Simplify and enhance In-Vehicle application development

Extensible, open and dynamic architecture
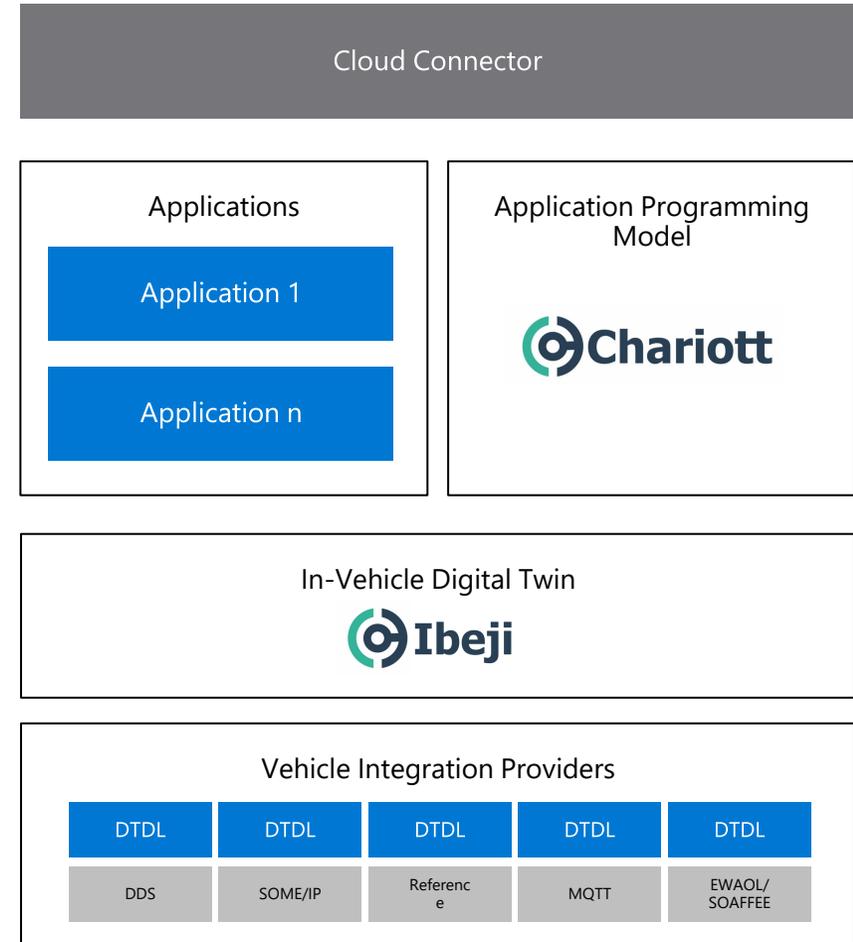

Chariott

Capability oriented model for App-to-App and App-to-Digital Twin Communications

Ibeji

**Digital representation of vehicle state and its capabilities**

At a glance…

Community driven

Secure

Dynamic and extensible

Componentized

Single and Multi Node

Platform and cloud agnostic

Cloud Connector

Applications

Application 1

Application n

Application Programming Model

Chariott

In-Vehicle Digital Twin

Ibeji

Vehicle Integration Providers

DTDL	DTDL	DTDL	DTDL	DTDL
DDS	SOME/IP	Reference	MQTT	EWAOL/ SOAFFEE

Developed in cloud, delivered in the vehicle

File   Edit   Selection   View   Go   Run   Terminal   Help   bash - sdv-ivm [Dev Container: Rust] - Visual Studio Code

target/debug/sdv-ivm-sample-application ×   Simple Browser ×

```
Cabin Temperature: 20
Cabin Temperature: 21
Cabin Temperature: 22
Cabin Temperature: 23
Cabin Temperature: 24
Cabin Temperature: 25
Cabin Temperature: 26
Cabin Temperature: 27
Changing aircon state to: true
Air conditioning: true
Send notification: "The car is now being cooled."
Setting UI message to: "The car is cooled, no need to worry."
Battery level: 99
Cabin Temperature: 26
Cabin Temperature: 25
Cabin Temperature: 24
Cabin Temperature: 23
```

