MLD-5-Sagemaker_Hillary

EU13_AWS_Sagemaker
Training Clarusway
Pear Deck - May 3, 2023 at 7:10PM

Part 1 - Summary

Use this space to summarize your thoughts on the lesson

Part 2 - Responses

Slide 1

Use this space to take notes:

Slide 2

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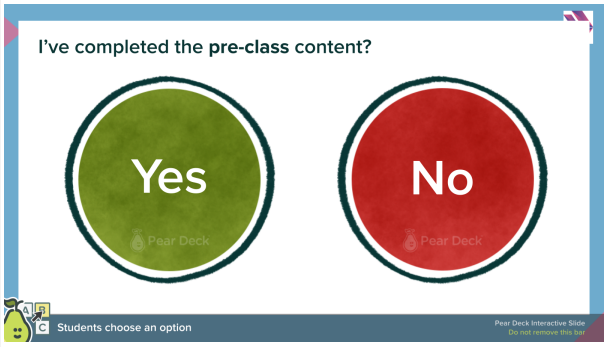
Slide 3	Your Response
	You Chose • **Yes** Other Choices • No

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Slide 4

SageMaker

CLARUSWAY©

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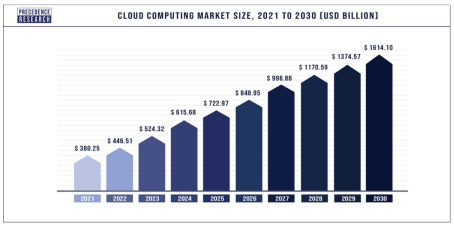
Cloud Computing Market Size



- The rising popularity of the latest novel technologies like **artificial intelligence** and **machine learning** and its rapid adoption in the cloud computing is empowering the growth of the global cloud computing market.

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SageMaker

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What is SageMaker

Amazon **SageMaker** is a **platform** service that simplifies the process of **building, training, and deploying ML models** by providing everything organizations need to connect to their training data, select and optimize the **best algorithm and framework**, and **deploy their model** on auto-scaling clusters of Amazon **EC2**.

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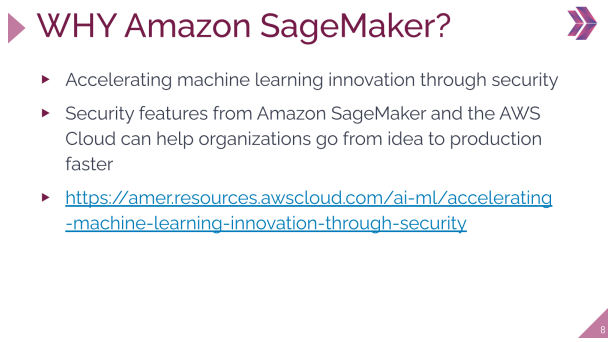

Link(s) on this slide:

- https://amer.resources.awscloud.com/ai-ml/accelerating-machine-learning-innovation-through-security
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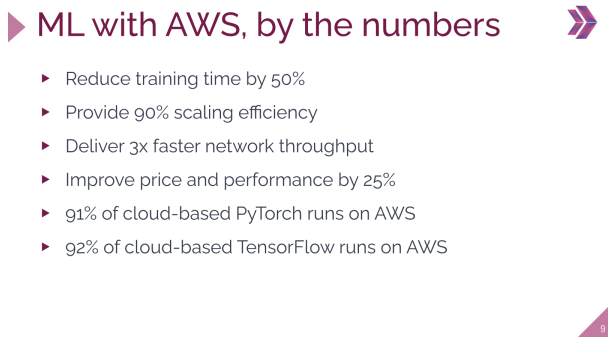

