Bring Your Own Algorithms

AWS SageMaker

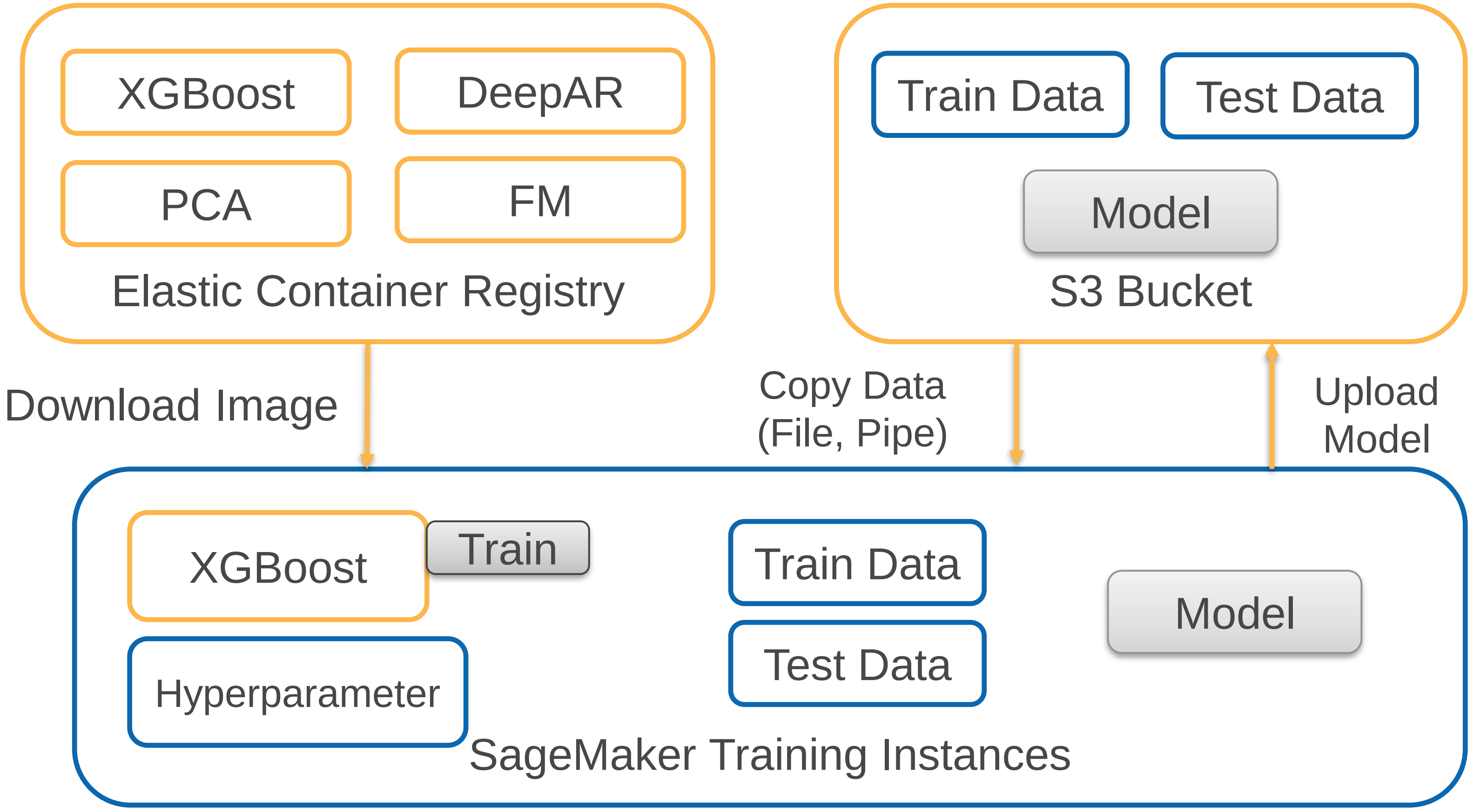
Chandra Lingam

Cloud Wave LLC

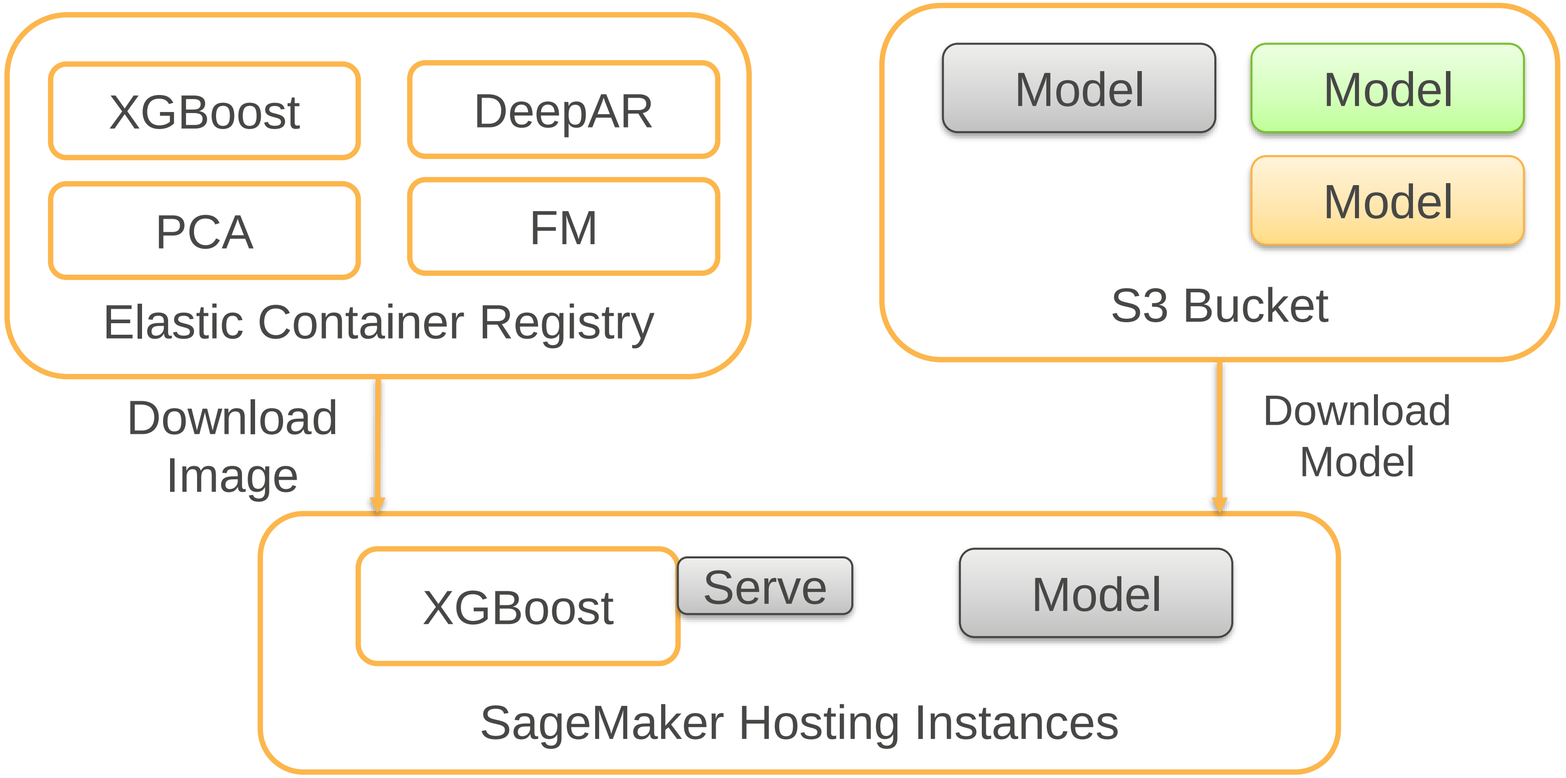
SageMaker – Training and Hosting

Options	Usage Scenario
Built-in Algorithms	Training algorithms provided by SageMaker Easy to use and scale Optimized for AWS Cloud
Pre-built Container Images	Supports popular frameworks like MxNet, TensorFlow, scikit-learn, PyTorch Flexibility to use wide selection of algorithms
Extend Pre-built Container Images	Extend pre-built container images to your needs
Custom Container Images	Use different language and framework

