



AVISTO

EASTERN EUROPE

CASE STUDY

Centralized Platform for Design Validation





Case Study: Centralized Platform for DV



Introduction

The semiconductor industry requires rigorous validation processes to ensure the quality and functionality of silicon and SoC (System-on-Chip) designs.

This case study presents the development of a software project aimed at creating a centralized platform for design validation in the semiconductor industry. The platform provides a Web Interface that seamlessly connects the specification requirements with the verification plans meant to be executed during design validation. It incorporates various validation methodologies, including simulation, automated test equipment, and silicon validation, streamlining the overall validation workflow.



Case Study: Centralized Platform for DV



Project Primary objectives

- Central and unified interfaces to gather product data.
- Rest API to connect any feeding systems.
- Easy monitoring of requirement coverage.
- Simple Audit of requirements, ISO26262 compliance.
- Easy report generation and sharing.
- Migration Path from the existing validation system to the next gen which leverages the advanced functionalities and improved performance offered by the new system. The project aims to ensure a smooth transition and seamless migration of existing data and processes.
- Manual Import of Product Specifications from Excel Sheet: To enhance flexibility and ease of use, the platform allows users to manually import product specifications from Excel sheets. This feature enables quick and convenient data entry, reducing the manual effort required for specification input.
- Integration with Ticketing System: The platform includes a link to submit requests directly to the ticketing system. This integration streamlines the issue tracking and resolution process, ensuring efficient collaboration between validation teams and support staff.



Case Study: Centralized Platform for DV



Key Benefits

The software solution brings several key benefits to the platform, enhancing its usability and performance:

- **Support of Requirement Tracking System:** Project includes a robust requirement tracking system, allowing users to effectively manage and track requirements throughout the validation process. This feature ensures traceability and compliance with design specifications.
- **Performance Driven:** The platform's frontend is optimized for performance, with the initial loading time reduced to less than 5 seconds for brand new projects. This improvement enhances user experience and reduces waiting times during project setup and execution. It is important to note that the previous solution for the same functionality had loading times in hours.
- **Supported Browsers:** The platform is compatible with all major web browsers, ensuring accessibility and usability across different environments and devices.
- **Cache Data Refresh:** To provide real-time and up-to-date information, the platform automatically refreshes cached data. This feature ensures that users always have access to the latest data without manual intervention.



Case Study: Centralized Platform for DV



Key Benefits

- **Automated Sync of Users and Projects:** The platform seamlessly synchronizes user accounts and project data with the existing data Product Data Management system. This integration eliminates manual data entry and ensures consistency between different systems.
- **Native Support of STDF File Format:** The platform natively supports the STDF (Standard Test Data Format) file output generated by the STDF extractor. This compatibility allows for seamless data exchange and analysis with other validation tools and systems.
- **Data Export:** The platform offers the capability to export data using a Rest API. This integration enables seamless data transfer and synchronization between the validation platform and other downstream processes flow.
- **Flexible Temperature Profiles:** The platform has no limitation on the number of temperature profiles that can be used during the validation process. This flexibility allows for comprehensive testing across a wide range of temperature conditions.





Case Study: Centralized Platform for DV



Key Benefits

- **Customizable Coverage Methods:** In addition to a fixed set of coverage methods, the platform offers the flexibility to include custom coverage methods. This customization capability ensures that the validation process aligns with specific project requirements and industry standards.
- **Preferences and Customization Options:** The platform provides numerous preferences and customization options to tailor project setup and the overall user interface according to individual user preferences. This feature enhances usability and user satisfaction.
- **SOC/IP Mapping Management:** The platform includes comprehensive SOC/IP mapping management features, such as the ability to track items in the Bill of Materials (BOM) and map SOC/IP items to IP projects. This functionality streamlines the management and organization of complex designs.
- **Coverage Matrix:** The platform incorporates a coverage matrix feature, allowing users to analyze and evaluate the validation coverage across different parameters. This capability provides a comprehensive view of the validation status and helps identify any potential gaps.
- **Multiple Test Suite Report Selection and Comparison:** Users can select and compare multiple test suite reports within the platform. This feature enables comprehensive analysis and facilitates decision-making based on the comparison of different test results.



Case Study: Centralized Platform for DV



Key Benefits

- **Advanced Search Capabilities:** The platform offers powerful search capabilities within the reporting modules. Users can efficiently search and retrieve specific data, enabling quick access to relevant information for analysis and troubleshooting.
- **Support for New Types of Reports:** The platform introduces support for additional report types, including AMS top cell reports, generic reports for functional verification, and product final test reports. This expanded reporting capability enhances data analysis and facilitates comprehensive validation reporting.
- **Project Backup and Deletion:** The platform includes features for project backup and deletion. These features provide data protection and ensure the ability to recover or remove projects as needed, enhancing data management and maintenance.
- **Tool Preferences for Application Customization:** The platform introduces new tool preferences, allowing users to customize various aspects of the application. These preferences include settings for project setup, look and feel, and other application-specific configurations.