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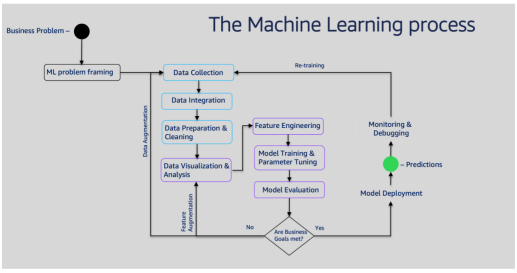
ML process



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CLARUSWAY©
WAY TO REINVENT YOURSELF

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SageMaker Free Tier (2 months)

Two months free tier – starts from the first month you create a SageMaker resource

Development – 250 Hours/Month t2.medium or t3.medium

Train – 50 Hours/Month m4.xlarge or m5.xlarge

Deploy – 125 Hours/Month m4.xlarge or m5.xlarge

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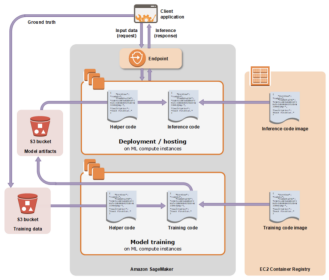
Model Deployment Architecture



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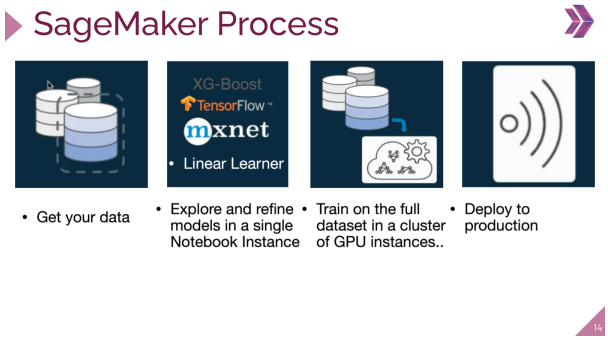

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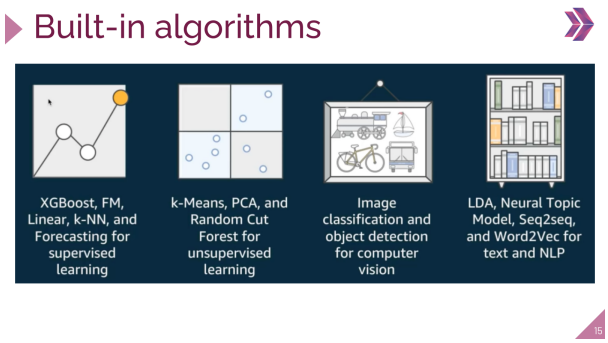

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Built-in algorithms-Supervised

- Linear Learner: regression
- K-Nearest Neighbors: non-parametric regression and classification
- XGBoost: regression, classification
- Factorization Machines: regression, classification, recommendation
- Semantic Segmentation: Deep Learning
- Image Classification: Deep Learning (ResNet)
- Object Detection (SSD): Deep Learning
- (VGG or ResNet)
- Sequence to Sequence: machine translation, speech to text and more
- DeepAR: time-series forecasting (RNN)

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Built-in algorithms-Unsupervised

- K-Means: clustering
- Principal Component Analysis: dimensionality reduction
- Random Cut Forest: anomaly detection
- Object2Vec: general-purpose embedding
- Neural Topic Model: topic modeling
- Latent Dirichlet Allocation: topic modeling (mostly)
- Blazing Text: GPU-based Word2 Vec, and text classification
- IP Insights: usage patterns for IP addresses

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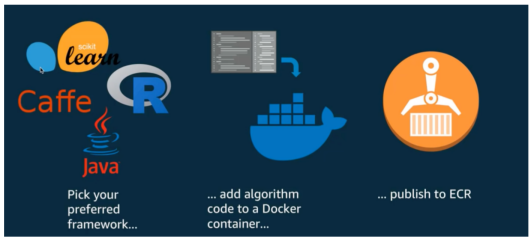
Bring your own algorithm



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Let's jump to the AWS SageMaker Service!

