Prevent online fraud while ensuring a frictionless customer experience

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Fraud Leads to Friction

SURGE OF FRAUDULENT ACCOUNT REGISTRATIONS

Fake credentials, stolen identities, and bots make creating fake accounts fast and easy

SPIKE IN FRAUD ALERTS INCREASES ACCOUNT REVIEWS

Customer service teams, overwhelmed by alert volumes, struggle to keep up

FRICTION ADDED TO STOP FRAUDULENT REGISTRATIONS

Friction slows and lowers account registrations from legitimate customers

Use Case: Coupon Shopper

A Digital Platform

An online rewards platform that allows users to earn Gift Cards, rewards and coupons for online shopping.

Growing User Base

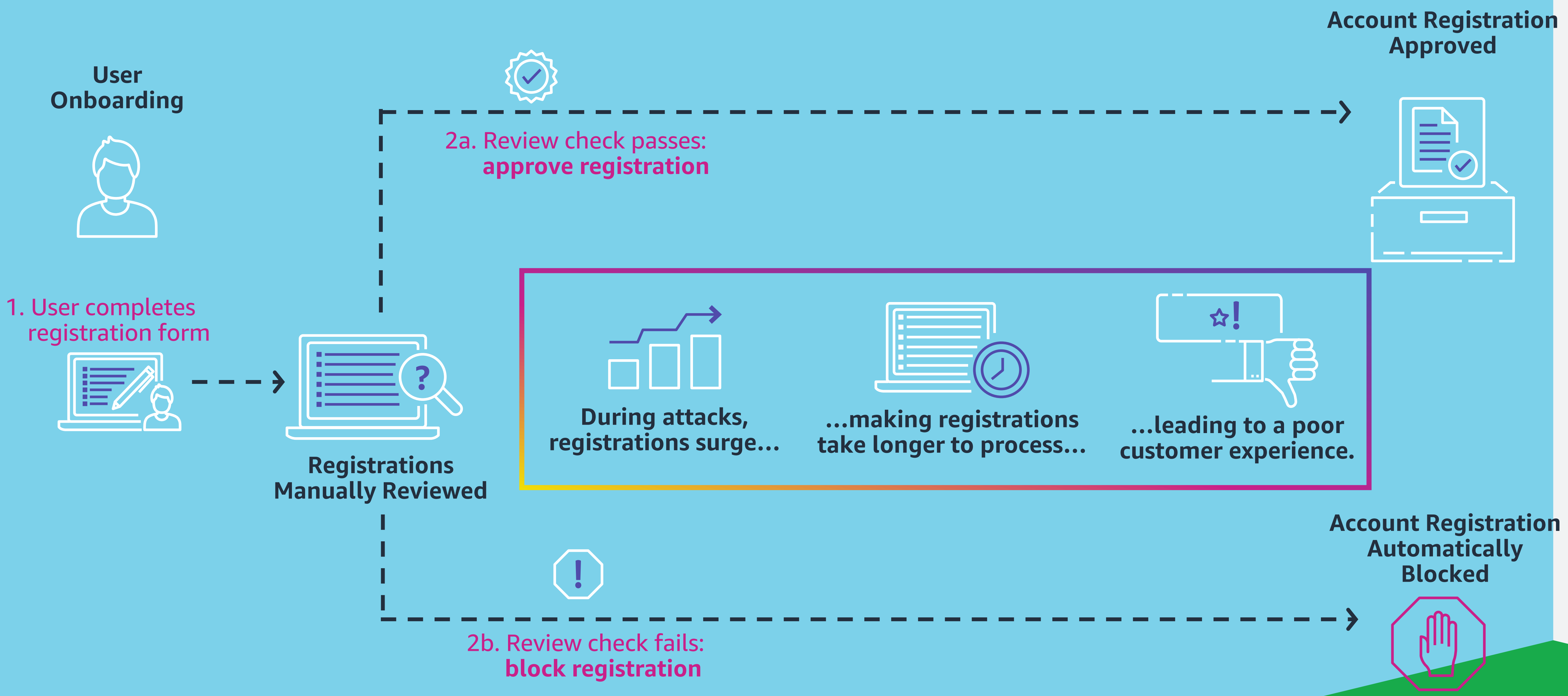
A growing user base with currently ~50k monthly active users. Awards millions of dollars worth of Gift Cards and coupons annually.

Increasing Online Fraud

Increasing fraudulent user registrations from bad actors, automated accounts/bots, who try to game the system to earn Gift Cards and coupons.

Net annual loss of ~$1.5 million

User Onboarding: with manual review



User Onboarding

1. User completes registration form

Registrations Manually Reviewed

2a. Review check passes: **approve registration**

Account Registration Approved

During attacks, registrations surge…

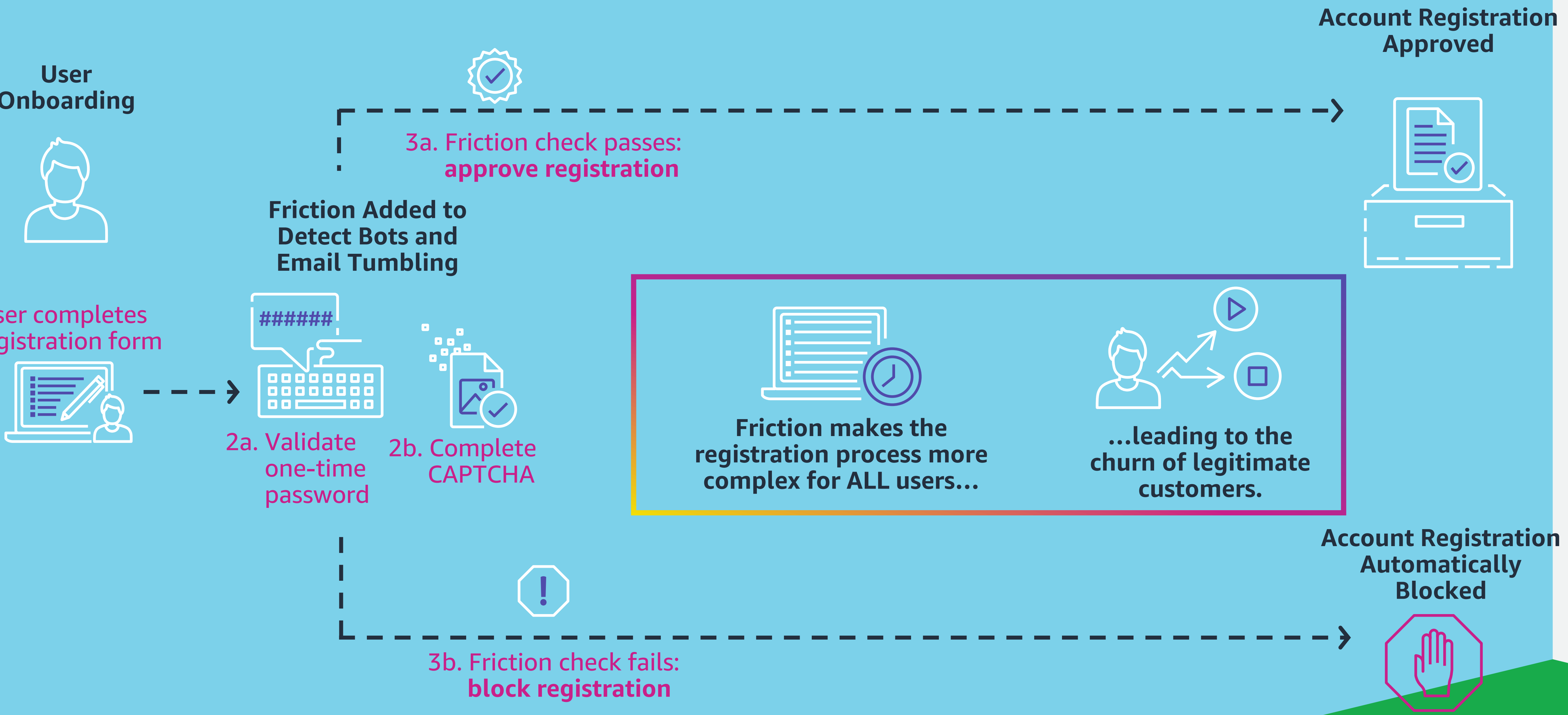
…making registrations take longer to process…

…leading to a poor customer experience.

