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Architecting for ML, On AWS

Day 3

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Machine Learning Solutions Architect

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Agenda

Day 1	Day 2	Day 3
AI/ML on AWS Intro lab	Feature engineering Model evaluation	Moving to production Build
Team up Define problem	Build	Present
Write-up	Working model	Solution architecture

Advanced Sagemaker Topics
Architecture Patterns, Security and DevOps

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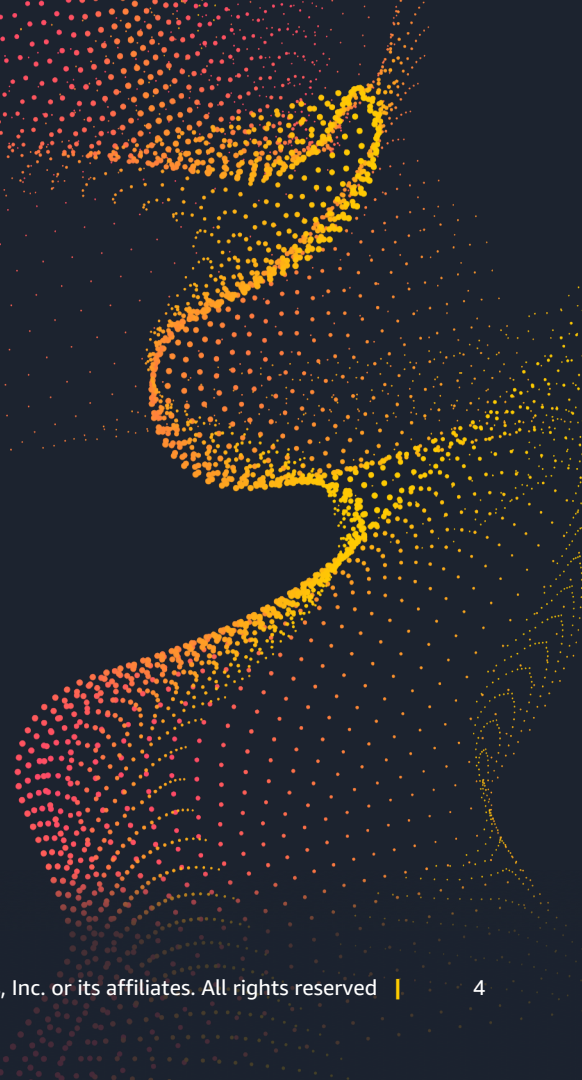
Survey link

http://bit.ly/2M3QF8j

Presentations PDF

https://bit.ly/2kRXfVZ



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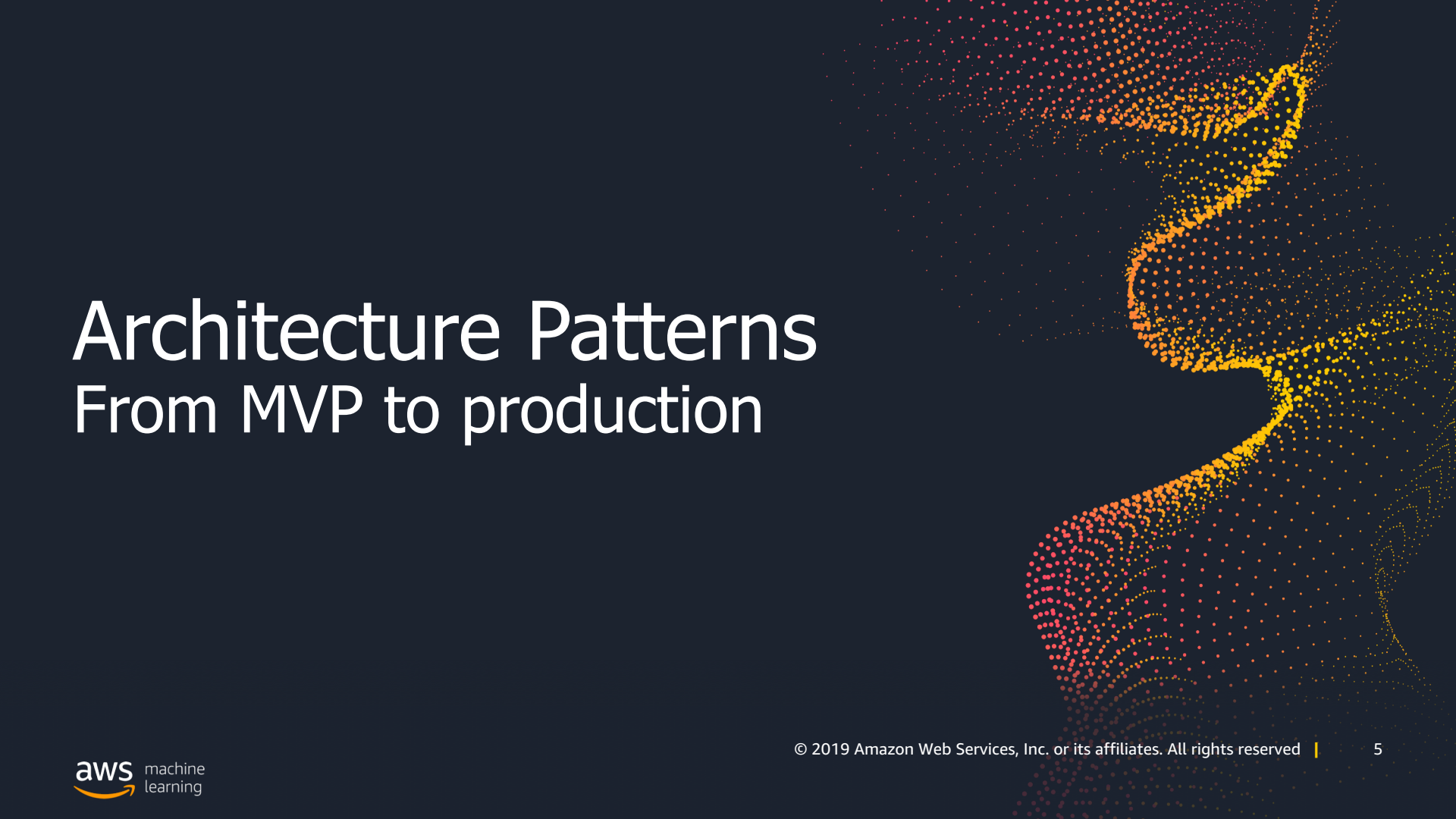
Architecture Patterns
From MVP to production