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S3 BUCKET and OBJECTS

- iden-ml-sagemaker/
  - bikerental/
    - train/
      - train.csv
    - validation/
      - validation.csv
    - test/
      - test.csv
    - model/
      - xgboost-bikerental-v1-2022-04-21-10-23-10-964/ (Job_name+datetime)
        - output
          - model.tar.gz

Amazon S3>Buckets>iden-ml-sagemaker>bikerental/output/xgbobikerental-v1-2022-04-21-10-23-10-964/output/model.tar.gz

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Notebook Instance

An *Amazon SageMaker notebook instance* is a machine learning (ML) compute instance running the Jupyter Notebook App. SageMaker manages creating the instance and related resources.

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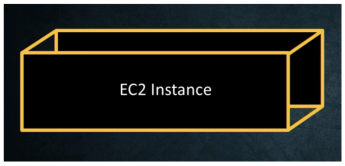
Notebook Instance

Use Jupyter notebooks in your notebook instance

- To prepare and process data,
- Write code to train models,
- Deploy models to SageMaker hosting,
- Test or validate your models.



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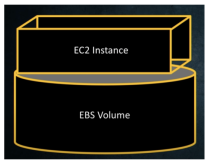
Notebook Instance



- Anaconda Packages,
- Tensorflow and Apache MXnet,
- Storage volume,
- Sample notebooks that contain complete code walkthroughs

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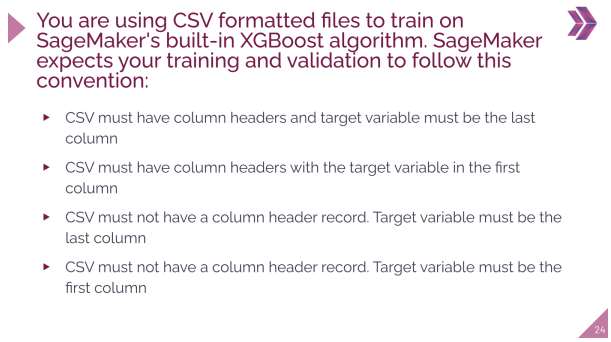

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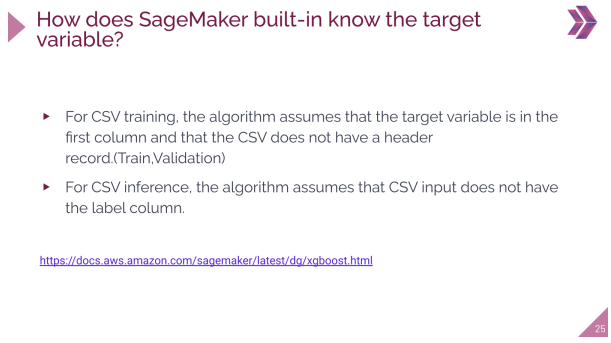

Link(s) on this slide:

- https://docs.aws.amazon.com/sagemaker/latest/dg/xgboost.html

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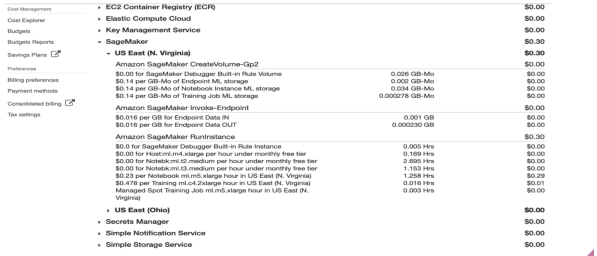
SageMaker Billing Dashboard