2b. Review check fails: **block registration**

Account Registration Automatically Blocked

User Onboarding: with automated friction



User Onboarding

1. User completes registration form

Friction Added to Detect Bots and Email Tumbling

2a. Validate one-time password

2b. Complete CAPTCHA

3a. Friction check passes: **approve registration**

Account Registration Approved

Friction makes the registration process more complex for ALL users…

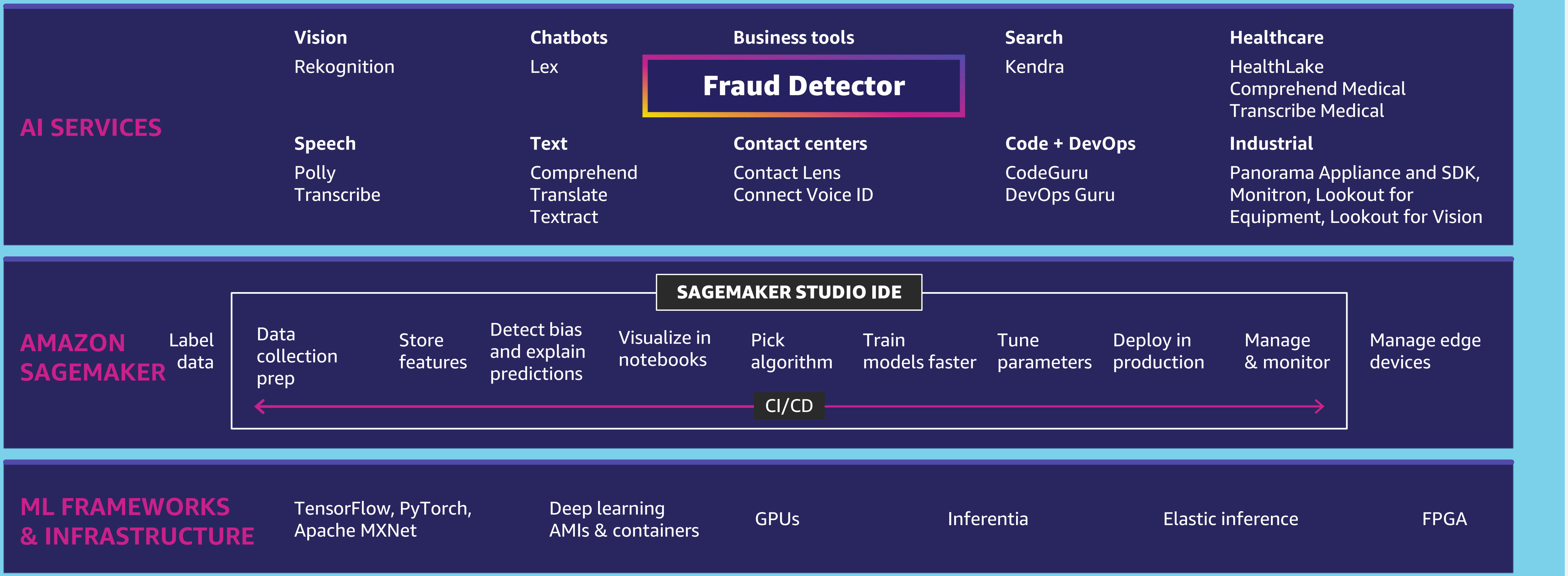
…leading to the churn of legitimate customers.

3b. Friction check fails: **block registration**

Account Registration Automatically Blocked

The AWS ML stack

Broadest and most complete set of machine learning capabilities



AI SERVICES

Vision
Rekognition

Chatbots
Lex

Business tools
Fraud Detector

Search
Kendra

Healthcare
HealthLake
Comprehend Medical
Transcribe Medical

Speech
Polly
Transcribe

Text
Comprehend
Translate
Textract

Contact centers
Contact Lens
Connect Voice ID

Code + DevOps
CodeGuru
DevOps Guru

Industrial
Panorama Appliance and SDK, Monitron, Lookout for Equipment, Lookout for Vision

AMAZON SAGEMAKER

Label data

SAGEMAKER STUDIO IDE

- Data collection prep
- Store features
- Detect bias and explain predictions
- Visualize in notebooks
- Pick algorithm
- Train models faster
- Tune parameters
- Deploy in production
- Manage & monitor

CI/CD

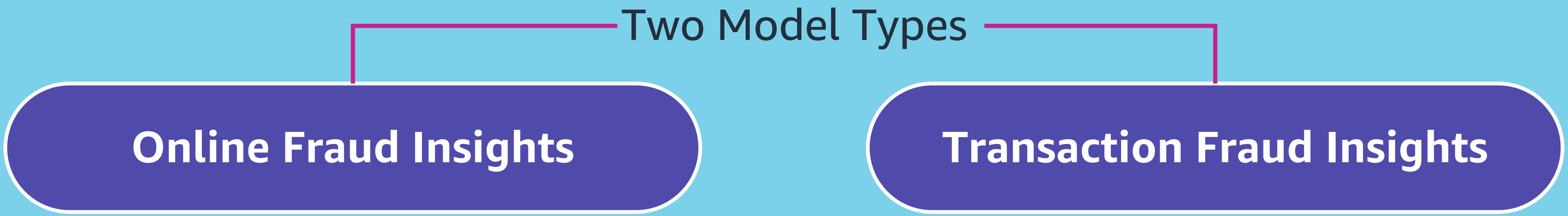
Manage edge devices

ML FRAMEWORKS & INFRASTRUCTURE

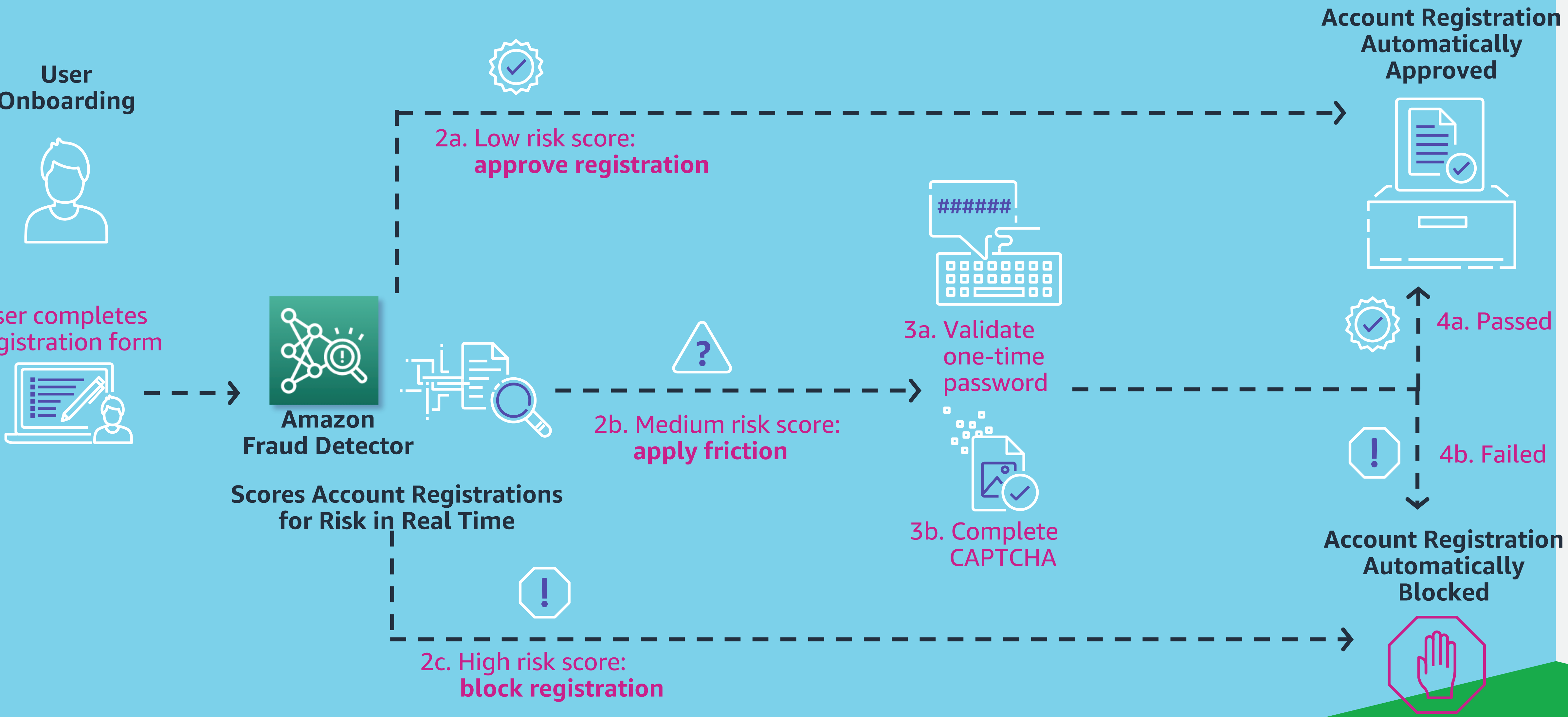
- TensorFlow, PyTorch, Apache MXNet
- Deep learning AMIs & containers
- GPUs
- Inferentia
- Elastic inference
- FPGA

Amazon Fraud Detector

A fully managed service that makes it easy to use machine learning to detect potential online fraud in real-time, at scale



