

The background of the image features a series of concentric, wavy lines in shades of blue and purple, creating a sense of depth and movement. In the bottom right corner, there is a vibrant, abstract shape in shades of pink, orange, and yellow, resembling a stylized flame or a modern architectural element.

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MFGA002

Surveillance optimization of port gate operations using ML at Edge

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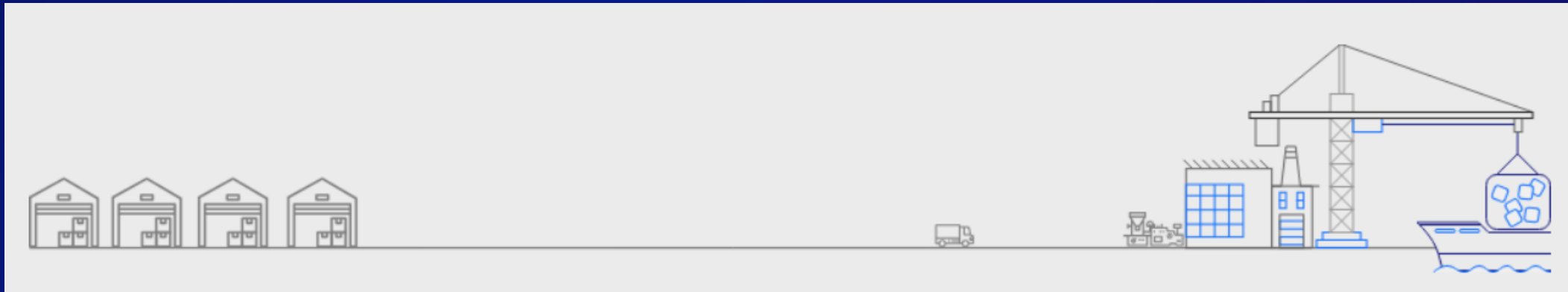
Agenda

- Business problem overview
- Solution approach & challenges
- Solution architecture & execution
- Business benefits
- How AWS helped Adani Ports & SEZ Team ?
- How can AWS help you in your AI/ML Journey ?

Overview

Adani Ports & SEZ Ltd. is the largest integrated transport utility in India, handling close to 24% of country's exim cargo through our ports.

Port operations involve a complex process of vessel berthing, cargo loading & unloading, yard operations & gate operations. Proper planning & efficient execution of each of the processes is required for handling the huge volume of cargo.



The problem



Image source : [Houstonssystem](https://www.houstonssystem.com/)

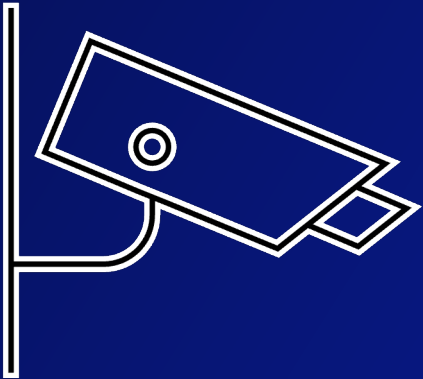
At our busiest port, every day more than 10k trucks gate-in to transport the huge volume of cargo.

Process of gate operations:

- Generation of gate pass before truck arrival time
- At the point of gate in, data entry of truck number plate to match against the gate pass
- CCTV monitoring and recording done 24 x 7 for surveillance
- Daily reconciliations done at periodic intervals to identify any missing entries or mismatches

Problem Statement: Manual process of reconciliation requires browsing through hours of videos to identify any erroneous or missing entry and/or timestamp mismatches

Solution approach



Identify and extract the truck number plate from CCTVs at the time of entry in real time and automate the reconciliation process

Solution Tenets:

- Real time image processing from multiple CCTVs
- Machine Learning model to identify number plate
- Machine Learning model to extract truck number
- Fuzzy reconcile with gatepass database

Solution challenges

- Number plate can appear at more than one place on vehicle front
- Registration number on plate can be 1-line or split in 2-lines
- Obstacles in front of number plate
- 20 sec (avg) stopping time for each truck at gate provides limited window to identify individual truck and corresponding license plate
- Solution throughput has to be high to process 25fps camera feed
- Solution needs to process multiple camera feeds for multiple lanes



