PERFORMANCE EVALUATION USING SERVERLESS ARCHITECTURE

CLOUD COMPUTING

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CONTENT

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INTRODUCTION

Objective:

Evaluate how cloud-based serverless processing compares to traditional on-premises processing in terms of performance, scalability, and efficiency.

Motivation:

Organizations frequently process large volumes of images or files. Choosing between on-premises resources and cloud-native services requires understanding differences in compute speed, scalability, cost, and operational effort.

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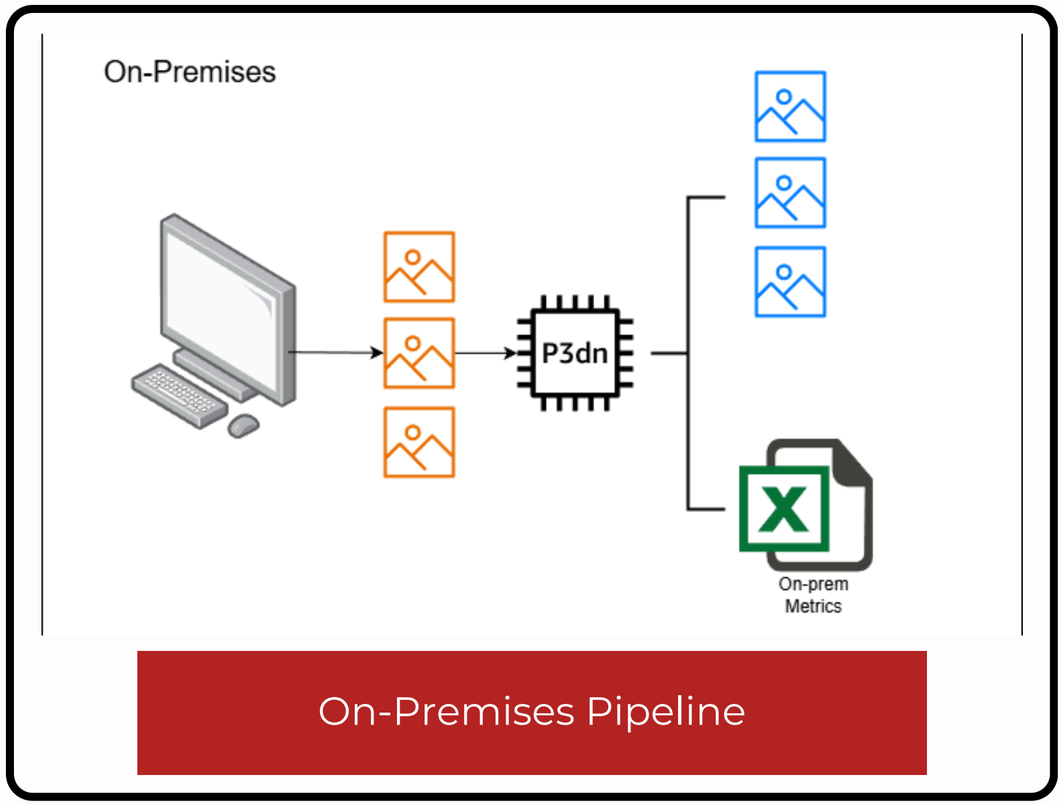
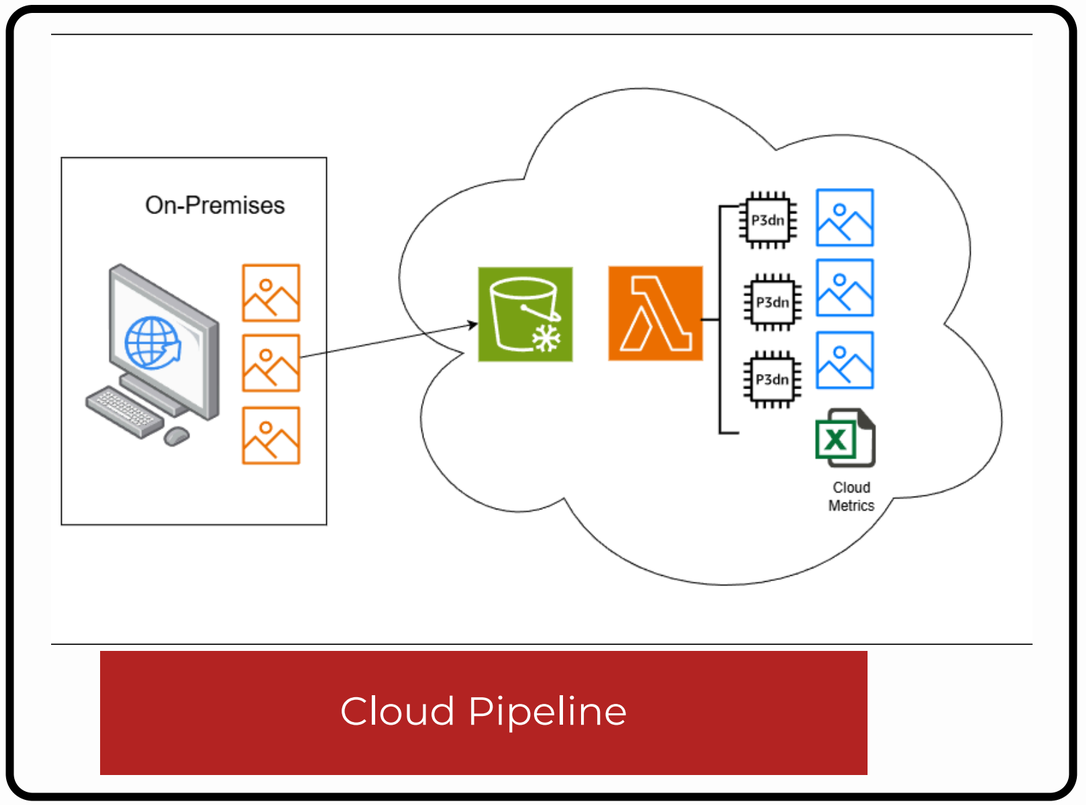
HIGH-LEVEL ARCHITECTURE





