
AWS
re:Invent
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ANT218

Leveling up computer vision and artificial intelligence development

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Building more with Kinesis Video Streams



Solving customer problems

How to get secure, reliable, and time-indexed video into advanced CV and AI models at scale
(15 min)

Kami Vision

Kami Vision and KamiCare

How Kami Vision uses Kinesis Video Streams to build an industry-leading fall detection system
(35 min)



Next steps

How to start building legacy and new camera fleets with Kinesis Video Streams
(10 min)

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What customers are building



Connected home

Video doorbells

Baby monitors

Outdoor cameras



Industrial

Safety management

Predictive maintenance models

Quality assurance



Public sector

Traffic management with 24/7 video

Public safety

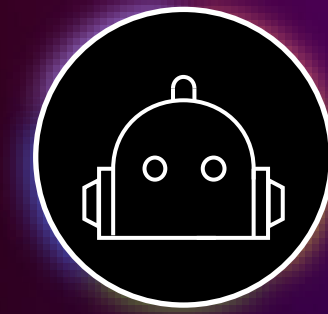


Automotive

Sentinel mode for vehicle monitoring

Telematics

Video dash cameras



Robotics

Remote control

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Customer challenges



SCALABILITY AND SECURITY

Connected home

High-reliability low-latency live viewing

Video playback and storage

Integrations with AI/ML models like Amazon Rekognition for people, pet, and package detection

Industrial

Media ingestions into CV and AI/ML models

Reliable 24/7 streaming

Imaging extraction for CV analytics

Public sector

Highly reliable video with multiple viewers

Imaging extraction for CV analytics

Automotive

Integrate with edge and cloud hybrid models to collect data while driving and analyze locally stored data when stopped

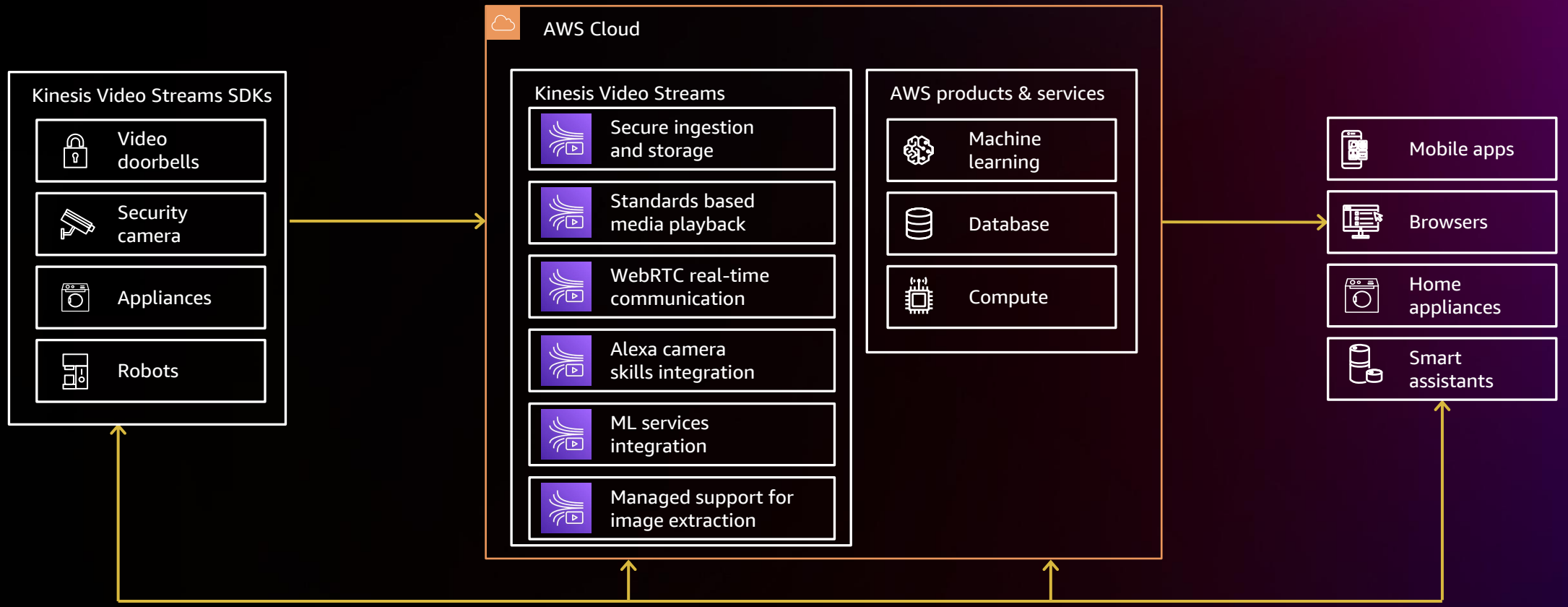
Robotics

Livestreaming video and metadata at 300ms latency to remote control products

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Kinesis Video Streams



Connect camera devices with open-source Kinesis Video Streams SDKs to securely stream video or upload clips

Ingest media in Kinesis Video Streams for secure storage, on-demand playback, and integration with ML services; connect over WebRTC for real-time communication and smart assistant integration

Connect to AWS AI/ML services for computer vision and other AWS services to build a unique product experience

Develop customer-facing apps and experiences

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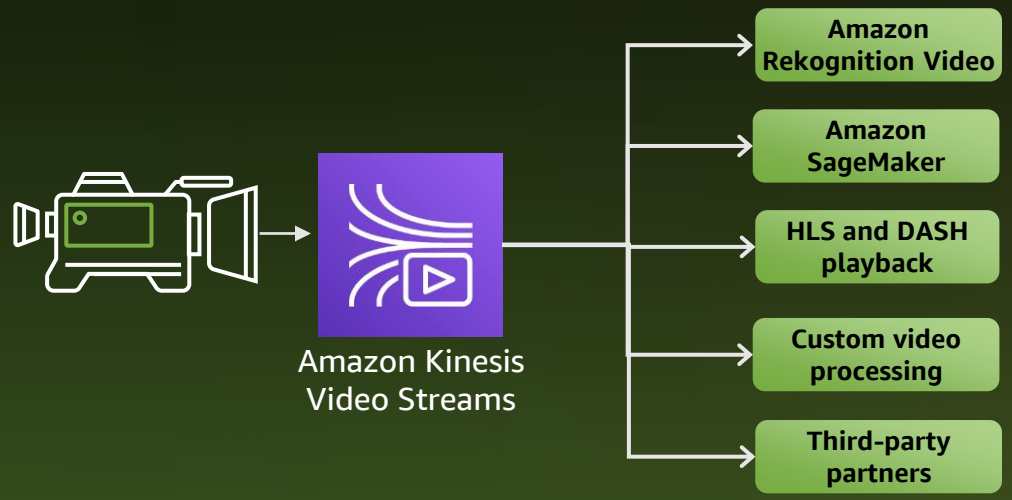
Two streaming methods