User Onboarding: with Amazon Fraud Detector



User Onboarding

1. User completes registration form

Amazon Fraud Detector

Scores Account Registrations for Risk in Real Time

2a. Low risk score: **approve registration**

2b. Medium risk score: **apply friction**

2c. High risk score: **block registration**

3a. Validate one-time password

3b. Complete CAPTCHA

4a. Passed

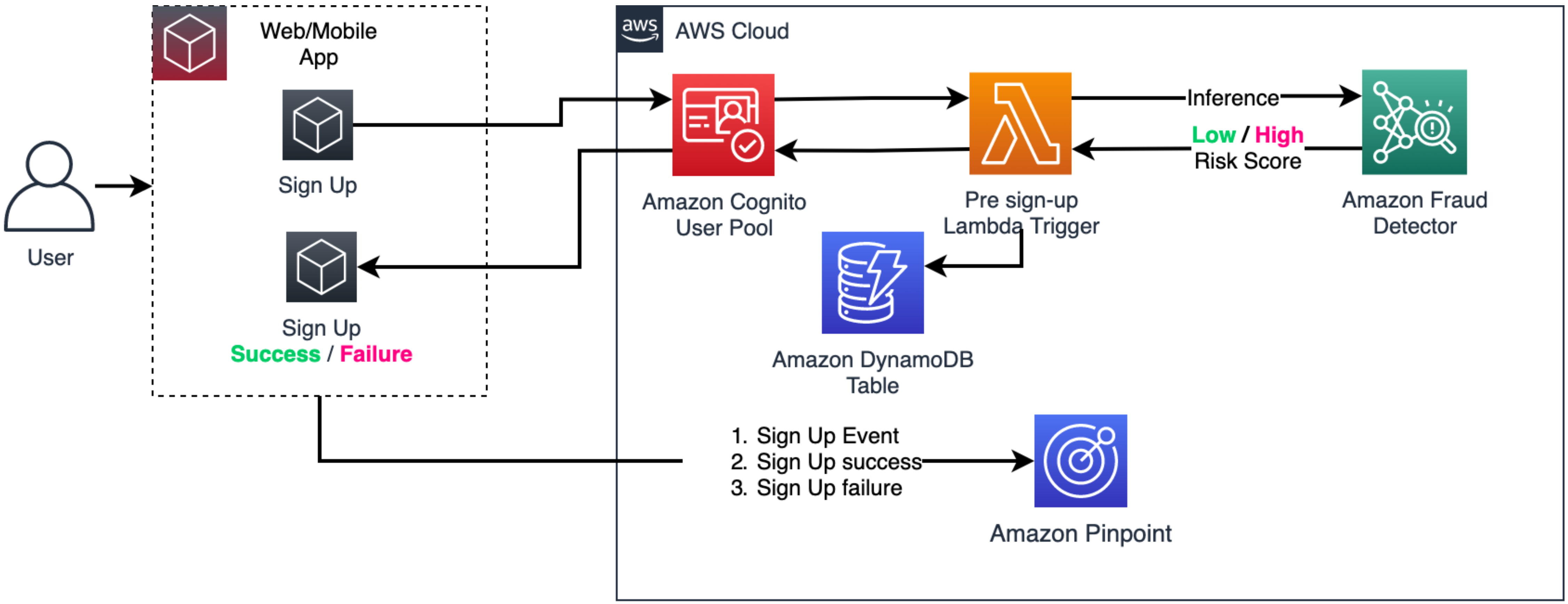
4b. Failed

Account Registration Automatically Approved

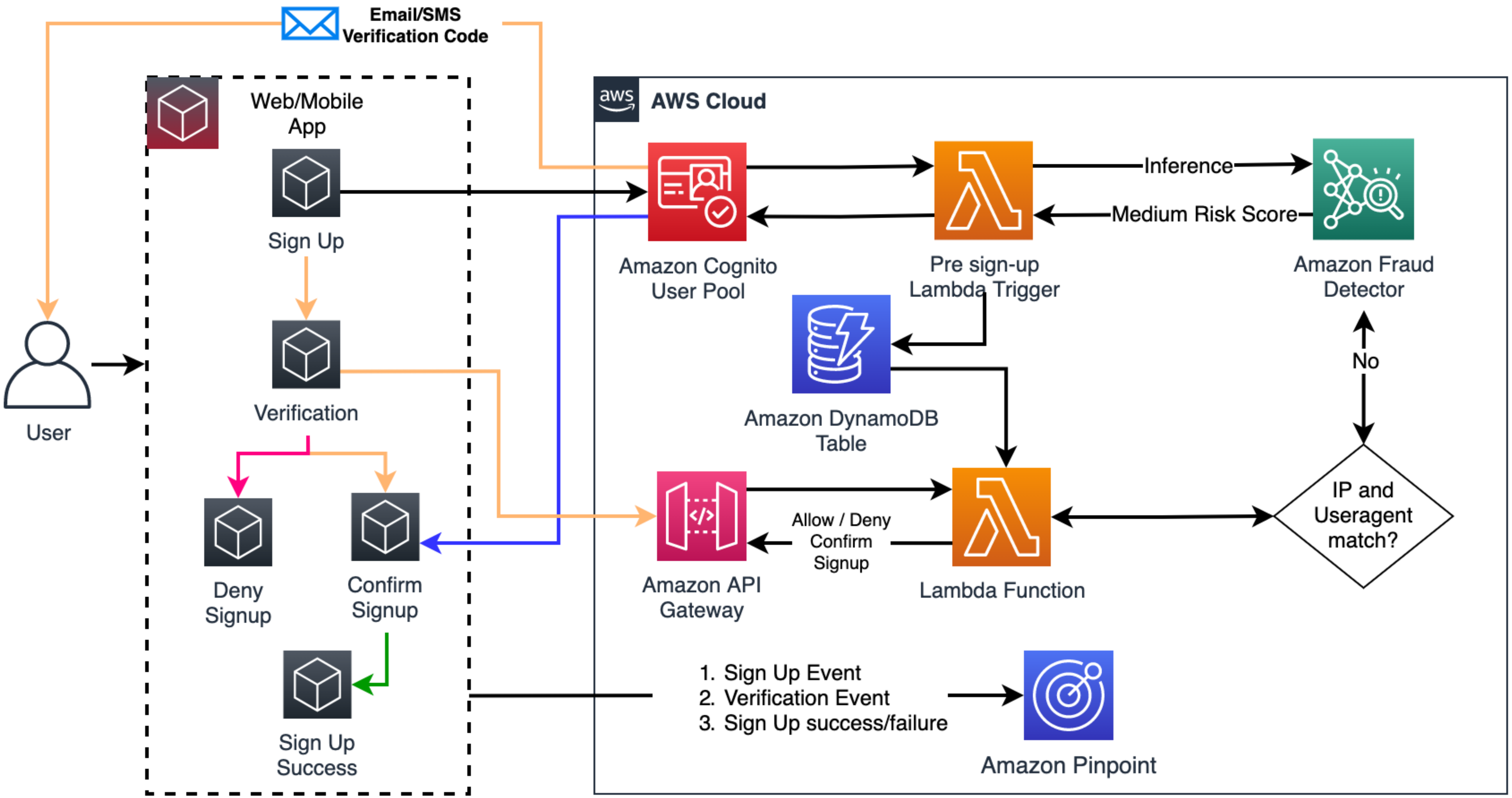
Account Registration Automatically Blocked

Coupon Shopper Demo

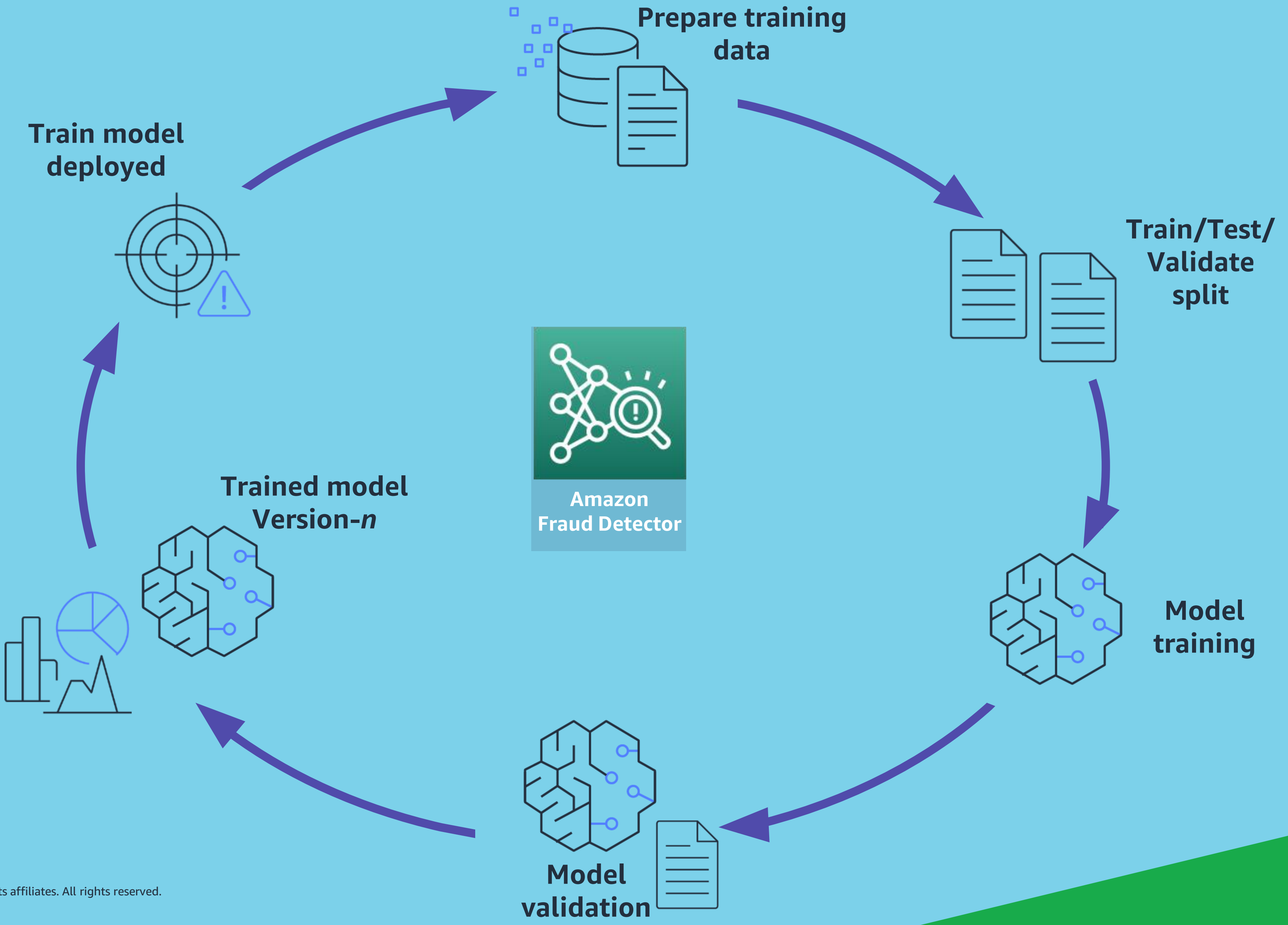
Solution Architecture



Solution Architecture



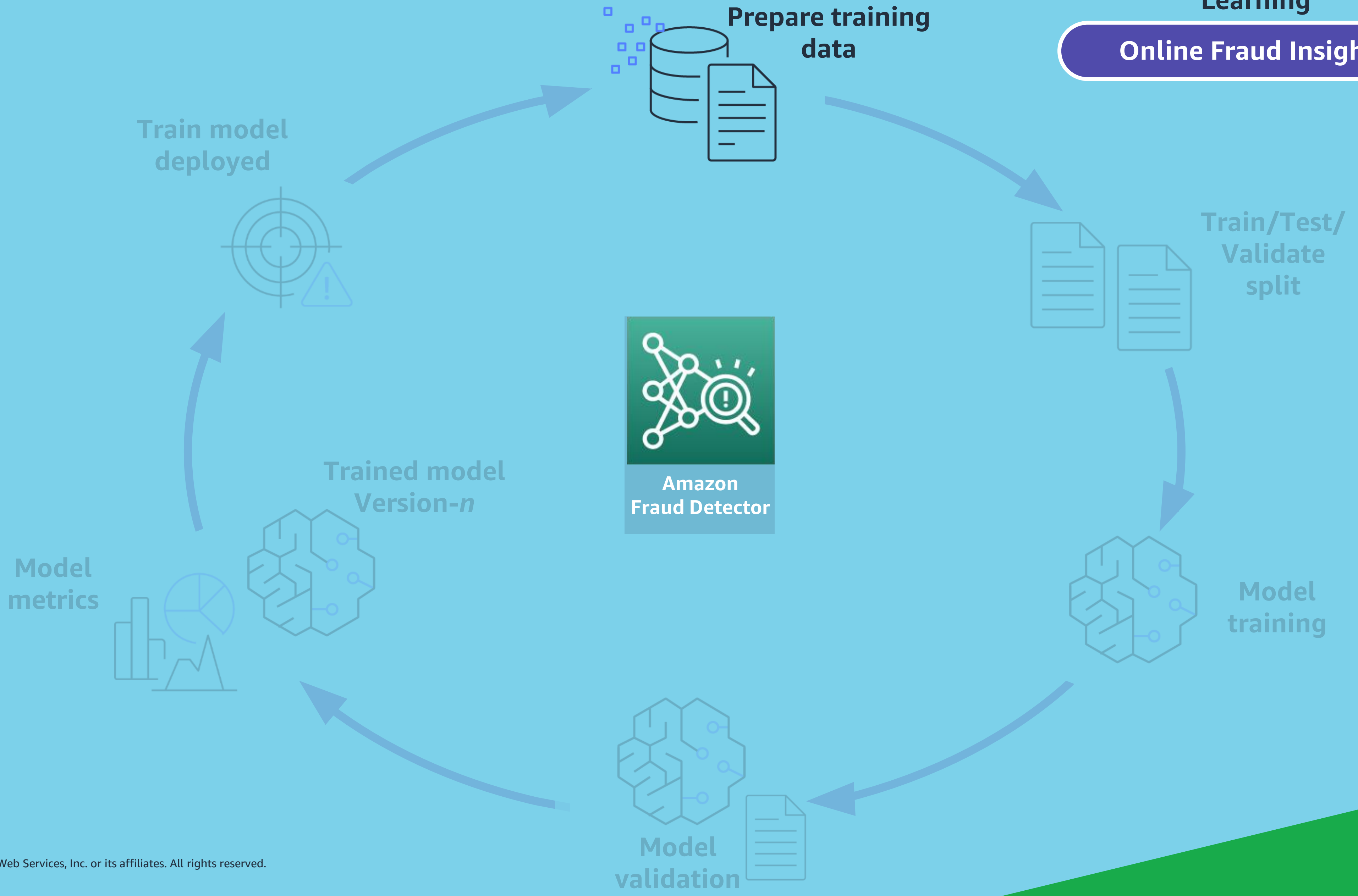
How Amazon Fraud Detector works



How Amazon Fraud Detector works

Supervised Learning

Online Fraud Insights



General Training Data Guidelines

At least 2 variables required (max 100)

Metadata

Metadata

At least
10K total examples
400 fraud examples

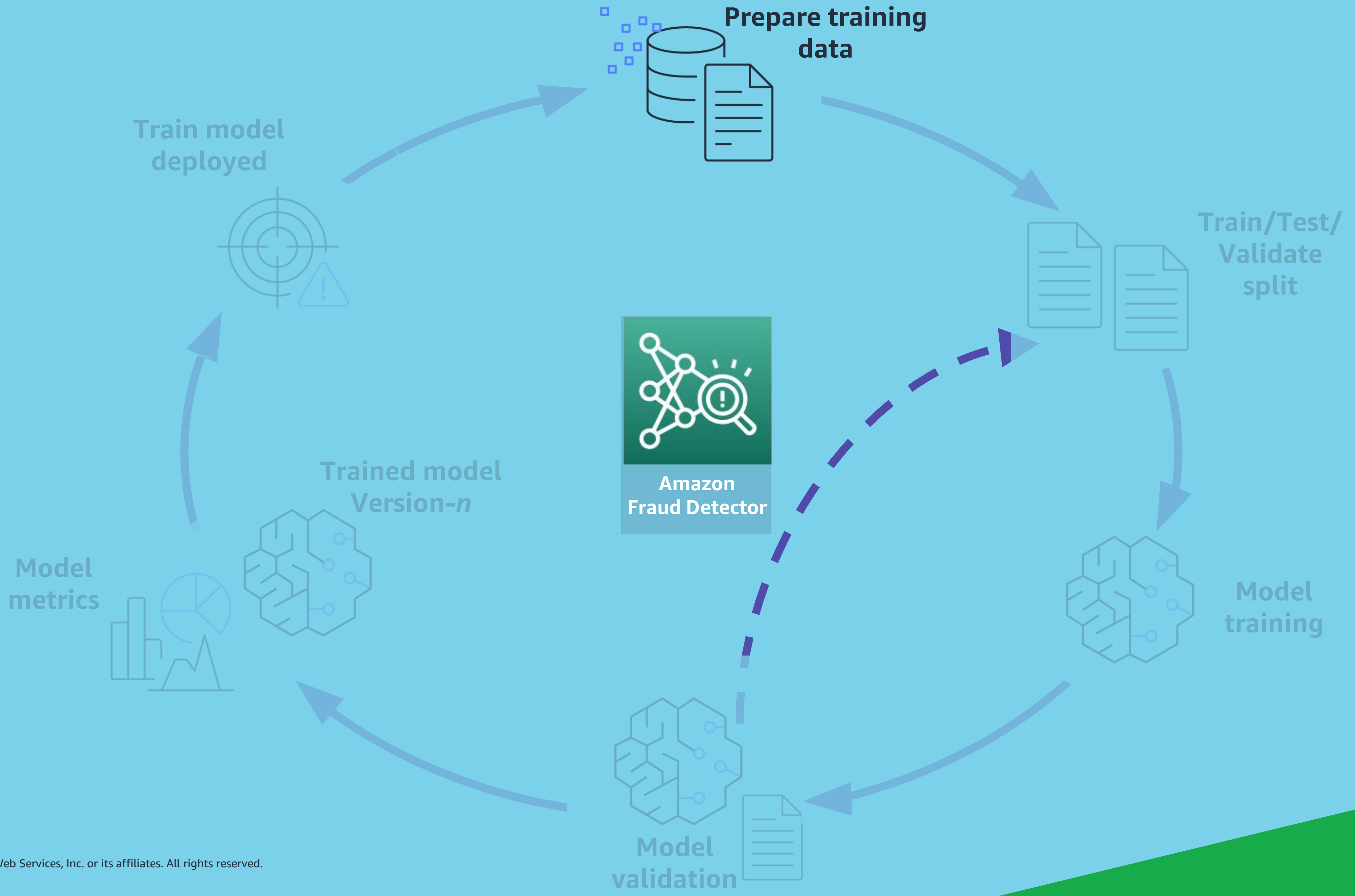
EVENT_TIMESTAMP	Variable 1	Variable 2	Variable N	EVENT_LABEL
9/10/2021 11:05	…	…	…	Legit / 0
9/10/2021 19:34	…	…	…	Legit / 0
9/10/2021 20:29	…	…	…	Fraud / 1
…	…	…	…	…

- **Data must be in CSV format – store in Amazon S3 bucket or stream directly.**
- **2 required Event Metadata variables for *Online Fraud Insights*:** EVENT_TIMESTAMP **and** EVENT_LABEL
- **Recommend at least 3-6 months of data for training the model**
- **Too many NULLs and missing values in a column means it won't be used**

