



ASTRA: Intelligent Multi-Cloud Storage

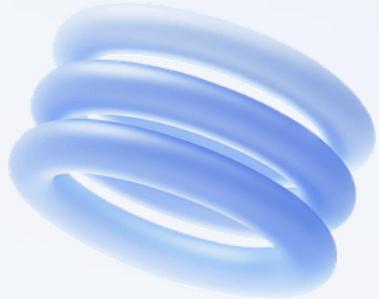
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2025/08/05



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The Challenge & Vision

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The Cloud Storage Crisis

Organizations drown in petabytes scattered across clouds, with **60-70%** of objects in over-priced tiers. The result is runaway spend, risky manual moves, and compliance gaps.



Runaway Spend

Millions wasted on hot storage for cold data.



Risky Manual Moves

Complex, error-prone migrations create downtime.



Compliance Gaps

Fragmented policies lead to audit failures.

The ASTRA Solution

ASTRA delivers autonomous, policy-driven orchestration to eliminate storage woes. It transforms cloud storage into a portable, intelligent utility.



ML-Driven Auto-Tiering



Zero-Downtime Migration



Unified Cost Analytics



40-60%
Cost Cut





Architecture Deep Dive

02



System Architecture: A Unified Orchestration Layer

Web Dashboard (Flask)
Interactive UI + Real-time Analytics

Core Engine Layer
Tiering Engine & Migration Manager

Cloud Abstraction Layer (S3Manager)

AWS S3

GCP Storage

Azure Blob

Component Deep Dive

S3Manager

Unified API for authentication, bucket management, and object operations. Handles tier mapping across providers.

Tiering Engine

Analyzes access patterns (frequency, recency) and calculates cost-benefit for intelligent tier transitions.

Migration Manager

Manages parallel, chunked transfers with integrity verification (checksums) and rollback capabilities.

Web Dashboard

Provides a single pane of glass for visualization, drag-and-drop migration, and cost analytics.



Intelligent Data Logic

03



Auto-Tiering Decision Engine

The engine continuously evaluates objects based on file type, age, and access frequency to propose the most cost-effective storage class.

Hot Data
Active customer transactions
STANDARD
\$0.023/GB



Warm Data
Monthly accessed backups
STANDARD_IA
\$0.0125/GB (46% savings)



Cold Data
Logs untouched for 90+ days
GLACIER
\$0.004/GB (82% savings)

Seamless Cross-Cloud Migration Flow



1. Pre-Migration

Validate source, destination, and bandwidth.



2. Chunked Transfer

Stream in 5MB chunks with parallel uploads.



3. Verification

Checksum and size validation for integrity.



4. Cleanup

Optional source deletion and metadata update.



Performance & Savings

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Benchmarks: ASTRA vs. Legacy Methods

Traditional Download-Upload

- ✗ 3x latency: 8 min for 1GB file
- ✗ OOM errors on large files (10GB+)
- ✗ Single point of failure
- ✗ High memory footprint (full file size)

ASTRA Streaming

- ✓ 2.7x faster: 3 min for 1GB file
- ✓ Constant memory (5MB chunks)
- ✓ 99.7% success rate with auto-retry
- ✓ Achieves 125 MB/s transfer speed

The Business Impact

For a typical enterprise with 500TB of data,
ASTRA delivers significant, quantifiable value.

Annual Savings
\$145,000

Payback Period
4.1 Months





Roadmap & Differentiators

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Innovation Roadmap: A Vision for the Future

Phase 1 (6-12 Mo.)

ML Integration & Enhanced UX

- LSTM Predictive Tiering
- Delta Sync & Bandwidth Throttling
- Slack/Email Alerts

Phase 2 (1-2 Yrs.)

Multi-Region & Governance

- Global Replication & Edge Caching
- GDPR/HIPAA Automation
- API Marketplace & SDKs

Phase 3 (2-5 Yrs.)

Autonomous Storage

- AI-Driven Self-Optimization
- Blockchain Audit Trails
- Quantum-Safe Encryption

The ASTRA Advantage: Why We're Different

Feature	ASTRA	AWS Native	Other Competitors
Multi-Cloud Support	Full AWS/GCP/Azure	AWS Only	Limited
Custom Tiering Rules	Fully Customizable	Fixed Algorithm	Basic Rules
Migration Automation	Drag-and-Drop	Manual	CLI Only
Cost Transparency	Real-time Dashboard	Delayed Billing	Monthly Reports



Go-to-Market & Next Steps

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Deployment Strategy

A staged rollout ensures smooth adoption and minimizes disruption, targeting 30% savings within 90 days.

- 1 **Pilot:** Deploy in a sandbox with 10TB of test data.
- 2 **Staged Rollout:** Migrate non-critical workloads and monitor.
- 3 **Full Production:** Enable automation and CI/CD integration.

Risk Mitigation

Data Loss

Mitigation: Checksums, rollback, and backup retention.

API Limits

Mitigation: Exponential backoff and request queuing.

Cost Overruns

Mitigation: Real-time budget alerts and spending caps.

Ready to Revolutionize Your Cloud Storage?

Join the movement towards autonomous, multi-cloud storage that is cheaper, safer, and infinitely scalable.



Try the Demo

<https://github.com/AnshNohria/Astra>



THANK YOU FOR READING!

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