Kinesis Video Streams

Secure data ingestion from millions of camera devices

Ingest media and store, consume, and play back time-indexed media data

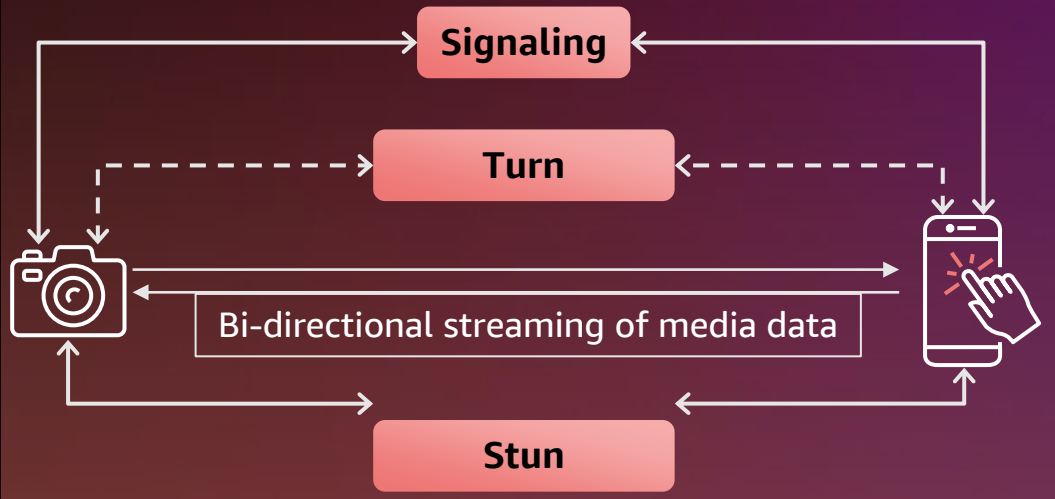
Integration with AI/ML services



Kinesis Video Streams

Low-latency and two-way media streaming with WebRTC

Managed signaling, STUN, and TURN servers



"Stream" and "WebRTC" are used for convenience in this presentation

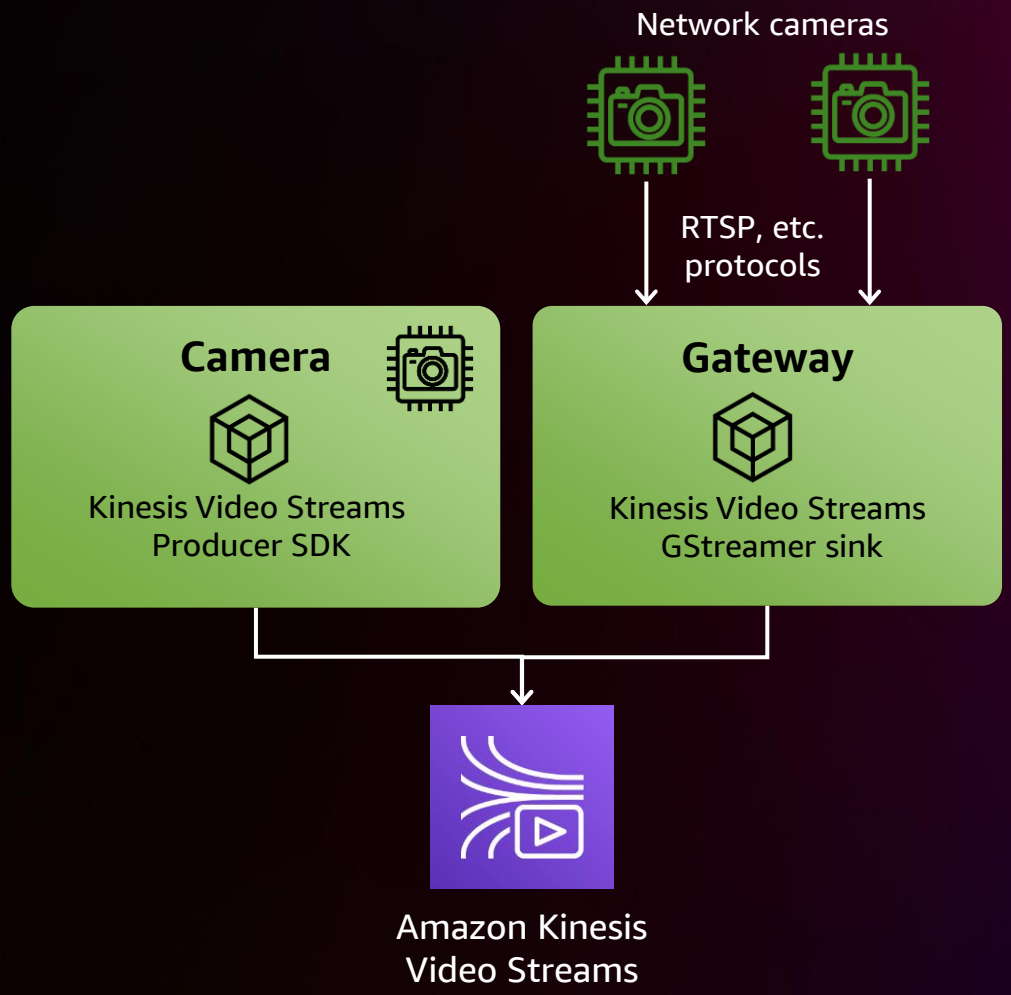
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1. Ingest media

