SYNOPSYS®

Synopsys and IntelliProp

VC Verification IP for NVDIMM-P, Verdi and VCS Help IntelliProp Meet Aggressive Design Schedule for Memory Controller

"The integration of Synopsys VC VIP, Verdi and VCS was seamless. This combination of solutions allowed for a more enhanced user experience and helped us to accelerate our design schedule and meet our design goals."

~Hiren R. Patel, VP, Business Development, IntelliProp

Business

IntelliProp is a leading provider of IP cores and ASSP products for targeted memory and storage companies. IntelliProp's focus on storage, with increased emphasis on flash-based technologies, has helped them expand IP core expertise into areas such as NAND interfaces, ECC, encryption, Flash Controllers and RAID.

Challenges

- Acquire a verification solution to meet an aggressive design schedule and deliver high-performance server systems-on-chips (SoCs)
- Ensure IP testbench bring-up in 24 hours
- Get two UVM-based models, exercising two different protocols, to work together seamlessly in a single environment for NVMe chip level verification
- Enable use of a 3rd party simulator with Gen-Z chip level verification platform

Synopsys Verification Solutions

- VC Verification IP (VIP) for NVDIMM-P
- VCS® Simulator
- Verdi® Debug

Benefits

- Ease-of-use enabled delivery against an aggressive time-to-market schedule
- Seamless integration of VIP with Verdi Debug and VCS accelerated verification environment setup
- VIP complied with latest JEDEC specification updates
- Enabled a scalable and reusable UVM verification environment
- First design bugs were flagged within an hour of connecting the VIP

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Overview

IntelliProp, founded in 1999, provides ASIC design and verification services for the storage industry. IntelliProp devices have applications in a multitude of customer products that require interfacing to memory and storage devices, including traditional Hard Disk Drives (HDD), Solid State Drives (SSD) and Multi Media Cards (MMC).

IntelliProp's stringent design requirements to develop an NVDIMM-P memory controller product prompted them to select a high-quality, high-performance verification IP solution that supports custom requirements. They invested in Synopsys as a trusted provider, to help ensure compliance with the latest specification and provide an enhanced user experience. With Synopsys' VC VIP for NVDIMM-P, IntelliProp was able to achieve first-test success in less than an hour, integrate their IP in one week, and accelerate time-to-market by a month.

Industry-Leading Verification Solutions

Intelliprop's project had three phases and integrated multiple verification solutions, including third-party software. The first phase used Synopsys VIP for NVDIMM-P with firmware running on an embedded microprocessor, Synopsys VCS simulator and Verdi for waveform/debugging. For verification closure tracking, Synopsys' VIP provided a built-in coverage model, including CMDs, state transition, MR settings, configuration, and checkers. Intelliprop's objective in phase one was to inject errors, manipulate delays, and reorder the data on reads, which were all successfully completed.

Phase two added complexity and included verification setup at the NVMe chip level. Intelliprop continued to use Synopsys VIP for NVDIMM-P, in combination with a third-party UVM based NVMe BFM model and simulator. Leveraging Synopsys design examples and emulating script changes enabled IntelliProp to execute full chip-level simulations, which is a substantial benefit when integrating new protocols into full demonstration-ready systems.

Phase three of the project was at the Gen-Z chip level, which was a simpler integration due to the use of an in-house Gen-Z BFM model. For this configuration the main concern was enabling use of a third-party simulator, which was supported without significant effort as Synopsys VIP includes repositories for code that is designed for a variety of simulation tools.

The seamless integration of Synopsys solutions and the ability to integrate with third-party tools enabled Intelliprop to quickly setup their verification environment and achieve first test pass within hours. Synopsys VIP integration with Verdi debug was also essential for finding bugs quickly. The rich set of protocol and timing checks with detailed error messages reduced development time considerably and enabled the ability to introduce delays and error injection within the VIP model to exhaust any latent issues.

Expert and Responsive Technical Support

To meet an aggressive time-to-market schedule and handle a changing specification, IntelliProp relied on Synopsys' expert verification support team. The success at IntelliProp proves the quality, maturity, and robustness of Synopsys Verification IP, VCS, and Verdi.

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