http://localhost:5079

23°C   99%
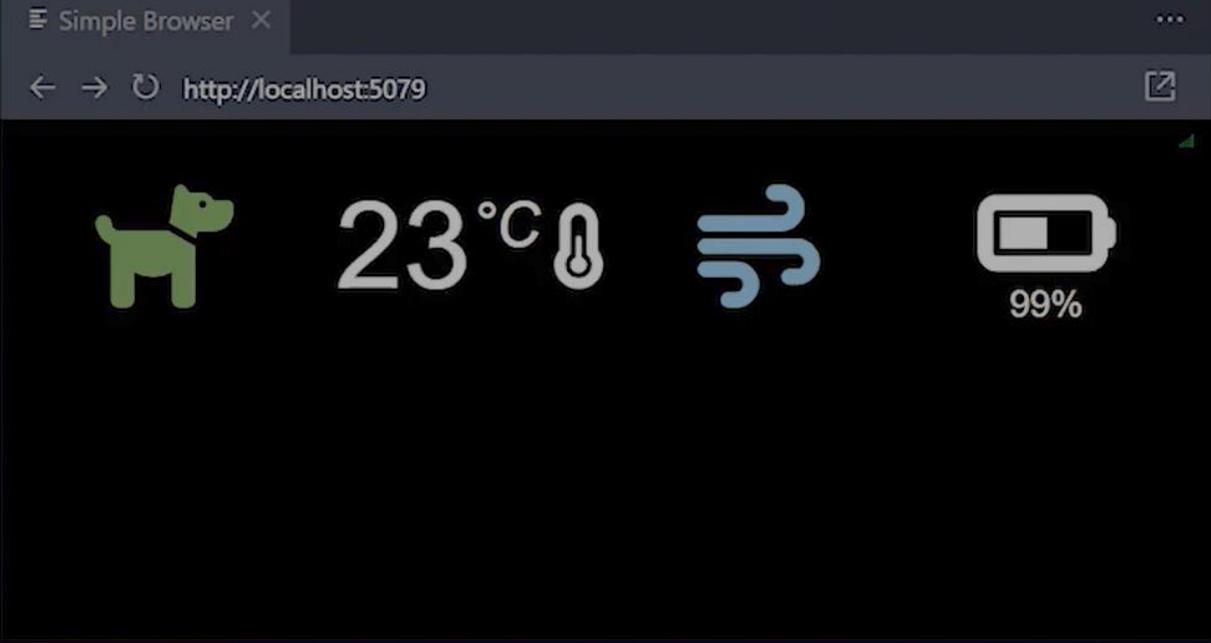
target/debug/middleware ●   bash

```
vscode ➜ /workspaces/sdv-ivm (demo X) $ cargo run
warning: /workspaces/sdv-ivm/Cargo.toml: file found to be present in multiple b
uild targets: /workspaces/sdv-ivm/tests/profile_memory.rs
    Finished dev [unoptimized + debuginfo] target(s) in 0.09s
     Running `target/debug/middleware`
2022-06-29T09:29:31.728548Z  INFO middleware: middleware server listening on 0.
0.0.0:50051
```

```
led: true }
2022-06-29T09:30:20.689382Z  INFO sdv_ivm_mock_provider::function_handler: Sett
ing message in UI: The car is now being cooled.
2022-06-29T09:30:20.693483Z  INFO sdv_ivm_mock_provider: Updated state to Vehic
leStateData { dog_mode: false, temperature: 26, battery_level: 99, air_con_enab
led: true }
2022-06-29T09:30:20.697848Z  INFO sdv_ivm_mock_provider::function_handler: Send
ing notification: The car is cooled, no need to worry.
2022-06-29T09:30:21.694828Z  INFO sdv_ivm_mock_provider: Updated state to Vehic
leStateData { dog_mode: false, temperature: 25, battery_level: 99, air_con_enab
led: true }
2022-06-29T09:30:22.695881Z  INFO sdv_ivm_mock_provider: Updated state to Vehic
leStateData { dog_mode: false, temperature: 24, battery_level: 99, air_con_enab
led: true }
2022-06-29T09:30:23.696938Z  INFO sdv_ivm_mock_provider: Updated state to Vehic
leStateData { dog_mode: false, temperature: 23, battery_level: 99, air_con_enab
led: true }
```

1st Contribution Day

Dev Container: Rust   demo*   ⊗0 △0   4   1.62%   1.50 GHz   78%   2.52/15.42 GB   Watch

2nd Contribution Day

Eclipse Chariott at a Glance

- Remote API based **programming model**
    - gRPC proto is the contractual API
    - Common operations (inspect, read, write, invoke, discover, etc.)
- Richer **brokering system** modeling after COA
- **Dynamic Discovery** supporting direct app to app communication incl. streaming
- **Inspection of the system** allowing lighting up features in applications
- Readying it for **integration with Ibeji** (in-vehicle Digital Twin)
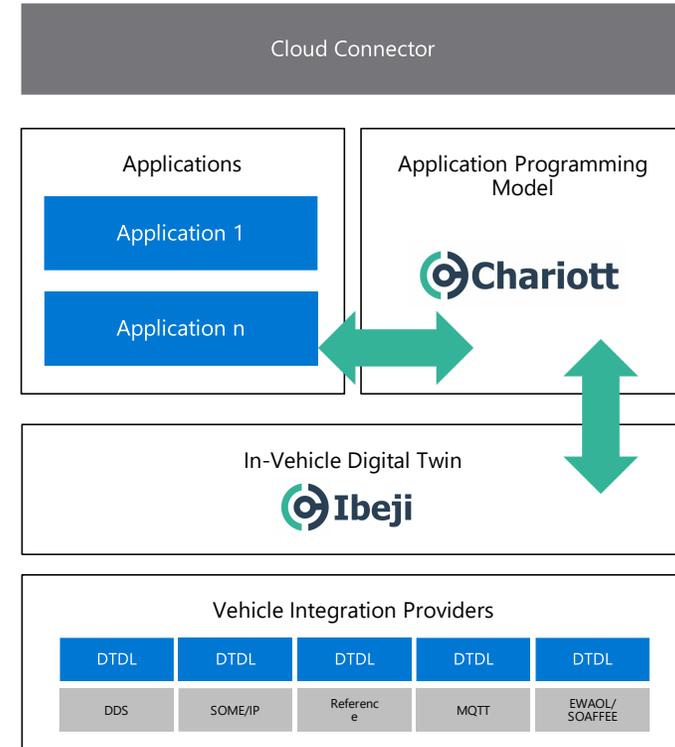
Ibeji – Vehicle Provider DTDL and Vehicle Digital Twin in Action