Streams

Amazon Kinesis Video Streams Producer SDK

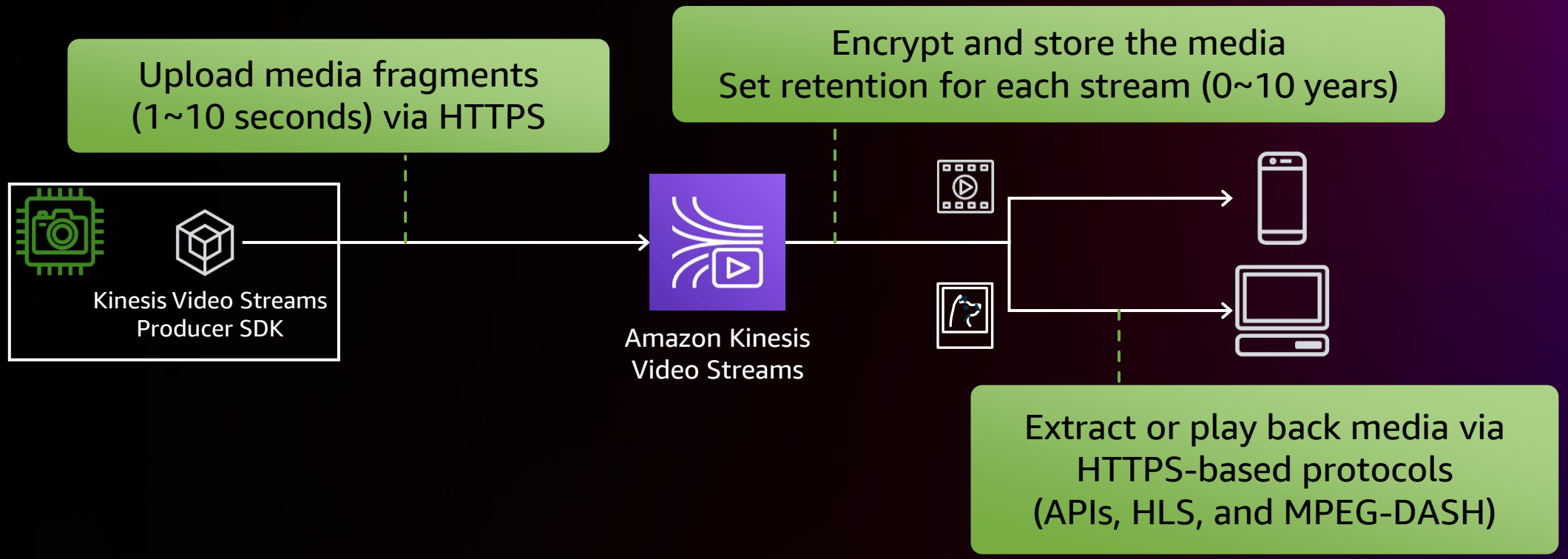
- C++ (https://bit.ly/3Vcgrdb)
- C (https://bit.ly/3Gz9xdc)
- Java (https://bit.ly/3TUp6zq)



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2. Store and index media

Streams



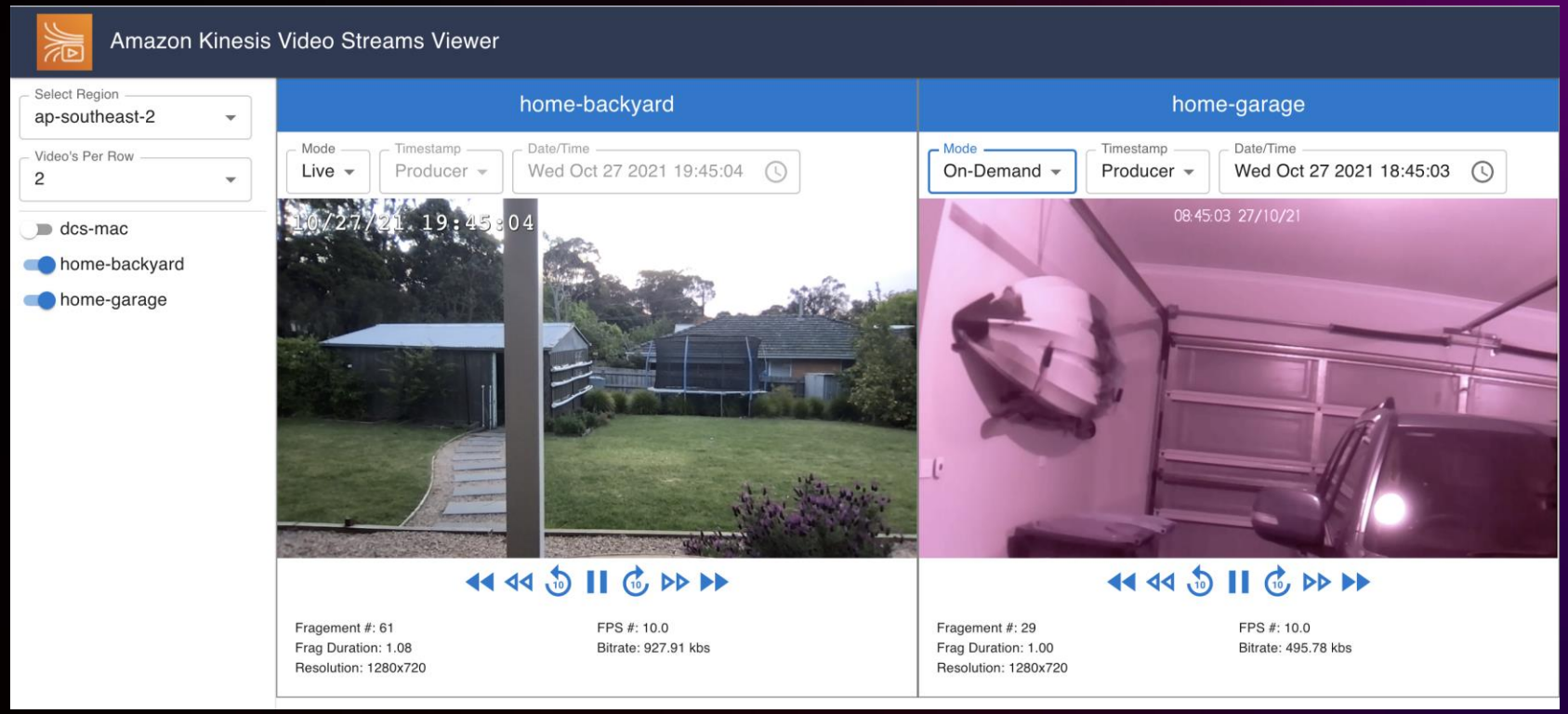
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3. Play back media