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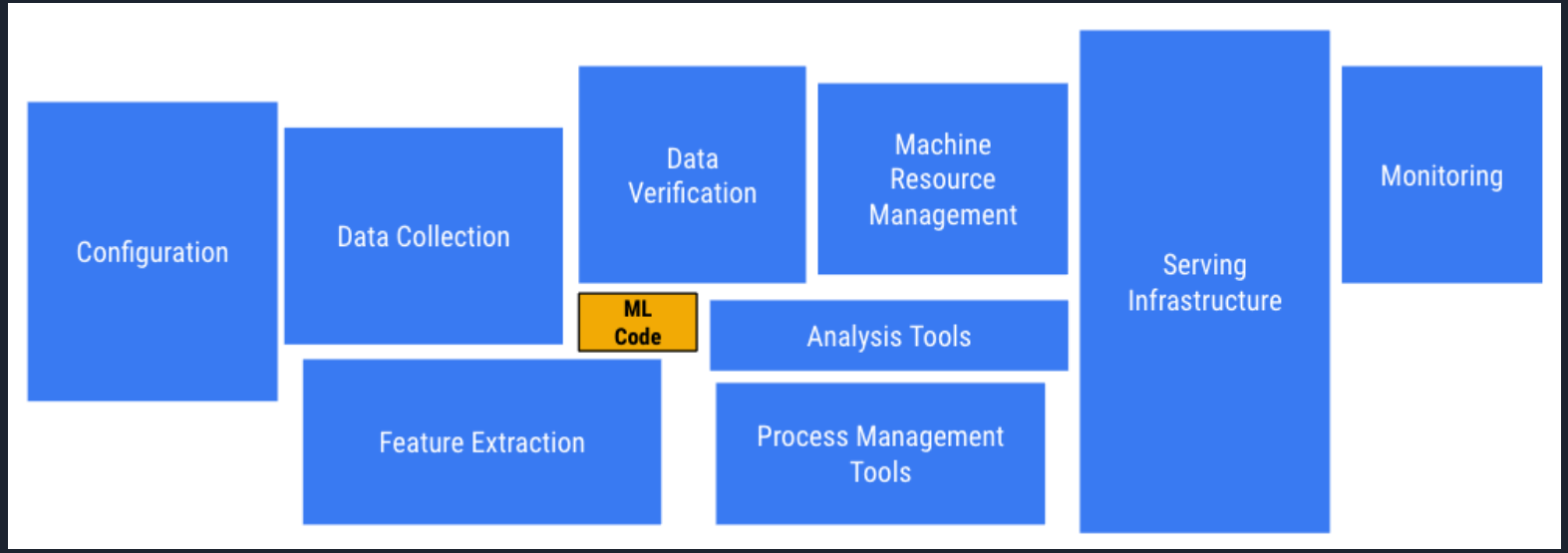
Hidden technical debt of Machine Learning



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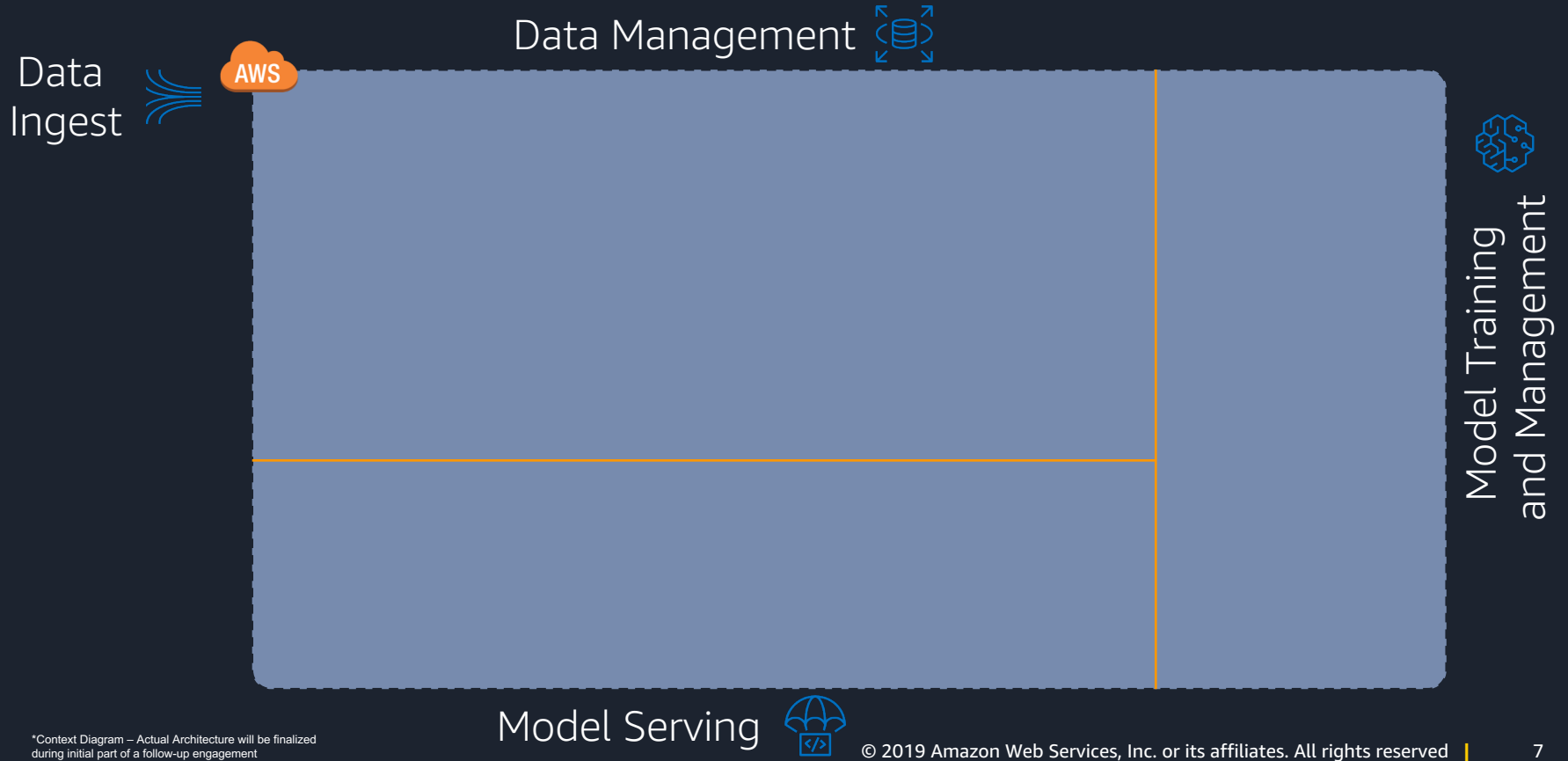
Architecture building blocks



