

New Vehicle Architectures - New CANoe?

Testing the Future with CANoe - Vector Congress November 21th 2018

Agenda

1.

Introduction

2.

AUTOSAR Adaptive Platform

3.

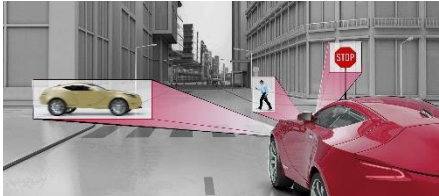
Impact on CANoe

4.

Outlook

Current Trends and Requirements in Automotive Applications

ADAS



- ▶ Camera/LIDAR & Machine Learning

Connectivity



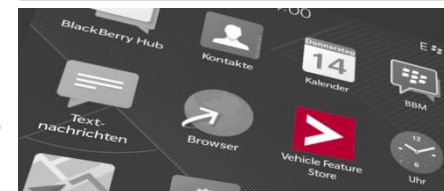
- ▶ Connection to non-AUTOSAR services
- ▶ Security

Infotainment

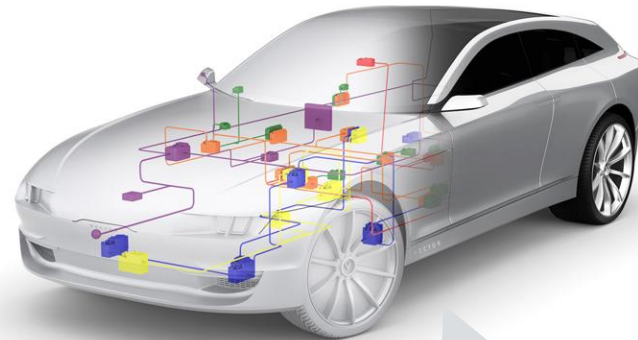


- ▶ Integration of end-user devices
- ▶ File handling

Dynamic Software



- ▶ Install and start applications during runtime
- ▶ Enable 3rd party applications