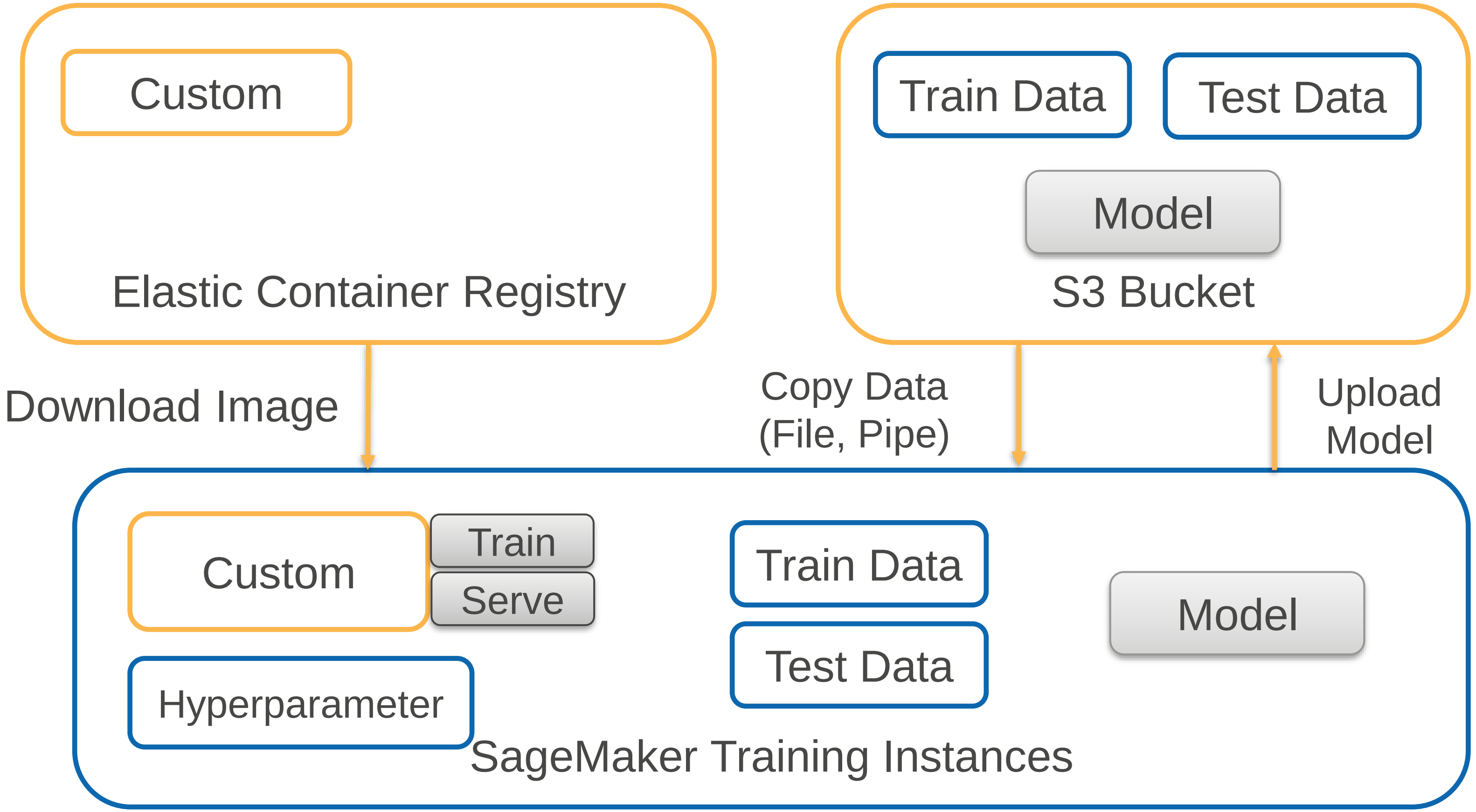
Built-in Algorithms - Training



