ASAM:GUIDE

ACCELERATE ENGINEERING FOR MOBILITY
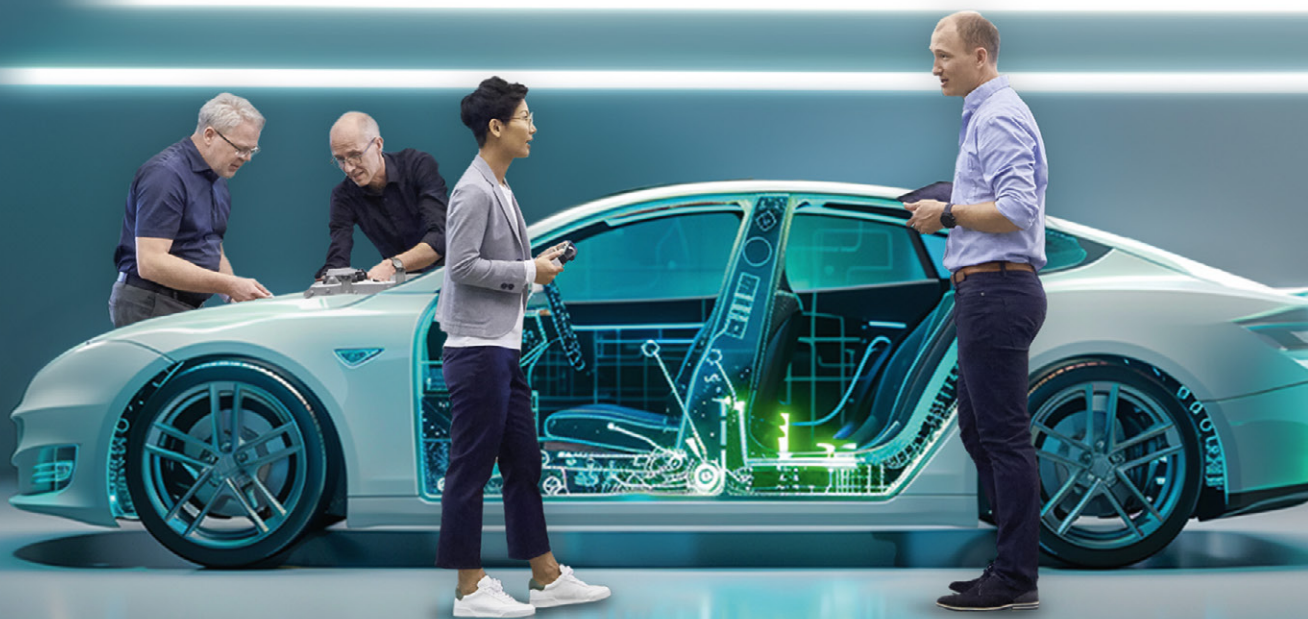
ASAM

Association for Standardization of
Automation and Measuring Systems

Peak Solution GmbH

ASAM ODS data analytics with Python, Notebooks, and AI-Agents

Featured Standard:

ASAM ODS

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SUMMARY

Keeping up with the latest innovations and technology trends can sometimes be difficult from a standards perspective. In the field of data management (ASAM ODS), Python is the "lingua franca" for data analytics and AI tools, while the existing ASAM ODS HTTP API does not seem very practical from a Python perspective.

With ASAM ODSBox, Peak Solution has introduced a lean Python wrapper on top of the ASAM ODS HTTP API that offers ASAM ODS data in a way that the multitude of existing Python analytics libraries and AI tools can be utilized. A user-friendly query language combined with notebook-based examples lowers the entry barrier for using ASAM ODS. Since all of this is available as open source, AI agents such as Google Gemini or Microsoft Copilot can now also be used to gain data-driven insights - even by non-data scientists.

INITIAL SITUATION

In its daily work with OEMs and solution partners, Peak Solution recognized early on the need to use ASAM ODS data for machine learn–ing (ML) and artificial intelligence (AI). A review of the existing ASAM ODS HTML-API revealed that the current interface was not suitable for this purpose. The weak support for Python – the 'lingua franca' of the data scientist – and the very ASAM ODS specific query language make it difficult for data analysts and data scientists to use ASAM ODS. In addition, the missing public examples makes it even more difficult to get the open-source communities interested in the ASAM ODS standard.

SUCCESS STRATEGY / SOLUTION

After realizing and analyzing the problem, the three top-most action items were identified:
- Provide ASAM ODS data in way suitable for Python libraries
- Provide an easy-to-learn and "well-known" query language
- Provide examples for using the ASAM ODS-Box

To address the first topic, ASAM ODSBox introduces Pandas.DataFrames as native data type. DataFrames are supported by all relevant Python analysis and machine learning libraries. Furthermore, DataFrames also work in other toolchains such as Apache Spark – a widely adapted technology stack to handle big data. So, mixing and matching technology stacks as well as accessing other data pools is becoming a no-brainer.

