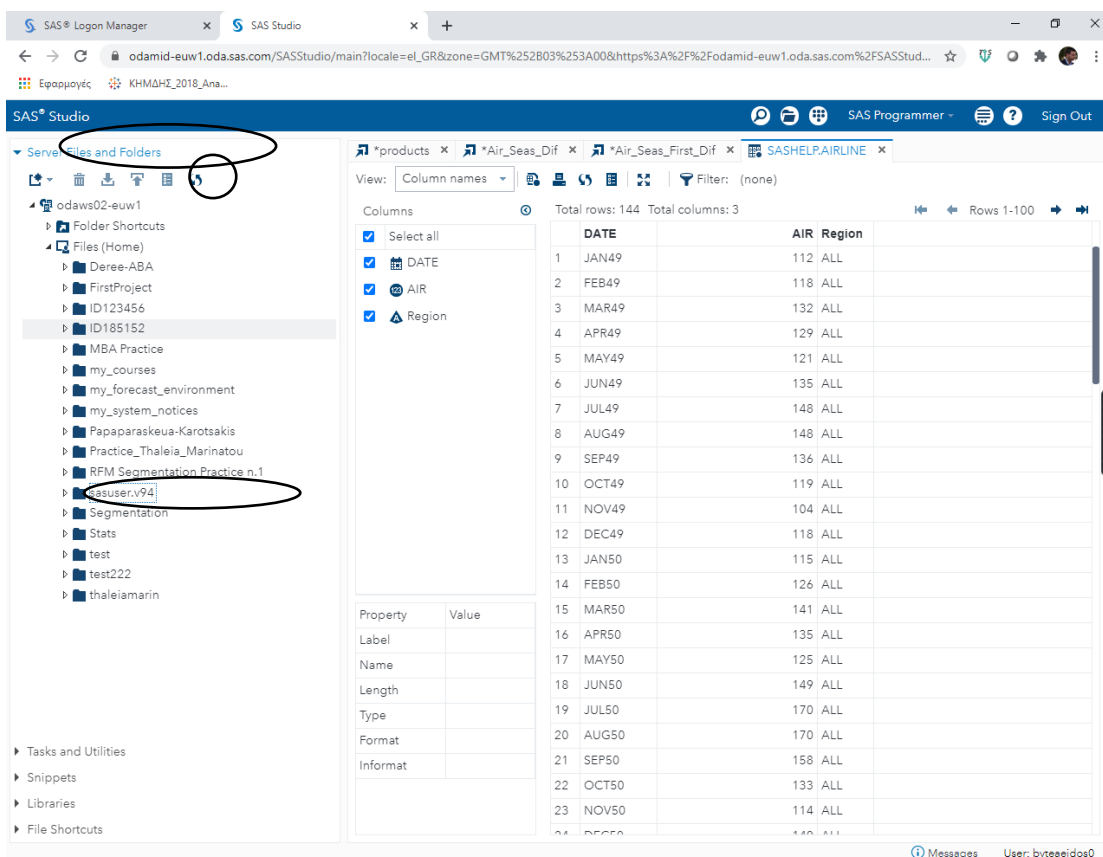


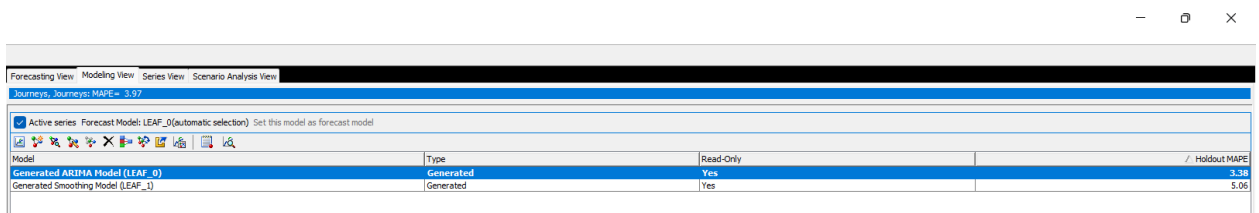
Demo & Exercise ARIMA Augmented with Event

- 1) Open google chrome
- 2) Go to welcome.oda.sas.com
- 3) Select Europe in the drop down menu and press sign in
- 4) Insert your credentials
- 5) In the dashboard select SAS Studio
- 6) On the left hand side select Server Files and Folders and then sasuser.v94
- 7) Press the upload button (the one with the arrow heading upwards).