*Context Diagram – Actual Architecture will be finalized during initial part of a follow-up engagement

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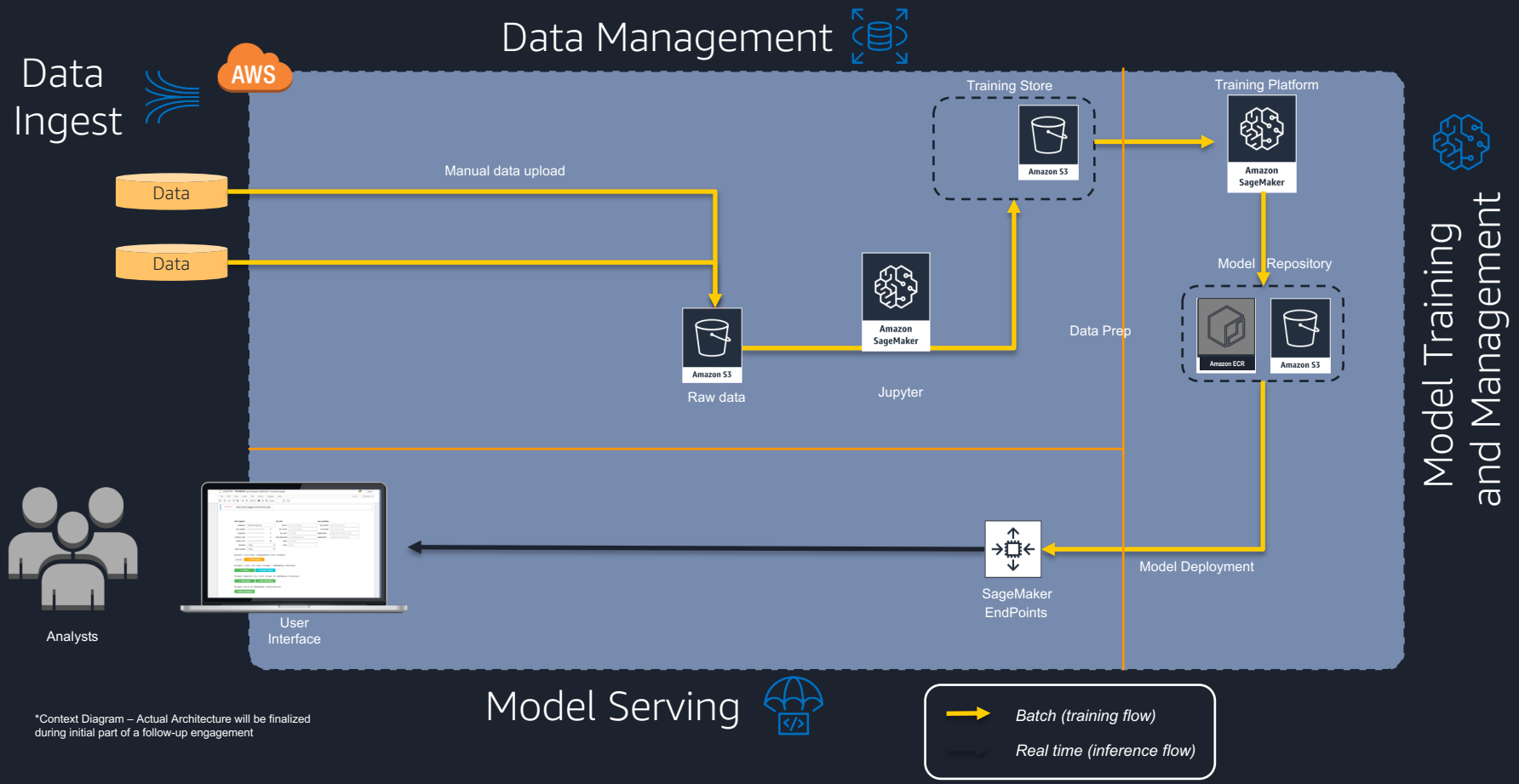
POC/MVP



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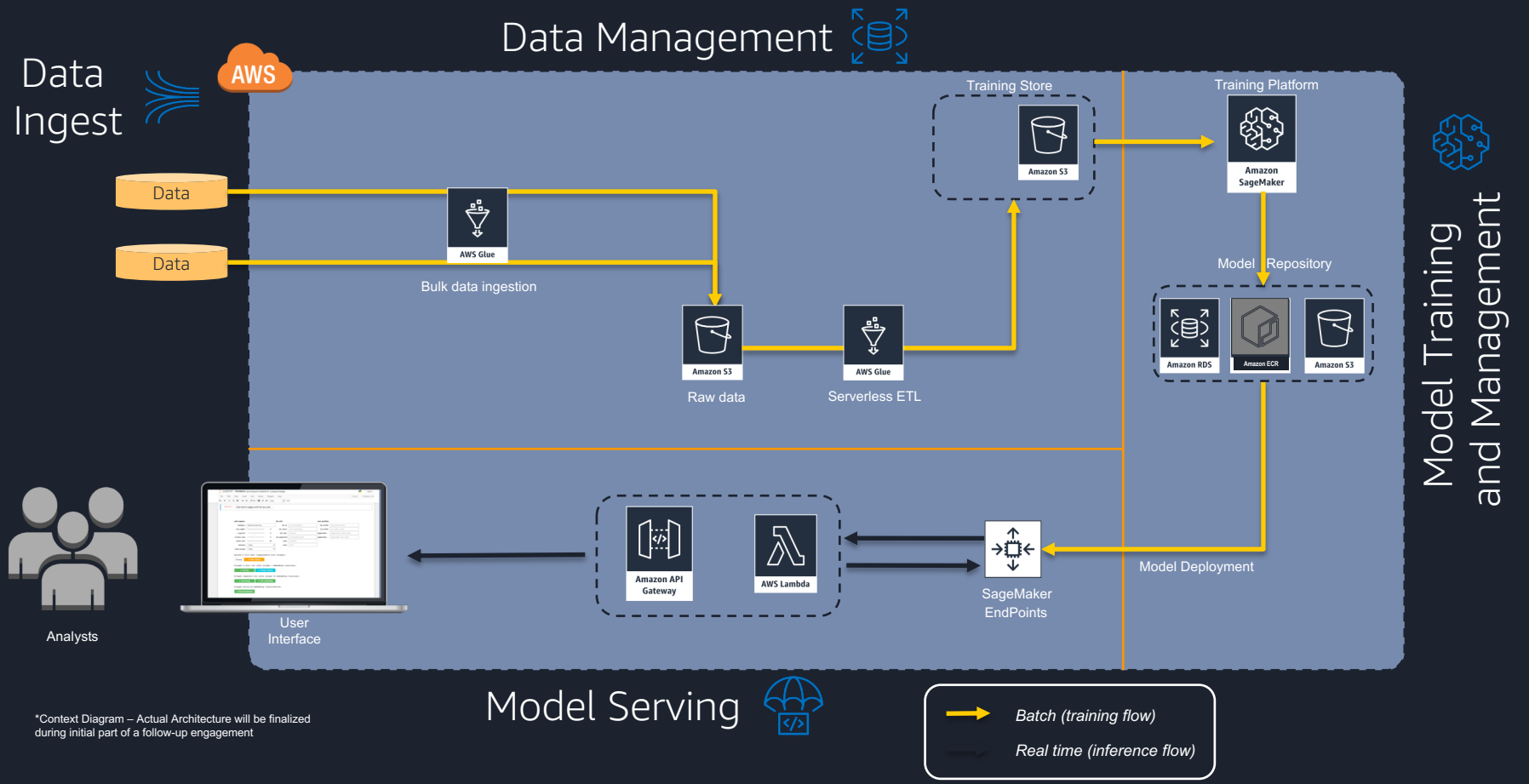
Model management enhancement