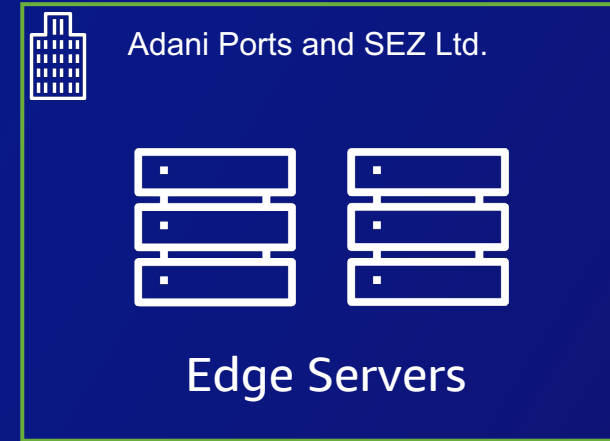
Solution steps

- Determine an 'Area of Interest' (Aoi) from CCTV viewing angle to consider candidate frames
- Rule based engine to identify entry-exit of truck within Aoi
- Image processing (morphological) techniques to improve the data quality
- Machine Learning model to detect 'number plate' as object within Aoi
- Machine Learning based image quality assessment to determine two 'Bestpick for text extraction'
- Amazon Rekognition to extract license plate number
- Fuzzy distance algorithms to reconcile with gatepass database entries

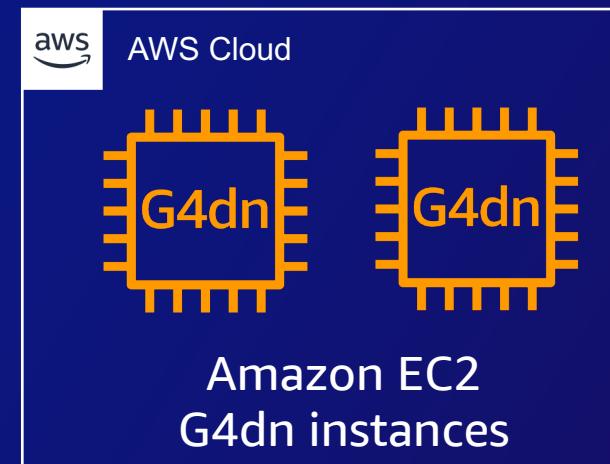


Machine Learning (ML) model training & deployment

- Machine Learning models are trained on Amazon EC2 GPU instances (g4dn)
- To reduce latency, object detection and image quality assessment models are implemented at Edge server
- License Plate number extraction using Amazon Rekognition and Fuzzy distance methods are implemented on AWS
- Reconciliation reports and alerts are generated on AWS