Cost Management		
Cost Explorer		
Budgets		
Budgets Reports		
Savings Plans		
Preferences		
Billing preferences		
Payment methods		
Consolidated billing		
Tax settings		
▸ EC2 Container Registry (ECR)		$0.00
▸ Elastic Compute Cloud		$0.00
▸ Key Management Service		$0.00
▾ SageMaker		$0.30
▾ US East (N. Virginia)		$0.30
Amazon SageMaker CreateVolume-Gp2		$0.00
$0.00 for SageMaker Debugger Built-in Rule Volume	0.026 GB-Mo	$0.00
$0.14 per GB-Mo of Endpoint ML storage	0.002 GB-Mo	$0.00
$0.14 per GB-Mo of Notebook Instance ML storage	0.034 GB-Mo	$0.00
$0.14 per GB-Mo of Training Job ML storage	0.000278 GB-Mo	$0.00
Amazon SageMaker Invoke-Endpoint		$0.00
$0.016 per GB for Endpoint Data IN	0.001 GB	$0.00
$0.016 per GB for Endpoint Data OUT	0.000230 GB	$0.00
Amazon SageMaker RunInstance		$0.30
$0.0 for SageMaker Debugger Built-in Rule Instance	0.005 Hrs	$0.00
$0.00 for Host:ml.m4.xlarge per hour under monthly free tier	0.169 Hrs	$0.00
$0.00 for Notebk:ml.t2.medium per hour under monthly free tier	2.695 Hrs	$0.00
$0.00 for Notebk:ml.t3.medium per hour under monthly free tier	1.153 Hrs	$0.00
$0.23 per Notebook ml.m5.xlarge hour in US East (N. Virginia)	1.258 Hrs	$0.29
$0.478 per Training ml.c4.2xlarge hour in US East (N. Virginia)	0.016 Hrs	$0.01
Managed Spot Training Job ml.m5.xlarge hour in US East (N. Virginia)	0.003 Hrs	$0.00
▸ US East (Ohio)		$0.00
▸ Secrets Manager		$0.00
▸ Simple Notification Service		$0.00
▸ Simple Storage Service		$0.00

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SageMaker Use Case Example

ZAPPOS

"We are…using analytics and machine learning solutions to personalize sizing and search results for individual users. AWS services (including Amazon SageMaker) allow (our) engineers to focus on improving performance and results rather than DevOps overhead."

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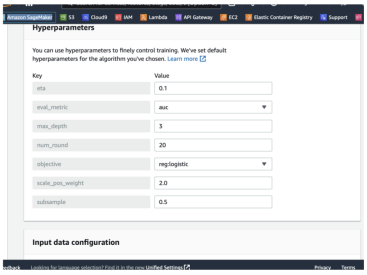
Hyperparameters



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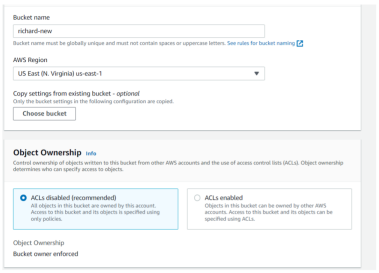
S3 Settings



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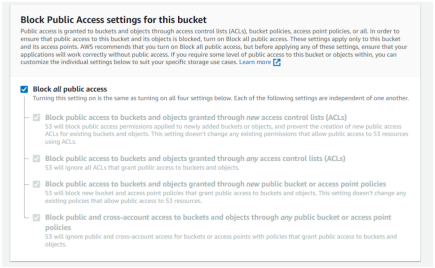
S3 Settings



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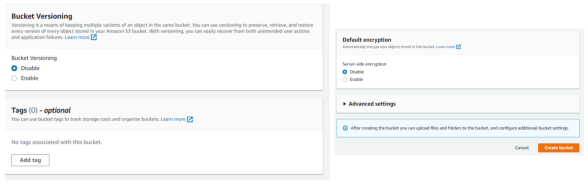
S3 Settings