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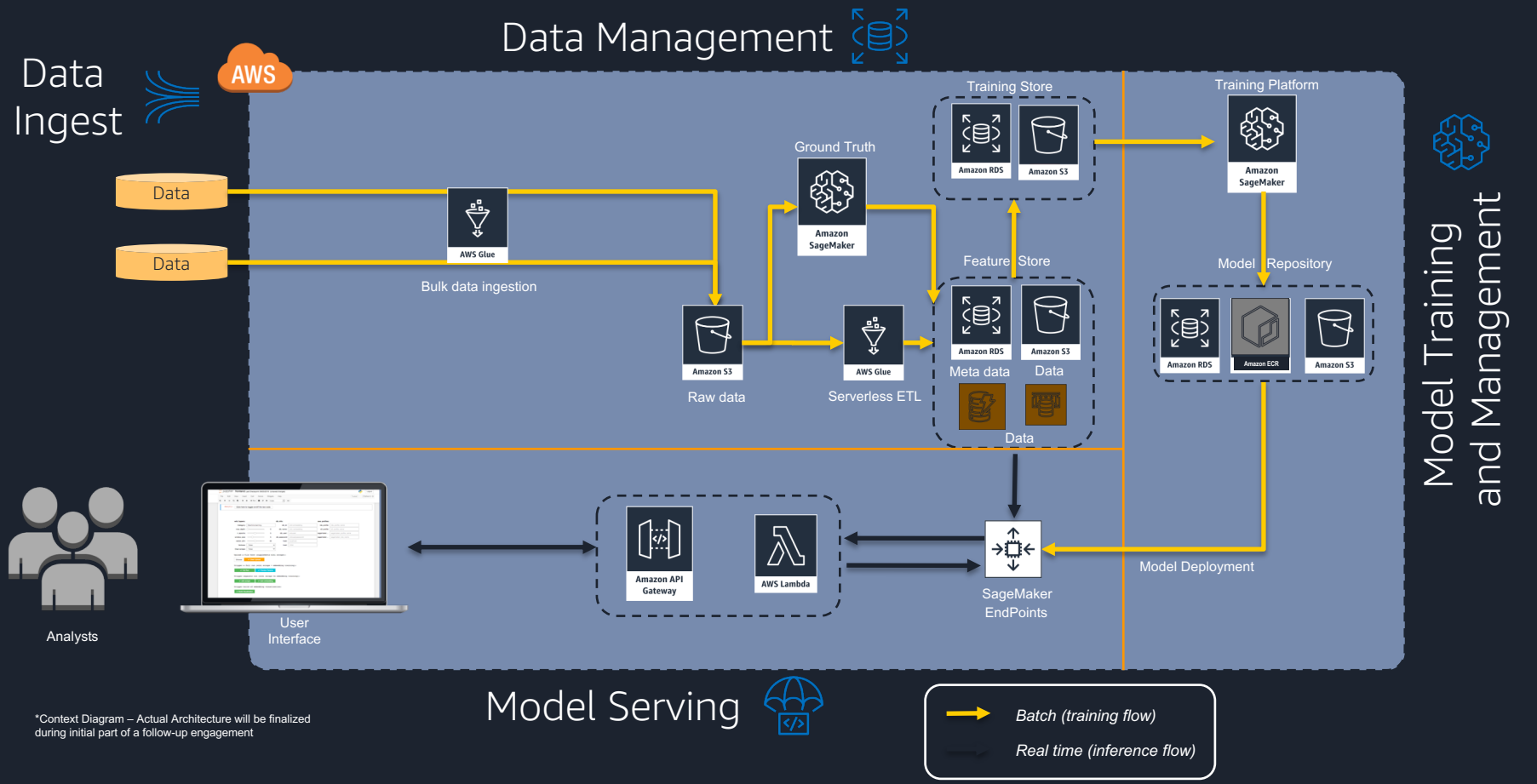
Feature and training store management



