

Black.ai

Maximizing Margins and Performance for AI/ML Processing



\$250K

Azure Credits Quickly Burned

Situation

Black.ai, an Australian artificial intelligence/machine learning (Al/ML) company, developed powerful Al technology that renders movements and events captured on camera as searchable by consuming and analyzing massive amounts of video data. They were in need of readily available, reliable object storage to keep up with demanding video processing while keeping their infrastructure costs low at scale.

1000s

of Files Processed Simultaneously

Solution

Black.ai chose Backblaze B2 Cloud Storage along with compute provider, Vultr, to store and process client video footage and databases to support their AI/ML data analysis for a few reasons. They sought a company that specialized in storage rather than a diversified provider trying to be all things to all customers, and they prioritized a simple interface, affordability, scalability, and performance.

100%

Result

Automated Video Analysis From a budgetary perspective, Backblaze B2 improved margins versus other providers, freeing up resources to invest back into their product. Beyond that, it gave them the ability to build a specialized stack using providers like Backblaze B2 and Vultr that are laser-focused on delivering best-of-breed services.

black.ai

Black.ai is a cutting-edge artificial intelligence/ machine (AI/ML) learning company based in Australia. Using their customers' existing IP camera hardware and their Computer Vision software, they can track people's journeys within live spaces such as retail stores to analyze patterns and behavior, helping to create instant insight and inform better decisions using AI and ML. Black.ai uses a combination of Backblaze B2 with Vultr to support their AI/ML analysis using SQLite databases on a scalable backbone of cloud storage.



Backblaze Helps Make Human Activity Searchable for Smarter Automation

As Sebastien Collier, CTO of Black.ai, points out; we are not yet living in the "future" we have heard about for so long, with flying cars and robots that sense and adapt to their environment. However, with its artificial intelligence and machine learning software, Black.ai is trailblazing a path to a new future.

Black.ai's mission is "making human activity searchable," which means that they take customers' existing IP camera setups, add their own hardware, and consume hours of video footage identifying people and following them across live spaces to make their journey available to software or humans to better inform automated decisions. With applications in industries ranging from healthcare to warehousing, the first vertical to show real opportunity for the company was retail. In a large environment such as a shopping center or grocery store, Black.ai's AI/ML software could analyze footage of a space and determine predictable behaviors for hundreds of individuals at once.

Naturally, that massive volume of footage creates the need for a quick, efficient, and user-friendly way to store and access files. Black.ai's solution eliminates the need for security personnel to review hundreds of hours of footage, but it in turn creates a need for quickly searchable storage. When that need is met, their software examines massive amounts of video evaluating behaviors and boils down one person's journey into a few short frames for review.

For example, in a supermarket, instead of checking everyone's bags to avoid theft, Black.ai's software would identify specific individuals to bag check based on the persons' journey throughout the store, their actions, and by tracking particular points on their body that indicate suspicious activity.

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Sebastien Collier, CTO/Co-Founder, Black.ai

Black.ai's Early Years and Growing Pains

During Black.ai's first five years, the development team focused on building the tech out. Collier fondly recalls that he and the other two founders would be "Eating ramen noodles and hacking away at things." They had only a single hard drive in the office which presented multiple problems when it came to backing up and searching, not to mention the limits it put on growth. Space was a driving force behind their decision to move into cloud infrastructure.

When they started out, Black.ai had no infrastructure to speak of and couldn't envision what things would look like now. The company has grown from a single GPU when they first started, to running 30 GPUs for deep research and machine learning training.

Initially, they built their system on Microsoft Azure because they had \$250,000 in cloud credits. "We burned through those Azure credits quickly and realized we had to do something about it," Collier said. Black.ai felt blocked by Azure's limitations, complex interface, and lack of S3 compatibility. They wanted to explore coding using different tools that didn't work with Azure, and as Collier commented, "We were super locked in, which was not great."

Additionally, they had issues getting serverless functions to work and wasted a lot of valuable time trying to troubleshoot them. Generally, this would be accomplished using OpenFaaS, a framework for building serverless functions with Docker and Kubernetes. Instead of using OpenFaaS for serverless functions, however, Azure was handling these functions in their own way which was difficult and confusing.

To address some of the issues, they tried to migrate to several other solutions, but experienced data loss and poor performance. The solutions weren't reliable enough for their growing needs.

When it came time to switch, reliability and cost were two of the biggest priorities Black.ai needed from a new cloud storage partner. Other considerations include multi-region support, a way to mitigate egress fees, and S3 compatibility.