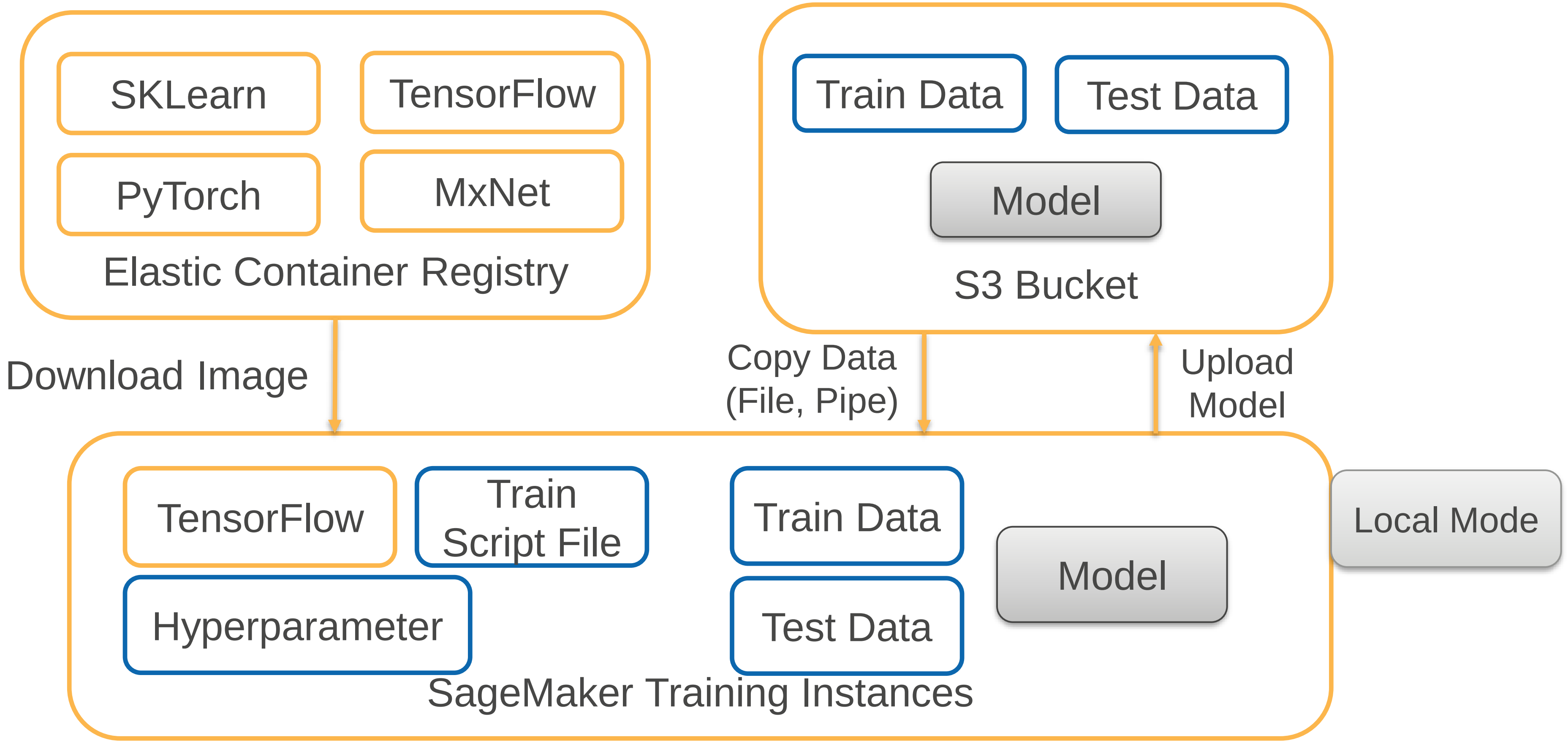
Built-in Algorithms – Hosting (Realtime, Batch)