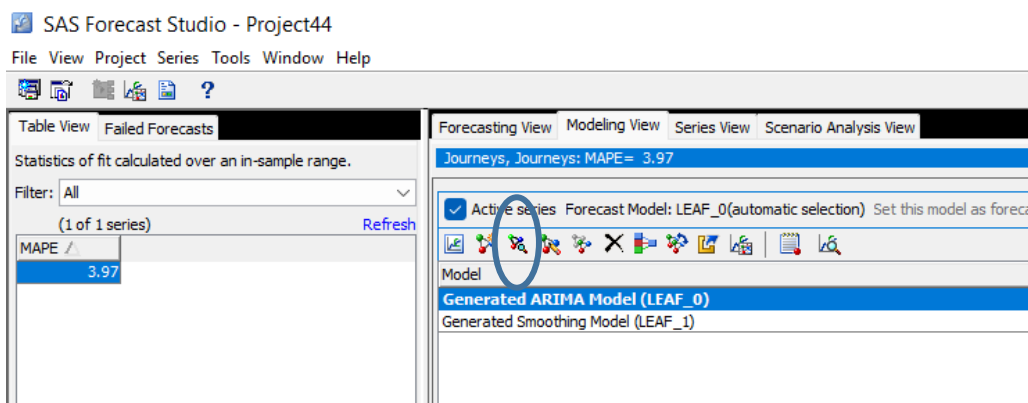
- 8) Select the file “Airline_Data_events_For_SAS.sas7bdat”
- 9) Press Upload
- 10) Open SAS Forecast Studio
- 11) In the projects window press New.
- 12) In step 1 name the project “Airline_Data_Events” and press next.
- 13) In step 2 open the sasuser library, Select the “Airline_Data_Events_For_SAS” data set and press next.

- 14) In step 3 press next
- 15) In step 4 select Month as the time id variable.
- 16) In step 5 select Journeys as the dependent variable.
- 17) In step 6 press next
- 18) In step 7 set 12 in the Change the number of periods to forecast (horizon). Press Change Other Forecasting Settings. Select the Model Selection tab. Check the Use Holdout Sample for Model Selection option and input 27 and 25. Press OK. Press Next.
- 19) In step 8 press finish
- 20) In the Forecast Summary window double click on the Model Type box. What do you observe? Press close.
- 21) In the Forecasting view window, comment on the characteristics of the time series. Is your observation in line with the results of the previous step (model type)?
- 22) Select the Series View window. Select plot Unit Root Test. Which one of the three windows should you look (Zero Mean, Single Mean, Trend)? What do you conclude? Is this in line with the results in the two previous steps?
- 23) Select plot Seasonal Unit Root on the differenced data. What do you conclude?
- 24) Select the Modelling View window



Model	Type	Read-Only	Holdout MAPE
Generated ARIMA Model (LEAF_0)	Generated	Yes	3.38
Generated Smoothing Model (LEAF_1)	Generated	Yes	5.06

- 25) An ARIMA model is chosen as the optimal with **MAPE=3.38%**
- 26) Select the View Selected model button as shown below:



Subset ARIMA Model

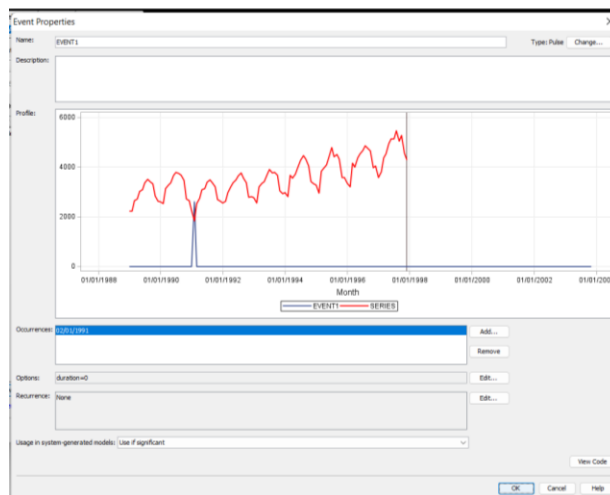
Name: LEAF_0
Description: "ARIMA: Journeys ~ D = (1,12) Q = (12) NOINT"
Details: "ARIMA: Journeys ~ D = (1,12) Q = (12) NOINT"
Model family: ARIMA
Model type: GENERALARIMA
Source: HPFDIAGNOSE **Intercept:** None
Forecast variable: Journeys
Delay: 0
Differencing: (1,12) Q: (12)

