

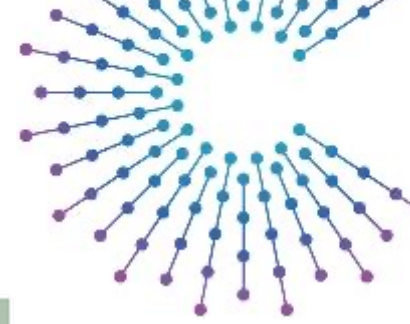


KUKSA

Eclipsecon 2022 Automotive Community Day

COVESA

VSS – Vehicle Signal Specification

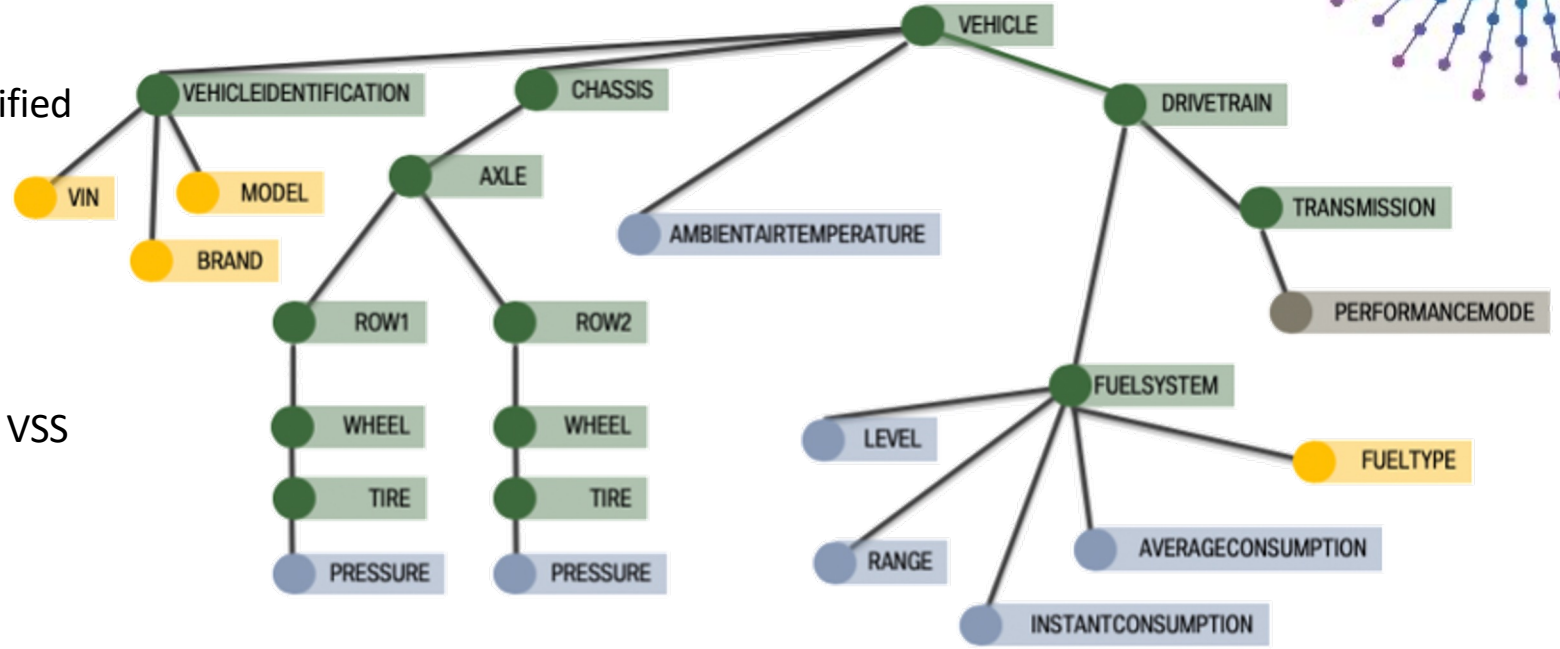


A generic, extensible data model currently specified within COVESA

https://covesa.github.io/vehicle_signal_specification/

A protocol to access data based on the COVESA VSS model specified within W3C

<https://www.w3.org/TR/vehicle-information-service/>

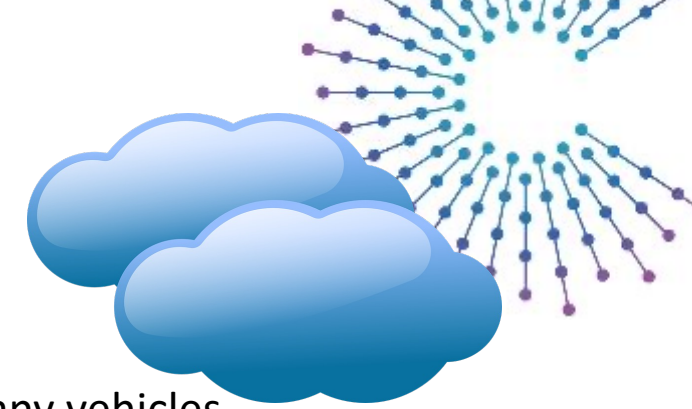


Learn more what VSS is, and what not:

<https://youtu.be/UOt00sbg5Vg>

```
- Drivetrain.Transmission.Speed:  
  type: sensor  
  datatype: uint16  
  unit: km/h  
  min: 0  
  max: 300  
  description: The vehicle speed, as measured by the drivetrain.
```

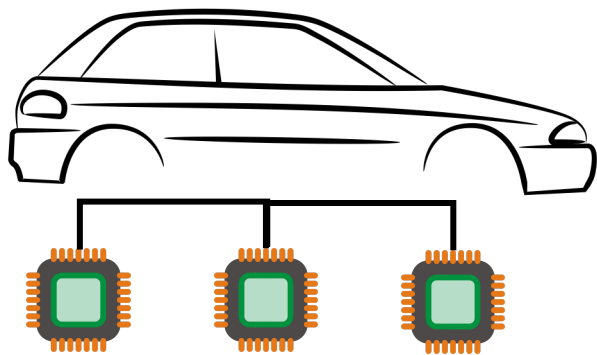
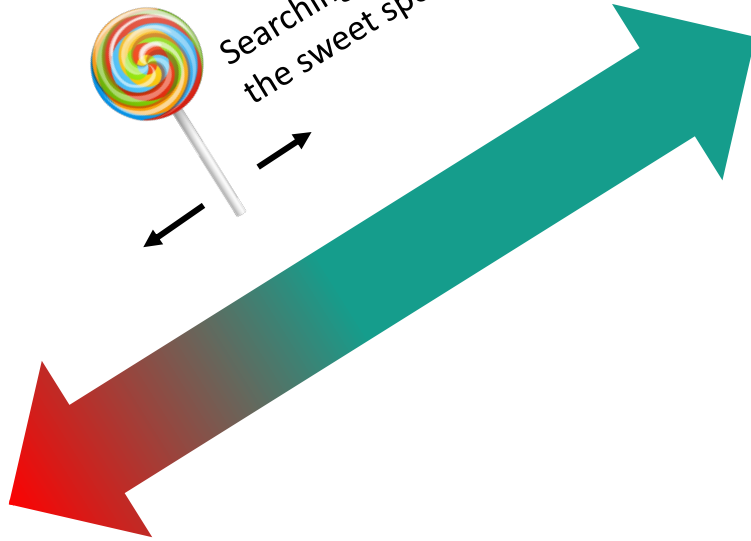
Where to best leverage VSS?



Backend

- The cloud
- Aggregating data of many vehicles
- Link data to other domains

You want common data models: VSS

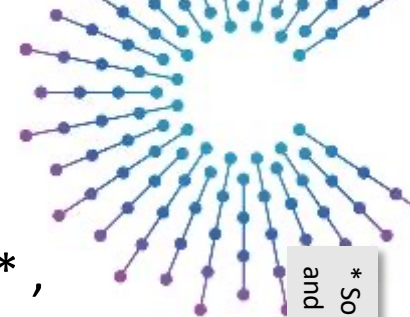


Deeply-Embedded Layer

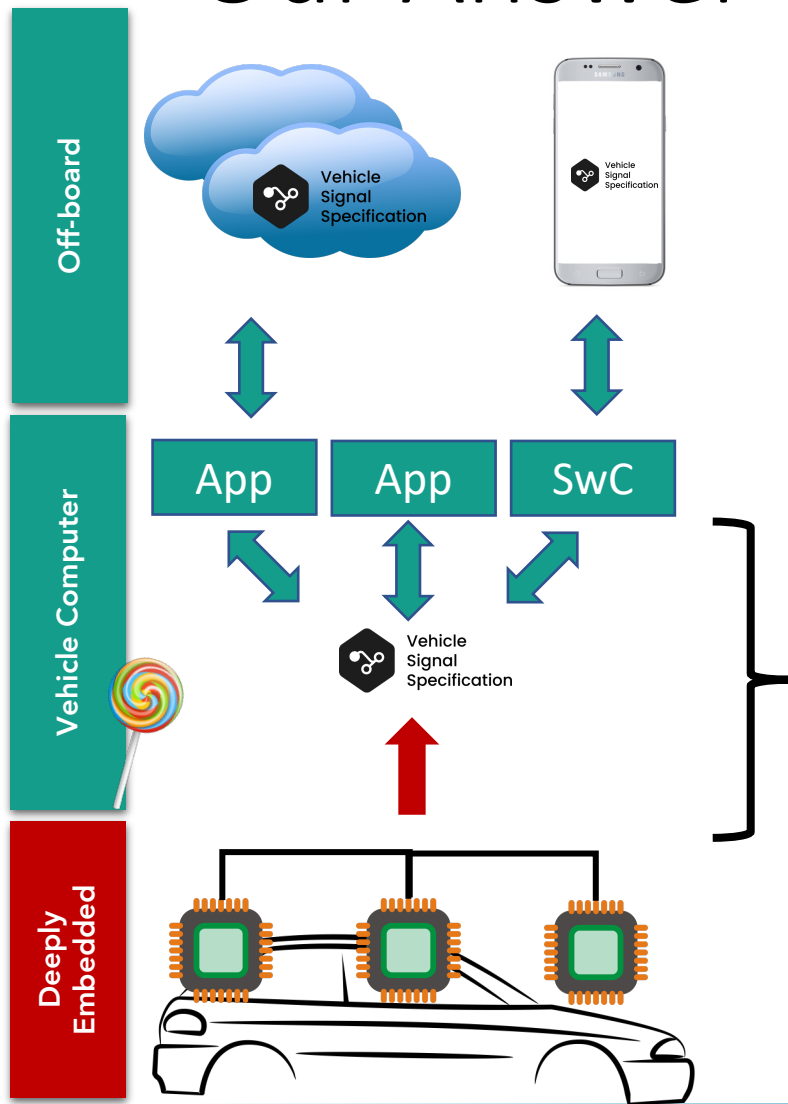
- Small μ Cs
- CAN/LIN
- Very proprietary

Not a happy place for VSS





Our Answer



- Start converting to the VSS world in a Vehicle computer* , because
 - This is the place the industry is working on decoupling hard- from software
 - Here you save money & effort with more generic/portable software
 - Here you can afford the costs of abstraction

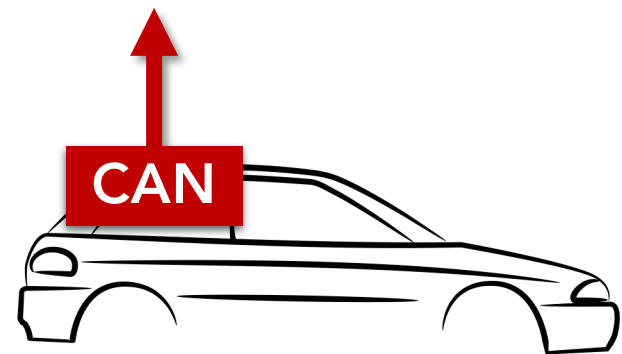


- Has you covered transforming signals from different parts of your E/E architecture to VSS.
- Provides secure access to VSS signals using simple to use interfaces

* Something with a processor and a full blown (POSIX) OS

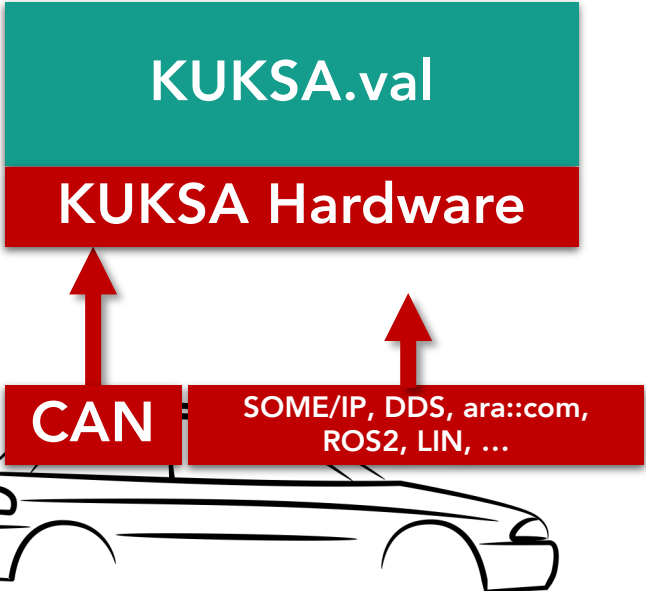
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System Overview

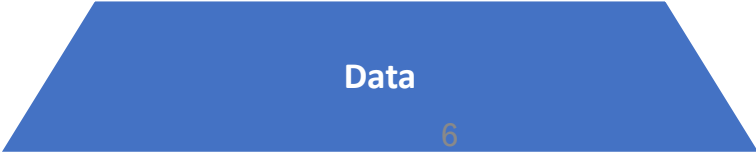


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System Overview



```
vcan0 442 [8] AF EF 9C 09 52 15 30 43
vcan0 6D5 [8] 08 F5 D8 5F 19 14 3B 57
vcan0 5FB [0]
vcan0 2BA [8] 48 F6 A1 74 92 28 97 38
vcan0 26C [8] AA 0A A0 7E E9 32 AA 67
vcan0 72A [3] CB 1B C7
vcan0 4DD [8] 8C 37 6D 7E 39 AB 2E 3C
vcan0 4C0 [8] 1E D5 D7 13 02 91 A6 47
vcan0 135 [8] 54 A6 D6 0A 0A A0 15 49
vcan0 2F6 [8] 24 B4 50 20 F2 70 3F 67
vcan0 26D [8] 5F 57 84 24 27 8D 9D 20
vcan0 714 [7] BA B5 34 59 80 19 CA
vcan0 123 [4] 69 4C 74 2F
vcan0 588 [4] 40 71 EB 74
vcan0 141 [8] 9E 5D 7D 40 01 1E C7 46
vcan0 1F4 [8] 03 AF 6D 0E 2A BB AF 3F
vcan0 789 [8] 34 5B C5 08 80 DA C4 5A
vcan0 0B5 [8] 72 4B 04 42 22 EB E2 5B
vcan0 0A4 [1] 49
vcan0 079 [3] 38 71 14
vcan0 668 [2] EA F1
vcan0 5D6 [8] 55 76 34 0D 18 77 E9 6D
vcan0 3F6 [4] 19 95 B0 34
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```



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System Overview

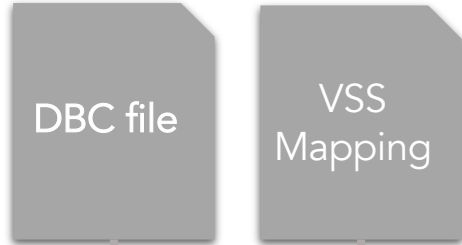
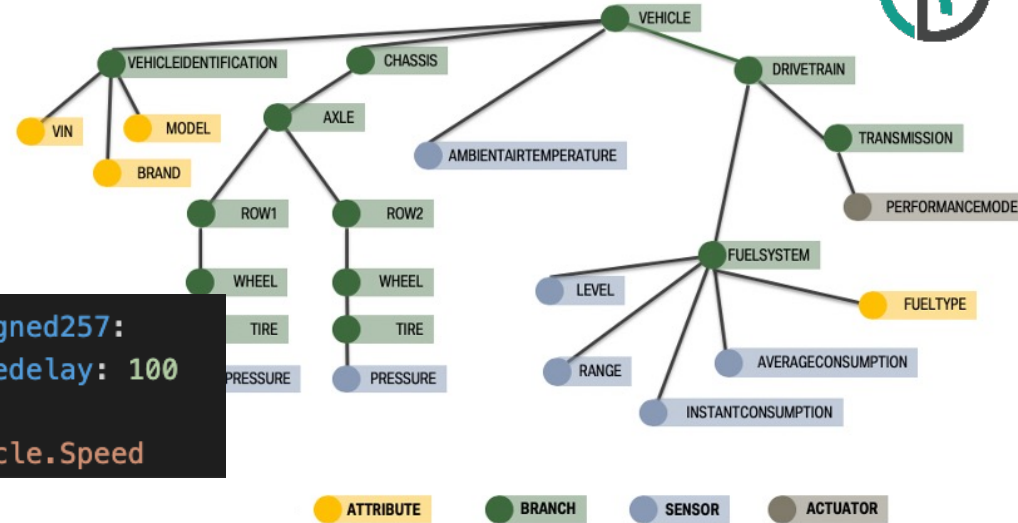


```

3000 B0_599 ID257Uispeed: 8 VehicleBus
3001 SG_UispeedUnits257 : 32|1@1+ (1,0) [0|0] "" Receiver
3002 SG_Uispeed_signed257 : 12|12@1+ (0.08,-40) [-40|287.6] "KPH" Receiver
3003 SG_Uispeed_abs257 : 24|8@1+ (1,0) [0|255] "MPHKPH" Receiver
3004 SG_UispeedChecksum257 : 0|8@1+ (1,0) [0|0] "" Receiver
3005 SG_UispeedCounter257 : 8|4@1+ (1,0) [0|0] "" Receiver
3006 SG_UISpeedHighSpeed257 : 33|9@1+ (1,0) [0|510] "MPHKPH" Receiver
    
```

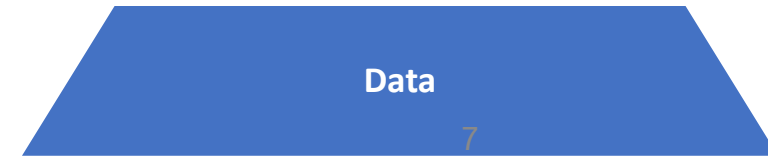
```

3 Uispeed_signed257:
4 minupdatedelay: 100
5 targets:
6 - Vehicle.Speed
    
```



```

vcan0 442 [8] AF EF 9C 09 52 15 30 43
vcan0 6D5 [8] 08 F5 D8 5F 19 14 3B 57
vcan0 5FB [0]
vcan0 2BA [8] 48 F6 A1 74 92 28 97 38
vcan0 26C [8] AA 0A A0 7E E9 32 AA 67
vcan0 72A [3] CB 1B C7
vcan0 4DD [8] 8C 37 6D 7E 39 AB 2E 3C
vcan0 4C0 [8] 1E D5 D7 13 02 91 A6 47
vcan0 135 [8] 54 A6 D6 0A 0A A0 15 49
vcan0 2F6 [8] 24 B4 50 20 F2 70 3F 67
vcan0 26D [8] 5F 57 84 24 27 8D 9D 20
vcan0 714 [7] BA B5 34 59 80 19 CA
vcan0 123 [4] 69 4C 74 2F
vcan0 588 [4] 40 71 EB 74
vcan0 141 [8] 9E 5D 7D 40 01 1E C7 46
vcan0 1F4 [8] 03 AF 6D 0E 2A BB AF 3F
vcan0 789 [8] 34 5B C5 08 80 DA C4 5A
vcan0 0B5 [8] 72 4B 04 42 22 EB E2 5B
vcan0 0A4 [1] 49
vcan0 079 [3] 38 71 14
vcan0 668 [2] EA F1
vcan0 5D6 [8] 55 76 34 0D 18 77 E9 6D
vcan0 3F6 [4] 19 95 B0 34
vcan0 6B0 [8] 15 41 8F 1E 3A FE D0 13
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```

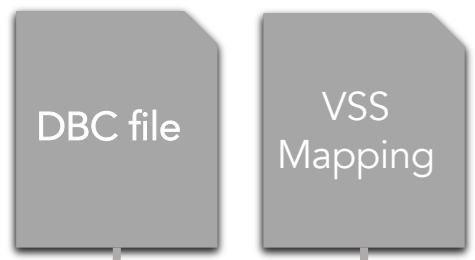
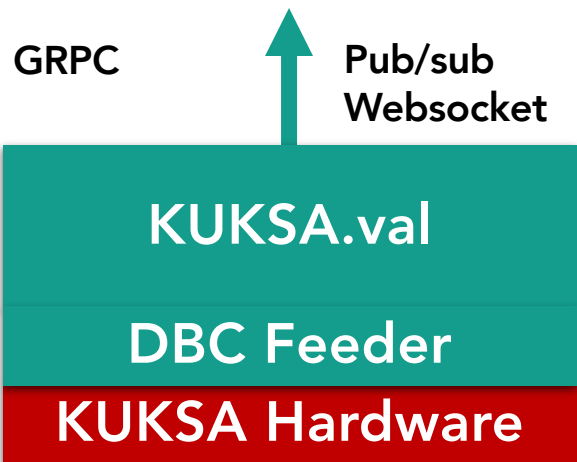
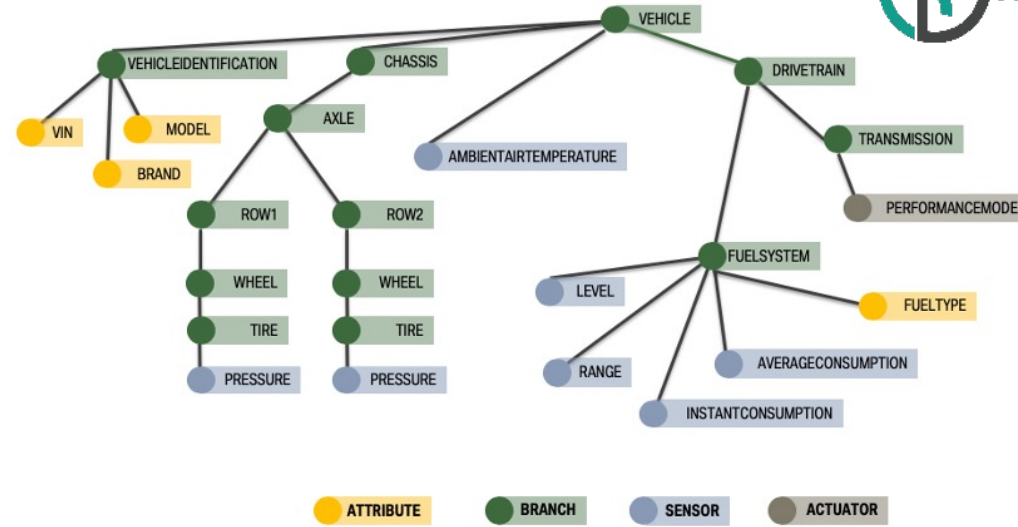


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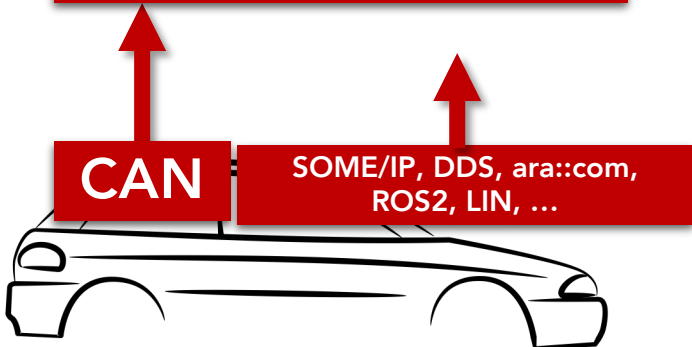
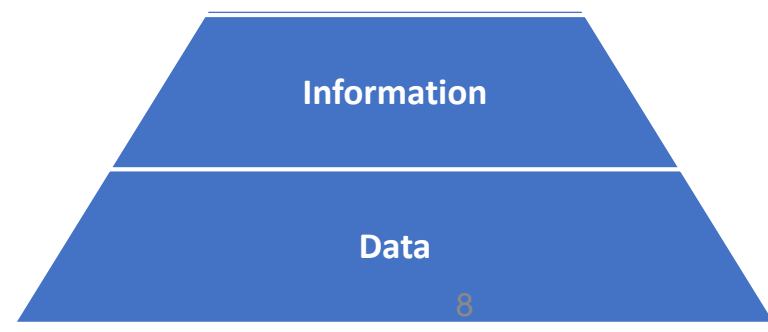
System Overview



```
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  "value": "100"
}
```

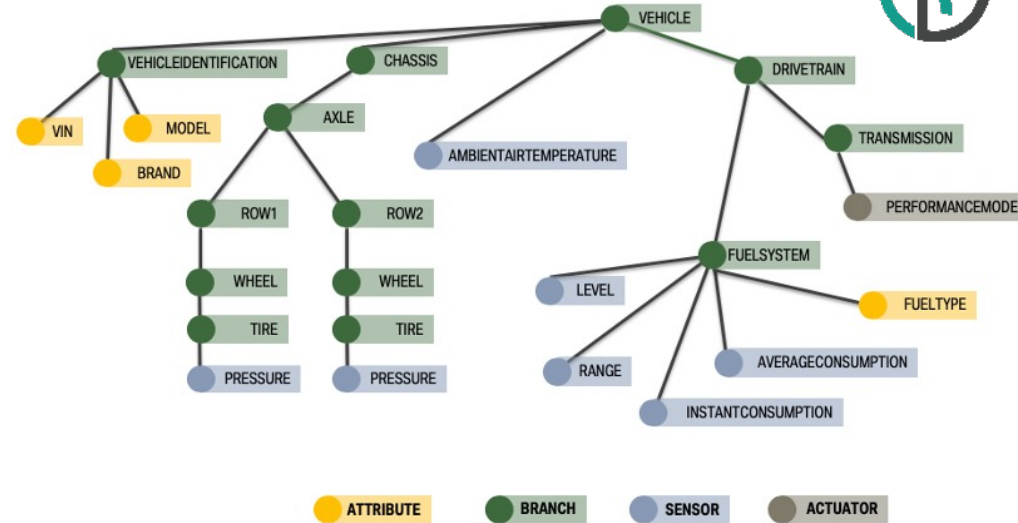


vcan0	442	[8]	AF EF 9C 09 52 15 30 43
vcan0	6D5	[8]	08 F5 D8 5F 19 14 3B 57
vcan0	5FB	[0]	
vcan0	2BA	[8]	48 F6 A1 74 92 28 97 38
vcan0	26C	[8]	AA 0A A0 7E E9 32 AA 67
vcan0	72A	[3]	CB 1B C7
vcan0	4DD	[8]	8C 37 6D 7E 39 AB 2E 3C
vcan0	4C0	[8]	1E D5 D7 13 02 91 A6 47
vcan0	135	[8]	54 A6 D6 0A 0A A0 15 49
vcan0	2F6	[8]	24 B4 50 20 F2 70 3F 67
vcan0	26D	[8]	5F 57 84 24 27 8D 9D 20
vcan0	714	[7]	BA B5 34 59 80 19 CA
vcan0	123	[4]	69 4C 74 2F
vcan0	588	[4]	40 71 EB 74
vcan0	141	[8]	9E 5D 7D 40 01 1E C7 46
vcan0	1F4	[8]	03 AF 6D 0E 2A BB AF 3F
vcan0	789	[8]	34 5B C5 08 80 DA C4 5A
vcan0	0B5	[8]	72 4B 04 42 22 EB E2 5B
vcan0	0A4	[1]	49
vcan0	079	[3]	38 71 14
vcan0	668	[2]	EA F1
vcan0	5D6	[8]	55 76 34 0D 18 77 E9 6D
vcan0	3F6	[4]	19 95 B0 34
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vcan0	175	[8]	BA D8 95 6E 2A 8A 56 60



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System Overview

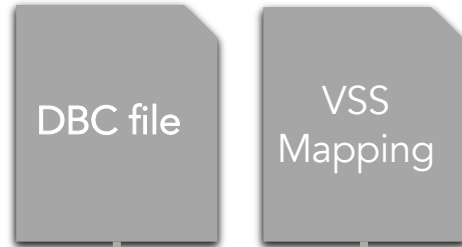


Data Consumer

GRPC

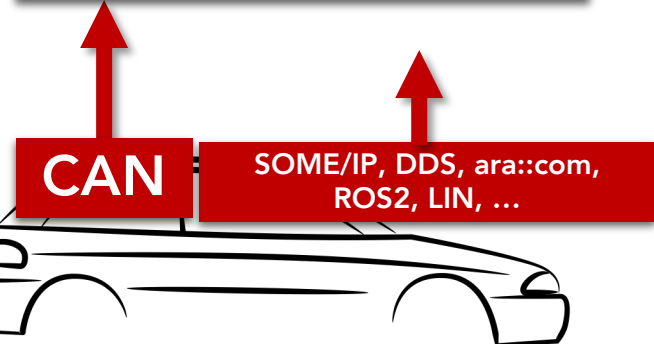
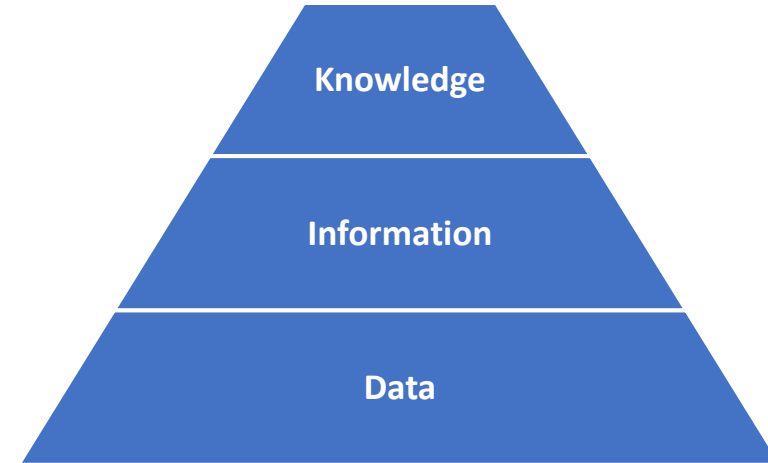
Pub/sub
Websocket

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DBC Feeder
KUKSA Hardware



```

vcan0 442 [8] AF EF 9C 09 52 15 30 43
vcan0 6D5 [8] 08 F5 D8 5F 19 14 3B 57
vcan0 5FB [0]
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vcan0 079 [3] 38 71 14
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vcan0 3F6 [4] 19 95 B0 34
vcan0 6B0 [8] 15 41 8F 1E 3A FE D0 13
vcan0 175 [8] BA D8 95 6E 2A 8A 56 60
  
```



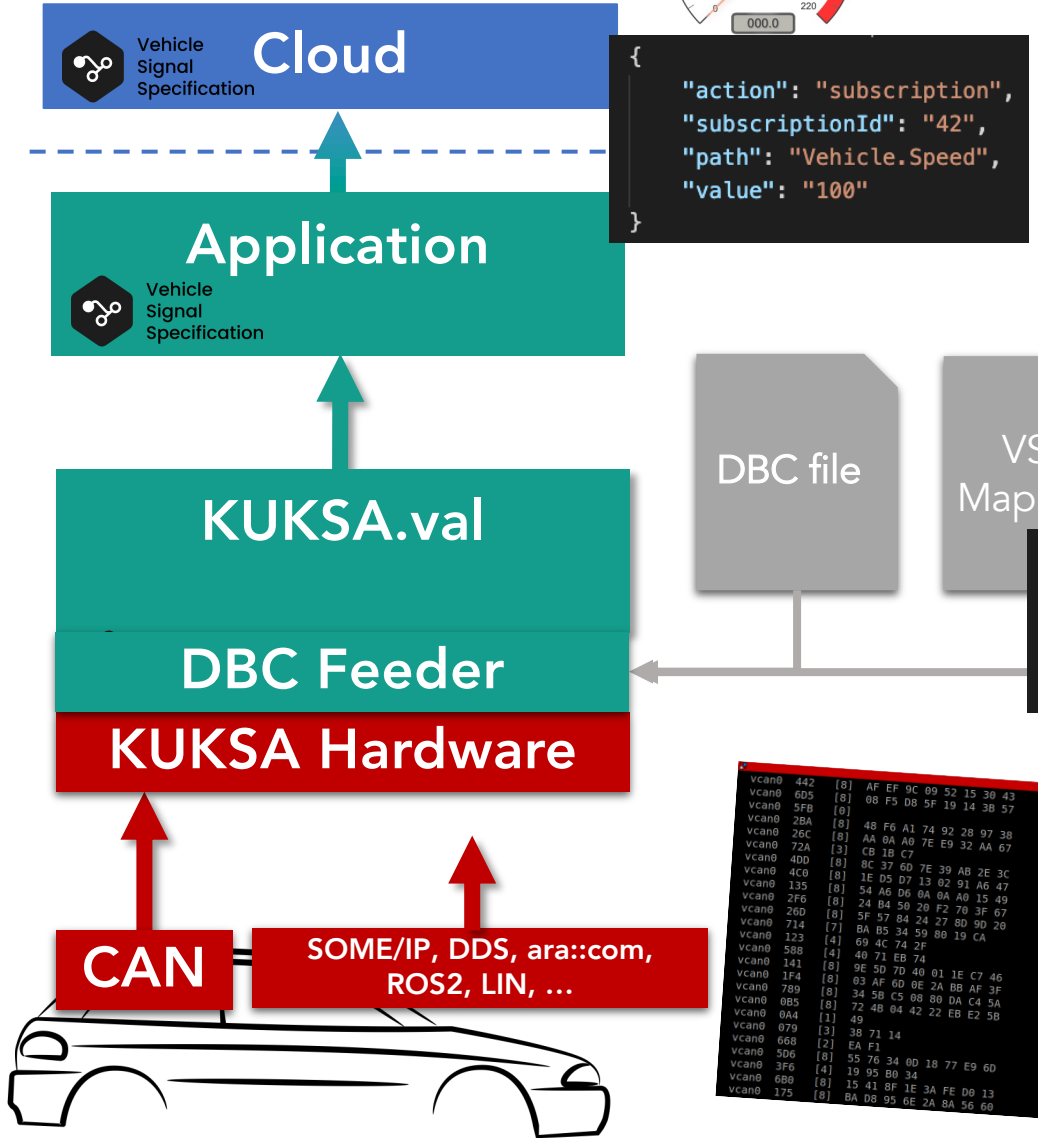
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System Overview

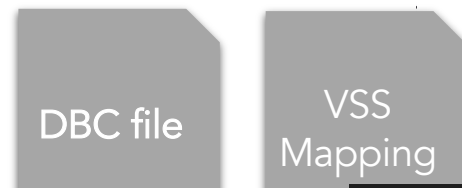


Offboard

Onboard

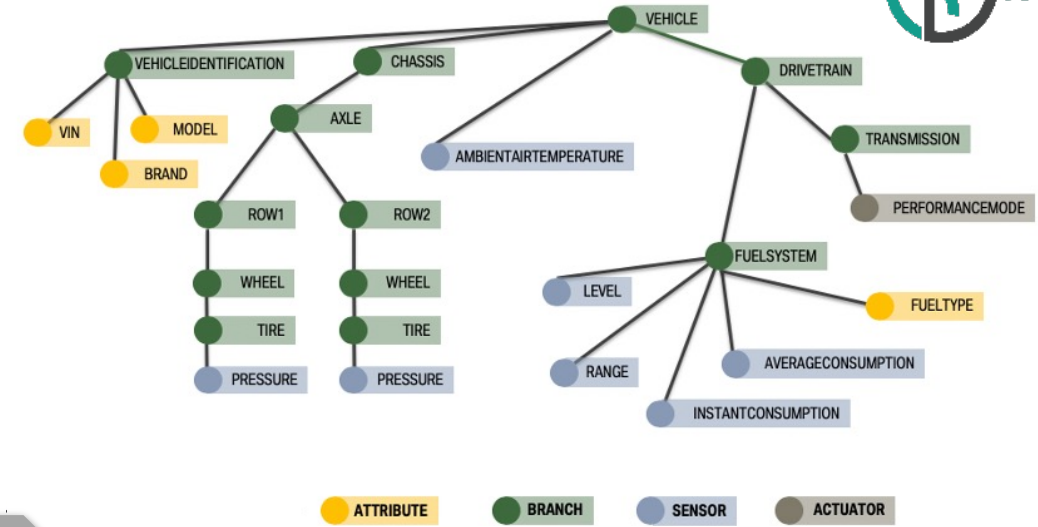


```
{
  "action": "subscription",
  "subscriptionId": "42",
  "path": "Vehicle.Speed",
  "value": "100"
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```

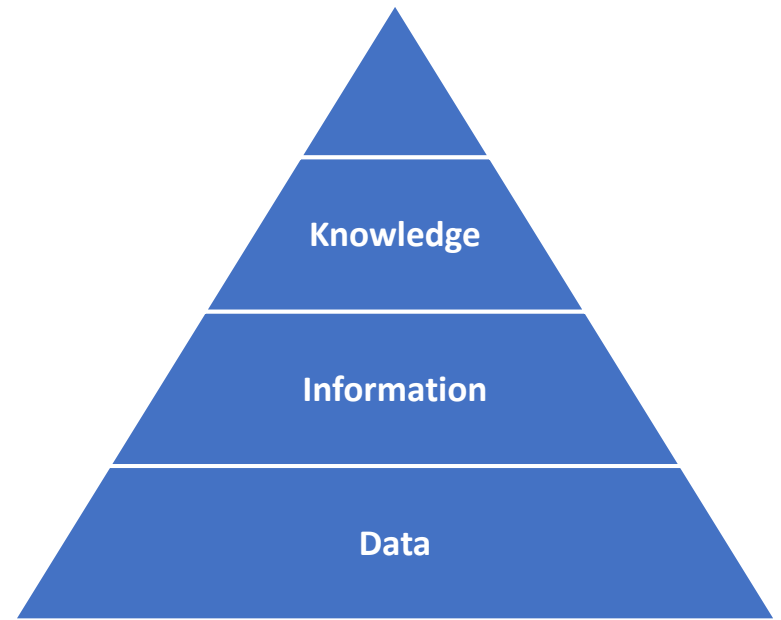


