



@devops
HEROES



#DOH19

ML.NET Model Lifecycle with Azure DevOps

Machine Learning Model Lifecycle



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Organizer & sponsors

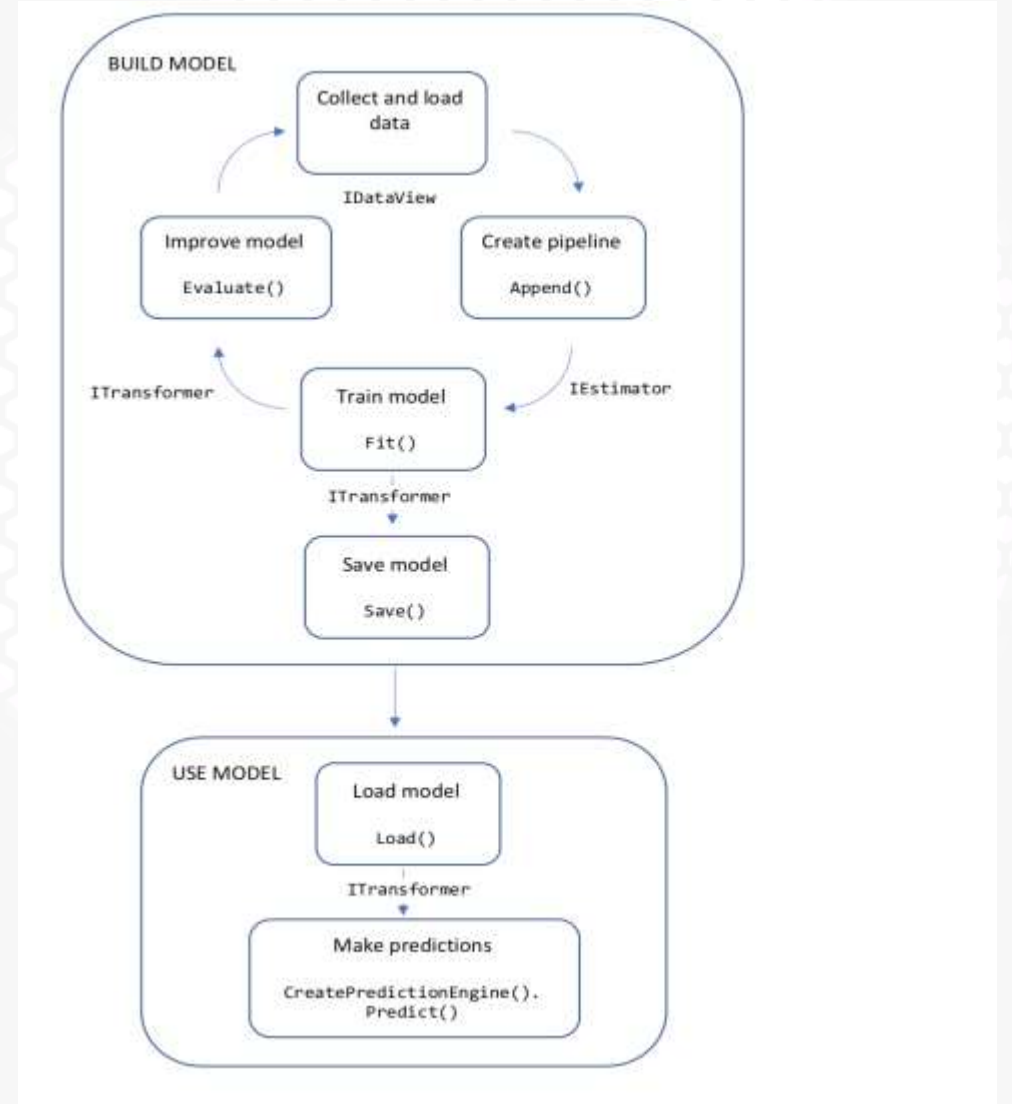


What is ML.NET?

