	QCOW2	Native Go	Yes
VMDK	VHD	Native Go	No
VMDK	VHDX	Native Go	Yes

VMDK	RAW	Native Go	**N/A**
VHD	QCOW2	Native Go	**Yes**
QCOW2	RAW	Native Go	**N/A**

Cost Comparison

Cloud storage pricing for staging exported VM disk images.

Service	Storage (per GB/month)	Egress (per GB)	API Calls (per 10K)	Free Tier
AWS S3 Standard	$0.023	$0.09	$0.005 (GET)	5 GB / 12 months
Azure Blob Hot	$0.018	$0.087	$0.004 (Read)	5 GB / 12 months
GCS Standard	$0.020	$0.12	$0.004 (GET)	5 GB / 12 months
AWS S3 Infrequent	$0.0125	$0.09	$0.01 (GET)	N/A
Azure Blob Cool	$0.01	$0.087	$0.01 (Read)	N/A
GCS Nearline	$0.01	$0.12	$0.01 (GET)	N/A

Cost Optimization Tips

Use Infrequent/Cool Tiers

Staging buckets only hold images temporarily during migration. Use IA/Cool tiers with lifecycle policies to auto-delete after 7-14 days.

Same-Region Transfer

Keep your migration host in the same region as the source VMs. Intra-region data transfer is free on all three clouds — only cross-region/internet egress is charged.

Compress Before Upload

QCOW2 compression and sparse image handling can reduce disk image sizes by 40-70%, directly cutting storage and egress costs.

HyperSDK Cost Estimator

Built-in cost estimation API calculates expected storage, egress, and API costs before starting a migration. No surprises on the cloud bill.

Best Practices

Recommendations for secure, efficient, and reliable public cloud migrations.

Credentials Management

Never hardcode cloud credentials. Use IAM roles (AWS), managed identity (Azure), or workload identity (GCP). For development, use the cloud CLI's cached credentials. HyperSDK's secret manager integrates with HashiCorp Vault.

Network Bandwidth

Plan for bandwidth: a 500 GB VM takes ~11 hours at 100 Mbps. Use AWS Direct Connect, Azure ExpressRoute, or GCP Interconnect for dedicated bandwidth on large migrations.

Parallel Exports

Run multiple VM exports concurrently with HyperSDK's job system. Each export runs in its own goroutine with independent progress tracking and error handling.

Validation Checklist

Verify disk integrity (checksums), confirm OS boots, validate network connectivity, check application health. HyperSDK generates a post-migration validation report.

Migration Phases

1. **Discovery & Assessment**
   Inventory all VMs, estimate costs, identify dependencies, plan migration waves.
2. **Pilot Migration**

Migrate 2-3 non-critical VMs end-to-end. Validate the process, measure timing, refine procedures.

3

Batch Migration

Run parallel exports in waves of 10-50 VMs. Use HyperSDK's schedule system for off-hours execution.

4

Cutover & Decommission

Switch DNS/load balancers, verify production traffic, then decommission source cloud resources.

Migrate from Any Cloud with Confidence

HyperSDK's unified provider interface means the same workflow works for AWS, Azure, and GCP. Write once, migrate from anywhere.