The JSON syntax of MongoDB queries is designed to be intuitive and flexible and was used as a blueprint for the „Json ASAM ODS Query Language" –JAQueL for short. It allows the definition of the respective object, the query expression, the attributes to be returned and also aggregates in a JSON format. Furthermore, JSON is also a perfect solution for Python.
To explain the use of ASAM ODSBox we have combined documentation and active (Python) code in form of Jupyter Notebooks and make them available in our open source Github repository "Data Management Learning Path". With this approach, our sample Notebooks can be easily used in Microsoft Visual Studio Code, GitHub Codespaces and Google Colab – to only name a few.
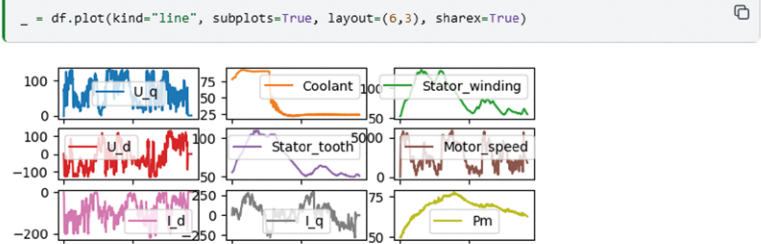

The combination of open source, established standards and HTML documentation brings an additional benefit: Large Language Models can now be trained in such way that AI Agents such as Microsoft Copilot or Google Gemini can help to create data queries or suggest visualizations for plots of ASAM ODS measurement data.

CHALLENGES DURING THE PROJECT

Introducing the typical build and test pipeline in the open source ASAM ODSBox repository requires that all parts of this pipeline are available as open source. In particular, the data content definition files (Google protobuf files – for the experts) used to decode and convert the data to DataFrames were missing. After the situation was explained to the ASAM organization, the issue was quickly resolved by making these files available in the ASAM Github repository.

BUSINESS BENEFITS

The open source ASAM ODSBox Github project offers the possibility to use Python libraries specifically for data analysis and machine learning in combination with ASAM ODS data. These libraries are often free of charge and also well-known by the data communities which offers a high potential in cost and time savings. The introduction of a simple query language

additionally lowers the entry barriers using ASAM ODS and makes it more attractive for data analysts and data scientists, which also lead to better recognition of the ASAM ODS data management standard.

The provision of comprehensive documentation of the ASAM ODSBox in combination with examples lead to the additional positive side effect that AI agents such as Google Gemini or Microsoft Copilot can now also help non-data scientist to gain more insights from the existing ASAM ODS data.

Siemens Digital Industries Software and Peak Solution GmbH

Ready for openness managing NVH test data

Featured Standard:

ASAM ODS

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SUMMARY

Siemens partners with Peak Solution to help BMW Group move from their established data management solution to a more performant, open, and modern data management solution. Siemens introduces Simcenter Testlab Data Management, based on the ASAM ODS standard and the associated NVH application model to enable access to a central and open server-based database, leveraging the value of annotated data. The key benefit of the solution is that thanks to the openness granted by the ASAM ODS standard, the customers can work with any data source, regardless of the suppliers, as it helps manage and retrieve this data.

INITIAL SITUATION

BMW Group's structural dynamics department sought to transition from a proprietary data management system to an open standard alternative that would grant them independence from any specific supplier. The outdated database solution presented various challenges, necessitating a more modern solution. The Simcenter Testlab Data Management solution, based on the ASAM ODS standard, offered the centralized, open-standard database access BMW Group desired. Additionally, they sought a more efficient solution with robust search and advanced data annotation capabilities. The Simcenter Testlab Data Management solution met all these criteria, offering standardization, openness, and supplier independence.

SUCCESS STRATEGY / SOLUTION

The tight integration of the Simcenter Testlab Data Management solution into the engineering tool of Simcenter Testlab is the first key factor of an industrialized solution.

The Simcenter Testlab Data Management solution is based on the ASAM ODS NVH application model, leveraging ASAM ODS standards for data annotation and management. Both companies closely worked together to implement extensions to Siemens' standard test data management solution, managing to fully meet BMW Group's data management requirements.

The extensibility of the ASAM ODS standard allowed Peak Solution and Siemens to seamlessly work together to implement a background process that would integrate data from different vendors into the same structured and open database without modifying the original data. This process enriched the data with labels to make it compatible with Simcenter Testlab, allowing for further data consumption within the engineering tool.

Key extensions were made in permission management and system openness. Advanced permission management features were implemented to enhance data accessibility and security for individuals or groups, considering the complexity of their internal structure.

The successful implementation of this solution relied on the collaboration between Siemens and Peak Solution.

CHALLENGES DURING THE PROJECT

The migration from BMW Group's proprietary database to the ASAM ODS database presented the biggest challenge of all. Due to huge complexities in data annotation in the old data management solution, a data conversion process was implemented to ensure consistency throughout the entire dataset.

To smoothen the transition, Siemens created tools such as data overviews to understand the scope of the data migration and mapping tables to help BMW Group adjust the database for a 100% consistent outcome. Successful outcomes were achieved through top-down support, tireless collaboration with BMW Group, and with a focus on implementing the desired BMW Group data annotation.

The implementation of the Simcenter Testlab data management solution yielded significant business benefits. These included time savings when searching for and comparing historical data, increased flexibility thanks to the openness of the ASAM ODS standard, and improved project quality.

By capitalizing on the value of NVH data, the solution paved the way for strategic process improvements and future technology integration, such as machine learning and virtual prototype assembly.