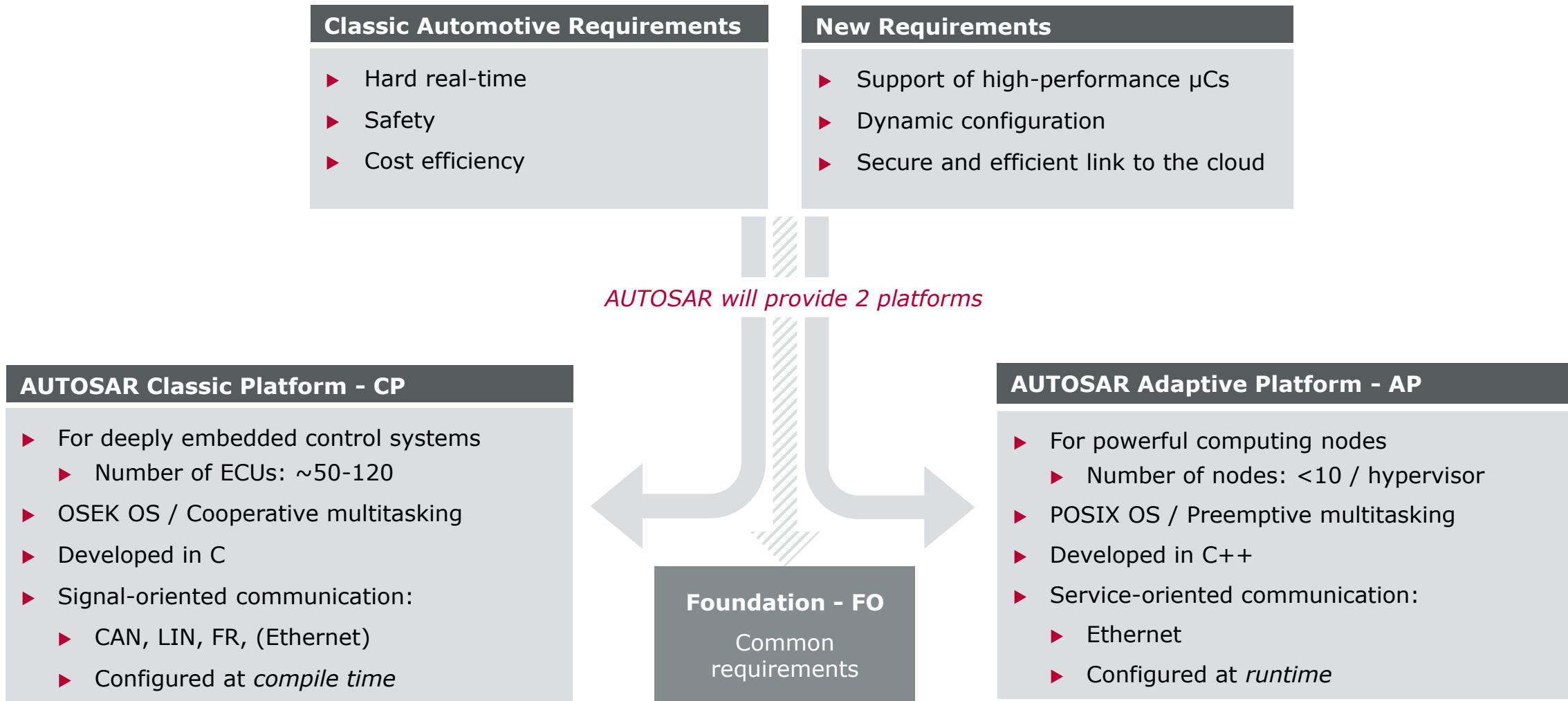


New EE Architectures (Management Summary)

- ▶ Central Idea: “Smartphone on Wheels”
- ▶ Key Features: Updateability and connection to backend infrastructure
- ▶ Service-oriented architectures allow update and upgradeability during lifecycle of vehicle
- ▶ Forward and backward compatibility
- ▶ Ethernet and SOA enabling “End-to-End Architecture” from vehicle to the backend
- ▶ New architectures will introduce high-performance nodes
- ▶ Connection of high-performance nodes is realized with Ethernet as communication technology

