STORAGE DEVELOPER CONFERENCE



BY Developers FOR Developers

# An Al Inference Engine for Object Storage Systems

Presented by Dan Pollack and Jessica Bresnahan

### Outline

- What are we building? A plugin AI Engine for Object Storage Systems
- Why is it interesting? Metadata and search
- What does it do? Automatically inspects file content
- How does it work? The magic of software
- What's next? Features to do list
- Q & A



### What are we building?

A plugin AI Engine for Object Storage Systems

- Object storage systems store unstructured data
- We know when objects are stored and where but not much else
- The storage system is often used by a different group than the one that manages it
- More awareness of the content is better
- The Engine is still a work in progress



### Why is it interesting?

Content awareness enables better utilization and data management

- Discover multiple data types in objects (e.g text in images)
- Search files for content in addition to more traditional metadata
- Apply policy to data based on content



### Why is it interesting?



June 28 2023 Data Fabric: Connecting the Dots between Structured and Unstructured Data

#### **Unstructured Data Content Inspection**





### What does it do?

- Watch for object creation events
- Examine object type
- Perform multiple AI inference operations based on expected content
- Perform secondary AI inference operations based on extracted content
- Index the extracted content



- Use native event notification of Object Storage System
  - PoC use webhooks
  - Queues and databases are also options depending on the Object storage system
- On object creation event detect the file type
- Run inference operations based on the file type
- Report the inference results as text
- Flag the operation as completed



- Use native event notification of Object Storage System
  - MinIO PoC use webhooks
  - Queues and databases are also options depending on the Object storage system AWS S3,
- On an object creation event detect the file type stored
  - Images
  - Text
  - Audio
  - Video

#### Run inference operations based on the file type – local and aaS based operations

- OCR
- Object recognition images and video
- Object detection images and video
- Text in images
- Report the inference results as text
  - Bounding boxes
  - Object types
  - Text
- Flag the operation as completed

- Audio speech to text
- Audio from video
  - Images from video presentation slides
  - Forms recognition



OCR example





### OCR example





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Foreword by Jim Bridenstine Pushing the boundaries of space exploration, science, and technology once again, America is on the verge of exploring more of the Moon than ever before. This new era of lunar exploration is called Artemis. Named after the twin sister of Apollo, she is the Goddess of the Moon, and we are the Artemis Generation. NASA is building a coalition of partnerships with industry, nations and academia that will help us get to the Moon quickly and sustainably, together. Our work to catalyze the U.S. space economy with public-private partnerships has made it possible to accomplish more than ever before. The budget we need to achieve everything laid out in this plan represents bipartisan support from the Congress. Today, NASA is delivering more missions, more science, and more innovation at a better value for the American taxpayer than at any point in the agency's history and with half the buying power than 1964, when Apollo development was at its peak. We thank the President, the Congress, the American taxpayers, and the emerging space industry for the combined efforts to strengthen our nation's space program. Under the Artemis program, humanity will explore regions of the Moon never visited before, uniting people around the unknown, the never seen, and the once impossible. We will return to the Moon robotically beginning next year, send astronauts to the surface within four years, and build a longterm presence on the Moon by the end of the decade. I am proud to share NASA's Artemis Plan-this is how we will go to the Moon once again. And how we will use the Moon as the stepping stone for our next greatest leap-human exploration of Mars. We are going, and we go together. Ad lunam! NASA Administrator Jim Bridenstine



Image example





Image example



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Face | Bounding Box | Emotion Face | 0: 273 85 391 227 | neutral.



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Audio example





### Video presentation example





Al processing



Object Creation Notification



### What's next?

- Background process to check for objects that failed to complete or were missed at creation time
- Tool to run new inference operations on some or all old objects on demand
- Access to perform inference operations on encrypted content if authorized
- Auto-scale server backend as load increases
- Load balancer for incoming inference operations
- Run Al Engine on alternative compute Computational Storage Devices, External CPU/GPU complexes



### Questions?

# Questions?



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