Images Folder → local_image_proc.py → Processed Folder + Metrics CSV

- Runs on local machine
- Processes one image at a time
- Real image editing using Pillow

Image Upload → S3 Input Bucket → S3 Event Trigger → AWS Lambda → S3 Output Bucket

- When an image is uploaded to S3, Lambda automatically runs.
- Lambda loads the image, processes it, and writes results to S3.
- All executions occur in parallel, depending only on the number of images.

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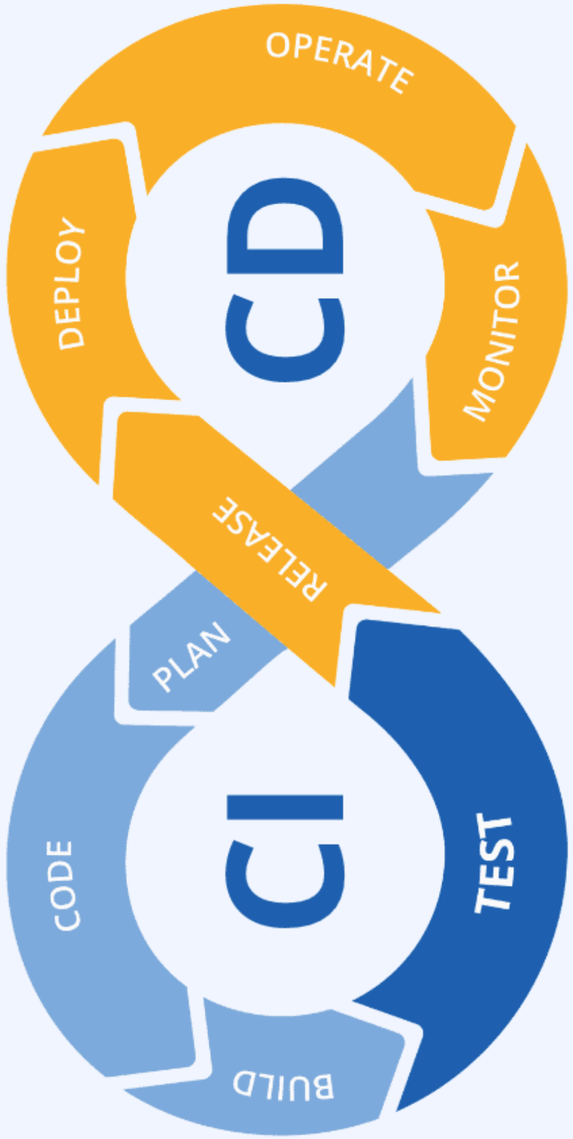
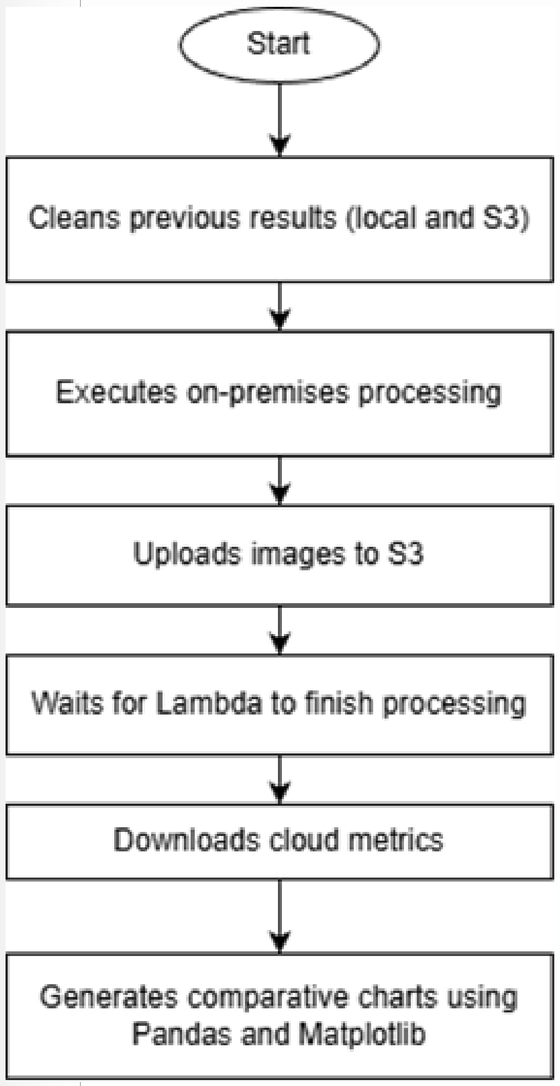
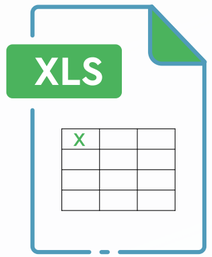
WHY SERVERLESS?

- Automatic scaling
- Event-driven processing
- Zero server management
- Highly consistent performance
- Pay-per-use (no idle cost)
- Perfect fit for short, repetitive processing tasks

AUTOMATION AND METRICS







	A	B	C	D	E
1	timestamp	image_key	orig_size	new_size	proc_ms
2	2025-11-23T02:07:34.011052	dog_0000.jpg	8562	46716	85.02
3	2025-11-23T02:07:34.059369	dog_0001.jpg	9981	45806	43.98
4	2025-11-23T02:07:34.111845	dog_0002.jpg	54954	68124	49.53
5	2025-11-23T02:07:34.180285	dog_0003.jpg	47965	51185	68.84
6	2025-11-23T02:07:34.253342	dog_0004.jpg	27897	44311	69.07