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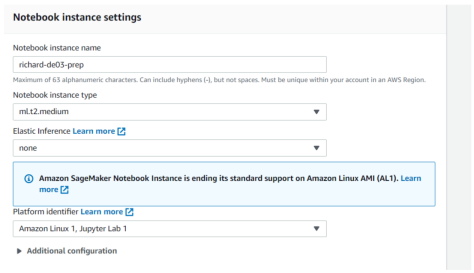
Notebook Settings



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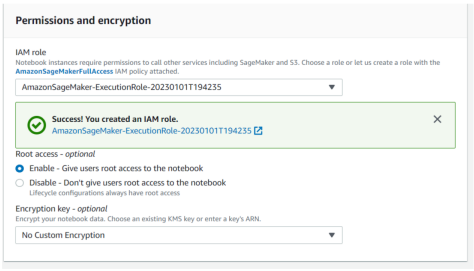
Notebook Settings



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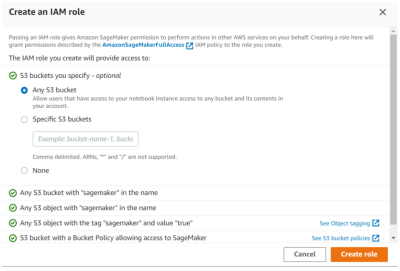
Notebook Settings



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Notebook Settings

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Notebook Settings

Now open the notebook from Sagemaker and send the data S3 via notebook

Sending data come back to the sagemaker console and do the jobs:

Training Job Creation-Model Creation- End Point Creation

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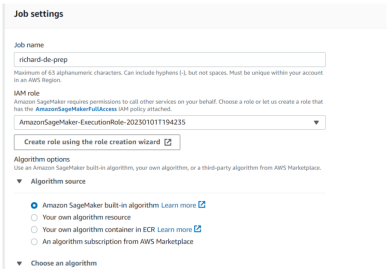
Train Job Settings



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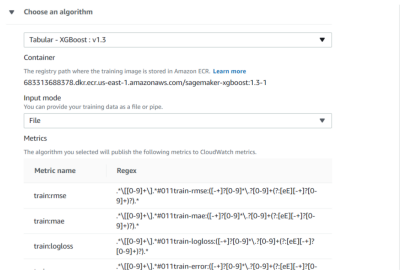
Slide 39

Train Job Settings



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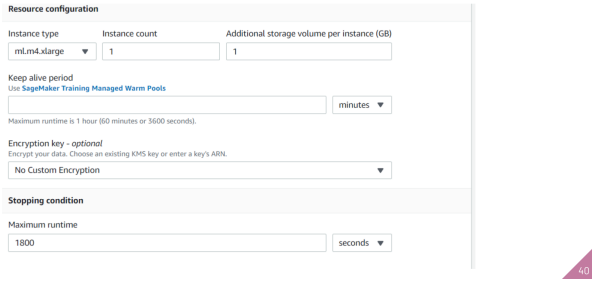
Train Job Settings



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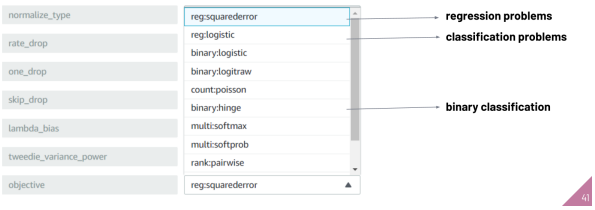
Train Job Settings

```
xgb_model.set_hyperparameters(max_depth=4,
                              eta=0.3,
                              num_round=200,
                              objective = "reg:squarederror",
                              early_stopping_rounds=10)  #objective = "reg:squarederror", "reg:linear" for latest xgboost!
```



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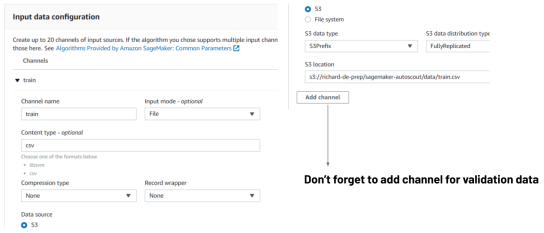
Train Job Settings