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Future Proofing With Backblaze B2 Cloud Storage

When Collier and his co-founders started Black.ai, they wanted to build out infrastructure that would serve the company long-term. Over the past two to three years, they started seriously considering how their solutions would scale. Cost-effective storage was one of the keys to a sustainable business model. Adopting Backblaze B2 Cloud Storage allowed them to achieve their futureproofing goals.

Collier discovered Backblaze by reading the quarterly Hard Drive Stats review. When Black.ai's growth forced them to consider a new cloud storage provider, he came across Backblaze and recalled, "Oh yeah, it's that company that publishes hard drive reports." Collier was attracted to Backblaze's specialization in storage. "There is a big advantage to working with someone who focuses on one thing and does it well," Collier commented. Backblaze's pricing also meant that storage didn't cut into margins.

Backblaze's close partnership with Vultr, a compute provider, enabled Black.ai to easily utilize compute resources without paying egress fees between the two services. Using Vultr to fetch and extract frames from files in Backblaze B2 gave them a far more costefficient way to deploy and scale containerized apps via their Kubernetes service.

The Technical Nuts & Bolts of Black.ai

The nuts and bolts of how Black.ai works is that they position devices next to the customers' existing cameras that consume the video feed storing the information in a database and then software maintains and analyzes the data.

Black.ai uses SQLite databases that they split up daily to upload. They process over 100GB of data daily, utilizing Backblaze as the storage container for these databases. They have also built query tools in Vultr that search and pull data back from the database stored on Backblaze B2.

The workflow from ingestion of video to analysis looks something like this:

 The cameras provide a video stream (RTS8), and Black.ai's server listens to the states, runs models on the data, and queues up metadata of the user journey.

- Using Kubernetes, the data will take one of two routes.
 - a. If they are running a site consuming live data, the web portal will connect directly to the site and get live data for a theft application for real-time response.
 - b. Otherwise, the video will be uploaded to Backblaze for historical data or archiving.

A supermarket makes a good sample use case for this technology. Cameras pick up all the journeys someone takes through the store. Using AI and ML, the software can answer questions like "Why is the user behaving like this?" As a result, security staff or management can understand what they need to do to accomplish their goals to prevent theft and optimize store processes. Instead of manually reviewing hours of CCTV video to watch one person's journey, Black.ai analyzes all the raw footage, cutting down that person's journey to a short 15-minute video.



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Privacy and Security Concerns

Consuming video would, of course, prompt privacy and security concerns. Black.ai addresses those concerns by consuming video on the consumer's side and by not using facial recognition software. By blurring faces and other identifying marks, they make it impossible to identify a specific person. This process is handled automatically.

Instead, they use an abstract fingerprint of the person's essential whole-body appearance.

They also use session-based tracking, where someone is tracked while in a location, but once they leave and time goes by, the session expires. If the same person returns to the same location later, the software will see them as a brand-new person. Nothing is retained for long-term recognition.

Black.ai Going Forward

"We use a massive amount of Backblaze B2 Cloud Storage and it runs like a top. Partnering with Backblaze has inspired us to find new ways to use the storage, like experimenting with how fast we can perform data pulls, upload files, and use caching," Collier explained. "Backblaze's scalability supports our growth. The backups help to keep our data secure, and the service is highly reliable. We love being able to directly access our files instantly using Backblaze."

Since Backblaze is working so well for Black.ai, they have started overhauling their process, exploring

options for architecture and infrastructure. They are questioning assumptions, finding the fastest way to process data, and changing their attitude about what to use Backblaze B2 Cloud Storage for. To balance speed versus cost, they plan on experimenting with caching, possibly machine learning training, and calibration.

Collier concluded, "Finding out how to get that sweet spot between speed and cost is the focus going forward."

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Vultr was founded in 2014 with the mission to simplify the cloud and empower developers with the ability to quickly and easily deploy infrastructure in the cloud. Vultr provides frictionless provisioning of cloud storage and bare-metal servers. The company employs 25 data centers around the globe to deliver high-performance, reliable cloud computer servers to its customers.

About Backblaze

The Backblaze B2 Storage Cloud is purpose-built for ease. It offers always-hot, S3 compatible object storage that supports your workflows via third-party software integrations, APIs, CLI, and web UI. And it's priced for easy affordability at rates a fraction of other cloud providers. Businesses in more than 175 countries use the platform to host content, build and run applications, manage media, back up and archive data, and protect and recover from ransomware.

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