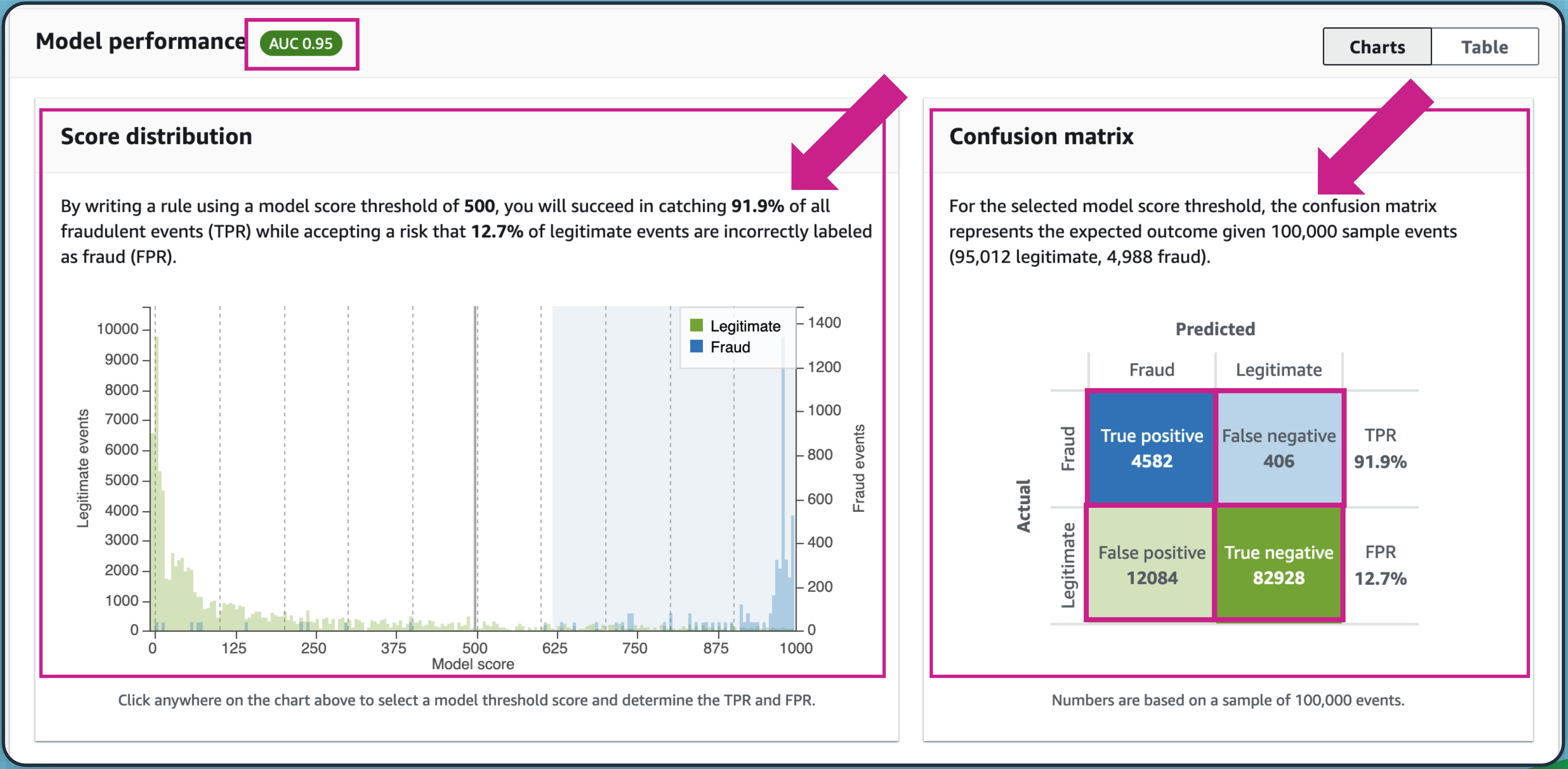
Sample Data

Mandatory variables		6 Additional variables					
EVENT_TIMESTAMP	EVENT_LABEL	IP_ADDRESS	EMAIL	PHONE	ADDRESS	STATE	POSTAL
4/29/19 8:34	fraud	192.94.136.134	synth_crossdaniel@gmail.com	(555)715 - 6254	43424 Davis Inlet Apt. 764	NY	32155
4/29/19 8:41	fraud	192.31.192.222	synth_wilsonjustin@yahoo.com	(555)740 - 7222	55403 Jackson Hill	ND	32843
4/29/19 8:43	fraud	192.174.61.17	synth_julie09@hotmail.com	(555)514 - 6454	68642 Leslie Rest Suite 087	NY	34109
4/29/19 8:48	legit	192.88.115.133	synth_max43@hotmail.com	(555)303 - 9960	403 Linda Parkway	KS	33965
4/29/19 8:51	legit	73.60.135.213	synth_billy51@gmail.com	(555)992 - 9688	2566 Henderson Creek Apt. 138	LA	32156
4/29/19 9:28	legit	198.51.101.133	synth_qharris@hotmail.com	(555)672 - 1421	7295 Peterson Ports	ND	33090
4/29/19 9:30	legit	181.20.252.125	synth_john02@yahoo.com	(555)463 - 8749	2404 Huff Pine Apt. 018	MD	34109
…	…	…	…	…	…	…	…
5/2/19 7:36	legit	123.143.40.137	synth_ashley90@hotmail.com	(555)200 - 9565	64680 Solomon Causeway	LA	32678
5/2/19 7:38	legit	192.88.107.202	synth_barrettashley@hotmail.com	(555)562 - 3998	4556 Jordan River Suite 917	AK	32967
5/2/19 7:47	fraud	192.175.40.168	synth_colemariah@gmail.com	(555)491 - 8229	046 Joel Turnpike Suite 872	CA	34205

How Amazon Fraud Detector works



Assessing Model Performance



Model performance AUC 0.95

Score distribution

By writing a rule using a model score threshold of **500**, you will succeed in catching **91.9%** of all fraudulent events (TPR) while accepting a risk that **12.7%** of legitimate events are incorrectly labeled as fraud (FPR).

Click anywhere on the chart above to select a model threshold score and determine the TPR and FPR.

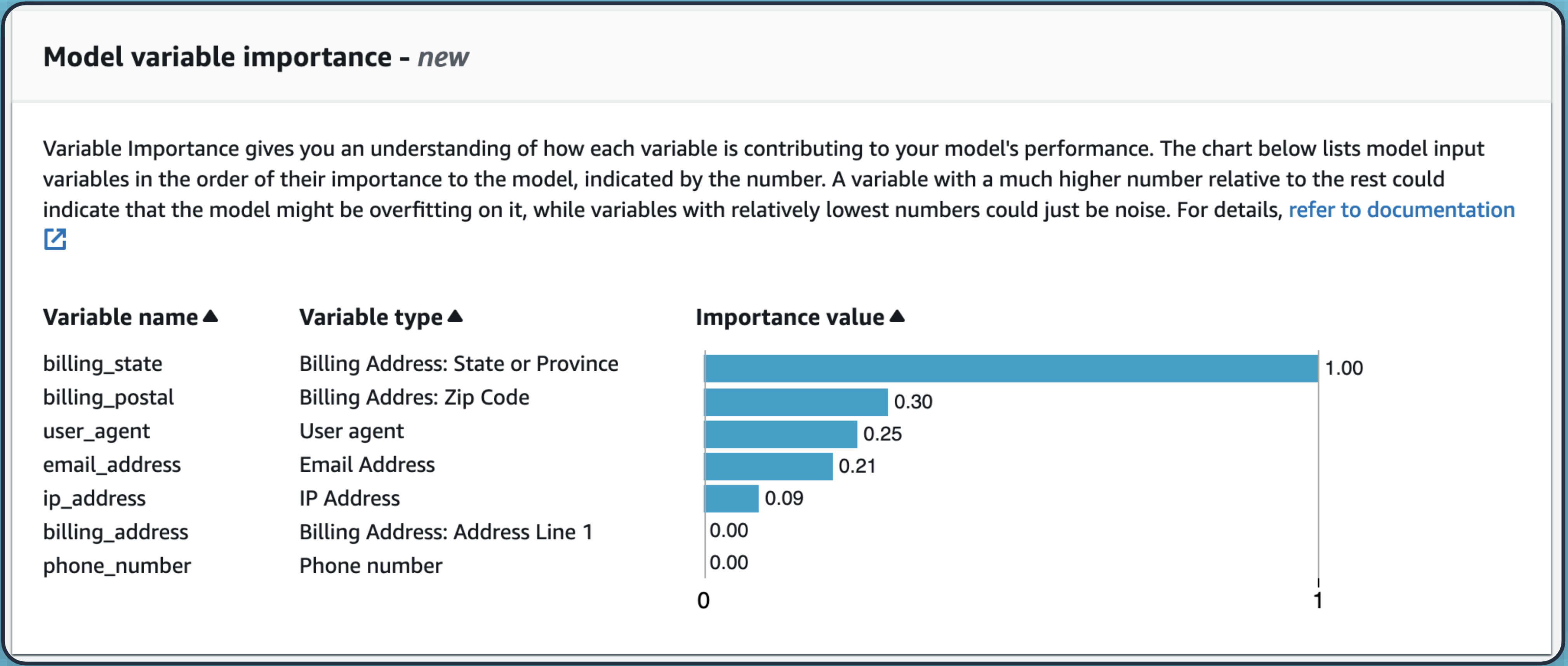
Confusion matrix

For the selected model score threshold, the confusion matrix represents the expected outcome given 100,000 sample events (95,012 legitimate, 4,988 fraud).

		Predicted		
		Fraud	Legitimate	
Actual	Fraud	True positive 4582	False negative 406	TPR 91.9%
	Legitimate	False positive 12084	True negative 82928	FPR 12.7%

Numbers are based on a sample of 100,000 events.