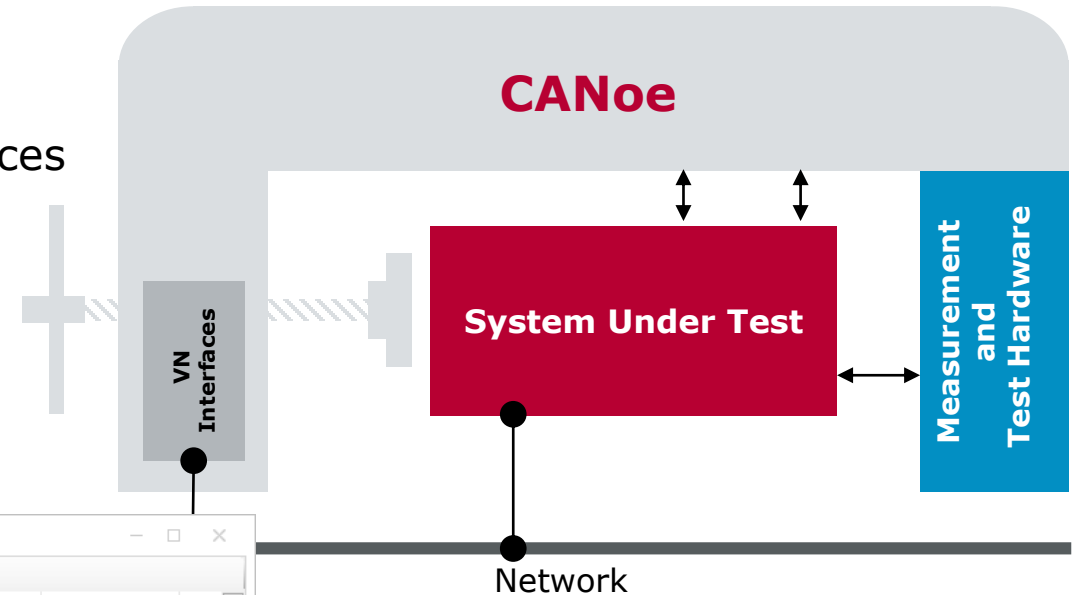


In Detail: AUTOSAR Classic is Supplemented by AUTOSAR Adaptive



CANoe Today

- ▶ The primary use cases of CANoe is to test ECUs and networks
 - ▶ During the development to verify individual development steps
 - ▶ Test prototypes
 - ▶ Perform regression and conformance tests
- ▶ CANoe services the **System Under Test** at all interfaces
- ▶ Main focus of CANoe:
 - ▶ Network specific elements ("CAN frame")



Time	Chn	ID	Name	Event Type	Dir	DLC	Da...	Data	Frame Duration	Bus Idle	Bus Busy
0:00:00.00	83.720	CAN 2 67	Ignition_Info	CAN Frame	Tx	2	2	01 00	0.134 ms (67 bits)	19.078 ms	0.134 ms
	83.720	CAN 1 1A0	Console_1	CAN Frame	Tx	4	4	00 00 00 24	0.172 ms (86 bits)	19.206 ms	0.172 ms
	83.730	CAN 1 1F0	DOOR_l	CAN Frame	Tx	1	1	08	0.118 ms (59 bits)	9.828 ms	0.118 ms
	83.730	CAN 1 1F1	DOOR_r	CAN Frame	Tx	1	1	0E	0.114 ms (57 bits)	0.000 ms	0.232 ms
	83.740	CAN 2 67	Ignition_Info	CAN Frame	Tx	2	2	01 00	0.134 ms (67 bits)	19.866 ms	0.134 ms
	83.740	CAN 1 1A0	Console_1	CAN Frame	Tx	4	4	00 00 00 24	0.172 ms (86 bits)	9.768 ms	0.172 ms
	83.750	CAN 2 64	EngineData	CAN Frame	Tx	8	8	F4 06 19 06 77 01 EE 02	0.234 ms (117 bits)	9.866 ms	0.234 ms
			EngSpeed					1780 rpm	6F4		
			EngTemp					0 degC	19		
			IdleRunning					Running	0		
			PetrolLevel					6 l	6		
			EngForce					375 N	177		
			EngPower					7.5000 kW	2EE		
	83.750	CAN 2 66	EngineDataIEEE	CAN Frame	Tx	8	8	CE 8C DE 44 00 80 BB 43	0.232 ms (116 bits)	0.000 ms	0.466 ms
	83.750	CAN 1 111	Gateway_2	CAN Frame	Tx	8	8	00 00 00 F4 06 06 78 00	0.240 ms (120 bits)	10.062 ms	0.240 ms

Service Orientation

- ▶ New approach for built-in “service-oriented communication” instead of “network specific elements” was required
- ▶ Solution:
 - ▶ Communication Objects (CO) to model any type of communication
 - ▶ New CO layer fully integrated in the existing tool
 - ▶ Mixed operation with classic network specific elements possible