Machine learning for .NET applications

ML.NET runs on:

Windows, Linux, and macOS using .NET Core



Machine learning for .NET applications

Data loading and saving		DataOperationsCatalog	
Data preparation		TransformsCatalog	
Training algorithms	Binary classification	BinaryClassificationCatalog	
	Multiclass classification	MulticlassClassificationCatalog	
	Anomaly detection	AnomalyDetectionCatalog	
	Clustering	ClusteringCatalog	
	Forecasting	ForecastingCatalog	
	Ranking	RankingCatalog	
	Regression	RegressionCatalog	
	Recommendation	RecommendationCatalog	add the <code>Microsoft.ML.Recommender</code> NuGet package
	TimeSeries	TimeSeriesCatalog	add the <code>Microsoft.ML.TimeSeries</code> NuGet package
Model usage		ModelOperationsCatalog	

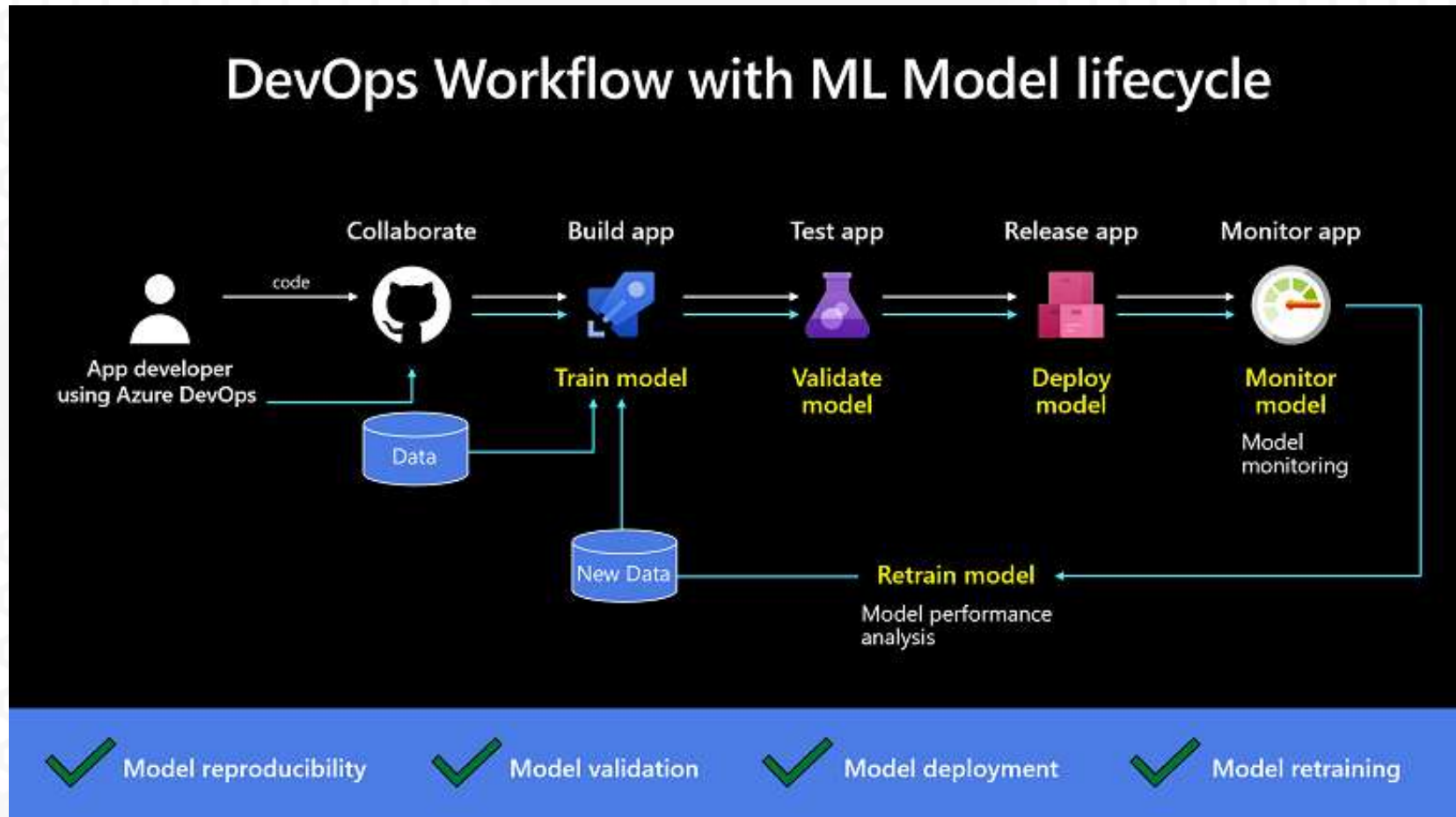
ML.NET CLI



Normal application lifecycle - building

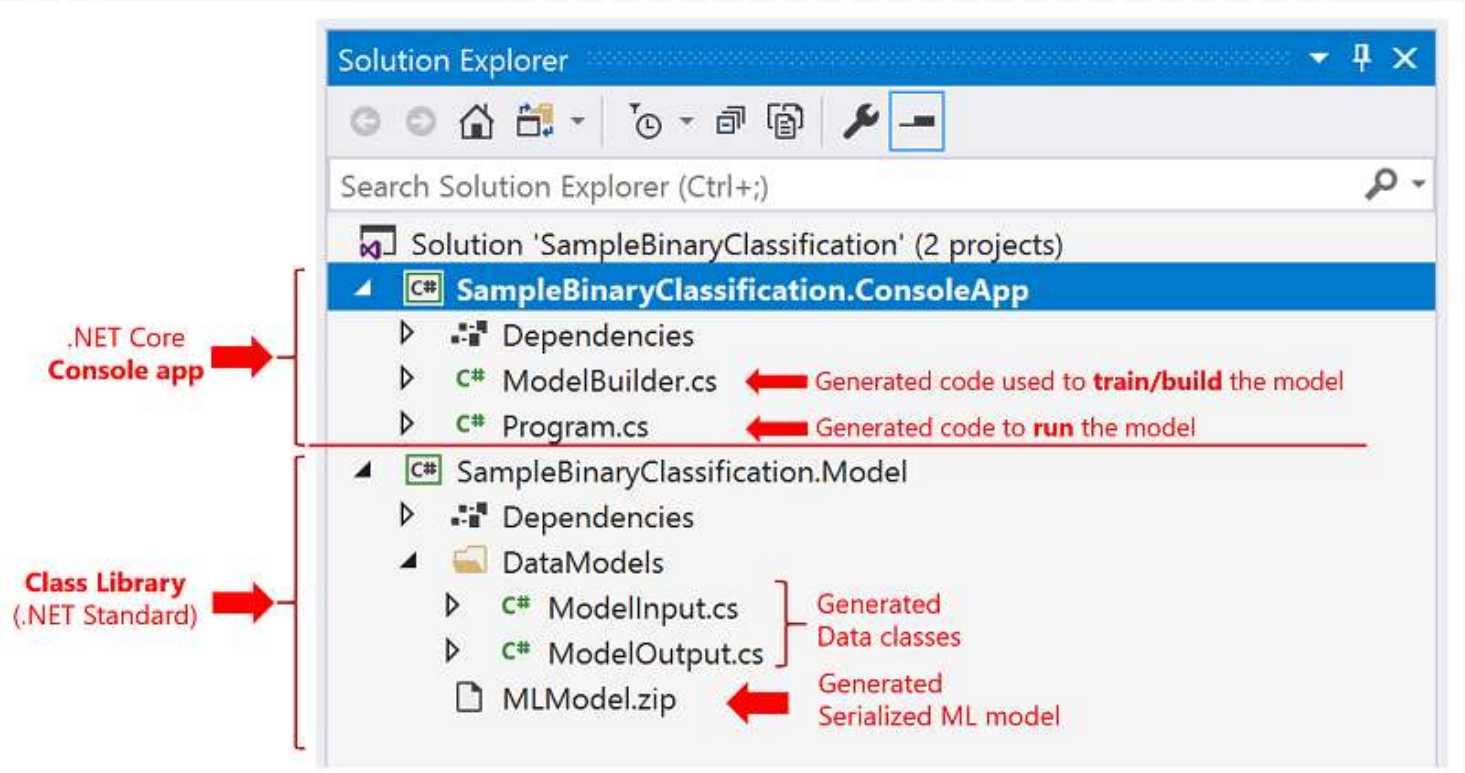


ML model lifecycle



The code

This is our sample ML model and trainer console app for the CI pipeline