Assessing Model Performance

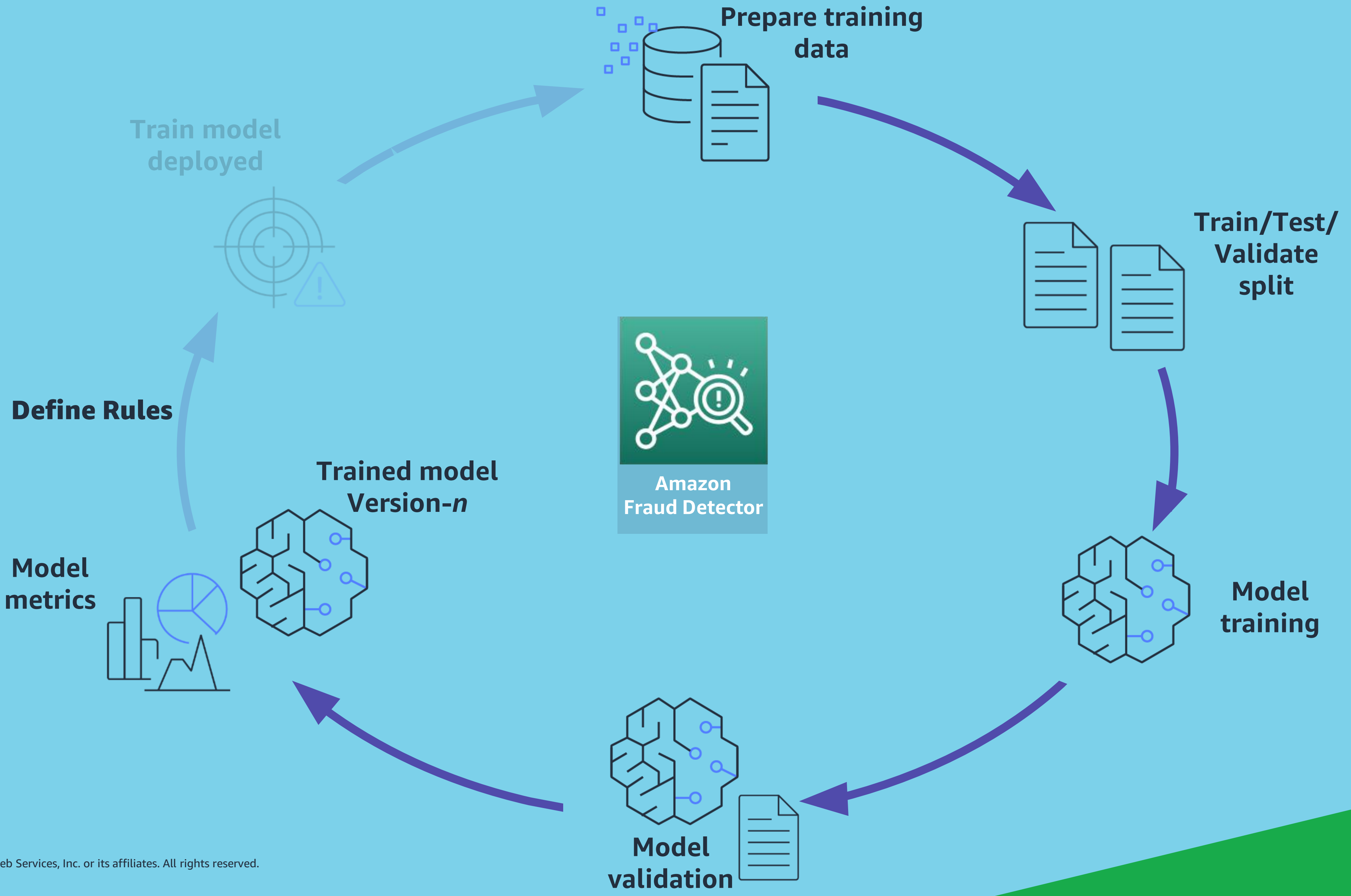


Model variable importance - *new*

Variable Importance gives you an understanding of how each variable is contributing to your model's performance. The chart below lists model input variables in the order of their importance to the model, indicated by the number. A variable with a much higher number relative to the rest could indicate that the model might be overfitting on it, while variables with relatively lowest numbers could just be noise. For details, refer to documentation ↗

Variable name ▲	Variable type ▲	Importance value ▲
billing_state	Billing Address: State or Province	1.00
billing_postal	Billing Addres: Zip Code	0.30
user_agent	User agent	0.25
email_address	Email Address	0.21
ip_address	IP Address	0.09
billing_address	Billing Address: Address Line 1	0.00
phone_number	Phone number	0.00

How Amazon Fraud Detector works



Prepare training data

Train/Test/ Validate split

Model training

Model validation

Model metrics

Trained model Version-*n*

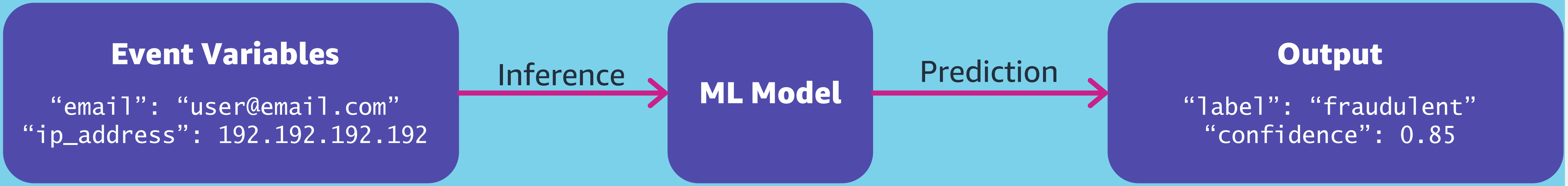
Define Rules

Train model deployed

Amazon Fraud Detector

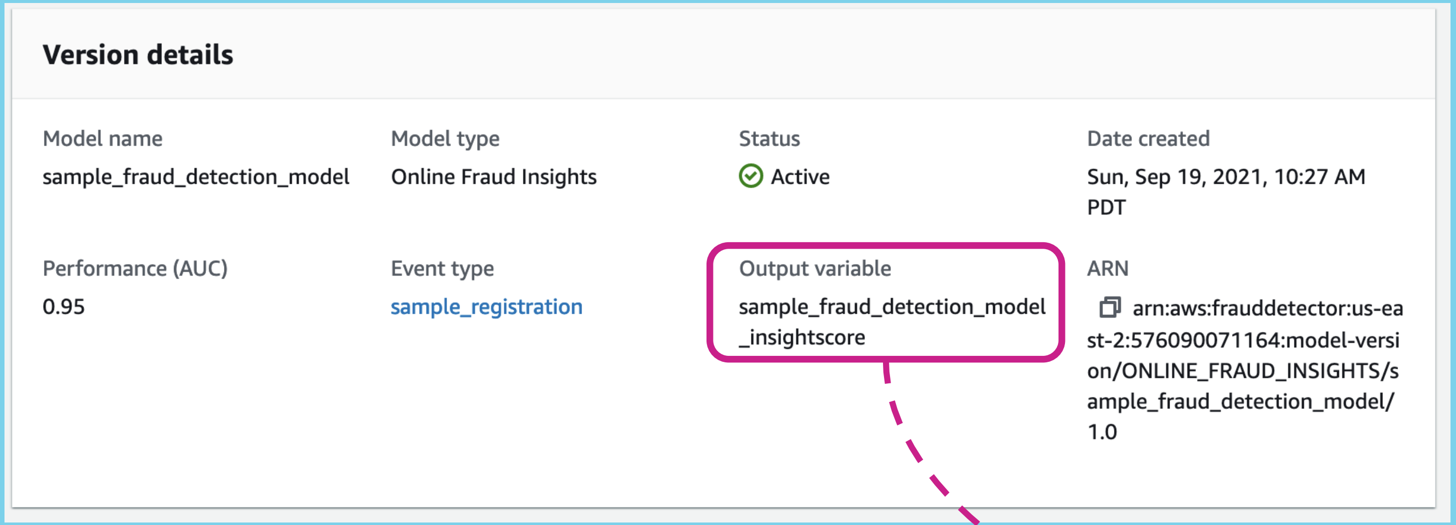
Defining Rules

A typical ML model outcome



Confidence score between 0 and 1

Defining Rules



Version details

Model name
sample_fraud_detection_model

Model type
Online Fraud Insights

Status
✓ Active

Date created
Sun, Sep 19, 2021, 10:27 AM PDT

Performance (AUC)
0.95

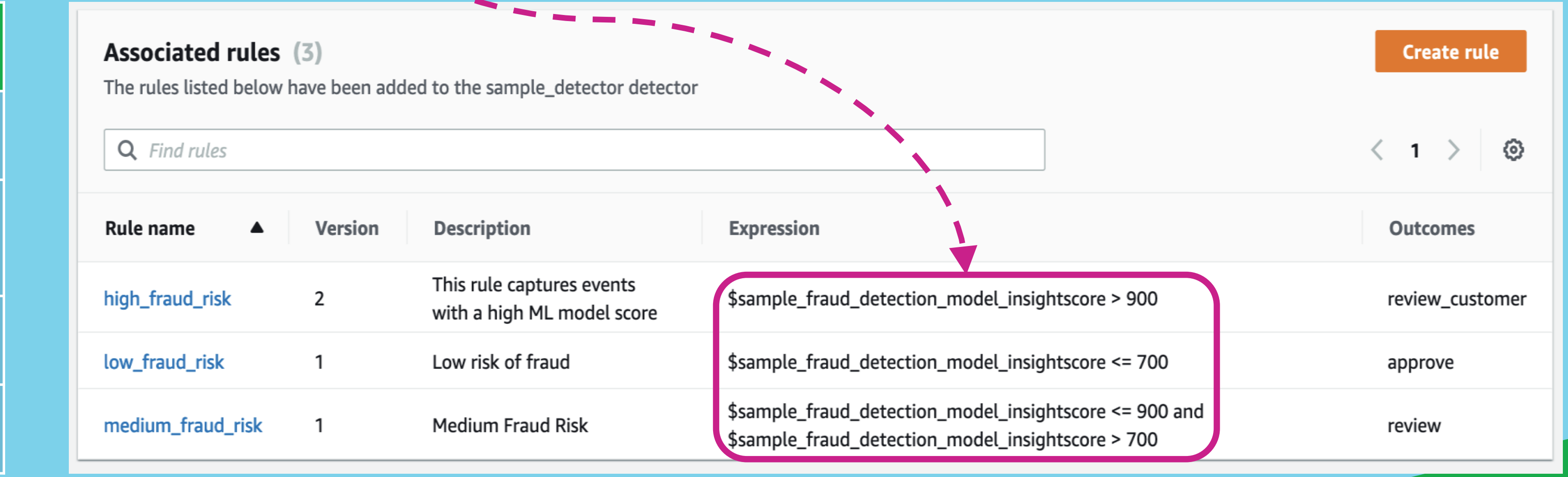
Event type
sample_registration

Output variable
sample_fraud_detection_model_insightscore

ARN
arn:aws:frauddetector:us-east-2:576090071164:model-version/ONLINE_FRAUD_INSIGHTS/sample_fraud_detection_model/1.0

Model Score	Estimated FPR
975	0.05%
950	1%
900	2%
860	3%
775	5%
700	7%
600	10%

Rule language
`$variable < 100`
`$variable in [5, 10, 25, 100]`
`$variable != "US"`
`$variable == 1000`