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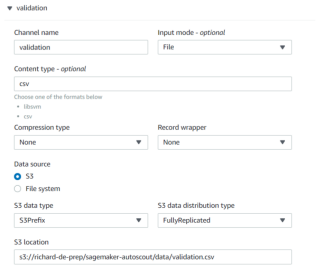
Train Job Settings



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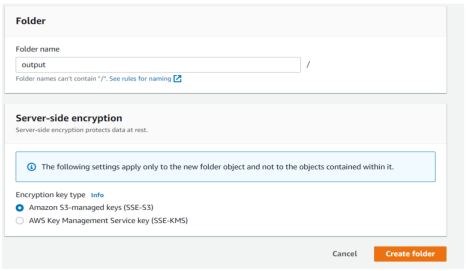
Create Output Folder from S3



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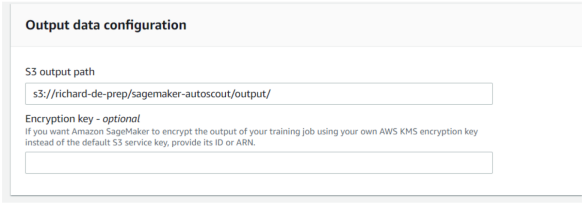
Train Job Settings



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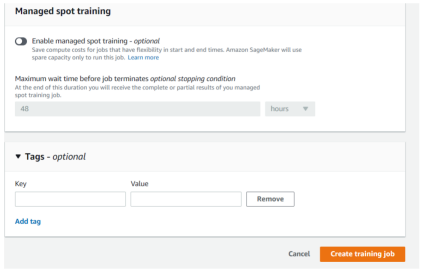
Train Job Settings



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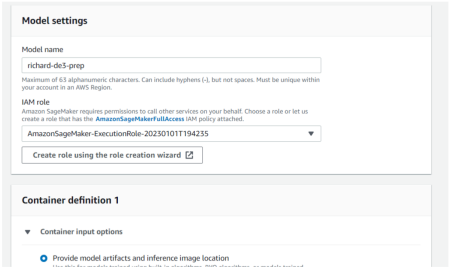
Model Settings



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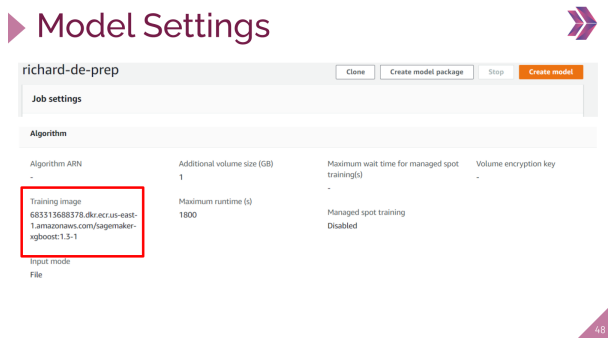

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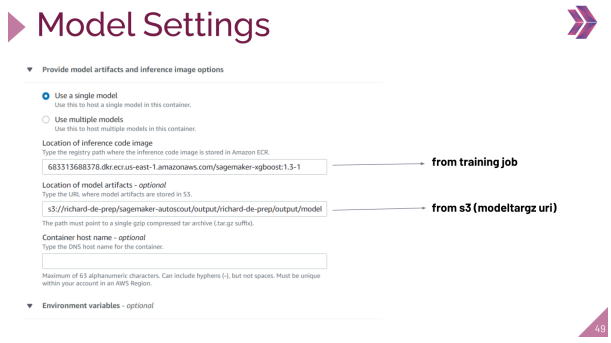