In-Vehicle Digital Twin

Intents: Discovery, Subscribe, Invoke

Vehicle Store

Parse

Vehicle Integration Providers

DTDL
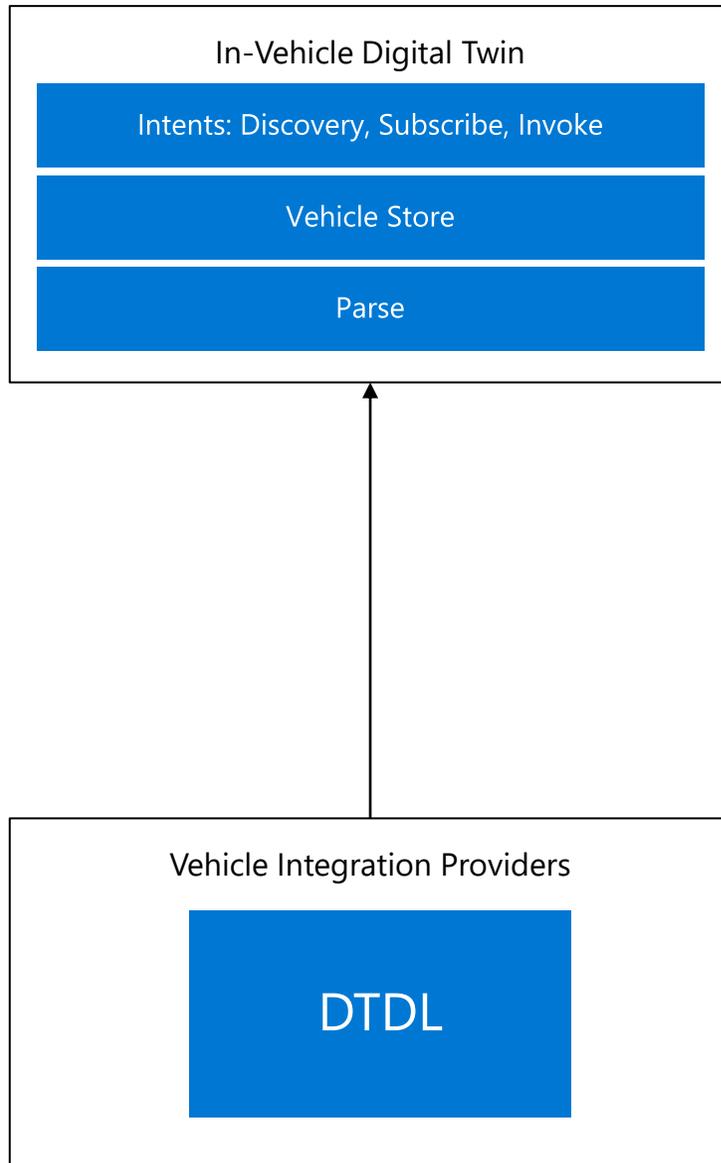
```
1   [
2     {
3       "@id": "DogMode:OnOffSwitch;1",
4       "contents": [
5         {
6           "@type": ["Property", " RemotelyAccessible"],
7           "name": "DogMode_OnOffSwitch",
8           "description": "DogMode on-off switch may be either 'on' or 'off'.",
9           "schema": "string",
10          "remote_access": [
11            {
12              "@type": "Endpoint",
13              "uri": "grpc://localhost:8010",
14              "operations": [ "inspect", "read", "subscribe", "invoke", "discover" ]
15            }
16          ]
17        }
18      ]
19    },
20
21    {
22      "@id": "HVAC:FanSpeed;1.0",
23      "contents": [
24        {
25          "@type": ["Property", " RemotelyAccessible"],
26          "@name": "HVAC_Fanspeed",
27          "description": "Fan Speed, 0 = off. 100 = max",
28          "schema": "integer",
29          "remote_access": [
30            {
31              "@type": "Endpoint",
32              "uri": "grpc://localhost:8010",
33              "operations": [ "inspect", "read", "subscribe", "invoke", "discover" ]
34            }
35          ]
36        }
37      ]
38    },
```

Closing Remarks

Project has been approved for publication by Eclipse!

A detailed walkthrough recording is available at Eclipse Chariott Project website.

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Thank YOU.

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