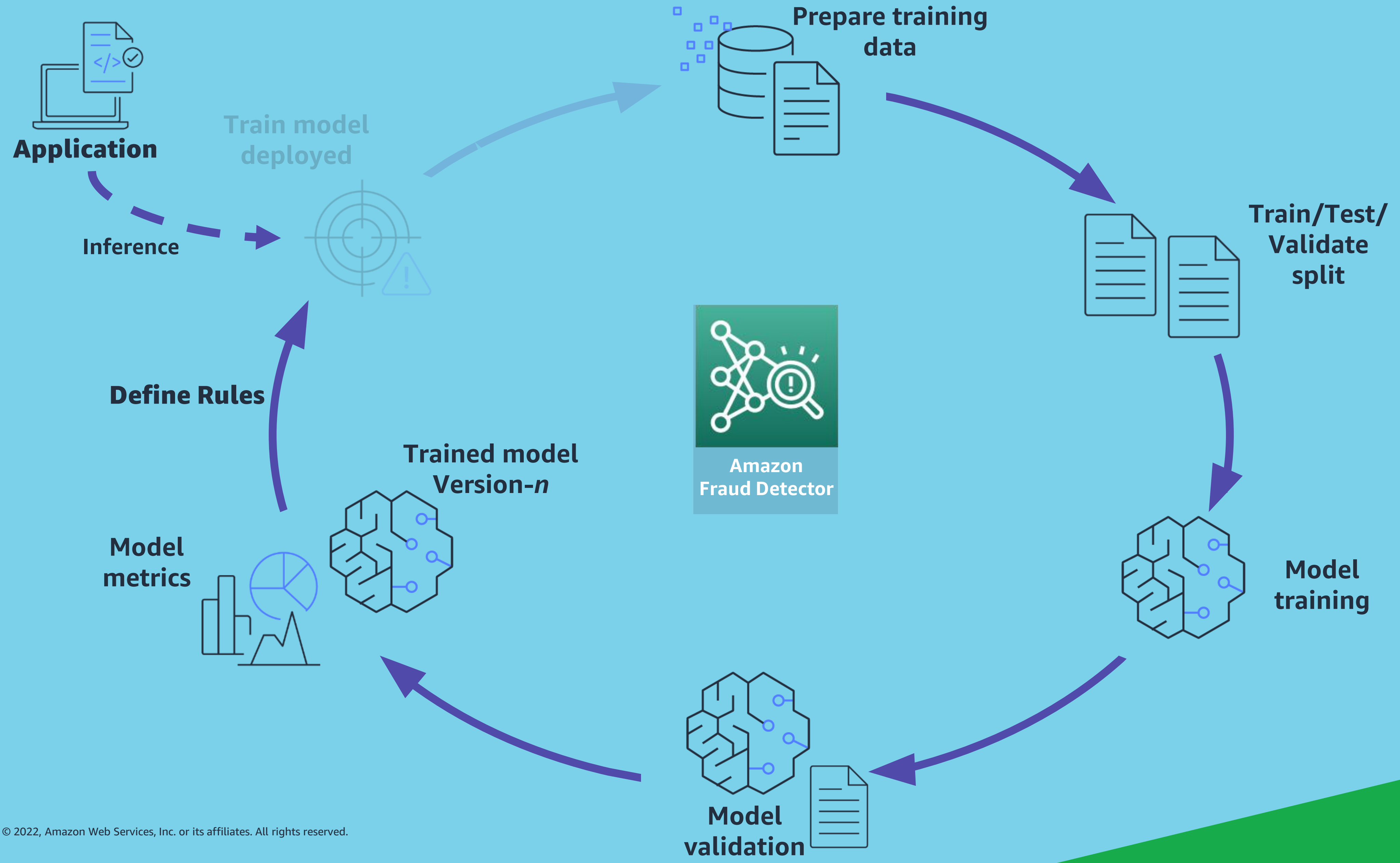


Associated rules (3)

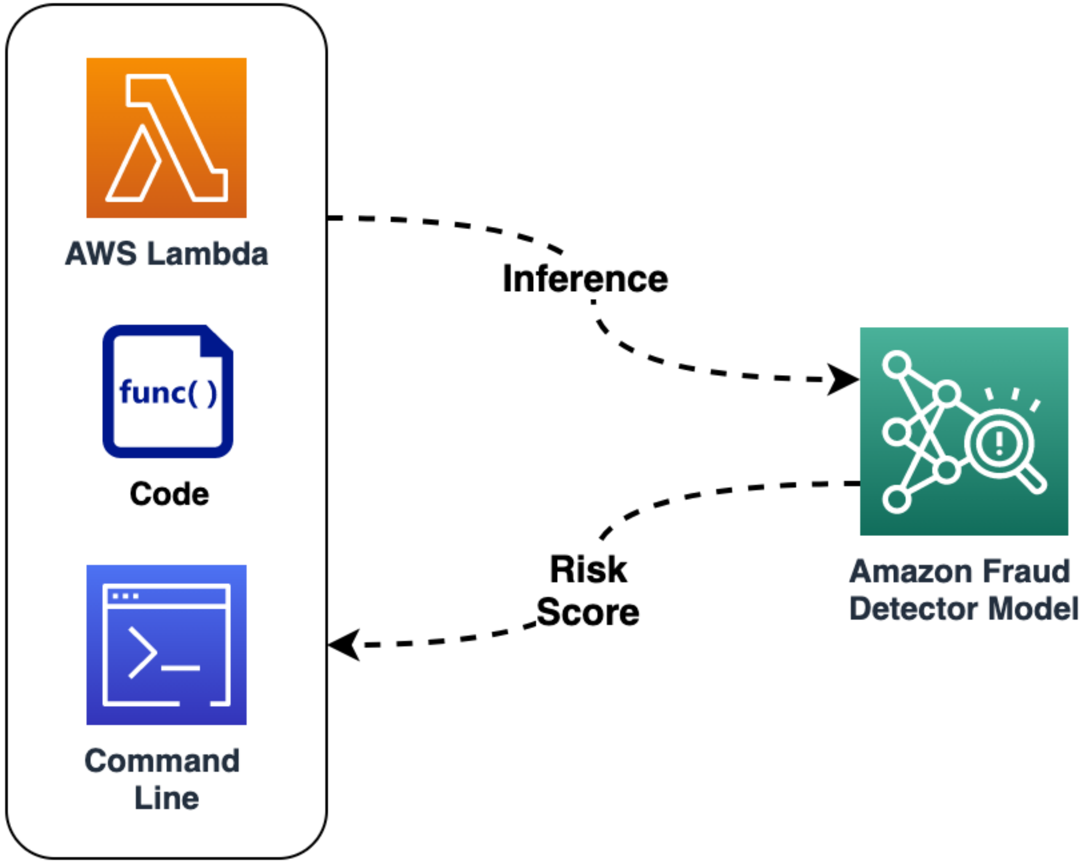
The rules listed below have been added to the sample_detector detector

Rule name ▲	Version	Description	Expression	Outcomes
high_fraud_risk	2	This rule captures events with a high ML model score	$sample_fraud_detection_model_insightscore > 900	review_customer
low_fraud_risk	1	Low risk of fraud	$sample_fraud_detection_model_insightscore <= 700	approve
medium_fraud_risk	1	Medium Fraud Risk	$sample_fraud_detection_model_insightscore <= 900 and $sample_fraud_detection_model_insightscore > 700	review

How Amazon Fraud Detector works



Generating predictions with a deployed model



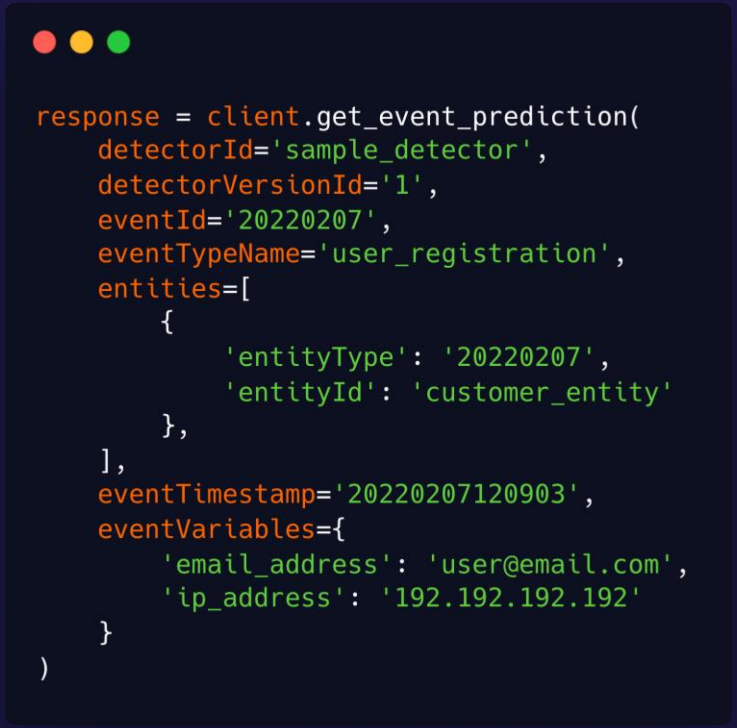
Generating predictions with a deployed model

AWS SDK

Python, NodeJS, Java, C++, .Net etc.