Streams

Live and on-demand playback via HLS and DASH protocols

Open-source sample viewer app is available on GitHub



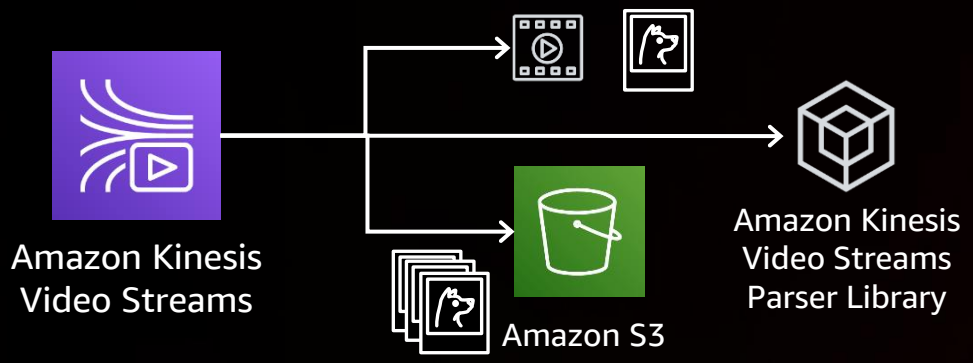
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4. Extract and analyze media

Streams

Extract media

- MP4 clip or image frame
- Export images to S3 periodically
- Build custom media processing applications



Analyze media

- Real-time video analysis with Amazon Rekognition Video
- ML inference with Amazon SageMaker

Amazon Rekognition Video

Amazon SageMaker

Face detection and recognition

Person, pet, and package detection

Image inference with custom ML model

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WebRTC on Kinesis Video Streams

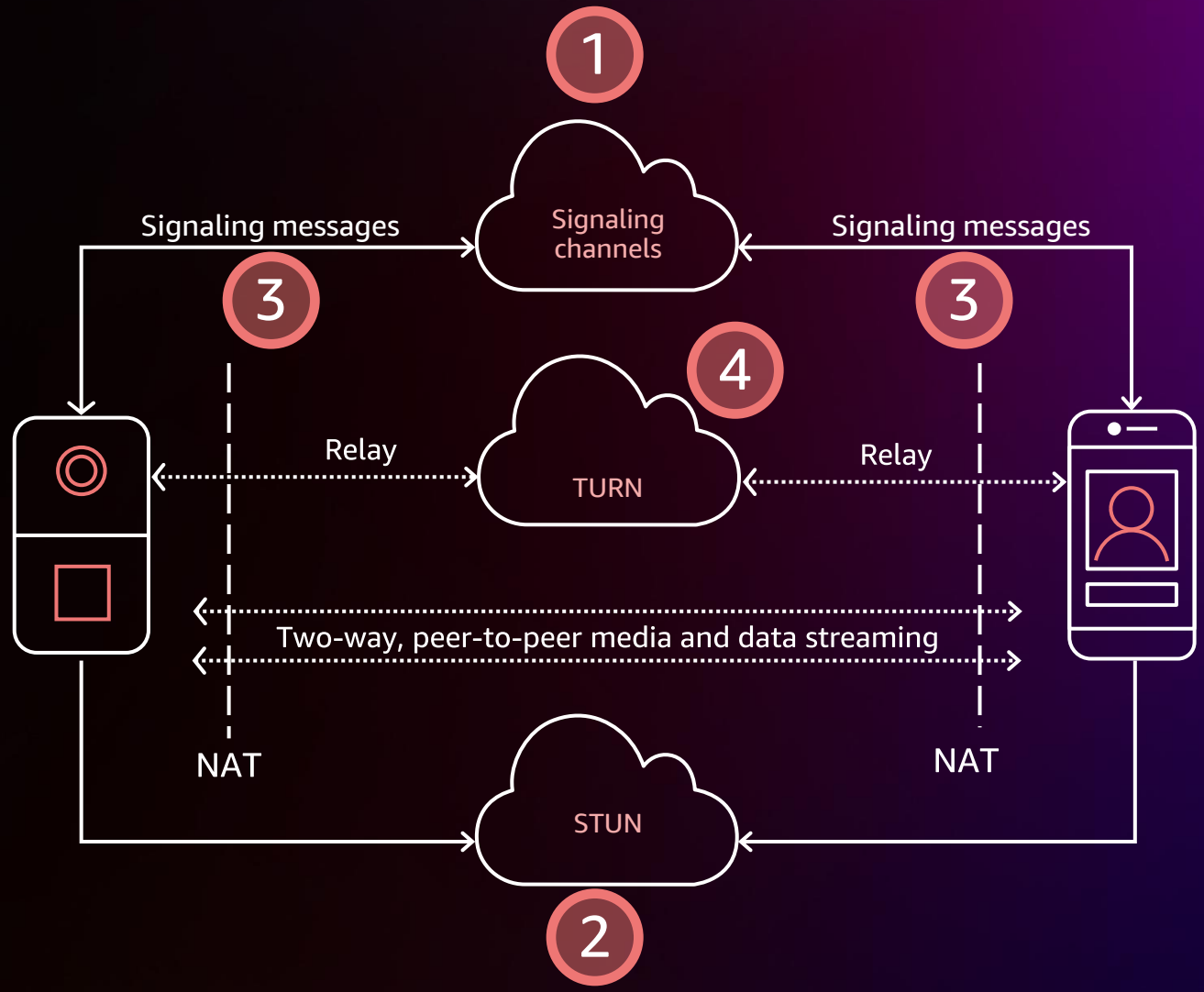
WebRTC

Signaling channels
Kinesis Video Streams cloud resources waiting for devices to connect

STUN
Kinesis Video Streams cloud service enabling the camera and mobile device to discover their public IP addresses and connect to each other peer to peer

Signaling messages
Technical messages sent between the camera and mobile app to establish the live streaming session

TURN
Kinesis Video Streams cloud service relaying media from the camera to mobile app if peer-to-peer connection has failed



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Introducing Kami Vision and KamiCare

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Project goal

Make high-quality vision AI affordable and accessible for consumers, SMBs, and enterprises across multiple verticals

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Kami Vision

THE VISION AI LEADER

Headquarters
San Jose, California

220+
employees worldwide

15+ million
devices connected

6+ million
active users

Users in 120
countries

248 million
alerts delivered daily

50+
businesses served

25+ petabytes
of AI data analyzed

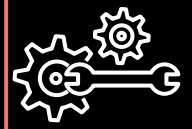
Supporting both
consumer cameras and business solutions

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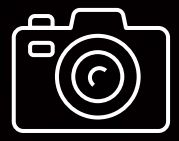
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Problem statement

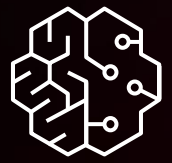
How do we build a robust vision AI platform that can handle diverse use cases?