ML Model
Deployment

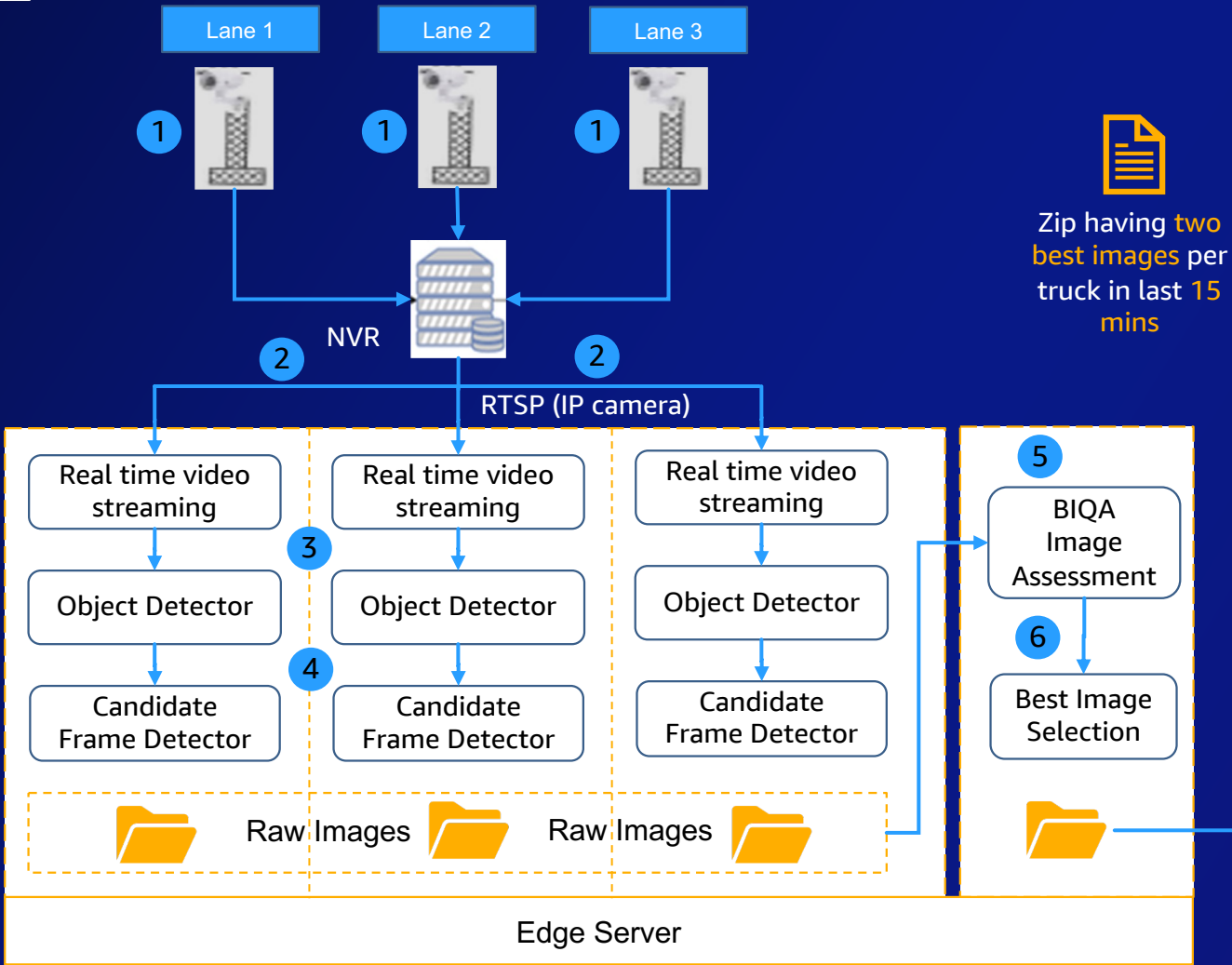


ML Model
Training

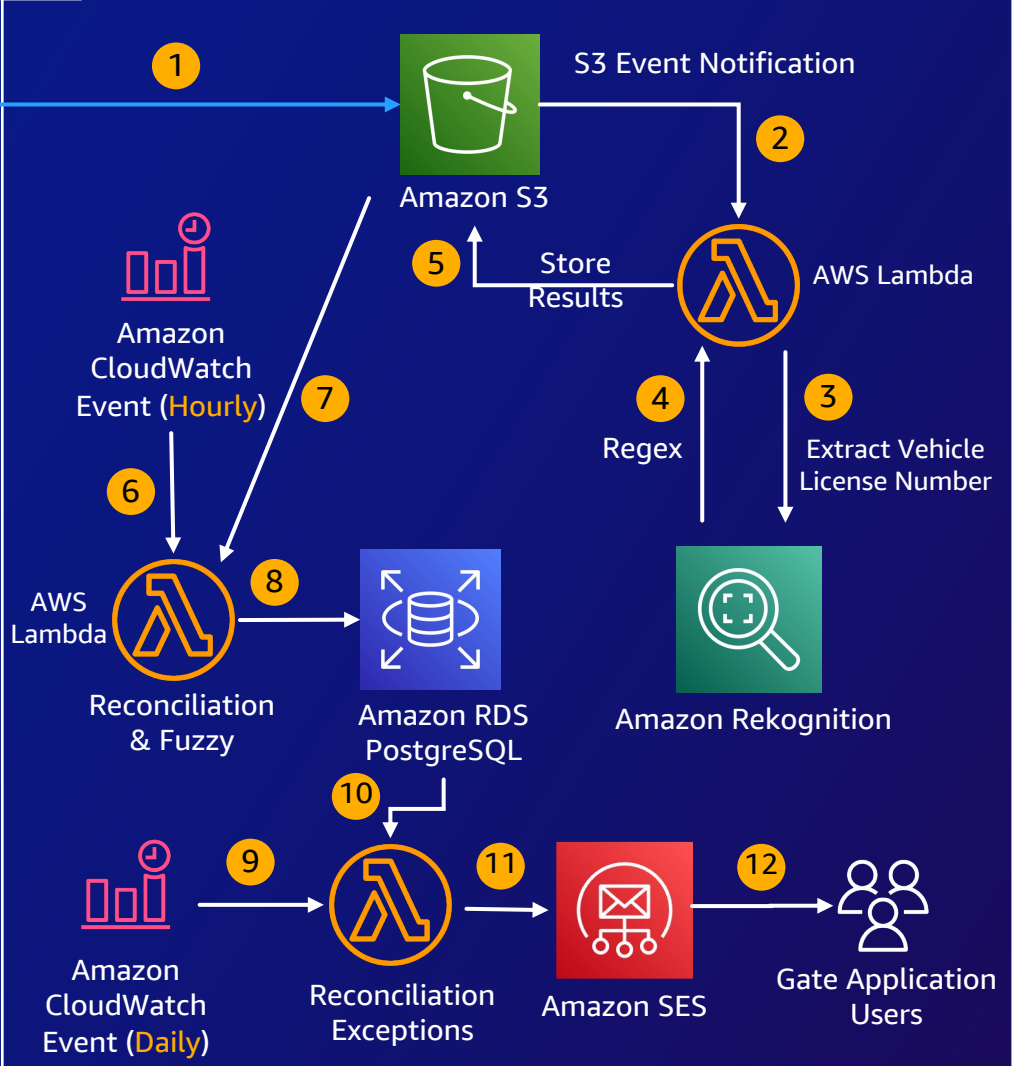
Solution architecture



Adani Ports and SEZ Ltd



AWS Cloud



Business benefits

- Automate and optimize the reconciliation process
- Reduce reconciliation time by approximately 50%
- Enhance security surveillance by maintaining digital footprint with timestamp
- Avoid any potential revenue leakage due to timestamp mismatches