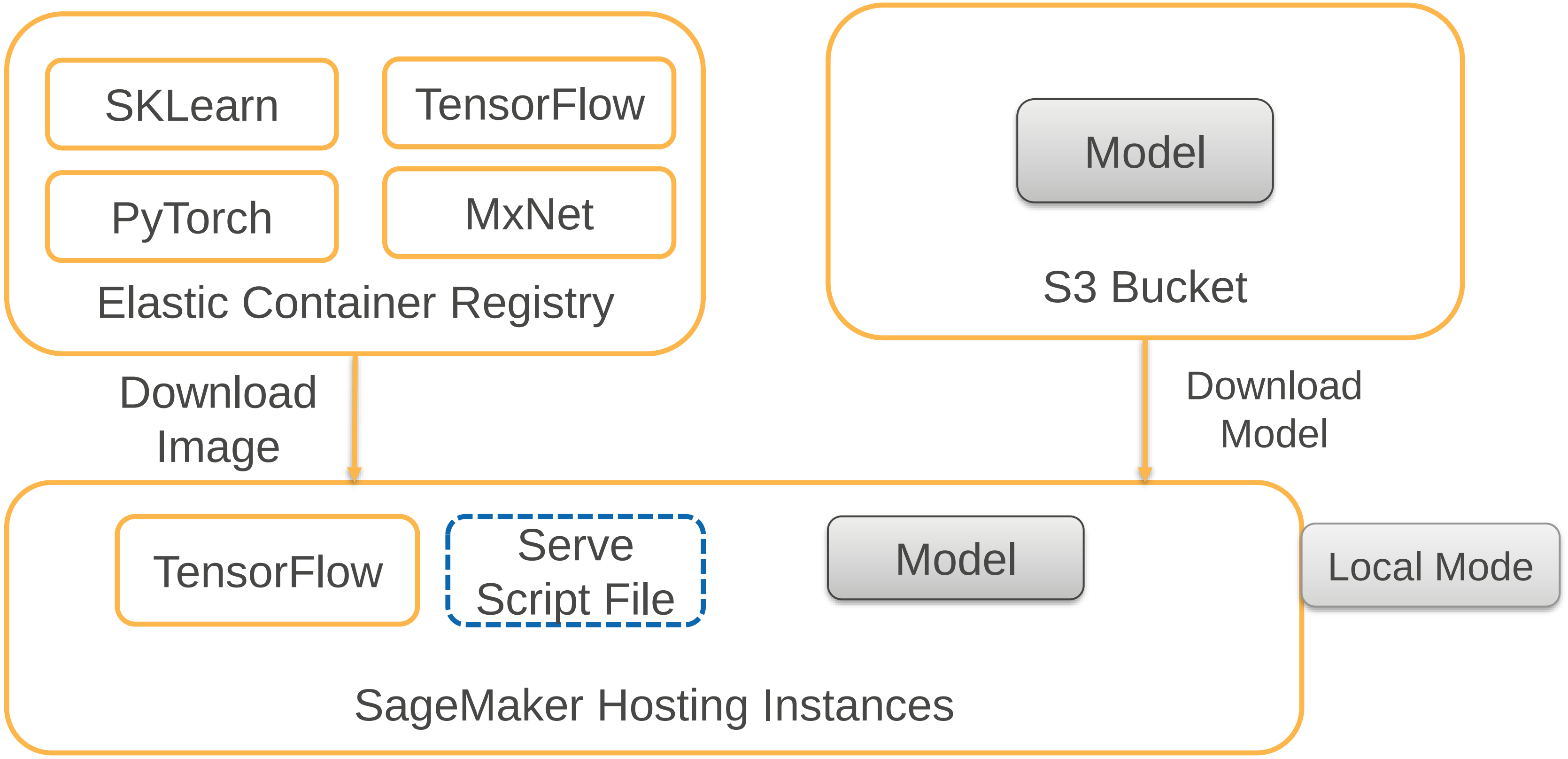
Custom Image – Training, Hosting



Framework - Training



Framework - Hosting



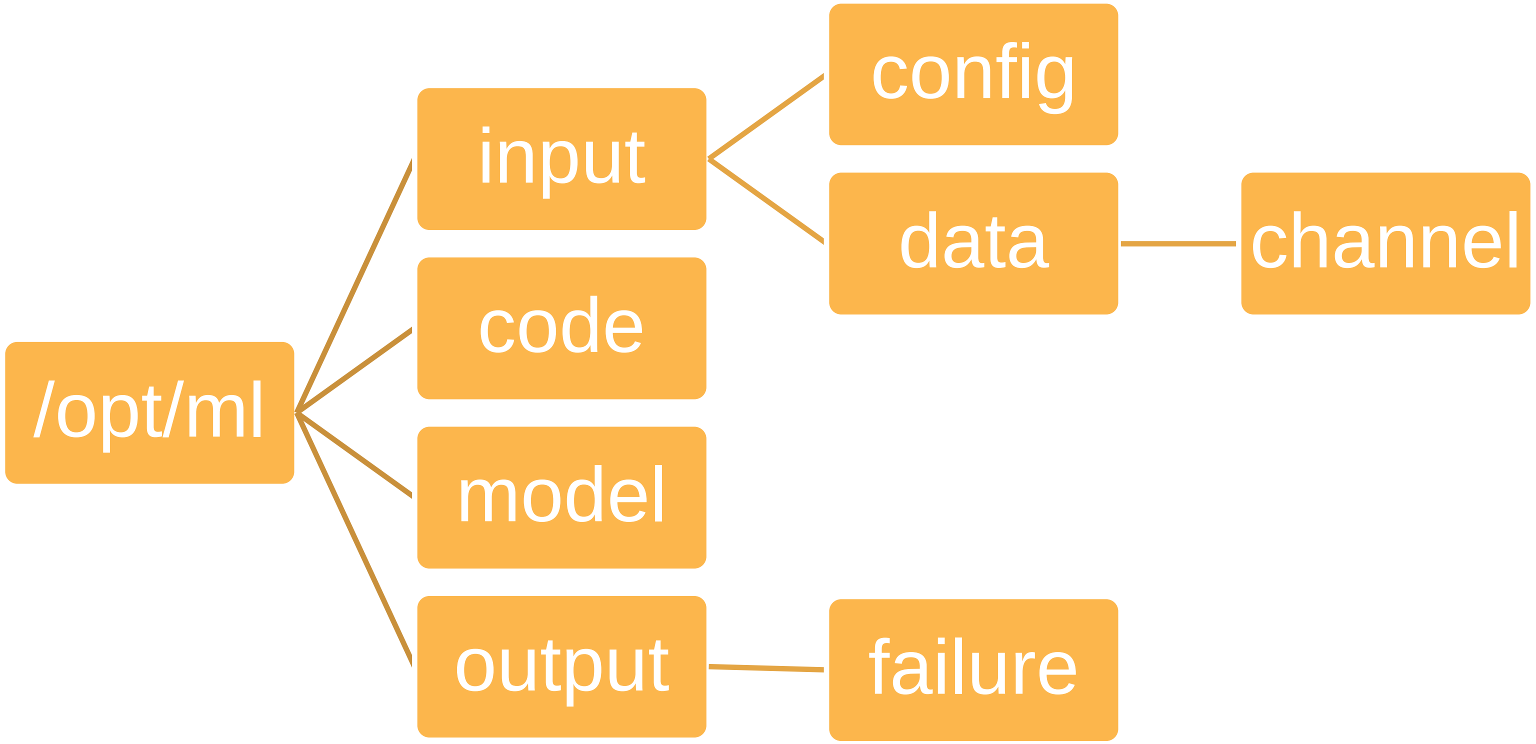
Bring Your Own Algorithm Training and Hosting

"Amazon SageMaker has certain contractual requirements that a container must satisfy to be used with it."

- Standard folder structure for reading data and resources
- Entry point that contains the code to run when container is started
- Instrumentation – Use StdOut, StdErr. SageMaker sends these message to CloudWatch log
- Metric Capture – Log metrics and define regex patterns to capture values from log
- One image for training and hosting (or) separate images (when compute resource requirements are substantially different)

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

Container Folder Structure



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

Container Folder Structure - Training

Folder	Purpose
/opt/ml/input/config/	• hyperparameters.json for training • resourceConfig.json - Container network layout for distributed training
/opt/ml/input/data/channel/	• channel = training, testing, … • Contains files for each channel /opt/ml/input/data/training/ /opt/ml/input/data/testing/
/opt/ml/input/data/channel_epoch/	• Channel = training, test, eval, … • Epoch = 0,1,2,… • Read the pipe to stream data from S3 for each epoch
/opt/ml/code/	• Scripts to run from container

