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CDL Introduction
What is CDL?

• Car Data Logger
• CDL is responsible for collecting, storing and providing the car data
  – Car data related to..  
      • Diagnostic, navigation, infotainment, information on vehicle itself, driver specific information, functional status, DLT, …  
      • But, not limited to a specific list or pre-defined items
  – Collection of car data  
      • Collection of user specified car data by configuration set
  – Store of car data  
      • In a specific format configured by the user as database or file
  – Provide of car data  
      • To other GENIVI components or cloud server of outside the vehicle requiring specific car data
Architecture of CDL

- Use VSS via VSI
- Managed by configuration (JSON)

- To other internal module or applications
- Using CommonAPI

- Stored in a specific format (ex. JSON)
- Can be stored to database

- To external server
- Using RVI-core

• Other Devices
• App
• External Server

CAN
DLT
DB

VSS Data Collector
Data Store
CDL

On-board Provider
Off-board Provider

CommonAPI
RVI_Core (JSON RPC)

CDL Daemon

DBus
SomeIP
Configurations

• You can collect and manage car data you want by configuration of ‘DataConfig.json’
• Configuration defines which car data will be collected how frequently
• Event data is also defined separately

```
"Cycle":
  [ "1000":
      "Signal.Drivetrain.FuelSystem.AverageConsumption"
    ],
    "2000":
    ],
    "3000":
    ],
  ]
},
"Event":
    "Vehicle.Light.Front.Left",
    "Vehicle.Light.Front.Right"
  ]
```
Project Status Overview

• Since 2014

• Registered as P2-PC in Miranda release (11.0)
• CDL concept demo is integrated into GDP12

• Focusing on implementing proof of concept for AC
• Preparing submission CDL as AC
Overview of Car Data Use Case
Car Data Usage Trend

To User/Driver/Consumer
- Concierge & Maintenance
- PHYD
- ...

Car Data

To OEM/Manufacturer/Tiers
- Recall Forecasting
- Driver’s Intentions & Usability
- ...

To Public/Infra/Government
- Real-time Traffic Management
- Road Infra Design
- ...

* McKinsey Advanced Industry (Mar 2016) - Car data: paving the way to value-creating mobility, Perspectives on a new automotive business model
## Use Cases

<table>
<thead>
<tr>
<th>Value creation models</th>
<th>Use cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generating revenues</td>
<td></td>
</tr>
<tr>
<td>Direct monetization</td>
<td>Over-the-air software add-ons</td>
</tr>
<tr>
<td>Selling products,</td>
<td>Networked parking service</td>
</tr>
<tr>
<td>features, or services</td>
<td>Tracking/theft protection service</td>
</tr>
<tr>
<td>to the customer</td>
<td>Vehicle usage monitoring and scoring</td>
</tr>
<tr>
<td></td>
<td>Connected navigation service</td>
</tr>
<tr>
<td></td>
<td>Onboard delivery of mobility-related contents/services</td>
</tr>
<tr>
<td></td>
<td>Onboard platform to purchase non-driving-related goods</td>
</tr>
<tr>
<td>Tailored advertising</td>
<td>Predictive maintenance</td>
</tr>
<tr>
<td>Leveraging car data</td>
<td>Targeted advertisements and promotions</td>
</tr>
<tr>
<td>to push individual</td>
<td></td>
</tr>
<tr>
<td>offerings to customers</td>
<td></td>
</tr>
</tbody>
</table>
## Use Cases

<table>
<thead>
<tr>
<th>Use Case</th>
<th>R&amp;D and material costs reduction</th>
<th>Warranty costs reduction</th>
<th>Data-/feedback-based R&amp;D optimization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gathering product field data for development</td>
<td>Traffic-data-based retail footprint and stock level optimization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customers’ costs reduction</td>
<td>Usage-based insurance – PAYD/PHYD</td>
<td>Car pooling</td>
</tr>
<tr>
<td></td>
<td>Analyzing actual usage patterns to reduce repair and downtime costs</td>
<td>Driving style suggestions</td>
<td>P2P car sharing</td>
</tr>
<tr>
<td></td>
<td>Improved customer satisfaction</td>
<td>E-hailing</td>
<td>Trucks platooning</td>
</tr>
<tr>
<td></td>
<td>Better tailoring product/services to customer needs</td>
<td>Early recall detection and software updates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increasing safety and security</td>
<td>Driver’s condition monitoring service</td>
<td>Aggregated car database-based CCTV service</td>
</tr>
<tr>
<td></td>
<td>Reducing time for intervention</td>
<td>Improved road/infrastructure maintenance and design</td>
<td>Road laws monitoring and enforcement</td>
</tr>
<tr>
<td></td>
<td>Collecting and forwarding warnings in real time, pointing in the right direction</td>
<td>Breakdown call service</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Emergency call service</td>
<td></td>
</tr>
</tbody>
</table>
18th AMM Showcase
# Showcase History