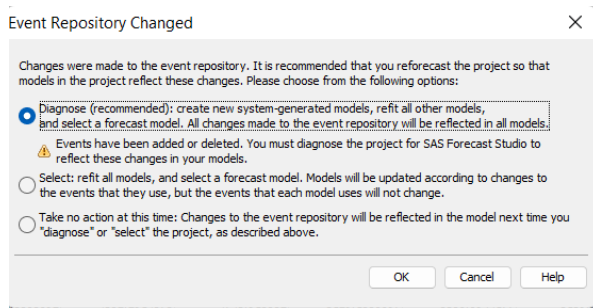
Estimation Options

Method: CLS
Convergence criterion: 0.001
Number of iterations: 50
Delta: 0.001
Singularity criterion: 1E-7
Grid value: 0.005
Restrict parameters to stable values: Yes
NOLS: 0

[View Code](#)

- 27) As you can see the automated algorithm of the series has chosen to perform a first difference (D=1 - because the series is not stationary) and a seasonal difference (D=12) because the series exhibits seasonality.
- 28) Can the model be improved? What happened in 02/1991?
- 29) Go to the main drop down menu in the upper left corner and select Project -- > Event Repository.
- 30) Select New. Name the event Pulse and set the Occurrence to Feb 1991.

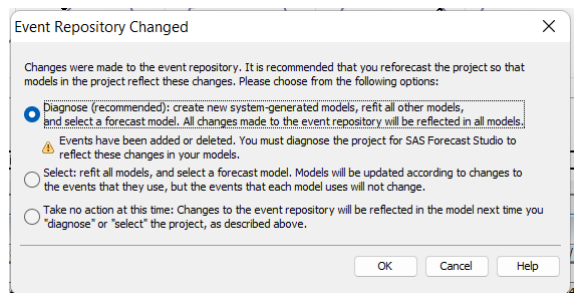
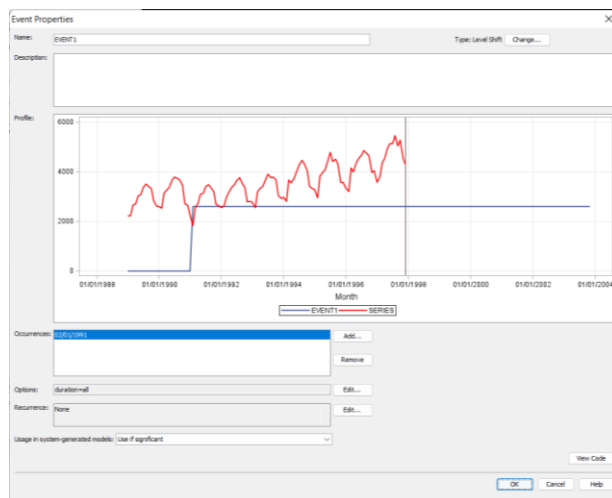




- 31) See the model performance (MAPE). Has it improved? No! **MAPE=3.39%**

forecasting View Modeling View Series View Scenario Analysis View				
Journeys, Journeys.MAPE= 3.78				
Active series Forecast Model: LEAF_3(automatic selection) Set this model as forecast model				
Model	Type	Read Only		Holdout MAPE
Generated ARIMA Model (LEAF_3)	Generated	Yes		3.39
Generated ARIMA Model (LEAF_4)	Generated	Yes		3.60
Generated Smoothing Model (LEAF_5)	Generated	Yes		5.06

- 32) Go to the main drop down menu in the upper left corner and select Project -- > Event Repository.
- 33) Select New. Name the event Step and set the Occurrence to Feb 1991.
- 34) Change the type to Level Shift on the upper right corner.



- 35) See the model performance (MAPE). Has it improved? Yes, **MAPE=3.22%**

- 36) Go to the modelling view and select Parameter Estimated. What is the effect of the shift event in the number of Journeys?

Parameter Estimates

Component	Parameter	Estimate	Standard Error	t Value	Approx Pr > t
Journeys	MA1_12	0.73106	0.08428	8.67	<.0001
STEP	SCALE	-347.87928	160.99736	-2.16	0.0333