Smart Imaging Redefined: Vistapath's AI–Powered Pipeline on the Cloud

Executive Summary

VistaPath Biosystems partnered with binbash to design and implement a secure, scalable, and efficient computer vision data pipeline on AWS. Leveraging the binbash Leverage™ framework and AWS services like SageMaker, AWS Glue, and Redshift, the project focused on ensuring HIPAA and ISO27001 compliance while enabling efficient data processing and real-time analytics. This collaboration marks a pivotal advancement in VistaPath's mission to modernize pathology workflows through innovative technology.

Customer Challenge

- VistaPath faced the following challenges in scaling its pathology operations:
- Data Management: Handling high volumes of high-resolution image data and metadata with stringent security and compliance requirements.
- Machine Learning Enablement: Preparing datasets for effective model training and inference.
- Annotation Accuracy: Streamlining the creation and management of labeled datasets for machine learning.
- Business Insights: Delivering real-time analytics to drive data-driven decision-making.

Solution

binbash implemented a robust solution leveraging AWS services and security best practices:

1. **Data Management:** Amazon S3 was configured to securely store images, metadata, and annotations with fine-grained access controls.
2. **Machine Learning Integration:** ECS (EC2) facilitated model training, deployment, and inference for pathology image analysis.

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vistapath

VistaPath Biosystems is a groundbreaking innovator in digital pathology, focused on automating laboratory processes using computer vision and artificial intelligence. Their flagship product, Sentinel, revolutionizes the pathology workflow by automating the inspection, description, inking, and measurement of tissue samples, significantly improving diagnostic accuracy and operational efficiency. With a mission to modernize pathology through cutting-edge technology, VistaPath is transforming healthcare one sample at a time.

binbash have shown great flexibility throughout our engagement to help fill any gaps we need them to fill.