Device/camera management



Camera setup for specific events



Event generation from camera-based edge AI



Video storage per event



Search across videos based on features, time, and devices



Alerting and notification per event

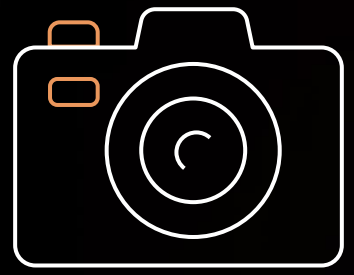


User and access management

We wanted to build such a platform while using a few key pieces from AWS to reduce time to market

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High-level product design



Cameras

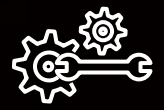
Multiple cameras are supported with or without AI chips (with optional smart AI box)

CAMERA SDK →



KAMI CORE

Cloud backend featuring core services needed for any vision AI solution



Camera management



AI model management



Video & image storage

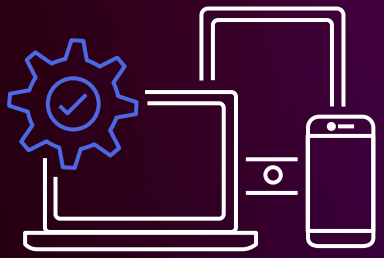


User access controls



Alerts & notification

← REST APIs



Web and mobile app

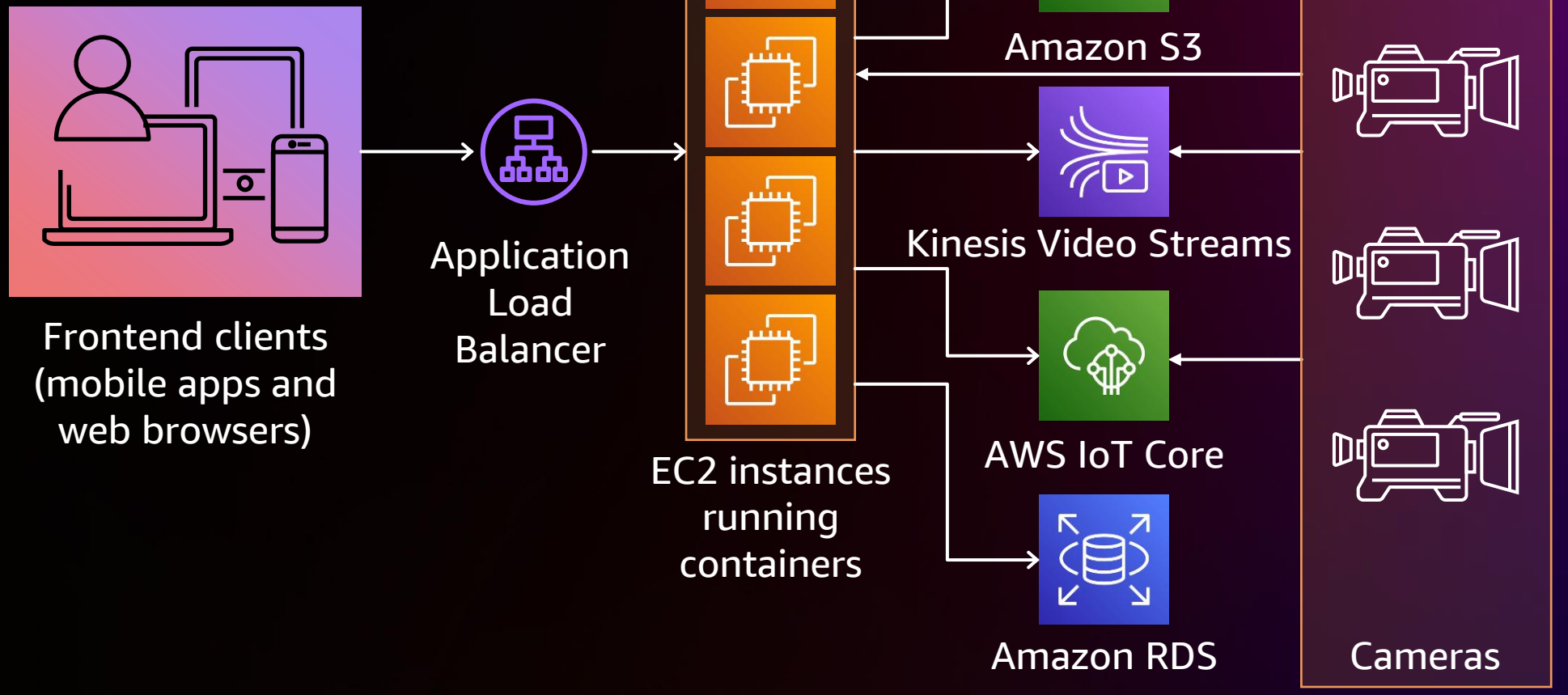
Consume events, live view, and manage devices using various UIs

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Product architecture

Kami Core high-level architecture



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Key benefits of Video Streams and WebRTC

Kinesis Video Steams SDK

- Reduced Kami's development time by more than 6 months
- No need to have a team to build video management functions
- No need to deploy and scale infrastructure for videos or live view
- Use WebRTC as a standard to capture live video

AWS benefits

- Large number of AWS certified developers and DevOps ENGs
- AWS introduced us to various partners to help with development
- We worked with one of the partners to speed up the go-to-market
- AWS subsidized the partner cost for the initial POC

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KamiCare fall management solution

An application example

kamiCare

KamiCare is a vision
AI-based solution for
fall detection and management



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KamiCare fall management solution

