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INCISIVE ENTERPRISE SCENARIO BUILDER INCREASES VALUE AND VERIFICATION IP REUSE

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Developing and deploying verification intellectual property (VIP) products pose many challenges to corporate R&D organizations, whether such VIP is produced internally or procured from a third party. As verification has swiftly grown to account for more than 70% of the overall design process, VIP has emerged—along with its underlying methodologies such as constrained-random stimulus generation, self-checking, and total coverage measurement—as a mission-critical technology that will match the levels of reuse and efficiency that enable IP-based design. Just like design IP, VIP needs to be self-contained, all-encompassing, interoperable, modular, and plug-and-play. However, even more so than for design IP, VIP must be user friendly, easy to comprehend and operate, extremely configurable, and highly customizable. All are important but, unfortunately, conflicting requirements.

Incisive® Enterprise Scenario Builder, the latest addition to the Cadence® Incisive functional verification platform, effectively addresses some of these issues by enabling enhanced visibility, better ease-of-use, and increased productivity. Cadence and Globetech Solutions collaborated during the development and quality assurance stages of Scenario Builder to ensure that the perspective of the VIP provider and user are strongly represented in the final product.

In this article, we discuss the clear advantages Scenario Builder offers to the VIP ecosystem, as well as how VIP providers can leverage Scenario Builder to extend benefits to the end user.

SCENARIO BUILDER: WHAT IS IT?

Scenario Builder is a graphical user interface (GUI)-based product that can be used to create reusable stimulus and test cases on top of an existing Incisive Enterprise Specman Elite® verification environment. It visualizes the verification environment and its components in a single window organized into frames, each focusing on a different area of the verification environment. The user employs the GUI to select the collection of data items or sequences displayed to describe the kind of stimuli required in a test or sequence. Thus, Scenario Builder enables the creation of useful scenarios, such as sequences or tests, using advanced VIP without the accompanying learning curve necessary to master Specman or *e* language.

The target user of Scenario Builder is a test writer—someone who needs to create scenarios for verifying a block, module, or system. Test writers can be the end users of the VIP or members of the VIP development team. VIP end users need to create scenarios that will be applied to a device under test to meet verification objectives or functional coverage goals. VIP development teams need to build sequences and tests, not only for testing the VIP and ensuring quality standards, but also to deliver sequence libraries and test examples with the final VIP product.

LEVERAGING THE ADVANTAGES OF SCENARIO BUILDER WHEN DEVELOPING AND DEPLOYING VIP

FASTER AND EASIER VIP DEPLOYMENT

Perhaps one of the most exciting benefits offered by Scenario Builder is the speed and ease of deploying new VIP. Once the VIP is imported into the verification environment, users of all levels of verification language literacy can immediately benefit from enhanced visibility into the VIP's capabilities at a high level:

- Sequence drivers that can participate in a test
- Scenario elements of each sequence driver that can participate in a scenario (including sequences, items, and events)
- Available sequences organized into sequence libraries
- User-constrainable fields for any struct/unit
- Short in-line help messages for all of the above, minimizing the need to reference the User Guide as well as any ambiguities resulting from its reference

Equipped with these tools, users are able to better conceptualize the capabilities of the VIP and start composing complex tests instantly. Furthermore, design engineers with no working knowledge of *e* or the VIP can construct test cases without needing to rely on verification engineers or undergoing a steep learning curve.

ENHANCED EASE-OF-USE

Using Scenario Builder's GUI, which allows for visual creation of scenarios, *e*-expert and non-expert users alike can quickly and efficiently create tests ranging from simple sequences of input stimuli all the way to highly complex multi-channel flows using multiple VIPs. Both VIP users and developers benefit from this user-friendly approach, which allows access to the advanced verification methodologies available in the VIP while almost removing the upfront time investment in training that authoring tests in a new and complex verification environment would otherwise impose.

Because the verification environment is visualized in a single window, scenario creation is as simple as dragging and dropping scenario elements from the Elements frame to the Scenario Edit frame. From the VIP developer's point of view, scenarios should be considered part of the deliverable VIP and incorporated into the VIP package.

VIP developers should be concerned with providing a uniform experience to VIP users. Conversely, VIP users are concerned about interfacing to a multitude of VIP environments in a flexible and configurable way. Scenario Builder offers a common portal that supports developers by allowing them to better understand and meet the user's needs. This common portal also serves to demonstrate the qualities of the VIP during the user's evaluation and helps ensure that both parties' expectations are clearly aligned.

e Reuse Methodology (*e*RM) guidelines ensure uniformity at the architectural, packaging, messaging, and documentation levels by focusing on the reusability of VIP. Although these are necessary requirements to maximize reuse and interoperability, they do not offer uniformity at the user-interface level of the verification environment. Scenario Builder's GUI enhances the visualization of the verification environment and provides the basis for a uniform user experience for all VIP, even when they are sourced from different providers.

IMPROVED SUPPORT FOR VIP

Scenario Builder can also be used to improve technical support for the VIP user. For example, by exchanging Scenario Builder setup and scenario definition files, both the user and the support team will more fully comprehend the intended functionality, thus greatly facilitating support for the end user. This higher level of interaction also allows the VIP support team to provide direct support to non-experts, such as design engineers who are unfamiliar with the VIP's verification language constructs or verification engineers who are not up to speed with the VIP's targeted standard, interface, or interconnect.

Leveraging the enhanced visualization capabilities offered by the GUI, new efficiencies emerge in the support cycle such as enabling online Scenario Builder-based collaboration, which leads to much quicker and more efficient support resolutions.

Finally, a better support experience will also emerge from the extra requirement that VIP developers will impose on user interfacing to ensure full controllability and configurability of the VIP from Scenario Builder. Encrypted code, for example, is a typical IP protection technique and a common point of contention between VIP support teams and users. In order to truly leverage the advantages of Scenario Builder, VIP developers will need to spend the extra time necessary to ensure that all the capabilities users need in order to operate the VIP are not only visible, but also sensibly selected and well documented.

PROCESS-DRIVEN QUALITY ASSURANCE FOR VIP

Using Scenario Builder internally as part of the VIP development flow can lead to significant improvements in overall productivity and quality assurance procedures.

At Globetech Solutions, we extended our internal VIP development procedures to include guidelines targeted at an enriched user experience under Scenario Builder. VIPs that embody these guidelines are optimized for use with Scenario Builder, which improves the visibility into the environment, in-line documentation, sequence, and driver addressing. Furthermore, setup and scenario definition files used for our own development and quality assurance cycles will soon begin shipping as standard deliverables, providing customers with even more productivity gains.

For VIP developers, using Scenario Builder to reduce the time needed to visualize, comprehend, and produce scenarios for testing VIP also shortens the time needed to reach quality assurance objectives, leading to faster, better quality assurance cycles. Furthermore, quality assurance teams for new VIP can now include non-verification technology experts, removing the bottleneck from the verification team. With VIP optimized for Scenario Builder, all engineers—whether they be verification or test experts—will be able to share designs and manipulate VIP however necessary to fulfill their needs.

CONCLUSIONS

Not only is Incisive Enterprise Scenario Builder a tremendous productivity enhancer, but it significantly facilitates VIP-based verification process automation by providing a user-friendly and language-agnostic interface foundation. Therefore, it helps address numerous challenges facing the VIP ecosystem, ranging from ease of integration all the way to product support. Companies that deploy VIP with Scenario Builder in their verification environments will benefit from increased engineering efficiency, enhanced reuse, and improved overall quality of result. In the end, the real winners are the end users.