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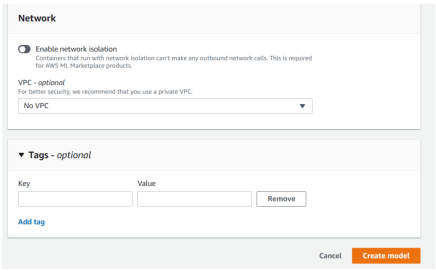
Model Settings



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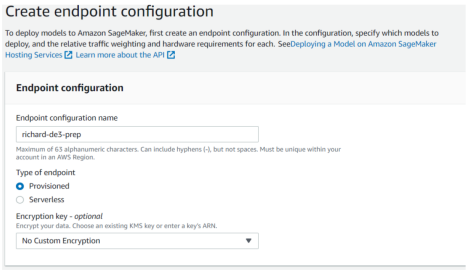
Endpoint Config Settings



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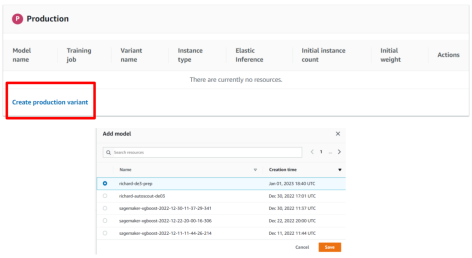
Endpoint Config Settings



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Use this space to take notes:

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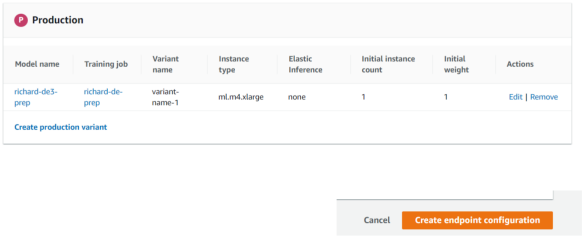
Endpoint Config Settings



53

Use this space to take notes:

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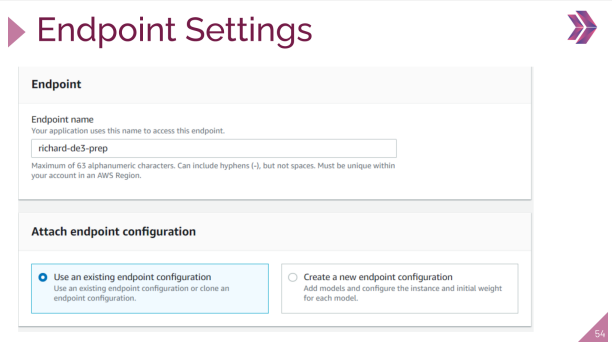

Use this space to take notes:

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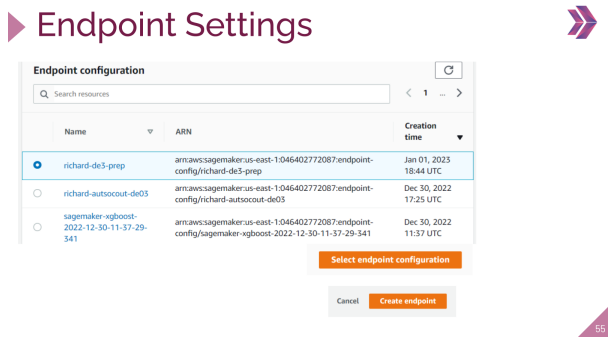

Use this space to take notes:

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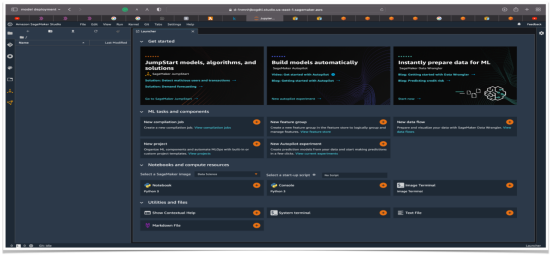
SageMaker Studio



Use this space to take notes: