Multi-Cloud Migration

with HyperSDK

Discover, export, convert, and deploy virtual machines across 10 cloud providers — with a unified workflow, batch scheduling, and format conversion.

10 Providers — 7 Disk Formats — Carbon-Aware Scheduling

Supported Migration Paths

Every major hypervisor and cloud platform as a source.

vSphere / ESXi to KVM

Export via OVF/OVA with CBT incremental support. Convert VMDK to qcow2. Auto-detect guest OS. Deploy to libvirt or KubeVirt.

AWS EC2 to KVM

Discover EC2 instances across regions. Export AMIs via EBS snapshots. Convert to qcow2 with metadata preservation.

Azure VMs to KVM

Export managed disks as VHD. Convert VHD/VHDX to qcow2. Preserve network configuration and resource tags.

GCP Compute to KVM

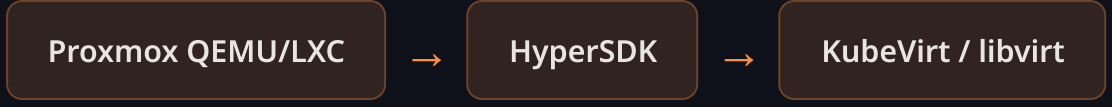
Export persistent disks from Compute Engine. Support for custom machine types and multi-disk VMs.

Hyper-V to KVM

WMI-based discovery. VHD/VHDX export with generation 1 and 2 support. Automatic driver injection for Linux guests.

OCI / OpenStack / Alibaba

Full discovery and export support for Oracle Cloud, OpenStack Nova, and Alibaba ECS instances with native API integration.


Proxmox QEMU/LXC
HyperSDK
KubeVirt / libvirt

Migration Workflow

Four-stage pipeline from discovery to deployment.

1

Discover

Connect to any of the 10 supported providers. ListVMs returns normalized domain.VMInfo with CPU, memory, disk, power state, OS, and tags. Filter and select targets via CLI, API, or dashboard.

2

Export

ExportVM triggers provider-native export: OVF for vSphere, EBS snapshot for AWS, managed disk download for Azure. Progress tracked via WebSocket with real-time percentage updates.

3

Convert

Automatic format conversion: VMDK, VHD, VHDX, RAW to qcow2. Disk compression and optimization. Multi-disk VMs handled with correct boot order preservation.

4

Deploy

Generate libvirt domain XML or KubeVirt VirtualMachine YAML. Register with virsh or kubectl apply. Export manifest written with full metadata for audit and rollback.

5-30
Minutes Per VM
(Typical Migration)

95%
Faster with CBT
Incremental Export

0
Manual Steps
for Standard Guests

Format Support

Comprehensive disk image format handling.

Format	Read	Write	Source Providers	Notes
OVF	✓	✓	vSphere	Open Virtualization Format with manifest
OVA	✓	✓	vSphere	Tar-packed OVF with embedded disks
VMDK	✓	-	vSphere, ESXi	Flat and sparse variants supported
QCOW2	✓	✓	Proxmox, OpenStack	Default output format, compressed
VHD	✓	-	Azure, Hyper-V	Fixed and dynamic variants
VHDX	✓	-	Azure, Hyper-V	Generation 2 Hyper-V format
RAW	✓	✓	All providers	Maximum I/O performance, no overhead

Automatic Detection

HyperSDK auto-detects source format from file headers and provider metadata. No manual format specification needed.

Export Manifests

Every export generates a JSON manifest with checksums, source metadata, conversion details, and timing — for audit trails and reproducibility.

Batch Migration & Scheduling

Scale from single VM to datacenter-wide migrations.

Cron Scheduling

Schedule migrations using standard cron expressions. Off-hours batch processing. Carbon-aware window selection for lowest emissions.

Job Dependencies

Define migration order with dependency chains. VM-B waits for VM-A. Database before app server. Full DAG support.

Retry Policies

Configurable retry with exponential backoff (CalculateBackoff). Per-job retry limits. Failed jobs don't block the queue.

Progress Tracking

Real-time progress via WebSocket. Per-VM status: pending, running, completed, failed. Dashboard and CLI monitoring.

Example: Batch Migration YAML

```
jobs:
  - name: "migrate-web-tier"
    provider: vsphere
    vms: ["web-01", "web-02", "web-03"]
    format: qcow2
    schedule: "0 2 * * SAT"    # 2 AM Saturday
    carbon_aware: true
    retry_policy:
      max_attempts: 3
      backoff: exponential

  - name: "migrate-db-tier"
```

```
provider: vsphere
vms: ["db-master", "db-replica"]
depends_on: ["migrate-web-tier"]
format: qcow2
```

Integration Ecosystem

HyperSDK connects with your existing infrastructure.

hyper2kvm Pipeline

Seamless integration with hyper2kvm for end-to-end VM migration: export with HyperSDK, convert and deploy with hyper2kvm's guest fixup pipeline.

libvirt / virsh

Generate libvirt domain XML with correct device mappings. Direct virsh registration. Support for networks, storage pools, and NUMA.

KubeVirt

Generate KubeVirt VirtualMachine YAML. PVC-backed disk storage. Live migration support. OpenShift Virtualization compatible.

Webhooks

Event-driven notifications on job state changes. Integrate with Slack, PagerDuty, or custom systems via webhook payloads.

Metrics & Telemetry

Prometheus-compatible metrics endpoint. Grafana dashboards for migration throughput, error rates, and provider health.

CI/CD & GitOps

REST API enables integration with Jenkins, GitHub Actions, ArgoCD. Infrastructure-as-code migration workflows.

One SDK, Every Cloud

HyperSDK replaces 10 provider-specific tools with a single unified platform.
Discover, export, convert, and deploy — across any cloud, any format, any target.

github.com/ssahani/hypersdk