Case Study: Centralized Platform for DV



Architecture and Technologies

The software project adopts modern and scalable architecture, utilizing a combination of frontend and backend technologies to deliver a high-performance platform and leverages cutting-edge technologies to ensure scalability, performance, and robustness.

The backend is developed using **TypeScript** programming language and utilizes the **Node.js** runtime. The NestJS framework provides a solid foundation for building scalable and maintainable server-side applications.

The project utilizes **TypeORM** as the **Object-Relational Mapping** (ORM) tool for seamless integration with the **MySQL 8** database. Advanced code optimization techniques and design patterns are employed to handle large datasets, which can be measured in terabytes in the context of semiconductor industry data.





Case Study: Centralized Platform for DV



Frontend

The frontend of the platform is developed using TypeScript programming language and leverages the popular **React library** and **Redux Toolkit** to optimize rendering performance and manage state efficiently.

React is a powerful JavaScript library for building user interfaces. It provides a component-based architecture that promotes **reusability, modularity**, and a **declarative approach to building UI** components. React efficiently updates and renders only the necessary parts of the user interface, resulting in improved performance and responsiveness.

Redux Toolkit is a library that simplifies the management of application state in a Redux-based application. It provides a set of opinionated tools and utilities to **reduce boilerplate code, streamline development workflows, and optimize performance**. Redux Toolkit includes features such as the defining action, reducers, handling asynchronous actions, and creating a Redux store with built-in middleware and dev tools integration.

The combination of React and Redux Toolkit in the frontend **architecture ensures efficient rendering and state management**, leading to a smooth user experience and improved performance in the platform's web interface.





Case Study: Centralized Platform for DV



Backend

On the backend, the software project utilizes TypeScript programming language, the Node.js runtime, and the NestJS framework to build a scalable and maintainable server-side application. Node.js is a JavaScript runtime that enables the execution of JavaScript code on the server-side. It provides **an event-driven, non-blocking I/O model**, which allows for **high concurrency and scalability**, making it well-suited for handling large amounts of concurrent requests.

NestJS is a progressive Node.js framework for building efficient, reliable, and scalable server-side applications. It follows the modular architecture pattern and uses decorators, dependency injection, and TypeScript to enhance code **readability, maintainability, and testability**. NestJS also offers a wide range of built-in features, such as middleware, routing, authentication, and database integration, which expedite development and ensure consistent coding standards.

In terms of data storage, the project employs the TypeORM library, which is an Object-Relational Mapping (ORM) tool. TypeORM provides an abstraction layer that simplifies database interactions and allows developers to work with databases using TypeScript classes and objects. For data storage, the project utilizes the MySQL 8 database, known for its reliability, performance, and scalability.

The use of TypeScript, Node.js, NestJS, TypeORM, and MySQL 8 in the backend architecture **ensures efficient data storage, retrieval, and processing, even when dealing with large datasets measured in terabytes.**



Case Study: Centralized Platform for DV



Results: Performant and reliable platform

By employing a **frontend architecture** based on **React and Redux Toolkit**, the software project ensures efficient rendering and state management, leading to improved performance and a responsive user interface. The combination of these technologies allows for **reusable and modular UI components, optimized rendering, and streamlined state management**.

On the **backend**, TypeScript, Node.js, NestJS, TypeORM, and MySQL 8 collectively provide a robust foundation for building a **scalable and maintainable server-side application**. These technologies enable efficient data storage, retrieval, and processing, meeting the demands of the semiconductor industry where large datasets are common.

Together, the frontend and backend technologies work in harmony to create a **performant and reliable platform for digital validation of silicon IP and SoC**, enhancing the overall user experience and productivity of validation teams in the semiconductor industry.





Case Study: Centralized Platform for DV



Conclusion

This case study has illustrated the development of a software project for the creation of a centralized platform dedicated to the digital validation of silicon IP and SoC in the semiconductor industry.

By implementing the Scrum methodology, the project successfully achieved its objectives. The resulting platform offers numerous benefits such as enhanced performance, comprehensive validation capabilities, flexible customization options, and seamless integration with various tools and systems.

The adoption of modern technologies and development practices ensures the platform's scalability, reliability, and ability to handle large datasets typically encountered in the semiconductor industry.



LET'S CONNECT!

Milos Milutinovic

Regional Director

@AVISTO Eastern Europe

milos.milutinovic@avisto-eastern.com



*Where passion
leads to excellence*

ABOUT US

AVISTO Eastern Europe

AVISTO Eastern Europe is a service provider that focuses on empowering Industrial automation and Semiconductor projects by offering tailored made solutions in areas of Embedded Systems, Test Automation, Application Software and DevOps.

Established in 2007, AVISTO currently operates three design centers in Serbia and boasts a strong network of experienced engineers empowered by high level of technical adaptability to meet the specific requirements and demands of clients' projects.

As a French company and a member of the Advans Group, which comprises over 1000 engineers, AVISTO can deliver comprehensive product-based development support to clients at the enterprise level.

THANK YOU