<table>
<thead>
<tr>
<th>AMM</th>
<th>Schedule</th>
<th>Key Concepts</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>16th (GB)</td>
<td>Spring 2017</td>
<td>Accompanying Various GENIVI Component</td>
<td>- Vehicle Simulator</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- VSS/VSI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- RVI_Core</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- CommonApI DBus/SomeIP</td>
</tr>
<tr>
<td>17th (KR)</td>
<td>Fall 2017</td>
<td>Collaboration</td>
<td>- ACCESS’s WebApp</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- CANDevStudio</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Security with On-board Authentication &amp; Data Encryption</td>
</tr>
<tr>
<td>18th (DE)</td>
<td>Spring 2018</td>
<td><strong>Interaction with Outer World</strong></td>
<td>- Cloud Server</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Android Apps</td>
</tr>
</tbody>
</table>
18th GENIVI AMM in Munich (DE)

**CAN Simulator**
- CANDevStudio (GENIVI)
- Vehicle Signal Generating
- Speed, RPM, Wheel angle, HVAC, Warnings, etc

**Cluster & CDL**
- Cluster HMI with Qt
- CDL Daemon on Raspberry Pi 3

**HVAC Application**
- Web App by ACCESS
- VISS Server, Web Engine and Web Application on Raspberry Pi 3

**Big Data Server**
- Historical View of Car Data with RVI
- Periodical Data Transfer to Server

**Concierge Service**
- Android App
- Consumables Status and Warnings
- TCP Socket

**Remote Monitoring**
- Real-time Vehicle Monitoring via Server
- Record & Replay

**ACCESS Cloud**
Concierge Service App

- Concept
  - Real-time car data transmission to driver’s mobile app
  - Pre-configured warnings and consumable status are notified
  - Navigation to the nearest service center (TBD)
Server Side Architecture

• Expected functions in Cloud Service for Vehicle
  – User Management
  – Mover (e.g. Vehicle) Management
  – Mover / User Relation Management for Security
  – Group/Organization Management
  – Map Service Framework
  – Big Data Analysis
  – Visualization
  – Etc.

• Use cases
  – Carrier/Delivery Business, Taxi, Car Share, IoT Car Insurance, etc
Cloud Service Architecture

- ACCESS’s Cloud Service for Vehicles Concept

<table>
<thead>
<tr>
<th>User Manager</th>
<th>Mover Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>Vehicle</td>
</tr>
<tr>
<td>Operator</td>
<td>Person</td>
</tr>
<tr>
<td>Staff</td>
<td>Package</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organization /Group Manager</th>
<th>Map Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headquarters</td>
<td>MapFan</td>
</tr>
<tr>
<td>Branch</td>
<td>Google Map</td>
</tr>
<tr>
<td>Maintenance Spot</td>
<td>MapBox(OpenStreetMap)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location Manager</th>
<th>Visualization Support</th>
<th>Chat Module</th>
<th>External Connection Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search by Area</td>
<td>D3.js, WebGL</td>
<td>Group Chat</td>
<td>Master data</td>
</tr>
<tr>
<td>Search by Address</td>
<td></td>
<td>Beacon Message</td>
<td>Travel Distance</td>
</tr>
<tr>
<td>Route Management</td>
<td></td>
<td>Area Broadcast</td>
<td></td>
</tr>
</tbody>
</table>

External System (Smartphone/PC/Cloud)
Cloud Service Architecture

These software entities have been appended for Demo.
Cloud Service and Client Application

Cloud Service

For Vehicle

WebSocket Server

HTTP Server

Restful API

Commercial Network

WebSocket I/F

for streaming data

Websocket I/F

RVI

CDL Daemon

Client Mobile App

Client Web App

Restful API: for stored data/static operation
(analysis data, past data, command, etc)
Client Mobile Application

• Mobile App for Demo Showcase
  – Functions
    • Monitor Vehicle Position with data from CDL
    • Visualize driving information
    • Record and Replay
CDL Roadmap and Action Items
CDL Project Roadmap

**TODAY**

**Pulsar**
April 2018
- PoC for Abstract Component
- Preparing submission of CDL as AC

**Quasar**
October 2018
- Submission of CDL as AC

**R-release**
Spring 2019
- Code improvement
- Integrate CDL AC-PoC into GDP

Contribution to
DIRO ; SHDA
Future Action Items

• Machine Learning and AI
  – Giving LIFE to car data
  – Building the context and meaning of car data as a ‘model’

• Practical Usages
  – What do we want to do with car data
  – Various requirements from various stakeholders

• Security
  – Inter-EG collaboration
Thank you!

Visit GENIVI at http://www.genivi.org or http://projects.genivi.org
Contact us: help@genivi.org

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