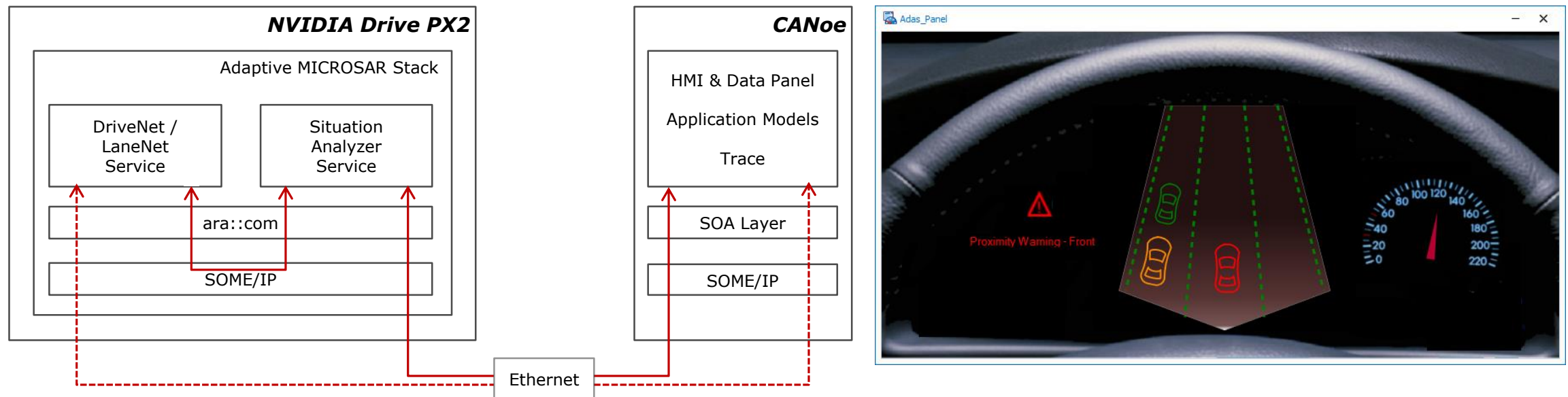
Application Trace

<Search> Communication O...

Time	Name	CO Type	CO Detail	Dir	Src	Dest	Data
0.010008	analyzerServiceInterface	Service	Connection State		Env	[DrivePxMachine]	Connectable
0.010008	analyzerServiceInterface	Service	Connection State		Env	[DrivePxMachine]	Available
0.010008	analyzerServiceInterface.ObjectRecognitionEvent	Event	Subscription State		Env	[DrivePxMachine]	Available
0.010008	analyzerServiceInterface.LanesAndWarningEvent	Event	Subscription State		Env	[DrivePxMachine]	Available
0.040032	analyzerServiceInterface.ObjectRecognitionEvent	Event	Subscription State		Env	[DrivePxMachine]	Subscribed
0.040032	analyzerServiceInterface.LanesAndWarningEvent	Event	Subscription State		Env	[DrivePxMachine]	Subscribed
1.000014	analyzerServiceInterface.ObjectRecognitionEvent	Event	Value	Rx	DrivePxMachine	Env	8 0 0 0 0 2 0 0 0 2 0 0 0
	frontCar	8	8	-			
	leftCar	2	2	-			
	rightCar	2	2	-			
1.000014	analyzerServiceInterface.LanesAndWarningEvent	Event	Value	Rx	DrivePxMachine	Env	129
2.000012	analyzerServiceInterface.ObjectRecognitionEvent	Event	Value	Rx	DrivePxMachine	Env	8 0 0 0 0 2 0 0 0 2 0 0 0
3.000006	analyzerServiceInterface.ObjectRecognitionEvent	Event	Value	Rx	DrivePxMachine	Env	8 0 0 0 0 2 0 0 0 2 0 0 0
4.000014	analyzerServiceInterface.LanesAndWarningEvent	Event	Value	Rx	DrivePxMachine	Env	115

Testing the Future

- ▶ Usage scenario: Testing algorithms on a platform for autonomous driving
 - ▶ Access to service-oriented software is directly possible from within CANoe
 - ▶ Analysis, simulation and automated test can be performed on Communication Objects