Jacob Guggenheim - CTO

3. **Annotation Workflow:** InstaLabel.ai was integrated for efficient annotations management.
4. **Event Handling:** AWS SQS and Lambda functions automated workflow orchestration, ensuring seamless scalability.
5. **Data Transformation and Analytics:** AWS Glue automated data structuring, while Redshift and QuickSight enabled actionable insights.
6. **Security Compliance:** The solution adhered to HIPAA and ISO27001 standards, implementing robust security measures, including IAM policies, encryption with AWS KMS, centralized logging with CloudTrail, and resource monitoring with AWS Config.
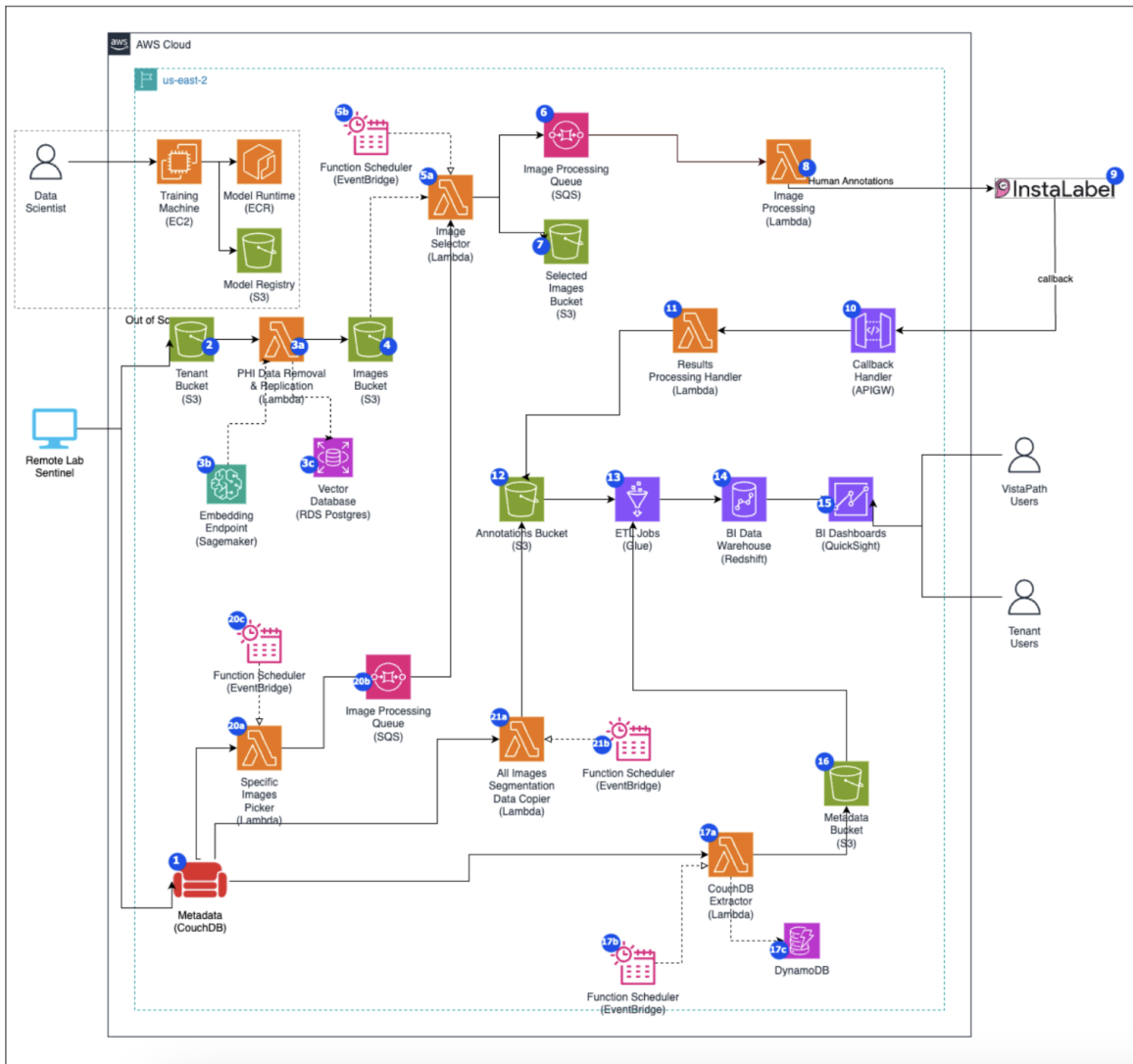
Key Milestones

1. **Phase 1:** Secure Data Storage Setup
   - Provisioned Amazon S3 buckets with compliant policies for secure image, metadata, and annotation storage.
2. **Phase 2:** Automated Image Processing Pipeline
   - Deployed Lambda functions, SQS queues, and Step Functions for scalable and automated image processing.
3. **Phase 3:** Compliant Annotation Management
   - Integrated InstaLabel.ai and DynamoDB to streamline and monitor annotation workflows under compliance standards.
4. **Phase 4:** Machine Learning Infrastructure
   - Configured SageMaker endpoints for segmentation and feature extraction, ensuring secure data handling.
5. **Phase 5:** Analytics and Business Intelligence
   - Automated ETL processes with AWS Glue and implemented dynamic dashboards using QuickSight for compliant analytics.

Results and Impact

- **Scalability:** Efficiently handled increasing data volumes with a future-ready pipeline.
- **Security and Compliance:** Achieved HIPAA and ISO27001 compliance with robust security measures.
- **Automation:** Reduced manual workflows, increasing accuracy and operational efficiency.
- **Real-Time Insights:** Delivered actionable insights through QuickSight dashboards integrated with Redshift.
- **Accelerated Deployment:** Leveraged the binbash Leverage™ framework for rapid and reliable implementation.

Conclusion

By building a scalable and compliant computer vision data pipeline, VistaPath Biosystems and binbash successfully transformed pathology operations. This collaboration not only supports VistaPath's commitment to innovation but also reinforces the importance of security and compliance in advancing healthcare technology.