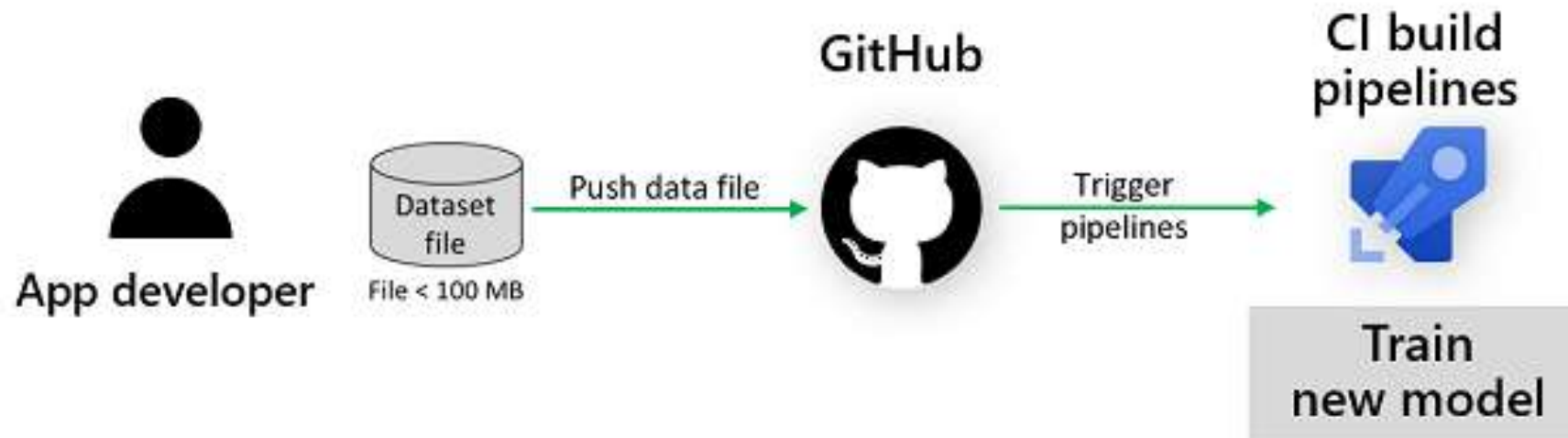
Unit tests from Azure DevOps dashboard

If your build pipeline passes all the tests you defined, then you are good to go and deploy the just trained/built ML.NET model.

The screenshot displays the Azure DevOps dashboard for a pipeline run. The left sidebar shows the navigation menu with 'Pipelines' selected. The main area shows the pipeline run details for '#20190516.5: Update azure-pipelines.yml for Azure Pipelines'. The summary section indicates that 1 run(s) completed with 1 passed and 0 failed tests. A donut chart shows 103 total tests, all of which passed. The pass percentage is 100% and the run duration is 7s 317ms. Below the summary, a table lists individual test results.

Test	Duration
VS Test Run Release (103/103)	0:00:03.571
TestAccuracyHigherThan60	0:00:00.193
TestNegativeSentimentStatement	0:00:00.117
TestSentimentStatement("Food quality has been horrible.",False,False)	0:00:00.047
TestSentimentStatement("My boyfriend and i sat at the bar and had a completely delightful experience.")	0:00:00.043
TestSentimentStatement("this is the worst sushi i have ever eat besides Costco's.",False,False)	0:00:00.043
TestSentimentStatement("Some may say this buffet is pricey but I think you get what you pay for and th	0:00:00.040
TestSentimentStatement("Awful service.",False,False)	0:00:00.040
TestSentimentStatement("Pricing is a bit of a concern at Mellow Mushroom.",False,False)	0:00:00.040
TestSentimentStatement("The service was terrible, food was mediocre.",False,False)	0:00:00.040
TestSentimentStatement("This place is pretty good, nice little vibe in the restaurant.",True,True)	0:00:00.040

«Providing new data» is the trigger



“bad data” == bad quality

mlnetsamples / MLNETWebAPISample / Pipelines / Builds / CESARDELATORRE.MLNETS... / #20190522.3

#20190522.3: Pushed dataset file with WRONG/BAD data

Triggered today at 6:36 pm for CESARDELATORRE / CESARDELATORRE/MLNETSENTIMENTCICD master 39cfb59