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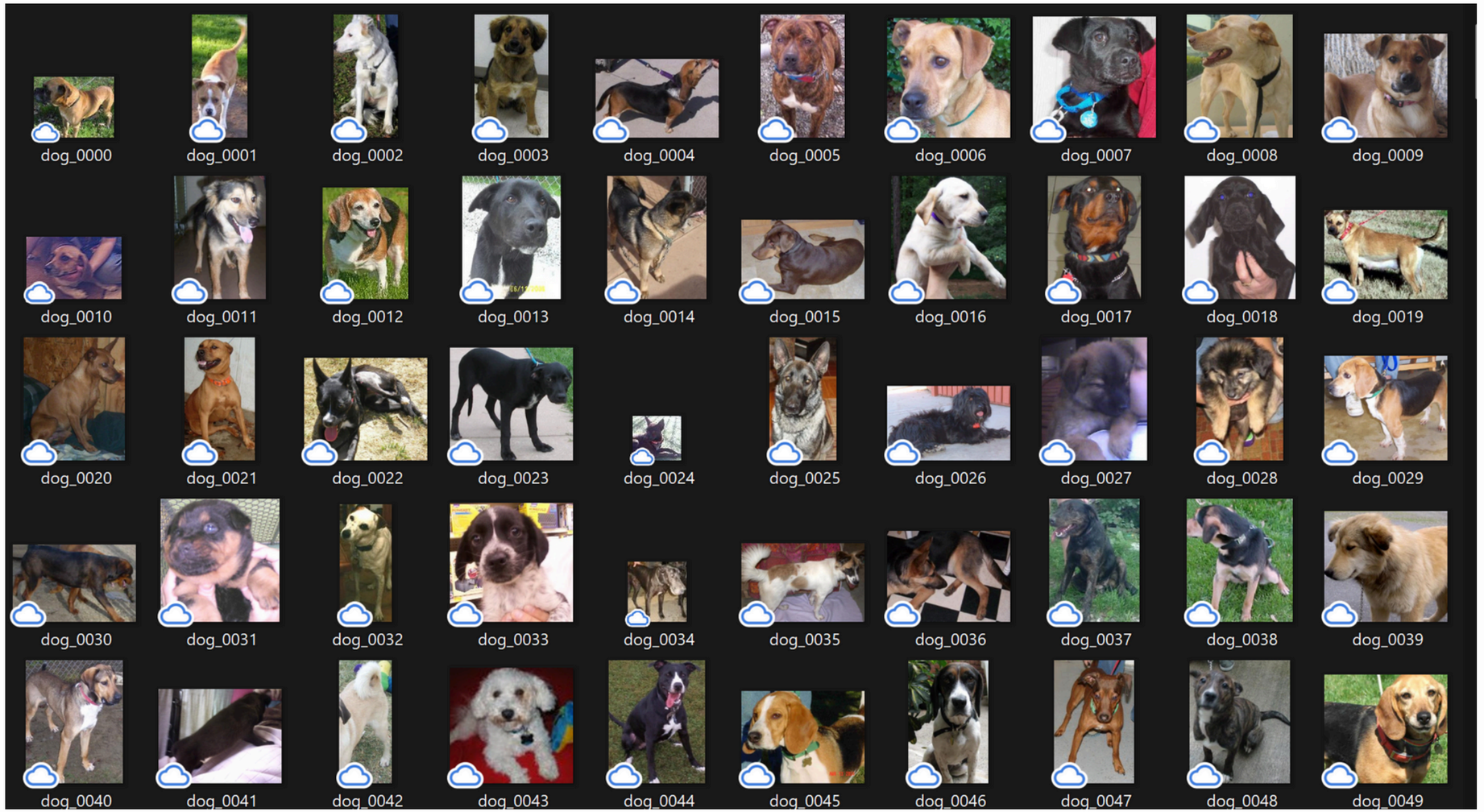
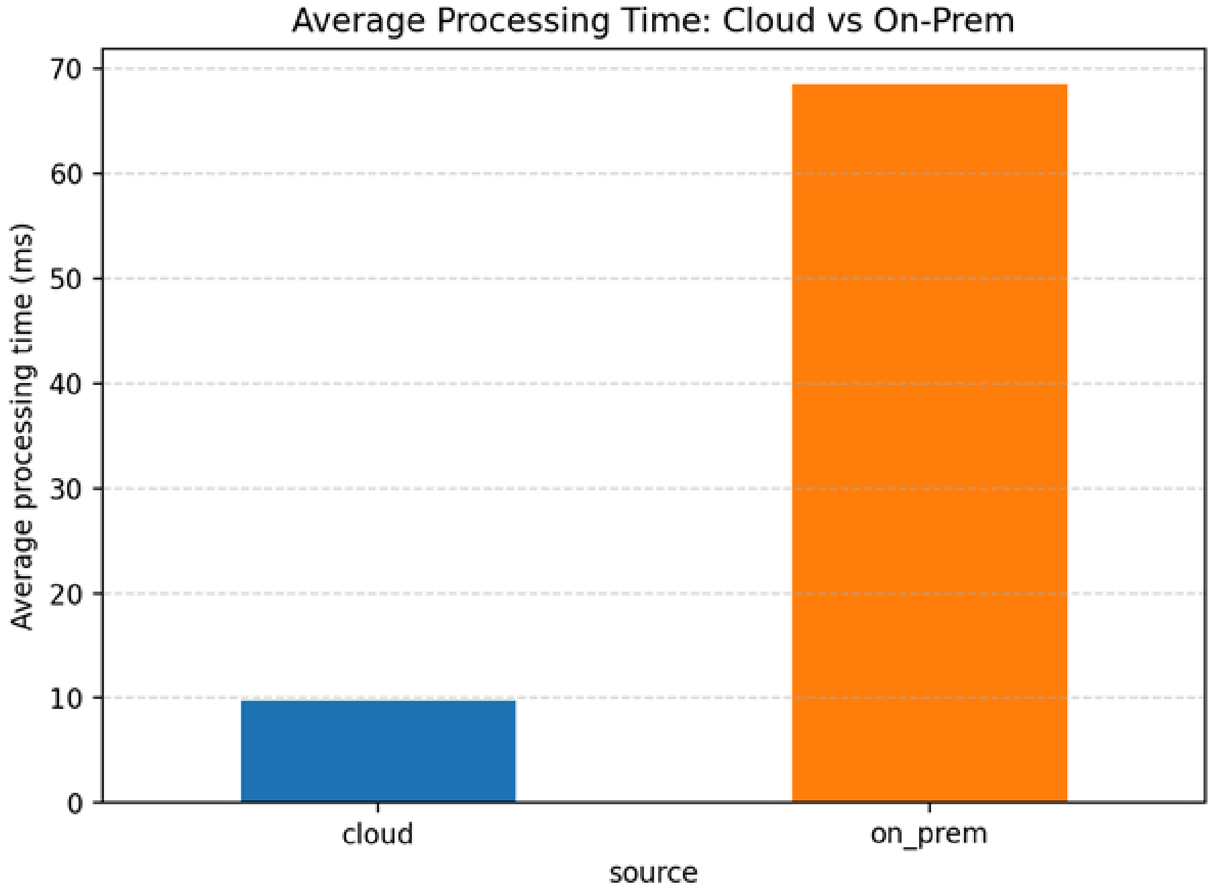
DATASET