Container Folder Structure – Training Output

Folder	Purpose
/opt/ml/model/	• Script should write the generated model to this directory • Store your model checkpoints and final output. • SageMaker uploads the content of model folder to your S3 bucket
/opt/ml/output/failure	• If the training fails, your script should write the error description to the failure file • SageMaker returns the first 1024 characters from this file as Failure Reason in the job description • SageMaker uploads content of output folder to your S3 bucket

Container Folder Structure – Hosting

Folder	Purpose
/opt/ml/model/	• Model files to use for inference
/opt/ml/code/	• Scripts to run from container

Important Environment Variables –Your script can use

Variable	Value & Purpose
SM_MODEL_DIR	/opt/ml/model – use this to store your model checkpoints and final output. SageMaker uploads this to your S3 bucket
SM_CHANNELS	Contains the list of input data channels in the container. Example: ["training“, "testing"]

SM_CHANNEL_{channel_name}	Directory containing channel data files
	Example:
	SM_CHANNEL_TRAINING='/opt/ml/input/data/training'
	SM_CHANNEL_TESTING='/opt/ml/input/data/testing'

Reference & Usage Examples: https://github.com/aws/sagemaker-containers#how-a-script-is-executed-inside-the-container

Important Environment Variables –Your script can use

Variable	Value & Purpose
SM_HPS	Contains a JSON encoded dictionary with the user provided hyperparameters Example: SM_HPS='{"batch-size": "256", "learning-rate": "0.0001","communicator": "pure_nccl"}'

SM_HP_{hyperparameter_name}	Contains value of the hyperparameter
	Example:
	SM_HP_LEARNING-RATE=0.0001
	SM_HP_BATCH-SIZE=256
	SM_HP_COMMUNICATOR=pure_nccl

NOTE: Hyperparameters are also provided as arguments to your script	

Reference & Usage Examples: https://github.com/aws/sagemaker-containers#how-a-script-is-executed-inside-the-container

Important Environment Variables –Your script can use

Variable	Value & Purpose
SM_HOSTS	JSON encoded list containing all the containers that are used for training Example: SM_HOSTS=["algo-1", "algo-2"]
SM_CURRENT_HOST	Name of the current container Example: SM_CURRENT_HOST=algo-1
SM_NUM_GPUS	The number of gpus available in the current container Example: SM_NUM_GPUS=1

Reference & Usage Examples: https://github.com/aws/sagemaker-containers#how-a-script-is-executed-inside-the-container

Lab – Bring Your Own Algorithm with SKLearnEstimator

- Develop scikit-learn model using scripts
- Train and host using SageMaker SKLearnEstimator
- Test using local mode
- Train and deploy on cloud Instance

Modified version of AWS Example: https://github.com/awslabs/amazon-sagemaker-examples/blob/master/sagemaker-python-sdk/scikit_learn_iris/Scikit-learn%20Estimator%20Example%20With%20Batch%20Transform.ipynb

Lab – Bring Your Own Algorithm TensorFlow Estimator

- Develop TensorFlow model using scripts
- Train and host using SageMaker TensorFlow Estimator
- Test using local mode
- Deploy to cloud instance

Modified version of AWS Example: https://github.com/awslabs/amazon-sagemaker-examples/blob/master/sagemaker-python-sdk/tensorflow_script_mode_training_and_serving/tensorflow_script_mode_training_and_serving.ipynb

Optional Lab – Built your own container

Most complex requires knowledge of Docker Containers, Web Stack for hosting

Walk through the code example here:

https://github.com/awslabs/amazon-sagemaker-examples/blob/master/advanced_functionality/scikit_bring_your_own/scikit_bring_your_own.ipynb

Chandra Lingam

aws certified
Solutions Architect
Associate
aws certified
Developer
Associate
aws certified
SysOps Administrator
Associate
aws certified
Solutions Architect
Professional
aws certified
Machine Learning
Specialty

50,000+ Students

Up-to-date Content