```
3 UIspeed_signed257:
4   minupdatedelay: 100
5   targets:
6     - Vehicle.Speed
```

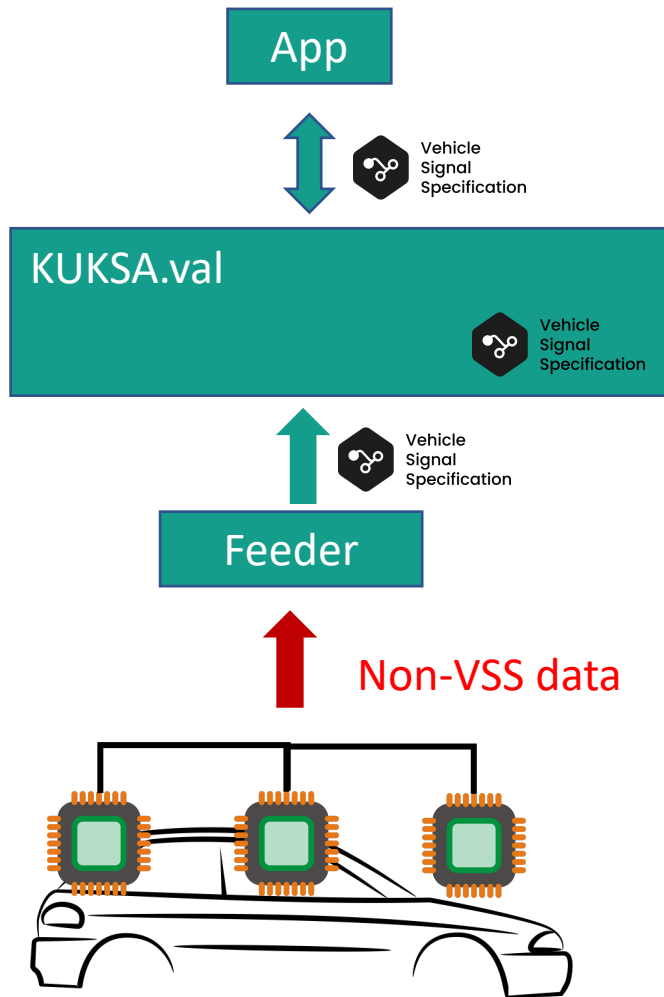
```
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vcan0 40D [8] 8C 37 6D 7E 39 A0 2E 3C
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```



● ATTRIBUTE ● BRANCH ● SENSOR ● ACTUATOR



KUKSA.val Scope and Design Choices



- 100% Open Source Eclipse Project (Apache 2.0 license)
- "In-vehicle digital twin" based on VSS
- Only providing "current" view (no historic data)
- No access without authorisation
- Lightweight (core written in C++/RUST)
- Easy to use language-agnostic interfaces (VISS/GRPC)
- Data Feeders to transform data to VSS
- Support for simple VSS actors

KUKSA CANOPi

Perfect SDV prototyping platform

- Can run Linux stack and also containers/Kubernetes
- Does provide direct access to CAN and On-board-Diagnostics
- Can be powered directly from Vehicle
- Ready to use 4G/5G & GPS (M2 slot and SIM card holder on board)
- USB Ports and some Pins for “special” extensions
- Slightly more powerful than current generation highend ECUs, but not as far out as a laptop

Check the next talk to see what can be done with CANOPi using KUKSA and other Automotive OSS software



Strong players around VSS



FleetWise



Check:

<https://aws.amazon.com/iot-fleetwise/>

<https://www.autosar.org/news-events/details/leading-automotive-sw-organizations-announce-collaboration-on-sdv-topics-2022-oct-14/>



KUKSA

Thank you

Stay in contact

<https://github.com/eclipse/kuksa.val>

<https://eclipse.org/kuksa>

sebastian.schildt@de.bosch.com