Telediagnosis@Mercedes-Benz powered by MongoDB

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Mercedes-Benz
The best or nothing.
About Myself

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Role: IT Architect - Diagnostics and Connected Car Data / Mercedes-Benz Aftersales

Topics: Vehicle Diagnosis / Telediagnosis
Connected Cars Services
Agenda

• Telediagnosis and Mobility @ Mercedes-Benz

• Why Mercedes-Benz has chosen MongoDB
  • Data specifics
  • How data is accessed
  • Data storage requirements

• Our Mongo DB journey
  • How we started with MongoDB (sizing)
  • How our Architecture looks like (Sharding, Replicas, Indexes)

• Q & A ( Speaker Room 1 | Wednesday, June 10, 2020 | 2:00pm - 3:00pm CEST )
Future Mobility

Intuitive to use

- Connected
- Autonomous
- Shared & Services
- Electric

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Telematics as Core Process in the future Mercedes Services

Vehicles are transmitting regularly status and health data into...

...the Vehicle Data Conditioning (VDC) where these technical vehicle events are processed...

...and the follow-up processes are triggered with real-time recommendations for actions.

CAC
Retail
Customer

Aggregated Quality Analisys

MongoDB

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MongoDB Data - Vehicle Telediagnosis Msg

```json
{
    ............
    "schema": "3.1.0",
    "createdAt": {..},
    ............
    "vehicleIdentData": {
        "chassisNumber": "WDD24708A5432J63",
        "countryCode": "4f3490b14e238a5f",
        "modelSeries": "f16ad22d42064811",
        "modelType": "2196868af1c70d74",
        "modelYear": "5e01ac15d73c3e4a",
        "steering": "4a3424fe6411461c"
    },
    "basicData": {
        "mileage": {..},
        "batteries": [..],
        "tanks": [..],
        "tiresPressure": [..],
    },
    "controlUnits": [..],
    "affectedFunctions": [..],
    "vehicleClusterMessagesData": [..],
    "maintenanceData": {..}
    ............
}
```

"controlUnits": [
  {
    "ecuId": {..}
    "name": "a927e49b0549f00f71",
    "detailsHardware": {},
    "detailsSoftware": {},
    "dtc": [
        {
            "code": "B214F73",
            ...
            "environmentalData": {...}
        },
        ...
    ],
    ...
  }
]
How Data is accessed

Controlling Units Failures
- MPC-Multifunction Camera
- Water fluid level too low
- N10-Signal acquisition module (SAM)

MPC-Multifunction Camera
- Software Version: 15/0930
- Hardware Revision: 13/0930
- Ignition Cycle: Counter: 9
- Error Frequency: Counter: 3
Top Requirements

- Horizontal Scaling
- Speed / Fast Response Time
- Support HA
- Mature technology, good community
Our Journey with MongoDB: First POC - 1

- How easy it is?
- Storage requirements for 500 mil EES
- Test MongoDB performance
- Insight on scaling

MongoDB – primary
- Ubuntu
- 4 Cores
- 32 GB
- 500 GB SSD 3000 IOPS

MongoDB – secondary
- Ubuntu
- 4 Cores
- 32 GB
- 500 GB SSD 3000 IOPS
Our Journey with MongoDB: First POC - 2

rs0:PRIMARY> db.ees.count()
62544261 (62 mil)
rs0:PRIMARY>

rs0:PRIMARY> db.ees.totalIndexSize()
1404067840 (1.4GB)
rs0:PRIMARY>

• How easy it is?
• Sizing
• Insight on scaling
• Performance

Filesystem Size Used Avail Use% Mounted on
udev 126G 8.0K 126G 1% /dev
tmpfs 126G 12K 126G 1% /dev/shm
/dev/xdval 41G 7.8G 32G 20% /
/dev/xdvb 500G 251G 249G 51% /data/db

insert query update delete getmore command dirty used flushes vsize res qrw arw net_in net_out conn
991 432 *0 *0 0 2|0 3.4% 4.5% 0 2.90G 297M 0|0|0 0 12.9m 84.2k 12
989 482 *0 *0 0 2|0 3.6% 4.7% 0 2.91G 310M 0|0|0 0 12.9m 84.1k 12
988 419 *0 *0 0 1|0 3.7% 4.8% 0 2.92G 323M 0|0|0 0 12.8m 83.8k 12
MongoDB MVP - Architecture

PRODUCTION ENVIRONMENT
MongoDB MVP - Architecture

OPS. Manager

TEST ENVIRONMENT

PRODUCTION ENVIRONMENT

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MongoDB - Project Specifics

• **Sharding**
  • Using 3 shards from the beginning.
  • Expecting to store up to 2 TB per shard
  • 3 Replica set node per shard
  • Using the VIN (chassisNumber) as the shard key

• **Indexing**
  • VIN (chassisNumber), ECU, DTC, TextExp

• **Collections**
• **Transactions**
• **Data Migration**
• **Backup**
• **Cloud vs On-Premise**
• **Monitoring**
• **Operations**
Conclusions
Seamless integrated mobility platforms will be game changer for future mobility services.
Thank You!

Questions?

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