Synopsys Helps Advance IBM's Vision of 1,000 Times Improvement in AI Compute Performance during the Coming Decade

Collaboration with IBM Research's AI Hardware Center Addresses the Challenges of Developing New AI Chip Architectures with Innovative Design Methodologies

MOUNTAIN VIEW, Calif., Oct. 21, 2020 /PRNewswire/ --

Highlights:

- Unique IBM collaboration leverages Synopsys as lead EDA and IP partner for IBM's AI Hardware Center; silicon verification and demonstrable performance improvements already achieved
- Synopsys delivers design, verification and IP solutions, and technical expertise focused on developing new AI-specific hardware architectures
- Cross-industry partners addressing key technology challenges to achieve performance scaling and power efficiency necessary to expand AI use across a wide range of applications and use cases

Synopsys, Inc. (Nasdaq: SNPS) today announced the latest stages in its ongoing collaboration with IBM Research's AI Hardware Center to advance the development of chip architectures and design methodologies critical to the next generation of AI chips. Synopsys is working closely with IBM to implement the latest AI Hardware Center technologies in full chip solutions, which could be commercialized in the near future. Their unique collaboration was established last year, leveraging the rich expertise of IBM's renowned research organization, and combining the efforts of multiple commercial partners, as well as academic and government entities that support the initiative.

The overarching goal of the work with IBM is to achieve a continued trend of annual doubling of the AI compute performance for a decade or more. To do this, the companies are working together to redesign hardware with AI specifically in mind, with a vision of expanding the use of AI to solve more problems in business and the world in general. This work includes developing new computing accelerators, technologies, and architectures designed and optimized specifically for AI computation.

"Together, AI and hybrid cloud will play a critical role in the next generation of enterprise computing and scaling AI, with new hardware solutions as part of a wider effort at IBM Research to envision and realize What's Next in AI," said Mukesh Khare, Vice President, Hybrid Cloud, IBM Research. "To achieve this, we need to build a new class of AI hardware accelerators that increase compute power without the demand for more energy. Additionally, developing new AI chip architectures will enable companies to dynamically run large AI workloads in the hybrid cloud. Synopsys' unmatched breadth of experience and technical offering is an extremely valuable asset in this effort."

The AI Hardware Center has achieved several tapeouts and test chips of designs targeting advanced process manufacturing nodes, supporting its aggressive roadmap. Part of the roadmap to reach 1,000x performance improvement by 2029 was the delivery of AI processor cores that improve performance by 2.5x each year; IBM Research realized a gain of twice that in its first year.

Synopsys' participation, which includes both technology and engineering personnel collaborating with the IBM researchers, focuses on addressing several of the key challenges in complex AI chip design, verification and manufacturing. Specifically, Synopsys brings expertise in three main areas:

- **Multi-die integration in a package, silicon design and verification**, with Synopsys 3DIC Compiler, Fusion Design Platform™ and Verification Continuum® Platform, which include the use of state-of-the-art functional verification, prototyping and emulation systems that address the size and scale of the designs being developed, and support for hardware and software co-design and co-analysis methodologies.
- **Silicon engineering,** provides software to address critical manufacturing and yield challenges introduced by leading-edge process technologies such as the use of novel materials, gate-all-around 3D stacked architectures, and source and mask creation for EUV technology. Our Design Technology Co-Optimization (DTCO) solution combines our capabilities to provide more options and help achieve global optimality.
- **Silicon IP,** which addresses the processing, memory performance and real-time connectivity requirements of AI chips, providing a broad portfolio of silicon-proven DesignWare® IP such as LPDDR5 and PCI Express® 5.0 for a wide array of applications.

"This a unique opportunity for Synopsys to be part of a collaborative effort that connects the entire semiconductor value chain,"

said Arun Venkatachar, Vice President, Artificial Intelligence and Central Engineering at Synopsys. "To realize IBM Research's vision, the AI hardware being designed requires a fundamentally new approach, which needs innovative strategies – from tools, to IP, to workflows and manufacturing. Our involvement with the AI Hardware Center provides a platform for us to help drive the future of AI chip design with a synergistic partner."

Read more about Synopsys' collaboration with the IBM Hardware Research Center:

- Synopsys blog
- IBM blog

About Synopsys

Synopsys, Inc. (Nasdaq: SNPS) is the Silicon to Software™ partner for innovative companies developing the electronic products and software applications we rely on every day. As the world's 15th largest software company, Synopsys has a long history of being a global leader in electronic design automation (EDA) and semiconductor IP and is also growing its leadership in software security and quality solutions. Whether you're a system-on-chip (SoC) designer creating advanced semiconductors, or a software developer writing applications that require the highest security and quality, Synopsys has the solutions needed to deliver innovative, high-quality, secure products. Learn more at www.synopsys.com.

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