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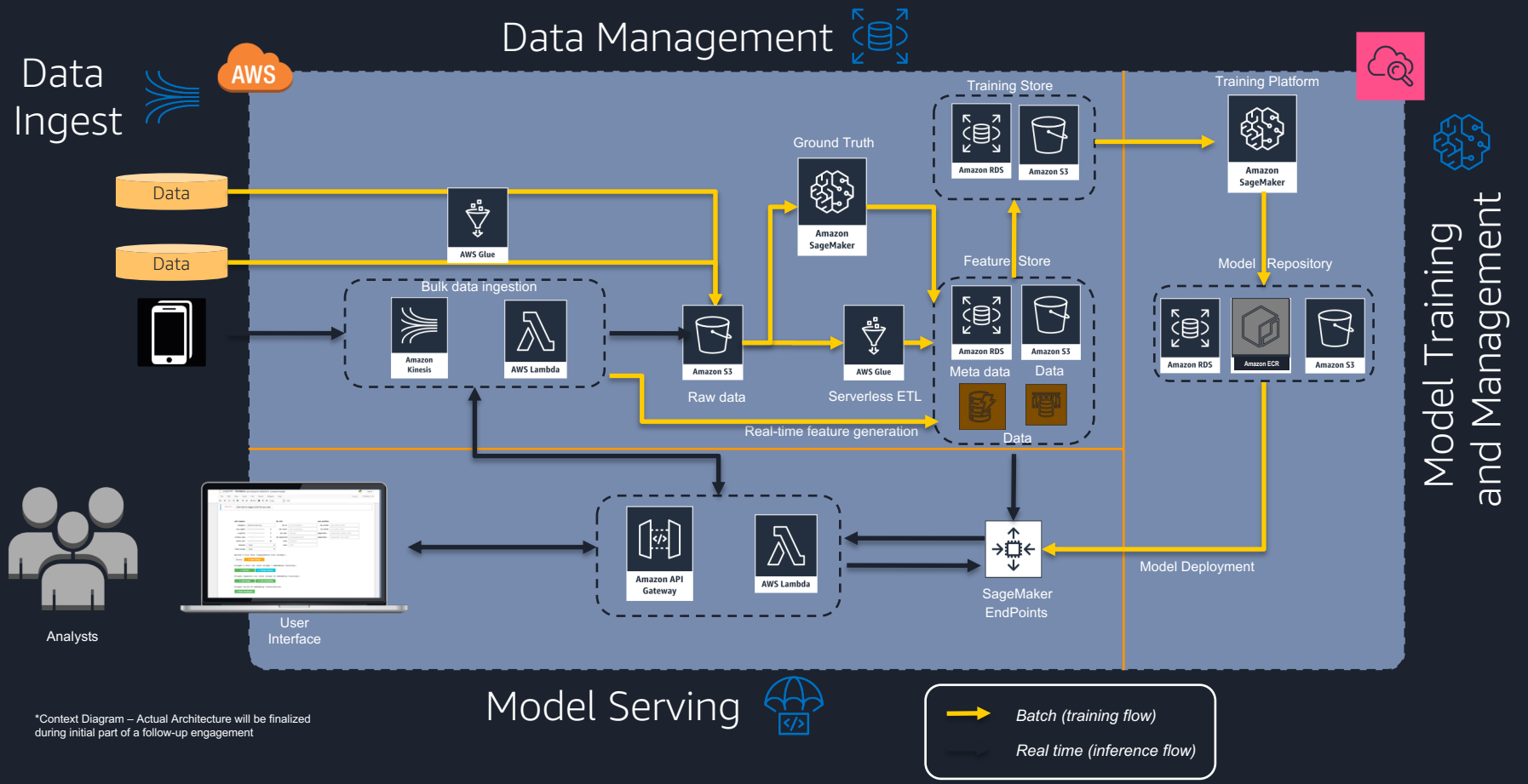
Realtime capability and Monitoring



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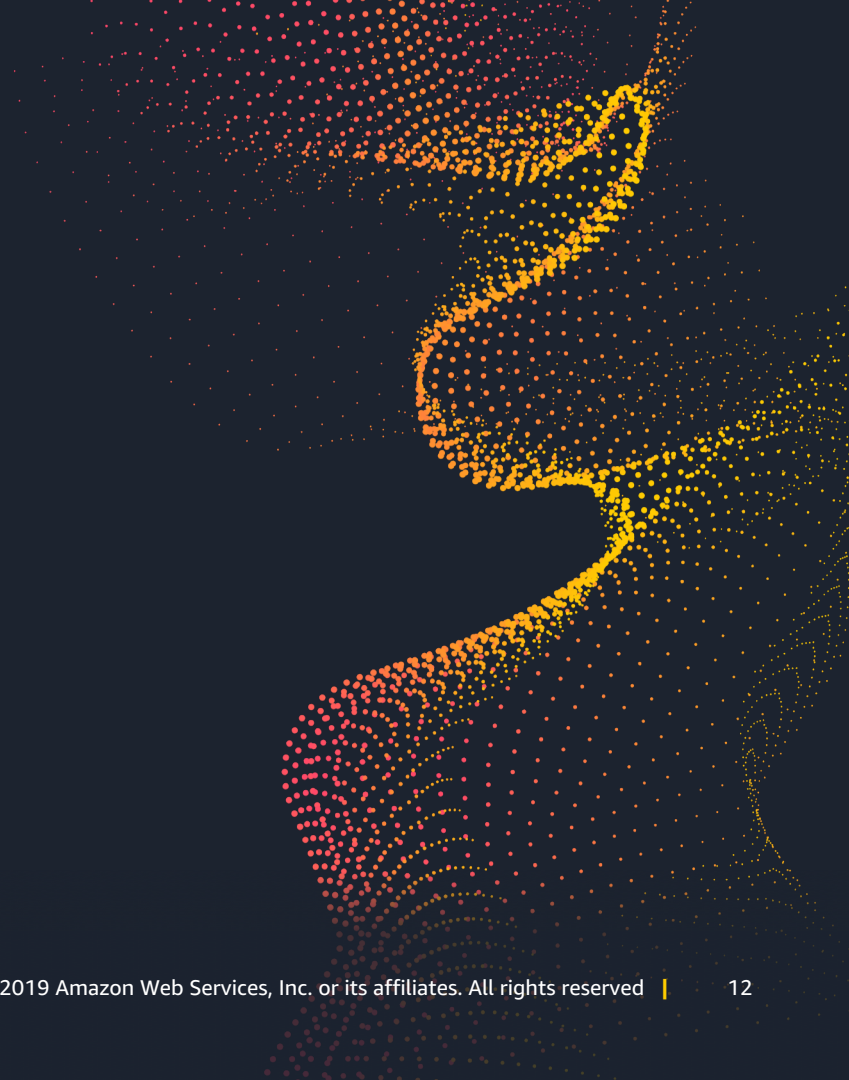
MLOps