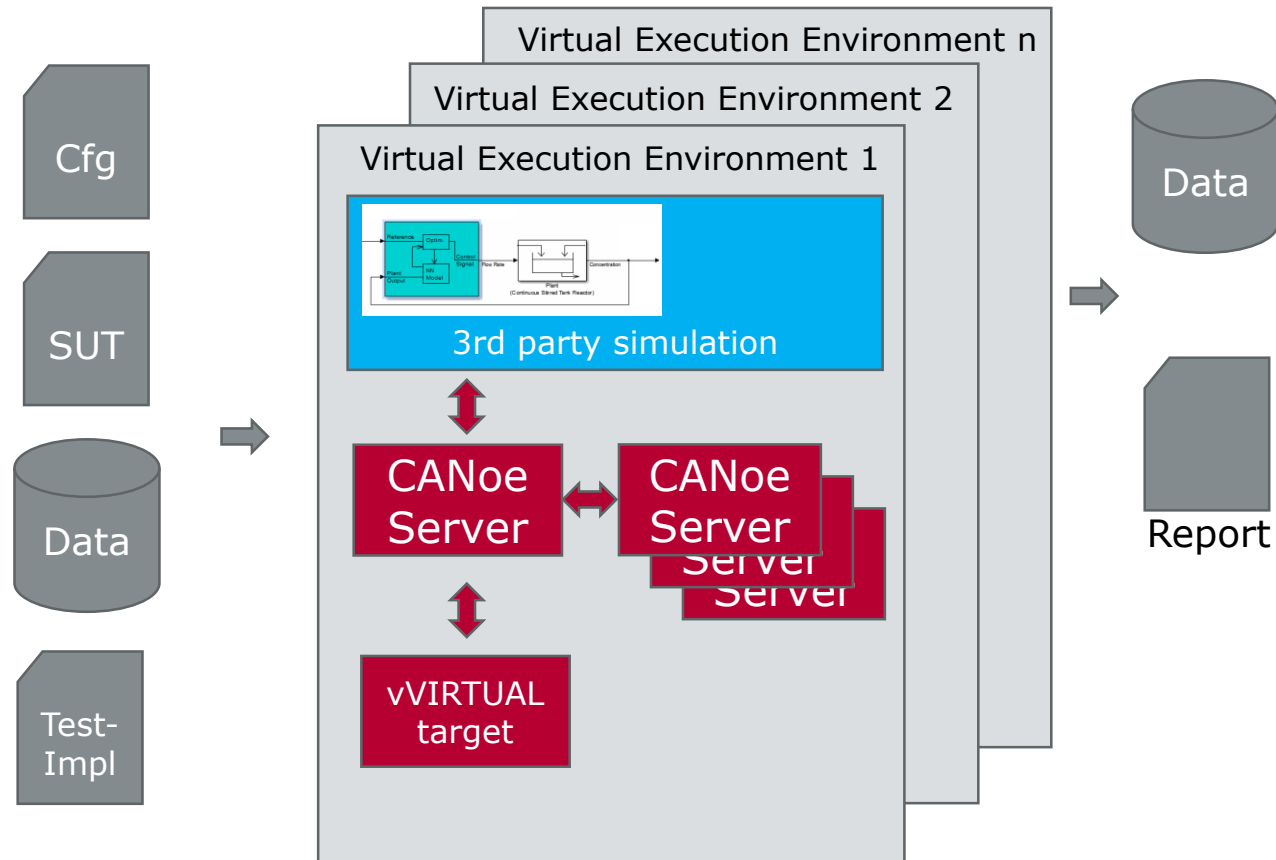
What's still right about the CANoe approach

- ▶ Cars are not just another IT software
 - ▶ Testing of all production variants highly desired
 - ▶ Tests must be performed on various integration levels
 - > Software component level
 - > ECU level
 - > Subsystem level
 - > Entire vehicle network level
 - > Test drive
 - ✓ CANoe can be used on all these levels

- ▶ Most important CANoe concepts
 - ▶ Simultaneous operation of all networks
 - ▶ Same time base for all networks and application layer objects
 - > Allows testing of gateway applications
 - ▶ Scalability (distributed operation on multiple PCs)

And Yet – Software Testing will become more important

- ▶ New product in planning: CANoe Server
 - ▶ Offering parallel and scaled computing



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