Falls are a major cause of hospitalizations in adults aged 65 or older

Every 20 seconds, a senior suffers a major fall in the US

95% of falls are unwitnessed

Falling is more acute in people with dementia and Alzheimer's disease

KAMICARE

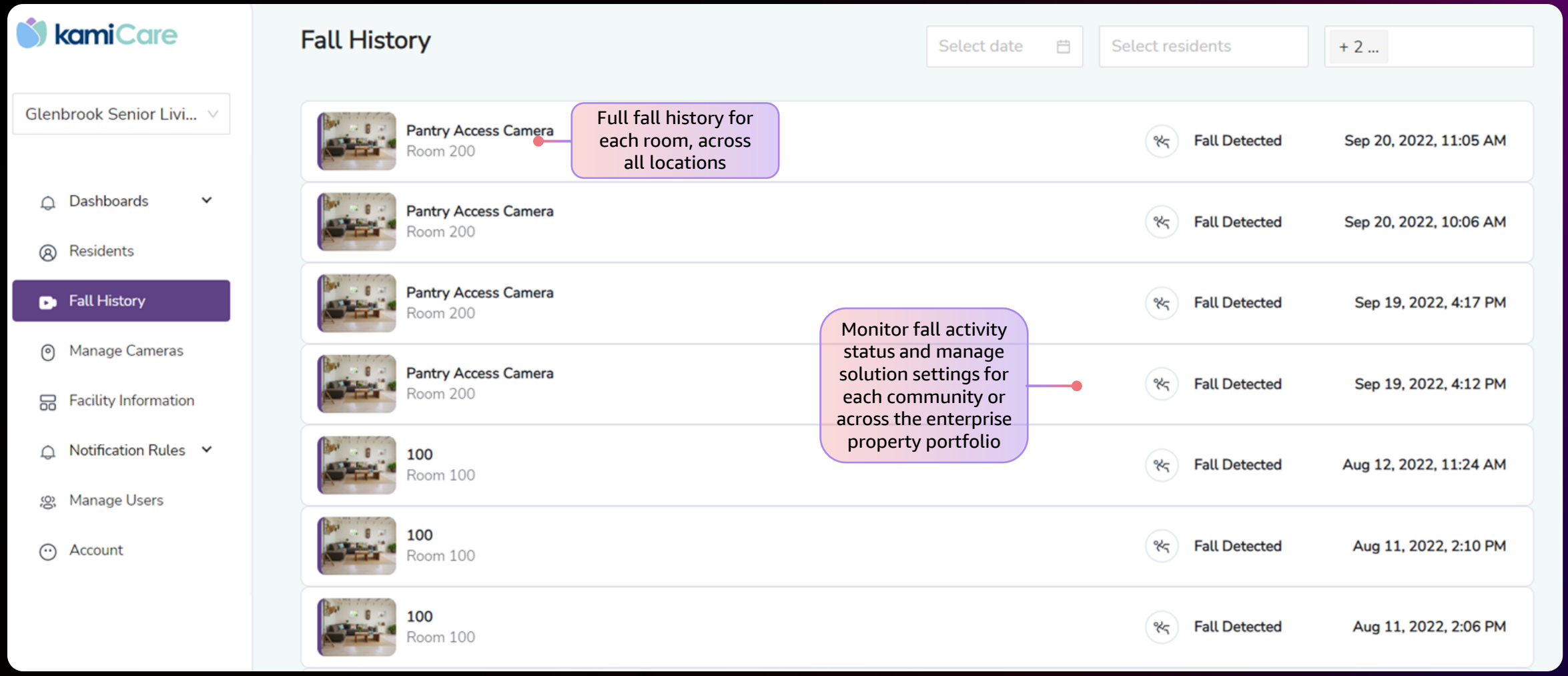
- Deployed in senior communities
- Easy to deploy using wifi cameras running edge AI
- 99.9% accurate
- Sends alerts to care staff within 90 seconds
- Shows 15 seconds pre-fall video and up to 30 mins post-fall video
- Able to differentiate between behavioral falls vs. actual falls
- Identifies contributing factors to prevent future falls