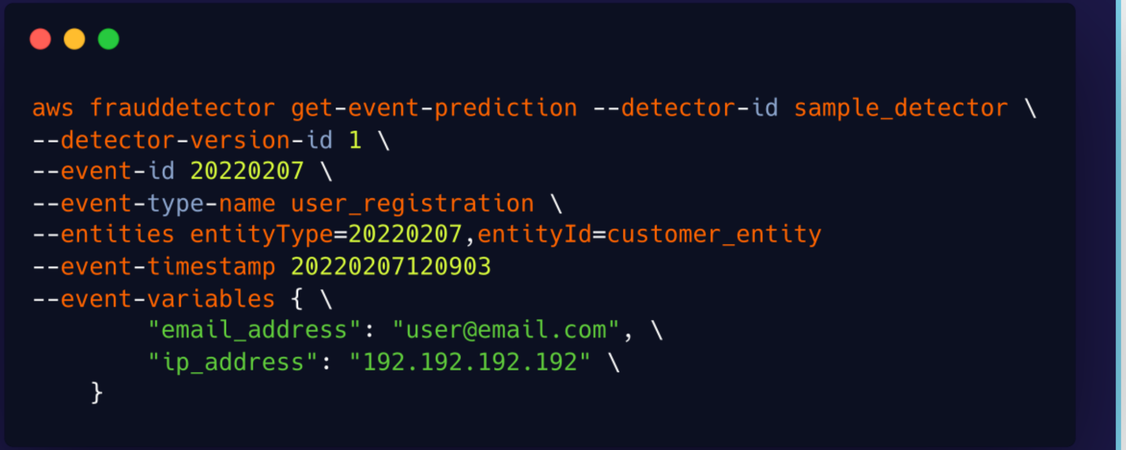
GetEventPrediction **API**

Python example



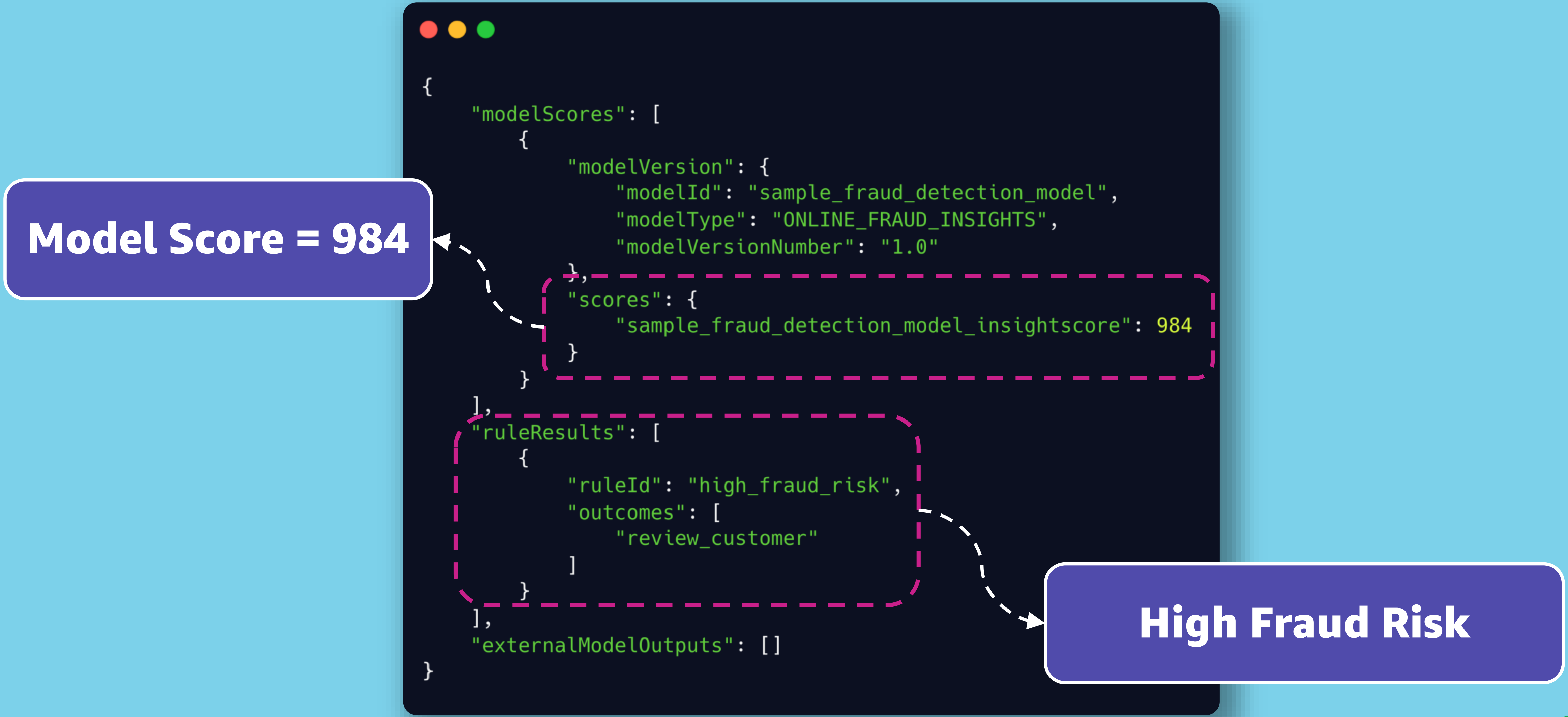
```
response = client.get_event_prediction(
    detectorId='sample_detector',
    detectorVersionId='1',
    eventId='20220207',
    eventTypeName='user_registration',
    entities=[
        {
            'entityType': '20220207',
            'entityId': 'customer_entity'
        },
    ],
    eventTimestamp='20220207120903',
    eventVariables={
        'email_address': 'user@email.com',
        'ip_address': '192.192.192.192'
    }
)
```

AWS CLI



```
aws frauddetector get-event-prediction --detector-id sample_detector \
--detector-version-id 1 \
--event-id 20220207 \
--event-type-name user_registration \
--entities entityType=20220207,entityId=customer_entity
--event-timestamp 20220207120903
--event-variables { \
        "email_address": "user@email.com", \
        "ip_address": "192.192.192.192" \
    }
```

Sample Prediction



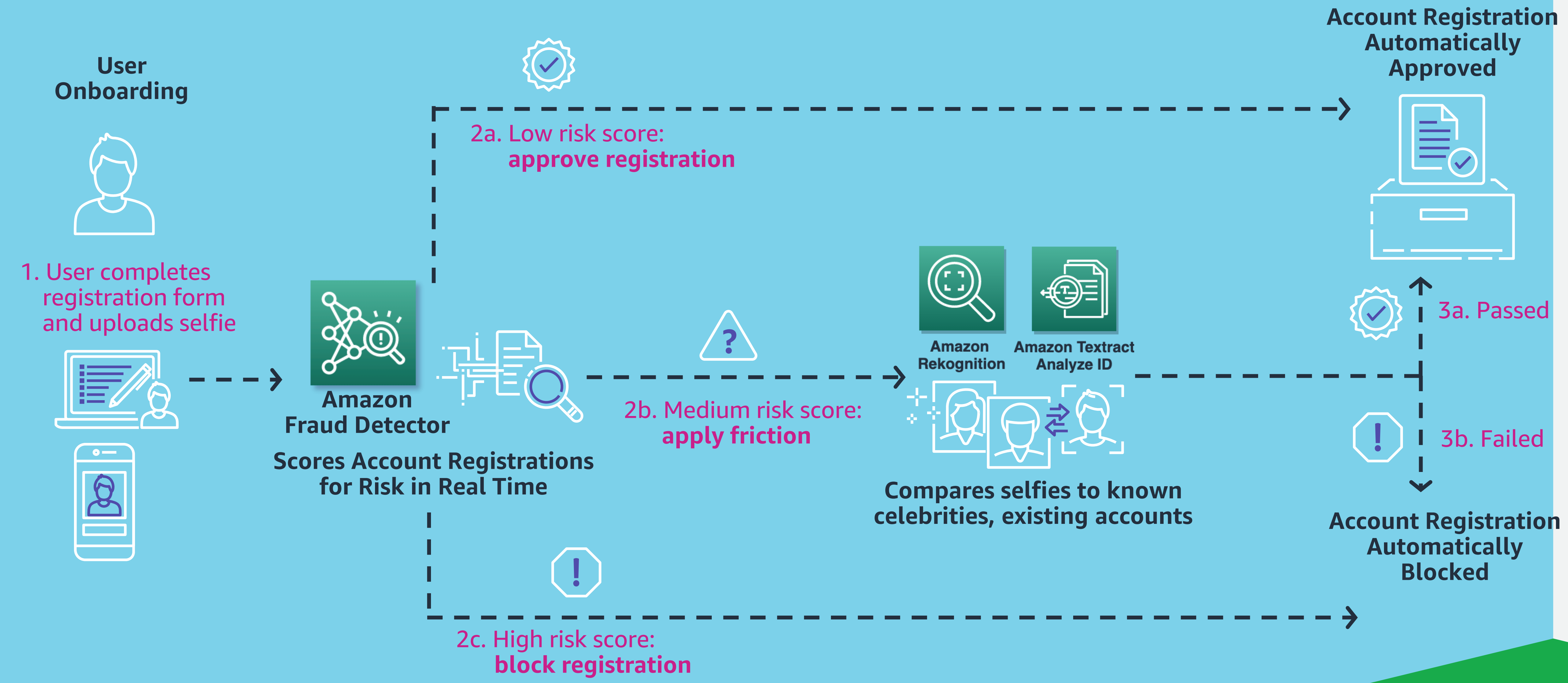
```
{
    "modelScores": [
        {
            "modelVersion": {
                "modelId": "sample_fraud_detection_model",
                "modelType": "ONLINE_FRAUD_INSIGHTS",
                "modelVersionNumber": "1.0"
            },
            "scores": {
                "sample_fraud_detection_model_insightscore": 984
            }
        }
    ],
    "ruleResults": [
        {
            "ruleId": "high_fraud_risk",
            "outcomes": [
                "review_customer"
            ]
        }
    ],
    "externalModelOutputs": []
}
```

Model Score = 984

High Fraud Risk

Fraud Detection

Combined with facial recognition & ID verification



User Onboarding
1. User completes registration form and uploads selfie
Amazon Fraud Detector
Scores Account Registrations for Risk in Real Time
2a. Low risk score: approve registration
2b. Medium risk score: apply friction
2c. High risk score: block registration
Amazon Rekognition
Amazon Textract Analyze ID
Compares selfies to known celebrities, existing accounts
3a. Passed
3b. Failed
Account Registration Automatically Approved
Account Registration Automatically Blocked

WUZON

Wuzzon

Wuzzon is an app marketing agency that is committed to aid app owners grow and activate their user acquisition by helping them set up a complete marketing plan, including user acquisition, app store optimization and re-engagement strategies.

> By implementing Amazon Fraud Detector into the WuzzTrack system, Wuzzon now has a much more robust and reliable fraud detection solution, which can also detect more novel fraud techniques. The implementation was quick and easy and the results were even better than initially hoped. In some extreme cases there was a **decrease in false positives of up to 43%** (when compared to the previous rule-based solutions), while for other sources, **the true positive rate increased by 11-14%**.

Justin Westerveld

CTO

What Comes Next?

Try It Yourself

Blog:

Prevent fake account sign-ups in real time with AI using Amazon Fraud Detector

https://a.co/4cgDed2

Talk With Us

Deep Dive:

Contact your AWS Account Team to get help with your specific situation

Mention this session!

Learn More

For documentation, code samples and pricing visit:

aws.amazon.com/fraud-detector

Thank you!

Anjan Biswas

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