How AWS helped Adani Ports Digital Team



Architecture Reviews

On-demand Architecture reviews to build secure, high-performing, resilient, and efficient solution on AWS



Cost Optimization

Periodic cost optimization sessions to implement cost-aware mechanisms and kept solution cost with-in budget.

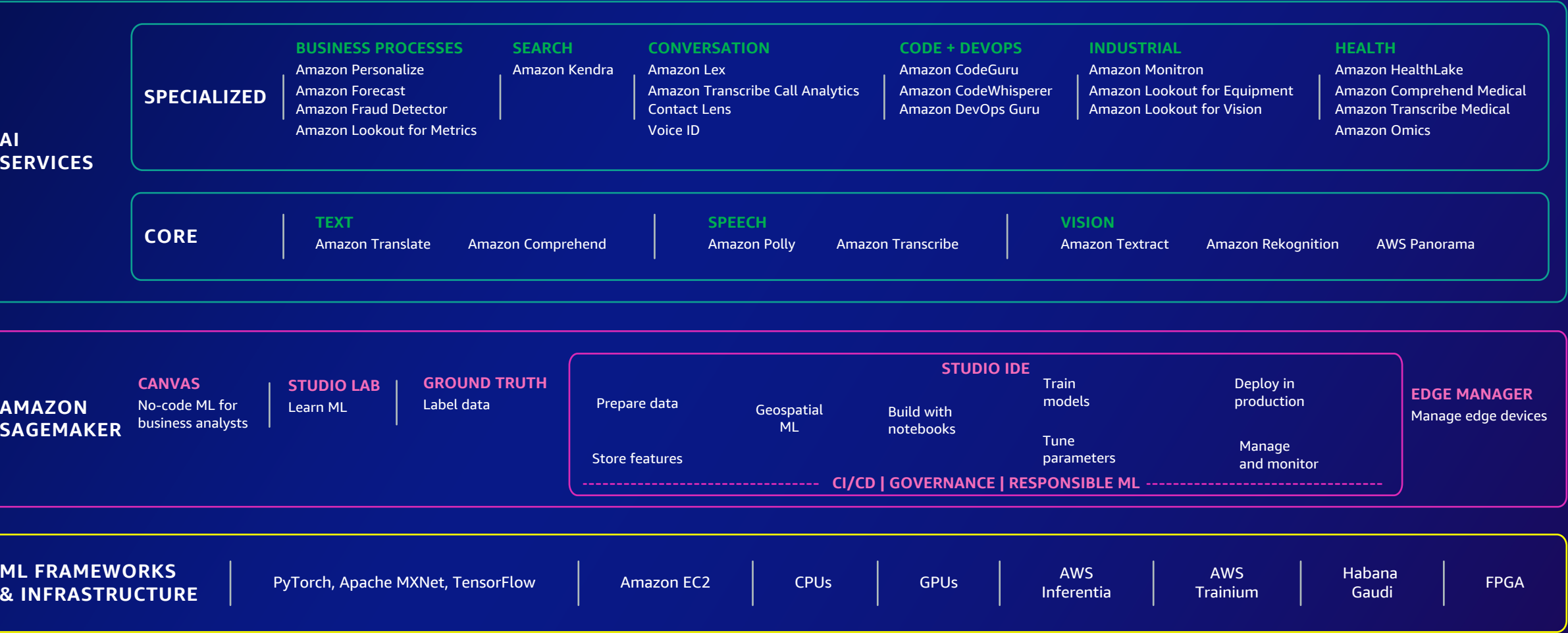


Training and Enablement

Upskilling through prescriptive training and enablement sessions for applicable AWS Services.