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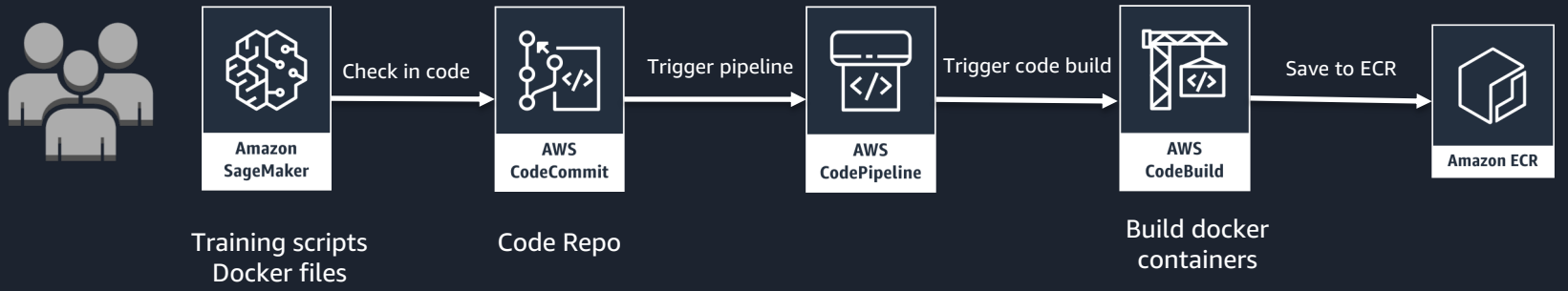
ML DevOps – Custom Docker Image Build Pipeline



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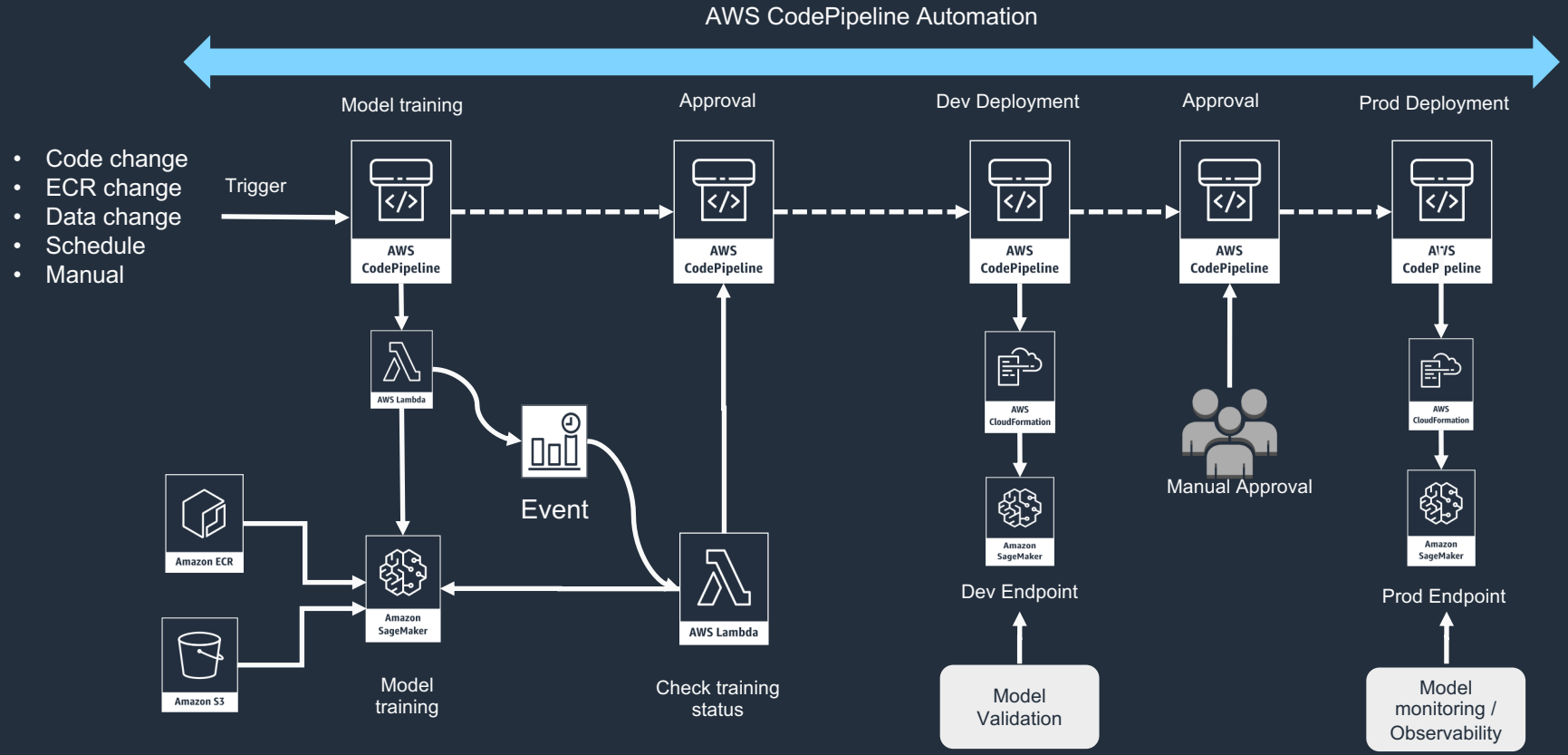
Sample Training/Deploy Pipeline



How do I orchestrate my ML pipeline?

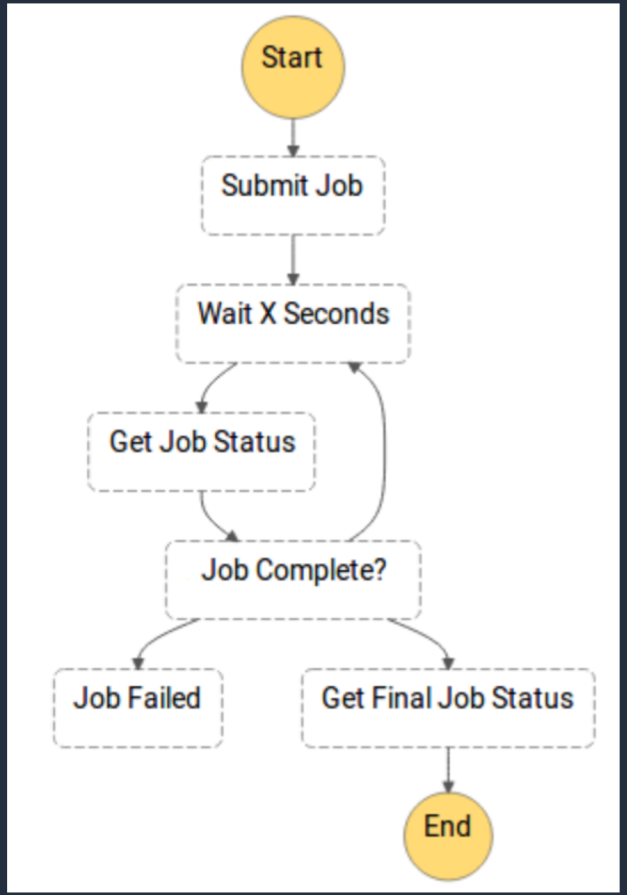
- Step functions
- Cloud Development Kit (CDK)
- Apache Airflow
- Kubeflow