Logs Summary Tests

Summary

1 Run(s) Completed (0 Passed, 1 Failed)

103 Total tests

2 Passed
101 Failed
0 Others

101 Failed tests (+101)
101 New
0 Existing

1.94% Pass percentage
↓ 98%

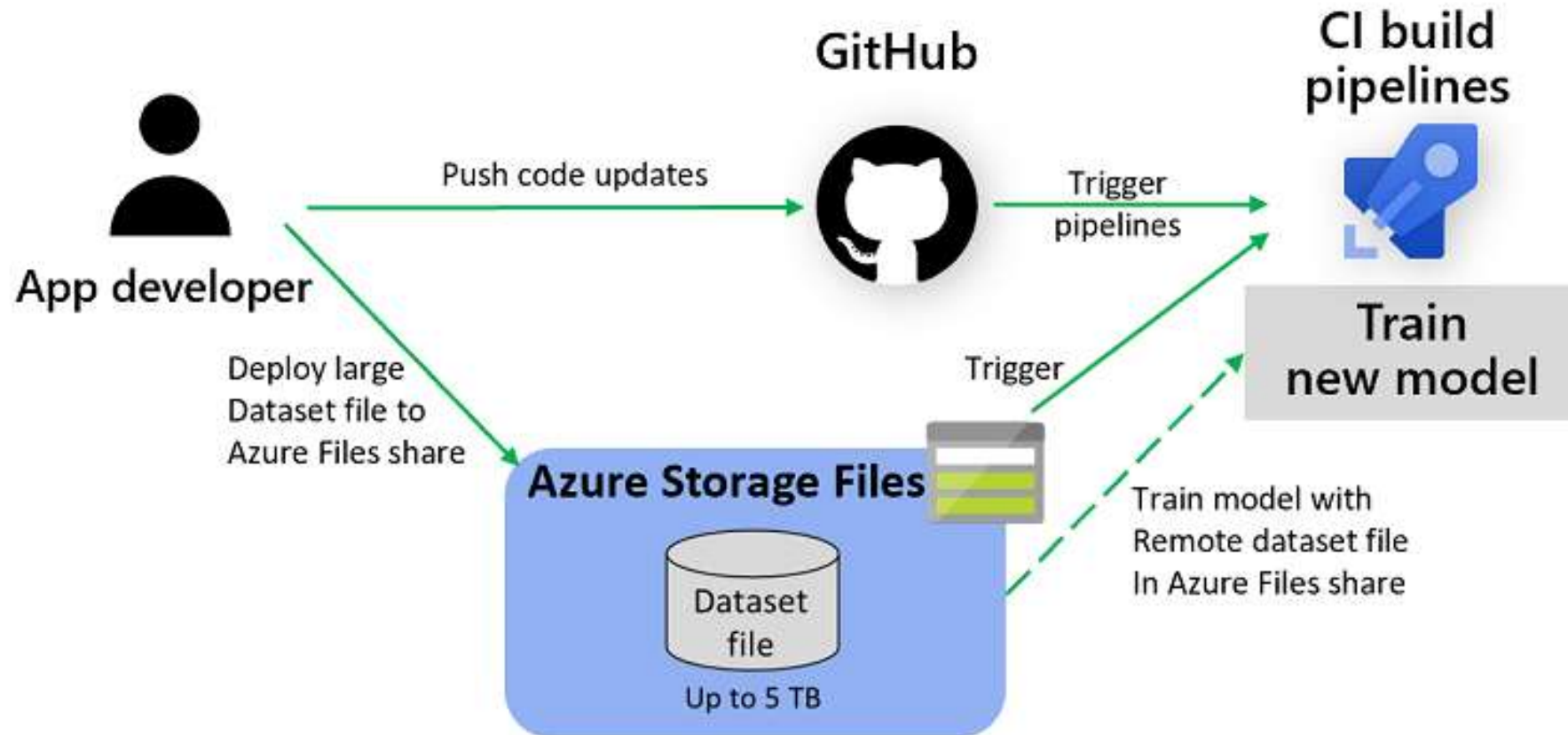
7s 244ms Run duration
↑ +234ms

Filter by test or run name

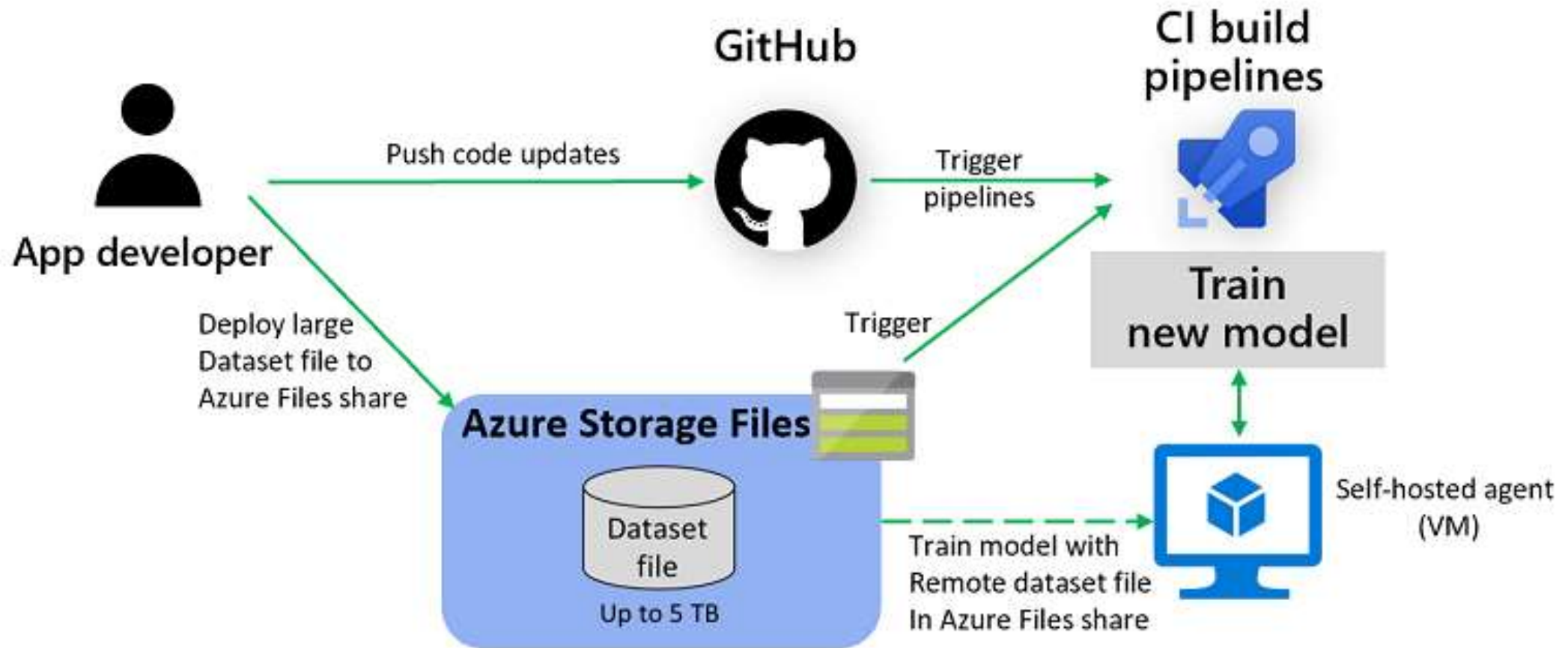
Test	Duration	Failing since	Failing build
VSTest Test Run Release (101/103)	0:00:03.469		
TestNegativeSentimentStatement New	0:00:00.220	5m ago	Current build
TestSentimentStatement("Food quality has been horrible.",True,False) New	0:00:00.043	5m ago	Current build
TestSentimentStatement("Do not waste your money here!",True,False) New	0:00:00.040	5m ago	Current build
TestSentimentStatement("Awful service.",True,False) New	0:00:00.037	5m ago	Current build
TestSentimentStatement("Do yourself a favor and stay away from this dish.",True,False) New	0:00:00.037	5m ago	Current build
TestSentimentStatement("I could eat their bruschetta all day it is divine.",False,True) New	0:00:00.037	5m ago	Current build
TestSentimentStatement("I have never had such bland food which surprised me considering the article v	0:00:00.037	5m ago	Current build
TestSentimentStatement("I paid the bill but did not tip because I felt the server did a terrible job.",True,F	0:00:00.037	5m ago	Current build

Unit tests help us

Azure files can help us for large dataset



Azure DevOps self-hosted agent is better



Improvement in the future

- Versioning datasets
- Databases as training data
- DevOps workflow Scenarios
- ML Model Versioning
- Integration with *Azure ML* and *MLFlow*

Improvement

Get started with ML.NET 1.0!

Get started with [ML.NET here](#).

Tutorials and resources at the [Microsoft Docs ML.NET Guide](#)

Sample apps using ML.NET at the [machinelearning-samples GitHub repo](#)



**ddevops**

THANK YOU!



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