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KamiCare UI

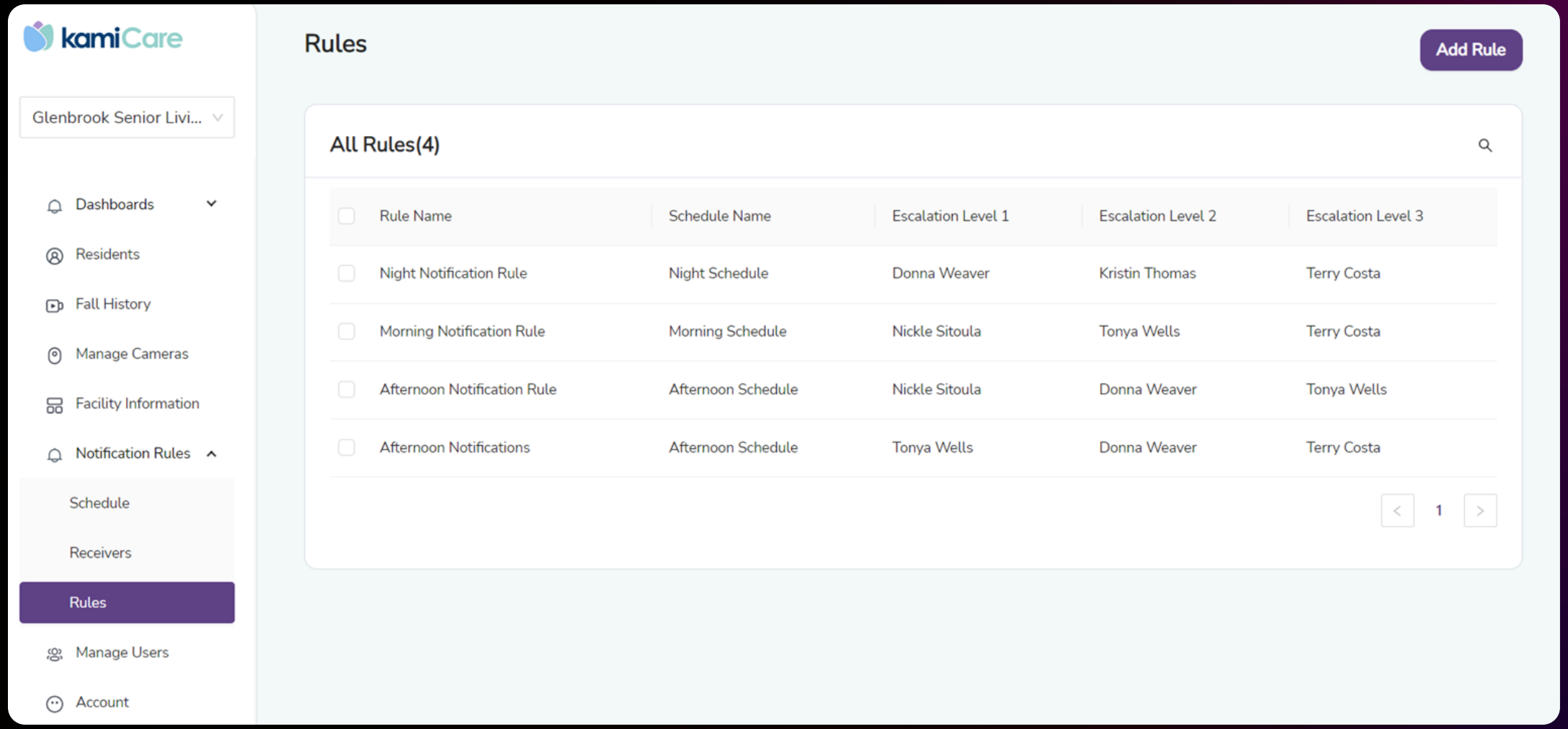
FALL HISTORY



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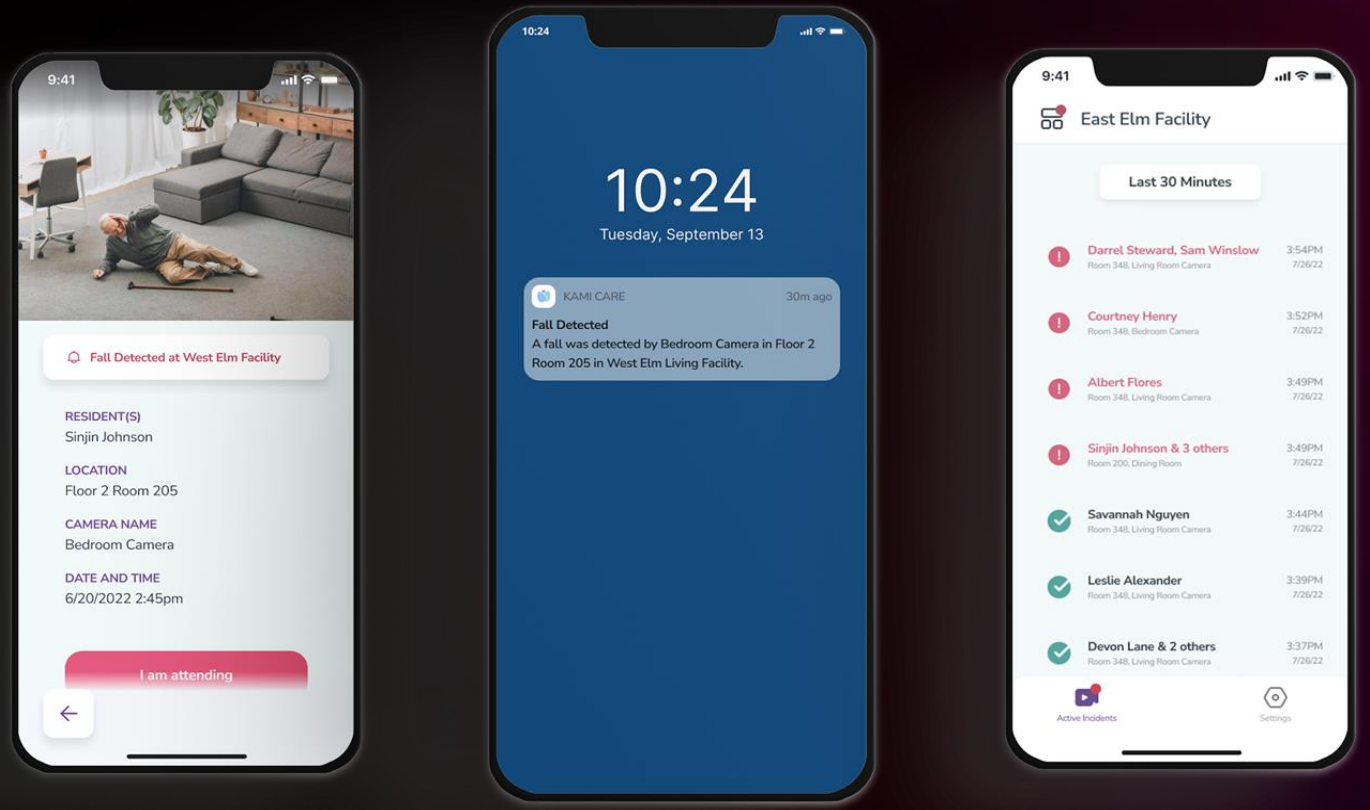
KamiCare UI

NOTIFICATION RULES



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KamiCare mobile app



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Solution #2

VISION AI SENSORS MODERNIZE PERS

PROBLEM

Bay Alarm Medical, the leading medical alert provider, approached Kami Vision to improve its PERS

The company wanted a better way to help seniors call for help and stay safe; they also wanted to remove the false positives in this space



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Solution #2

VISION AI SENSORS MODERNIZE PERS

SOLUTION

We designed a custom solution to integrate DIY cameras with the existing PERS system for video verification

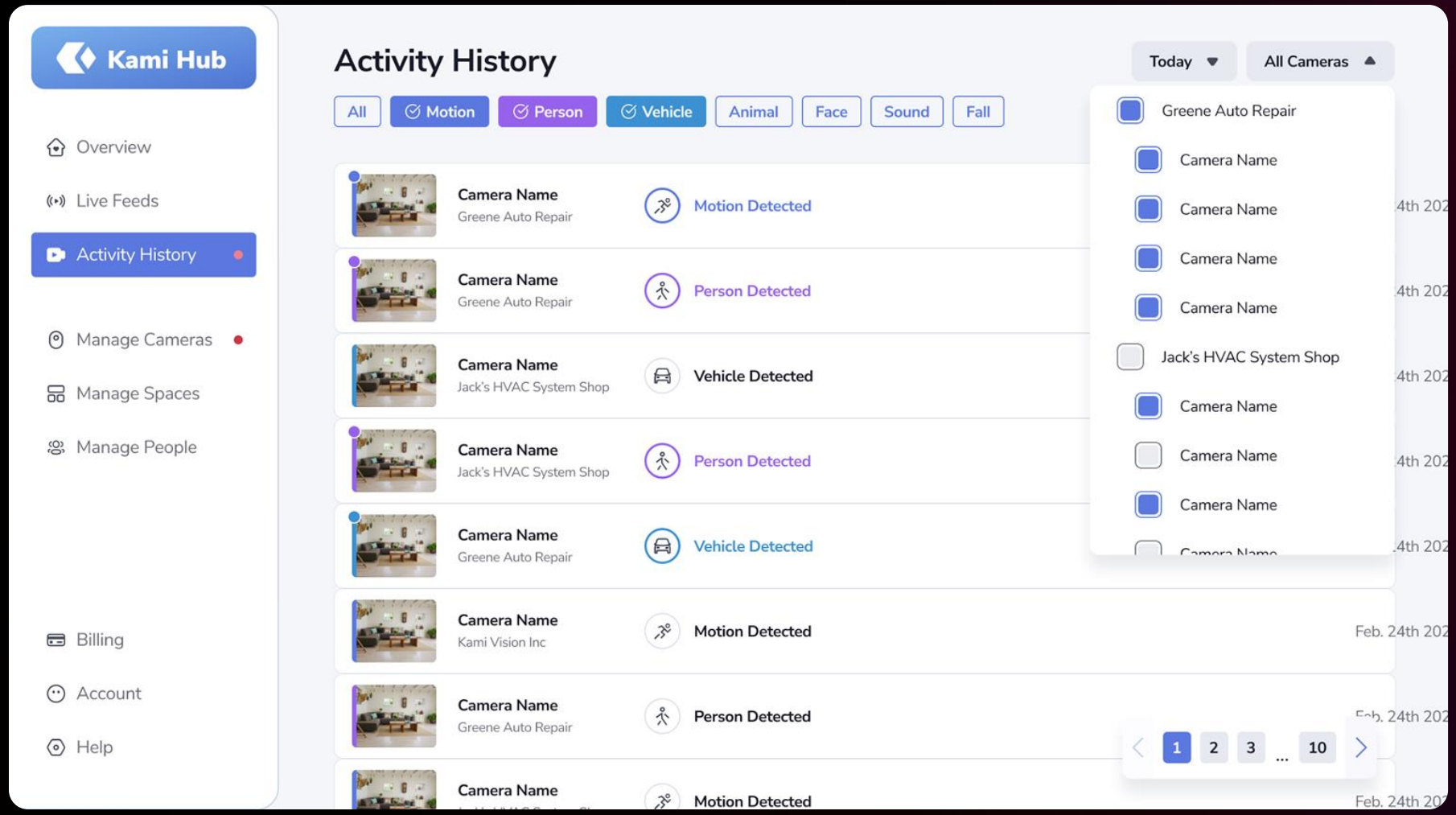
The solution records and sends a video to the monitoring center for better help dispatch