Step Functions

Supported Amazon SageMaker APIs :

CreateTrainingJob

CreateTransformJob



CDK example

API gateway > Lambda > SM


```
lambdaFn = lambda_.Function(
    self,
    "callsmlambda",
    code=lambda_.InlineCode(handler_code),
    handler="index.lambda_handler",
    timeout=core.Duration.seconds(300),
    runtime=lambda_.Runtime.PYTHON_3_7,
    environment={"endpoint_name":endpoint_name, # CHANGE TO YOUR ENDPOINT NAME!!
                 "content_type":"text/csv"}
)

lambdaFn.add_to_role_policy(aws_iam.PolicyStatement(actions=['sagemaker:InvokeEndpoint',],
    resources = ['arn:aws:sagemaker:{}:{}:endpoint/{}'.format(my_region,my_acc_id,endpoint_name),]))
```

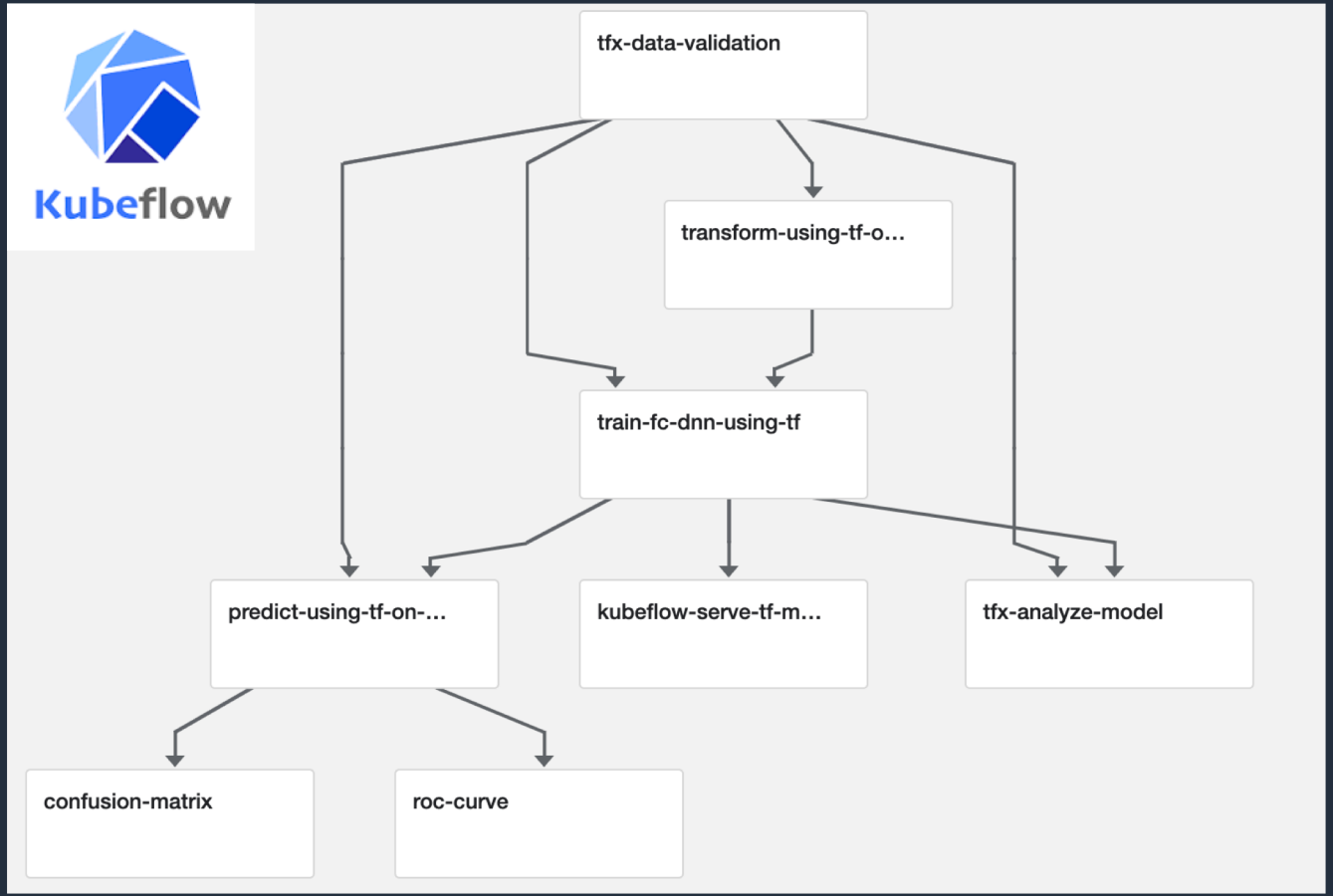
Airflow with SageMaker on AWS

Currently, the following SageMaker operators are supported:

- SageMakerTrainingOperator
- SageMakerTuningOperator
- SageMakerModelOperator
- SageMakerTransformOperator
- SageMakerEndpointConfigOperator
- SageMakerEndpointOperator