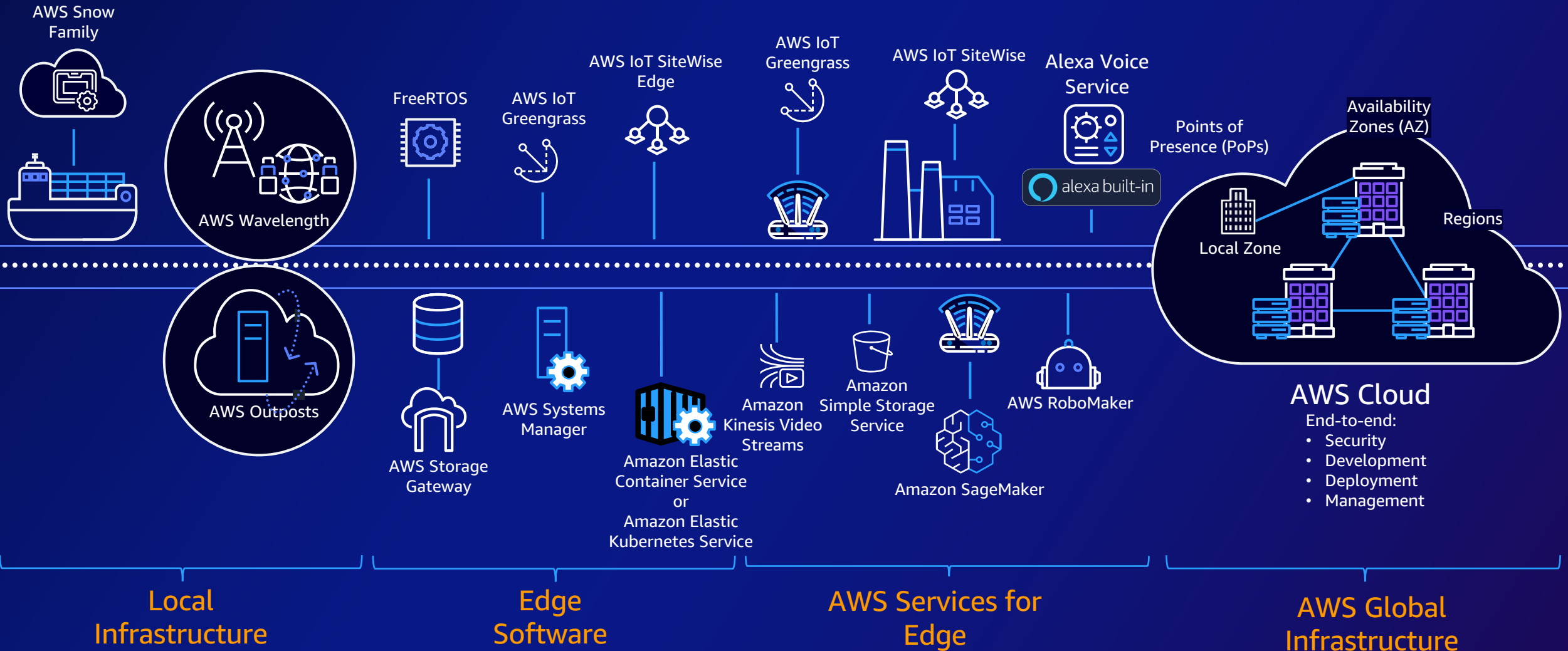
How can AWS help you ?

THE AWS AI/ML STACK



How can AWS help you ?

BUILDING AND DEPLOYING EDGE APPLICATIONS



How can AWS help you ?

FAST TRACK YOUR AI/ML JOURNEY WITH ENGAGEMENT PROGRAMS



ML Solution Lab

Joint-Accelerated engagements to create high impact tangible deliverables around AI/ML, microservices, containers, and serverless initiatives



Prototyping Program

Contextualize uses of the AWS Platform and associated services by building working prototypes of specific business use cases, leveraging existing data, devices and systems.