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Kami Hub

GENERIC VISION AI PLATFORM



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Lessons learned for CTOs

1

Focus on overall product value – prove value first

2

Create architecture diagram and use existing components to reduce time to market (e.g., we use a standard DB vs writing it ourselves)

3

Product meeting customers is very different than product meeting QA

4

We learned a lot from the real deployments after v1 launch

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Kinesis Video Streams benefits summary

1. Kinesis Video Streams makes it very easy to stream videos from devices for storage, analysis, and lifecycle management
2. Kinesis Video Streams handles all the infrastructure needed for video streams
3. Supports both live video and playback for events
4. Easy to integrate with AI models running in the cloud
5. SDKs help build the application quickly

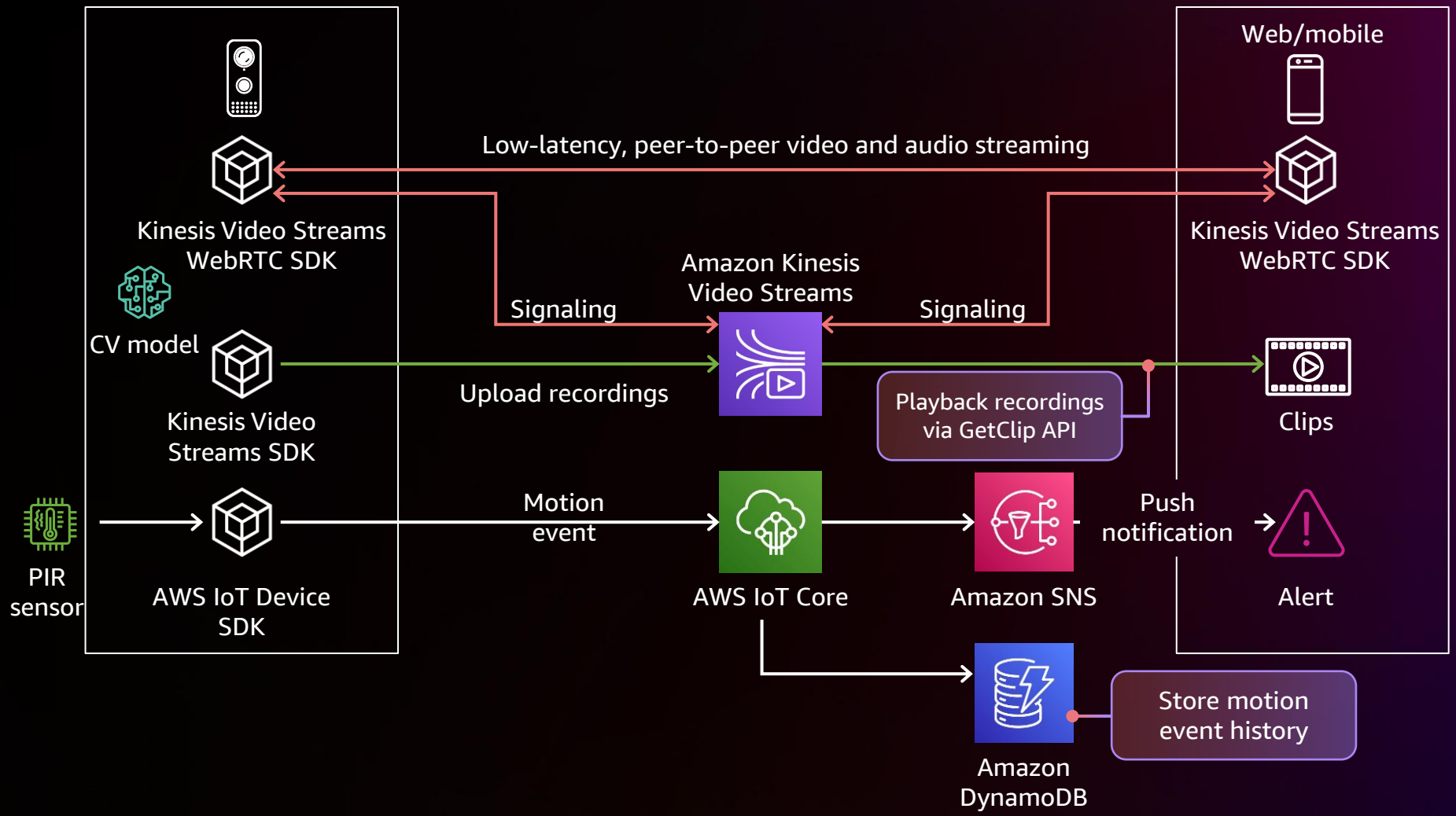
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Smart home

Streams

WebRTC



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Thank you!

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