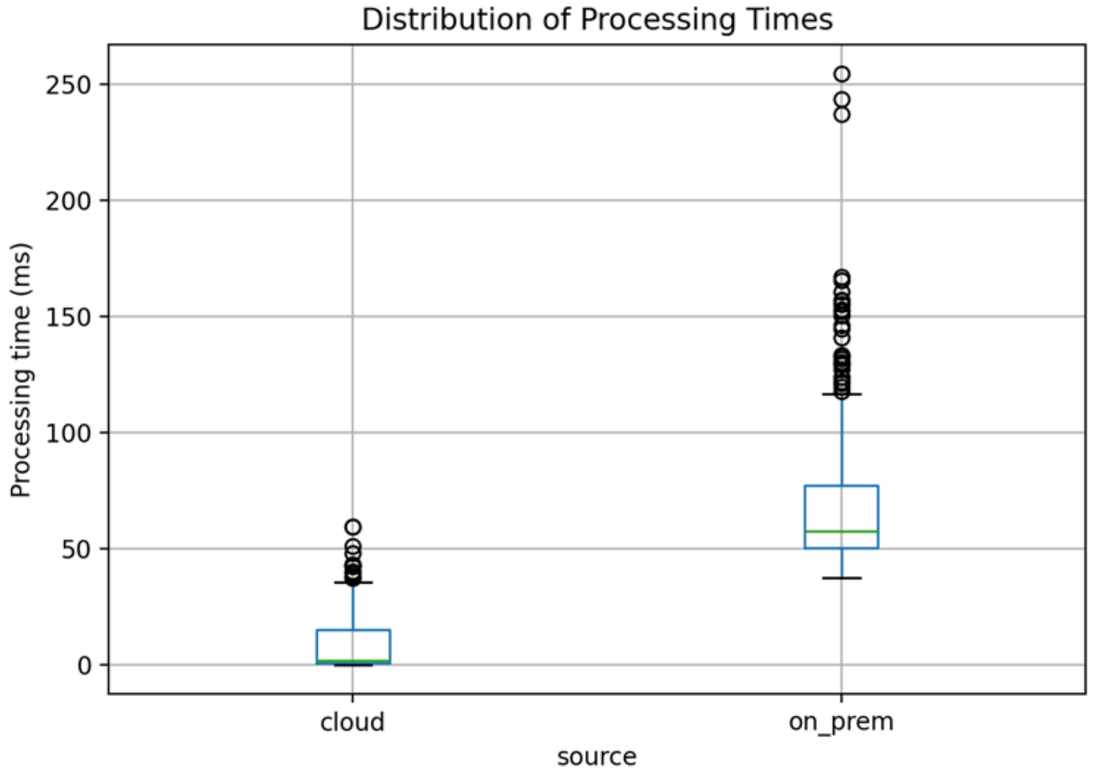


P. Roy, "Natural Images," Kaggle, 2018. [Online]. Available: https://www.kaggle.com/datasets/prasunroy/natural-images.

DEMO

RESULTS





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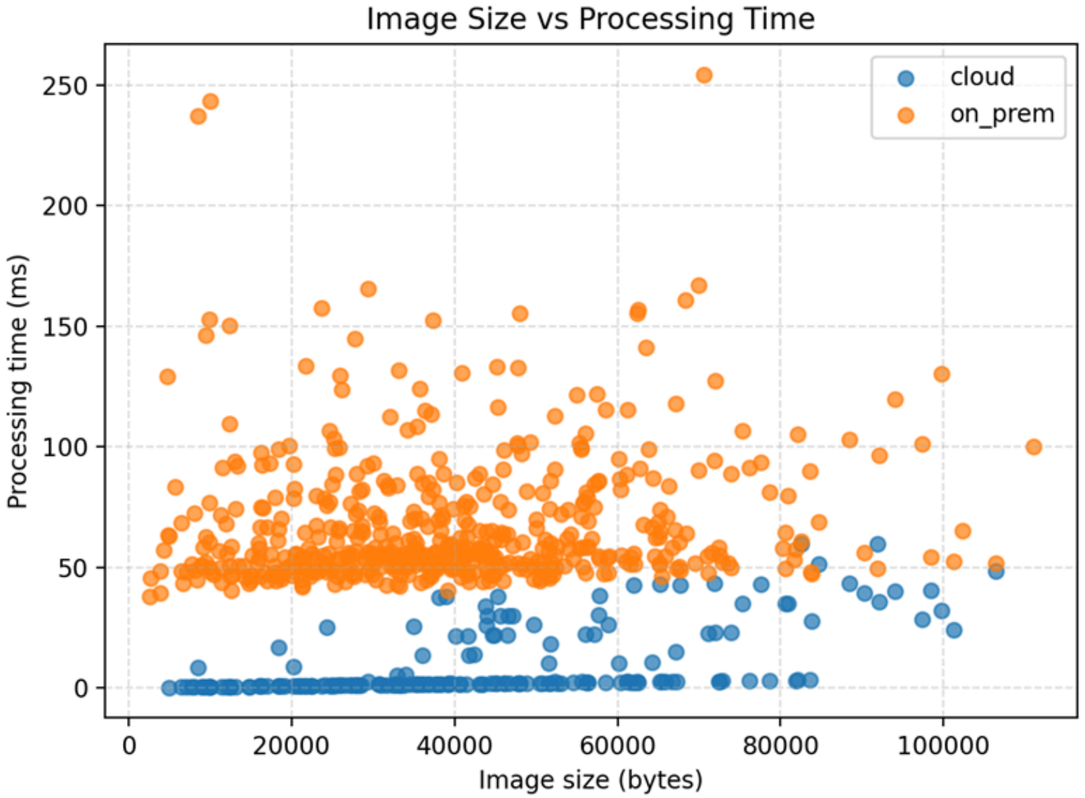
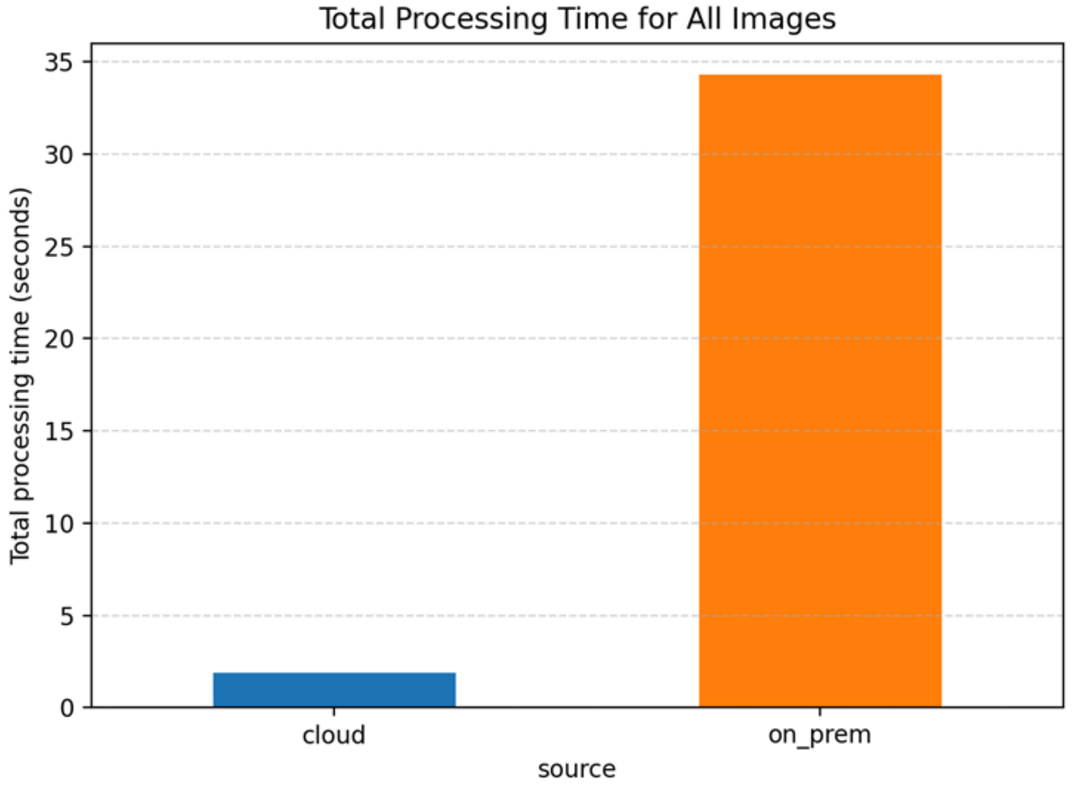
RESULTS





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REFERENCES

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[3] A. Kleppmann, Designing Data-Intensive Applications, O’Reilly Media, 2017.
[4] AWS, “AWS Lambda Execution Environment and Available Libraries,” Amazon Web Services Documentation, 2023.
[5] B. Burns, B. Grant, D. Oppenheimer, E. Brewer, and J. Wilkes, “Borg, Omega, and Kubernetes,” Communications of the ACM, vol. 59, no. 5, pp. 50–57, 2016.

Take a look to my code: https://github.com/Jehosua97/ImageProcessing-Cloud-vs-OnPrem

THANK YOU

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