Digital Innovation

Focused efforts towards innovation and building better digital experiences for end customers

How can AWS help you ?

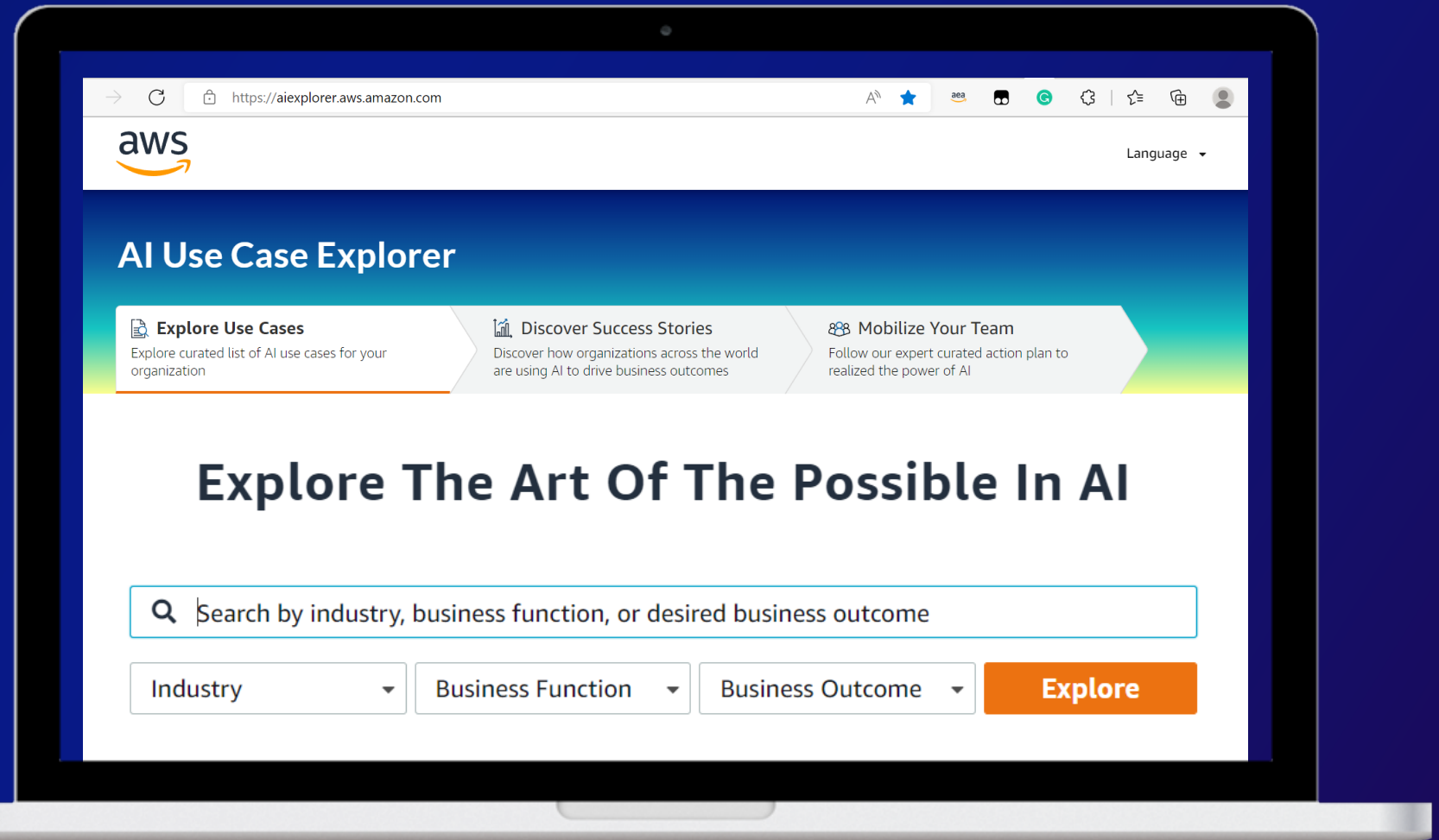
READYMADE INDUSTRY USE CASE SOLUTIONS

aiexplorer.aws.amazon.com



AI Use Case Explorer

Easily find the most relevant AI use cases with related content and guidance to make them real



Resources



Hybrid Machine Learning on AWS

Whitepapers



Achieve Production Optimization with AWS
Machine Learning



Machine Learning Lens - AWS Well-Architected
Framework

skillbuilder.aws 

Your time is now

Build in-demand cloud skills your way

Thank you!

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