https://sagemaker.readthedocs.io/en/stable/using_workflow.html

Taxi Tip Prediction Model Trainer using Tensorflow DNN



Notebook Security

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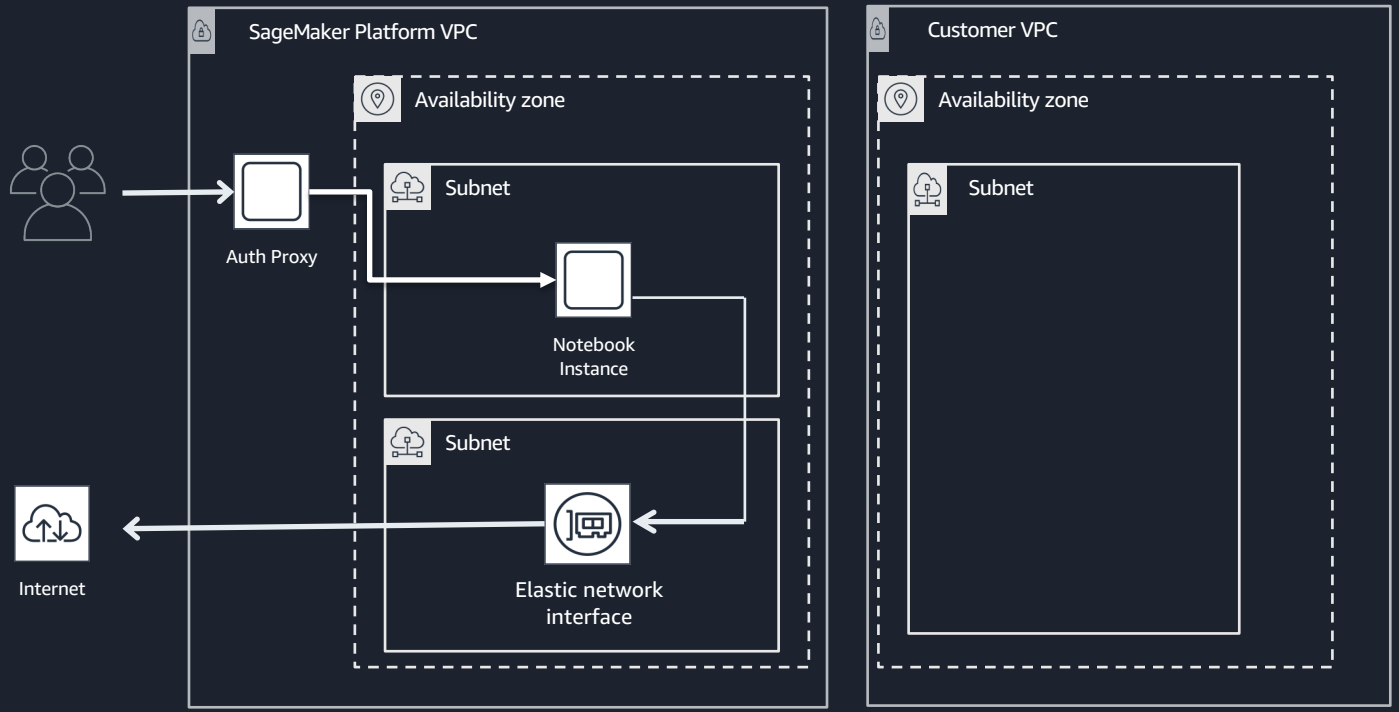
Jupyter notebooks - Default



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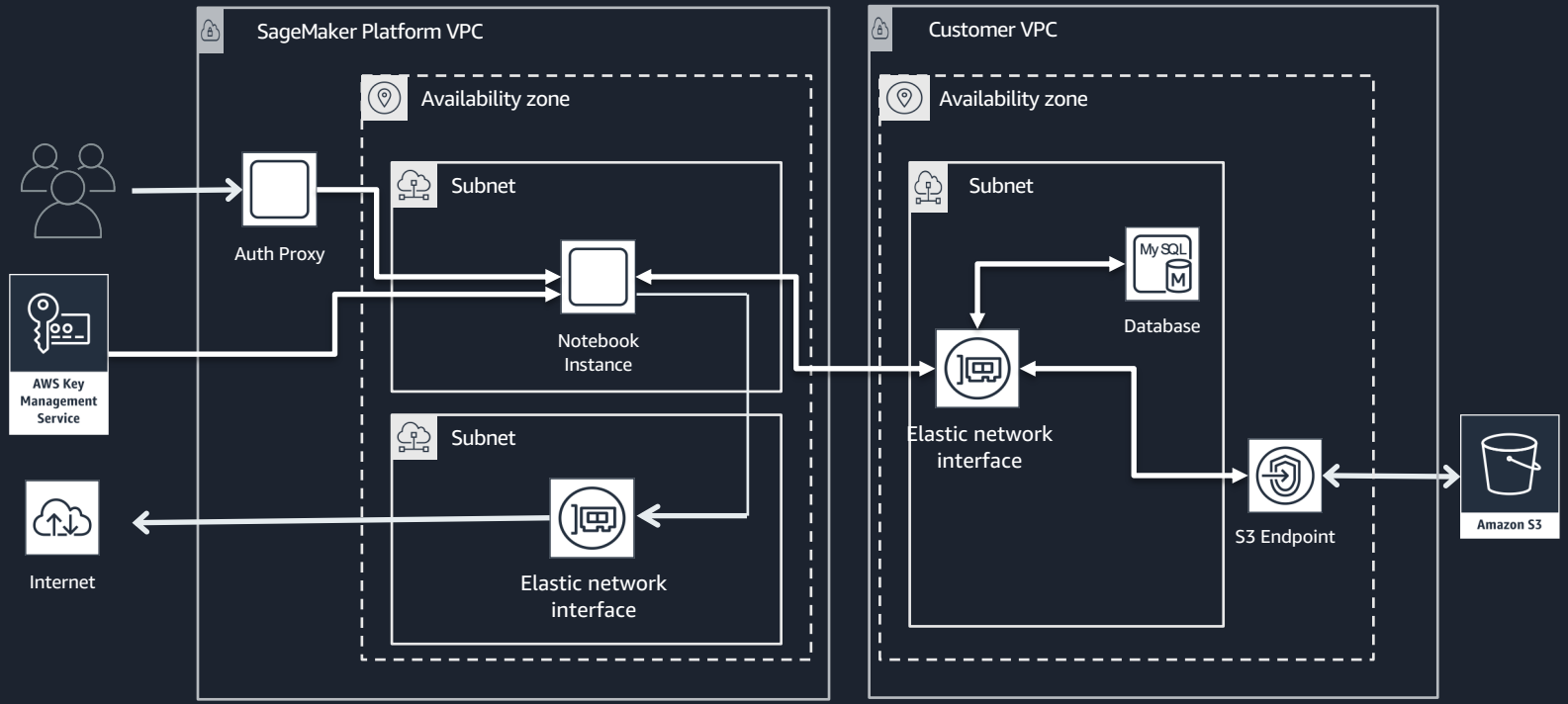
Secure Jupyter notebooks + VPC



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Deployment Best Practices

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Deployment best practices

- Deploy to at least 2 availability zones, multiple regions for DR
- Use auto-scaling to accommodate traffic spikes
- Consider Lambda and API Gateway
- Consider batch inference or edge deployment
- Use Elastic Inference Accelerators to reduce inference costs
- Automate training and deployment pipeline
- Use blue/green deployment techniques
- Clearly define re-training triggers
- Enable model versioning, implement MLDevOps pipeline
- Monitor performance

Project Presentations

- Project goal, business context
- ETL strategy
- Modeling strategy
- Solution architecture
- Goal for going into production
- 20 minutes to present, can use slides

